

# Wildfire Associated Landslide Emergency Response Team (WALERT)



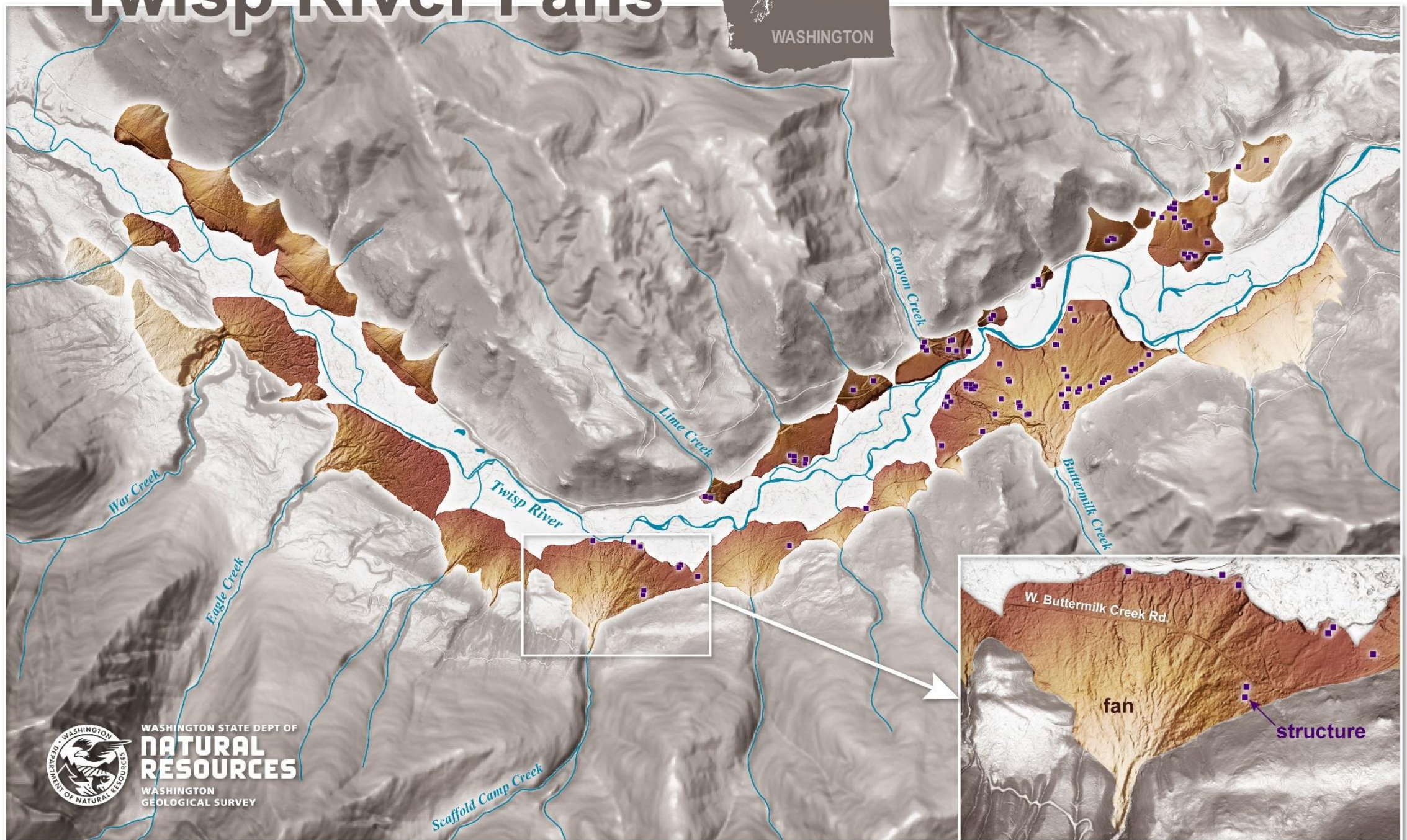
**Trevor Contreras, L.E.G.**  
**WALERT Team Lead**  
**[Trevor.contreras@dnr.wa.gov](mailto:Trevor.contreras@dnr.wa.gov)**





