

Indian Valley Restoration and Water



Luke Hunt

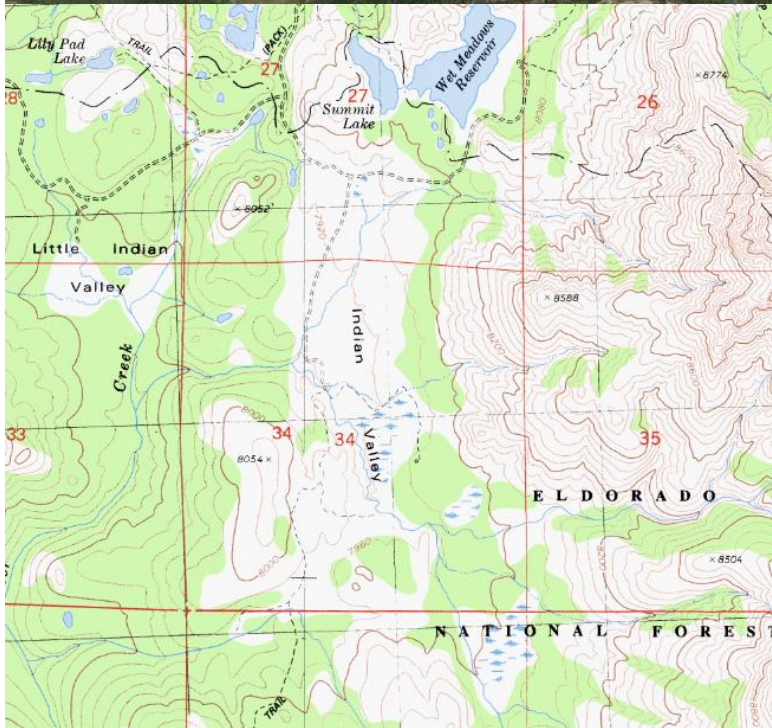
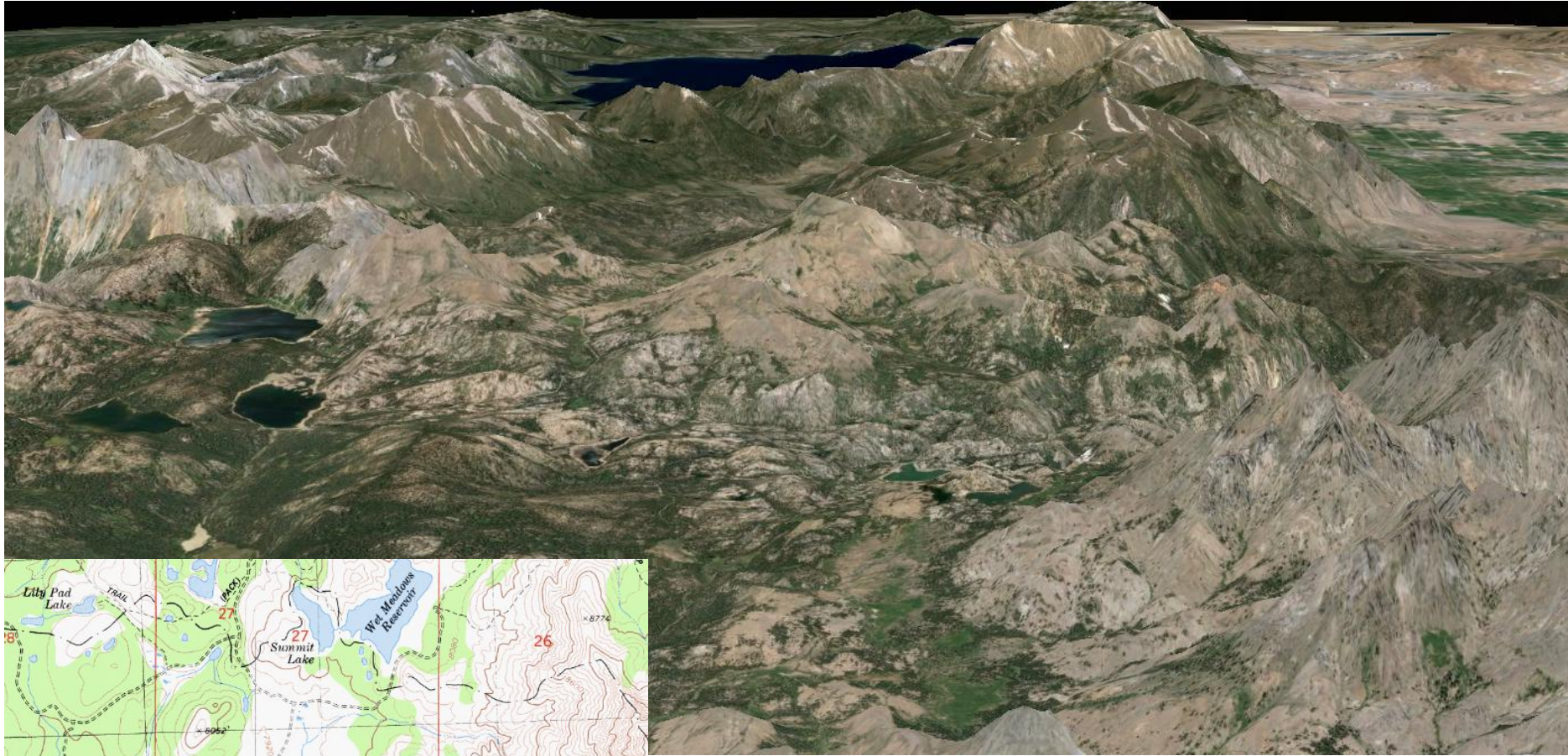
Director of Headwaters Conservation
American Rivers

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American Rivers
Rivers Connect Us

