

Flood Task Force – Tri-Lakes Operations

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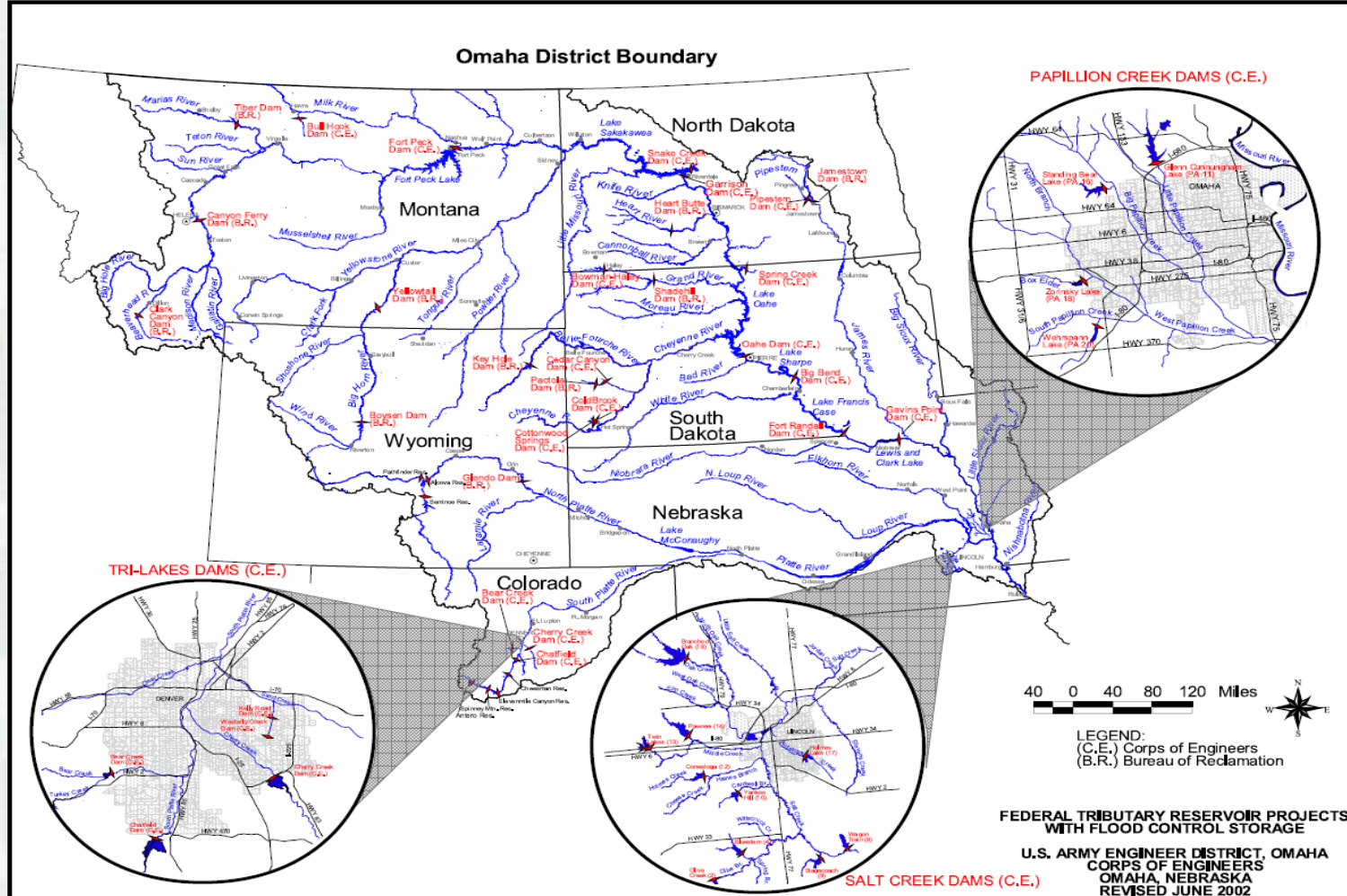
March 20, 2014



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Omaha District Boundary



33 Tributary Reservoirs

- 22 USACE owned and operated
- 11 USBR Section 7 projects



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Tri-Lakes Water Control Plans Summary

- Tri-Lake Dams include Bear Creek, Chatfield, and Cherry Creek Dams
- Design based on initially storing flood inflows and evacuating within downstream channel capacity
- Operated as a system (2+ with flood storage) or individually

System Evacuation:

- Maintain parallel reservoir balance
- Level I (small) vs Level II (large)
- Chatfield Reallocation does not change the flow target

DESIRED CONTROLLED FLOW TARGET - DENVER STREAM GAGING STATION

April - July:

Any Reservoir at Level II - 5,000 cfs
All Reservoirs at Level I, with one or more, more than 50% filled - 5,000 cfs
All Reservoirs at Level I, and all less than 50% filled - 4,000 cfs

August – March

Any Reservoir at Level II - 5,000 cfs
All Reservoirs at Level I, with one or more, more than 50% filled - 4,000 cfs
All Reservoirs at Level I, and all less than 50% filled - 3,000 cfs

Individual Evacuation:

- Cherry Creek and Chatfield target up to 5000 cfs (inflow dependent)
- Bear Creek releases at pool levels

Bear Creek Elevation	Percent Flood Full	Target Release
5558 - 5611.5 ft	0% - 50%	up to 500 cfs
5611.5 - 5625 ft	50% - 75%	up to 1000 cfs
5625 - 5635.5 ft	75% -100%	up to 1500 cfs
5635.5 - 5667 ft	surcharge	up to 2000 cfs

Reservoir Daily Bulletin:

<https://mrbbwm.nwo.ds.usace.army.mil/rcc/nwo/dailybull.pdf>

Last 14 days of data (plot):

<https://mrbbwm.nwo.ds.usace.army.mil/rcc/plots/plots.html>

Archive daily data from 2009 to present:

www.rivergages.com



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Tri-Lakes Water Control Plans Summary (cont.)

FLOOD REGULATION STORAGE LEVELS (without reallocation – current)

	Level I			Level II		
	Elevation (feet)	Storage (AF)	Incr. Storage (AF)	Elevation (feet)	Storage (AF)	Incr. Storage (AF)
Cherry Creek	5550.0	14,000		5554.4	18,000	
	to 5554.4	18,000	4,000*	to 5598.0	93,900	75,900
Chatfield	5432.0	26,600		5456.1	75,000	
	to 5456.1	75,100	48,400**	to 5500.0	235,000	160,000
Bear Creek	5558.0	2,000		5569.3	3,300	
	to 5569.2	3,300	1,300*	to 5635.5	28,300	25,000

* 5 percent of total flood pool
 ** Total Flood Control Storage (235,000 af) minus 26,600 af = 208,400 af; 208,400 af minus Standard Project Rainfall Flood (160,000 af) = 48,400 af

- Releases based on equal protective balance of flood storage kept vacant
- Reallocating 20,600 acre-ft of Chatfield flood control to joint-use flood control and water supply storage results in smaller Chatfield Level I zone
- Small storage changes due to new storage capacity curve

FLOOD REGULATION STORAGE LEVELS (with reallocation)

	Level I			Level II		
	Elevation (feet)	Storage (AF)	Incr. Storage (AF)	Elevation (feet)	Storage (AF)	Incr. Storage (AF)
Cherry Creek	5550.0	12,600		5554.4	16,500	
	to 5554.4	16,500	3,900*	to 5598.0	91,900	75,400
Chatfield	5444.0	47,700		5455.3	73,100	
	to 5455.3	73,100	25,400**	to 5500.0	233,100	160,000
Bear Creek	5558.0	1,800		5569.2	3,300	
	to 5569.2	3,300	1,500*	to 5635.5	30,300	27,000