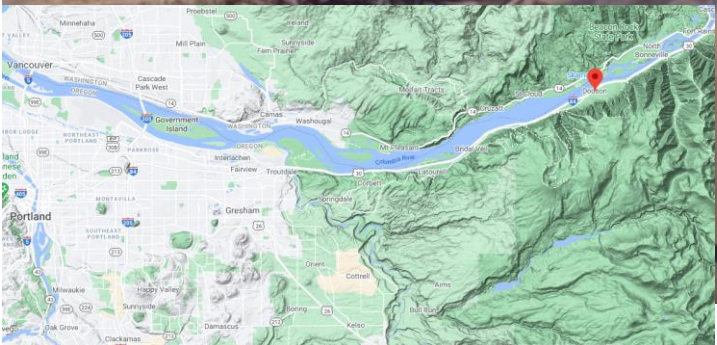


# Twisp River Fans





Aerial view of landslide near Dodson in the Columbia River Gorge









R E S O U R C E S  
N A T U R A L

# WILDFIRE-ASSOCIATED LANDSLIDE EMERGENCY RESPONSE TEAM REPORT

## Cedar Creek and Cub Creek 2 Fires

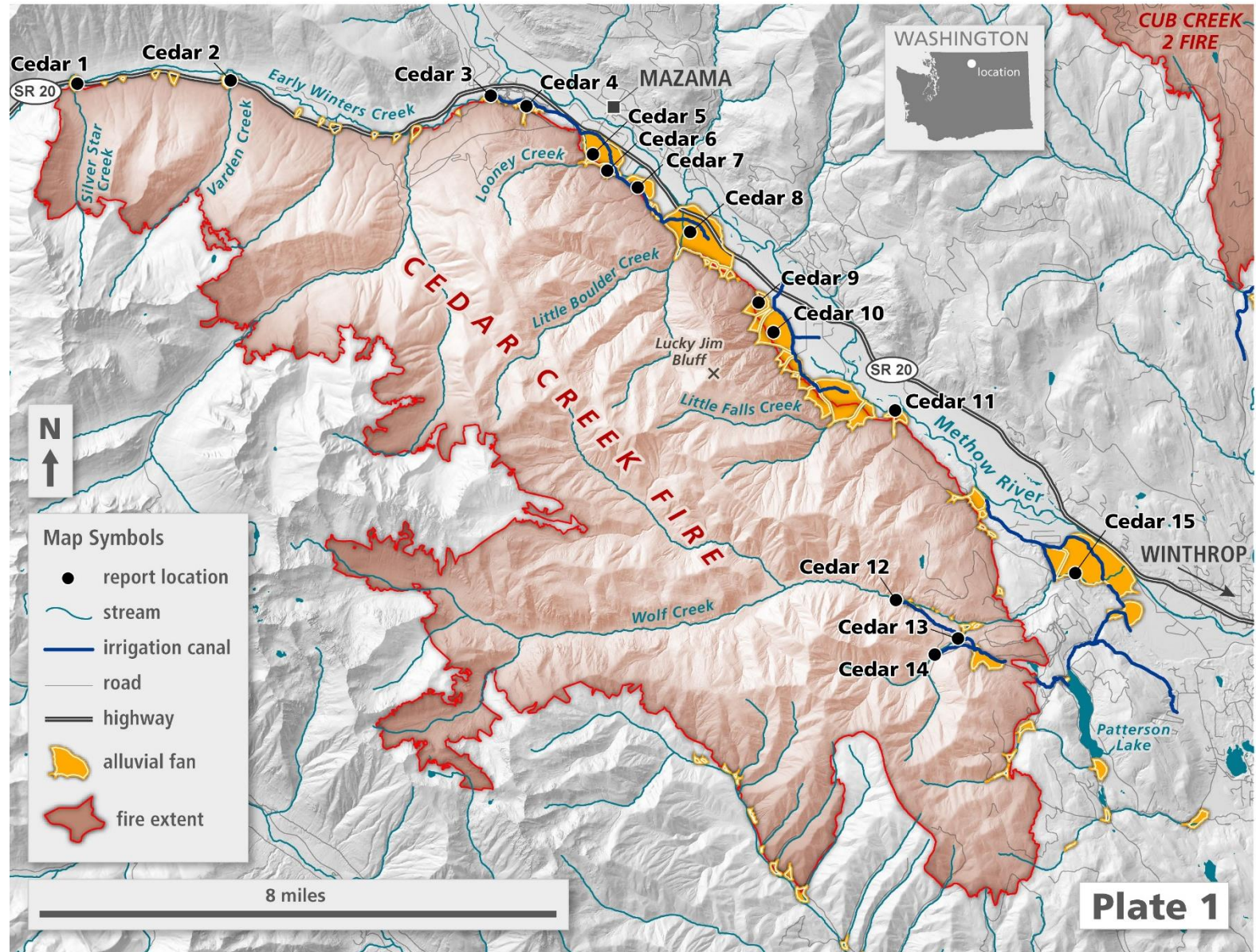
Okanogan County, Washington

by Trevor Contreras and Kate Mickelson

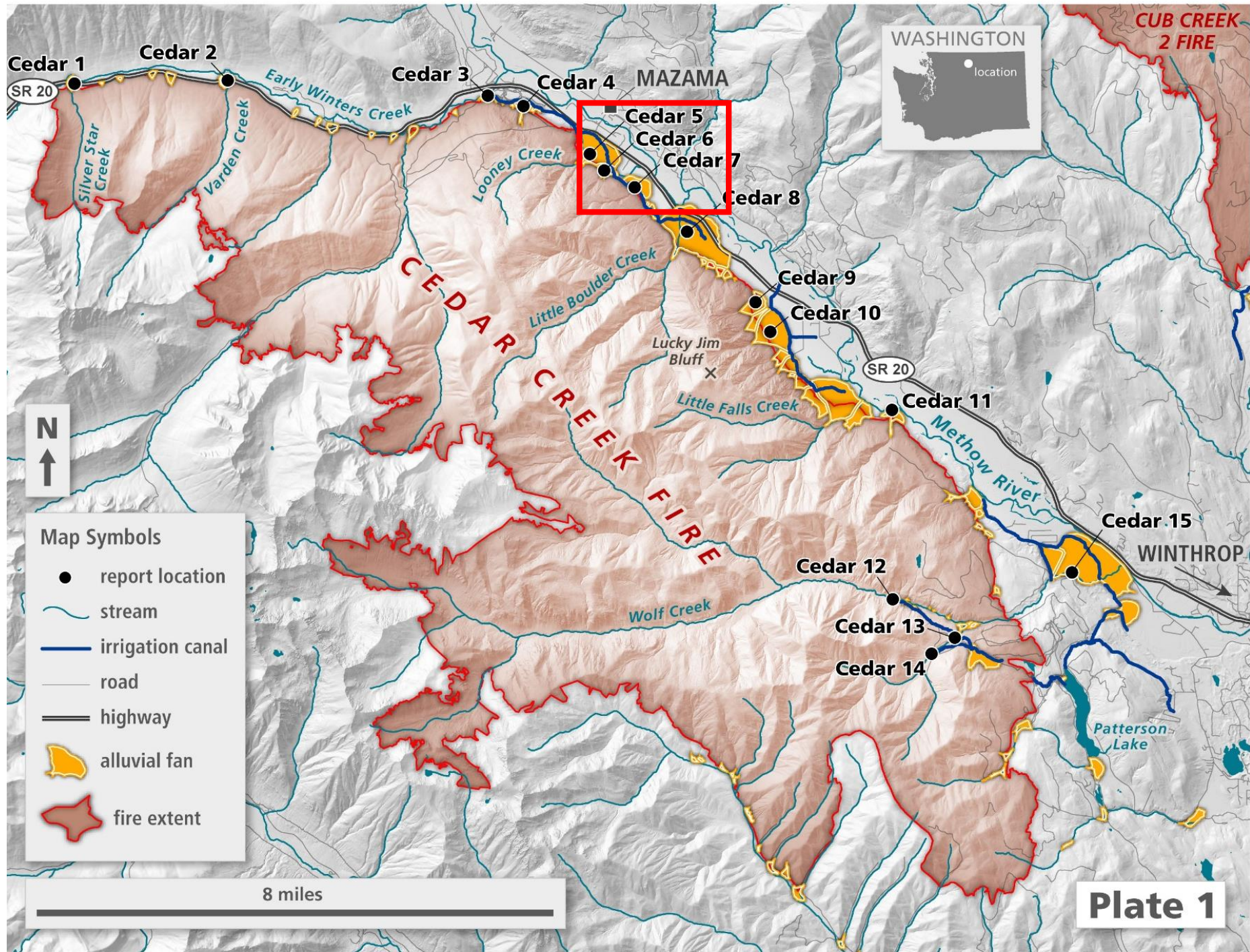
WASHINGTON  
GEOLOGICAL SURVEY  
WALERT Report  
September 8, 2021



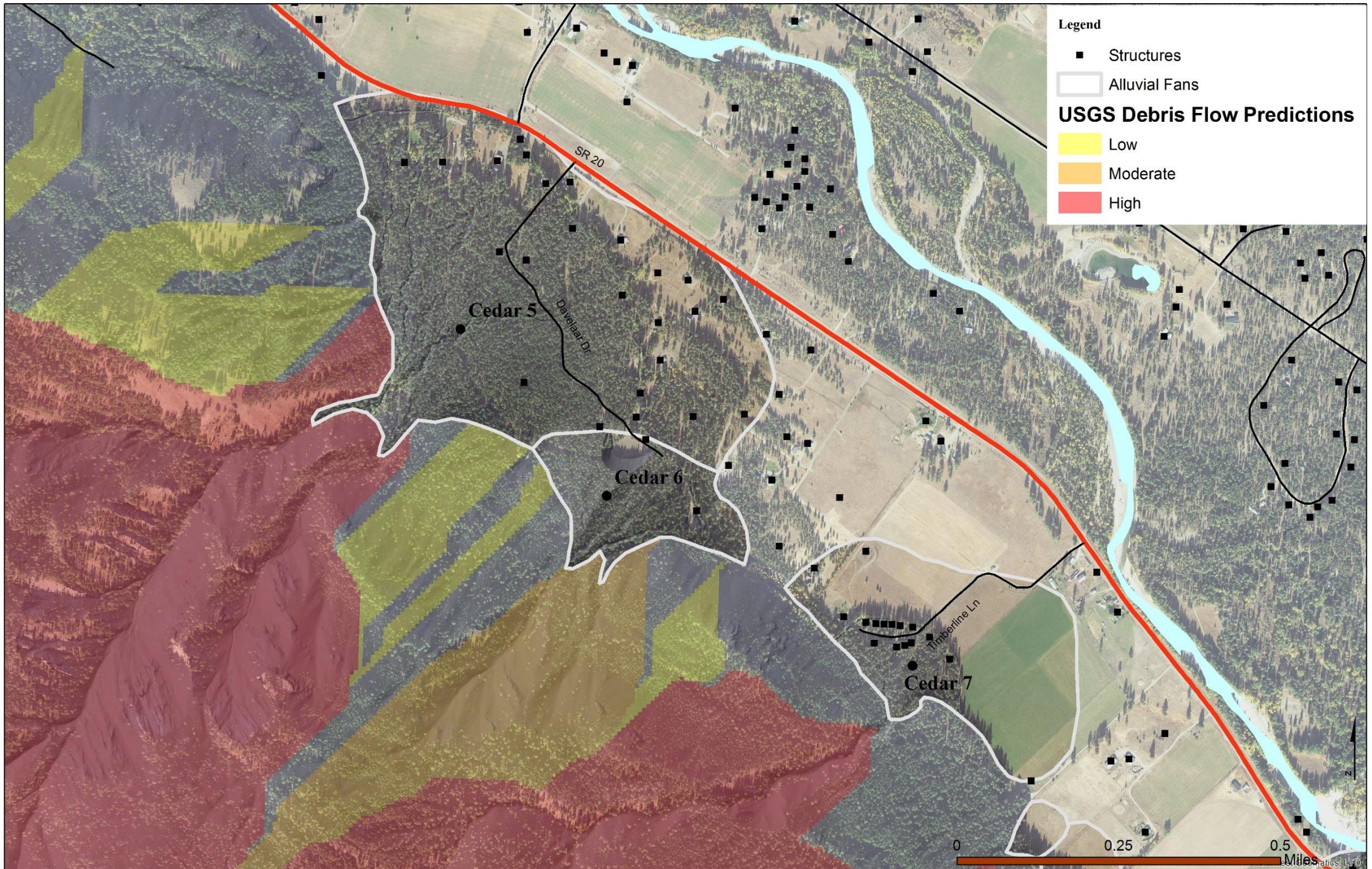
WASHINGTON STATE DEPARTMENT OF  
**NATURAL RESOURCES**  
WASHINGTON GEOLOGICAL SURVEY



