

(Reference FSH 2509.13)

P. Geologic Types: TKg – intrusive rocks, Qtsp – sedimentary deposits, pCgr – intrusive rocks,

Q. Miles of Stream Channels by Order or Class: perennial – 11, intermmittent/ephemeral - 333

R. Transportation System

Trails: 100 miles Roads 88 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 17,200 (low) 34,100 (moderate) 33,200 (high)

B. Water-Repellent Soil (acres): 10,000

C. Soil Erosion Hazard Rating (acres):
10,000 (low) 39,500 (moderate) 35,000 (high)

D. Erosion Potential: 16 tons/acre

E. Sediment Potential: 1900 cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years): 5

B. Design Chance of Success, (percent): 80

C. Equivalent Design Recurrence Interval, (years): 25

D. Design Storm Duration, (hours): 1

E. Design Storm Magnitude, (inches): 2.5

F. Design Flow, (cubic feet / second/ square mile): 160-660

G. Estimated Reduction in Infiltration, (percent): 30

H. Adjusted Design Flow, (cfs per square mile): 250 - 1800

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency: The fire has burned a large portion of Sabino Canyon watershed, including the town of Summerhaven, destroying over 300 structures. Summerhaven is upstream from the Pusch Ridge Wilderness Area, Sabino Canyon Recreation Area, and developed private lands. Additionally, Sabino Canyon Creek is habitat for the Gila chub, a proposed listed species. The potential for accelerated erosion and runoff through Summerhaven and the undeveloped areas downstream to carry ash, sediment, and unknown possibly hazardous materials to and through the Gila chub habitat, recreation areas, and private lands is high. Downstream infrastructure critical to the city of Tucson is at risk from runoff. Large portions of the Canada del Oro watershed also burned. Off forest developments adjacent to Canada del Oro are at risk from flooding, as is Catalina State Park. Mount Lemon Highway (Sky Island Scenic Byway) is the only paved reasonable access for permanent year-round residents, to inholdings within the Forest boundary. It also is the access for electronic sites which include facilities for television and radio stations, law enforcement agencies, Federal Aviation Administration and Forest Service.

Values and type of risk:

MULTIPLE PRIVATE INHOLDINGS AND SUMMER HOME PERMITS (flood and debris risk) within the Sabino Canyon Watershed; Summerhaven, Loma Linda, and Sykes Knob. Within the Canada del Oro Watershed ; Saddlebrook and Catalina. Many homes and lots within Summerhaven are now subject to flooding and loss of access due to now undersized culverts.

IMPOUNDMENTS AND RESERVOIRS (flood and debris risk); earthen stockponds within the Canada del Oro drainage network, Soldier Pond and Sabino Dam within the Sabino Canyon drainage network. Inadequate spillway capacities could increase probability of breach hydrology. Interior range fences and the boundary fences may act as temporary “trash racks” with subsequent failures of “impounded” water and debris.

WATER QUALITY – Inholding upgradient of NFS lands include pollutants (such as asbestos) that may run on to NFS lands. Vault toilets on private upstream land and NFS may be at risk of flooding and contaminating runoff. Potable water supply springs are at risk of inundation by sediment and debris.

TRANSPORTATION INFRASTRUCTURE – Runoff and debris flows may compromise access necessary to maintain facilities for emergency operations (radio towers, FAA towers, television transmitters, etc) and private year-round residences.

SITE PRODUCTIVITY – Ponderosa pine/mixed conifer community are rare and limited to the tops of “sky islands”. Soil losses will reduce recovery rates in this ecotype.

RECREATIONAL SITES – Riparian recreational areas are now prone to inundation by post fire flood flows. Pre-burn storm flows have resulted in loss of life and property, these conditions are now exacerbated. This is one of three coniferous forests accessible by road in southern Arizona.

B. Emergency Treatment Objectives:

Stabilize the watershed and remove or stabilize potentially hazardous materials before the first damaging storm.

Reduce risk of breach hydrology.

Reduce risk of pollutant and contaminant transport.

Reduce the risk to downstream infrastructure and residences.

Reduce the risk to life and property.

Maintain emergency access to critical communication sites.

When complimentary to other objectives, reduce loss of site productivity.

