CHaMP | Columbia Habitat Monitoring Program

CHaMP 2012: Introduction and What's New

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Terraqua, Inc.

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

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

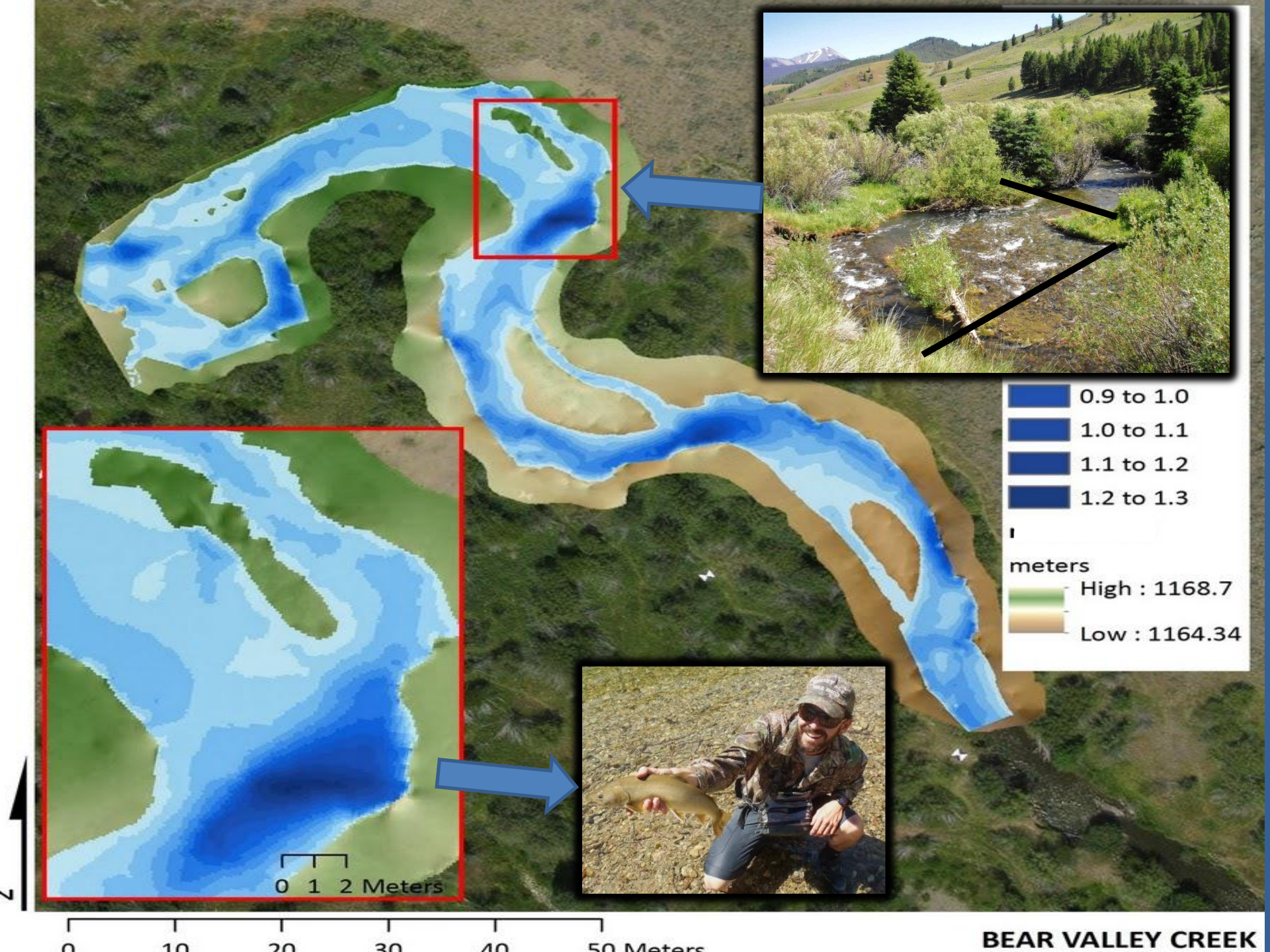
- Developers: NOAA, Terraqua, South Fork Research, EcoLogical Research, Sitka, QCI
- Collaborators: ISEMP, ODFW, CRITFC, CDFG, Campbell Timberlands, OSU/BLM
- Effectiveness Monitoring: Entiat, John Day, Lemhi, Umpqua, Coastal California
- Status and Trend Monitoring: Columbia Basin, Coastal California

CHaMP Program

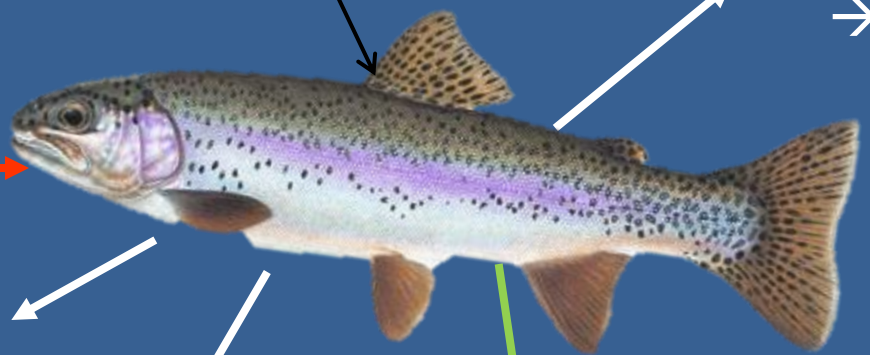
- Standardized Training
- Standardized Protocol
- Standardized Implementation
- Standardized Data QC/QA
- Standardized Data Management and Sharing
- Flexible Objectives
- Flexible Designs
- “Flexible” Metrics/Indicators

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.


0.9 to 1.0
1.0 to 1.1
1.1 to 1.2
1.2 to 1.3
meters
High : 1168.7
Low : 1164.34
0 1 2 Meters
0 10 20 30 40 50 Meters
BEAR VALLEY CREEK

