An aerial photograph of the Poudre River winding through a dense, green forest. The river is brownish, and the surrounding land is covered in various shades of green trees and shrubs. The text is overlaid on the top portion of the image.

An Ecosystem view of the Poudre River

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Department of Biology
Colorado State University

Poudre River Forum, 2/1/19

On the Cache la Poudre River, Colorado (1871)

Worthington Whittredge (1820-1910)

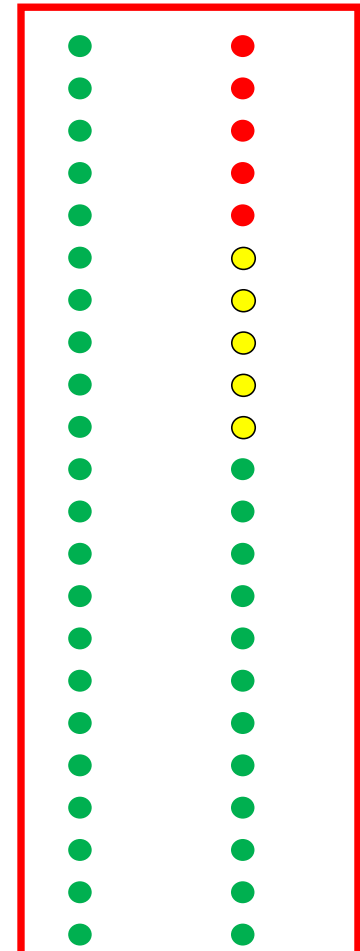


Poudre River Fish Assemblage Through Time

- Altered hydrograph
- Many other insults to system
- More development will hasten demise

Common name	Front Range	Poudre River (H)	Poudre River (P)
northern redbelly dace	●		
lake chub	●		
hornyhead chub	●		
blacknose shiner	●		
suckermouth minnow	●		
stonecat	●		
central stoneroller	●	●	●
common shiner	●	●	●
river carpsucker	●	●	●
quillback	●	●	●
cutthroat trout	●	●	●
plains topminnow	●	●	●
northern plains killifish	●	●	●
brassy minnow	●	●	●
bigmouth shiner	●	●	●
creek chub	●	●	●
sand shiner	●	●	●
fathead minnow	●	●	●
longnose dace	●	●	●
longnose sucker	●	●	●
white sucker	●	●	●
black bullhead	●	●	●
channel catfish	●	●	●
green sunfish	●	●	●
orangespotted sunfish	●	●	●
Iowa darter	●	●	●
johnny darter	●	●	●
red shiner	●	●	●
	28	22	12

12/22 native fishes threatened or extinct



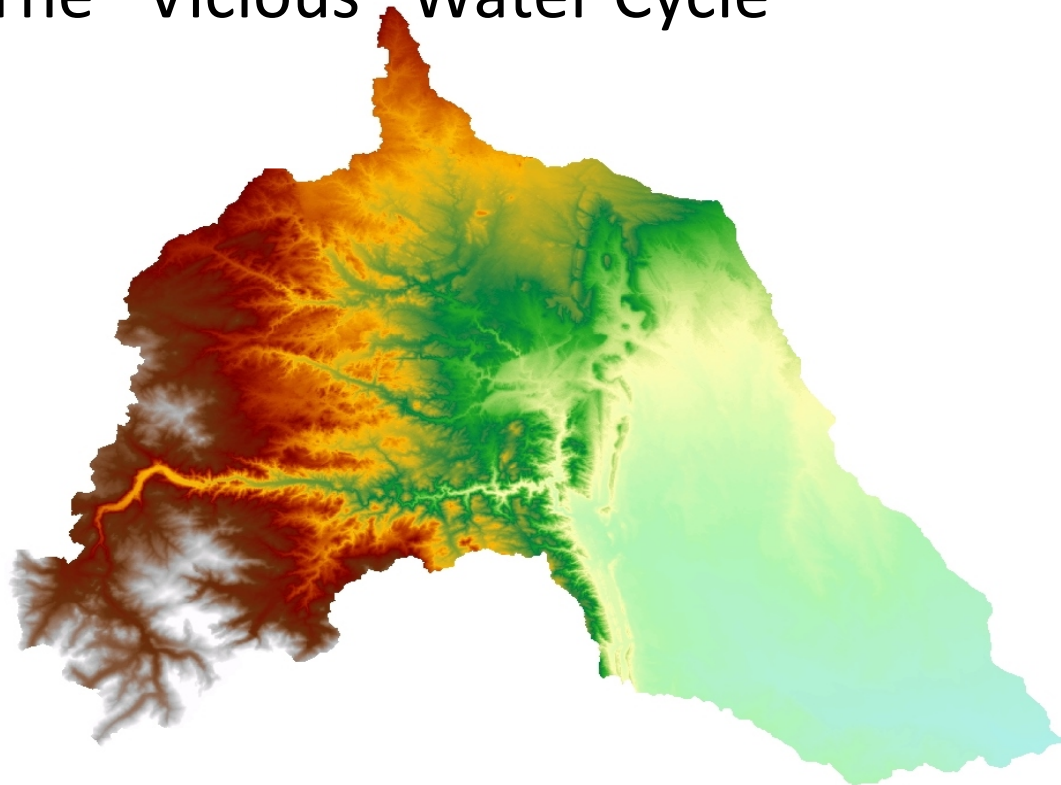
Floodplain connectivity in the contemporary Poudre River

