

Date of Report: 8/28/06

BURNED-AREA REPORT

(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

- ☒ 1. Funding request for estimated WFSU-SULT funds
☐ 2. Accomplishment Report
☐ 3. No Treatment Recommendation

B. Type of Action

- ☒ 1. Initial Request (Best estimate of funds needed to complete eligible rehabilitation measures)
☐ 2. Interim Report
 ☐ Updating the initial funding request based on more accurate site data or design analysis
 ☐ Status of accomplishments to date
☐ 3. Final Report (Following completion of work)

PART II - BURNED-AREA DESCRIPTIONA. Fire Name: Cavity Lake FireB. Fire Number: MN-SUF-060253C. State: MND. County: Cook and LakeE. Region: 9F. Forest: SuperiorG. District: GunflintH. Date Fire Started: 7/14/2006I. Date Fire Contained: 96% as of 8/16/06J. Suppression Cost: \$11,213,804 as of 8/16/06

K. Fire Suppression Damages Repaired with Suppression Funds

1. Fireline waterbarred (miles): 0
2. Fireline seeded (miles): 0
3. Other (identify): Fire line rehab (hand line and explosives) by pulling debris back over the line and camouflaging/blackening stumps and cut ends, pulling any helispot or repeater flagging and markers, and dismantling and scattering wooden helicopter landing pads.

L. Watershed Number:

HUC6	HUC_NAME
090300010105	Extortion Creek
090300010102	Chub River
090300010101	Little Saganaga Lake
090300010204	Seagull River, Lower
090300010203	Seagull River, Upper
090300010206	Knife Lake
090300010205	Kekekabic L

M. Total Acres Burned: 24,152 acres (T Area within the fire perimeter = 31,830 - 7,678 acres of lakes = 24,152): NFS Acres(29,053 including 7,678 lake acres) Other Federal () State (2,777) Private () County ()

N. Vegetation Types: Predominantly jack pine (32%), and aspen-birch (20%), with scattered red and white pine in uplands (2%); spruce-fir (18%), lowland conifers (12%), and lowland shrubs (9%).

O. Dominant Soils: All soils in the burn area are derived from glacial drift over granite bedrock. Soils that are shallow to bedrock dominate the area, making up between 60-80% of the soils. Slopes are moderate to steep over most of the burn area. Dominant soils within the fire perimeter are: Typic Dystrocrepts, Typic Fragiocrepts, Lithic Dystrocrepts, Lithic Udorthents, Typic Haplohemists, Terric Haplohemists, and Aquepts. Soil surface textures are generally sandy loams, with duff layers are highly variable. Five to six inch average depths may occur in lower slope positions and wetter areas. Gravels, cobbles and rock fragments make up significant portions of the soil profile in the upland soil groups. Exposed rock and bedrock varies with LTA and slope position but it can be as high as 30%. Soils are generally well drained. Water movement in the soils is as interflow during the frost free and snow free periods.

P. Geologic Types: The burn area has a variety of rock types that influence topography and soil development within the Vermillion Geomorphic Province. Generally, the burn area is comprised of Saganaga granodiorite intrusives to the northeast (19%), Knife Lake Group argillite, slate, phyllite, biotite schist, and metagraywacke to the northwest (15%), Knife Lake Group conglomerate and felsic metavolcanics to the middle west-east (23%), metabasalt with some metadiabase rocks to the middle east (20%), and Duluth Complex tractolite and anorthosite to the south (23%). Locally, the south end of Jasper Lake and the east-west sides of Ray Lake have minor intrusive andesite rocks. The area mainly has bedrock outcrops and shallow soils. The most pronounced structure is a fairly well developed set of faults with directions of failure trending to the NW and NE. The faults provide zones of weakness that have been exploited by weathering and glacial erosion, creating lake basins. Large lakes tend to be located at the junctions of faults or groups of faults.

Q. Miles of Stream Channels by Order or Class: Lake connector (1 mile), wetland connector (4 miles), intermittent stream (0.6 miles) perennial stream (18 miles). There is also 249 miles of lakeshore within the fire perimeter.