Bioenergetics



flow

temperature

Drift

Active Metabolism
→ Costs from activity

Consumption

Respiration
→ Basal Metabolism

Specific Dynamic Action
→ Costs from digestion

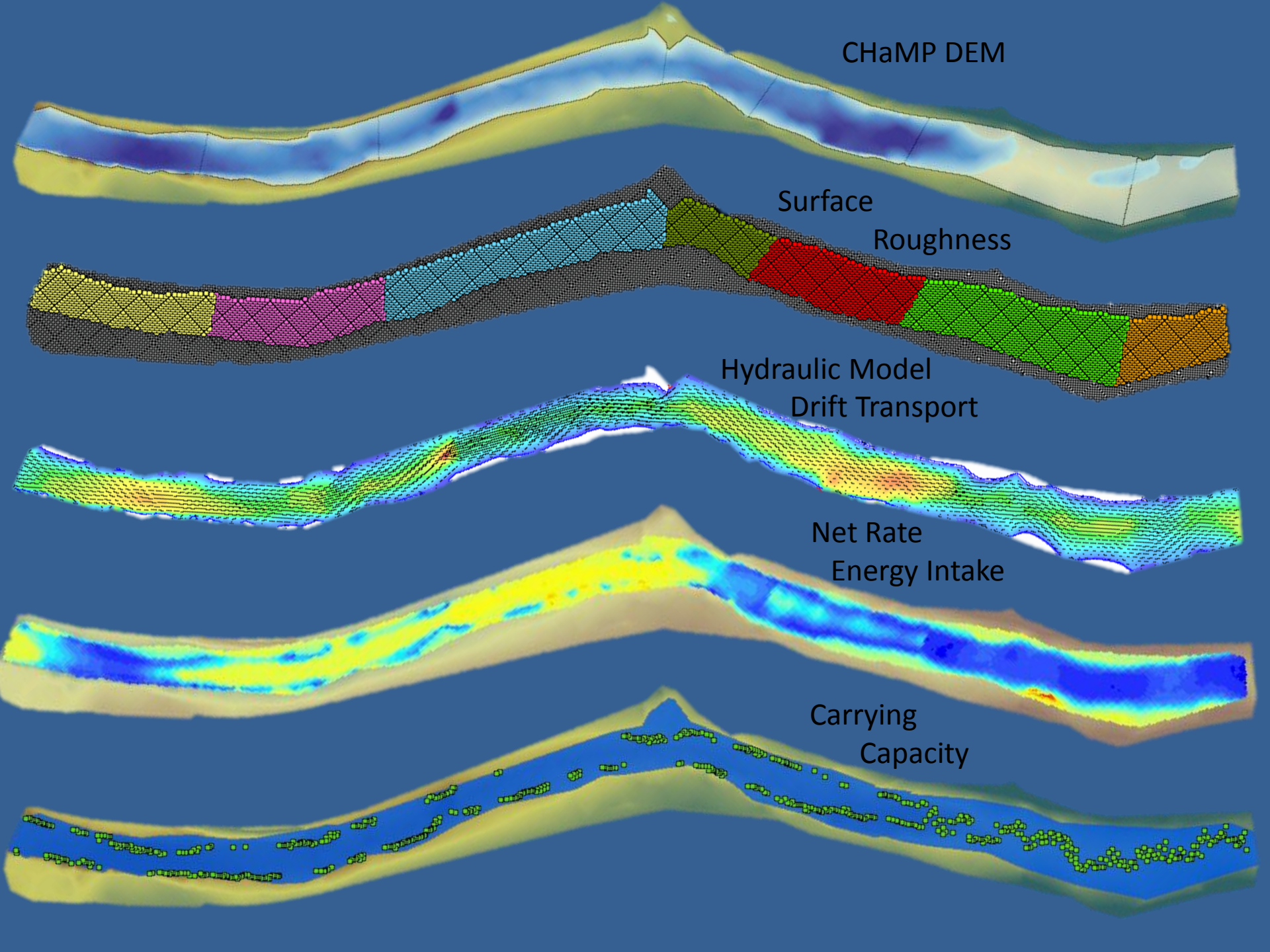
Waste

ΔBiomass
→ Growth

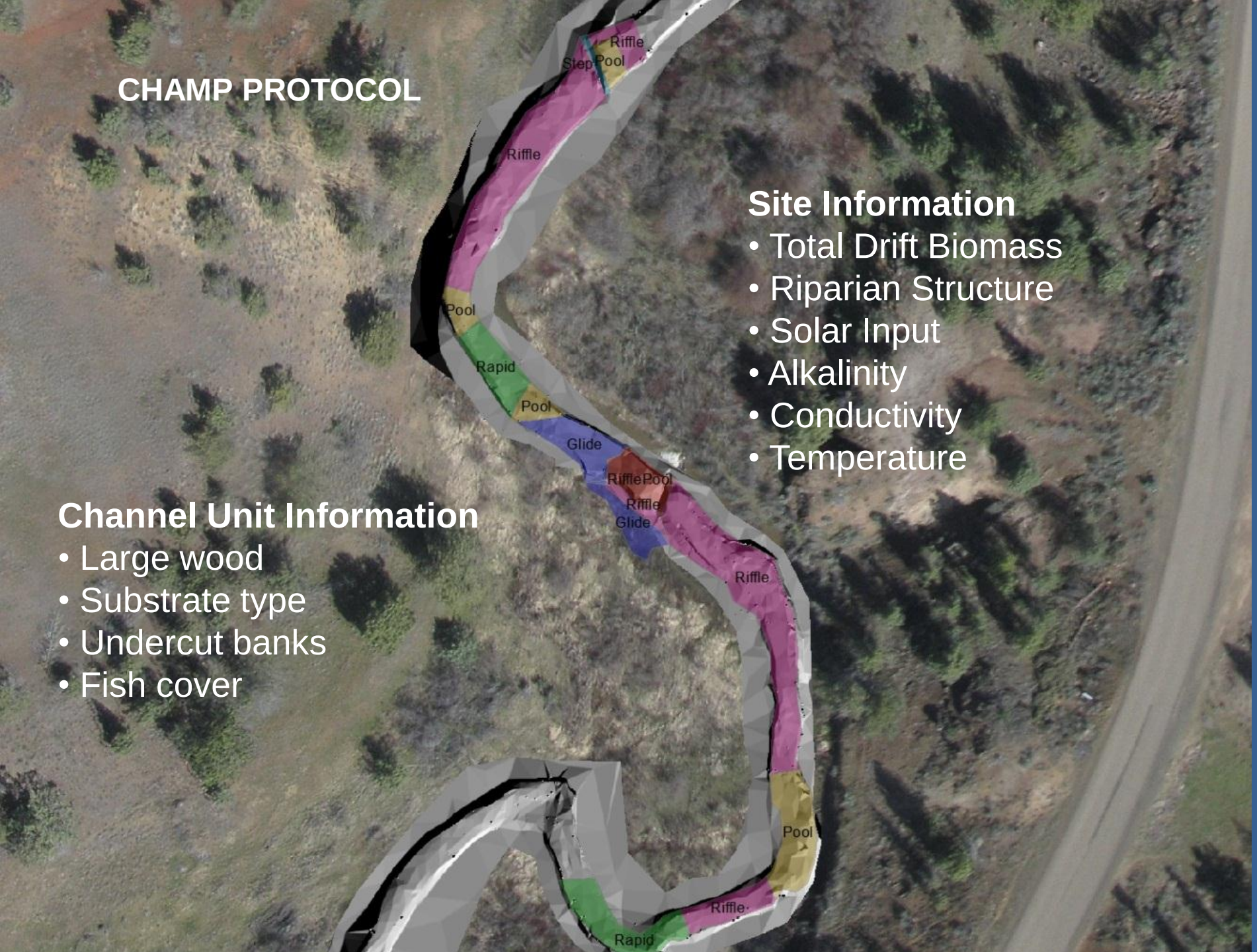
Consumption = (Metabolism) + (Waste) + (Growth)

Measure in the Lab

Measured in the Field


CHaMP DEM
Surface
Roughness
Hydraulic Model
Drift Transport
Net Rate
Energy Intake
Carrying
Capacity

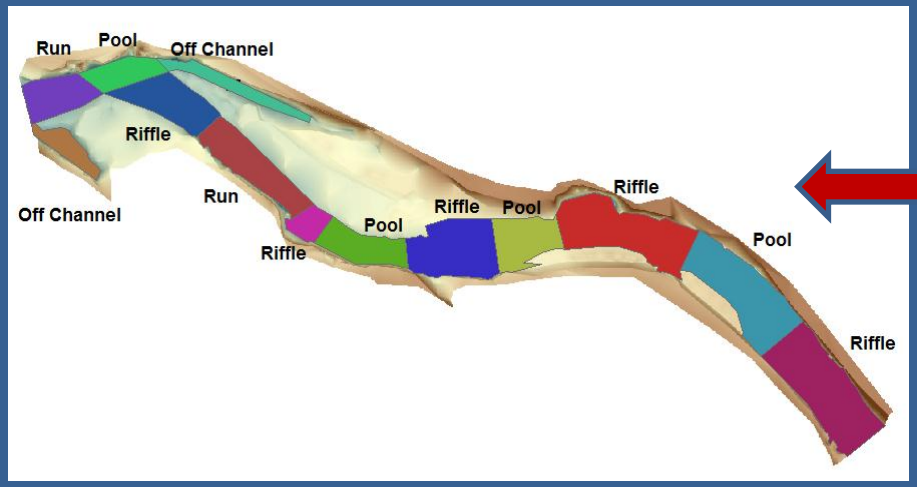
CHAMP PROTOCOL



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

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

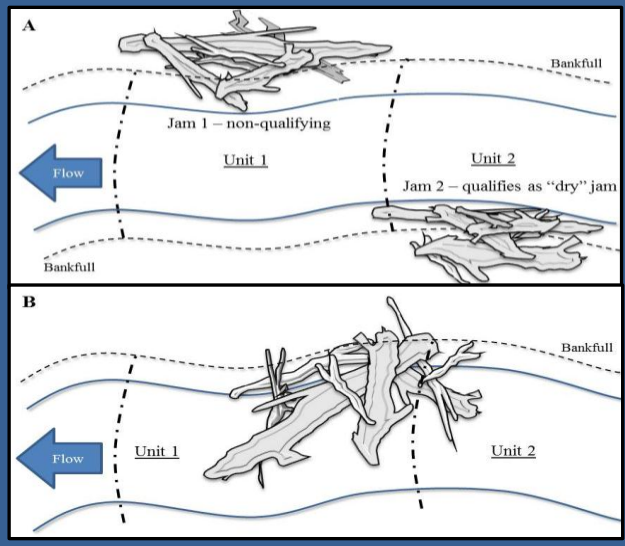
Columbia Habitat Monitoring Program (CHaMP)
Data Collection Methods – Topographic Surveys



