USDA Forest Service Date of Report: August 29, 2001
(Initial.2)

ICICLE COMPLEX FIRES - 2001

BURNED-AREA REPORT
(Reference FSH 2509.13, Report FS-2500-8)

PART I - TYPE OF REQUEST

A. Type of Report

[**X**] 1. Funding Request for Estimated FFF-FW22 Funds
[ ] 2. Accomplishment Report
[ ] 3. No Treatment Recommendation

B. Type of Action

[**X**] 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 and design analysis
[ ] Status of accomplishments to date

[ ] 3. Final report - following completion of work

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: **Icicle Complex Fires*** B. Fire Number: **P68089**

C. State: **Washington** D. County: **Chelan**

E. Region: **Region 6** F. Forest: **Okanogan &Wenatchee NFs**

G. District: **Leavenworth Ranger District**

H. Date Fire Started: **8-14-01** I. Date Fire Controlled: **Unknown****

J. Suppression Cost: **$ 4.3 Million (8/21/01 ICS 209 Report)*****

* Icicle Complex Fires evaluated here included: Fourth of July Fire (#536) and Johnny/Jay Fire (#572); Proposed BAER treatments restricted to Fourth of July Fire
** Containment: no projection to date
*** Projected Final Cost: $10 + Million

K. Fire Suppression Damages Repaired with FFFS-PF12 Funds:

1. Fireline waterbarred (miles) **13.9 (8/21/01 ICS 209 Report)**
2. Fireline seeded (miles) **0 (8/21/01 ICS Report)**
3. Other (identify) **Spike camps, base camps & safety zones****

**See suppression-related rehab plan

L. Watershed Number: **17020011 – Wenatchee River**

M. NFS Acres Burned: **7666** Total Acres Burned**: 7696*****
Ownership type: **Almost entirely on National Forest Lands**

( )State ( )BLM **(less than 30 acres)PVT**

*** According to August 25, 2001 GIS Burn intensity Map.

N. Vegetation Types: **: Low elevations – Douglas-fir and Grand fir Series;**

Upper elevations – Subalpine Fir; Other – Some Riparian hardwood and riparian shrublands

O. Dominant Soils: **Shallow coarse textured soils with more than 25% profile rock larger than 2 inches in diameter**

P. Geologic Types: **Mount Stewart Batholith ignous units (Granidiorite); landforms developed from alpine glacial oversteepened; with some debris slides, and fluvial deposition and erosion.**

Q. Miles of Stream Channels by Class:

I- 7 **II-0** **III-0** **IV- 17**

R. Transportation System:

Trails: **12** miles Roads: **29.1** miles

PART III - WATERSHED CONDITION

A. Fire Intensity* (acres): **4,883** (low-64%) **1,643** (moderate 21%) **0** (high-0%) **1,140** (unburned 15%)

***Fire intensity figures based on 8/25/01 survey information; See Appendix D for map.**

B. Water-Repellent Soil (acres): **None observed and little expected**

C. Soil Erosion Hazard Rating (acres):

0 (low) **766** (moderate**)** **6,900** (high)

D. Erosion Potential: **161** tons/acre

E. Sediment Potential**:** **41,280** cubic yards / square mile

Assumptions for Erosion and Sediment Potential: The erosion and sediment figures listed above reflect the contribution from the debris slides and channel scour based the hydrologic design factors. These figures are quite high; however the fans and scour areas only represent approximate 300 acres or 3.9 percent of the fire. However, the fan deposition and channel scour are the major sources of sediment delivery to the Icicle River. If these figures were spread over the entire fire area, the Erosion Potential is estimated to be 6.3 Tons/Acre and Sediment Potential is 1,615 cubic feet/Square Mile.

