



Flash Flooding After Wildfires

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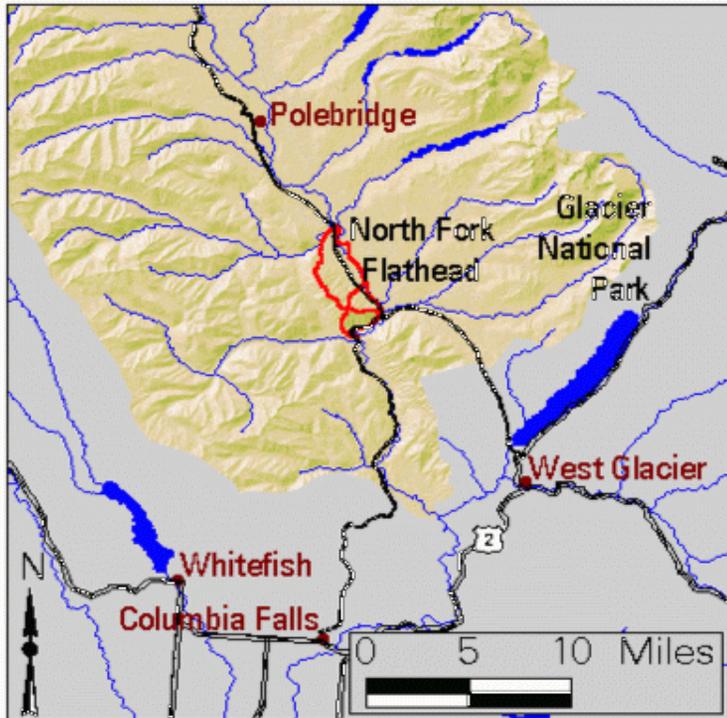


OVERVIEW

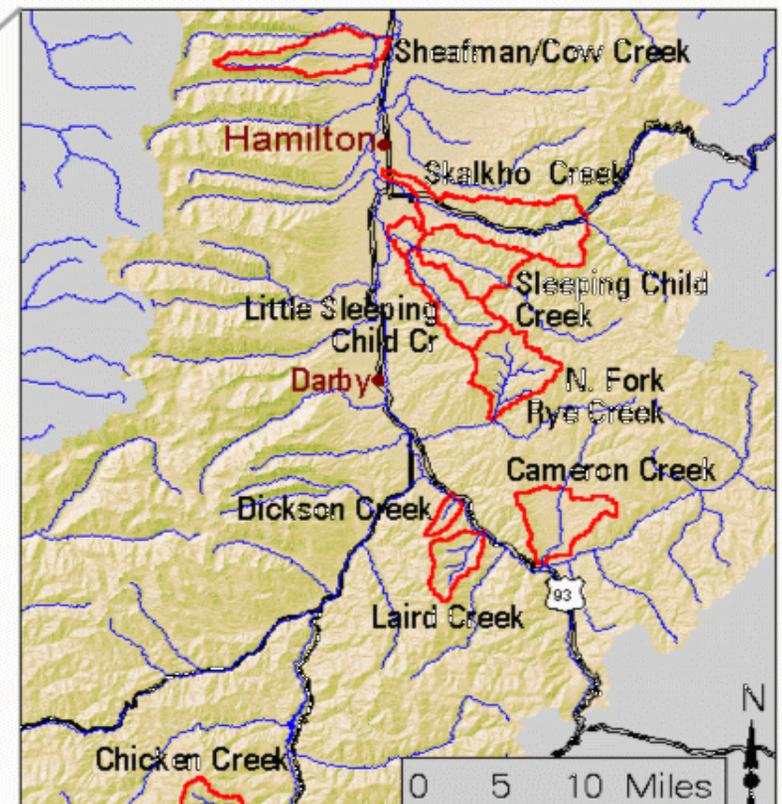
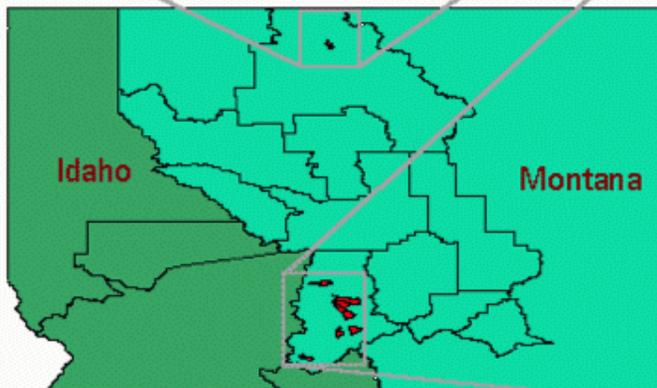
- Severely burned forest fire areas in Western Montana 2000 to 2003
- Coordination to develop early warning detection and dissemination
- Forecast Office training and education
- Response to heavy rain over severely burned area



