

Flood Response & Recovery Plans

Division of Water Resources

November 5, 2013

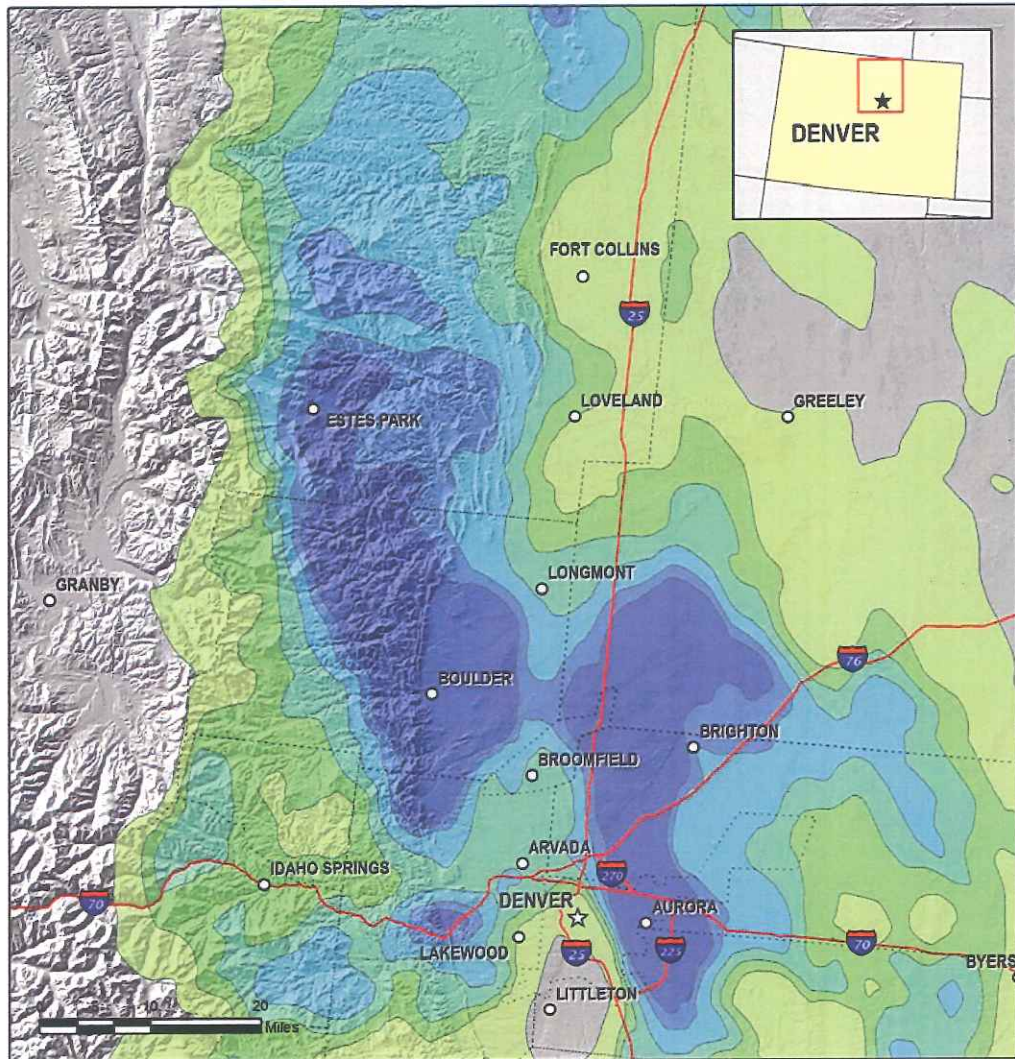
Dick Wolfe, P.E.
Director / State Engineer



NOAA Precipitation

Dark (purple) areas experienced storm w/ annual probability of less than 1 in 1000.

(Greater than 1000 year event.)



Colorado Flood Event, 9-16 September 2013 Annual Exceedance Probabilities (AEPs) for Worst Case 7-day Rainfall

Hydrometeorological Design Studies Center
Office of Hydrologic Development, National Weather Service
National Oceanic and Atmospheric Administration

