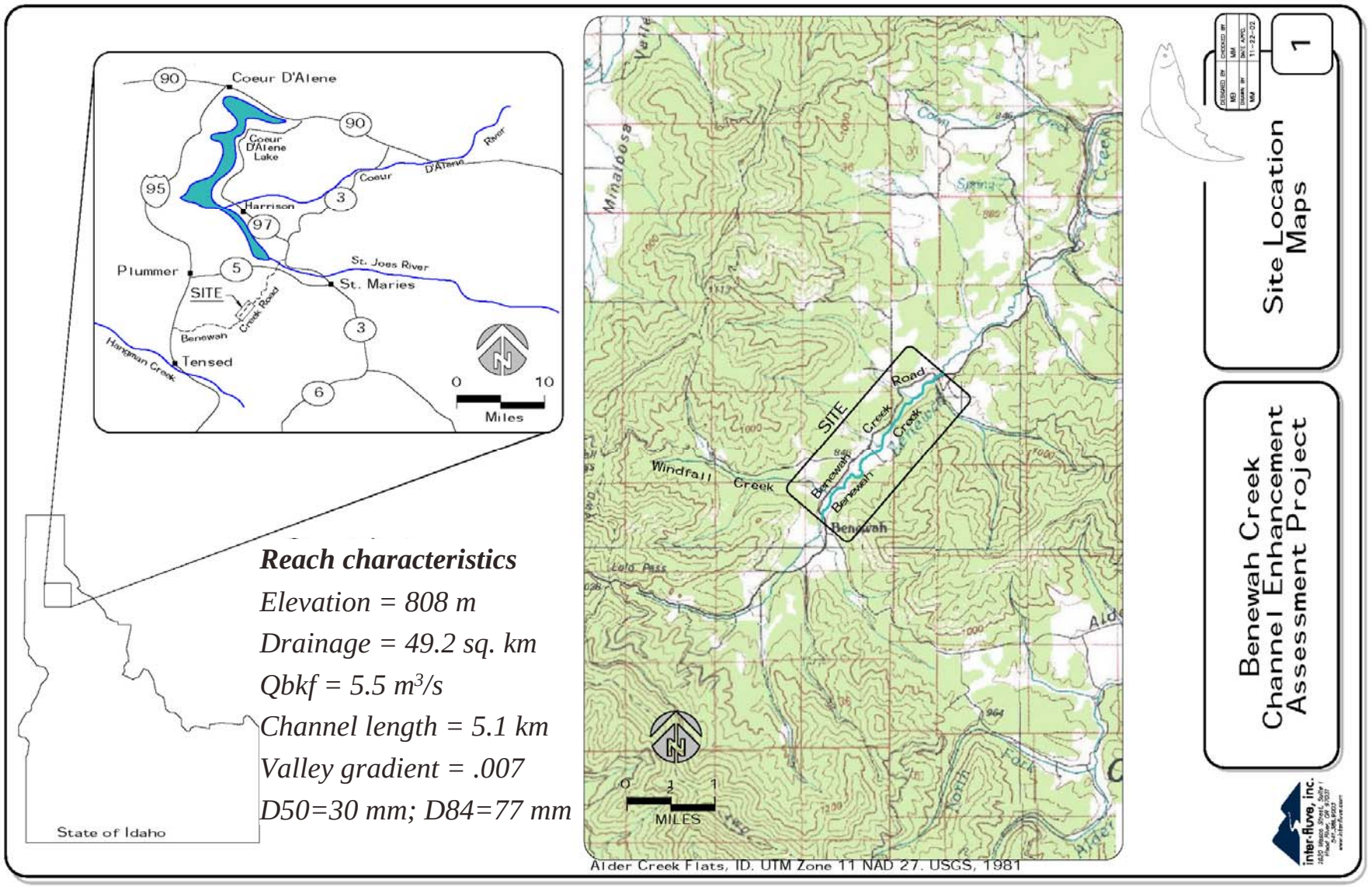
The ´Eltumish Project

Addressing Tribal Objectives Through Restoration of an Incised Stream

Project Location



Reach characteristics

Elevation = 808 m

Drainage = 49.2 sq. km

Qbkf = 5.5 m^3/s

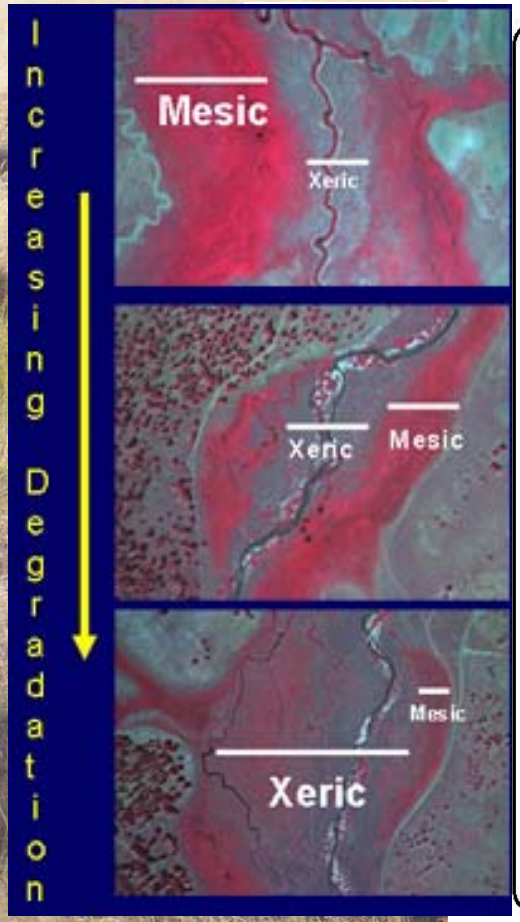
Channel length = 5.1 km

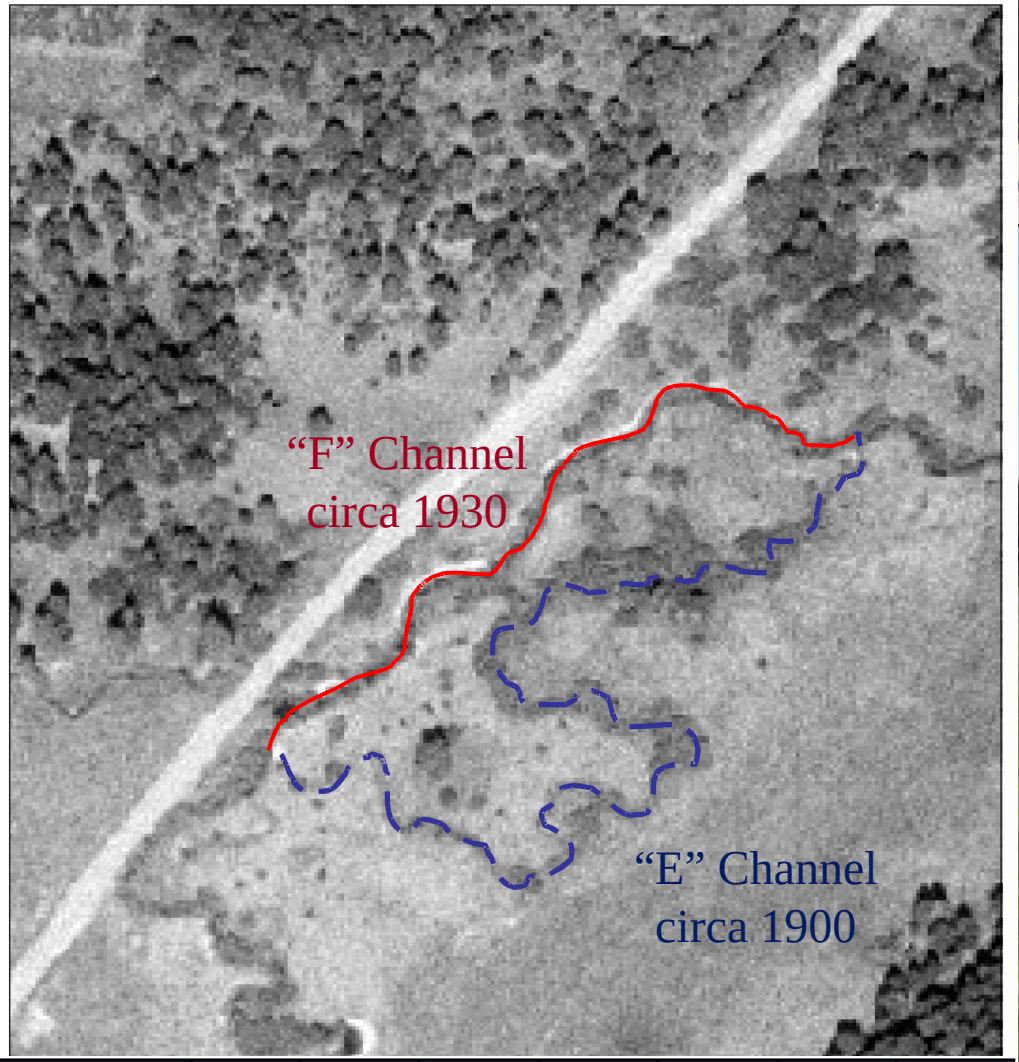
Valley gradient = .007

D50=30 mm; D84=77 mm

Limiting Factors

- Degraded riparian vegetation





Return Interval Flood Discharge	1.5- Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Benewah Creek Magnitude and Fequency of Instantaneous Peak Flows	183 cfs	245 cfs	430 cfs	580 cfs	780 cfs	960 cfs	1150 cfs

