2024 Umpqua National Forest Wildfires

Burned Area Report

Fire Background

Several wildfires burned across the Umpqua National Forest from July through October including the Lane 1, Diamond Complex, and Homestead Complex on the Cottage Grove, North Umpqua, and Diamond Lake Ranger Districts, and the Dixon and Devils Knob fires on the Tiller Ranger District. Approximately 60,000 acres have burned on the Umpqua National Forest in 2024.

While many wildfires cause minimal damage to the land and pose few threats to the land or people downstream, some fires result in damage that requires special efforts to reduce impacts afterwards. The Burned Area Emergency Response (BAER) program is designed to identify and manage potential risks to resources on National Forest System (NFS) lands and reduce these threats through appropriate emergency measures to protect human life and safety, property, and critical natural or cultural resources. BAER is an emergency program for stabilization work that involves time critical activities to be completed before damaging events to meet program objectives.

The Forest Service assembled several BAER teams in September and October 2024 to cover the burned area assessments. These teams of experts in various resource disciplines began assessing the post-fire effects to critical values on Forest Service lands. Impacts to the soil are the primary indicator of potential post-fire changes in watershed response, as well as watershed recovery. The teams developed soil burn severity (SBS) maps to document the degree to which the fires had changed soil properties. Using the SBS map, physical scientists can predict erosion potential, changes to runoff and flood flows, and increased geologic hazards. Field evaluations and modeling results are used to determine relative increases in post-fire risk to different critical values and inform recommendations to address these increased risks.

Picture 1. Soil scientists assessing burn severity on the Potter Fire in the Diamond Complex. (USFS photo)

Soils

Soil burn severity is not an assessment of vegetation consumption, but rather an integration of vegetation loss, changes in soil structure and infiltration capacity, remaining vegetation, duff, or ash, and soil color, all of which may indicate relative degrees of soil heating.

The final soil burn severity maps were developed with ESRI ArcGIS software using satellite-imagery-derived Burned Area Reflectance Classification (BARC) and field survey data. Field work included assessment of ash characteristics, ground cover, root condition, soil structure, soil water-repellency, and vegetation burn severity as described in the Field Guide for Mapping Post-fire Soil Burn Severity (Parsons et al. 2010). High burn severity is characterized by a complete consumption

of organic material with the surface layers of the soil resulting in a change to single-grain structure. Fine roots are commonly charred or consumed 3-5 cm deep. The highest-severity areas often have a loose, dusty appearance, and no longer have any cohesion or soil strength. Generally, there will be less destruction of soil organic matter, roots, and structure in an area mapped as moderate compared to high. In areas mapped as moderate SBS, soil structure, roots, and litter layer may remain intact beneath a thin ash layer. Low soil burn severity results in very little alteration of soil organic matter and little or no change in soil structural stability.

Mapped and validated SBS for the burned area are shown in Table 1 (see maps on pages 6-19). The fires all resulted in a mixed mosaic pattern of low soil burn severity with patches of moderate and isolated pockets of high soil burn severity. The more severe a fire's effects are on the soil, the more likely those soils will erode in subsequent rainstorms – especially in locations with steep slopes. Erosion after fires can cause tremendous damage to homes and other structures in the years after a fire.

Table 1. Final soil burn severity acres for the 2024 Umpqua National Forest Fires (NFS acres only)

Fire	Very Low	Low	Mod	High
Devils Knob	482	1,355	594	58
Diamond Complex	1,234	6,829	2,312	33
Dixon	14	430	329	45
Homestead Complex	2,681	5,918	1,079	55
Lane 1	7,507	5,783	2,413	279

Geology

The team identified the geologic conditions and processes that have shaped and altered the watersheds and landscapes and assessed the impacts from the fire on those conditions and processes that could affect downstream critical values. Using the understanding of rock types and characteristics, geomorphic processes, and distribution of geologic hazards helps predict how the watersheds will respond to and be impacted by upcoming storms. Volcanic materials dominate the geologic setting of the burned areas. The terrain is the higher elevations are glacially scoured with cirque basins, icefields, and large U-shaped valleys, with vertical to near-vertical slopes in bedrock common throughout. The lower elevations are dominated by dissected mountains where erosion and mass wasting over time has resulted in a highly dissected landscape with deep V-shaped valley walls that are contiguous from ridge-top to valley bottom.

The team provided soil burn severity field data to the US Geological Survey Landslide Hazard Program to assist in forecasting the probability, potential volumes, and hazards of debris flows through their developed empirical models. The USGS Post-fire Debris Flow Hazard Model estimates a minor increase in debris flow potential for the majority of the fires with isolated areas of higher risk, primarily in areas with previous fires that reburned in 2024 (see maps on PWFDF Dashboard (arcgis.com)).

Picture 2. Overview of the Lane 1 fire. (USFS photo)

Hydrology

Primary watershed response is expected to include an initial flush of ash and burned materials, erosion in drainages and on steep slopes in the burned area, increased peak flows and sediment transport and deposition, and debris flows. Watershed response is dependent on the occurrence of rainstorms and rain-on-snow events and will likely be greatest with initial storm events. Increased watershed response is most likely in areas with high to moderate soil burn severity. Disturbances will become less evident as vegetation is reestablished, providing ground cover that reduces erosion and increases surface roughness which slows flow accumulation and increases infiltration. This will likely lead to increased water quality concerns for municipal and domestic drinking water providers within and downstream of the fire.

Picture 3. Road within the Dixon Fire. (USFS photo)

Critical Values

The first critical value BAER teams assess is always human life and safety on National Forest System lands. During and after heavy rainstorms, Forest Service employees and visitors to National Forest System Lands could be threatened by falling trees, floodwaters, and debris flows. In addition, users of roads within and downstream of the burned areas may be affected by road washouts during and after heavy rainstorms. The National Weather Service can establish an early warning alert plan for areas that are potentially at risk from these events. The BAER team recommends general warning signs and communications to travelers on any National Forest System roads and trails within or directly adjacent to the fires.

Roads and Bridges

Roads in and downstream of burned areas are at risk of damage due to post-fire conditions. The most likely threat due to the fires is clogging of culverts, bridges, and other in-channel infrastructure from the higher levels of floatable debris (especially burned trees) in burned watersheds. Once blocked by debris, road drainage structures no longer function and the stream flows over the road, often causing considerable damage and limiting access. Various measures can reduce this risk, including protecting culvert inlets with debris racks, removing large floatable debris from channels upstream of structures before floods, and making heavy equipment available and readily mobilized during storm events to keep structures clear of debris.

Debris flows are less likely than debris-laden flood flows, but they pose a greater threat to roads when they do occur and are difficult to mitigate.

Critical values addressed in the BAER report include Forest Service System Roads and related drainage features. Treatments for the protection of these roads include improved road drainage and storm inspection and response.

Recreation

National Forest System recreation infrastructure includes campgrounds, trails, and day use areas. Similar to roads, recreation infrastructure could be damaged in post-fire storm events. The team proposes trail drainage stabilization treatments, which include armoring and/or cleaning existing

water control features and adding additional drainage features to provide additional capacity for elevated sediment laden post-fire runoff, and hazard tree falling for the protection of recreation infrastructure.

Botany

Invasive plants adversely affect native plant communities through allelopathy (suppression of growth of a native plant by release of a toxin from a nearby invasive plant) and direct competition for water and resources. Over time, native plant diversity decreases as invasive plants expand, reducing habitat for native plant species and wildlife. Shifts from diverse native plant communities to non-native invasive plant dominance could alter future fire behavior, intensity, extent, and season of burning.

Current infestations are primarily located along roads, old dozer lines, campgrounds, and trails throughout the burned area, with interior areas being largely un-infested. However, the burned area creates conditions for invasive species to outcompete native plants. The team recommends a treatment of Early Detection, Rapid Response (EDRR) to monitor for, and treat? noxious weed infestation and expansion in areas disturbed due to mechanical suppression activity and burned areas prone to new noxious weed infestations.

Cultural Resources

The most typical post-fire threats to cultural sites are physical threats such as erosion or damage from (now dead) falling trees. In some cases, newly exposed artifacts are threatened by human damaging activities such as looting or vandalism. Cultural resources were evaluated by the team and treatments proposed as necessary to protect these values from post-fire threats.

Federally Listed Species - Wildlife and Fisheries

Some of the 2024 fires burned within the current range of northern spotted owl, gray wolf, North American wolverine, and Franklin's bumble bee. Threats include additional loss of habitat in the fire area due to blowdown, mass soil movement, flooding, and insects and disease. Due to the low severity of the fires, the majority of the habitat for these species should recover naturally.

Picture 4. Photo of Bradley Lake within the Fuller/Bullpup fire of the Homestead Complex. (USFWS photo)

Critical habitat for Federally listed Coho Salmon occurs in select river drainages. Impacts to aquatic systems are directly related to the anticipated increases to runoff, erosion, and sedimentation in streams. The watershed response for these fires is anticipated to cause short-term localized effects that will not cause damage to populations.

Anticipated Vegetation Recovery

Post-fire recovery varies greatly based on climate, vegetation types and burn severity. It is typical for recovery to take between 3-5 years for reestablishment of ground cover. The persistence of drought in the years following wildfires also delays the recovery time frame. Even with only a short period of time since fire containment, resprouting of trees and shrubs as well as emergence of forbs have been noted within the burned area.

Non-Forest Service Values

Since fire effects know no administrative boundaries, additional threats exist for assets not owned or managed by the Forest Service. Post-fire emergency response is a shared responsibility. There are several Federal, State, and local agencies that have emergency response responsibilities or authorities in the post-fire environment. The BAER team and local unit BAER Coordinator has engaged with interagency partners to facilitate consideration of off-Forest values covered through other programs with the relevant responsible entities.