The fire area occurs predominately in a glacial trough that also served as melt water drainage during continental recessional periods. Consequently this drainage is very steep and rocky. Natural landform sediment delivery and routing efficiency (90%) is considered very high but episodic. Runoff is routed fairly rapidly into first order channels that can be flashy in nature. Sediment delivery is in the form of debris slides from tributary streams or first order debris chutes. These slides form fans that spread onto the Icicle valley bottom and naturally constrain or realign a portion of the lower Icicle River. Hence, sediment is delivered directly from the debris slides and indirectly from the Icicle River alignment adjustments contributing to bank scour. With exception of catchment basins, tributary streams, debris chutes, hill slope erosion will be collected in very bouldery talus slopes that occur on lower slopes, which tend to hinder direct delivery into the Icicle channel.

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period: **5** years

B. Design Chance of Success: **70** percent

C. Equivalent Design Recurrence Interval: **10** years

D. Design Storm Duration: **0.5** hour

E. Design Storm Magnitude: **1.4** inches

F. Design Flow: **93** cubic feet/second/square mile

G. Estimated Reduction in Infiltration: **<10** percent

H. Adjusted Design Flow **155** cubic feet/second/square mile

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency:

The Icicle Fire Complex and potentially impacted areas downstream exhibit many important characteristics that were considered in determining the proposed course of action. The following summary describes the conditions that warrant emergency rehabilitation actions.

1. ***Loss of Site Productivity*** –

The natural inherent soil productivity is low for the fire area. Soils are derived from igneous bedrock units (granitic) that have weathered into very coarse "sandy soils". Soil moisture (except in valley bottom) is often a limiting factor on Southern exposures. Glacial erosional and glacial fluvial processes

have also had a major role in soil occurrence in the landscape. Soil depths are relatively shallow to moderately deep associated with excessive bedrock outcrop exposures. Along with continental weather characteristics, the overall site productivity is low for the fire area. Hence, this fire will not have a significant effect on inherent soil productivity.

This fire area has a natural history of debris slides from steep slopes during relatively frequent storm events (10 year storm return intervals). These debris slides become incorporated into stream flows which become deposited on toe slope alluvial fans. Fires in this area are a natural disturbance factor in environmental processes. In fact, it is very likely that the repetitive cycle of fires, high intensity storm events in this steep landscape (with its attendant flooding and debris slides) has helped to maintain the relatively low productivity of the uplands within the fire area. Hence, organic matter accumulation are very low in these soils which continues to limit soil productivity.

The primary geomorphic process that has altered the landscape is alpine glaciation. The U shaped valleys were carved out by glaciers resulting in over-steepened slopes with a dense network of first order drainages. These first order streams often become the source of debris slides. It is unlikely that seeding of shallow-rooted species will significantly reduce the risk of debris slides. The risk of debris slides will be elevated for the next five years as tree root anchoring is significantly reduced.

Even when slopes are vegetated, erosional processes are substantial. Sediment/debris loading in first order stream systems is apparent. Many of these first order drainages act as debris chutes. The upper part of the first order system is incised into solid bedrock. Loss of vegetation in these first order stream systems will accelerate the risk of debris slides. Often the debris failure is in association with the contact with glacial till deposits that occur at approximately 4,200 feet. The high occurrence of debris slides is a normal hydrologic function of these glacial troughs. It unlikely that landscape level seeding and or fertilization would significantly reduce surface erosion and debris slides. As a result, upland aerial seeding was not selected as a BAER treatment.

One significant risk to site productivity loss is due to noxious weeds. The road and trailhead will serve as a beachhead for noxious weeds to rapidly increase in the area. Weed seed sources exist along roadways, staging areas, adjacent to the fire area, as well as at the fire camp. The proposed regimen of weed management is critical to help preserve the productivity and character of this area (see Appendices A, B and C).

2. ***Loss of Water Quality –***

Water quality in the Icicle River drainage is critical for many uses including domestic/municipal water supply, agricultural, hatchery use, aquatic habitat for the Threatened and Endangered species (spring Chinook salmon, steelhead, bull trout), and recreation use.

