

APPENDIX H1. BWEIS PRESCRIBED BURN PROGRAM

Burn Unit Overview

SAUCER LAKE (FTU 36/42) PRESCRIBED BURN PLAN

LOCATION AND ADMINISTRATIVE INFORMATION

1. Ranger District	Gunflint
2. Acres	3280 acres / 1327 hectares
3. Management Code(s)	WFHF03
4. Est. Cost for the unit	\$ 119,387.00
5. Compartment/Stand(s)	FTU 36 & 42 as designated by the BWCAW EIS
6. Legal Description	T65N, R2W, Sections 17 - 22, 27 - 30
7. Lat / Long	N48° 06' 00" x W90° 36' 00" (Center)

DESCRIPTION OF THE BURN UNIT

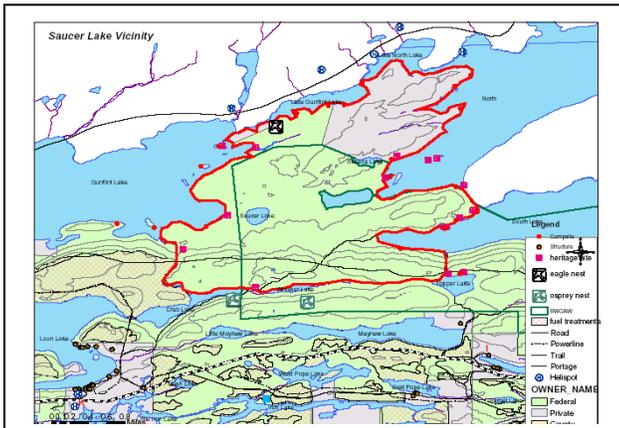
- Overstory:** This area was affected by a windstorm in July 1999. Due to this event, approximately 60 % of the overstory has been blown down. Remaining overstory consists of boreal forest with mixed coniferous and deciduous species. Fuel model 13 represents the blowdown areas of this unit. Fuel Models 8, 9, &10 represent standing forest areas.
- Understory:** Various brush species (FM 5) and Balsam Fir.
- Fuels:** Fuels within the Saucer Lake unit consist of closed canopy hardwood stands (FM8/M2), stands of long needle conifers (FM9/C5), stands of short needle conifers (FM10/C3), and blowdown (FM13/S1) on about 60% of the unit.
Fuel loading:
 - One hour fuels (0-1/4 in.) = 5-8 T/A
 - Ten hour fuels (1/4-1 in.) = 8-13 T/A
 - One hundred hour fuels (1-3 in.) = 20-50 T/A
 - One thousand hour fuels (> 3 in.) = 40-70 T/A
 - Total fuel loading is approximately = 100 T/A
- Topography:** Flat to steep north facing slopes, averaging 10 to 20 percent slope. Elevations range from 1500 to 1900 feet. Ridges and valleys run East and West in FTU 36. Most of FTU 42 is fairly flat.
- Chains of line to establish:** 210 chains / Line needs to be completed from Pt. I to Pt. J on the south boundary of the unit (See Unit Map).
- Land Type Association:** The Land Type Association (LTA) is 14. The unit is mostly early Proterozoic rock formations with Logan intrusions and is bordered by iron formations. This LTA is about 40% ELT16, 30% ELT14, 10% ELT 2, and 8% ELT 17.

RESOURCE OBJECTIVES

Reduce the loading of needles and 0 to 3 inch woody fuels in blowdown areas to minimize the potential for high intensity wildland fires from spreading from the BWCAW into other ownership. Elimination of potentially volatile fuel loads next to the Canadian border.

TREATMENT OBJECTIVES

Reduce 1, 10, & 100 hour dead and down woody fuel loads by 30 to 90%.



SPECIAL CONSIDERATIONS

1. **POTENTIAL IMPACT ON WATER & RIPARIAN RESOURCES:** Past burns have shown that no significant impacts have occurred in riparian areas. Adjusting ignition techniques and sequences to control fire intensity will mitigate potential impacts. Spill prevention measures will be taken at pump sites and Minimum Impact Tactics will be used as applicable in all operations. There are several riparian areas within the unit. These areas are wet enough that fire will not affect them.
2. **POTENTIAL IMPACT ON WILDLIFE:** Any impacts to wildlife would be brief in nature, and in the long run should be beneficial due to regeneration of brush species. No threatened and endangered species have been identified in this area.
3. **POTENTIAL IMPACT ON SOIL:** No significant impact is anticipated. Soil disturbance should be at a minimum since the only ground access will be by foot. No fireline will be constructed which exposes mineral soil. Natural barriers will be used as much as possible instead of constructed fireline and the unit will not be lit until 1000-Hr fuel moistures are above 18%.
4. **POTENTIAL IMPACT ON AIR QUALITY:** The BWCAW is a Class 1 airshed where long-term visual impairment from smoke must be avoided. Impact should be short term (3 to 5 days). Problems may include morning or evening inversions. Visibility may be impacted on the Gunflint Trail. Burning should be done when there are appropriate mixing heights, transport winds to support smoke dispersion, and when the State Dispersion Index is fair or better. Smoke sensitive residents on Several Lakes will be notified before burning.
5. **POTENTIAL IMPACT ON PUBLIC SAFETY:** Burning in the fall would greatly reduce potential impacts to wilderness visitors. Impacts on public safety will be mitigated by an area closure and posting of entry points before and during the burn. 15 campsites within the unit boundary and five within a half mile of the unit would be closed, as well as 2 portages. The Border Route Trail from Loon Lake to South Lake Portage will also be closed. Public Information personnel will be placed on the Gunflint Trail and other key locations to address public concerns.
6. **IMPACT ON ADJACENT LANDOWNERS:** Affects should be limited to short-term smoke impacts. Burning on days with good transport winds, high mixing heights and good smoke dispersion should mitigate smoke effects. Approval has been obtained to burn state lands located within the unit. Coordination with the Ontario Ministry of Natural Resources will be arranged to deal with Canadian properties. Once again, smoke sensitive residents will be notified before burn day.
7. **POTENTIAL IMPACTS ON WILDERNESS/RECREATION/VISUAL RESOURCES:** This burn will require the use of mechanized equipment such as pumps and aircraft within the BWCAW. The use of mechanized equipment is permitted according to the Minimum Requirements and Minimum Tool Analysis. However, mechanized equipment will be used for as short of duration as possible and M.I.S.T. will be used as much as possible.
8. **POTENTIAL IMPACTS ON HERITAGE RESOURCES:** Five prehistoric sites are located in Unit 36. Two prehistoric sites are located in Unit 42. (See H.R. Map). Heritage resource sites will be avoided by ground personnel, thus mitigating impacts. Due to the long history of activity in this area, there is a potential of affecting numerous sites that have not been identified.
9. **POTENTIAL IMPACTS ON VEGETATION:** Impact on vegetation under remaining stands of timber is expected to be minimal. The fire will most likely consume any potential seed sources within blowdown areas. Although there is a chance for standing red and white pines to re-seed adjacent areas, jack pine and aspen will most likely repopulate burned blowdown sites. Shoreline species on the perimeter of unit may be pre-treated if necessary.
10. **POTENTIAL IMPACT ON THREATENED & ENDANGERED PLANTS:** Least Moonwort, a TES species, is located near shore on the southern-most bay of Gunflint Lake. Creeping rush, also sensitive, is located in a low area between North Lake and Susana Lake. Canadian Yew has been identified along the east and south boundaries of the Saucer Lake unit. Lines have been re-routed to minimize impact to these plants and activities will be minimized in these areas. Activities from ground personnel in most of these areas should be kept to a minimum.