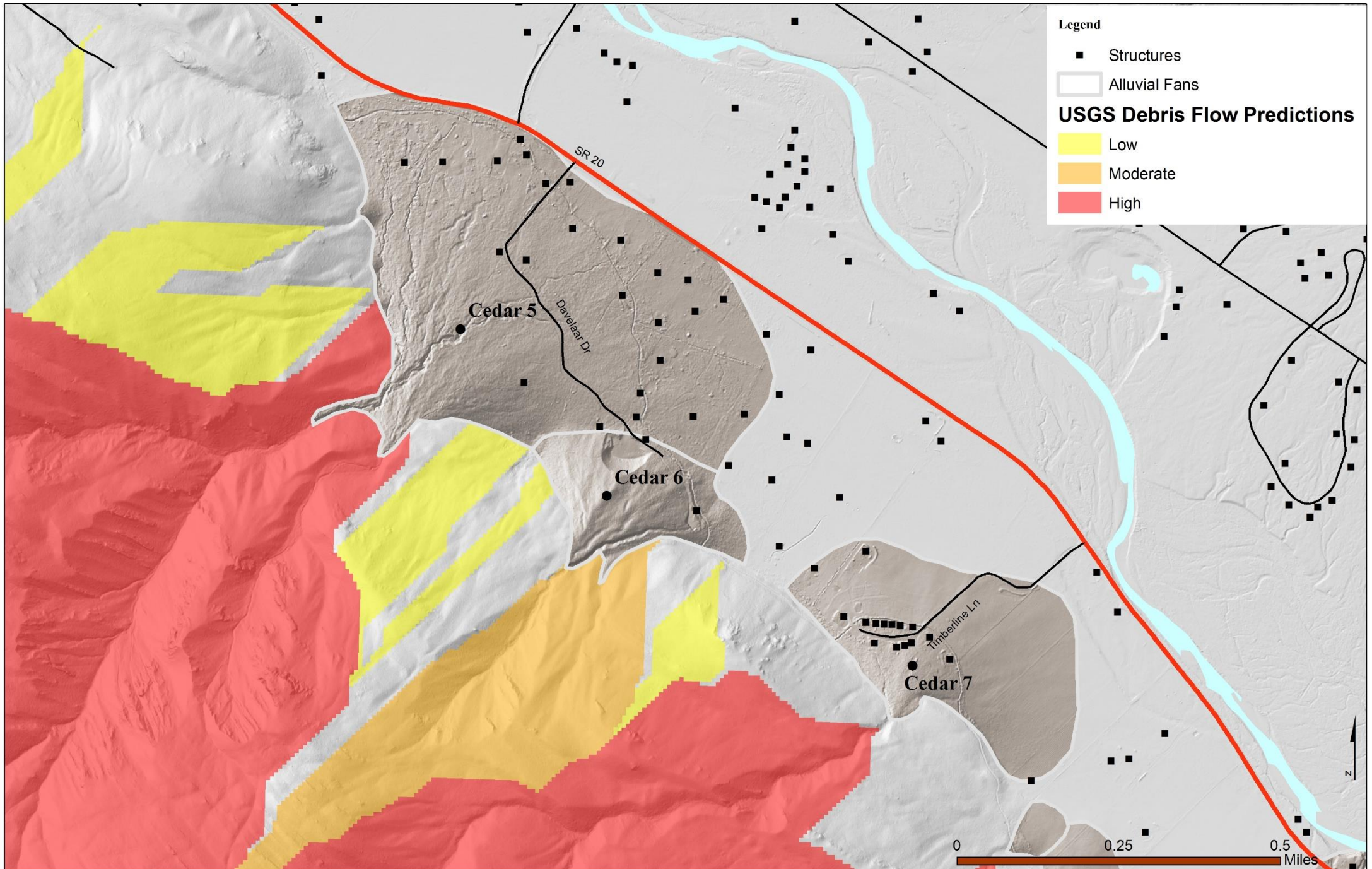




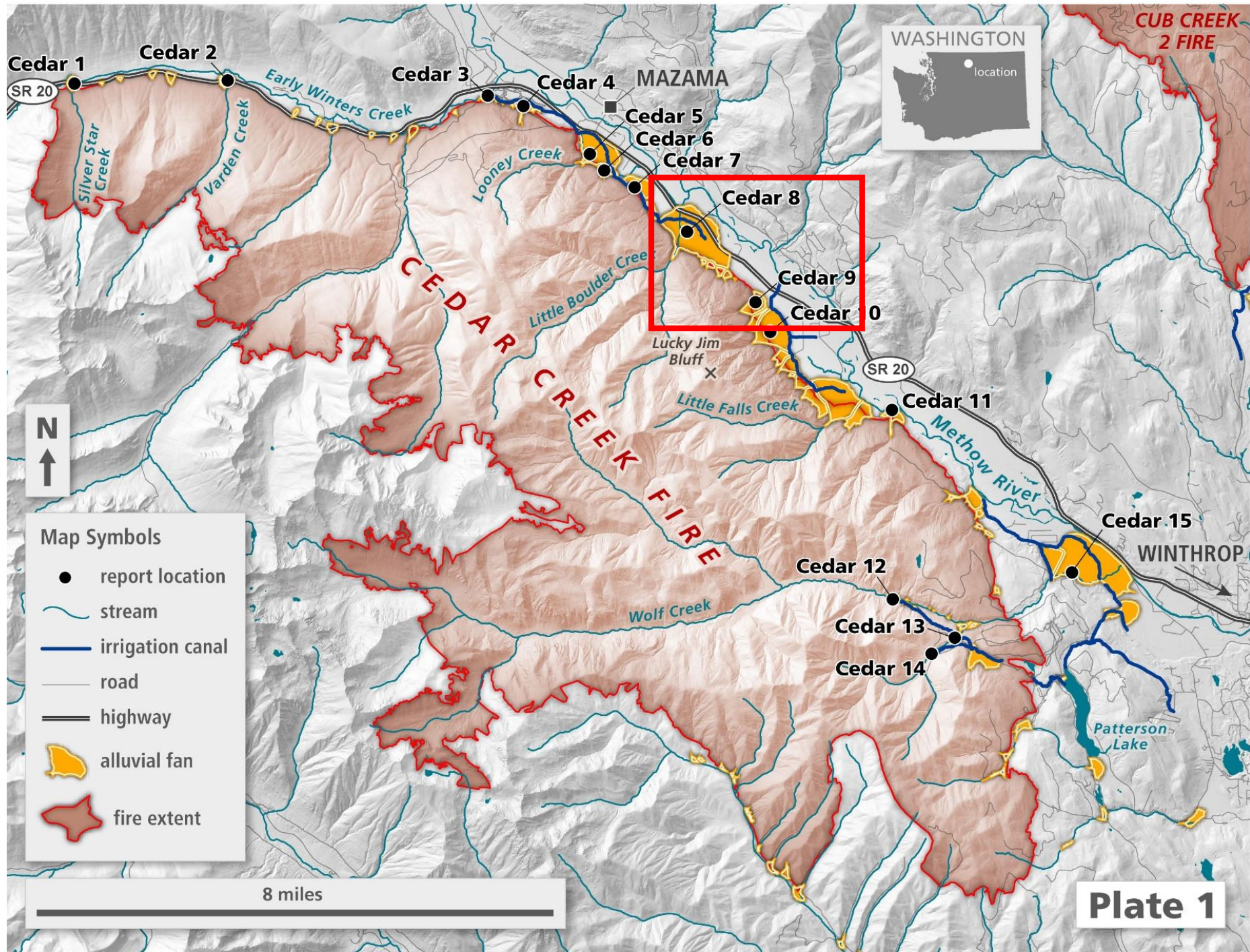






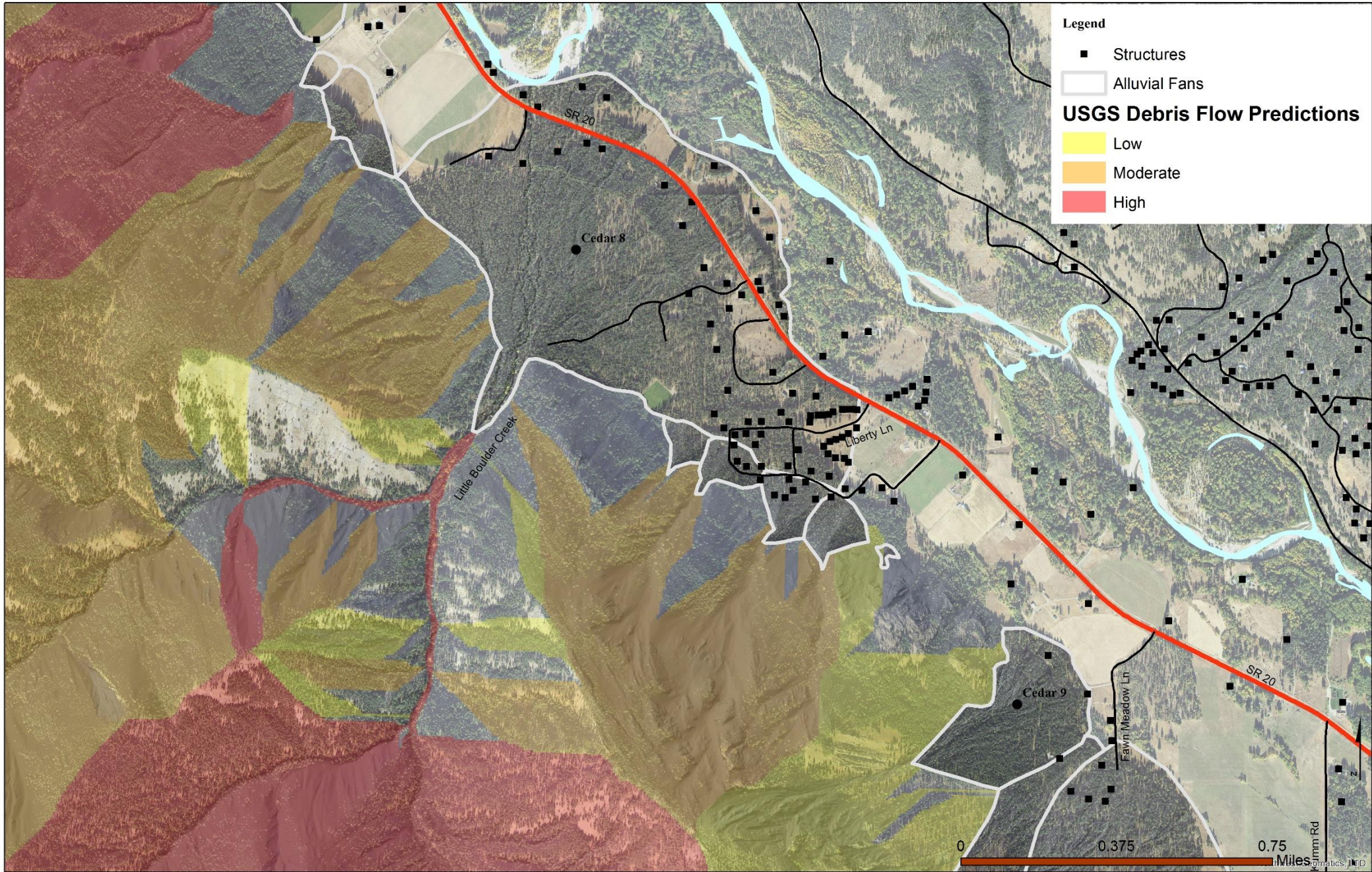




