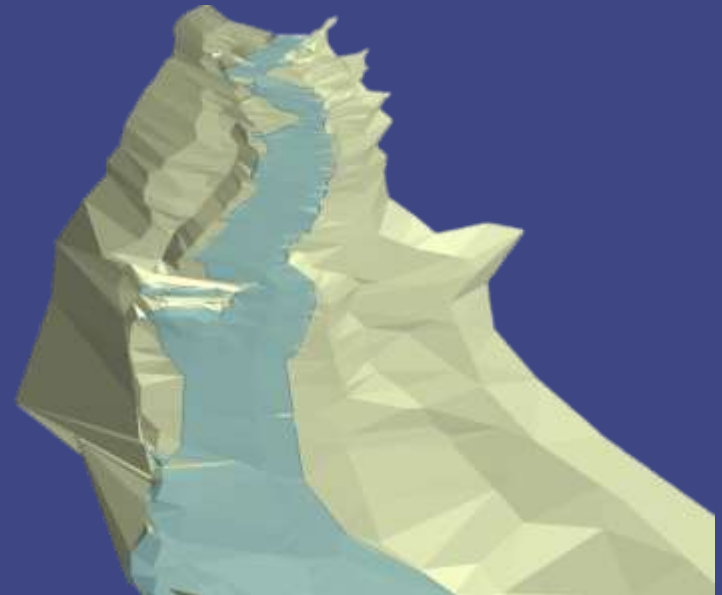


# Can the CHaMP Protocol Detect Habitat Changes Resulting from the Addition of Large Wood to a Northern California Stream?



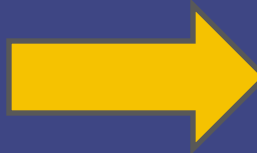
Elizabeth Mackey  
Fisheries Biologist  
Pacific States Marine Fisheries Commission  
California Department of Fish and Wildlife  
Fort Bragg, CA  
March 13, 2015



