



**US Forest Service
Deschutes and
Willamette
National Forests**



Prescribed Fire in the Mt. Jefferson, Mt. Washington and Three Sisters Wilderness Areas

~ briefing paper ~



Summary

- Annual lightning storms mean that we have an ignition source and our wilderness areas are at risk of large wildfires that are likely to escape and threaten adjacent values like ski resorts, campgrounds and nearby cities.
- To keep fires from threatening adjacent values, immediate actions are taken to suppress fires when they occur naturally.
- Active suppression activities create impacts that threaten the untrammelled condition of the wilderness.
- Suppressing fires also leads to a build-up of fuels because they are not consumed by fire. This results in more fuels for future, larger fires.
- By deliberately applying prescribed fire inside the wilderness boundaries we can begin to address these problems by modifying vegetation (creating patches) in a way that protects adjacent values, changes the pattern of how future fires might burn, and may allow managers to let future fires burn naturally within the wilderness.



View of Success

Successful prescribed burns will mean that wildfires will have more opportunities to play a natural role in wilderness areas in the future because:

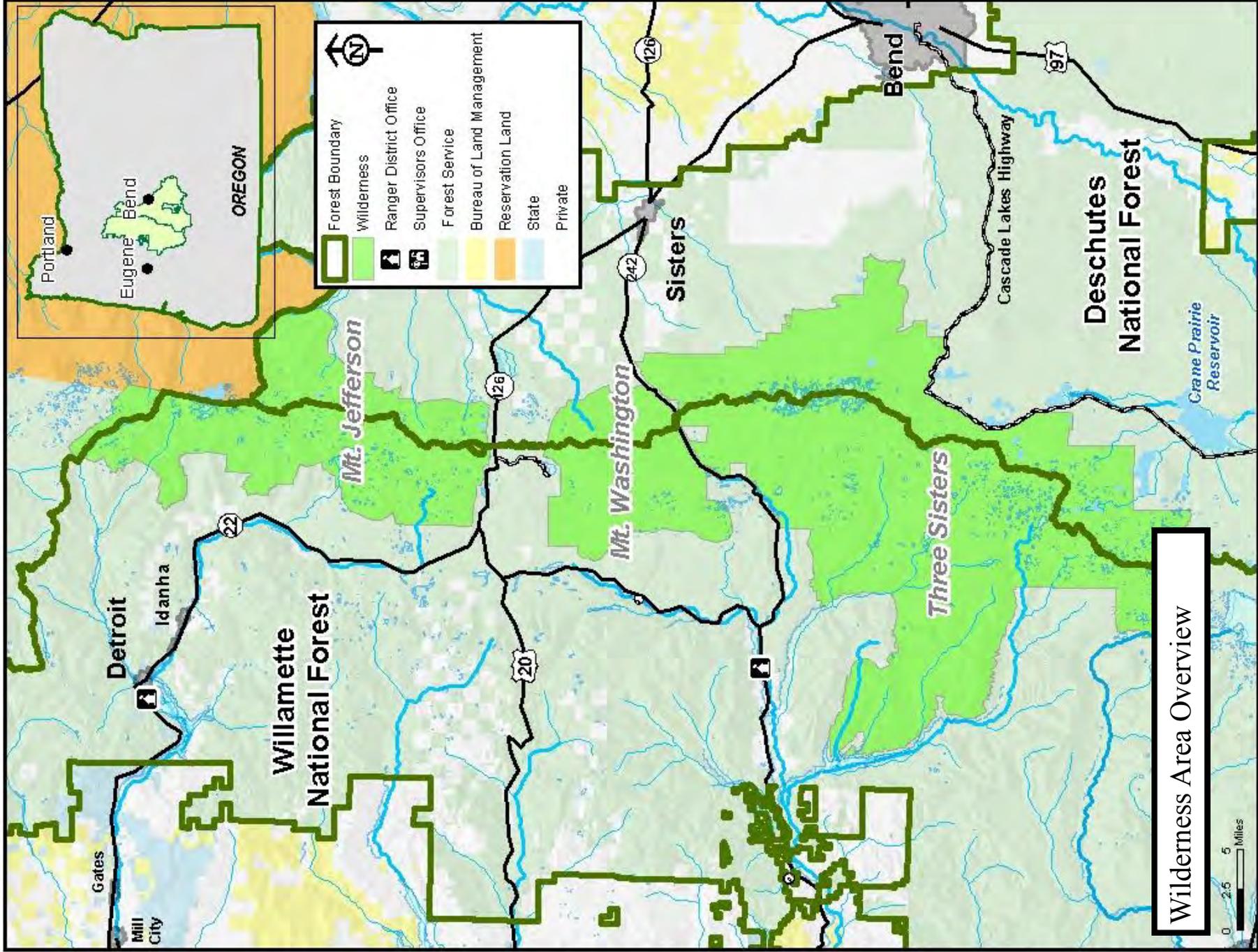
- The patches of wilderness forest will vary from each other in size and structure and will decrease the potential for large-scale wildfires to spread.
- Wildfires will have less potential to move beyond wilderness boundaries and threaten values at risk.
- When needed, firefighters will have more control points to base suppression actions.
- Firefighters will be able to better confine wilderness wildfires and reduce their exposure to the high-risk environment of wildfire suppression.



Photo: Aerial view of patchy fire effects.

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Prescribed Fire in the Wilderness

Look inside for these special insights:

- What have we accomplished to date?
- What will fire on the landscape look like?
- What is success?

