

HSWA LANL G/m/CGF

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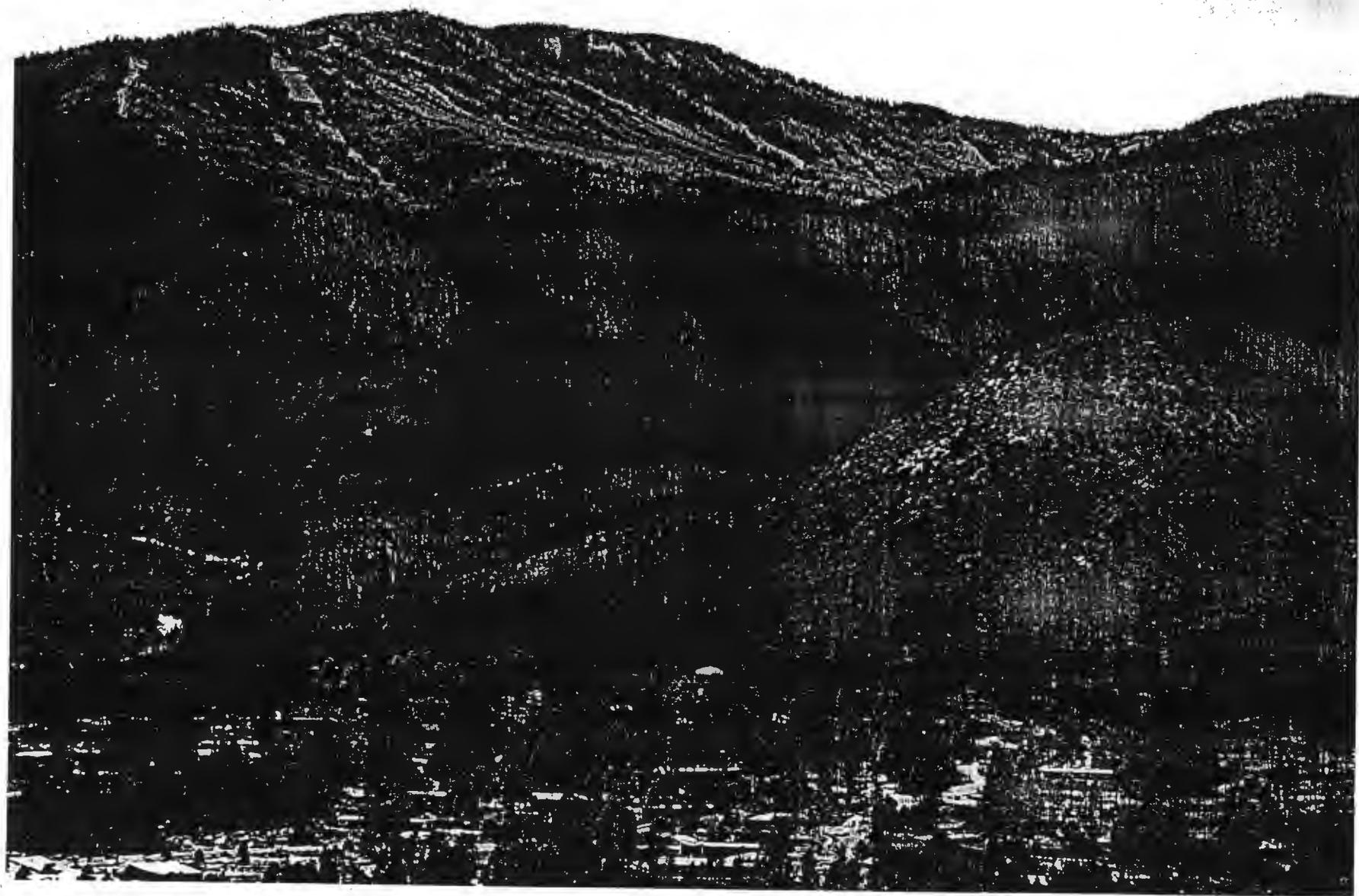
5/1/2000

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MAY 2000

TV











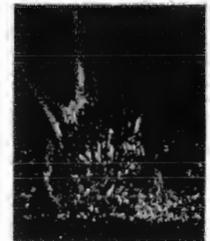


Objectives of BAER

- Threats to human life and safety or property
- High Water
- Sediment
- Debris Flows



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Objectives of BAER

- Loss or Degradation of Site Productivity
- Raindrop Impact
- Running Water
- Wind



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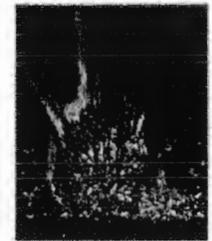


Objectives of BAER

- Unacceptable Degradation of Critical Cultural & Natural Resources
- Irreversible Loss of Native Vegetation
- Threats to T & E Species
- Threats to Critical Cultural Resources



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BAER Team

Interagency

BIA

BLM

DOE

LANL

NPS

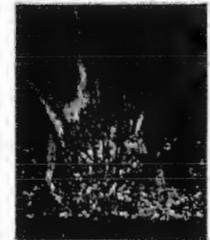
NRCS

USFS

USFWS



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Interdisciplinary

- Hydrologist
- Geologist
- Soil Scientist
- Archeologist
- Wildlife Biologist
- Forester
- Vegetation Specialist
- Engineer
- Environmental Protection Specialist
- Geographic Information Specialist
- Computer/Documentation Specialist
- Photographer
- Operations Specialist
- Landscape Architect
- Contracting Specialist
- Public Affairs Specialist
- Team Leader



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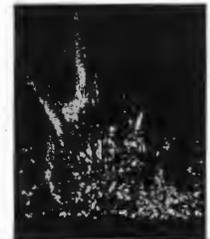
WATERSHED ASSESSMENT

OBJECTIVES

- **Locate the most critical soil and watershed areas and issues related to the Cerro Grande Fire and prescribe treatments to mitigate risks.**
- **Develop maps of watershed burn severity, erosion and debris flow potential, and areas to be treated.**
- **Estimate potential flooding in Los Alamos Canyon and other downstream areas that will receive runoff from the fire.**
- **Assess overall watershed changes from the fire, particularly those that pose substantial threats to human life, property, and critical natural and cultural resources. This includes evaluating changes to soil productivity, hydrologic function, and watershed response to precipitation events.**



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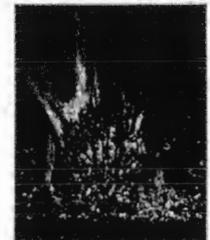
WATERSHED ASSESSMENT

OBJECTIVES

- **Assess potential erosion from headwaters and channels in severely burned watersheds.**
- **Assess fire-related runoff and sedimentation in Santa Clara Canyon: two fish ponds, two stock ponds, a campground and an irrigation inlet potentially at risk of storm impacts.**
- **Assess runoff and debris-related damage to utility lines, a transformer station, and a well at the confluence of “Siouyacongae” Canyon and Santa Clara Canyon.**
- **Assist archaeologists with mitigating surface flow around burned archaeological sites.**
- **Identify future assessment or analysis needs.**



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ISSUES

- Greatly increased potential for storm flow runoff and flooding, particularly in watersheds with a large percentage of high burn severity.
- Threats to human life and property from floods and debris flows in burned watersheds (see Watershed Vulnerability Map in appendix).
- Threats to infrastructure and waste/contaminant sites in canyons subject to fire-related floods and debris flows.
- Threats to vegetative productivity in moderately to severely burned areas due to loss of ash, soil, and other nutrients.