Julie Fair, Max Odland: American Rivers
Austen Lorenz: SF State University



Indian Valley

1. Flow
2. Groundwater
3. Damage and Recovery



7-14-55



7-28-56



7-14-55

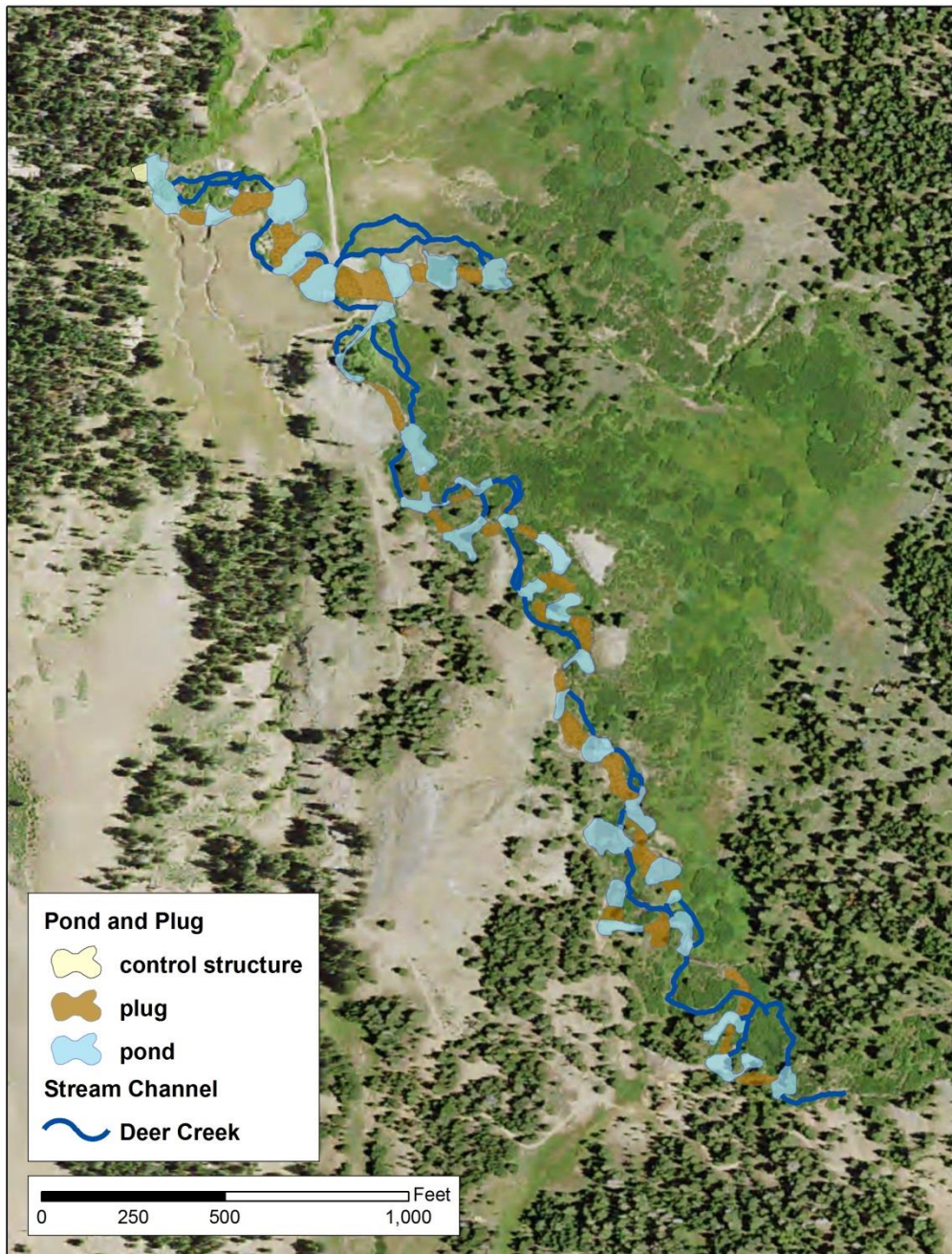


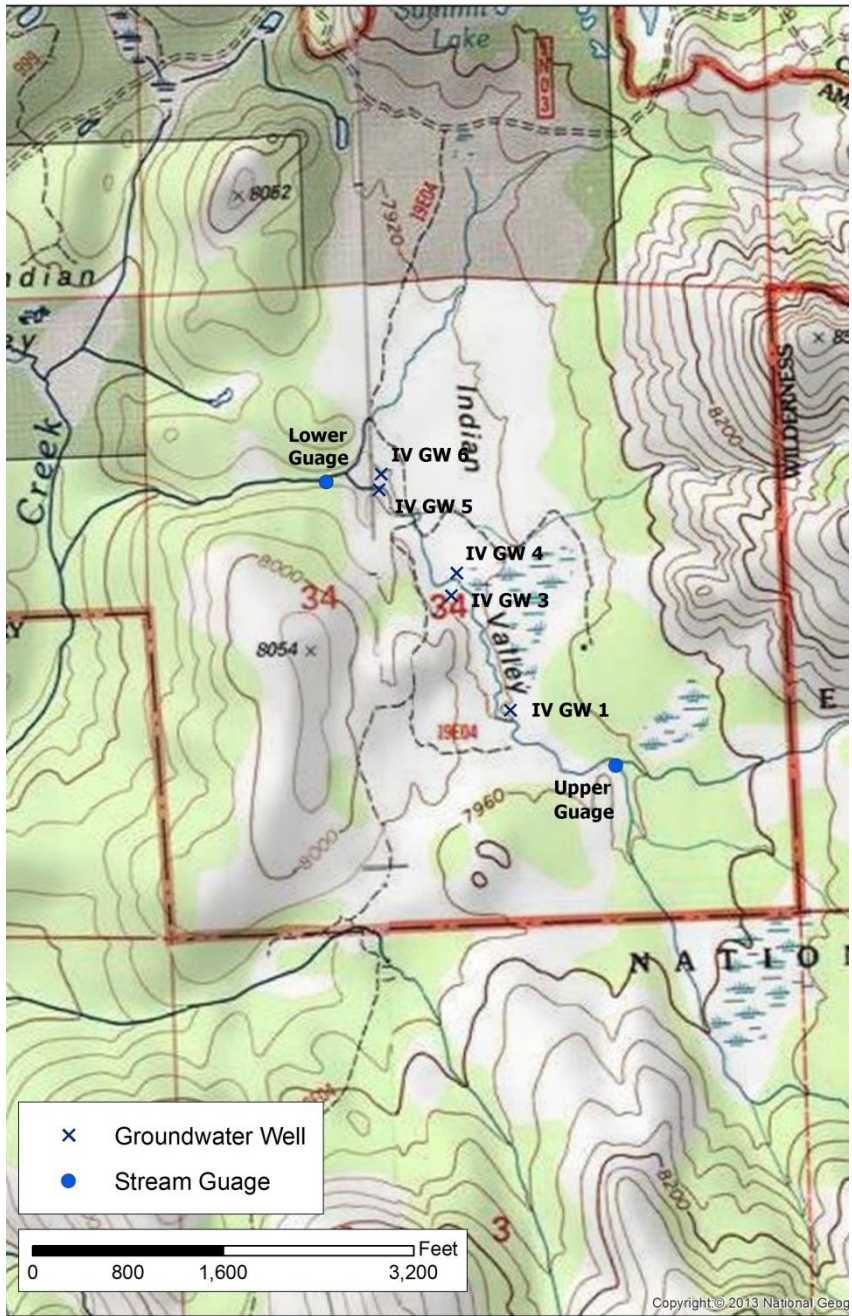
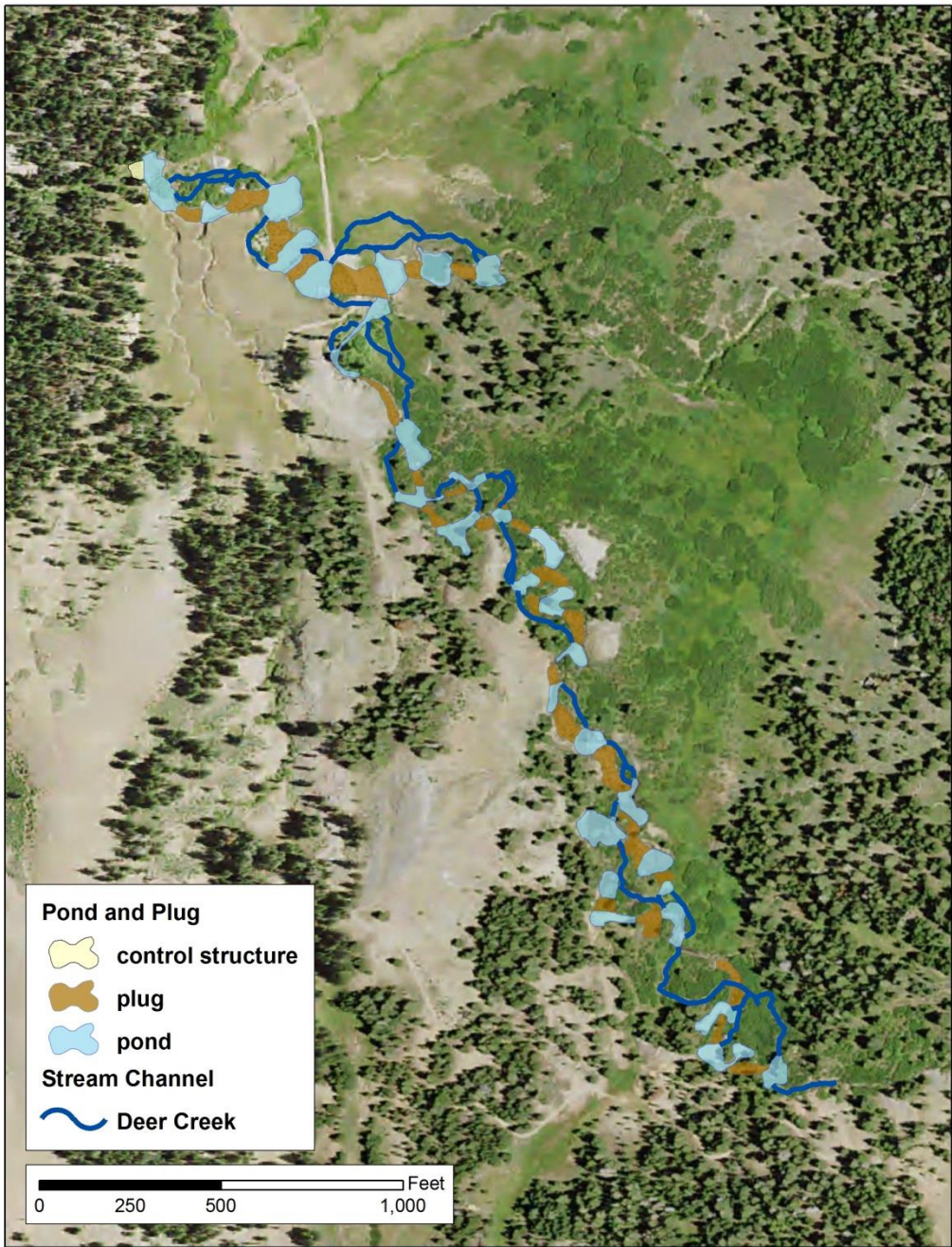
Indian Valley

3.5 acres of pond

2.0 acres of fill

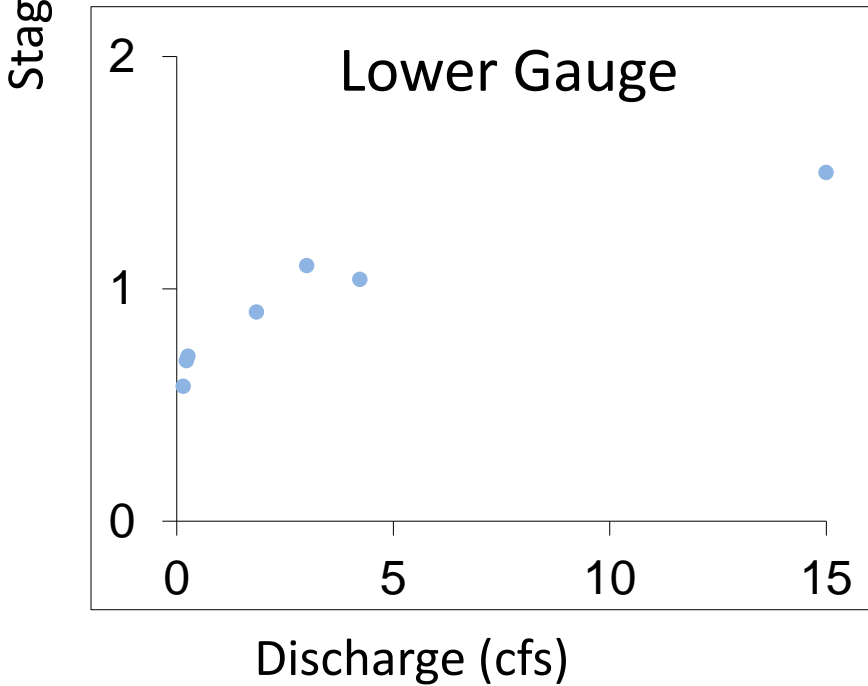
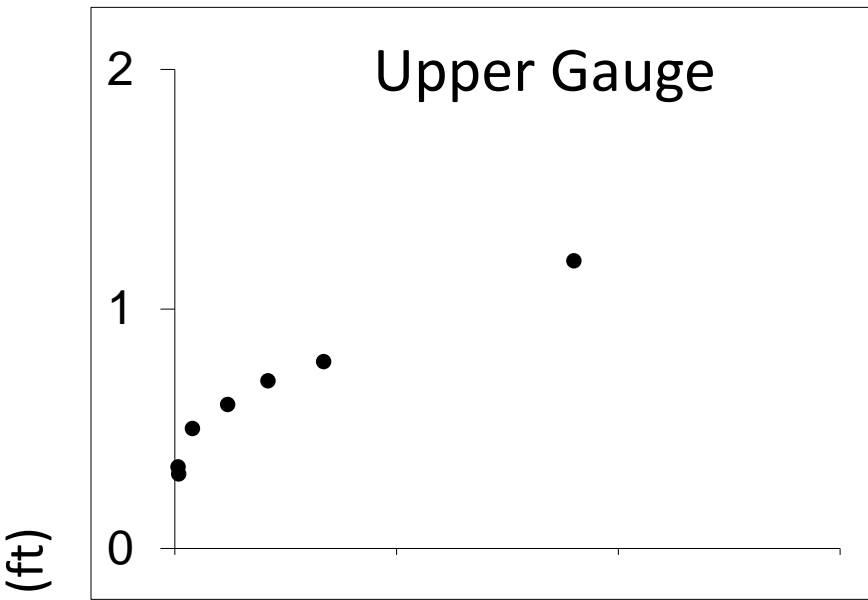
1.2 miles of channel

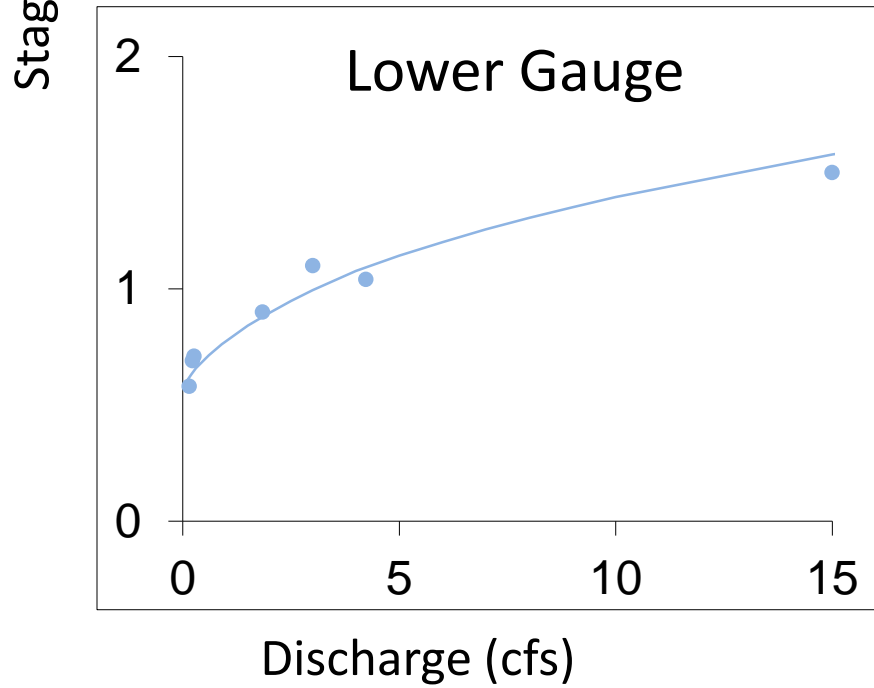
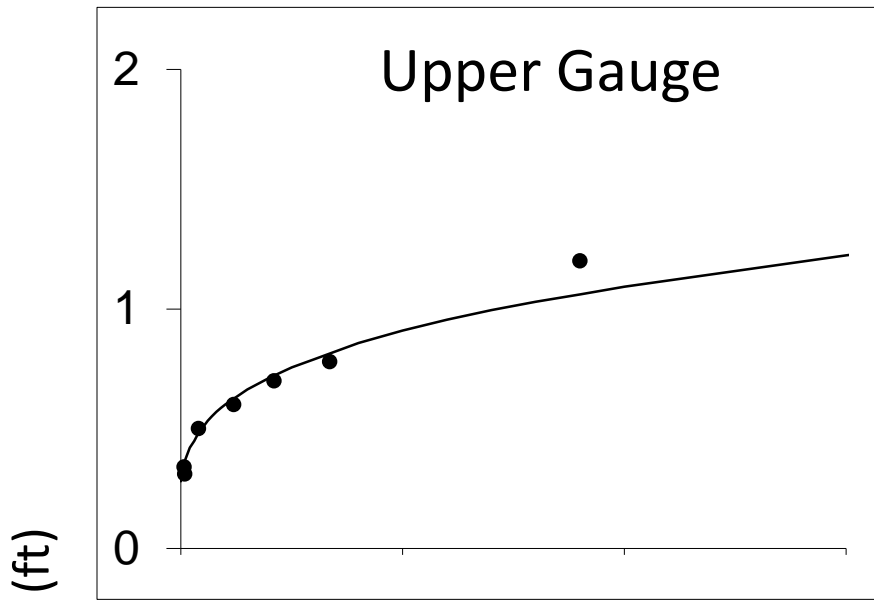