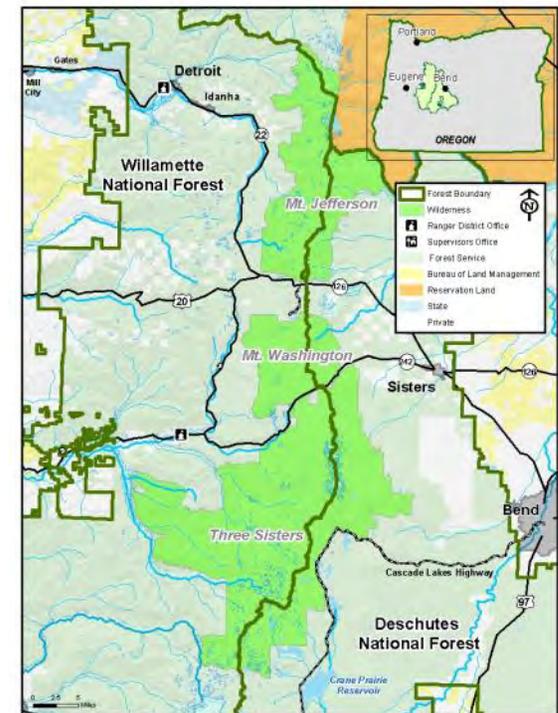
Prescribed Fire in the Mt. Jefferson, Mt. Washington and Three Sisters Wilderness Areas

Wilderness policy directs managers to allow natural processes to play as natural a role as possible. Prior to European settlement of the west, fires burned at varying scales within the wilderness areas, resulting in a mosaic of age classes of stands that would have provided a long-term barrier to large scale fire spread.

Forest managers are limited in allowing wildfires to play a natural role in wilderness because of the potential for large wildfires to move out of the wilderness.

The economic, social and ecological effects of wildfires are raising awareness that a different approach is necessary to reduce these threats.

Managers are concerned about wilderness values, firefighter and public safety, the economic and ecological cost of suppressing fires, and the increasing trend of wildfires burning larger and larger areas.



Below: Waldo Lake Wilderness; Charlton Fire, 1996, in the background and an earlier lightning fire in the foreground (gray).



Note: Diamond Peak and Waldo Lake Wilderness Areas not considered for prescribed fire because they don't have completed wildland fire use plans.

The Wilderness Issue

The current state of the wilderness areas along the Cascade Crest can prevent Forest managers from allowing wildfires to play a natural role and increases the risk to fire-fighters. Some of these conditions include:

- A century of fire suppression means fuels don't resemble a natural pattern of variously-sized patches on the landscape.
- Wildfires now burn larger and with more continuous intensity and severity due to the lack of diversity on the landscape.
- The wilderness areas are long, thin bands that span both sides of the crest. This shape, combined with homogenous vegetation increases the potential for large wildfires to move out of the wilderness.
- Suppression to keep fires contained to wilderness areas puts wilderness values at risk by using techniques that threaten the untrammled nature of wilderness.



The Wilderness Solution

Forest land managers have an opportunity to return to more natural conditions by allowing strategically placed prescribed fires to:

- create a variety of patches across the wilderness landscape;
- create conditions where natural wildfires can play a role with reduced threat to values outside the wilderness boundaries;
- leave the wilderness area in a natural condition, and allow land managers to achieve wilderness objectives and follow wilderness direction;
- reduce the potential for fire suppression activities to impact the untrammled nature of wilderness.



Values at Risk

HUMAN LIVES: wildland firefighters, public recreating, public living near wilderness areas

SOCIAL VALUES (facilities, infrastructure outside the wilderness): Wildfires moving out of the wilderness and impacting campgrounds, transmission lines, trailheads, municipal watersheds/city water sources, resorts, private infrastructure, ski resorts, youth camps, private property, and other economic values from tourism and recreation-based business.

NATURAL RESOURCE VALUES: wildlife and fish habitat, watershed health, road access, soils/erosion, and wilderness characteristics at risk from suppression activities.

Goal of Prescribed Fire in the Wilderness

After experiencing wildfires moving through and out of our wilderness areas, threatening values at risk outside the wilderness, and compromising wilderness values with suppression activities, managers are ready to change how wilderness fires are managed. They will move toward meeting the following goals:

- Maintain an untrammeled, undeveloped, **natural** environment that provides for solitude and unconfined recreation. (1964 Wilderness Act)
- Recognize the inevitability of lightning-ignited wildfires (See Maps: Lightning Strikes and Lightning-Caused Wildfires).
- Permit lightning-caused fires to play, as nearly as possible, their natural ecological role within the wilderness. (FSM 2324.21)
- Reduce, to an acceptable level, the risks and consequences of a wildfire within the wilderness or escaping from wilderness. (FSM 2324.21)

Many steps have already been taken to reach these goals, including completing

Wildland Fire Use plans for the Three Sisters, Mt Washington, Mt Jefferson and forming an interdisciplinary (ID) team from the Deschutes and Willamette National Forests.

These specialists identified 13 ‘focus areas’ in the wilderness’ where fire is likely to burn hot and pose a risk to values.



Prescribed fire is one of the only tools available for use in wilderness areas to address fire risk, and the only one that can be used on a larger scale.



Prescribed Fire Overview

Prescribed fires are intentionally set under specific weather and fuel conditions that will allow for a variety of fire intensities to meet fire and resource protection objectives. Prescribed fires are like “pre-planned” wildfires that reduce fuel buildup and create gaps, which can reduce the potential for large-scale wildfires that threaten values at risk.



