

Opportunities for Coordination between Dam Safety and Floodplain Managers

CASFM Lunch and Learn
Denver, CO
October 14th, 2015



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Division of Water Resources
Department of Natural Resources

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Dam Safety Engineer

Opportunity to Improve DSE's to CFM's Communication

- Pre April 2013
 - Relatively unaware or unmotivated?
 - Dam safety and floodplain management rarely intersected
 - 100-yr floodplain vs PMF floods and Sunny Day failures
- Post April 2013 - FEMA CRS 630 - Dams
 - Becoming aware, motivated
 - Need information from each other
- Post September 2013 - heavy rainfall
 - Dams spilling, outlets running and some dams failing
- Post May 2015 - heavy spring rains/runoff
 - Normal Dam operation leads to flooding
 - Communication and language needed

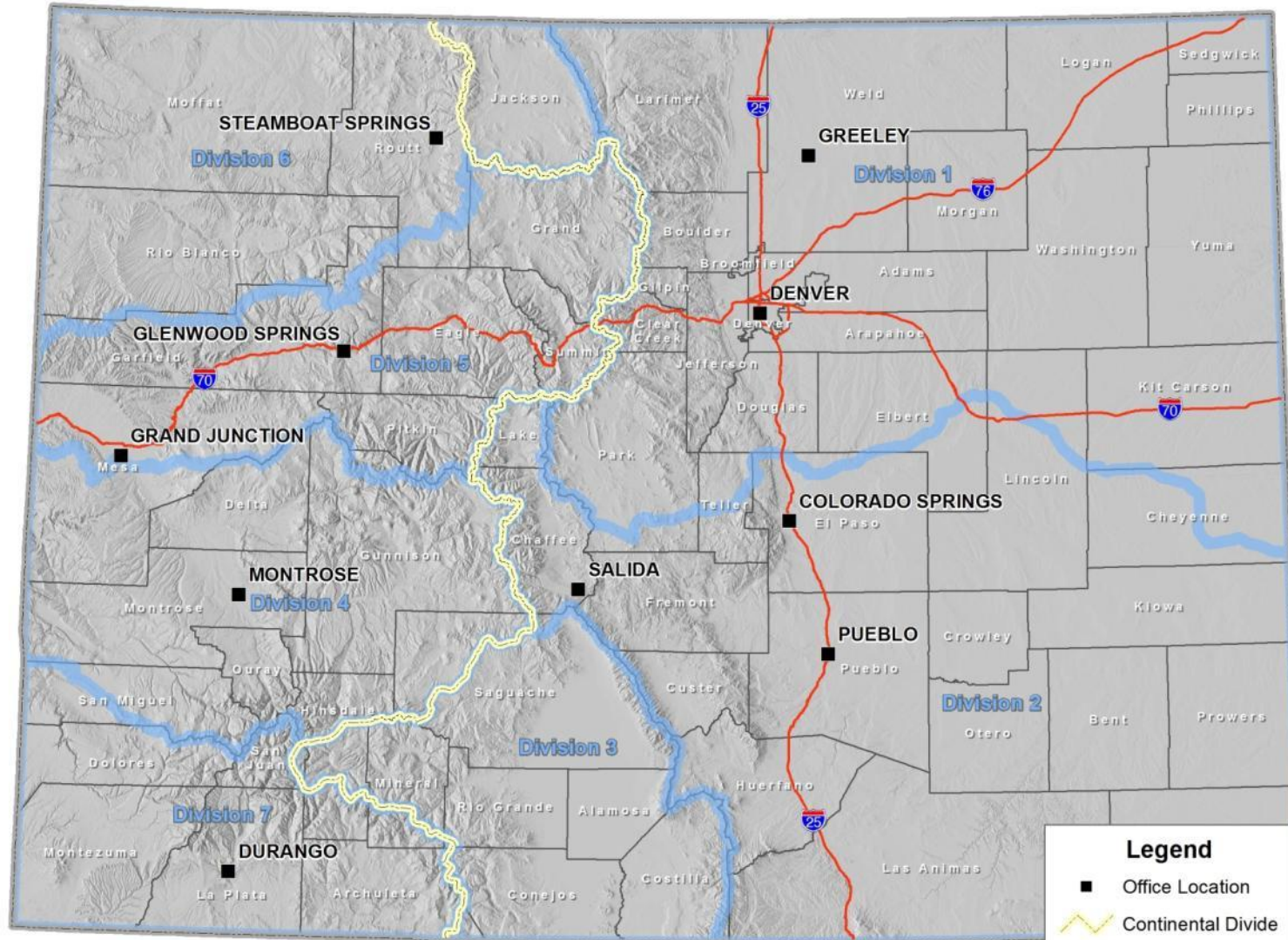


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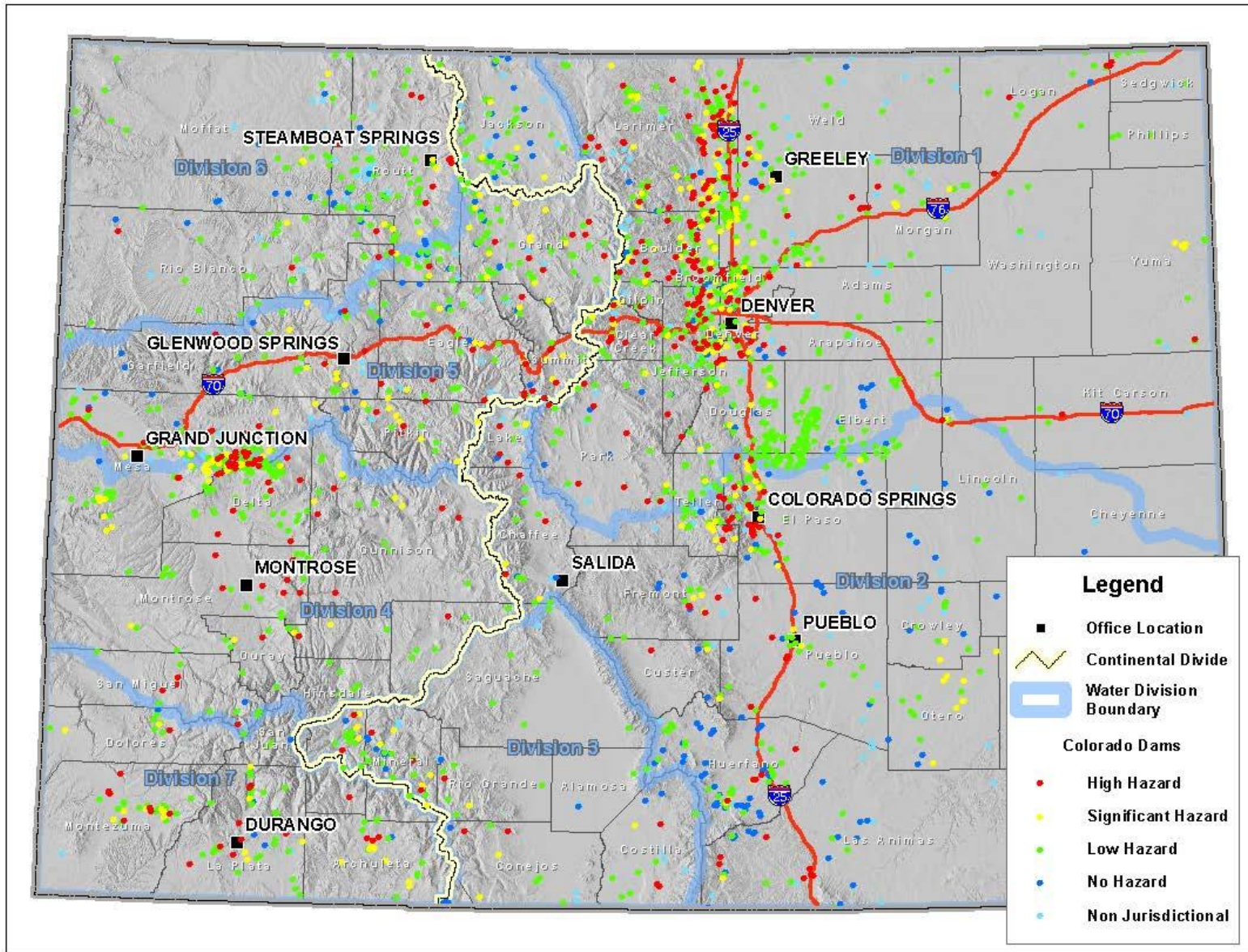
Communication

- Dam Owners - CFMs
 - Dam outlet opened
 - Dam Spillway running
- Dam Owners - Emergency Managers
 - Dam has problems
 - Problem heads downstream
- Dam Safety in the middle

Colorado Dam Safety Branch



Dams in Colorado



Where CFM's and DSE's intersect

- Emergency Action Planning
- Inundation zones
- Dam releases
 - Spillway
 - Outlet



Examples

- September 2013
 - Major flooding
 - Spillways flowing
 - Dams failing
- May 2015
 - Flooding
 - Spillways running
 - Outlets opened