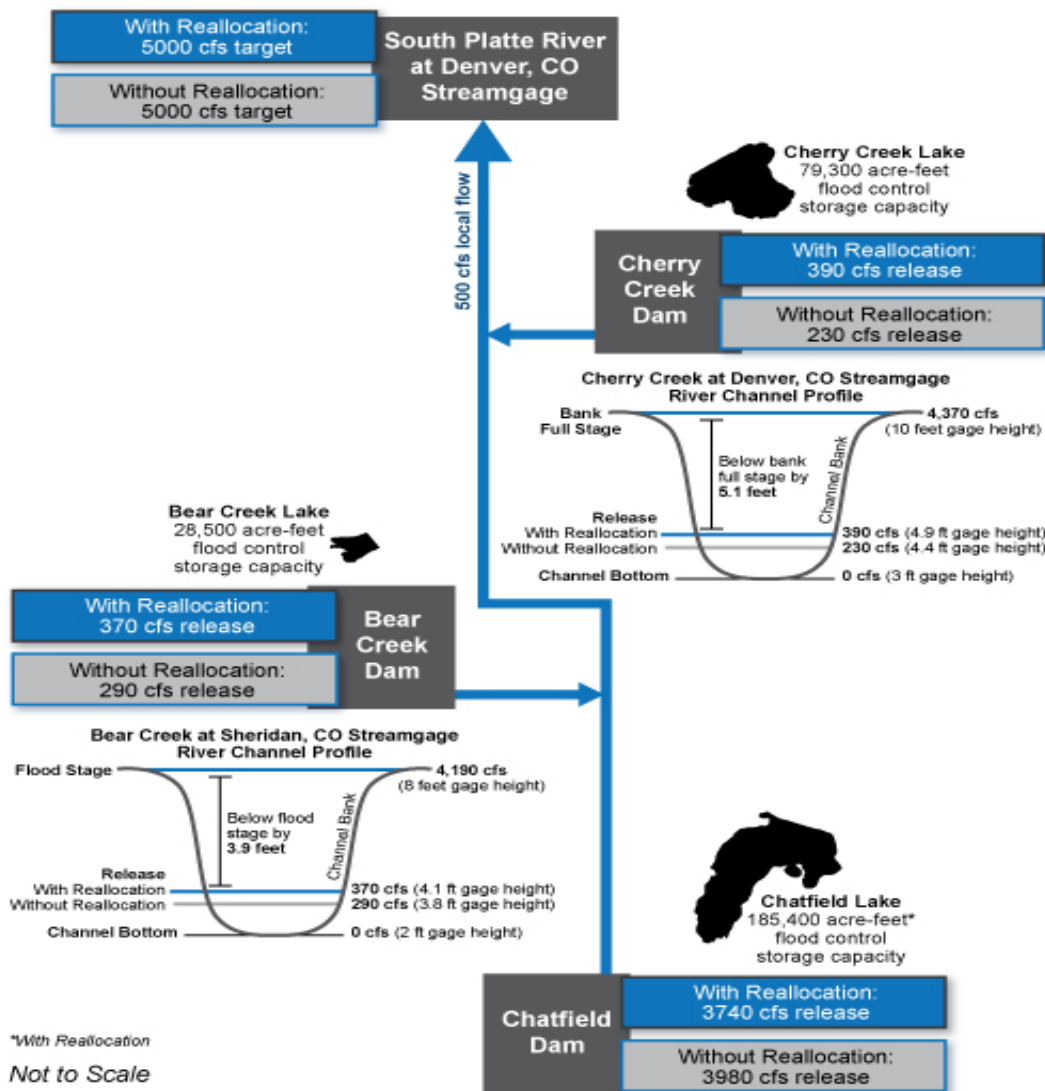
* 5 percent of total flood pool
 ** Total Flood Control Storage (233,100 af) minus 47,700 af = 185,400 af; 185,400 af minus Standard Project Rainfall Flood (160,000 af) = 25,400 af



Tri-Lakes Water Control Plans Summary (cont.)

Chatfield Reservoir Flood Control Storage Reallocation

Example of Tri-Lakes system flood control storage evacuation for Level I (small flood events)



Reallocation of 20,600 acre-ft of flood storage to joint-use flood control and water supply storage at Chatfield

- No impact to primary flood risk management purpose
- Slightly increases releases and affects timing and duration of releases at Bear Creek and Cherry Creek during Level I (small flood) system evacuation
- No change to storage evacuation time
- No change to Level II



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Tri-Lakes September 2013 Actual Operations

- Heaviest rainfall missed the basins above the flood control reservoirs
- Flood Mitigation Goal: do not add to the downstream flooding unless dam safety is threatened
- Coordination with State and Local Officials

Bear Creek

Peak inflow 1170 cfs (record)

Max release 500 cfs

Filled to 5607.8 ft (record)
(43% of flood pool)