- limited by channel stabilization and urbanization



Can we maintain and/or improve the ecological health of the Poudre River?

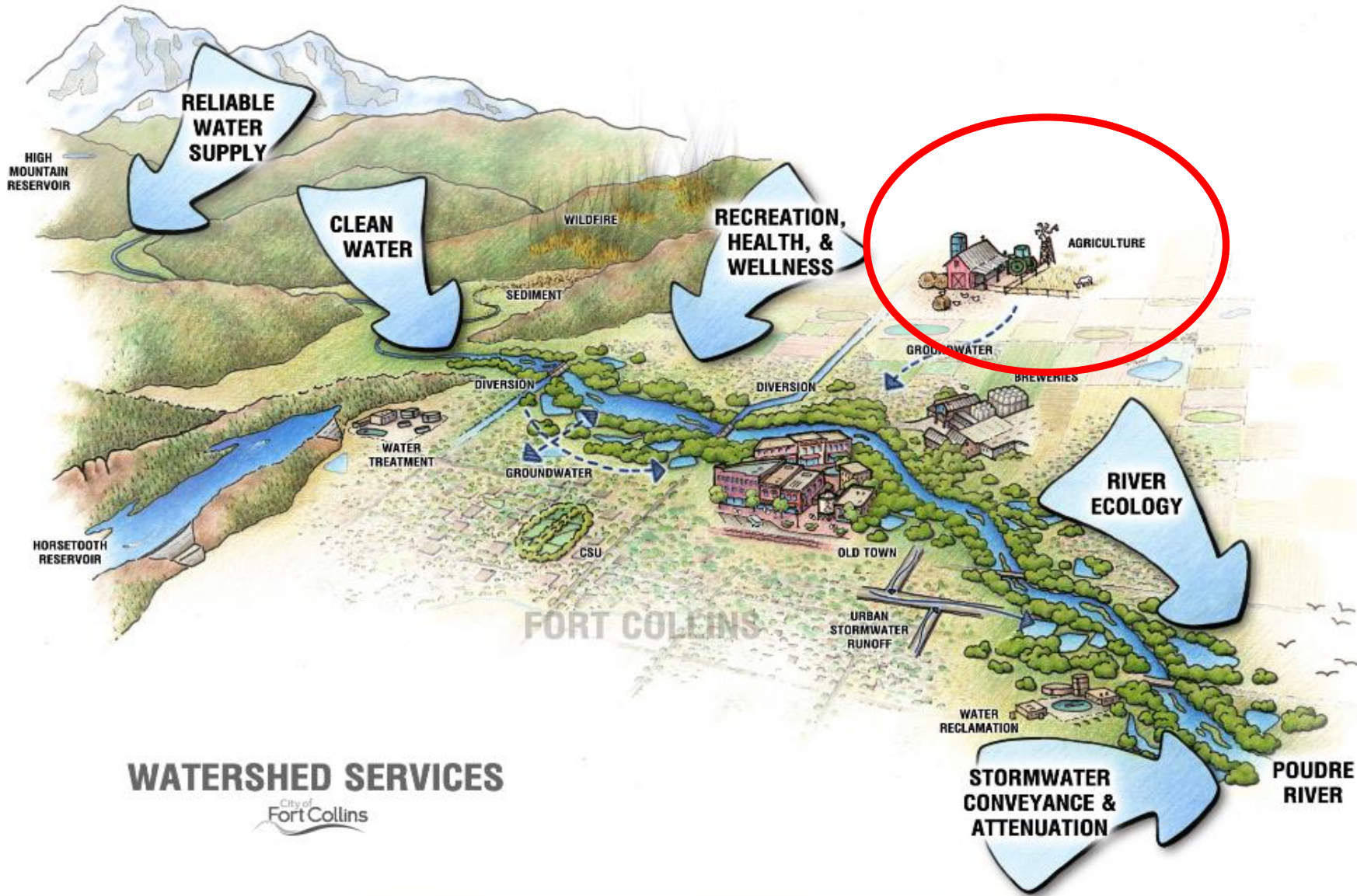
The “Vicious” Water Cycle



The “Virtuous” Water Cycle



Poudre River



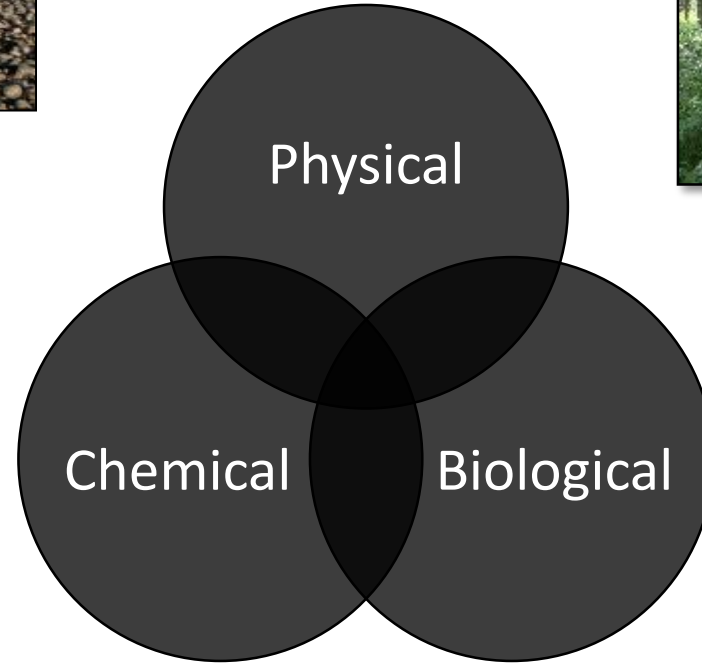
WATERSHED SERVICES
City of Fort Collins



How to measure a healthy river?

A	Reference	No management needed
B	Highly functioning	May need some management
C	Functioning	Management likely required
D	Functionally Impaired	Extensive, active management
F	Non-Functioning	Biologically unsuitable

Ecological Health of Poudre River Ecosystem



River Health Indicators by Reach

Zone	Canyon			Rural			Urban						Plains					
Reach	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Flow Regime	75	75	75	74	74	73	73	72	72	72	69	69	69	69	69	70	77	77
Sediment Regime	91	84	84	83	82	81	81	82	81	79	79	80	79	79	79	79	79	79
Water Quality	88	77	77	77	87	87	87	87	89	89	89	89	88	88	88	86	83	83
Floodplain Connectivity	78	82	85	74	65	85	62	61	87	50	67	71	70	77	50	98	82	71
Riparian Condition	85	87	85	77	73	74	64	69	76	63	65	70	71	73	70	76	71	68
River Form	82	74	72	79	68	78	67	74	76	70	78	74	75	77	67	74	75	69
Resilience	82	79	76	79	75	76	67	77	78	69	79	71	74	75	71	76	74	68
Physical Structure	76	74	71	82	72	79	66	77	79	77	81	79	77	76	63	74	74	69
Aquatic Life	80	81	73	76	76	76	77	78	72	74	79	79	85	85	85	78	78	78
River Health	81	79	78	77	74	75	70	74	78	70	74	74	75	76	70	78	76	71
	80			76			74						75					

Grading Scale	
A	100-90
B+	89-85
B	84-83
B-	82-80
C+	79-77
C	76-73
C-	72-70
D/F	69 or lower

An aerial photograph of a river winding through a lush, green landscape. The river is surrounded by dense trees and shrubs, with some sandy banks visible. The water appears slightly turbid. The text is overlaid on the image.

