

Long Term Gravel Augmentation Compendium

Presentation for GAWG

March 18,2015



Goals Stated for Gravel Augmentation

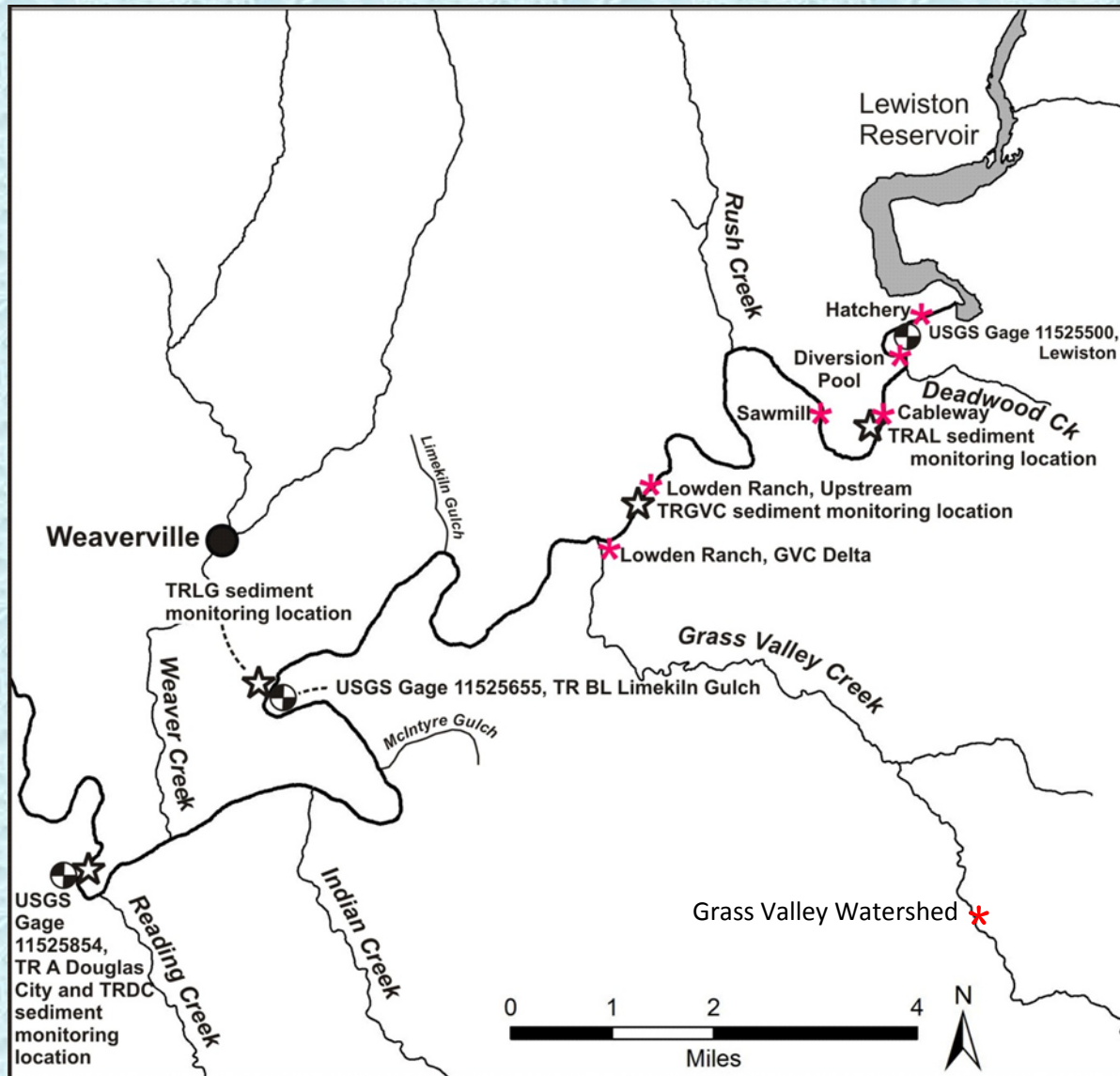
- 1) Increase sediment storage to provide immediate benefits to salmonids by promoting geomorphic processes. **Short term objective**
- 2) Supply gravel at a rate that maintains a balanced sediment budget to sustain geomorphic processes and habitat functioning. **Long term objective**

Gravel Augmentation Design

1. Define objectives (TRFES/CSMP)
2. Design considerations
 - Injection Point Location (short vs. long term)
 - Implementation Equipment
 - Source of Injection Material (Varies)
 - Size of Injection Material (1/2 – 5 inches)
 - **Volume of Injection Material (???)**

Augmentation designs are supported with the best available science

Gravel Augmentation (Sites)



Gravel Augmentation (Implementation)



Gravel Augmentation (Source)

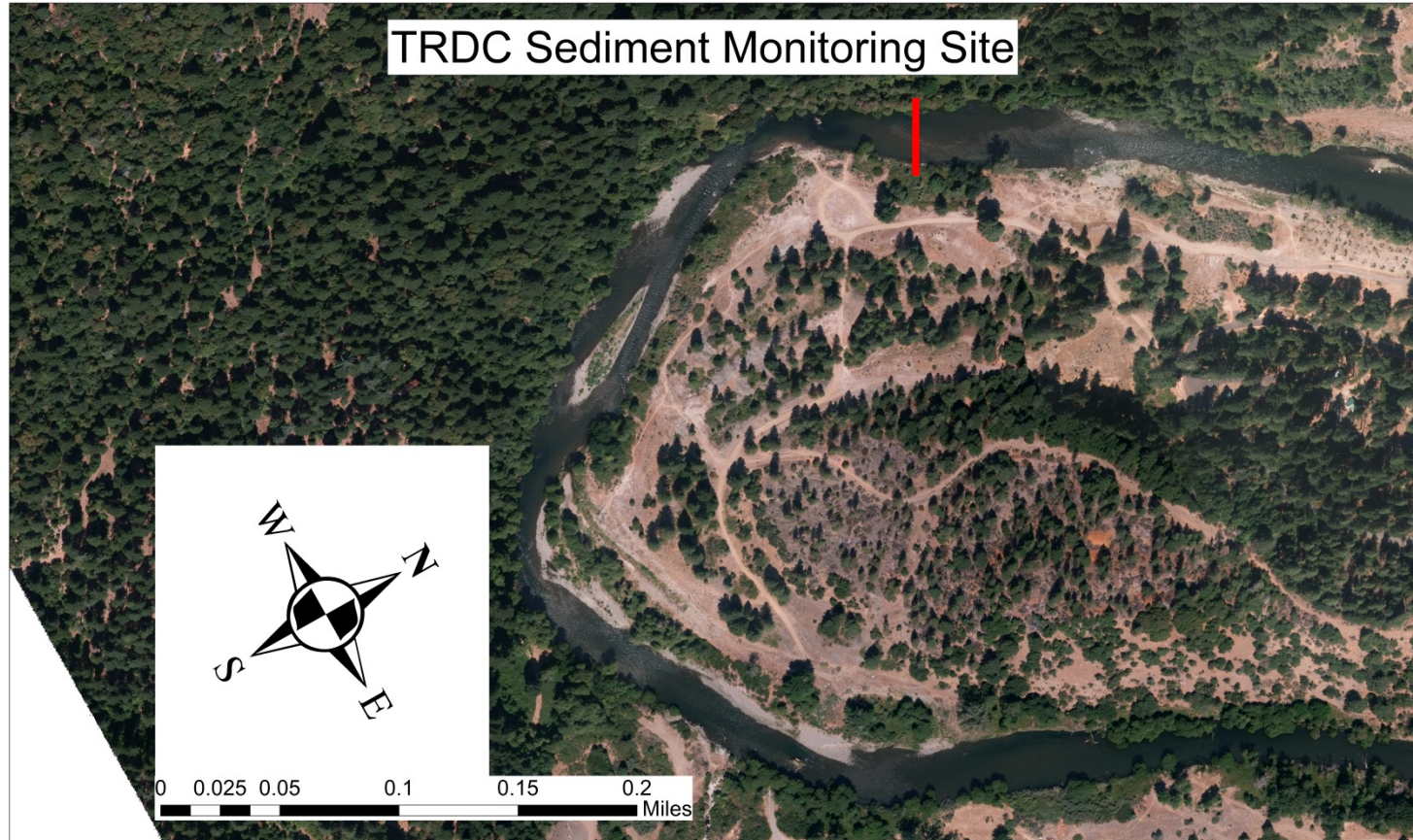


Gravel Augmentation (Size)



Gravel Augmentation (volume)

- Douglas City Transport rates are scaled to hydrological conditions at upstream locations.