290,000 Acres Burned in the Bitterroot National Forest

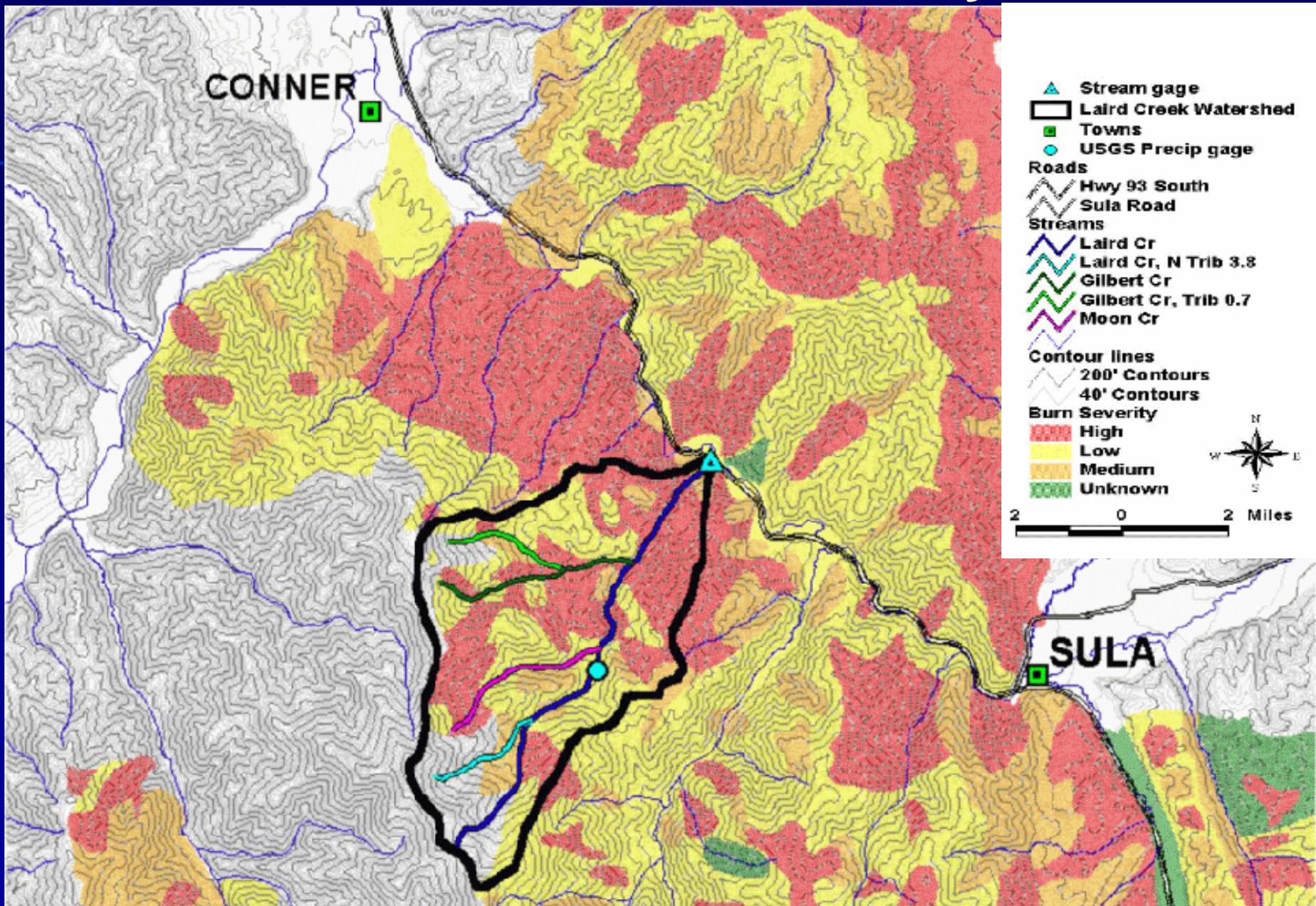


Burned Areas
2000 and 2001
Bitterroot National Forest Fire
and Moose Creek Fire





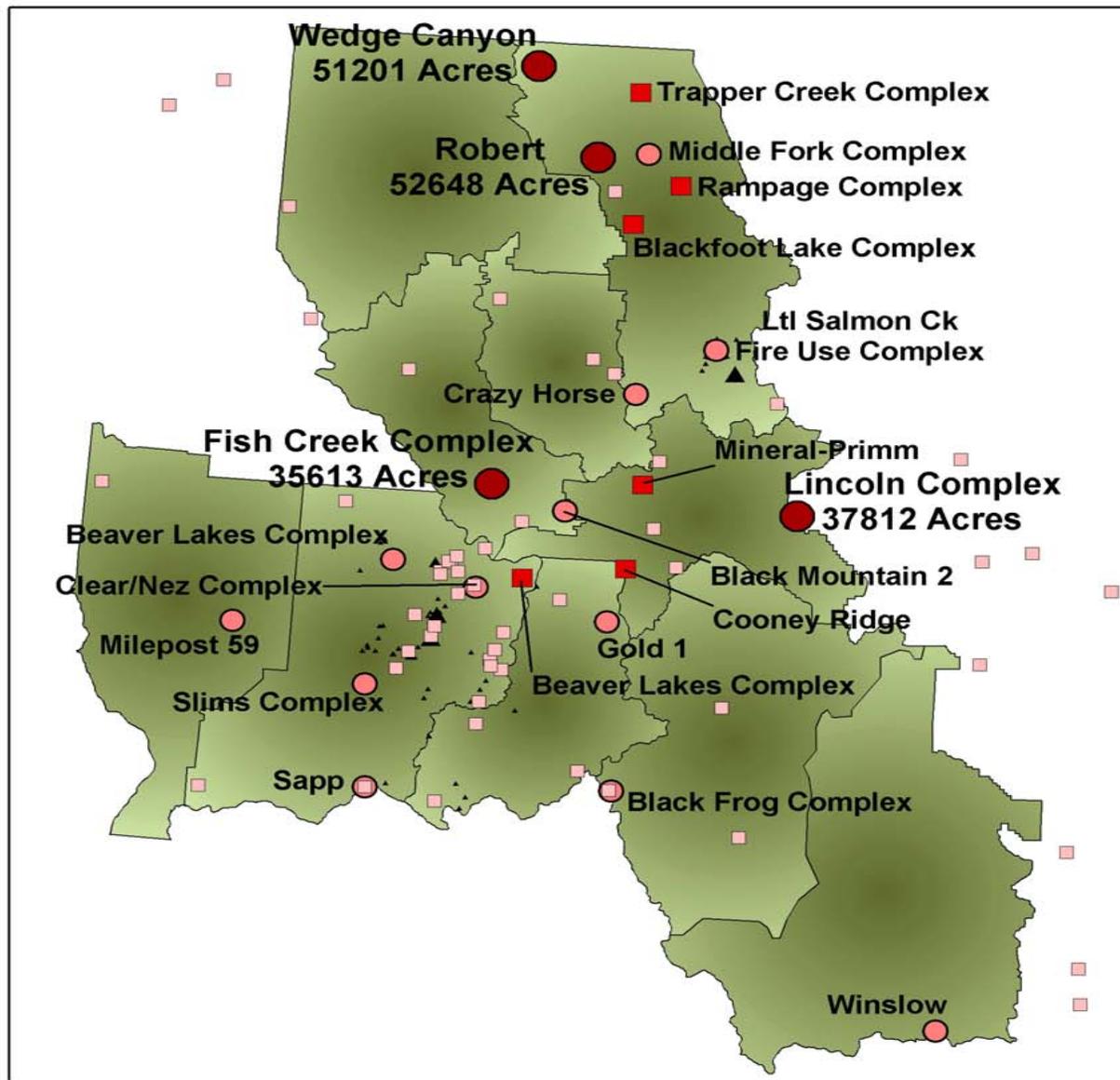
