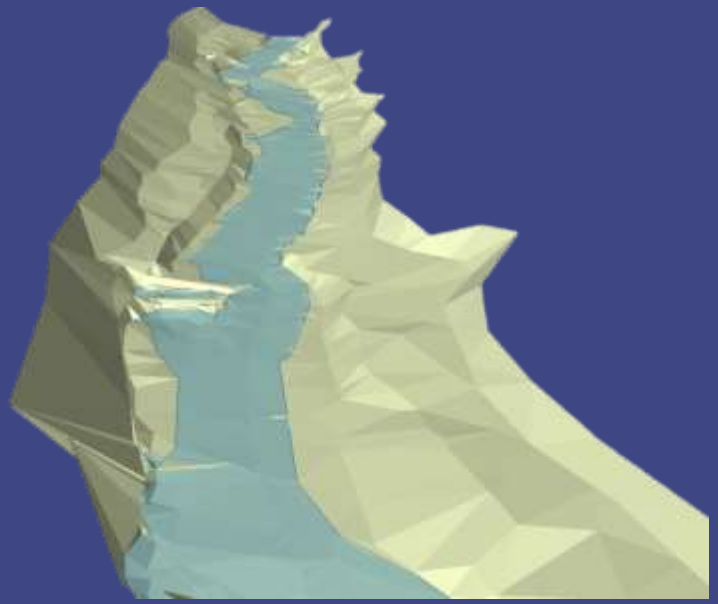
Can the CHaMP Protocol Detect Habitat Changes Resulting from the Addition of Large Wood to a Northern California Stream?