R. Transportation System

Trails: 15.75 miles Roads: 0 miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres): 7246 (low) 12076 (moderate) 4830 (high - Includes exposed rock)
(Total = 24,152 acres)

B. Water-Repellent Soil (acres): 0

C. Soil Erosion Hazard Rating (acres): Total = 24,152
7246 (low) 12076 (moderate) 4830 (high)

D. Erosion Potential: tons/acre *

E. Sediment Potential: cubic yards / square mile *

*No emergencies were found to be related to watershed and soil conditions, therefore calculation of post-fire erosion and flooding was not conducted for parts III and IV. See Part V and the specialist report for more discussion.

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years):	<u>1</u>
B. Design Chance of Success, (percent):	<u>*</u>
C. Equivalent Design Recurrence Interval, (years):	<u>2</u>
D. Design Storm Duration, (hours):	<u>6</u>
E. Design Storm Magnitude, (inches):	<u>1.6-1.8</u>
F. Design Flow, (cubic feet / second/ square mile):	<u>*</u>
G. Estimated Reduction in Infiltration, (percent):	<u>*</u>
H. Adjusted Design Flow, (cfs per square mile):	<u>*</u>

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency:

The Cavity Lake Fire burned 31,830 acres in the Boundary Water Canoe Area Wilderness. The BWCAW is a mosaic landscape characterized by numerous lakes, separated by areas of uplands interspersed with wetlands, intermittent and perennial stream channels. Much of the area contained downed and dead trees due to a significant wind storm that occurred in the BWCAW on July 4, 1999. Lightning started the Cavity Fire and the fire spread rapidly fueled by the dead and downed trees from the July 4, 1999, wind storm. The affects of the fire on soil and water resources was largely mitigated by the mosaic landscape pattern.

The initial assessment of the burned area evaluated post-fire conditions on the ground in the burned area. The initial assessment and resulting prescriptions have been developed utilizing experience gained from the 2005 Alpine Fire. BWCAW campsite ground and aerial visits in Seagull Lake and Alpine Lake (for previous fire comparisons) were made initially on July 26 and 28, 2006, and later by other BAER team members in surrounding lakes August 3-6, 2006. The Forest monitoring crew also assessed fire affected soils by evaluating the organic layer to determine the extent and level of burn severity.

Vaules At Risk – Emergency Determination

Threats to Human Life (Safety) and Property - BWCAW Campsites.

The most significant impact from the Cavity Fire was to the wilderness campsites. The fire partially or completely burned over 95 wilderness campsites.

The health and safety, property, and wilderness character values are at risk due to post-fire campsite conditions which include jackstraw and hazard trees, burned over latrines and water bars, standing snags, down trees over sites and trails, burned over landings, and moderately burned vegetation to no vegetation which will contribute to campsite expansion should the site open before vegetation recovery begins.

Visitors are only permitted to camp in designated campsites with a latrine and fire grate, with no dispersed camping in most of the BWCAW. This presents a problem in that visitors can't simply "camp somewhere else"

when a site is damaged either now or into the near future. During times of fire or other natural disasters, campsites need to be rehabbed and opened for use or the entry point quota must be reduced. Since the quotas will not be reduced beyond this season, the potential risk to health and safety remains in that visitors may camp in existing sites under unsafe conditions or in an unauthorized campsite without proper waste containment. These unauthorized sites pose a threat to wilderness character in the BWCAW.

NNIS Plants (NNIP)

Field surveys focused on campsites and surrounding areas that experienced moderate to high burn severity. Objectives during field surveys were to detect NNIP infestations if possible and evaluate risk of NNIP invasion in moderate and high severity burn areas. Four new NNIP infestations were detected during field surveys: 3 small hawkweed populations and one small purple loosestrife population. The loosestrife and one hawkweed population were pulled.

Field investigations confirmed the values at risk. Moderate and severe burn sites had significant amounts of exposed soil and bedrock which are extremely susceptible to weed invasion. Very little tree, shrub, forbes, or grass canopy remained in these areas, resulting in full sun exposure which invasive plants typically favor. Weed invasion in such areas could threaten the values at risk.

Two other types of sites or site conditions that could threaten values-at-risk were not observed in the field. Areas with human -caused ground disturbance was fairly limited in extent (e.g. approximately one mile of fireline that had been blasted by explosives), but such areas are susceptible to weed invasion. Also, six campsites within the fire perimeter were used by out-of-state fire crews.