Assumptions of Augmentation Volumes

1. Douglas City transport rates are sufficient to support desired fluvial processes to produce complex bed morphology (Geomorphic)
2. Fluvial processes supported by these transport rates will improve anadromous salmonid populations (Habitat)

Assessments

- Geomorphic
 - Short term (Geomorphic Forms)
 - Long term (Balanced Sediment Budget)
- Salmonid production
 - Short term (Habitat)
 - Long term (Biological response)

Assessment (Geomorphic)

- Sediment Transport Monitoring
- Aerial Photography
- Bathymetric Surveys
- Particle Tracking
- Geomorphic Mapping

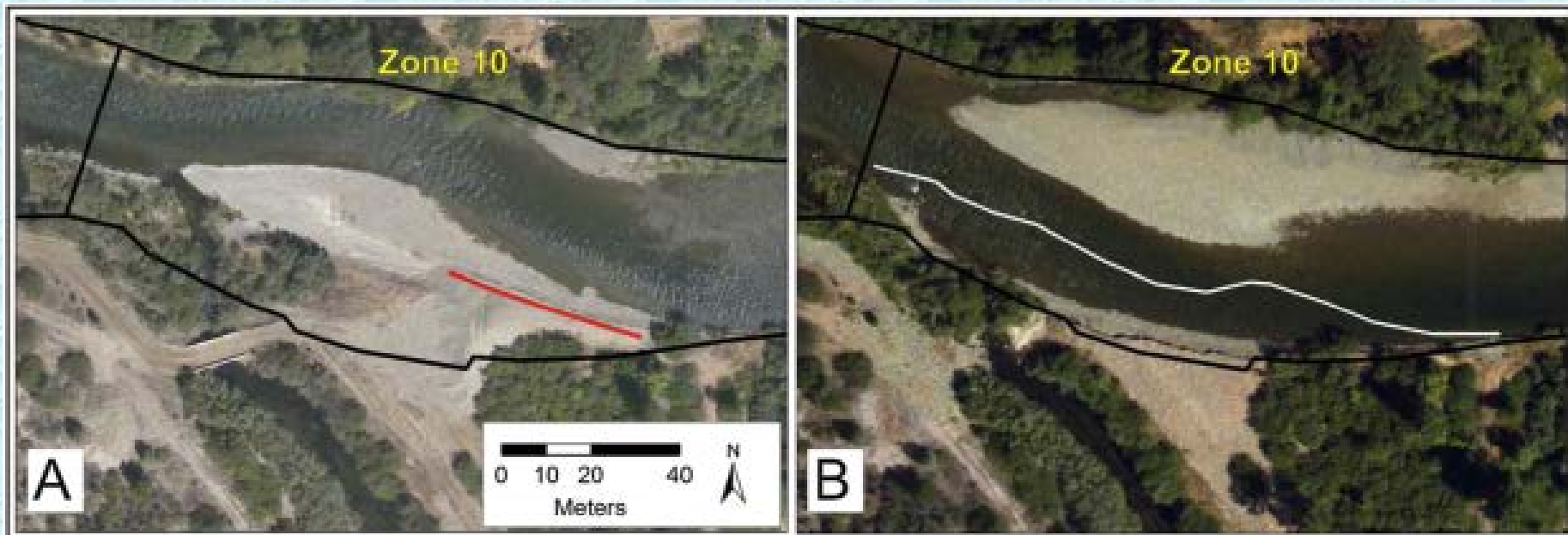
Assessment (Sediment Transport)

- Fine and course sediment monitoring
- 4 mainstem locations
- Enables sediment budget analysis

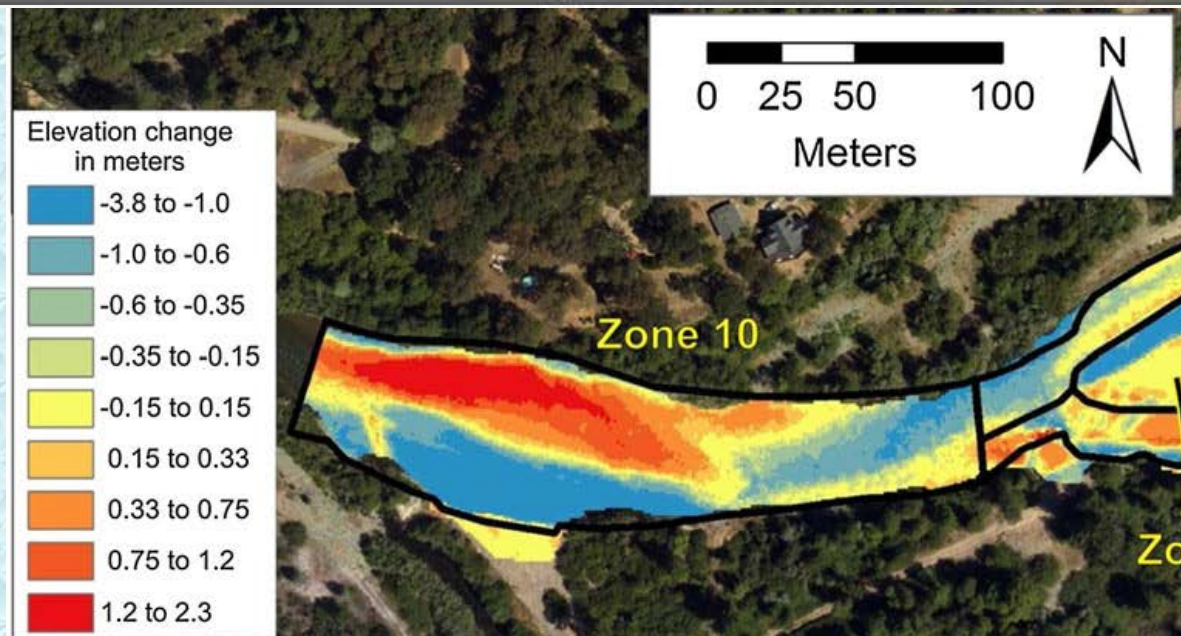
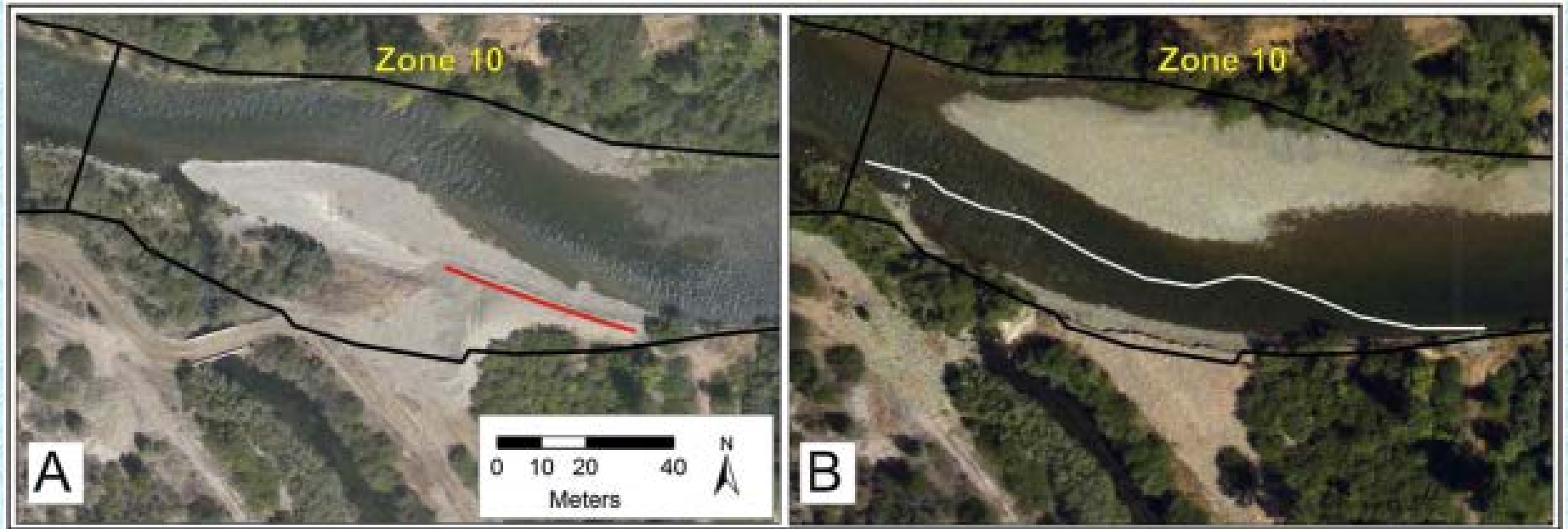


Assessment (Aerial Photography)

- Initial Assessment of Geomorphic changes
- Quantify Bank Erosion
- Identify areas for further analysis



Assessment (Bathymetric Surveys)



Assessment (Geomorphic Map)