Elizabeth Mackey

Fisheries Biologist

Pacific States Marine Fisheries Commission

California Department of Fish and Wildlife

Fort Bragg, CA

March 13, 2015

Effectiveness Monitoring

Implementation

Validation

Validation

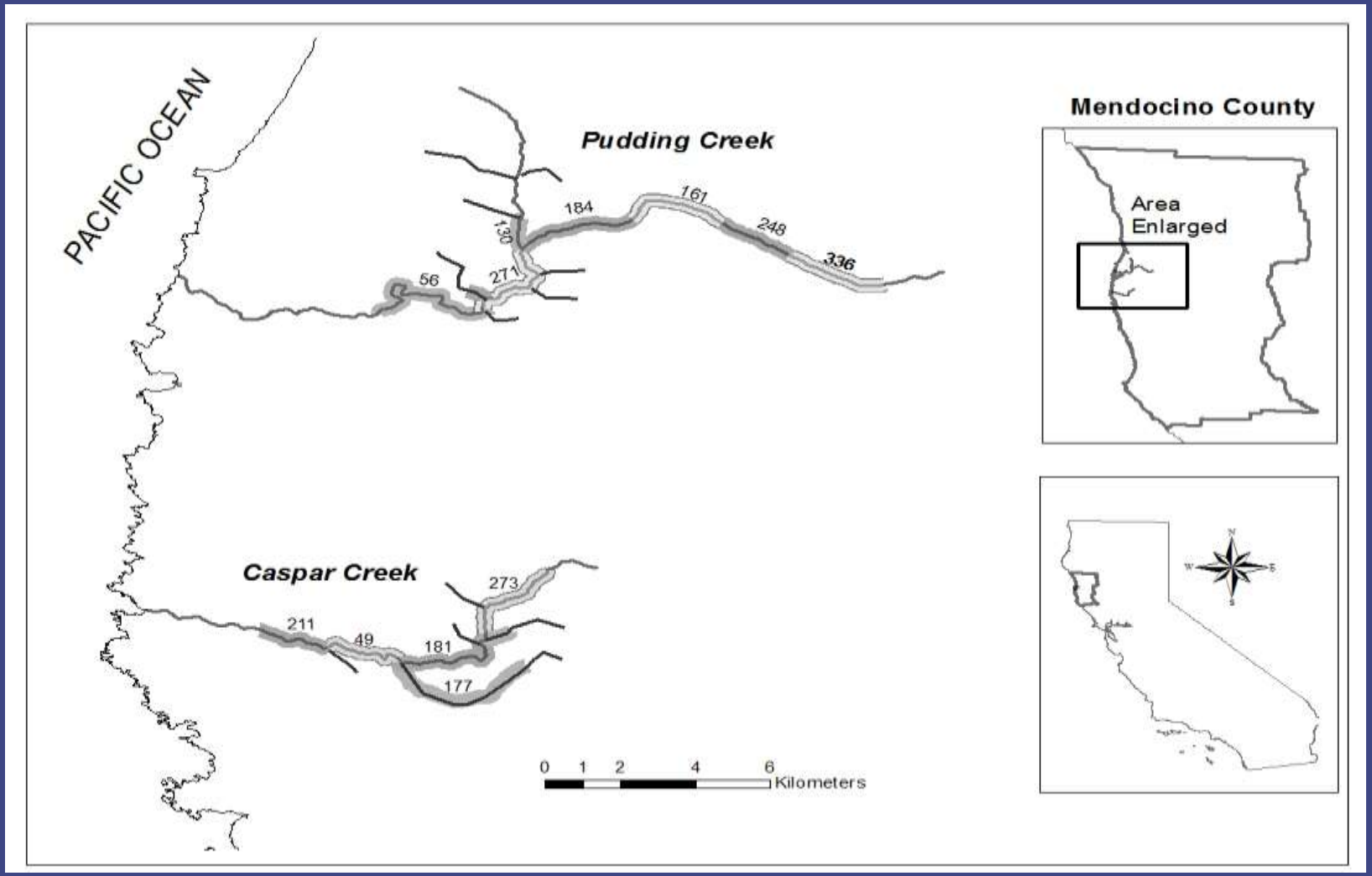
Effectiveness

Restoration Photos Courtesy of Blencowe Watershed Management

www.fishwatch.gov

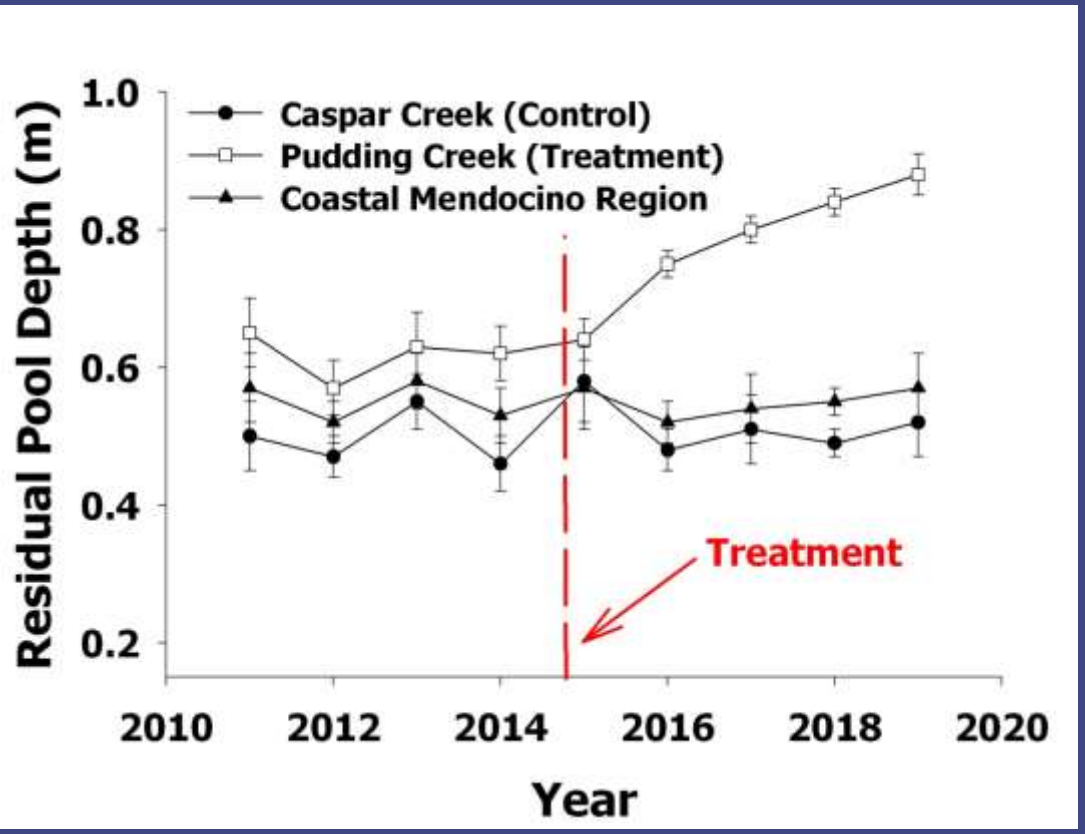
Pudding/Caspar Creeks BACI Experiment

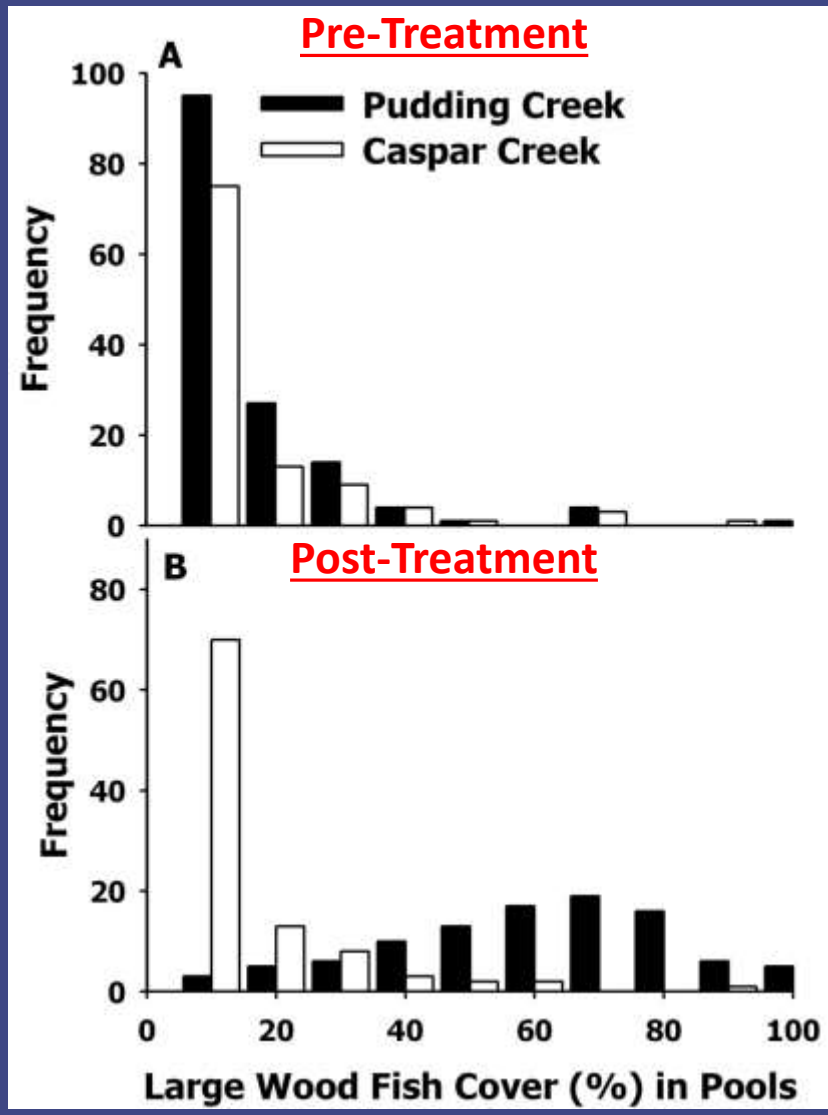
- Before-After-Control-Impact
  - Repeated measures design, 3 years pre-/ 3 years post-treatment monitoring
- Treating 80% (7.5 mi) of mainstem Pudding Creek



Pudding/Caspar Creeks BACI Experiment

We expect to see:





But how are we measuring these changes?