In summary, field investigations confirmed that the values at risk are ecosystem function, native plant community integrity, and wilderness character. The potential for NNIP to invade the Cavity Lake Fire threaten the values-at-risk and constitute an emergency. Left unchecked, NNIP populations can grow explosively and can eventually: cause increased erosion, alter hydrologic regimes, alter nutrient cycling, alter fire regimes, displace native plants, and change plant community composition. Such changes disrupt natural processes which designated wilderness areas such as the BWCAW are intended to preserve, so consequently such changes can negatively alter wilderness character. The relatively low levels of weed invasion in the Cavity Lake Fire at present further magnify the critical need to act now to prevent them from increasing.

Heritage Resources

Post-fire conditions affecting heritage resources on the ground vary by the relative cover from site to site and by the burn severity on a site specific basis. Heritage sites associated with the thinnest soil cover and or burn severity are generally most at risk.

The principle risk to heritage values at class I or class II historic properties within the burn area results from the burn off of the leaf litter and duff layers which in the past has served to protect surface artifacts from the attention of the visiting public. Use of campsites and portages co-occupied by historic properties in the burned area by the visiting public will result in a threat of public acquisition of artifacts.

Values not at risk - No emergency.

Water Quality, Runoff, Soil Erosion and Productivity: Current site conditions are such that emergency rehabilitation treatments to protect the soil and water quality from further erosion or site productivity losses are not needed. The site has received over 1.5 inches of rain within the two weeks prior to the assessment and very little soil movement was present. Soil properties have not been significantly altered. Soils still have moderate to high infiltration rates, organic litter still exists over most soils, and bare soil areas are relatively small and discontinuous. The exposed surfaces are very rough, due to the coarse surface fragments and residual large woody debris. These features will help in breaking up any surface runoff, limiting the chance of rill or gully formation. The many rocks and cobbles will act as small retention areas to trap soil particles dislodged by raindrop impact and surface runoff, limiting the distance of soil movement that is displaced. Neither mass wasting nor delivery of large amounts of sediment to streams or lakes is expected. Though significant losses of total above ground biomass have occurred over much of the area, these should be viewed as short term losses.

A field visit to the 2005 Alpine Fire revealed that the moderate to severely burned areas are recovering well. There was some evidence of sheet erosion and short distance soil displacement. However, the rough slope characteristics acted to retain the soil on site. The remaining surface organic matter was still present. Vegetation cover varies from 30-50% on the rockier and more severe burned areas, to nearly 100% in deeper soil areas. No rill or gully erosion was detected.

Fisheries Populations, Habitat and Aquatic NNIS: Fish populations, habitat, riparian areas, and wetlands were not considered to be values at risk. It was determined post-fire water quality impacts to nearby surface waters and the possible negative effects to fish populations and habitat was low within both low and moderate burn severity areas. Overall impacts to riparian areas and wetlands were generally considered low to moderate although effects varied considerably among sites. Based upon observations in the Alpine Lake burn, it was determined that the Cavity Lake Fire would have no long-term negative effects to fishery resources.

Field sampling did not detect spiny water flea in Sea Gull Lake, therefore it was determined that the transport of spiny water flea from Sea Gull Lake into non-infested waters by fire suppression activities was unlikely to pose an immediate risk to aquatic communities within or adjacent to the Cavity Lake Fire area.

B. Emergency Treatment Objectives:

Campsites

Objectives include; (1) to protect public health and safety, and to limit public access to protect treated or recovering areas (2) to protect public health and safety from falling trees or dangerous obstacles in or near campsites (3) to minimize unacceptable exposure to latrine contents and to prevent new exposures (4) To inform and/or warn the public of conditions or dangers resulting from the fire (5) To assure sites remain unused and to conduct late season monitoring to determine future site treatments or the need for continued closures.