Water quality parameters most affected by this fire are sediment loading and to a lesser degree temperature. Stream sediment loading in the Icicle River is expected to increase as the post-fire frequency of debris slides increases. Most of this sediment debris is expected to be larger sized gravels, cobbles, and boulders. Ash and fine sediment will also be a component of these flows. Fine woody debris loading is also expected to increase. Some sediment material will move downstream to "nick points" (debris and alluvial fans) where the channel gradients lower and material accumulates. It is at these nick points that large woody debris will accumulate as well. Sediment loading is expected to increase significantly for the next two to three years and then decline.

The Icicle Complex fires will also accelerate surface runoff that affects Forest Service road and trails in the area. Many of these transportation facilities have inadequate drainage features. Tread and drainage conditions on these facilities need to be upgraded (e.g., reconstruct or install drainage dips, increase

culvert sizes) in order to minimize the potential for water quality degradation from fire-accelerated erosion and sedimentation.

Water temperatures are not likely to increase significantly because of the minimal canopy impact of the low fire intensity along toe slopes. In addition, the Icicle has topographic controls that limit late afternoon warming in the valley bottom.

3. ***Threats to Human Life and Property –***

The values at risk include homes, bridges, campgrounds, hatchery ponds, (mostly downstream) roads and cultural sites. Some of these developments are already in existing flood plains and are already at risk to flood damage.

As described, alpine glaciation over-steepened the Icicle drainage creating a U shaped valley with very steep side slopes (troughs). The tributary drainage system on these troughs is characterized by a dense pattern of parallel first order stream systems. These first order streams act as debris chutes for debris slides. These slides form fans that spread onto the Icicle valley bottom. Periodic debris slides have occurred over time (10 year return interval) and have built up these fans. Hence, this deposition process is a natural hydrologic function on these fans. Most of these fans are in private ownership and the concentrated runoff and debris slides originate from lands administered by the Okanogan and Wenatchee National Forests. These home owners and their property are already at risk of periodic flooding . These debris slide/flood events also pose a threat to down stream land owners that have property along the lower Icicle River.

All of these debris fans occur along the Icicle River. Sediment from debris slides will deposit coarse textured sediment directly into the Icicle River. This sediment will have an effect on downstream irrigation and domestic/municipal water use. However, the sediment delivered is not expected to have a significant effect on fish habitat. These debris slides often deliver large woody debris along with the sediment into the Icicle River.

Accelerated surface runoff from burned areas will impact the road and trail system. Proposed drainage improvement on selected portions of this system will minimize potential adverse effects both on and from these facilities and will reduce the hazard to both Forest personnel and the public.

B. Emergency Treatment Objectives:

A primary objective of emergency treatment is to establish conditions within the burn that support long-term, natural recovery while reducing short-term negative impacts. The application of the BAER treatments should assist natural recovery and minimize both on-site and downstream damage to values at risk. The non-structural land treatments proposed are designed to help maintain site productivity and ecosystem function by inhibiting weed establishment and spread. This is done by using a cultural practice (grass seeding) to provide competition for weeds and by manual weed control.

Proposed structural treatments to roads and trails are intended to reduce post-fire increases in accelerated erosion and sedimentation from Forest Service facilities.

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

Land **70 %** Channel NA % Roads **90 %** Other NA %

D. Probability of Treatment Success

	<----Years after treatment-----> 1	3	5
Land	70%	70%	70%
Channel	%	%	%
Roads	90%	90%	90%
Other	**%**	**%**	**%**

E. Cost of No Action (Including Loss): **$1,010,000**

F. Cost of Selected Alternative (Including Loss): **$513,630**

G. Skills Represented on Burned-Area Survey Team:

[**X**] Hydrology	[**X**] Soils	[**X**] Geology	[**X**] Range
[ ] Timber	[**X**] Wildlife	[ ] Fire Mgmt.	[**X**] Engineering
[ ] Contracting	[**X**] Ecology	[ ] Research	[**X**] Archaeology
[X] Recreation/Wilderness			[**X**] Fish Biologist

Team Leader: **\s\ Carl Davis**

Phone: **(509) 662-4231** Electronic Address: **cedavis@fs.fed.us**

H. Treatment Narrative:

Overall Goal of Proposed BAER Treatments: To complete a combination of comprehensive treatments to reduce sediment delivery, protect water quality of the Icicle River and protect the road and other Forest Service facilities within the burned area. In addition, the treatment will reduce noxious weed effects to site productivity in the area and enhance natural vegetative recovery.