<http://www.nws.noaa.gov/ohd/hdsc/>

Created 24 September 2013

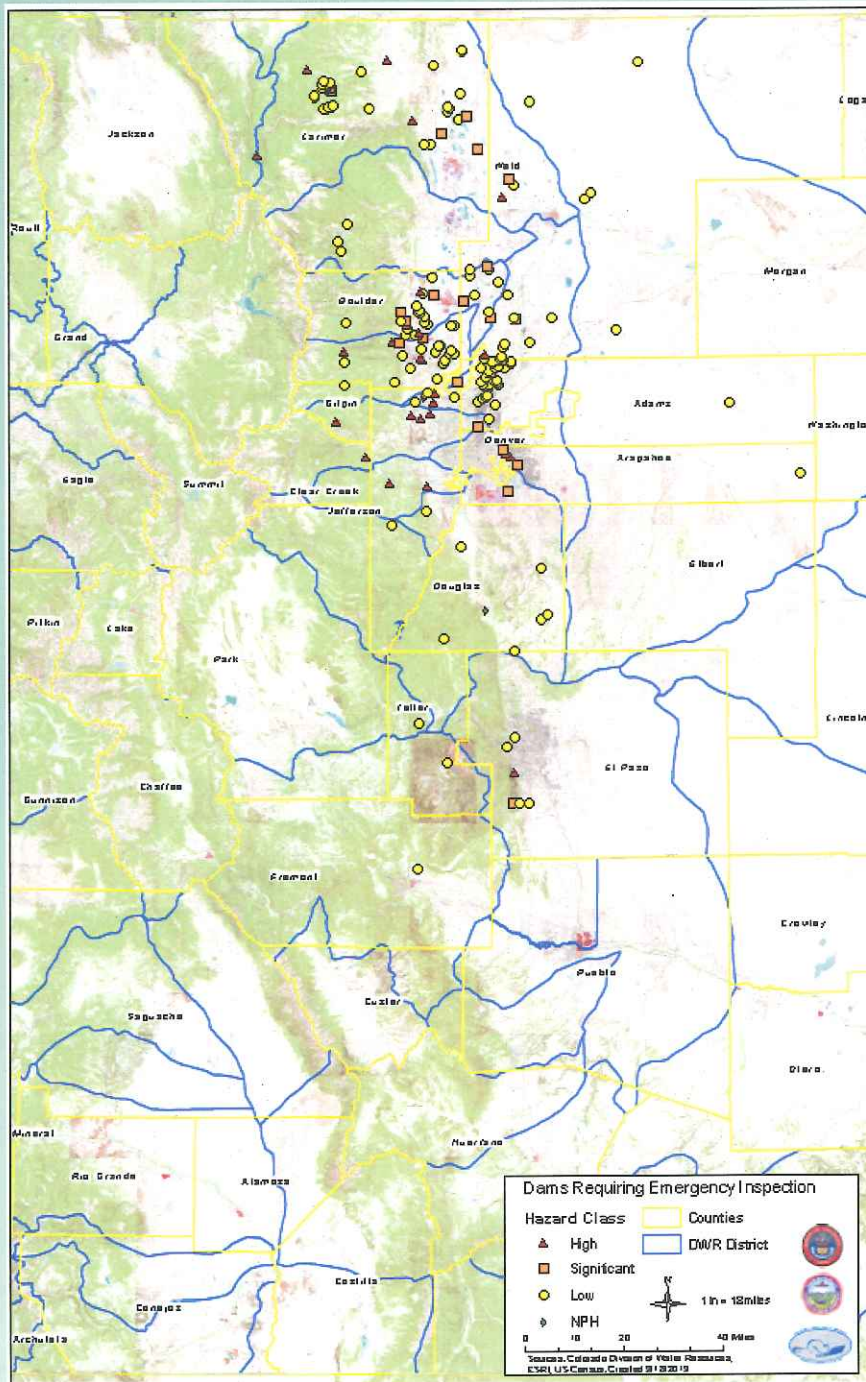
Precipitation frequency estimates are from NOAA Atlas 14, Volume 8, Version 2.
Rainfall values come from 6-hour multi-sensor data.

- > 1/10
- 1/50 - 1/10
- 1/100 - 1/50
- 1/200 - 1/100
- 1/500 - 1/200
- 1/1000 - 1/500
- < 1/1000