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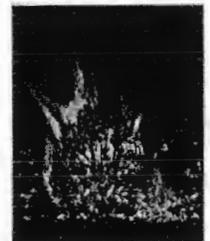


ISSUES

- Threat of large-scale erosion of headwaters and canyon bottoms in burned watersheds.
- Threats to water quality, specifically from sedimentation and contaminants, in the lower reaches of burned watersheds.
- Threats to archeological sites from overland runoff in burned watersheds.
- Treatment limitations for flood protection.



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OBSERVATIONS

GREATEST RISK IS IN WATERSHEDS WITH HIGH AMOUNTS OF HIGH AND MEDIUM BURN SEVERITY.

Burn Severity	Acres	Percent
High	14,511	34
Moderate	3,323	8
Low	25,035	58
Total	42,869	100

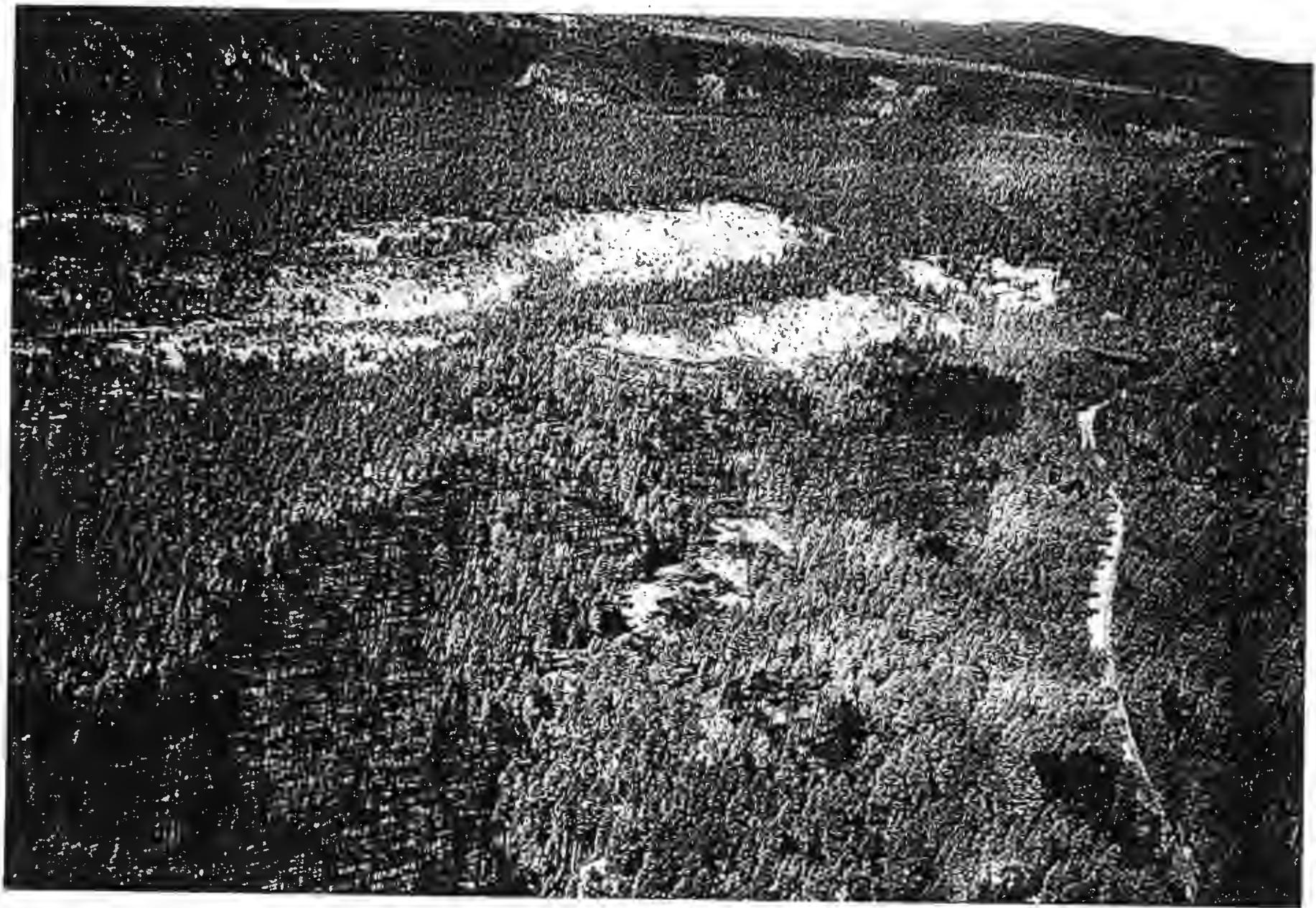


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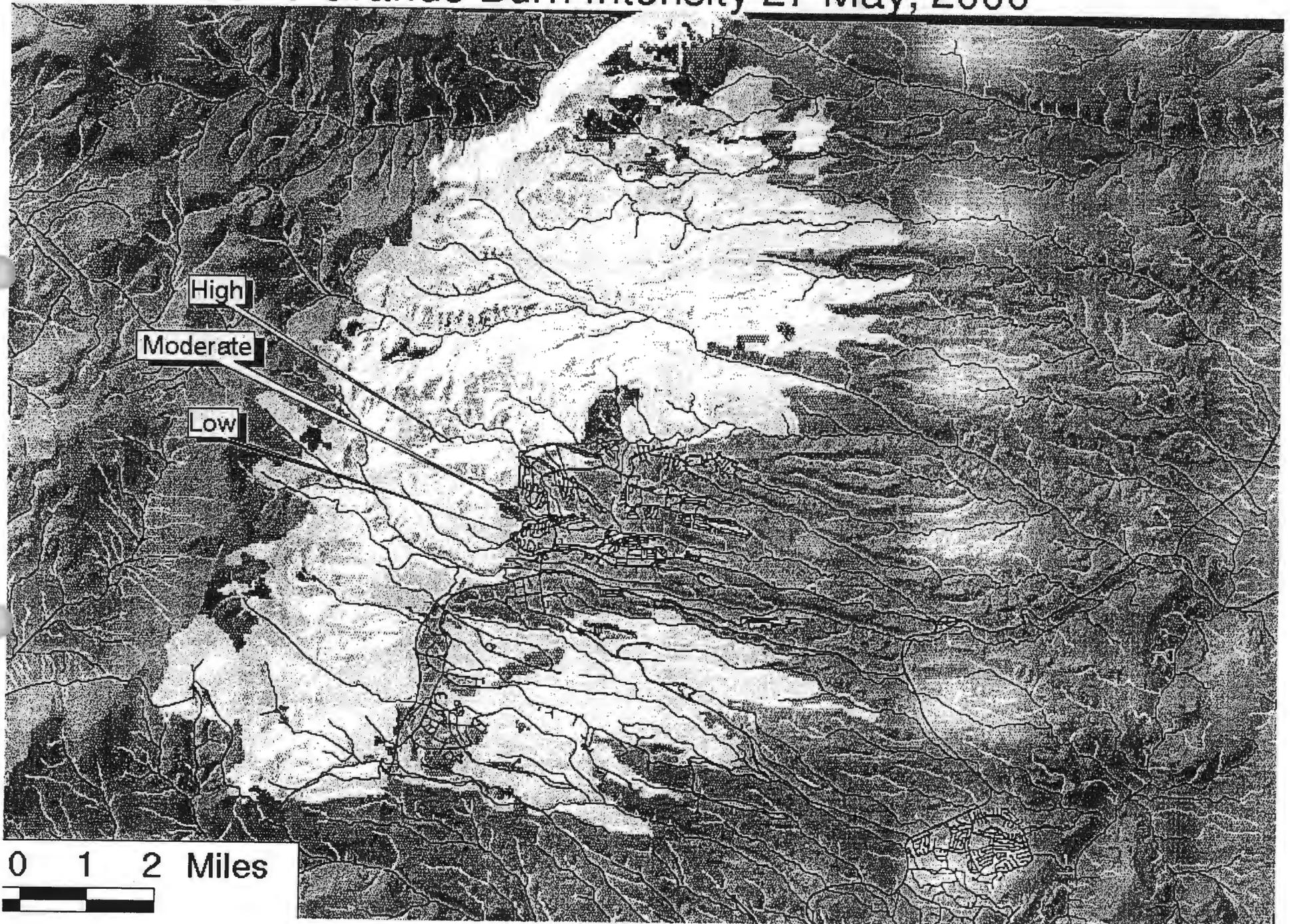