Auxiliary Data

Channel Unit Attributes

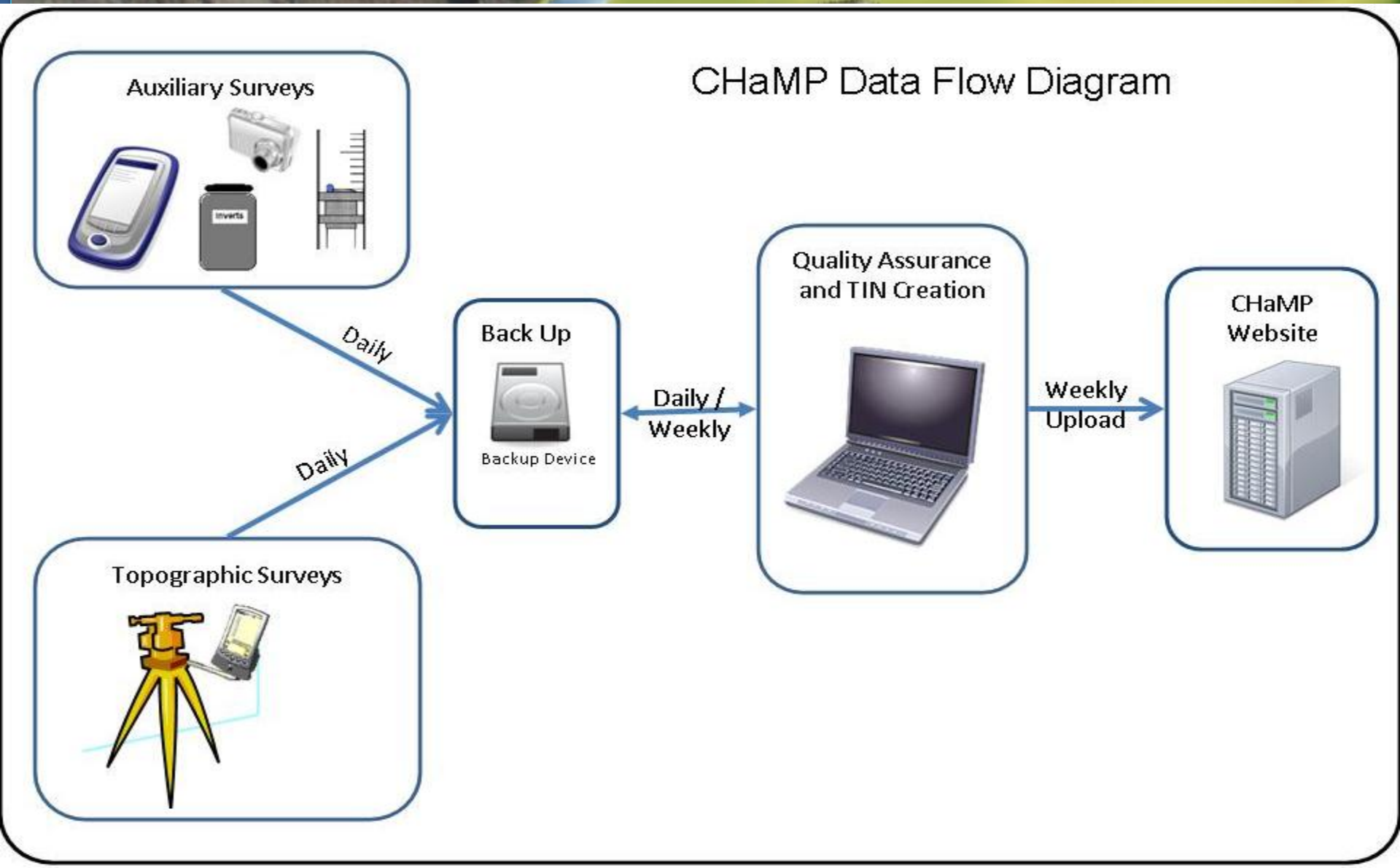
1. Fish Cover
2. Ocular Substrate
3. Particle Counts
4. Embeddedness
5. Pool Tail Fines
6. LWD
7. Side Channels



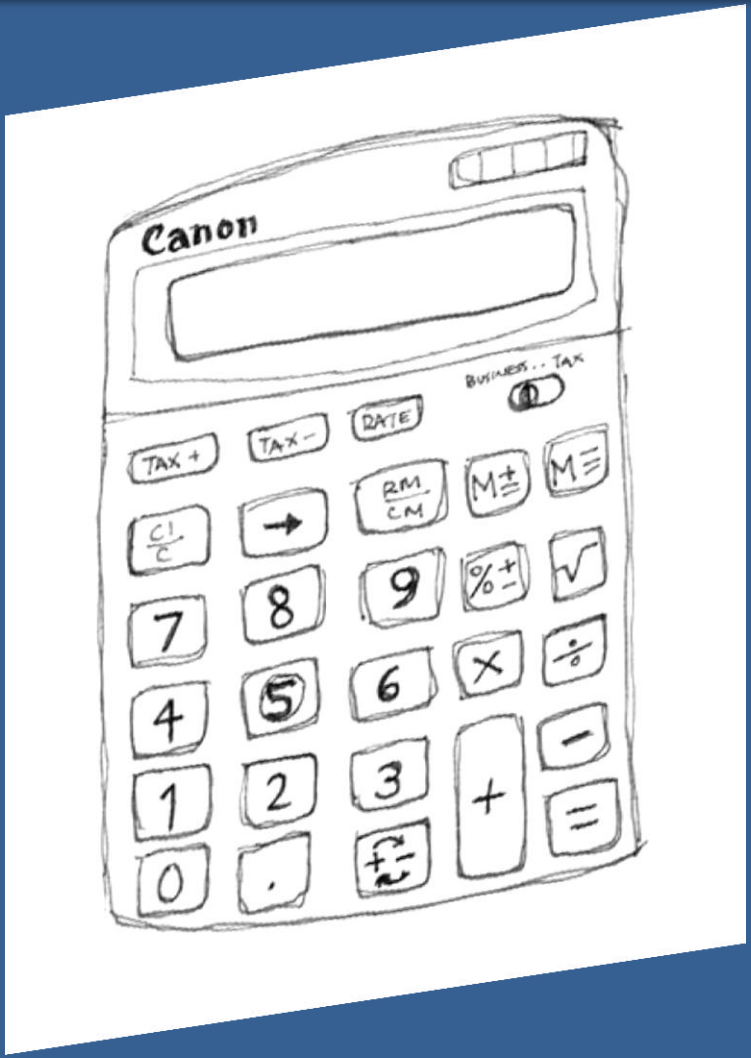
Site Level Attributes

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

CHaMP Data Flow



RBT = **Gnomes with calculators**

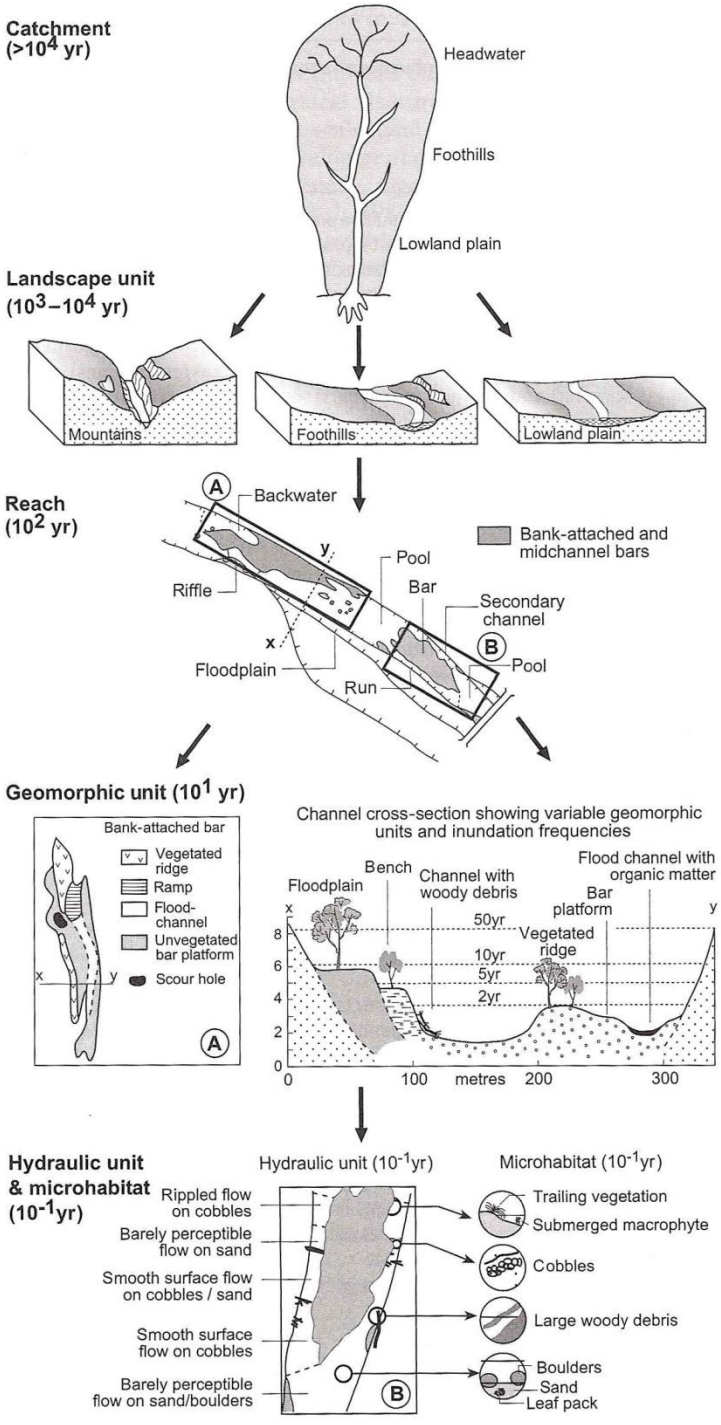


RBT Metrics and Indicators for CHaMP

- Channel Dimensions and Features
- Channel Unit Frequency
- Bar Features
- 2-D Flow Model
- Froude Number
- Velocity Heterogeneity
- Channel Unit Complexity
- Channel Score
- Change Detection