Dams in Affected Area

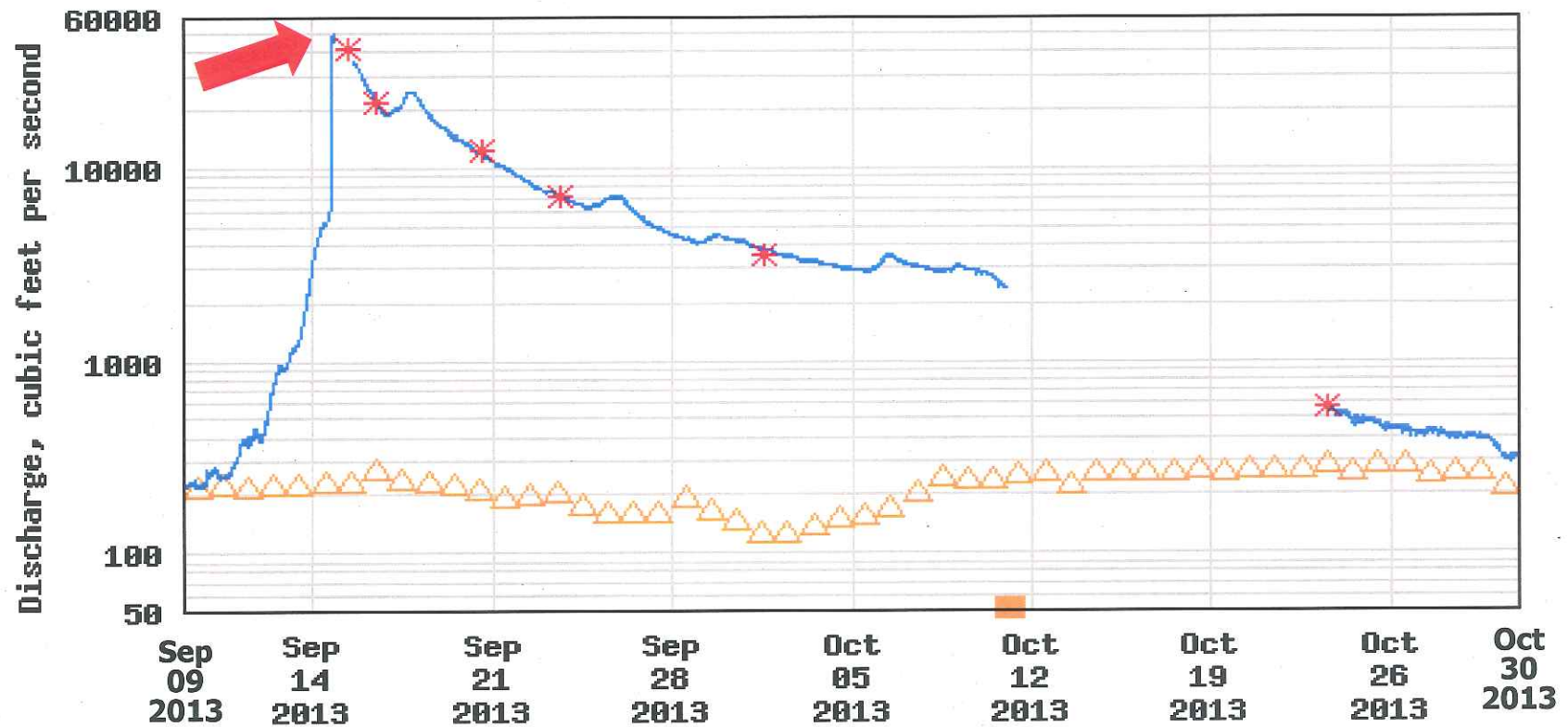
- Many spillways activated (Prompted concerns of failure)
- 9 low hazard dams failed
- 207 needed inspection
- Over 100 volunteer, licensed P.E. organized



Emergency Dam Inspections Status

Condition Assessment	Number	Percent of Total
Safe for normal operation	131	63%
Functional; some repairs needed; No dam safety concerns	63	31%
Potential dam safety issue; Required immediate evaluation/mitigation	13	6%
Urgent; failure is a concern	0	0%
Totals	207	100%