Treatment Unit 210 PRESCRIBED BURN PLAN

LOCATION AND ADMINISTRATIVE INFORMATION

1. Ranger District	Gunflint
2. Acres	331 acres, 128 acres of blowdown
3. Management Code(s)	HFPM24
4. Est. Cost for the unit	\$ 132.73 per acre
5. Compartment/Stand(s)	FTU 210 as designated by the BWCAW Fuel Treatment EIS
6. Legal Description	T64N R2W Sections 3-4,9-10

DESCRIPTION OF THE BURN UNIT

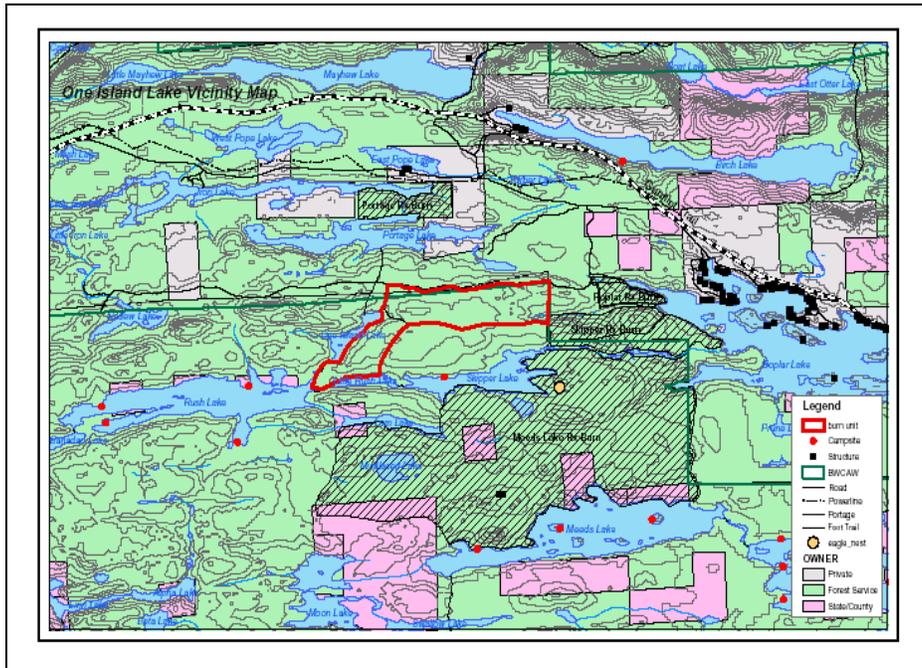
Overstory: This area was affected by a windstorm in July 1999. Due to this event, approximately 40 percent of the overstory has been blown down. The remaining overstory consists of boreal forest with mixed coniferous and deciduous species. Fuel models 13 represents the blowdown areas. Standing forest areas can be represented by Fuel Models 5, 8 and 9.

Understory: Balsam fir and various understory brush species.

Fuels: 30 - 80 tons/acre

Topography: Flat to gently rolling. Lakeshores are 15 to 30 percent slope. Elevations range from 1925 to 2000 feet.

Unit Boundaries: The north flank consists of the Bedew Lake Road, an unimproved dirt road. The east flank consists of a 10 ft. saw line constructed for the Skipper Lake 163 burn. The east boundary for the southwest portion of the unit is the edge of the continuous blowdown. The south flank consists of lakes, swamps and an overgrown logging road that is easily visible from the air. The west boundary is the One Island Lake, and the portages to the 1335 road to the north and Rush Lake to the south. Fireline will consist of alder swamps, spruce bogs, lakes, cleared portages, roads and trails.



RESOURCE OBJECTIVES

Reduce the potential for high intensity wildland fires from spreading from the BWCANW into areas of intermingled ownership.

TREATMENT OBJECTIVES

Reduce fuels 0-3" in blowdown affected areas to 9-11 tons per acre.

SPECIAL CONSIDERATIONS

POTENTIAL IMPACT ON WATER:

- No significant impact is anticipated. One Island and Little Rush Lakes border the unit but impacts on them are expected to be minimal.
- Spill prevention measures will be taken at pump sites. Spill kits will be made available in the unlikely event of fuel spillage. The use of water, rather than foam or liquid retardant, will be favored.
- In the case of accidental spill of retardant in a lake agencies will be notified & water quality will be monitored.
- The use of water, rather than foam or liquid retardant, will be favored.

POTENTIAL IMPACT ON WILDLIFE:

- Any impacts to wildlife would be brief in nature, and in the long run should be beneficial due to regeneration of brush species. There is one bald eagle nest in close proximity to the unit. The nest is outside the unit boundaries, east of Skipper Lake. There will be protection measures taken, including clearing fuel from around the base of the tree. Only if the burn were to spread outside the boundaries of the unit to the SE would this nest be in jeopardy. If fire were to threaten it, measure will be taken, such as aerial water drops, to protect the nest. The US Fish and Wildlife Service has been consulted with on nest sites and are in agreement with the measures that will be taken.

POTENTIAL IMPACT ON SOIL:

- No significant impact is anticipated. Soil disturbance should be at a minimum. No fireline will be constructed which exposes mineral soil. Natural barriers will be used instead of constructed fireline.
- Tool scars will be minimized where possible by using water or wetting agents to extinguish fire. Where possible line will be constructed to the minimum width and depth necessary to control the prescribed fire.
- In order to minimize soil disturbance, the burn prescription requires soil moistures of greater than 30% and 1000 hour fuel moistures of >18%; under these conditions fire will not carry easily through these riparian areas.

POTENTIAL IMPACT ON AIR QUALITY:

- The BWCANW is a Class 1 airshed where long-term visual impairment from smoke be minimized. The impact will be short term. Problems may include morning or evening inversions. Visibility may be impacted on the Gunflint Trail.
- Burning will be done when there are appropriate mixing heights and transport winds to support smoke dispersion. This prescribed fire will only be ignited when the proposed State Smoke Management Plan dispersion index is at "Fair" or better. Where smoke is a potential problem on roads, traffic control will be provided.

