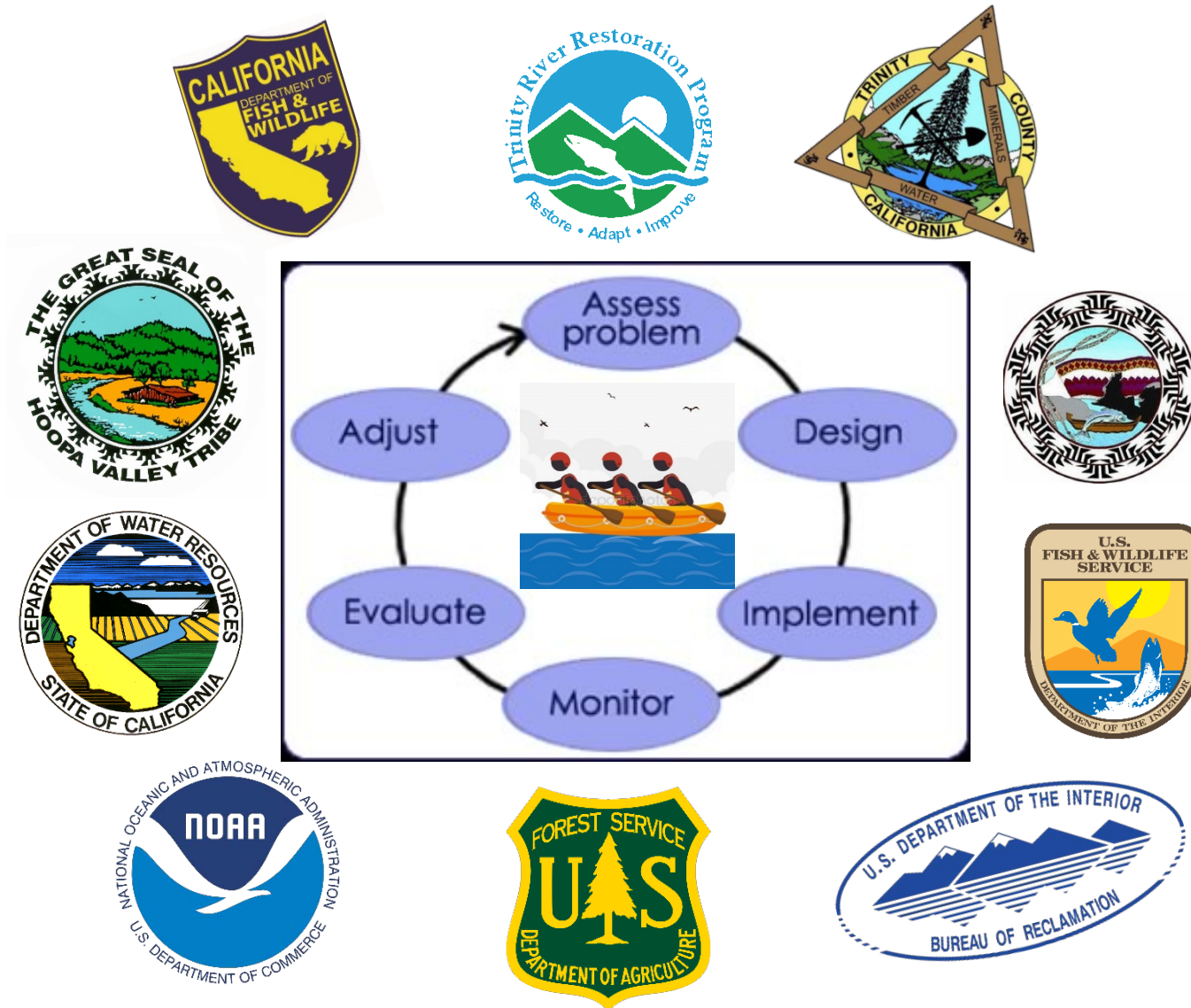
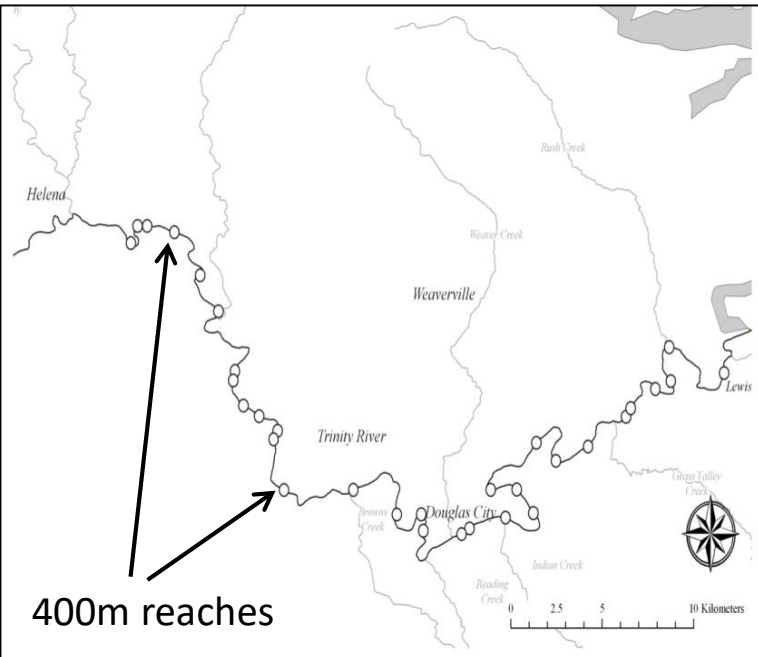


The adaptive management cycle: looping back to effectiveness monitoring

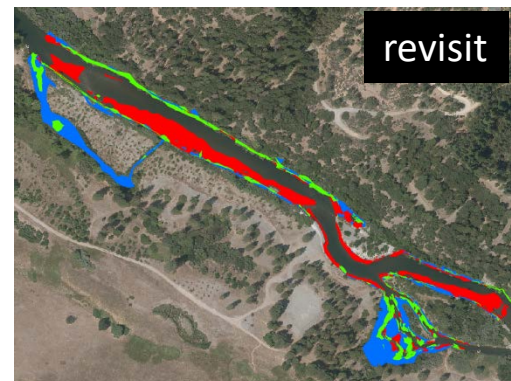
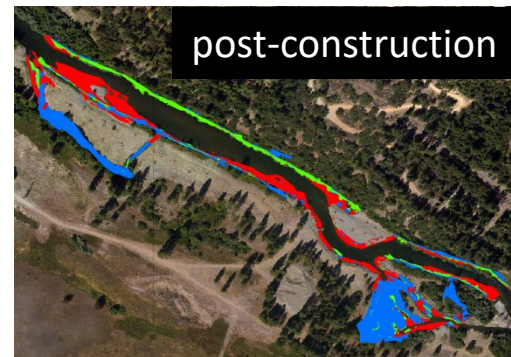
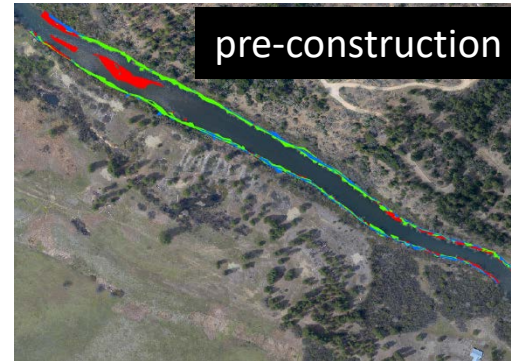


Effectiveness Monitoring: multiple scales and methods

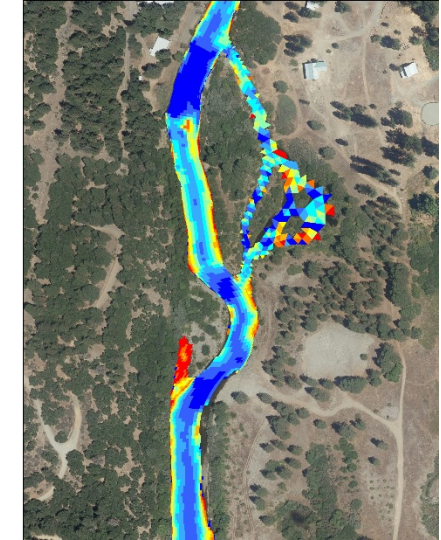
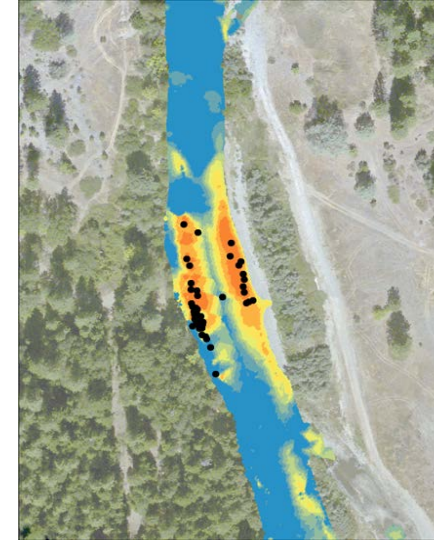
Systemic Evaluation