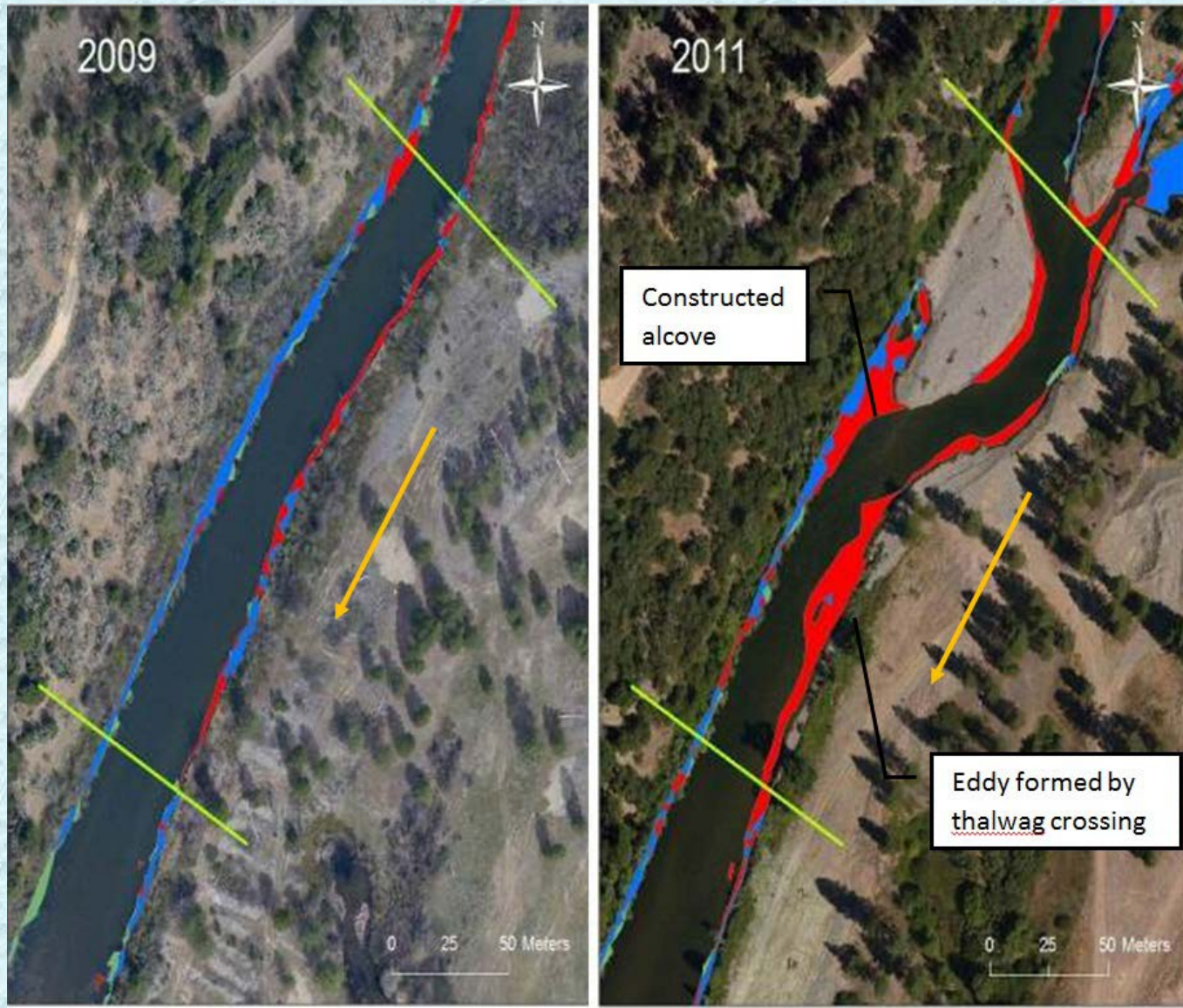
[illegible]

Assessment (Salmonid Production)

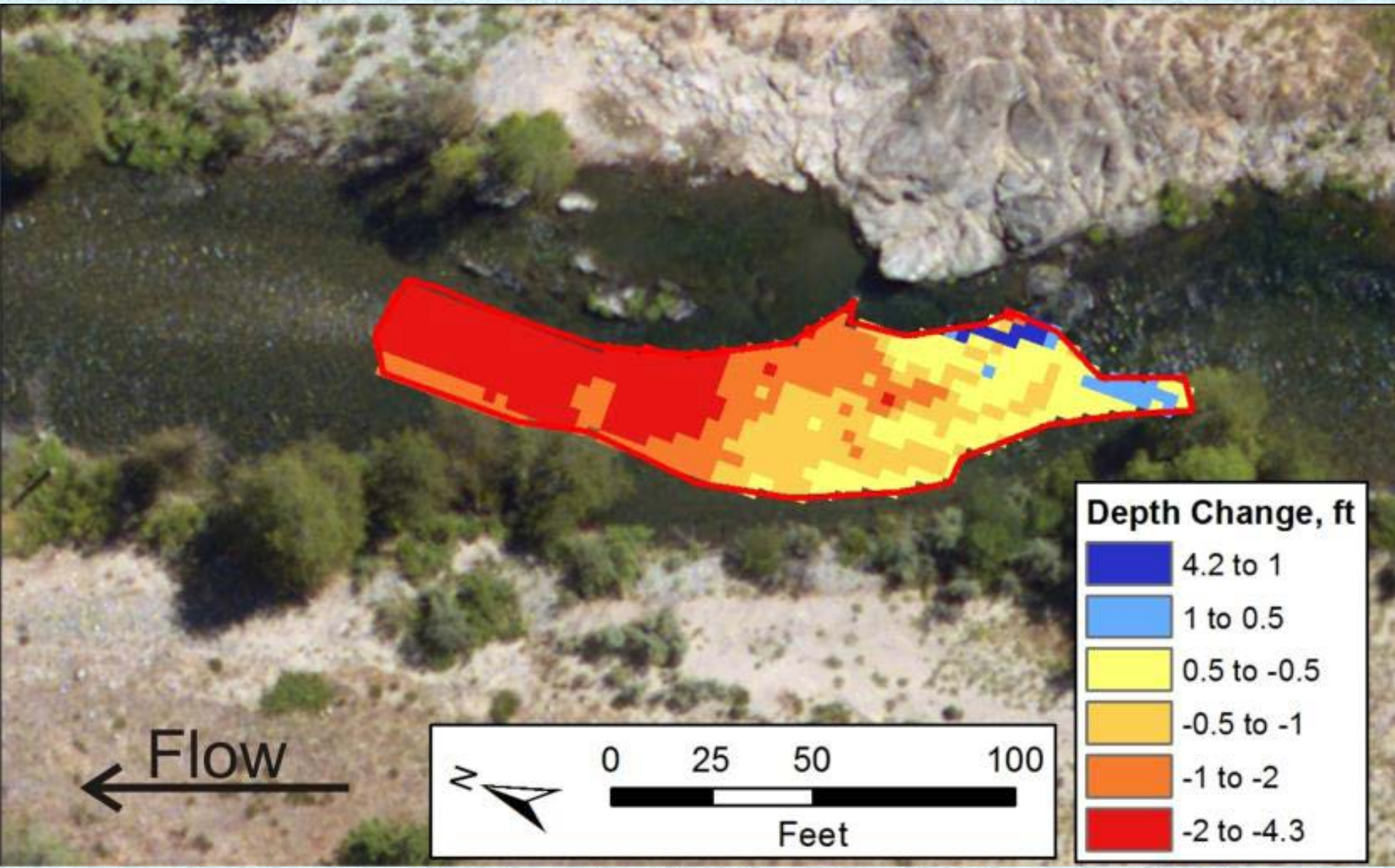
TRRP gravel augmentations are intended to restore geomorphic processes with the assumption that these restored processes will lead to improved anadromous salmonid populations

