Trail Creek Fire

Burned Area Emergency Rehabilitation Plan

Agency/Unit: U.S. Forest Service
Boise National Forest

Location: Boise, Idaho

Date: March 19, 2003

Prepared By: Boise National Forest BAER Team

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[ ] 1. Funding request for estimated WFSU-SULT funds
[**X**] 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

[**X**] 3. Final Report (Following completion of work)

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: **Trail Creek Fire**

B. Fire Number: **523**

C. State: **Idaho**

D. County: **Elmore**

E. Region: **R4**

F. Forest: **Boise**

G. District: **Idaho City RD**

H. Date Fire Started: **August 18, 2000**

I. Date Fire Contained: **Sept. 1, 2000**

J. Suppression Cost: **Est. 8.0 million**

K. Fire Suppression Damages Repaired with Suppression Funds
1. Fireline waterbarred (miles): **4.5**
2. Fireline seeded (miles): **4.5**
3. Other (identify): fire camp (10 ac.); helispots (est. 10-15)

L. Watershed Number: 1705011108

M. Total Acres Burned: **33, 202** acres
NFS Acres(**31,527**) Other Federal (**0**) State (**0**) Private (**465**)

N. Vegetation Types: Warm Dry Subalpine Fir (40%); High elevation Sublapine Fir (10%); Cool Moist Douglas-fir (13%); other Douglas-fir types (12%); non-forest grass or shrub types (20%).
O. Dominant Soils: **sandy loams**

P. Geologic Types**: Idaho Batholith granitics**

Q. Miles of Stream Channels by Class: Perennial: **65.0** miles; Intermittent : **47** miles

R. Transportation System- Trails**: 33** miles Roads: **37.0** miles

PART III - WATERSHED CONDITION

A. Burn Severity (acres)*: **1,350** (low) **7,420** (moderate) **5,952** (high)

B. Water-Repellent Soil (acres): **13,372**

C. Soil Erosion Hazard Rating (acres)*: **5,305** (low) **17,955** (moderate) **7,600** (high)

D. Erosion Potential: **1.36** tons/acre

E. Sediment Potential: **200** cubic yards / square mile

**These acres specifically represent burned area and not fire perimeter.*

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period, (years):	**5-10**
B. Design Chance of Success, (percent):	**90**
C. Equivalent Design Recurrence Interval, (years):	**5**
D. Design Storm Duration, (hours):	**0.25 hrs**
E. Design Storm Magnitude, (inches):	**0.41 in.**
F. Design Flow, (cubic feet / second/ square mile):	**14 cfs/m^2**
G. Estimated Reduction in Infiltration, (percent):	**40%**
H. Adjusted Design Flow, (cfs per square mile):	**20 cfs/m^2**

PART V - SUMMARY OF ANALYSIS

A. Description of Watershed Emergency:

The Trail Creek Fire burned over 33,000 acres near the small community of Atlanta Idaho. The fire burned at moderate and high severity over approximately 13,300 acres and created an increased potential for debris flows/torrents into the town of Atlanta. Several abandoned mine sites with potentially hazardous tailing ponds could also be at risk to flood events. Should these mine waste sites be impacted by a flood event, hazardous materials could be transported into the Middle Fork Boise River that is a migratory corridor for the bull trout, a threatened and endangered species. The area consists of an Idaho Batholith granitic intrusion that is highly erosive producing coarse-grained sandy loam material.

There are two distinct areas of concern affected by this fire, the Yuba River and those tributaries draining into Atlanta. The tributaries, Quartz Gulch and Montezuma Creek, encompass about 4 square miles and drain directly into the town of Atlanta and its source for drinking water. There is a serious and direct threat to life and property below both of these drainages due to the 944 acres of moderate to high severity burn above town. There is also a direct concern in these tributaries and including Flint Creek, tributary to Decker Creek, for delivery of unacceptable amounts of toxic materials to the stream system. The second area of concern is the Yuba River drainage, which consists of about 49 square miles draining to the Middle Fork Boise River. The confluence is about 0.25 miles upstream of the Kirby Dam, which produces hydropower and serves as a containment structure for toxic mining waste. The Yuba River is also a Bull Trout stronghold for the Middle Fork Boise River, therefore, creating a greater need to maintain full migratory access to the fish ladder on the Kirby Dam. Higher than normal stream flows and sediment loads are expected to interrupt the functionality of the fish ladder. Further, the fire has greatly increased the potential for the spread of noxious weeds throughout the burned area, both from weeds present in the Atlanta basin and new species potentially brought in from the suppression/rehabilitation activities.

Due to the separation of these two areas of concern, and the consideration of management within the Yuba River Management Area #10, an Inventoried Roadless Area managed for undeveloped recreation, two alternatives have been developed. Alternative 1 would include recommended treatments for the entire fire area, including the Roadless Area. Alternative 2 would include treatments only in the Atlanta Management Area #11 and including Flint Creek due to the concern for mobilization of heavy metals.

B. Emergency Treatment Objectives:

The treatment objectives are to:

- Locate and stabilize severely burned hillslopes that pose a threat to human life and property, and, important cultural and natural resources. This would be accomplished by rehabilitating infiltration capacities and reducing fire-accelerated erosion rates on moderate and high severity burn areas.

- Implement treatments before the end of October.

- Retard the invasion of noxious weed species into the fire area.

- Provide a long-term monitoring plan with recommendations to ensure the success of the rehabilitation efforts.

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

Land **90** % Channel **90** % Roads **80** % Other ___ %

D. Probability of Treatment Success

Alternative 1

	Years after Treatment		
	1	3	5
Land			
Yuba River	60	70	80
Atlanta Front	75	85	90
Channel			
Atlanta Front	70	80	90
Roads	80	85	90
Other	70	80	90

Alternative 2

	Years after Treatment		
	1	3	5
Land			
Yuba River	No treatment	No treatment	No treatment
Atlanta Front	75	85	90
Channel			
Atlanta Front	70	80	90
Roads	80	85	90
Other	70	80	90

E. Cost of No-Action (Including Loss):

See Attachment 1

F. Cost of Selected Alternative (Including Loss):

See Attachment 2

G. Skills Represented on Burned-Area Survey Team:

[X] Hydrology	[X] Soils	[X] Geology	[X] Range
[X] Forestry	[X] Wildlife	[ ] Fire Mgmt.	[X] Engineering
[ ] Contracting	[ ] Ecology	[X] Botany	[X] Archaeology
[X] Fisheries	[X] Research	[X] Landscape Arch	[X] GIS

H. Team Leader(s):

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Treatment Narrative

Treatment Narrative

(Describe the emergency treatments, where and how they will be applied, and what they are intended to do. This information helps to determine qualifying treatments for the appropriate funding authorities. For seeding treatments, include species, application rates and species selection rationale.)