Cerro Grande Burn Intensity 27 May, 2000

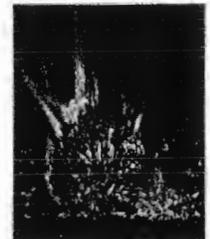


HOW DO WE KNOW?

- LOW LEVEL MAPPING
- FIELD REVIEW
- BURN SEVERITY MAP
- IDENTIFICATION OF INFRASTRUCTURE AND FACILITIES AT RISK
- SELECTION OF DESIGN STORM
- MODELING OF PRE-FIRE STORM FLOW
- ESTIMATION OF STORM FLOW REDUCTION POTENTIAL W/ BAER TREATMENTS
- PEER REVIEW



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WHAT IS AT RISK?

■ CULVERTS

■ DIAMOND STREET FILL BRIDGE

■ STORM FLOW DRAINAGE-NORTHWEST SIDE OF LOS ALAMOS

■ RENDIJA CANYON ROAD CROSSING AND SUBDIVISION NEAR GUAJE PINES CEMETERY.

■ WELL PUMPING STATION AND ROADS 57 AND 442 DOWN GUAJE CANYON.

■ SEWAGE TREATMENT PLANT INFLOW PIPES AND SEWAGE MAINLINE PIPE ALONG STREAM BOTTOM OF PUEBLO CANYON.

■ MULTIPLE LANL RESEARCH FACILITIES ALONG STREAM BOTTOMS INCLUDING TA-41 IN LOS ALAMOS CANYON AND TA-18 AT THE CONFLUENCE OF PAJARITO AND THREE MILE CANYON.

■ MULTIPLE SANTA FE NATIONAL FOREST ROADS BELOW GUAJE CREEK AND CARCIA CANYON.

■ MULTIPLE CULTURAL RESOURCE SITES IN ALL JURISDICTIONS.



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WHAT WE MODELED?

- 2-YEAR 1-HOUR EVENT 1.1 INCHES
- 25-YEAR 1-HOUR EVENT 1.9 INCHES
- 100-YEAR 1-HOUR EVENT 2.3 INCHES



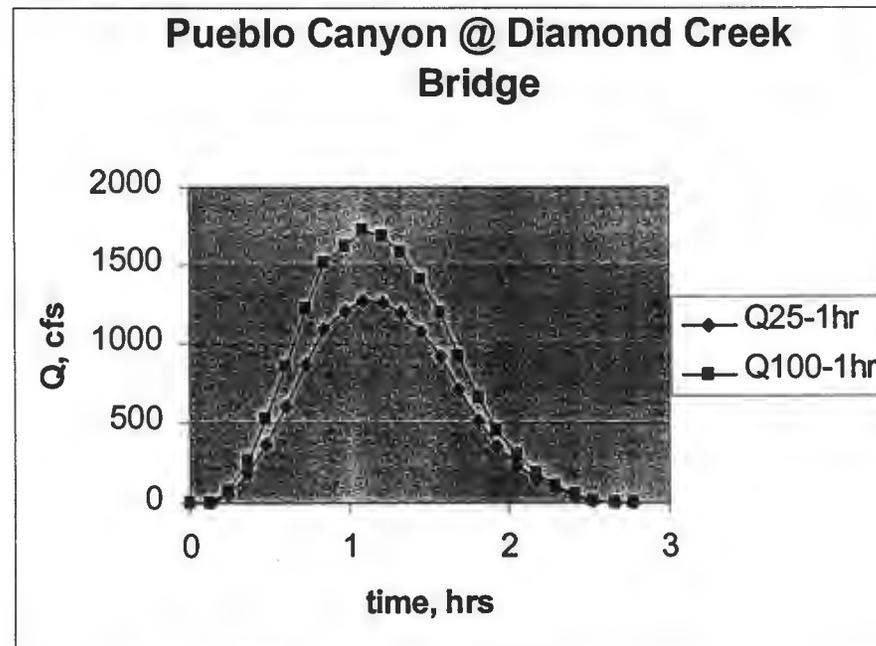
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FOR EXAMPLE:

DIAMOND STREET FILL BRIDGE

- 25-YEAR, 1-HOUR EVENT UNBURNED = 9cfs
- 2-YEAR, 1-HOUR EVENT BURNED = 494cfs
- 25-YEAR, 1-HOUR EVENT BURNED = 1278cfs
- 100-YEAR, 1-HOUR EVENT BURNED = 1711cfs



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UPSLOPE TREATMENTS

- 30% REDUCTION OF RISK AT THE BRIDGE
- THE COUNTY IS WORKING TO REDUCE IMPACTS BY PUTTING A 6-FT CULVERT IN PLACE.
- EVACUATION PLANS BASED ON AN EARLY WARNING NETWORK WILL REDUCE MORE OF THE RISK



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SEE WATERSHED TREATMENT MAP

SIMILAR PLANS HAVE BEEN MADE FOR OTHER KEY FACILITIES

PRIORITY WATERSHEDS

NORTH CERRO GRANDE

HIGH PRIORITY

- PUEBLO CANYON
- GARCIA CANYON
- SAWYER CANYON

MODERATE PRIORITY

- SANTA CLARA CANYON
- RENDIJA CANYON

SOUTH CERRO GRANDE

HIGH PRIORITY

- LOS ALAMOS
- PAJARITO CANYON

MODERATE PRIORITY

- WATER CANYON



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LANL Assessments

- Teams
 - LANL/BAER personnel (advisory role)
 - Watershed/Hillslope
 - Wildlife
 - Cultural

Watershed Assessments

- Objectives
 - Assess burn severity on LANL property.
 - Recommend treatments to mitigate adverse hydrologic conditions.

Watershed Assessments

- Issues/Recommendations
 - LANL lands will not contribute significantly to peak flows.
 - Protect structures from flooding.
 - Road crossing improvements.
 - Floodwater detention.
 - Protection of utility lines.

Watershed Assessments

- Issues/Recommendations
 - Protection of monitoring wells.
 - Diversion of floodwaters.
 - Runoff reduction

Wildlife Assessments

- Objectives
 - Assist BAER team in preparing wildlife resource assessment and conducting emergency consultation with USFWS on effects of fire, suppression, and emergency rehabilitation on threatened and endangered species.