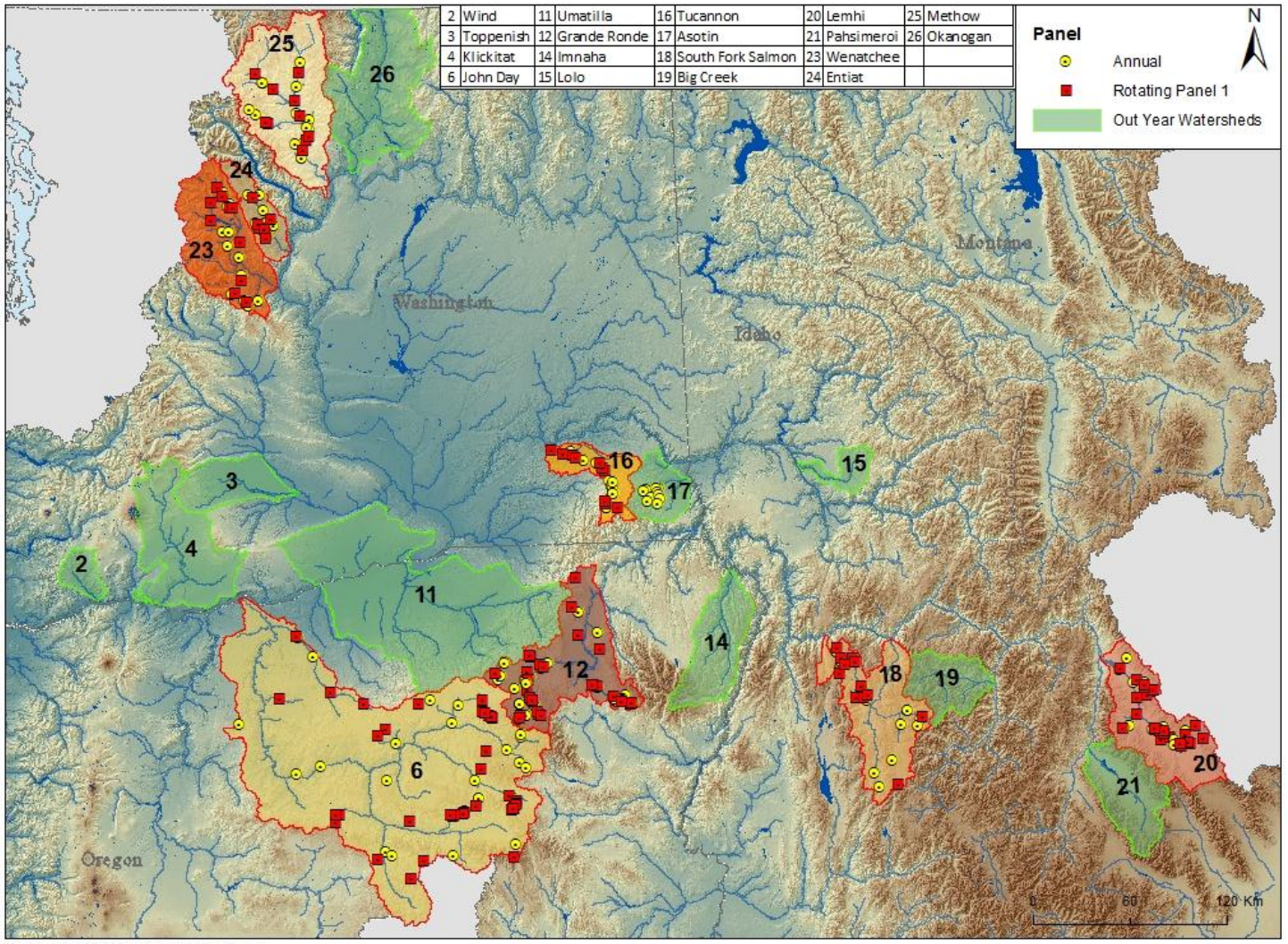
Sample Designs

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



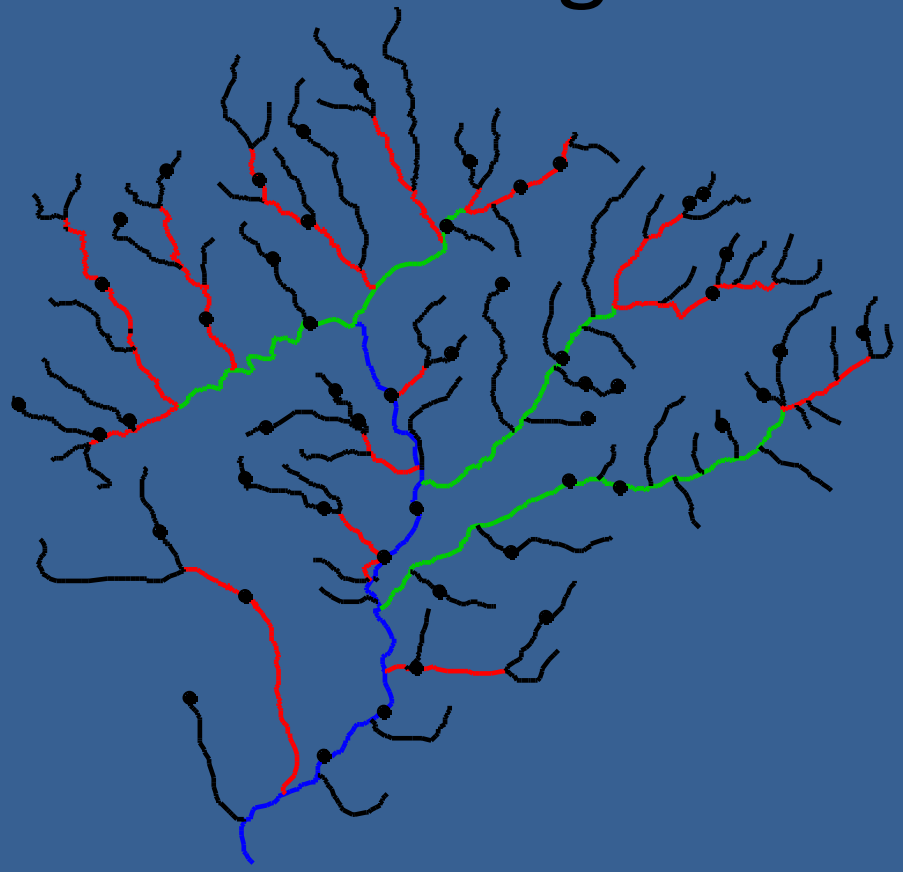
Sample Designs

2011 Annual and Rotating Panels



Map by: Jean Olson, South Fork Research, Inc.
Date: November 22, 2011

Sampling a Stream Network with (GRTS): Generalized Random-Tessellation Stratified Designs



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	-

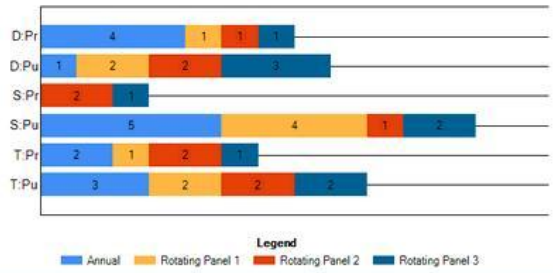
Rotating Panel 2 — rotating panel measured every 3 years, starting in 2012