Conclusion

There are multiple phases of post-fire actions after a wildfire covering suppression repair through long-term recovery. BAER is the rapid assessment of burned watersheds by a BAER team to identify imminent post-wildfire threats to human life and safety, property, and critical natural or cultural resources on National Forest System lands and take immediate actions to implement emergency stabilization measures before the first major storms. The BAER team has identified imminent threats to critical values based on a rapid assessment of the area burned by the 2024 Fires. The assessment was conducted using the best available methods to analyze the potential for damage from post-fire threats, including flooding and debris flows. The findings provide the information needed to prepare and protect National Forest System critical values against post-fire threats.

BAER treatments cannot prevent all the potential flooding or soil erosion impacts, especially after a wildfire-changed landscape. It is important for the public to stay informed and prepared for potentially dramatic increased run-off events. Many burned-area watersheds were already hydrologically responsive to rainfall and prone to erosion and sediment transport prior to the fire and will likely be even more responsive due to post-fire conditions. However, vegetation recovery is anticipated to be rapid with ground cover approaching pre-fire conditions within 1-3 years, which will attenuate any post-fire effects on watershed processes. The Forest Service will continue to provide information and participate in interagency efforts to address threats to public and private values resulting from the 2024 Fires.

The Forest Service will continue to work towards long-term recovery and restoration of the burned area in coordination with efforts to rebuild and restore the communities affected. A vegetation burn severity map, or mortality map, may be produced as a part of the recovery efforts to help other scientists, such as wildlife biologists, botanists, and silviculturists understand what to expect from this changed landscape for wildlife habitat, invasive weeds, timber salvage, and reforestation needs.

Local Forest Service BAER Coordinator

Joe Blanchard, joseph.blanchard@usda.gov

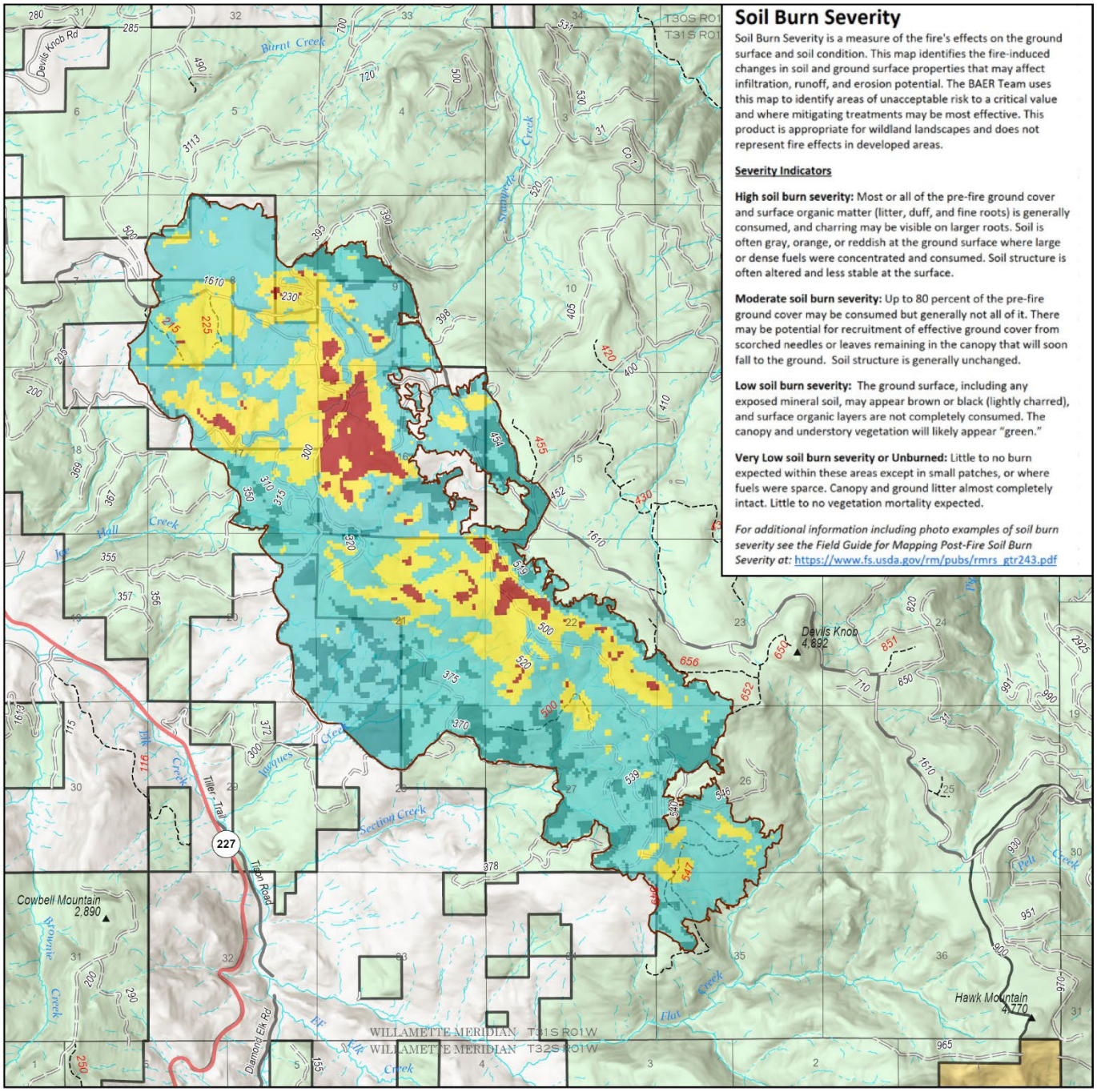
References:

Parson, Annette; Robichaud, Peter R.; Lewis, Sarah A.; Napper, Carolyn; Clark, Jess T. 2010. Field guide for mapping post-fire soil burn severity. Gen. Tech. Rep. RMRS-GTR-243. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 49 p. (https://www.fs.usda.gov/rm/pubs/rmrs_gtr243.pdf)

Soil Burn Severity - Devils Knob

Burned Area Emergency Response (BAER)

Date: 10/8/2024



Soil Burn Severity

Soil Burn Severity is a measure of the fire's effects on the ground surface and soil condition. This map identifies the fire-induced changes in soil and ground surface properties that may affect infiltration, runoff, and erosion potential. The BAER Team uses this map to identify areas of unacceptable risk to a critical value and where mitigating treatments may be most effective. This product is appropriate for wildland landscapes and does not represent fire effects in developed areas.

Severity Indicators

High soil burn severity: Most or all of the pre-fire ground cover and surface organic matter (litter, duff, and fine roots) is generally consumed, and charring may be visible on larger roots. Soil is often gray, orange, or reddish at the ground surface where large or dense fuels were concentrated and consumed. Soil structure is often altered and less stable at the surface.

Moderate soil burn severity: Up to 80 percent of the pre-fire ground cover may be consumed but generally not all of it. There may be potential for recruitment of effective ground cover from scorched needles or leaves remaining in the canopy that will soon fall to the ground. Soil structure is generally unchanged.

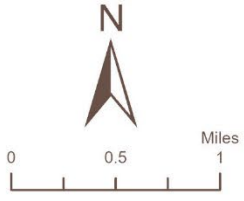
Low soil burn severity: The ground surface, including any exposed mineral soil, may appear brown or black (lightly charred), and surface organic layers are not completely consumed. The canopy and understory vegetation will likely appear "green."

Very Low soil burn severity or Unburned: Little to no burn expected within these areas except in small patches, or where fuels were sparce. Canopy and ground litter almost completely intact. Little to no vegetation mortality expected.

For additional information including photo examples of soil burn severity see the Field Guide for Mapping Post-Fire Soil Burn Severity at: https://www.fs.usda.gov/rm/pubs/rmrs_gtr243.pdf

Soil Burn Severity

- Very Low/Unburned (723 Acres)
- Low (2,270 Arcres)
- Moderate (969 Acres)
- High (199 Acres)



Soil Burn Severity - Dixon Fire
Burned Area Emergency Response (BAER)