Site Evaluation



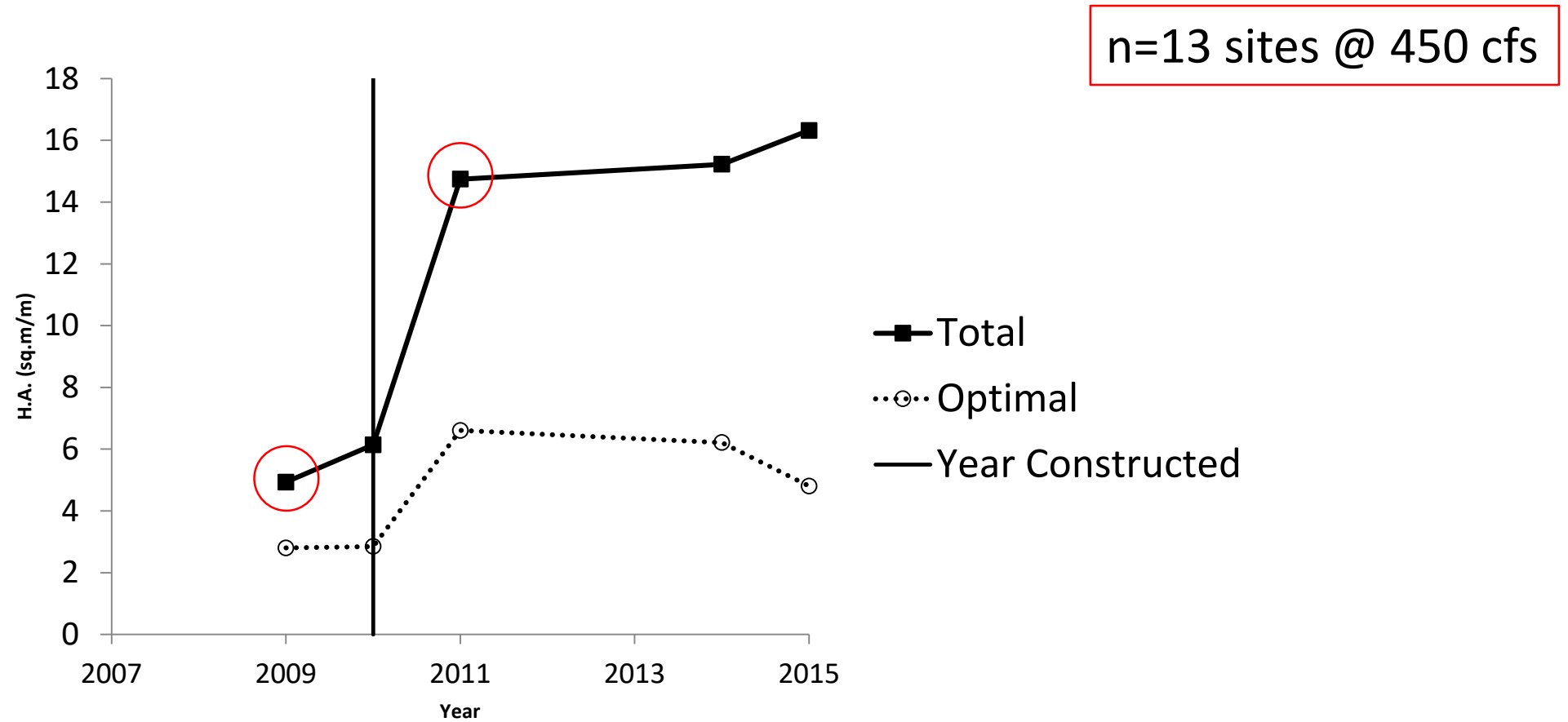
Hydraulic Modeling



Large Wood Surveys



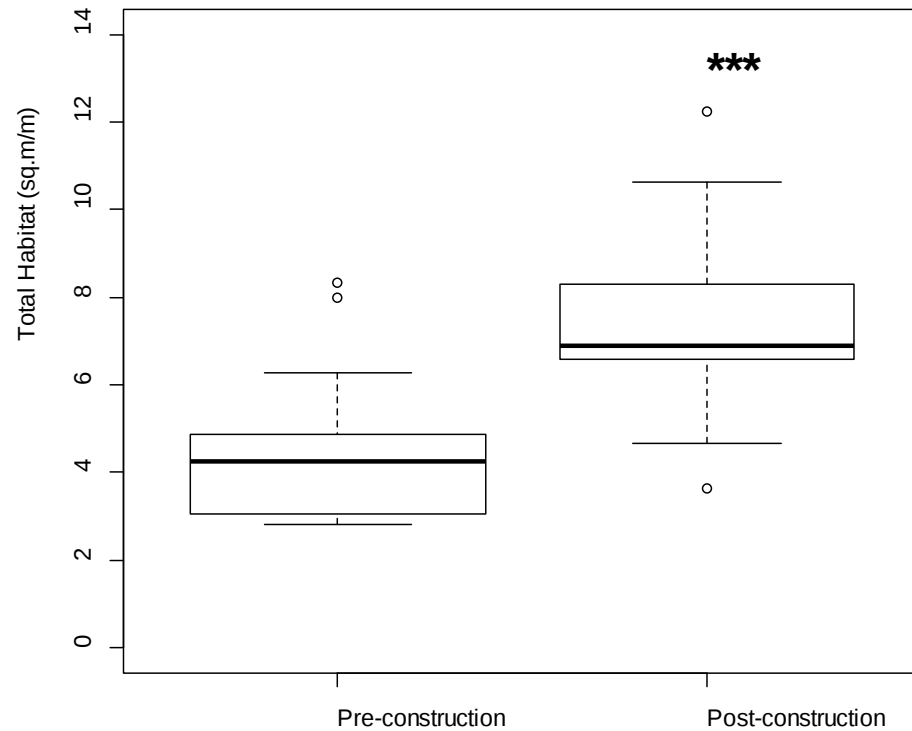
Boyce, J., D.H. Goodman, N.A. Som, J. Alvarez and A. Martin. 2018. **Trend Analysis of Salmon Rearing Habitat Restoration in the Trinity River at Summer Base Streamflow, 2005-2015.**



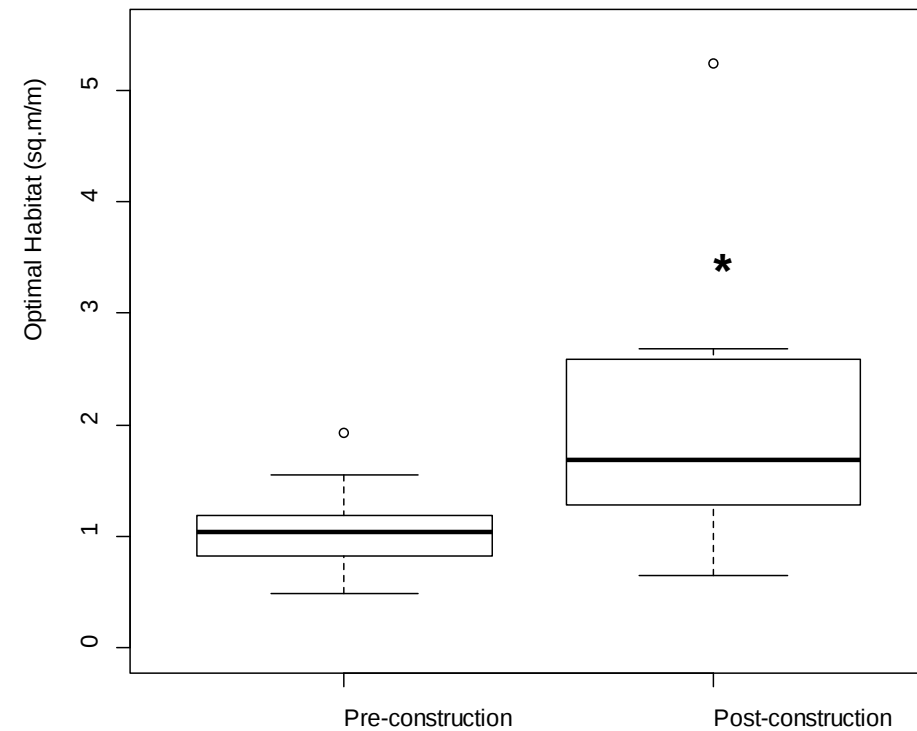
Habitat availability at rehabilitation sites at 450 cfs

