



# Carlton Complex Fire Burn Area Emergency Response

Forest Service and Interagency BAER Assessment  
Findings and Recommendations

September 13, 2014



# The Carlton Complex Fire

- Multiple fires started on July 14 and grew into one fire on July 20.
- Great Basin type team 1 assumed command of fire on August 11.
- The fire made significant runs towards Brewster and Pateros between July 17-18, consuming homes and critical infrastructure.
- More than 2,100 firefighters and support crew supported fighting the fire,
- Fire burned 255,181 acres on the Okanogan-Wenatchee NF, Tribal, BLM, Washington State, and private lands





# Cow & Frazer Creek

Frazer Radar Ave - 0.37"

Storm Total through **August 13**, 3am

Approx Return Interval:

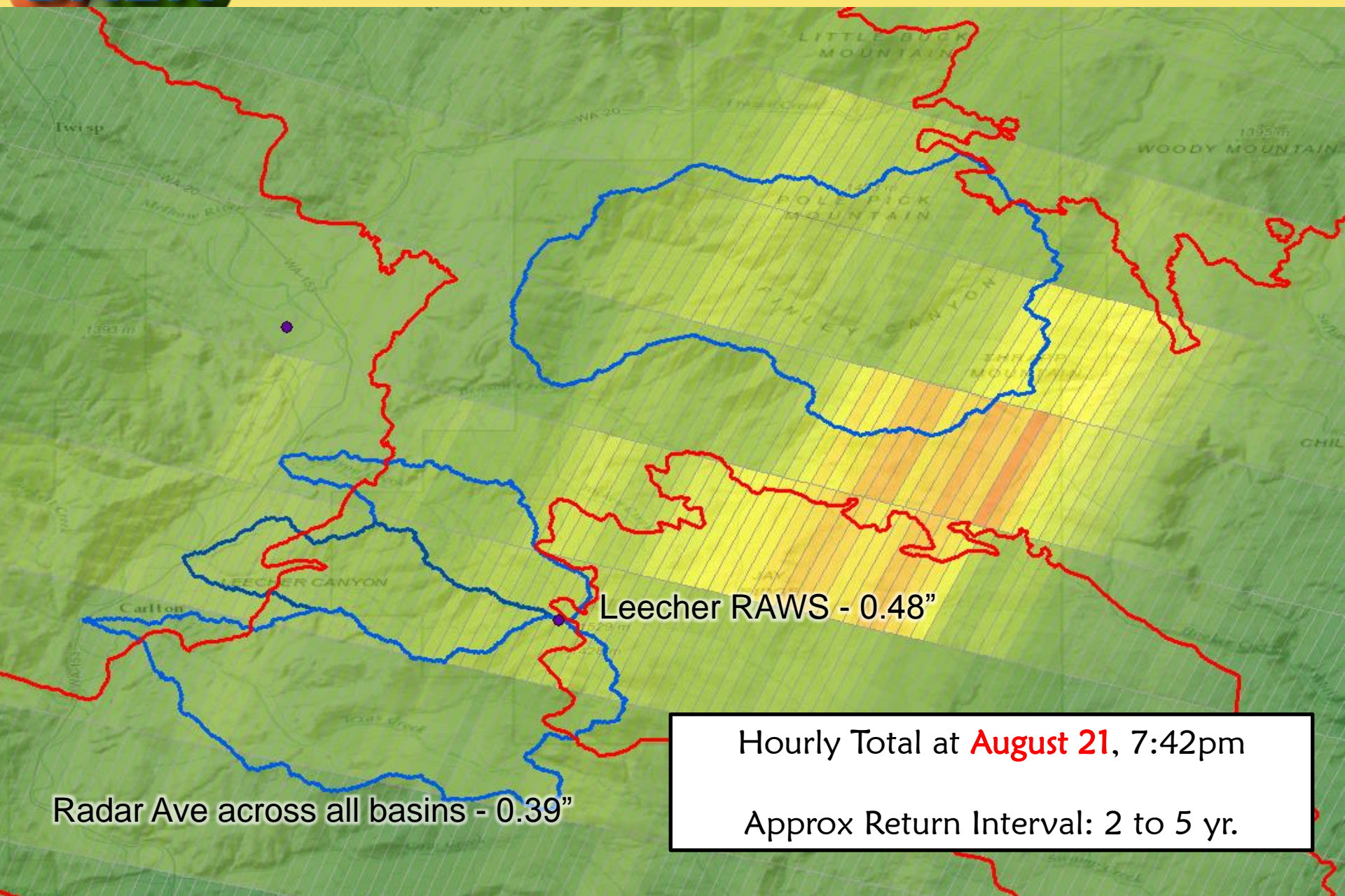
2 to 5 yr. event for Frazer.

5 to 10 yr. event for Cow Creek

Leecher RAWS - 0.34"

Cow Cr Radar Ave - 0.59"