USGS 06759500 SOUTH PLATTE RIVER AT FORT MORGAN, CO



----- Provisional Data Subject to Revision -----

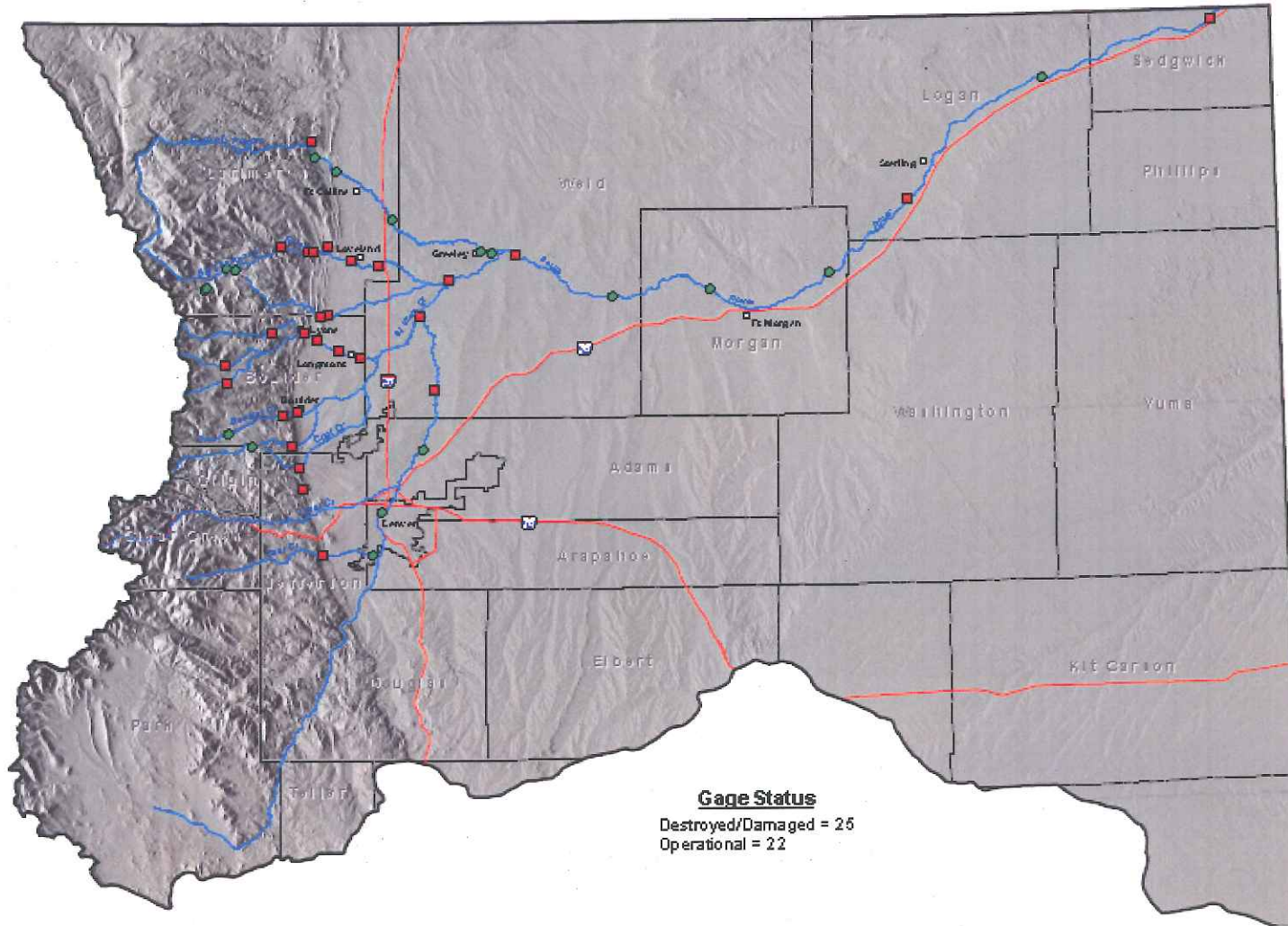
- △ Median daily statistic (25 years)
- Discharge
- Data temporarily unavailable
- * Measured discharge

- 50,600 CFS at Fort Morgan (8:15 pm)
- Took 46 days for basin to drain (9/14 - 10/30)

Flood Comparisons, CFS

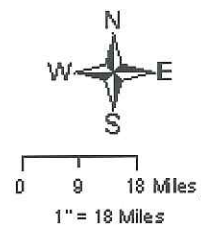
	Fort Morgan	Julesburg
Jun-1965	100,000	37,600
Jun-1935	84,300	31,300
Sep-2013	50,600	21,440

State of Colorado
 Division of Water Resources
**Flood Affected Stream
 Gages in the South Platte
 Basin**