- Juvenile Habitat
- Adult Holding Habitat
- Spawning

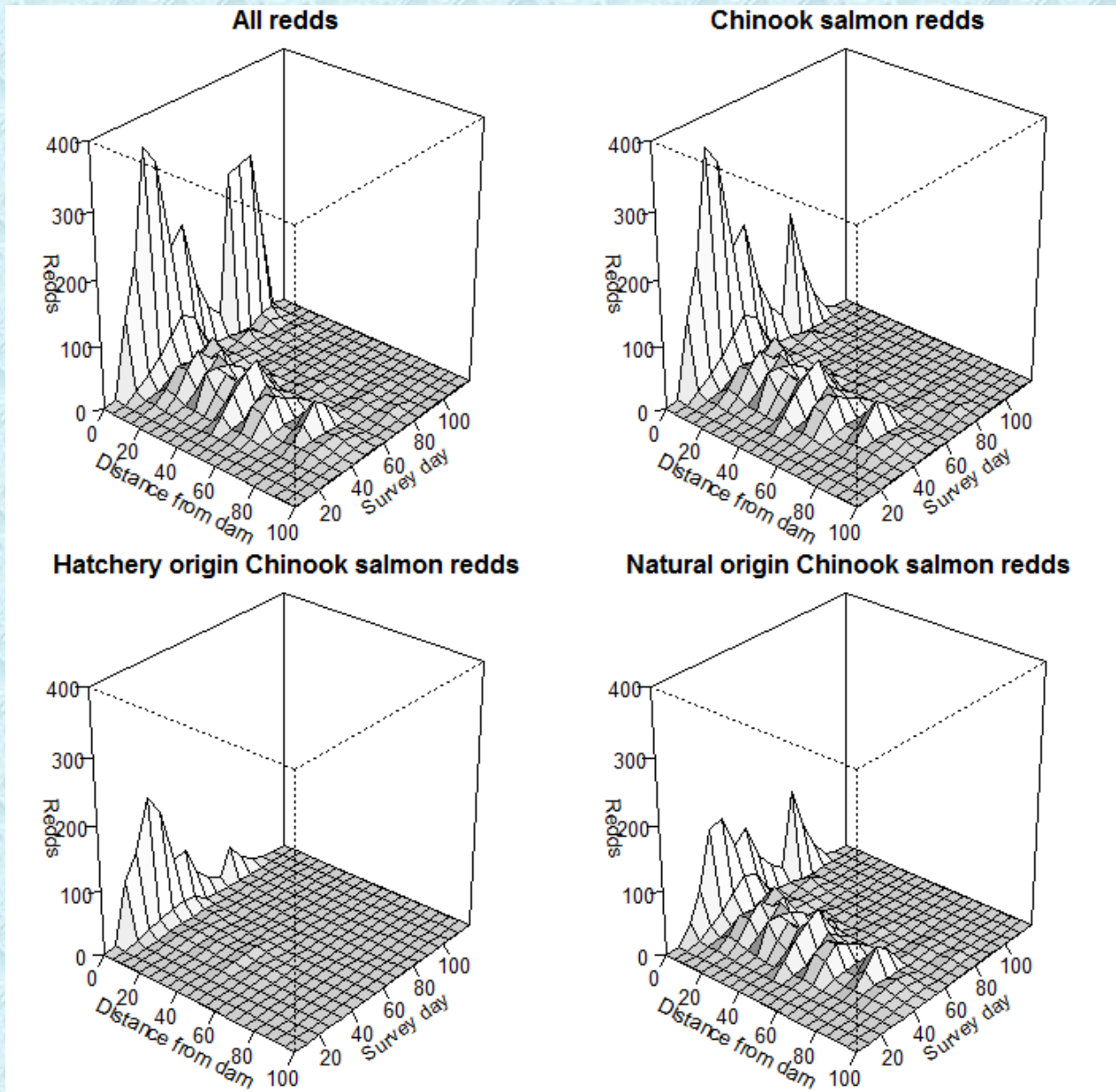
Assessment (Juvenile Habitat)



Assessment (Holding Habitat)



Assessment (Spawning)

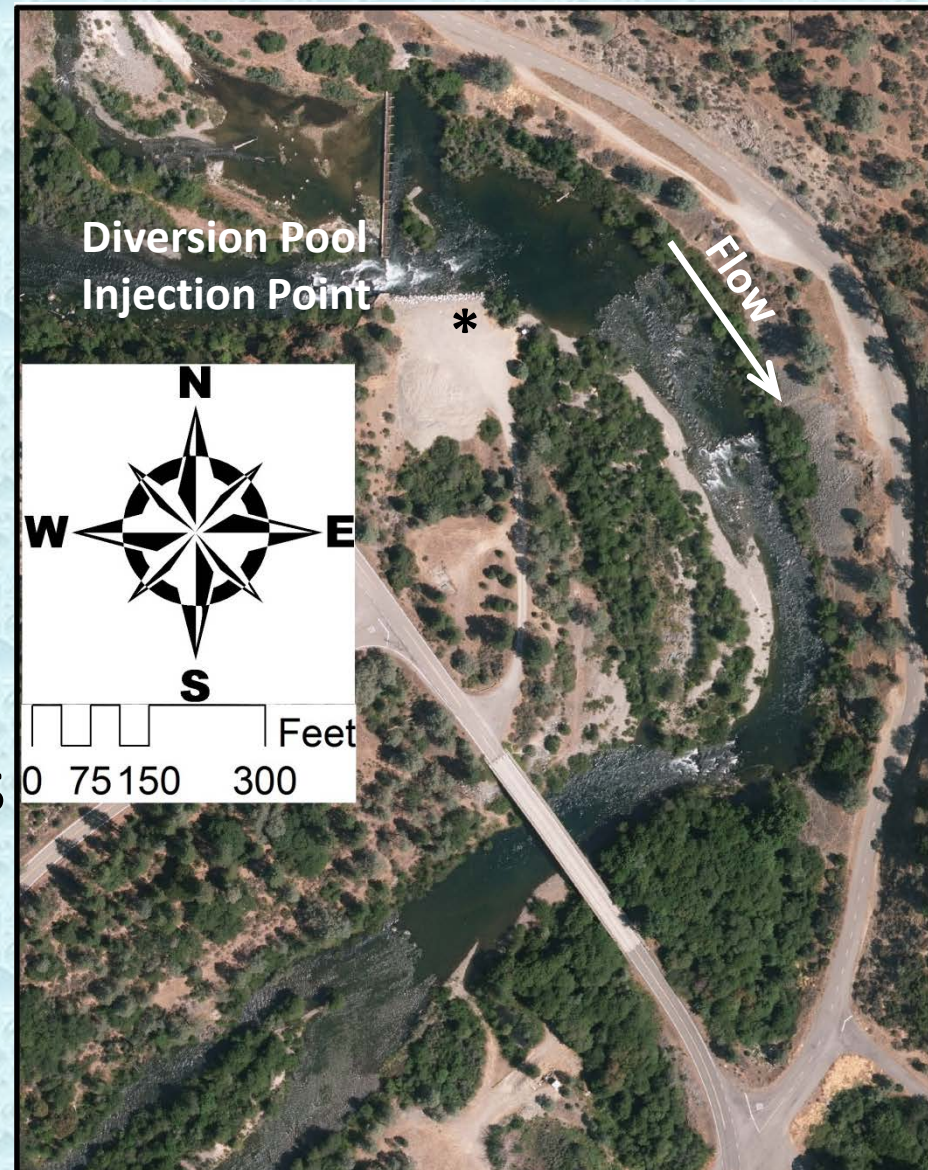


Description of Individual Site Assessments

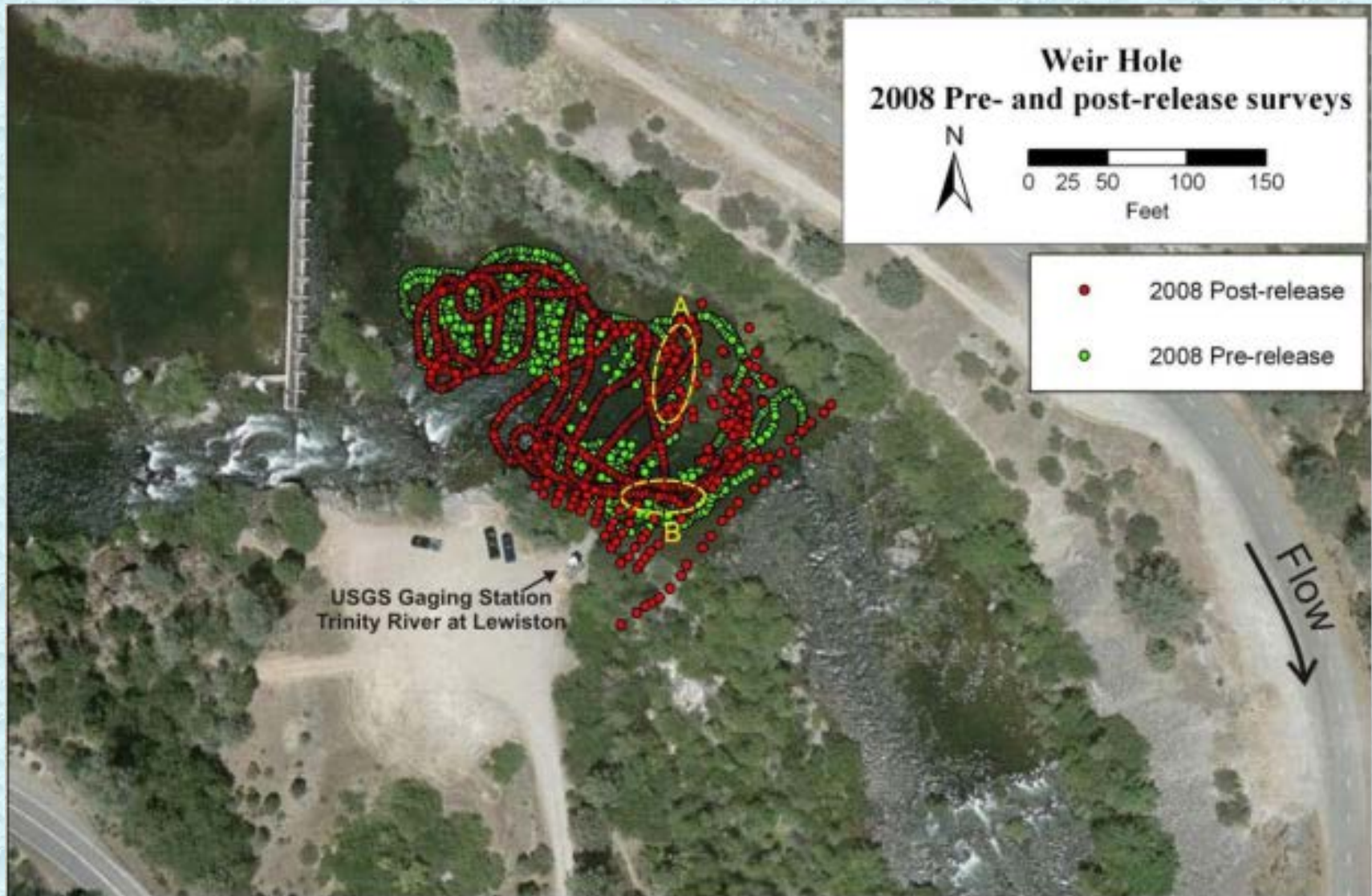
- Hatchery
- Diversion Pool
- Cableway
- Sawmill Burner Hole
- Lowden Ranch
- Grass Valley Creek Watershed