Land Treatments

Purpose: Reduce the negative effects of increased weed populations on site productivity and biological diversity. Treatments are intended to maintain ecosystem health by encouraging natural vegetation recovery. This will be accomplished by applying several weed management practices. The intent is to: (1) Reduce noxious weed reestablishment and infestation in the burned area by seeding along the roads, in the developed safety zones and at the group site by both manual and chemical treatment where appropriate and (2) Increase vigor of planted species to better compete with weeds by fertilizing seeded areas.

Treatment #L1-Manual Control of noxious weeds along the Icicle River road, part of the 8-mile road and spurs, Dr. Bob road, and part of the Icicle Ridge Trail. Hand pulling/grubbing would be used. See summaries of noxious weed treatments in Appendices A, B and C.

Treatment #L2 – Chemical/Manual Control of noxious weeds along part of the 8-Mile road and spurs,

the Cashmere group site, part of the Icicle Ridge Trail and the Mack Creek road and Jay Creek road. Chemical control will be used following the NEPA documents for the Icicle River Area (previously completed) if possible. Later treatments may include manual followup treatments. See the analysis file document summarizing noxious weed treatments.

Treatment #L3- Fertilize areas treated in #L4 below and the three safety zones seeded earlier with suppression funds. See the analysis file document summarizing seed and fertilizer treatments. Fertilizer would be used only when away from water. Additionally, fertilizer would be used on the three safety zones seeded with suppression funds (Chatter Creek, Dr. Bob and Trout). Fertilization of all sites would occur in early spring of 2002 once seeded species are established. This treatment includes fertilizer costs of approximately $23.50/ac and application costs of approximately $50/ac. for all 47 acres. (Please note that the administrative cost of all weed control treatments was incorporated in the unit cost of treatment L3 [see Summary of Noxious Weed Management Costs table in Appendix A]).

Treatment #L4- Seed areas for weed control. See the analysis file document summarizing seed and fertilizer treatments for seed specifications and acreages. The areas to be seeded are those where weed control has been done or where bare soil is present. These areas include: along the Icicle, 8-Mile, Mack and Jay Creek Roads; and at the Cashmere Group Site. Seeding is planned for 38 acres at a cost of $95.50/ac for seed and $62/ac for application. Cost for administering all seed, fertilizer and control treatments are included here ($3000).

Road and Trail Treatments

Road Treatments

Purpose: Implement actions to: (1) minimize the potential for concentration of accelerated surface runoff from Forest Service roads within the Icicle Fire Complex in the Icicle River watershed, (2) minimize the potential for road related surface/mass erosion and accelerated sediment delivery to high value fish habitat (listed species) and downstream water supplies (municipal/hatchery) and (3) insure that public is aware of road-related and other hazards in the burned area. The treatments will meet the intent of the applicable direction requiring road drainage to be designed to minimize accelerated sedimentation and handle storm flood events---while maintaining aquatic connectivity. All proposed treatments are on the Icicle River Road system (7600). Also refer to the Land Treatment section for details on revegetation/noxious weed control actions associated with proposed road work.