CHaMP

Columbia Habitat Monitoring Program Protocol

Topographic Data

Auxiliary Habitat Data

"The goal of CHaMP is to generate and implement a standard set of fish habitat monitoring (status and trend) methods in up to 26 watersheds across the Columbia River Basin."

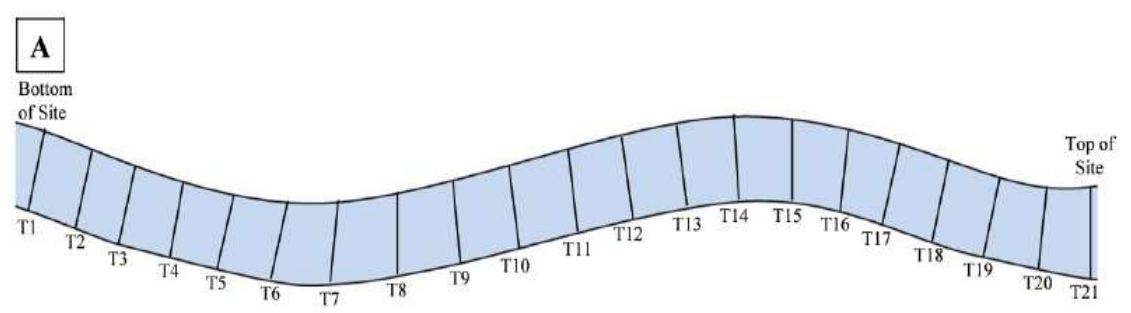
Applying CHaMP in the Field

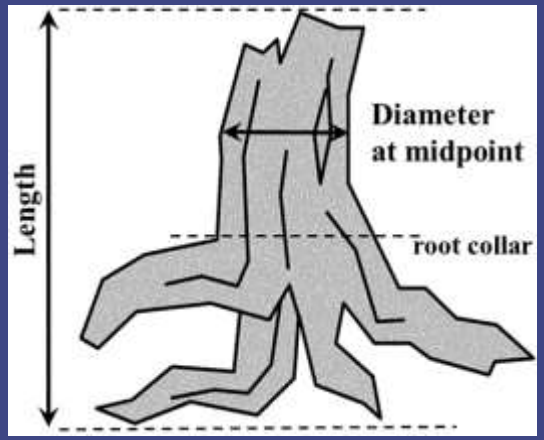
- Rapid but rigorous surveys at summer base flow
- Site length ranges from 120-600m
- 3-person crew
- Topographic surveying and auxiliary habitat data collection

Site Level and Channel Unit Attributes

- Alkalinity
- Conductivity
- Solar Input
- Discharge
- Water temperature
- Riparian Vegetation
- Site Photos

- Habitat Unit Classification
- Fish Cover
- Undercut Banks
- Substrate Size/Distribution
- Pool Tail Fines
- Large Woody Debris

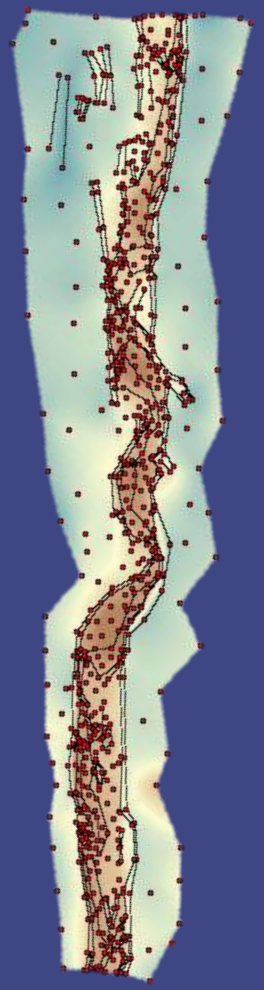




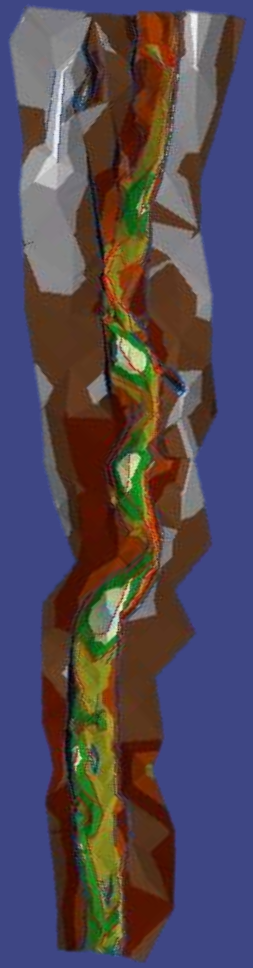
All photos courtesy of champmonitoring.org