Land Treatments:

Treatments by Alternative

Treatment	Alternative I (acres)	Alternative II (acres)
Contour Felling		
Boise National Forest	8,008	1585
Private Land	69	69
Wattles		
Boise National Forest	2,017	1346
Private Land	256	256
Scarification/Mulching		
Boise National Forest	484	484
Private Land	76	76
Seed		
Boise National Forest	820	820
Private Land	86	86
Total Treated Area	**11,816**	**4,722**

Land Treatments:

1. **Seeding**

Purpose: To minimize soil erosion by providing a vegetative surface cover.

Treatment: Aerial seeding will occur at a rate of 20 lbs/acre on high intensity and moderate intensity burn areas. An estimated 13,000 pounds of seed will be used on approximately 650 acres. Additionally (refer to Alt 2 table, line item #7- seeding roads and trails), 335 acres along roads and trails will be ground-based applied. An additional 50 acres will be hand-seeded adjacent to existing noxious weed populations. This would require an additional 7,700 pounds of seed.

Actual: Aerial seeding was implemented in the spring of 2001 rather than fall of 2000 and applied on all 650 acres originally planned. Application rates were monitored for uniformity and found to be successful even under windy conditions. Seed germination was difficult to determine due to an unexpected positive response from native vegetation.

2. **Scarification/mulching**

Purpose: To break up hydrophobic layers within the top 2-4 millimeters of the soil surface. This will increase infiltration and reduce runoff.

Treatment: Manually rake portions of upper and middle watersheds above the town of Atlanta. Raking should occur to a depth of 1-4 cm. Mulch disturbed ground with weed free straw to a depth of 2-4 inches. An estimated 300 acres would be hand scarified and mulched in Montezuma and Quartz Gulch subwatersheds.

Actual: The plan called for approximately 485 acres of scarification mulching. During implementation, the number of scarification acres was decreased by half due to the steepness of the terrain and rocky soil conditions that were not identifiable through the aerial survey and GIS analysis of the burned area. The reduction of acres for this treatment is not expected to decrease the project's probability of success.

3. **Contour Felling of Trees**

Purpose: To trap sediments from side slopes to prevent material from entering stream channels and to keep sediment on site.

Treatment: Trees will be felled and installed on slopes < 70 percent and perpendicular to the slope. An estimated 30-40 logs/acre are felled and this treatment will vary depending on alternative selected and approved.

Actual: The plan called for approximately 1345 acres of contour felling within moderate and high burn severity areas. The actual area treated with contour felling was 1621 acres. During the layout of contour felling units, some areas considered to be low to moderate severity were reevaluated and

determined to be a higher burn severity than originally assessed. Due to the adequate supply of trees, these areas were recommended for contour felling.

4. **Straw wattles**

Purpose: To capture and retain sediment on slopes, reduce soil creep and sheet rill/erosion until vegetation reestablishes.

Treatment: Straw wattles will be installed on slope contours where sufficient trees are not available for contour felling. An estimated 30-wattles/acre is installed and this treatment will occur depending on alternative selected and approved.

Actual: The plan called for 2000 acres of straw wattles. Many of these planned acres were based on aerial reconnaissance and GIS analysis. During implementation, it was found that nearly 500 of these acres were not treatable, resulting in finally treating 1536 acres. These acres were not treatable due to one or a combination of the following reasons:

- ✓ *Steep and rocky slopes*
- ✓ *Untreated private land upslope of public land*
- ✓ *Lower burn severity than originally assessed on grass/forb hillslopes*

The plan also called for approximately 60,000 wattles. The actual number of wattles placed on the ground was less than 30,000 wattles. The reason for the decrease in the number of expected wattles was due in part to the reduction in acres, but more importantly due to the mixing of wattle and contour felling treatments on a large portion of the area originally delineated for one or the other single treatments.

5. **Land Treatment/Reduction of Hydrophobic Soils Monitoring**

Purpose: To monitor and evaluate the effectiveness of land treatments in reducing surface erosion and water repellent soils within the burned area.

Treatment: Measuring the effectiveness of treatments in reducing surface erosion and the continuity of water repellent soils within treated and non-treated areas.

Actual: Hydrophobic conditions and treatment effectiveness was monitored biannually and following major storm threats. Observations are documented as part of an attachment to this 2500-8.

Channel Treatments:

6. **Straw Bale Check Dams**

Purpose: To trap and store channel-mobilized sediment temporarily, to prevent down cutting, and attenuate sediment transport and peak flows by routing water through several small basins.

Treatment: Straw bale check dams are constructed of no greater than five bales

perpendicular to intermittent channels. They are positioned in a shallow trench with the bottom of the end bales 8 – 12 inches higher than the center spillway. All bales are wrapped together with chicken wire and staked, using small metal T-posts. The spillway is draped with filter cloth and rocks placed on the downstream side to prevent head cutting.

Actual: The plan called for 600 straw bale checkdams. Only 162 of the originally planned structures were constructed. The original plan estimate was based on 30,000 ft of low gradient stream channels. During implementation, this estimate was revised due to the actual steepness of the stream channels being greater than modeled in GIS. Local hillslope and channel morphologies were not conducive to this type of treatment.

Roads, Trail, and Facilities Treatments:

7. **Debris Racks and Culverts**

Purpose: Debris racks are installed to prevent the plugging of culverts or other water intake structures. Oversized culverts within the burned area should be installed to handle the increased runoff from the burned area.

Treatment: Replace undersized culverts and install new culverts where increased runoff from the burned watershed will cause damage to the road or trail system.

Actual: The plan estimated a need for approximately 21 culverts or debris racks which was based on the number of roads crossing drainage features that would require processing intermittent or perennial flow. During implementation and a more complete on-the-ground survey, it was found that a large number of these roads were outsloped and that drainage features did not indicate the flow volumes originally estimated. Drainage improvements included 8 new or upgraded culverts.

1. *8" culvert to 18" culvert*
2. *none to 18"*
3. *12" to 24"*
4. *24" to 48"*
5. *18" to 30"*
6. *15" to 36"*
7. *24" to 48"*
8. *18" to 30"*

8. **Road/Trail drainage improvement**

Purpose: Roads and trails within the burned area are often not constructed with a definite drainage template. There are several instances where the ill-defined road or trail template could allow runoff from adjacent burned slopes to flow down the road surface for several hundred yards. In the past this has not resulted in significant road damage, however the

current watershed condition could easily produce enough runoff to cause unacceptable road damage.

Treatment: Out-slope some critical road segments, and where needed, pull outside road edge burms, and establish inside ditch lines where necessary.

Actual: Improved drainage on about 18 miles of road within forest service jurisdiction. Seed spread along all roadwork that exposed raw soil surfaces with mix of Mountain Brome and Thickspike Wheatgrass. Water bars were constructed as driveable dips on all 18 miles of road that indicated signs of erosion.