Treatment #R1 – Install Out-sloped Dips: Construct rolling out sloped dips with surfacing to improve ditch relief and ability of road to better handle anticipated increases in surface runoff. Armor dip inlets and outlets, especially on exposed fills. Dip installation sites are: (1) locations where no drainage feature existed before (inadequate frequency) or (2) locations where existing dips (or water bars) are inadequate to handle anticipated flows or (3) locations where an existing damaged or inadequate culvert can be replaced with a low maintenance rolling dip. Log, "Eco-Log" or straw bale structures will be installed within run-out area of dips to help further disperse runoff water and minimize sediment delivery.

Treatment #R2 – Pull Existing Culverts: Remove existing culverts to re-establish more natural flow patterns and reduce the risk of pipe plugging, runoff concentration and accelerated sedimentation.

Treatment #R3 – Replace/Install Culverts – Install one new ditch relief CMP (18") to improve drainage, increasing capability of treated road section to handle post-fire increases in surface runoff and minimizing sedimentation.

Treatment #R4 – Harden Existing Culvert Installations: Clear blockages from existing culvert installations to provide capacity for anticipated post-fire increases in surface runoff. Repair existing/install rock headwall, collar and apron to improve efficiency of drainage structure, reducing potential for scour/slough and sedimentation resulting from post-fire increases in surface runoff.

Treatment #R5 - Upgrade Culvert Installations: Replace existing undersized culverts with larger diameter culverts to improve ability of road drainage to handle anticipated increases in surface runoff, reduce the potential for plugging and accelerated sediment delivery.

Treatment #R6 - Stabilize Roadbed: Spot rock selected locations with native pit-run and/or crushed aggregate to help reshape and stabilize road prism to improve surface drainage and minimize accelerated sediment delivery due to post-fire increases in surface runoff.

Treatment #R7 - Road Surface Water Management: Blade road surface, pull specific ditchline sections, remove outside berms and outslope where appropriate to improve road surface drainage. Inslope above switchbacks where appropriate to utilize run-out ditch and minimize surface runoff through curve. Remove rock and woody debris blocking ditch line. Install berms to limit traffic access and minimize rutting at ends of selected spurs. Treatment will improve capability of roadway to handle post-fire increases in surface runoff.

Treatment #R8 – Hazard/Closure Signing: Purchase and install closure and burned area hazard notification signs to inform public of post-fire conditions and management actions taken to protect public safety. (non-BAER funding source)

Trail Treatments

Purpose: Implement actions to: 1) minimize the potential for concentration of accelerated surface runoff and sedimentation from Forest Service trails; 2) reduce the safety risks to Forest personnel improving trail sections; and 3) reduce the threat to the public safety while using trails within the Icicle Fire Complex. As noted in Part V-A above, soils in the burned area are primarily derived from glacial till deposits originating from the Mt. Stuart Batholith. This parent material weathers to coarse sands resembling the Idaho Batholith gruss type soils. These soils occur on over-steepened slopes (>60%) and are extremely susceptible to slope raveling. Much of the trail system in the fire area occurs on these slope conditions.

Trails in the burned area have not experienced a landscape scale fire since their construction. The Icicle Fire has removed much of the woody material and duff, resulting in accessive hillslope raveling which has filled trail tread in many locations (Fourth of July Trail). In some trail sections, the trail shoulder (berm) was supported by shrub and tree roots which were severely burned, resulting in sloughing of the shoulder and loss of the trail. As a result of these fire-related impacts, trail drainage features have been rendered non-functional and the tread condition represents a hazard to both Forest personnel and the public. Due to fire induced watershed impairments accelerated windthrow and sluffing in the fall of 2001 and spring of 2002 will occur. To be most effective the trail work should be staged and completed in the summer of 2002.

Treatment #T1 – Improve Trail Drainage: Install drain dips on 6.0 miles of trail to reduce the potential for runoff concentration and accelerated surface erosion from anticipated fire effects. Dips will vary from rolling outslope dips to waterbars constructed from peeled and anchored native wood material. This treatment will occur interspersed over the entire 12 miles of targeted trail.