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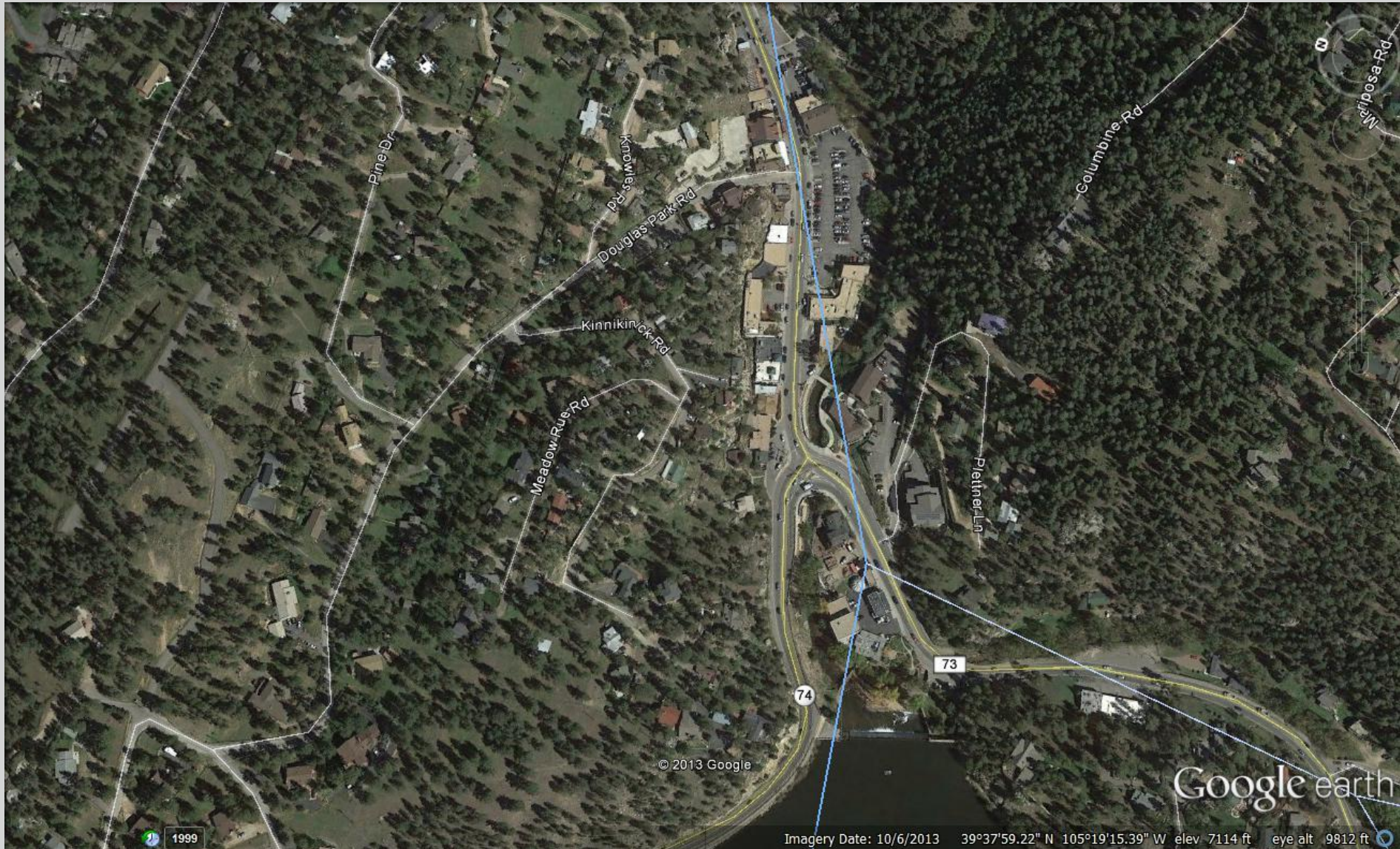


Spillway Flows 9/20/13



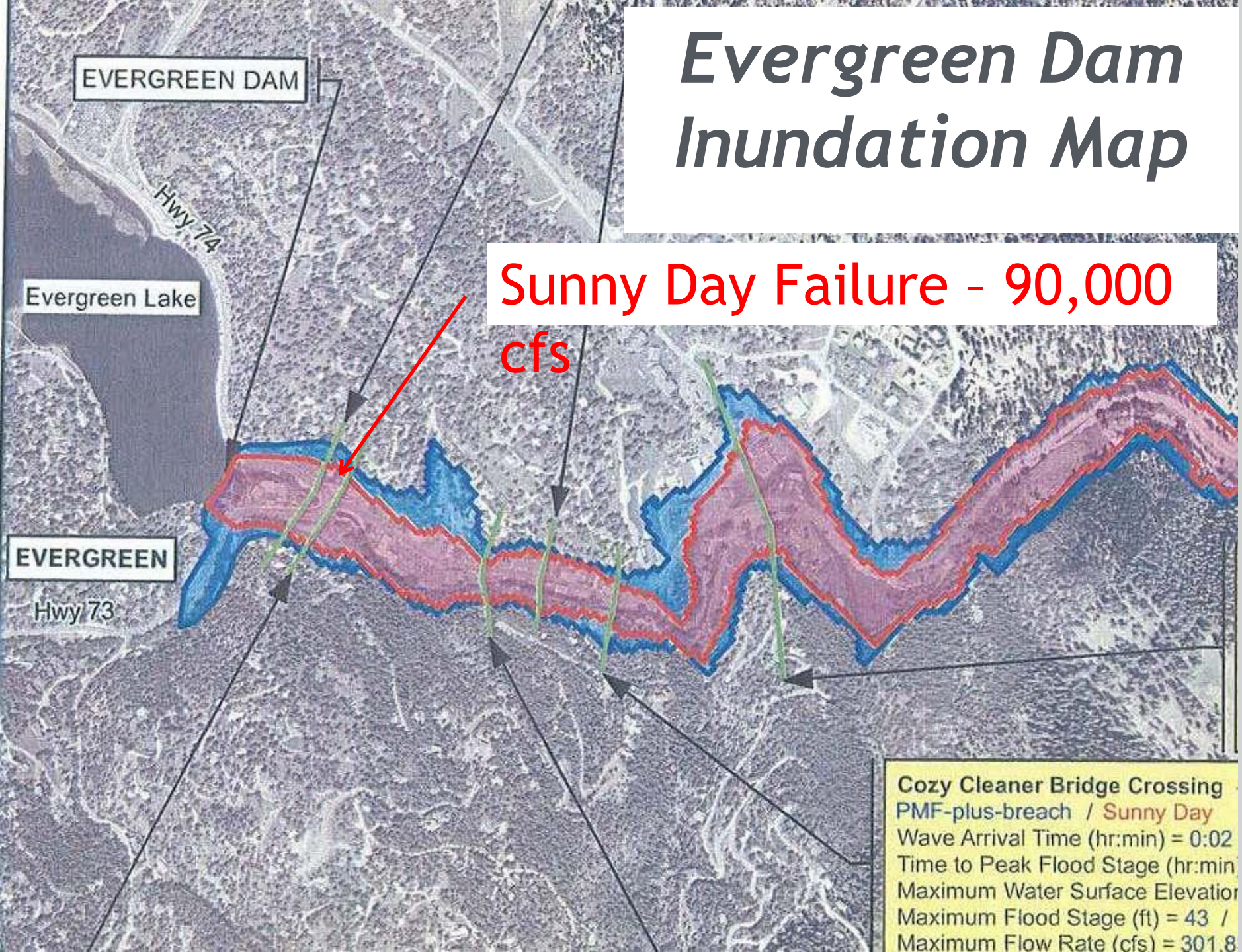
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Evergreen Dam