Date: 8/30/2024

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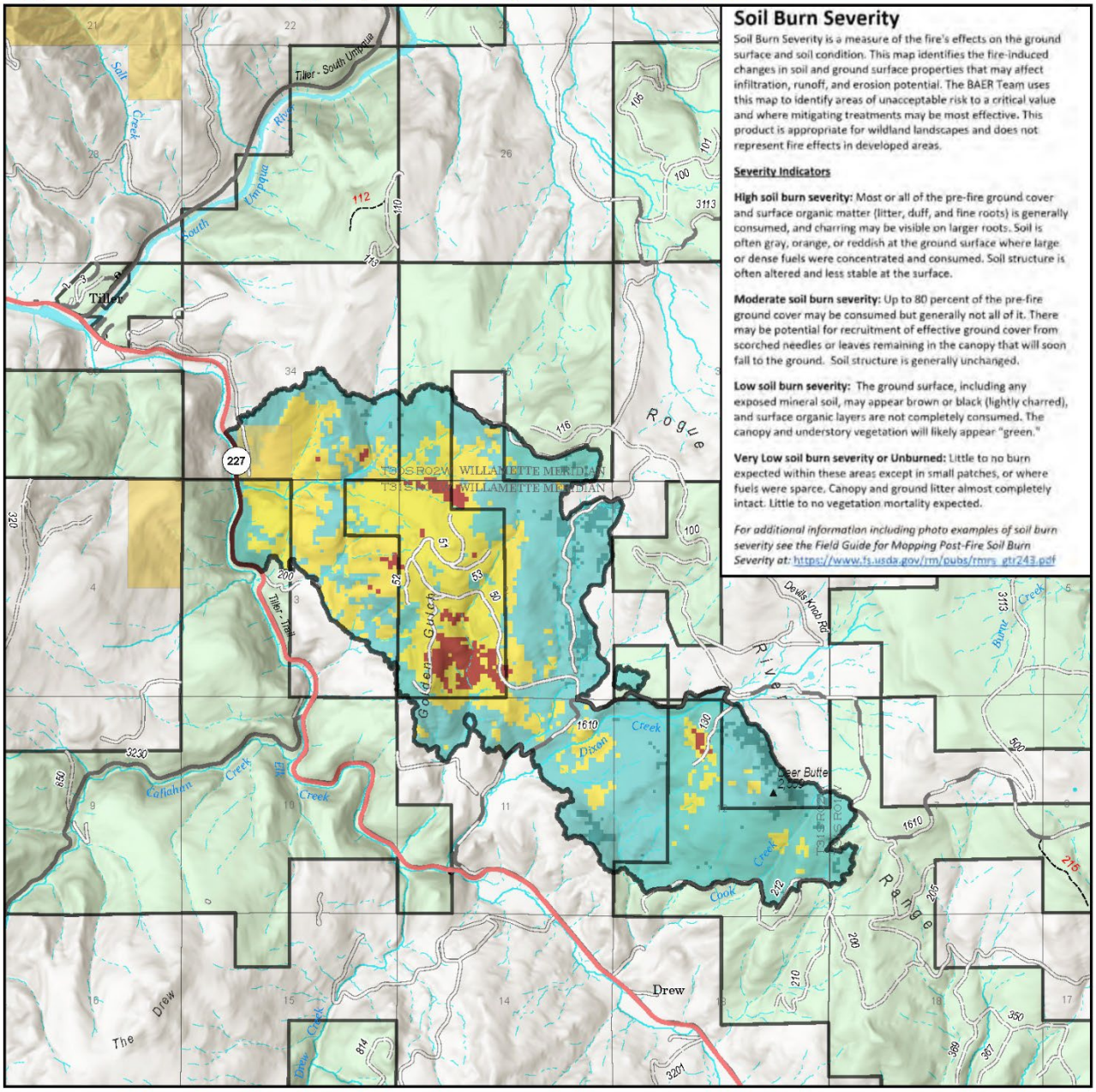

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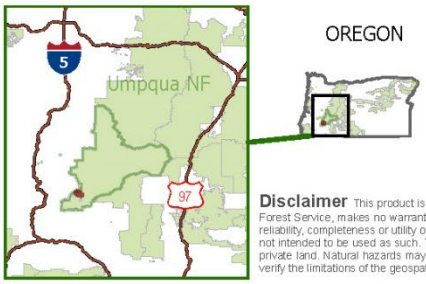

OREGON

Soil Burn Severity

- Very Low / Unburned (104 acres)
- Low (1,173 acres)
- Moderate (633 acres)
- High (52 acres)

Soil Burn Severity - Fuller Lake

Burned Area Emergency Response (BAER)

N

Date: 9/30/2024

Soil Burn Severity

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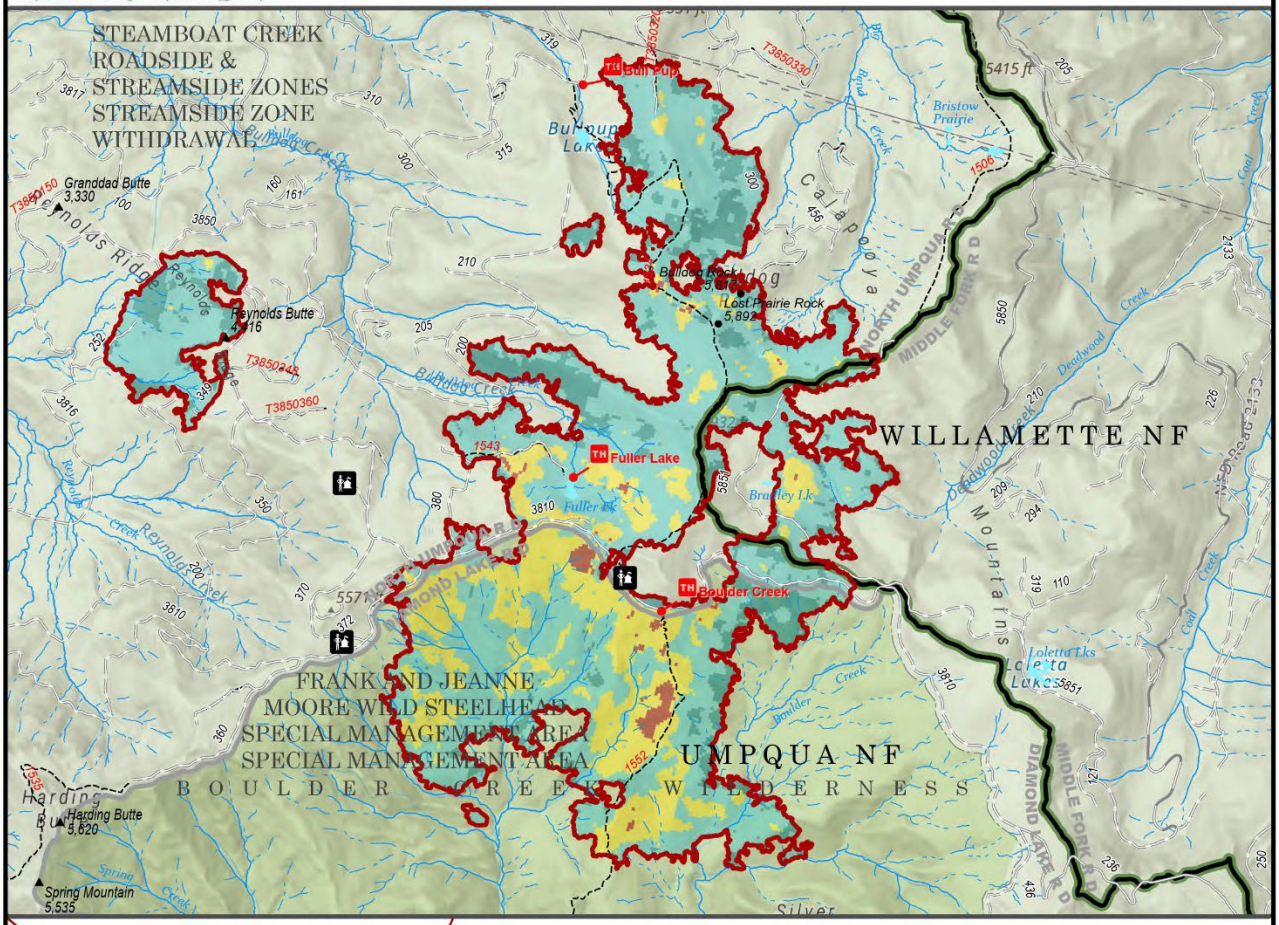
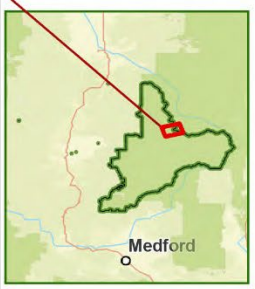
Soil Burn Severity
- Very Low / Unburned
- Low
- Moderate
- High





Soil Burn Severity	Acres	% of Burn
Very Low or Unburned	739	17%
Low	2490	58%
Moderate	985	23%
High	55	1%
Total	**4269**	

0 0.25 0.5 1 1.5 2 2.5 3 3.5 Miles

Soil Burn Severity - Horse Heaven Creek
Burned Area Emergency Response (BAER)

N

Date: 9/30/2024

Soil Burn Severity

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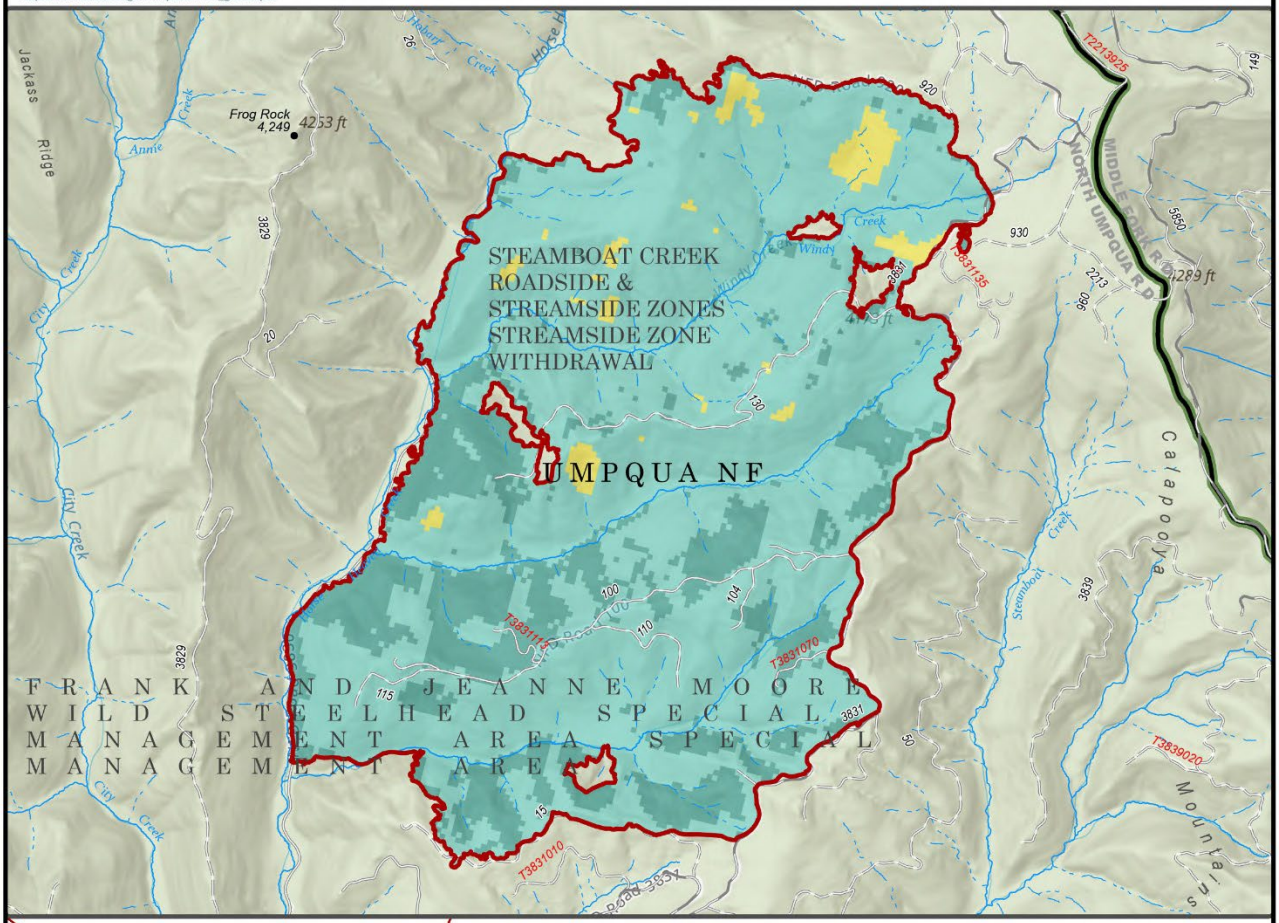
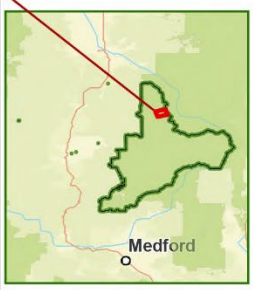
Soil Burn Severity
- Very Low / Unburned
- Low
- Moderate
- High