Take Home: River Health Assessment

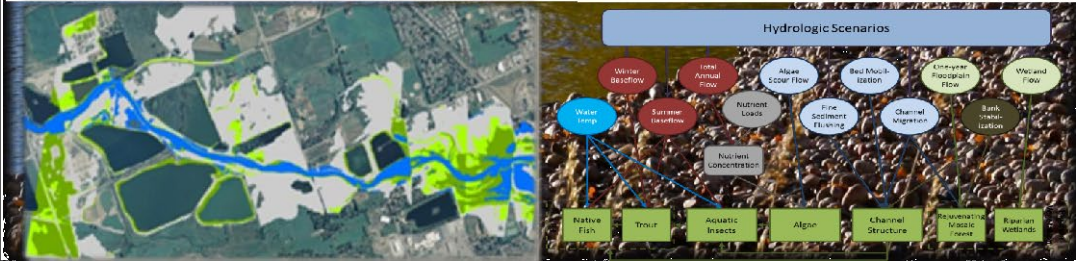
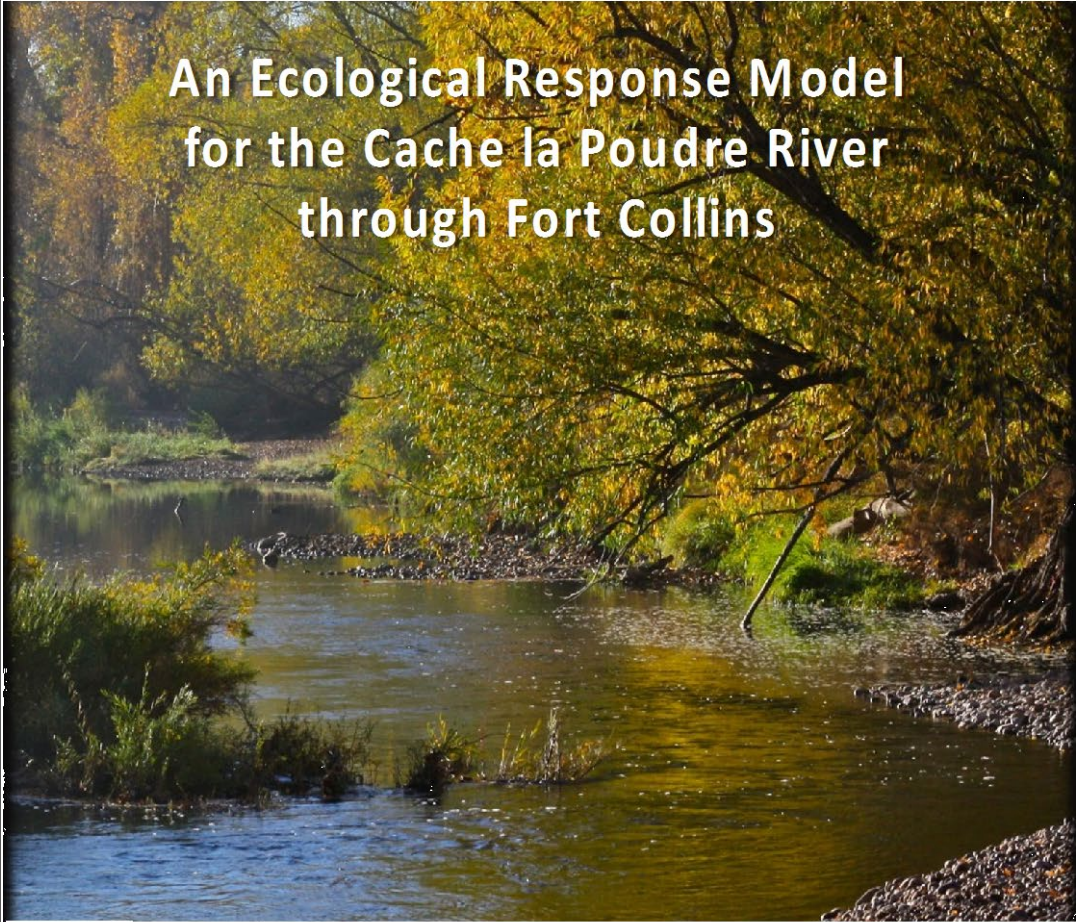
River is impaired and sensitive to further degradation

What does the **FUTURE** hold?

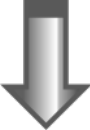
City of Fort Collins - ERM



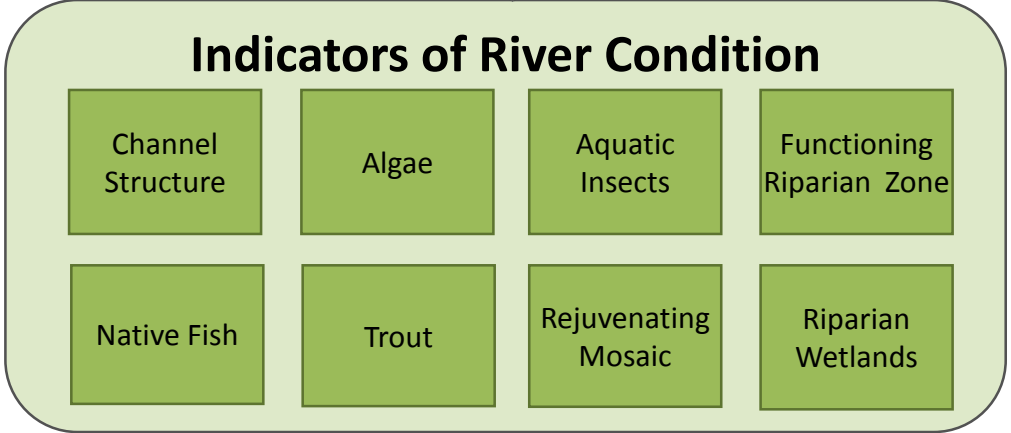
An Ecological Response Model
for the Cache la Poudre River
through Fort Collins