Laird Creek Burn Severity



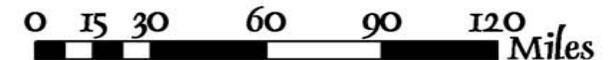


Numerous Wild Fires throughout the Northern Rockies Burned 400,000 Acres in 2003

110 Wild Fires in the NWS Missoula Fire District for Summer of 2003



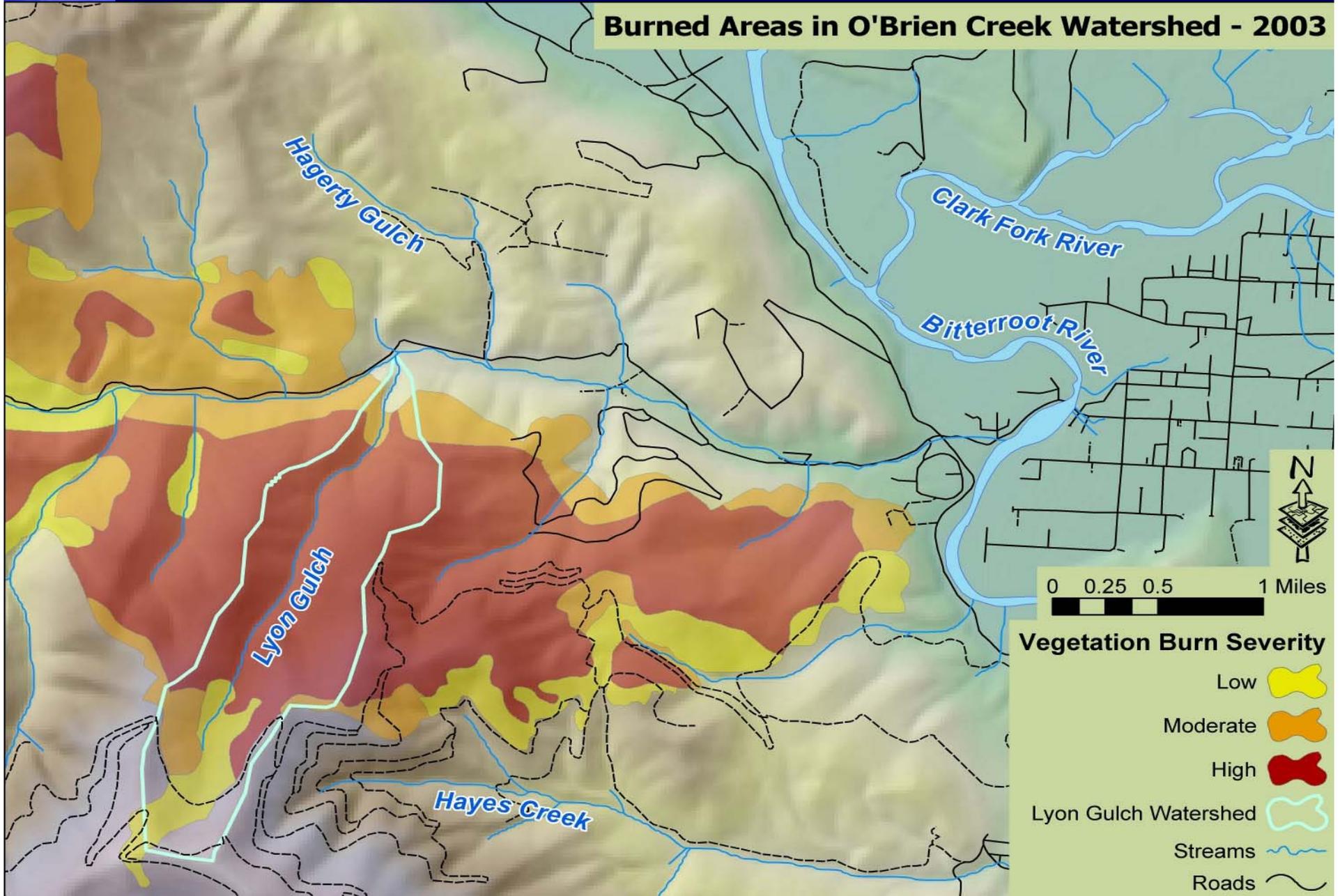
Data obtained from NRCG
Geospatial Data Archive 209 Reports
from: <http://www.fs.fed.us/r1/firegis/2003web/dataindex.htm>