Soil Burn Severity	Acres	% of Burn
Very Low or Unburned	583	21%
Low	2108	76%
Moderate	74	3%
High	0	0%
Total	**2765**	

0 0.25 0.5 1 1.5 2 Miles

Lane 1 Soil Burn Severity Map

Burned Area Emergency Response (BAER)

Miles
0 0.5 1 2
N

Date: 9/7/2024

Soil Burn Severity

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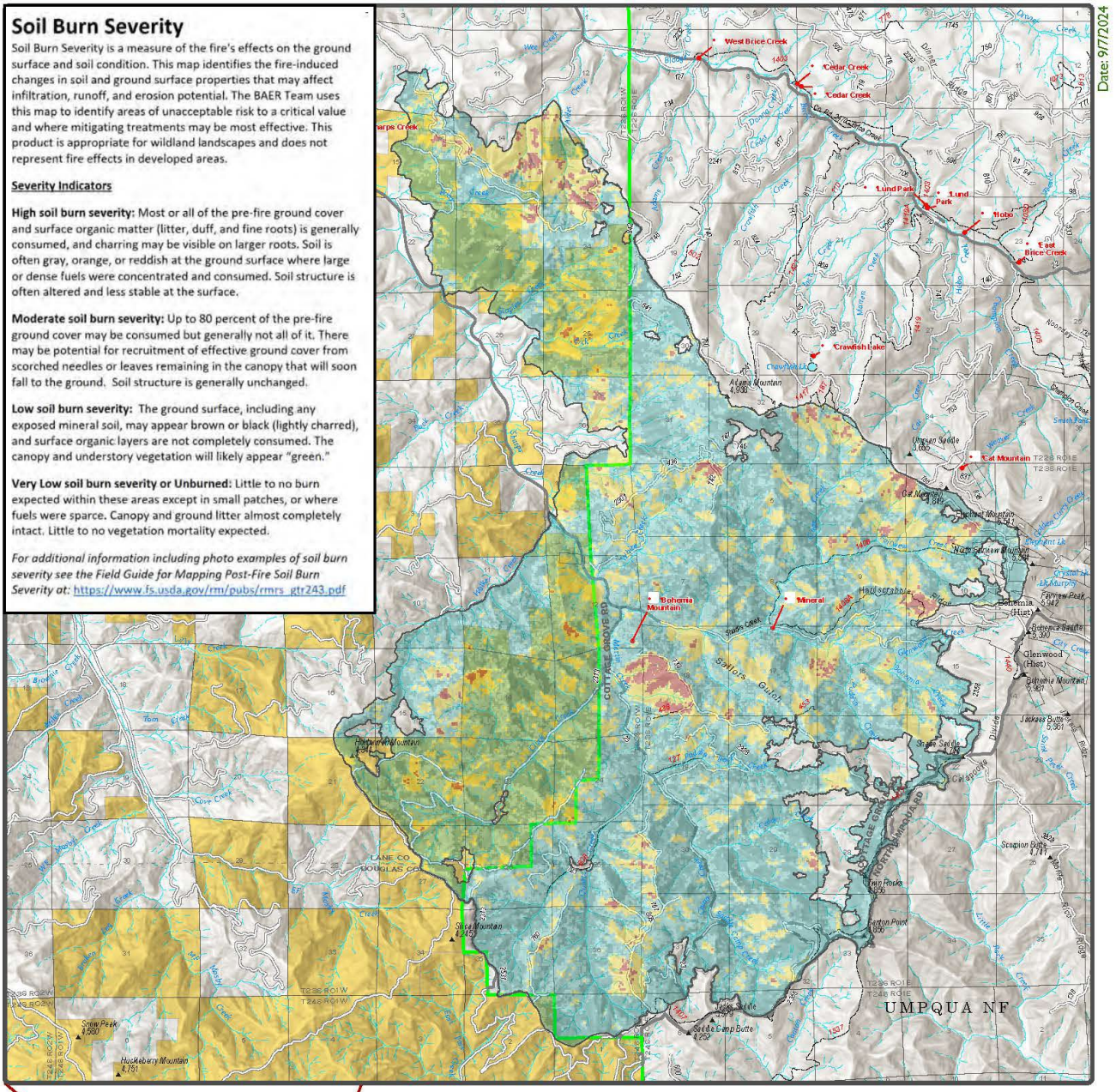

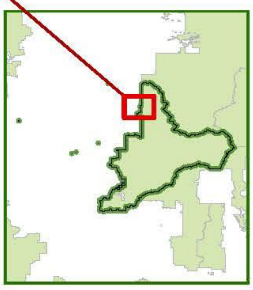

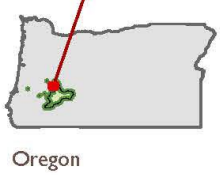

Fire Perimeter

Soil Burn Severity

- Very Low / Unburned - 11,550 acres
- Low - 9,115 acres
- Moderate - 4,167 acres
- High - 430 acres

Soil Burn Severity - Lemolo

Burned Area Emergency Response (BAER)

N

Date: 9/29/2024

Soil Burn Severity

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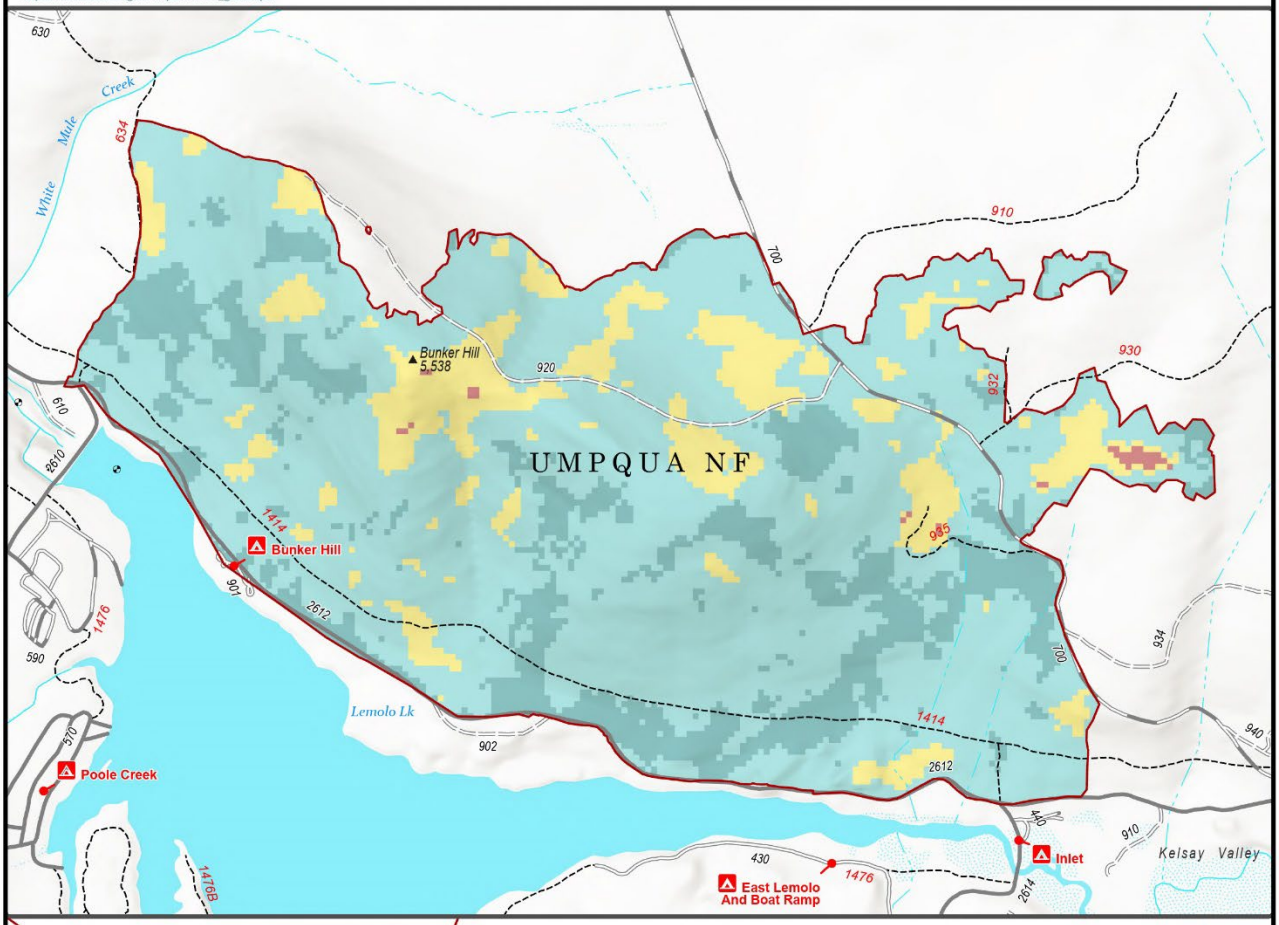
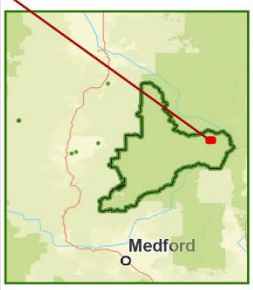
- High