C. Probability of Completing Treatment Prior to First Major Damage-Producing Storm:

Land 50 % Channel 90 % Roads 95 % Other 80 %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	70	80	80
Channel	80	70	50
Roads	90	90	80
Other			

E. Cost of No-Action (Including Loss): **\$67,160,000**

F. Cost of Selected Alternative (Including Loss): **\$40,810,000**

G. Skills Represented on Burned-Area Survey Team:

<input checked="" type="checkbox"/> Hydrology	<input checked="" type="checkbox"/> Soils	<input type="checkbox"/> Geology	<input checked="" type="checkbox"/> Range	<input type="checkbox"/>
<input checked="" type="checkbox"/> Forestry	<input checked="" type="checkbox"/> Wildlife	<input type="checkbox"/> Fire Mgmt.	<input checked="" type="checkbox"/> Engineering	<input type="checkbox"/>
<input checked="" type="checkbox"/> Contracting	<input checked="" type="checkbox"/> Ecology	<input type="checkbox"/> Botany	<input checked="" type="checkbox"/> Archaeology	<input type="checkbox"/>
<input type="checkbox"/> Fisheries	<input type="checkbox"/> Research	<input type="checkbox"/> Landscape Arch	<input checked="" type="checkbox"/> GIS	

Team Leader: Gregory A. Kuyumjian/Robert E. Lefevre

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H. Treatment Narrative:

Land Treatments: 500 acres mulched July, 2003. 9,970 acres seeded July, 2003. 7,200 acres reseeded March, 2004. 300 acres mulched March, 2004

High elevation (above 7500 feet) seed mix – 60% barley (*Hordeum vulgare*), 40% slender wheat (*Agropyron trachycaulum*); 140 pounds/acre = 65 seeds/sq.ft. July, 2003

Lower elevation (below 7500 feet) seed mix – 60% oats (*Avena sativa*), 30% sand dropseed (*Sporobolus cryptandrous*), 10% side oats grama (*Bouteloua curtipendula*); 125 pounds/acre = 65 seeds/sq ft. July, 2003

Lower elevation (below 7500 feet) seed mix - 25% each: Green Spangletop (*Leptochloa dubia*), Rothrock Grama (*Bouteloua rothrockii*), Mountain brome (*Bromus marginatus*), and Sideoats grama (*Bouteloua curtipendula*) March, 2004

Channel Treatments: 7 miles of channel cleared. Spillway of Sabino Dam cleared.

Roads and Trail Treatments: 6 miles of road drainage upgraded. Culvert protection installed at historic culverts in Marshall Gulch Picnic Ground. Concrete reinforcements to bridges complete on Sabino Canyon Rd.

Structures: Water gaps taken down at all fences across washes.

Human Health and Safety: 100 warning signs placed in and adjacent to burn area. Toilets near channels pumped, sanitized, and sandbagged. Killer trees removed from summer home sites and National Forest adjacent to private lands. Picnic tables removed from floodprone area.

Treatments on Other Lands: Stabilization activities are also being conducted by other agencies using their own funding sources on adjacent or affected private lands. The NRCS is performing seeding and mulching activities on 175 acres within the Summerhaven subdivision as part of the EWP program. Pima County is building strawbale dikes for containment of potential hazardous substances near burned structures and implementing structure and road protection (sandbags and culvert removal) in Summerhaven and on Mt. Lemmon Highway (sandbags). Pima County is also installing 9 automated rain or flow stations on National Forest (special use permits) for flood warning. The USGS has helped with the BAER assessment and is re-activating their gaging station in Sabino Canyon.

I. Monitoring Narrative:

Aspen BAER treatments will be monitored to determine if:

- 1) treatments were implemented to expected standards
- 2) treatments were successful in meeting objectives (effective ground cover, road damage mitigation)
- 3) treatments resulted in undesirable results (noxious weeds)

Seed purity and noxious weed testing by Arizona State University seed testing laboratory. Each “batch” of seed was tested according to standards and methods for seed collection and analysis. Confirmation has been received from the lab that no noxious weeds were detected.

Storm patrol – after major runoff events, critical bridge abutments and culverts have been examined.

See attached (Appendix A) for monitoring plan details.