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

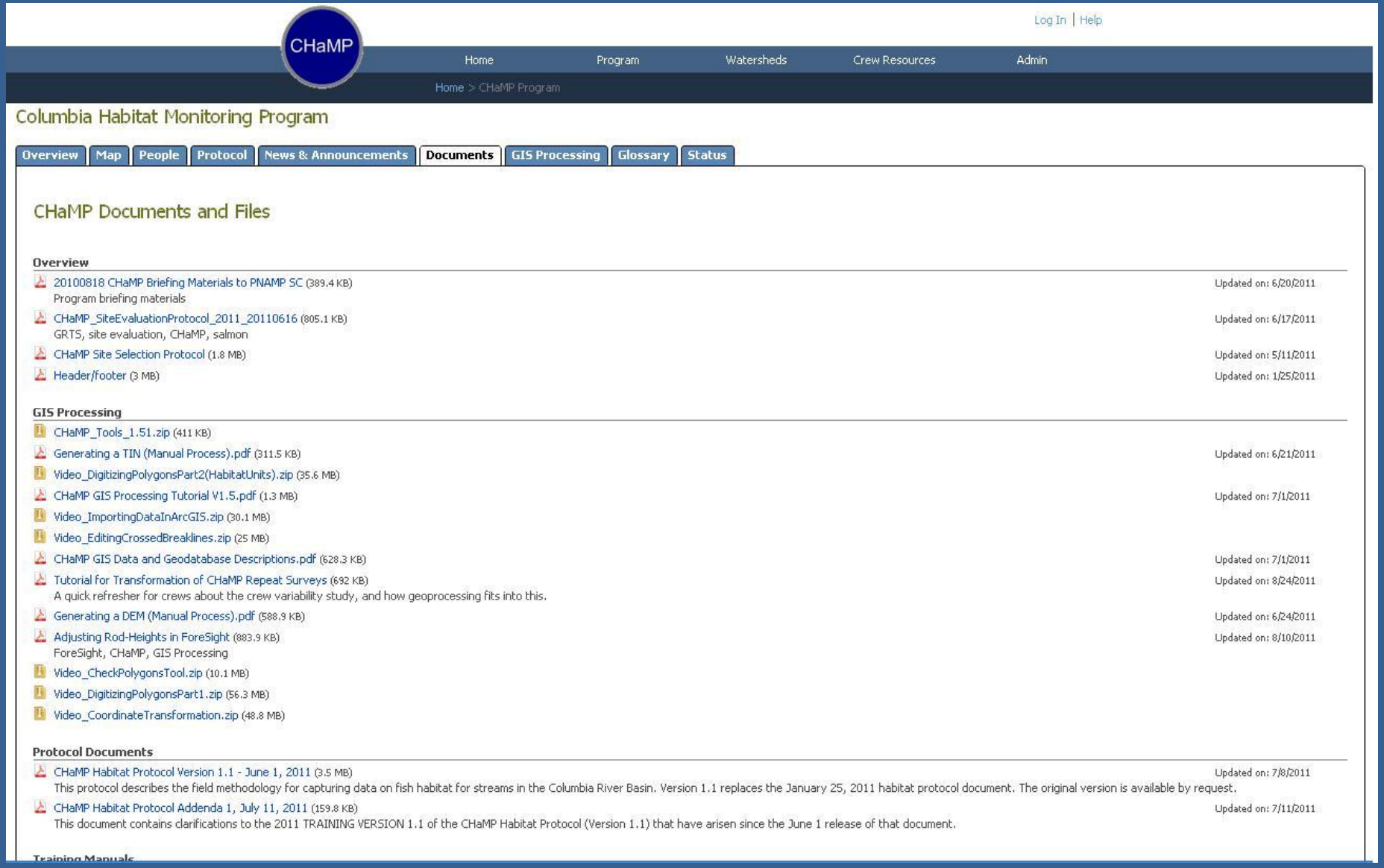
Category	Valley Class	Ownership	# of Sites
Depositional : Public Lands (D:Pu)	Depositional	Public Lands	3
Transport : Public Lands (T:Pu)	Transport	Public Lands	2
Source : Public Lands (S:Pu)	Source	Public Lands	2
Depositional : Private Lands (D:Pr)	Depositional	Private Lands	1
Transport : Private Lands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