current channel capacity

Project Goals

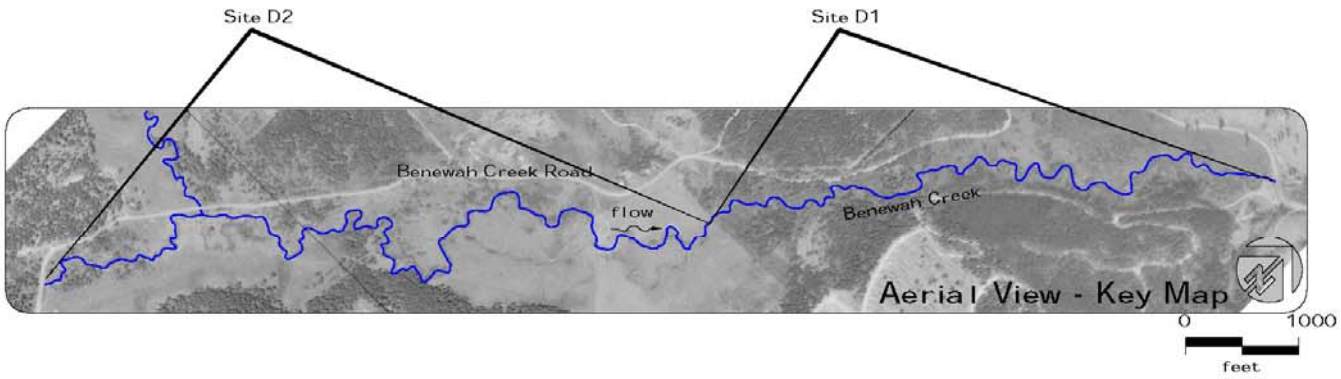
- *Restore hydraulic connectivity and stable channel configuration*
- *Improve instream and wetland habitats by increasing dynamic and long term surface and ground water storage*
- *Increase juvenile westslope cutthroat trout rearing capacity*

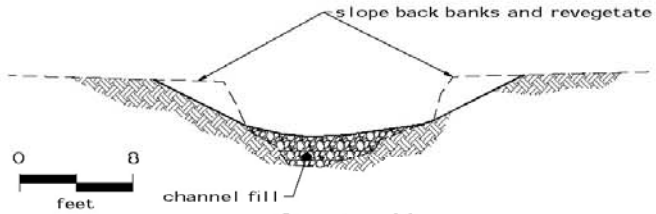
Assumptions

Reconnecting the incised channel with the historic floodplain will:

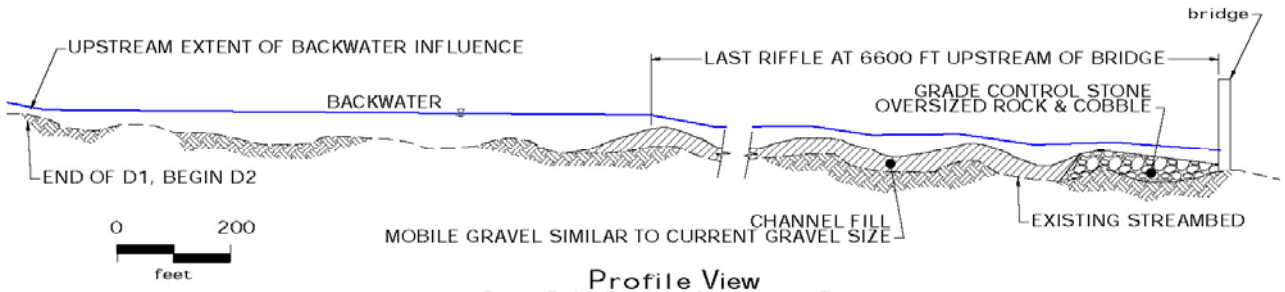
- *Reset channel form and function within the range of historical conditions*
- *Reverse the observed shift from hydric/mesic (wetter) to xeric (drier) vegetation communities across the valley bottom*
- *Increase instream thermal heterogeneity and reduce ambient water temperature*