9. **Road and Trail Drainage Cleaning**

Purpose: To reestablish road and trail drainage after rainfall events where sediment deposits have impaired the function of the road drainage system.

Treatment: Have a road patrol identify and clean sediment deposits from the road drainage system that have resulted from rainfall events. The road patrol would include a backhoe with operator, dump truck, and two laborers.

Actual: This was accomplished in the late fall of 2000 and was never necessary to repeat. However, tree planting efforts within approved National Fire Plan authorities did complete minor cleaning and improvements for crew access.

Debris Removal at Kirby Dam and Road Bridges

Purpose: Snags and other organic debris from the fire area can be transported downstream during peak flows to bridges and the Kirby dam. These snags and other debris can cause blockages at bridges and at the dam that could further cause scouring around bridge abutments or around the dam facility. The potential scouring action around abutments or the bridge facility could cause the bridges or dam to fail. Sediment deposits at the Kirby Dam Fish Ladder could also compromise the function of the ladder.

Treatment: Utilize an excavator (with thumb) or similar equipment to remove debris and/or sediment blockages at Kirby Dam and at Bridges along the Yuba River. This would reduce the potential for impounding water or sediment upstream from these facilities.

Actual: This activity was moved into the authorities for National Fire Plan, however, never necessary even under that program.

10. **Mud and Flood Road Patrol**

Purpose: To patrol and identify hazards to public safety which have resulted from the burned watershed condition such as, accumulation of debris behind bridges, Kirby Dam, and other road drainage structures.

Treatment: A team of two employees will be designated to patrol the area immediately high precipitation or runoff events and during spring snowmelt.

Actual: This activity was moved into the authorities for National Fire Plan, however, never necessary even under that program

11. **Structures: none planned at this time.**

Natural Resource Treatments

10 **Non-native Invasive Plant Control (noxious weeds)**.

Purpose: This proposal establishes an intensive integrated and coordinated noxious weed monitoring, management and control program for the burned area, areas impacted by fire suppression activities, and potential for weed spread through BAER rehabilitation activities. Due to the presence of noxious weeds in the Atlanta Basin (approximately 2,800 acres) and the presence of localized infestations within the burned area (approximately 200 acres), the entire burned area is at risk for weed infestation. The noxious weeds in question are extremely aggressive and adaptable to the burned area site conditions, especially in their post-burn state. Additionally, fire suppression crews and equipment were brought in from numerous locations around the U.S. without requiring any preventive measures to insure that introduction of new weed seed or plant parts did not occur. Treatment costs after a weed infestation is established range from $60 to over $200 per acre annually with multiple year treatments required. Noxious weed infestations replace native ecosystem components, prevent regeneration of tree species, increase in many cases long-term erosion and loss in soil productivity and alter the environment to the point that native flora and fauna are displaced. Unmanaged, the potential for noxious weed infestations spreading throughout the burned area would cost the public millions of dollars in lost resource uses, ecological values, and site productivity.

Treatment: Seed roads, trails, and portions of the burned area to increase the vegetative competition against the invasion and/or spread of noxious weeds. Chemical treatment would include sites within the burn area. Monitoring will identify the location and spread of invading noxious weed populations.

*Actual: **Seeding Roads/Trails** has been accomplished for the roads only and all seeding of trails was moved under National Fire Plan authorities. This project will tie directly to trail clearing and maintenance identified under the NFP program. Most of the trails will require some clearing prior to being able to seed cost efficiently.*

***Chemical Treatment** was moved to National Fire Plan authorities.*

***Monitoring** was completed as early as possible following snowmelt and ties into monitoring for NFP program for accuracy of treatments in year 2001 and 2002. This will be the monitoring already identified in year 2000 treatment plan. This activity was moved to the National Fire Plan in 2001.*

Equipment Needs *were purchased for all the above invasive plant treatments in the spring of 2001 prior to the field season in order to effectively accomplish work that was identified within the original BAER plan. Most of the work then got moved under the National Fire Plan authorities.*

Cultural Resource Treatments

12. **Survey & Inventory**

Purpose: To protect existing cultural resources in the burned area and inventory sites prior to implementation work. Treatment: Locate and flag all sites to be avoided by implementation operation, inventory newly found or uninventoried sites, and remove flagging following completion of BAER treatments.

Actual: The survey of the area for cultural resources sites (not contents) was completed and further inventory was to be accomplished under other authorities.

Health and Safety

13. **Law Enforcement**

Purpose: An area closure is planned for the rehabilitation area. The area closure will be applied due to the potential for contact with hazardous materials, the loss of protective structures around mine shafts, hazardous snags, and increased rehab related vehicle traffic on low standard windy roads. Also, hunting season is approaching, and the burned area is a popular area with fall season hunters. There is an increased potential for conflicts or an accident between hunters and rehabilitation workers. The purpose using law enforcement would be to enforce the area closure.

Treatment: Have one law enforcement officer patrol the area for approximately 2 months during the implementation activities. Install three gates at entrance points to the fire area to assist in the control of public access to the rehabilitation area.

Actual: This activity was found to be unnecessary and cancelled.

14. **Hazard Signing**

Purpose: To warn the public of the potential flash flood and snag hazards within the burned area. Signs will be concentrated at trailheads and at the intersections of roads most commonly used within the fire area.

Treatment: Install warning signs at all access points to the fire area along trails or roads. The signs will describe potential dangers due to flood events, falling trees, rolling material, and any implementation operations.

Actual: This activity was found to be unnecessary and cancelled.

15. **Hazard Tree Removal at Moderate and High Intensity Areas Adjacent to Roads and Trails**

Purpose: To provide safety to public and employees utilizing trail and road systems.

Treatment: A certified faller will remove hazard trees within 75 feet to either side of system roads and trails. Specific trees would be flagged as hazard trees utilizing established guidelines for hazard tree identification along recreational trails. Only trees identified as meeting the hazard tree guidelines would be removed.

Actual: This activity was moved into the authorities for National Fire Plan.

16. **Evaluation of Hazardous Materials Risk**

Purpose: The fire area encompasses a historic mining district. Chemicals used to process ore samples, and hazardous material byproducts from the mining operations, are present throughout the area. Several structures were burned which may have contained toxic materials. According to the BAER survey team mining geologist, known sites that were originally identified as hazardous waste sites, could be larger than previously mapped. Further, new unknown sites that were previously covered with vegetation could be exposed now that the vegetation has been burned off. In his opinion, these sites, known and unknown, potentially represent a threat to the public and to personnel working on the rehabilitation project.

Treatment: Implement reconnaissance surveys for hazardous materials where mining materials and/or structures have been damaged or destroyed by the fire. Also, sample areas that could be mine waste sites. Any new sites identified would be cordoned off and treated through normal hazardous waste treatment processes. This hazardous waste survey would be contracted to a local hazardous waste contractor.

Actual: This activity was moved into the authorities for National Fire Plan.