Evergreen Dam Inundation Map

Sunny Day Failure - 90,000
cfs



Concrete Dam, Ogee-Crested Spillway





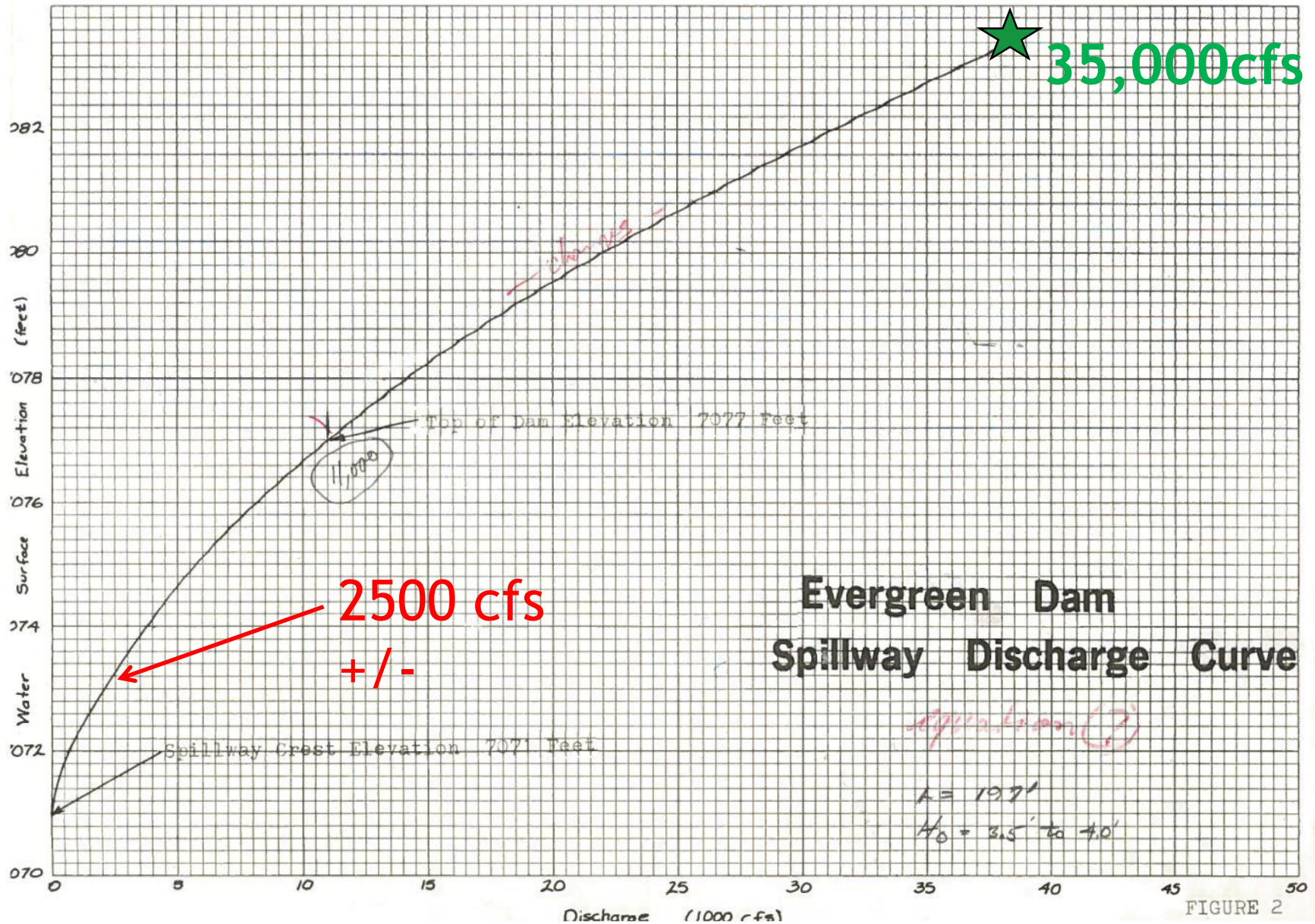


FIGURE 2

ESTES PARK

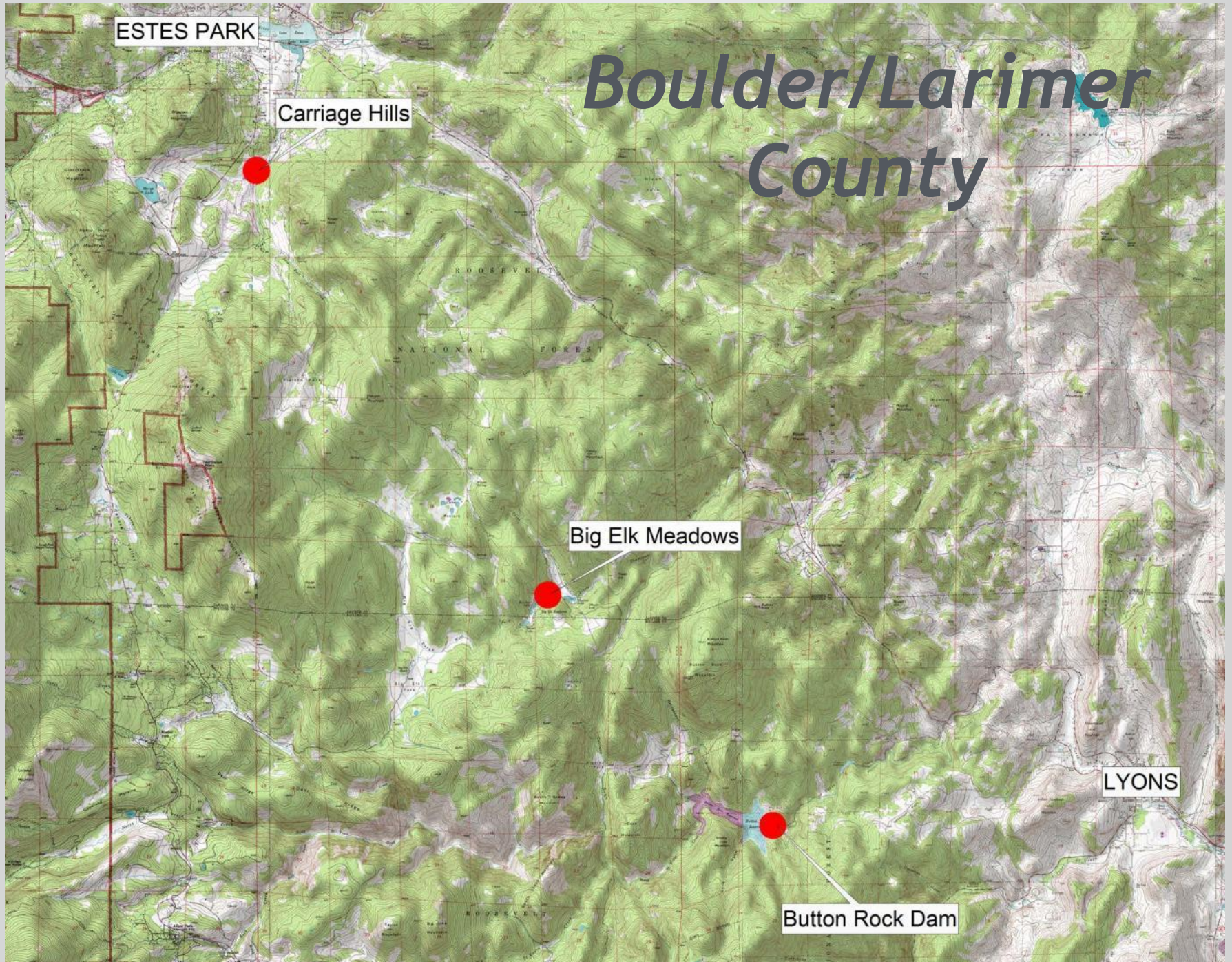
Carriage Hills

Boulder/Larimer County

Big Elk Meadows

LYONS

Button Rock Dam



Button Rock Dam











Table 5

Button Rock Dam
Reservoir and Spillway Characteristics

<u>Elevation</u>	<u>Surface Area (acres)</u>	<u>Storage Capacity (acre-feet)</u>	<u>Elevation</u>	<u>Spillway Capacity (cfs)</u>
6230	0.0	0.0	6400	0
6240	7.9	27.6	6401	325
6260	26.8	368.2	6402	918
6280	46.6	1,100.8	6403	1,686
6300	68.2	2,246.4	6404	2,596
6320	94.4	3,864.3	6405	3,628
6340	122.0	6,032.8	6406	4,769
6360	151.8	8,762.6	6407	6,010
6380	184.0	12,123.4	6408	7,343
6400	221.8	16,197.2	6409	8,762
6402		16,644.7	6410	10,262
6404		17,100.1	6411	11,839
6406		17,563.5	6412	13,489
6408		18,035.9	6413	15,210
6410		18,517.5	6414	16,998
6412		19,006.7	6415	18,852
6414		19,502.0	6416	20,768
6416		20,003.7	6417	22,745
6418		20,514.6	6418	24,781
6420		21,035.3	6419	26,875
6422		21,564.1	6420	29,024
6424		22,099.5	6420.1	29,255
6426		22,641.8	6420.2	29,498
6428		23,191.8	6420.3	29,749
			6420.4	30,005
			6420.5	30,268
			6420.6	30,535
			6420.7	30,807
			6420.8	31,083
			6420.9	31,364
			6421.0	31,648
			6421.1	31,936
			6421.2	32,227
			6421.3	32,522
			6421.4	32,820

Observed high
water mark on the
spillway.