Topographic Survey Processing

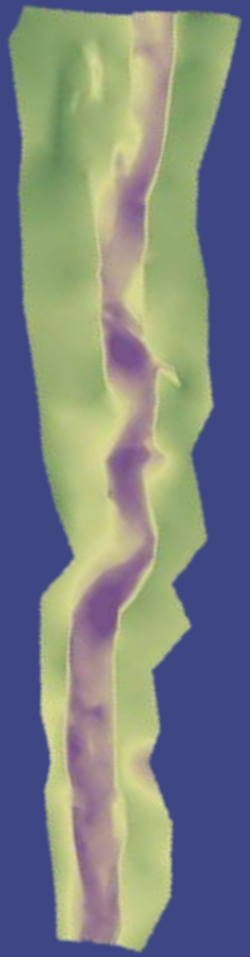
CHaMP toolbar in ArcGIS



Points and Lines from Total Station

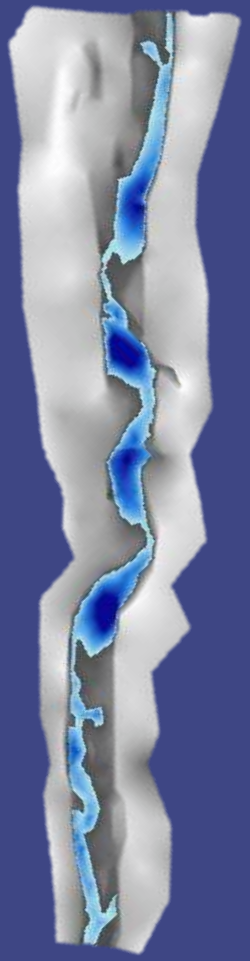


TIN
(Triangulated Irregular Network)



DEM
(Digital Elevation Model)

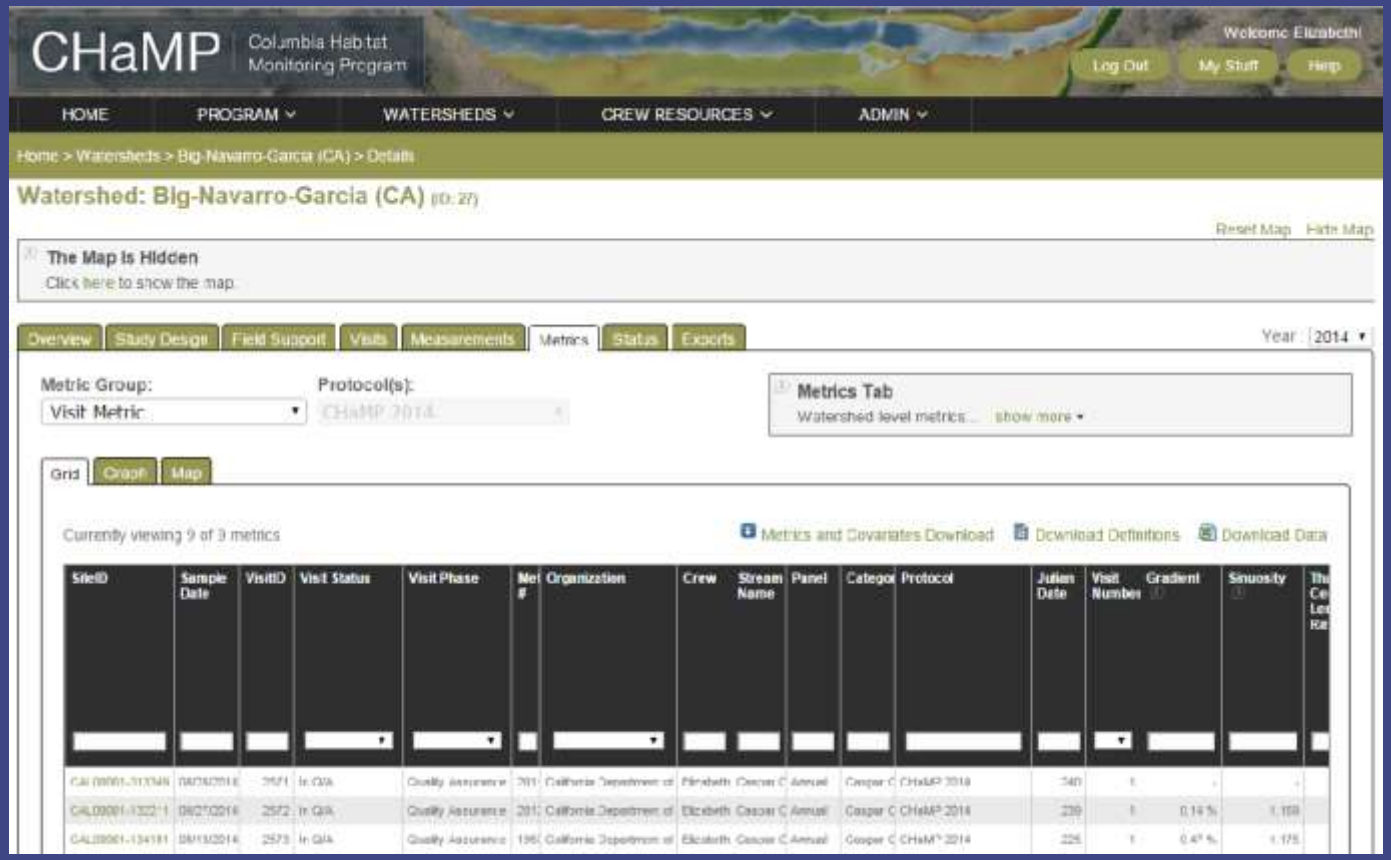
Hill Shade



Depth

Habitat Units

Data Management, QA/QC, and Additional Metric Generation



- Data is organized and processed within the interface of www.champmonitoring.org
- All data is processed through the River Bathymetry Toolkit (RBT) to generate additional metrics for each site

BACI Experiment and CHaMP

- 9 CHaMP sites: 5 in treatment stream, 4 in control
- Some key metrics:
  - Slow water frequency/depth/volume
  - Substrate distribution
  - Habitat Complexity