29 day drawdown

Chatfield

No flood control
operations

Cherry Creek

Peak inflow 800 cfs

Max release 100 cfs

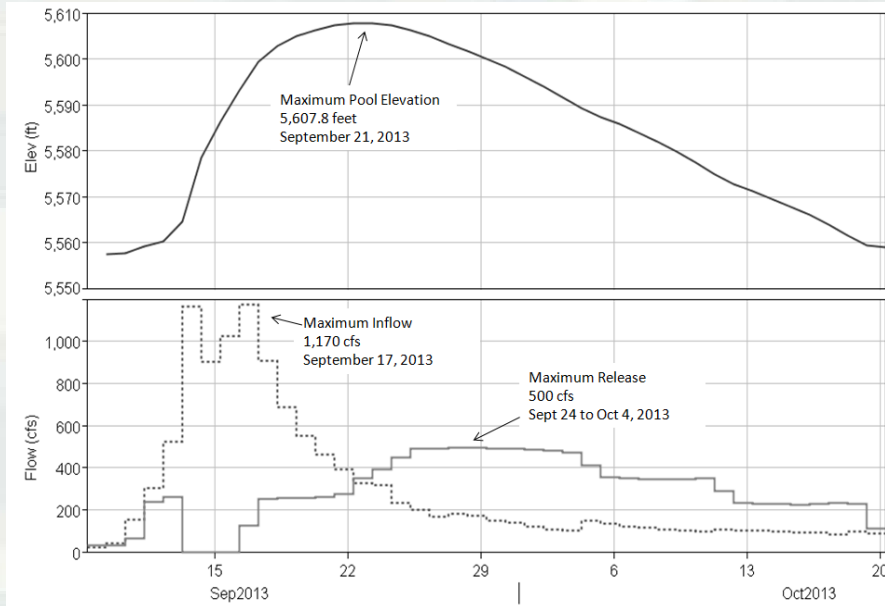
Filled to 5553.4 ft
(5% of flood pool)

24 day drawdown

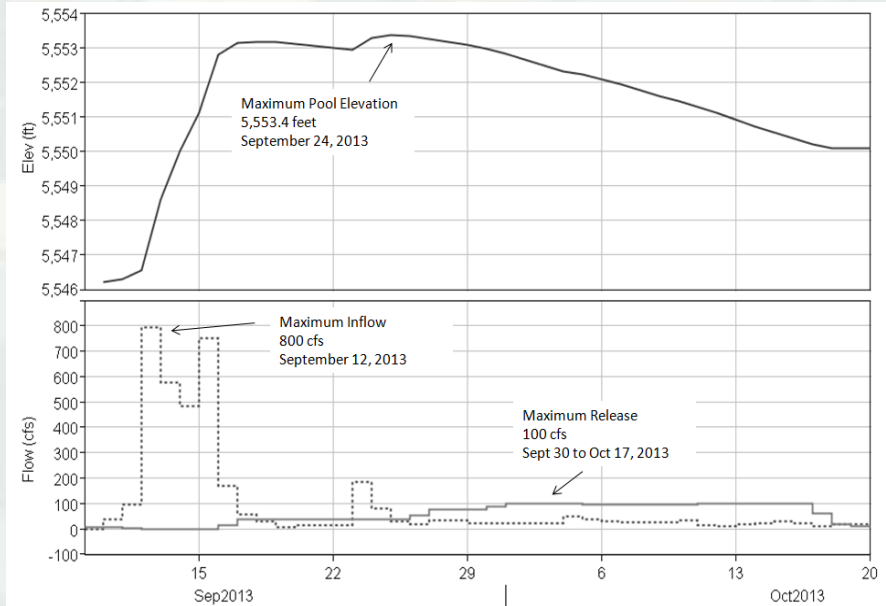


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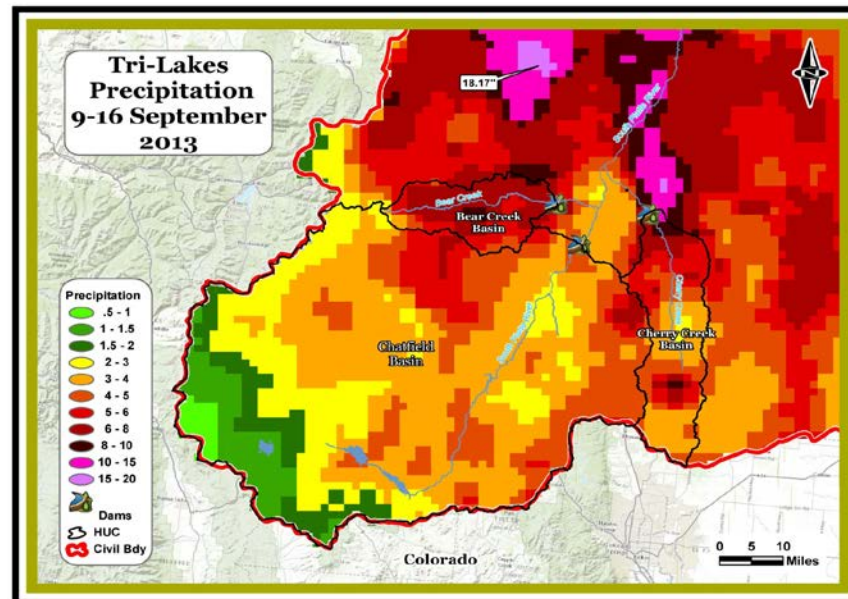
Tri-Lakes September 2013 Actual Operations (cont.)