17. **Evaluation of Early Warning System in consultation State and County Emergency Services**

Purpose: To provide the local community of Atlanta with an early warning system in the event of a flash flood.

Treatment: Work with local and national emergency services organizations to assess the feasibility of installing an early warning system.

Actual: This activity was found to be unnecessary and cancelled.

Part VI – Actual 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										
Aerial Seeding	acres	156	650	$101,400	$0		$0		$0	$101,400
Scarification/Mulching	acres	779.5	242	$188,639	$0		$0		$0	$188,639
Contour Felling	acres	397	1621	$643,537	$0		$0		$0	$643,537
Straw Wattles	acres	1068	1536	$1,640,294	$0		$0		$0	$1,640,294
Non-native Invasive Pl	acres	231	335	$77,385	$0		$0		$0	$77,385
Cultural Resource Inve	each	11100	1	$11,100	$0		$0		$0	$11,100
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Land Treatments				$2,662,355	$0		$0		$0	$2,662,355
B. Channel Treatments										
Straw Bale Check Dam	each	1420	162	$230,040	$0		$0		$0	$230,040
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Channel Treat.				$230,040	$0		$0		$0	$230,040
C. Road and Trails										
Road & Trail Drainage	site vis	2100	2	$4,200	$0		$0		$0	$4,200
Debris Rack & Culverts	each	3750	8	$30,000	$0		$0		$0	$30,000
Road/trail Drainage Im	mile	4087	18	$73,566	$0		$0		$0	$73,566
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Road & Trails				$107,766	$0		$0		$0	$107,766
D. Structures										
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Structures				$0	$0		$0		$0	$0
E. BAER Evaluation										
2500-8		46000	1	$46,000	$0		$0		$0	$46,000
				$0	$0		$0		$0	$0
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Evaluation				$46,000	$0		$0		$0	$46,000
F. Monitoring										
Hill slope Monitoring	site vis	1604	9	$14,436	$0		$0		$0	$14,436
Insert new items above this line!				$0	$0		$0		$0	$0
Subtotal Monitoring				$14,436	$0		$0		$0	$14,436
G. Totals				**$3,060,597**	**$0**		**$0**		**$0**	**$3,060,597**

PART VII - APPROVALS

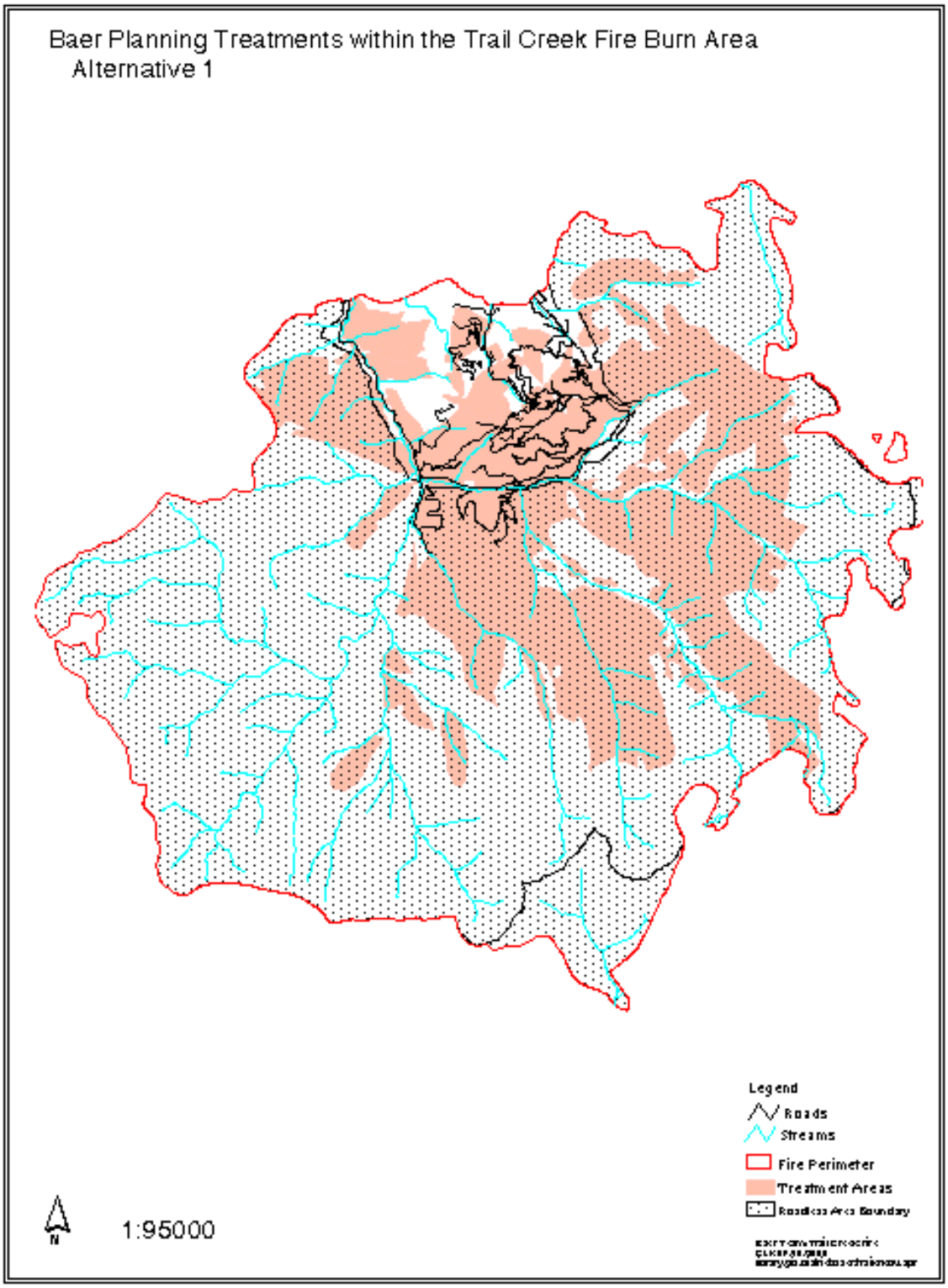
Alternative 1 ____
Atlanta Front & Yuba River Watershed