Two Log Creek, Site 72: Before

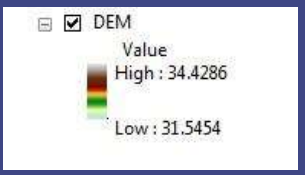
Two Log Creek, Site 72: After

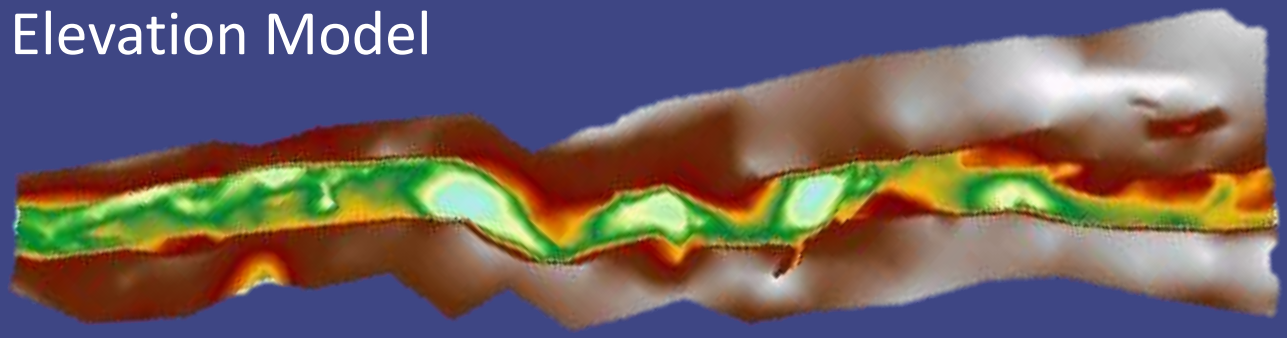
Photos Courtesy of Blencowe Watershed Management