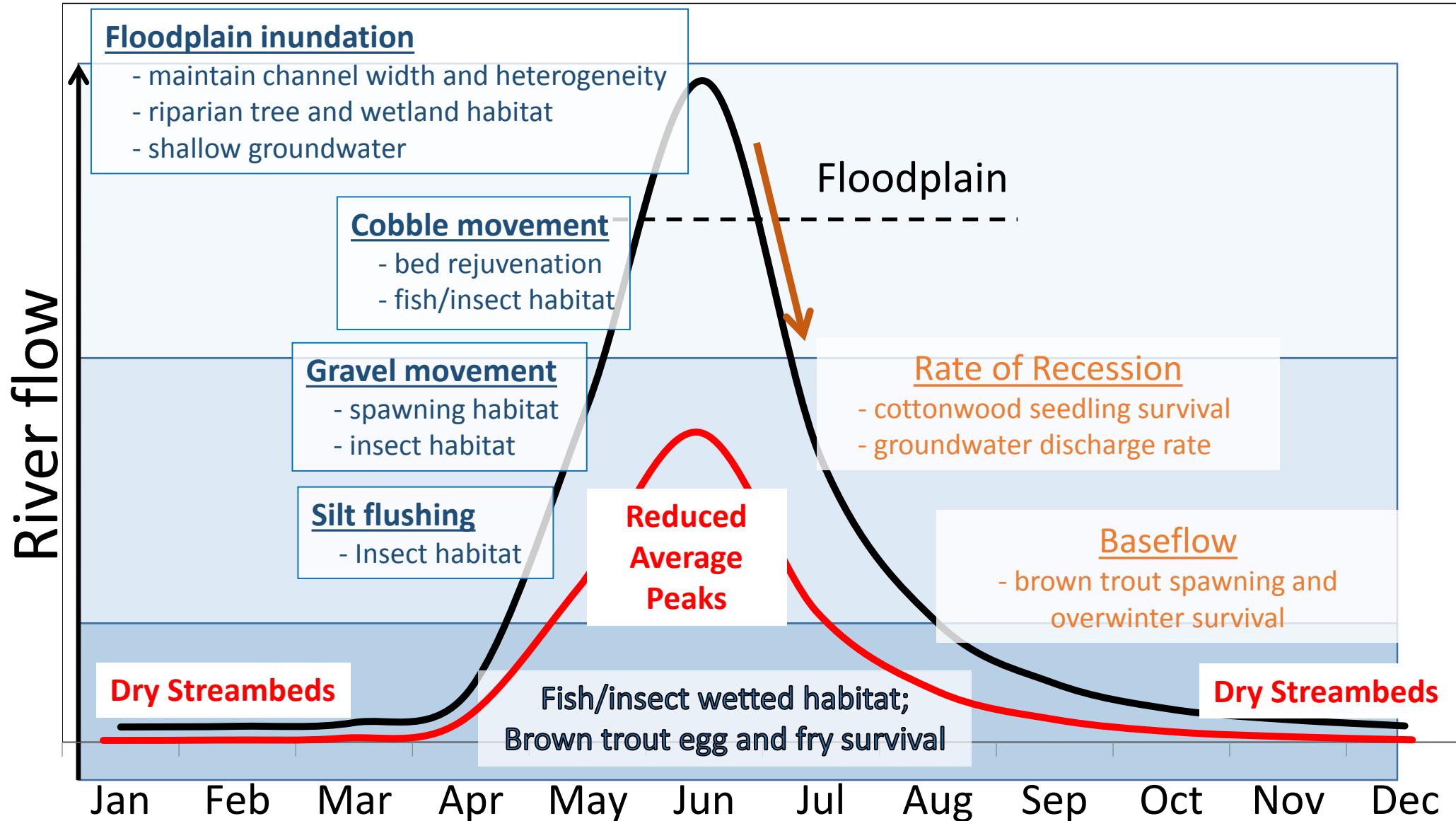
Flow Scenarios