Treatment #T2 – Trail Tread Improvement. Improve 4.0 miles (out of 12 miles) of trail tread that has been degraded by the fire. Remove slough and debris that has reduced the width of the trail tread or

reconstruct the cut slope of the trail providing additional trail width. This treatment is needed in order to eliminate safety concerns and provide suitable access for installation of other trail treatments.

Treatment #T3 –Trail Log Out. A number of fire-killed trees are falling and blocking trail access. Trail log out will be necessary on 12 miles of trail in order to gain access to the sections of trail that need drainage (T1) and tread improvements (T2).

BAER Evaluation

Survey Costs The estimated cost of BAER survey and preparation of the Initial Burned Area Report is listed in Part VI of the 2500-8.

Implementation of the proposed treatments will require the development on an Implementation Plan. Specifics related to all facets of the noxious weed treatments are shown in Appendices A, B and C. More specific information related to proposed road and trail treatments are in the analysis file.

BAER Treatment Monitoring

No formal BAER treatment monitoring has been proposed for this burned area.

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										
L1 - Manual Weed Control(3yrs)	ac	650	9	$5,850			$0		$0	$5,850
L2 - Chem/Man Weed Control (3yrs)	ac.	650	14	$9,100			$0			$9,100
L3 - Fertilization (includes admin. of all weed control work)	ac	138	47	$6,486			$0		$0	$6,486
L4 - Seeding (inc application)	ac	158	38	$6,004			$0			$6,004
Subtotal Land Treatments				$27,440			$0		$0	$27,440
B. Roads and Trails										
R1-Install Dips	ea	1420	38	$53,960						53960
R2 - Pull Culverts	ea	2000	4	$8,000						8000
R3 - Install Culverts	ea	4000	1	$4,000						4000
R4 - Harden Culverts	ea	400	34	$13,600						13600
R5 - Upgrade Culverts	ea	6178	9	$55,602						55602
R6 - Stabilize Roadbed	yds	70	120	$8,400						8400
R7 - Surf Water Mgt	miles	11.2	900	$10,080			$0		$0	$10,080
R8 - Install signing	ea	1500	1	$1,500						$1,500
T1 - Improve Trail Drainage	miles	2500	6	$15,000			$0		$0	$15,000
T2 - Improve Trail Tread	miles	7500	4	$30,000			$0		$0	$30,000
T3 - Logout Trail	miles	300	12	$3,600			$0		$0	$3,600
Subtotal Road & Trails				$203,742			$0		$0	$203,742
C. BAER Evaluation										
BAER Survey Costs *					$12,600		$0		$0	$12,600
				$0			$0		$0	$0
D. BAER Treatmt. Monitoring				$0			$0		$0	$0
None Proposed										
E. Totals				**$231,182**	$12,600		**$0**		**$0**	**$243,782**

* BAER Survey costs ($12,600) covered by the P Code for the Icicle Complex Fires.

PART VII - APPROVALS

ICICLE COMPLEX FIRES - 2001

1. Sonny O'Neal
for Forest Supervisor — Date: August 29, 2001
\s\ *Maureen Hanson*

2.
Regional Forester — Date:

Appendix A

Noxious Weed Management
(Includes seeding, fertilization, manual and chemical control)

Summary of Noxious Weed Management Costs
Icicle Complex Fires-- BAER Recommendations

The treatments described here address the need to manage noxious weeds in the fire area. Reduction in shading and the increase in open sites are expected to exacerbate the weed populations that already exist in the area. The primary concern related to weeds involves their potential to reduce site productivity and biological diversity. In order to manage these weeds several treatments are planned. These include both manual, chemical and cultural control methods. Cultural methods include seeding and fertilization. Chemical methods will be considered where feasible to reduce costs, increase efficiency and possibly get some carryover residual effects into the following years—particularly on diffuse knapweed. Manual methods will be used in some areas as well or as a follow-up to chemical treatment. The costs of treatment also include the cost of administration and monitoring of BAER treatments.

