

Trails Assessment - Rough Fire North Zone BAER
Sierra National Forest
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I. Potential Values At Risk

Forest Service system motorized and non-motorized (hiking and stock trails) within the Rough Fire burn area are threatened from damage and tread loss as a result of post-fire watershed response and could also present a threat to watershed stability. Existing off-trail unauthorized routes are now open to OHV trespass due to fire removing vegetation that previously concealed the routes could lead to the creation of unauthorized trails and impacts to vegetative and soil recovery in the fire area. Six trail segments within the fire area were identified, and field and GIS assessments were completed to determine if threats exist to trail infrastructure and watershed. The following trails within the fire area were identified for assessment:

- Rodgers Ridge Trail (28e05)
- Cliff Camp Trail (28e04)
- Statham Creek Trail (28e40)
- Bear Wallow Trail (27e43)
- Kings River National Recreation Trail (Kings River NRT- 27e40)
- Spanish Mountain OHV Trail (28e224)

Other values at risk are human health and safety to hikers, OHV recreationalists and stock riders using trails due to unstable burn area conditions and destabilized trail tread. Burned trees along the trails could randomly fall are also a threat. Soil productivity may be impacted as a result of post-fire water erosion where water control features on the trails are lacking. One of the trails (Kings River NRT) has a potential of flash flooding at several stream crossings that presents a life and safety hazard to trail users.

II. Resource Condition Assessment

A. Resource Setting

The Rough Fire burned within tributary watersheds of the Kings River north of Kings Canyon on the Sierra National Forest, High Sierra Ranger District and this area is where the trails assessment was focused. The area where the trails are located is characterized by steep granitic rock formations with elevations from 1000 feet at the confluence of North Fork Kings River to 10,000 feet along Rodgers Ridge and Spanish Mountain. Dense forests of Jeffrey Pine, Incense Cedar, White and Red Fir, Sugar Pine and Western White Pine are found along long, steep continuous slopes leading to granitic rock outcrops and sub-alpine conditions on Spanish Mountain and Rodgers Ridge at the highest elevations. The Kings River drains into Pine Flat Reservoir approximately 10 miles downstream of the fire. The trails assessed follow densely forested slopes and drainages in the upper elevations and within grassland shrub and oak communities along the slopes of the river canyon. The Rough Fire BAER Hydrology report discusses the

watershed resource setting further and other detailed information on watershed condition applicable to this assessment. The Spanish Mountain OHV trail ends at the John Muir Wilderness boundary and becomes a non-motorized wilderness trail. Statham Creek and Three Springs trail also lead into the wilderness.

B. Findings of the On-The-Ground Survey

1. *Resource Condition Resulting from the Fire*

The identified trails for assessment have sections are located within moderate and high burn severity areas of the fire along steep slopes where runoff from storm and snowmelt is likely to be increased and have the ability to concentrate on the trails. Water control features on these trails are lacking adequate drainage features or are in need of repair or maintenance, and with expected increases of runoff the trails will likely experience severe erosion in their current condition and as a result could lead to major trail repairs and costs. Forest Service roads, mostly of native soil are found in the fire area that access trailheads. Multiple abandoned logging trails are found along these roads that access the trailheads in the upper elevations are now exposed by the fire when vegetation burned, and there are no barricades present to discourage OHV use and trespass. These now exposed trails present a potential OHV trespass problem that could lead to the development of unauthorized trails, increased resource damage and could slow vegetative recovery. OHV use on the fire area roads is common and popular according to Sierra NF staff, and the Spanish Mountain OHV trail is high use.

Several large, dead or slowly burning trees remain standing in the assessment area that will likely fall at a later time will add to trail damage and present a threat to life and safety. Along with large woody debris, large amounts of ash and burned debris are covering trail tread and following of trails is difficult in these areas. Post-fire trail users (OHV, hikers and stock) could vulnerable to severe injury or death in areas with large burned trees and limbs, particularly during the first year after the fire as fire weakened trees fall, more so during high wind events. Tree fall onto trails can occur randomly depending on weather conditions and other factors. Fallen trees over trails can cause trail users to navigate around the downed trees for access, and this tends to cause the development of additional, or multiple trail patterns that usually are erratic in alignment. This condition can lead to additional soil erosion and vegetation impacts in the long term if trees are not cleared from trails, and can lead to route finding problems.