# Effectiveness Monitoring



Implementation



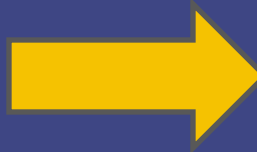
CHaMP

Validation



CHaMP

Validation

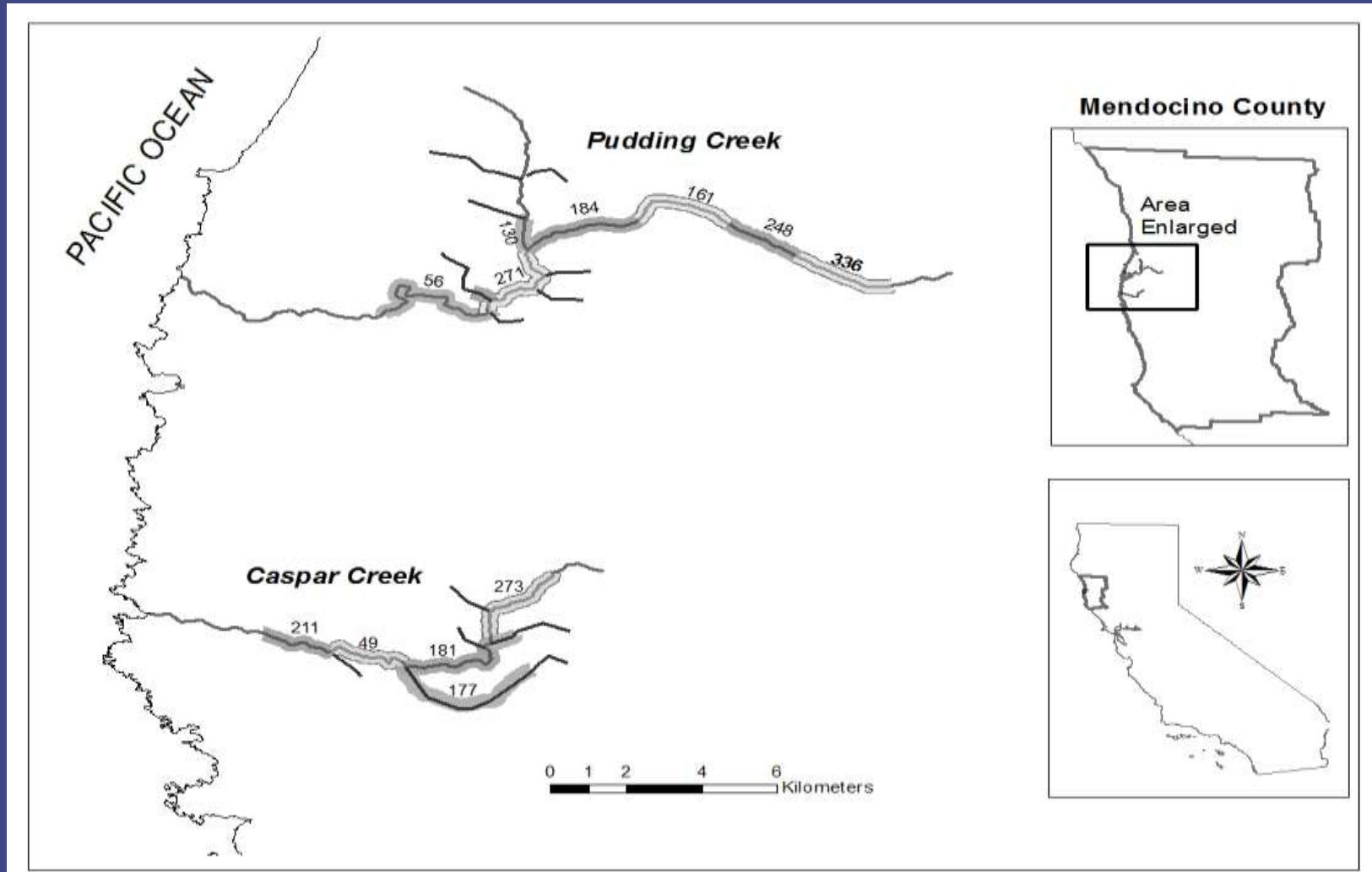


CHaMP

Effectiveness

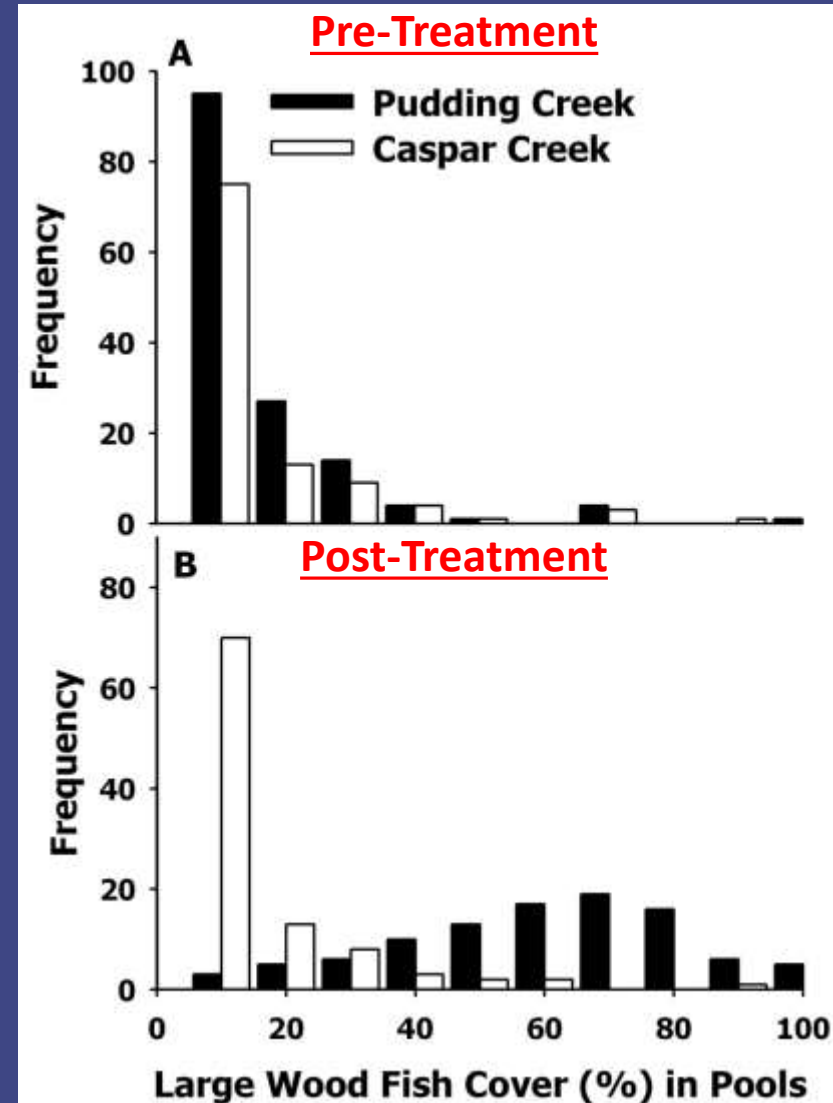