Prescribed fires can be planned for a range of sizes – from small, 30-acre units, to large units exceeding 1,000 acres. Prescribed fire in the wilderness will resemble a wildfire, with areas of higher and lower consumption, raggedy edges and pockets of unburned materials. The effect will create patches and buffers that can modify future fire behavior. This diversity and fragmentation will help reduce the rate of fire spread, modify fire intensity and decrease the potential for future wildfires to move beyond the wilderness boundaries.

Scott Mountain Fire

The 2010 Scott Mountain Fire demonstrates the variety of outcomes expected across the landscape from the application of prescribed fire:

Patches of 100—300 acres of crown consumption as seen by the “black” areas



Areas with crown scorch, shown by the red-dish-brown segments



Islands or stringers of green unburned or lightly underburned vegetation

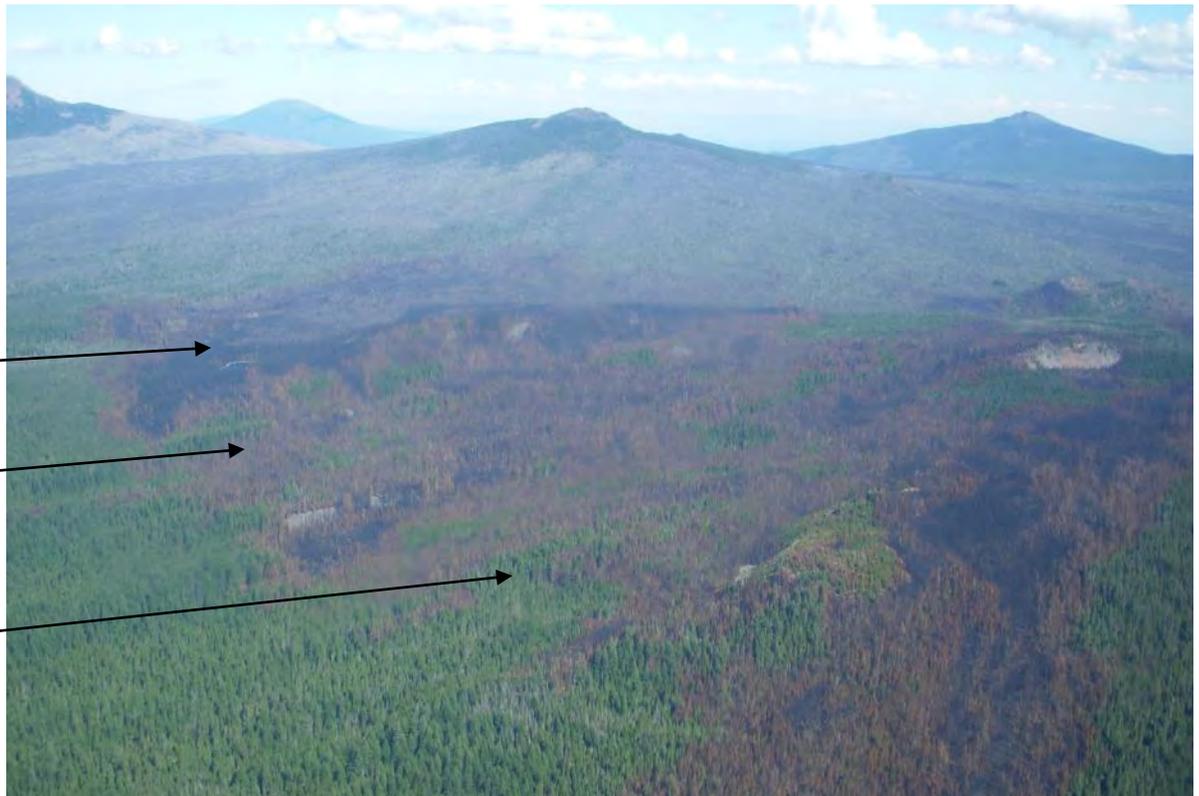


Photo credit: S. Swetland

Prescribed Fire: What will it look like?

Prescribed fire is expected to have a range of effects within the planning areas of the Cascade Crest Wilderness Areas.

Depending on overall fuel type, fuel density, weather and topography, managers should expect prescribed fire to have the following effects:

- A range of burned patches from 10's to 1,000's of acres in size
- A variety of dead and downed fuel consumption
- A range of fire behavior from areas with crowning and torching to light underburning
- A variety of live vegetation effects from areas with high tree mortality to areas with only ground fuel consumption
- Variable recovery rates due to fire severity, soil effects and patch size
- Visual changes across the landscape

Photo 1: Potential for high severity effects from crowning and torching

Photo 2: Pocket of tree scorch and tree mortality, retaining some downed woody debris and soil structure

Photo 3: Patch of severe fire effects including tree mortality and high consumption of downed woody debris; fire edge includes tree scorch adjacent to green trees.

Photo 4: Transition edge between light—severe fire effects

Photo 5: Low-moderate fire effects





Prescribed Fire: How will it be done?

Based on a combination of factors including fire prescription, current and expected weather, current wildfire situation and access, fuels specialists will ignite prescribed fires using different tools to achieve a variety of effects. The fires will be ignited using helicopters and/or by hand with drip torches. In some cases, pre-treating areas outside the wilderness will also be important to achieve success.

Time of year will play a role in which strategies and tactics are used depending on whether we want to burn ground or canopy fuels or both.

WINTER – Strategies implemented with snow on the ground will focus on burning tree canopies. This treatment would involve igniting individual trees and would likely be followed up by a surface treatment.

The benefits of a winter burning include: reduced fire intensity and a targeted and tailored prescription to treat problem areas. On the other hand, winter treatments have a greater level of complexity due to the targeted nature and the skill set required to achieve objectives.