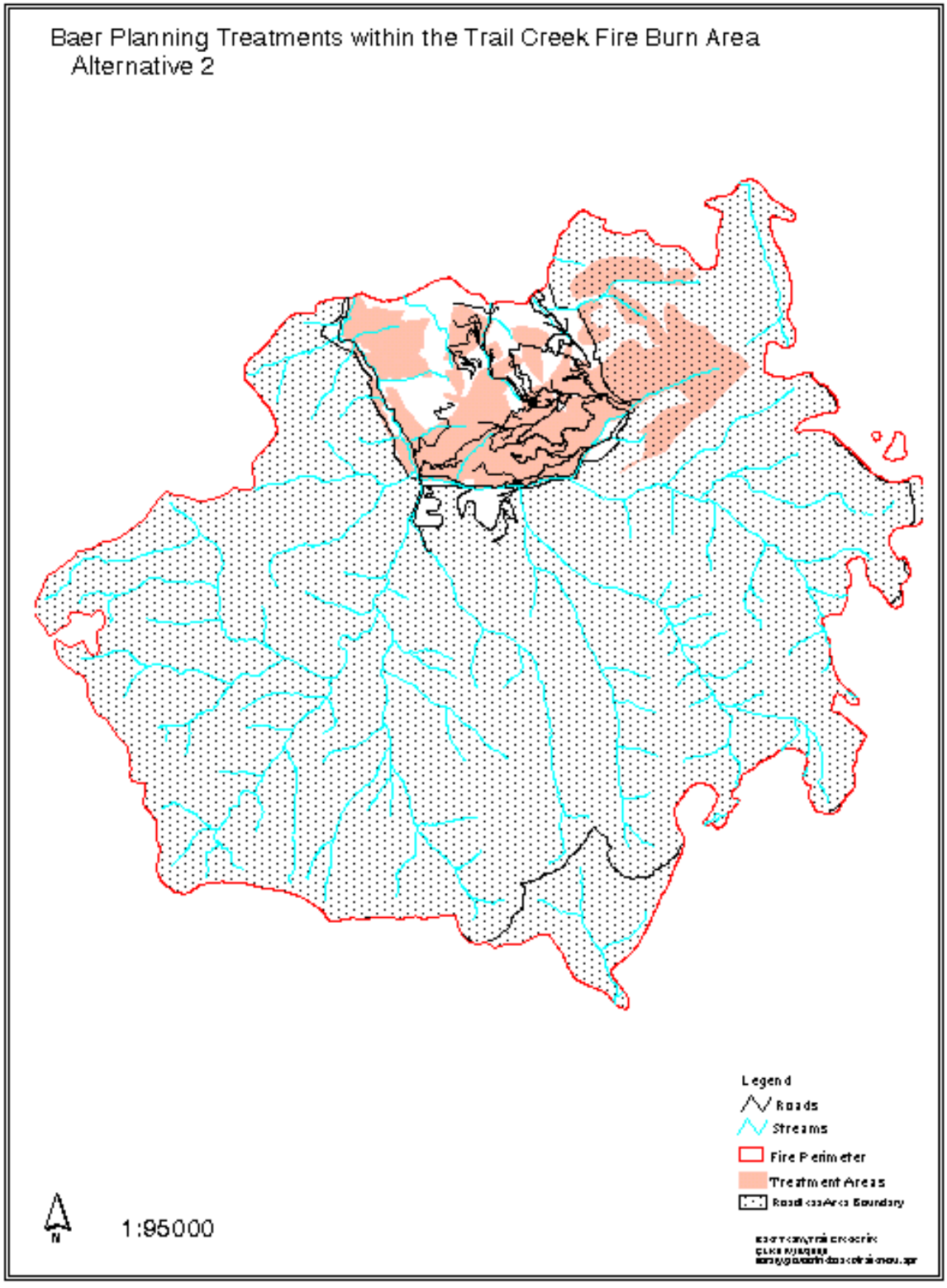
Alternative 2 __X***__
Atlanta Front Watershed

1. _____ _____
District Ranger (signature) Date

2. _____ _____
Forest Supervisor (signature) Date

3. _____ _____
Regional Forester (signature) Date


Baer Planning Treatments within the Trail Creek Fire Burn Area
Alternative 1
Legend
Roads
Streams
Fire Perimeter
Treatment Areas
1:95000


Baer Planning Treatments within the Trail Creek Fire Burn Area
Alternative 2
Legend
Roads
Streams
Fire Perimeter
Treatment Areas
1:95000

Monitoring Observations

Hill slope Treatments

Wattles and Contour Falling

Generally, a storm of the magnitude and duration that these treatments were designed to mitigate did not occur. However, there were a few locations within the burned area that received similar precipitation. Some rilling between structures did occur in those areas. Many of the structures, especially near the ridgetop were slightly filled to capacity with sediment filling increasing as you move down the hillside. This occurred as a result of cascading runoff over each successive structure. Spacing was generally above design specifications of 30-40 (20-25 foot) pieces per acre. For instance, Upper Flint Creek averaged about 44 pieces per acre and Lower Flint Creek averaged about 47 pieces per acre. Most of the structures were installed very well with an average structure slope of 4% off level with wings at each end for both logs and wattles. It was noted that being level plays a huge role in runoff storage, and that wings help mitigate for pieces that are not level. It was also noted that log and wattle structures play more of a role for water retention then for erosion control or sediment storage.

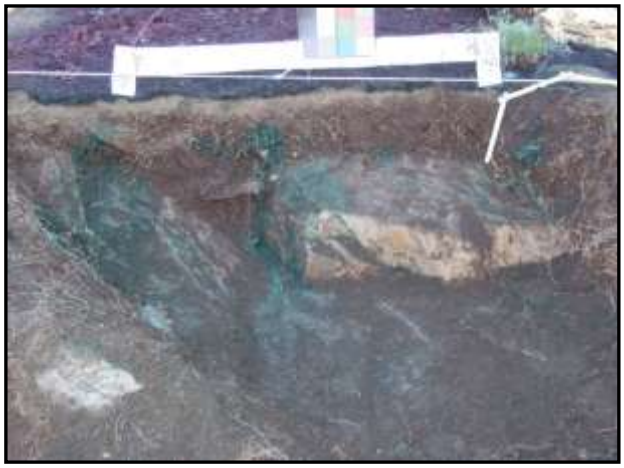
Flint Creek and a few untreated watersheds were the only watersheds that received rainfall of a level close enough to test the structure design. The largest storm recorded during this period was in 2002 with an intensity of about 0.75 inches received in 30 minutes. A precipitation event with a recurrence interval of not much more than 2.5 years is estimated to have reached the full working capacity of these structures for runoff mitigation or attenuation compared to untreated hillsides.