Kings River National Recreation Scenic Trail

Based on hydrologic modeling and debris flow modeling, there is an increased threat of flash flooding and debris flow at the mouth of the large drainages/tributaries to the Kings River that burned with large areas of moderate and high severity where the trail crosses. Safety and life of trail users are at threat if camped or present in the area if flooding and debris flows occur (See hydrology and geology assessment reports).

C. Describe Critical Values/Resources and Threats:

1. *Trails (Motorized and Non-motorized)*

Emergency conditions exist for specific trails and sections of trail within the burned area. These emergency conditions are based on threats associated with anticipated post wildfire impacts on trails and trail users. Threats to trails include excessive erosion of the trail tread caused by interception and diversion of runoff from steep burn hill slopes. Trails may also be impacted where they intersect with drainages and crenulations. **Table 1** below outlines the amount of miles of trails per burn severity.

There is a total of approximately 24 miles of hiking trails and 3.4 miles of motorized (OHV) trails within the fire area. Approximately .13 miles of systems hiking trails are in high burn severity areas with 3.6 miles in moderate burn severity areas (due to topography and post-fire conditions moderate severity is estimated to have a high watershed response). Approximately, .11 miles of the Spanish OHV trail is in high burn severity with 1 mile in moderate burn severity. Life and safety of trail users is also at risk in some areas within the burn. Specific trails and sections of trail at increased risk from post wildfire threats are the Rogers Ridge (28e05), Cliff Camp (28e04), Bear Wallow (27e43), Statham (28e40), Kings River NRT (27e40) and Spanish motorized OHV trail (28e224). This determination is based on professional judgement and field based identification of segments of trail where implementing treatments would effectively lower the risk of major trail damage, thus a favorable benefit to cost ratio was determined.

Table 1: Miles of Trail per Burn Severity

Non-motorized & motorized Trail Miles by Soil Burn Severity Class			
	Non-Motorized (all other trails)	Motorized (only trail 28E224, Spanish)	Total Miles
High	0.13	0.11	0.24
Moderate	3.56	1.04	4.6
Low	14.49	1.46	15.95
Unburned/Very Low	6.14	0.73	6.87
Total Miles	24.3	3.34	27.64

Table 2: BAER Risk Assessment – Rough Fire Trails

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	RISK		
Very Likely			
Likely		High	
Possible			
Unlikely			

Probability of Damage or Loss: Likely. This determination is based on the burn severity in relationship to the trail and estimated runoff impacting the trails.

Magnitude of Consequence: Moderate. This determination is due to the potential damage to the trails compared to the level of use.

Risk Level: High.

III. Treatments:

A. Land Treatments

1. *OHV (Off Highway Vehicle) Trespass*

Increased unauthorized access to the Rough Fire burned area is expected to occur due to removal of vegetation. Unauthorized access is a threat to the burned watersheds. Erosion, spread of invasive species, damage to cultural sites, destruction of rare plant and native plant communities, disturbance to wildlife, destruction of wildlife habitat, and risks to public safety can result from unauthorized access. The BAER Assessment team has identified areas off the Spanish OHV trail and 11S025A for example, within the burned area for barriers to prevent unauthorized off highway vehicle access: Old, previously closed skid trails and routes that were grown over are now exposed. These areas offer easy unauthorized OHV access to burned areas and thus are recommended for blocking and signage to protect vegetative recovery. Blocking will consist of installation of native on site materials, Funding for crews to construct the barriers and signage is requested. This will also require limited heritage clearance for the ground disturbance.

Through past experience, the BAER Team determined that signage, and barriers, installed to discourage soil disturbance and assist in allowing natural vegetative recovery, are not effective without enforcement patrol. Therefore, additional funding is requested to monitor effectiveness these barriers. Funding is also requested for District FPO's to patrol within and adjacent to the burned area to enforce the physical barriers and deter unauthorized access, on National Forest System lands.