SPRING—Strategies will mean applying fire immediately after surface fuels dry following snow melt underneath trees. Ignitions will be done by hand or helicopter and fires would be expected to be limited by remaining patches of snow.

Similar to winter, spring treatments would have reduced fire intensity and spread. Spring treatments would be able to be used next to riparian areas or other problem areas. Complications of this type of treatment include access due to remaining snow and the potential for a “hold-over” fire to rekindle during summer months.

FALL – Strategies during the fall will focus on fire moving throughout planning areas; managed by existing topography and features on the ground. Burning would be expected to continue until a season-ending weather event. Fires would be expected to burn in a variety of patterns, patch sizes and with a variety of intensities.

Benefits of burning in the fall include the potential of achieving objectives with one entry and minimizing human impacts to wilderness areas. Burning in the fall would allow the prescribed fire to burn with similar intensities as a typical summertime fire; however, shorter days and cooler temperatures could potentially mitigate fire behavior and decrease the potential for “hold-over” fires. On the other hand, increased complexity could arise with inaccurate weather forecasting; unexpected fire spread and increased firefighter exposure in the event that the fire moves beyond maximum management areas.



From 13 to 2: Deciding Where to Start

An interdisciplinary team of specialists and land managers completed an analysis of the locations within the three wilderness areas most likely to sustain an ignition and to burn with high flame lengths (hot). The team compared a map of these sites within the wilderness with values at risk outside the wilderness.

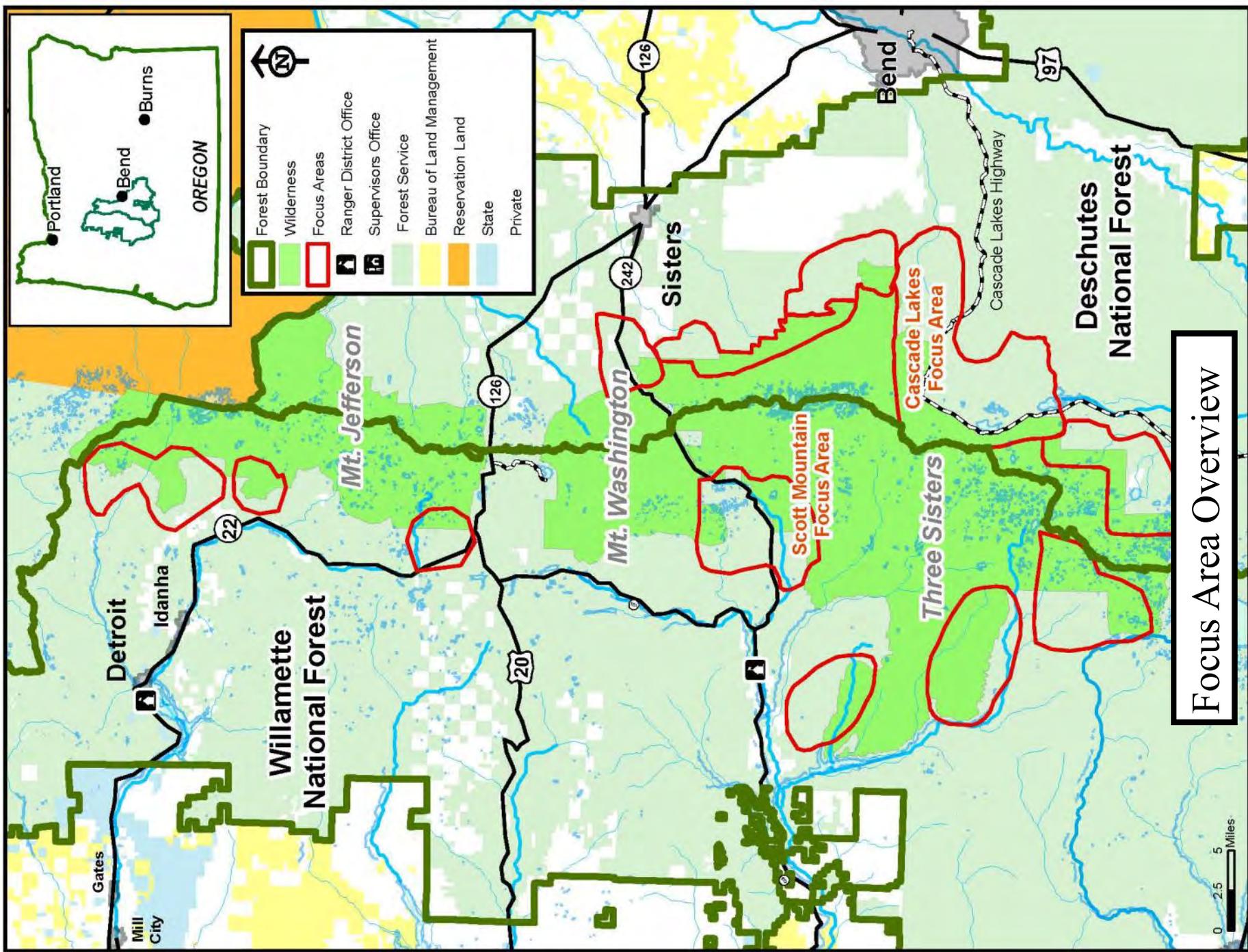
From this, they were able to identify 13 focus areas where wildfires are likely to burn and pose a serious risk to life, property and natural resources outside wilderness.