Our BACI Experiment and CHaMP

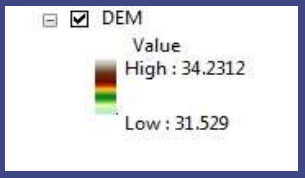
Geomorphic Change Detection

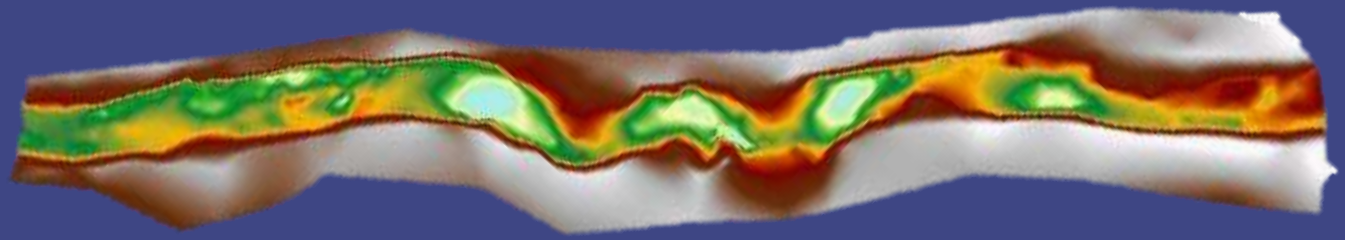
2014 Digital Elevation Model





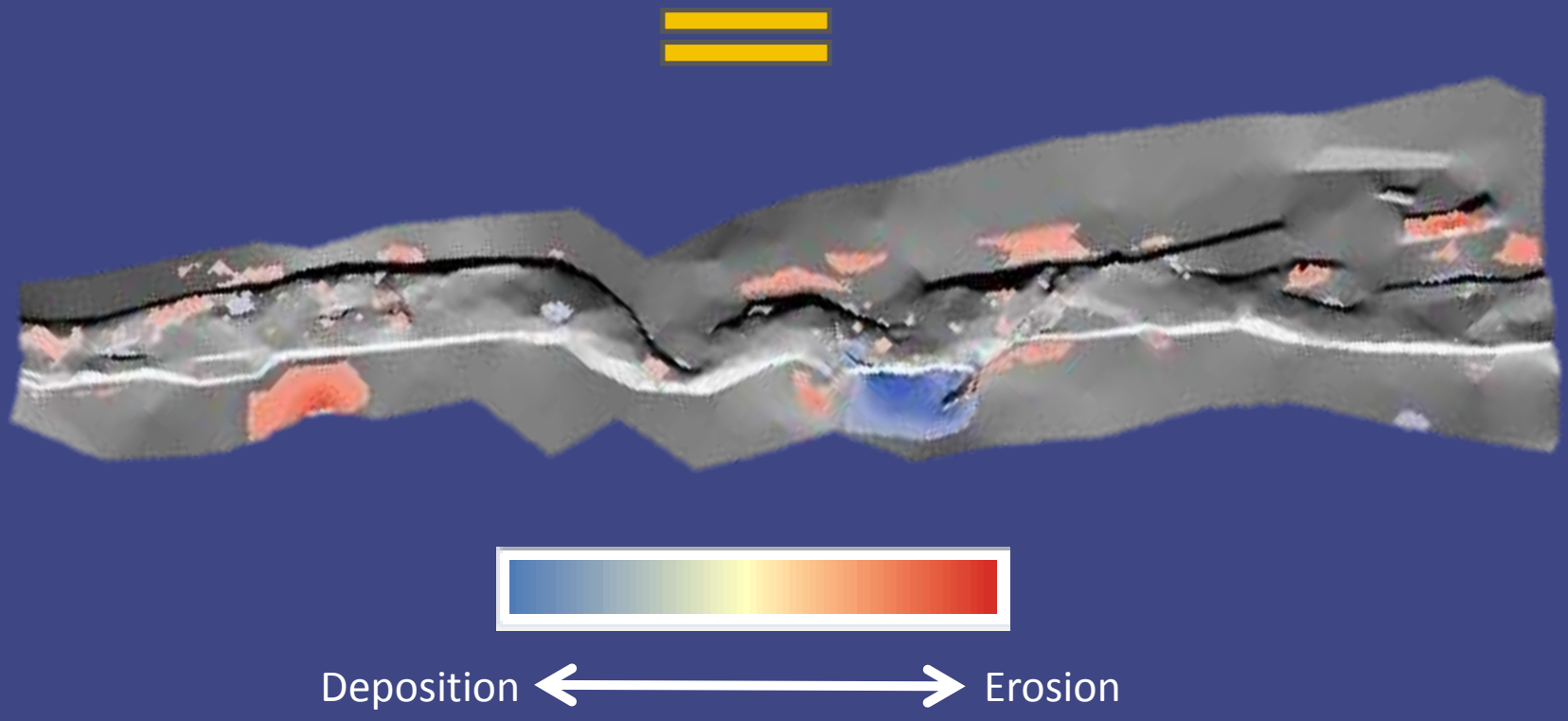
2013 Digital Elevation Model





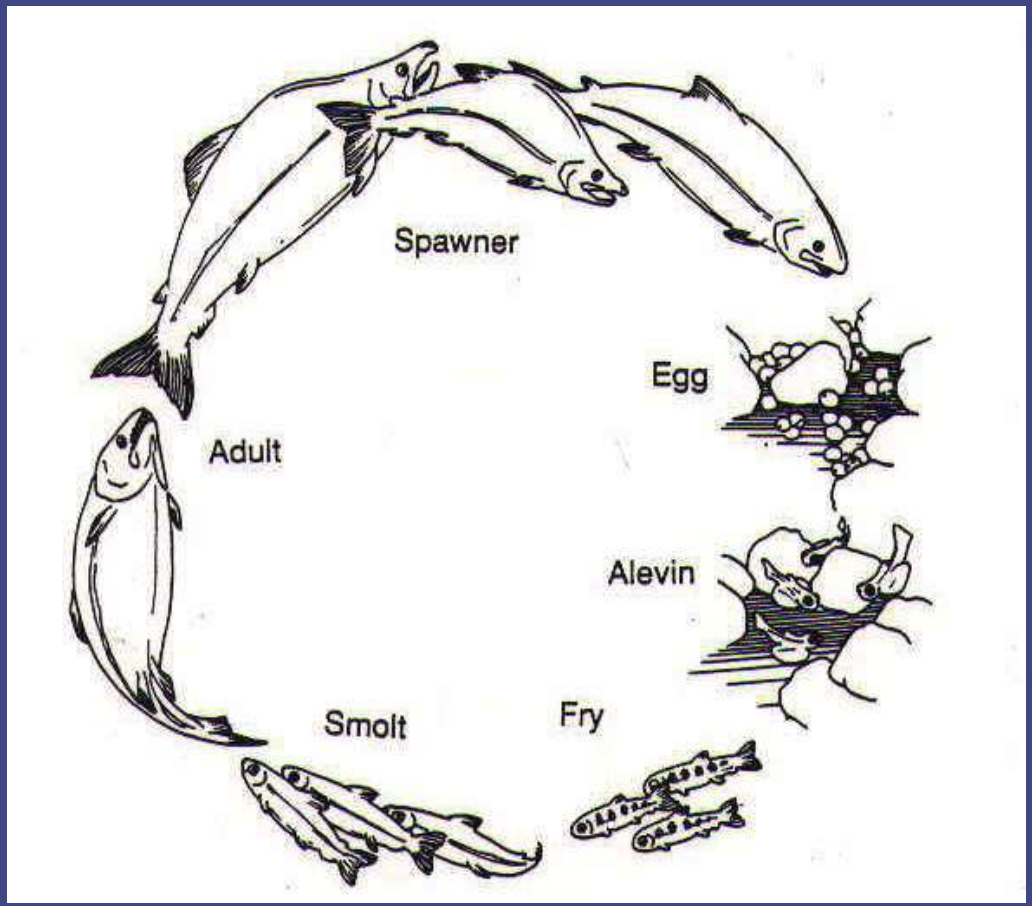
Our BACI Experiment and CHaMP

Geomorphic Change Detection



Why is CHaMP Cool?

- CHaMP is fish-centric
  - CHaMP data describes salmonid habitat for all life stages



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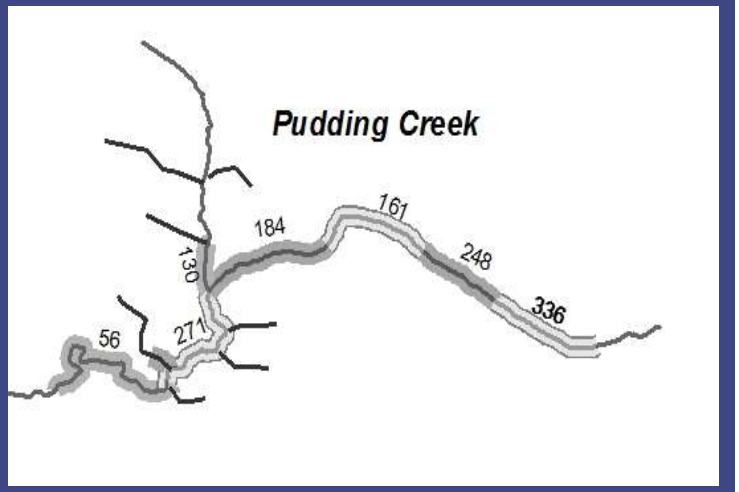
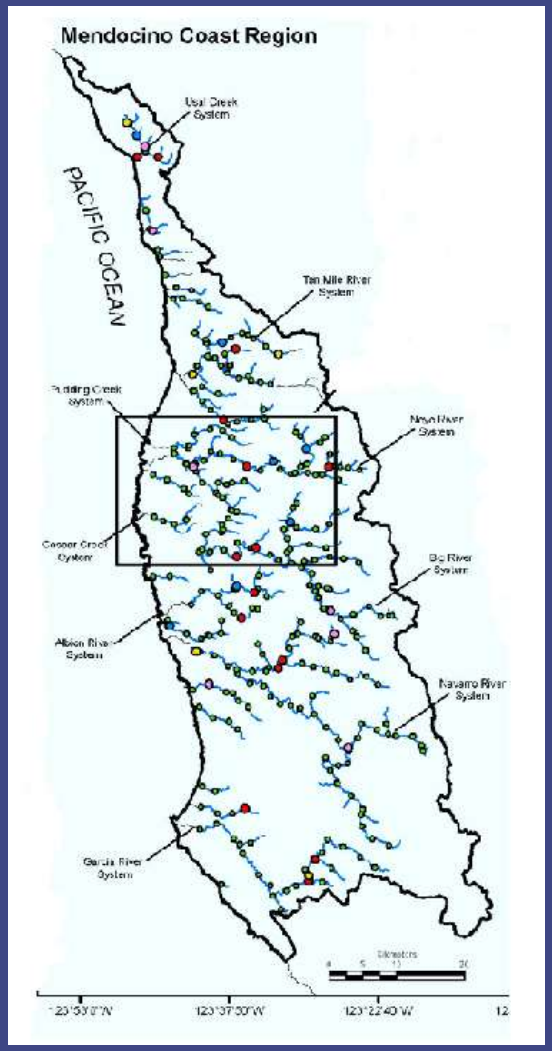
- Growth
- Production
- Survival

