CHaMP | Columbia Habitat Monitoring Program

# Status Report to ISRP/ISAB: Update on Pilot Project

January 13, 2013

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CHaMP Program Coordinator
Terraqua, Inc.

# Acknowledgments


Sponsors: Bonneville Power Administration
NOAA Fisheries

Collaborators:

Columbia River Inter-Tribal Fish Commission
Oregon Department of Fish and Wildlife
Landowners across 9 watersheds

Special Thanks:

Northwest Power & Conservation Council
Independent Scientific Review Panel


# CHaMP Overview

- CHaMP is:
  - A project: Bonneville Power Admin.  #2011-006
  - A program: Columbia Habitat Monitoring Program
  - A protocol:  standardized, salmonid habitat
  - A process:  training, equipment, tools, design, sampling, data QC/QA, data management
  - A philosophy:  standardization, coordination, open data sharing, timely processing and reporting

# CHaMP Project

- CHaMP is a standardized salmonid habitat status and trend monitoring project across the Columbia River Basin's salmon and steelhead populations.
- Federal Columbia River Power System 2008 BiOp: prescriptions for habitat monitoring and adaptive management requirements
- Result of collaboration among BPA, the National Oceanic and Atmospheric Administration (NOAA) and other regional fish management agencies.

# CHaMP Program

- Developers:  NOAA, Terraqua, South Fork Research, EcoLogical Research, Sitka, QCI
- Collaborators:  ISEMP, ODFW, CRITFC, CDFG, Campbell Timberlands, OSU/BLM
- Effectiveness Monitoring:  Entiat, John Day, Lemhi, Umpqua, Coastal California
- Status and Trend Monitoring:  Columbia Basin, Coastal California

# CHaMP Program

- Standardized Training
- Standardized Protocol
- Standardized Implementation
- Standardized Data QC/QA
- Standardized Data Management and Sharing
- Flexible Objectives
- Flexible Designs
- “Flexible” Metrics/Indicators

# CHaMP Protocol

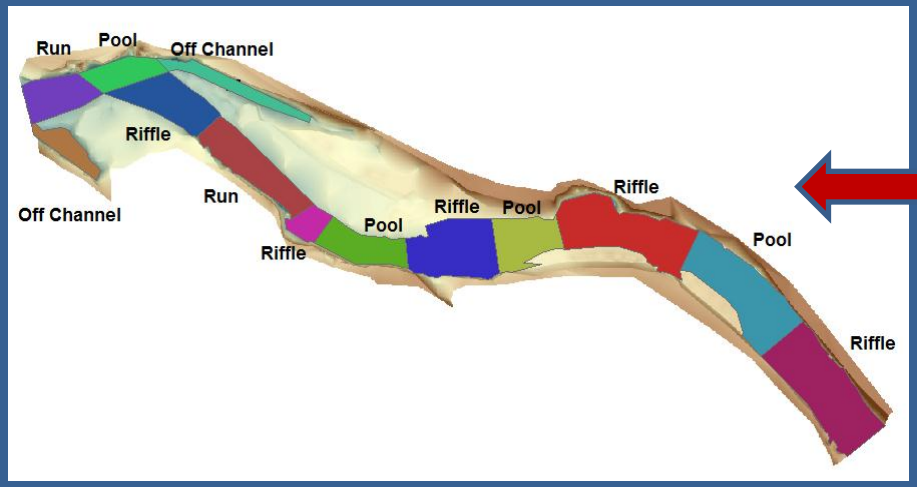
- Salmonid habitat related to life history requirements of salmonids
- Salmonid habitat related to land management and stream restoration.
- Link environmental factors to measures of salmonid growth, survival and production
- Factors influencing salmonid performance: stream temperature, production, and channel morphology, channel attributes.

# Topographic and Auxiliary Data Collection

**2 Crew members :**
**a Gunner and a Rod Person**

**1 Crew member**
**Auxiliary Data Collection**

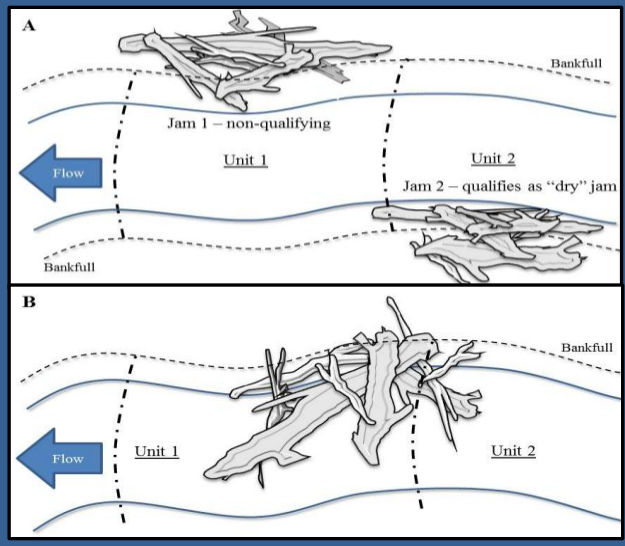
# Columbia Habitat Monitoring Program (CHaMP)
# Data Collection Methods – Topographic Surveys



# Auxiliary Data

## Channel Unit Attributes

1. Fish Cover
2. Ocular Substrate
3. Particle Counts
4. Embeddedness
5. Pool Tail Fines
6. LWD
7. Side Channels




## Site Level Attributes

1. Photos
2. Solar input
3. Riparian
4. Temp
5. Discharge
6. Water Chemistry
7. Macroinvertebrates
8. Site Map




# CHaMP Data Standardization and Sharing

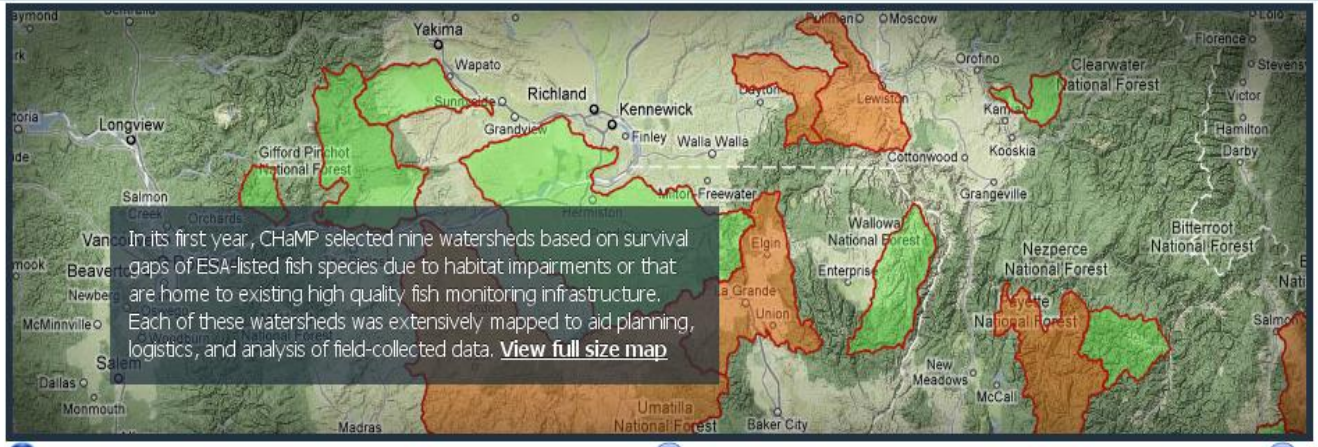
Mauna Kea Weather Center | WSDOT - Weather Forecast | Google | CHaMPMonitoring.org Ho

https://www.champmonitoring.org

CHaMP | Columbia Habitat Monitoring Program

Log In | Help

Home | Program | Watersheds




## Overview of CHaMP

**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.**
The watersheds have been chosen to maximize the contrast in current habitat conditions and also represent a temporal gradient of expected change in condition through planned habitat actions. Surveys will be conducted in watersheds with perceived large juvenile life-stage survival gaps due to habitat impairments or that are home to existing high quality fish monitoring infrastructure. CHaMP implementation will occur on the spatial scale of the Technical Recovery Team (TRT) populations with the intention for inference on habitat quality and quantity at the fish population level.