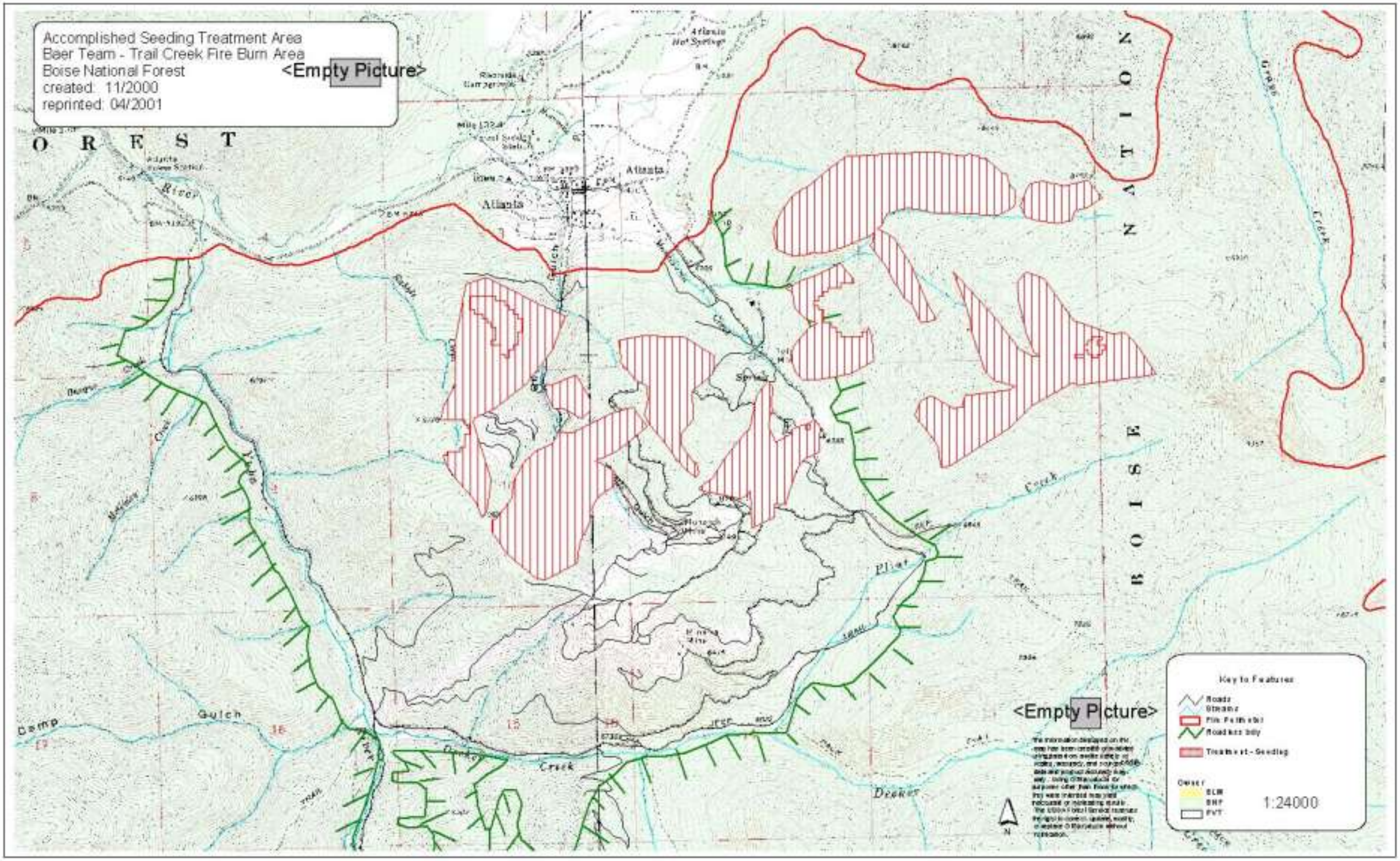
Straw Mulch

Straw mulch was applied to lower gradient slopes, but appears to have been the most effective hill slope treatment for reducing site erosion, raindrop impact, and runoff from the site. Straw was applied at a monitored rate of between 2 and 4 inches depth for every square foot treated. The result when compared to adjacent hillsides was that no erosion was visible on the treated hillside, whereas, the untreated hillside, even under lower burn severity experienced definite evidence of soil movement. The actual rate was within the specifications designed into the plan. However, when considering vegetation response within mulched areas, it is recommended that the mulch be applied at a rate below 2 inches in depth per unit. The entire mulched treatment was also seeded with a mix of native seed. This seeding was only apparent in portions of the mulch that were much less than 2 inches in depth after the first year. The 2nd year indicated more successful vegetative response within the mulched area. The 1st year was interesting because there was actually a very good response of wheat straw growth that was related to the straw itself and was not a seeded species. Conclusion puts mulching an a category of an excellent treatment to apply when possible, even though costs are not that much less than contour falling.

Hydrophobic Soil Conditions

Water repellent soils were found to resemble estimates within the 2500-8, however, probably more pronounced in depth and coverage. Although, huge variations in the level of repellency were observed for any parcel of land, most of the burned areas were water repellent. Interestingly, it was found that water repellency did not allow infiltration except for in pores or holes in the ground that covered about 1 percent of the area. These holes were the method if infiltration rather than an evenly distributed system of infiltration.