Design Overview





Section View
Site D1- Bank Sloping



Profile View
Site D1- Raise Channel Bed

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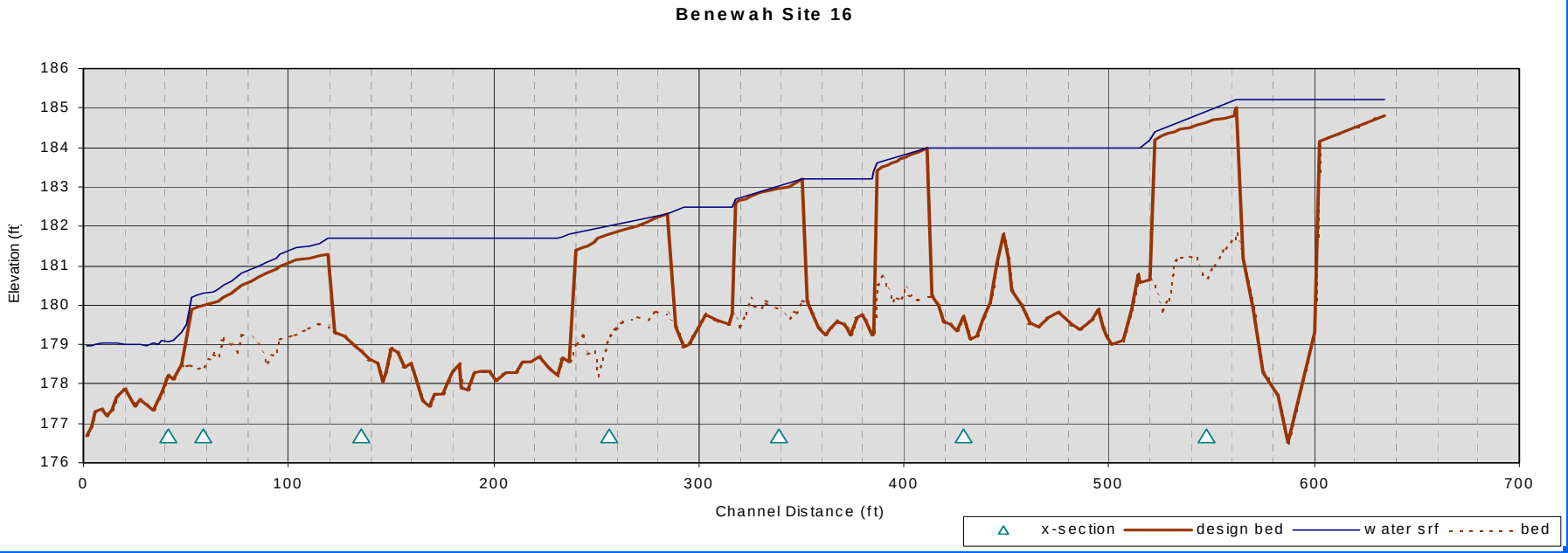
Sites D1 & D2

Benewah Creek
Channel Enhancement
Assessment Project

inter-fluve, inc.

Phase I Construction

Physical Habitat Response



Response variable	*Before*	*After*	*%Change*	*Objective*
Sinuosity	1.28	2.01	**+57**	2.0
Slope	0.0048	0.002	**-58**	<0.003
Entrenchment ratio	2	12.3	**+515**	>12
Belt width (m)	41.7	71.0	**+70**	>60
Mean residual pool depth (m)	0.64	1.15	**+81**	>1.0
Residual pool volume (m^3/100m)	177.5	469.8	**+165**	>370
LWD density (m^3/100m)	5.2	23.9	**+359**	>15

Streambank Erosion Prediction

A. 1-year post construction

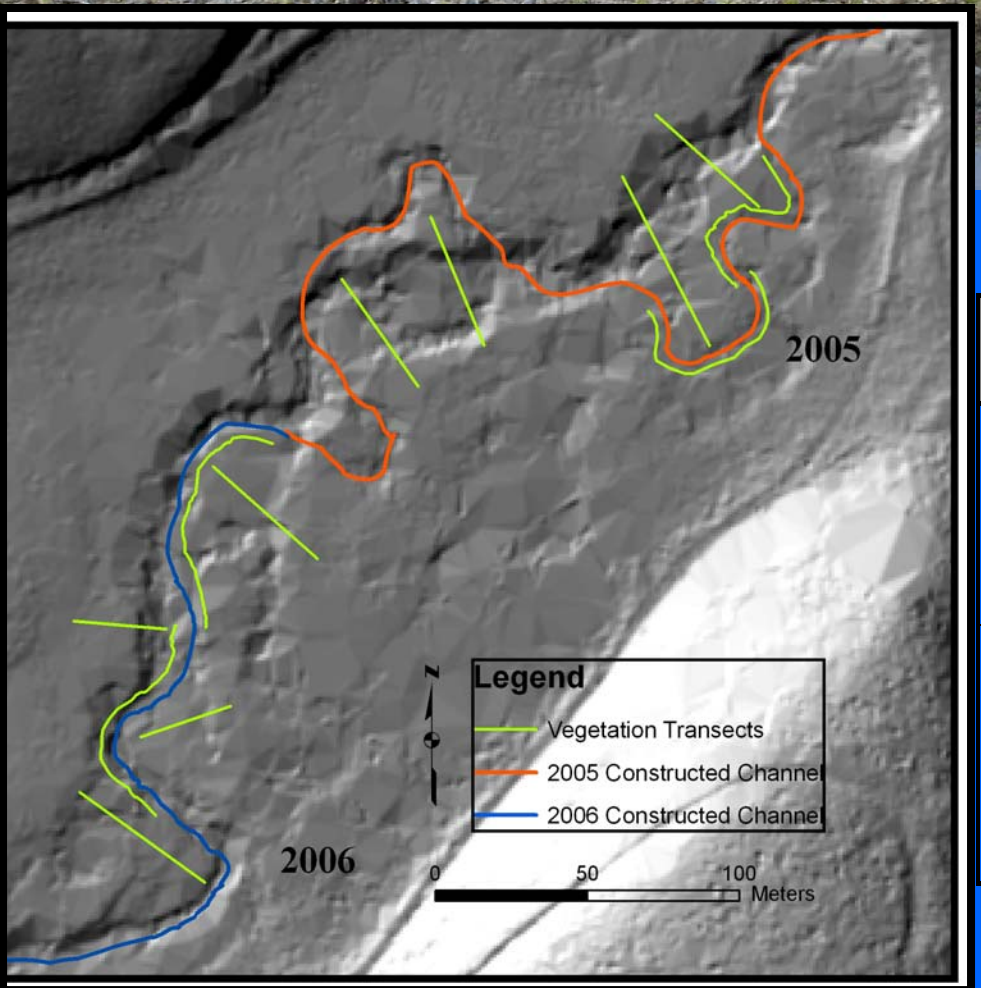
- Bank height ratio = 1.08
- Est. rate = 0.06 tons/yr/ft