OHV (Off Highway Vehicle) Trespass				
Item	Unit	Unit Cost	# of Units	
OHV Techs. X4	Days		7	
GS-11 Archaeologist Clearance	Days		1	
GS-12 Recreation Specialist	Days		3	
Misc. Supplies	Each		1	
Carsonite Posts and stickers	Each		20	
1-GS-7 Patrol	Days		10	
Mileage for Patrol	Miles		1,500	
Total Cost				

2. Trail Storm Proofing (motorized and non-motorized):

Prior to the first damaging rain events and within the first year following the fire, storm proofing is recommended to minimize erosion of the trail tread. Storm proofing treatments, implemented with hand-tools, would include out-sloping, de-berming, water-bars, armored crossings at ephemeral drainages, and other suitable treatments outlined in the BAER Treatments Catalog to protect the trails from accelerated post fire flows and soil erosion. Rodgers Ridge, Cliff Camp, Bear Wallow, Statham, Kings River NRT hiking trails and Spanish OHV trail would be treated. Repairs are recommended for at least 4 miles of hiking trails and 2 miles of OHV trail (total of approximately 6 miles) within high and moderate soil burn severity where high watershed responses are anticipated. Trail stream crossings need to be cleared of obstructions (loose floatable woody debris, rocks, etc.) to allow for channel capacity and flow bypass and to reduce lateral erosion to the trail entries and reduce potential for on-trail diversion of flow.

Implementation Crew Labor Cost and Project Oversight (Trail Specialist)				
Item	Unit	Unit Cost	# of Units	
Wilderness Techs. x 4	Days		17	
GS-12 Recreation Specialist	Days		5	
Fire crew (hazard tree mitigation)	Days		3	
1 GS-11 Archaeologist Clearance	Days		1	
Supplies	Each		1	
Travel (mileage)	Miles		1000	
Total Cost				

3. *Hazard Signs for motorized and non-motorized trails:*

To inform trail user life/safety, hazard signs are recommended on five hiking trails and on the Spanish OHV trail. Following the first winter, the trail and watershed conditions should be evaluated to determine if hazardous conditions still exist. Closure would be implemented through the issuance of a forest order or area closure and trailhead signage.

Hazard sign development and placement				
Item	Unit	Unit Cost	# of Units	
GS-12 Recreation Officer	Days		4	
Hazard signs (includes installation)	Each		6	
Misc. Supplies	each		1	
Travel (Mileage)	Miles		500	
Total Cost				

Other info on treatments:

Probability of completing treatment prior to damaging storm or event: 100%. Probability of treatment success: 1 year, 100%.

IV. Appendix A

1. Site Photos (1-3)
2. Trail Treatment Location Maps (1-4)

1. Site Photos



Photo 1: Spanish Mountain OHV Trail in moderate burn severity and steep slopes. Lack of adequate drainage features on this section of trail will likely cause increase soil erosion and loss of trail post-fire.



Photo 2: Steep section of the Spanish Mountain OHV Trail. Moderate to high burn slopes are located over a large area above this section of trail that will bring increased runoff to the trail. Other trails surveyed on fire have similar conditions. Additional drainage features are needed to reduce erosion. Rough Fire NZ BAER Trails Assessment, Sierra National Forest September, 2015
C. Shannon, BAER Hydrologist



Photo 3: Abandoned logging trail off Rodgers Ridge. An example of one of the several abandoned logging trails/skid trails now exposed by removal of vegetation by the fire that are connected to Forest Roads and Trails in the fire area. Without vegetation present to hide the trails, the potential for OHV's to trespass on the trails is high.