Two of these (13) have been picked as a starting point to explore our strategy of utilizing prescribed burning to allow fire to play more of a natural role in the wilderness. These areas were chosen as starting points because the landscapes exhibit some of these important characteristics:

- Topography, geography, and vegetation provide opportunities for prescribed burns that could allow lightning caused-fire to play more of a natural role in the area in the future
- High values at risk in areas adjacent to wilderness such as resorts and recreation areas
- High risk to firefighter safety from suppression actions because of need to protect human life and property; or because of being placed into remote, inaccessible areas to suppress fires.
- Where naturally occurring fires are likely to ignite and spread and move outside the wilderness



Photo: B&B Fire, 2002. Approximately six minutes after start of fire.



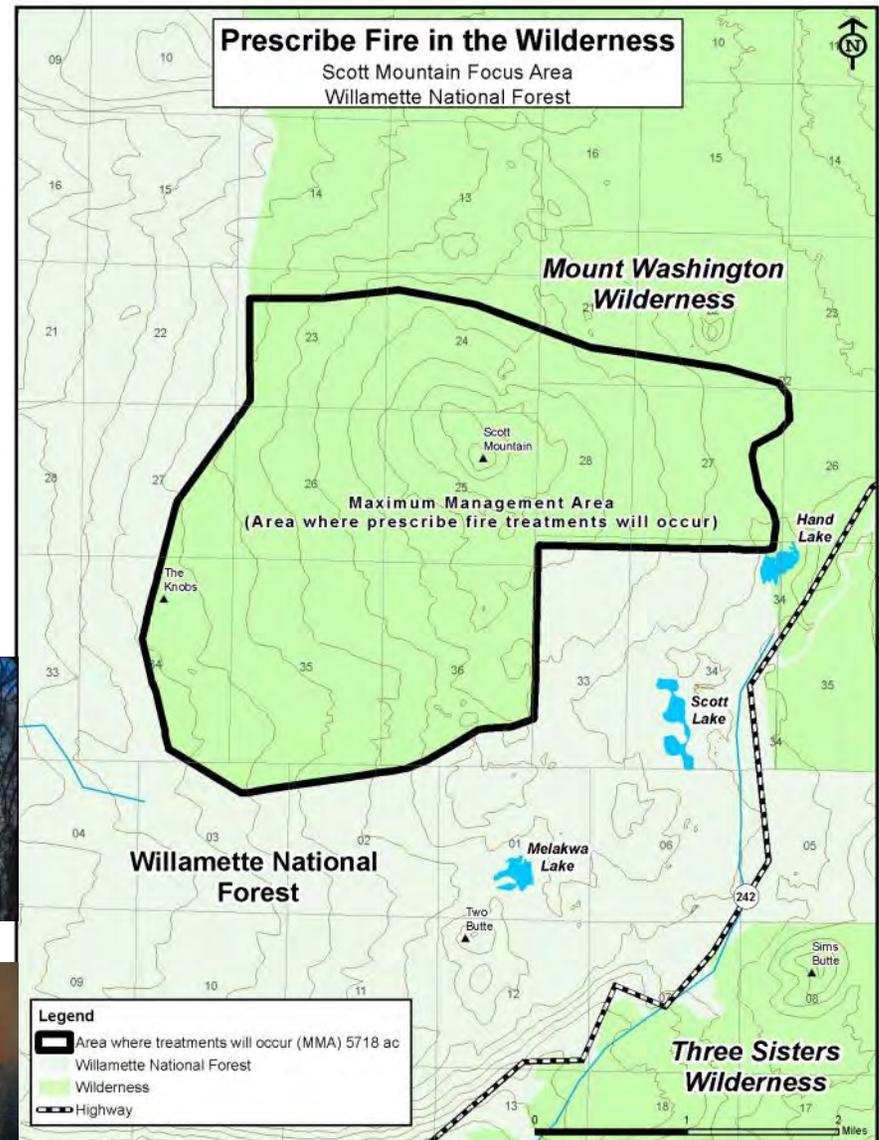
Scott Mountain Focus Area

The Scott Mountain Focus Area covers about 5,700 acres in the southern half of the Mount Washington Wilderness in the Willamette National Forest, approximately 16 miles southwest of Sisters and two miles north of Highway 242.

The focus area is bounded on the northern edge by the 2010 Scott Mountain Fire scar, lava fields on the east and the wilderness boundary on the south and west. The project area has a consistent gentle, slope that runs from the peak of Scott Mountain down to the base and continues to the edge of the wilderness boundary.

The goal is to treat 1,000—1,200 acres with prescribed fire. Fires will be ignited in strategic patches and allowed to burn for one more day, depending on weather conditions. The intent is to allow prescribed fires to burn within the management area without on-the-ground suppression tactics. Treatments are likely to occur in the fall months; however, burning may occur at other times of the year if weather, fuel moisture and air quality factors are favorable.

Below Far Left: Waldo Fire, 1996; Below Left: Tumblebug Fire 2009; Right: Warner Fire 1998



Cascade Lakes Focus Area

The Cascade Lakes Planning Area is about 9,000 acres and is located 19 miles west of Bend, along the Cascade Lakes Scenic Byway. The planning area boundaries wrap around Mt. Bachelor and extend well into the Three Sisters Wilderness to the north and west.