Details

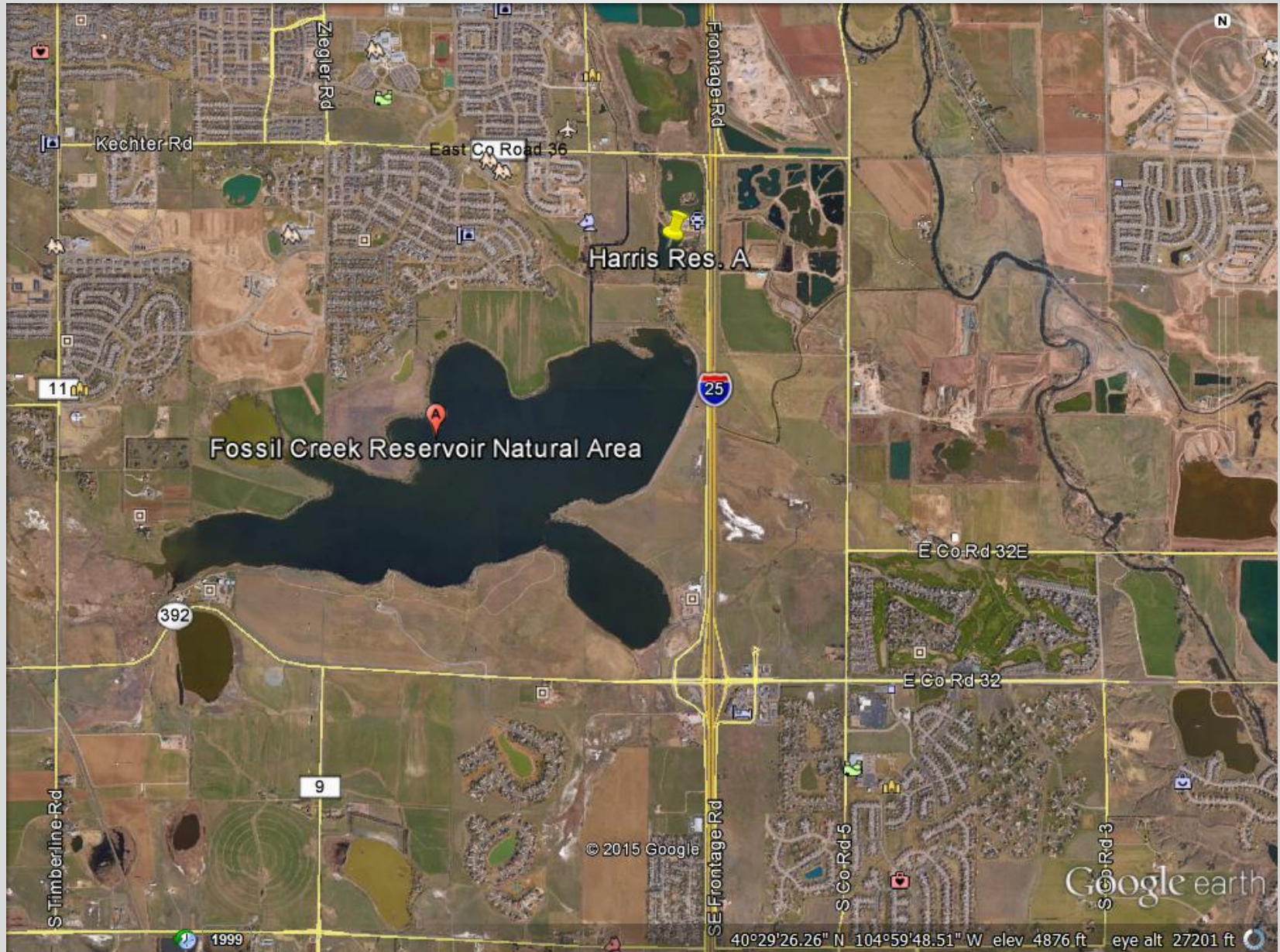
Basemap

Share

Print



2015 Spillway vs 100 yr flows

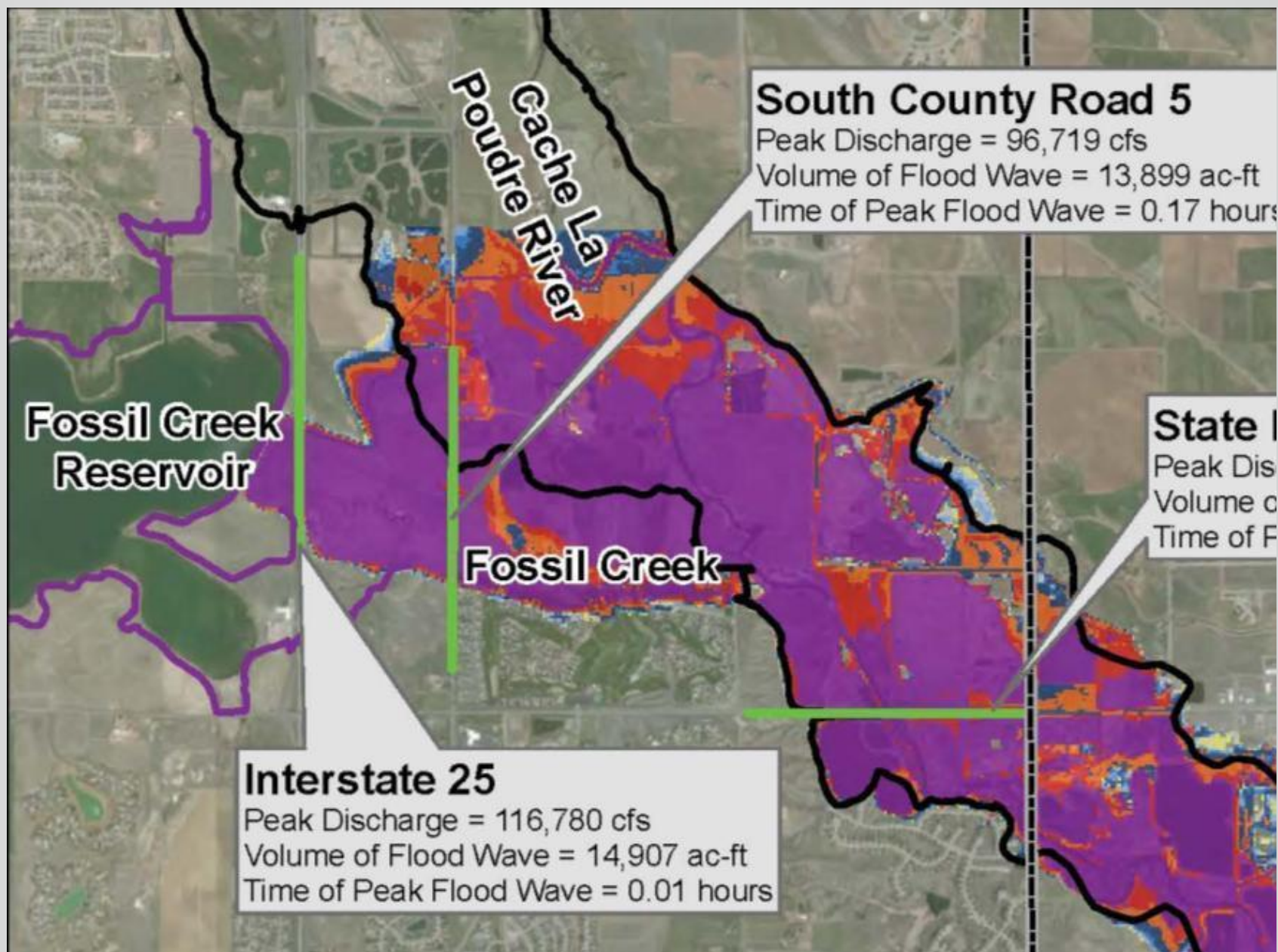


Fossil Creek Dam

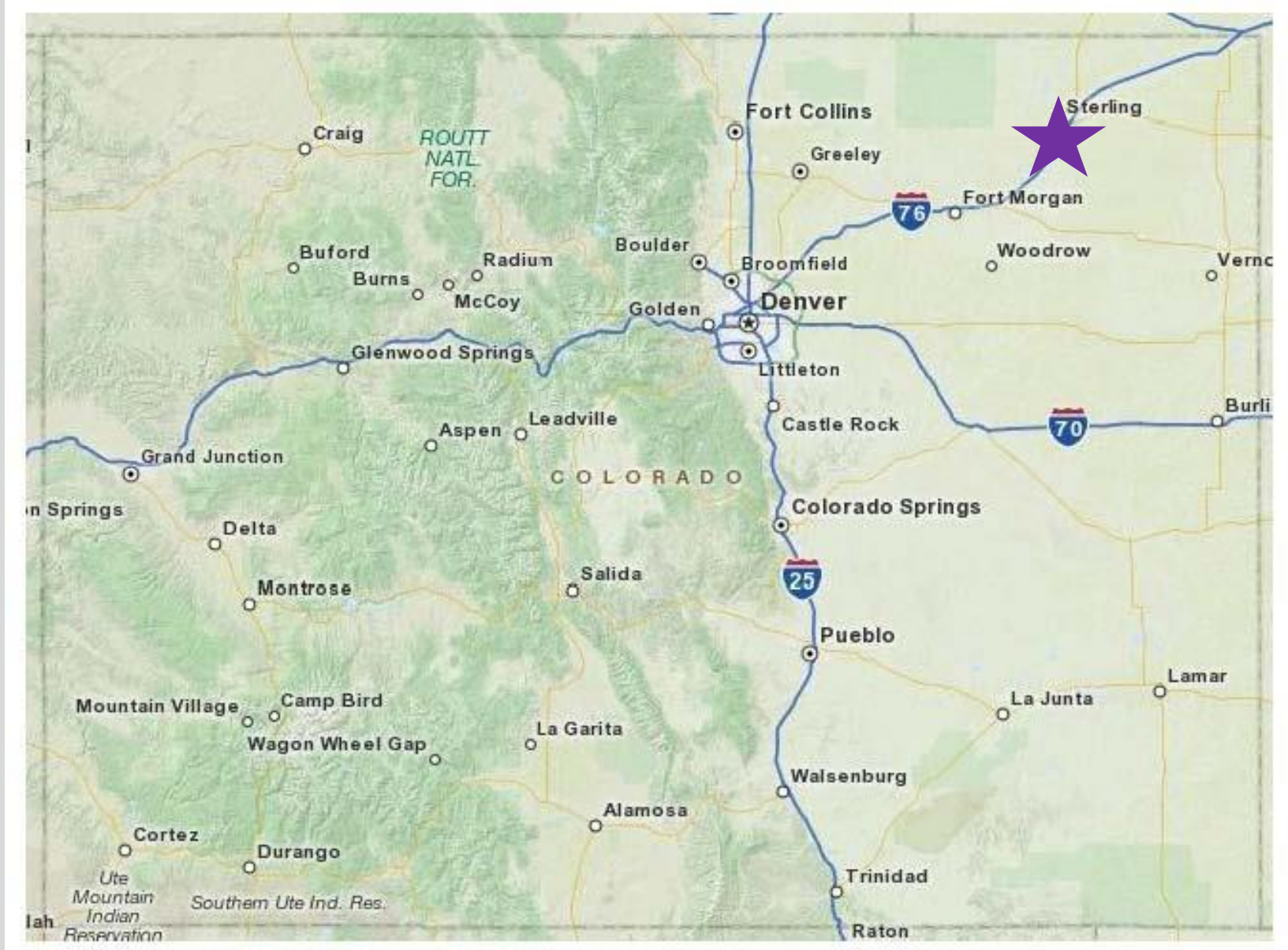
- 100 yr flow at CR 27 Poudre River = 9,600cfs
- PMF = 80,000 cfs, spillway flows
- Outlet released 270 cfs



Fossil Creek Inundation



2015 Spillway Flow



North Sterling Reservoir





Reservoir

SPILLWAY

DAM

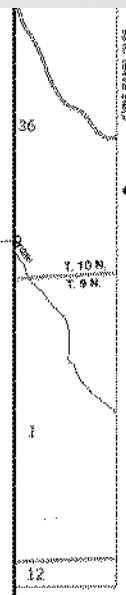
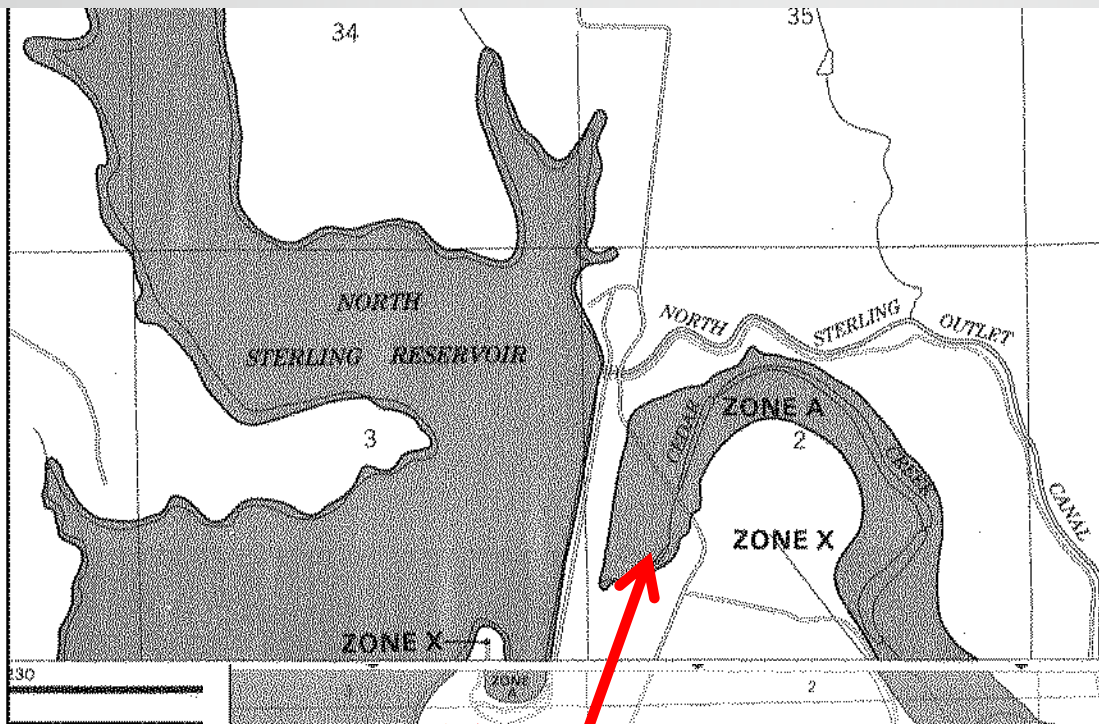