2. Trail Treatment Location Maps

Map 1: Bear Wallow Trail Treatment Locations

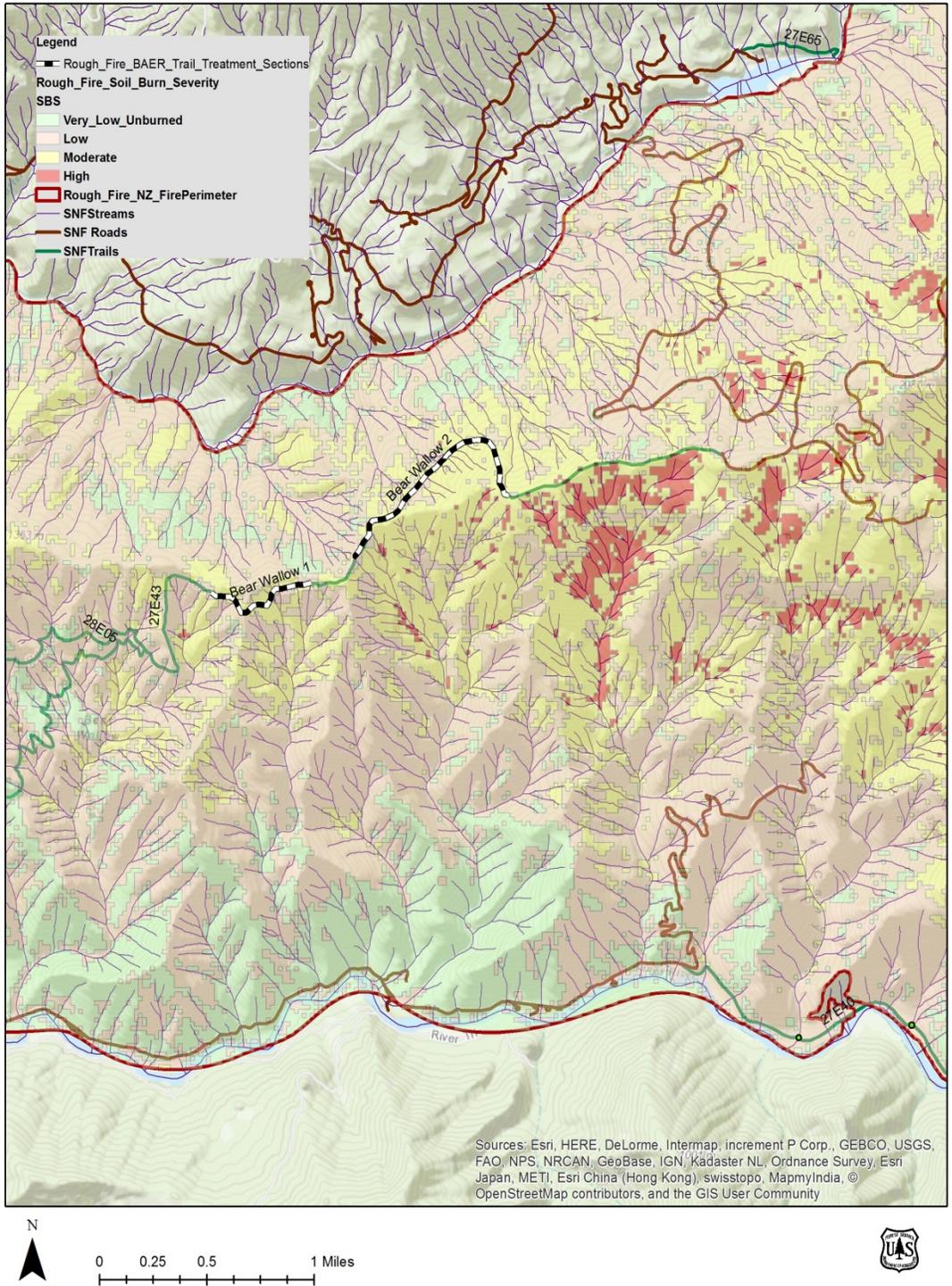
Map 2: Rodgers Ridge Trail Treatment Locations

