OREGON FIRE BAER ASSESSMENT

GEOLOGIC REPORT

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BACKGROUND

Methods- This is a reconnaissance level assessment done at the request of the BAER team leader for the Oregon Fire. It is based solely on a review of existing GIS data, reports, maps, and weather data, as well as discussions with BAER team members. As such, it provides an overview of the geology of the fire area, but does not address site specific geologic conditions or hazards.

Geomorphology- The terrain in the burn area is gently sloping to the south, averaging about 15%, but ranging from 5% to 40%; the inclines are steeper in the north and gentler to the south. Although no dormant landslides or inner gorges are mapped within the fire area, the watersheds that drain into Weaverville lie on a series of Tertiary/Quaternary debris flow and glacial till deposits.

Three minor ephemeral drainages are encompassed within the larger ~570-acre burn perimeter: McKinzey Gulch, Sidney Gulch, and Garden Gulch. A smaller burn area that is geographically separated yet immediately to the east of the main fire, is about 21 acres in size and lies on the eastern slope of Ten Cent Gulch. See Map 1.

Bedrock- The fire burned primarily on the Tertiary Weaverville Formation which consists mainly of a poorly bedded and weakly indurated cobble to pebble conglomerate of alluvial and glacial genesis (Irwin). It is noteworthy that parts of the Weaverville Formation are prone to slumps and earthflows and many features of this type were activated along Highway 299 about a mile west of Weaverville following the Junction and Oregon fires which occurred in 2007 and 2011, respectively. See Map 2.

Severity of the Fire- Approximately 70% of the fire area sustained either high or moderate soil burn severity, mostly in the western half and eastern quarter of the fire area. See Map 3.

KEY GEOLOGIC HAZARDS

Recent Debris Slides- Only one significant recent debris slide appears in the burn area (see Map 1). This NE-SW trending slide is about 180 feet wide and 550 feet long, and is visible on the GIS coverage as well as 1993 Google Earth imagery. This feature is approximately 500 feet SW of the fire perimeter where it crosses McKinzey Gulch. This area was only subjected to low to moderate burn severity while the slopes above were untouched by the fire.

Natural Asbestos Hazards- Ultramafic rock typically contains natural asbestos, and dust-producing ground disturbance could introduce asbestos fibers into the air, constituting a health concern. The Weaverville formation, on which the fire burned, does not contain any ultramafic bedrock but may

contain trace amounts as pebble- to sand-sized clasts in the alluvium. These clasts were transported and deposited here from nearby ultramafic sources through alluvial and glacial processes.

Landslide and Erosion Hazards- The presence of a recent debris slide, despite the gentleness of slopes, reveals an increased potential for slumps and shallow debris slides. There is also significant potential for sediment transport due to three main factors:

1. Historical placer and hydraulic mining in the vicinity has destabilized the poorly-cemented conglomerate of the Weaverville Formation. McKinzey Gulch, especially, shows signs of historic mining activities. This drainage suffered the highest fire severity and should prove be the greatest contributor of sediment and debris.

2. Brad Rust, soil scientist at the Shasta-Trinity SO, performed soil tests in the area. The extreme temperature of the fire over most of the burn area has increased the hydrophobicity of the soil, with water repellency reaching 1" in depth in areas with the highest burn severity.

3. The lack of vegetative and organic debris cover caused by this fire and the two previous fires increases the likelihood of sheeting, rilling, gullying and movement of sediments.

Snow Avalanche Hazards- No snow avalanche tracks are evident on either Google or GIS imagery and therefore should not present a hazard.

RESULTS

Potential Effects- Due to the Mediterranean climate, the Weaverville area receives between 6.5 to 8 inches of rain per month during the winter rainy season (U.S. Climate Data). With nearly all vegetation and organic litter removed from the slopes in the larger perimeter of the burn, a large volume of fine to pebble-sized sediment as well as plant debris is likely to be entrained and transported into the ephemeral creeks. This will most likely have an impact on the infrastructure in the town of Weaverville, namely the culverts under Weaver Bally Loop, Sidney Gulch Road, Main Street (SR 299), Forest Avenue, and Odd Fellows Avenue. The foot bridges over Sydney Gulch within the U.S. Forest Service Weaverville Ranger Station compound may be affected, as well as the area behind the Joss House State Historic Park.

As stated in the bedrock section above, parts of the Weaverville Formation are prone to slumps and earthflows and many features of this type were activated along Highway 299 about a mile west of Weaverville following the Junction and Oregon fires which occurred in 2007 and 2011, respectively.