- To reduce smoldering emissions from duff and large woody fuels, the NFDRS index for 1,000 hour fuels moistures content will be 18% or greater.
 - No sensitive receptors are known in the vicinity.
- POTENTIAL IMPACT ON PUBLIC SAFETY: Impacts on public safety will be mitigated by:
- Burning in the fall would greatly reduce the potential impacts to wilderness visitors.
 - An area closure and posting of entry points prior to and during the burn. One campsite will be closed on the north shore of Skipper Lake, as well as 3 portages. Forest Service law enforcement and wilderness managers will be involved with the closure at least 1 week prior to the burn. The decision to reopen the area will be made by the Burn Boss and wilderness managers.
 - Wilderness rangers and public affairs personnel will be stationed at entry points, portages and other areas when there is a closure or potential safety problems.
 - Trees that pose a safety hazard will be removed near campsites and along portages and trail prior to reopening the above mentioned areas.
 - The public will be notified prior to the burn.
- POTENTIAL IMPACT ON RECREATION RESOURCES:
- This burn will require the use of mechanized equipment such as pumps and aircraft in the wilderness in accordance to the Minimum Requirements and Minimum Tool Analysis. However, mechanized equipment will be used for as short of duration as possible.
 - Portages act as boundaries for a few portions of the burn unit. Any down material on the portage as a result of the burn will be cleared.
 - Three portages will be used for holding lines (Little Rush Lake to Rush Lake, Rush Lake to One Island Lake and One Island Lake to the unimproved 1335 road). They will have to be cleared and possibly widened. Every effort will be made to minimize visual impacts on the portages. Debris cleared from the portages will be consumed in the burn.
 - Where saw cuts are required brush, logs and limbs will be scattered in a natural way. Stumps will be cut low, flush with the ground.
- POTENTIAL IMPACT ON HERITAGE RESOURCES: Surveys have been completed and no sites have been identified.
- POTENTIAL IMPACTS ON VEGETATION:
- To minimize impacts on standing forests, only the patches of blowdown will be ignited. Some of the surrounding standing trees may be burnt, but this mortality will be limited to the area directly around the patch.
 - No known threatened and endangered species are known in the area.
 - The spread of potential noxious weeds will be minimized by cleaning and visually inspecting helicopter buckets and snorkels used in the wilderness.

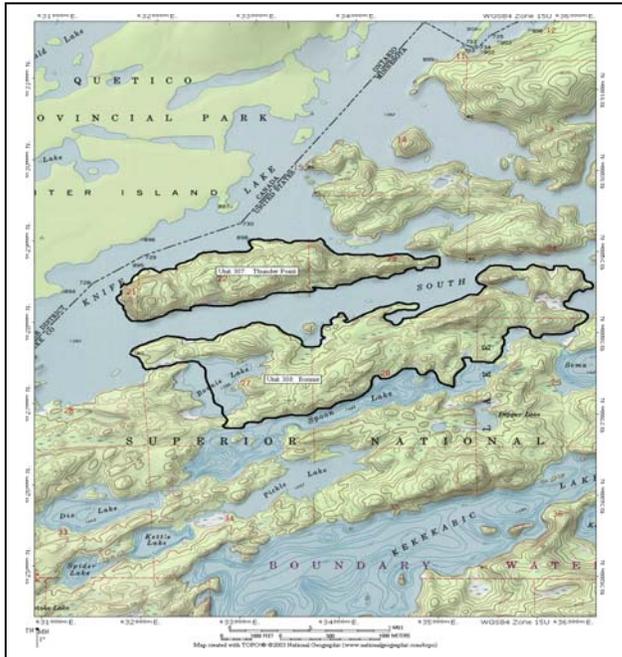
Knife Lake Treatment Units 307/308 PRESCRIBED BURN PLAN

LOCATION AND ADMINISTRATIVE INFORMATION

1. Ranger District: **Kawishiwi**
2. Prescribed Burn size: **1,234 acres (both units)**
Thunder Point Unit 386 acres
Bonnie Unit 848 acres
3. Management Code(s): **WFHF03**
4. Estimated Cost for Prescribed Burning Operations:
Total Cost (both units): \$108,400
Cost Per Acre: \$87
 Burning units separately would increase costs.
5. Compartment/Stand: N/A (these units are within the BWCA Wilderness)
6. Legal Description & Lat / Long (unit center):
Thunder Point Unit: T65N, R7W, Section 22, SW ¼ of the NE ¼
48° 06.067' X 91° 12.867'
Bonnie Lake Unit: T65N, R7W, Section 26, NW ¼ of the NE ¼
48° 05.433' X 91° 11.467'

DESCRIPTION OF THE BURN UNIT

- 1. Forest Vegetation Structure:** Most of the mature trees were blown down during the July 4, 1999 windstorm. Both units have a remnant of live standing trees along the shoreline, and a few interior patches of live standing trees remain that include red pine, white pine, jack pine, white spruce, balsam fir, aspen and birch. Northern white cedar is found along the shorelines. Balsam fir and various brush species, which existed in the understory prior to the blowdown event, are now exposed to full sunlight and are growing vigorously.
- 2. Fuels:** The Risk of Wildfire section of the EIS notes the tremendous increase in fuel loading and risk to life and property caused by the July 4, 1999 wind event. It also notes that historic fuel loadings ranged from 5 to 20 tons per acre and that current loadings have increased to as much as 50 to 100 tons per acre as a result of the storm. Of the total current biomass on the units, about 80% is dead. Fuel models 8, 10, and 13 represent the fuel loading and condition of both units. In fuel model 8 and 10, slow burning surface fires are expected, with low to high intensities and flame lengths of less than 4 feet; some flare-ups in jackpots of fuel accumulation can be expected. Areas in fuel model 13 (consisting of heavy blowdown with live immature balsam fir) will provide increased fire behavior in the form of torching and spotting, with flame lengths over 30 feet and intensities of up to 2,000 BTU/FT/SEC.
- 3. Topography:** Both units have gently rolling topography with the exception of shoreline areas of most of the Thunder Point unit. The Thunder Point unit rises sharply from the lake with an elevation increase of approximately 100 feet before leveling off to a more gently rolling terrain. Roughly 170 feet in elevation separates the water level from the highest location on the Thunder Point unit and 150 feet on the Bonnie unit. It should be noted that the Bonnie Lake unit does not rise as sharply as the Thunder Point unit except for approximately 4,000 feet of shoreline on the northeast corner. The average elevation of each unit is about 1,500 feet above sea level.
- 4. Adjacent property ownership:** The Thunder Point unit lies adjacent to the U.S./Canadian border. The land to the north is part of Quetico Provincial Park in Ontario. All remaining lands adjacent to Thunder Point are National Forest. The area within and immediately adjacent to the Bonnie Lake unit is also all National Forest System land within the BWCAW. A section of State land is located approximately ½ mile south of the Bonnie Lake unit and the nearest private land to either unit is over twelve miles to the southwest. The nearest structures are located at the Canadian Ranger Station at Prairie Portage, located approximately nine miles to the west.
- 5. Maps** -Unit General Location Map -Individual Burn Unit Topographic Maps-Tentative Resource Deployment Map (Operations Map)-Unit Grid Maps-Ignition Plan Maps-Secondary Holding Perimeter and Contingency Map-Site Closure Maps-Aerial Photos and Additional Maps



RESOURCE OBJECTIVES

- (1) Reduce the potential for fire starts growing into large, hard to control wildfires by decreasing the 1 to 100 hour fuel loading through the application of prescribed fire.
- (2) Reintroduce fire as a process in the fire-dependent boreal ecosystem.
- (3) To the extent reasonable, retain shoreline and interior patches of surviving mature cedar/pine.