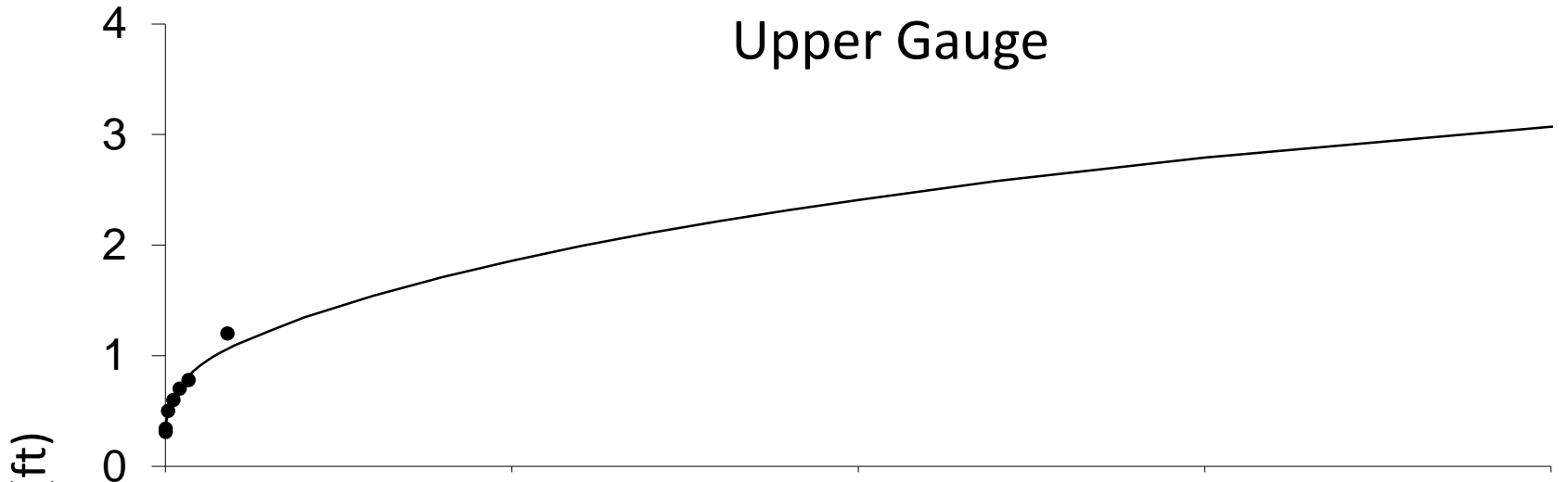




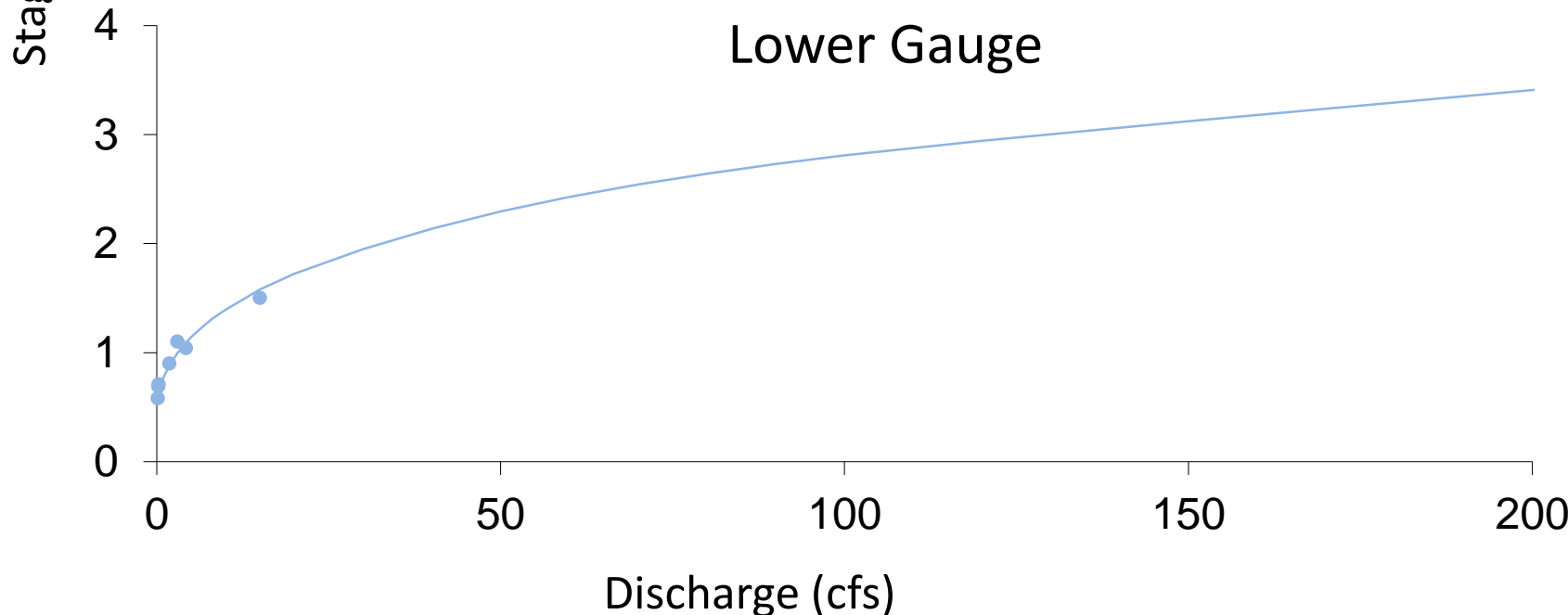




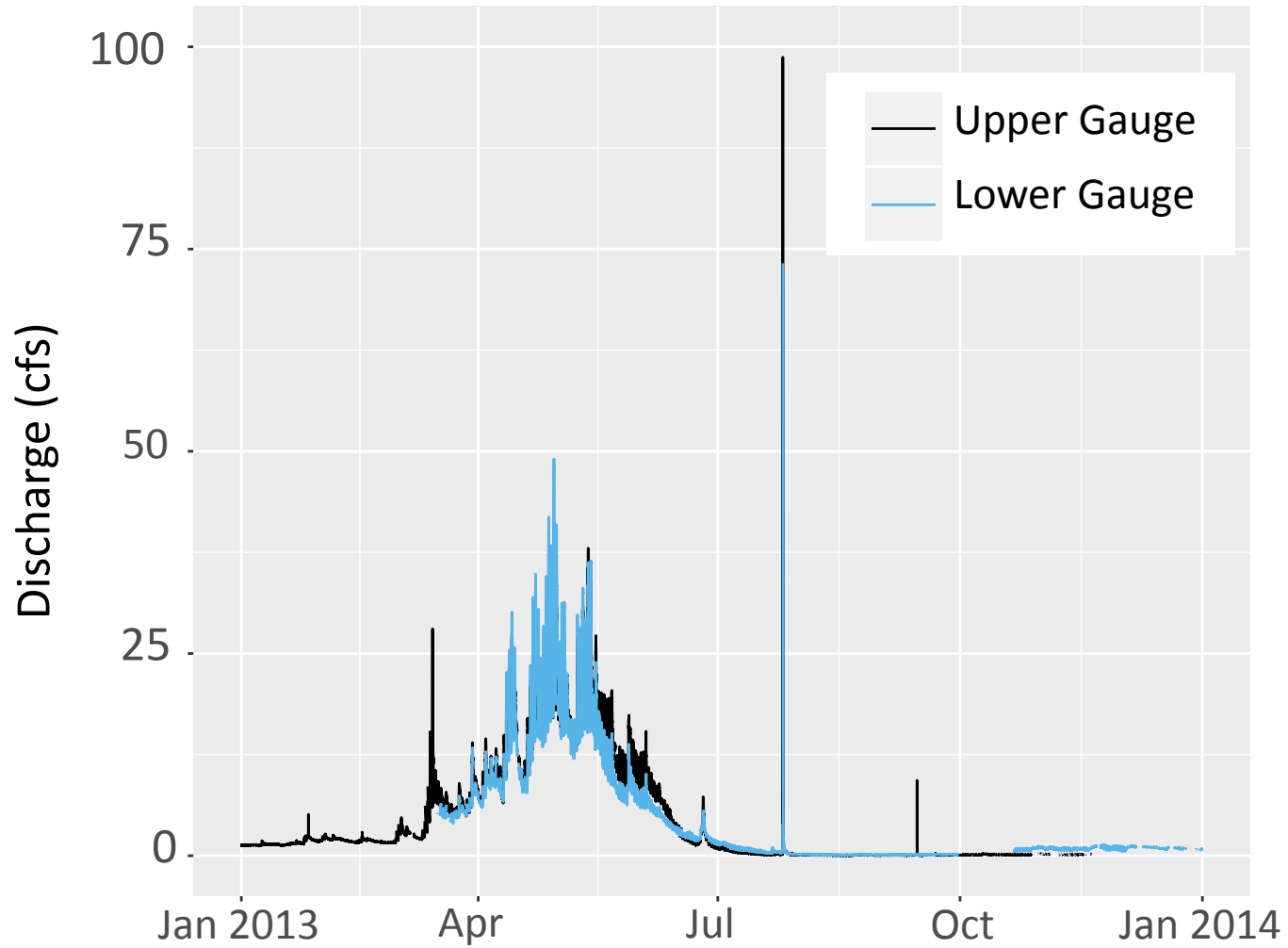
Upper Gauge



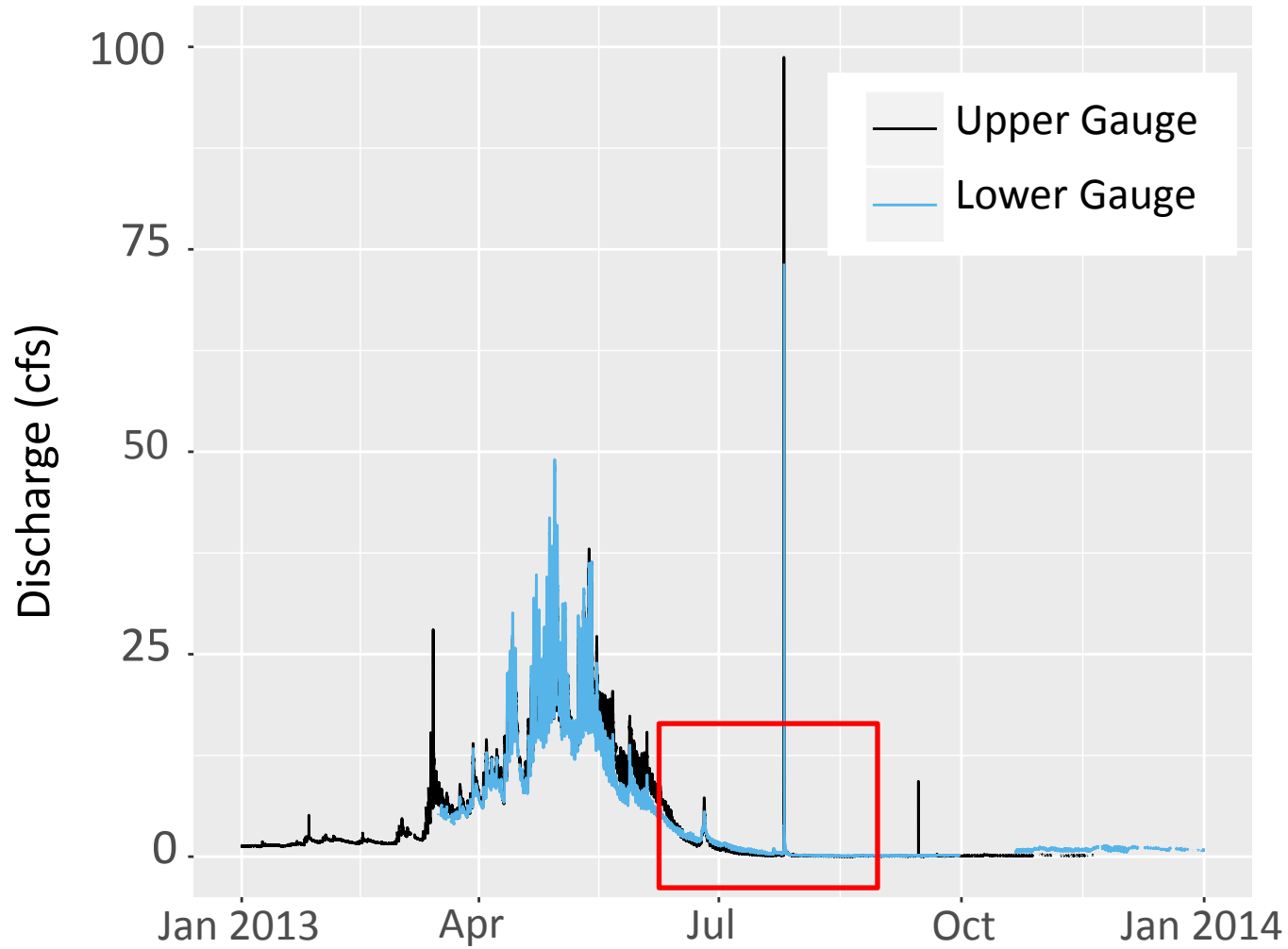
Lower Gauge