B. Untreated control

- Bank height ratio = 2.01
- Est. rate = 0.23 tons/yr/ft

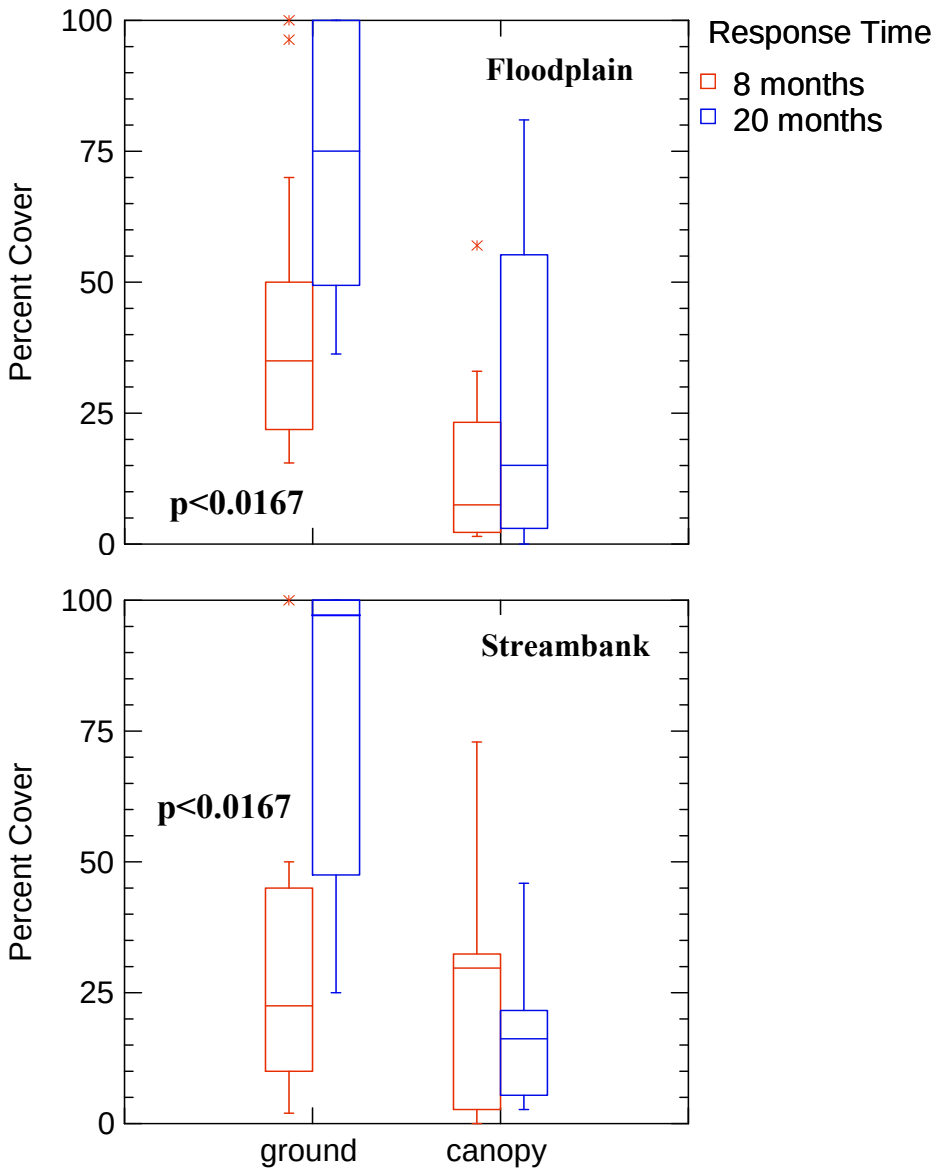
Total estimated sediment reduction = 1,037 tons/yr