CHaMP is being built around a single habitat monitoring protocol with a program-wide approach to data collection and management. More

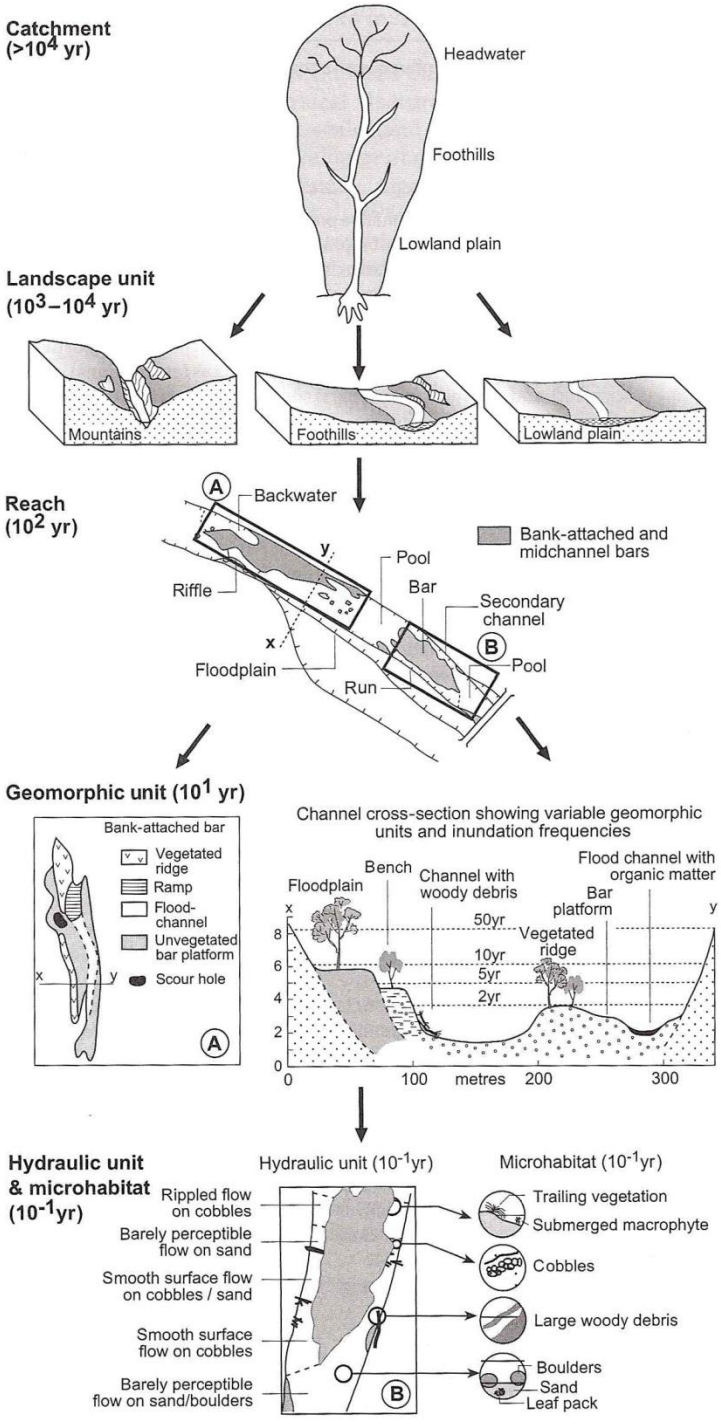
## News and Announcements

12/7/2012 **CHaMP 2012 post-season workshop presentations available**
The presentations from Day 1 and Day 2 of the November 27-28, 2012 post-season workshop, held in Portland, OR, are now available under 'Program' > 'Documents': see the November 2012 Workshop heading at the bottom of the Documents page. The detailed CHaMP 2012 post-season workshop final agenda is also available. More

Desktop 92% 8:32 AM

# CHaMP Designs

- Cost effective allocation of effort
- Statistically rigorous
- Inferences over multiple spatial and temporal scales



# CHaMP Designs



## Watershed: Wenatchee (ID: 23)

**The Map is Hidden**
Click here to show the map.

Overview | **Study Design** | Site Evaluation | Status

**Temporal Design** | Spatial Design

View Protocol Information in Monitoring Methods

**Protocol:** Scientific Protocol for Salmonid Habitat Surveys within the Columbia Habitat Monitoring Program (CHaMP) (ID: 416)

**Temporal Design Category:** Complex - we revisit / resample some sites

**Temporal Design Description:** The temporal design for CHaMP monitoring watersheds will follow one of two possible panel designs, where a panel is defined as a set of sites that have the same revisit schedule. For watersheds where trend estimation is of primary concern, a single annual panel design will be used. Under this design all 25 sites will be revisited on an annual basis. A split panel design (Figure 11) will be used for watersheds where there is a need to balance status and trend estimation. Under the split panel design 15 sites will be revisited on an annual basis and 10 sites will be allocated to each of three rotating panels that will be visited once every three years. The motivation of these two temporal designs stems from a need to balance the power to 1) estimate status of the population at a point in time and 2) estimate trends in the population across time. While status is best estimated by sampling as many sites as possible across the broadest geographical distribution, trends are best estimated by repeated sampling of the same set of sites over time. Establishing two or more panels provides the possibility to balance priority of status estimation versus trend estimation.

**Protocol Field Schedule Notes:** Pre-Season (April-June 15th) Document project, statistical design, and site evaluation metadata. Field-Season (June 15-Sept 30th) Daily data capture and quality assurance review of topographic and auxiliary data. Complete weekly quality assurance procedures and generated TIN file for each site. Perform weekly uploads of datasets to CHaMP website. Post-Season (Oct 1- Oct 30th) Ensure datasets are complete. Perform quality assurance on completed datasets and derived site-level metrics.

**Panel Design**

| Panel | | Sampling Occasion (1 Year(s)) | | | | | | | | | Planned # Of Sites |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 1 | Annual | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 15 |
| 2 | Rotating Panel 1 | ■ | | | ■ | | | ■ | | | 10 |
| 3 | Rotating Panel 2 | | ■ | | | ■ | | | ■ | | 10 |
| 4 | Rotating Panel 3 | | | ■ | | | ■ | | | ■ | 10 |
| Planned # of Sites per 1 Year(s) | | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | |
| | | | | | | | | | | **Total # of Planned Sites** | **45** |



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# CHaMP Designs

Temporal Design | Spatial Design

Download the Spatial Design
Download all 4699 sites in the Wenatchee Watershed

**Annual** — yearly panel, starting in 2011

| Category | Valley Class | Ownership | # of Sites |
|---|---|---|---|
| Depositional : Public Lands (D:Pu) | Depositional | Public Lands | 1 |
| Transport : Public Lands (T:Pu) | Transport | Public Lands | 3 |
| Source : Public Lands (S:Pu) | Source | Public Lands | 5 |
| Depositional : Private Lands (D:Pr) | Depositional | Private Lands | 4 |
| Transport : Private Lands (T:Pr) | Transport | Private Lands | 2 |
| Source : Private Lands (S:Pr) | Source | Private Lands | - |

**Rotating Panel 1** — rotating panel measured every 3 years, starting in 2011

| Category | Valley Class | Ownership | # of Sites |
|---|---|---|---|
| Depositional : Public Lands (D:Pu) | Depositional | Public Lands | 2 |
| Transport : Public Lands (T:Pu) | Transport | Public Lands | 2 |
| Source : Public Lands (S:Pu) | Source | Public Lands | 4 |
| Depositional : Private Lands (D:Pr) | Depositional | Private Lands | 1 |
| Transport : Private Lands (T:Pr) | Transport | Private Lands | 1 |
| Source : Private Lands (S:Pr) | Source | Private Lands | - |

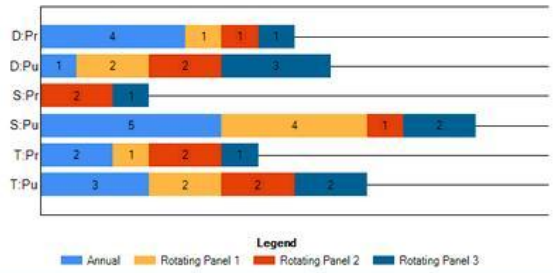
**Rotating Panel 2** — rotating panel measured every 3 years, starting in 2012

| Category | Valley Class | Ownership | # of Sites |
|---|---|---|---|
| Depositional : Public Lands (D:Pu) | Depositional | Public Lands | 2 |
| Transport : Public Lands (T:Pu) | Transport | Public Lands | 2 |
| Source : Public Lands (S:Pu) | Source | Public Lands | 1 |
| Depositional : Private Lands (D:Pr) | Depositional | Private Lands | 1 |
| Transport : Private Lands (T:Pr) | Transport | Private Lands | 2 |
| Source : Private Lands (S:Pr) | Source | Private Lands | 2 |