Map 3: Spanish Mountain, Statham Creek, Cliff Camp Treatment Locations

Map 4: Kings River National Recreation Trail Treatment Locations

Map 5: Overall location map of trail treatment areas, NZ Rough Fire BAER

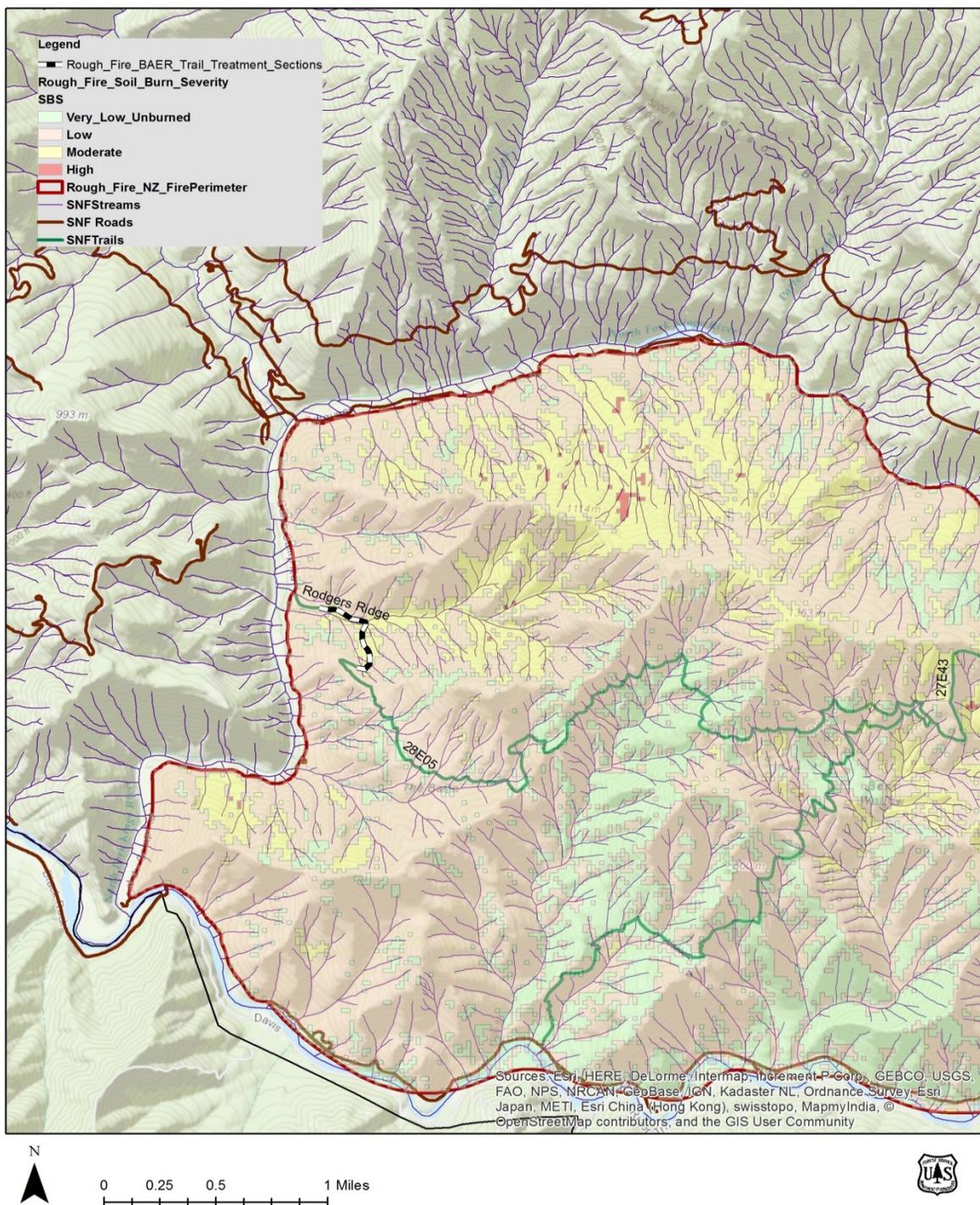
Rough Fire North Zone BAER Sierra NF - Bear Wallow Trail Treatment



Map 1: Location of Bear Wallow Trail treatment sections on Roberts Ridge.