# Leecher, Canyon Cr & Lower Finley



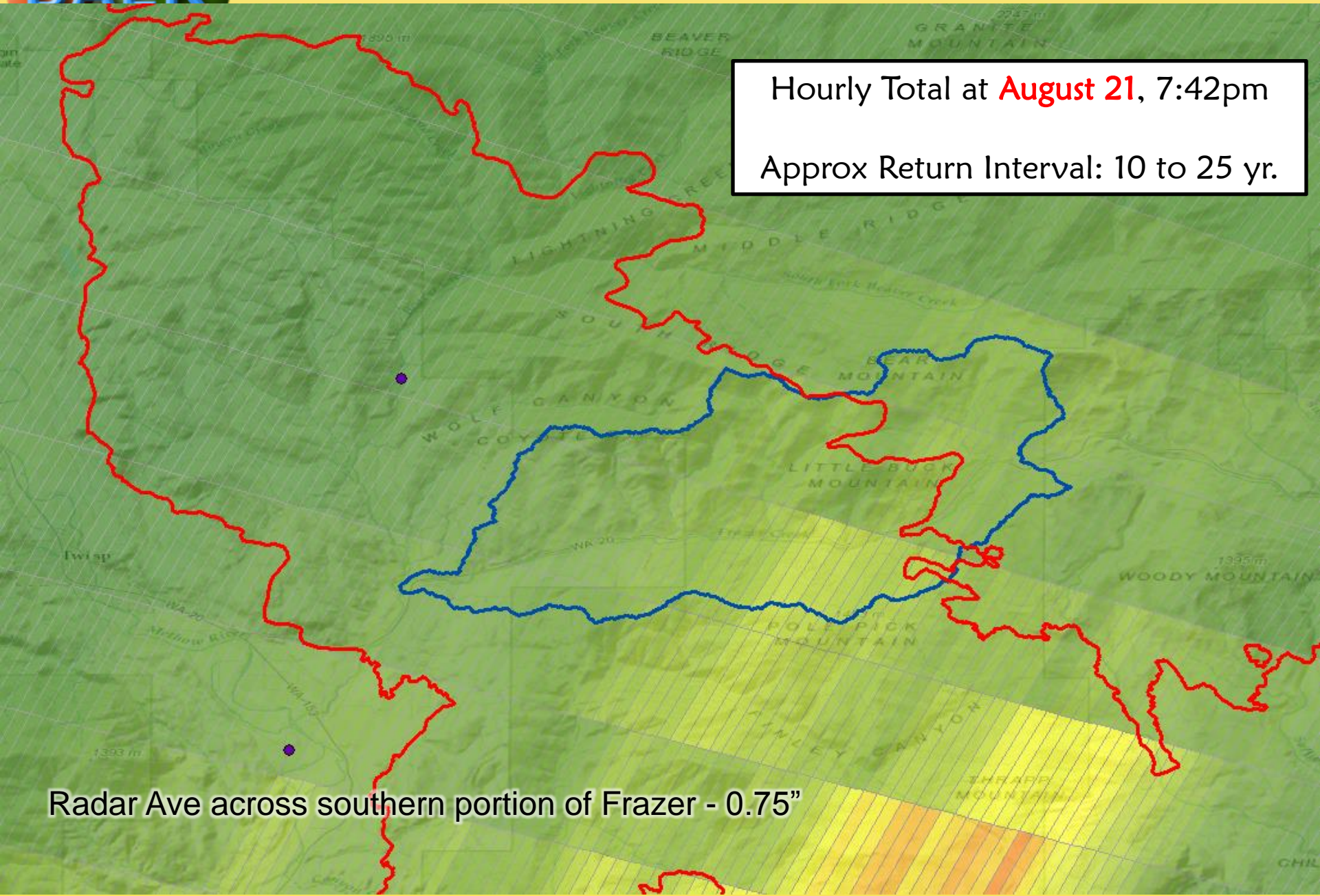


# Frazer Creek

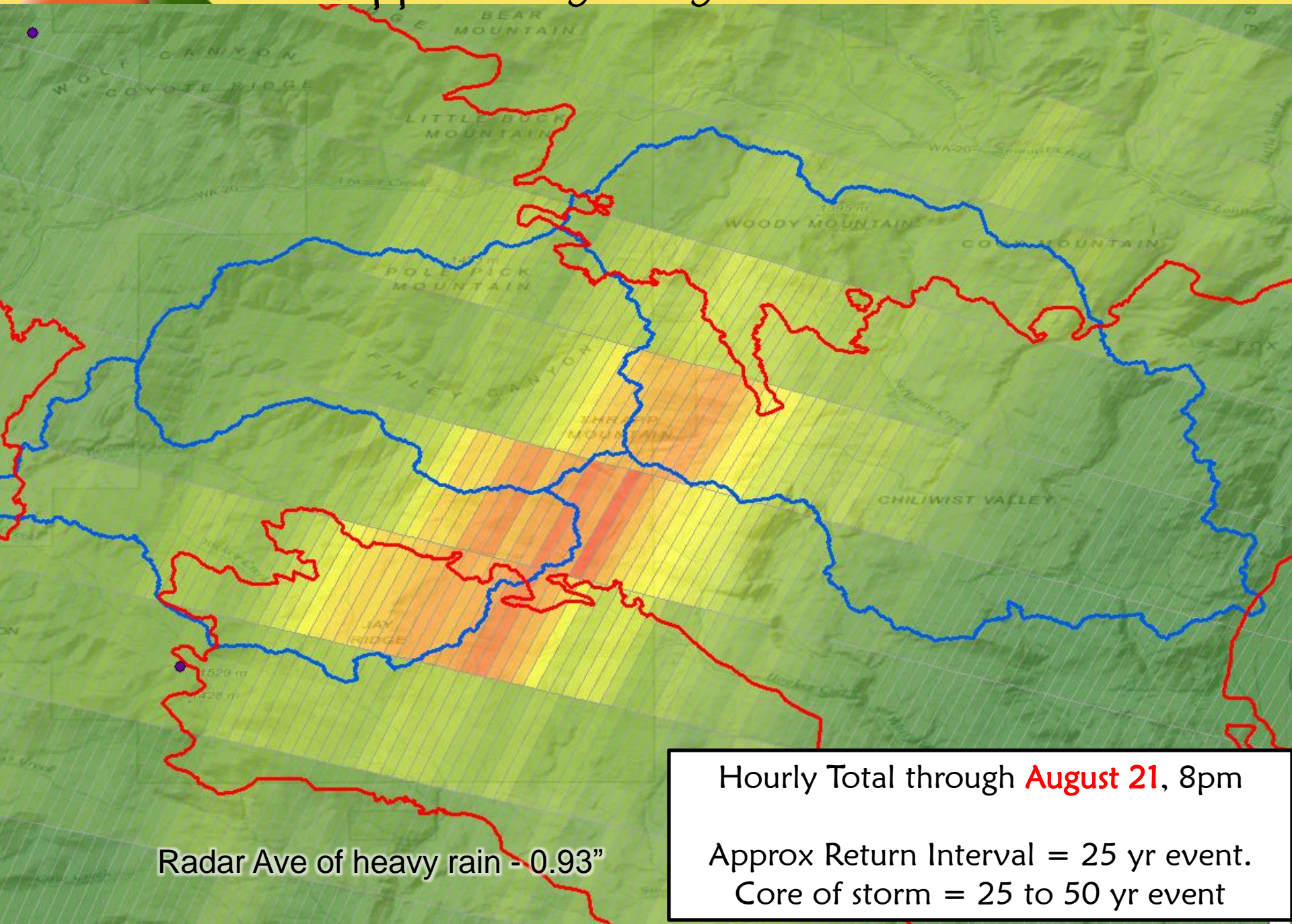
Hourly Total at **August 21**, 7:42pm

Approx Return Interval: 10 to 25 yr.

Radar Ave across southern portion of Frazer - 0.75"



# Upper Finley Canyon, Benson, & Chiliwist



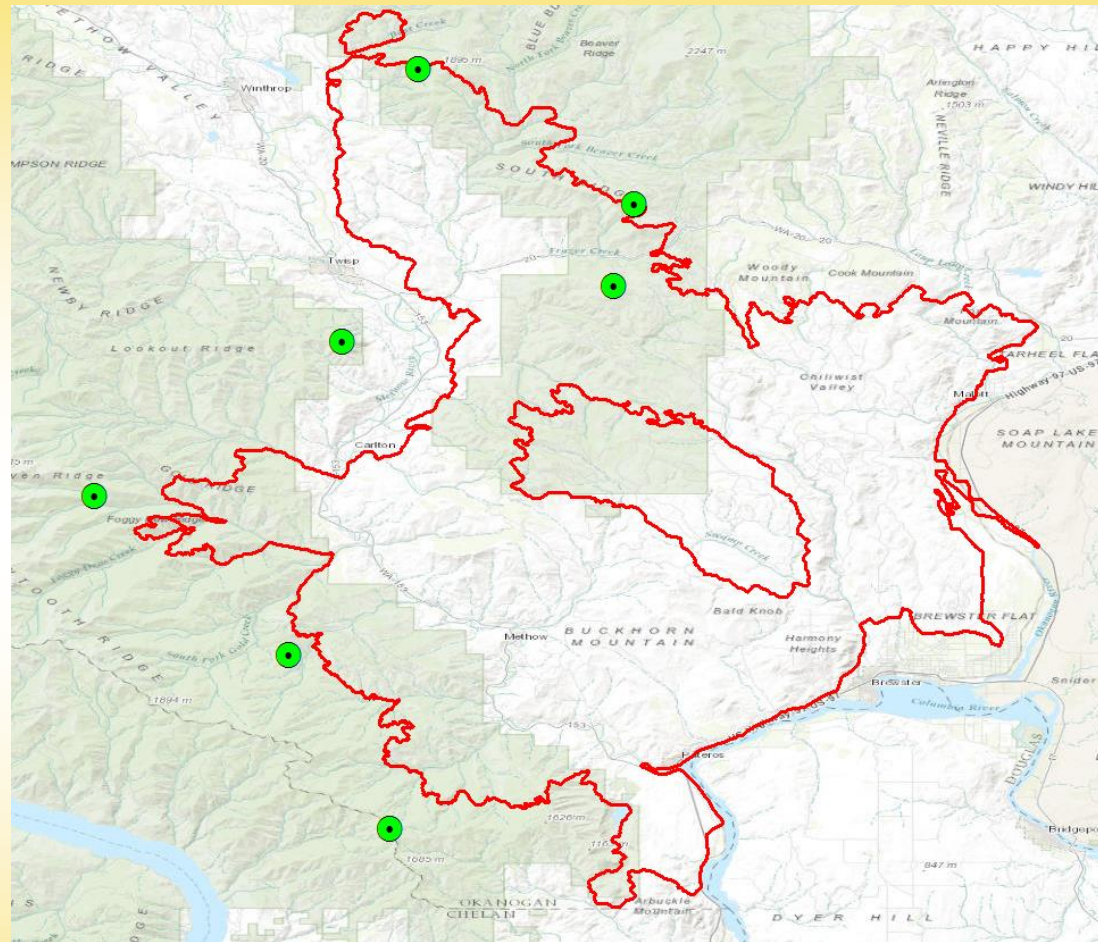
Radar Ave of heavy rain - 0.93"

Hourly Total through **August 21**, 8pm

Approx Return Interval = 25 yr event.  
Core of storm = 25 to 50 yr event

# Early Warning Systems

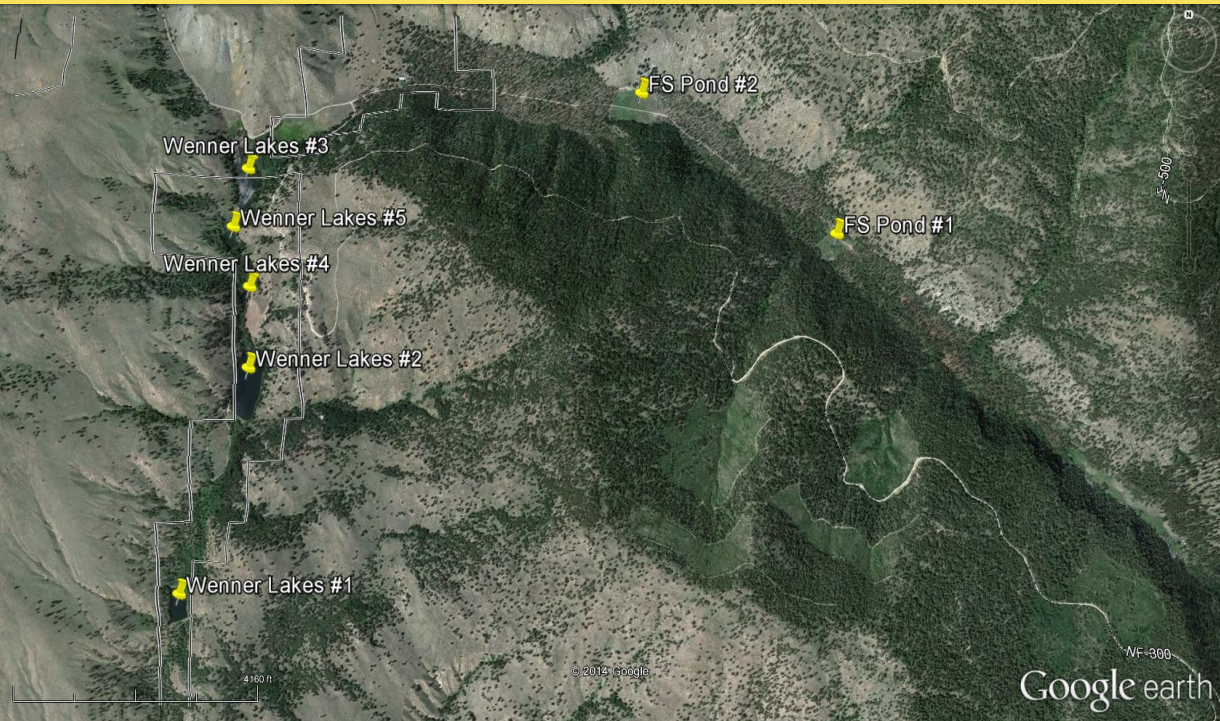
- Flood warning systems
  - National Weather Service Storm Tracking
  - Rapid Reporting Rain Gages
- Evacuation Plans and Routes
- Media
  - Press Releases
  - Internet Bulletins
  - Radio Notices
  - Newspapers