330

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Google earth

1998

Imagery Date: 4/26/2013 40°46'33.15" N 103°15'32.06" W elev 4036 ft eye alt 17044 ft



LOGAN COUNTY,
COLORADO
(UNINCORPORATED AREAS)

PANEL 150 OF 500

(SEE MAP INDEX FOR PANELS NOT PRINTED)



PANEL LOCATION

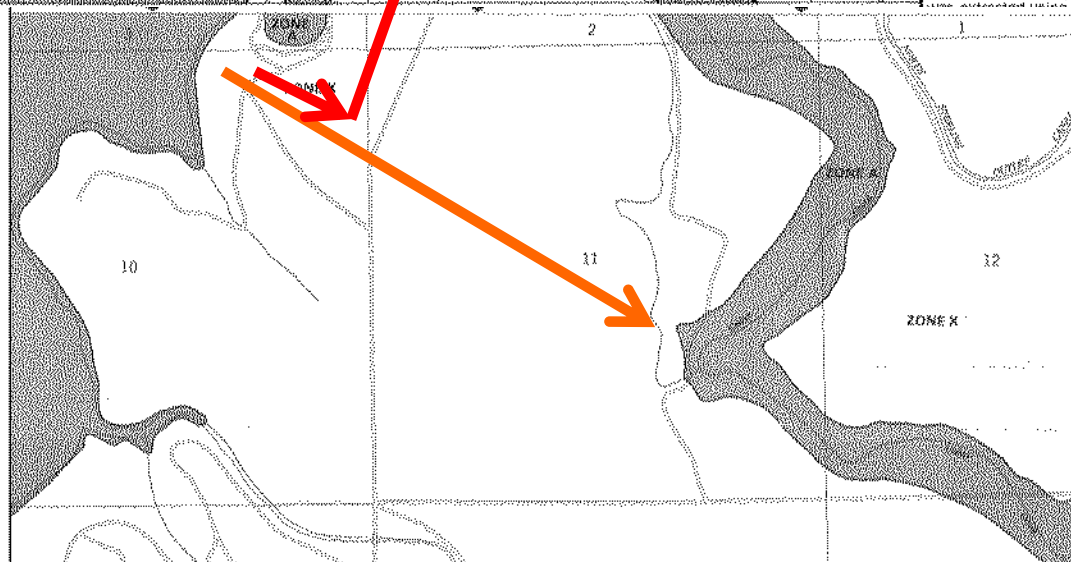
COMMUNITY-PANEL NUMBER
080110 0150 B

EFFECTIVE DATE:
SEPTEMBER 29, 1989



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It is not to be used for any other purpose.