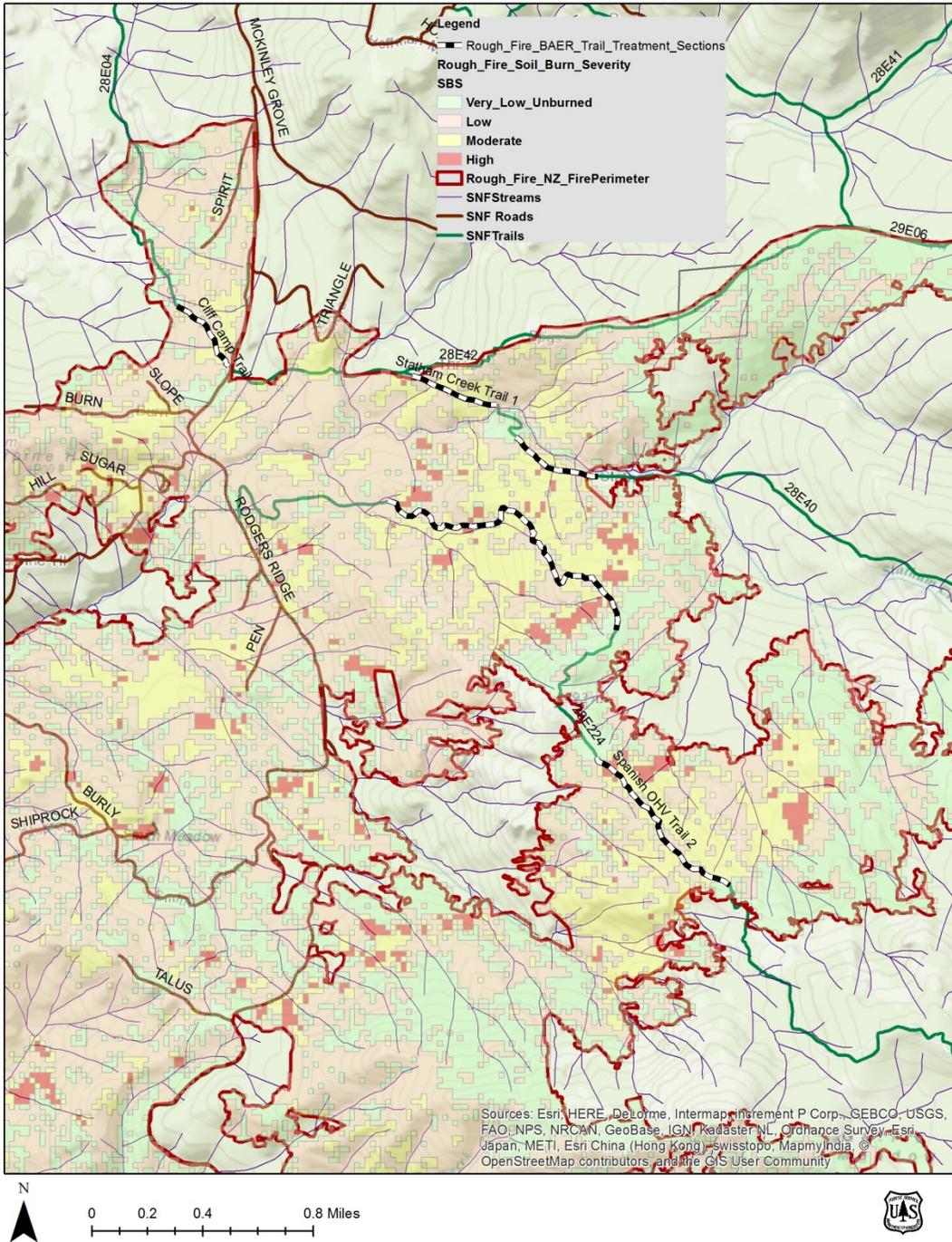
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Rough Fire North Zone BAER Sierra NF - Rodgers Ridge Trail Treatment