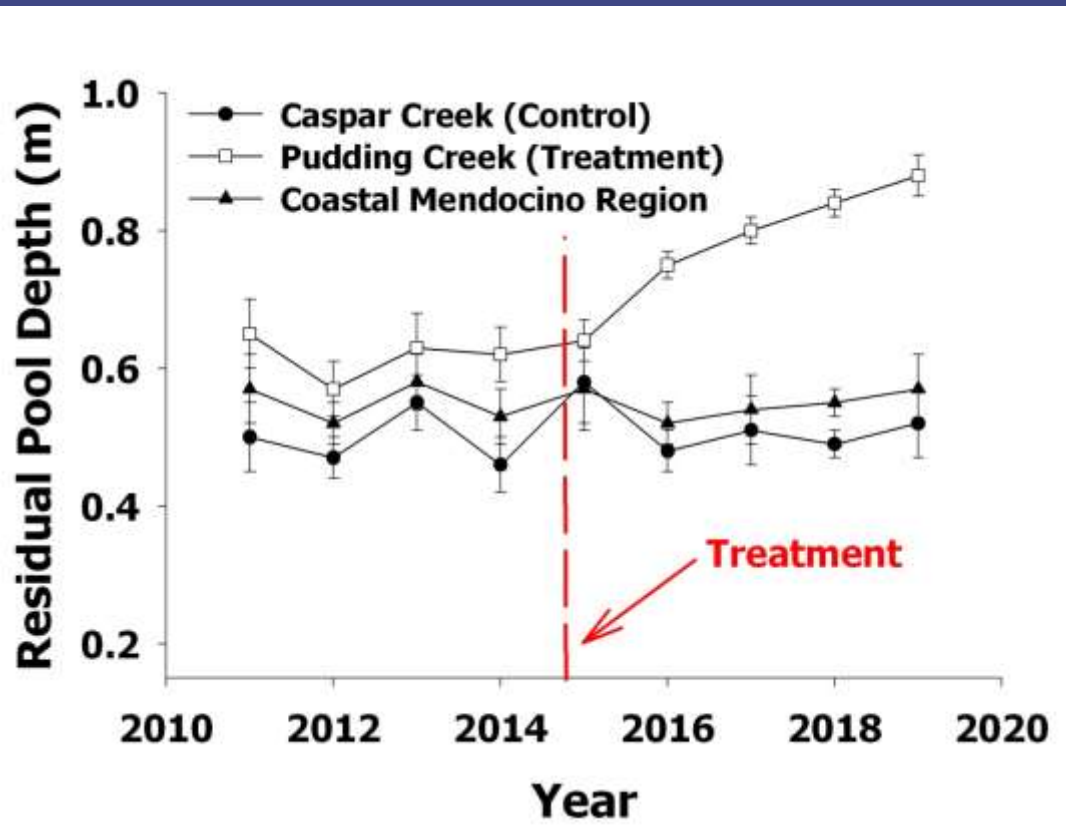
# pudding/Caspar Creeks BACI Experiment

- 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.”

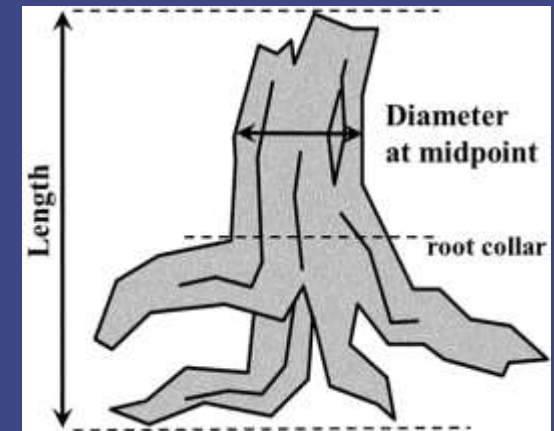
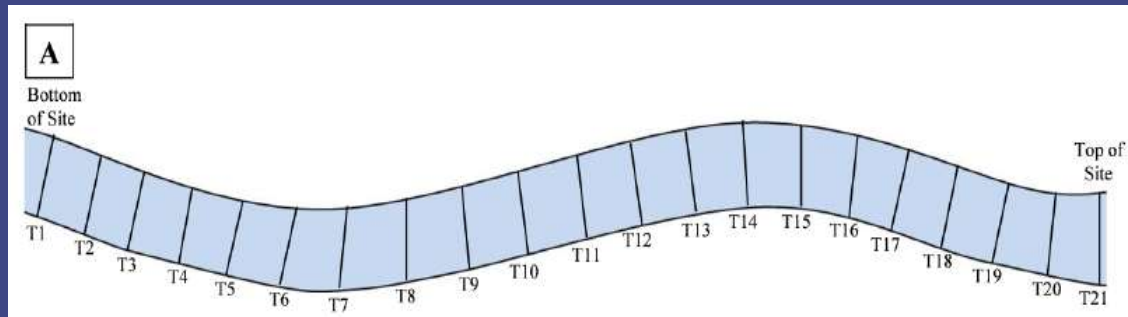
# Applying CHaMP in the Field