Summary of Noxious Weed Treatment Acres*

AREA **	Seeding for Weeds***	Seeding for Stabilization****	Manual Weed Control (ac.)	Chemical Weed Control (ac.)
Icicle Road	6		4	
8-Mile Road and spurs	6		1	3
Cashmere Group Site	6			4
Chatter Creek Safety Zone		3	0	
Dr. Bob Road	10		3	
Dr. Bob Safety Zone		3	0	
Trout Safety Zone		3	0	
Icicle Ridge Trail	0		1	4
Mack & Jay Creek Roads	10			3
TOTAL	**38**	**9**	**9**	**14**

* Noxious weed treatments may include herbicide use for areas covered by the “Noxious Weed Control in the 1994 Fire Recovery Area” EA and in administrative sites such as trailheads and campgrounds.

** Ecosystem values related to sustainability and biodiversity would be of primary concern with the occurrence of weed populations, both within the burn and the adjacent areas. The roads are heavily traveled and noxious weeds are abundant along the roadway. There are also weeds in some of the other camp site areas. There is a need to hand pull weeds this fall around some of the camp sites to reduce the weed seed input. Concerns for roadside erosion and subsequent sedimentation and impacts on Icicle River water quality are also addressed by this seeding.

*** See Appendix A below for seed and fertilizer information.

**** The safety zones will all be treated with suppression funds and will not be included as a first year cost. However, additional treatment may be needed in following years for weeds and fertilization and will occur on these sites in year 2 using BAER funds.

Summary of Noxious Weed Management Costs
Including:
Seed & Fertilizer Costs, Application Rates & Control Costs

Weed Tmt	Item/Species	Cost per Unit	Units Treated	Cost Per Season	Total Cost for 3 years
L1	Hand pulling,1 treat./season	$300/ac (yr 1) $200/ac (yr 2) $150/ac (yr 3)	9 acres	$2,700 (yr 1) $1,800 (yr 2) $1,350 (yr 3)	$5,850
L2 *	Chemical/Manual Weed Control	$300/ac (yr 1) $200/ac (yr 2) $150/ac (yr 3)	14 ac.	$4,200 (yr. 1) $2,800 (yr. 2) $2,100 (yr 3)	$9,100
L3 **	Application cost for weed control fertilization	$50/ac (yr.2)	47 acres	$2,350	$2,350***
L3 **	Fertilizer cost for seeded areas	$24/acre (yr.2)	47 acres	$1,128	$1,128***
L3	Administration of noxious weed treatments	$1,000/year	All projects	$1,000	$3,000***
L4	Application cost for weed control seeding	$62/ac (yr.2)	38 acres	$2,356	$2,356
L4	Noxious Weed Competitive Seeding—Seed costs only	$96/acre	38 acres	$3,648	$3,648
				TOTAL =	**$27,432*** **

***** Chemical control methods will be considered where possible. Should chemicals be used, the costs will be reduced to: $150/ac (yr.1); $100/ac (yr.2); $ 50/ac (yr.3)

**Includes fertilization of the safety zones in year two. Fertilization will not be applied near water.

*** Note: In the cost spreadsheet (Part VI of the 2500-8), the line item for fertilizer application (L3) included actual cost of fertilizer, cost of fertilizer application and administration cost of all noxious weed treatments. The line item for seeding included both seed cost and application cost. Also note that the totals are slightly different.

APPENDIX B

Seeding/Fertilizer Prescriptions

The following seed mix is recommended for the general situations outlined below. The pounds/acre is based on a desired broadcast rate of about 100 pure live seeds/square foot (PLS/SQ.FT). All seed must be "Prohibited and Restricted Noxious Weed Free for the State of Washington." All seeding rates should be determined on a pure live seed (PLS) basis. Certified "Blue Tag" seed is preferred. ACCEPT NO SEED WITH ANY NOXIOUS WEED CONTENT!

- ***SEEDING PRESCRIPTION:***

Note: For seed mix, other species may be substituted in consultation with the District or Forest vegetation specialists.