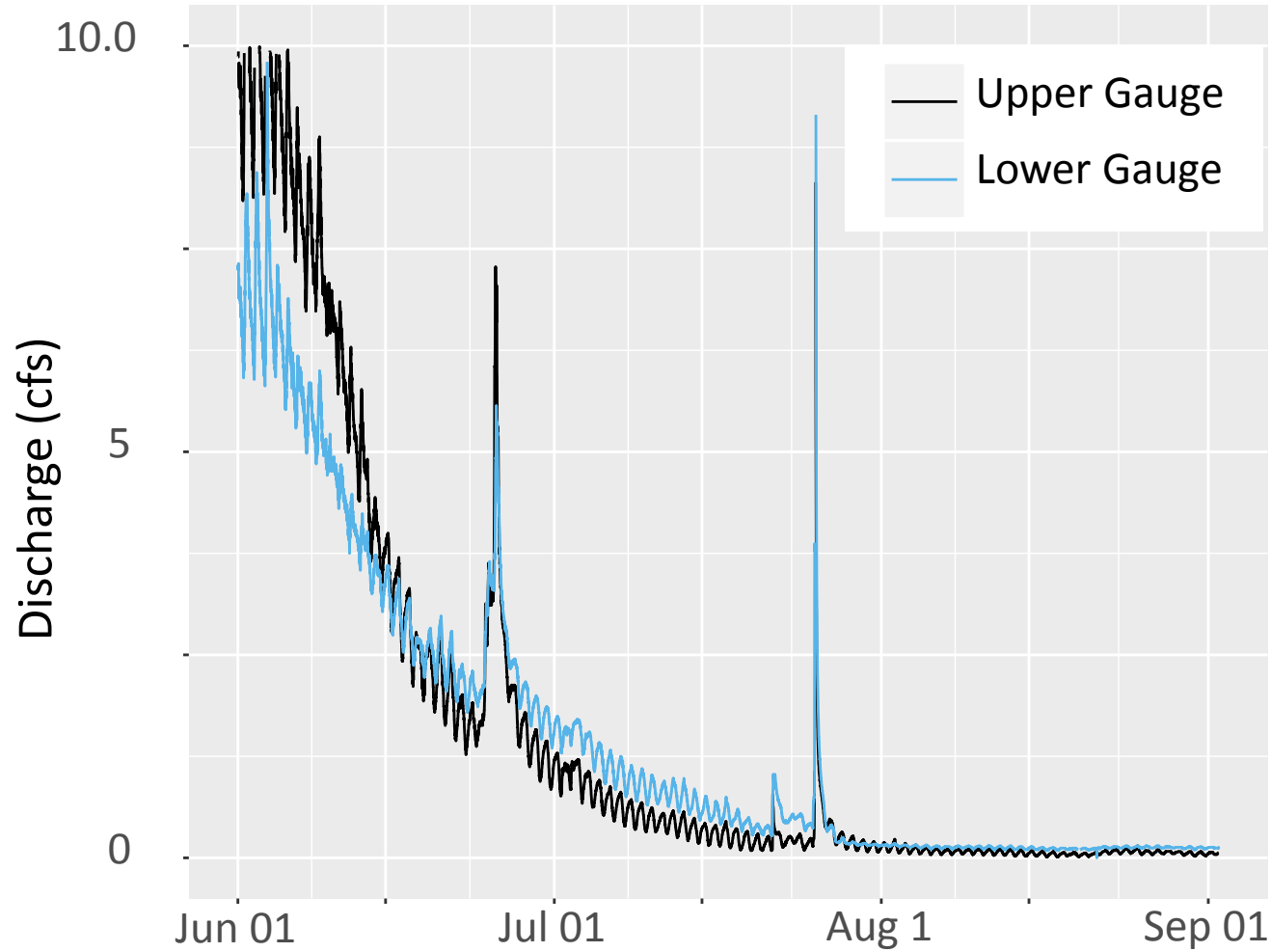
Annual Flow



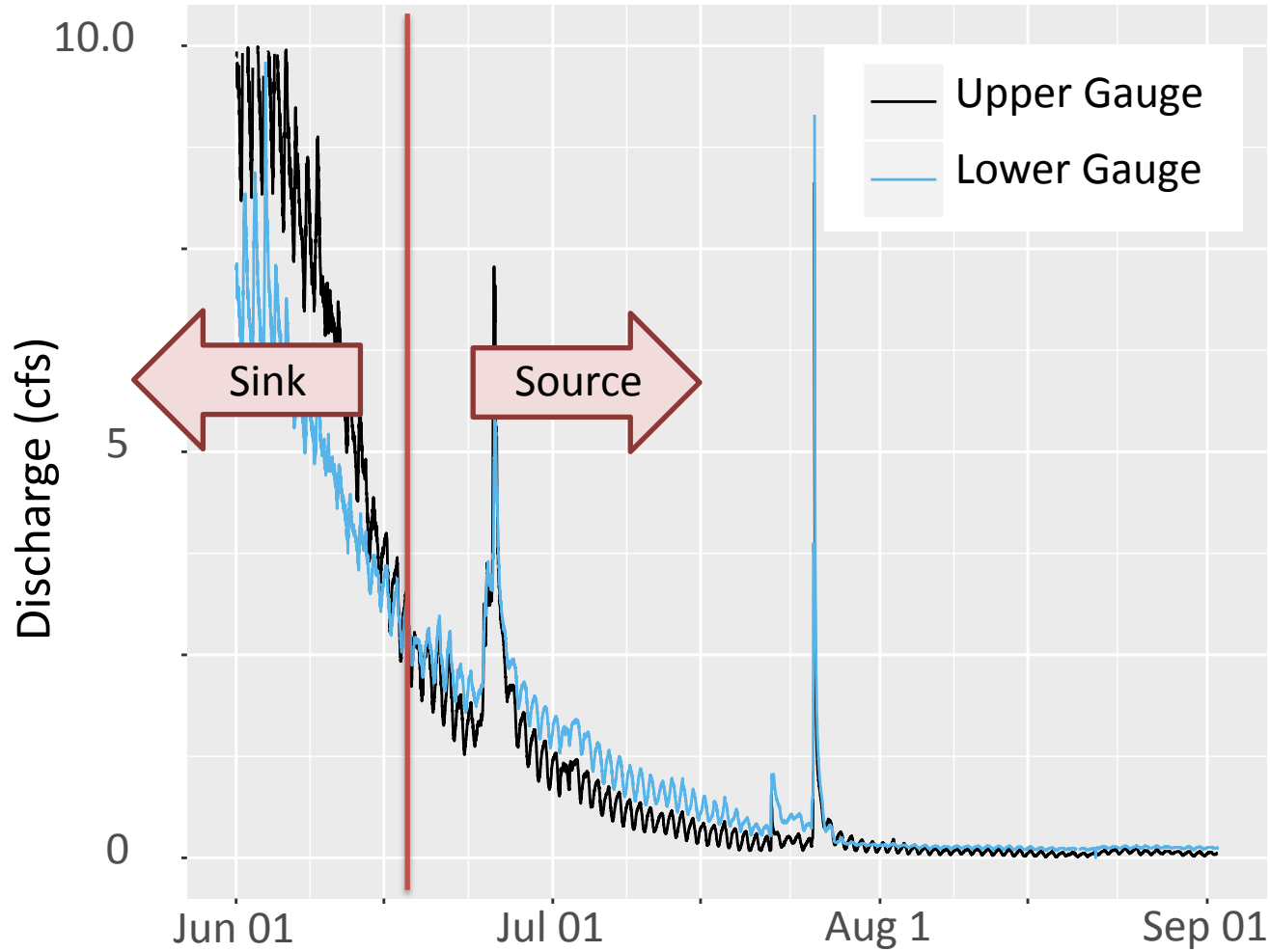
Annual Flow

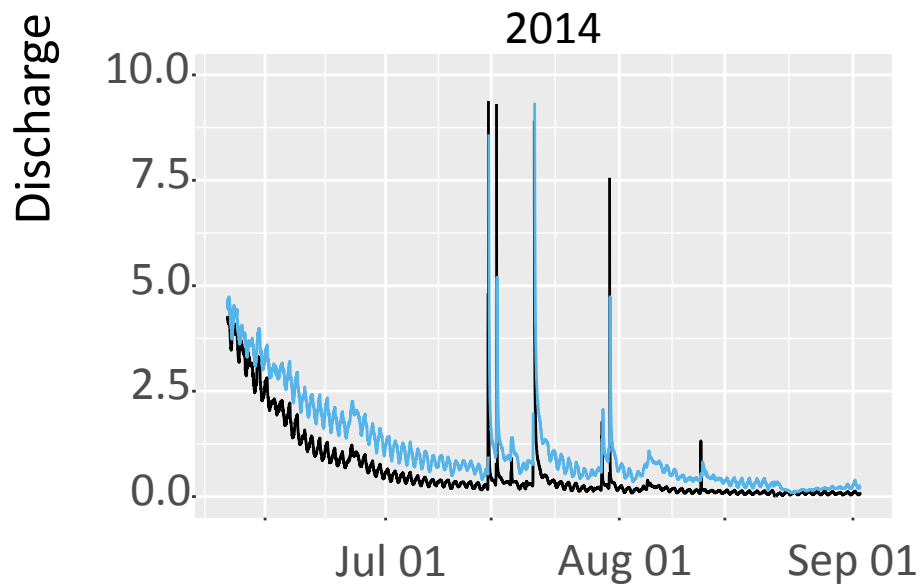
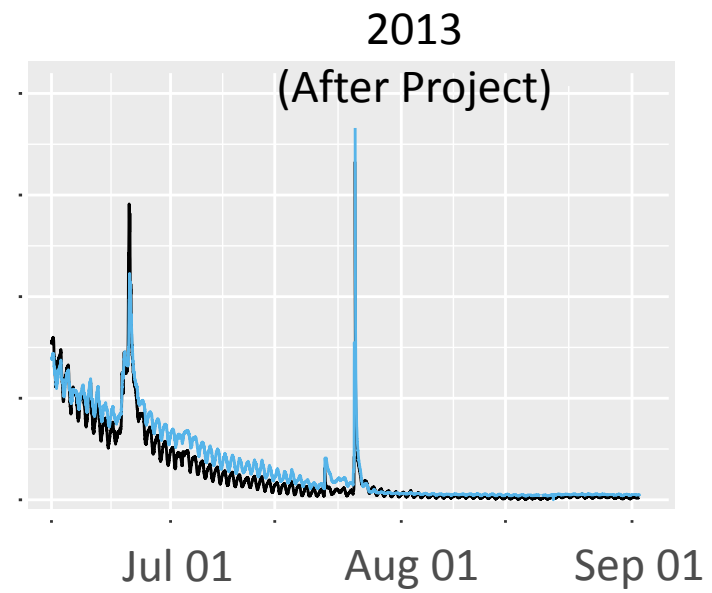
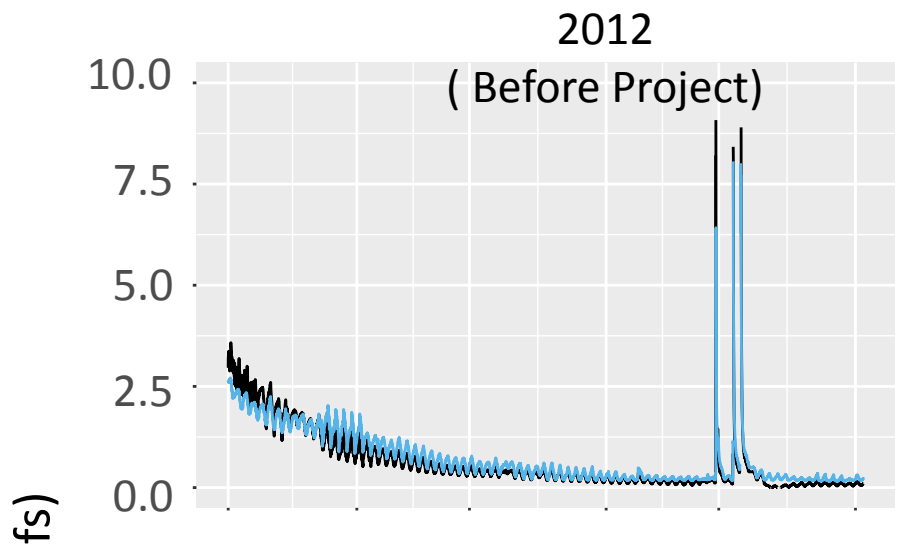