n=13 sites

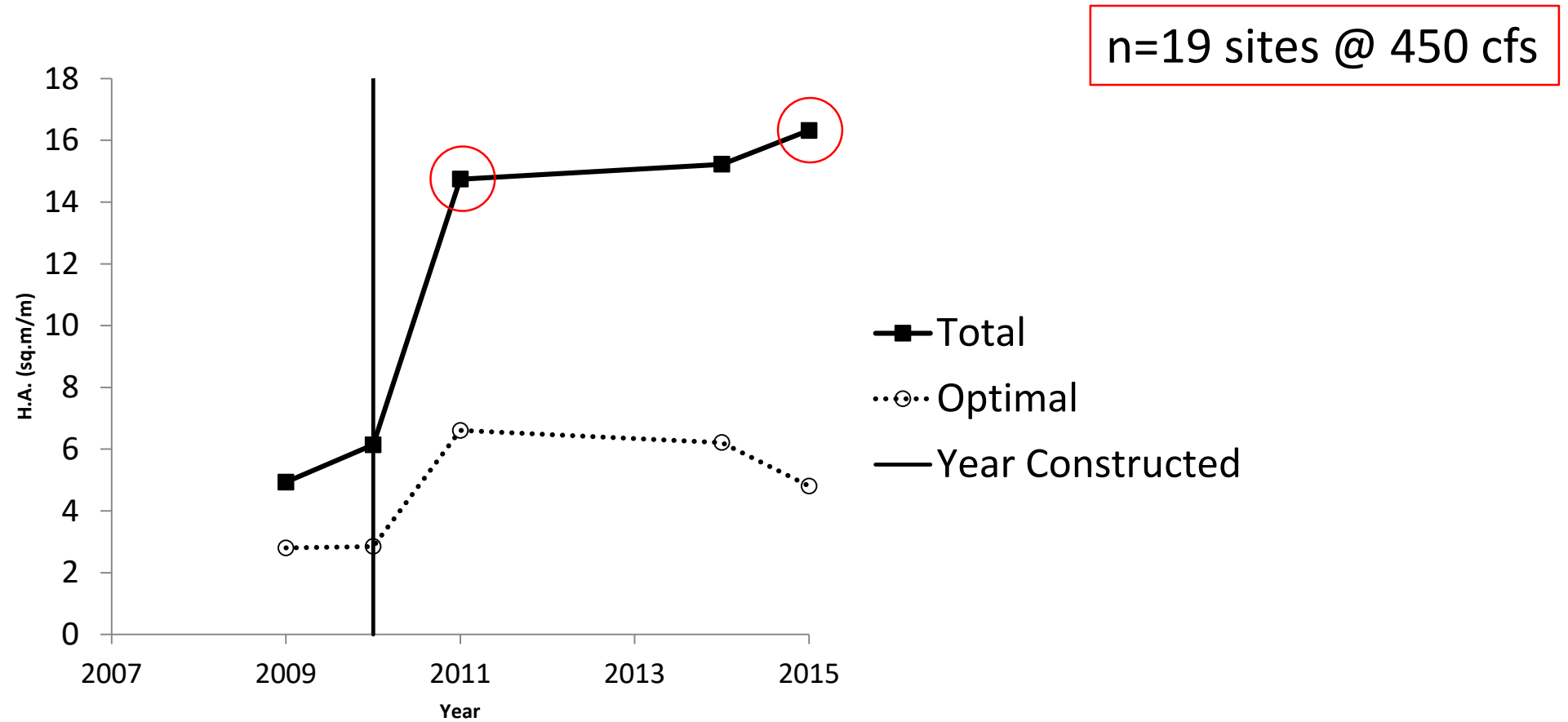
Paired t test: $p < 0.001$



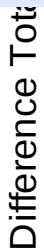
Paired t test: $p < 0.05$



Boyce, J., D.H. Goodman, N.A. Som, J. Alvarez and A. Martin. 2018. **Trend Analysis of Salmon Rearing Habitat Restoration in the Trinity River at Summer Base Streamflow, 2005-2015.**



2

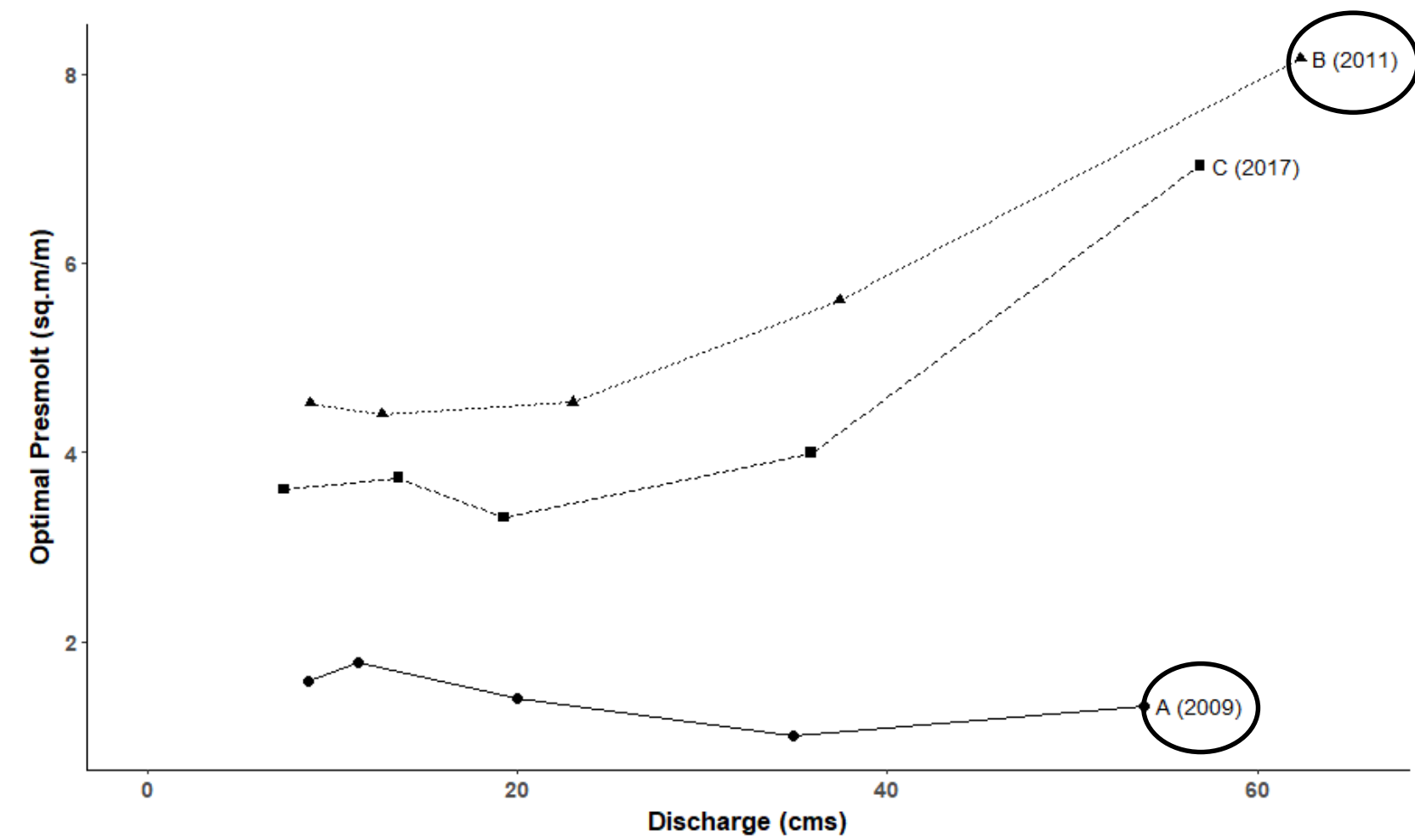


Difference Optimal

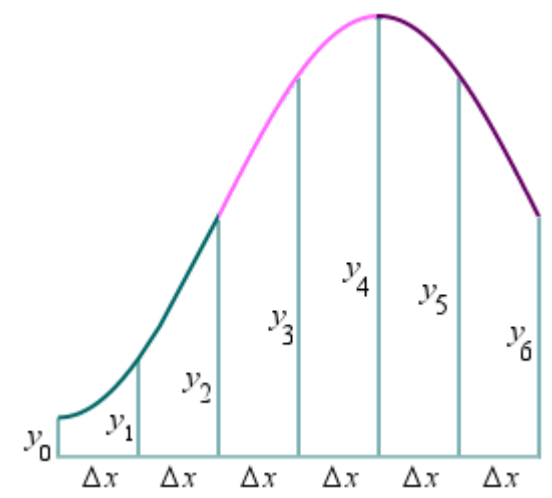
Boyce et al. (*in prep*) **Streamflow and Juvenile Salmonid Habitat Availability at Six Rehabilitation Sites on the Trinity River, California 2008-2017.**