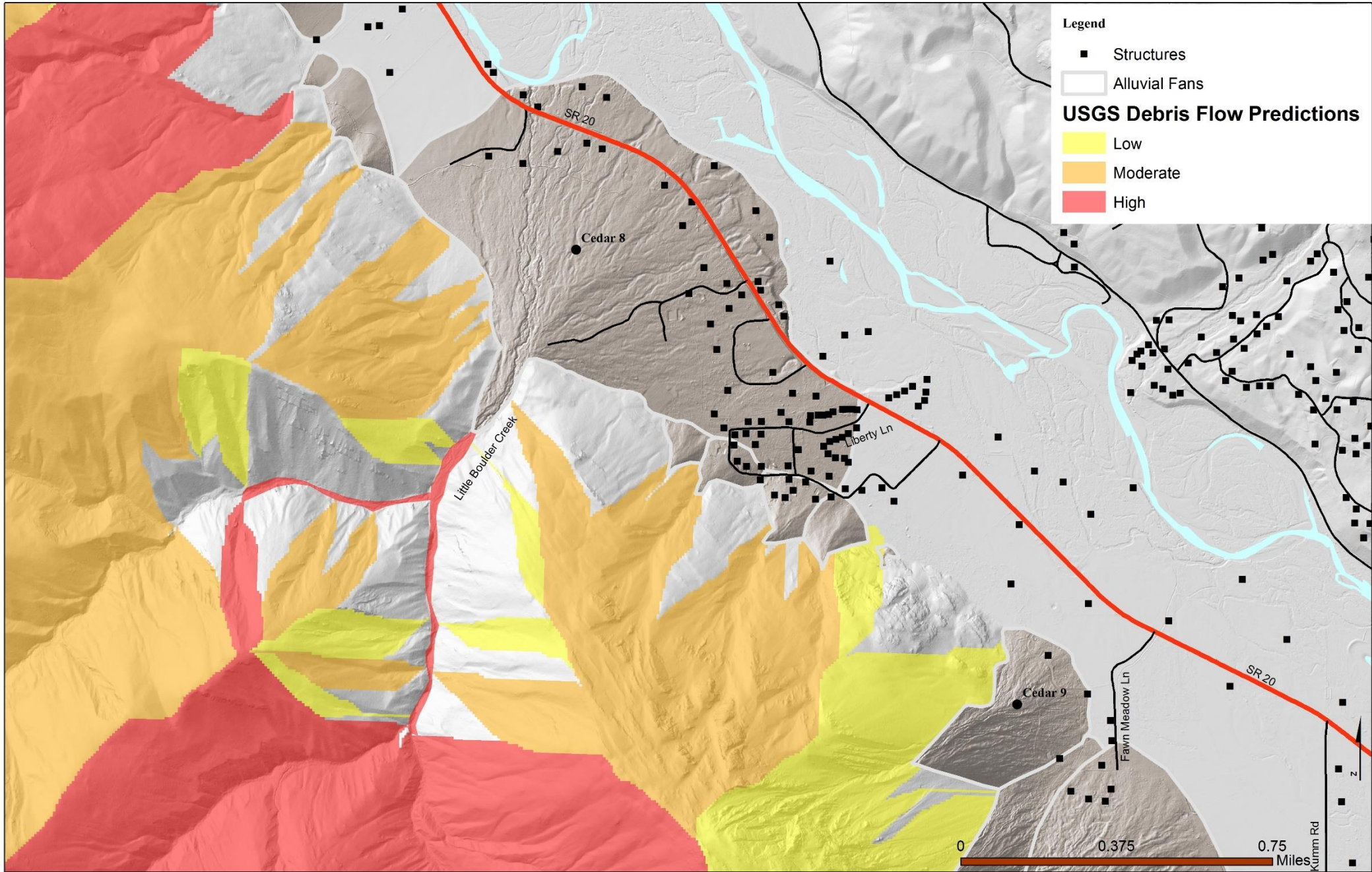


**Plate 1**

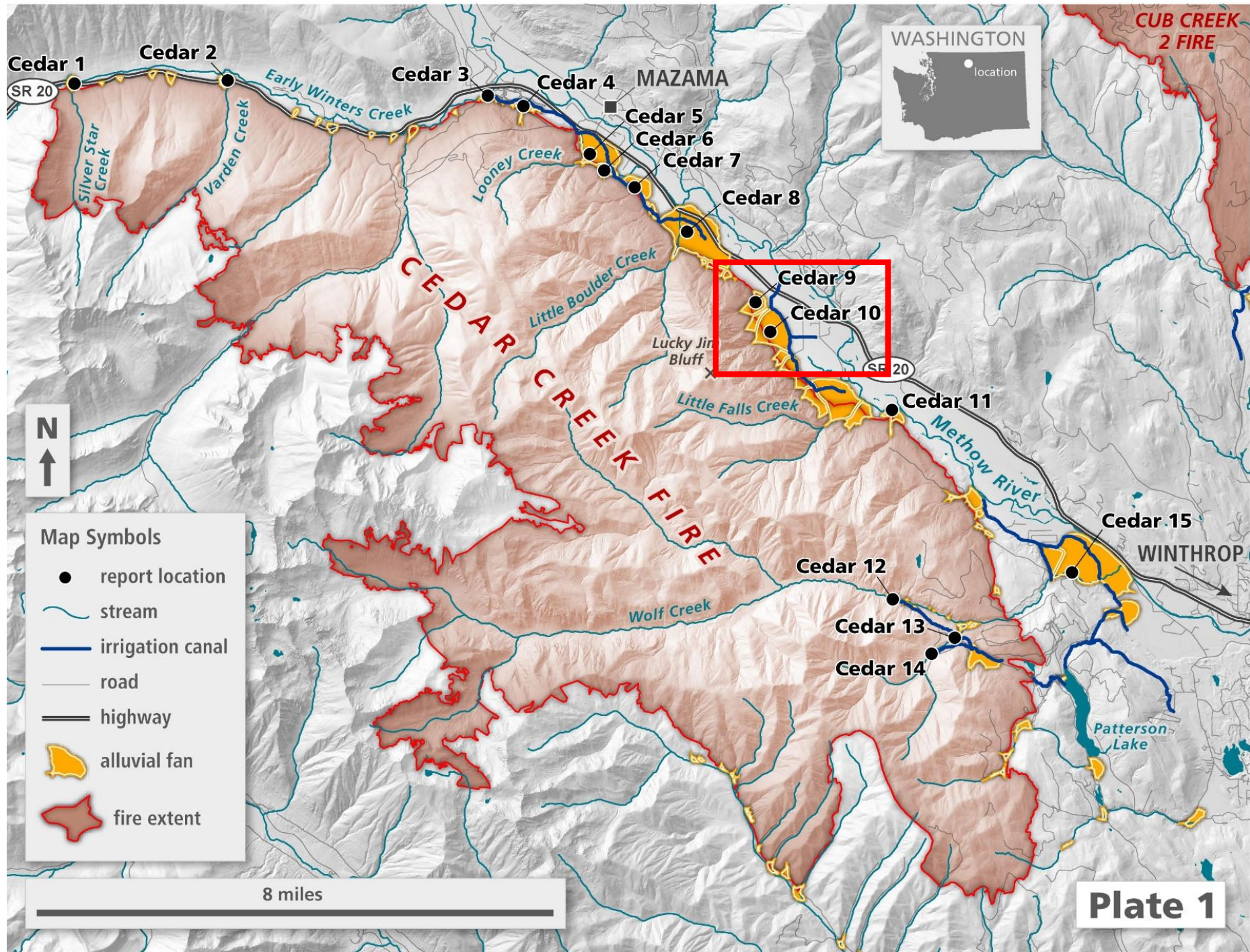




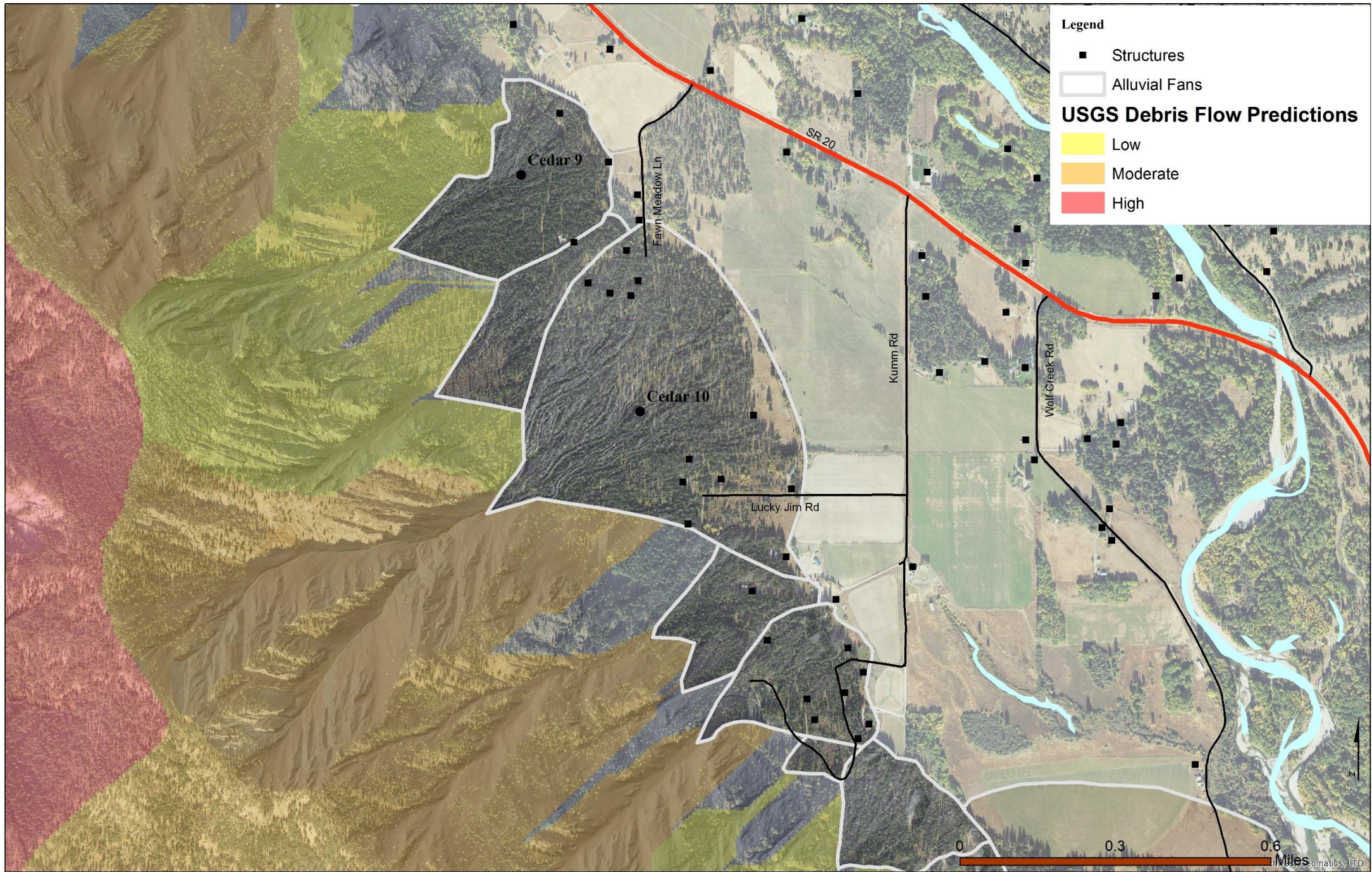




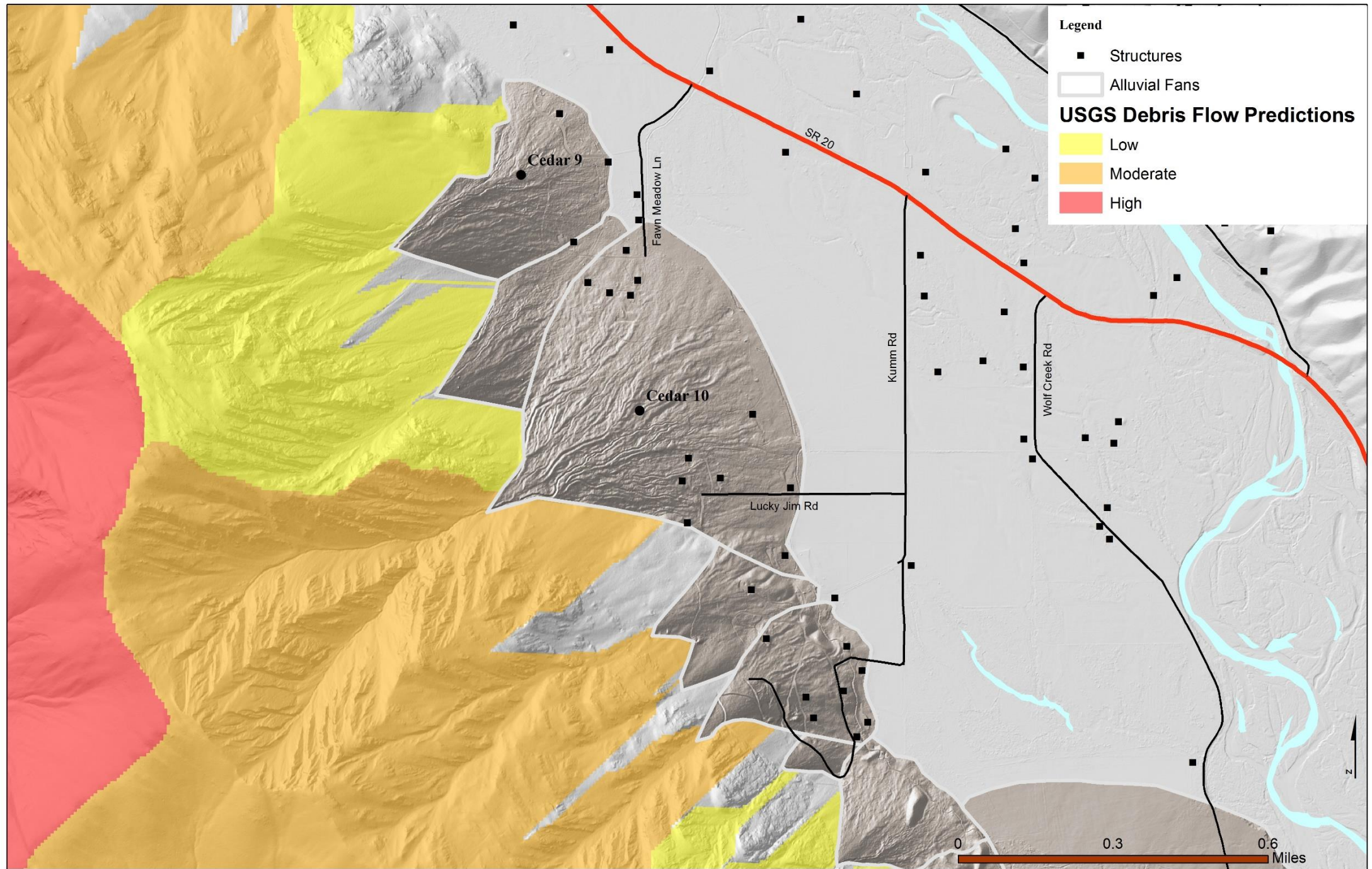