Summer Flow



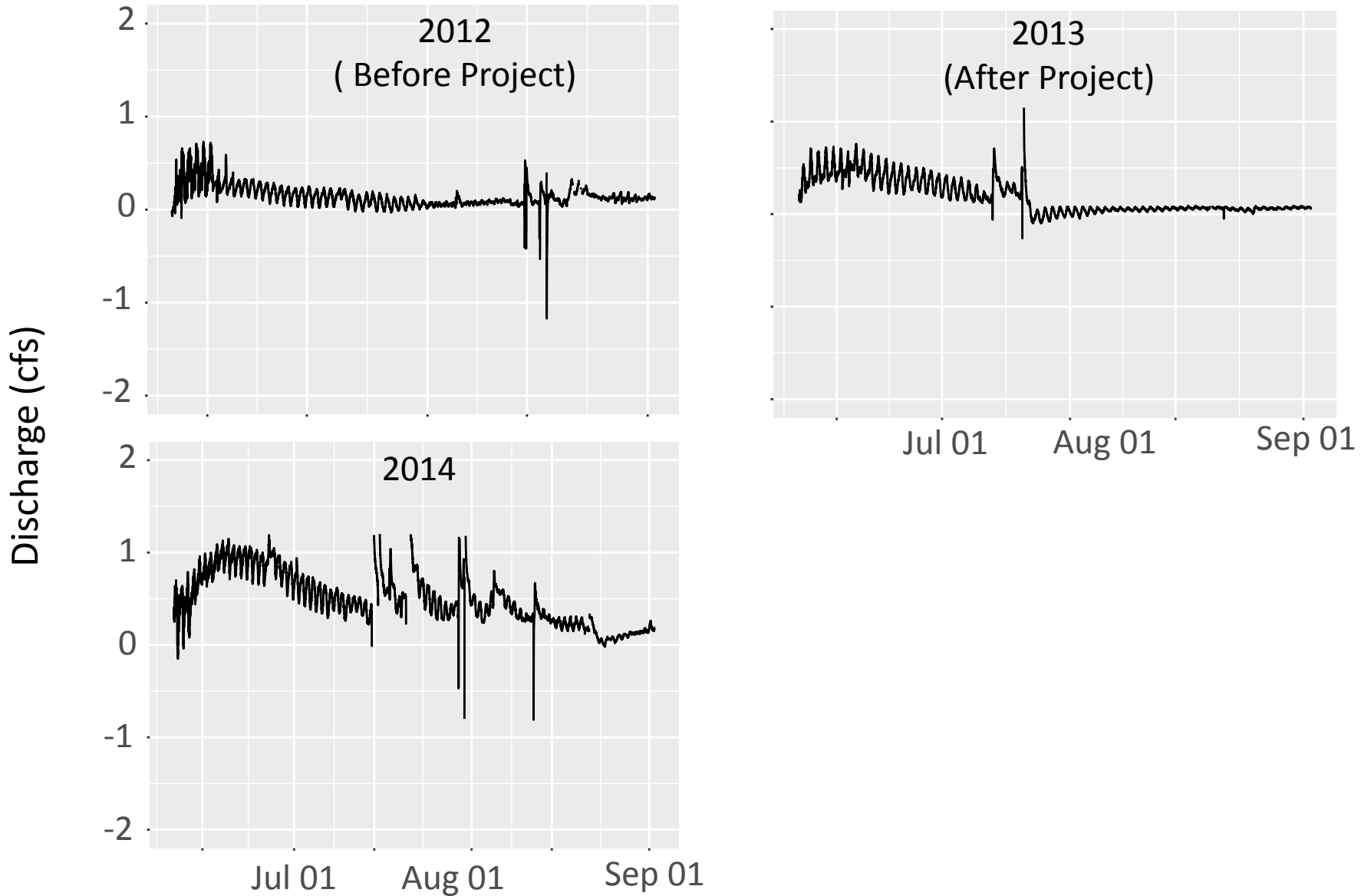
Summer Flow



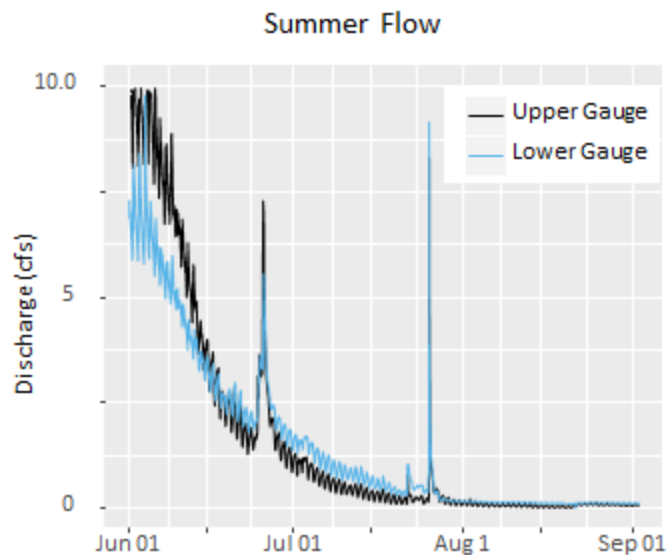


How Much?
When?

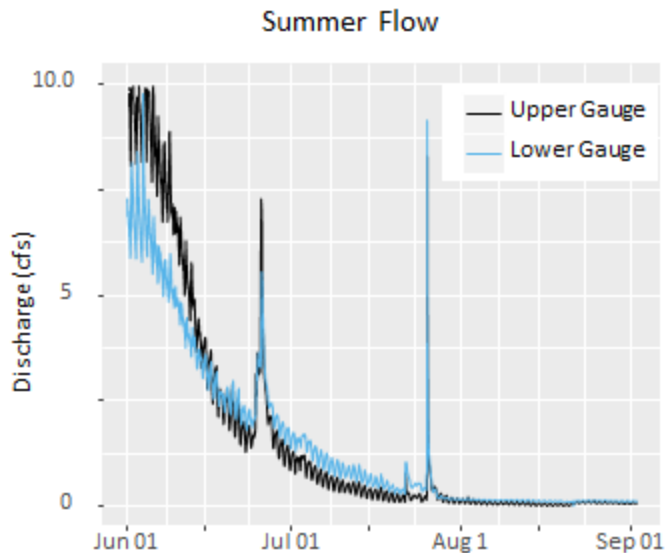
Difference (Outflow – Inflow)



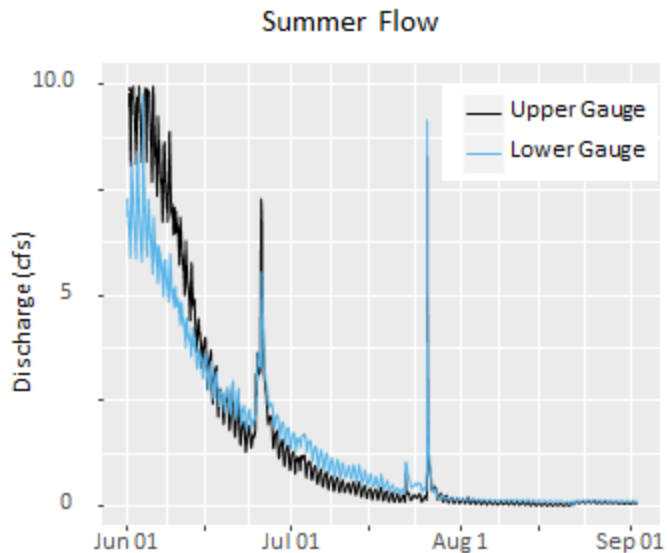
Year	Snow Water Eq May 1 (in)	Total Summer Inflow June-Sept (acre-ft)	Crossover Date (Outflow > Inflow)	Meadow Subsidy June-Sept (acre-ft)
2012	13	18.6	6/26	2.6
2013	10	19.9	6/17	5.4
2014	11.9	13.4	6/9	15.2



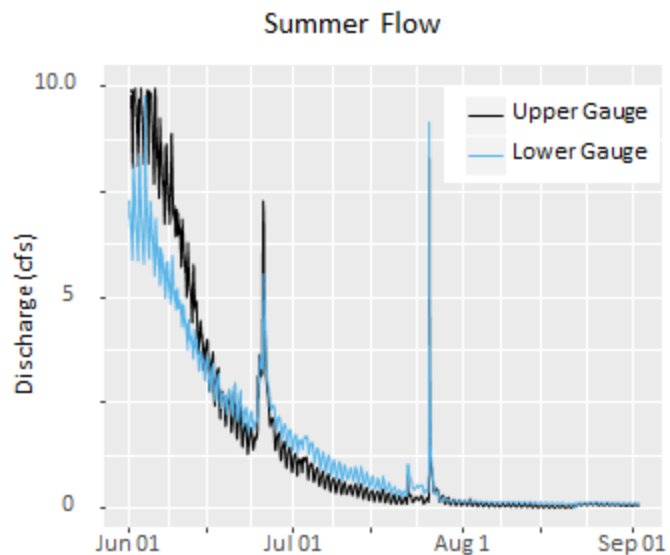
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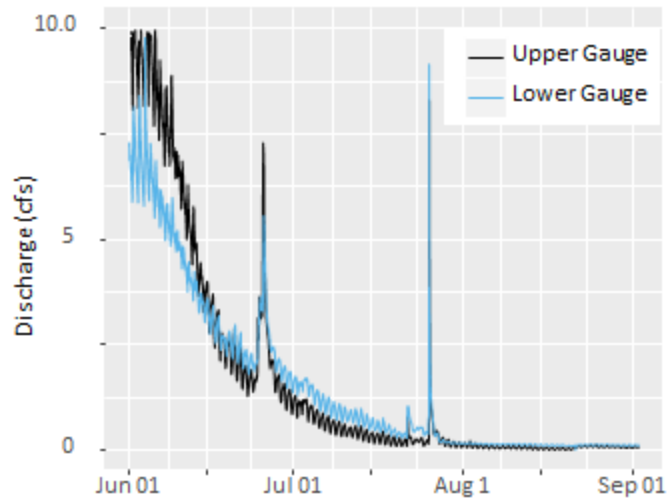


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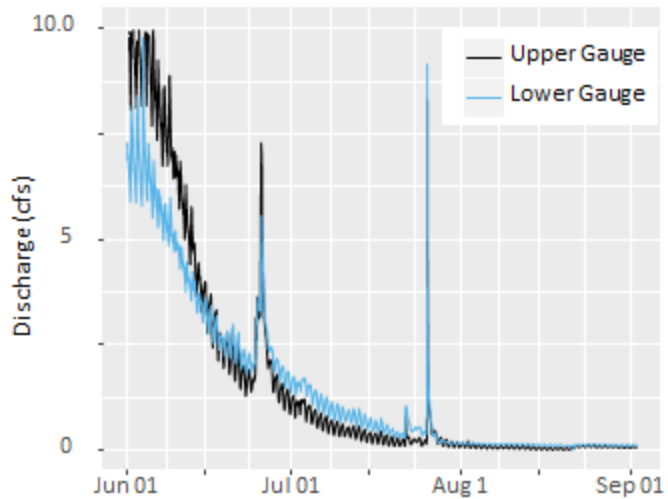
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Summer Flow



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2015	0			

Summer Flow



9/4/2012 Pre-Project

Year Snow
Water Eq
May 1 (in)