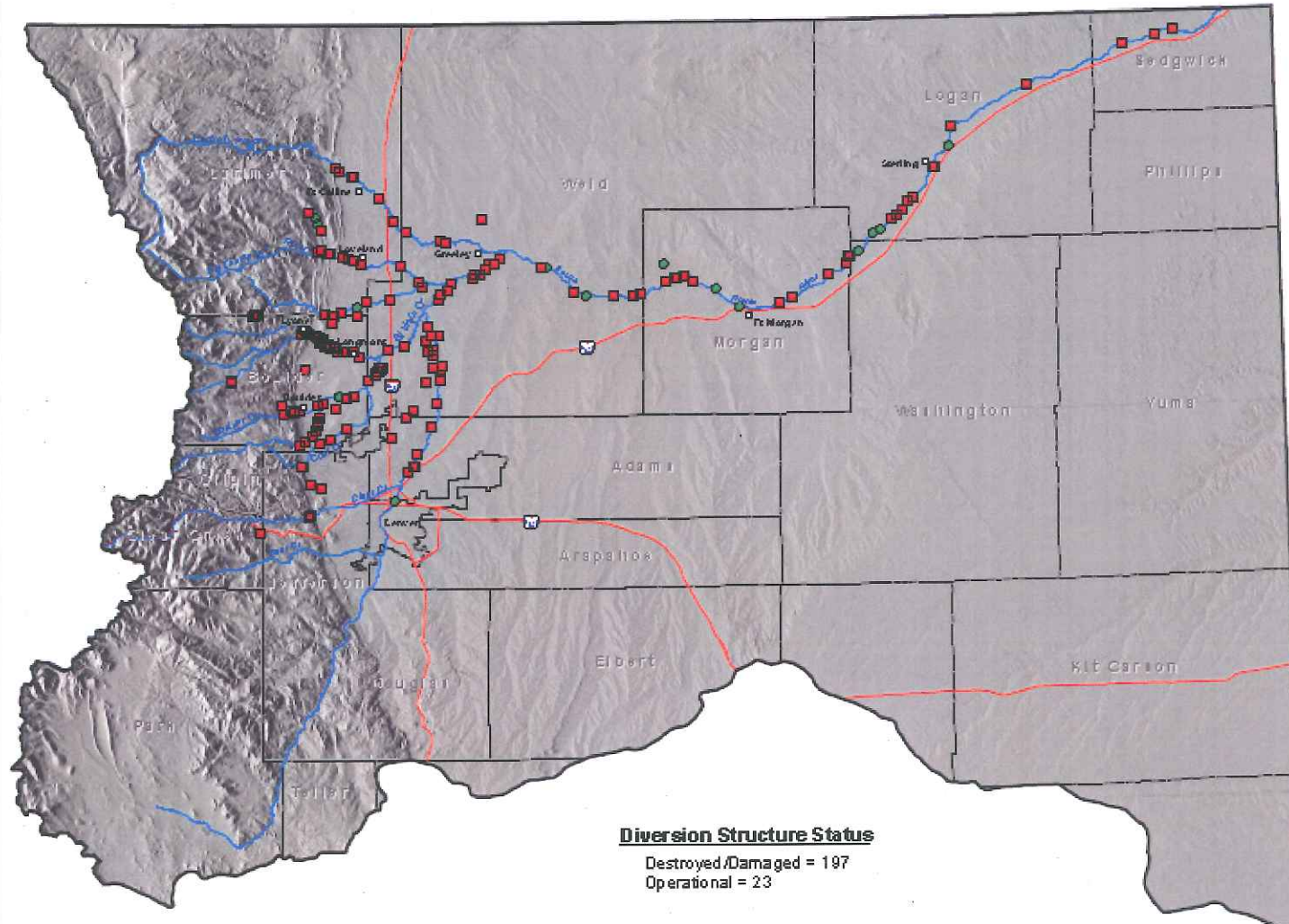
Gage Status
 Destroyed/Damaged = 25
 Operational = 22

- Legend**
- Gage Status**
- Operational
 - Destroyed/Damaged



State of Colorado
Division of Water Resources

Flood Affected Diversion Structures in the South Platte Basin



Diversion Structure Status
Destroyed/Damaged = 197
Operational = 23

Legend
Diversion Structure Status
● Operational
■ Destroyed/Damaged



0 9 18 Miles
1" = 18 Miles

Map Date: 11/4/2013



Recovery Effort – Dam Safety

- Herculean effort by salaried staff
- Inspection documentation will take thru 11/24
- Triage missed normal duties and catch up
- Some dam owners may seek help for repairs

Recovery Effort – Hydrography

- Set up 7 temporary gages for administration
 - 224 hours to install (2 FTE x 2 days x 7 gages)
 - 336 hours to rate (correlate stage to flow)
(1 FTE x 4 hours x 12 measurements x 7 gages)
- Rebuild/repair 25 permanent gages
 - Approximately \$500,000 in damaged infrastructure
 - \$100,000 in electronics
 - 2500 FTE hours to install (2.5 FTE x 40 hours/gage)
 - 1200 FTE hours to rate
- DWR pursuing FEMA grant to fund repairs