TREATMENT OBJECTIVES

	Minimum	Maximum
<3" Fuel Loading Reduction	40%	100%
Total Fuel Loading Reduction	10%	25%
Mortality in remnant pines >16" dbh <u>within blowdown</u> areas.		Up To 100%
Mortality in remnant pines >16" dbh <u>outside of blowdown</u> areas.		Up To 20%
Mortality other species	0%	100%

SPECIAL CONSIDERATIONS

- 1. Potential Impacts on Water.** The cumulative effects on wetlands section of the BWCAW EIS states that "none of the alternatives are likely to result in adverse cumulative effects on wetlands". The proposed burns have approximately 16 miles of shoreline perimeter. Specific actions to be taken include the use of low intensity fire along shorelines, used in conjunction with moderate-high duff moisture conditions and no straight-streaming of water (from pumps and hose nozzles) to minimize the effects on the surface organic layer. This will reduce the runoff and the introduction of ash into the lake. Fire will typically not be applied directly to the shoreline areas, but will be applied strategically to allow it to back into them.
- 2. Potential Impacts on Wildlife and Sensitive Species.** Biological surveys were completed and no mitigations are required. There are no eagle nests within the burn units and the nearest nest is over three miles to the south. If burning is scheduled to occur in the fall, nearby nest sites outside of the unit will not be impacted. If burning is scheduled for spring or summer, should a wind direction on burn day place nests downwind, they would still be outside of the heaviest smoke impact areas. If any previously unknown sensitive species are identified during the course of the project, appropriate mitigation measures will be taken.
- 3. Potential Impacts on Cultural Resources.** Cultural resource surveys were completed with seven prehistoric sites identified in the Thunder Point unit and six prehistoric sites in the Bonnie unit. There were no known historic era sites within either unit. The use of straight stream hoses for mop-up shall be avoided on these sites and also within 200 feet of the shoreline on the balance of the units. No control lines or helispots are planned in areas of identified sites, with the exception of the helispot on the Canadian side of Knife Lake. The Canadian archeologist has given approval for the sites use as a helispot. If any previously unknown sites are found or identified during the course of the project, a cultural resource specialist will be contacted for protection guidance.
- 4. Potential Impacts on Soil.** Impact to the soil resource is expected to be low due to moderate-high moisture in the duff layers. Mitigation measures include burning while duff moisture and large fuel moisture is high enough to limit consumption of sub-surface organic matter.
- 5. Potential Impacts on Air Quality.** The impact from significant smoke production will be of short duration, lasting no longer than the burn day with minor amounts of visible smoke lasting up to a few days in the dusk/dawn inversion layer. Mitigation measures include burning on days when mixing height and transport wind speeds support maximum dispersion of smoke emissions (Minnesota Dispersion Index of "Fair" or better). An attempt will be made to avoid burning when there is a westerly wind so smoke will be transported away from populated areas on the Gunflint Trail. However, the remote location of this burn would permit ignition under any wind direction scenario with minimal impact to populated areas. The closest populated areas are over fifteen miles from the burn units, east on the end of the Gunflint Trail, and southwest to Moose Lake at the end of the Fernberg Trail. The Quetico Provincial Park is adjacent to the burn site. This provides a buffer of over thirty miles to the north before developed areas are encountered.
- 6. Potential Impacts on Public Safety.** Providing for the safety of the public could be of moderate complexity depending on date of ignition. The burn site is quite remote and the area traditionally does not receive heavy recreational use during the fall but earlier in the season public use in the area could be heavy. A public safety group is included as part of the prescribed burn organization to provide for coordination with potential public visitation on burn day. This contact group will advise members of the public who may be canoeing in the area and they will be requested to move back to safe distances if needed.
- 7. Potential Impacts on Wilderness Campsites and Portages.** There are five campsites located within the Thunder Point unit and 10 campsites within the Bonnie Lake unit. Fire will be allowed to burn through the campsites. This has been the policy in previous prescribed burning both inside and outside the wilderness. Fire effects on sites varies but has been deemed acceptable in past burns. The fiberglass latrine risers will be removed from the sites immediately prior to closure and will be returned prior to re-opening. Each site will be cleared of hazard trees before re-opening as well. Some tree mortality on site perimeters (if the storm left any standing) is expected. No adverse effects are expected to portages. They may be temporarily closed during the ignition phase of the burn but this will likely only last only two to three hours. Once the burning is complete, hazard trees along the portages will be removed .
- 8. Fire Effects on Remnant Pine and Cedar.** Older pine and cedar trees along the shoreline and within the few remaining patches found on the interior of the units have been identified as important to retain where reasonable. However, fuel concentrations and geographic conditions will prohibit exclusion of lethal fire in many areas. Especially susceptible will be those pine and cedar in areas of heavier blowdown and those in downwind sites. Mitigation measures include using center fire ignition to draw fire away from downwind sites and ignition applied in a manner where fire will back into remnant tree patches and down to shorelines against the wind and down slope. If conditions allow, mortality of cedar and pine in some selected areas may be further reduced by lowering intensities with water drops from aircraft.

Trout Lake Treatment Units 87,81,66,68,89,88,&82 PRESCRIBED BURN PLAN

LOCATION AND ADMINISTRATIVE INFORMATION

1. Ranger District: LaCroix
Prescribed Burn size:(all units) **10,056 acres**
Unit 87: 2002 acres . Unit 81: 2273 acres. Unit 66:1620 acres. Unit 68:1702 acres
Unit 89: 300 acres. Unit 88: 682 acres. Unit 82: 1473 acres
3. Management Code(s): **WFHF03 (tentative)**
4. Estimated Cost for Prescribed Burning Operations
Total Cost: \$182,205
Total Cost per Acre (10,056 acres): \$18
5. Compartment/Stand: N/A (these units are within the BWCA Wilderness)

DESCRIPTION OF THE BURN UNIT

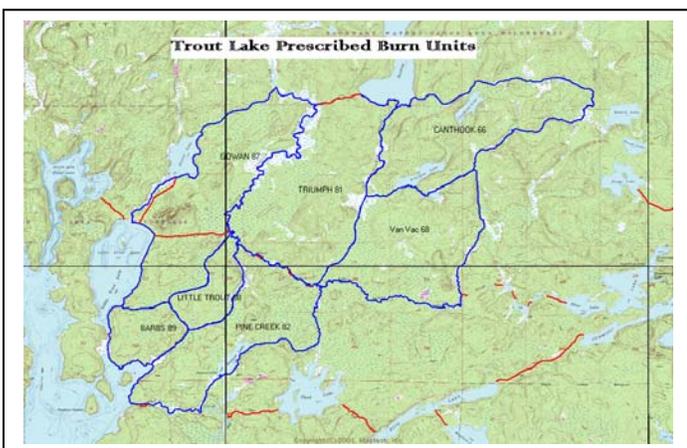
1. Forest Vegetation Structure: While many areas of the Superior National Forest experienced heavy and continuous blowdown, the units described in this burn plan were affected in a patchier manner. Within the Trout Lake Burn Plan units, areas of obvious heavy blowdown (from aerial and satellite reconnaissance) range from 5% to 40% of the total individual unit acreage. The remaining areas of substantially intact overstory however were also affected by the storm, as scattered broken tops and individual tree windthrow is prevalent throughout the units. All units have a remnant of live standing trees along the shoreline, and patches of live standing trees in interior areas include red pine, white pine, jack pine, white spruce, balsam fir, aspen and birch. Northern white cedar is found along the shorelines. Balsam fir and various brush species, which existed in the understory prior to the blowdown event, are now exposed to full sunlight and are growing vigorously in blowdown areas.