7 early warning rain gages installed so far.  
0.16"/10 min sustained for 15 min or more

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# Flood Damage



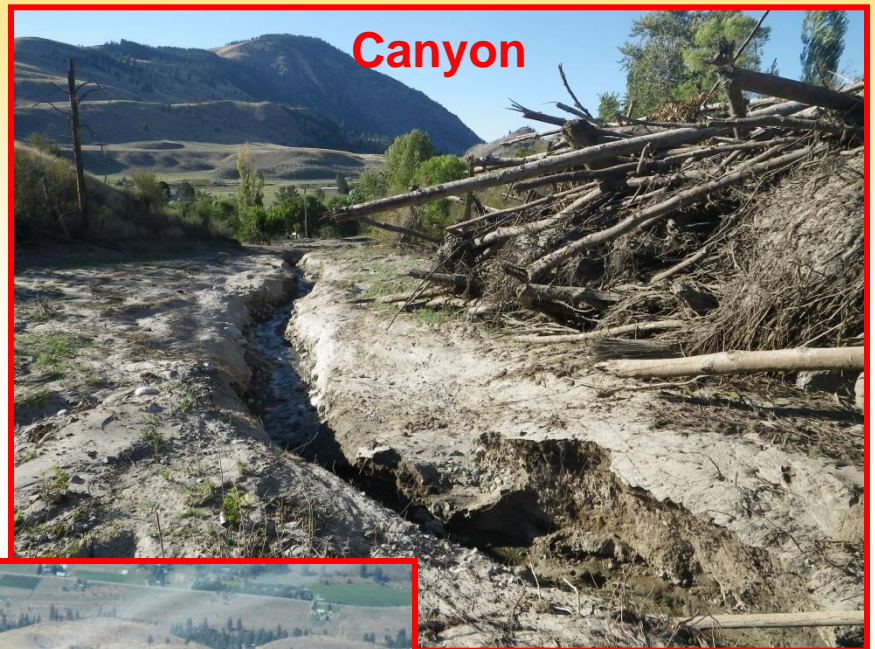
**Wenner Lake 1**



**Wenner Lake 4/5**



# Flood Damage



# Initial Response

- NRCS (Emergency Watershed Protection Program) – Structure evaluation
- Army Corps – County road culverts and utilities
- County Public Works – County roads
- Other Non-profits (Methow Conservancy)



The logo for the Business and Agriculture Emergency Response (BAER) team. It features the letters "BAER" in a bold, blue, sans-serif font. The letters are set against a circular background that is split vertically into two colors: orange on the left and green on the right.

# Disaster Declaration

Given the fire's size and severity, the Okanogan Conservation District asks WA State AG, Governor's Office, State Emergency Services, and Conservation Commission for interagency BAER team for Washington State and private lands.

President Obama signs Disaster Declaration authorizing the Federal Emergency Management Agency (FEMA) to coordinate disaster relief and help state and local agencies.





**Ground cover/organic matter consumed**



**Roots brittle/consumed**



**Site is often "black" due to extensive charring.**

- Primary flood areas
- High probability of accelerated erosion
- Slower vegetative recovery
- High potential threat to downstream values at risk



**Most, but not all ground cover consumed**



**Surface ash is blackened with gray patches.**

- May act as flood source areas
- Accelerated hill-slope erosion
- Moderate threat to downstream values at risk



**Weak-medium water repellency at or just below soil surface**



**Surface organic not consumed**



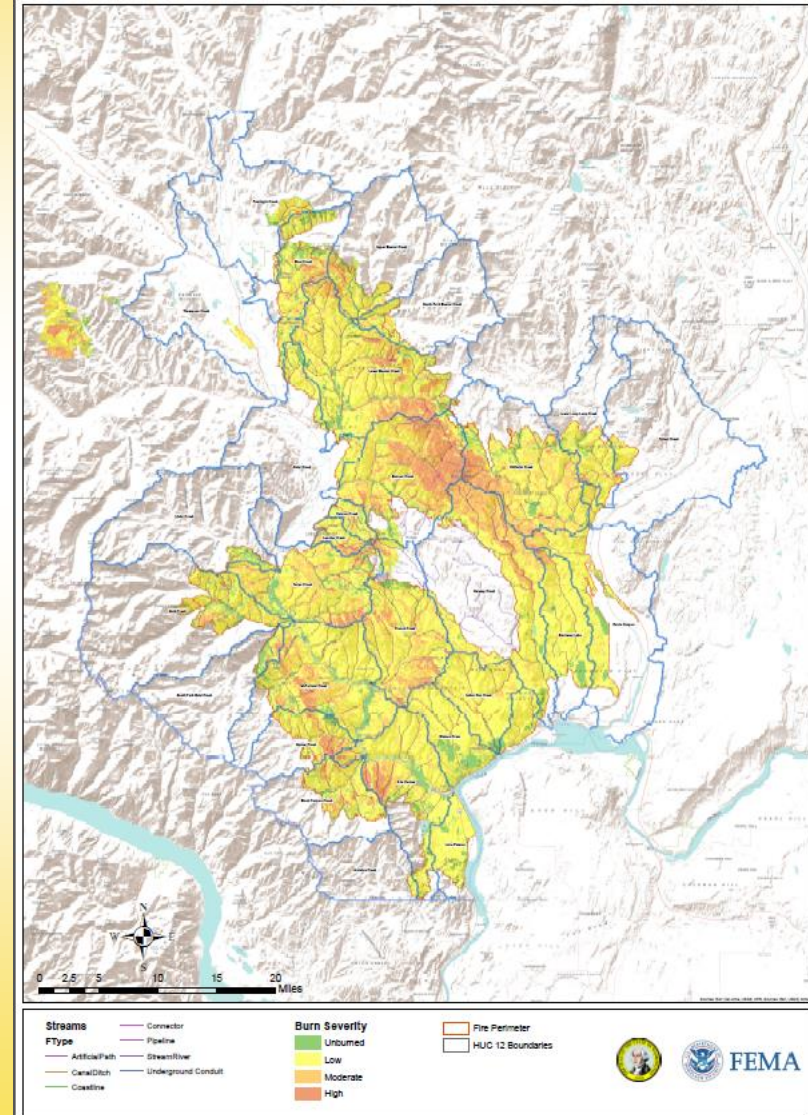
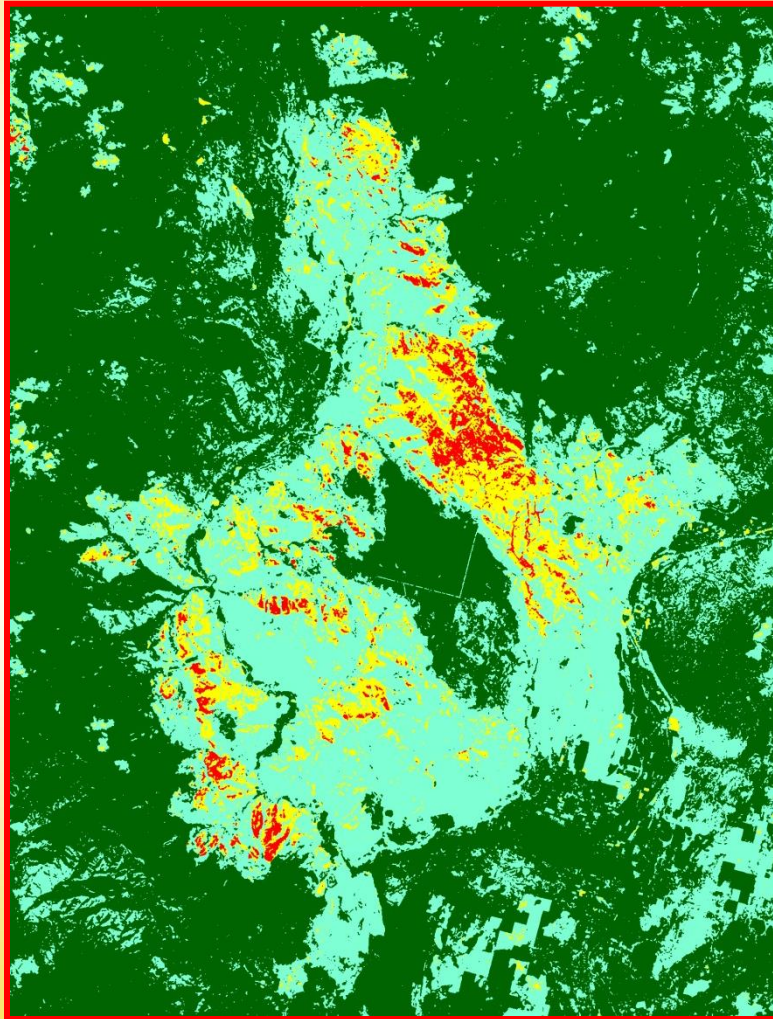
**Roots unchanged**



**Water infiltrates immediately;  
some soils exhibit natural water repellency**

- Rapid native vegetative recovery
- Low probability of accelerated hill-slope erosion
- Low flood source potential

# Burned Area Reflectance Classification to Soil Severity



# Value Identification

Identify critical values in, or in close proximity to, the burned area.