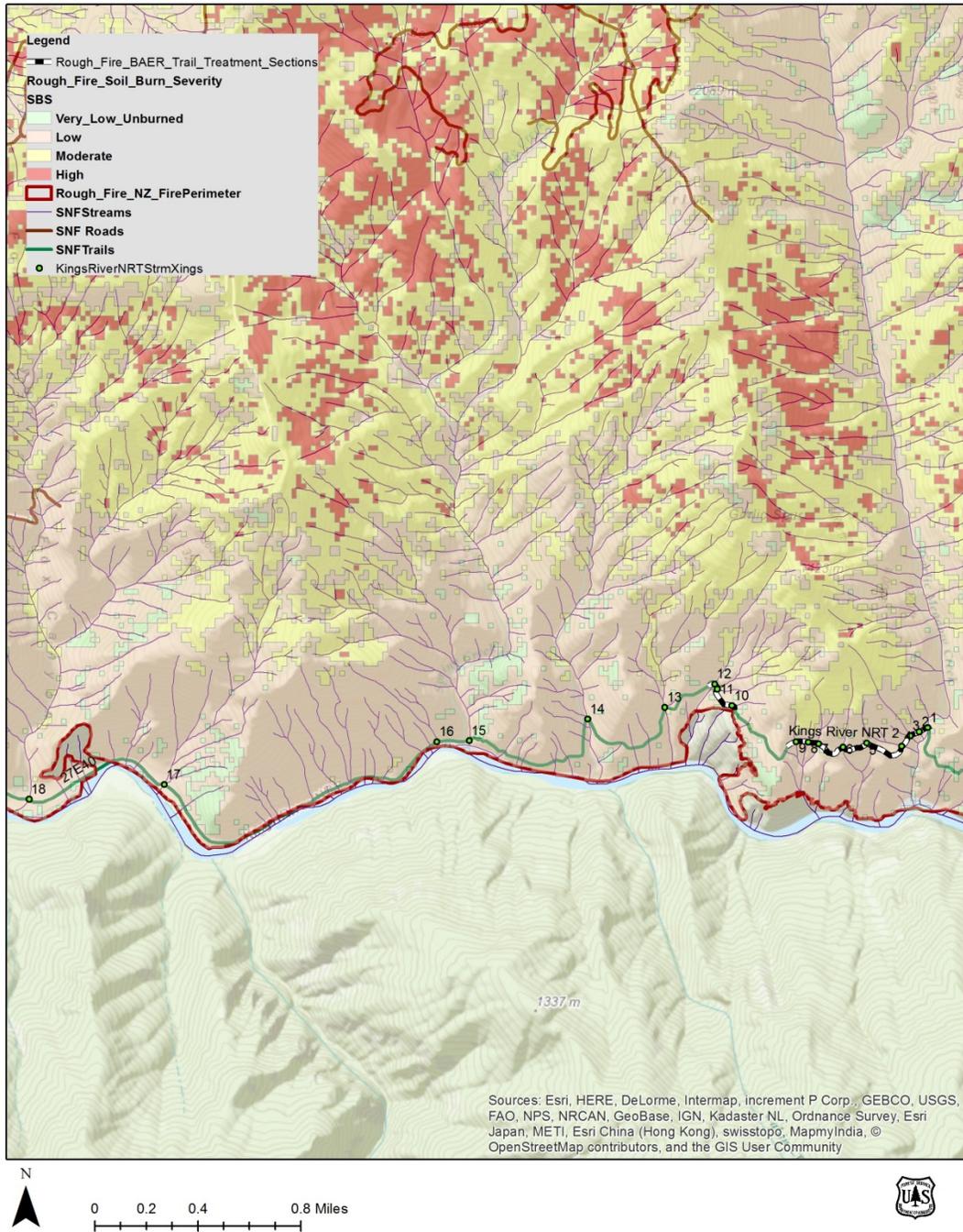
Map 2: Location of Roberts Ridge Trail treatment section, near North Fork Kings River trailhead.

Rough Fire North Zone BAER Sierra NF- Spanish Mountain Area Trail Treatments



Map 3: Location of Spanish Mountain trails treatment sections, including Spanish Mountain OHV, Cliff Camp and Statham Creek trails.

Rough Fire North Zone BAER Sierra NF- Kings River National Recreation Trail Treatment



Map 4: Location of stream crossing sites and trail treatment sections on the Kings River NRT.