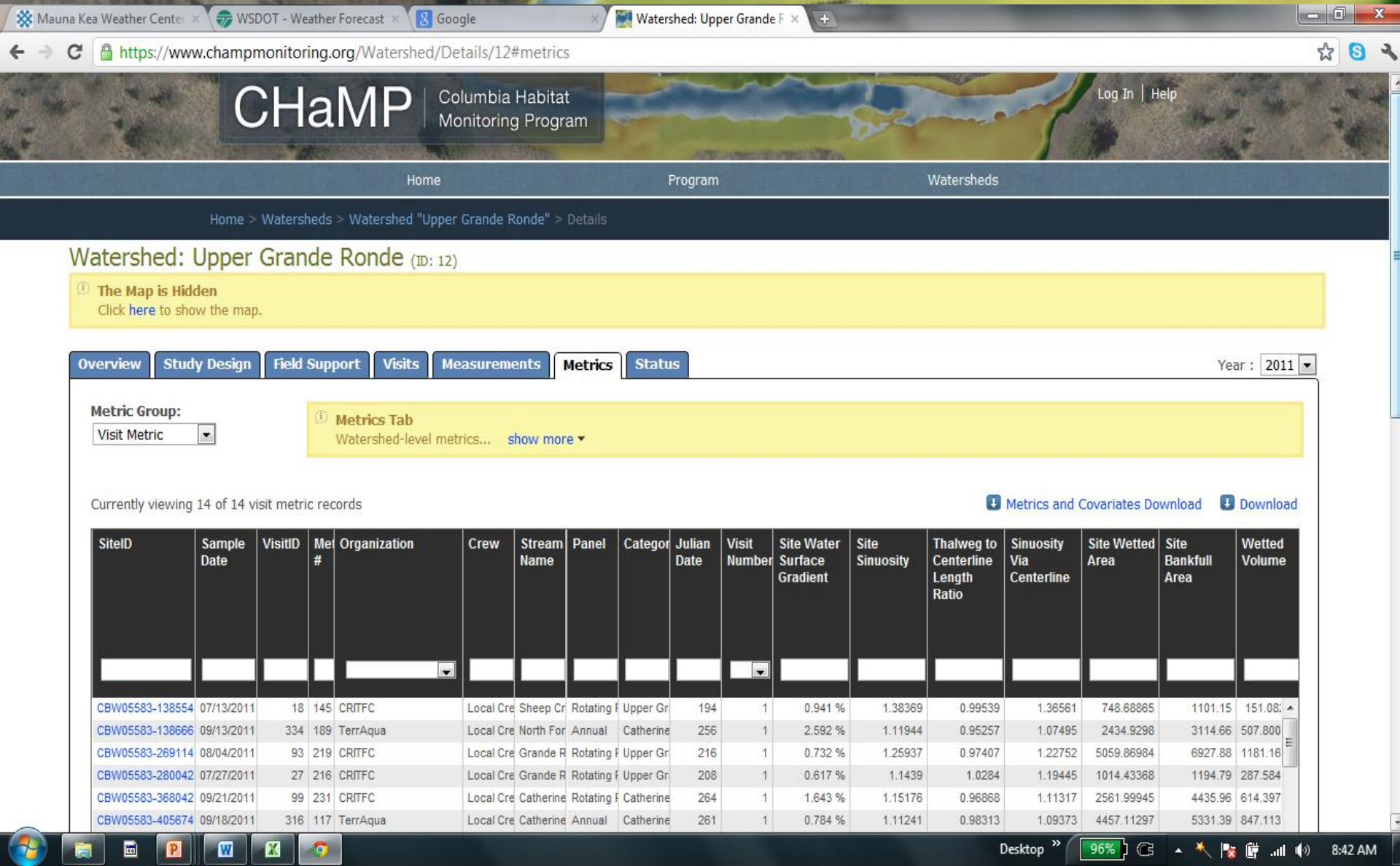
**Rotating Panel 3** — rotating panel measured every 3 years, starting in 2013

| Category | Valley Class | Ownership | # of Sites |
|---|---|---|---|
| Depositional : Public Lands (D:Pu) | Depositional | Public Lands | 3 |
| Transport : Public Lands (T:Pu) | Transport | Public Lands | 2 |
| Source : Public Lands (S:Pu) | Source | Public Lands | 2 |
| Depositional : Private Lands (D:Pr) | Depositional | Private Lands | 1 |
| Transport : Private Lands (T:Pr) | Transport | Private Lands | 1 |
| Source : Private Lands (S:Pr) | Source | Private Lands | 1 |

**Site Stratification**



# CHaMP Data Storage and Sharing




| SiteID | Sample Date | VisitID | Met # | Organization | Crew | Stream Name | Panel | Categor | Julian Date | Visit Number | Site Water Surface Gradient | Site Sinuosity | Thalweg to Centerline Length Ratio | Sinuosity Via Centerline | Site Wetted Area | Site Bankfull Area | Wetted Volume |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CBW05583-138554 | 07/13/2011 | 18 | 145 | CRITFC | Local Cre | Sheep Cr | Rotating F | Upper Gr | 194 | 1 | 0.941 % | 1.38369 | 0.99539 | 1.36561 | 748.68865 | 1101.15 | 151.08 |
| CBW05583-138666 | 09/13/2011 | 334 | 189 | TerrAqua | Local Cre | North For | Annual | Catherine | 256 | 1 | 2.592 % | 1.11944 | 0.95257 | 1.07495 | 2434.9298 | 3114.66 | 507.800 |
| CBW05583-269114 | 08/04/2011 | 93 | 219 | CRITFC | Local Cre | Grande R | Rotating F | Upper Gr | 216 | 1 | 0.732 % | 1.25937 | 0.97407 | 1.22752 | 5059.86984 | 6927.88 | 1181.16 |
| CBW05583-280042 | 07/27/2011 | 27 | 216 | CRITFC | Local Cre | Grande R | Rotating F | Upper Gr | 208 | 1 | 0.617 % | 1.1439 | 1.0284 | 1.19445 | 1014.43368 | 1194.79 | 287.584 |
| CBW05583-368042 | 09/21/2011 | 99 | 231 | CRITFC | Local Cre | Catherine | Rotating F | Catherine | 264 | 1 | 1.643 % | 1.15176 | 0.96868 | 1.11317 | 2561.99945 | 4435.96 | 614.397 |
| CBW05583-405674 | 09/18/2011 | 316 | 117 | TerrAqua | Local Cre | Catherine | Annual | Catherine | 261 | 1 | 0.784 % | 1.11241 | 0.98313 | 1.09373 | 4457.11297 | 5331.39 | 847.113 |

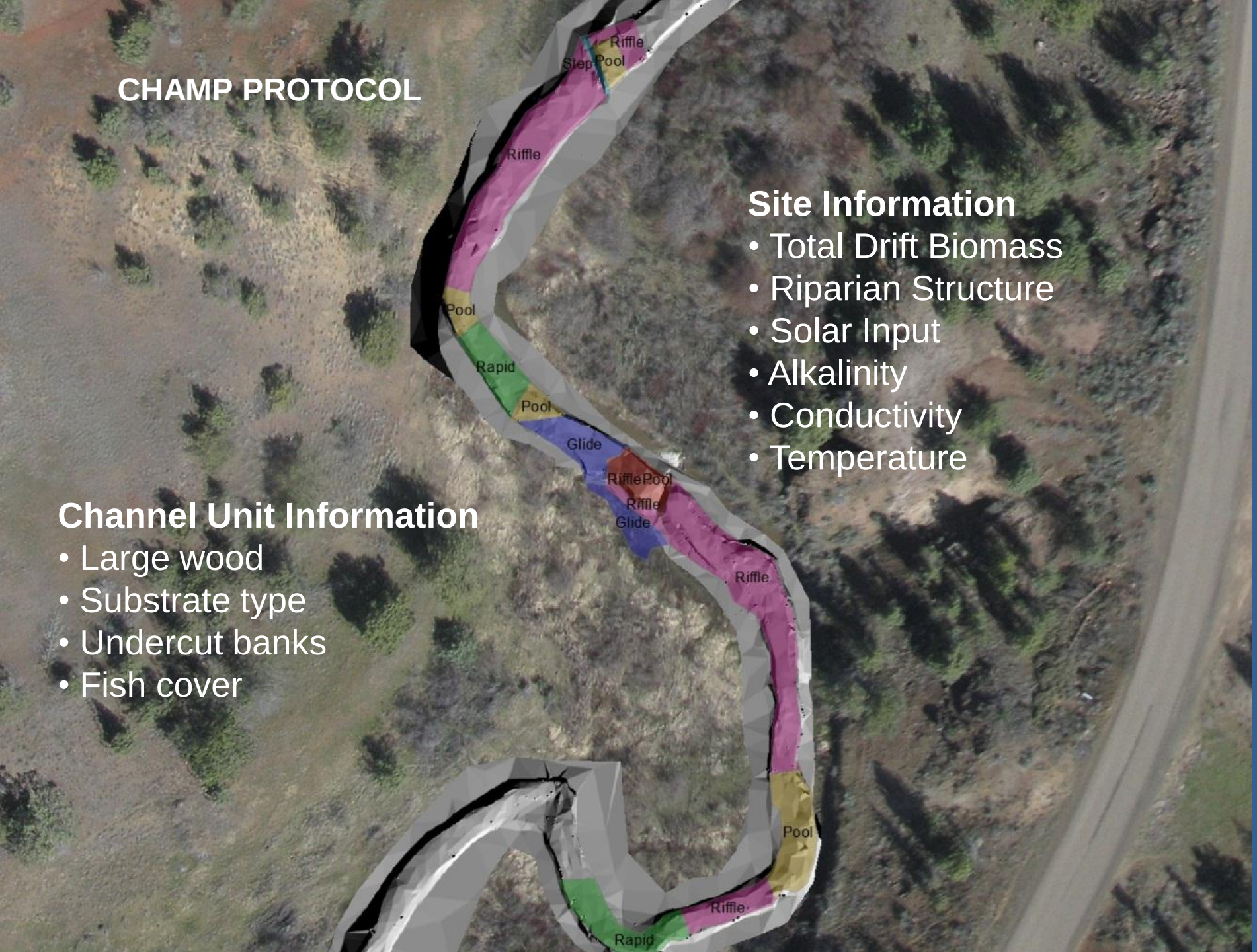
# CHaMP Data Completion Report: Building Blocks for Management