Wildlife Assessments

- Progress
 - Imagery interpretation to estimate amount of T&E habitat lost/damaged by fire and suppression.
 - Ground surveys of fire damage in LANL T&E habitats; report preparation.
 - USFWS consultation completed for fire and related activities to date.

Wildlife Assessments

- Conclusions/Recommendations
 - Adverse effects from fire on T&E species.
 - Additional emergency rehabilitation actions proposed on LANL after 5/31 will require a reinitiation of consultation with USFWS if there is a potential to affect T&E species.

Cultural Assessments

- Objectives

- Assess condition of cultural resources and mitigate effects of fire.

Cultural Assessments

- Conclusions/Recommendations
 - 519 recorded sites within the burn perimeter.
 - Many new sites being recorded.
 - Effects of suppression activities.
 - Assess and mitigate impacts.

Interagency BAER Team

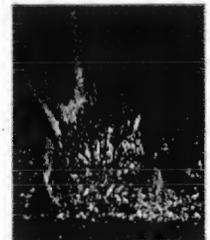
Forest Resources Assessment

Issues:

- (1) Hazard Trees**
- (2) Reestablishment of forest cover within forest stands**
- (3) Salvage of fire killed timber**
- (4) Long-Term effect on forest health**



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Observations

■42,878 acres within perimeter of Cerro Grande fire

■7 ownerships:

Bandelier N.M.

Santa Clara Pueblo

Santa Fe N.F.

Private Lands

Los Alamos N.L.

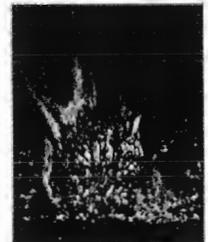
County Lands

San Ildefonso Pueblo

Each agency has own plan for managing the land creating complexity in this assessment.



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<i>Vegetation Type</i>	<i>Bandelier N.P.</i>	<i>Los Alamos National Lab</i>	<i>Santa Fe National Forest</i>	<i>San Ildefonso Pueblo</i>	<i>Santa Clara Pueblo</i>	<i>Private lands</i>
Aspen	16	0	1,177	0	28	105
Mixed Conifer	417	5	6,196	0	3,030	91
White Fir	0	12	657	0	4	4
Ponderosa Pine	344	3,479	13,837	155	3,102	877
Pinyon/ Juniper	0	1,385	2,613	137	335	574
Montane Grass	51	1,386	330	0	33	281
Grass Shrub	0	754	57	0	0	115
Oak	0	0	716	0	50	7
Other	0	381	18	0	99	0
TOTAL	828	7,402	25,601	292	6,681	2,054



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	<i>Underburn</i>	<i>Mosaic Burn</i>	<i>Stand Replacement</i>	<i>TOTAL by Agency</i>
Bandelier N.P.	0	761	67	828
Los Alamos N.L.	169	6,476	757	7,402
Santa Fe N.F.	2,067	10,461	13,073	25,601
San Ildefonso Pueblo	51	49	192	292
Santa Clara Pueblo	119	4,635	1,927	6681
Private (includes Baca Ranch)	206	1,719	129	2054
<i>TOTAL</i> by burn category	2,612	24,101	16,145	42,858



Underburn = Less than 25% mortality of standing volume

Mosaic Burn= Between 25% and 80% mortality of standing volume

Stand Replacement = Greater than 80% mortality of standing volume

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Findings

- Hazard Tree Identification, Marking and Felling

- Imminent hazard identified in or along:

- 7 Roads

Hazards felled on Highways 4, 501 & 502

- 19 Trails

Imminent hazards identified

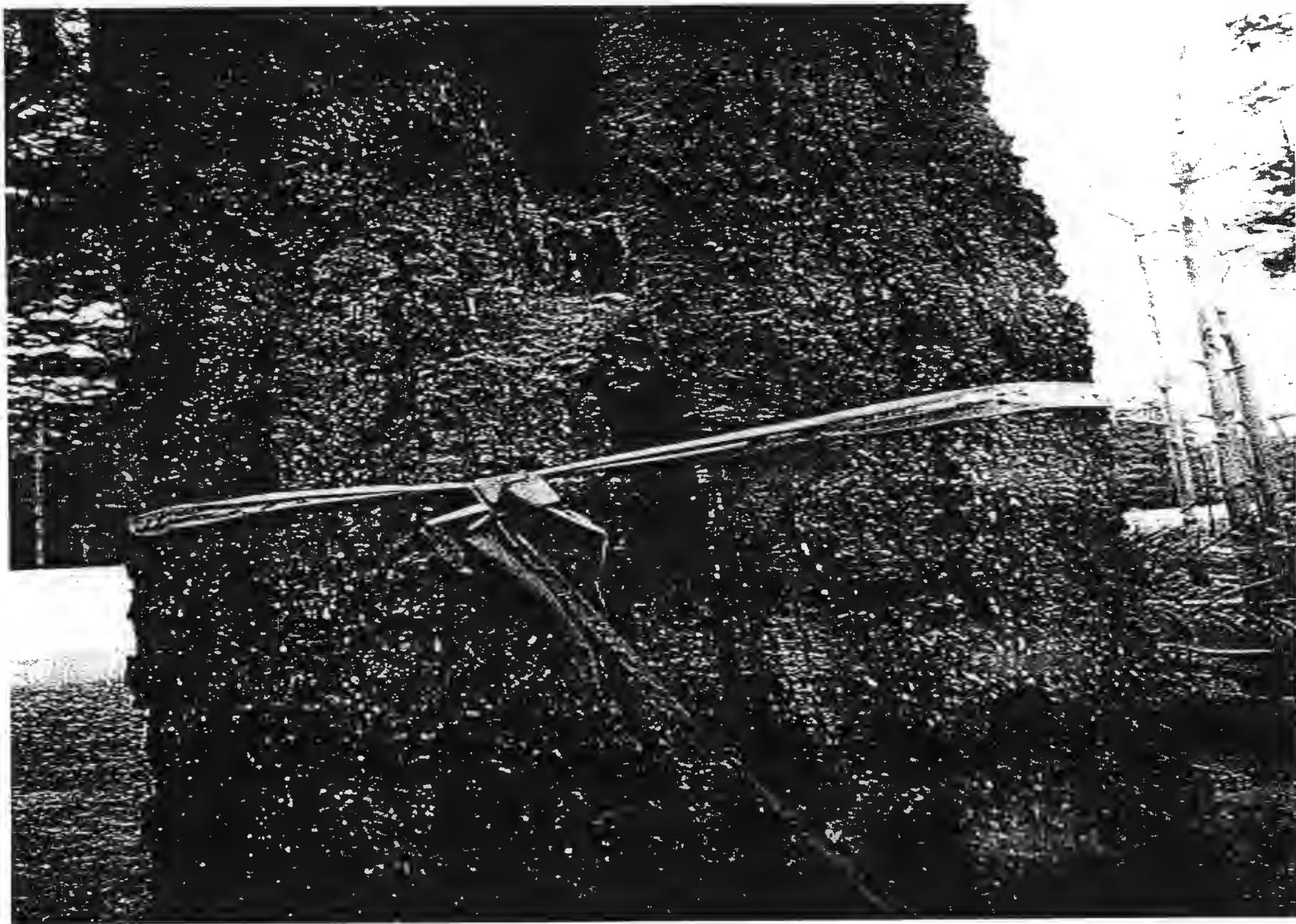
- Community Areas

Hazards being identified & felled



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Recommendations

All Ownerships

Identify & fell long term tree hazards

Continue monitoring

Santa Fe National Forest

Salvage 9,350 MBF on 3,463 acres

Reforest by hand planting of seedlings on 500 acres

Reforest by hand seeding on 500 acres

San Ildefonso Pueblo

Salvage 511 MBF on 151 acres in the Sacred Unit

Reforest by hand planting on same 151 acres.