APPROXIMATE SCALE IN FEET

1989

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

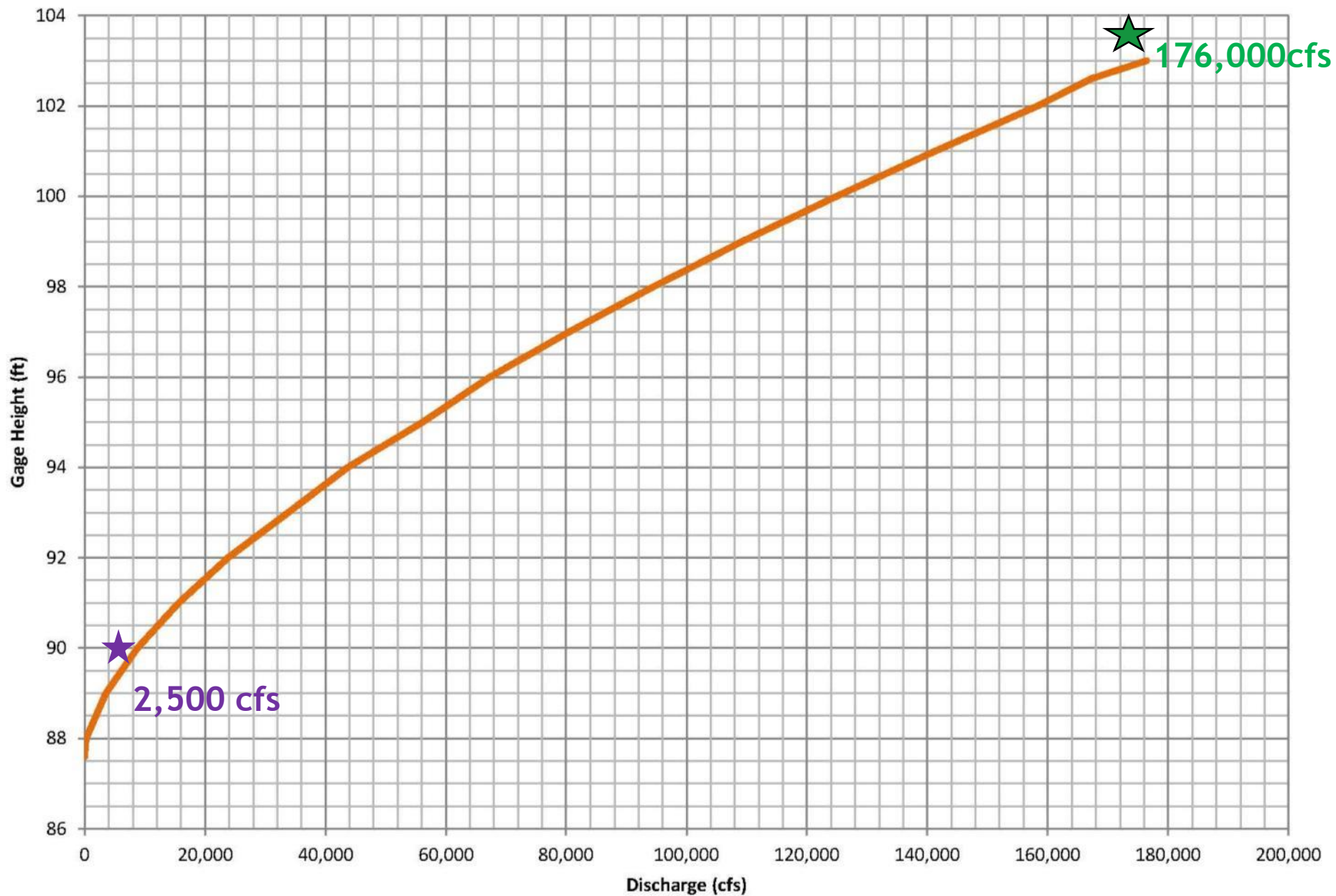
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COLORADO
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PANEL 150 OF 500

(SEE MAP INDEX FOR PANELS NOT PRINTED)

1989

North Sterling Spillway



Spillway Running



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Outlet Releases - EAP Activation Eleven Mile Canyon Dam