[illegible]

Boyce, J., D.H. Goodman, J. Alvarez, A. Martin and K. Hopkins.(*in prep*) **Streamflow and Juvenile Salmonid Habitat Availability at Six Rehabilitation Sites on the Trinity River, California 2008-2017.**



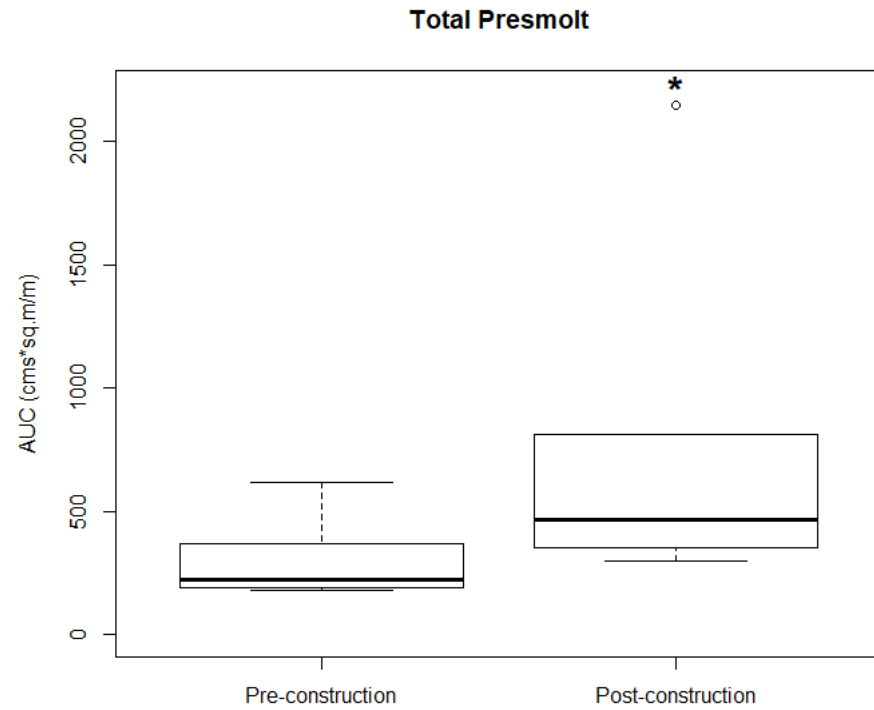
n=6 sites from 300-2,000 cfs



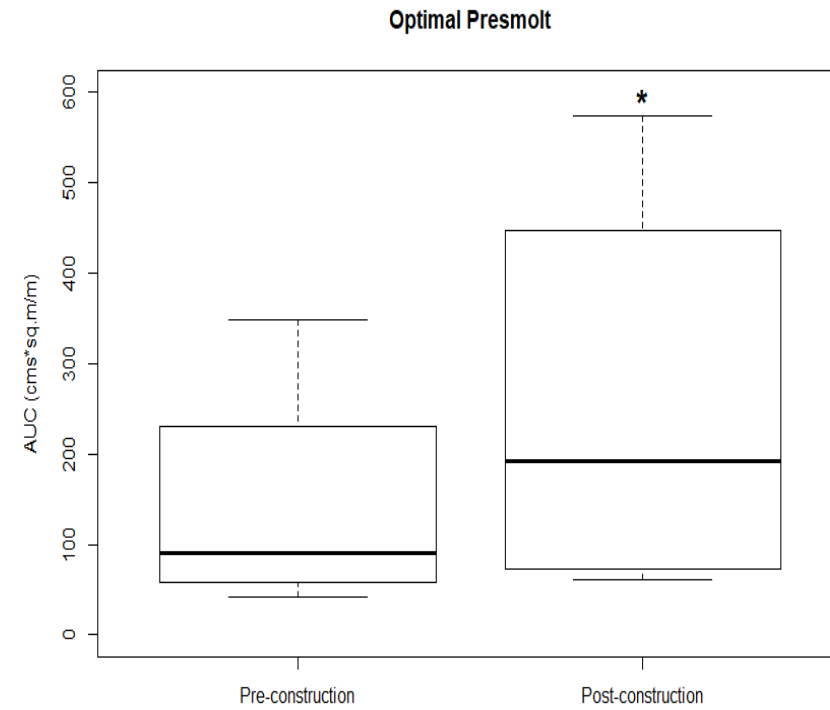
AUC (cms*sq.m/m)

Channel rehabilitation increased AUC values for total and optimal habitat

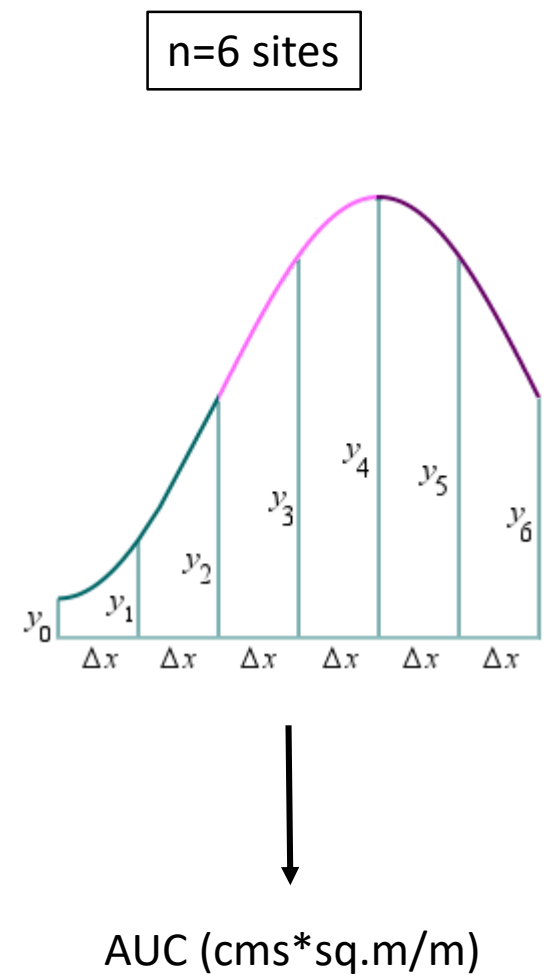
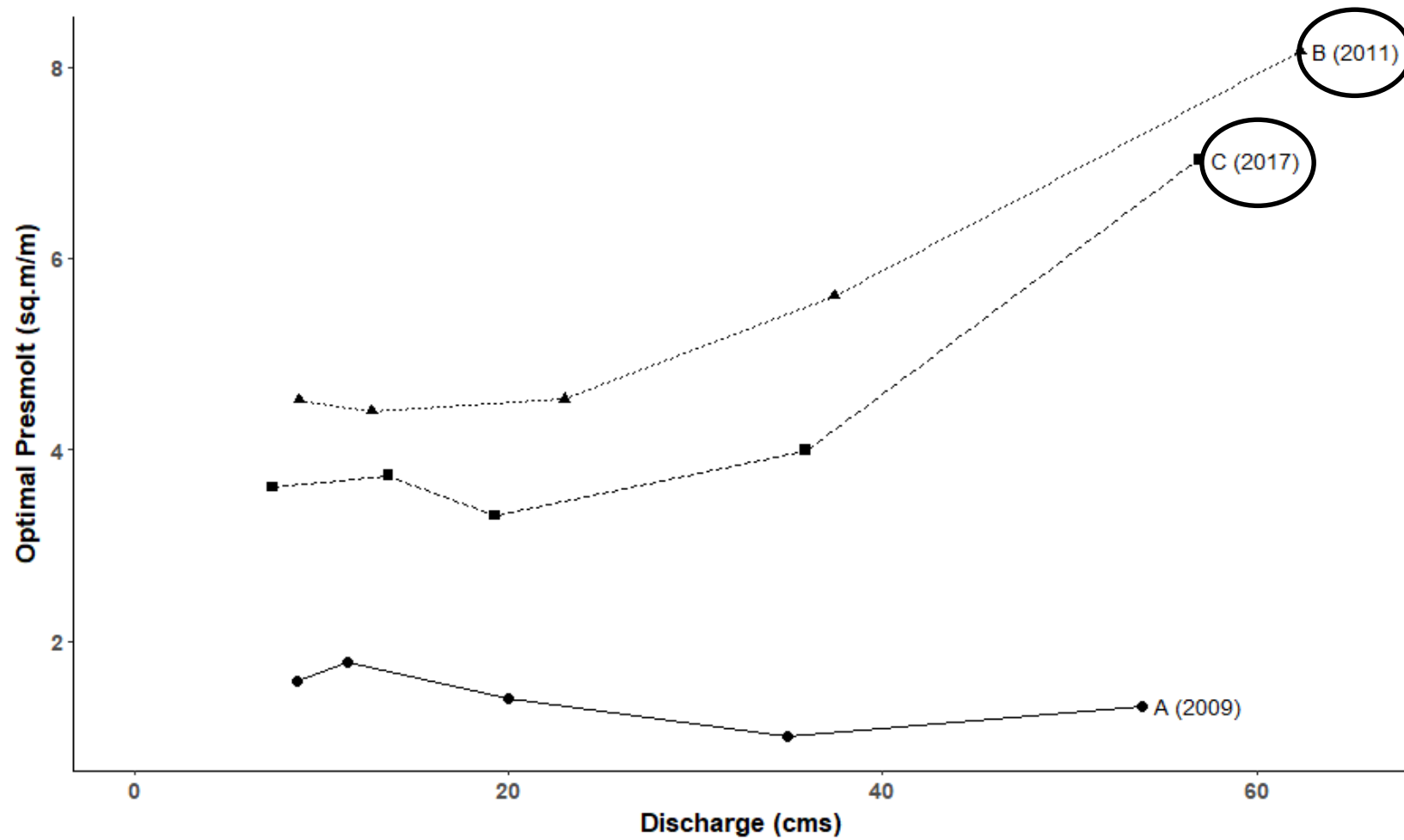
Wilcoxon signed rank test $p < 0.05$