Diversion Pool (Site)

- Long term gravel augmentation location
- Volumes based on transport rates
- Risk=Pool Filling
- Geomorphic adjustments

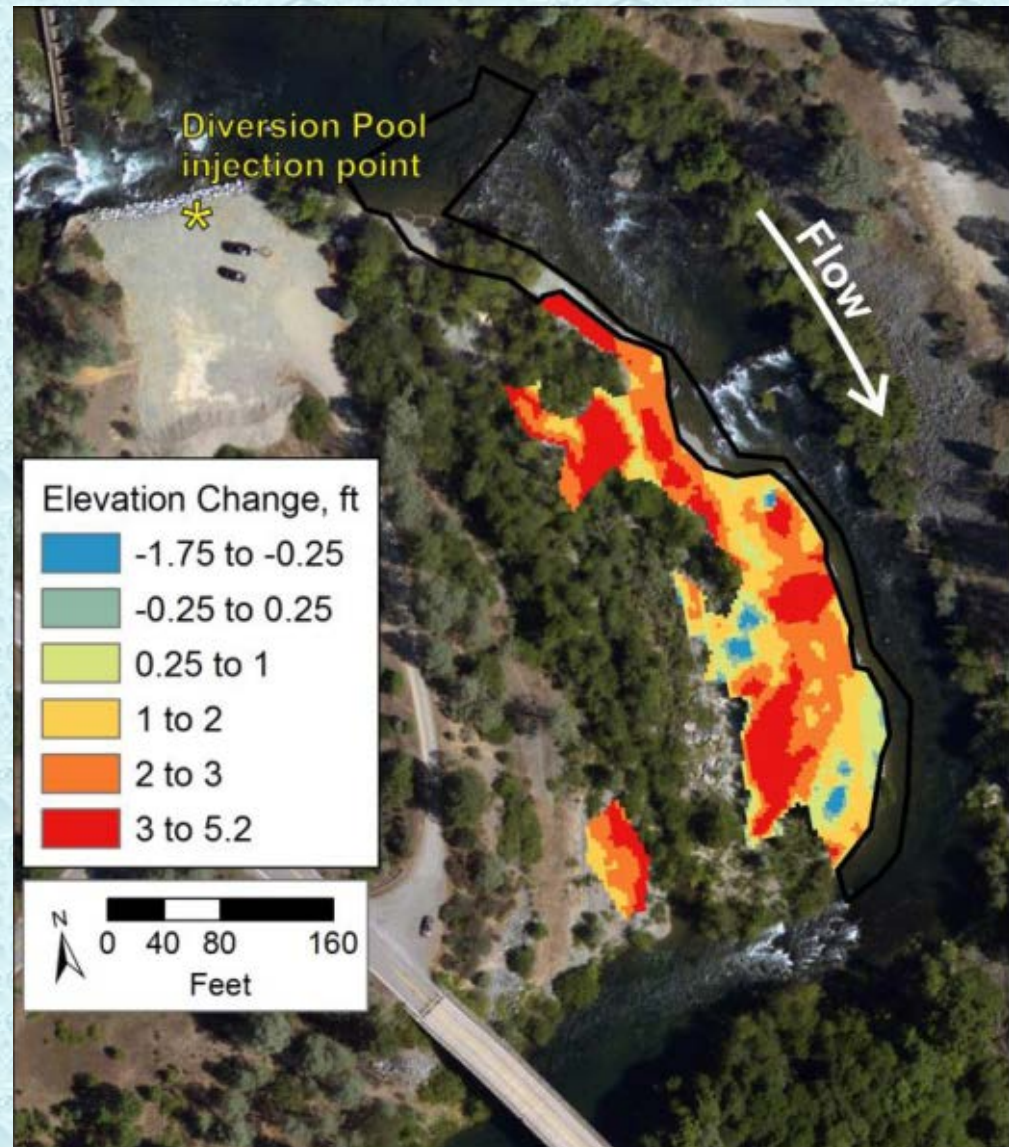


Diversion Pool (Risk Assessment)

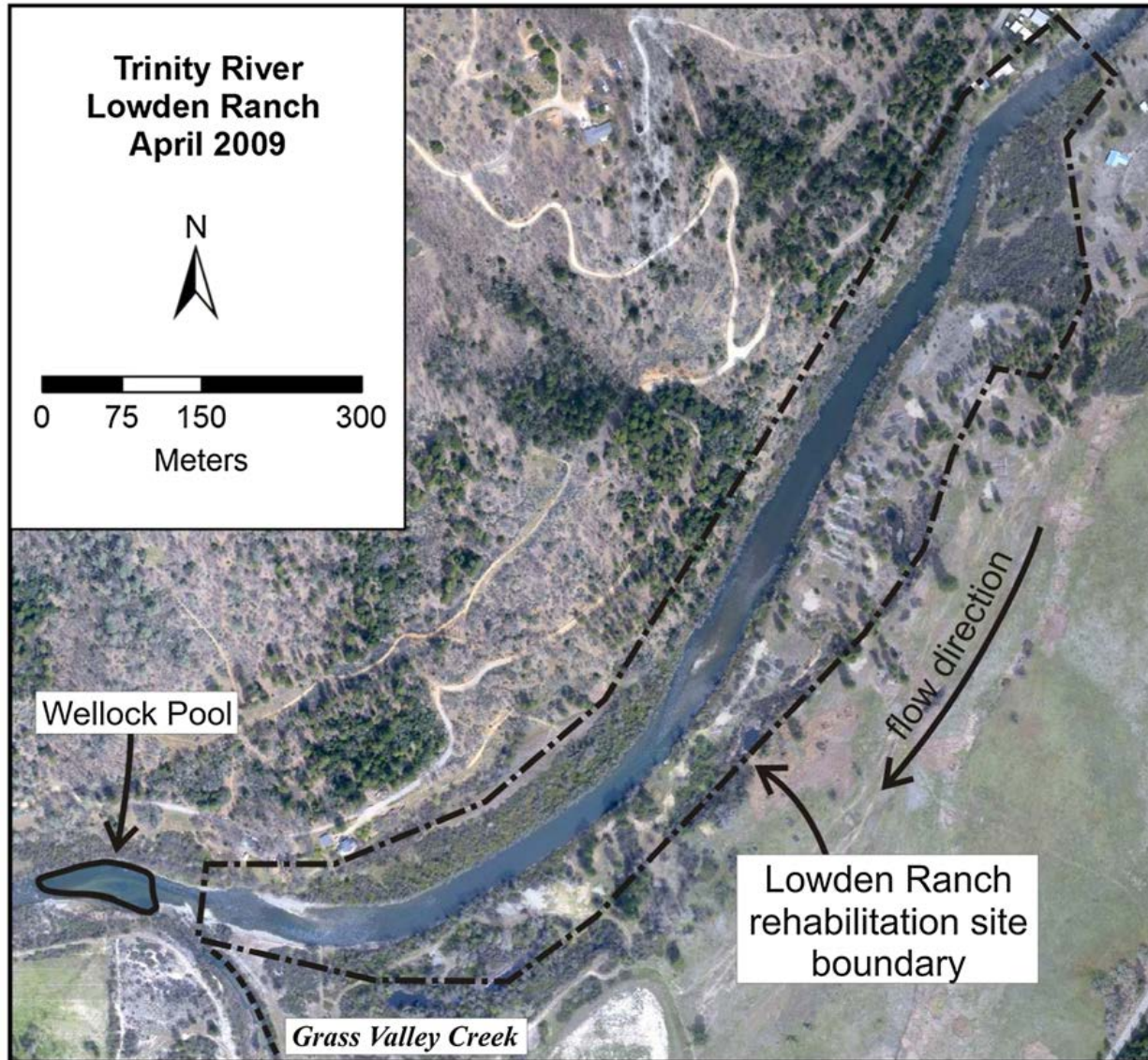


Diversion Pool (Geomorphic Change)