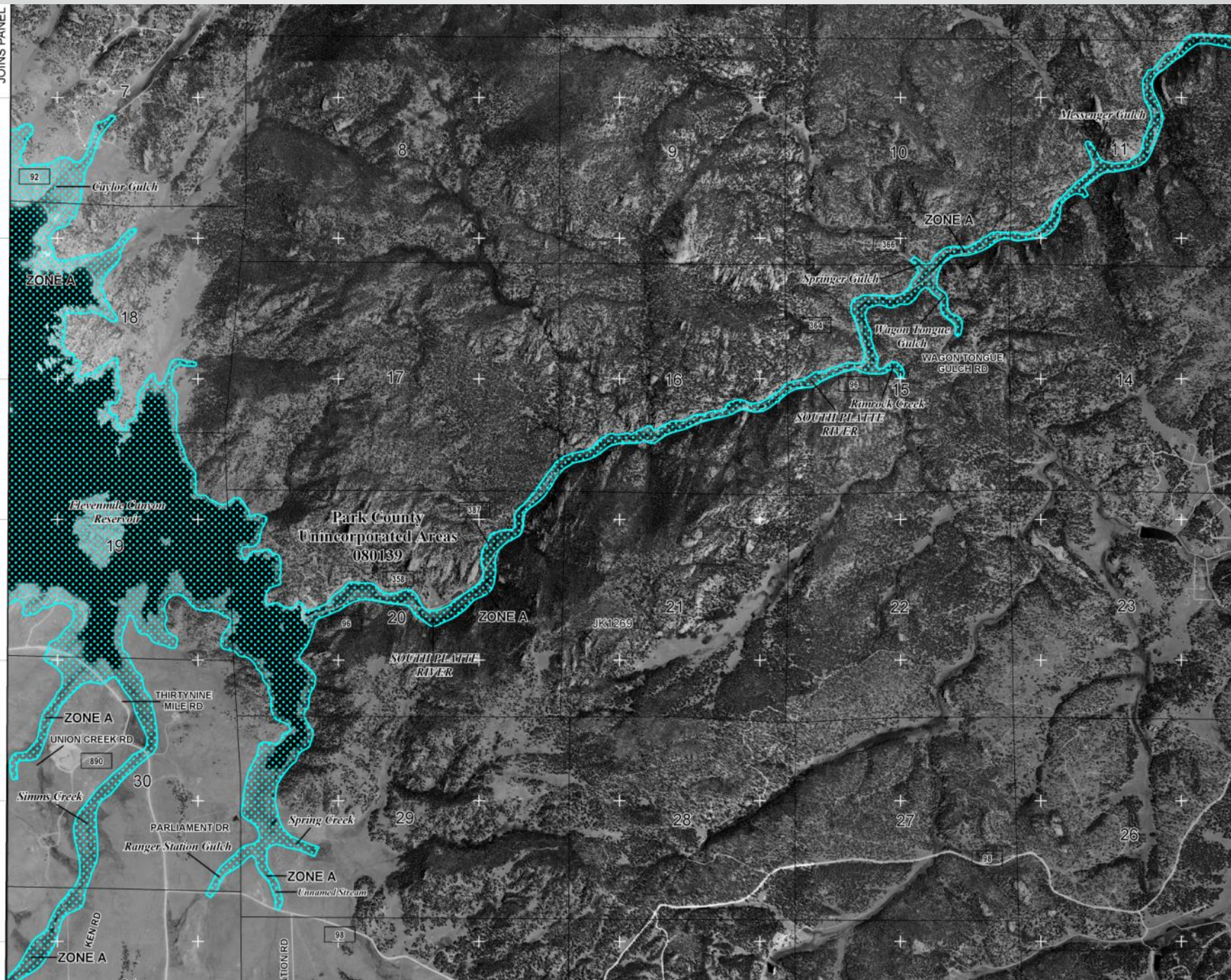




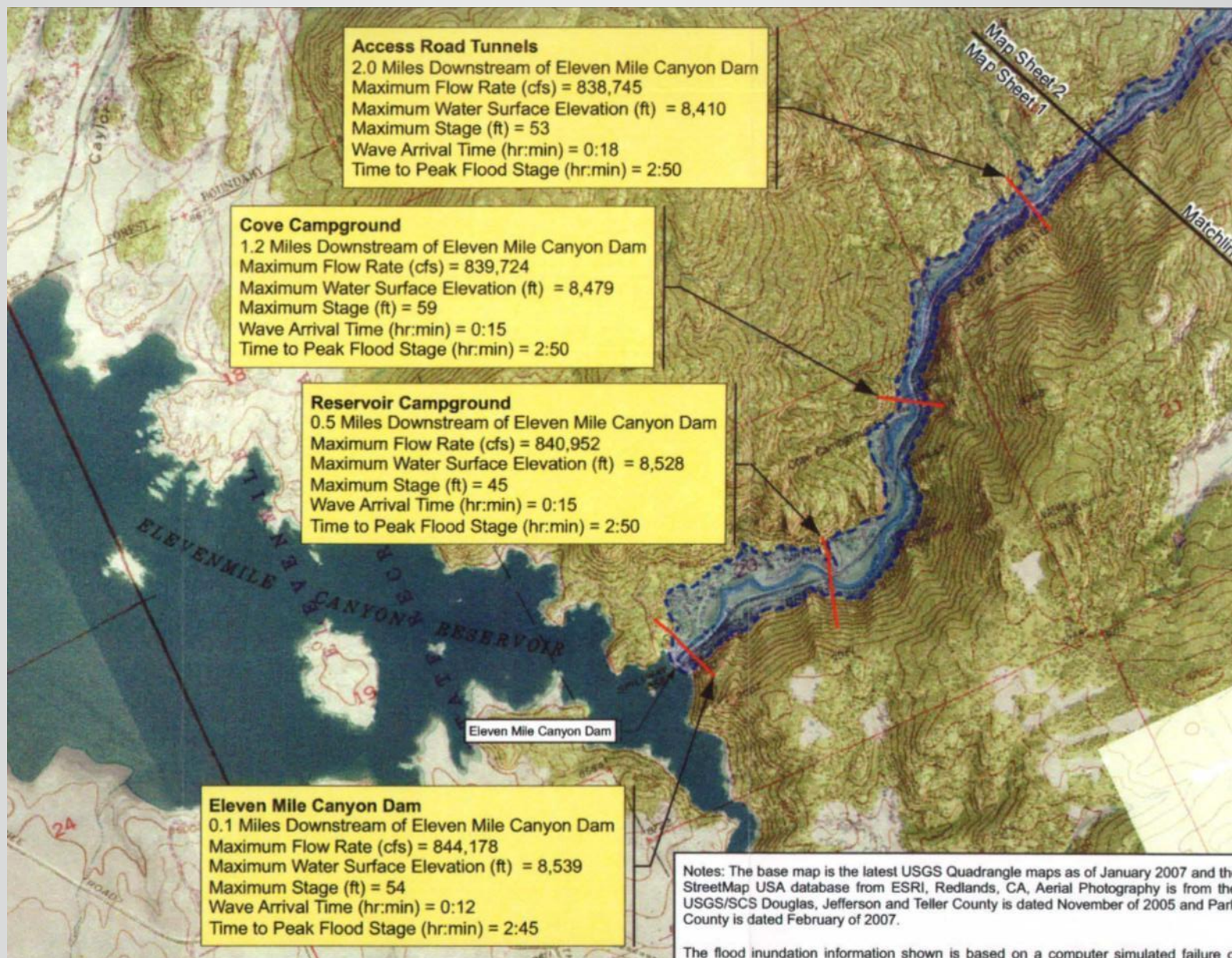
Outlet channel



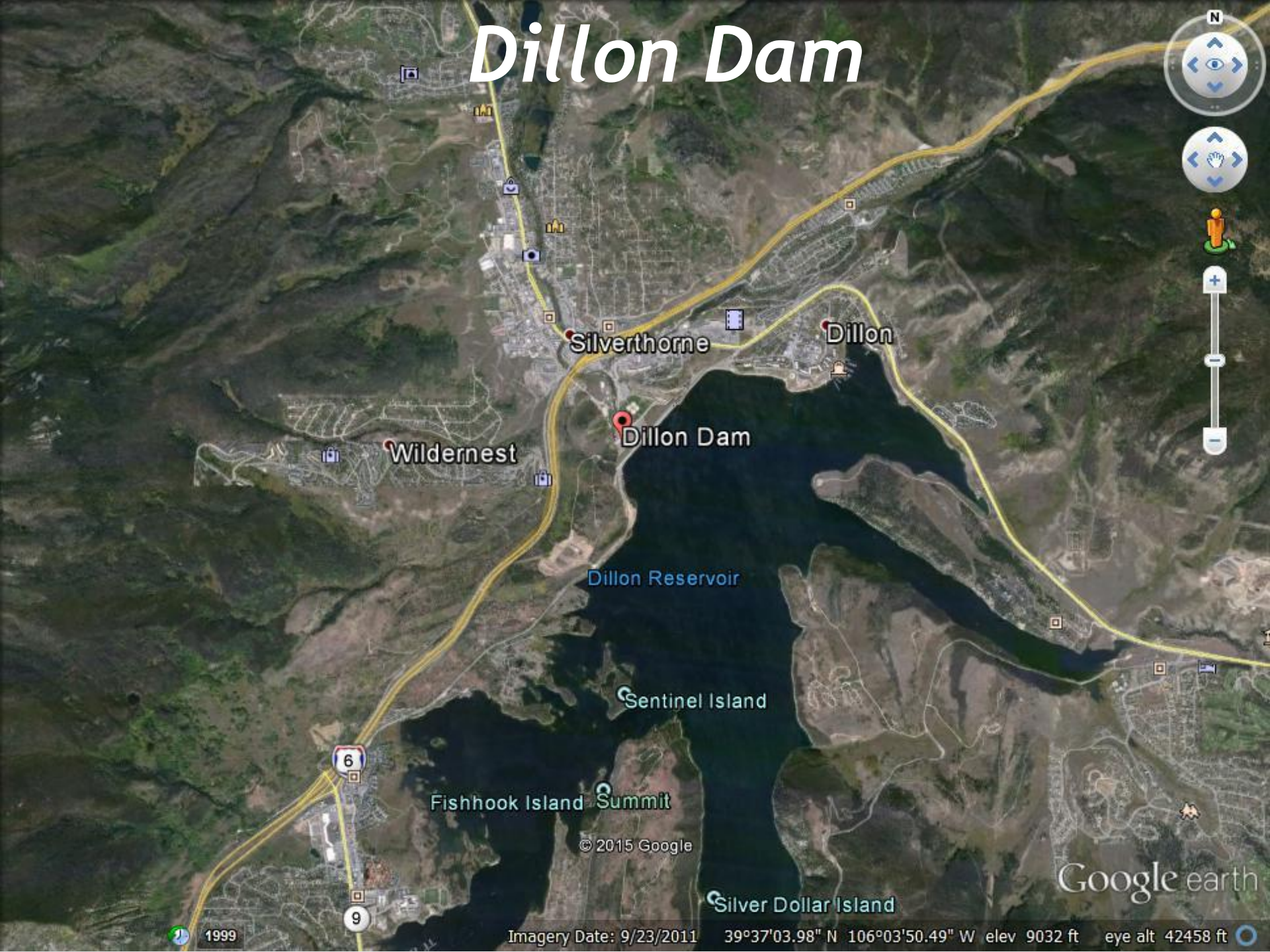
Spillway channel



Eleven Mile Inundation Map



Dillon Dam



Wilderrest

Silverthorne

Dillon

Dillon Dam

Dillon Reservoir

Sentinel Island

Fishhook Island Summit

Silver Dollar Island

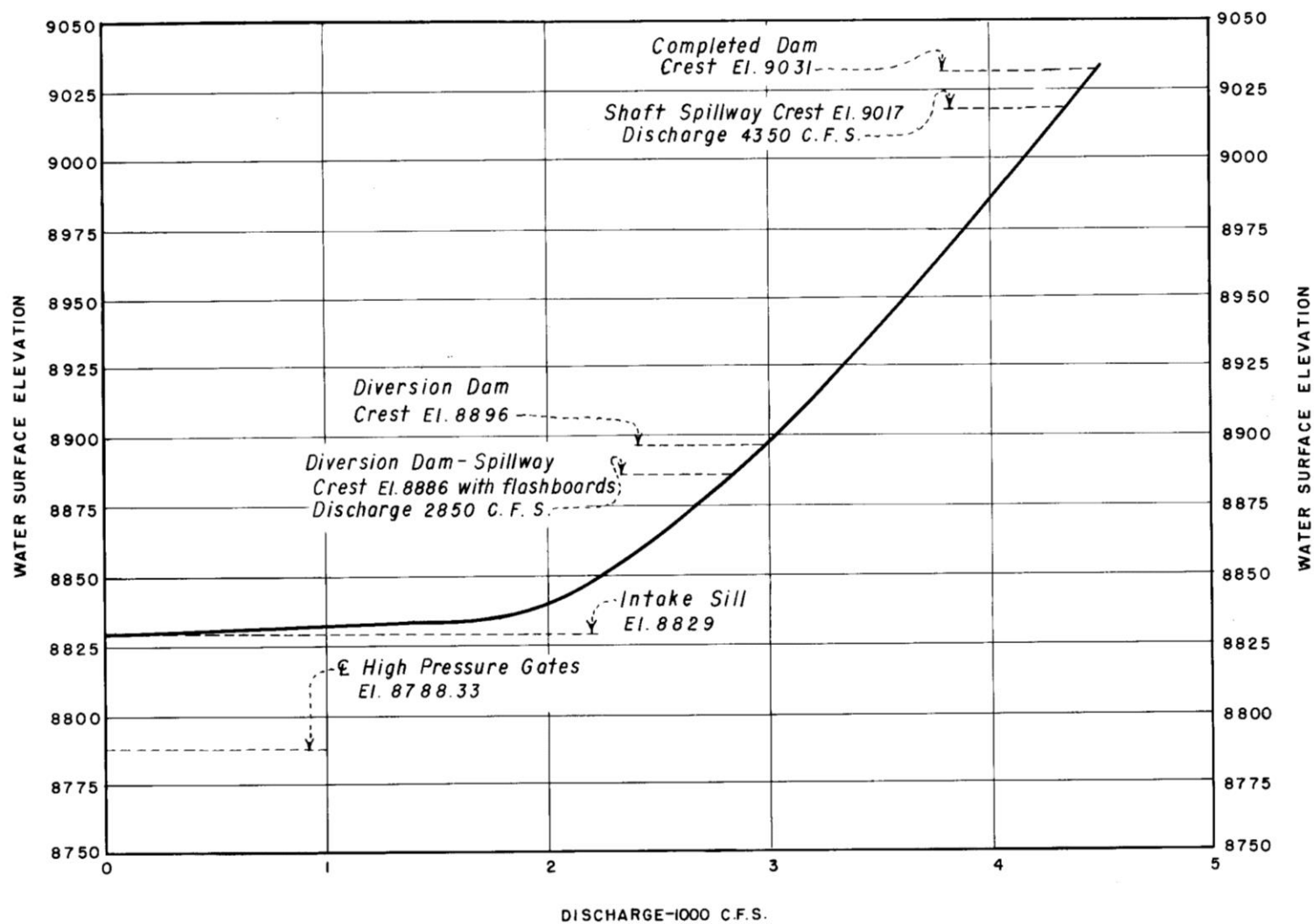
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Google earth