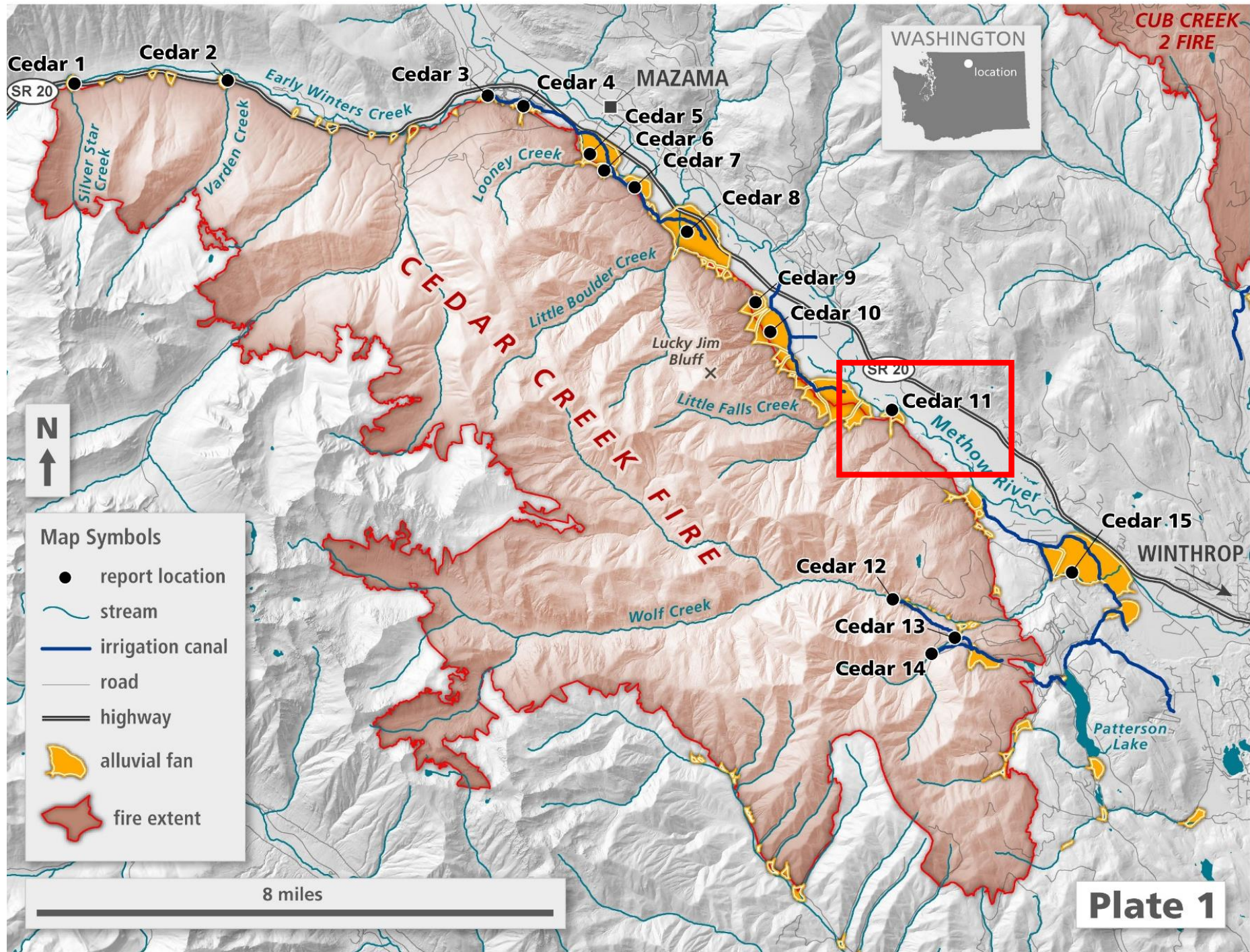




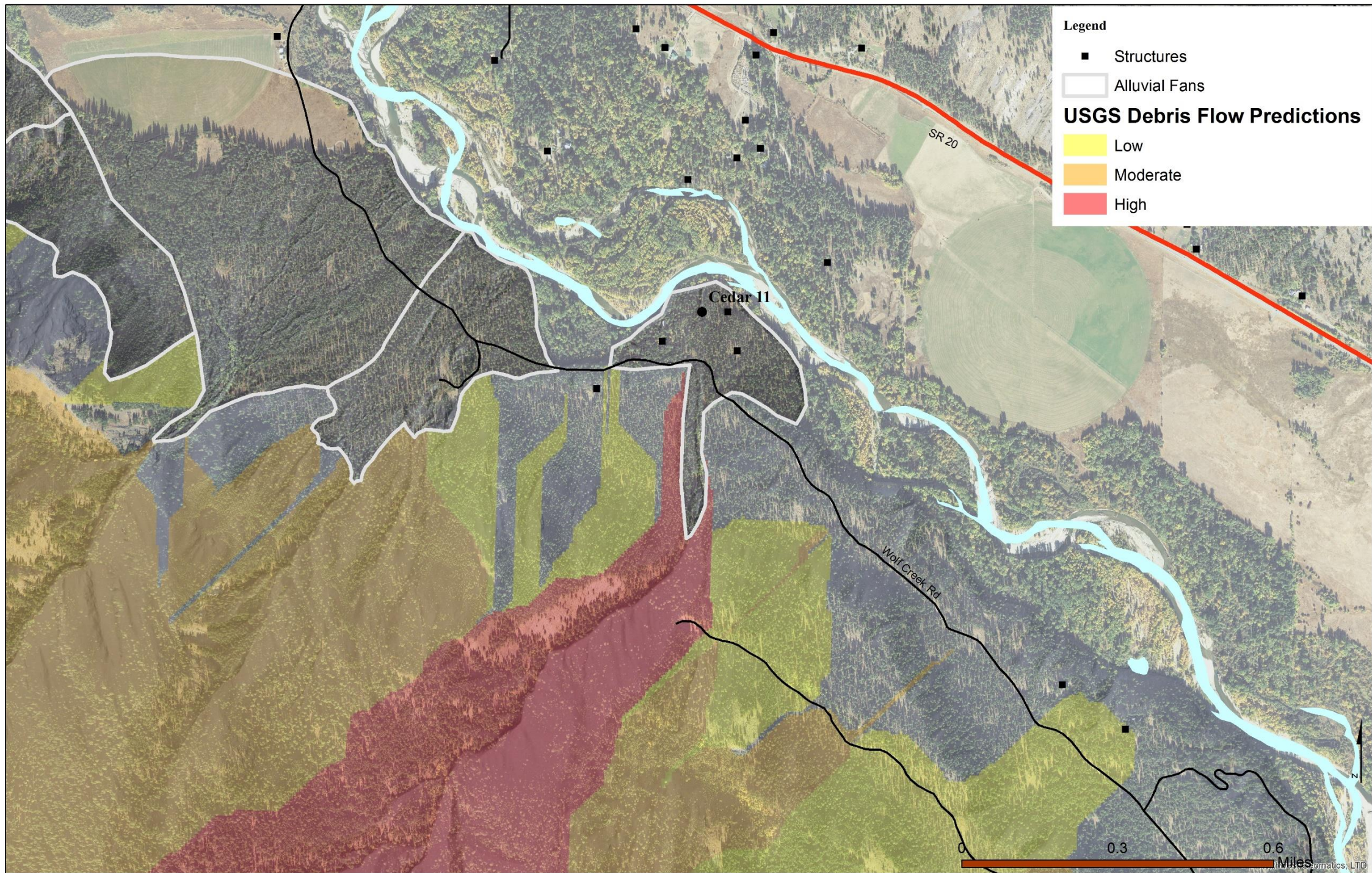




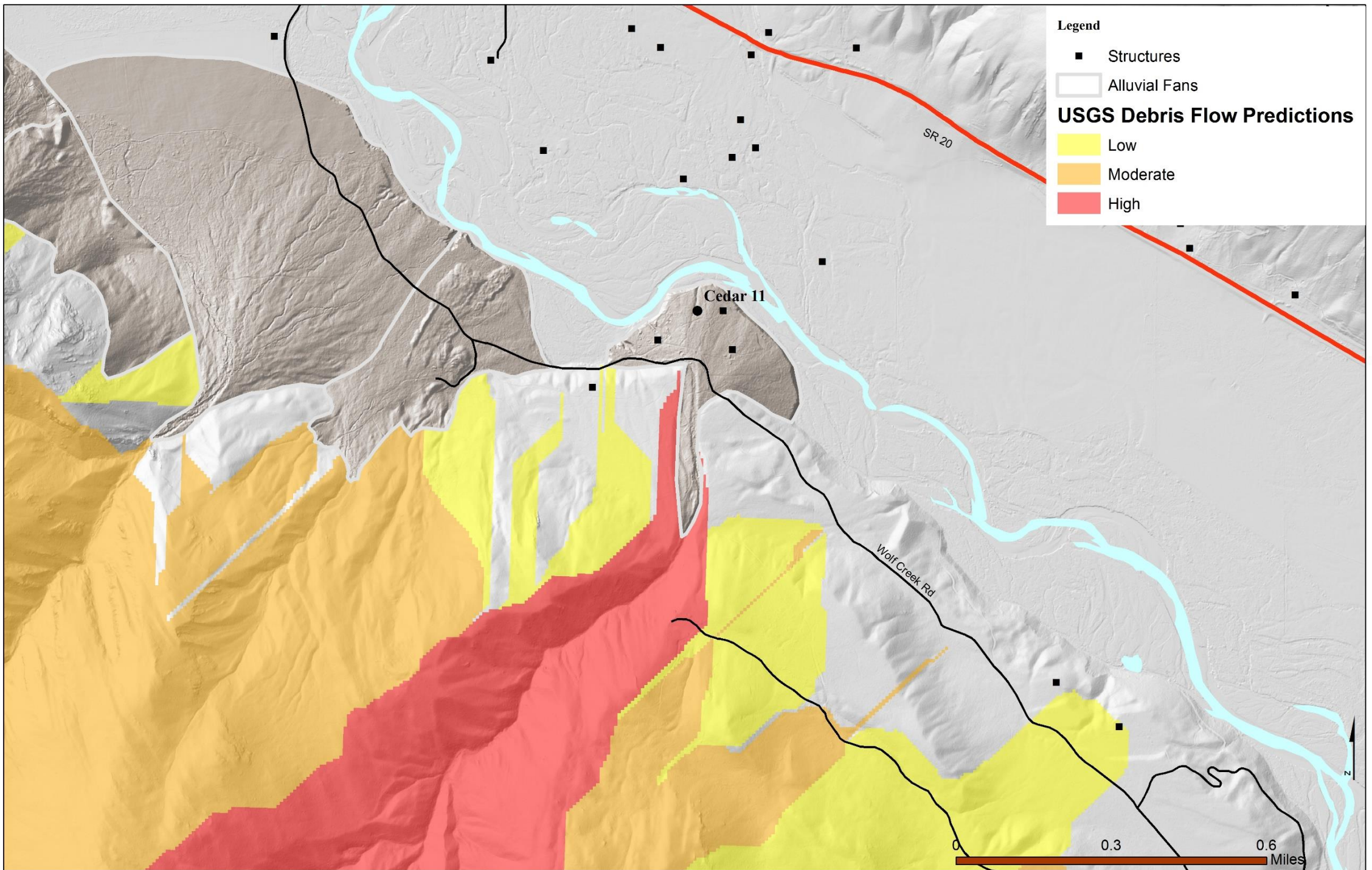