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



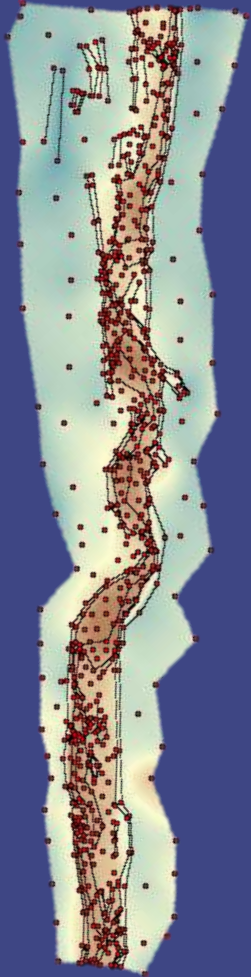
# Site Level and Channel Unit Attributes

- 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

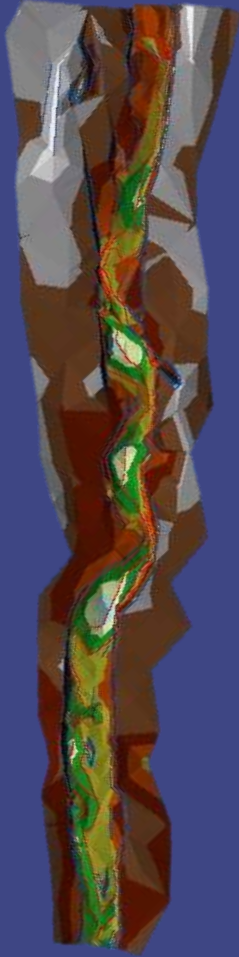


# Topographic Survey Processing

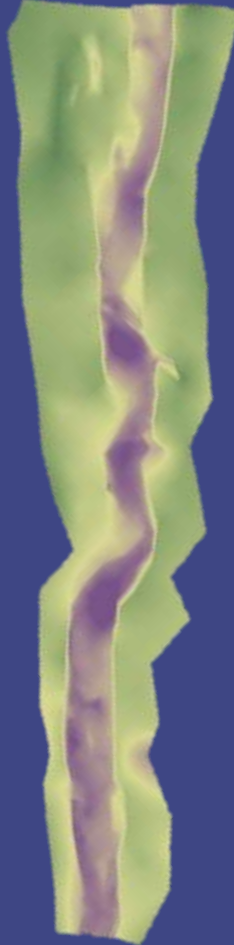
CHaMP toolbar in ArcGIS



Points and Lines from  
Total Station



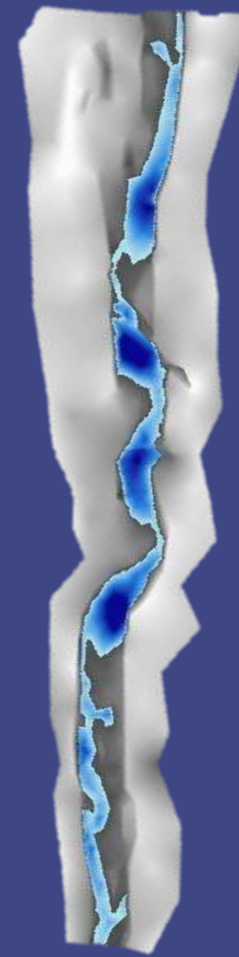
TIN  
(Triangulated Irregular  
Network)



DEM  
(Digital Elevation  
Model)