Site Stratification

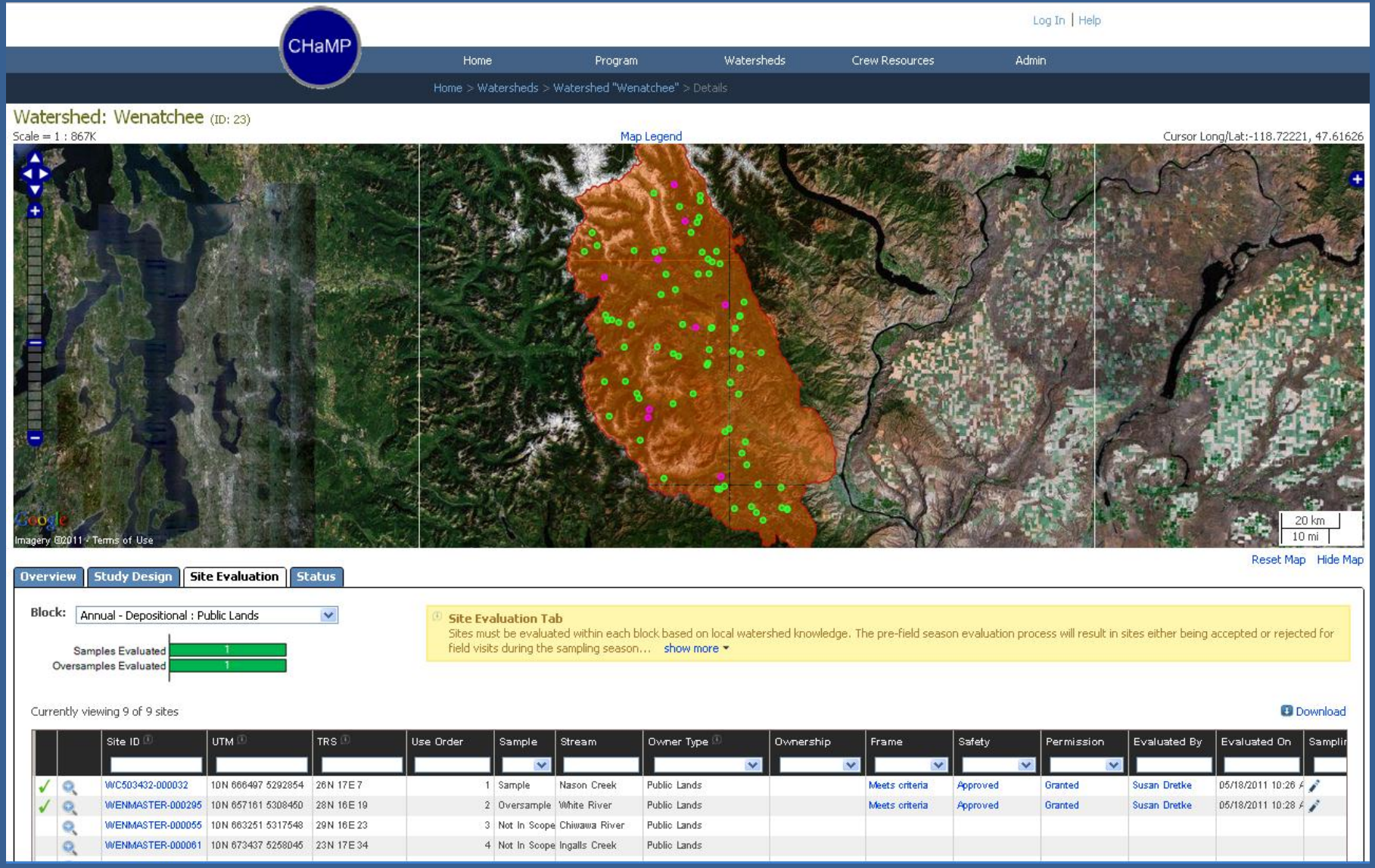


CHaMP Process: CHaMPMonitoring.org

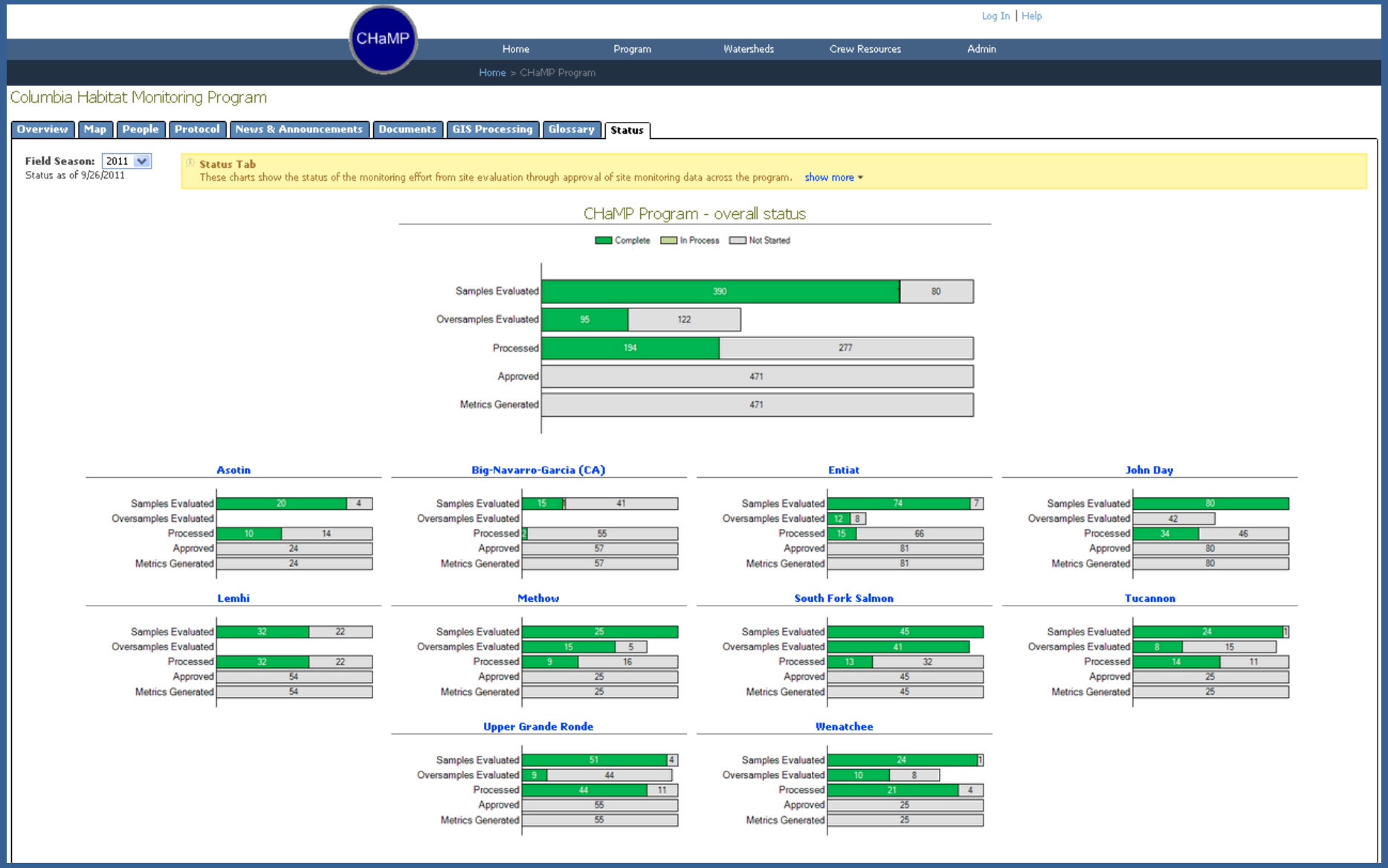
CHaMP Resources



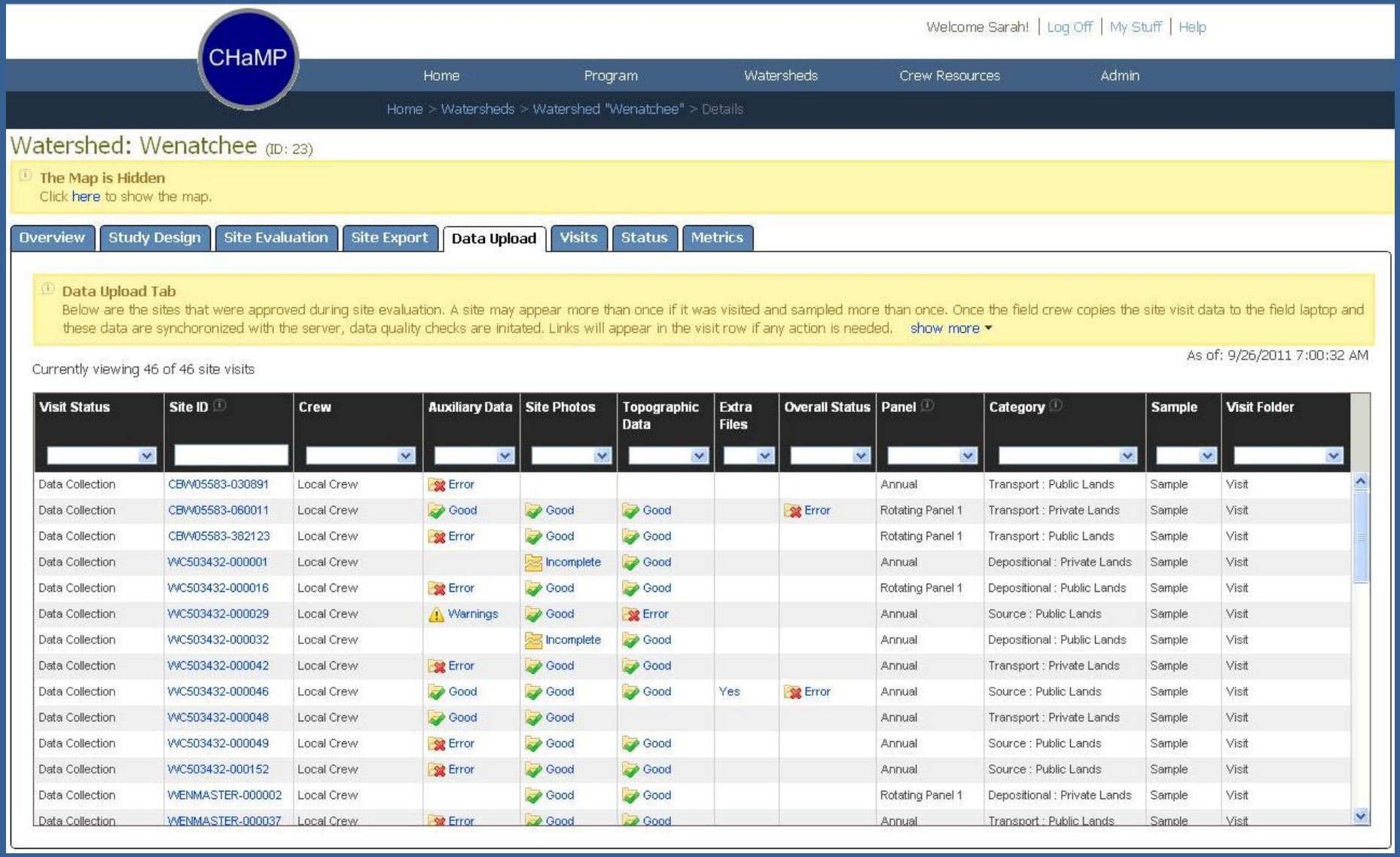
CHaMP Site Evaluation



CHaMP Implementation Progress



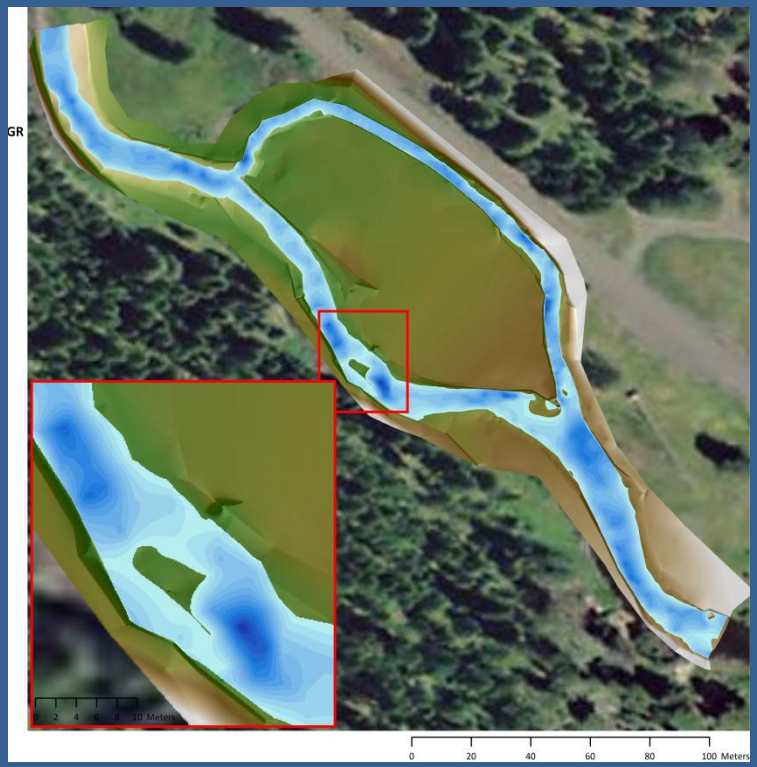
CHaMP Data Storage and Sharing

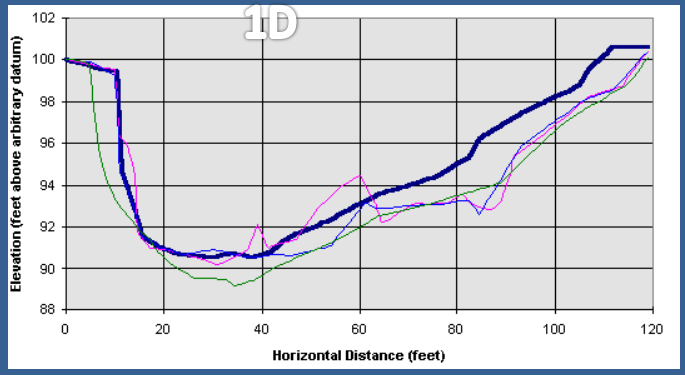


Visit Status	Site ID	Crew	Auxiliary Data	Site Photos	Topographic Data	Extra Files	Overall Status	Panel	Category	Sample	Visit Folder
Data Collection	CBW05583-030891	Local Crew	Error					Annual	Transport : Public Lands	Sample	Visit
Data Collection	CBW05583-060011	Local Crew	Good	Good	Good		Error	Rotating Panel 1	Transport : Private Lands	Sample	Visit
Data Collection	CBW05583-382123	Local Crew	Error	Good	Good			Rotating Panel 1	Transport : Public Lands	Sample	Visit
Data Collection	WC503432-000001	Local Crew		Incomplete	Good			Annual	Depositional : Private Lands	Sample	Visit
Data Collection	WC503432-000016	Local Crew	Error	Good	Good			Rotating Panel 1	Depositional : Public Lands	Sample	Visit
Data Collection	WC503432-000029	Local Crew	Warnings	Good	Error			Annual	Source : Public Lands	Sample	Visit