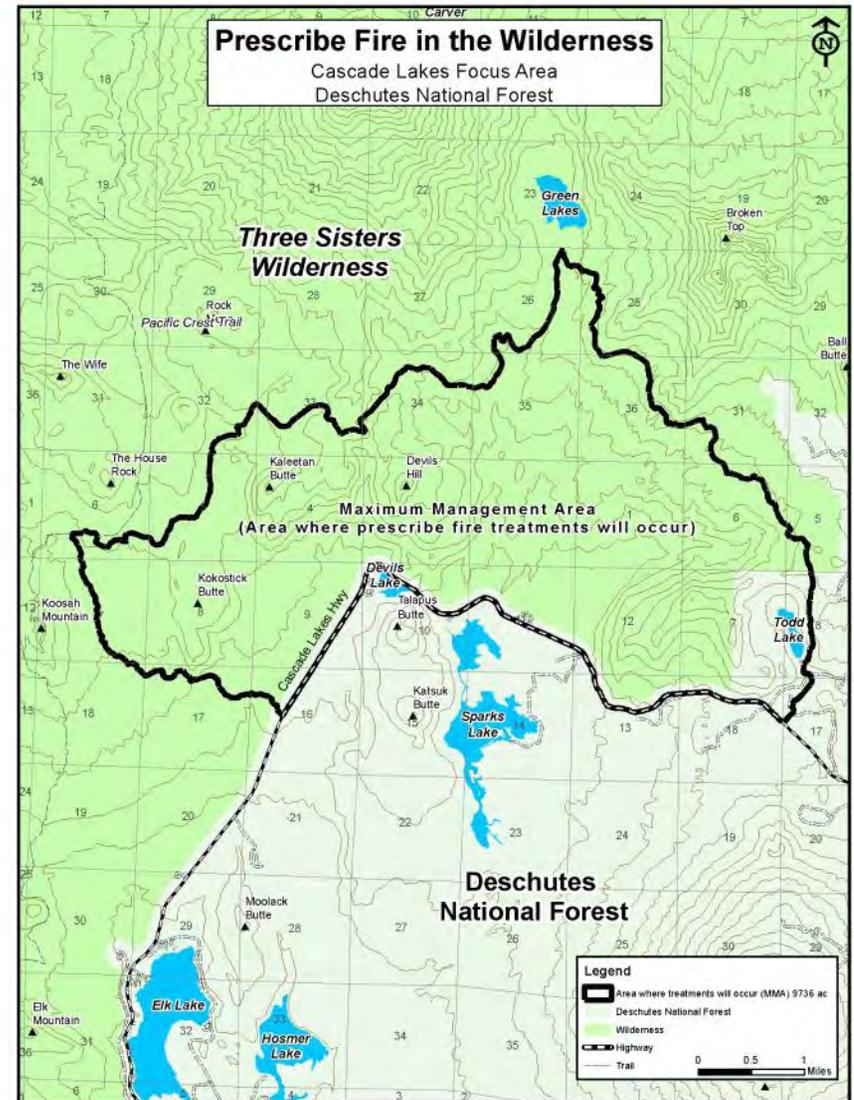
In addition the Three Sisters Wilderness, the area overlaps several special land designations, including: Bearwallow Butte Inventoried Roadless Area (IRA), Katsuk Butte Research Natural Area, Bend Watershed IRA, and West-South Bachelor IRA.

Fuels specialists are currently proposing to prescribed burn 3,800 acres in the Three Sisters Wilderness. Burns will mimic disturbances that would historically have occurred in the mountain hemlock and lodgepole pine plant association groups. This means that much of the area will burn with high severity and include visible amounts of crown scorch and tree mortality.

Pre-Treatment Requirements

Before prescribed fire can be applied in the wilderness, it will be necessary to implement some fuels treatments between the wilderness boundary and the Cascade Lakes Highway. These treatments would provide an essential defensible area to lower the risk of prescribed fires escaping, as well as providing a containment area for future wildfires that threatened to cross wilderness boundaries.

Treatments outside the wilderness would include small diameter tree thinning, handpile construction, tree pruning and prescribed fire treatments. These treatments also meet requirements established in the East-West Community Wildfire Protection Plan, which establishes the Cascade Lakes Highway as a primary evacuation route.



Techniques and Outcomes Common to Both Focus Areas

Techniques

Fuels specialists will map features, terrain, vegetation conditions and special areas prior to implementing this project. Using this on-the-ground knowledge, combined with computer modeling to predict fire spread and a range of effects (see Appendix A), fuels specialists will plan to use existing features and natural barriers to confine and contain these prescribed burns.

Due the size of the project, and the remote, limited access to the areas, fuels specialists propose to use helicopters equipped with Aerial Sphere Dispensers (ping-pong balls) or a heli-torch to accomplish prescribed fire ignitions.

It is unlikely that hand lighting techniques could safely meet the objectives of the plan; however, drip torches, or other hand lighting devices, could be used (i.e., black line or burn out) to protect sensitive areas.

All firefighters and fuels specialists would use Minimum Impact Suppression Tactics (MIST) if needed to control the spread of any prescribed burns ignited in the wilderness areas.

Natural barriers and existing trails will be used as treatment boundaries wherever possible to manage fire ignition and spread.

When necessary and as analyzed by the MRDG, chainsaws and mechanized pumps may be used during prescribed fire implementation if shown to be the minimum required tool in accordance with law, policy and regulation and approved by the Forest Supervisor.



Outcomes

The range of fire behavior will include areas with low flame lengths intended to burn litter, duff, grasses, herbaceous vegetation and shrubs, as well as higher flame lengths that will scorch tree crowns and allow single and group tree torching along with short crown runs. Ensuing fire severities among correlating plant association groups are expected to be commensurate to historic amounts.

When complete, treatments will have helped create a mosaic of vegetation conditions (both standing and down) across the landscape. This mosaic will affect future fire behavior by reducing the rate of spread, intensity and severity of future wildfires that might ignite in the treated areas.