Bear Creek Dam Operations

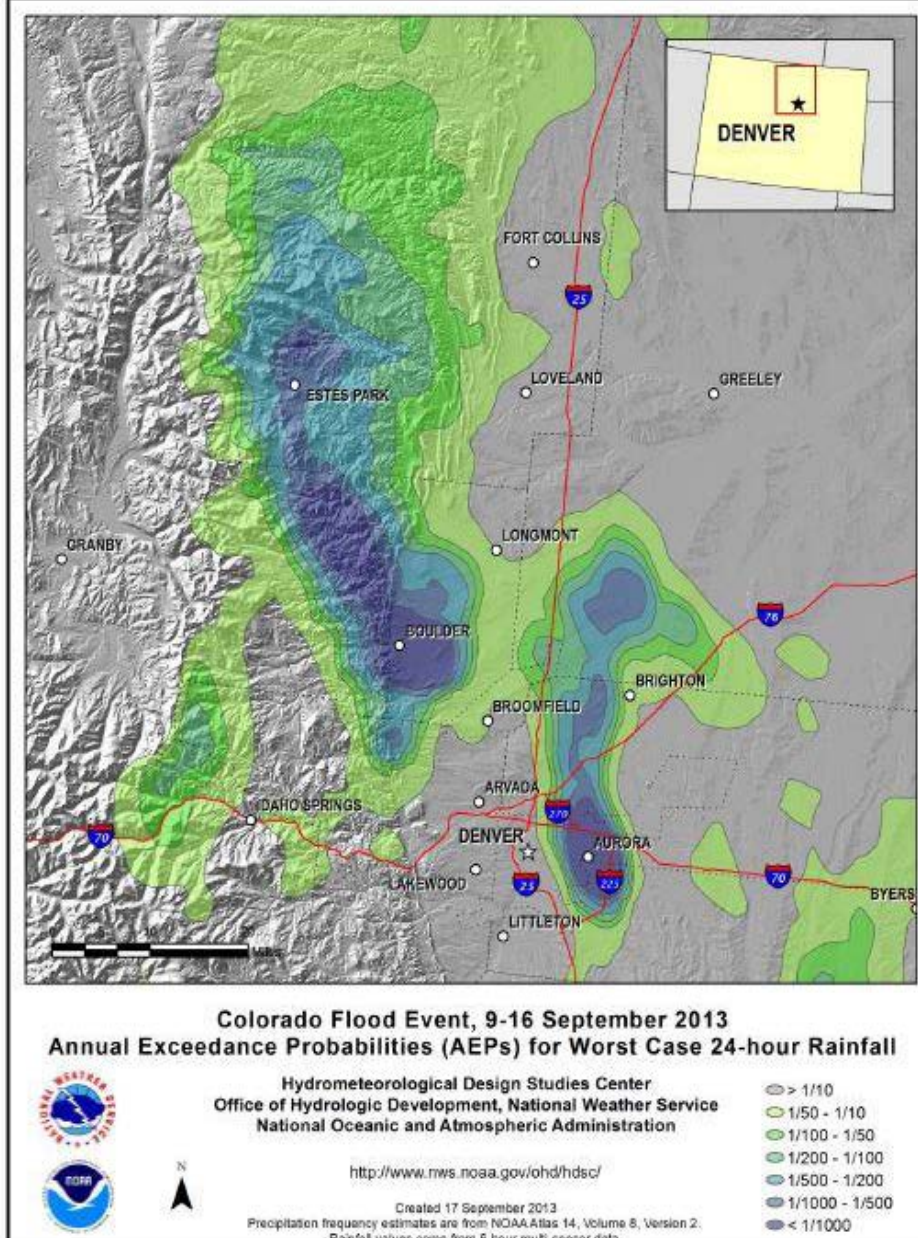
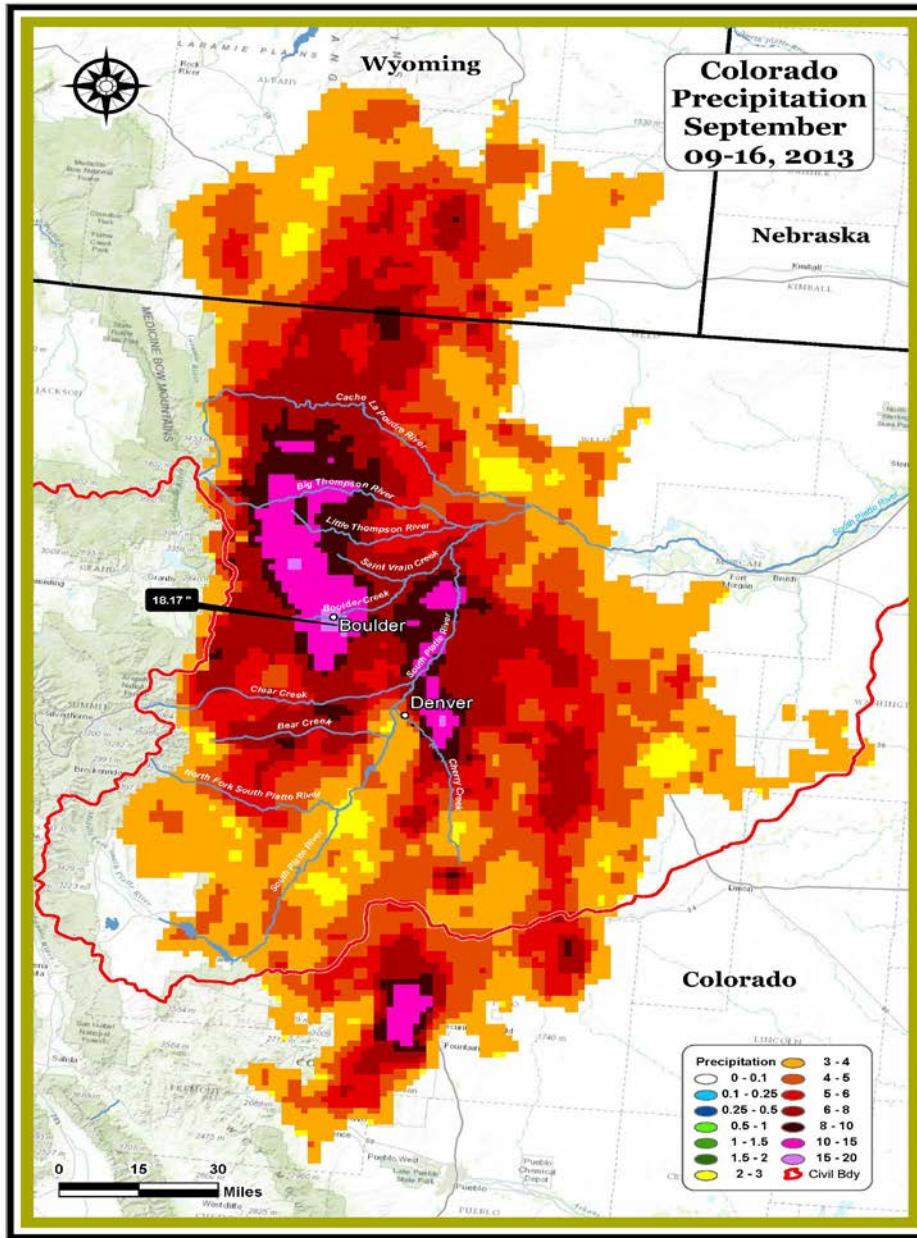