Vegetative Treatments

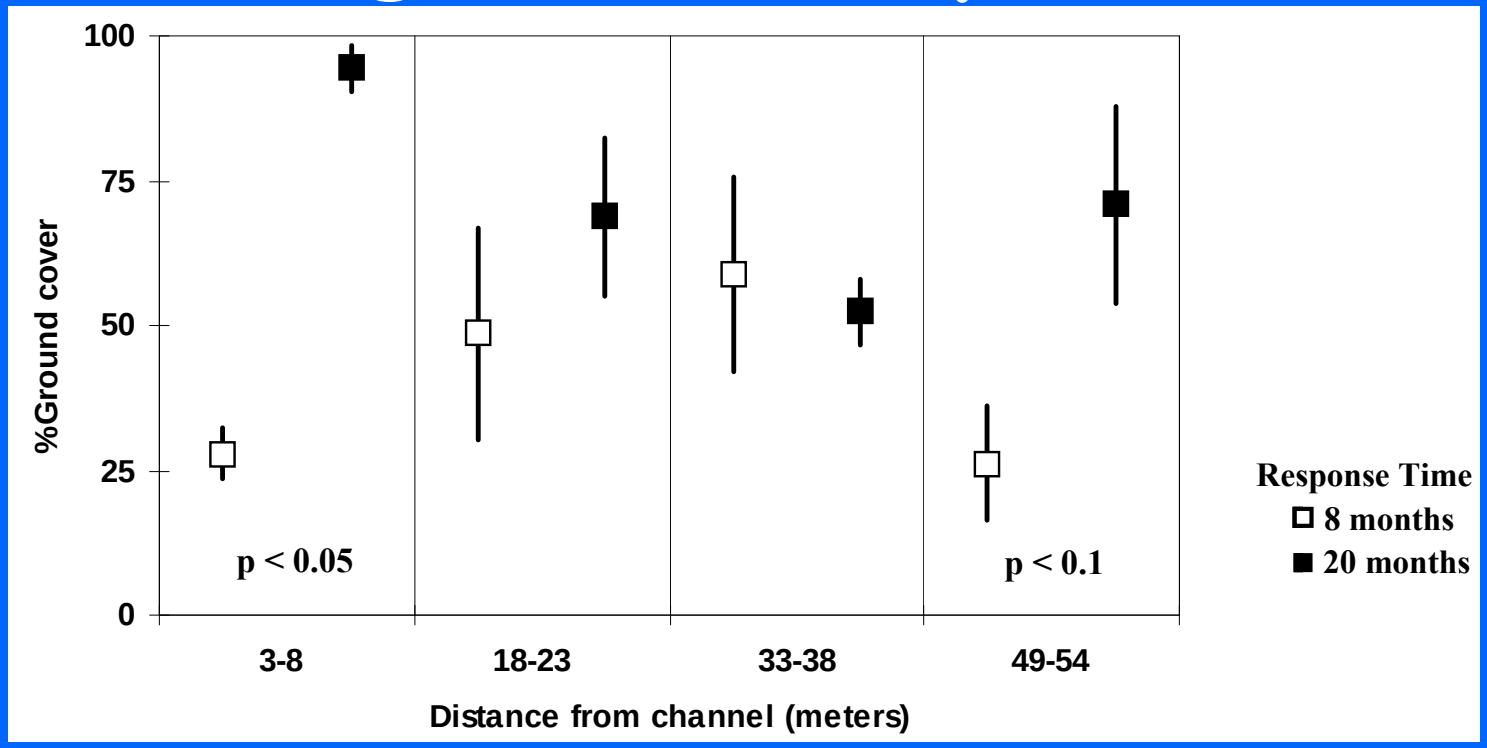


Zone	Plant Group	Material Type/Size	Density
Floodplain	trees and shrubs	1 gallon container	6’ o.c.
	sedges and rushes	20 cu. in. plug	3’ o.c.
	grasses	seed	40 lbs/acre
Streambank	trees and shrubs	1 gallon container live cutting	4’ o.c.
	sedges and rushes	20 cu. in. plug	12” o.c.
	grasses	seed	40 lbs/acre

Vegetation Response



Vegetation Response



3 meters distance from channel 50 meters

Temperature Monitoring

- **Continuous measures**

  Hobo® Water Temp Pro (±0.2 °C accuracy)

- **Discrete measures Riffle/Pool Sequences**

  Cooper® Digital thermistor (±0.2 °C accuracy)

Optimum Growth[1]