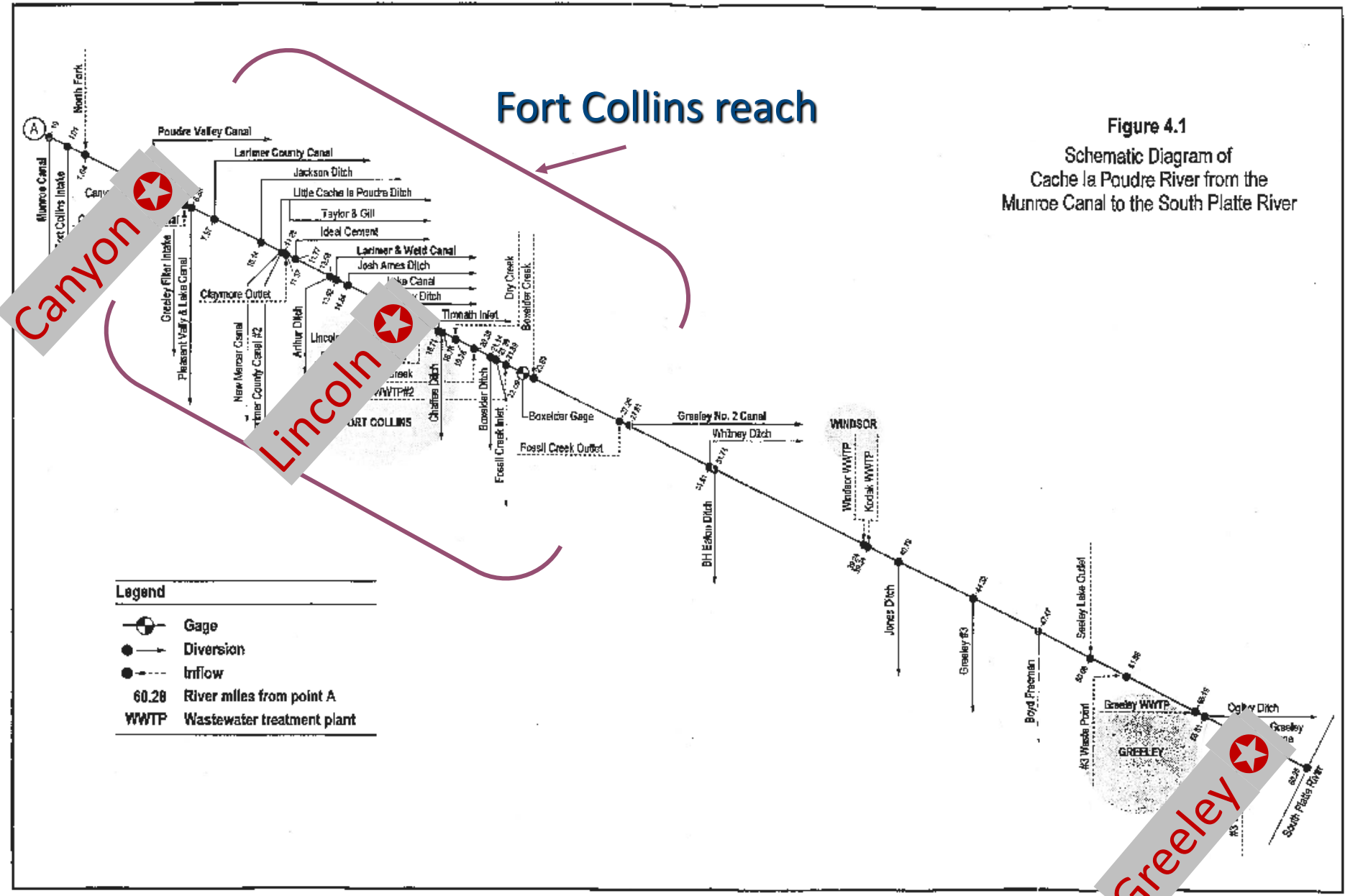
Key Reach Scale Drivers
(physical, chemical)