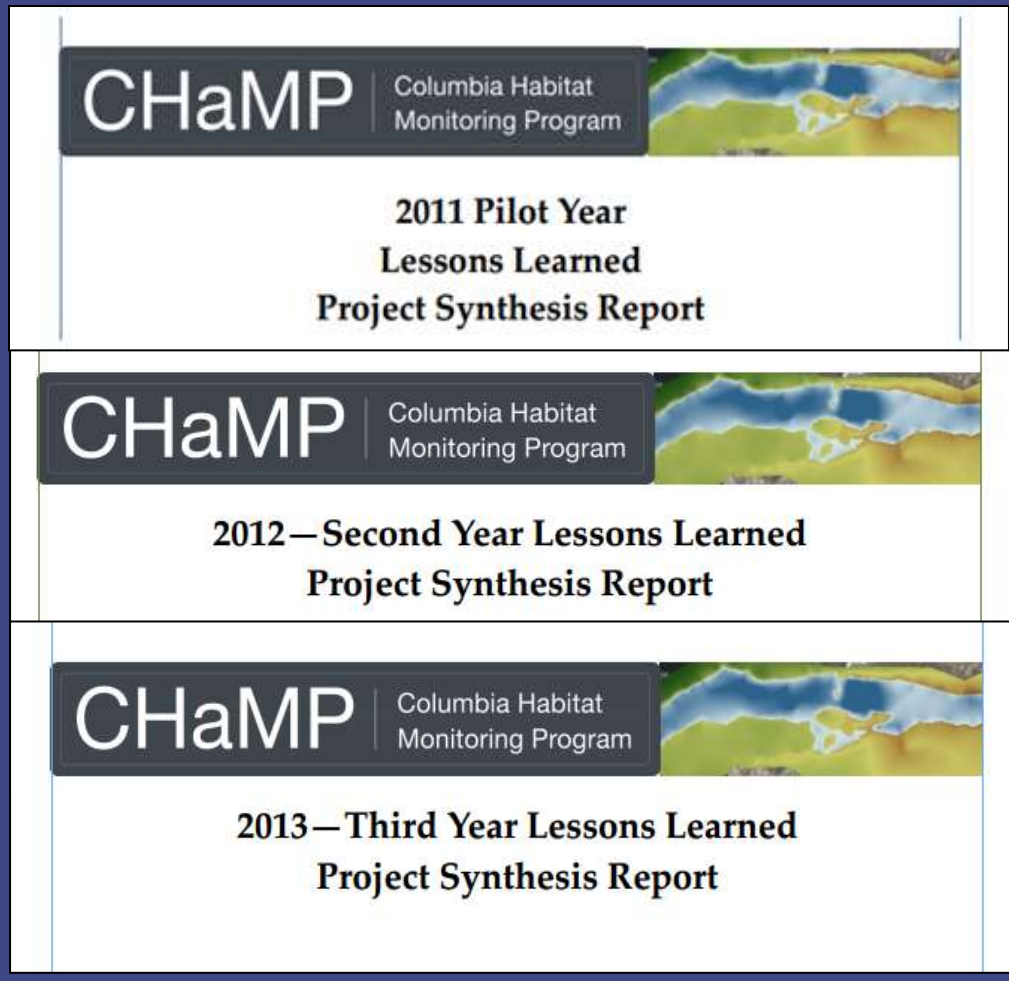
- Data is collected at multiple spatial scales
  - Within-channel unit, channel unit, geomorphic reach, watershed and subbasin scales





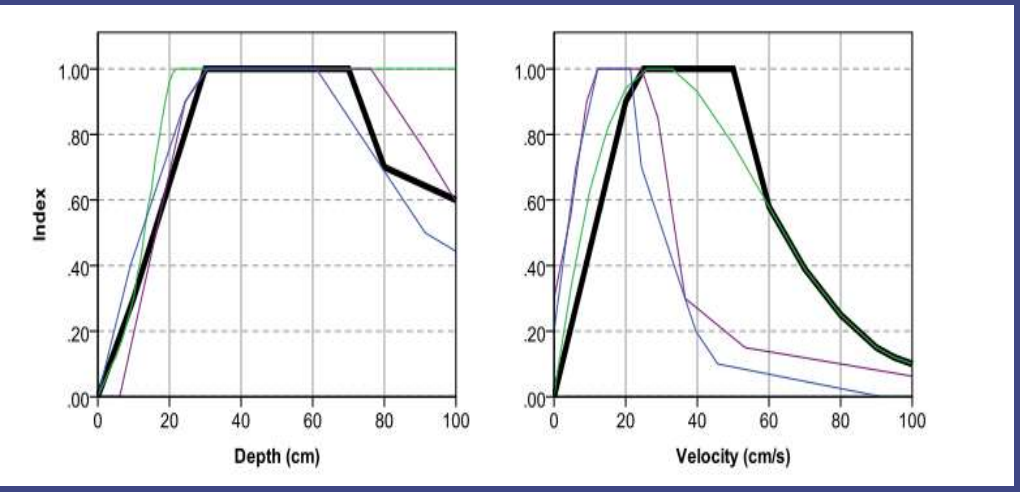
- CHaMP protocol is repeatable
  - CHaMP team regularly conducts repeatability studies
  - Methods are evaluated annually for issues and improvements