2. Fuels: The Risk of Wildfire section of the EIS notes the tremendous increase in fuel loading and risk to life and property caused by the July 4, 1999 wind event. It also notes that historic fuel loadings ranged from 5 to 20 tons per acre and that current loadings have increased to as much as 50 to 100 tons per acre as a result of the storm. Of the total current biomass on the units, about 80% is dead. Fuel models 8, 10, and 13 represent the fuel loading and condition of this unit. In fuel model 8 and 10, slow burning surface fires are expected, with low to high intensities and flame lengths of less than 4 feet; some flare-ups in jackpots of fuel accumulation can be expected. Areas in fuel model 13 (consisting of heavy blowdown with live immature balsam fir) will provide increased fire behavior in the form of torching and spotting, with flame lengths over 30 feet and intensities of up to 2,000 BTU/FT/SEC.

3. Topography: All seven of the units are flat in the drainages and have relatively rolling terrain on the high ground. Avg. elevation is 1450’.

4. Adjacent property ownership: The majority of land within and surrounding the units covered by the Trout Lake Burn Plan is under federal ownership, but St. Louis County and the State of Minnesota lands are within and adjacent to the units. The MN State Dept. of Natural Resources is a Cooperating Agency on this project. The St. Louis County Commission has been consulted and is in general agreement about treating fuels on the lands they administer (agreement # 02-PA-11090903-006). The nearest private land and structures are 2 miles to the north, off of FS 464 Road (Moose Loop- see maps). There are four buildings here (including outbuildings) and another two structures ¼ mile farther north. There is also private land and structures 3.5 miles south on the north end of Lake Vermillion.

5. Maps -Unit General Vicinity Map -Individual Burn Unit Topographic Maps -Tentative Resource Deployment Map -Unit Grid Maps -Structure Locations -Ignition Plan Maps -Secondary Holding Perimeter and Contingency Map -Site Closure Maps



RESOURCE OBJECTIVES

- (1) Reduce the potential for fire starts growing into large, hard to control wildfires by decreasing the 1 to 100 hour fuel loading through the application of prescribed fire.
- (2) To the extent reasonable, retain shoreline and interior patches of surviving mature cedar/pine.

Planned Fuel Reduction Results

	Minimum	Maximum
<3" Fuel Loading Reduction	40%	100%
Total Fuel Loading Reduction	10%	25%

Potential Remnant Pine Mortality

Mortality in remnant pines >16" dbh <u>within</u> <u>blowdown</u> areas.		100%
Mortality in remnant pines >16" dbh <u>outside of</u> <u>blowdown</u> areas.		20%
Mortality other species	0%	100%

SPECIAL CONSIDERATIONS

Water. The proposed seven units to be burned have combined approximately 15 miles of shoreline perimeter. Short-term release of nutrients into the water will occur and transpiration may be affected until vegetation is re-established. Specific actions to be taken include the use of low intensity fire along shorelines, used in conjunction with moderate-high duff moisture conditions and no straight streaming of water (from pumps and hose nozzles) to minimize the effects on the surface organic layer. This will reduce the runoff and the introduction of ash into the lake. Fire will typically not be applied directly to the shoreline areas, but will be applied strategically to allow it to back into them. In riparian and wetlands, equipment will be refueled and maintained in catch basins to prevent spills from contaminating soils and water. Spill kits will be on site if 5 gallons or more of petroleum fuel are used. The use of water, rather than foam, will be favored for pretreatment of control lines. Liquid fire retardant will not be used for pretreatment. If liquid fire retardant is used to suppress a prescribed fire that is threatening to escape, using liquid fire retardant within 400 feet of a water body or stream will be avoided. If an unintentional drop of retardant occurs in a water body, appropriate agencies will be notified and water quality will be monitored. If a spill occurs in a lake used as a drinking water source for local residents, potentially affected residents and the appropriate agencies will be notified.

Vegetation. In riparian areas and lakeshores that do not have extensive blowdown, impacts to standing forest will be reduced by mimicking natural fire burn patterns. Water and natural firebreaks will be used as a control line tactic where possible to reduce the amount of control line construction. Older pine and cedar trees along the shoreline and within remaining patches found on the interior of the units have been identified as important to retain where reasonable. However, fuel concentrations and geographic conditions will prohibit exclusion of lethal fire in many areas. Especially susceptible will be those pine and cedar in areas of heavier blowdown and those in downwind sites. Mitigation measures will be utilized where possible to reduce mortality. These measures include using center fire ignition to draw fire away from downwind sites and ignition applied in a manner where fire will back into remnant tree patches and down to shorelines against the wind and down slope. Shoreline patches of mature cedar and pine may receive pre-burn wetting to reduce mortality, where practical. The ignition pattern will also minimize impacts to standing forest by burning at cooler temperatures and moving the fire away from standing forest and riparian areas. Surveys of the sites were completed in August of 2004.

Wildlife and Sensitive Species. Two eagle nests are known to be located within the burn units described in the Trout Lake Burn Plan. Mitigation measures have been developed to protect these sites, including no burning or other activity within 1320 feet of the nest while it is active. Other potential measures, if needed, are pre-wetting with aircraft, conducting a burn out, and/or utilization of a pump, hoselay, and/or sprinkler system. A third Eagle nest is located just outside the burn units on the western shore of Gowan Lake. If spot fires were to threaten this site, measures as described above would be utilized to reduce the potential for nest tree mortality here as well. If any previously unknown sensitive species are identified during the course of the project, appropriate mitigation measures will be taken. The most recent surveys of the sites, completed on April 27, 2004, reported no bald eagle nests. Previous surveys found several nests within and in the proximity of the burn units. Past information remains in the burn plan for pre-burn consideration (See Section L: Pre-Burn Preparations Required).

Cultural Resources. Gowen Lake unit 87 contains one prehistoric and one archaeological site. There are two prehistoric sites located in Barbs 89 and three prehistoric sites located within Pine Creek 82. Surveys of the sites were completed on 9 June, 2003. The use of straight stream hoses for mop-up shall be avoided on the sites and also within 200 feet of the shoreline. No control lines or helispots are planned in areas of identified sites. If any previously unknown sites are found or identified during the course of the project, a cultural resource specialist will be contacted for protection guidance.

Soils. Impact to the soil resource is expected to be low due to moderate-high moisture in the duff layers. Mitigation measures include burning while duff moisture and large fuel moisture is high enough to limit consumption of sub-surface organic matter. The BWCAW EIS addresses soil impact concerns and determined that prescribed burns meet standards for the analysis area.