Burned patches will range from 10s of acres to 100 - 200 acres in size. The resulting mosaic will create a variety of vegetation



Other Considerations for Planning Prescribed Fire

When considering where and how to ignite a prescribed fire within the focus areas, the IDT used known criteria that will protect wilderness and other values from the impacts of the proposed human activities within the wilderness. Some of the values that will be considered during the environmental analysis process or incorporated into the initial design of the project include:

Safety and Risk Management

The goal of reducing risk to firefighters, as well as to the public and adjacent property is a critical consideration in deciding where to start. Safety considerations took into account the following occasions where firefighters would be exposed to the greatest risk:

- Where fires were likely to ignite and spread, and also where they would likely move outside the wilderness, triggering suppression action.
- Where fires would impact homes and property, increasing the numbers of firefighters called on to suppress the fire.
- Locations where firefighters would be placed in remote, inaccessible are-

Wilderness Values

Use of the Minimum Requirements Decision Guide and tool analysis for all project-related activities to insure that the minimum required tool is used in accordance with wilderness policy.

Recreation and Scenic Values

- Use natural terrain features whenever possible rather than trail boundaries to maintain natural fire edge appearance.
- Recognize and reduce where possible conflicts with wilderness users including uses of the trails and recreation facilities.



Wildlife and Riparian Values

- Exclude sensitive habitats such as nesting, roosting, and foraging areas for northern spotted owls from proposed prescribed burn areas.
- Exclude or avoid riparian habitats except as a low-intensity backing fire to preserve special habitat qualities such as shade or ground covers.