| | 2011 | 2012 | Total Unique Sites Surveyed With CHaMP Protocol and Tools* |
|---|---|---|---|
| Methow | 25 | 19 | 35 |
| Entiat | 76 | 60 | 83 |
| Wenatchee | 23 | 22 | 33 |
| Tucannon | 24 | 29 | 39 |
| South Fork Salmon | 33 | 25 | 45 |
| Lemhi | 42 | 48 | 75 |
| John Day | 56 | 73 | 126 |
| Upper Grande Ronde | 56 | 56 | 86 |
| CHaMP/PIBO | - | 12 | 6 |
| BPA-Funded Total Sites | 335 | 344 | 528 |

*These totals count, only once, annual sites that were sampled in both 2011 and 2012. Altogether, 793 visits.

** Non-BPA-funded sites = 62: 19 sites in the Asotin were funded/surveyed by Washington SRSRB, 20 sites were surveyed in California by CDFG-CMP, 3 sites surveyed for USBR in Methow, 3 sites in Meacham Creek, and 17 sites in Bridge Creek.

# CHAMP PROTOCOL




**Site Information**
- Total Drift Biomass
- Riparian Structure
- Solar Input
- Alkalinity
- Conductivity
- Temperature

**Channel Unit Information**
- Large wood
- Substrate type
- Undercut banks
- Fish cover

| Metric Name | Group |
|---|---|
| Site Length Wetted | Site Length |
| Site Length Bankfull | |
| Site Length Thalweg | |
| Site Water Surface Gradient | Gradient |
| Water Surface Gradient Profile Filtered Mean | |
| Water Surface Gradient Profile Filtered CV | |
| Site Sinuosity | Sinuosity |
| Integrated Bankfull Width | Bankfull Width |
| Bankfull Width Profile Filtered Mean | |
| Bankfull Width Profile Filtered CV | |
| Bankfull Width Constriction Profile Filtered Mean | |
| Bankfull Width Constriction Profile Filtered CV | |
| Integrated Wetted Width | Wetted Width |
| Wetted Width Profile Filtered Mean | |
| Wetted Width Profile Filtered CV | |
| Wetted Width Constriction Profile Filtered Mean | |
| Wetted Width Constriction Profile Filtered CV | |
| Thalweg Depth Profile Filtered Mean | Depth |
| Thalweg Depth Profile Filtered CV | |
| Centerline Depth Profile Filtered Mean | |
| Centerline Depth Profile Filtered CV | |
| Bankfull WidthToDepth Ratio Profile Filtered Mean | Width to depth |
| Bankfull WidthToDepth Ratio Profile Filtered CV | |
| Wetted WidthToDepth Ratio Profile Filtered Mean | |
| Wetted WidthToDepth Ratio Profile Filtered CV | |
| Site Wetted Area | Area |
| Site Bankfull Area | |
| Wetted Volume | Volume |
| Site Bank Angle Mean | Bank Angle |
| Site Bank Angle StdDev | |
| Pool Area | Pools |
| Pool Count | |
| Pool Frequency | |
| Pool Volume | |
| Pool Percent | |
| Fast-NonTurbulent Area | Fast-NonTurbulent |
| Fast-NonTurbulent Count | |
| Fast-NonTurbulent Frequency | |
| Fast-NonTurbulent Volume | |
| Fast-NonTurbulent Percent | |

| Metric Name | Group |
|---|---|
| Fast-Turbulent Area | Fast-Turbulent |
| Fast-Turbulent Count | |
| Fast-Turbulent Frequency | |
| Fast-Turbulent Volume | |
| Fast-Turbulent Percent | |
| Site Discharge | Discharge |
| Site Measurement of Conductivity | Water Chemistry |
| Site Measurement of Alkalinity | |
| Drift Inwertebrate Biomass Density | Invertebrates |
| Measurement of D16 | Substrate Size |
| Measurement of D50 | |
| Measurement of D84 | |
| Percent of Observations Less Than 2mm | |
| Percent of Observations Less Than 6mm | |
| Boulder and Cobbles | Substrate Distribution |
| Course and Fine Gravel | |
| Sand and Fines | |
| Wetted Large Wood Frequency per 100m | Large Woody Debris |
| Bankfull Large Wood Frequency per 100m | |
| Wetted Large Wood Volume by Site | |
| Bankfull Large Wood Volume by Site | |
| Wetted Large Wood Volume in Pools | |
| Bankfull Large Wood Volume in Pools | |
| Wetted Large Wood Volume in Fast-Turbulent | |
| Bankfull Large Wood Volume in Fast-Turbulent | |
| Wetted Large Wood Volume in Fast-NonTurbulent | |
| Bankfull Large Wood Volume in Fast-NonTurbulent | |
| Fish Cover Composition LWD | Fish Cover |
| Fish Cover Composition Vegetation | |
| Fish Cover Composition Undercut | |
| Fish Cover Composition Artificial | |
| Fish Cover Composition None | |
| Percent Big Tree Cover | Riparian |
| Percent Coniferous Cover | |
| Percent Ground Cover | |
| Percent Non-Woody Cover | |
| Percent Understory Cover | |
| Percent Woody Cover | |

78 published metrics, many more possible

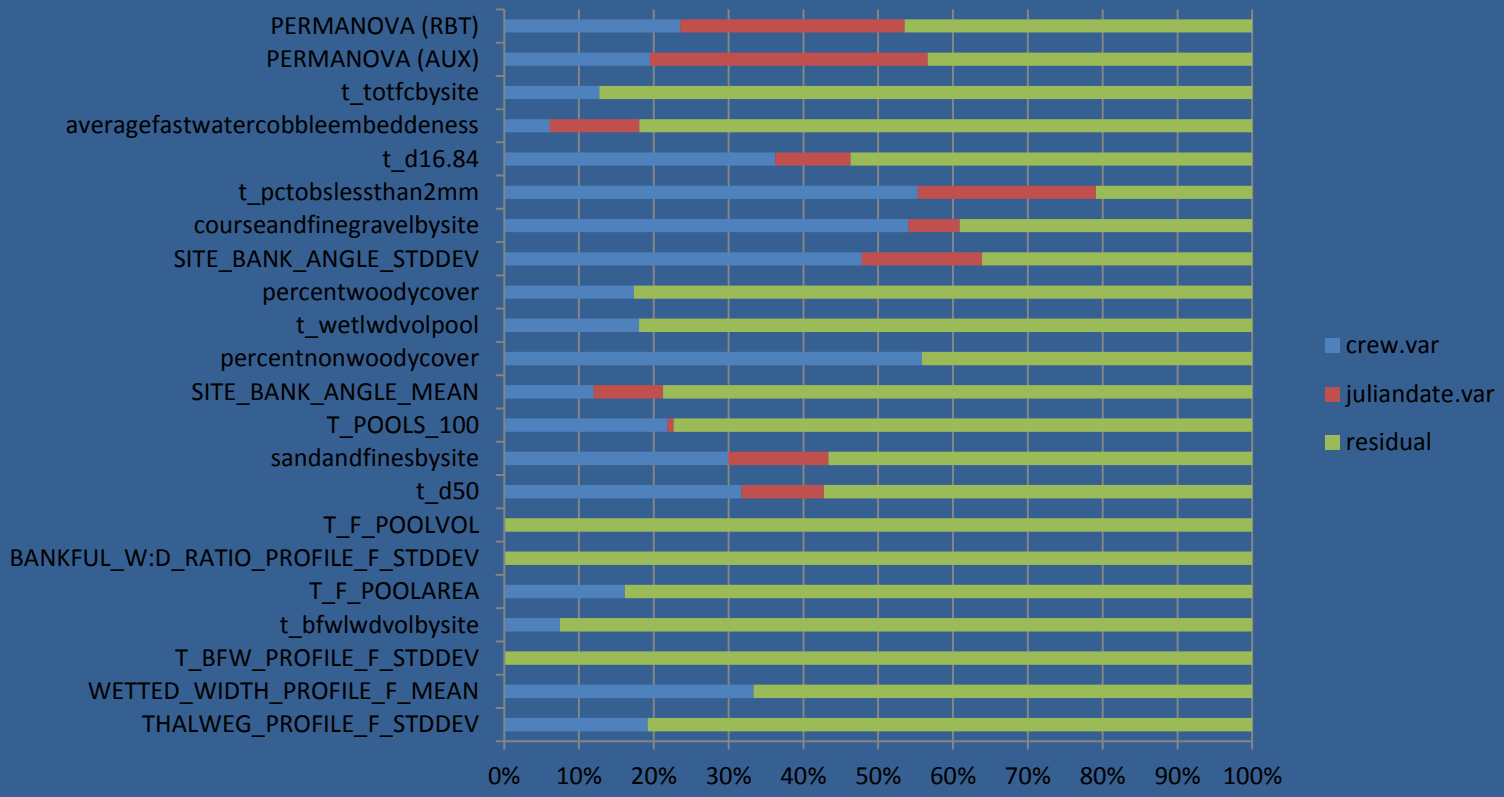
# Metric and Indicators Inclusion Rule Set