www.nwfsc.noaa.gov



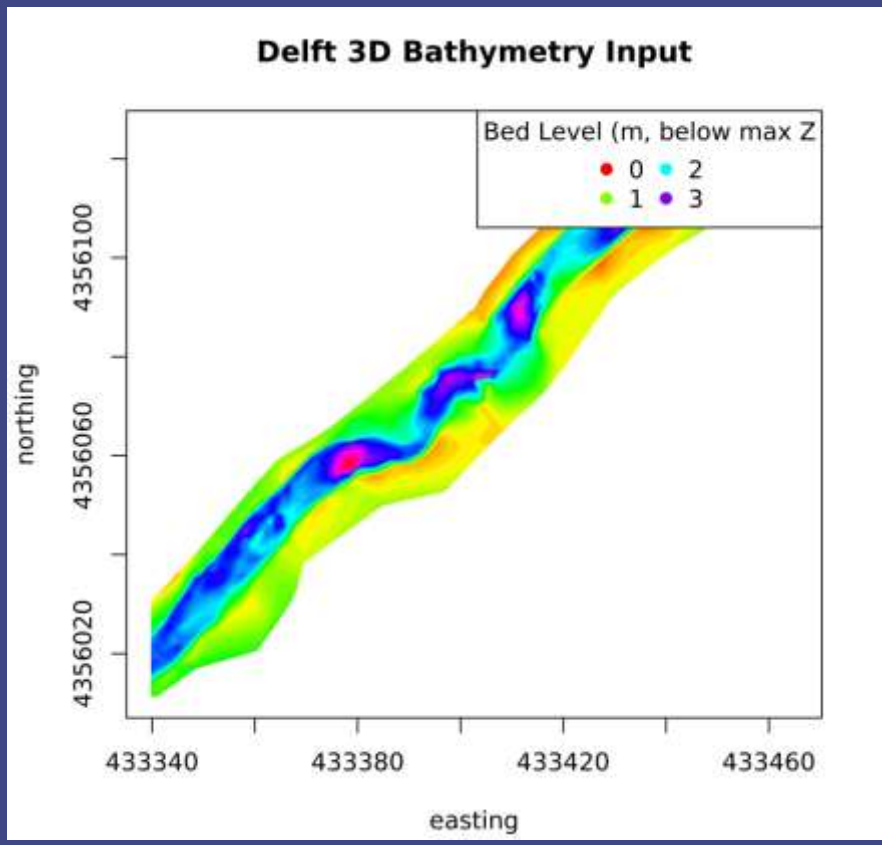
Additional Applications

CHaMP data is currently being used in the development of additional models



Rempel et al. 2012

Habitat Suitability Curves



Hydraulic Modeling

Additional Applications

- CHaMP data is also being used:
  - To characterize stream responses to restoration in the Columbia Basin

Tucannon River, WA

Bridge Creek, OR

Asotin Creek, WA


Calgary
Vancouver
Seattle
WASHINGTON
MONTANA
Missouri
Portland
Columbia
OREGON
IDAHO
WYOMING
Snake
Great Salt Lake
Salt Lake City
GREAT BASIN
NEVADA
UTAH
COLORADO
Sacramento
San Francisco
CALIFORNIA
Fresno
Las Vegas
Colorado

Additional Applications

- The results of our Pudding/Caspar Creeks BACI experiment could help to inform other restoration and management efforts throughout CA

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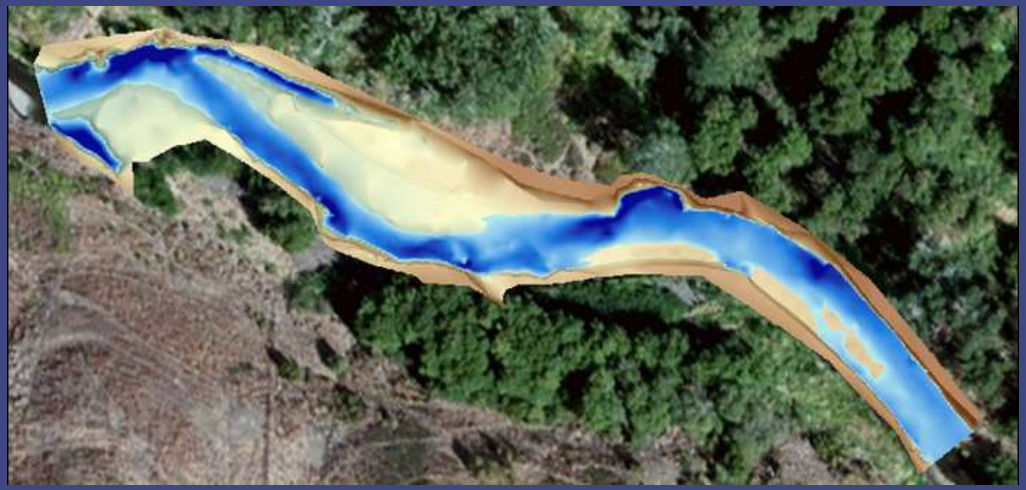

http://www.isemp.org/images/HabitatDataCollection.png

www.champmonitoring.org

Acknowledgements

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Questions?