Hill Shade



Depth



Habitat Units



# Data Management, QA/QC, and Additional Metric Generation

The screenshot displays the CHaMP (Columbia Habitat Monitoring Program) web interface. The header includes the CHaMP logo and navigation links for HOME, PROGRAM, WATERSHEDS, CREW RESOURCES, and ADMIN. The user is logged in as Elizabeth. The main content area shows the details for the 'Watershed: Big-Navarro-Garcia (CA) (ID: 27)'. A message indicates 'The Map is Hidden'. Below this, there are tabs for Overview, Study Design, Field Support, Visits, Measurements, Metrics, Status, and Exports. The 'Metrics' tab is active, showing a 'Metric Group' of 'Visit Metric' and a 'Protocol(s)' of 'CHAMP 2014'. A 'Metrics Tab' section shows 'Watershed level metrics ... show more'. Below this, there are buttons for 'Grid', 'Graph', and 'Map'. The 'Grid' view shows a table with 17 columns: SiteID, Sample Date, VisitID, Visit Status, Visit Phase, Met #, Organization, Crew, Stream Name, Panel, Category, Protocol, Julian Date, Visit Number, Gradient, Sinuosity, and The Cell Let Rat. The table contains three rows of data.

SiteID	Sample Date	VisitID	Visit Status	Visit Phase	Met #	Organization	Crew	Stream Name	Panel	Category	Protocol	Julian Date	Visit Number	Gradient	Sinuosity	The Cell Let Rat
CA10001-13374	08/02/2014	2571	In QA	Quality Assurance	201	California Department of	Elizabeth Casper	Casper	C	Annual	Casper C CHaMP 2014	240	1	-	-	-
CA10001-13321	08/27/2014	2572	In QA	Quality Assurance	201	California Department of	Elizabeth Casper	Casper	C	Annual	Casper C CHaMP 2014	226	1	0.14 %	1.109	
CA10001-13411	08/13/2014	2573	In QA	Quality Assurance	195	California Department of	Elizabeth Casper	Casper	C	Annual	Casper C CHaMP 2014	225	1	0.47 %	1.175	

- Data is organized and processed within the interface of [www.champonitoring.org](http://www.champonitoring.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