Cherry Creek Dam Operations



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Tri-Lakes September 2013 Rainfall (radar est.)



Tri-Lakes September 2013 Modeled Operations (cont.)

- What if the rainfall that fell from Boulder, CO north to Estes Park was shifted upstream of each of the dams separately? Summary of modeled results:

Bear Creek

Peak inflow 30,940 cfs
Modeled spill flow 18,400 cfs
Modeled gate release 0 cfs
Filled to 5,672.3 ft
(70% of surcharge)
Spillway Crest: 5667 ft
Dam Crest: 5689.5 ft

Chatfield (storm totals X1.5)

Peak inflow 132,085 cfs
Modeled spill flow 130,100 cfs
Modeled gate release 0 cfs
Filled to 5,516.8 ft
(76% of surcharge)
Spillway Crest: 5500 ft
Dam Crest: 5527.0 ft

Cherry Creek

Peak inflow 54,695 cfs
Modeled spill flow 3400 cfs
Modeled gate release 3400 cfs
Filled to 5,624.2 ft
(48% of surcharge)
Spillway Crest: 5610.6 ft
Dam Crest: 5644.5 ft

- When the storm was centered above the reservoirs, the South Platte at Denver, CO stream gage peaked at a flow of 65,927 cfs.



Questions?

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Cherry Creek Dam Safety Modification Study Progress

- This studies most significant safety concern is the potential for overtopping during an extreme precipitation event
- Chances are low but the potential impacts are quite high (large population including downtown Denver)
- Interim Risk Reduction Measures are being implemented to reduce the risk while long-term measures are being pursued

Study Goals:

1. Define the risks associated with Cherry Creek Dam
2. Assess options for reducing risk of life loss and property damage

Currently:

- Completing risk assessments for current and future conditions
- Preliminary development of risk reduction alternatives
- Initiating the National Environmental Protection Agency (NEPA) Process