The smaller ~21-acre burn area adjacent to Ten Cent Gulch is only likely to provide a limited amount of debris and sediment, and as such may have a minor impact on residential yards and driveways that lie within that drainage.

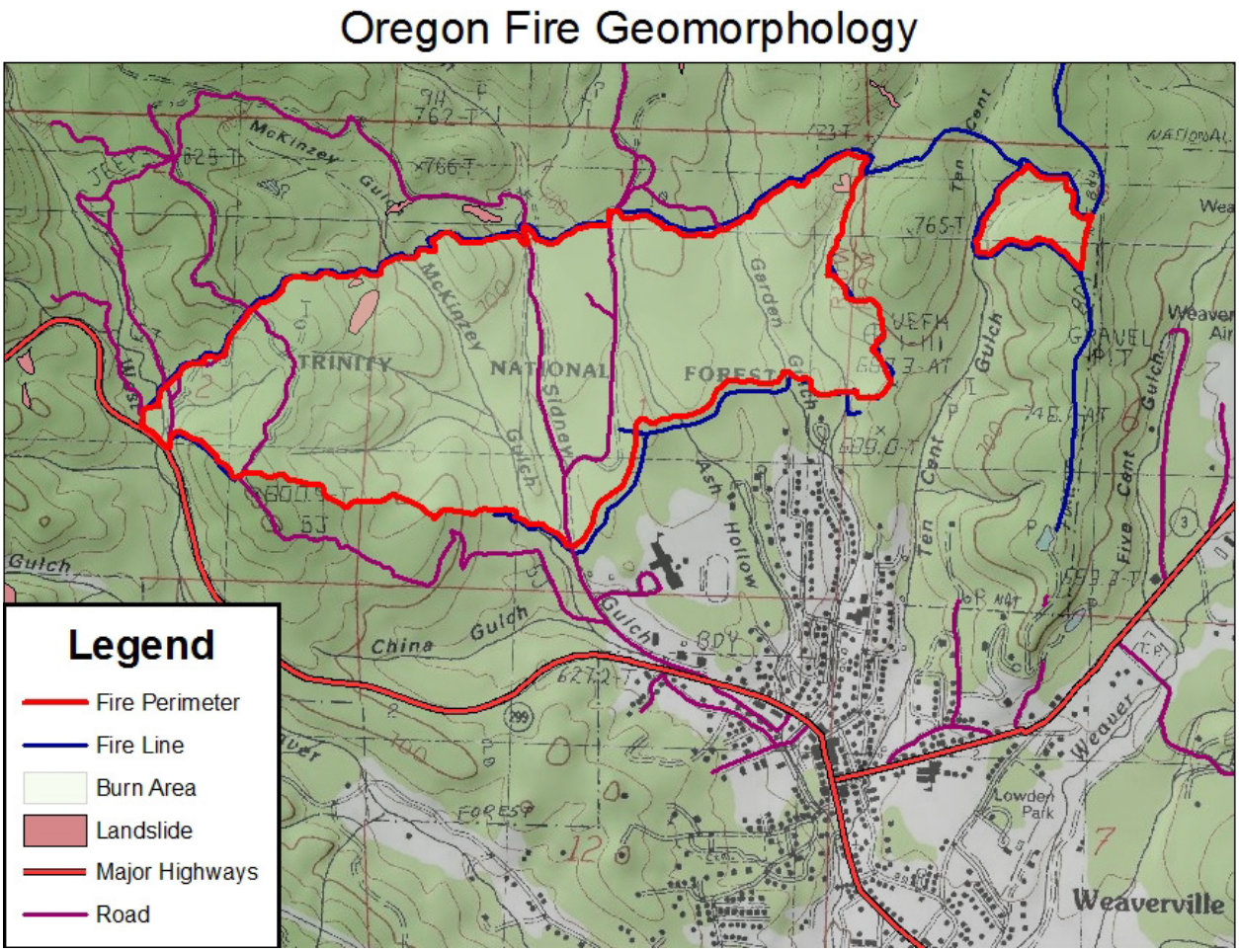
Mitigation and Rehabilitation Measures- Several land, streambed and road mitigation and monitoring measures have been proposed by the BAER team in order to reduce the amount of sediment and debris runoff. They are, briefly, as follows:

1. Land treatments – Hand and aerial mulching.
2. Channel treatments – In-channel straw and rock checkdams.
3. Roads and trails – Road stormproofing using rolling dips, larger culverts, mulching and other measures.
4. Protection and safety – Heritage site protection, burned area warning signs, road and trail signs as well as boulder and earthen barriers to reduce OHV access.