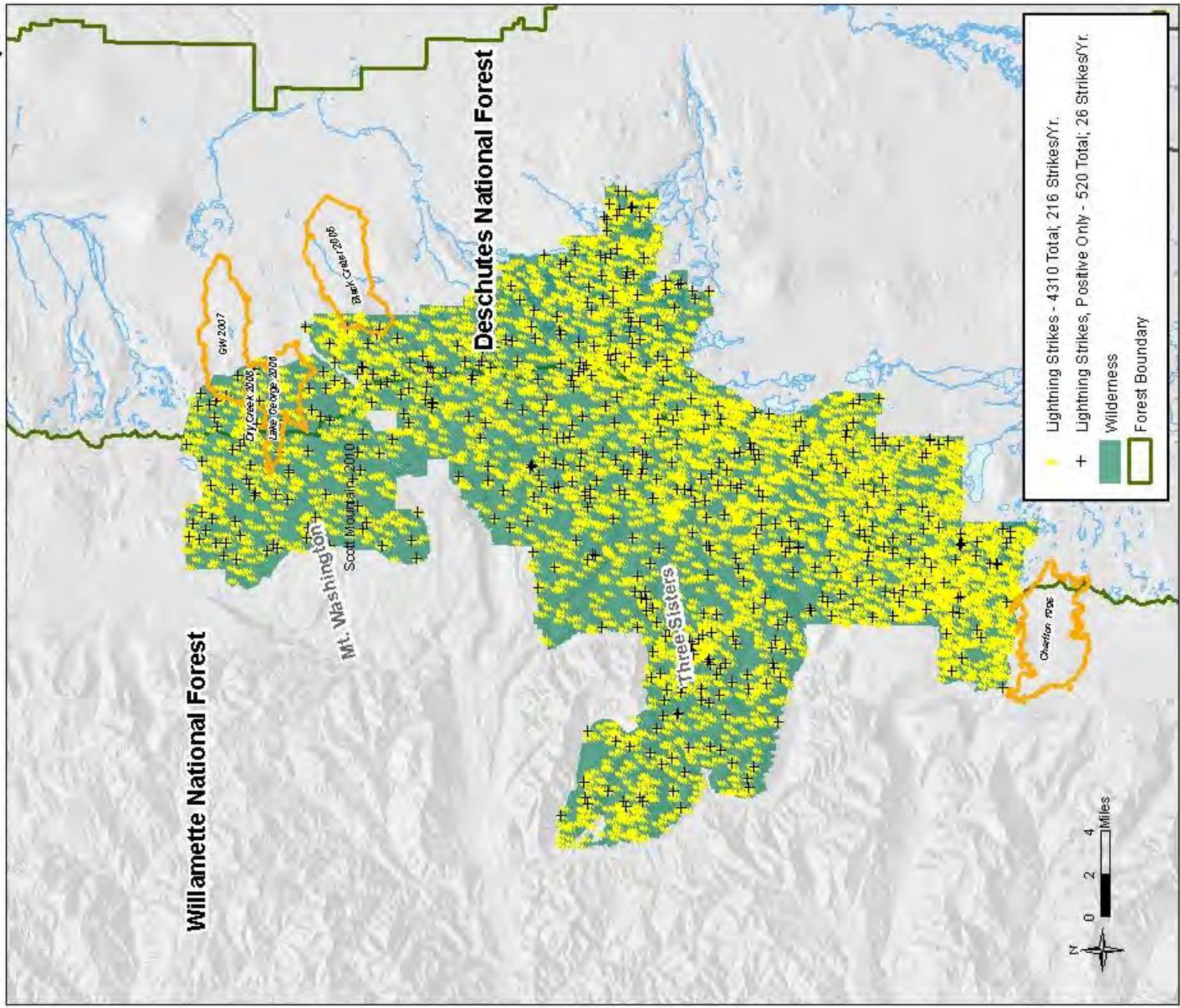


Lightning Maps

Appendices

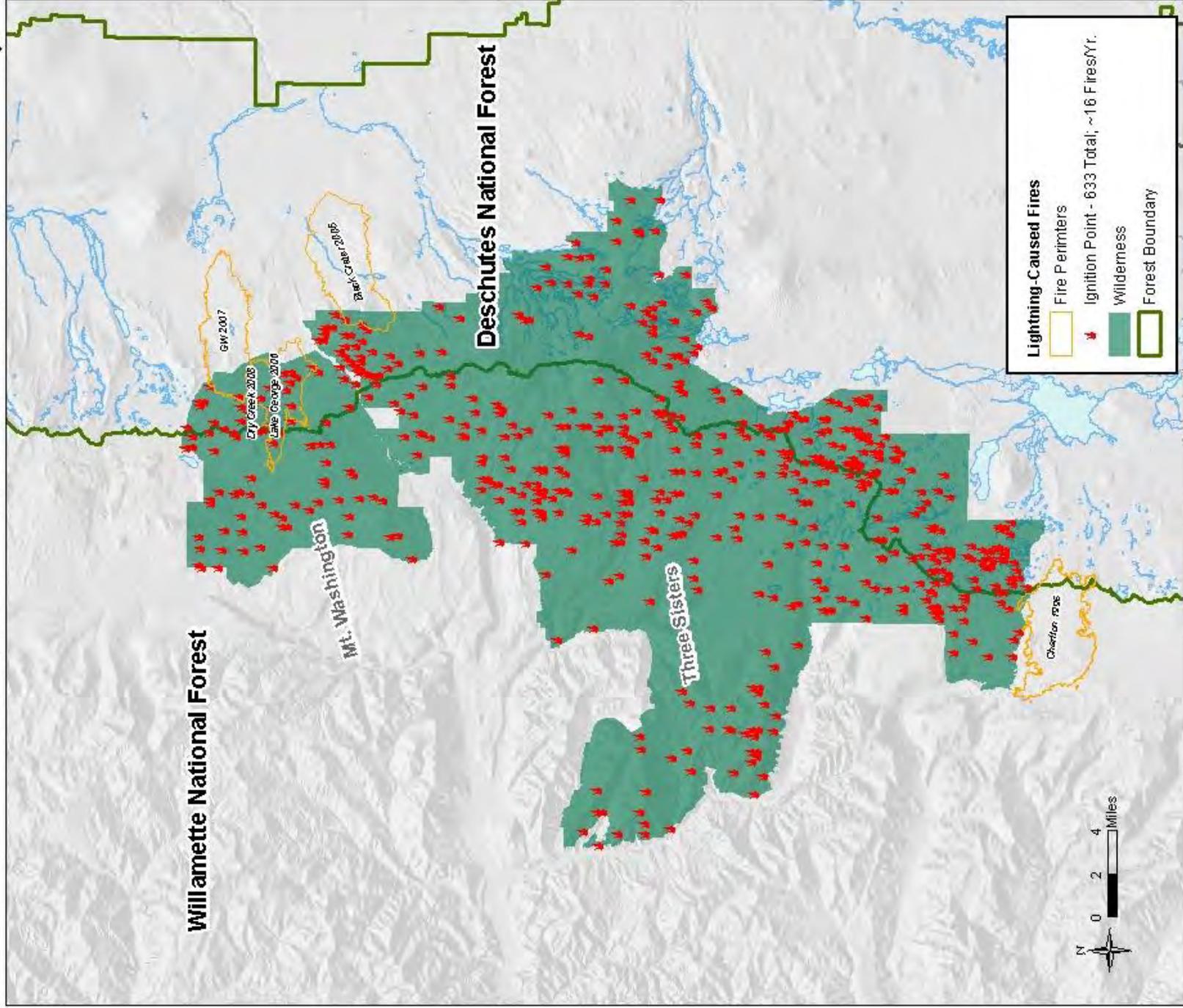


Lightning-Strikes: 1990 - 2009 Mt. Washington and Three Sisters Wilderness Areas





Lightning-Caused Fires: 1970 - 2009 Mt. Washington and Three Sisters Wilderness Areas



Appendix A: Prescribed Fire—A modeling example of fire spread

Modeling a wildfire igniting in a wilderness area—the following computer modeling exercise demonstrates the differences in fire behavior based on the presence or absence of treatments. The program shows fire spread based on weather, terrain and fuel characteristics from the same point of ignition. Modeling is one tool that can be useful in demonstrating what might occur; however, like all models the outputs are based on the information plugged into the computer.



Photo 1: No Treatments—Day One, fire ignites and moves 3,200 acres, crosses wilderness boundary and impacts recreation values at a nearby lake. Action would be taken to prevent fire from moving outside wilderness due to values at risk, leading to wilderness impacts from fire suppression activities.

Photo 2: Buffer Treatment Outside Wilderness—Day One, fire ignites and moves 2,100 acres, jumps buffer treatment and impacts recreation values at a nearby lake. Action would be taken to prevent fire from moving outside wilderness due to values at risk, leading to wilderness impacts from fire suppression activities.

Photo 3: “Patches” from previous fires inside wilderness—Day One fire behavior is modified by patch effect of previous “wildfires.” Fire moves 300 acres and stays within wilderness boundary. Fire can be monitored and/or Minimal suppression tactics taken.

Prescribed Fire: A modeling example of the range of effects



Computer modeling shows how the same prescribed fire can have two different results based on initial inputs, such as number of trees per acre. These results show a possible range of fire effects, including low intensity underburn in #1 to a high severity crown fire in #2. This modeling run can also be interpreted to demonstrate how a prescribed burn (#2) that reduced stand density might decrease the behavior of a future wildfire (#1) that ignites years later.

Table below: computer model data fire outcomes based on two different stand densities.

Stand	Pre-fire Trees/ Acre	Mortality 20 – 30” dbh	Fire type	Flame length (ft)
Mt. Hem 1	201	2 of 26	surface	3.2
Mt. Hem 2	865	3 of 5	torching	46.1