Highest growth rate over 60 days

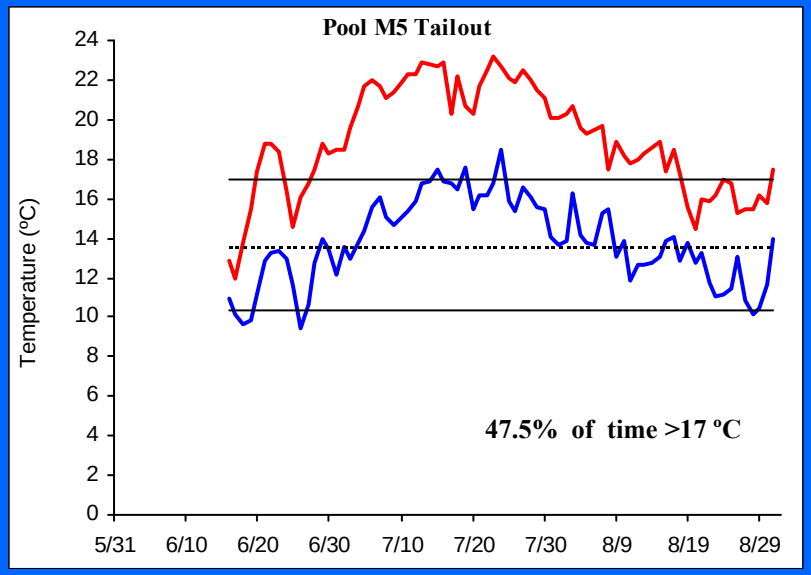
Mean =13.6 °C

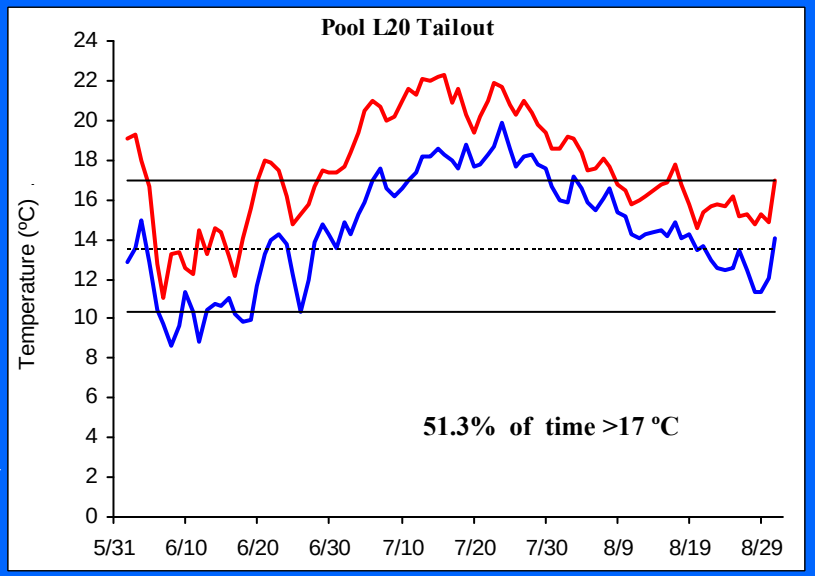
upper 95% CI =17.0 °C

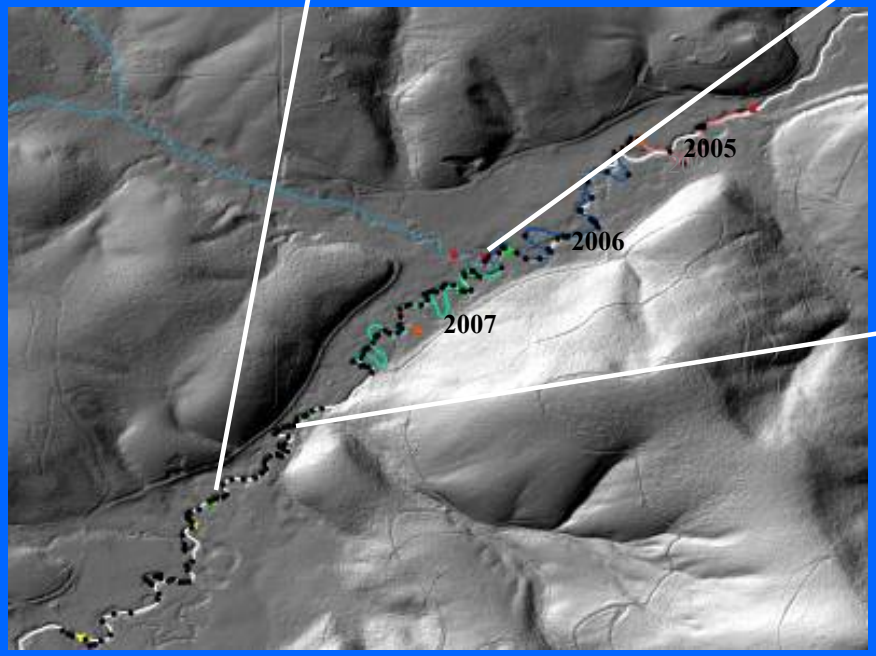
lower 95% CI =10.3 °C

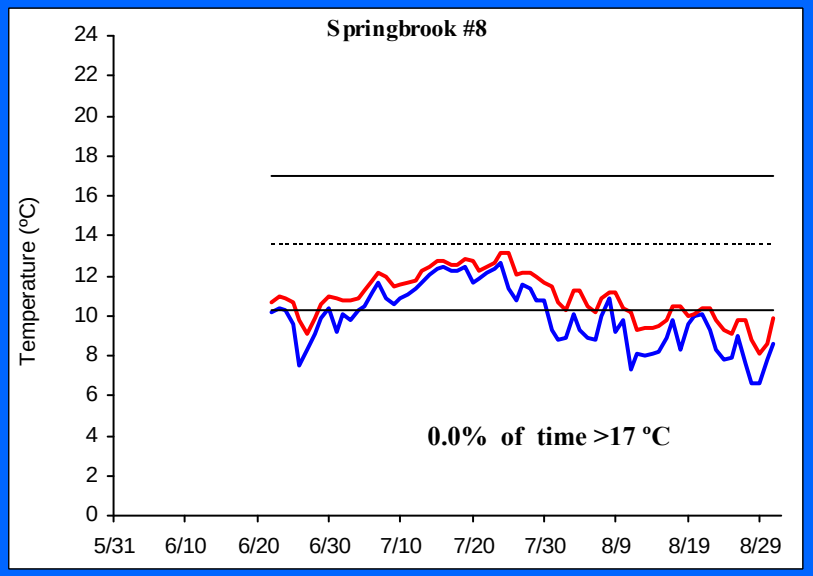
[1]*Acclimated Chronic Exposure method with 60 day trials (Bear et al. 2005)*