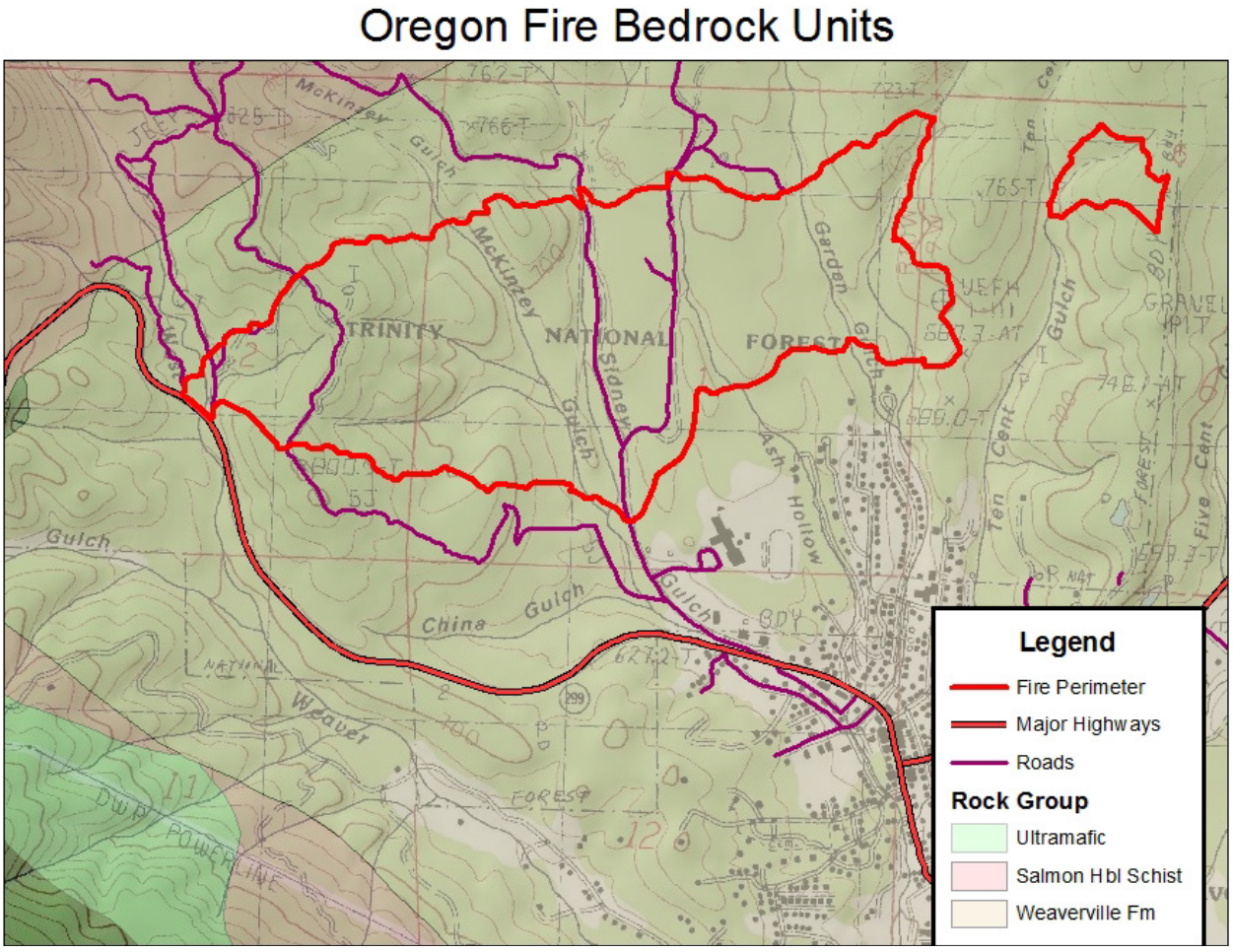
Post-Fire Erosion- In the event of a large post-fire storm, a field reconnaissance will be conducted by Forest Earth Science personnel to evaluate erosion and effectiveness of treatments.