- Bathymetric Differencing
- Design Considerations
- Risk assessment

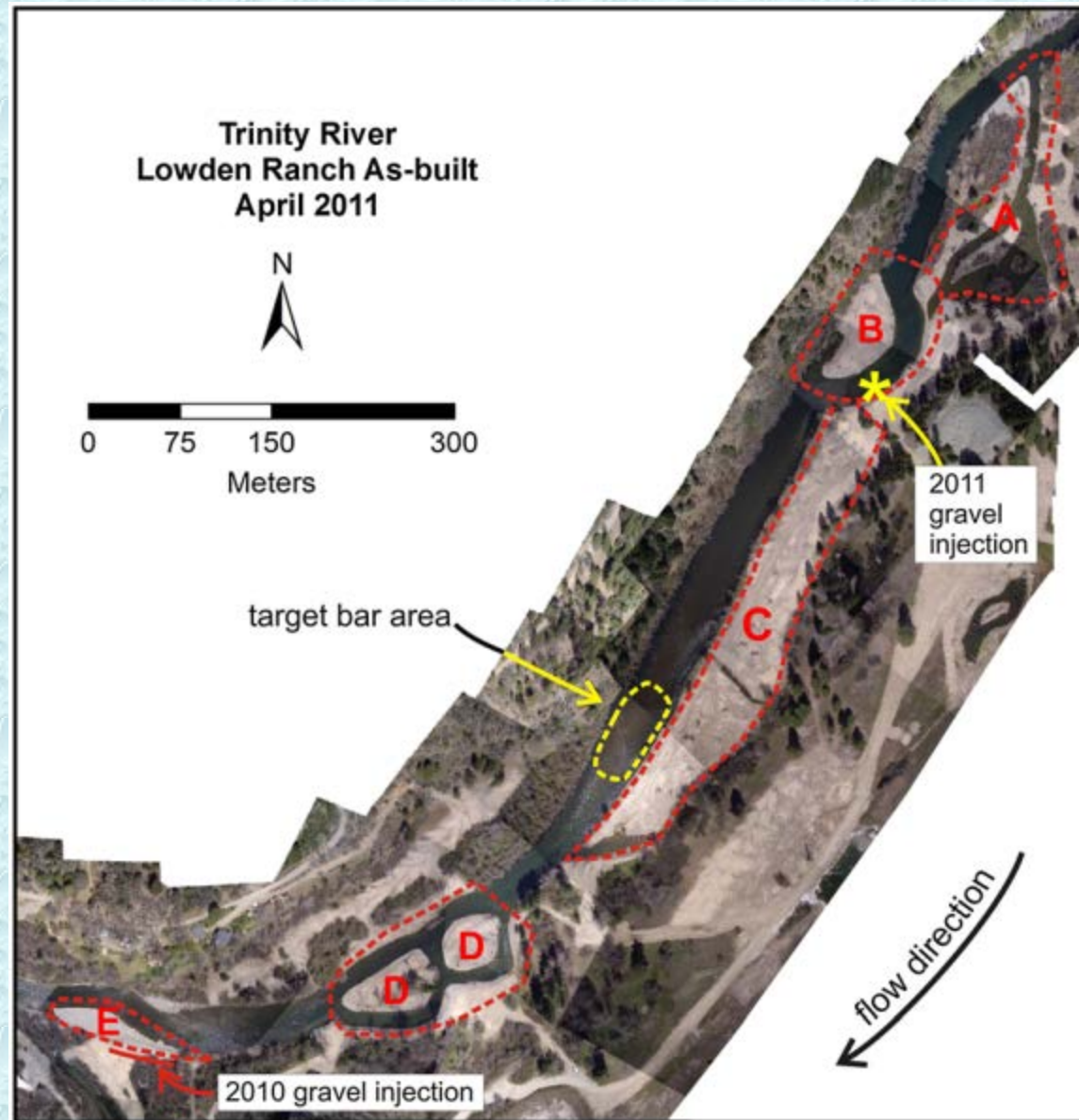


Lowden Ranch (Site)



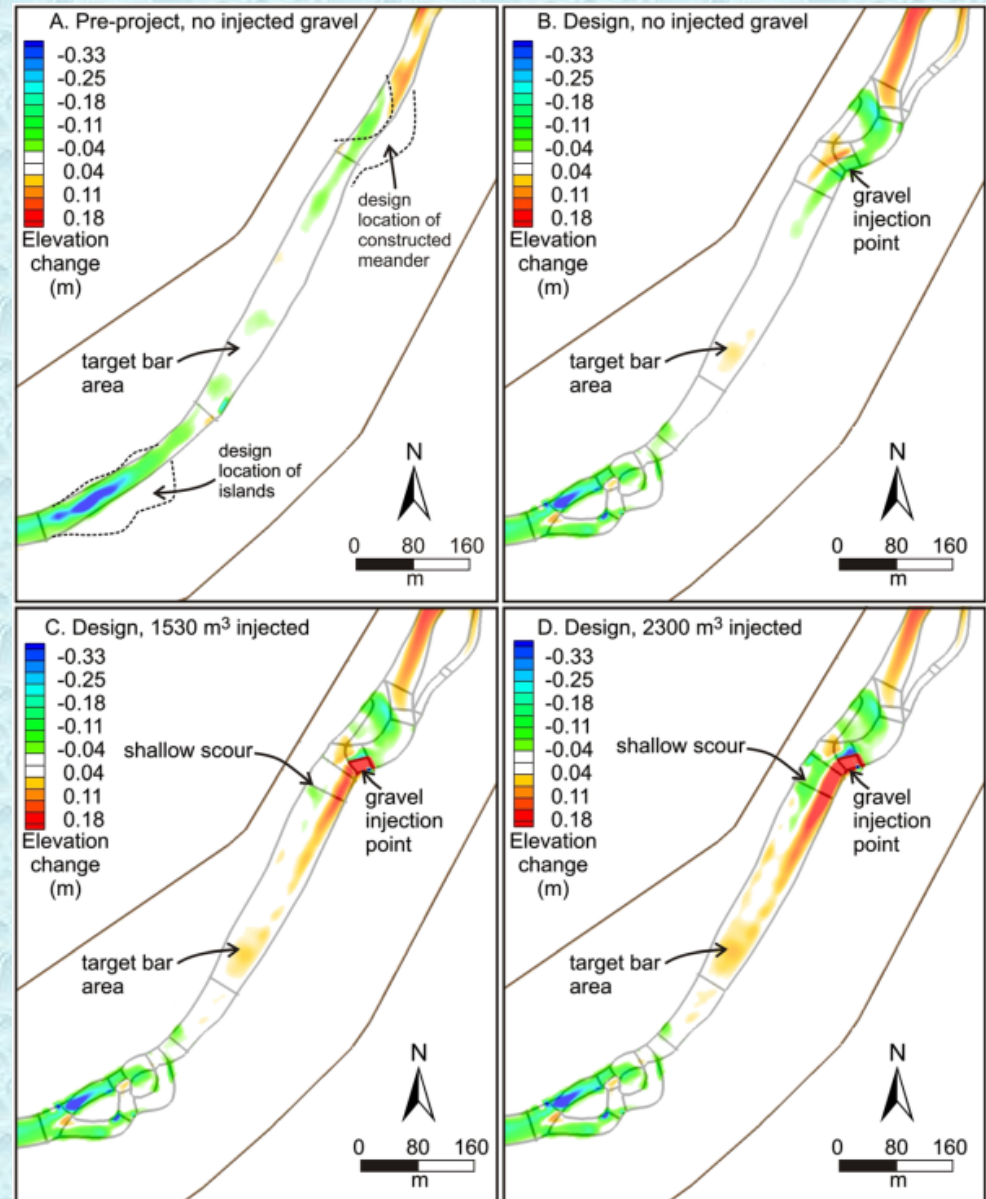
Lowden Ranch (Site)

- Site description
- Design Considerations
 - Location
 - Source
 - Size
 - Quantity
 - Equipment
- Numerical Modelling
- Geomorphic Change
- Habitat Change
- Risk assessment