Severely Burned Area Near Missoula, MT

Burned Areas in O'Brien Creek Watershed - 2003



Deer Creek burn area in Fish Creek Drainage



Eightmile Creek near Florence



Schwartz Creek Burn



Forest Fires of 2000-2003

- **High** flash flood potential from Thunderstorms:
 - Missoula County
 - Mineral County
 - Ravalli County
 - Flathead County



Coordination for Early Warning Detection and Dissemination

- **NWS Missoula Service Hydrologist "SH" Coordinates with USFS**
 - Supervisor Office Hydrologist from burned forest (any urban interface near burn)
 - Regional Hydrologist (any Burn Areas Rehabilitation Team "BAER" meetings)
 - Attend BAER meetings and analyze GIS burn severity layered maps
 - Field Trips to burn areas with USFS personnel



Coordination for Early Warning Detection and Dissemination Cont...

- **NWS Missoula Warning Coordination Meteorologist "WCM" Coordinates with:**
 - NWS SH to assess threat of flashing flooding in urban interface and need of weather sensors and/or weather spotters for early warning detection. Rainfall rates to trigger flash flood
 - Also attends BAER meetings to provide input for possible funding of weather stations and NOAA Weather Radios near burned area
 - County Disaster Emergency Coordinator and Sheriff for any needed updates to response plan(s)



Coordination for Early Warning Detection and Dissemination Cont...

- **NWS SH and WCM Coordinate with:**
 - NWS Regional Headquarters, USGS, USFS, NPS, and Salish and Kootenai Tribes for funding and installation of precipitation and river gauge sensors in small streams of burned areas.
 - County Disaster Emergency Services to develop letter to residents in burned areas; to let them know of potential danger from flash floods and about NOAA Weather Radio reception. NOAA Weather Radio should be monitored for flash flood watches and warnings.



Coordination for Early Warning Detection and Dissemination Cont...

■ NOAA and USGS Coordinate:

- Pilot Project for Flash Flood and Debris Flow Warning System in Southern California
- Will Cover the counties served by NWS Forecast Offices at Oxnard and San Diego where wildfires and heavy precipitation have proven deadly from flash floods.
- Fact Sheet on Project found at:

<http://pubs.usgs.gov/fs/2005/3104/>



NWS Missoula Staff Training and Education

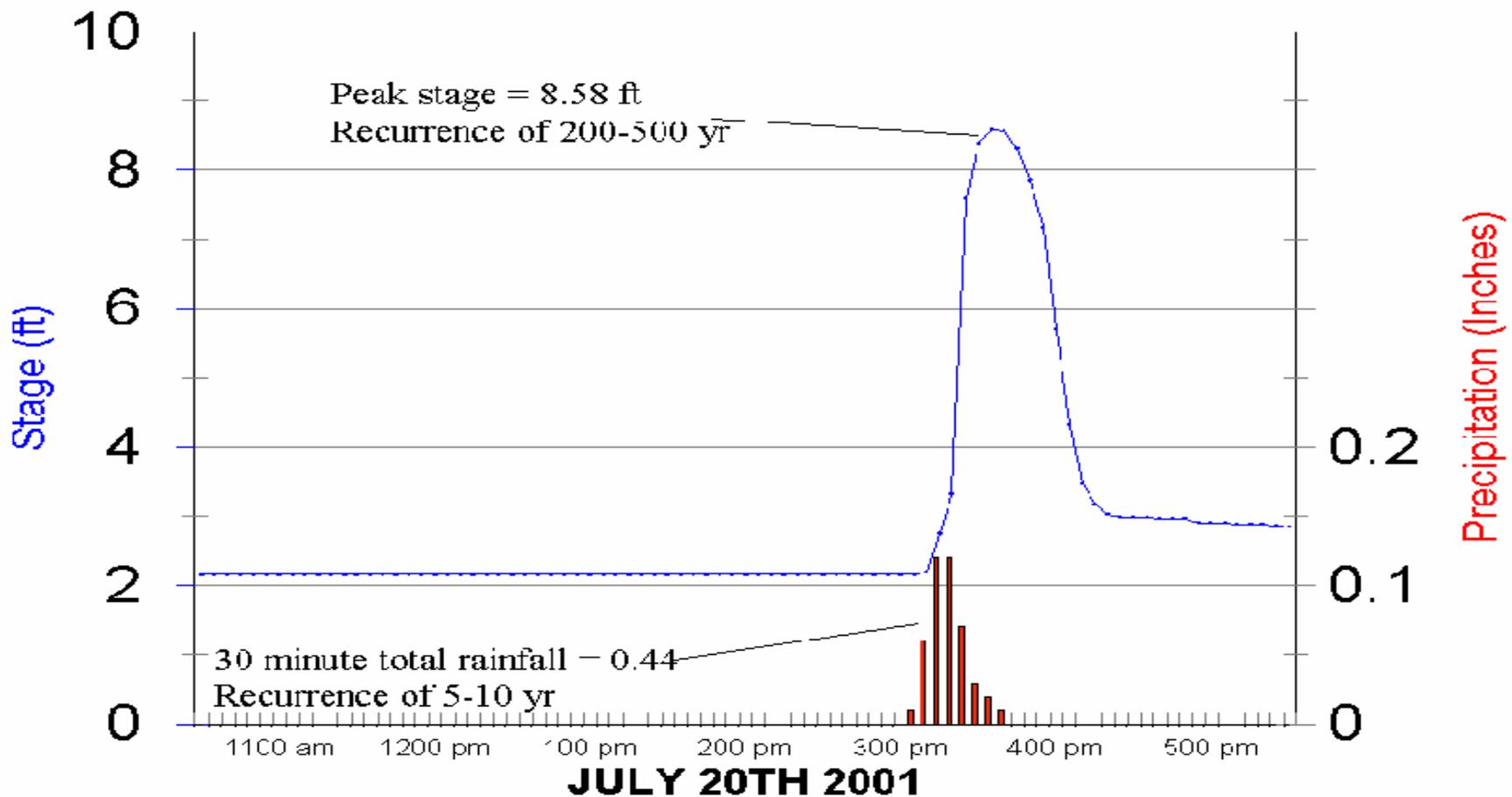
- NWS SH and WCM Train Staff:
 - USFS Burn Layered Maps are imported into ARC-GIS; shown and kept in operations
 - Shape files of burned areas are developed as overlays in NWS operational computer “AWIPS” on radar images
 - Rainfall rates for each specific burn area are determined and outlined in station duty manuals for flash flooding situations
 - Templates for each specific burn area can be formatted in flash flood warning statement