2012	13
2013	10
2014	11.9
2015	0



8/15/15

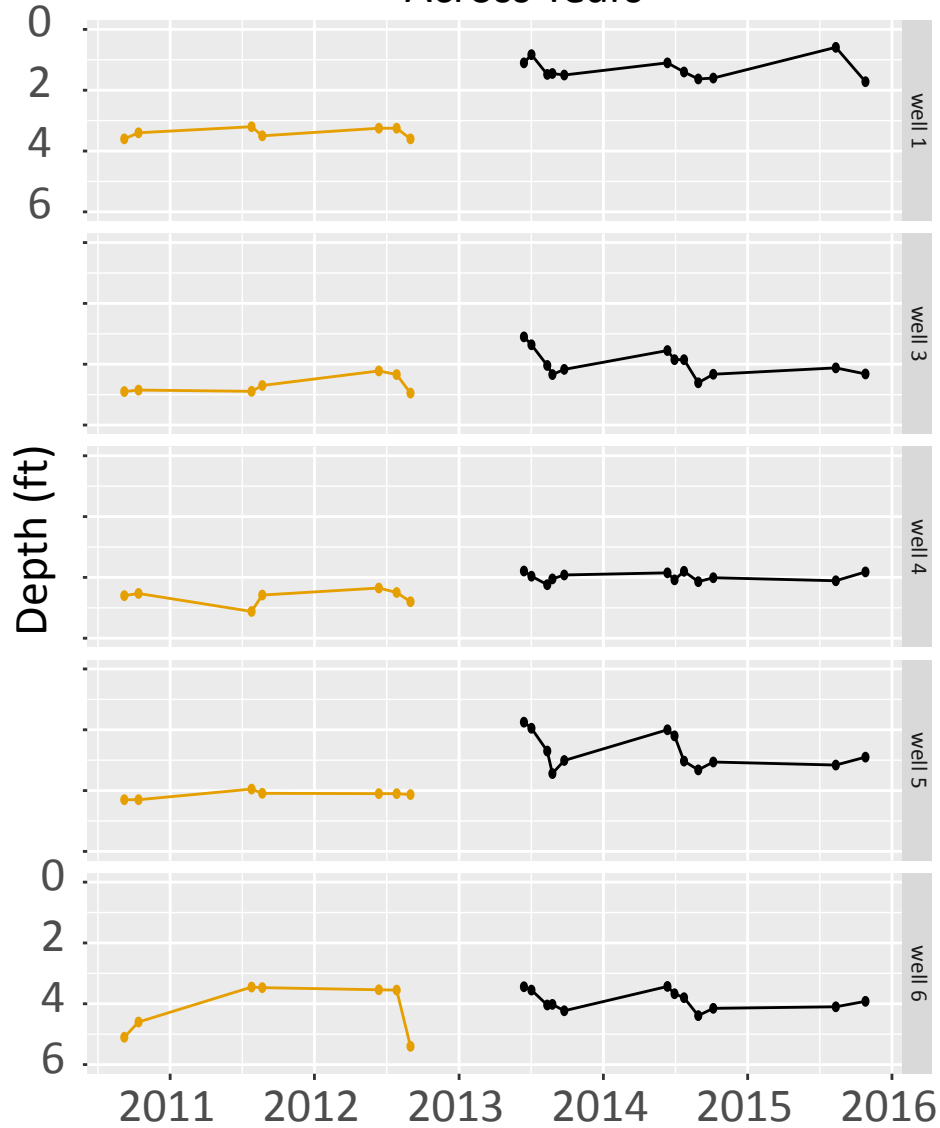


9/10/15



Groundwater Depth

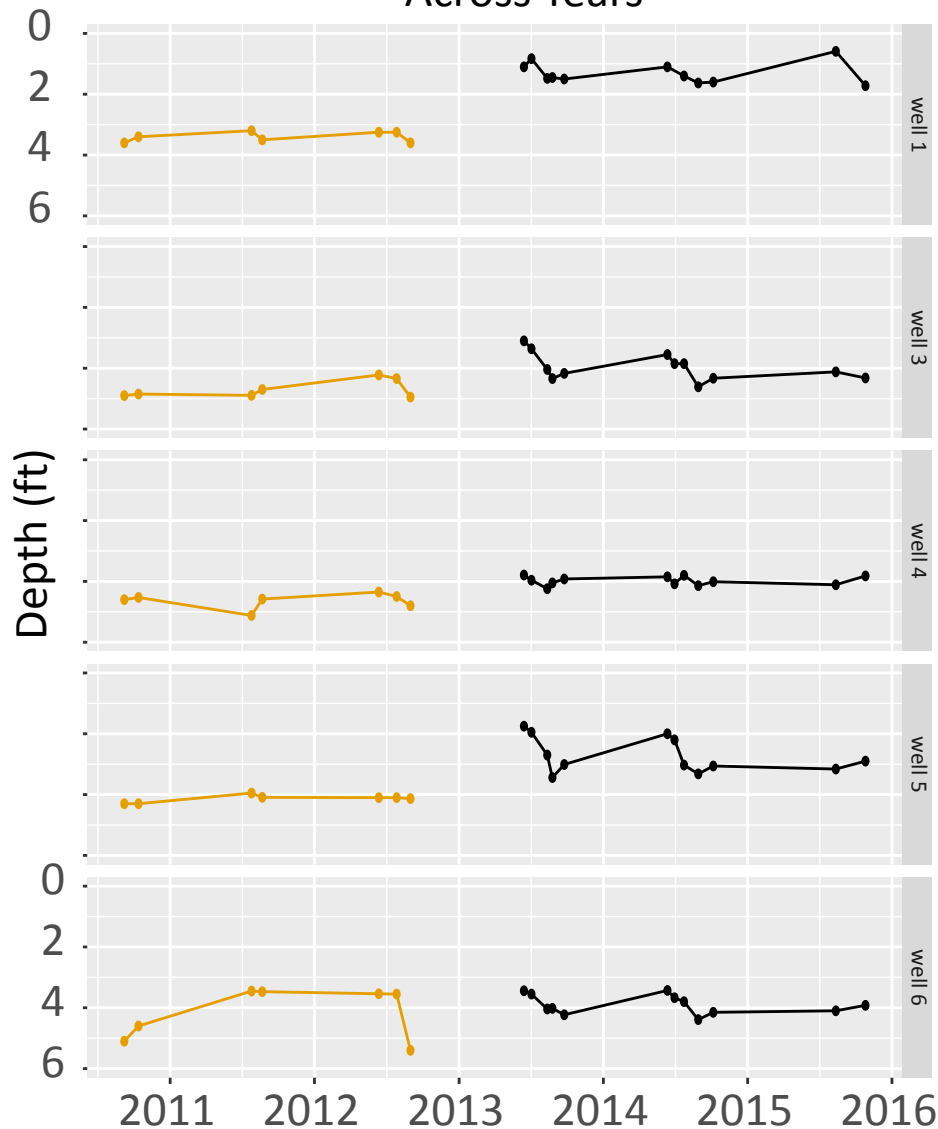
Across Years



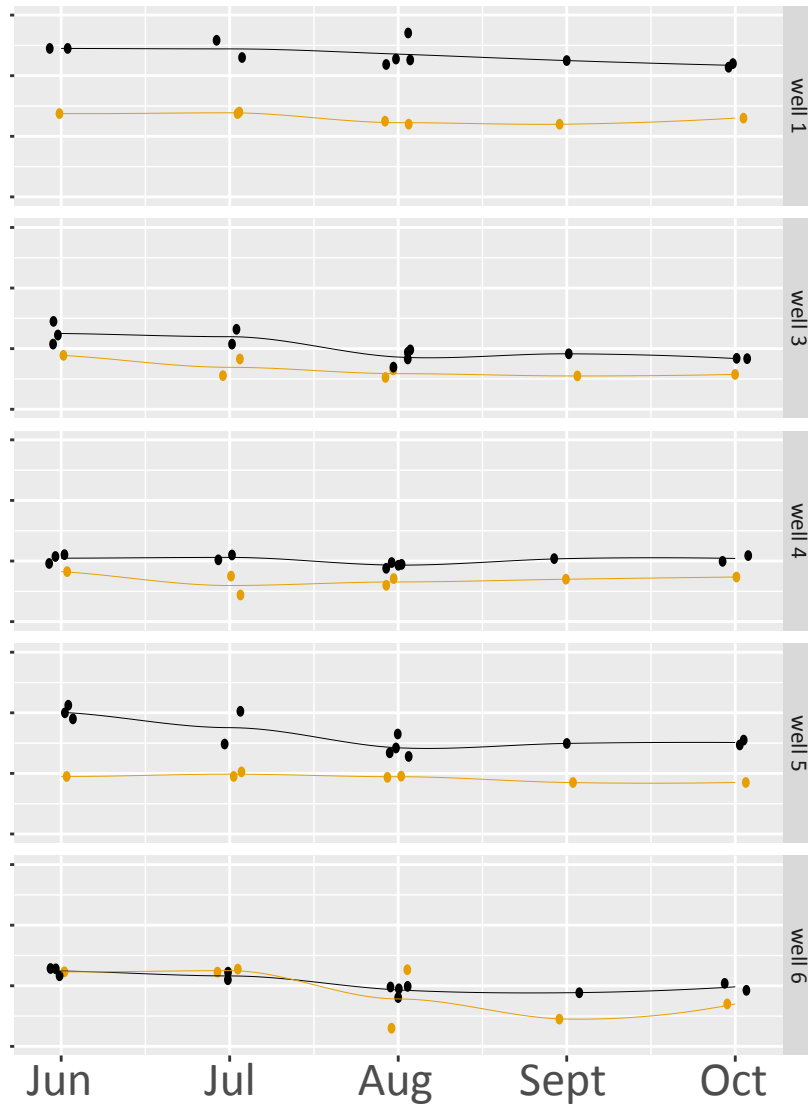
— Before
— After

Groundwater Depth

Across Years



By Month



Groundwater Depth

Rise in Groundwater Level
after Project

By Month

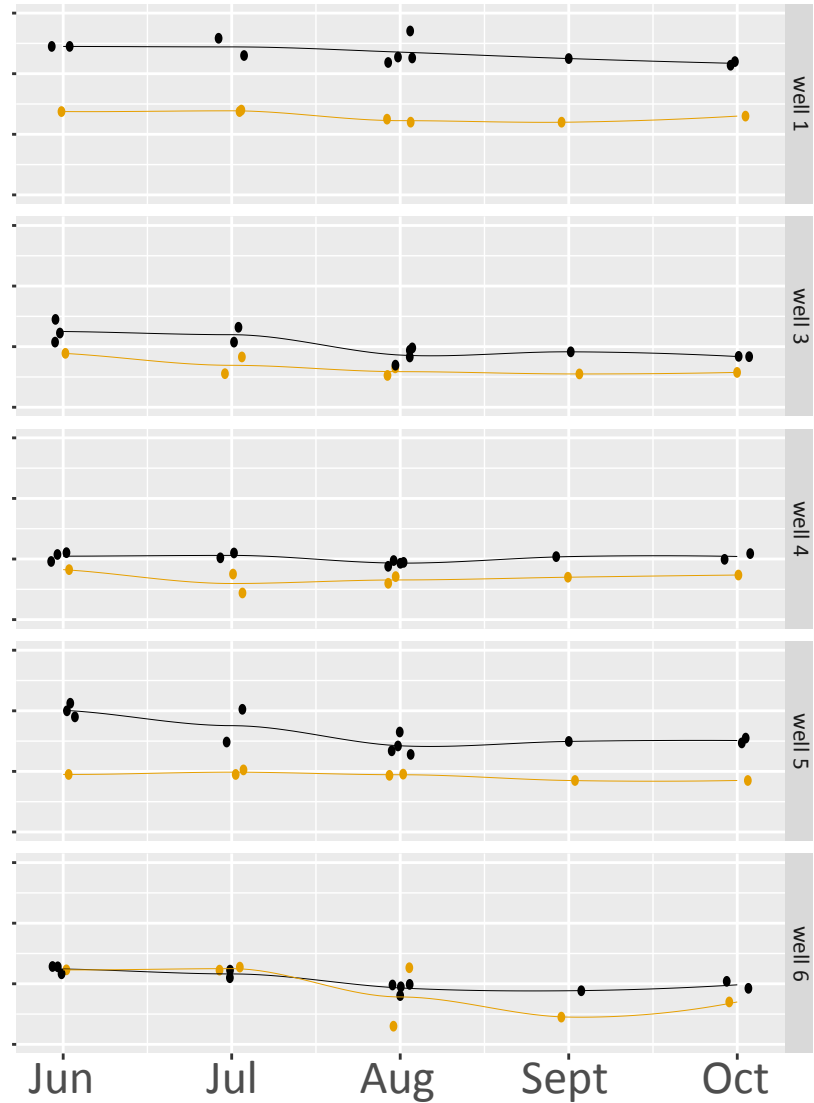
2.1 ft

0.7 ft

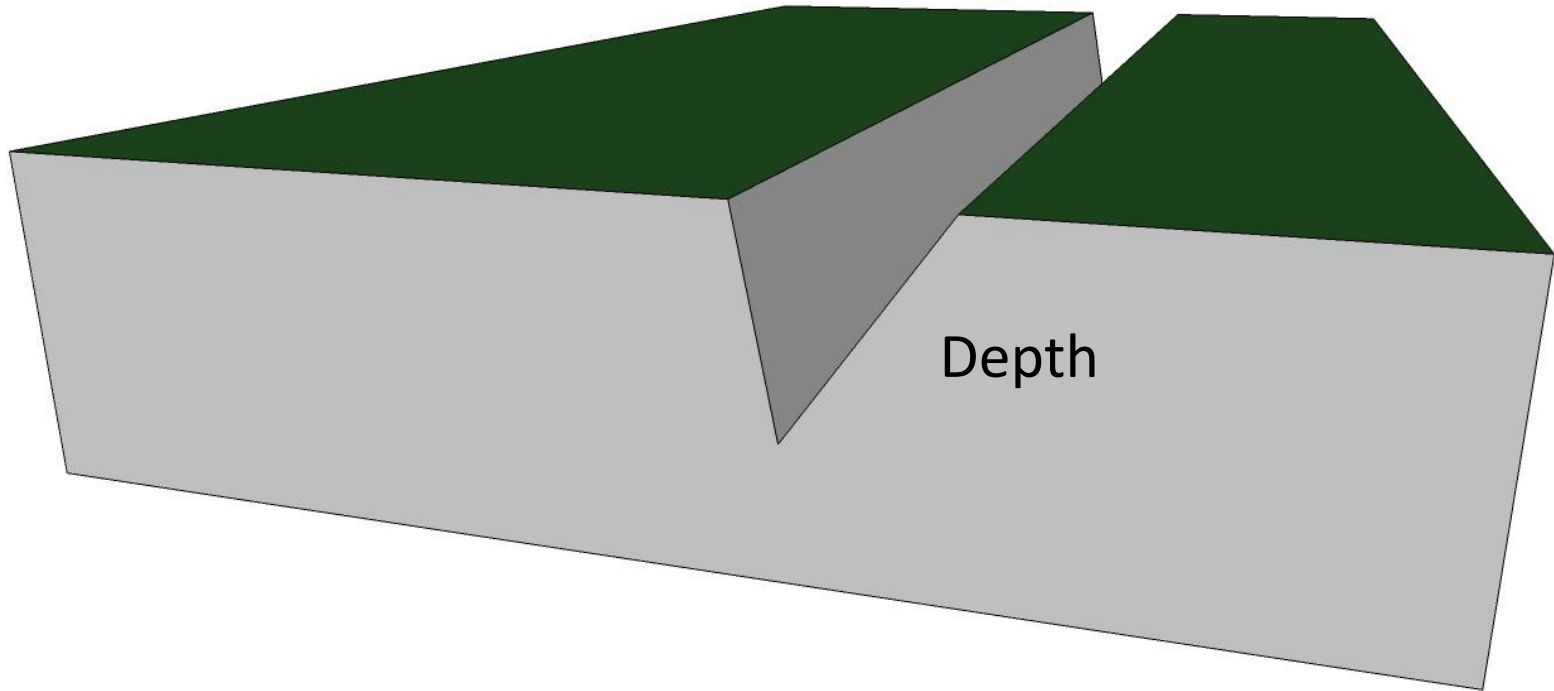
0.7 ft

1.4 ft

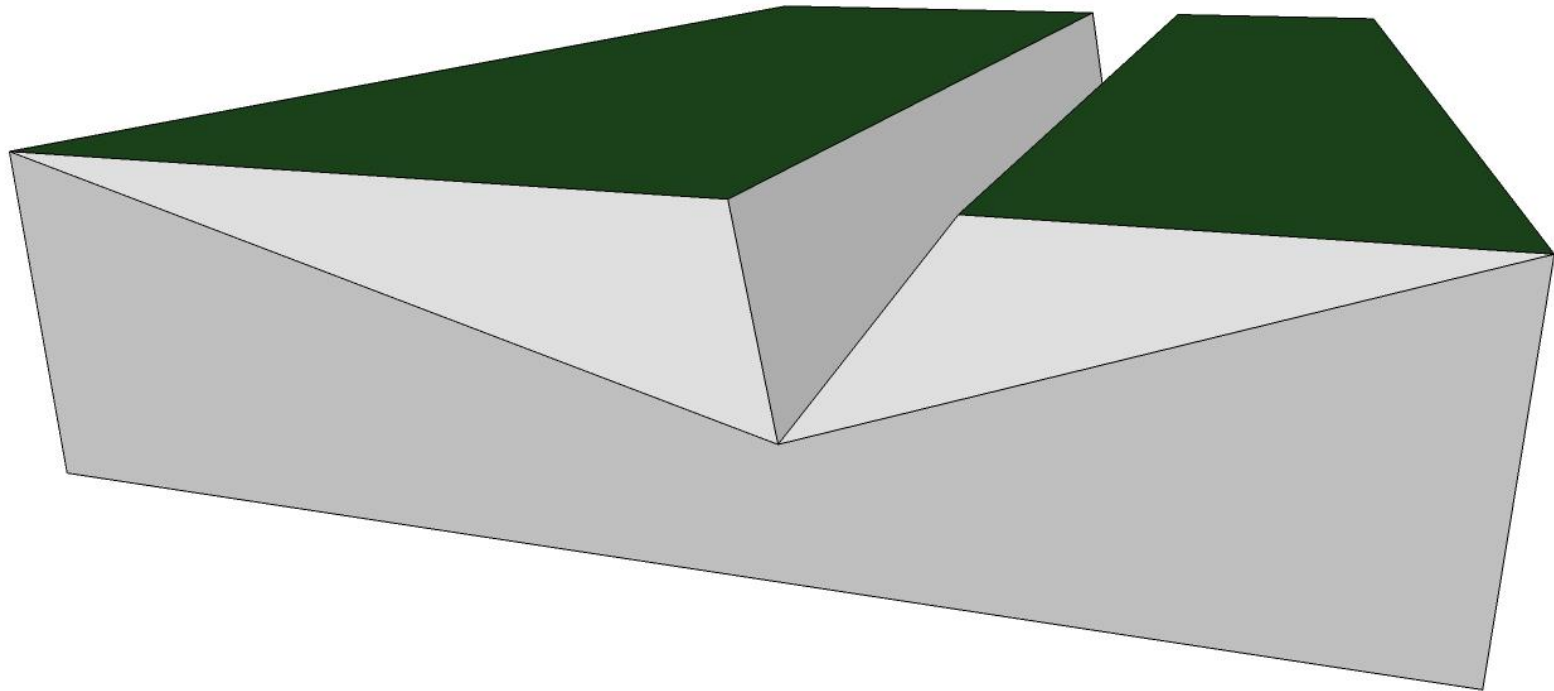
0.2 ft



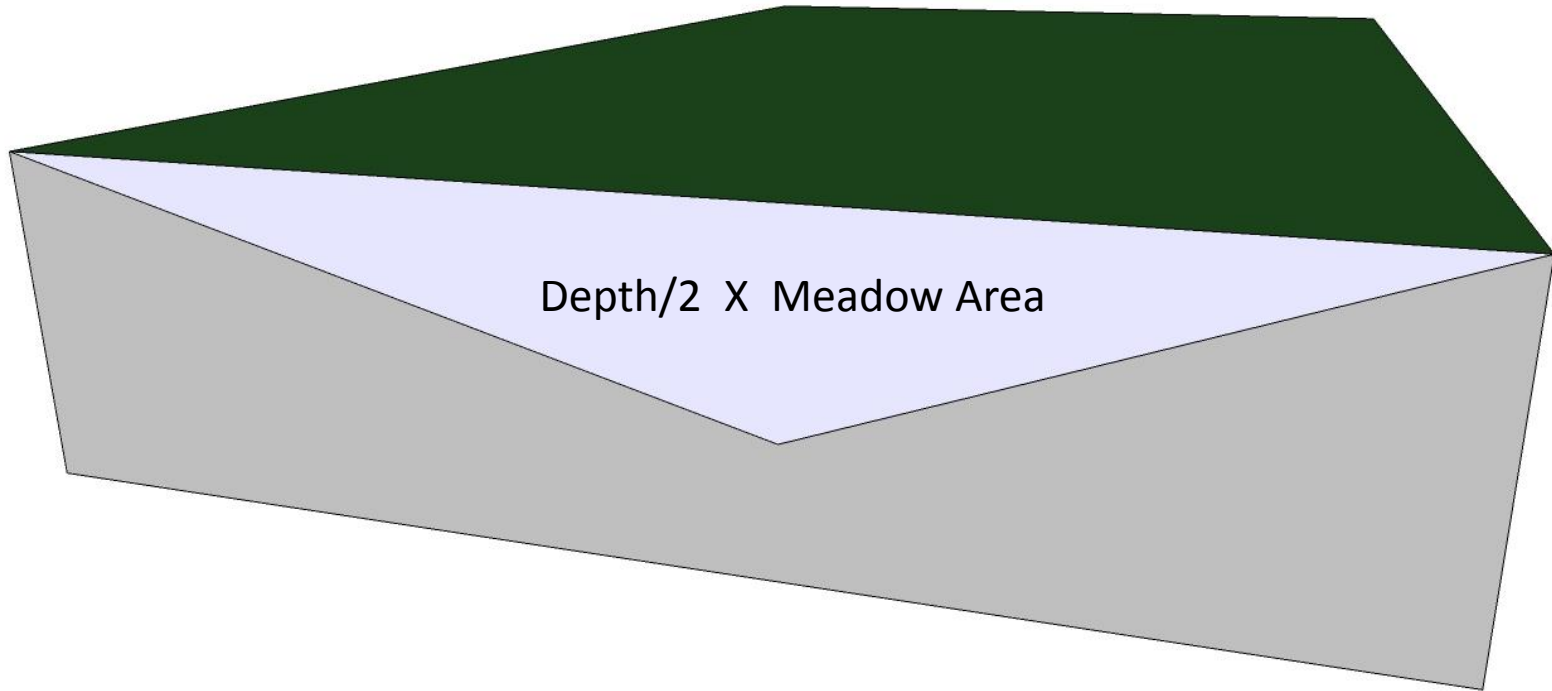
Coca-Cola Replenish Estimate



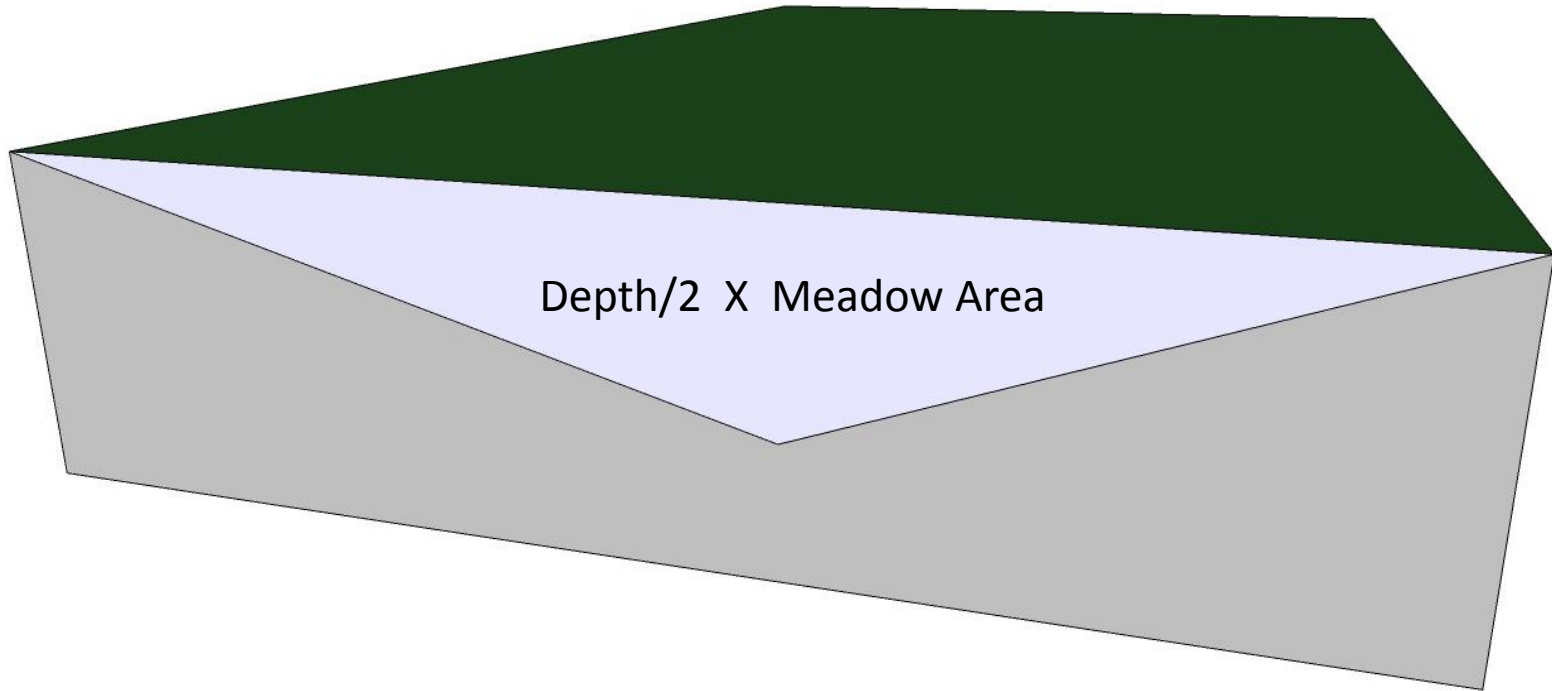
Coca-Cola Replenish Estimate



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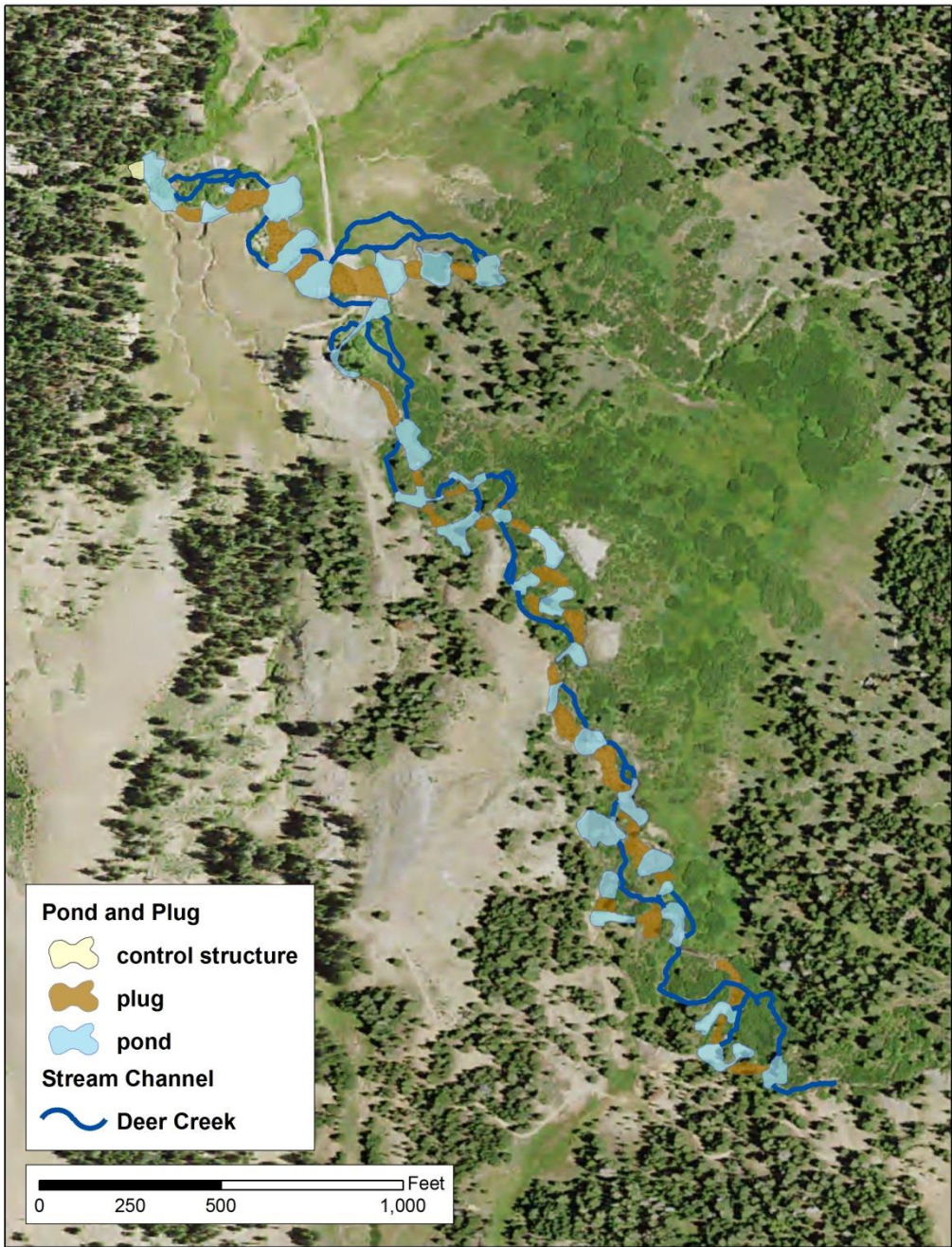