Soil Burn Severity	Acres	% of Burn
Very Low or Unburned	225	18%
Low	853	68%
Moderate	164	13%
High	4	0%
Total	**1246**	

0 0.25 0.5 1 Miles

Soil Burn Severity - No Man

Burned Area Emergency Response (BAER)

Date: 9/30/2024

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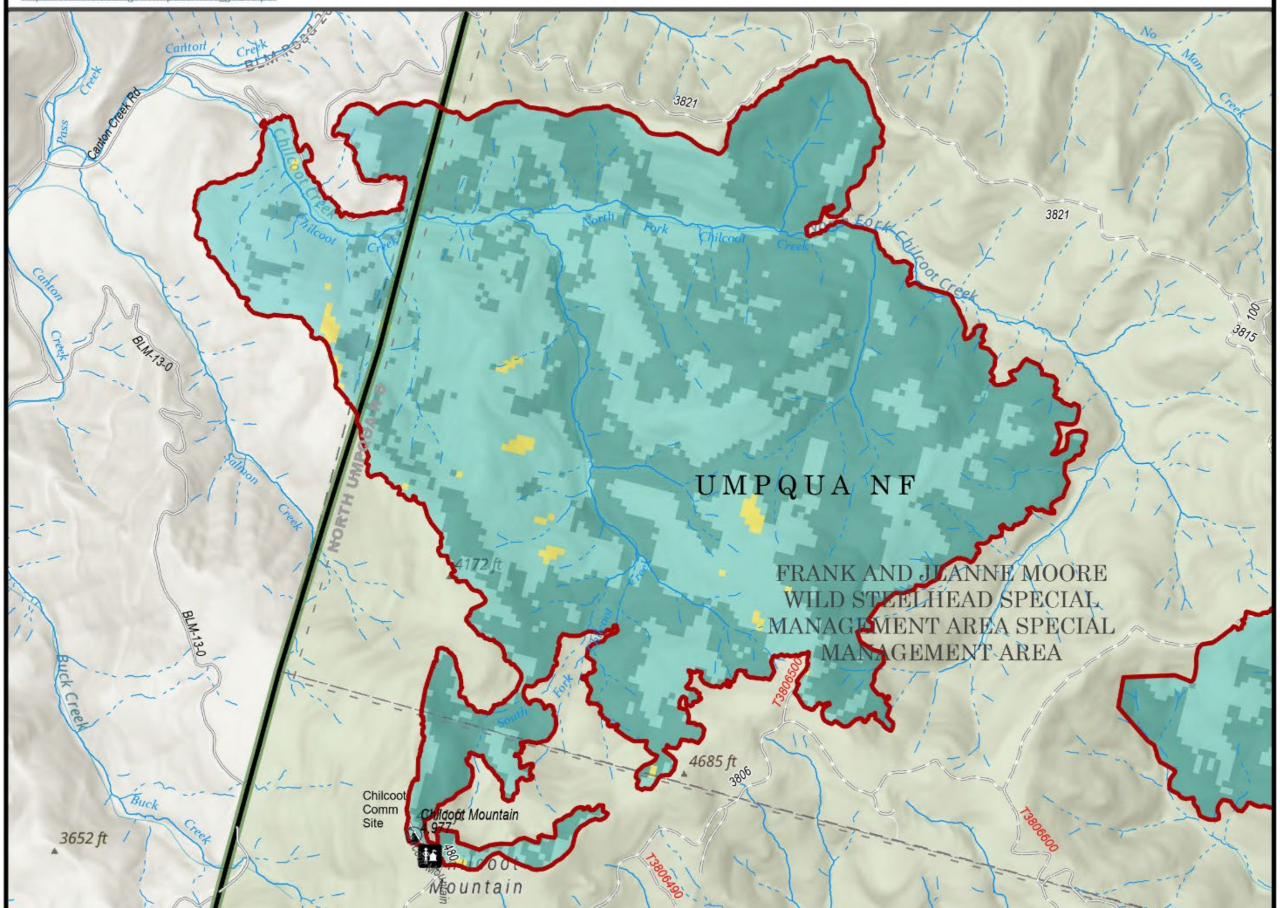
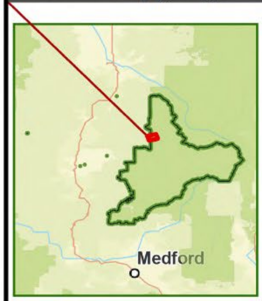
Very Low soil burn severity or Unburned: Little to no burn expected within these areas except in small patches, or where fuels were sparce. Canopy and ground litter almost completely intact. Little to no vegetation mortality expected.

For additional information including photo examples of soil burn severity see the Field Guide for mapping Post-Fire Soil Burn Severity at:
https://www.fs.usda.gov/rm/pubs/rmrs_gtr243.pdf

Soil Burn Severity

- Very Low / Unburned
- Low
- Moderate
- High





Soil Burn Severity	Acres	% of Burn
Very Low or Unburned	1085	52%
Low	988	47%
Moderate	18	1%
High	0	0%
Total	**2090**	

Soil Burn Severity - Ooya

Burned Area Emergency Response (BAER)

N

Date: 9/29/2024

Soil Burn Severity

Soil Burn Severity is a measure of the fire's effects on the ground surface and soil condition. This map identifies the fire-induced changes in soil and ground surface properties that may affect infiltration, runoff, and erosion potential. The BAER Team uses this map to identify areas of unacceptable risk to a critical value and where mitigating treatments may be most effective. This product is appropriate for wildland landscapes and does not represent fire effects in developed areas.

Severity Indicators

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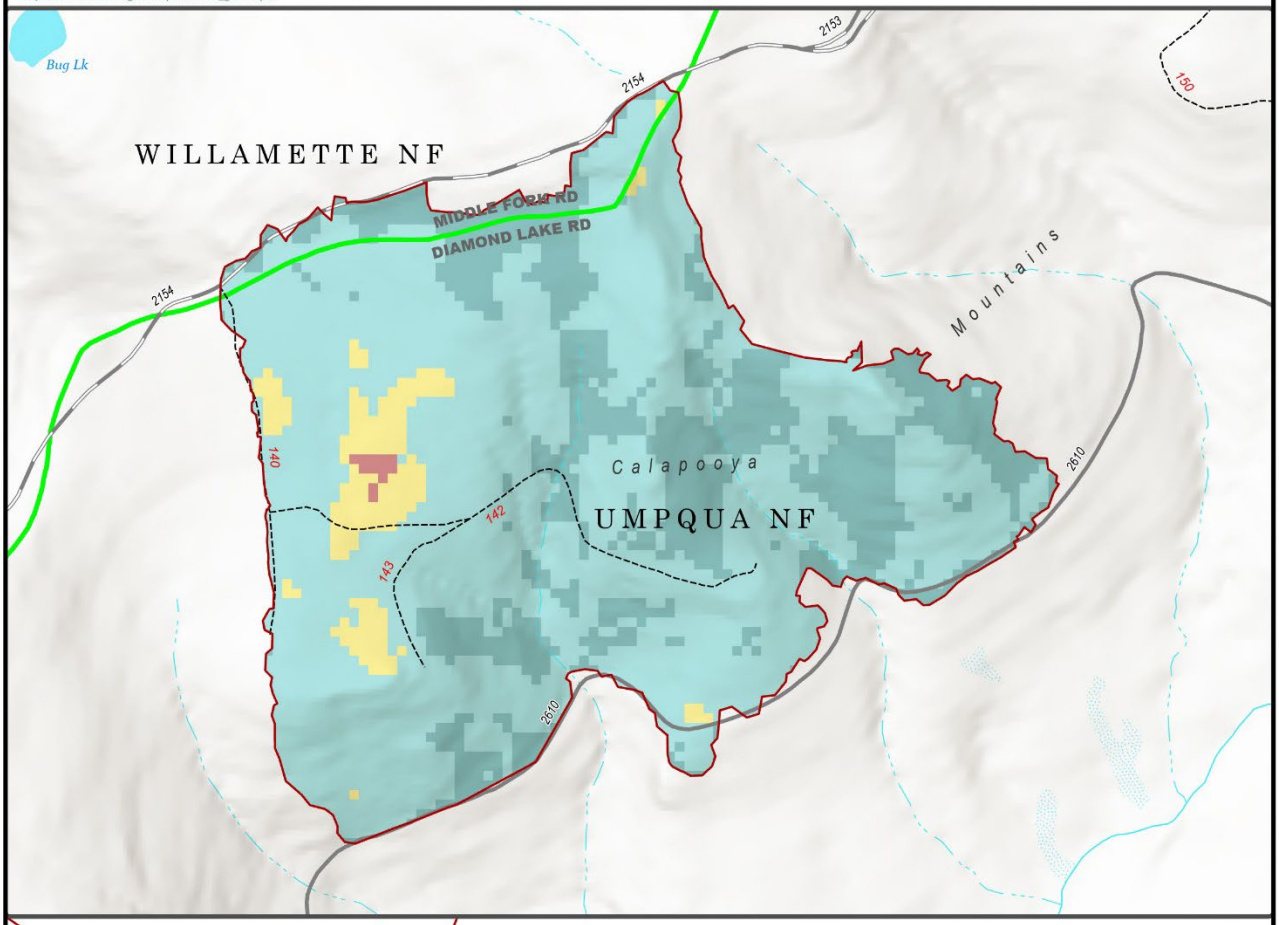
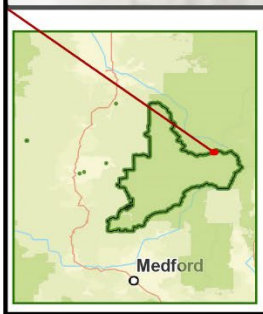
Soil Burn Severity
- Very Low / Unburned
- Low
- Moderate
- High