Data Collection	WC503432-000032	Local Crew		Incomplete	Good			Annual	Depositional : Public Lands	Sample	Visit
Data Collection	WC503432-000042	Local Crew	Error	Good	Good			Annual	Transport : Private Lands	Sample	Visit
Data Collection	WC503432-000046	Local Crew	Good	Good	Good	Yes	Error	Annual	Source : Public Lands	Sample	Visit
Data Collection	WC503432-000048	Local Crew	Good	Good				Annual	Transport : Private Lands	Sample	Visit
Data Collection	WC503432-000049	Local Crew	Error	Good	Good			Annual	Source : Public Lands	Sample	Visit
Data Collection	WC503432-000152	Local Crew	Error	Good	Good			Annual	Source : Public Lands	Sample	Visit
Data Collection	WENMASTER-000002	Local Crew		Good	Good			Rotating Panel 1	Depositional : Private Lands	Sample	Visit
Data Collection	WENMASTER-000037	Local Crew	Error	Good	Good			Annual	Transport : Public Lands	Sample	Visit

CHaMP Philosophy: Standardization: OWNERSHIP & PRIDE

- "Yeah, that looks exactly like what I saw…"



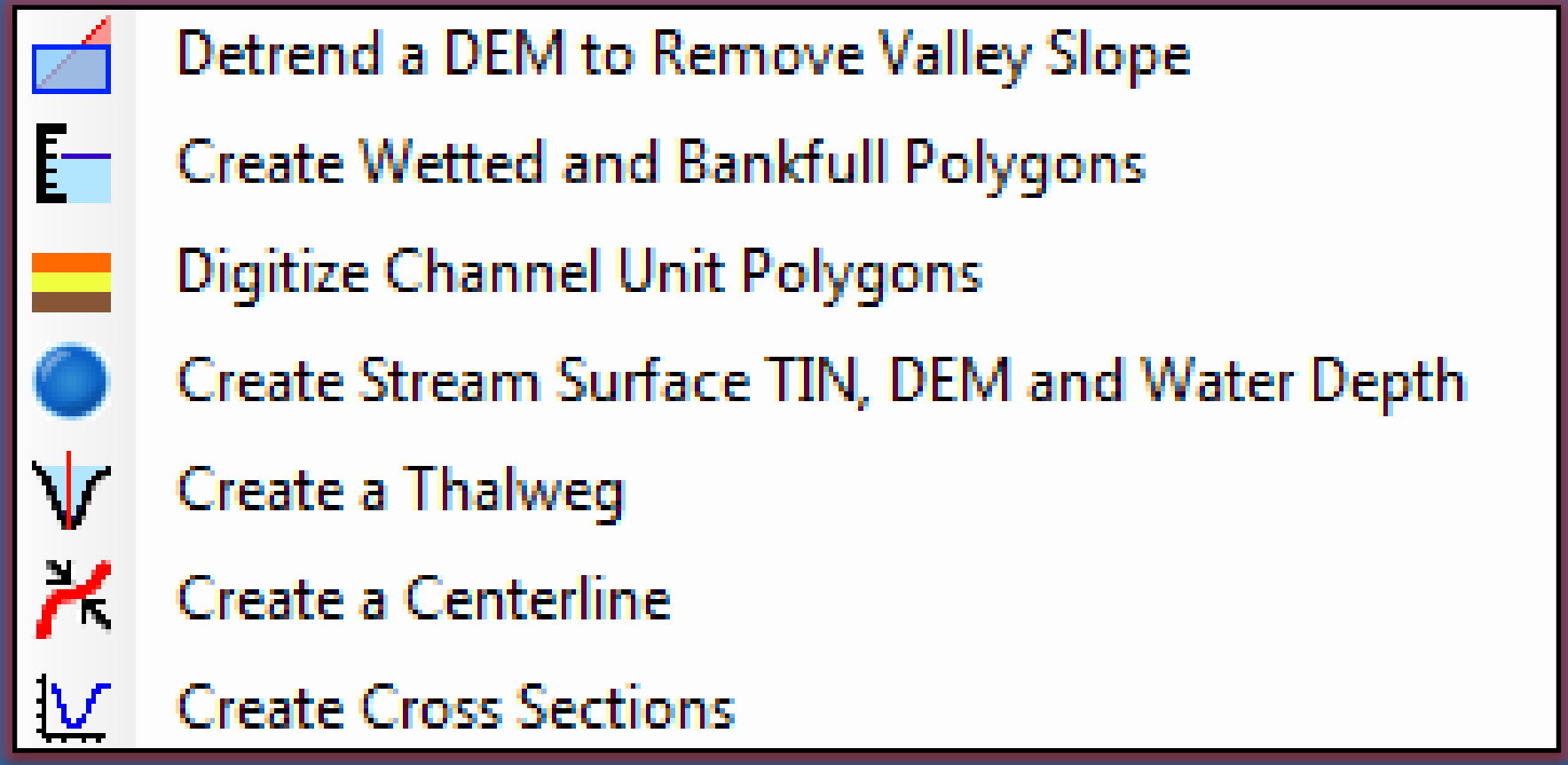


- Emphasis is on mapping & topography… more intuitive and enables much richer range of analysis

CHaMP 2012 Changes

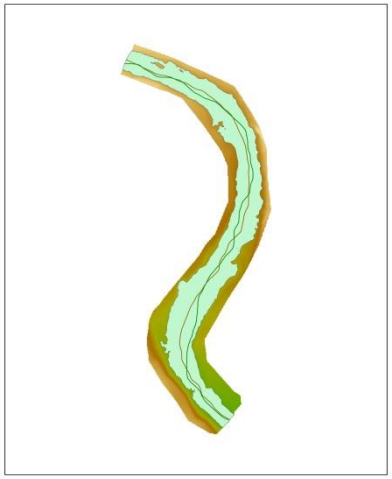
- Lessons Learned
- Improvements in Work Flow
  - Protocol changes
  - RBT changes
  - Data capture changes