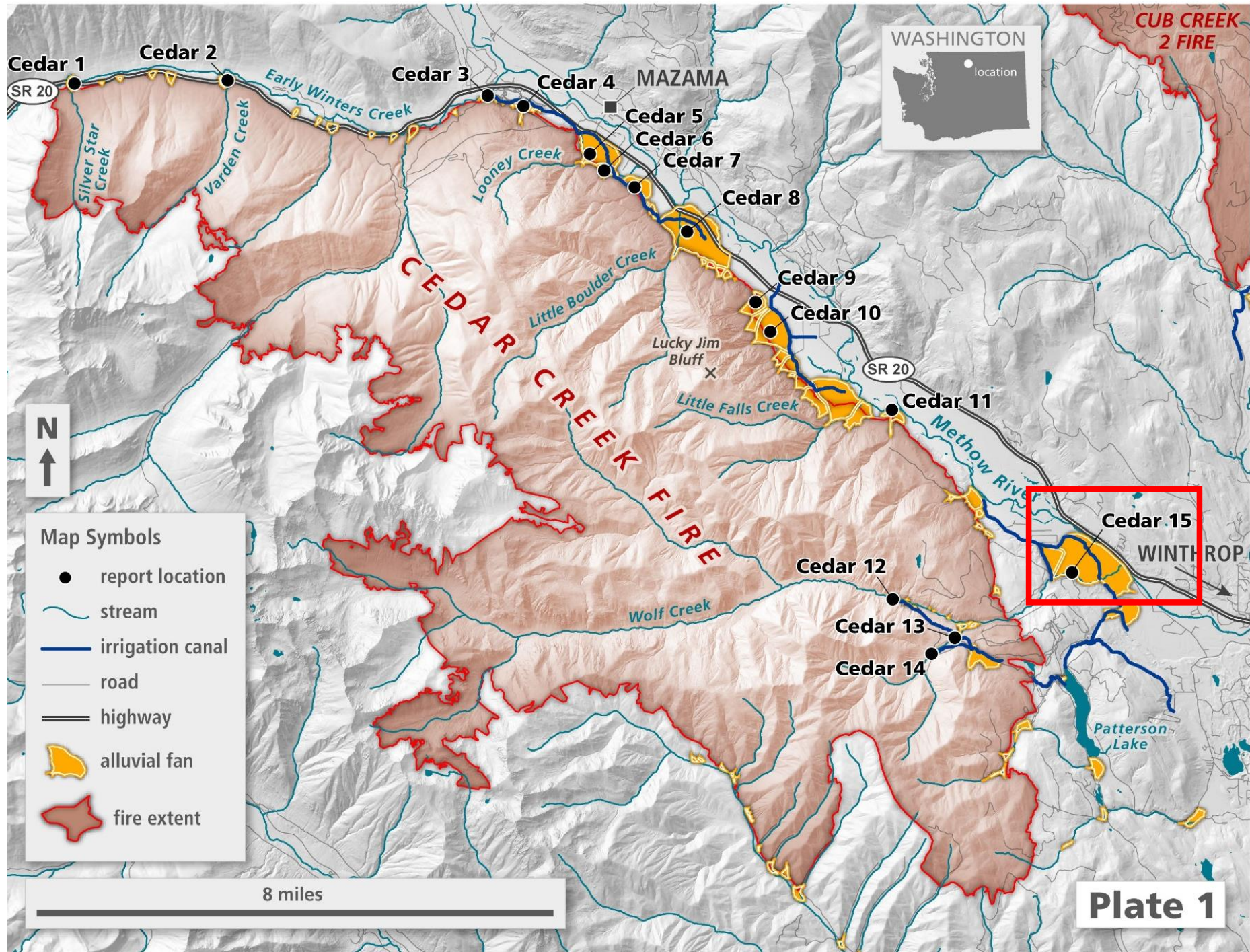












**Map Symbols**

- report location
- ~ stream
- irrigation canal
- road
- highway
- alluvial fan
- fire extent