Oregon

Soil Burn Severity	Acres	% of Burn
Very Low or Unburned	94	25%
Low	259	70%
Moderate	18	5%
High	1	0%
Total	**373**	

Miles
0 0.25 0.5

Soil Burn Severity - Pine Bench
Burned Area Emergency Response (BAER)

N

Date: 9/29/2024

Soil Burn Severity

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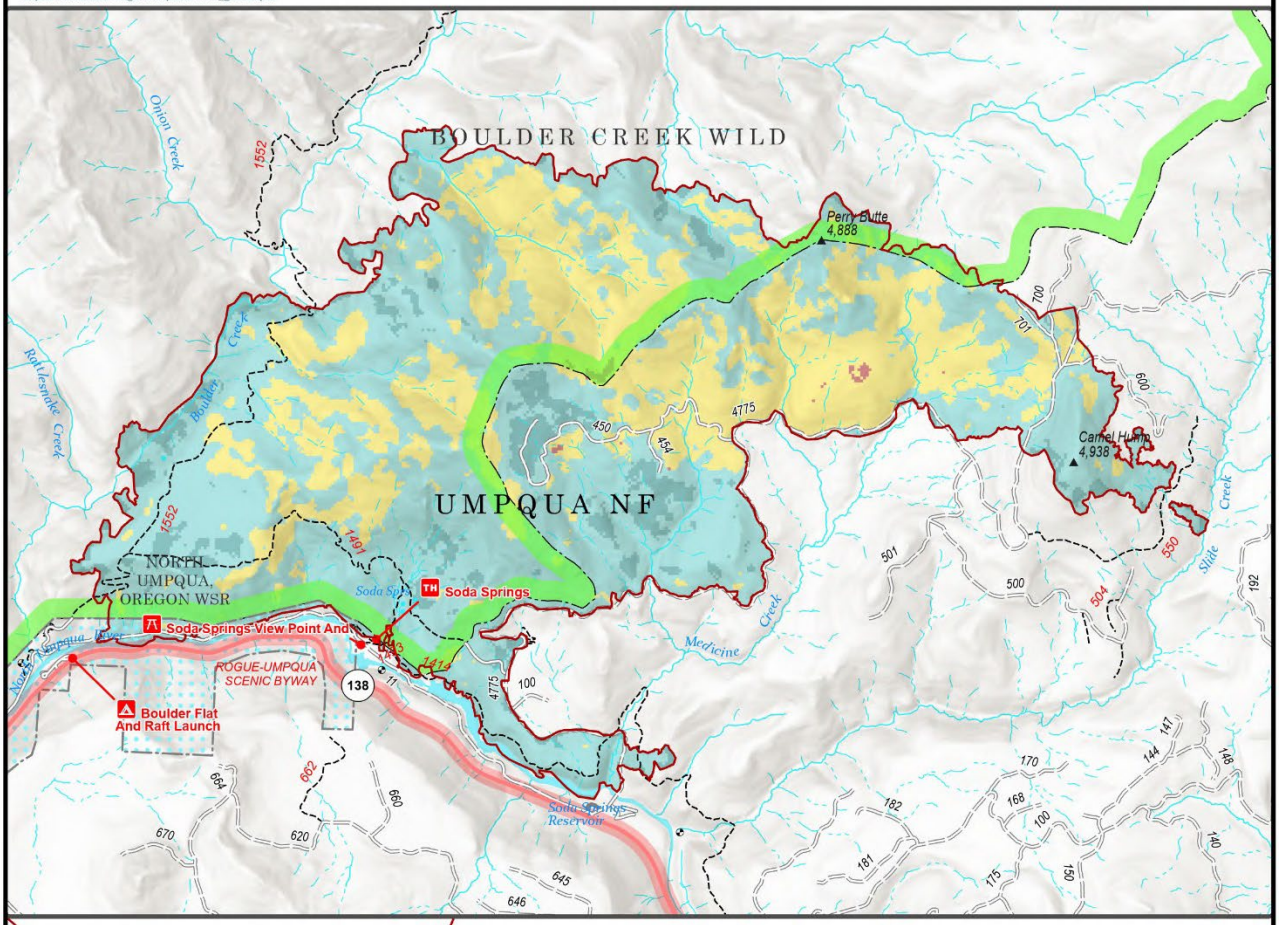
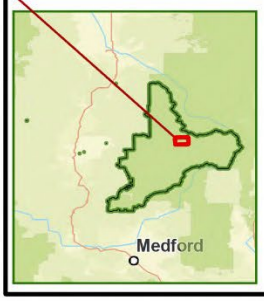
Soil Burn Severity
- Very Low / Unburned
- Low
- Moderate
- High





Soil Burn Severity	Acres	% of Burn
Very Low or Unburned	2772	7%
Low	2391	60%
Moderate	1310	33%
High	8	0%
Total	**3981**	

0 0.25 0.5 1 1.5 2 2.5 Miles

Soil Burn Severity - Potter

Burned Area Emergency Response (BAER)

N

Date: 9/29/2024

Soil Burn Severity

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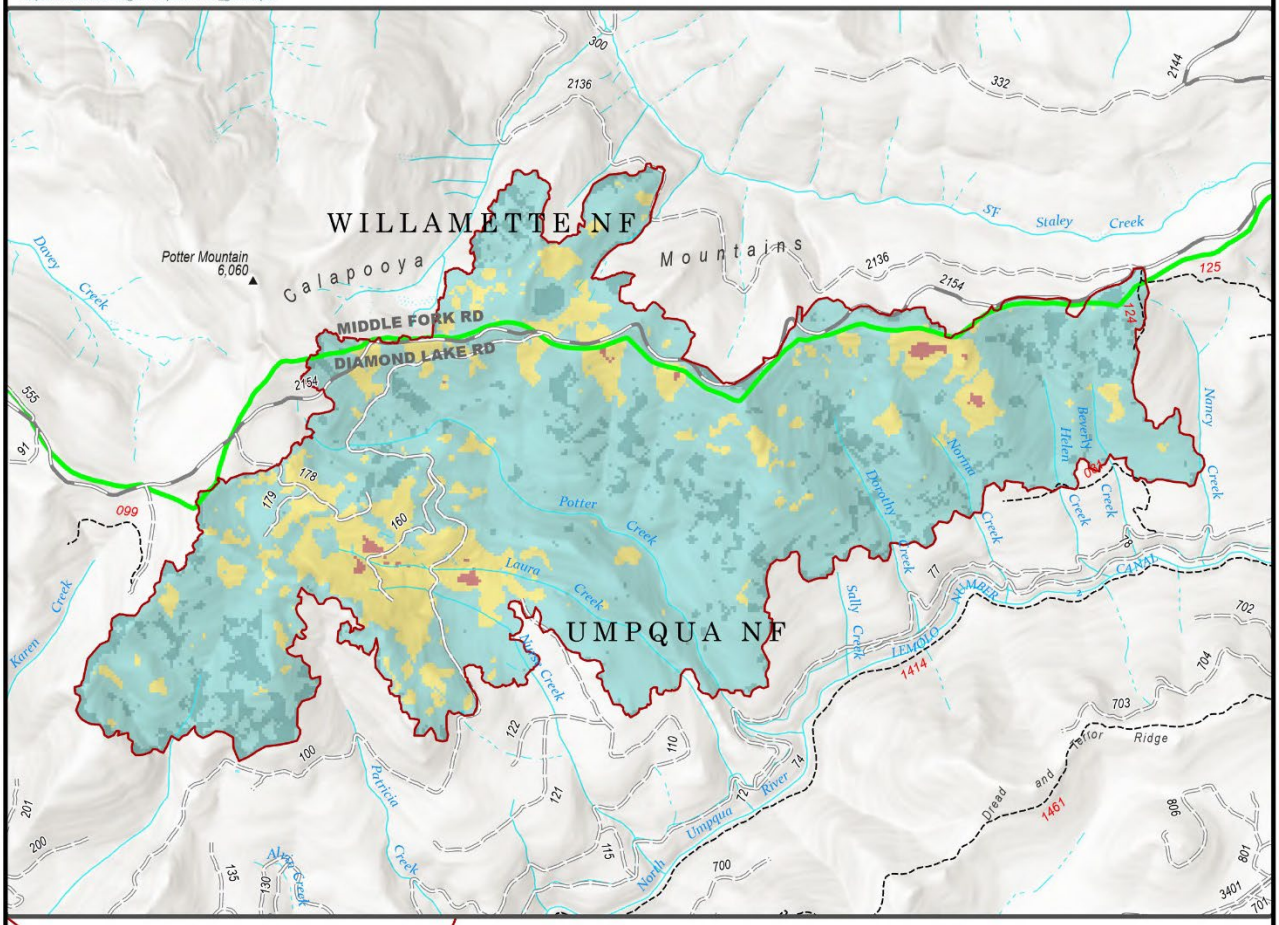
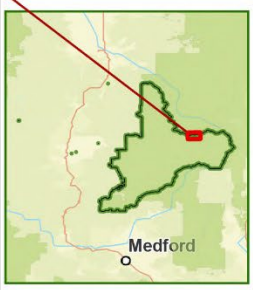
Soil Burn Severity
- Very Low / Unburned
- Low
- Moderate
- High