- Information Content:
  - Documented relationship to salmonid productivity
- Data Form:
  - Statistical information with robust data quality: repeatable, detect heterogeneity, adequate properties for modeling/statistics
- Feasibility:
  - Hardware/software that is ready for implementation
  - Three-person-day field survey at 80-90 percent of all sites likely to be encountered
  - 2012 budget constraints

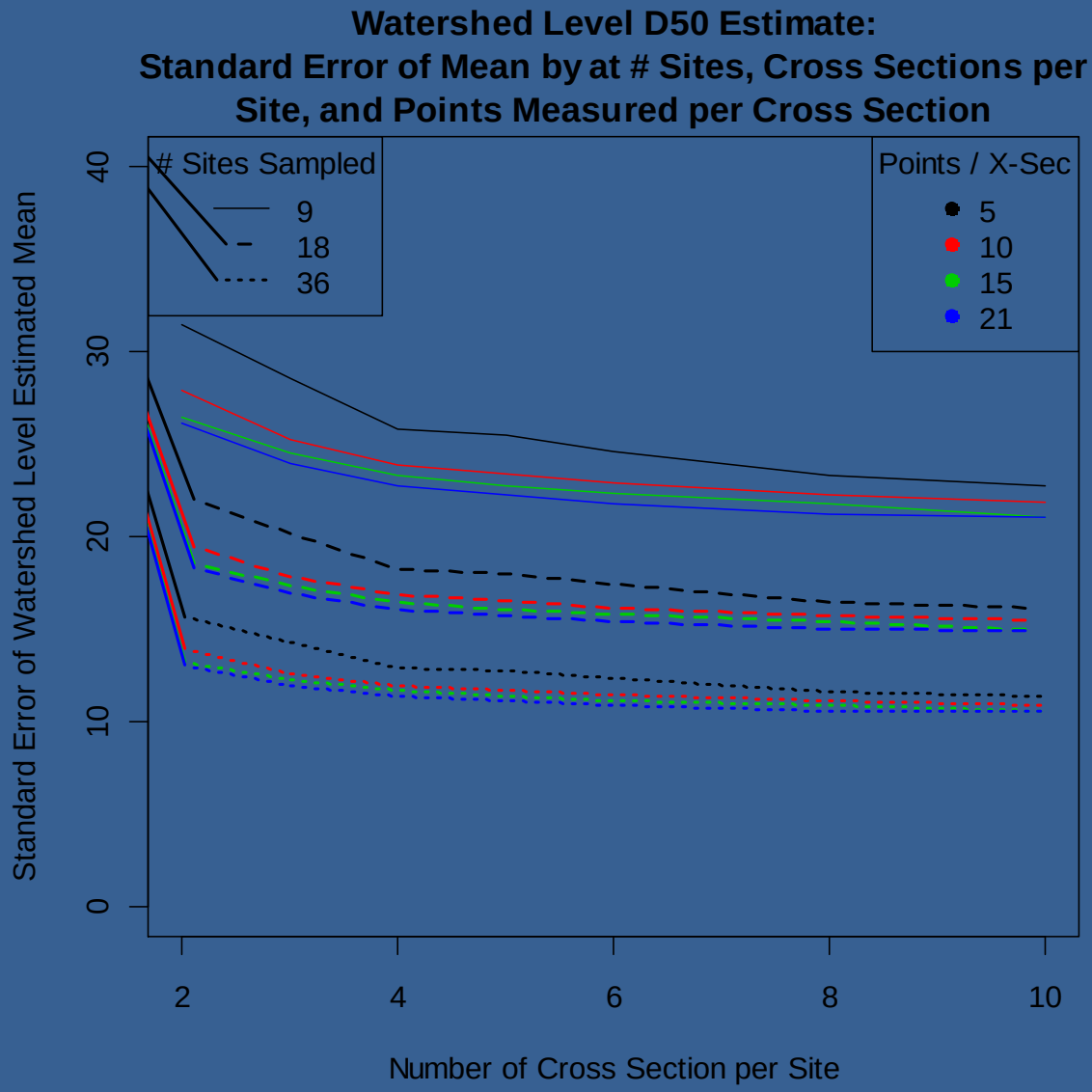
# CHaMP: Variability Decomposition

## Crew variability as a % of (crew+julian+residual)

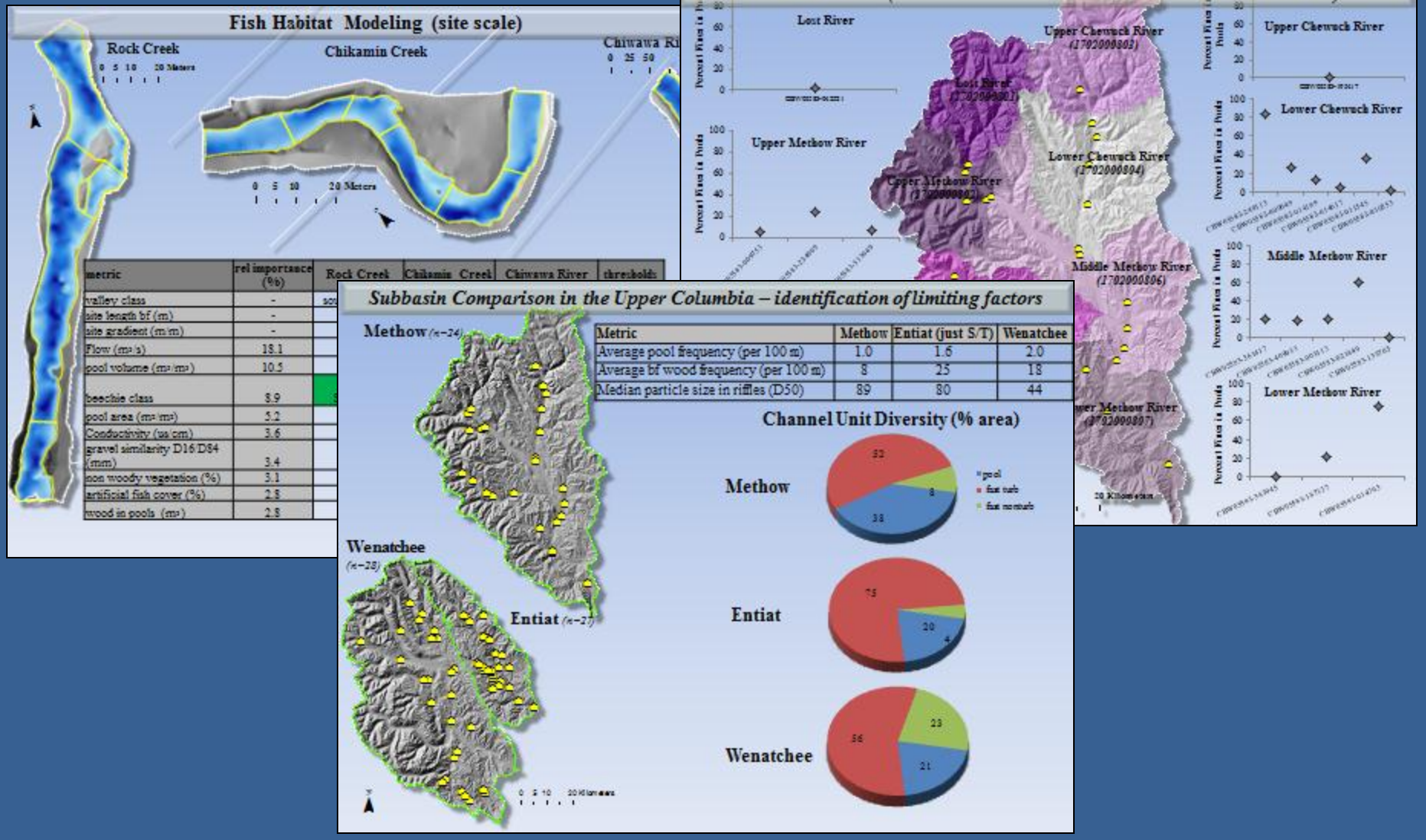
Caps = RBT metric; T = transformed metric; F = Filtered