Temperature Heterogeneity

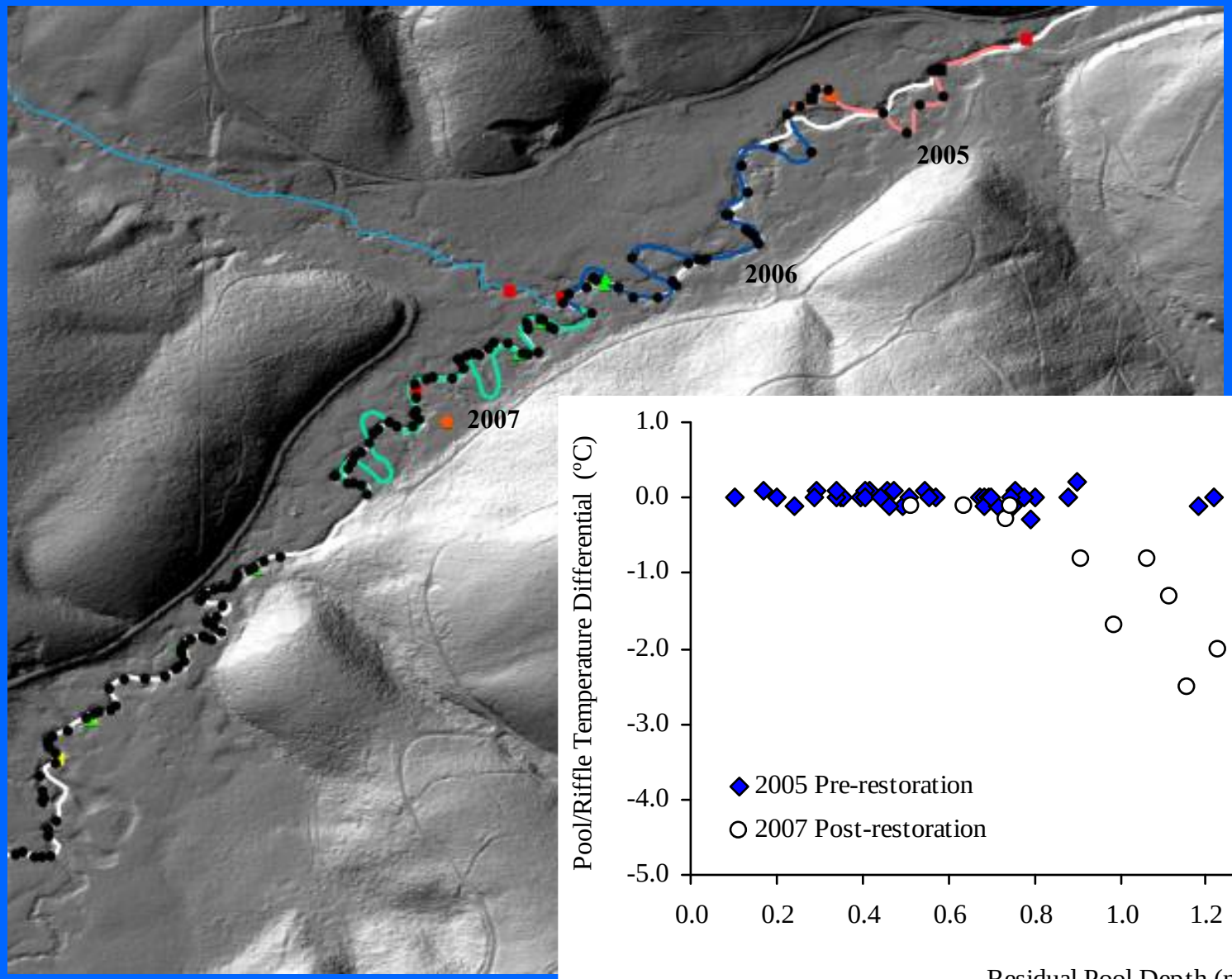








Thermal Refuge



Next Steps

- Continue restoration to reconnect the channel/floodplain
- Validate streambank erosion estimates
- Increase sample size and repeat measures of vegetation response; include additional response variables
- Repeat measures of temperature at riffle/pool sequences
- Use models to estimate change in ambient stream temperature
- Continue multi-pass electroshocking at index and random selected sites to estimate fisheries response

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