Desktop RBT Tools



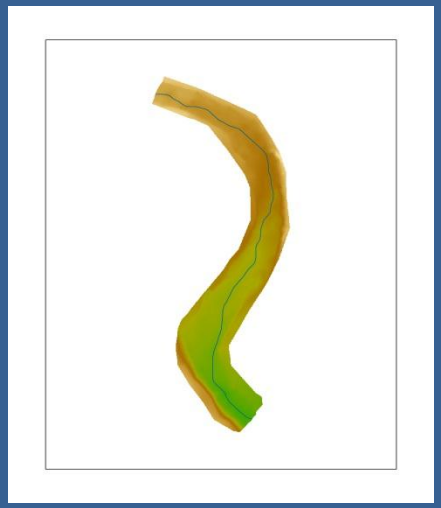
RBT QA Images

Water Extent

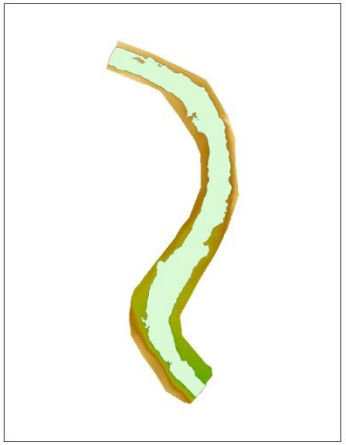


Thalweg

Plain DEM



Long Lines



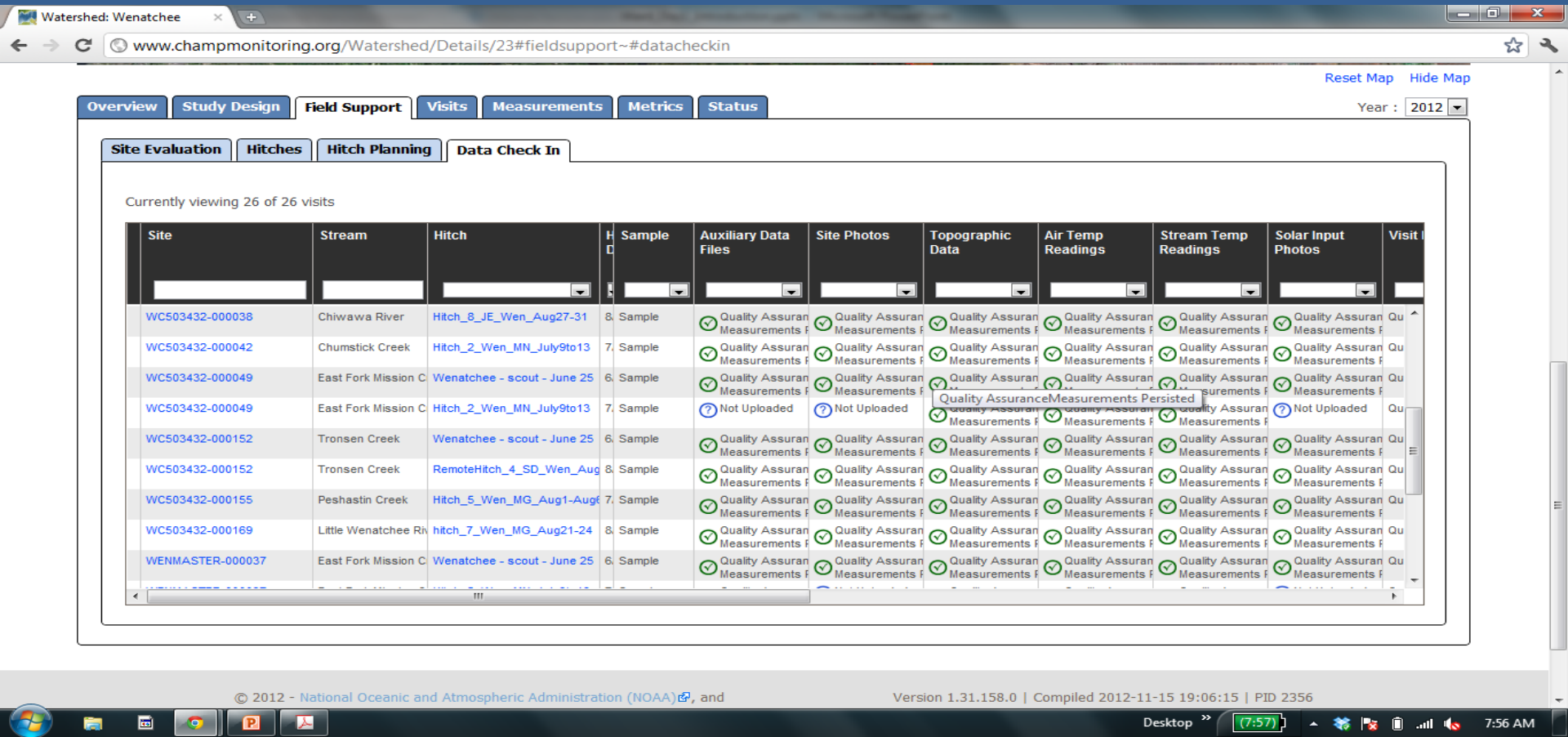
Center Line

Auxiliary Data Changes

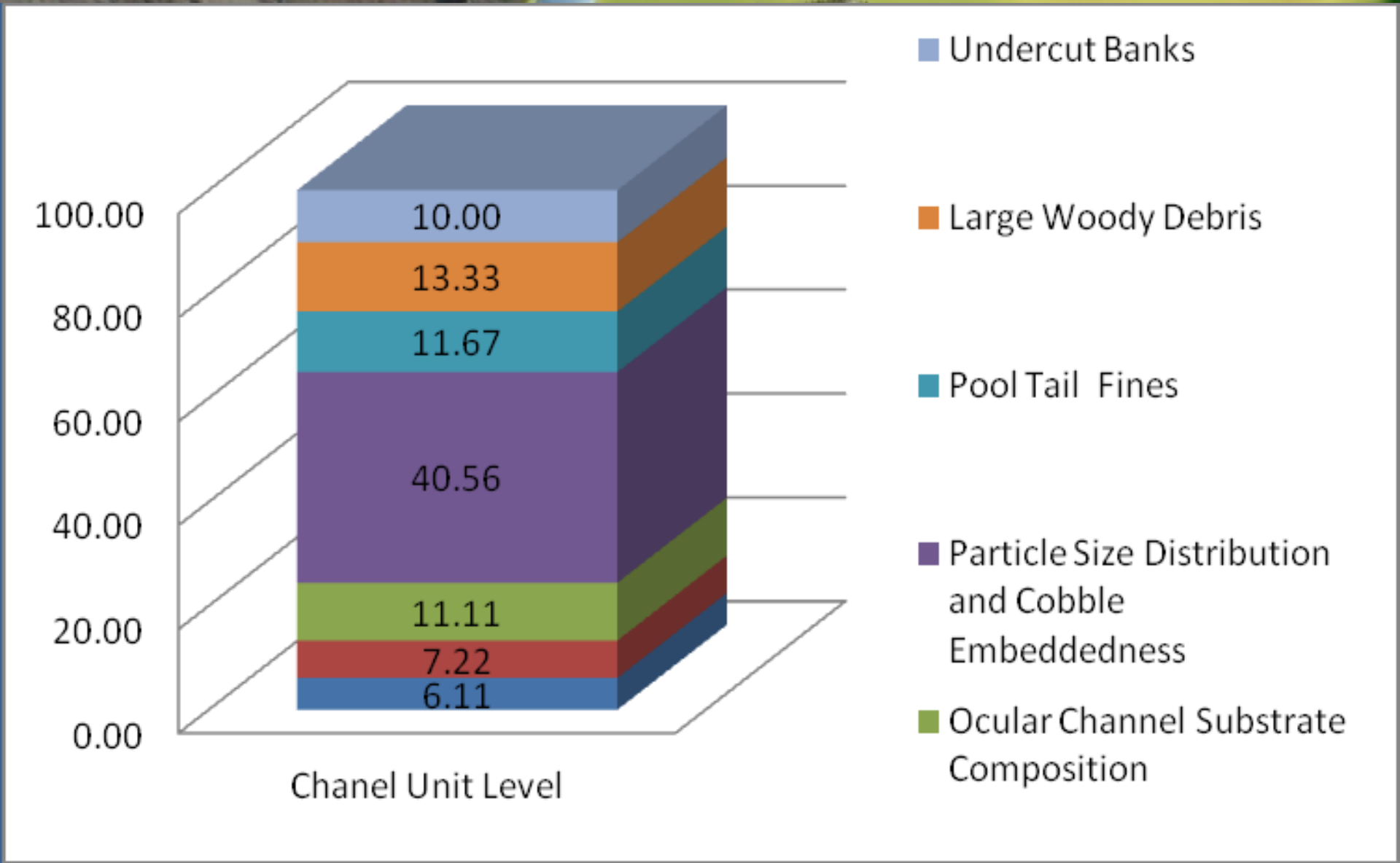
Gravelometer

Data Flow Changes

- Data Broker
- Data Check-In



Work Flow:
Channel Unit Level Rating



Work Flow:
Site Level Rating