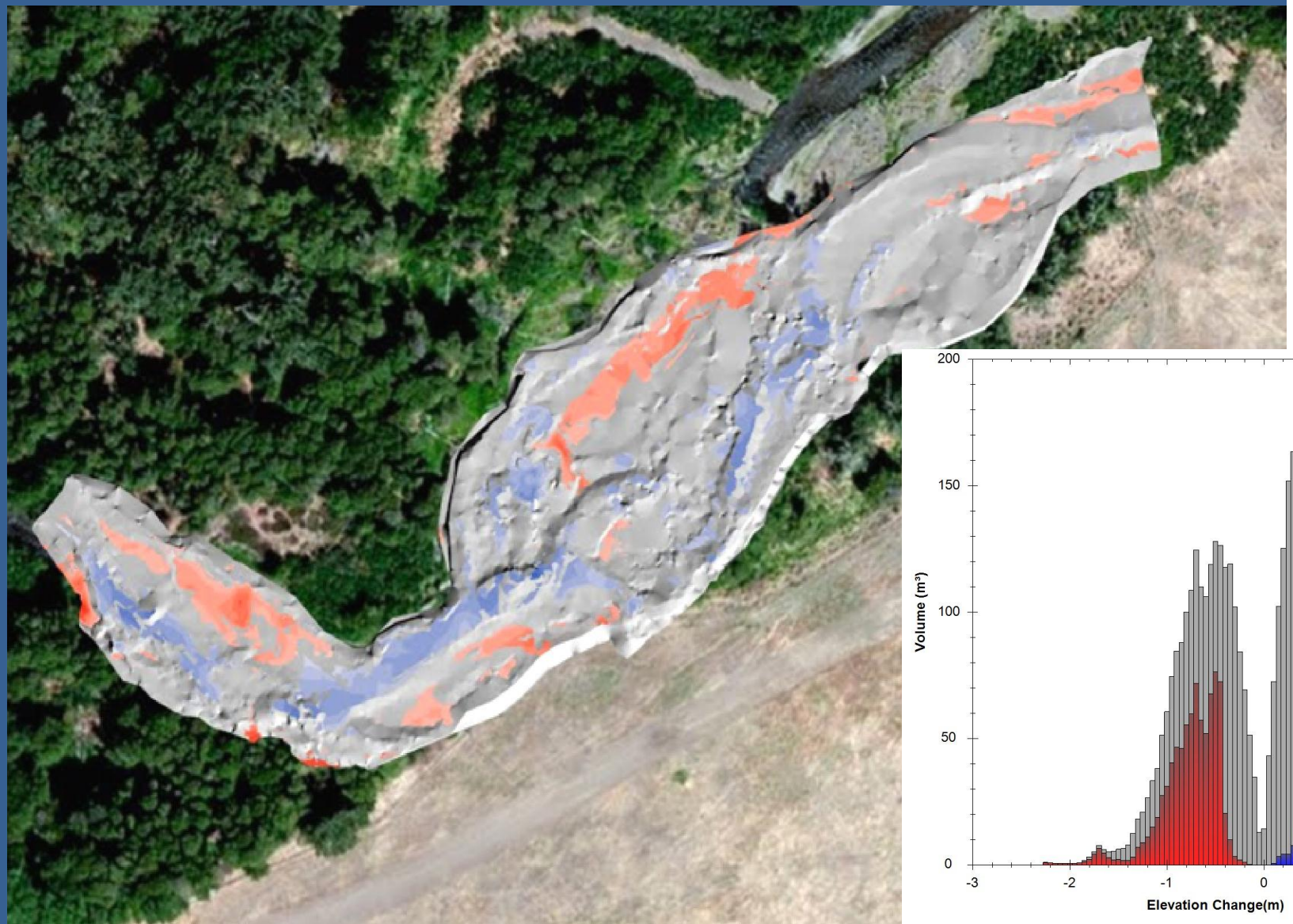
# Data Analysis Highlights: Optimizing Effort and Data Form