Coca-Cola Replenish Estimate



Replenish Volume = $\text{Depth}/2 \times \text{Meadow Area} \times \text{Specific Yield}$

$$= 3 \text{ ft}/2 \times 500 \text{ ac} \times 0.33 = 225 \text{ acre ft}$$



Indian Valley

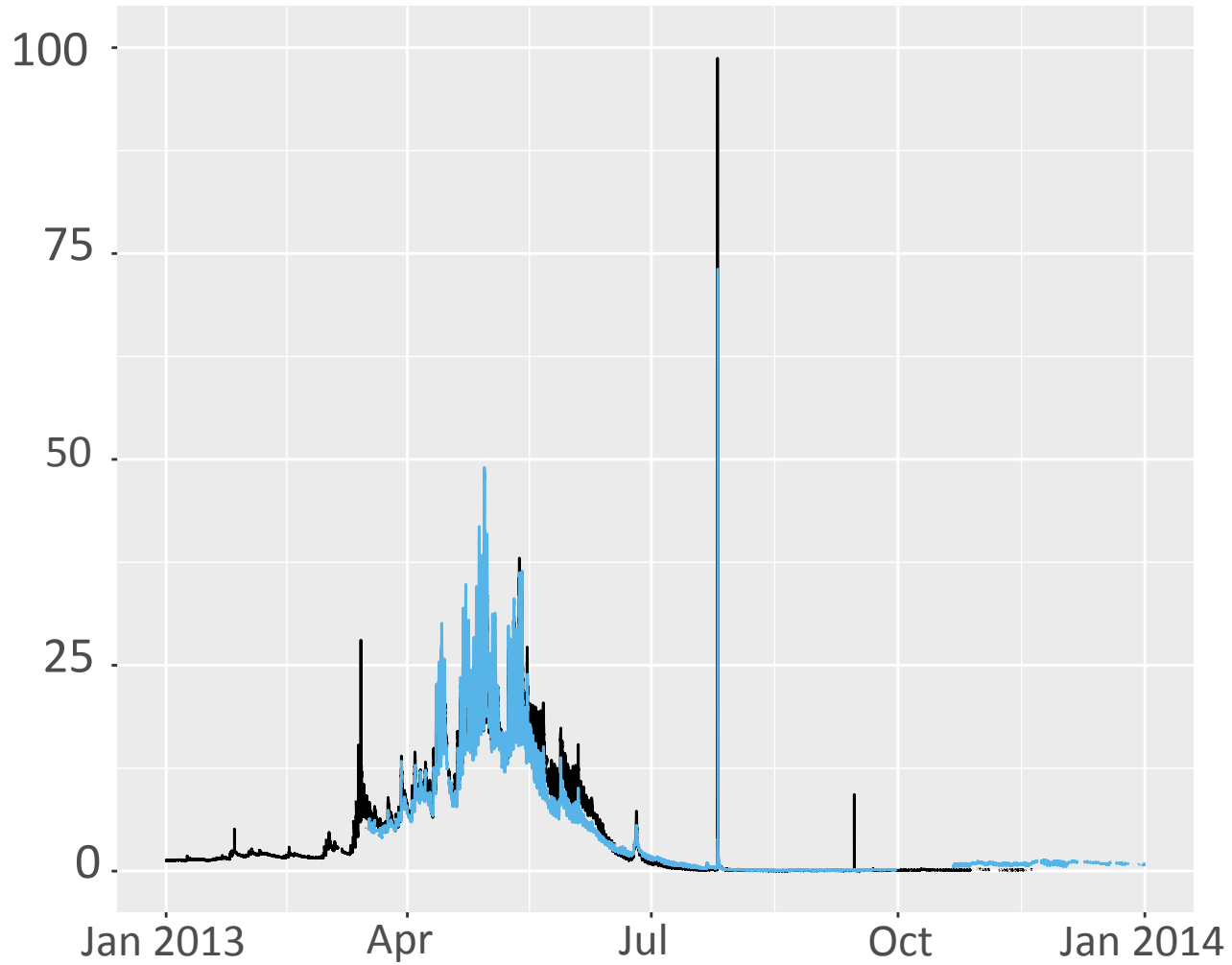
3.5 acres of pond X 3' deep

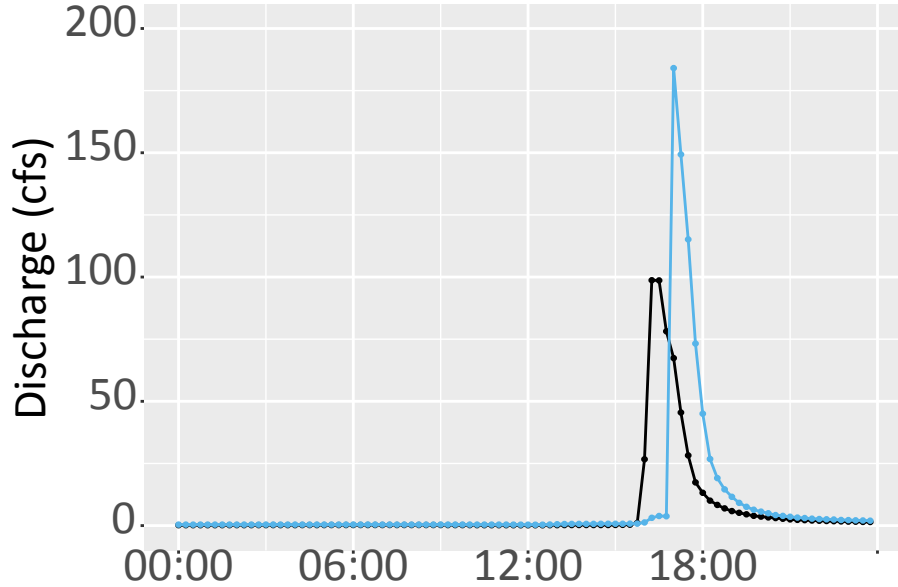
15 acres of floodplain X 1.5'

8 acres of floodplain X .7'

15-20 acre feet

Year 1 Damage





Flood 7/26/2013

Peak Flow: Upper Ga.= 100cfs

Lower Ga.= 180cfs

1.5 hours > 20 cfs

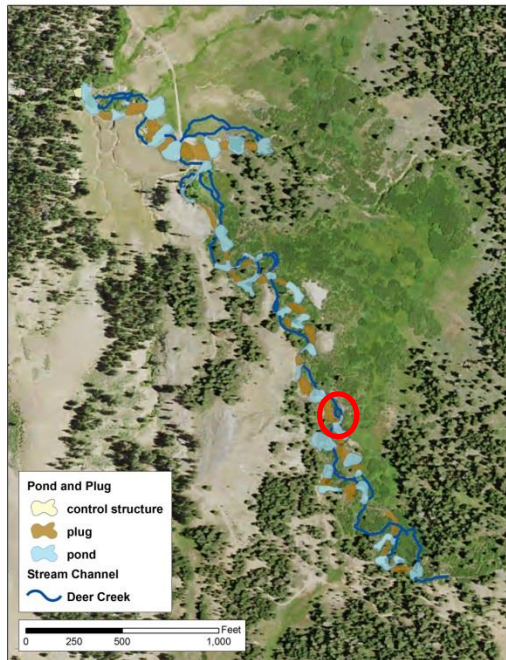
~8,000 cuft of sediment in
uppermost pond



2013



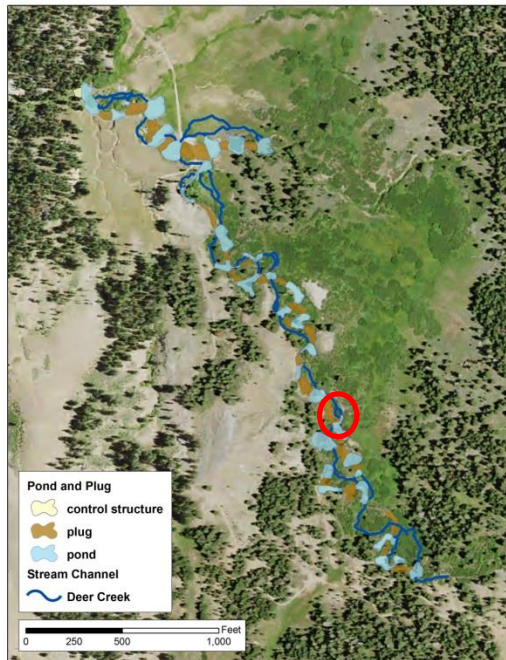
2013



2013



2013



2015





2013



Half-way through project reach