Response to Short Duration Heavy Rain Over Severely Burned Area

LAIRD CREEK - FLASH FLOOD

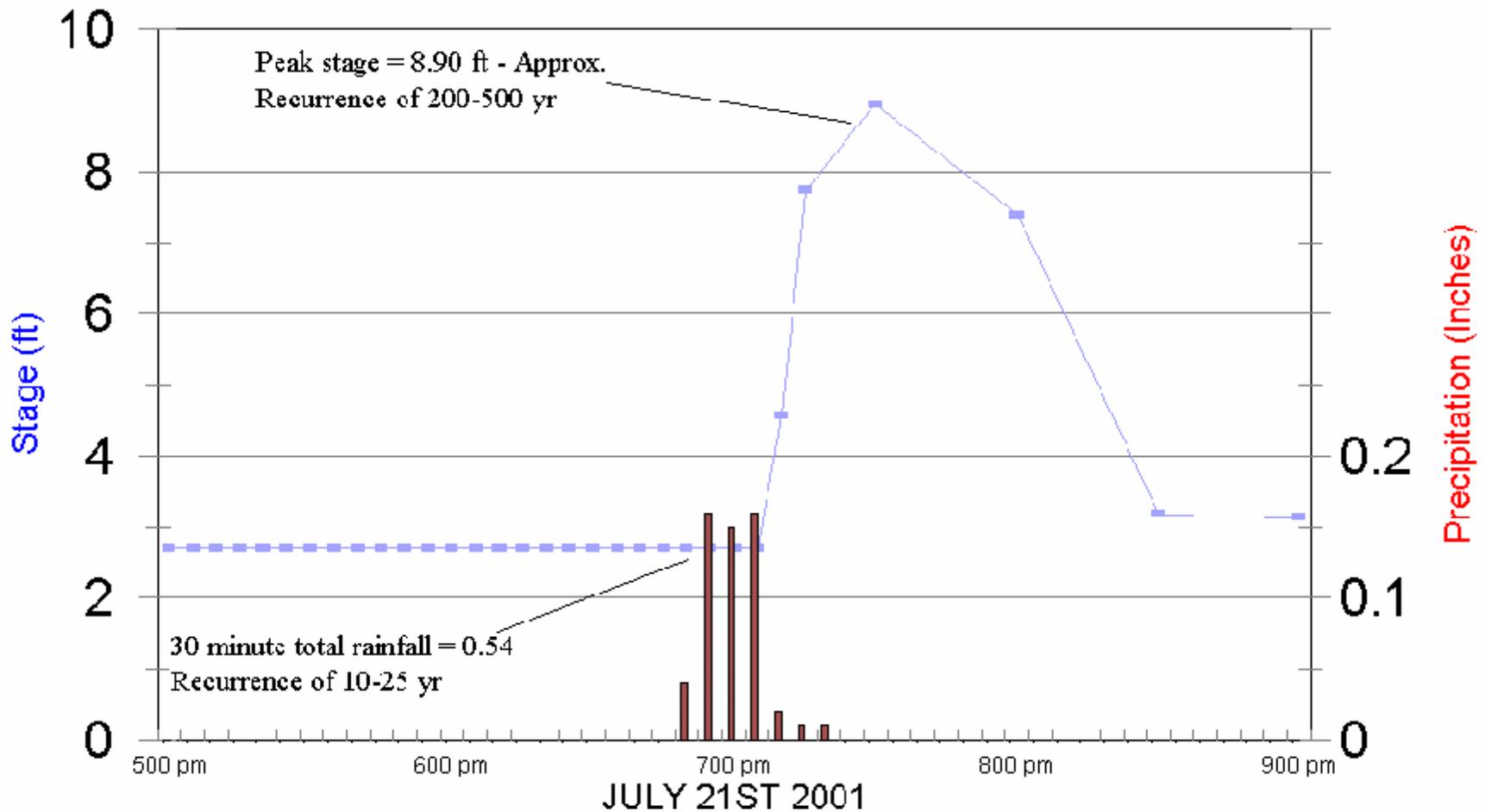
Rainfall & Stage Data





Response to Short Duration Heavy Rain Over Severely Burned Area Cont...

LAIRD CREEK - FLASH FLOOD Rainfall & Stage Data





LAIRD CREEK FLOODS HIGHWAY 93





LAIRD CREEK FLOODED HOMES





GULLY FORMED BY HYPERCONCENTRATED & DEBRIS FLOWS





FLAWS SCOUR TO BEDROCK





BOULDERS & TREES INSIDE GULLY





DEBRIS FAN





THE END