Recommendations- The City of Weaverville should be vigilant over the winter to insure that debris does not build up and block the culverts in the drainage areas. Blockage and subsequent overflowing of these culverts could result in damage to public and private property and infrastructure.

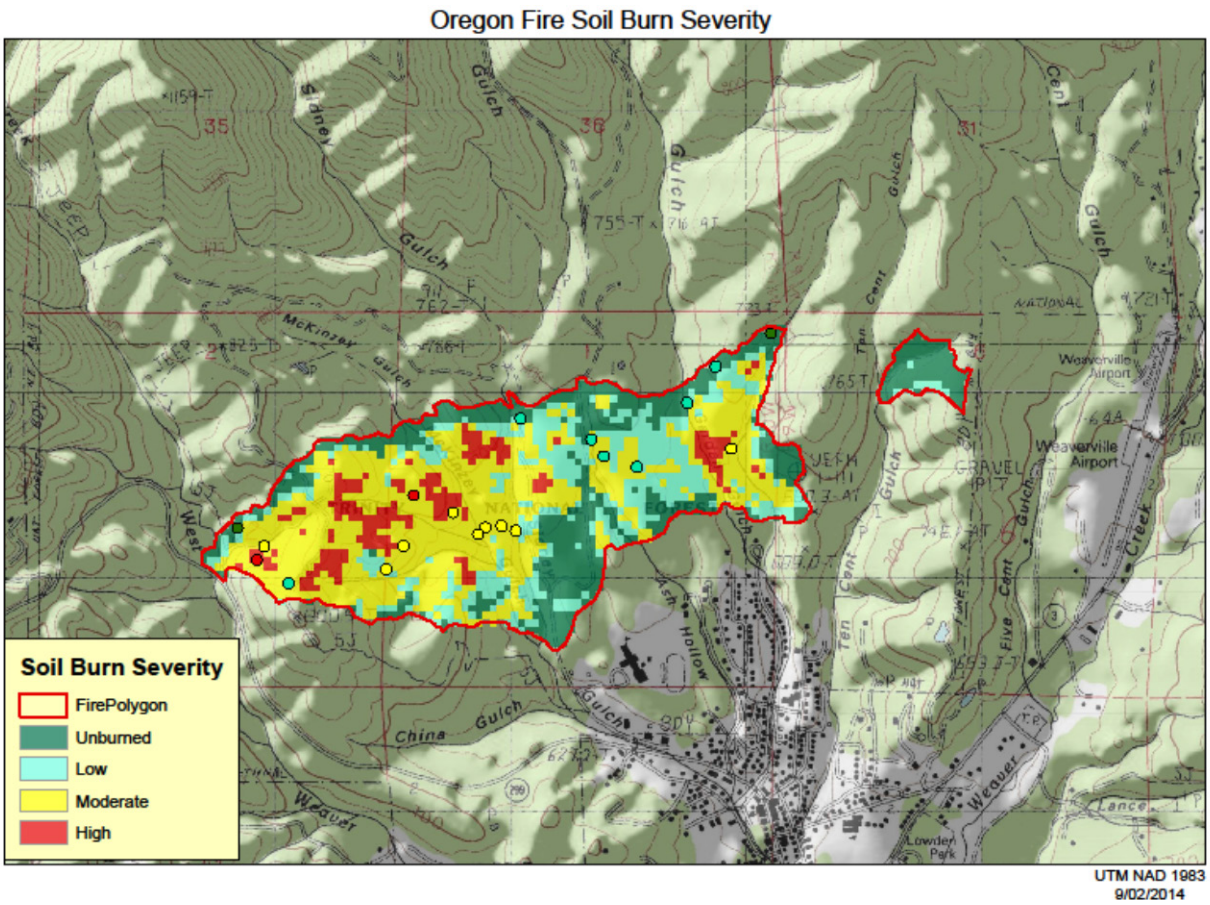
MAPS OF THE BURN AREA



Map 1: Area Geomorphology



Map 2: Bedrock Units



Map 3: Soil Burn Severity Map

Sources:

U.S. Climate Data for Weaverville, CA. Web. Accessed 8-28-2014. http://www.usclimatedata.com/climate.php?location=USCA1217

Irwin, W.P., 2009, Geologic map of the Weaverville 15' quadrangle, Trinity County, California: U.S. Geological Survey Scientific Investigations Map 3095, scale 1:50,000.

Shasta-Trinity National Forest geodatabase for Geology

Shasta-Trinity Burned Area Response (BAER) team report

Non Discrimination Statement