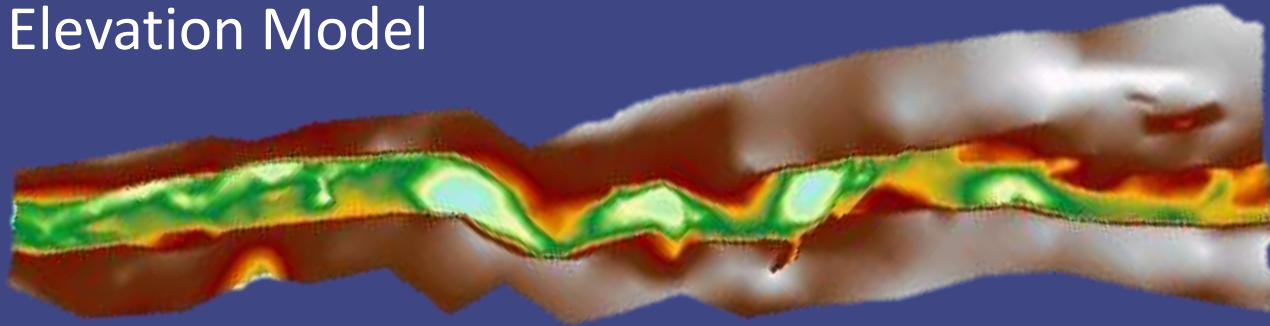
Two Log Creek, Site 72: After

# Our BACI Experiment and CHaMP

## Geomorphic Change Detection

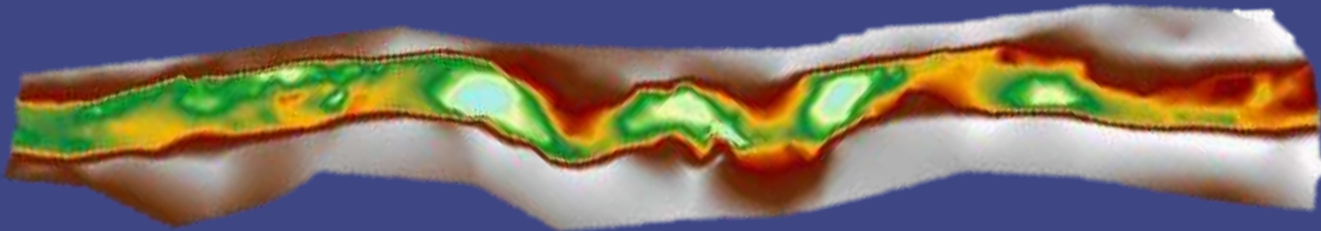
2014 Digital Elevation Model

DEM  
Value  
High : 34.4286  
Low : 31.5454



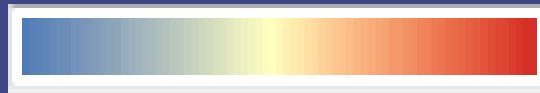
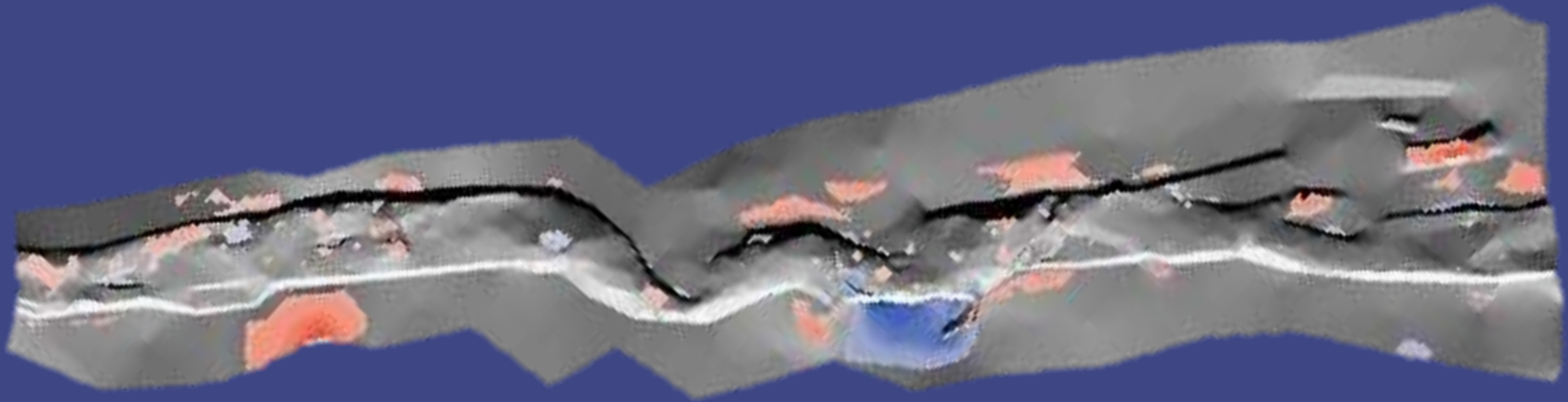
2013 Digital Elevation Model