Part VI – Emergency Rehabilitation Treatments and Source of Funds by Land Ownership

			NFS Lands				Other Lands			All	
		Unit	# of	WFSU	Other		# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	SULT \$	\$		units	\$	Units	\$	\$
A. Land Treatments											
Seeding	acres	\$62	17,050	\$1,065,284		X	175	\$18,550		\$0	\$1,083,834
Flow routing		\$5,267	3	\$15,802		X	175	\$175,000		\$0	\$190,802
Hazard (killer) tree felling		\$29	550	\$15,802		X		\$0	0	\$0	\$15,802
Mulching (adjust.)	acres	\$712	800	\$569,960		X		\$0	0	\$0	\$569,960
Relocate straw				\$31,604		X					\$31,604
Increase turn time				\$142,218		X					\$142,218
Relocate seed				\$31,604		X					\$31,604
Pollution containment	ea			\$0		X					\$0
Sand bags	ea	\$16	500	\$7,900		X		\$0	5000	\$25,000	\$32,900
Vault - pump/sanitize	ea	\$1,580	5	\$7,901		X		\$0			\$7,901
straw/pollution cont.						X			4000	\$48,000	\$48,000
Subtotal Land Treatments				\$1,888,075		X		\$193,550		\$73,000	\$2,154,625
B. Channel Treatments											
Clear debris		\$4,203	7	\$29,420		X			0.5	\$6,250	\$35,670
Remove fence						X			3	\$3,000	\$3,000
Sabino Dam spillway		\$297	1	\$297		X		\$0	0	\$0	\$297
Subtotal Channel Treat.				\$29,717		X		\$0		\$9,250	\$38,967
C. Road and Trails											
Replace culverts/dips	miles	\$152	6	\$913		X		\$0	6	\$30,000	\$30,913
Signs	ea	\$82	100	\$8,219		X		\$0	10	\$1,000	\$9,219
Dips	miles	\$152	6	\$913		X		\$0		\$0	\$913
Wing wall	ea	\$3,653	1	\$3,653		X					\$3,653
Concrete aprons	ea	\$5,327	6	\$31,964		X		\$0		\$31,000	\$62,964
Trash racks	ea	\$1,218	3	\$3,653		X					\$3,653
Buttress road undercut	ea	\$3,653	1	\$3,653		X		\$0	0	\$0	\$3,653
Repair water line	ea	\$2,739	1	\$2,739		X		\$0	0	\$0	\$2,739
Remove footbridge	ea	\$2,740	1	\$2,740		X					\$2,740
Armor crossings	ea	\$15,982	2	\$31,964		X		\$0		\$0	\$31,964
Subtotal Road & Trails				\$90,411		X		\$0		\$62,000	\$152,411
D. Structures											
Sandbag vault toilet		\$29	4	\$117		X					\$117
Remove picnic tables		\$91	12	\$1,096		X		\$0		\$0	\$1,096
Early warning - rain						X			6	\$60,000	\$60,000
early warning - flow						X			3	\$30,000	\$30,000
Demolish/remove wall		\$0	0	\$0		X					\$0
Remove fencing, breach stockpond				\$744		X		\$0		\$0	\$744
Subtotal Structures				\$1,957		X		\$0		\$90,000	\$91,957
E. BAER Evaluation											
Assessment Team	job	\$141,000	1	\$141,000		X		\$5,500			\$146,500
						X		\$0		\$0	\$0
Implementation	job		1	\$57,100		X		\$0		\$90,000	\$147,100
				\$0		X					\$0
F. Monitoring	job	\$20,648	1	\$20,648		X				\$0	\$20,648
G. Totals				\$2,228,908	\$0	X		\$199,050		\$324,250	\$2,752,208

PART VII - APPROVALS

1. Forest Supervisor */s/ Jeanine A. Derby* Date *4/19/2004*

2. Regional Forester Date

TOTALS:

- **80 ACRES AERIAL MULCHED**
- **17,050 ACRES AERIAL SEEDING COMPLETED BY FIXED WING**
- **120 ACRES AERIAL SEEDING COMPLETED BY HELICOPTER**
- **APPROXIMATELY 6 MILES OF ROAD DRAINAGE UPGRADED**
- **APPROXIMATELY 7 MILES OF CHANNEL CLEARING COMPLETE**
- **ABOUT 100 WARNING SIGNS PLACED IN BURN AREA**
- **CULVERT PROTECTIONS HAVE BEEN INSTALLED IN MARSHALL GULCH AND SABINO CREEKS**
- **CONCRETE REINFORCEMENTS TO BRIDGES COMPLETE ON SABINO CANYON RD**
- **TOILETS NEAR CHANNELS PUMPED AND SANITIZED**
- **KILLER TREES REMOVED FROM SUMMER HOME SITES AND NATIONAL FOREST ADJACENT TO PRIVATE LANDS**

- **75 PEOPLE INVOLVED IN THE ASSESSMENT AND IMPLEMENTATION OF THESE PROJECTS**