2015

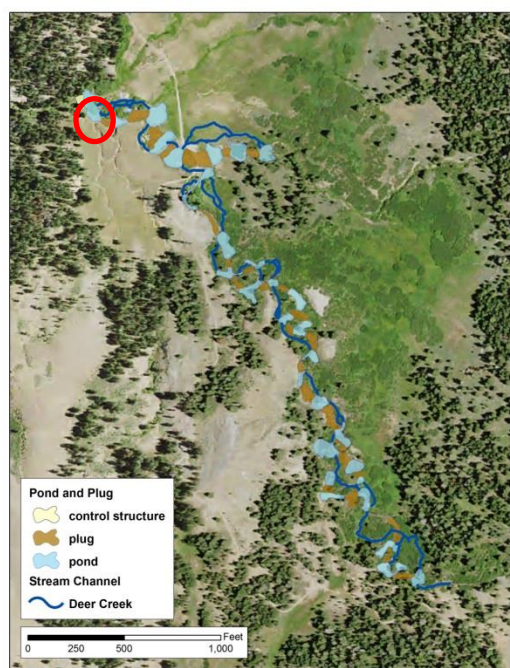


2013



Bottom of project

2015



Take homes:

1. Meadow soaks up water in spring, releases in summer.
2. Restoration increased summer outflows.
3. Net effect spring-summer is to reduce volume.
4. Groundwater elevated 1-2 feet. Narrow area affected.
5. Greatly increased summer aquatic habitat --- pools vs dry
6. Rapid sedimentation.



Thanks!



Chuck Loffland, Rick Hopson: USFS

Alpine Watershed Group staff and volunteers

Jim Wilcox and Terry Benoit: Plumas Corporation

Austen Lorenz: San Francisco State

Sierra Nevada Alliance Americorps Program

Julie Fair, Max Odland: American Rivers

NFWF, the CA LCC and Coca-Cola provided essential funding.



NFWF