Control Lines. Land features, changes in vegetation, and existing portages will be the primary perimeter of this prescribed burn. No constructed control lines are initially planned; however they may be utilized if burning conditions necessitate this holding tactic. Control lines would be built to the minimum width and depth necessary to control the prescribed fire and they would be placed to exclude areas of standing forest where possible, if they are needed. While constructing control lines, the following protocol will be adhered to when possible, without compromising safety. A screen of vegetation will be left between the ends of control lines and lakeshores to reduce the visibility of control lines. Where this is not possible, control lines will be angled so they are not visible from the water, as long as the control line effectiveness is not compromised. Where possible, logs will be rolled out of the control line instead of bucking them. Cutting trees (especially live trees) and limbs will be minimized unless necessary to prevent the spread of fire across the control line or for worker safety.

Air Quality. The BWCAW is a Class I Airshed where long term visual impairment from smoke must be avoided. Air quality downwind will be temporarily degraded by smoke during the burn day and that evening. The impact from significant smoke production will be of short duration, depending on length of ignition (1 to 4 days) lasting no longer than the burn day(s) with minor amounts of visible smoke lasting up to a few days in the dusk/dawn inversion layer. Mitigation measures include burning on days when mixing height and transport wind speeds support maximum dispersion of smoke emissions (Minnesota State Dispersion Index of "fair" or better). The closest populated areas are over three miles to the south in the lake Vermillion area. Smoke will be closely monitored during and after the burn.

Public Safety. Providing for the safety should be of moderate complexity, as the burn site is somewhat remote and the area traditionally does not receive heavy recreational use during the fall. If all units are burned within a period of two consecutive days or so, visitor use will have to be monitored over that period of time. A public safety group will be available to make contacts with local residents, as needed, in addition to phone calls made the day prior to burning. This contact group will advise members of the public who may be canoeing or boating in the area and they will be requested to move back to safe distances if needed. The group will also provide for closure of campsites, portages and entry points as needed for the duration of the burn. No trails will be affected with this burn. As a precaution, up to a total of 11 campsites, 17 portages, 1 entry point, and the Canthook Primitive Management Area (PMA) will be closed in regard to the burn throughout the ignition period, one to four days, depending upon burning a single unit in a day or burning multiple units in a day. The public may be required to wait two to three hours before they could be safely escorted across the portages, or they may utilize alternate routes. The public may also be required to wait one to two days and possibly up to four days before sites are reopened. Escorts will be provided while fire risk is present elsewhere within the burn unit and portages will be cleared of snags before being reopened. A pre-burn aerial inspection will be conducted to ensure the units, surrounding waters and nearby adjacent lands are clear of non-fire personnel prior to ignition.

Wilderness Values. The minimum actions and tools necessary within the Wilderness will be used to meet the purpose and need based upon the *Minimum Requirement and Minimum Tool Determination*. Chainsaws will only be used when safety prohibits the use of hand tools and another method, such as explosives, would not be as effective. All personnel will have MIST training and will be briefed on tool use for this project. No fire camps will be constructed for this burn. Instead, existing campsites will be used to minimize impacts on wilderness values. The campsite will be rehabilitated after use. All personnel working in the Wilderness will use Leave-no-trace procedures.

Burn Monitoring

During 2005 the Forest Monitoring crew working in conjunction with fire and other resource specialists visited 23 Burn Units in the BWCAW. Approximately 14 pre burn and 8 post burn visits were made respectively on 2005 burns. Five units burned this year had pre burn surveys conducted in previous years. The intent of these visits was to document burn mitigation compliance and fire effects outlined in the 2000 BWEIS. Moreover, fire severity and burn patterns was assessed in the Alpine Lake Fire. Other observations included pine establishment, topographic and lighting practice influence on burn patterns, influence of conifer succession & new blow-down on fire risk, and effects of treated and non treated blow down on big game use. Following are brief summary of monitoring findings for each resource.

Fuels (Post Burn Only)

-Burn Unit's Visited-8.

<i>Zone</i>	<i>BU</i>	<i>Plot</i>	<i>Vegetation Type</i>	<i>Duff Depth</i>	<i>Fuel Depth</i>
EZ	36	1	Mixed Conifer Hardwood forest cover MN Forest Classification; FDn43b	Pre Burn; Avg duff depth =.08'. Post Burn; Avg duff depth =.11'. Change; Avg duff depth =+.03'. No Change	Pre Burn; Avg Fuel depth =1.02' Post Burn; Avg Fuel depth =.62' Change; Avg Fuel depth =-.04' 40% Decrease
		2	MN Forest Classification; FDn43b	DID NOT BURN	DID NOT BURN
EZ	42	1	MN Forest Classification; FDn32c1	Pre Burn; Avg duff depth =.175'. Post Burn; Avg duff depth =.14'. Change; Avg duff depth =-.035'. 20% Decrease	Pre Burn; Avg Fuel depth =2.8' Post Burn; Avg Fuel depth =1.6' Change; Avg Fuel depth =-1.2' 43% Decrease
		2	MN Forest Classification; FDn32c1	DID NOT BURN	DID NOT BURN
WZ	66	1	MN Forest Classification; FDn43b	Pre Burn; Avg duff depth =.15'. Post Burn; Avg duff depth =.13'. Change; Avg duff depth =-.002'. 14% Decrease	Pre Burn; Avg Fuel depth =.48' Post Burn; Avg Fuel depth =.17' Change; Avg Fuel depth =-.31' 71% Decrease
WZ	87	1	MN Forest Classification; FDn33a1	Pre Burn; Avg duff depth =.10'. Post Burn; Avg duff depth =.07'. Change; Avg duff depth =-.03'. 30 % Decrease	Pre Burn; Avg Fuel depth =3.32' Post Burn; Avg Fuel depth =1.53' Change; Avg Fuel depth =-1.79' 54% Decrease
		2	MN Forest Classification; FDn43b1	DID NOT BURN	DID NOT BURN
		3	MN Forest Classification; FDn43b2	DID NOT BURN	DID NOT BURN
WZ	89	1	MN Forest Classification; FDn43b1	Pre Burn; Avg duff depth =.15'. Post Burn; Avg duff depth =.13'. Change; Avg duff depth =-.03'. 14 % Decrease	Pre Burn; Avg Fuel depth =.48' Post Burn; Avg Fuel depth =.17' Change; Avg Fuel depth =-.31' 65% Decrease
WZ	307	2	Upland Conifer Forest Type. MN Forest Classification; FDn32d.	Pre Burn; Avg duff depth =.13'. Post Burn; Avg duff depth =0'. Change; Avg duff depth =-.13' 100% Decrease	Pre Burn; Avg Fuel depth =1.64' Post Burn; Avg Fuel depth =0' Change; Avg Fuel depth =-1.64' 100% Decrease
WZ	308	1	Upland Conifer Forest Type. MN Forest Classification; FDn32d.	DID NOT BURN	DID NOT BURN
		2	Mixed Conifer Hardwood forest cover MN Forest Classification; FDn43b2	100% Decrease	100% Decrease
EZ	210			INCOMPLETE DATA	

Fuel Reduction Summary

Criteria	Duff Depth Reduction	Fuel Depth Reduction
Range	0 to 100%	40 to 100%
BU's W/Highest Reduction	307 & 308	307 & 308
BU's W/Lowest Reduction	36,66,89	36 & 42
Average Duff Reduction	40%	
Average Fuel Reduction		68%

Fuel Reduction Example



BU 307 Before. 9/02.



BU 307 After. 9/05.