Soil Burn Severity	Acres	% of Burn
Very Low or Unburned	385	11%
Low	2500	73%
Moderate	525	15%
High	15	0%
Total	**3426**	

0 0.25 0.5 1 1.5 2 2.5 Miles

Soil Burn Severity - Reynolds Butte

Burned Area Emergency Response (BAER)

N

Date: 9/30/2024

Soil Burn Severity

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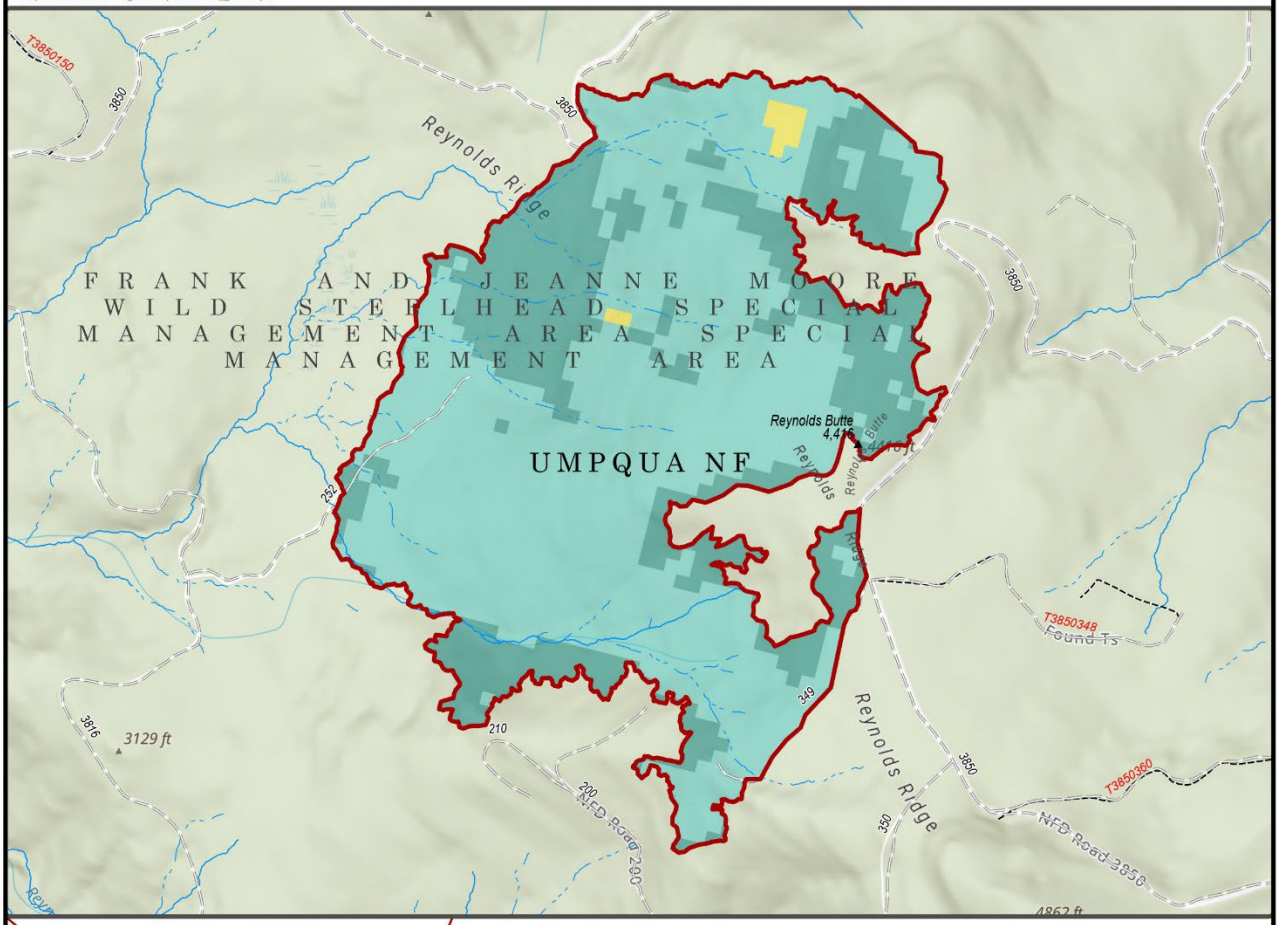
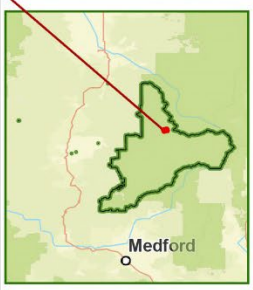
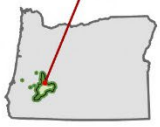
Soil Burn Severity
- Very Low / Unburned
- Low
- Moderate
- High







Oregon

Soil Burn Severity	Acres	% of Burn
Very Low or Unburned	108	32%
Low	224	67%
Moderate	2	1%
High	0	0%
Total	**334**	

Miles
0 0.25 0.5

Soil Burn Severity - Salmon 33

Burned Area Emergency Response (BAER)

N

Date: 9/30/2024

Soil Burn Severity

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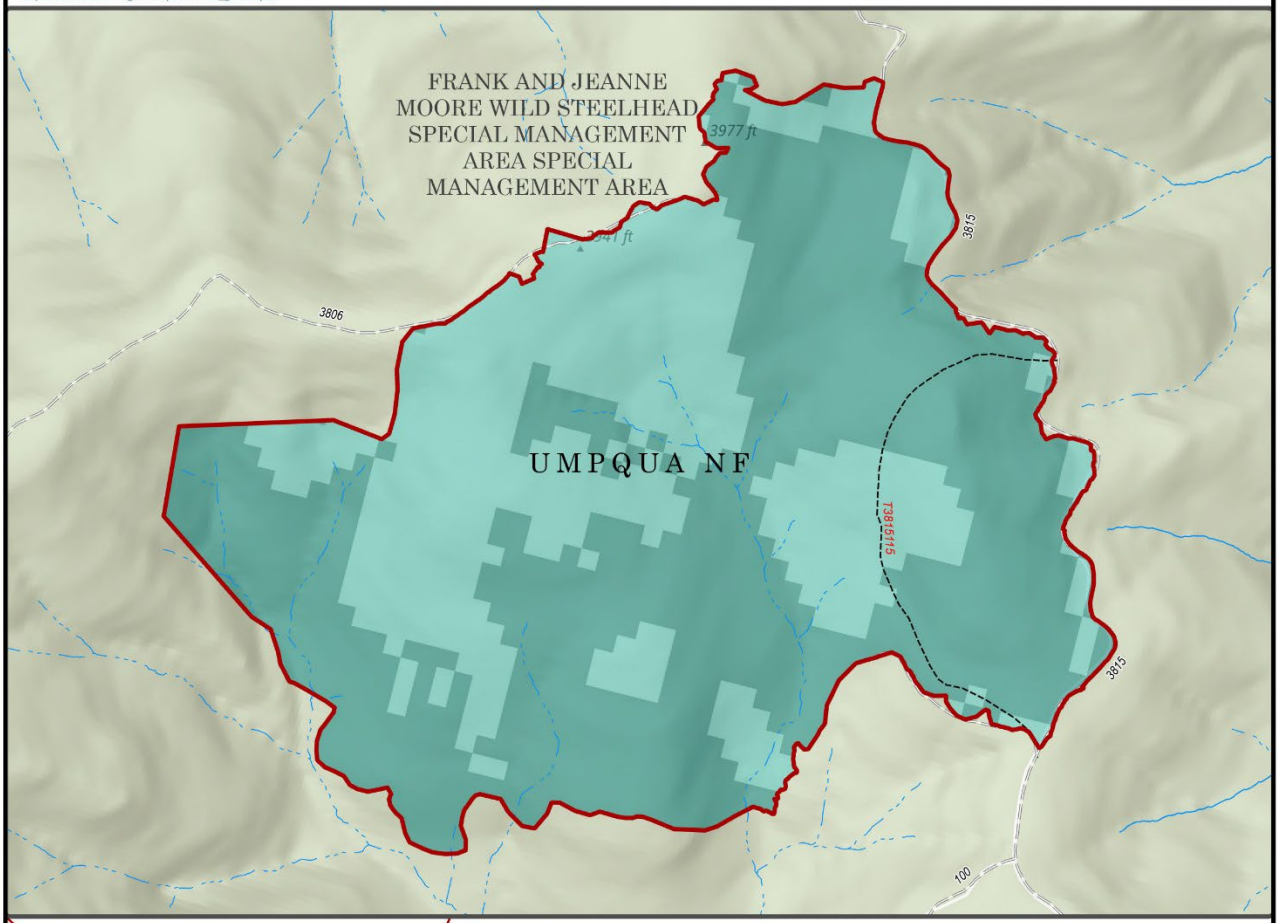
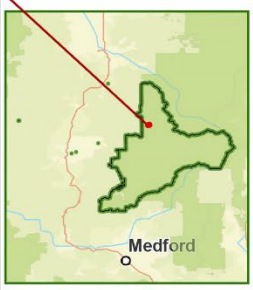
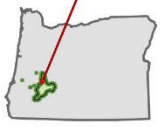
Soil Burn Severity
- Very Low / Unburned
- Low
- Moderate
- High