DEM  
Value  
High : 34.2312  
Low : 31.529



# Our BACI Experiment and CHaMP

## Geomorphic Change Detection



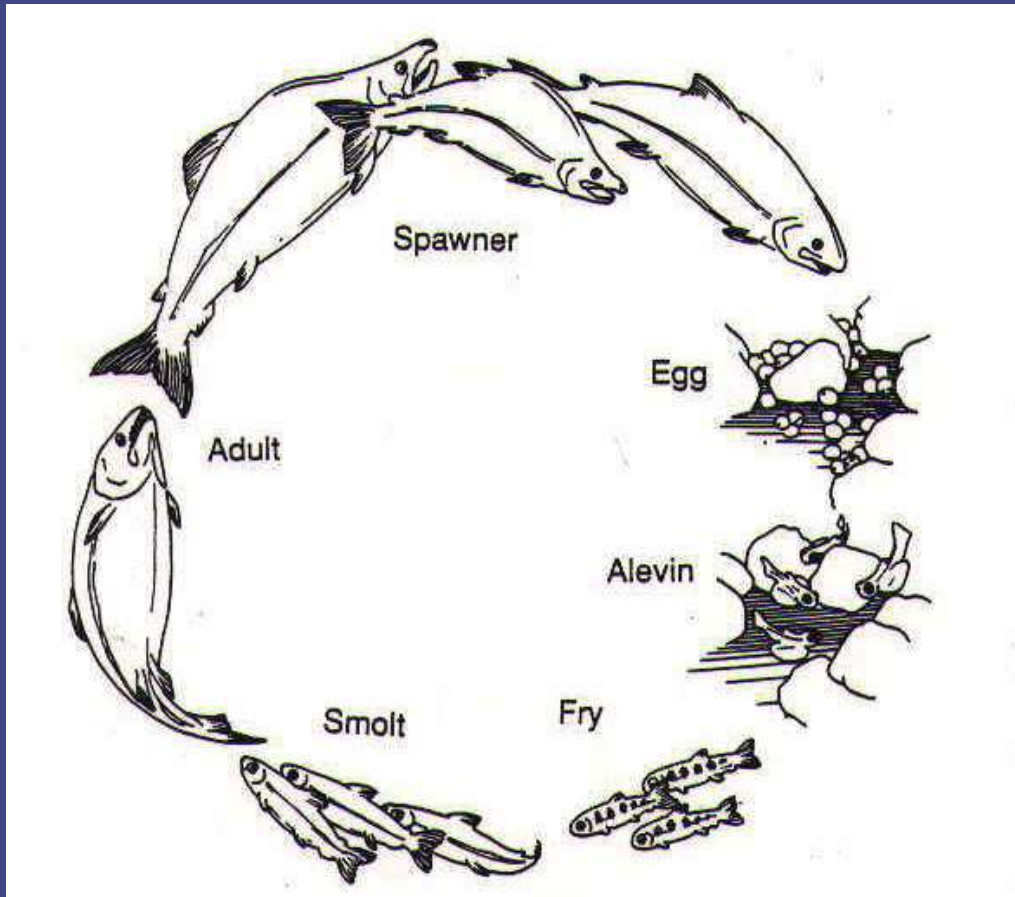
Deposition



Erosion

# Why is CHaMP Cool?

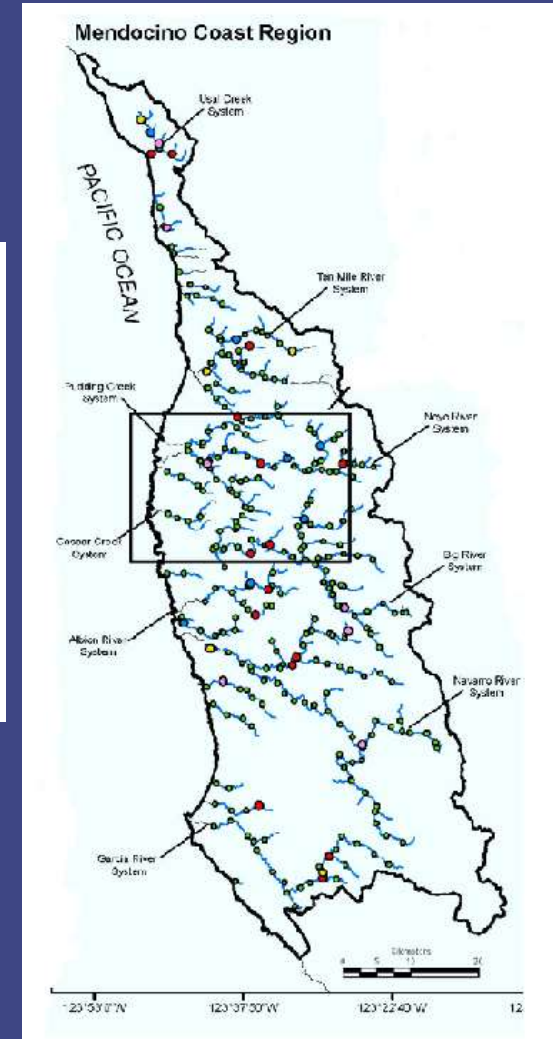
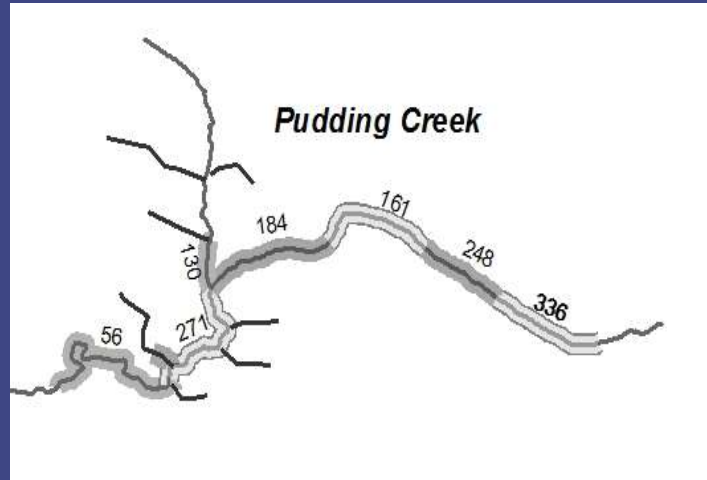
- CHaMP is fish-centric
  - CHaMP data describes salmonid habitat for all life stages



- 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](http://www.nwfsc.noaa.gov)