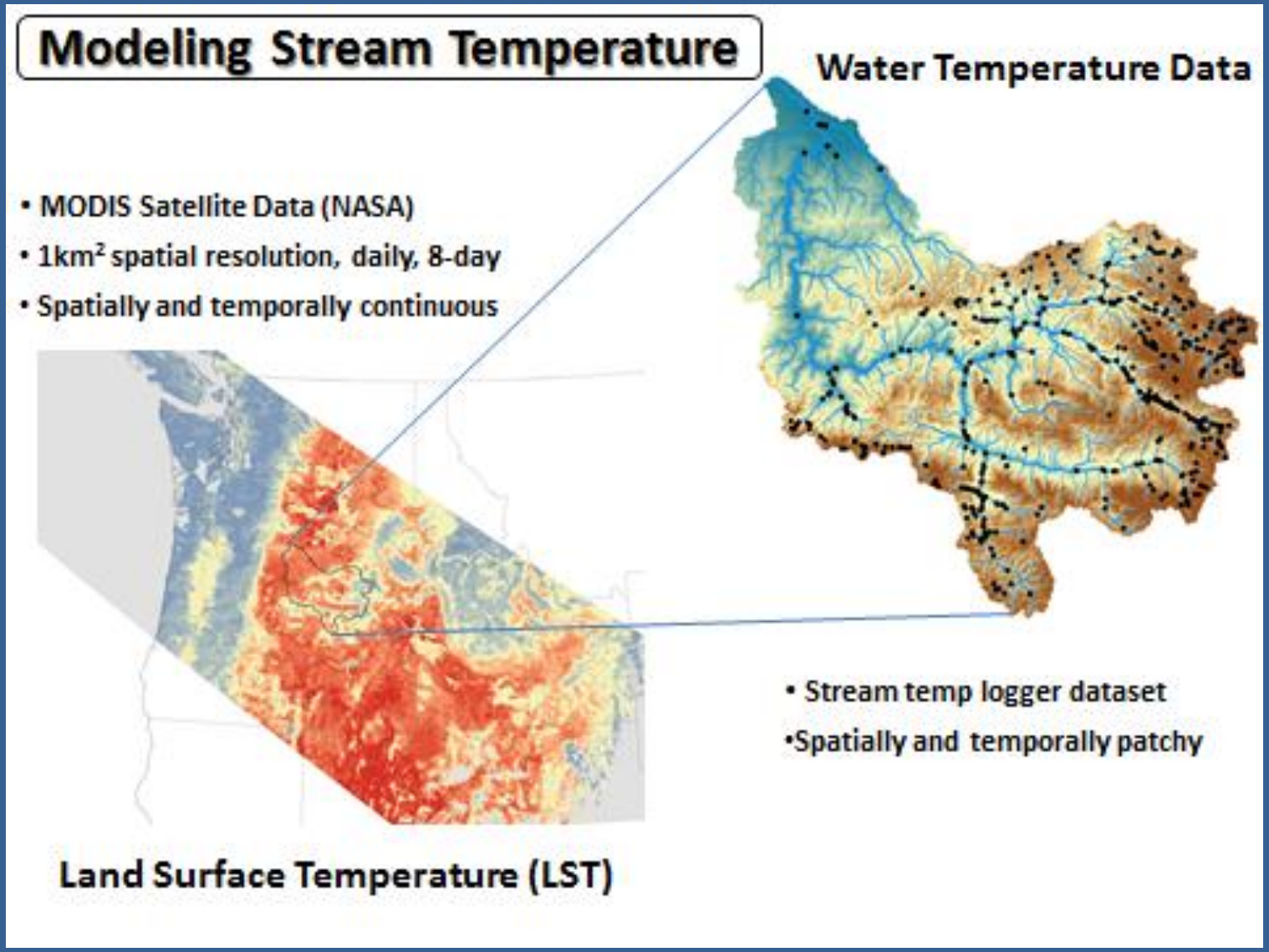
# Status and Trend Highlights



# Status and Trend Highlights: Geomorphic Change Detection



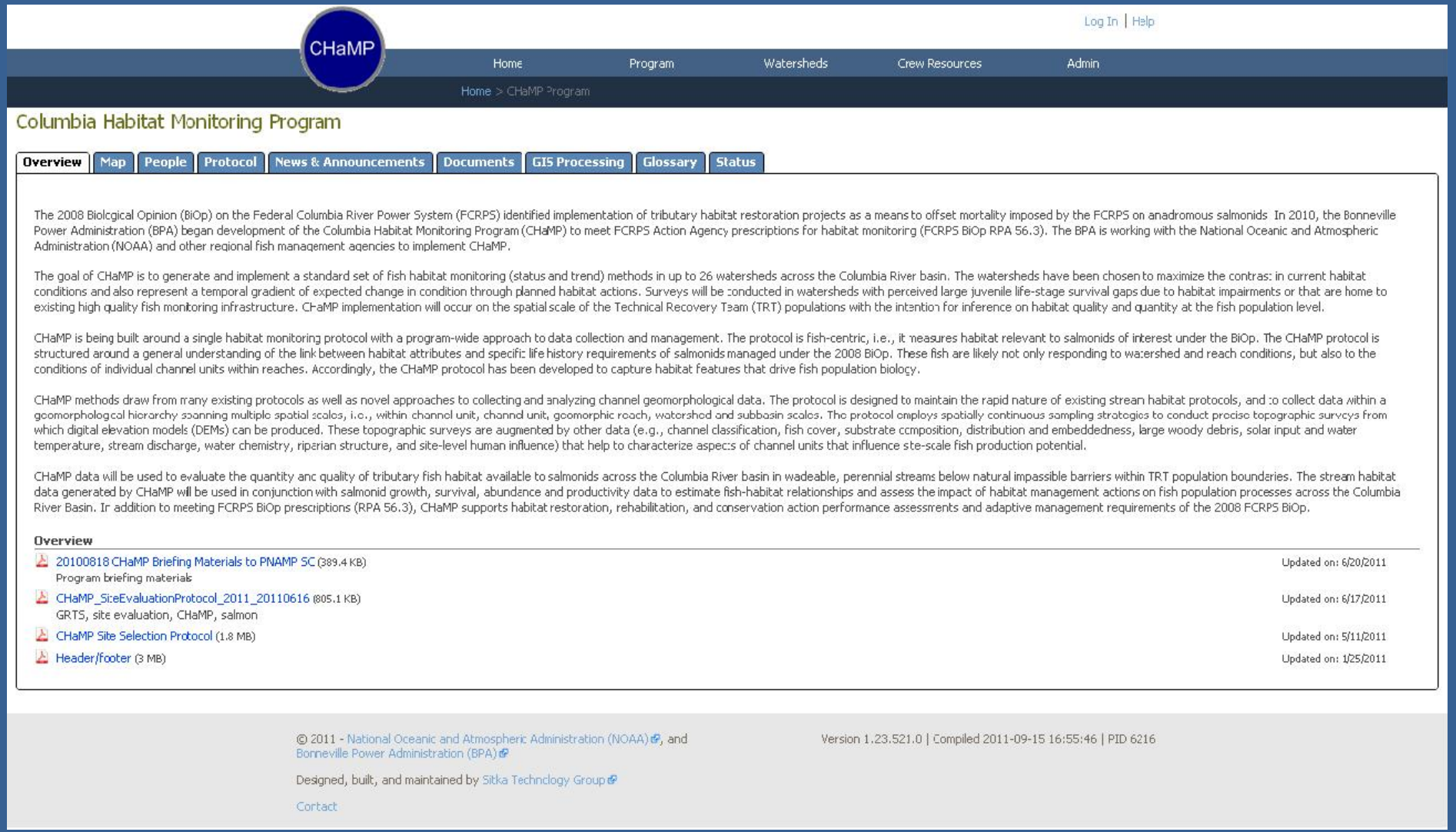
# Data Analysis Highlights: Reducing Effort with Remote Sensing