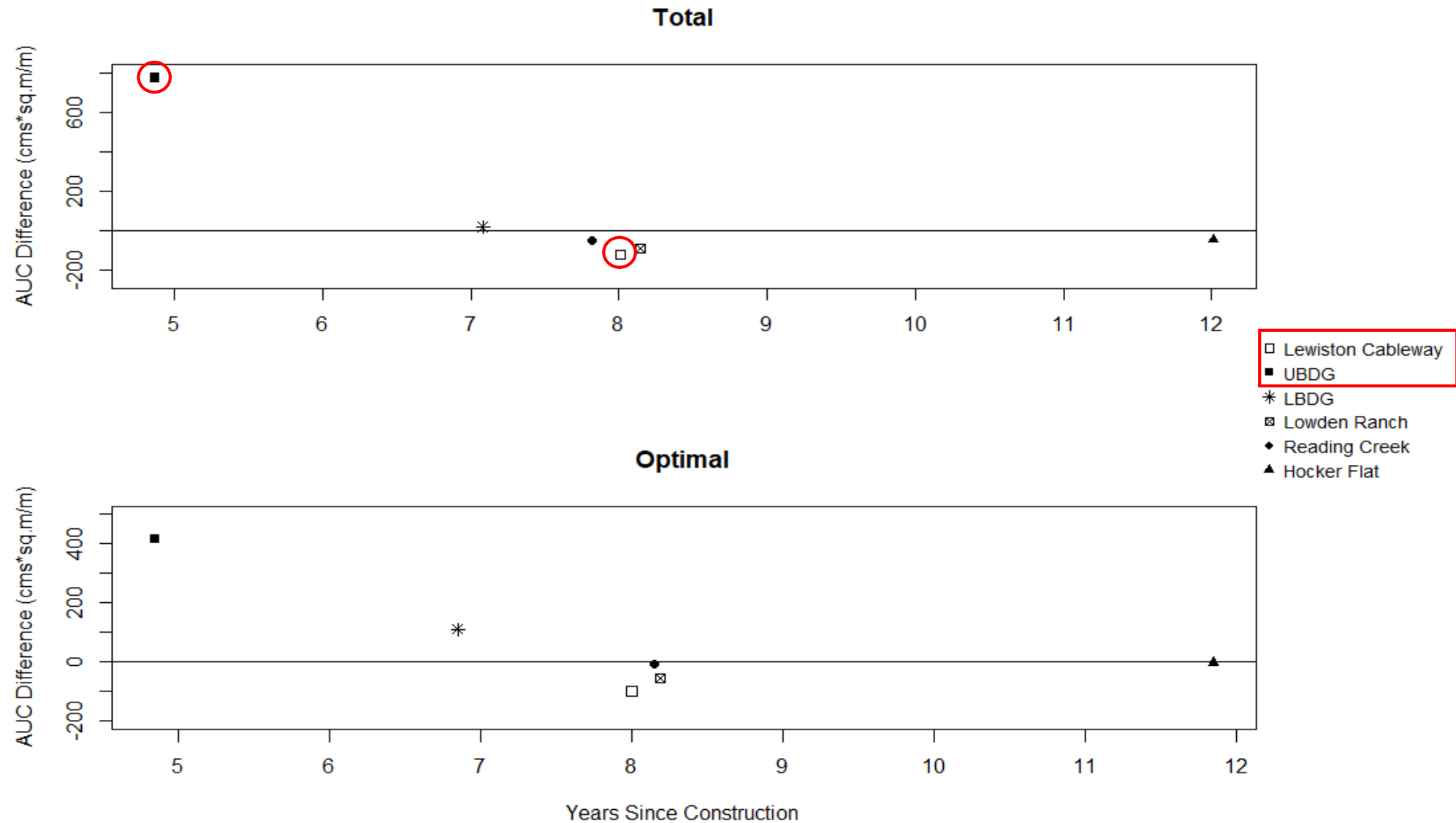
Wilcoxon signed rank test $p < 0.05$



(300-2,000 cfs)



2 of 6 sites had more habitat at most recent survey

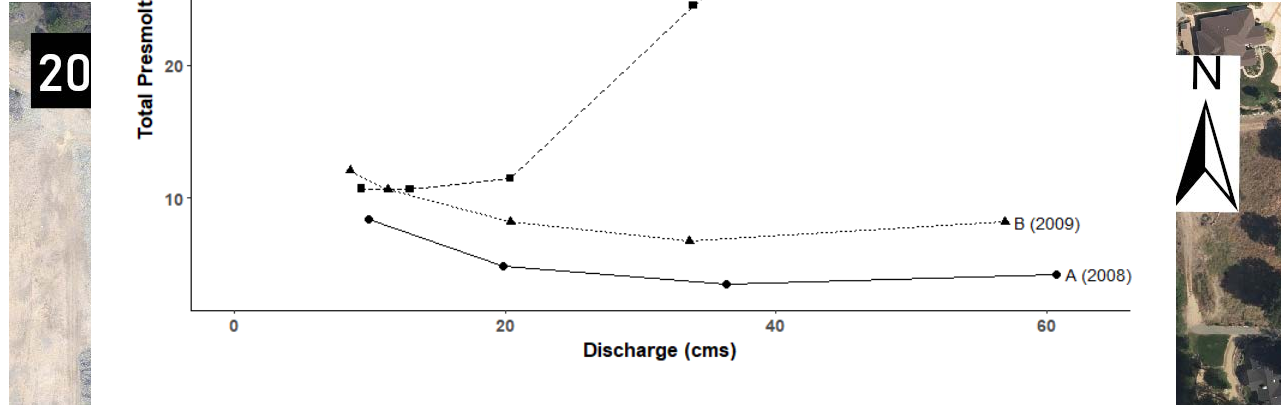


Cableway: 80% reduction in surface area of three point bars



UBTDG: sediment a

event) → habitat increases



Conclusions

1) Construction matters



Increased habitat availability (both trend analyses)