Roads and Group Camp Site (BAER cost)
Weeds are present with potential for spread into area and site is open, <4000' elevation, and permanently altered/disturbed e.g. roadside:

Species	**Rate**	**Seeds/sq.ft.**	**Cost/lb**	**Total Cost/ac**
Thickspike wheatgrass 'Schwendimar'	11 lbs/acre	37	$6.50/lb	$71.50/acre
big bluegrass 'Sherman'	2 lbs/acre	32	$6.25/lb	$12.50/acre
sheep fescue 'Covar'	2 lbs/acre	41	$4.50/lb	$9.00/acre
Soft White winter wheat 'Eltan'	16 lbs/acre	5	$.19/lb	$3.00
Total	**15 lbs/acre**	**115 seeds/sq.ft.**		**$96.00/acre**

Once grasses are established use the fertilizer treatment recommended below.

Safety Zones (1st year treatment borne by suppression)
Three safety zones were developed for use during the fire. These include Chatter Creek, Trout Creek and Doctor Bob**. Once grasses are established use the fertilizer treatment recommended below (Fertilizer treatment costs will be borne by BAER funds).**

- ***FERTILIZER PRESCRIPTION:***

Fertilizer	**Gross lbs/ac**	**N lbs/ac**	**Cost/Ac.**
Ammonium Nitrate Sulfate	160	48	**$24/ac**

Use 75% Ammonium Nitrate and 25% Ammonium Sulfate to get a 30-0-0-6 (N,P,K,S) mixture. Apply at the rate shown above. Fertilization should occur in early spring once seeded grasses are established and after weeds have been treated.

All seeding rates are for certified seed. If certified seed is not available and you MUST use non-certified seed only if it is at least 90% pure and has 90% germination. ACCEPT NO SEED WITH ANY NOXIOUS WEED CONTENT

Appendix C

Seeding/Fertilization Rationale
Icicle Complex Fires

On the Icicle Complex Fires, the seeding and fertilization treatments will be used as a cultural method to reduce noxious weed invasion and spread. This seeding treatment will use competitive domestic grasses along the roads, in areas disturbed by road work and in the Cashmere Group site. Fertilization will be used (only in areas away from water) after the seeded grasses are established to improve their vigor and growth rate.

Use of Grass Seeding to Suppress Noxious Weeds:

Noxious weeds are a concern in the fire area. The introduction and spread of noxious weeds can reduce the diversity and abundance of native vegetation, forage, diversity and quality of wildlife habitat, increase erosion and decrease water quality (ICEBMP 1997). Wildfire and road treatments may increase the potential for weed introduction and spread by removing vegetation the litter layer and "A" soil horizon, thereby creating an ideal seedbed for noxious weeds. Noxious weeds inhibit natural stand development and reduce natural biological diversity. Weeds may also inhibit re-establishment of native plants including trees. A number of weeds are established in the area and without treatment, may increase as a result of the open stand conditions. Seeding adjacent to known weed populations should help to reduce their susceptibility to invasion. It is well documented that vegetated sites are more resistant to weed invasion than sites devoid of vegetal cover. Shelley at Montana State is a strong supporter of revegetation as a means to inhibit weed invasion. Larson and McInnes (1989) found that some grasses were particularly effective at inhibiting encroachment of diffuse knapweed. Perennial domestic grass species are proposed and should occupy disturbed sites that are at risk from nearby noxious weeds.

Efficacy of Fertilizer

On the N 25 Fire BAER treatment monitoring, the fertilizer treatment was the only treatment that resulted in significantly higher cover. It is expected that fertilization will substantially improve the vigor and growth of seeded species particularly if applied in spring after plant establishment**. It is critical, however, that fertilizer not be directly spread into water bodies during the fertilizer treatment!**

Terry R. Lillybridge
Plant Ecologist

APPENDIX D

Burn Intensity Map of Icicle Complex Fires