NNIP

The type of treatment that is recommended for the burned area is detection or checking for presence/absence for NNIS. In 2007 susceptible sites, such as areas with moderate or severe burn intensities, exposed bedrock, south facing slopes, firelines, and helispots within the burn, would be the primary focus for the detection work. Standard weed inventory protocols would be followed for the detection. Two visits to the burned area would be needed, one for early season species and one for late season species. For any new infestations, the GPS location and infested area would be recorded. New infestations would be hand-pulled and eradicated. If NNIS species are detected and eradicated in 2007 then monitoring would be proposed for 2008 to assess effectiveness.

Heritage Resources

Protect heritage sites from increased vandalism. Observe effectiveness of mitigation measures over time. Tabulate unanticipated impacts-recommend follow-up mitigations.

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

Land n/a % Channel n/a % Trails n/a % Other n/a %

D. Probability of Treatment Success

	Years after Treatment		
	1	3	5
Land	90	90	90
Channel			
Roads			
Other			

E. Cost of No-Action (Including Loss): \$700,000

Campsites

Use of campsites, legal or not, that have safety hazards could likely result in injury or death. This is difficult to put a cost on. However, eventual site work and rehab work needed on newly created unauthorized sites could easily approach **\$50,000** in the next year.

NNIP

The cost of eradicating an NNIS infestation could easily approach 5 times the cost of detection requested in this report or **\$150,000**. There is also the cost of the potential loss of wilderness character and ecological function due to a significant infestation of NNIS.

Heritage

Loss of artifacts due to vandalism. **\$500,000** (best estimate...loss is irreplaceable)

F. Cost of Selected Alternative (Including Loss):

Campsite Safety and Closure Patrol: **\$32,078**

- Campsite Safety
 - 750 hrs x \$13.58/hr = \$10,185
 - Crew per diem 25/day x 75 days = \$ 1,875
 - Crew Travel \$1500 x 4 each = \$ 6,000
 - Wilderness Latrines \$300/each x 21 = \$ 6,300
- Closure Patrol
 - 480 x \$13.58/hr = \$ 6,518
 - Crew per diem 25/day x 48 days = \$ 1,200

NNIP Detection and Eradication: **\$27,525**

- 120 days x \$180/day = \$21,600
- Crew per diem 25/day x 120 days = \$ 3,000
- Beaver flight \$400 x 1 day = \$ 400
- NNIP report \$305 x 5 days = \$ 1,525
- Supplies \$1000 x 1 = \$ 1,000

Heritage Site Evaluation: **\$ 4,400**

- 16 days x \$200/day = \$ 3,200
- Crew per diem 25/day x 16days = \$ 400
- Report writing \$200/day x 4days = \$ 800

Total: **\$64,003**

G. Skills Represented on Burned-Area Survey Team:

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

Team Leader: Luke Rutten, Forest Hydrologist, Chippewa National Forest

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Team Members: Ken Gebhardt, Fisheries Biologist; Joe Gates, Soil Scientist; Sara Eckardt, Watershed Specialist; Walt Okstad, Historian; Bill Clayton, Archeologist; Jack Greenlee, Botany/NNIS; Ann Schwaller, Recreation/Wilderness; Loretta Cartner, Assistant Team Leader/Geologist; Tom McCann, GIS

Others Consulted/Involved in IDT field review: Dennis Neitzkie, District Ranger, Gunflint Ranger District; Steve Schugg, Tom Kaffine, and Tim Engrav, Cavity Lake Fire Resource Advisors; Barb Leuelling, Forest Soil Scientist

H. Treatment Narrative:

Land Treatments:

Campsites:

Ensuring user safety at BWCAW campsite will include; (1) Campsite closures (temporary and/or long-term) – the sites will be closed via signing (on-site and at entry point) and possible flagging at dangerous locations (i.e.; unmarked latrine hole, hazard trees, etc.) and with wilderness ranger patrolling. When closing a campsite, the objective is to return the area to a natural appearance or to the acceptable campsite standards and to prevent campsite expansion. Landing erosion will be stabilized with native materials and will be visually unobtrusive. Compacted soil should be tilled to develop an acceptable seedbed for vegetation in areas determined unnecessary for use. The object of the campsite treatment is recovery for visitor use and wilderness character. (2) There are burned, leaning, and jack-straw trees across the campsites, latrine trails and latrines. Because these trees constitute an urgent significant hazard, removal is necessary. Hazard trees may be cut with a cross cut saw or dispersed via explosives. (3) Latrine placement – replace burned over latrines to accommodate mandatory campsite use for visitors and/or employees using the area to prevent unsanitary conditions contributing to public health and safety issues. New holes may need to be established as burned over holes may collapse. (4) Signing – information and education signs at Ranger Districts, Forest kiosks, wilderness entry points, local business locations (outfitters, cooperators, etc.), (5) Site patrols - Sites will be patrolled to prevent visitor camping and to track the progression of campsite recovery due to closures to ensure objectives are being met. Patrolling may include photo points, quantitative vegetation data collection, and general ground surveys. A late season patrol in October will help determine site needs for the 2007 spring and summer.