2) Construction benefits not sustained at some sites

less habitat: most recent survey → first survey after construction

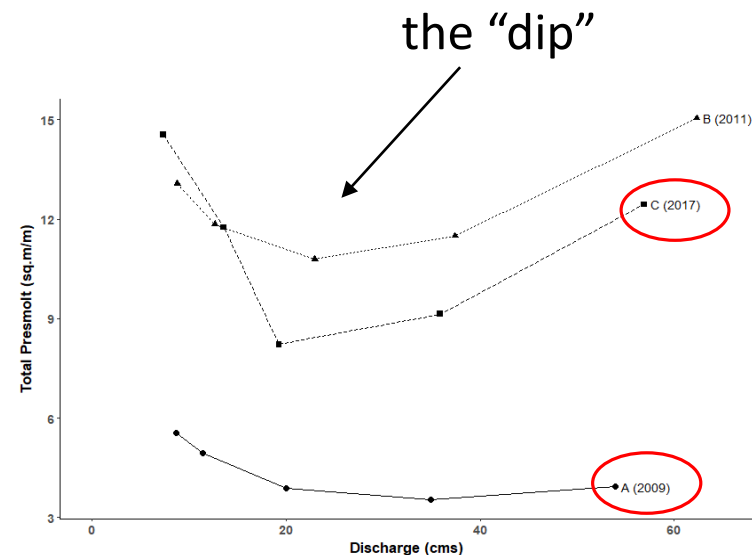
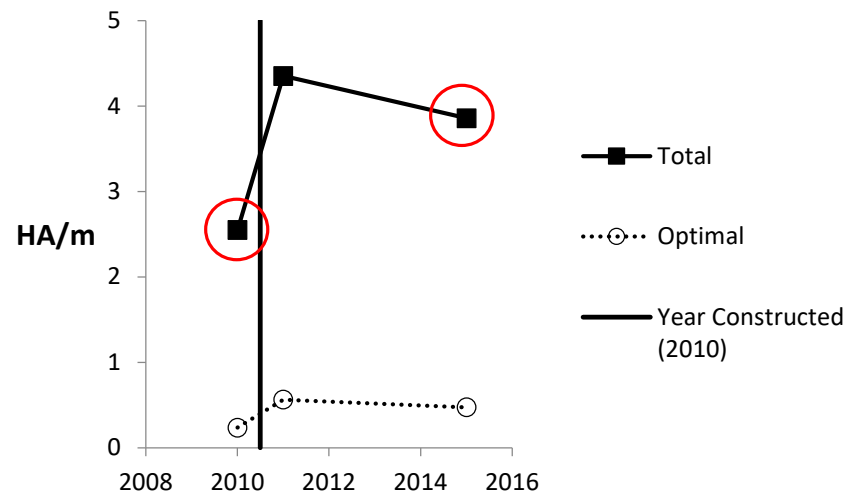
10/19: 450 analysis

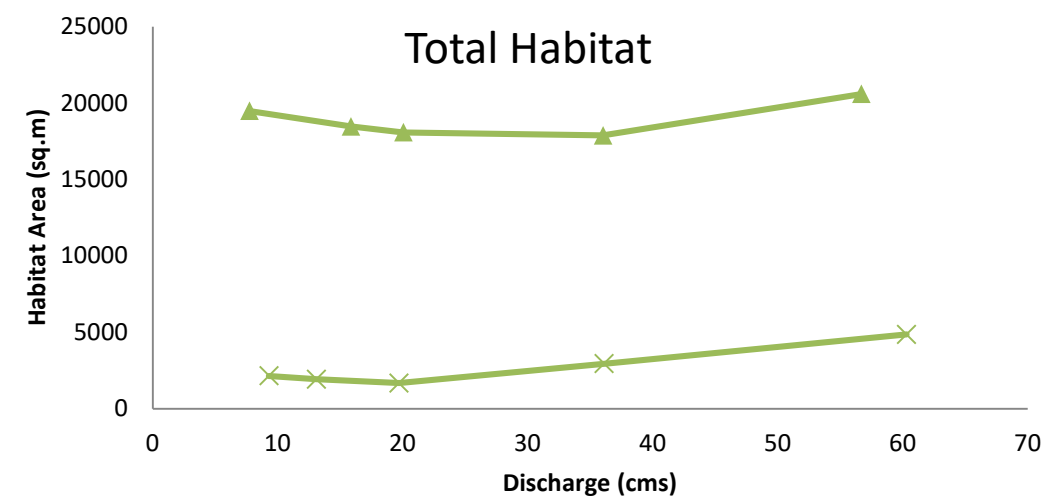
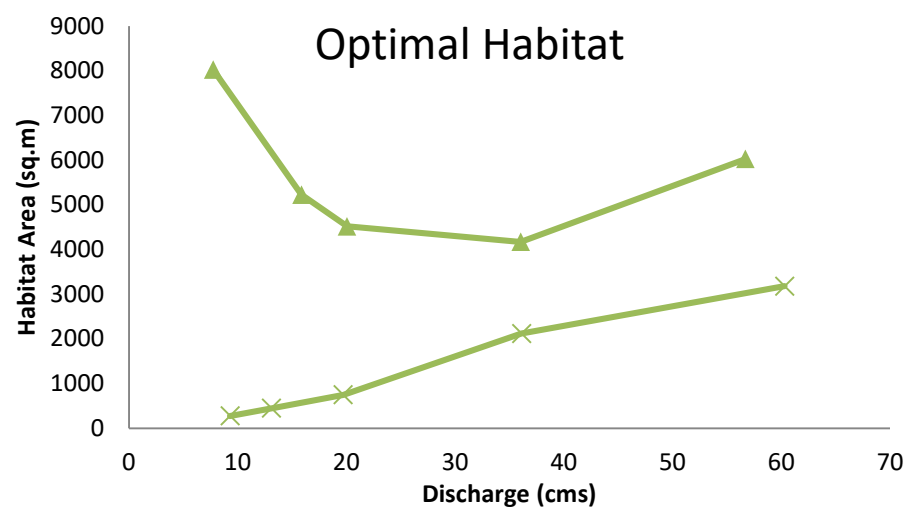
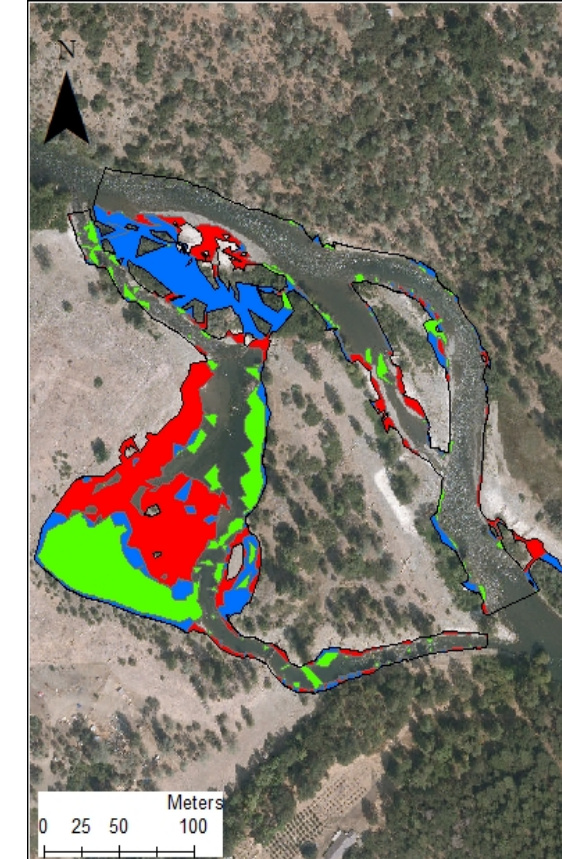
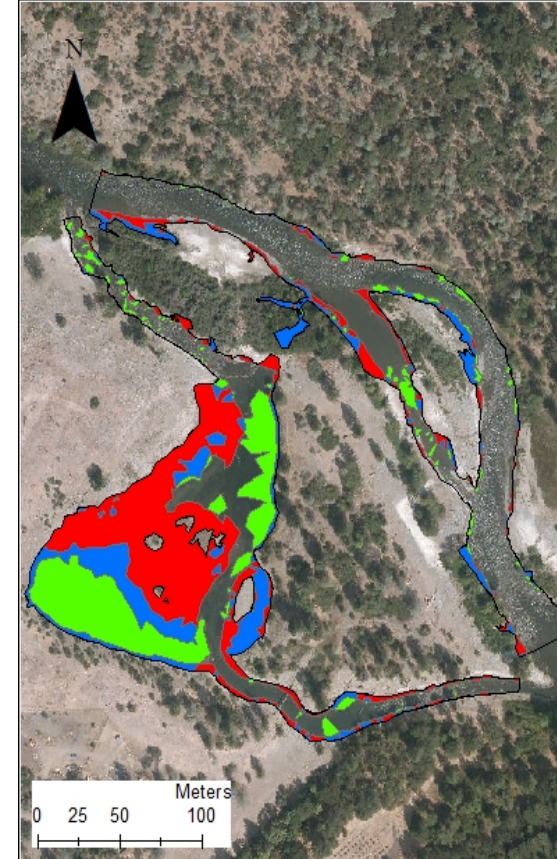
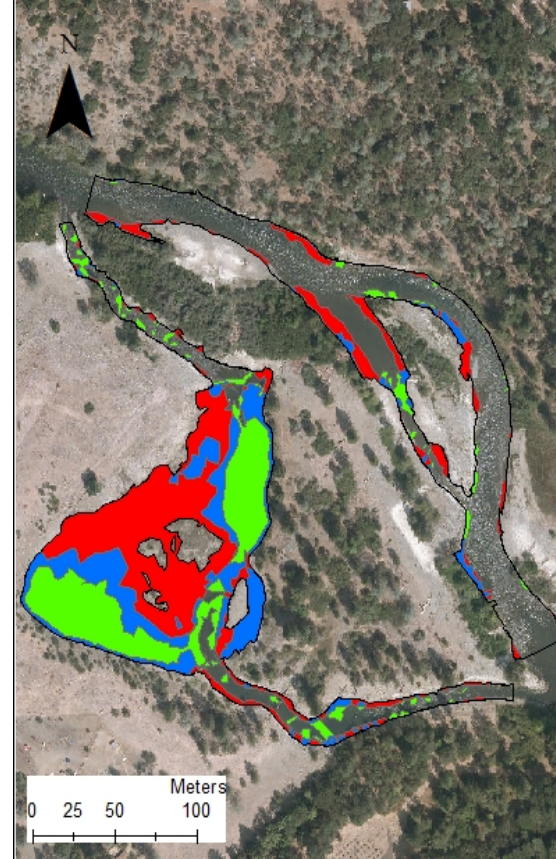
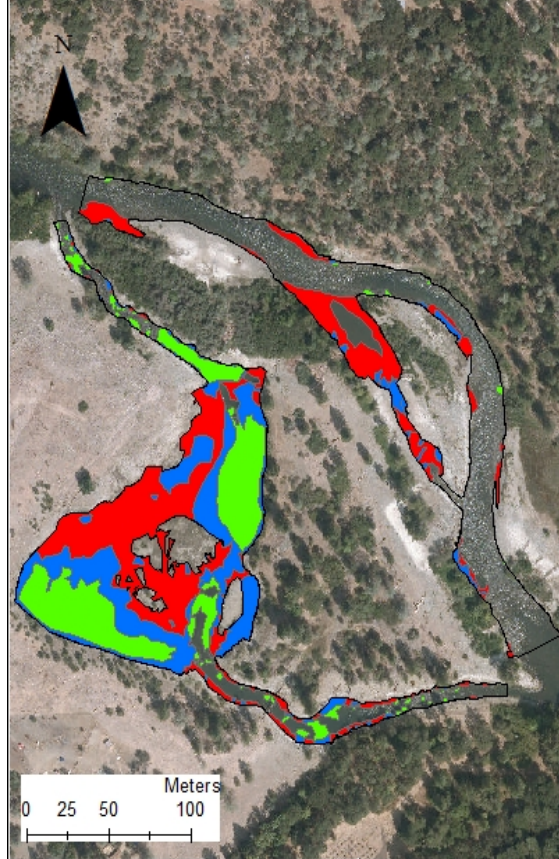
4/6: multiple flow analysis