## CRITICAL VALUES

### HUMAN LIFE AND SAFETY

**Human life and safety** on or in close proximity to burned NFS lands.

### PROPERTY

Buildings, water systems, utility systems, road and trail prisms, dams, wells or other significant investments on or in close proximity to the burned NFS lands.

### NATURAL RESOURCES

**Water** used for municipal, domestic, hydropower, or agricultural supply or waters with special state or federal designations on or in close proximity to the burned NFS lands.

**Soil productivity and hydrologic function** on burned NFS lands.

**Critical habitat** or suitable occupied habitat for **federally listed threatened or endangered terrestrial, aquatic animal or plant species** on or in close proximity to the burned NFS lands.

Native or naturalized communities on NFS lands where **invasive species or noxious weeds** are absent or present in only minor amounts.

### CULTURAL AND HERITAGE RESOURCES

Cultural resources on NFS lands which are listed on or potentially eligible for the National Register of Historic Places.

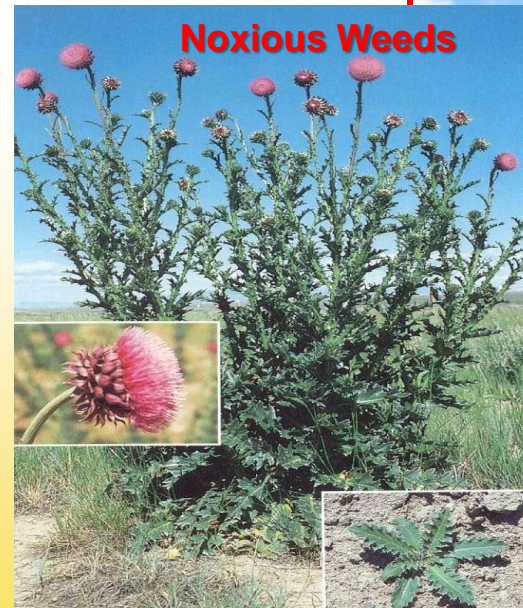
Life and Safety



Property



Noxious Weeds





# Treatments

Develop treatments that address the identified risks.

Treatments should be evaluated based on their:

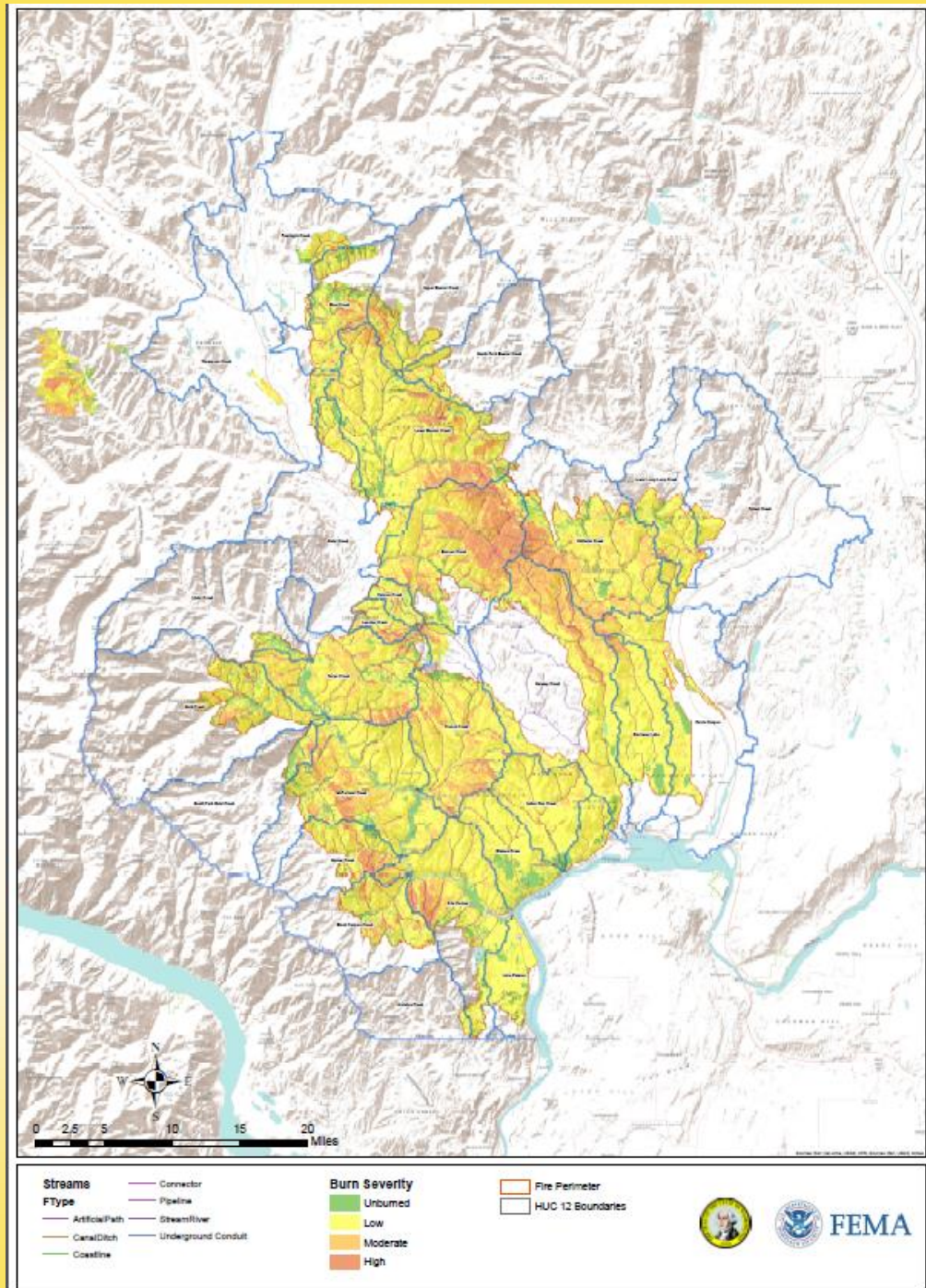
- ❖ Ability to be implemented in a timely manner;
- ❖ Effectiveness to reduce risks;
- ❖ Practical and technical feasibility;
- ❖ Cost