NNIP/S:

The type of treatment that is recommended for the burned area is “detection” or checking for presence/absence for NNIS. In 2007, susceptible sites, such as areas with moderate or severe burn intensities, exposed bedrock, south facing slopes, firelines, and helispots within the burn, would be the primary focus of this treatment. Standard weed inventory protocols would be followed during detection. Two visits to the burned area would be needed, one for early season species and one for late season species. For any new infestations, the GPS location and infested area would be recorded. New infestations would be hand-pulled and eradicated. If NNIS species are detected and species eradicated in 2007, then monitoring to assess treatment effectiveness will be proposed for 2008.

Heritage:

Temporary closure of campsites will help protect sites near those closures. Also, material cleared from sites for ensuring campsite safety will be directed to be placed on nearby Heritage sites in order to increase cover of those sites and make them less visible to visitors. Finally, heritage sites located near open campsites and portage trails will be observed in 2007 to determine if the sites are easily visible to visitors and if they are being impacted by vandalism.

Channel Treatments: n/a

Roads and Trail Treatments: n/a

Structures: Wilderness latrines; see discussion above under land treatments.

Monitoring Narrative:

See discussion under NNIP/S and Heritage for discussion of detection and observation work that will occur during first year. If treatments occurs, a detailed monitoring plan will then be submitted for work in year 2.

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

			NFS Lands				Other Lands			All	
		Unit	# of	WFSU	Other (Assmnt)		# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	SULT \$	\$		units	\$	Units	\$	\$
A. Land Treatments											
Campsite Safety	each	18060	1	\$18,060	\$0			\$0		\$0	\$18,060
Closure Patrol	each	7718	1	\$7,718	\$0			\$0		\$0	\$7,718
Insert new items above this line!				\$0	\$0			\$0		\$0	\$0
Subtotal Land Treatments				\$25,778	\$0			\$0		\$0	\$25,778
B. Channel Treatments											
Insert new items above this line!				\$0	\$0			\$0		\$0	\$0
Subtotal Channel Treat.				\$0	\$0			\$0		\$0	\$0
C. Road and Trails											
Insert new items above this line!				\$0	\$0			\$0		\$0	\$0
Subtotal Road & Trails				\$0	\$0			\$0		\$0	\$0
D. Structures											
Latrines	each	300	21	\$6,300	\$0			\$0		\$0	\$6,300
Insert new items above this line!				\$0	\$0			\$0		\$0	\$0
Subtotal Structures				\$6,300	\$0			\$0		\$0	\$6,300
E. BAER Evaluation											
				\$0	\$32,000			\$0		\$0	\$0
Insert new items above this line!				\$0	\$0			\$0		\$0	\$0
Subtotal Evaluation				\$0	\$32,000			\$0		\$0	\$0
F. Monitoring											
NNIP Detect and Erad	each	27525	1	\$27,525	\$0			\$0		\$0	\$27,525
Heritage Inspections	each	4400	1	\$4,400	\$0			\$0		\$0	\$4,400
Insert new items above this line!				\$0	\$0			\$0		\$0	\$0
Subtotal Monitoring				\$31,925	\$0			\$0		\$0	\$31,925
G. Totals				\$64,003	\$32,000			\$0		\$0	\$64,003

PART VII - APPROVALS

1. /s/ Roseann M. Eaton for Jim Sanders
Forest Supervisor (signature)

August 29, 2006
Date

2. /s/ John Phipps
Regional Forester (signature)

August 31, 2006
Date