Santa Clara Pueblo

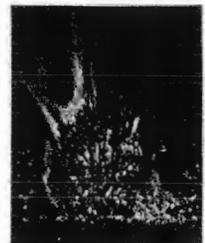
Salvage 830 MBF on 762 acres

Site prep 62 acres on Borega Mesa

Reforest 874 acres with Ponderosa pine and Douglas-fir



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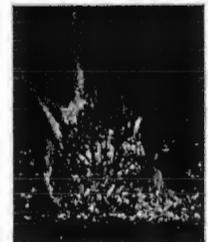


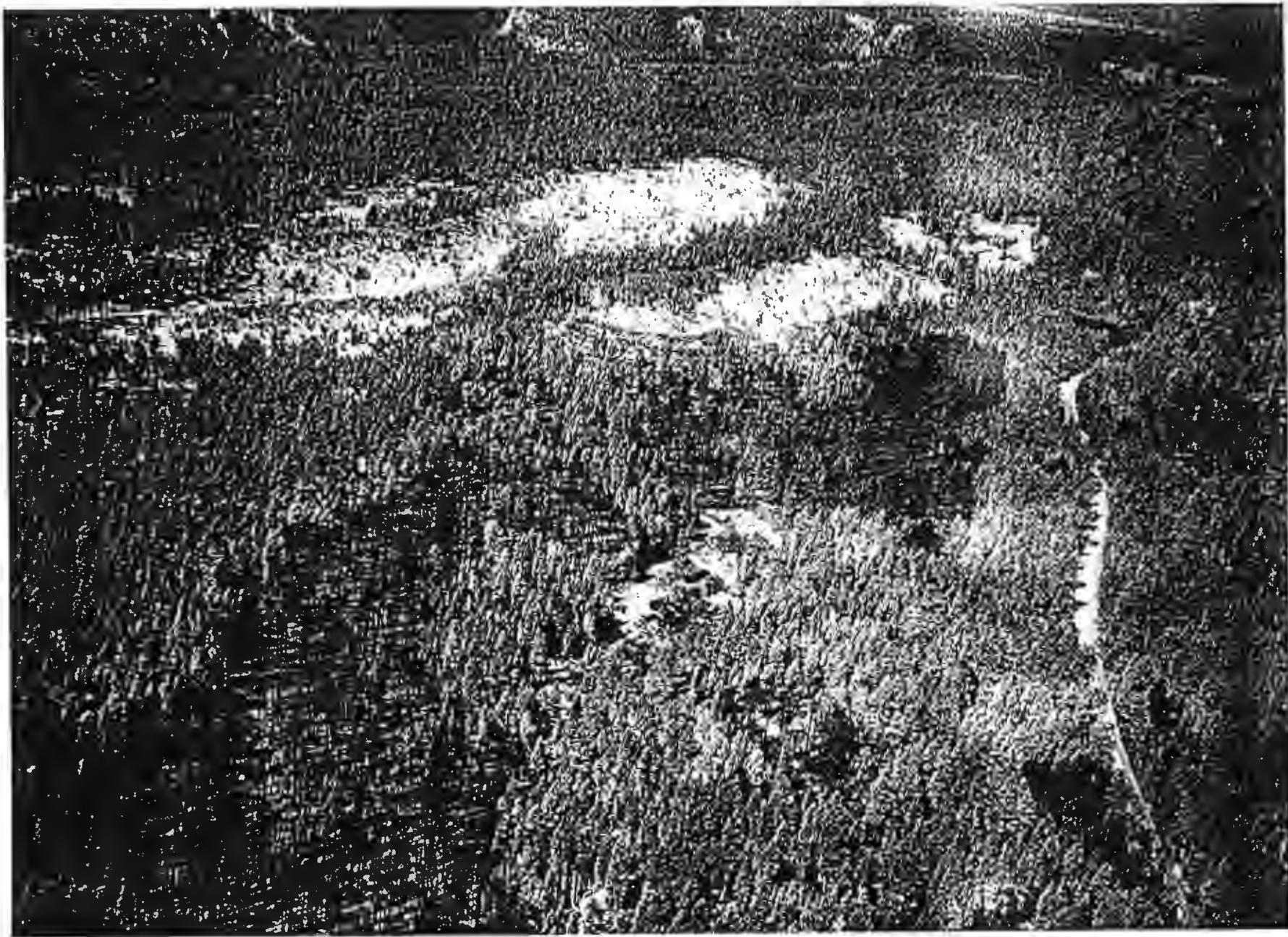
Other Recommendations

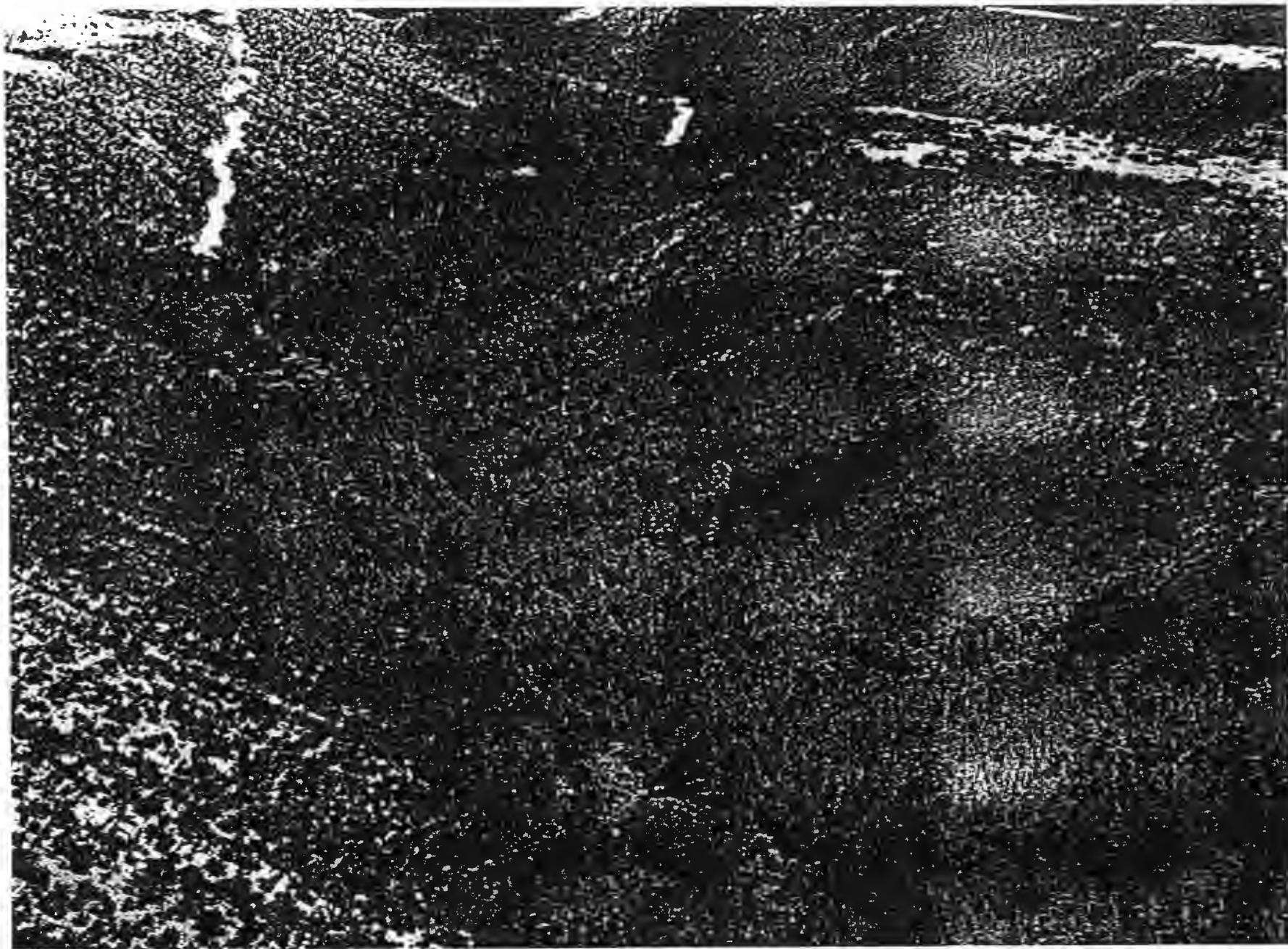
1. Conduct a damage assessment on the Santa Clara uneven-aged growth study plot
2. Reestablish bearing trees and replace tree tags on 43 CFI plots on the Santa Clara Pueblo