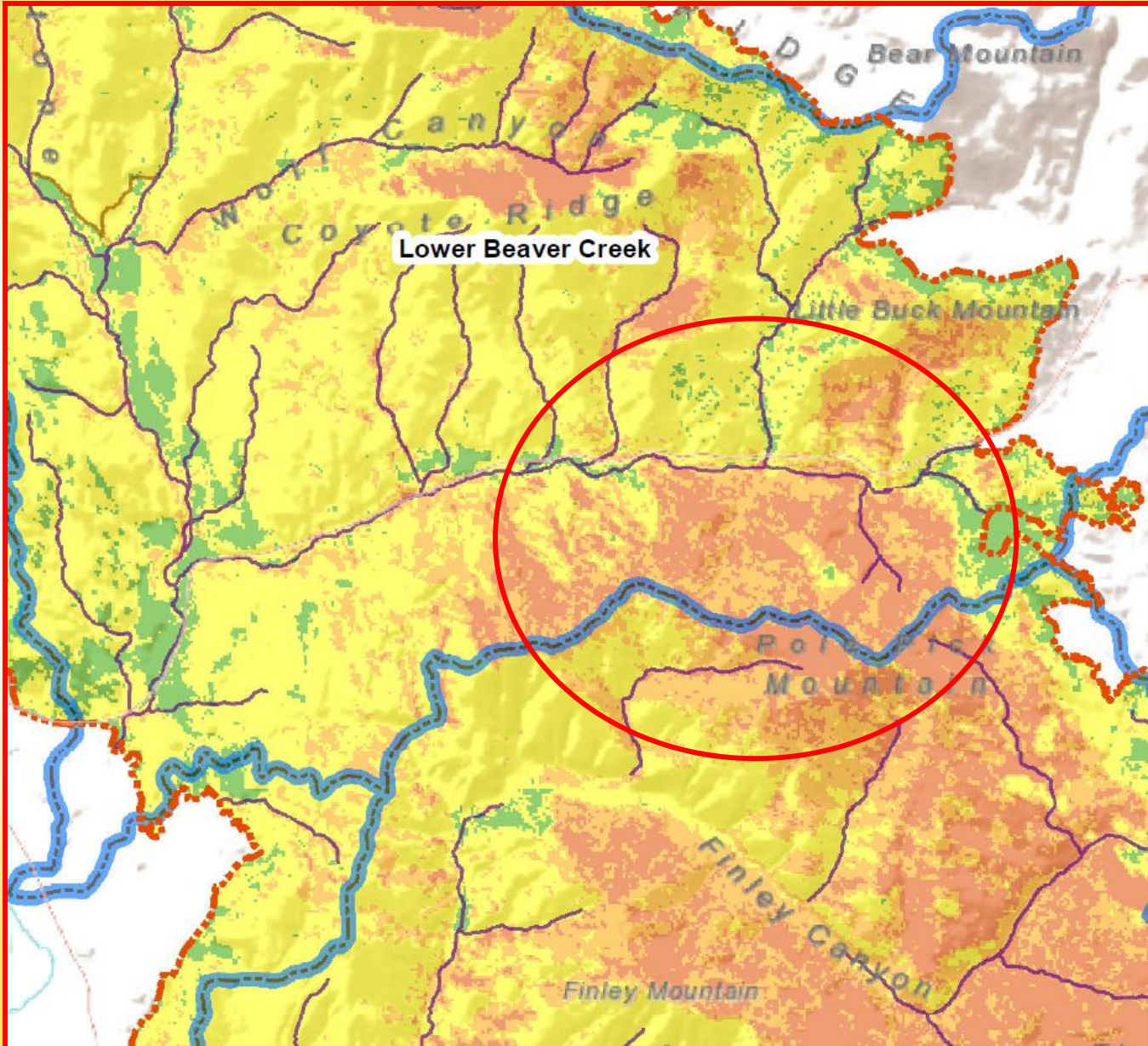
# Burn Severity

(what did we find?)

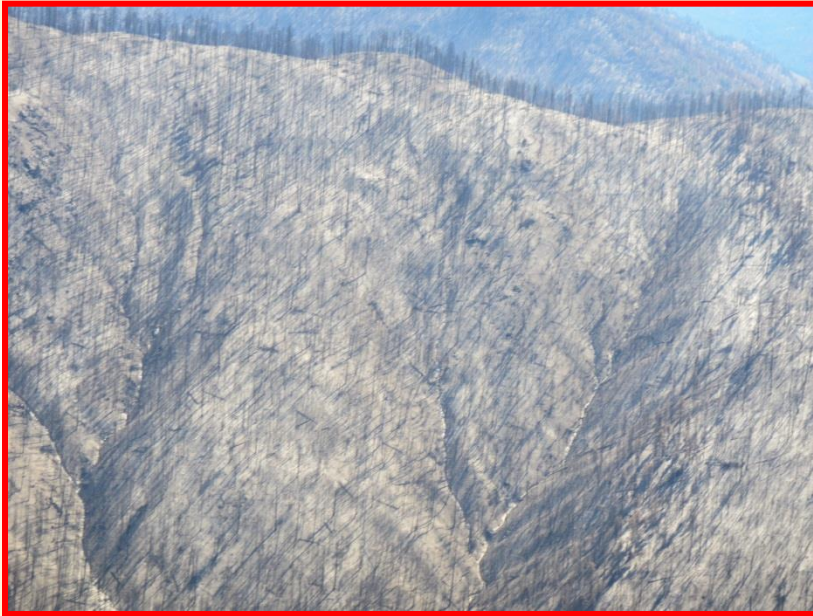
- 7% high
- 18% Moderate
- 65% low
- 10% unburned



# Frazer Creek



# Post-fire Findings National Forest and State Lands

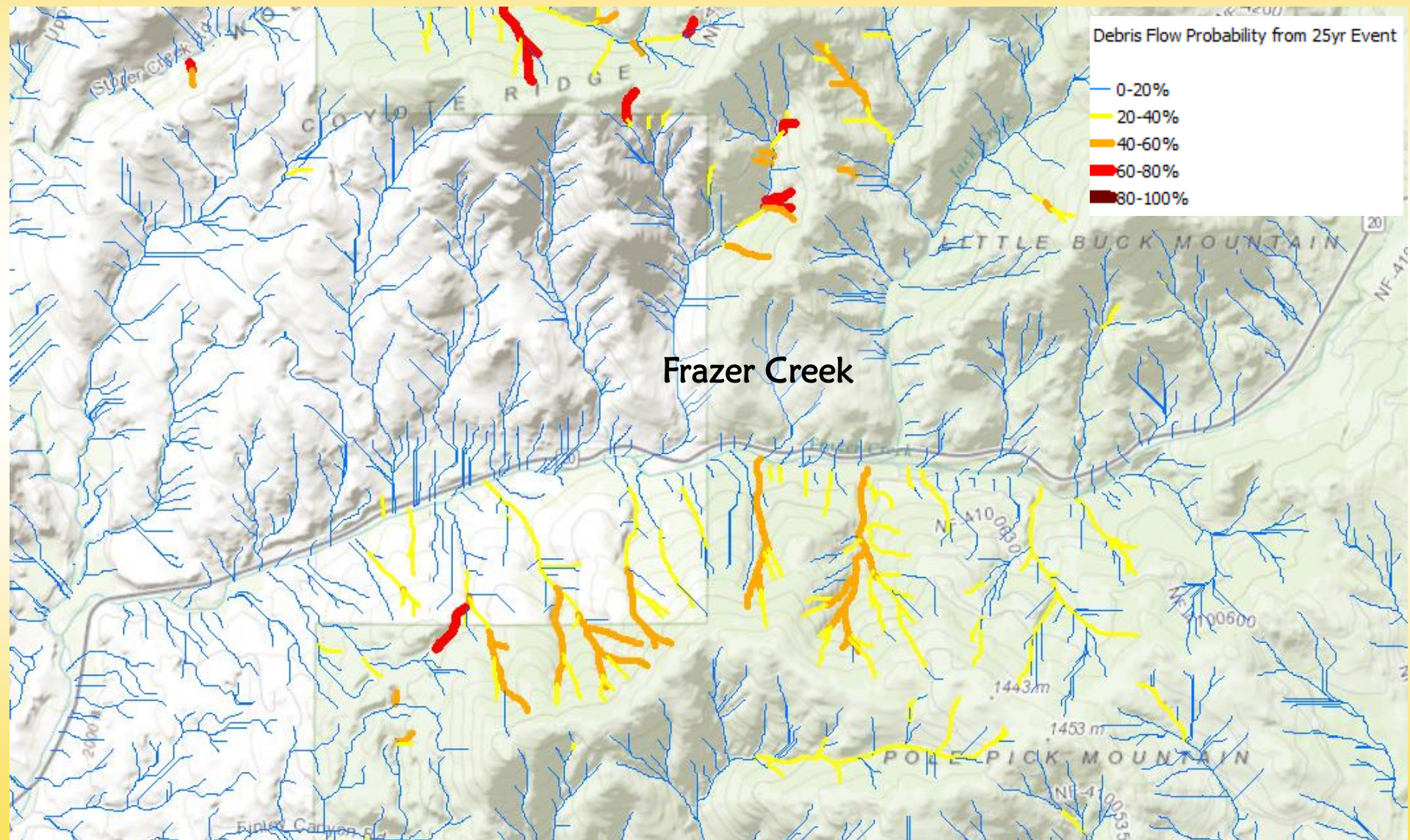


Change in watershed conditions increase potential for flooding and debris flows.

Bare ground susceptible to establishment of non-native invasive species.



# USGS Draft Model Output Debris Flow Probability





# Post-fire Findings Private Lands



- Generally low soil severity
- Rapid (2 years) vegetation recovery lower in the drainage



# Values at Risk Forest Service Lands

## Human Life & Safety

**Very High** risk to Forest visitors and National Forest employees from floods/debris flows, hazard trees, and rockfall traveling National Forest System (NFS) roads downslope and downstream of slopes that burned at moderate and high severity.

**Intermediate Risk** to travelers from floods/debris flows, hazard trees, and rockfall when navigating WSH 20. This segment of WSH 20 (roughly 4 miles) is located through NFS lands that burned mostly at low to moderate severity.

## Property

**Very High** risk for damage/loss of access to NFS roads from increased potential for floods and debris flows. Undersized culverts are expected to plug, with debris/flood waters overtopping roads.



# Values at Risk

## Forest Service Lands (cont.)

### Natural Resources

**High Risk** for detrimental damage to soil properties (repellency, loss of cover and structure) that decrease soil productivity and impact hydrologic function/water quality on NFS lands that burned at moderate to high severity. These conditions result in greater probability for floods and debris flows that persist for 2 to 5 years, depending on soil burn severity.

**High Risk** to federally listed steelhead, spring Chinook salmon, and Bull trout and associated designated Critical Habitat from increased threats of accelerated erosion, increased post-fire runoff, and subsequent sediment delivery. Threats are more prevalent where **Moderate** to **High Risk** has been identified to road infrastructure.