Oregon

Soil Burn Severity	Acres	% of Burn
Very Low or Unburned	166	61%
Low	108	39%
Moderate	0	0%
High	0	0%
Total	**274**	

0 0.25 0.5 Miles

Soil Burn Severity - Trail
Burned Area Emergency Response (BAER)

N

Date: 9/29/2024

Soil Burn Severity

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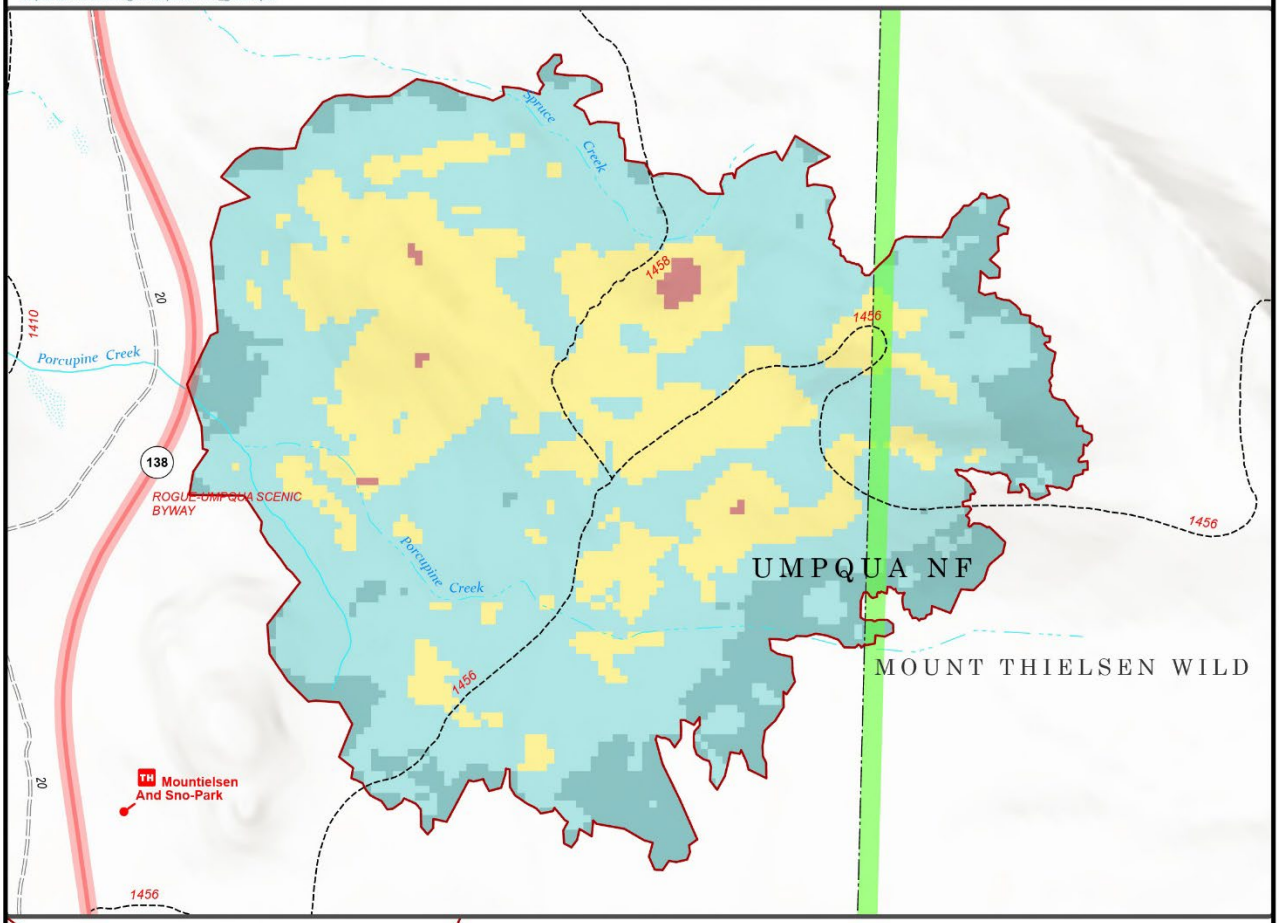

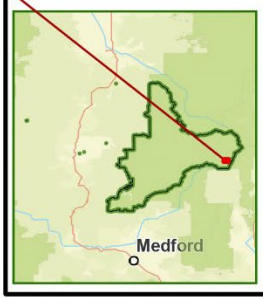

Soil Burn Severity	Acres	% of Burn
Very Low or Unburned	125	15%
Low	472	56%
Moderate	238	28%
High	4	1%
Total	**839**	

0 0.25 0.5 1 Miles

Soil Burn Severity - Trep

Burned Area Emergency Response (BAER)

N

Date: 9/29/2024

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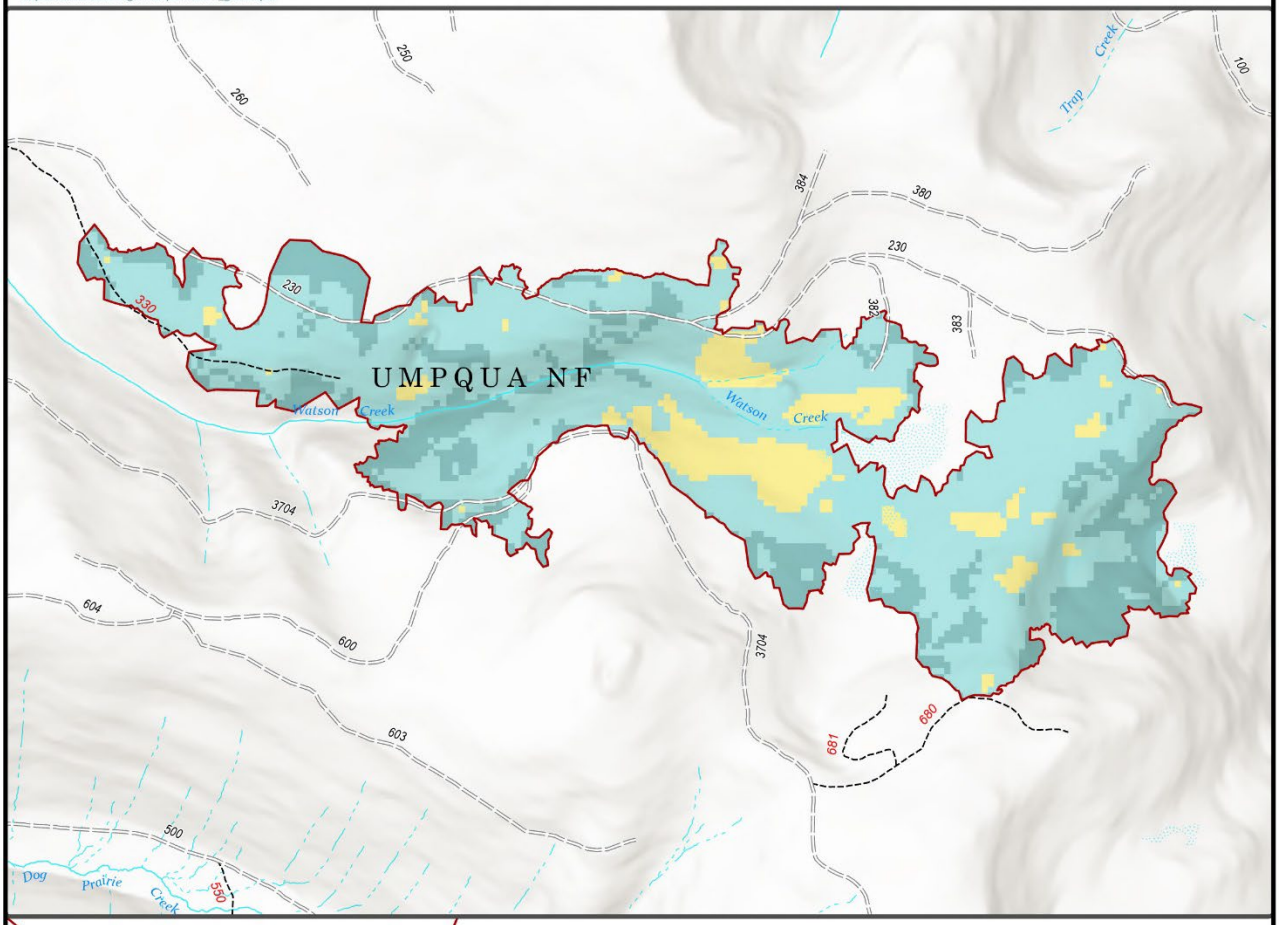
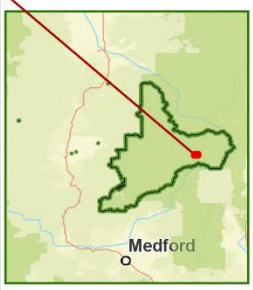
Soil Burn Severity
- Very Low / Unburned
- Low
- Moderate





Oregon

Soil Burn Severity	Acres	% of Burn
Very Low or Unburned	132	24%
Low	354	65%
Moderate	57	11%
High	0	0%
Total	**542**	

0 0.25 0.5 1 Miles