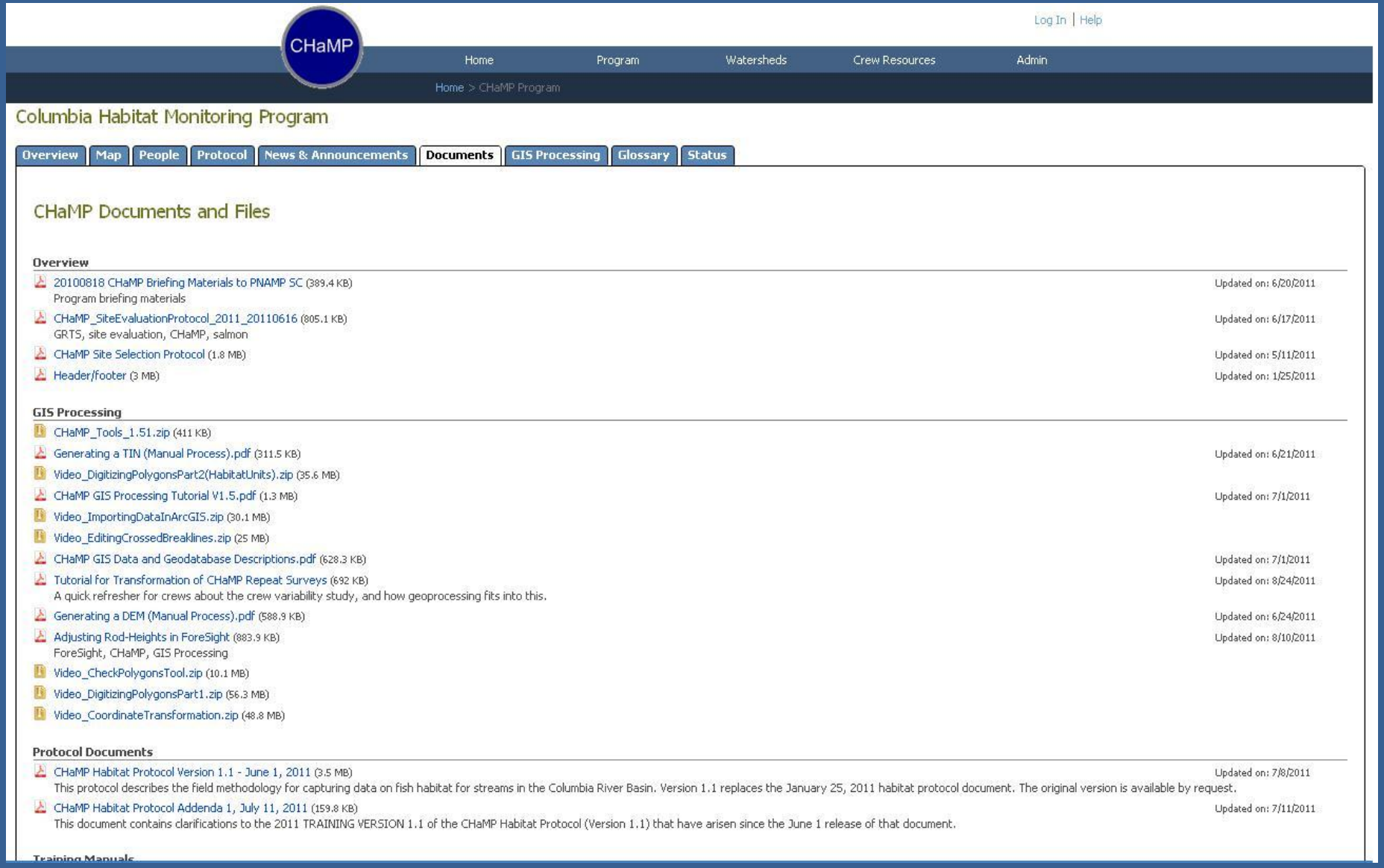
# CHaMP

- Discussion and Questions from ISRP/ISAB

# CHaMP Documenation



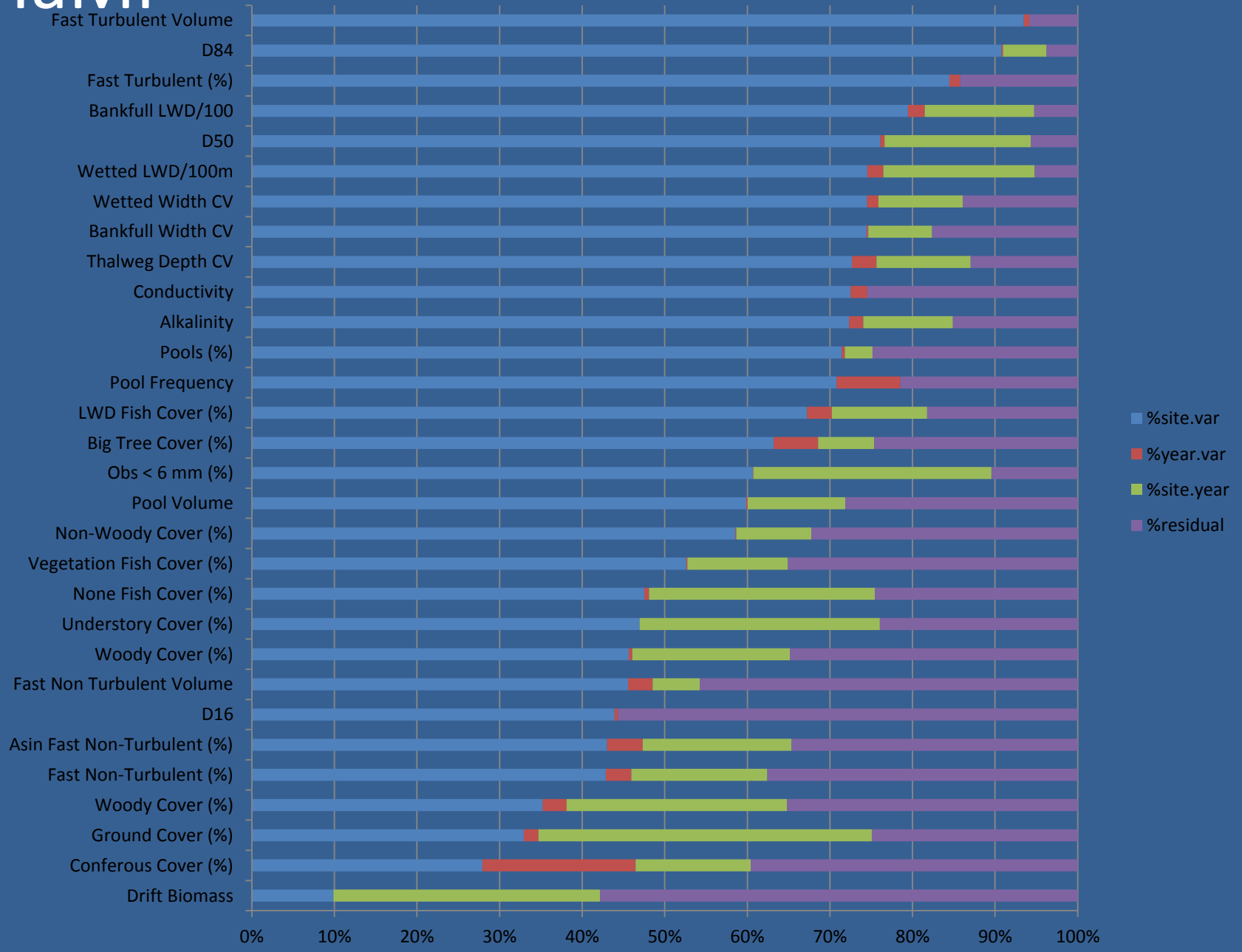
# CHaMP Resources



# CHaMP

- SCRAP follows this slide

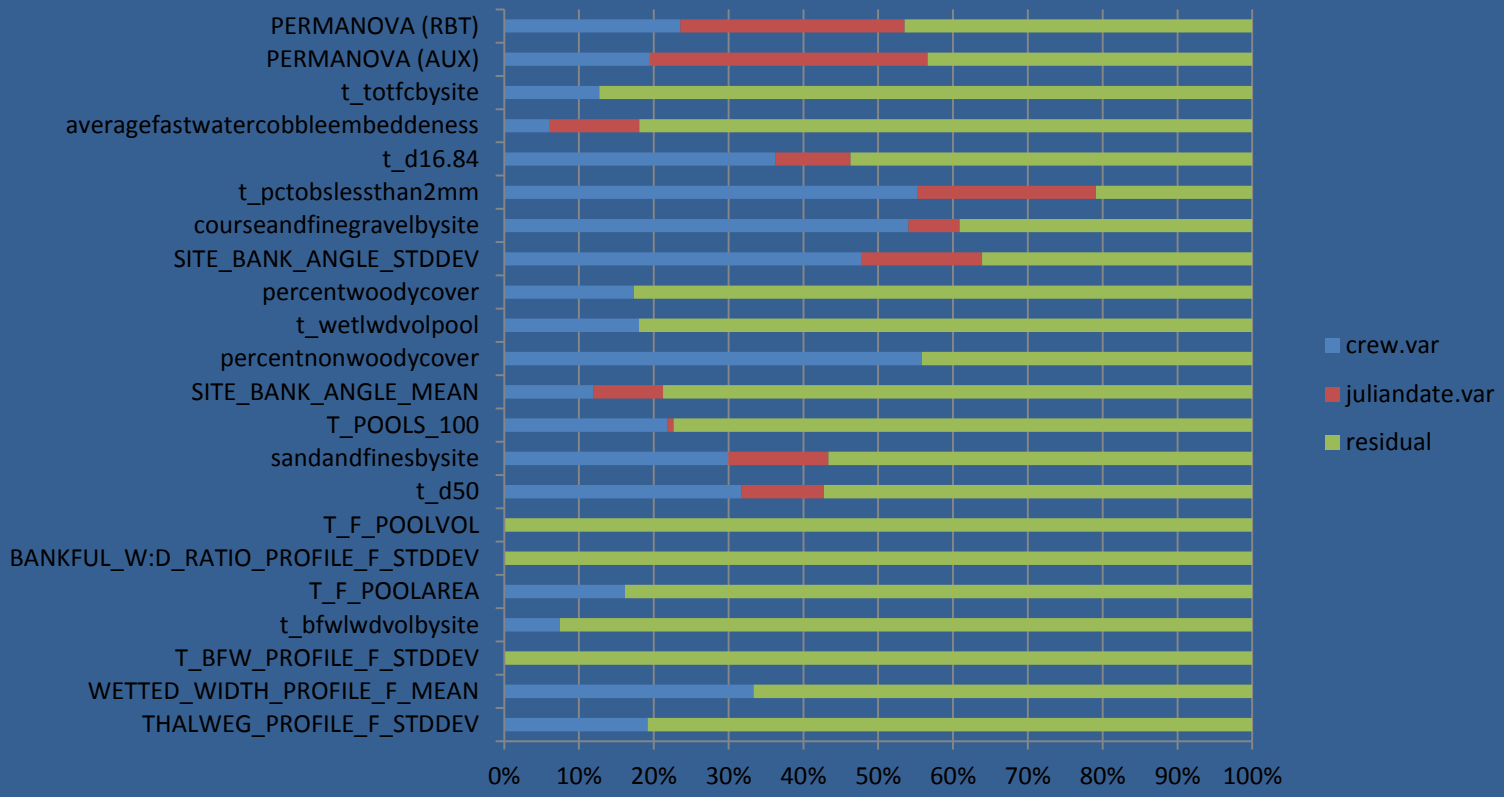
# CHaMP


Fast Turbulent Volume
D84
Fast Turbulent (%)
Bankfull LWD/100
D50
Wetted LWD/100m
Wetted Width CV
Bankfull Width CV
Thalweg Depth CV
Conductivity
Alkalinity
Pools (%)
Pool Frequency
LWD Fish Cover (%)
Big Tree Cover (%)
Obs < 6 mm (%)
Pool Volume
Non-Woody Cover (%)
Vegetation Fish Cover (%)
None Fish Cover (%)
Understory Cover (%)
Woody Cover (%)
Fast Non Turbulent Volume
D16
Asin Fast Non-Turbulent (%)
Fast Non-Turbulent (%)
Woody Cover (%)
Ground Cover (%)
Conferous Cover (%)
Drift Biomass
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
%site.var
%year.var
%site.year
%residual

# CHaMP

## Crew variability as a % of (crew+julian+residual)

Caps = RBT metric;  T = transformed metric;  F = Filtered



# 2012 Recap:
# Improve Data Performance and Flow

**"Improved" Approach to Challenging Metrics**

-- **Better Protocol and Training Improved Efficiency**

-- **Improved Standardization**

-- **Increased Cost of Each Survey**

**Improved Tools and Software**

-- **Streamlined the data flow process**

-- **Improved standardization**

-- **Reduced overall effort; shifted work to crews**

# 2012 Recap: Coordination With Managers

**Data Analysis Strategy Development: September 2012**

**-- Continue to Develop Status and Trend Data Displays**

**-- Improve Fish/Habitat Modeling with Regional Collaborators as Basis for Interpretation of Habitat Data**

**-- Prepare for: Comprehensive evaluation; 2013 BiOp check-in; 2013 BiOp remand; Council MERS plan; 2015 Expert Panel process; 2018 BiOp**