1999

Imagery Date: 9/23/2011

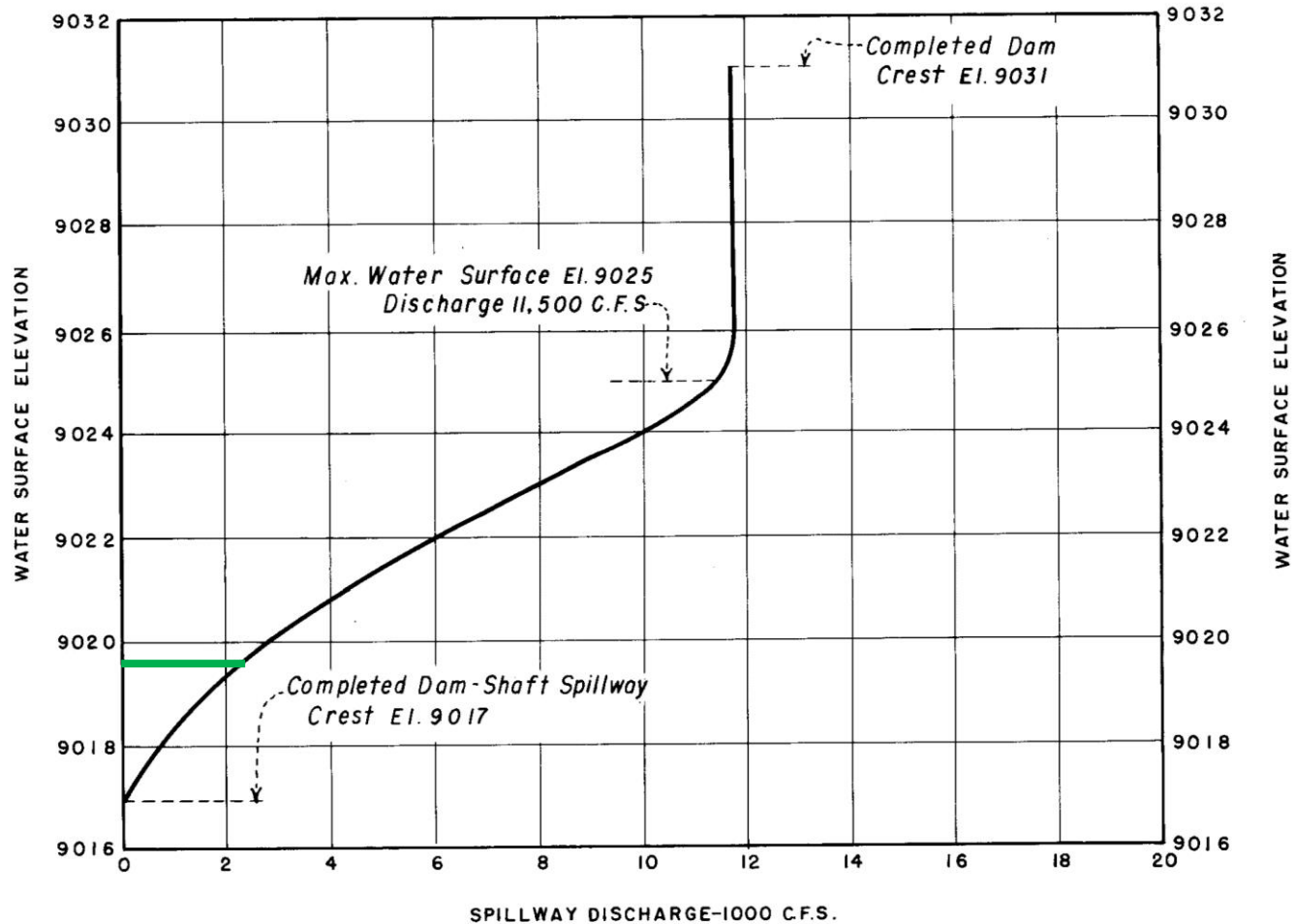
39°37'03.98" N 106°03'50.49" W elev 9032 ft eye alt 42458 ft



DISCHARGE CURVE-OUTLET WORKS

2 - 4'-0" x 5'-0" HIGH PRESSURE GATES

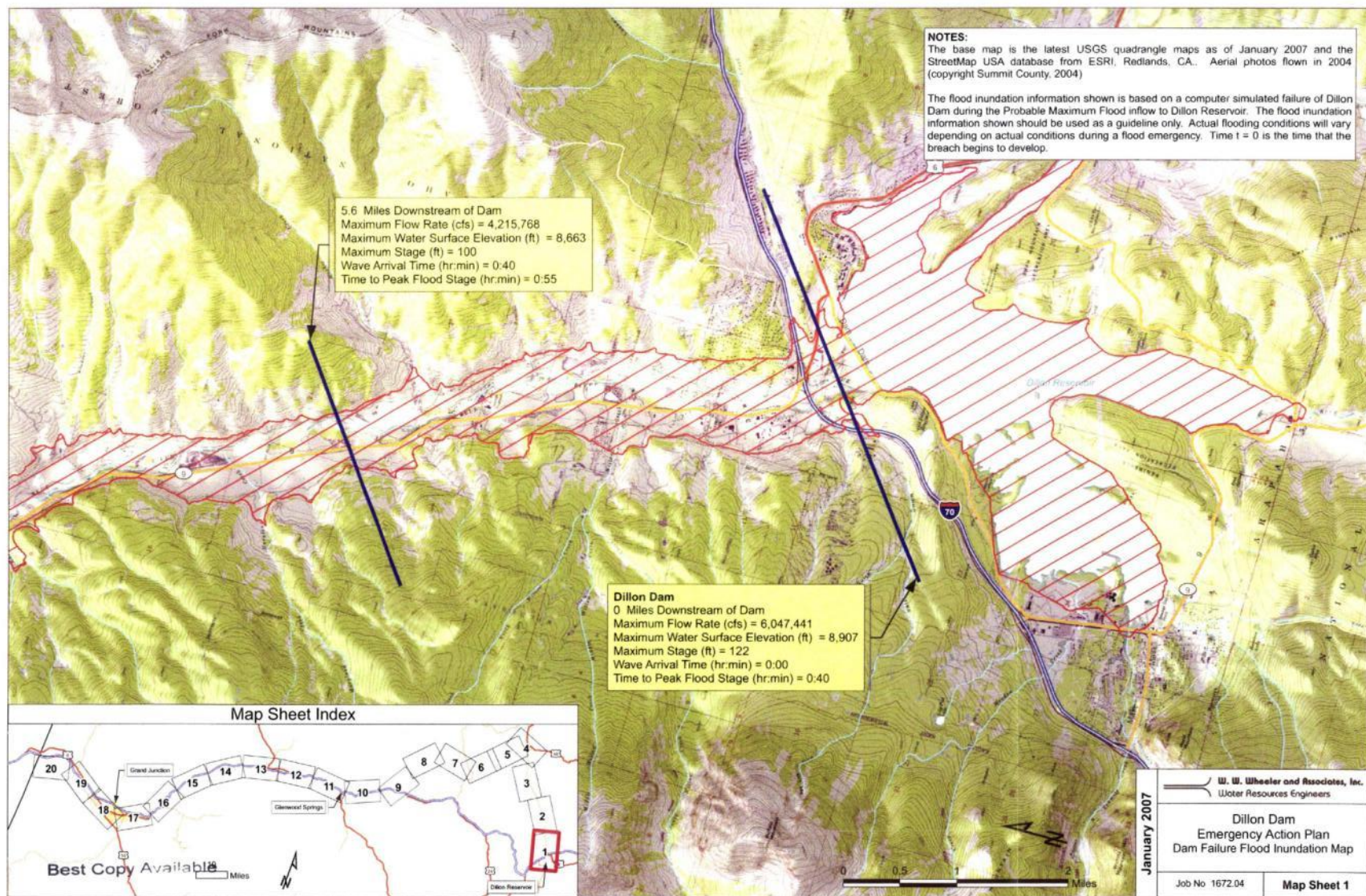
1 - 2'-3" x 2'-3" HIGH PRESSURE GATE



SPILLWAY DISCHARGE CURVE-COMPLETED DAM

56-FOOT DIAMETER SHAFT SPILLWAY

Approved on th



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Flooding - Summary

- Can be caused by
 - Spillway flows
 - Outlet Releases
 - Combination of the 2
- The Dam can be fine

Next Steps

- Collaborative Efforts Needed
- Communication
- Know your dams
 - Dam Failure vs Spillway Operation
 - Outlet Operations that cause flooding
- Communication
- Know who to call

Oh, crap!
Was that
TODAY?



Questions?



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