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On 42,878 acres included in the Cerro Grande fire area:

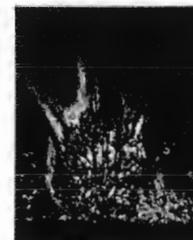
- **Pre-fire, natural erosion would yield 81,211 tons.**
- **Post-fire erosion potential is 609,438 tons.**

Estimated erosion reduction from grass seeding and other watershed treatments:

- **1st year = 8.8%**
- **2nd year = 22.9%**



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Of the 42,878 acres included in the Cerro Grande fire area:

- **9,327 acres or 22% exhibit hydrophobic soil properties.**
- **Hydrophobic soils occur mostly in Ponderosa Pine forest on north-facing slopes.**



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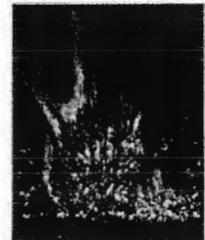


ISSUES

- **Suppression effects and short/long-term impacts to plant communities and vegetative resources within the Cerro Grande Fire on federal, county, private, and Trust lands.**
- **Protection and enhancement of other resource values including site productivity, wildlife habitat, vegetative resources, cultural resources and watershed stability.**
- **Management strategies which provide for the stabilization, natural regeneration and recovery of impacted areas.**
- **Monitoring of the seeding effectiveness of rehabilitation efforts.**
- **Monitoring of impacted lands for the early detection and control of invasive and noxious weed species.**



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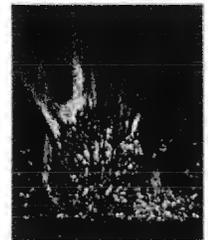


FINDINGS

- 42,858 acres of grass, grass/shrub, ponderosa pine, mixed conifer, aspen, white fire, and meadow plant associations impacted by fire.
- Vegetation was inventoried and mapped according to 4 vegetative loss categories:
 - 0-10% vegetative loss: 8% of fire area
 - 10-40% vegetative loss: 33% of fire area
 - 40-70% vegetative loss: 19% of fire area
 - 70-100% vegetative loss: 40% of fire area



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FINDINGS

- Native seed source negatively impacted within the moderate and high burn severity areas.
- Natural generation process already beginning within some areas of the fire.
- Emergency vegetative cover recommended on moderate and high burn intensity areas for the protection of downstream life and property values.
- Seed mixture composed to treat emergency watershed conditions on 20,000 acres with seeding rate of 60 seeds per sq. ft. for live plant establishment of 9-15 plants per sq. ft.



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Recommendations

- **Aerial Seeding (W-1a):** Apply seed mix at the rate of 36 lbs/acre over high and moderate burn intensity sites.
- **Install Range Fence:** Repair and replace 3.5 miles of range fence on the Santa Clara Reservation approximately 3/4 miles east of Puye Cliff Dwellings to protect revegetation efforts.
- **Monitor Seeding Effectiveness:** Establish transects in moderately to high burn intensity areas for each plant community type reseeded in June, 2000.
- **Invasive Species Monitoring:** Develop monitoring protocols and conduct field inventories on disturbed sites including but not limited to dozerlines, handlines, safety zones, and helibases to map, and initiate control measures on invasive species infestations that threaten native plant community recovery as discovered.



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CERRO GRANDE

FIRE BAER WILDLIFE ASSESSMENT

BAER WILDLIFE OBJECTIVES AND ISSUES

- Assess effects of fire and suppression action to Threatened, Endangered, and other significant species, and their habitat, including birds, mammals, amphibians, reptiles, fish and insects.

Three federally listed species occur within or downstream from the fire area

Ten culturally significant species

Two agency sensitive species

- Initiate Emergency Section 7 Emergency Consultation with FWS as required by the Endangered Species Act.

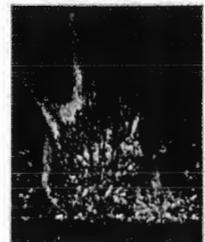
- Assess effect of fire to habitat improvements.

Big game guzzler

- Assess effects of emergency rehabilitation actions to TES species and habitats.
- Prescribe emergency rehabilitation measures and monitoring.



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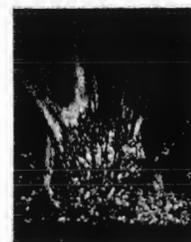


WILDLIFE OBSERVATIONS

	LISTING STATUS	EFFECTS SUMMARY
Mexican Spotted owl	T	Adverse/none/may affect
Bald eagle	T	not in fire area
SW Willow flycatcher	E	none/none/none; flooding
Elk	CS	short term neg; beneficial
Mule deer	CS	short term neg; beneficial
Black Bear	CS	short term neg; beneficial
Bob cat	CS	neutral
Mountain lion	CS	neutral
Golden eagle	CS	short term neg; neutral
Wild turkey	CS	short term neg; beneficial
Barred tiger salamander	CS	none
Rio Grande cutthroat trout	CS	none
Rainbow trout	CS	minimal
Peregrine falcon	S	negative/negative/none
Jemez Mtns salamander	S	negative



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RECOMMENDATIONS

- Emergency Consultation for the fire, suppression actions and emergency rehabilitation actions was concluded on 6/1; letters should be sent today (FS and DOE).
- DOE emergency rehab proposed after 5/31 should be evaluated for effects to T&E species; reopen emergency consultation if needed.
- The current determinations should be reassessed and Consultation updated if additional rehabilitation measures or vegetation management activities are proposed after May 31, 2000.
- Post fire monitoring proposed:

Mexican spotted owl fire effects

Jemez Mountains Salamander fire effects

Peregrine falcon on FS

- Wildlife rehab

Jemez Mountains Salamander emergency habitat restoration

Repair big game guzzler

Pellet transects

Road closures

If other vegetation management activities are proposed, such as salvage logging, another Biological Assessment will be prepared.