8 miles

Plate 1

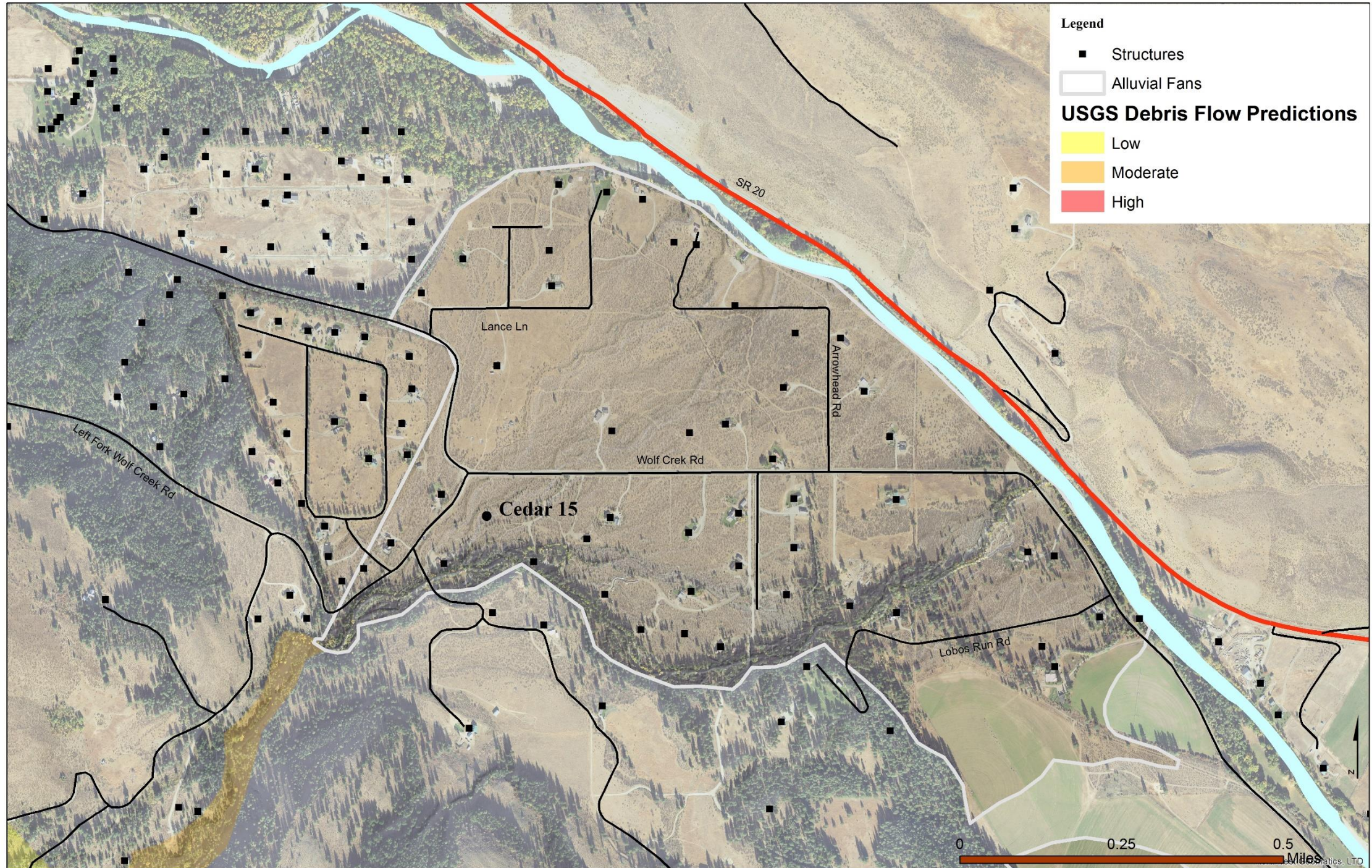


**Legend**

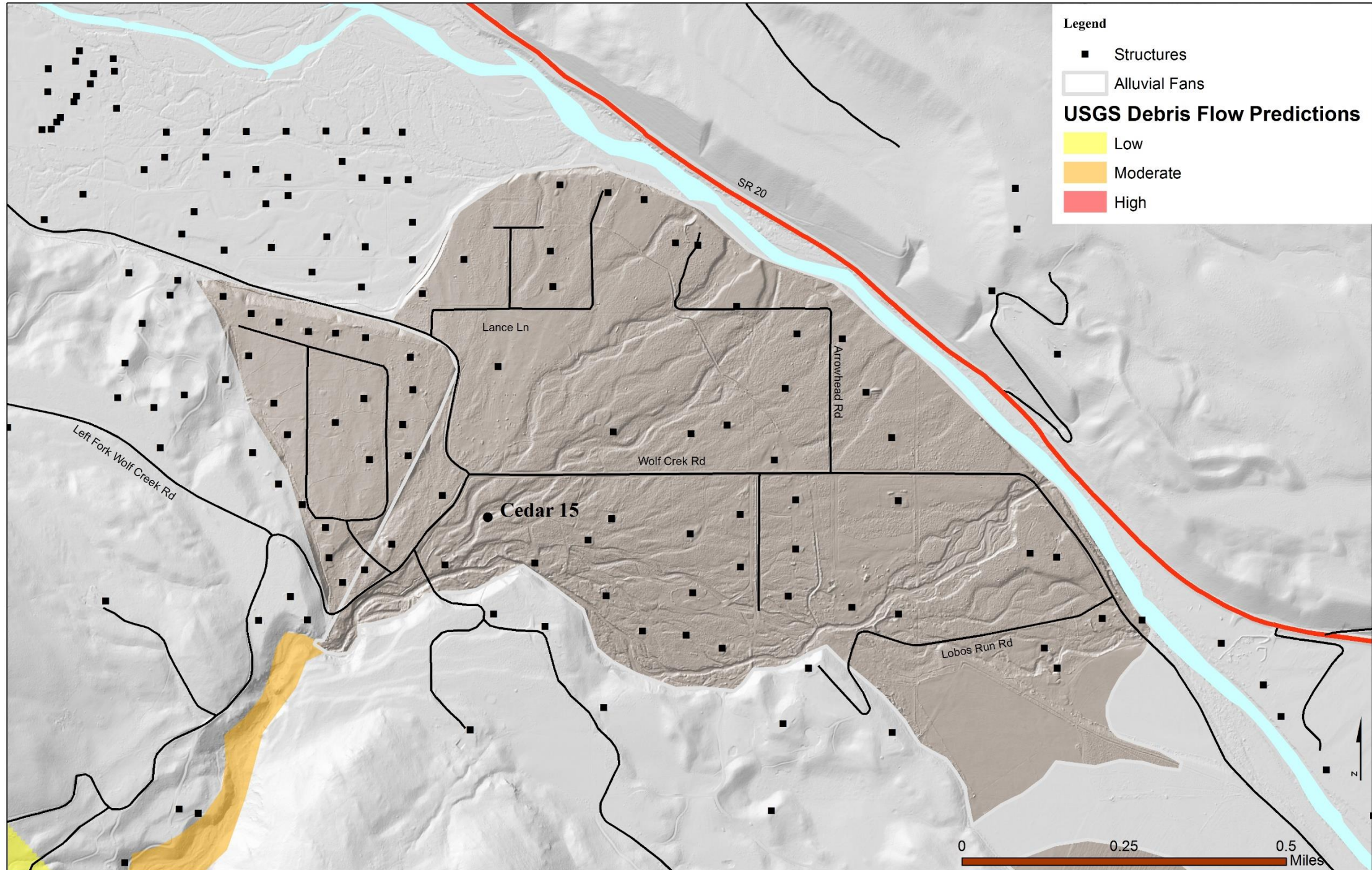
- Structures
- Alluvial Fans

**USGS Debris Flow Predictions**

- Low
- Moderate
- High







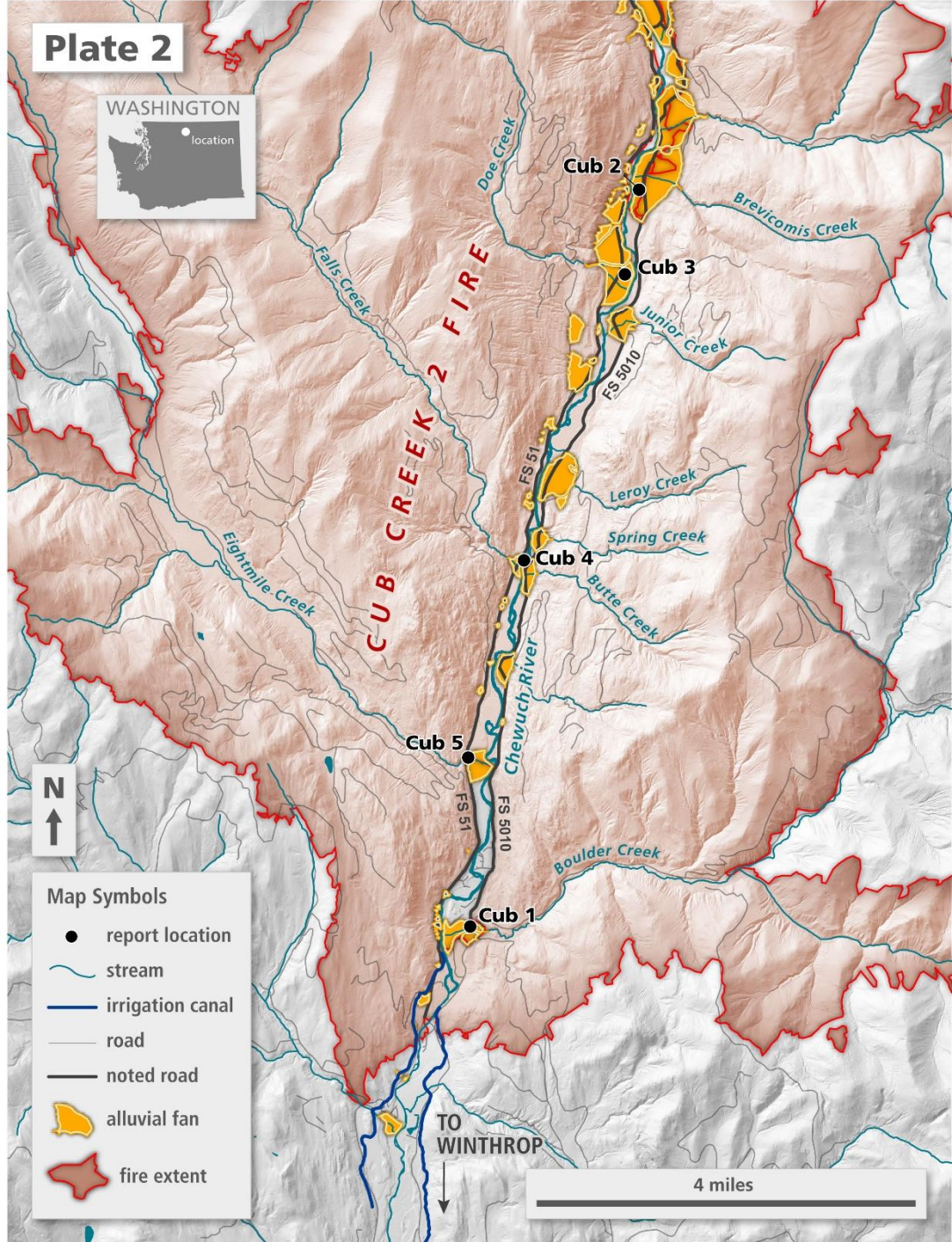






# Plate 2

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### Map Symbols

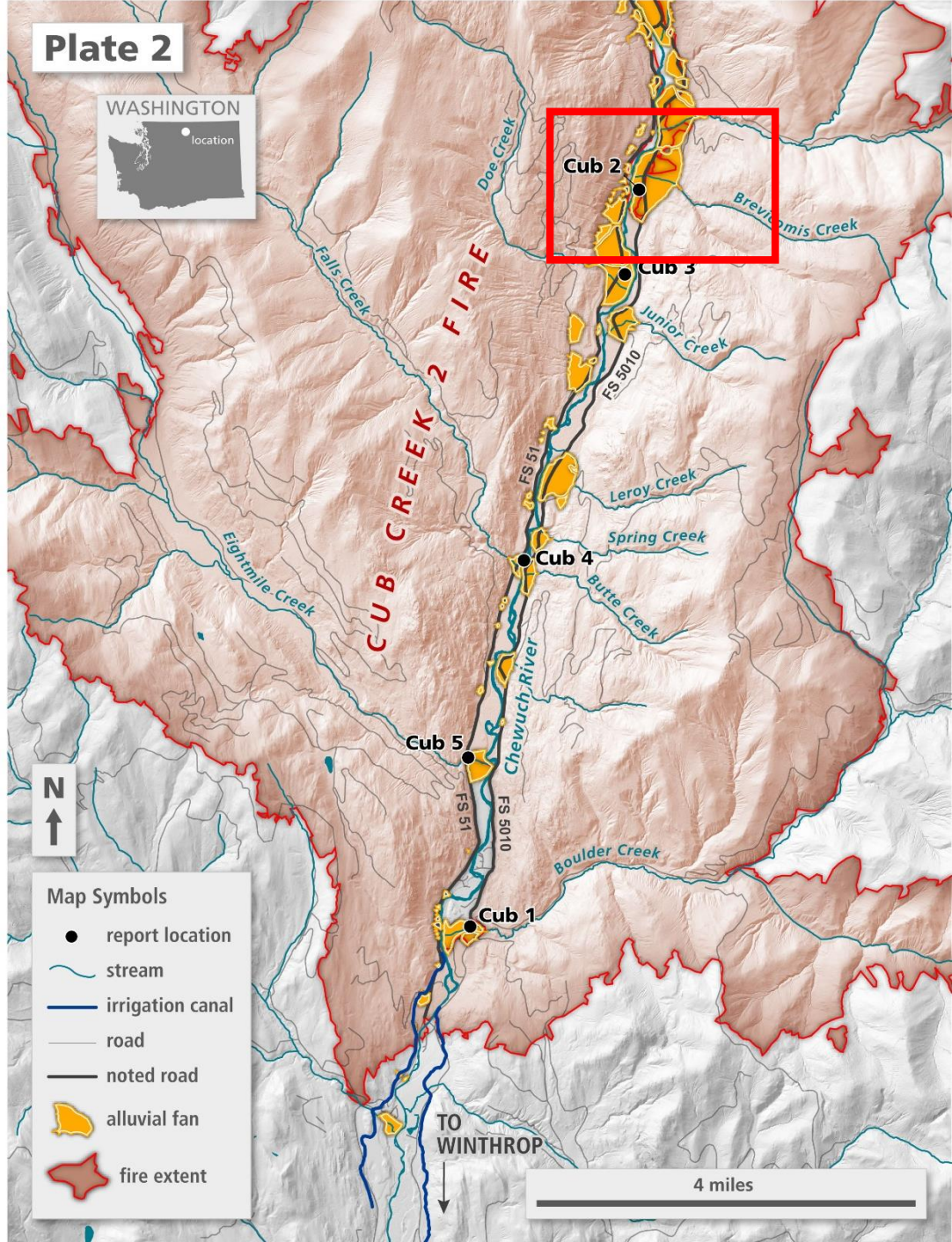
- report location
- ~ stream
- irrigation canal
- road
- noted road
- alluvial fan
- fire extent

4 miles



# Plate 2

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## Map Symbols

- report location
- ~ stream
- irrigation canal
- road
- noted road
- alluvial fan
- fire extent