Upshot: currently more habitat than at pre-construction

6/7: 450 analysis

5/5: multiple flow analysis





Providing feedback to the program...

TRRP meetings

-once a year

Written summaries

-rapid turnaround

Technical reports

-peer reviewed

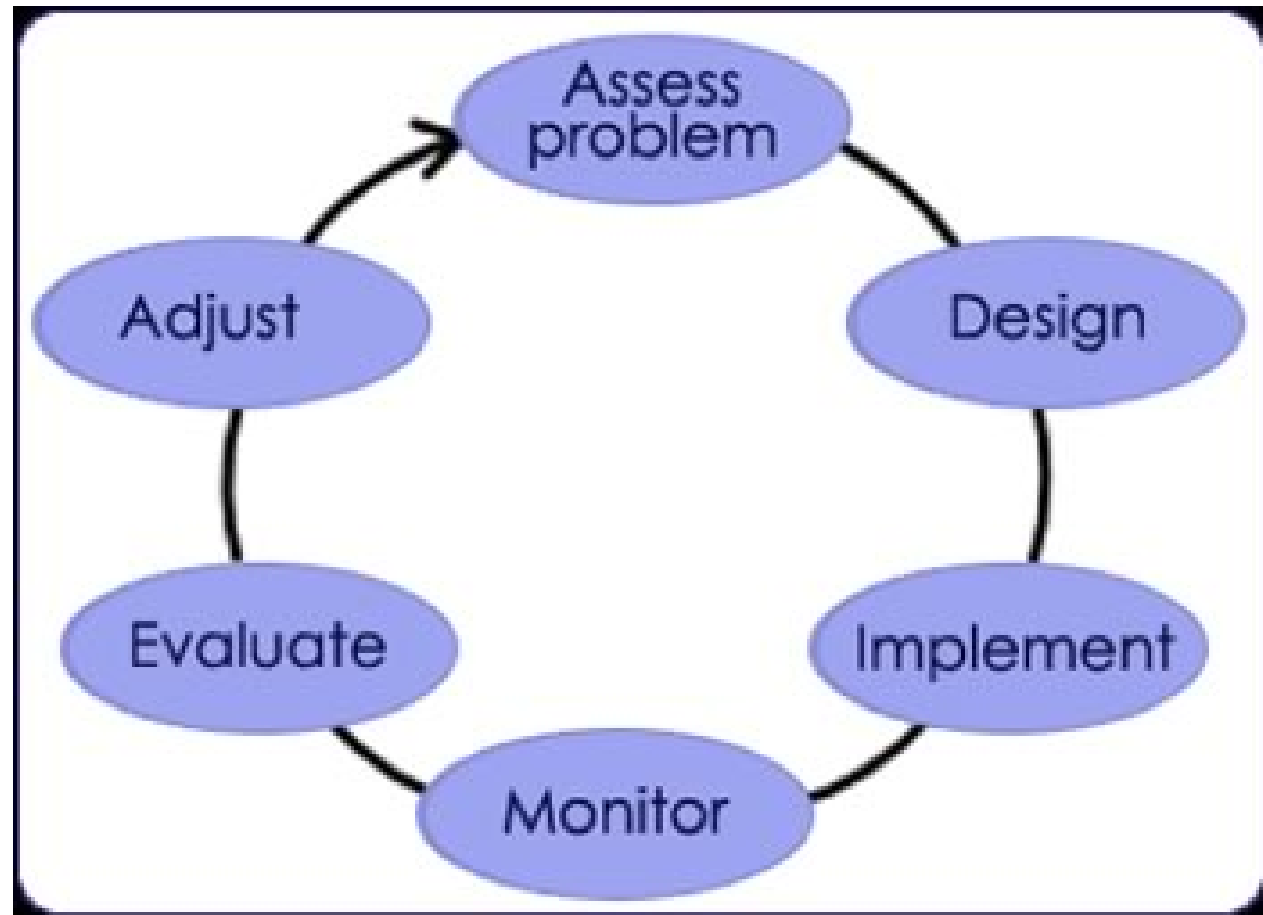
-interested members of the public

Scholarly Conferences

-e.g. AFS/TWS 2019 (Reno, NV)

Journal publications

-wider scientific community



Recent developments

TRRP website:

Boyce, J., and D. Go. 2018. Large Wood Placement at 2018 Tree Removal Sites by Lower Trinity River Restoration Program, 2005-2016 Summer Base Streamflow, 2005-2015.

in review - **Large wood** report, 2005-2016

in prep - synthesis reports:

- streamflow to habitat data 2008-2017 (co-author review soon)