Soils (Organic Layer) Post Burn Only

-Burn Unit's Visited-8.

Zone	BU	Plot	Vegetation Type	Average Fermented Depth	Average Humus Depth
EZ	36	1	Mixed Conifer Hardwood forest cover MN Forest Classification; FDn43b	Pre Burn; Avg Depth = .1'. Post Burn; Avg Depth = .01'. Change; Avg depth = -.09'. 90% Decrease	Pre Burn; Avg Depth = .16'. Post Burn; Avg Depth = .16'. Change; Avg Depth = 0'. No Change
		2	MN Forest Classification; FDn43b	DID NOT BURN	DID NOT BURN
EZ	42	1	MN Forest Classification; FDn32c1	Pre Burn; Avg Depth = .12'. Post Burn; Avg Depth = .025'. Change; Avg depth = -.1'. 80% Decrease	Pre Burn; Avg Depth = .11'. Post Burn; Avg Depth = .07'. Change; Avg Depth = -.04'. 37% Decrease
		2	MN Forest Classification; FDn32c1	DID NOT BURN	DID NOT BURN
WZ	66	1	MN Forest Classification; FDn43b	Pre Burn; Avg Depth = .01'. Post Burn; Avg Depth = .06'. Change; Avg depth = 0'. No Change	Pre Burn; Avg Depth = .16'. Post Burn; Avg Depth = .16'. Change; Avg Depth = 0'. No Change
WZ	87	1	MN Forest Classification; FDn33a1	Pre Burn; Avg Depth = .11'. Post Burn; Avg Depth = 0'. Change; Avg depth = -.11'. 100% Decrease	Pre Burn; Avg Depth = .07'. Post Burn; Avg Depth = .05'. Change; Avg Depth = -.02'. 30% Decrease
		2	MN Forest Classification; FDn43b1	DID NOT BURN	DID NOT BURN
		3	MN Forest Classification; FDn43b2	DID NOT BURN	DID NOT BURN
WZ	89	1	MN Forest Classification; FDn43b1	Pre Burn; Avg Depth = .13'. Post Burn; Avg Depth = .004'. Change; Avg depth = -.126'. 97% Decrease	Pre Burn; Avg Depth = .1'. Post Burn; Avg Depth = .001'. Change; Avg Depth = -.09'. 99% Decrease
WZ	307	2	Upland Conifer Forest Type. MN Forest Classification; FDn32d.	Pre Burn; Avg Depth = .175'. Post Burn; Avg Depth = .08'. Change; Avg depth = -.1'. 55% Decrease	Pre Burn; Avg Depth = .07'. Post Burn; Avg Depth = .04'. Change; Avg Depth = -.03'. 43% Decrease
WZ	308	1	Upland Conifer Forest Type. MN Forest Classification; FDn32d.	Pre Burn; Avg Depth = .08'. Post Burn; Avg Depth = .08'. Change; Avg depth = 0'. No Change	Pre Burn; Avg Depth = .04'. Post Burn; Avg Depth = .07'. Change; Avg Depth = 0'. No Change
		2	Mixed Conifer Hardwood forest cover MN Forest Classification; FDn43b2	Pre Burn; Avg Depth = .11'. Post Burn; Avg Depth = .09'. Change; Avg depth = -.02'. 20% Decrease	Pre Burn; Avg Depth = .08'. Post Burn; Avg Depth = .08'. Change; Avg Depth = 0'. No Change

Soil Reduction Summary

Criteria	Fermented Depth Reduction	Humus Depth Reduction	Total Organic Matter Reduction
Range	0 to 100%	0 to 99%	0 to 100%
BU's W/Highest Reduction	36 & 87	89	36, 87, & 89
BU's W/Lowest Reduction	66 & 308	36,66,308	36,66,308
Average OM Reduction	55%	26%	41%

Fuel Reduction Example



BU 308 Intact Organic Layer following Burn. 9/05.

Average total organic matter reduction was only 41% despite Burning Unit Indices (BUI's) being over 50%. The following table displays the BUI's for each burn unit at time of ignition. Refer to previous 2 tables for corresponding soil reduction for each burn unit.

Fall 2005 Hazardous Fuel Reduction Prescribed Burns, G-WS-10 documentation				
District	Date	Units	Acreage	BUI
LaCroix, Trout Lake Burn	9/6-9/8/05	7 units:	10,056	67.1
KawishiwiKnife Lake Burn	9/9-9/12/05	307/308	1234	76.9

Wildlife (Pre Burn Surveys Only)

Burn Unit's Visited-**25**.

Zone	BU	Bald Eagle Surveys (4/05)	Control Lines (TES Flora & Fauna)
EZ	36	Active in 04. Mitigation applied.	Surveyed in 02. No TES found.
EZ	42	Active in 04. Mitigation applied.	Surveyed in 02. No TES found.
WZ	54	No Active Nests in Burn Unit.	NA
WZ	66	No Active Nests in Burn Unit.	NA
WZ	87	No Active Nests in Burn Unit.	NA
WZ	88	No Active Nests in Burn Unit. New occupied nest north of BU88	NA
WZ	89	No Active Nests in Burn Unit.	NA
WZ	96	No Active Nests in Burn Unit. Active nest on island near 96.	Surveyed in 04. No TES found
EZ	126	No Active Nests in Burn Unit.	NA
EZ	130	No Active Nests in Burn Unit.	NA
EZ	210	No Active Nests in Burn Unit.	Surveyed in 02. No TES found.
EZ	220	No Active Nests in Burn Unit.	Surveyed in 05. No TES found.
EZ	225	No Active Nests in Burn Unit.	Surveyed in 05. No TES found.
EZ	227	No Active Nests in Burn Unit.	Surveyed in 05. No TES found.
EZ	255	No Active Nests in Burn Unit.	NA
EZ	261	No Active Nests in Burn Unit. Active in 03	NA
EZ	262	No Active Nests in Burn Unit.	NA
WZ	302	No Active Nests in Burn Unit.	Surveyed in 05. No TES found.
WZ	307	No Active Nests in Burn Unit.	NA
WZ	308	No Active Nests in Burn Unit.	NA
WZ	310	No Active Nests in Burn Unit.	Surveyed in 05. No TES found
WZ	316	No Active Nests in Burn Unit.	Surveyed in 05. No TES found
WZ	331/332	No Active Nests in Burn Unit. 1 nest unoccupied	?
EZ	352	No Active Nests in Burn Unit. Active nest east of BU	?

Wildlife Survey Summary

Criteria	BU's Surveyed	05 Findings
Eagle Surveys	25	No Active Nests observed.
Control Line TES	5	No TES Flora or Fauna encountered.