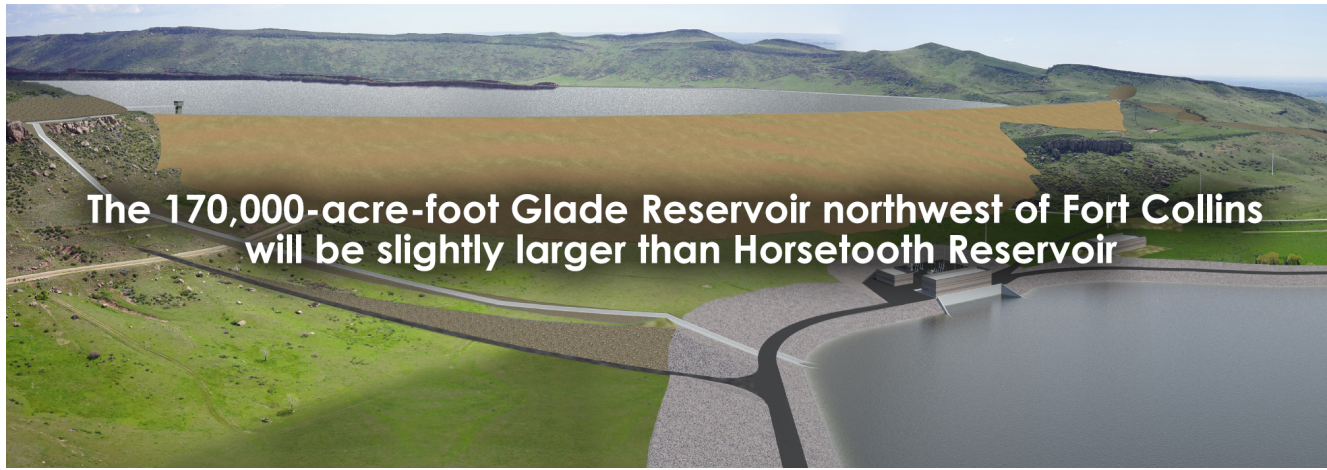


Poudre River Hydrograph: Key to Sustaining Ecosystem Functions

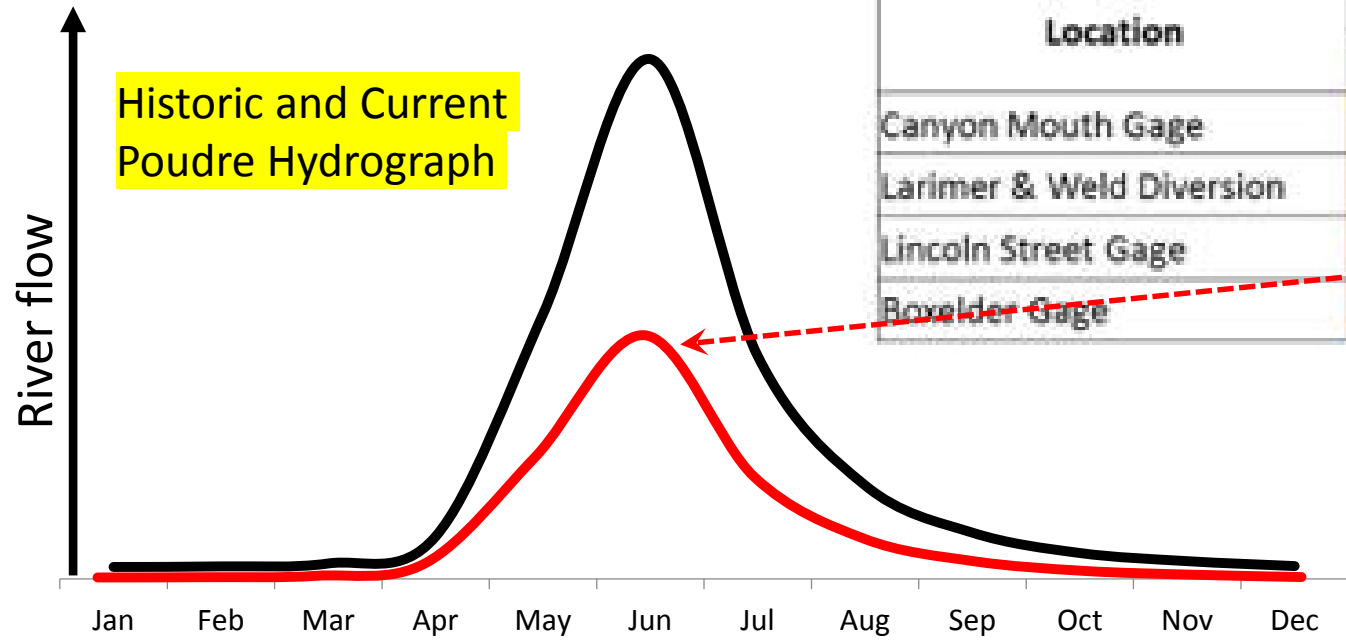


Main Cause of Severely Altered River Flows





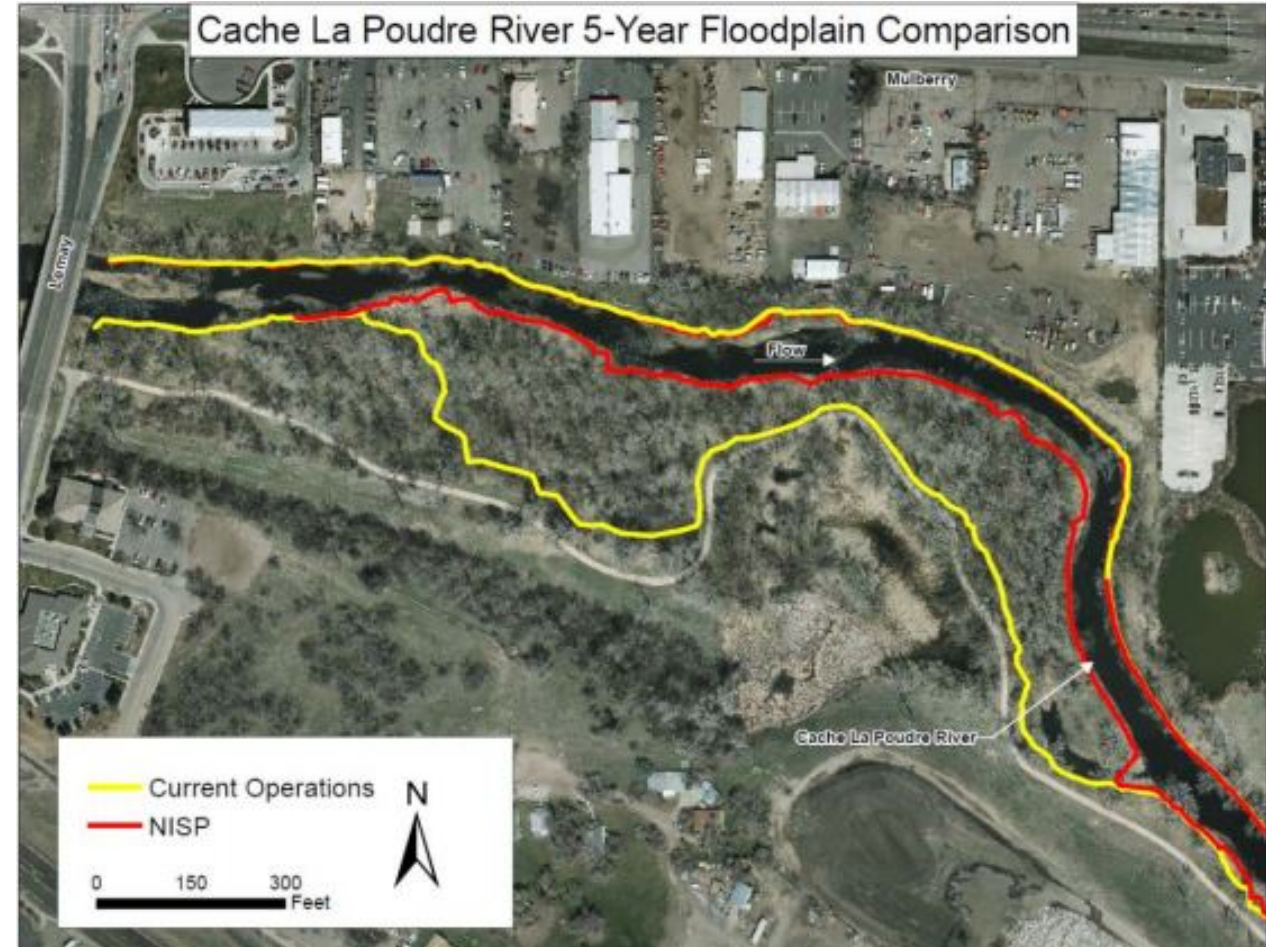
Projected changes in flows with NISP



Location	Average Percent Reduction in Total Streamflow			
	Annual	Runoff	Post-Runoff	Winter
Canyon Mouth Gage	-11%	-14%	-4%	-15%
Larimer & Weld Diversion	-12%	-20%	-6%	15%