- systemic estimate 2009-2017

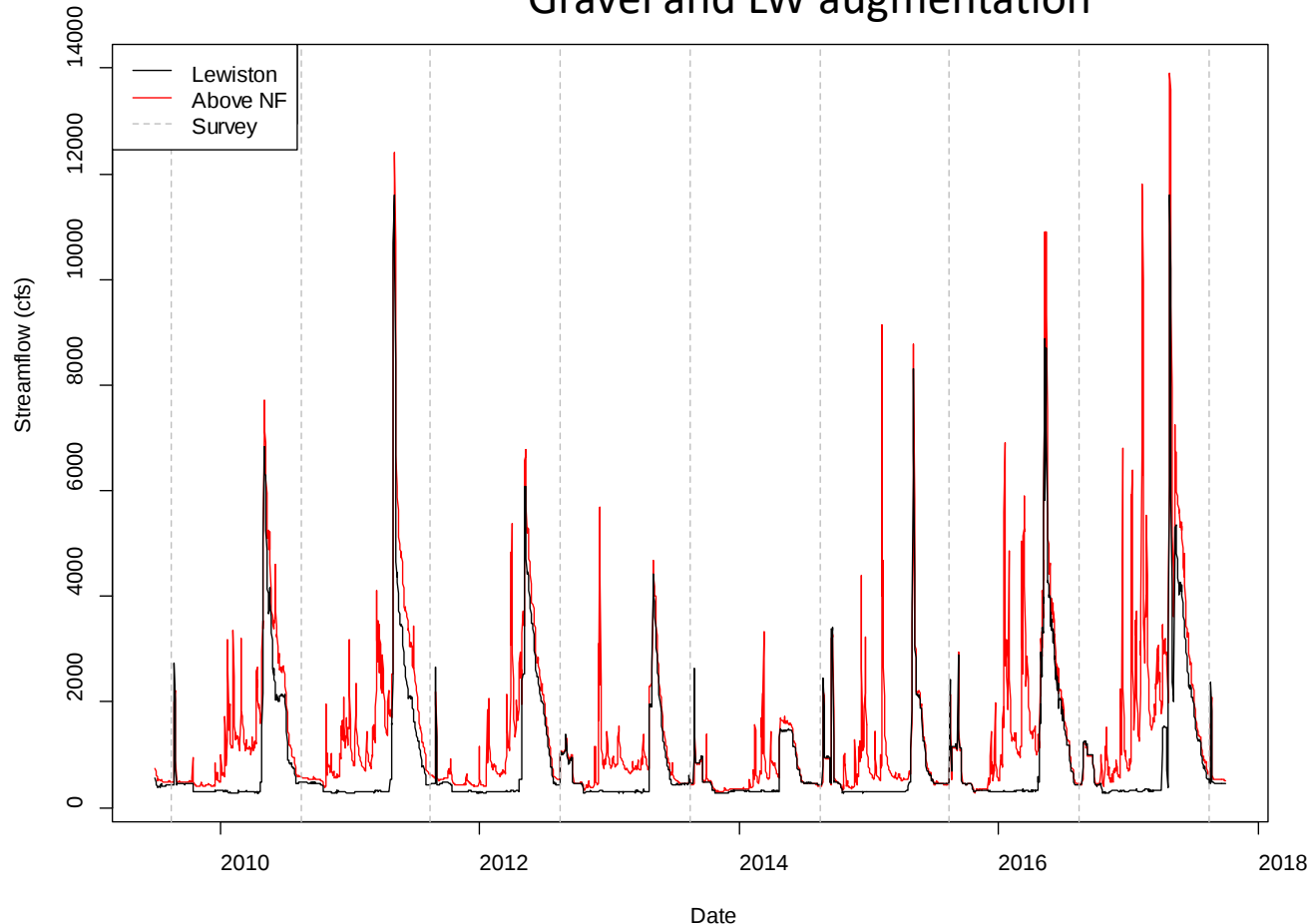
- 40 mile SRH-2D/habitat capacity (range of flows)

Lower Trinity 2D model development for S3

Systemic Habitat Synthesis 2009 to 2017

Revisit surveys of 50% of the restoration reach including:

- *23 channel rehabilitation sites
- *Water year types from Critically Dry to Wet
- *Gravel and LW augmentation



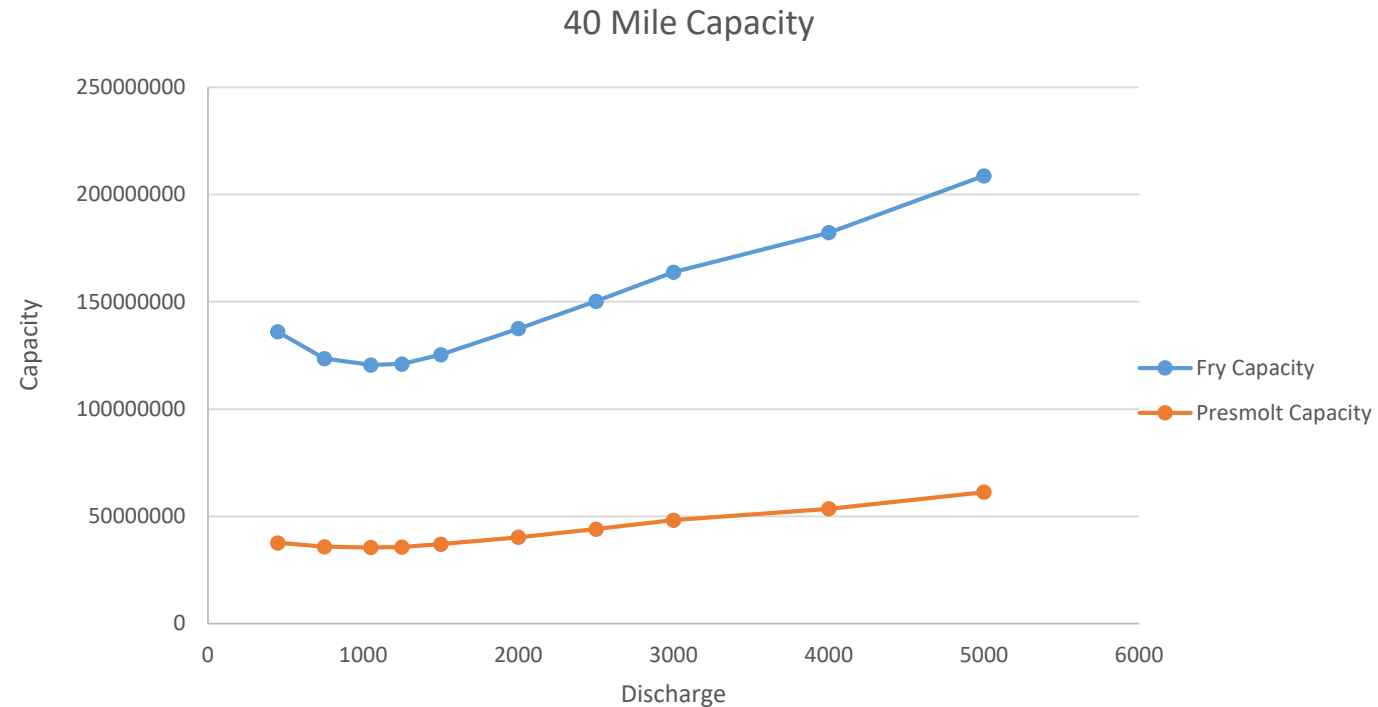
Predictors Include

- Channel rehabilitation
 - Year of construction
- Streamflow duration and magnitude
- Gravel augmentation
- Channel complexity

Report - **Forthcoming**
TMC Presentation – **Fall 2019?**

40 Mile SRH-2D/Capacity Synthesis Report

- Will evaluate capacity as a function of habitat across entire project reach
- Evaluate all constructed areas at the range of flows important to rearing (Up to 4-5000cfs)
- Compare constructed vs unconstructed areas at the range of flows important to rearing (Up to 4-5000cfs)
- Will include an integration component of geomorphic influence



Recent and future developments for habitat monitoring

- Data collection/analysis:
 - hydraulic modeling:
 - FY18-Deep Gulch and Sheridan (post-con)
 - Chapman (pre-con)
 - FY19-Upper Dark Gulch and JC suite

- Assessment work currently unfunded for FY2020

- Potential proposals:

continue to provide feedback on channel rehabilitation efforts
before-after assessments → hydrodynamic modeling
post-construction performance



Thank You