**Very High Risk** to native or naturalized vegetation communities from increased threat of noxious and undesirable non-native invasive plant species. Bare ground combined with accelerated soil erosion (and incorporated seed bank and nutrients) increase the susceptibility for expansion of aggressive invasive plant populations that exist adjacent to burned areas.





# Values on Forest State and Private Lands



Cultural Resources



Underground Utilities



Homes



Roads - Frazer



Wells

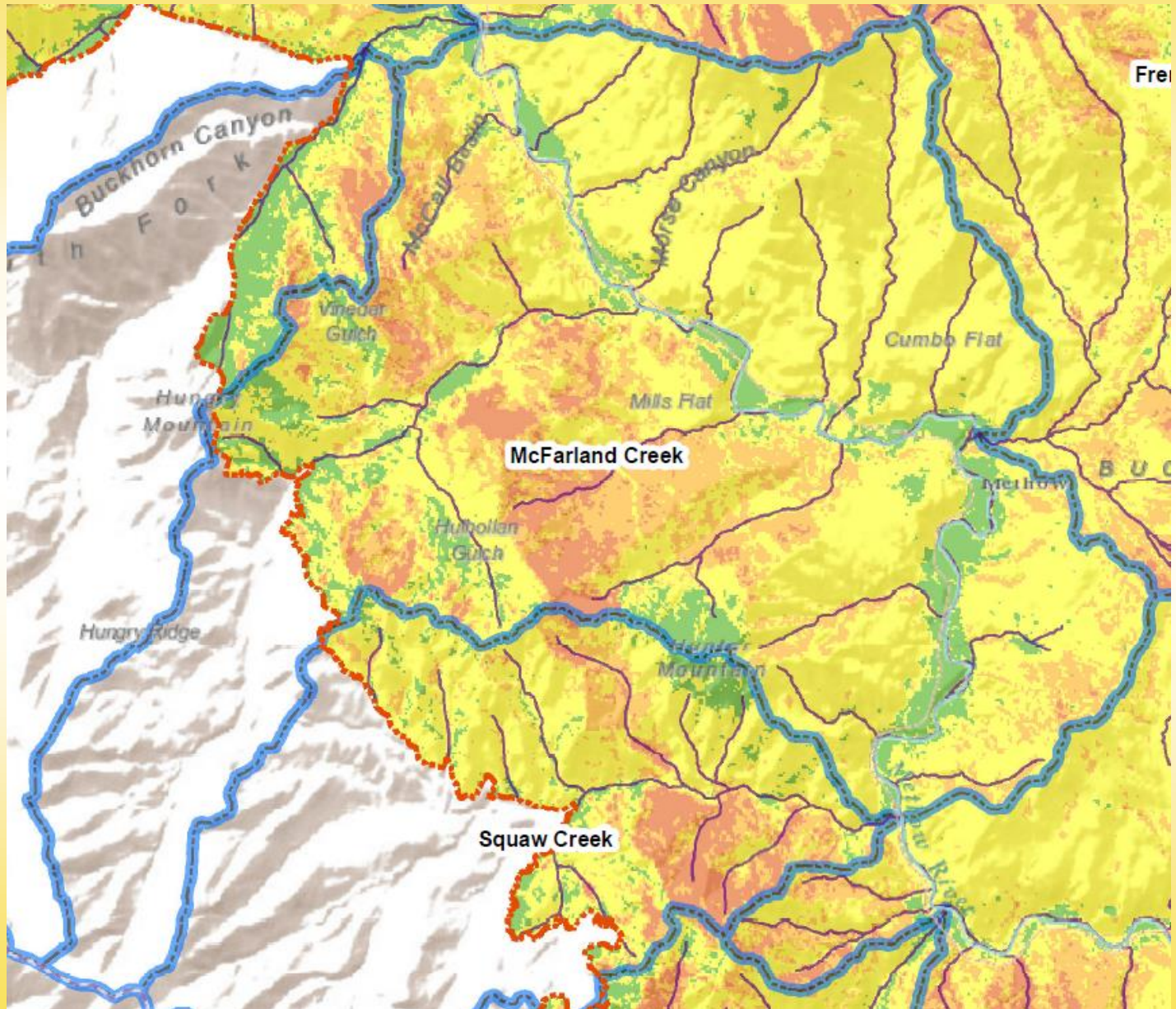


Highway 20



Diversions

# McFarland Creek



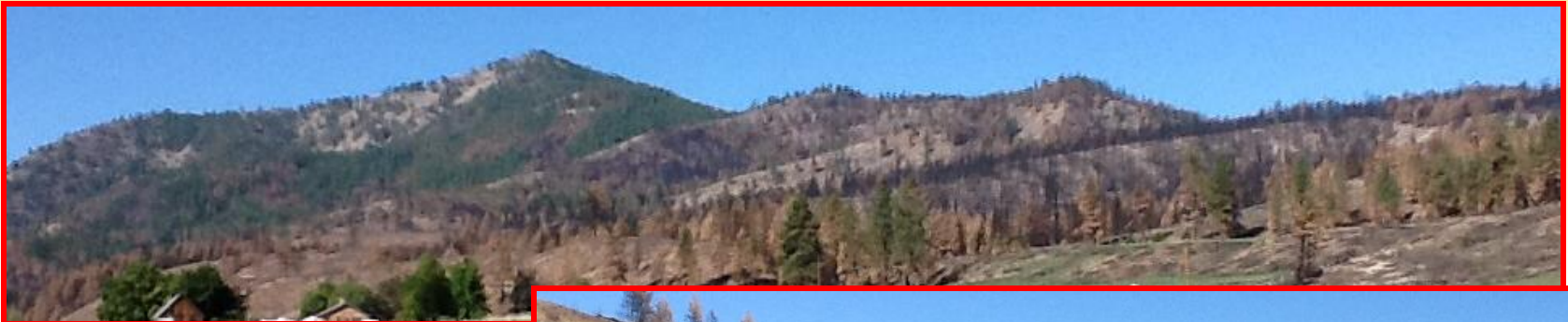


# Post-fire Findings National Forest Lands

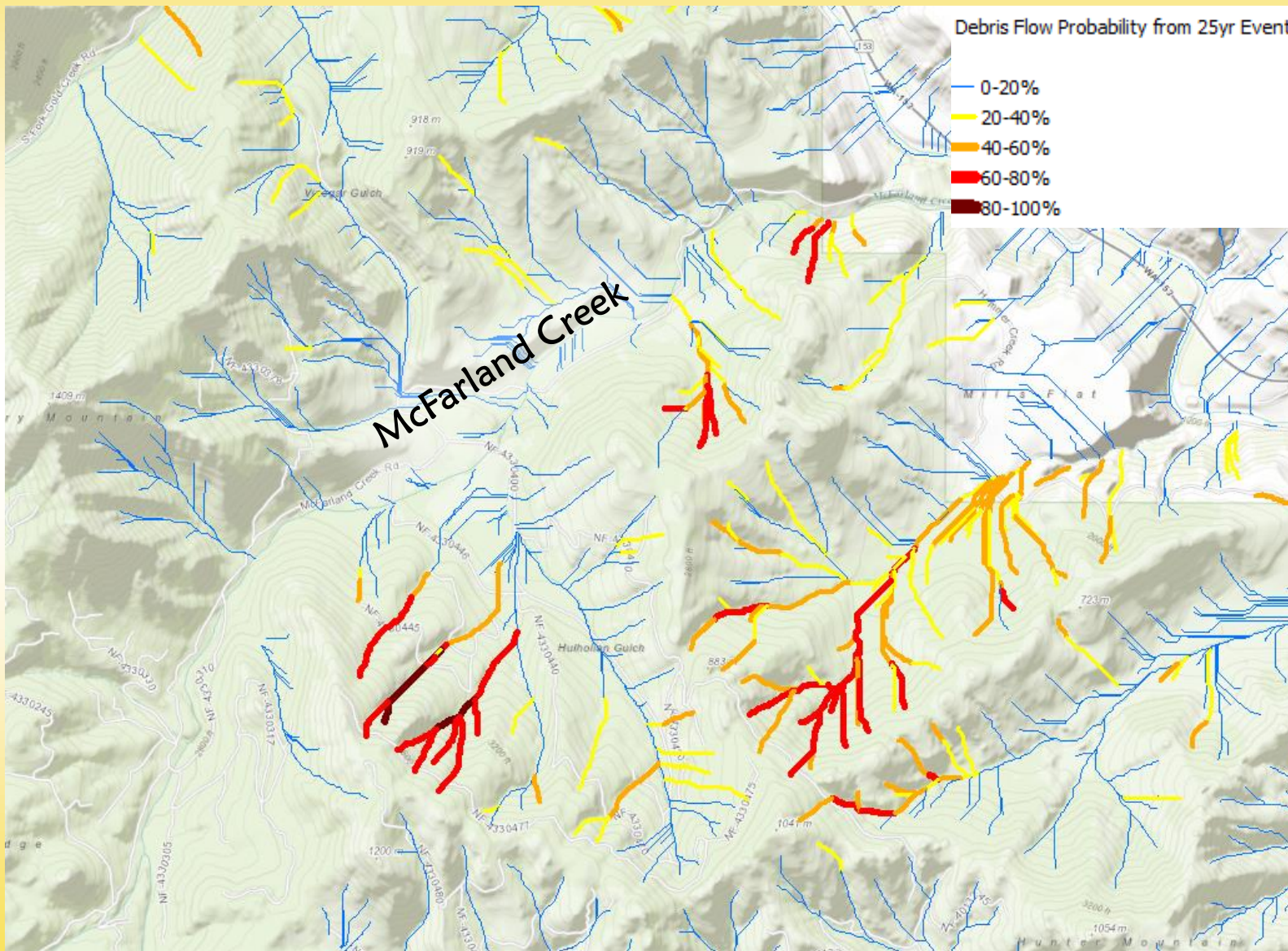


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# Post-fire Findings Private Lands



# USGS Draft Model Output Debris Flow Probability





# Values on Forest Service Lands

## Human Life & Safety

**High** risk to Forest visitors and National Forest employees when traveling roads subject to hazardous conditions and failures from floods/debris flows, hazard trees, and rockfall. Egress from NFS and private lands could be lost.