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Boise National Forest
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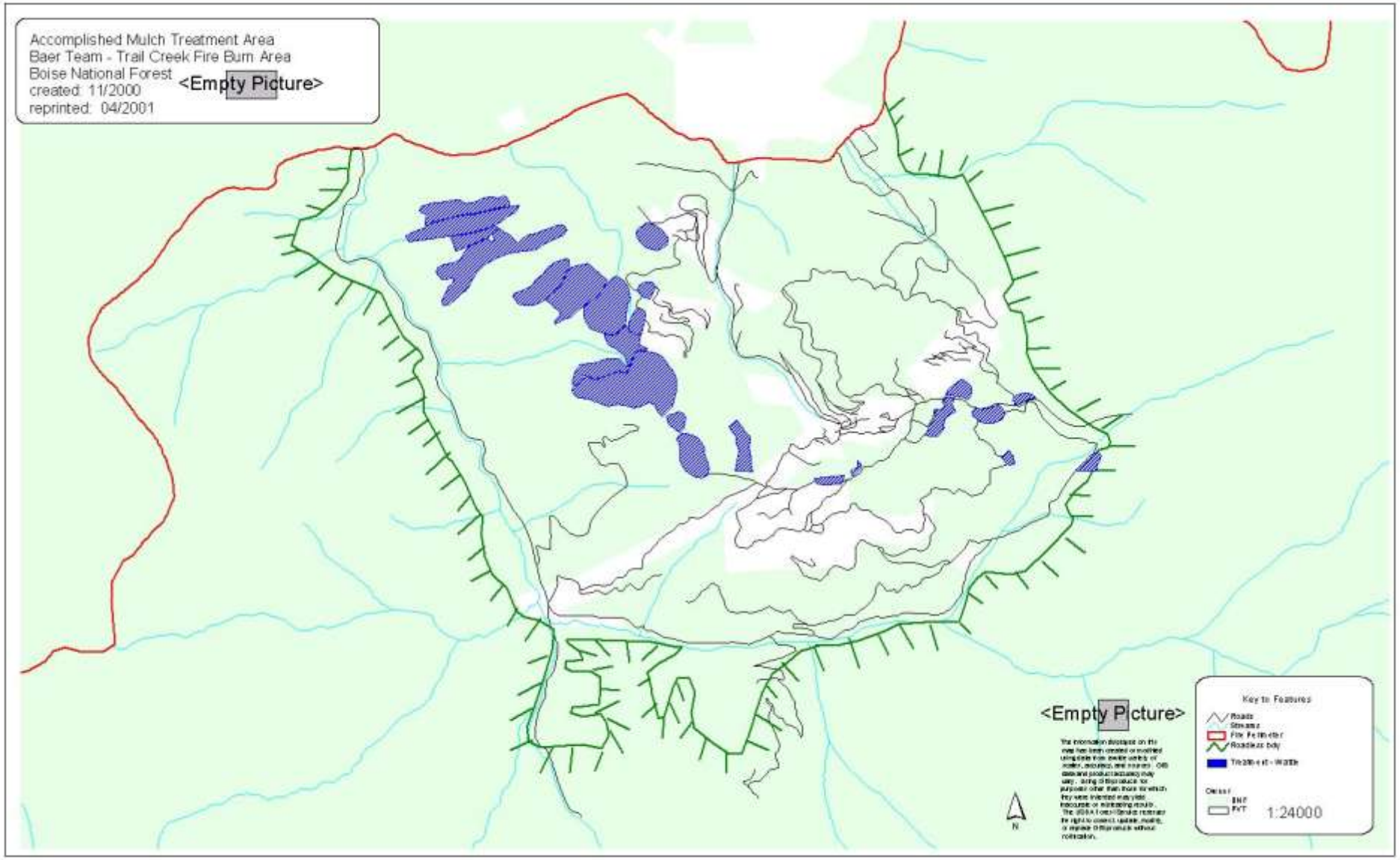
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Streams
Fire Perimeter
Roadless Adj
Treatment - Mulch
Owner
BNF
PVT
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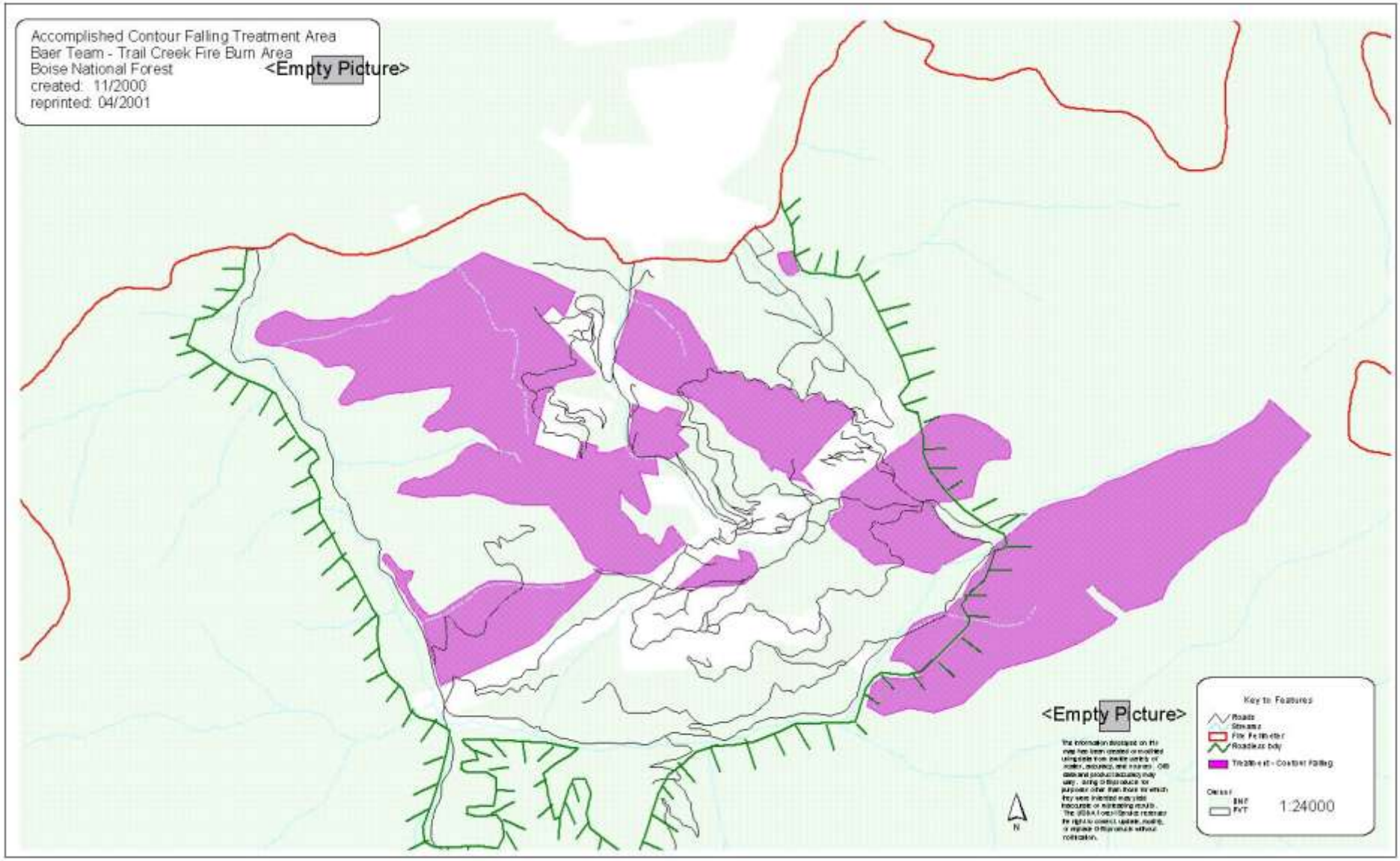
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Boise National Forest
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Roads
Streams
Fire Perimeter
Roadless bdy
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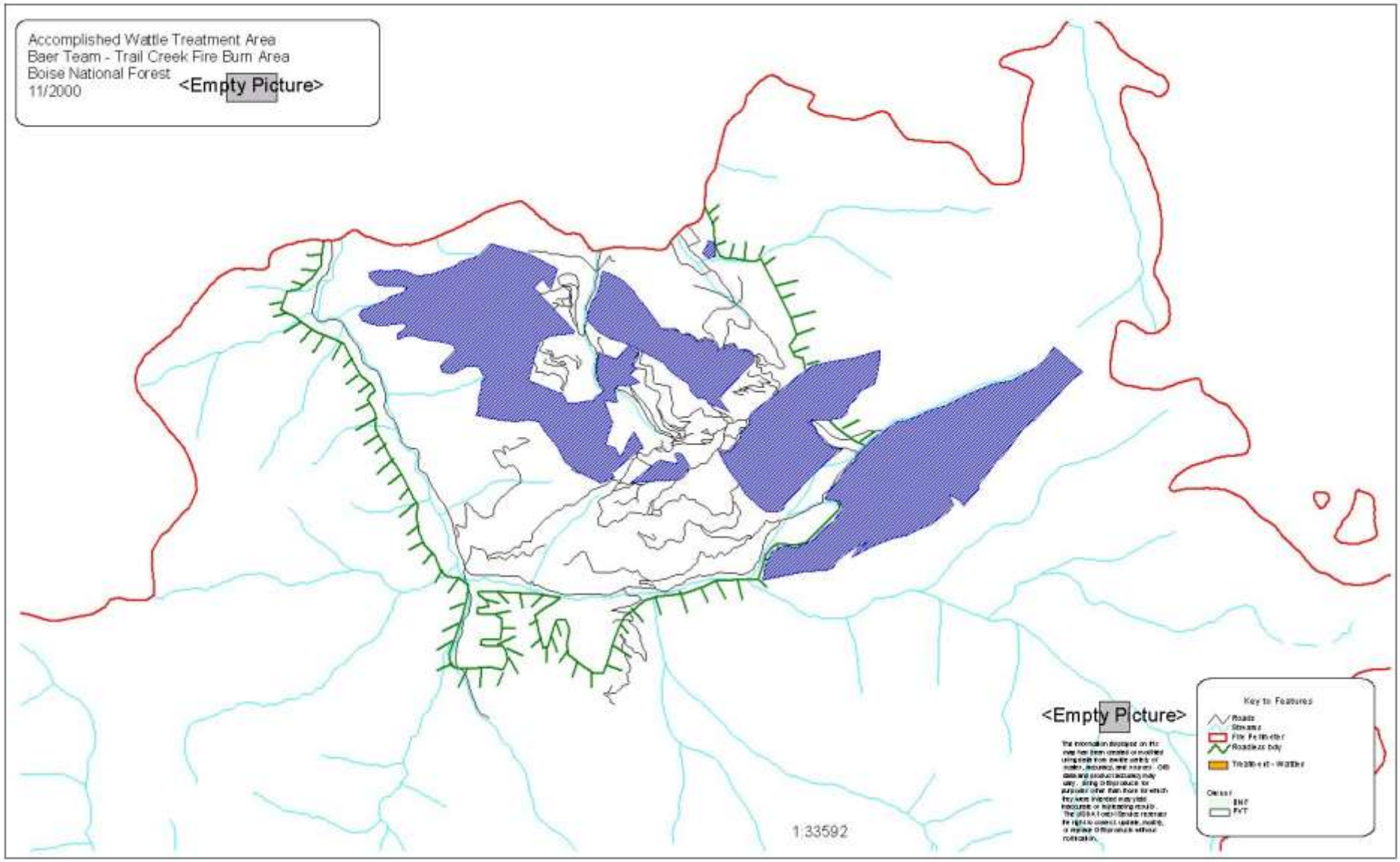