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Cultural Issues

- Protection of cultural resources from suppression activities
- Participation by the Pueblos of Santa Clara and San Ildefonso, public and private landowners, in the identification of threatened cultural resources and in the development of rehabilitation plans
- Cultural resource inventory of ground disturbance caused by fire suppression
- Assessment of fire and fire suppression effects on previously documented cultural resources
- Evaluation, monitoring, or preservation treatments for cultural resources



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OBSERVATIONS

- Prehistoric sites – Archaic up to historic Pueblo sites
- Historic sites – homesteads, wood products and grazing related
- 18 archaeologists have worked on the fire since May 5
- BAER archaeologists arrived May 21
- Principal role is to coordinate with Agency and Pueblo representatives in preparing site inventory, stabilization/rehabilitation and monitoring treatments



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FINDINGS

- 680 prehistoric, historic or historic/prehistoric sites previously recorded within the burn areas
- Site LA 12700, a property on the National Register of Historic Places, appears to be the most severely impacted prehistoric site, although historic sites were also destroyed



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Recommendations

- Emergency stabilization of archaeological site LA 12700, a property listed on the National Register of Historic Places
- Inventory of areas damaged by fire suppression and fire effects upon previously recorded or documented cultural properties within the burn area
- Implement site protection and data recovery measures to damaged cultural properties
- Monitor erosion at LA 122700 to determine the effectiveness of the prescriptions applied
- Monitor cultural resource compliance in the application of all prescriptions to the burn area
- Monitor known sites for damage from vandalism and erosion and inadvertent damage
- (Non-specification) Explore law enforcement MOU's between Forest Service and Pueblo law enforcement to consolidate site protection patrols and monitoring
- (Non-specification) Explore sources of seed and nursery stock for the reestablishment of native plant species of cultural significance to the Pueblos



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SCENIC RESOURCE ASSESSMENT

ISSUES

- Long term impacts on view shed from vegetative patterns, more visible built features
- Short term impacts of rehabilitation efforts
- Redefine Landscape Character Objectives through public involvement

OBSERVATIONS

- Scenic resources influence on people's lives
- Define communities' self image
- As important to restore landscape as rebuild lives
- Public understanding of impact for better acceptance of changes and creating new sense of community identity



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FINDINGS

- Pre-fire landscape: uniform matrix--ponderosa pine, mixed conifer, aspen, oak prominent rocky bluffs and outcrops



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FINDINGS

- Post-fire landscape: mosaic of black and gray scattered patches of unburned vegetation pattern to persist in areas vegetative pattern to feature more non-conifer species



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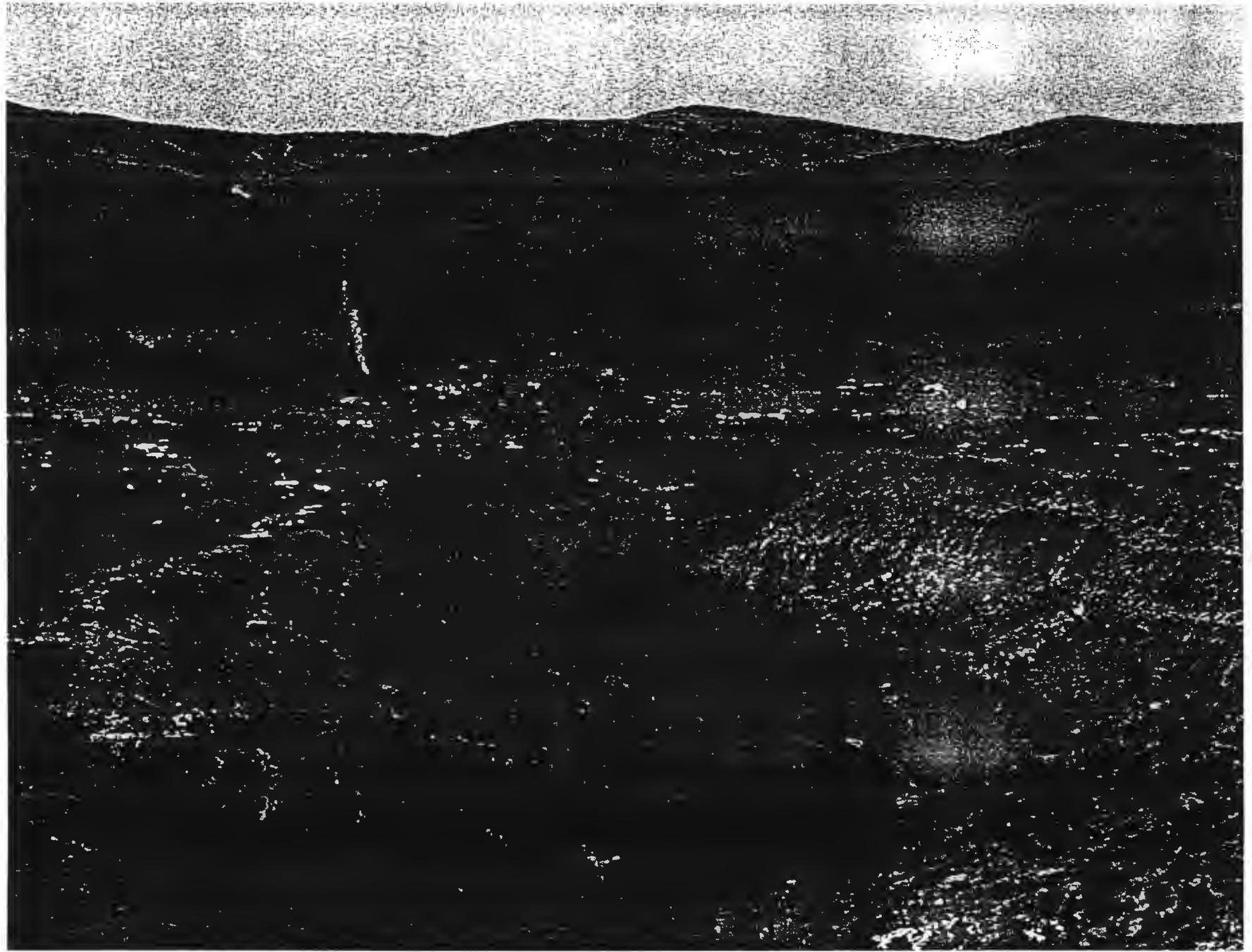
Post-fire trends/patterns

- Broad grasslands --can add scenic diversity, but can decrease desirability of recreation settings and scenic values if too expansive
- Oak brush --dominant vegetation over rockier sites
- Aspen clones -- scenic and recreational asset; at risk from elk predation
- Pine and mixed conifers --slow to naturally re-establish dominance
- Management activities more evident – pipeline access road
- Emergency Rehabilitation measures – short term impacts



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RECOMMENDATIONS

- Rehabilitate the pipeline access road
- Use visual simulations to define impacts on landscape through graphic simulations
- Define Landscape Character goals with public involvement
- Monitor aspen for over-browsing by elk
- Conduct public education programs on rehabilitation efforts and fire impacts



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RECREATION RESOURCE ASSESSMENT

ISSUES

- Direct and indirect fire damage, including suppression effects, to trails and recreation facilities
- Impacts to recreational uses
- Impacts on community trails from displaced mountain bikers—potential conflict

OBSERVATIONS

- High value placed on outdoor recreation
- Year-round use
- Major impacts: continued area closures, hazard trees and rocks on trails, damage from floods and increased erosion