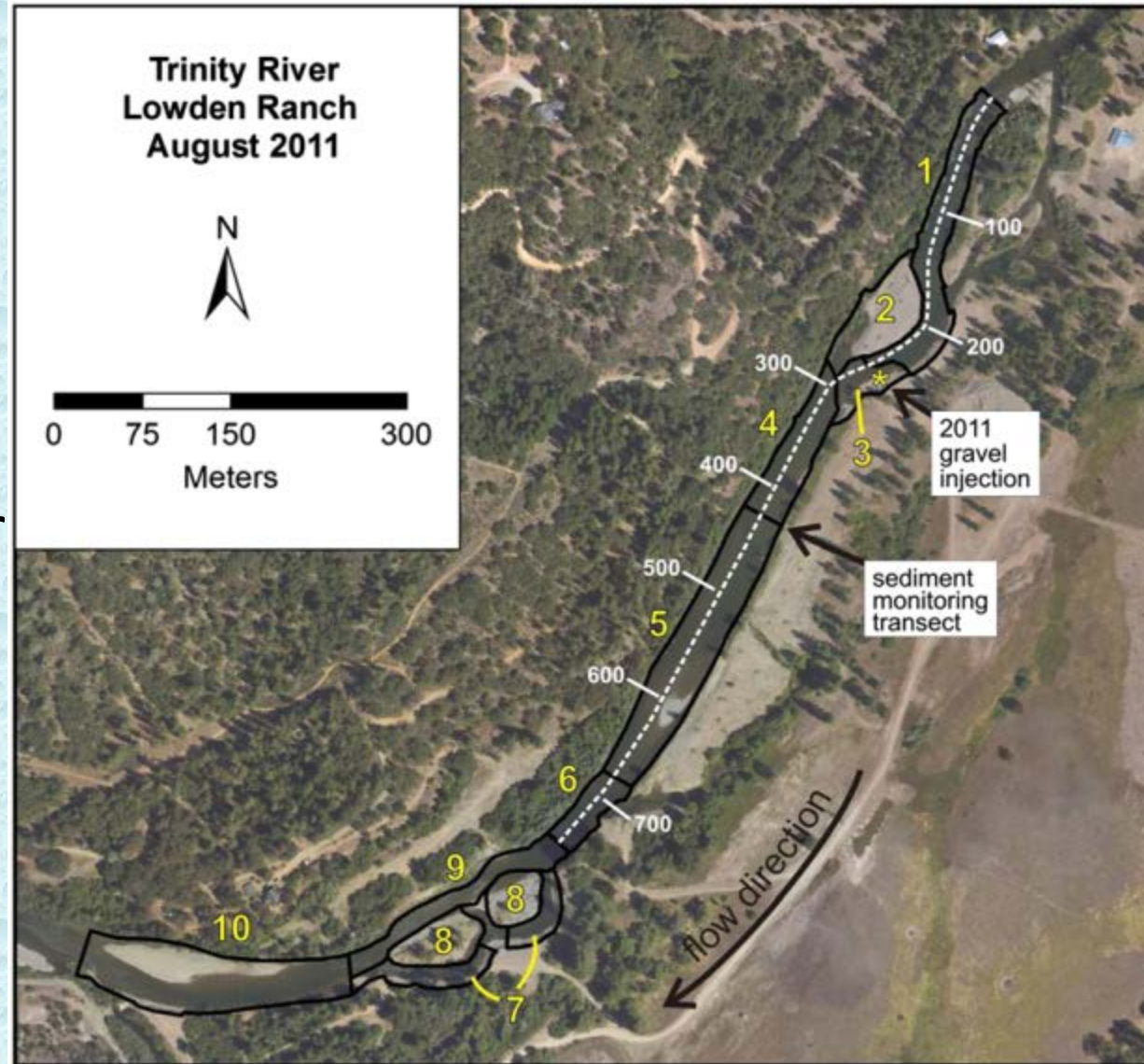
Lowden Ranch (Numerical Modelling)

- Geomorphic Change
- Risk Assessment
- Augmentation Volume



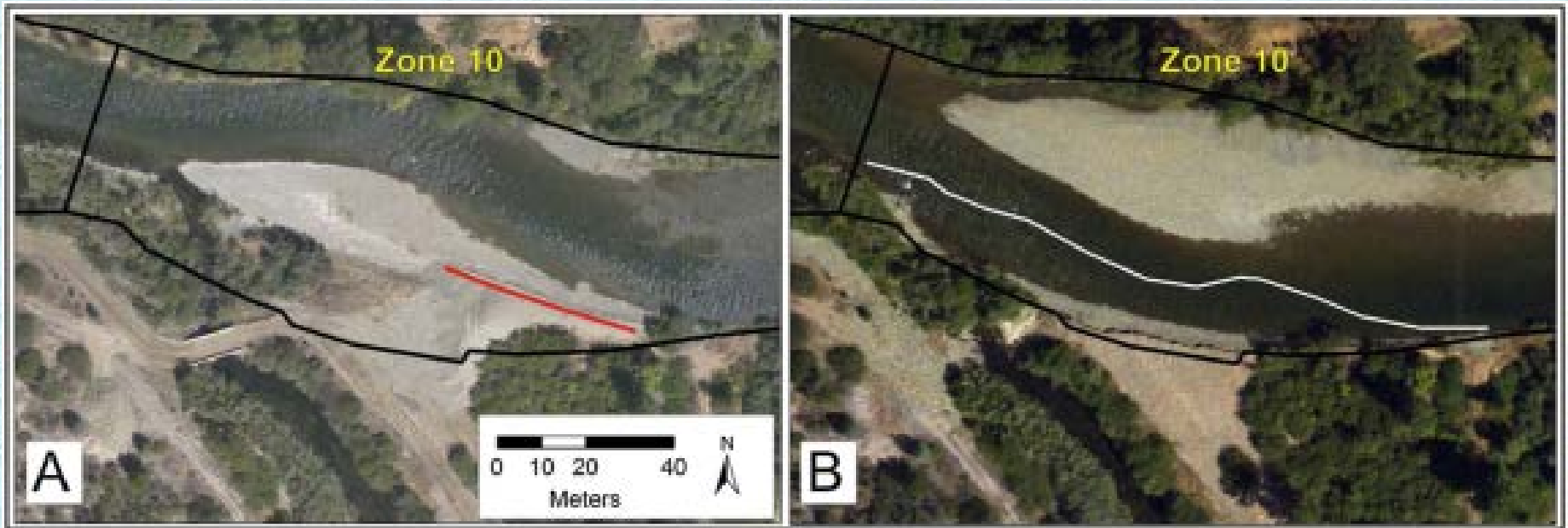
Lowden Ranch (Aerial Photography)

- Geomorphic Change
- Risk Assessment
- Identify locations for further analysis



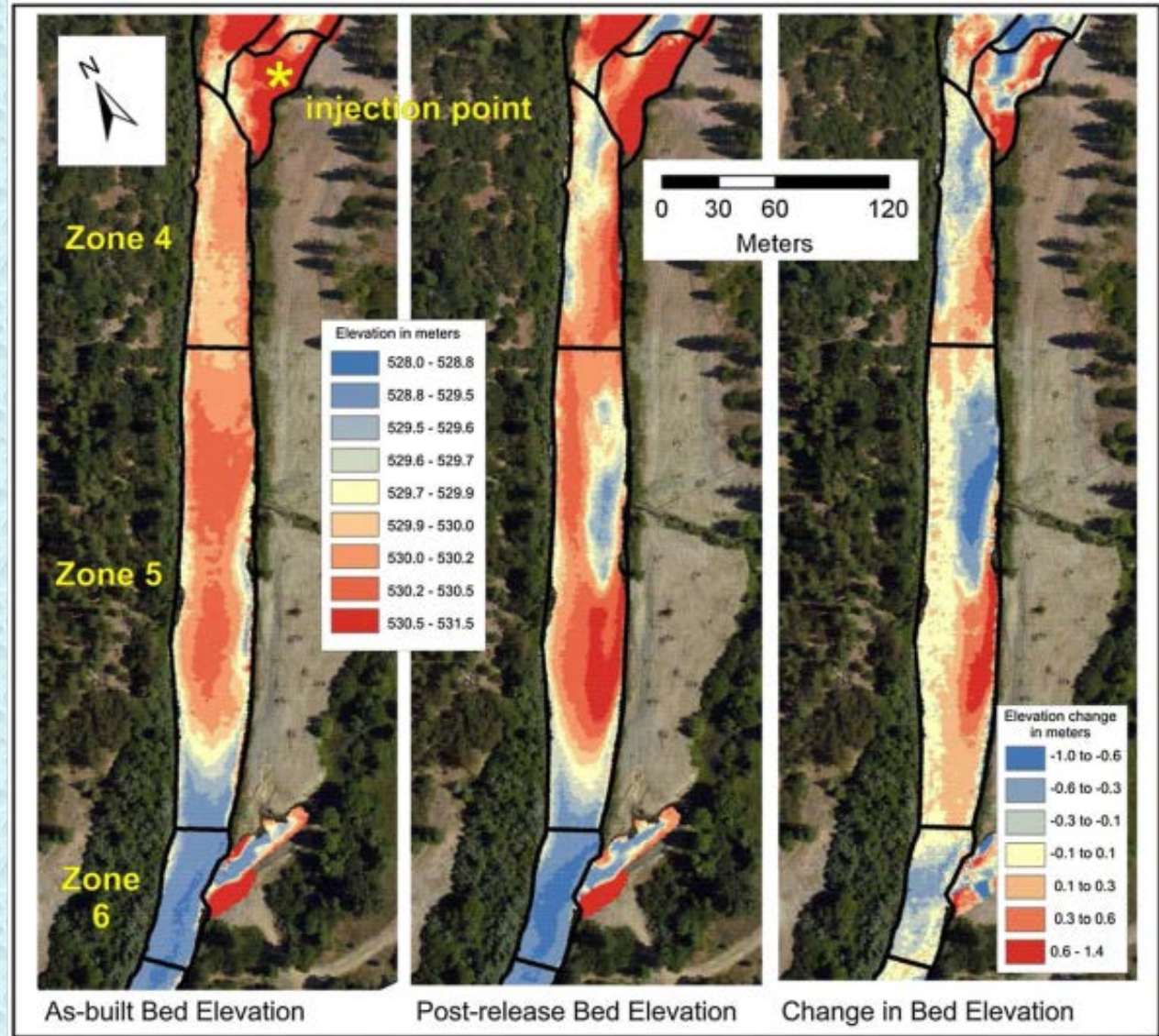
Lowden Ranch (Aerial Photography)