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Fire Perimeter
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Wilderness - Wildlife
Owner
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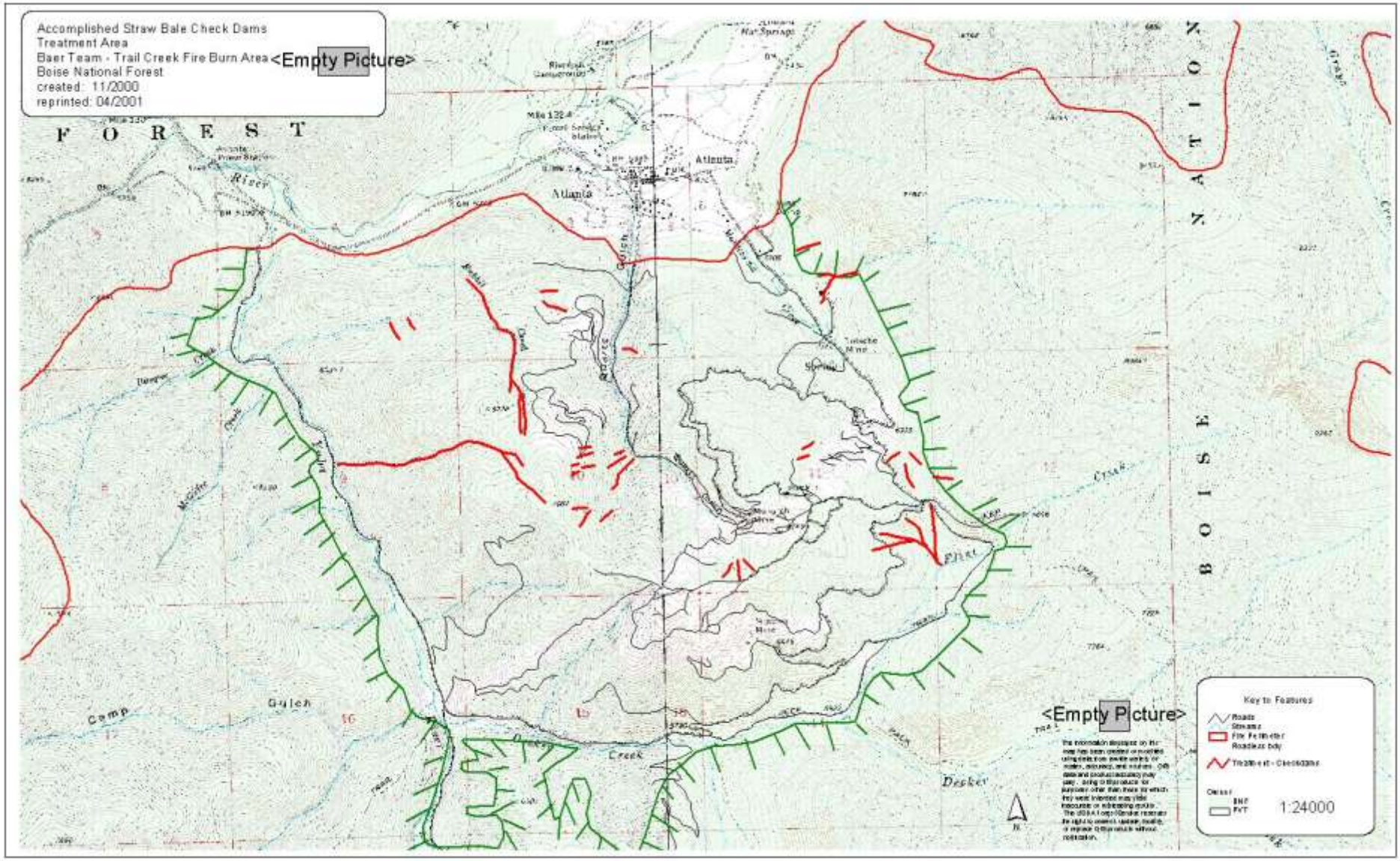
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Treatment Area
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F O R E S T
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Camp
Gulch
Creek
Decker
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Key to Features
Roads
Streams
Fire Perimeter
Roadless Indy
Treatment - Checkdams
Owner
BNF
PVT
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