Legend

■ Structures

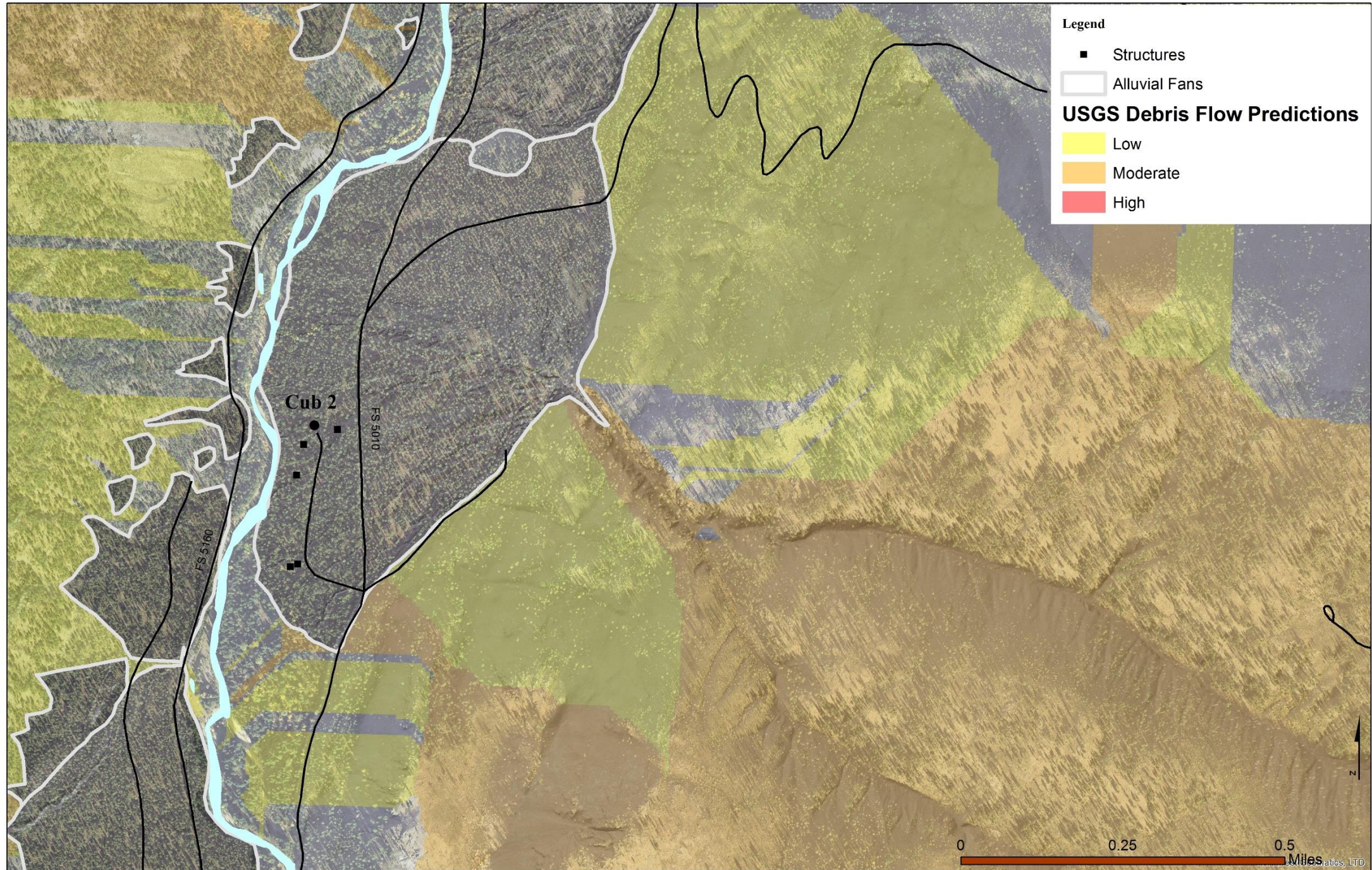
□ Alluvial Fans

**USGS Debris Flow Predictions**

Low

Moderate

High



0 0.25 0.5 Miles



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**Legend**

■ Structures

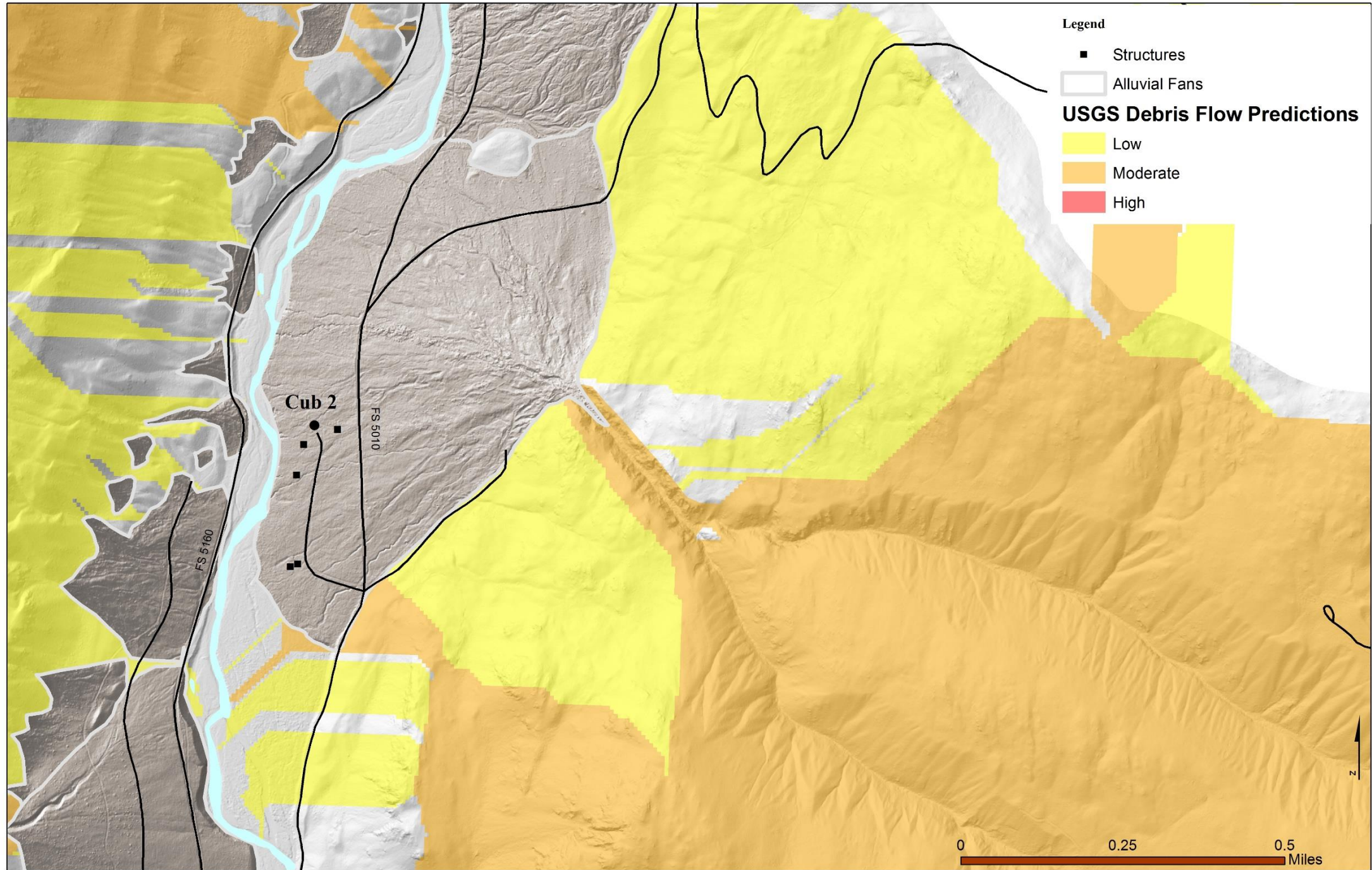
□ Alluvial Fans

**USGS Debris Flow Predictions**

Low

Moderate

High









# FLOODS AFTER FIRES

## WHAT YOU SHOULD KNOW ABOUT ALLUVIAL FANS AND WILDFIRES



If you live or work on an **alluvial fan** you could be at risk from potentially dangerous debris flows and floods, especially if you are near a recent wildfire burn area.

### What is an alluvial fan?

Alluvial fans are broad, gently sloping, fan-shaped landforms made of sediment and debris deposited when a stream emerges from steep hillslopes onto a wide, flat valley. Because these streams drain upland areas, alluvial fans are more prone to floods and debris flows. These sudden events can be catastrophic. Debris flows roar down into valleys, sweeping away everything in their path, including huge boulders, homes, and cars.

### Wildfires and flooding

*Wildfires change the properties of soils, causing water to run off more easily. The lack of vegetation also means rain can fall directly onto the ground. This leads to increased flooding.*

### What makes alluvial fans so dangerous?

Alluvial fans are always changing and often have several active and inactive stream channels. The streambed that is currently filled with water may not be the active channel after a flood. A previously safe structure could quickly become inundated following a major storm. A home far from a stream channel could suddenly be right in the path of a surging wall of mud and debris.



Photo: Jeff Coe, USGS

## How do I know if I live or work on an alluvial fan?



Look for large piles of cobbles and boulders on and around your property that may have been dropped by previous floods.

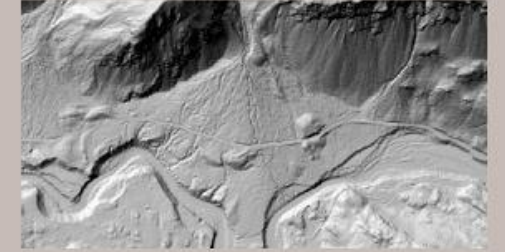
Fans are seen most clearly on lidar maps, which you can view on our Lidar Portal (<https://lidarportal.dnr.wa.gov/>). Look for broad fan shapes at the edges of valleys.



Explore our Landslide Inventory on the Washington Geologic Information Portal (<https://geologyportal.dnr.wa.gov/>)



Look for streambeds near you that seem to originate from a canyon or gully higher up.



## What should I do if I live or work on an alluvial fan?



Watch for impending storms and be prepared with an emergency plan in case you need to evacuate.



Buy flood insurance if warranted. Your insurance agent can help you make this decision.



Walk your property and identify potential flood pathways. Move outdoor items like furniture, barbeques, and cars to a safer location if they are in a potential hazard zone.



Identify stream channels and culverts in and around your property that may become blocked during a flood. Remove nearby debris, such as rocks, vegetation, and loose garbage.



Work with your neighbors and emergency manager to identify evacuation routes.



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### Visit these websites for more information:

- <https://www.dnr.wa.gov/wildfire-debris-flows>
- <https://afterthefirewa.org>

E-mail us: [geology@dnr.wa.gov](mailto:geology@dnr.wa.gov)

Call us: (360) 902-1450



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## **For More Information:**

**WALERT Report:** [https://www.dnr.wa.gov/publications/ger\\_hazards\\_landslide\\_walert\\_report\\_cedar\\_cub\\_2021.pdf](https://www.dnr.wa.gov/publications/ger_hazards_landslide_walert_report_cedar_cub_2021.pdf)

### **USGS Debris Flow Models:**

Cedar Creek: [https://landslides.usgs.gov/hazards/postfire\\_debrisflow/detail.php?objectid=374](https://landslides.usgs.gov/hazards/postfire_debrisflow/detail.php?objectid=374)

Cub Creek 2: [https://landslides.usgs.gov/hazards/postfire\\_debrisflow/detail.php?objectid=370](https://landslides.usgs.gov/hazards/postfire_debrisflow/detail.php?objectid=370)

**Lidar Data:** <https://lidarportal.dnr.wa.gov/#48.57314:-120.35797:13>

**Alluvial Fan Flyer:** [https://www.dnr.wa.gov/publications/ger\\_fs\\_alluvial\\_fans.pdf](https://www.dnr.wa.gov/publications/ger_fs_alluvial_fans.pdf)