**High Risk** to occupants in Foggy Dew Campground from floods/debris flows originating from Gold Creek tributaries.

## Property

**Very High** risk for damage to NFS roads from increased potential for floods/debris flows, hazard trees, & rock fall depositing material on the travel routes or removing portions of the prism. Undersized culverts are prone to plug from sediment-bulked flood waters with flows overtopping and damaging roads.

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# Values on State and Private Lands

**Private Roads**



**Homes**



**Powerlines**



**Hwy 153**



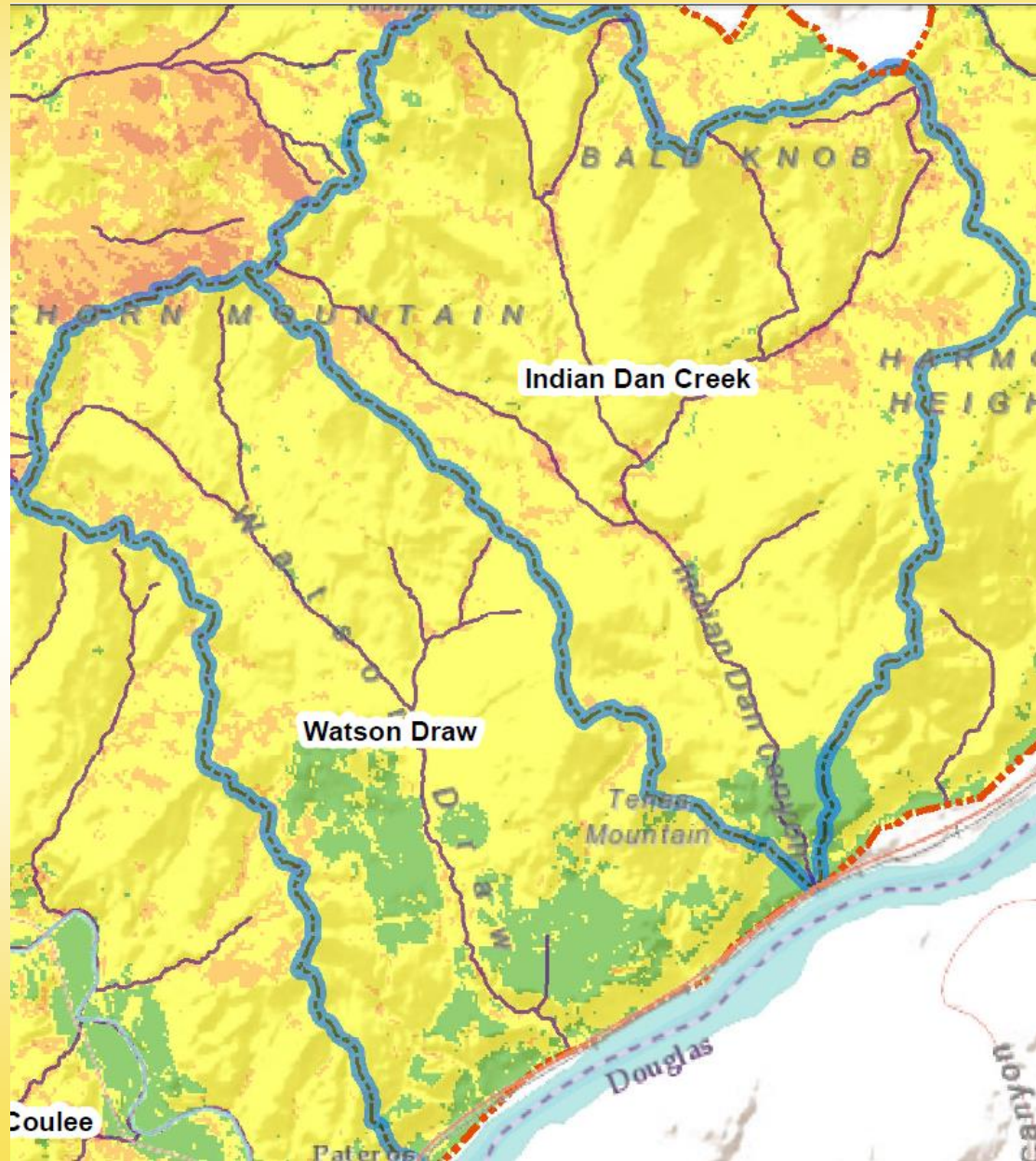
**Listed Fish Habitat**



**Underground Utilities**



# Watson Draw







# Post-fire Findings



Rapid native vegetative recovery  
Lower probability of accelerated hillslope erosion and runoff after 2 years



# Values on State and Private Lands



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# Treatments on Forest Service Lands

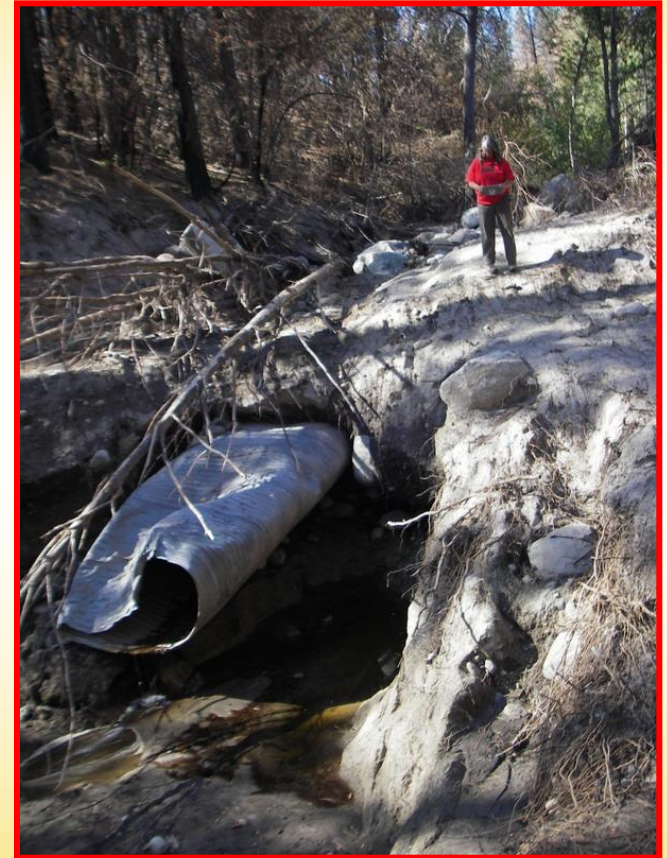




# Treatment Recommendations on State and Private Lands

## Typical Treatments

- Rebuild road surface
- Construct dips
- Construct new drainage ditches or swales
- Recondition existing drainage ditches
- Remove or replace with larger culverts
- Debris removal
- Road Warning Signs
- Variable Message Signs - Hwy 153/Hwy 20;  
153/I-97; Hwy 20 Loup Loup Summit.