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FINDINGS

ROADS AND TRAILS

- trails hold special significance to residents
- 99 out of 206 miles impacted; mainly Santa Fe National Forest trails—damage varies
- trail restoration -- important aspect of town's recovery

ROCK CLIMBING

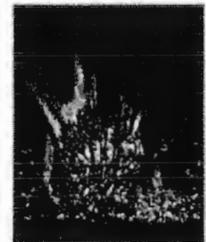
- Los Alamos and Pajarito canyons, off Mitchell Trail #69
- anchors and bolts affixed to canyon wall by users
- climbing walls in areas of low to moderate burn severity—hazards unknown

DEVELOPED RECREATION

- Pajarito Ski Area, ice-skating rink, Los Alamos Reservoir not damaged
- Reservoir and ice rink at risk from flood damage
- Puye Cliffs parking area damaged during fire suppression



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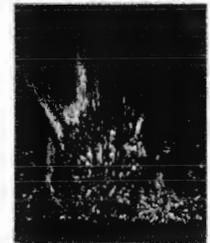


RECOMMENDATIONS

- Survey post-fire condition of trails; determine needed rehab
- Evaluate structural integrity of climbing walls
- Identify hazard trees along roads and trails
- Monitor effectiveness of emergency rehabilitation efforts
- Hire contractor to reconstruct Puye Cliffs Dwelling parking area
- Protect recreation values of Los Alamos Reservoir and ice rink
- Open selected trails to public as soon as possible
- Partnership opportunity -- interagency recreation management plan



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Handling Rehabilitation



© 1980 by [unreadable]





Specification Demonstration Area

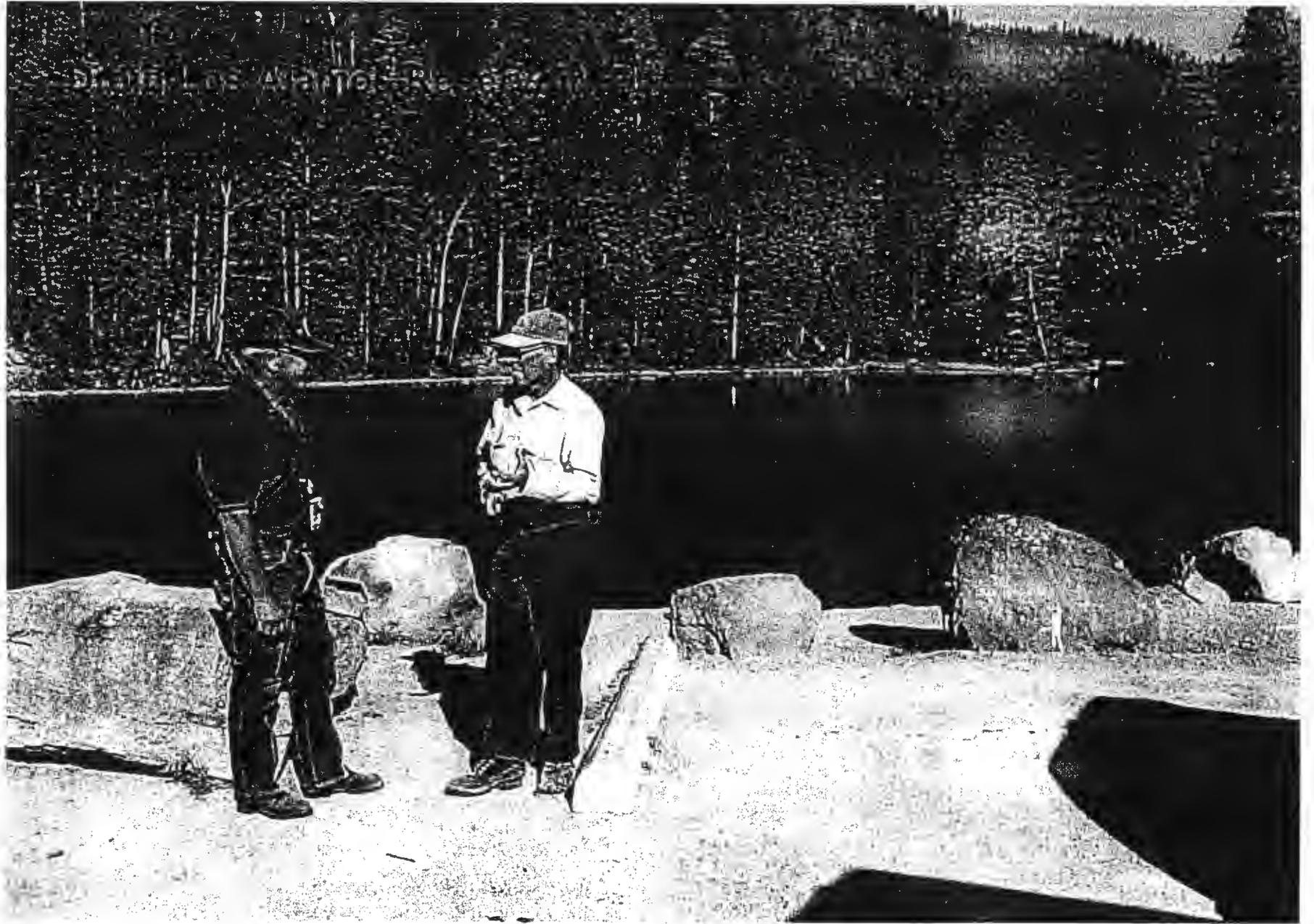


BAER - Interagency





Contour terracing - 1941







Grade Control Structures 1520 Units









Cerro Grande Fire Burned Area Emergency Rehabilitation Environmental Compliance Considerations and Documentation

■ National Environmental Policy Act Consultations

Council for Environmental Quality

Department of the Interior (Bureau of Indian Affairs and National Park Service)

Department of Agriculture (U.S. Forest Service and NRCS)

Department of Energy

■ Clean Water Act

Nationwide Permit 37 – Emergency Watershed Protection and Rehabilitation

■ Endangered Species Act (Emergency consultation completed)

■ National Historic Preservation Act (Consultation initiated and on-going)

■ Hazardous Materials and Contaminate Sites (State Environmental Dept. and DOE)

■ Agency Responsibility for Continued Consultation



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Emergency Watershed Protection Program (EWP)

- Administered by USDA Natural Resources Conservation Service
- For installing emergency recovery measures
- For Forest Service lands and nonfederal lands
- Provides both technical and financial assistance
- Must have a local unit of government as a sponsor
- Requires a 25% local match...can be in-kind



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Emergency Watershed Protection Program (EWP)

Current Status:

- \$750,000 to seed the watershed
- Requests for additional funds have been made
- Damage assessment in progress with the county and both pueblos
- Conservationists available for technical assistance to property owners
- Assisting in volunteer efforts



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INFRASTRUCTURE

DRAINAGE STRUCTURES (Aprox. 150 Sites)

- **CMP (Corrugated Metal Pipes)**
- **CBC (Concrete Box Culverts)**
- **Bridges**
- **Los Alamos Reservoir**
- **Pueblo Canyon at Diamond Drive**
- **Low Volume / Low Speed Roads**



ROADS:

- State Highway and DOE Highway 501
- County Roads – Municipal
- Low Volume / Low Speed Roads – FS, Pueblo, DOE
- Used for Suppression Efforts
- Affected Area Roads will be Rehabilitated
 - Because of Suppression Efforts
 - Because of Increased Runoff and Debris

SIGNS

- ROAD HAZARD
- TRAIL HAZARD