- Quantify bank erosion
- Quickly identify locations for further analysis



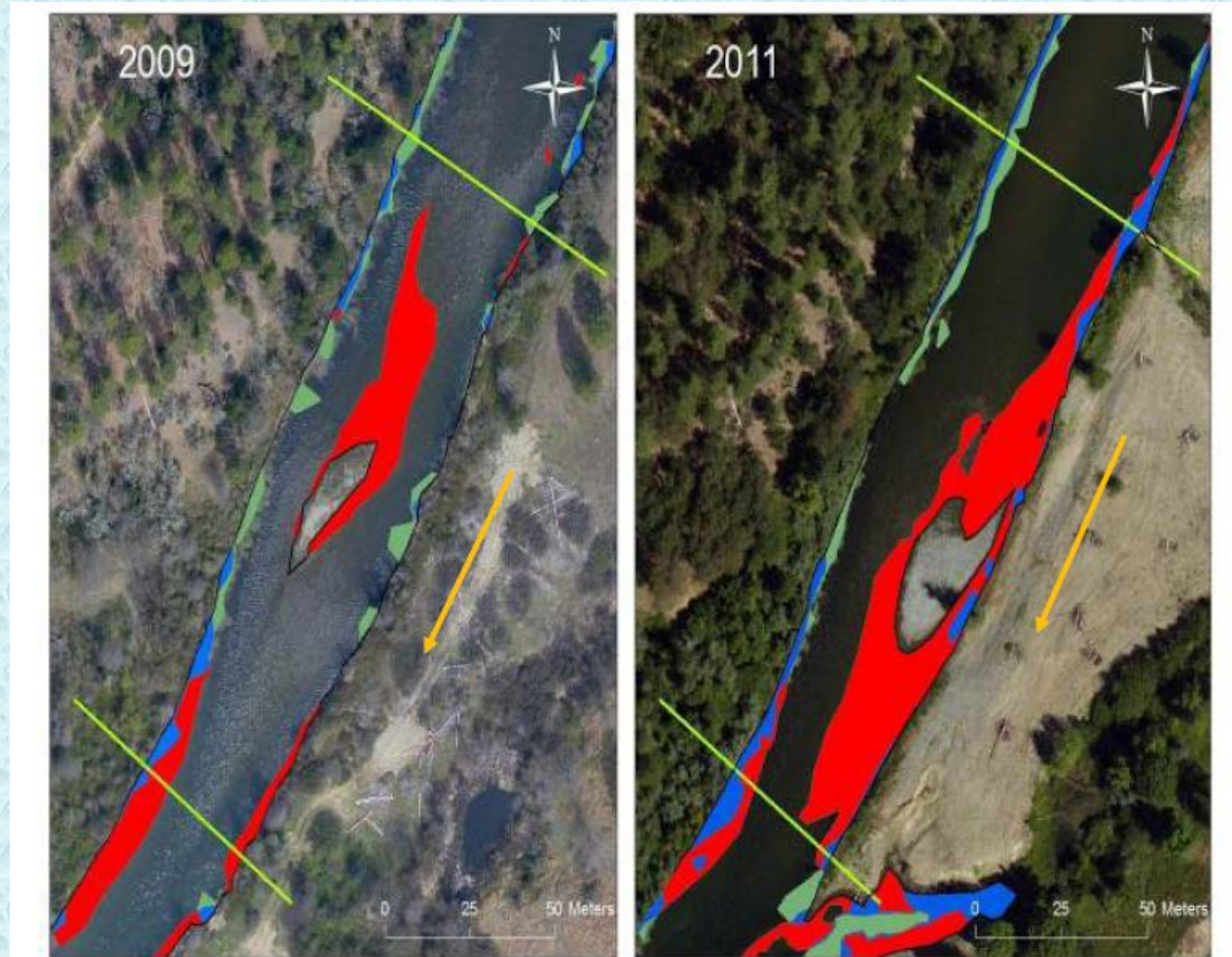
Lowden Ranch (Bathymetry)

- Pre
- Post
- Difference



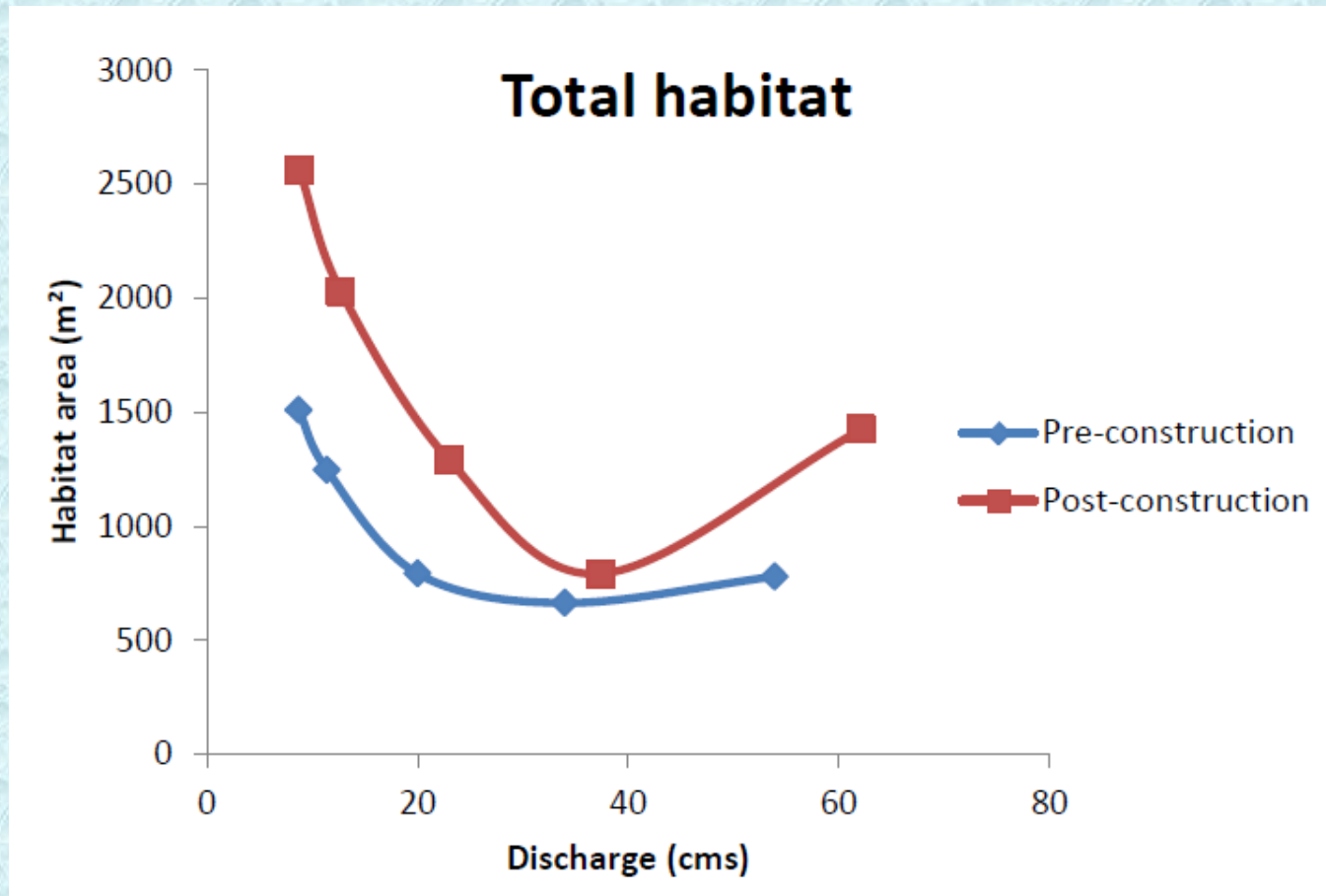
Lowden Ranch (Habitat)

- Habitat mapping
 - Pre
 - Post



Lowden Ranch (Habitat)

Total area of habitat as a function of flow rate is related to channel geomorphology



Lowden Ranch (Risk)

Did the island complex close off?

Was habitat lost from the island complex???