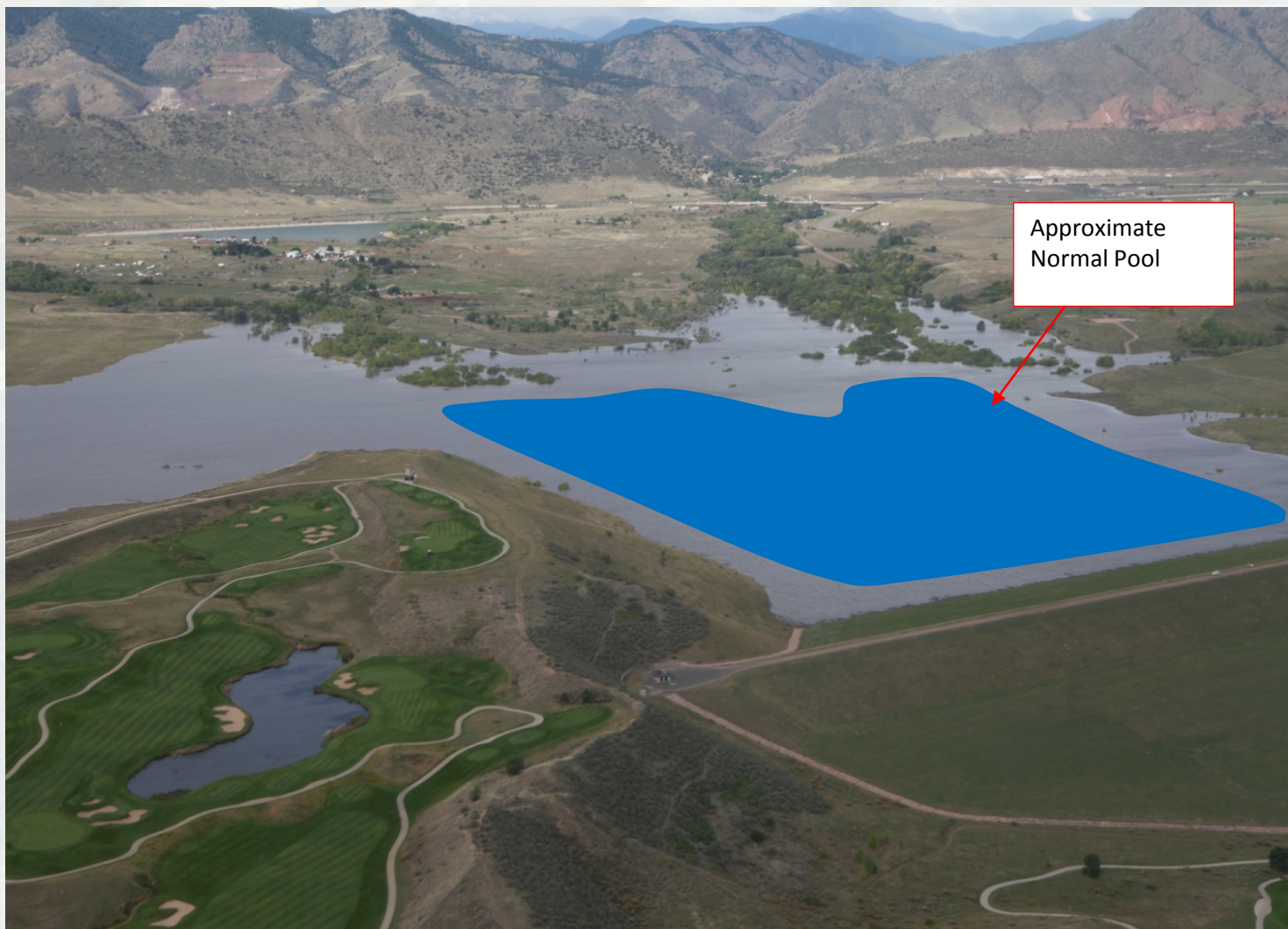




Approximate
Normal Pool



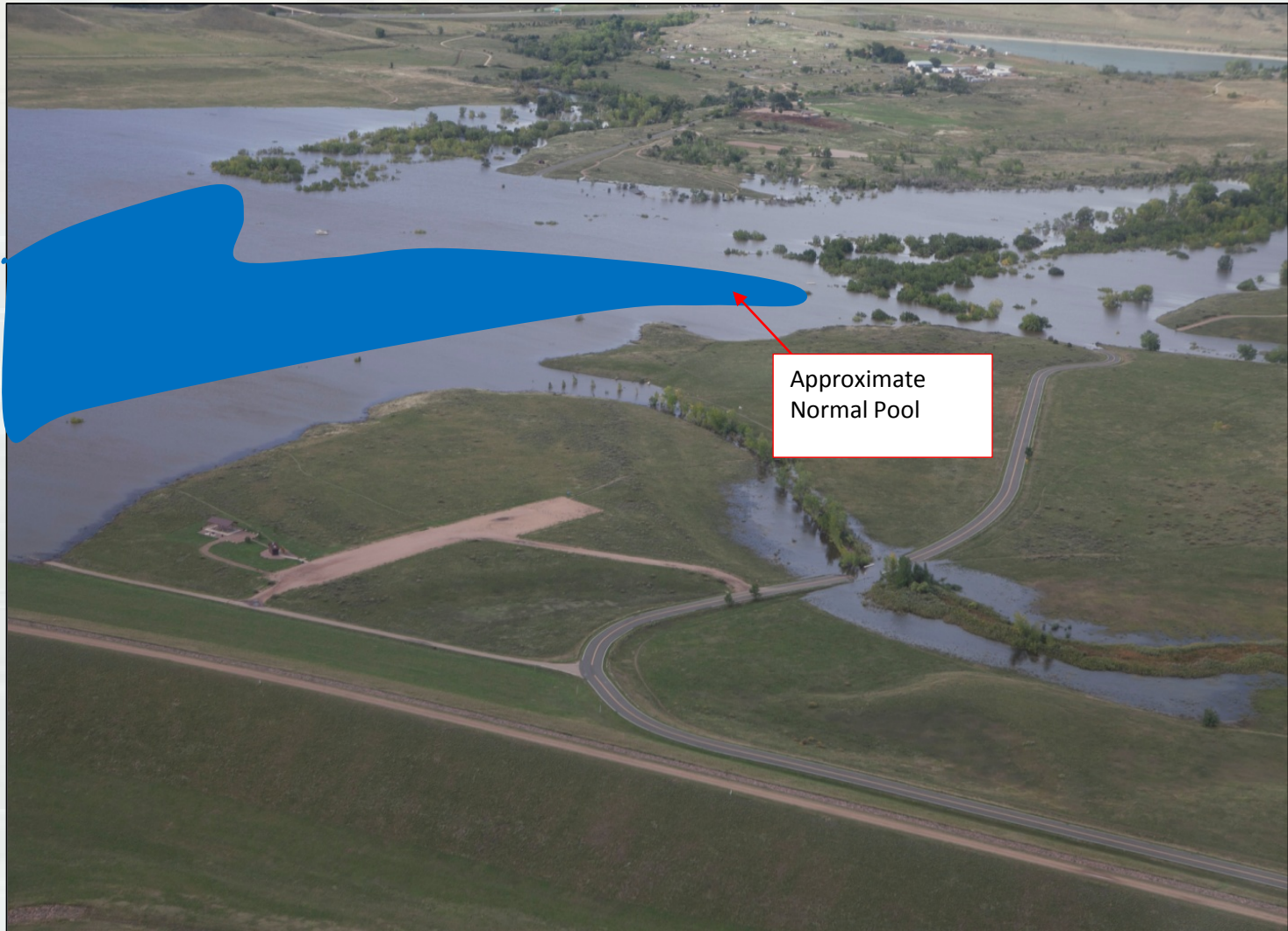
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Approximate
Normal Pool



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