Vegetation (Plant Succession) Pre-Burn Only

Sixteen Vegetative plots were established in 10 burn units to assess vegetative succession following burning. However, our plots revealed insight on how succession is proceeding within blow-down, particularly conifer establishment. The following table displays a brief summary of conifer occurrence:

Zone	BU	Plot	No Conifers	Low Conifer Amounts	High Conifer Amounts	Low Pine Amounts	High Pine Amounts
WZ	BU 54	1			X		X
WZ	BU 54	2			X		X
EZ	BU 126	1			X		
EZ	BU 126	1			X	X	
EZ	BU 130	1			X	X	
EZ	BU 220	1		X			
EZ	BU 255	1			X		
EZ	BU 262	1		X			
WZ	BU 302	1			X		X
WZ	BU 310	1		X		X	
WZ	BU 310	2			X	X	
WZ	BU 310	3			X	X	
WZ	BU 316	1		X			
WZ	BU 316	2	X				
WZ	BU 332	1		X			
WZ	BU 332	2		X		X	

Vegetation (Plant Succession) Summary

This data is important because it relates to two important issues of the BWEIS: (1) Prolonged Fuel Risk and (2) Pine (particularly white pine) occurrence following the blow down. Our surveys revealed a substantial release of ladder fuels (primarily balsalm fir) within unburned blow-down. These populations represent release of trees present prior to the wind storm and seedling establishment following the blow-down. The pine establishment is also significant. White pine observed in the above plots as well as young stands observed during recent visits to the Knife Lake burn are too a result of both post blow-down release and seedling establishment.

	# out of 16 Plots	%
All Conifer Establishment	15	94%
Pine Establishment	9	56%

Conifer Establishment Example



Balsam Fir Establishment. BU 302 Plot 1. 7/05



Pine Regeneration BU 310 Plot 1. 7/05

Vegetation (Old Forest)

Zone	BU	Old Forest Shoreline	Old Forest Interior	Immediate Fire Impacts
EZ	36	Yes	Yes	No
EZ	42	Yes	Yes	No
WZ	96	Yes	No	No
EZ	130	No	Yes	No
EZ	210	Yes	No	No
EZ	255	Yes	No	No
EZ	261	Yes?	No?	No
WZ	302	Yes	Yes	No
WZ	307	Yes	No	No
WZ	308	Yes	No	No
WZ	310	?	Yes	No

Vegetation (Old Forest) Summary

Immediate Post burn surveys indicate that neither shoreline nor interior old growth was consumed in the flaming front. However, future surveys will have to be done to assess if old forest mortality over time.

	# of BU's	Immediate Mortality
Old Forest Shoreline	9	No
Old Forest Interior	5	No



Non Native Invasive Species

NNIS plant surveys were conducted on all pre & post burn visits. NNIS of concern were not encountered within any burned or non burned plots, control lines, or other survey areas.

OTHER OBSERVATIONS

Prolonged Fire Risk

Recent (2004 & 2005) blow down was observed within or adjacent to several burn units. This in conjunction with release of conifers (see above) may be contributing to prolonged fire risk in the BWEIS. Further, more extensive assessments will need to occur to validate this.



Knife lake. Recent Red Pine blow down over 99



Knife lake. Recent Cedar blow down over 99 fuels.



Knife lake. Recent White Pine blow down over 99



Knife lake. Recent Red Pine blow down over

Fire Effects based on Topography, lighting pattern, etc

Over the past several years we have documented fire patterns as influenced by topography, time of year, fuel loadings, and lighting patterns. We continued to make observations this year. The intent is to provide this information to fire and wilderness managers if and when a PNF program is implemented in the BWCAW.



Knife Lake Burn. Note Burn pattern as influence by lighting pattern & topography.

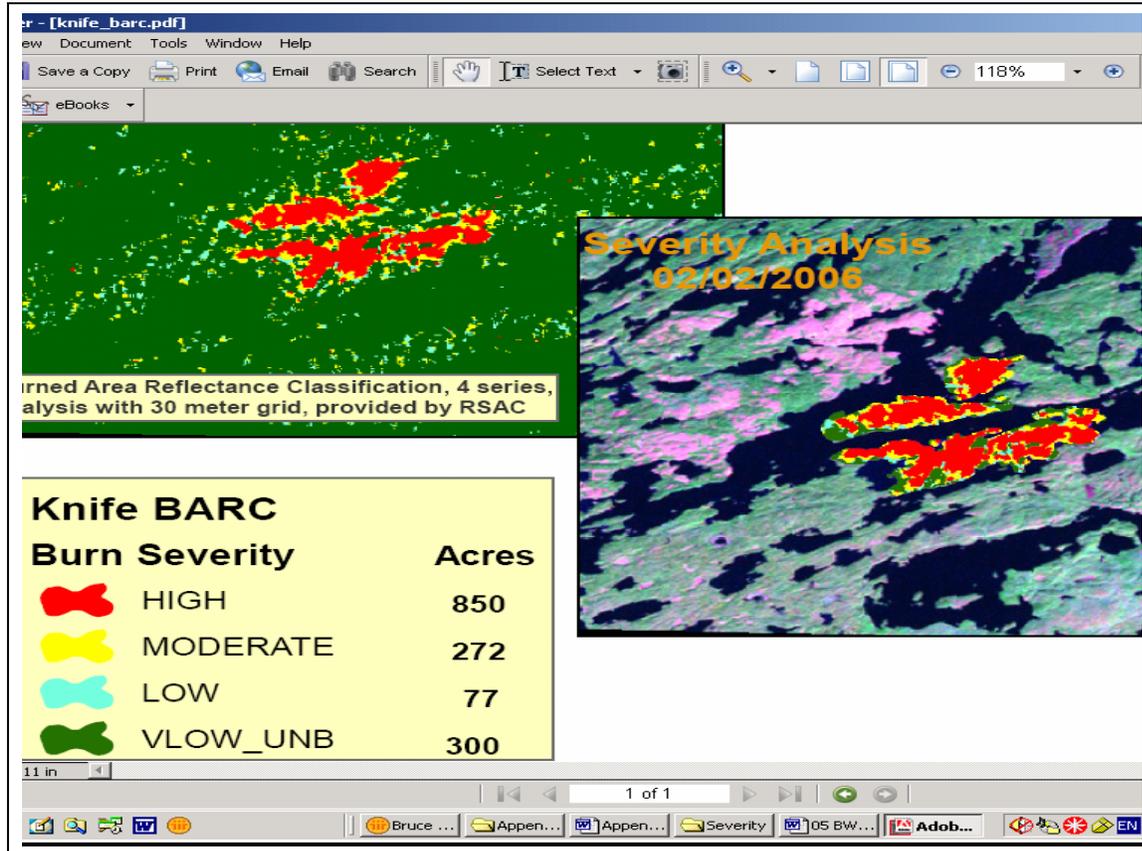


Knife Lake Burn. Note Burn pattern as influence by lighting pattern & topography.

Ground Verification of Fire Severity Mapping

During this summer we coordinated with a DNR researcher to ground validate the satellite BARC analysis (Fire Severity) within the Alpine Fire. Although field data has not yet been reported, the researcher concluded there was an extremely high correlation between the BARC analysis and field plots. These findings are also applicable for BARC analysis that was also performed on prescribed burns.

Fire Severity Example



Wilderness (Planned vs Actual Control Line)

Table. Wilderness Minimum Tool			
Control Line		Mechanized Use	
Planned vs Actual	Amount	Mechanized Use	Non Mechanized Use
2000-2005 Planned	72 Miles		
2000-2005 Actual	25 Miles		
Difference (Miles)	47 Miles		
<i>Actual as % of Planned</i>	35%		
Hours		411	1021
Percentage		29%	71%