Driveway culvert off Chiliwist Road



# Homes and Structures NRSC-EWP

## Potential impacts

- Damage from future sediment and debris flows

## Potential treatments

- Debris removal
- Concrete block or earth-fill super sack barriers
- Flow diversion berms
- Dips and re-grade of roads and driveways



House in Benson Creek



House at risk in French Creek

# Ponds and Dams

## Typical Treatments

- Evaluate structural integrity of dams
- Rebuild or upgrade outlets and spillways, or...
- Breach dams if too expensive to repair
- If breached leave it that way for now
- Stabilize exposed soils with vegetation



Farm pond, Leecher Creek watershed

## Potential Impacts

- Damage to wells and pump systems from erosion or burying with sediment/debris

## Potential Treatments

- Construct soil berms or concrete block barriers
- Long term: stabilize creek bank erosion by planting or drill new well in a safer location



Benson Creek





# Point Protection - Surface Water Diversions

## Potential Impacts

- Wash-out or filling of the impoundment structure
- Filling or destruction of diversion piping

## Potential Treatments

- Sediment removal
- Relocate to more stable location
- Long term: Stabilize upstream erosion in coordination with other watershed treatment



Small diversion structure  
on Chiliwist Creek

### Potential Impacts

- Damage to pivots and piping from erosion or burying with sediment /debris

### Potential Treatments

- Protect with concrete blocks, soil berms or diversion swales



Center Pivot, Lower Beaver Creek



Hand Line, Lower Beaver  
Creek



# Point Protection - Utility Lines

## Potential Impacts

- Burying or destruction by future debris flows

## Potential Treatments

- Relocate from high-erosion locations
- Diversion swales or berms
- Stabilize exposed locations with rock, vegetation or bioengineered techniques



Leaning Power Line,  
Benson Creek  
watershed



# Soil Treatments - Seeding

## •Emergency Treatment

### **Aerial Seeding (Majority on State Lands, Private only lower French)**

- Seeding to occur on moderate to severe burned areas where the risk of invasion from noxious weeds and invasive species is high
- secondary long term benefit of soil stabilization & soil health
- Frazier Creek: High Severity- 920 ac
- Cow Creek - 560 ac
- French Creek (Buckhorn Mountain) - 640 ac
- Finley/Chiliwist/Hooker (Thrapp Mountain) - 640 ac

### **Hand-Seeding**

- Seeding Dozer Lines - approx. 114 acres
- Recommend seeding 253 acres of private/other lands dozerlines

**Long Term Benefit** – Soil Stabilization & Soil Health



# Invasive Plant Species Treatments

**= Ground Disturbance Opportunity for introduction, est. and spread**

- **Emergency Treatment (1 year after fire) (State Lands)**
  - Chemical Treatment- 4 wheeler with boom, hand spraying
  - Prevention- noxious weeds & invasive species (chemical spraying, hand pulling, seeding)
  - Erosion Control & Soil Health (Hand seeding, broadcast seeding, aerial seeding)
  - Mechanical- noxious weeds & invasive species (mowing, hand removal)
  - Biological- noxious weeds (species specific)
- **Long Term Treatment (2-3 years after fire)**
  - **Chemical/Mechanical Treatment Areas:** re-identified roadsides and reseeded areas from field survey
- **Private, County, and Leased State Lands –responsible for treatment**

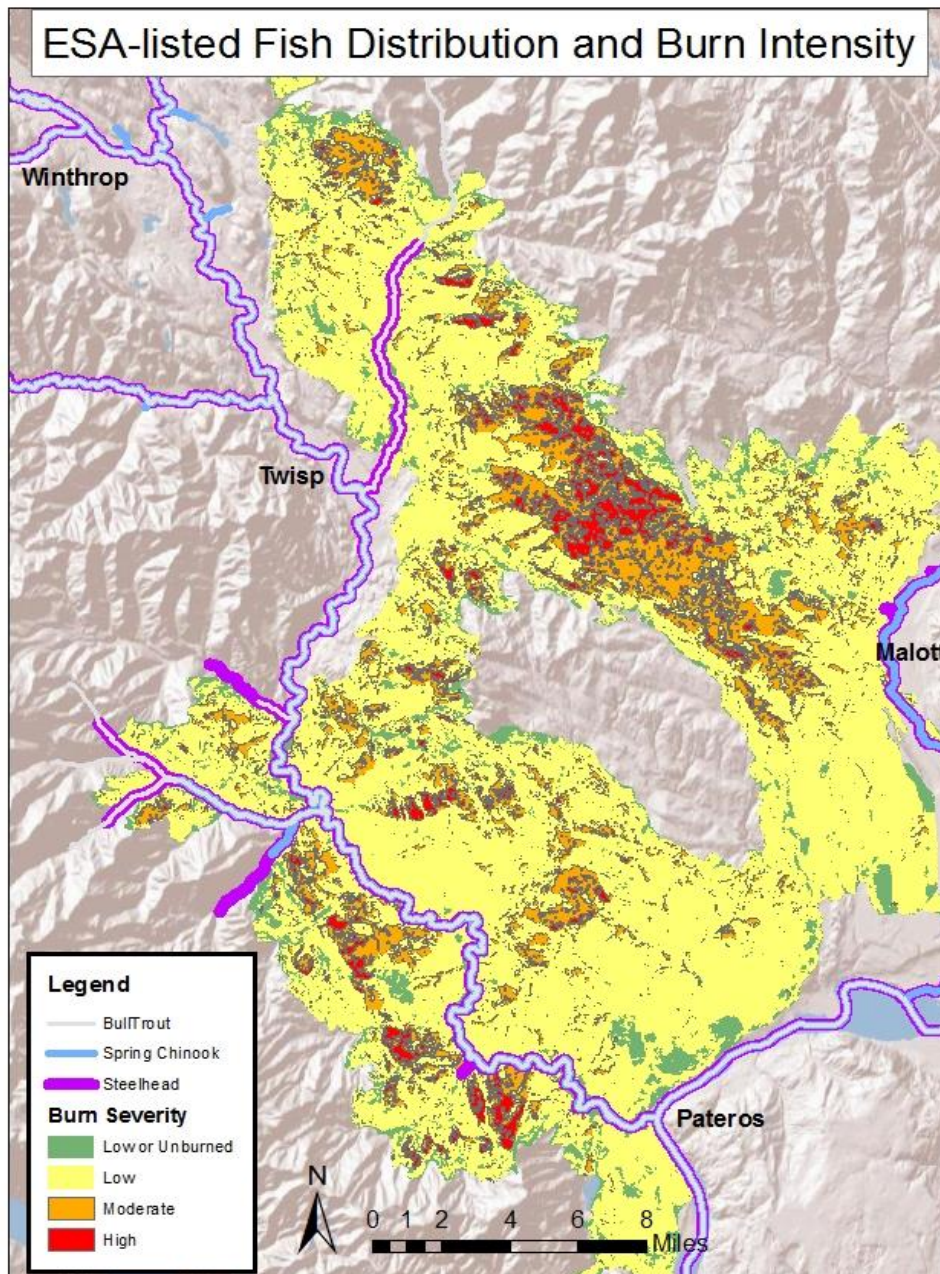
**Data Recovery** - Update records to reflect impacts to sites  
**Hazard Tree Falling** - burned trees pose a threat to standing structures





# Other Fire Effects and Long-term State/Private Restoration Recommendations

# Fire and Post Fire effects to Fisheries Resources





## Riparian

- 40% of riparian areas in Beaver Creek burned.
- 16% burned with moderate to high severity
- Resprouting rapidly
- **Stream Temperatures in lower Beaver Creek will increase impacting steelhead and bull trout habitat**

## Fine Sediment

- **15.5% of Methow Steelhead spawning habitat was affected**
  - Lower Mainstem Methow
- Lower 6 miles Beaver Creek

Good News: Debris flows delivered more wood and suitable spawning substrate!



# Recommendations for Fisheries

Fish habitat will benefit from treatments that restore natural drainage patterns, channel morphology and floodplain function.

## Monitor

- Stream **temperature** in Beaver Creek
- Fine **sediment** in spawning areas in lower Methow and Beaver Creek
- **Riparian** recovery in Beaver Creek.
- Performance of fish habitat enhancement **projects**

## Long term recovery

- Continue to increase in-channel large wood where deficient
- Eradicate **brook trout** in Frazer Creek
- Restore **fish passage** to Frazer Creek and Beaver Creek
- Replant riparian areas where recovery is anticipated to be slow.

# Wildlife Recommendations

**Mule Deer – (25% burned at moderate-high severity)** restore firelines to prevent the conversion to new motorized roads or trails, and include a variety of palatable shrub species (bitterbrush, choke cherry, service berry, elderberry, mock orange) in rehabilitation plantings to provide for critical long-term winter forage.



- **Columbian Sharp-tailed grouse** – include water birch in riparian planting/seeding efforts to provide for critical winter forage.
- **Western Gray Squirrel** – avoid additional tree canopy removal in the affected areas and include ponderosa pine in any tree planting efforts.



# Rangelands

- Hundreds of miles of boundary fence and range fences have been lost.
- Rangeland and grazeable woodlands shall be rested for two years (2015-2016) and deferred thru the critical period of the third year (2017)\* based on field evaluations



\* NRCS Range Technical Note 34, 2009



# Forest Service Treatment Cost Estimate

Treatments	Units
Early Detection Rapid Response	2,059 acres
Helicopter Mulch	529 acres
Seeding	827 acres
Road Drainage Reconstruction	58.1 miles
Upsize Culverts	6 culverts
Culvert Removal	43 sites
Storm Patrols	10 days
Road Closures	8 gates
Warning Signs	60 signs

**Total Estimate**  
**\$1,512,440**



# State and Private Treatment Costs

<b>Treatments</b>	<b>Costs</b>
Roads	\$686,000
Homes/Structures (EWP)	\$825,000
Ponds/Small Dams	\$241,800
Utilities, Wells, and Irrigation	\$73,385
Warning Signs (County Roads)	\$16,000
Variable Message Signs (Highways)	\$45,000
Seeding (2,760 acres)	\$763,100
Early Detection Rapid Response (Invasives) (1,500 acres)	\$136,200
Cultural Surveys	\$20,000
<b>Total</b>	<b>\$2,806,485</b>



# Implementation

*The Clock is Ticking?*

**Timing is Critical**



Treatments must be installed before further damaging storms that threaten life, property, or resource values needing protection



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# Coordination is Essential



Although the flames are out, but risks will remain for several years!





Where do we go from here?