**CHaMP**

Columbia Habitat  
Monitoring Program



**2011 Pilot Year  
Lessons Learned  
Project Synthesis Report**

**CHaMP**

Columbia Habitat  
Monitoring Program



**2012—Second Year Lessons Learned  
Project Synthesis Report**

**CHaMP**

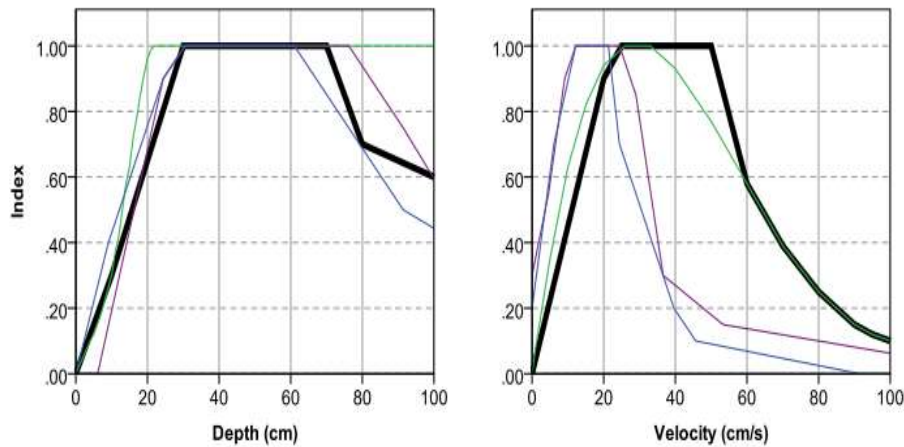
Columbia Habitat  
Monitoring Program



**2013—Third Year Lessons Learned  
Project Synthesis Report**

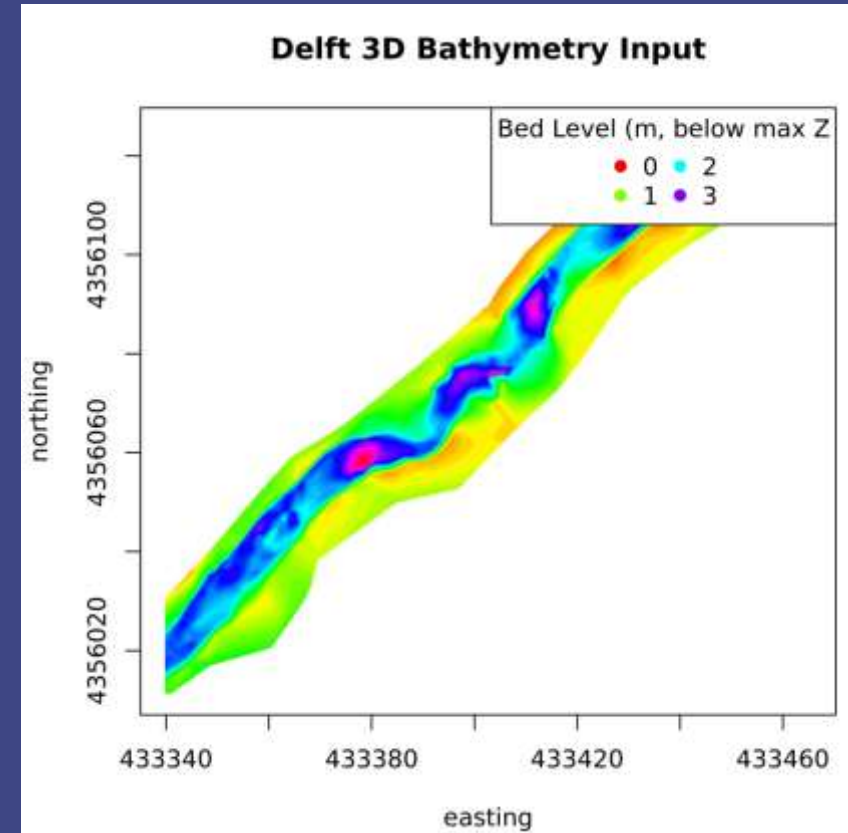
# Additional Applications

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 Project Area 3 Habitat Restoration  
Large Woody Debris Placement with a Helicopter



Tucannon River, WA



Bridge Creek, OR



Asotin Creek, WA



# Additional Applications

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



[www.nwfsc.noaa.gov](http://www.nwfsc.noaa.gov)



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



[www.champmonitoring.org](http://www.champmonitoring.org)

# Acknowledgements



- Thanks to Sean Gallagher, Wendy Holloway, Dave Wright, Emily Lang and Chris Blencowe for management and implementation of this project
- Special thanks to Chris Jordan, Carol Volk, Steve Rentmeester, Meagan Polino, and the rest of the CHaMP development team
- Thanks to field biologists and technicians Chris Bell, Andy McClary, Greg McClary, Katelyn Jordan, and Chris Chavez for their hard work and long hours.

# Questions?