Lincoln Street Gage	-11%	-22%	4%	29%
Bozelder Gage	-27%	-27%	-17%	-45%

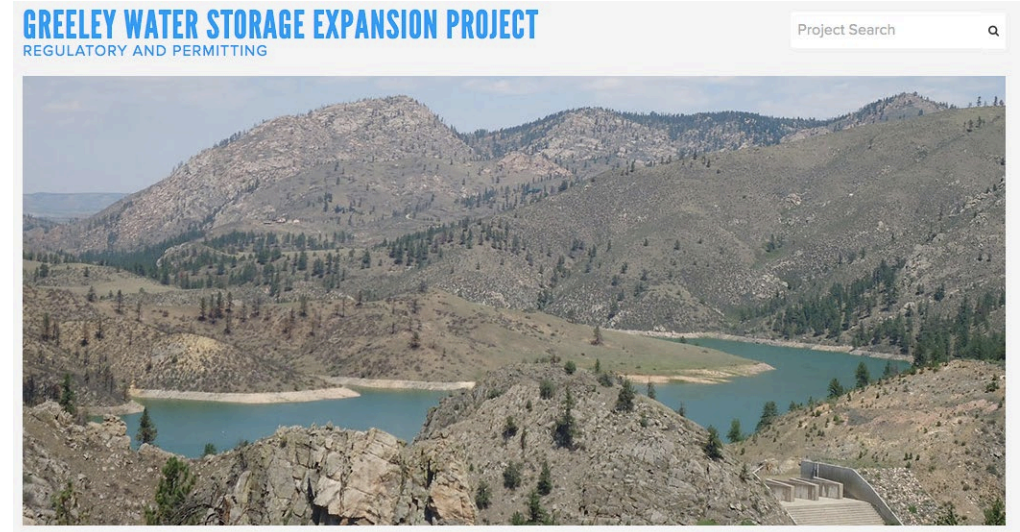
Reduced overbanking flows will lead to ...

- Direct gradual narrowing
- Thresholds: switch to upland or dominated by non-natives/pond like system
- Vegetation moving into the channel, smaller river



What's "next"?

Will we "work" the Poudre to death?!



Towards a longer-term "solution"???

Landscape our river corridors, not our lawns!