

CHaMP

Columbia Habitat
Monitoring Program



CHaMP 2012: Introduction and What's New

Nov. 26, 2012

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CHaMP Program Coordinator
Terraqua, Inc.

The top portion of the slide features an aerial photograph of a river system. Overlaid on the water and surrounding land is a color-coded map, likely representing habitat quality or flow characteristics. The colors range from dark blue (water) to yellow and orange (land/vegetation).

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



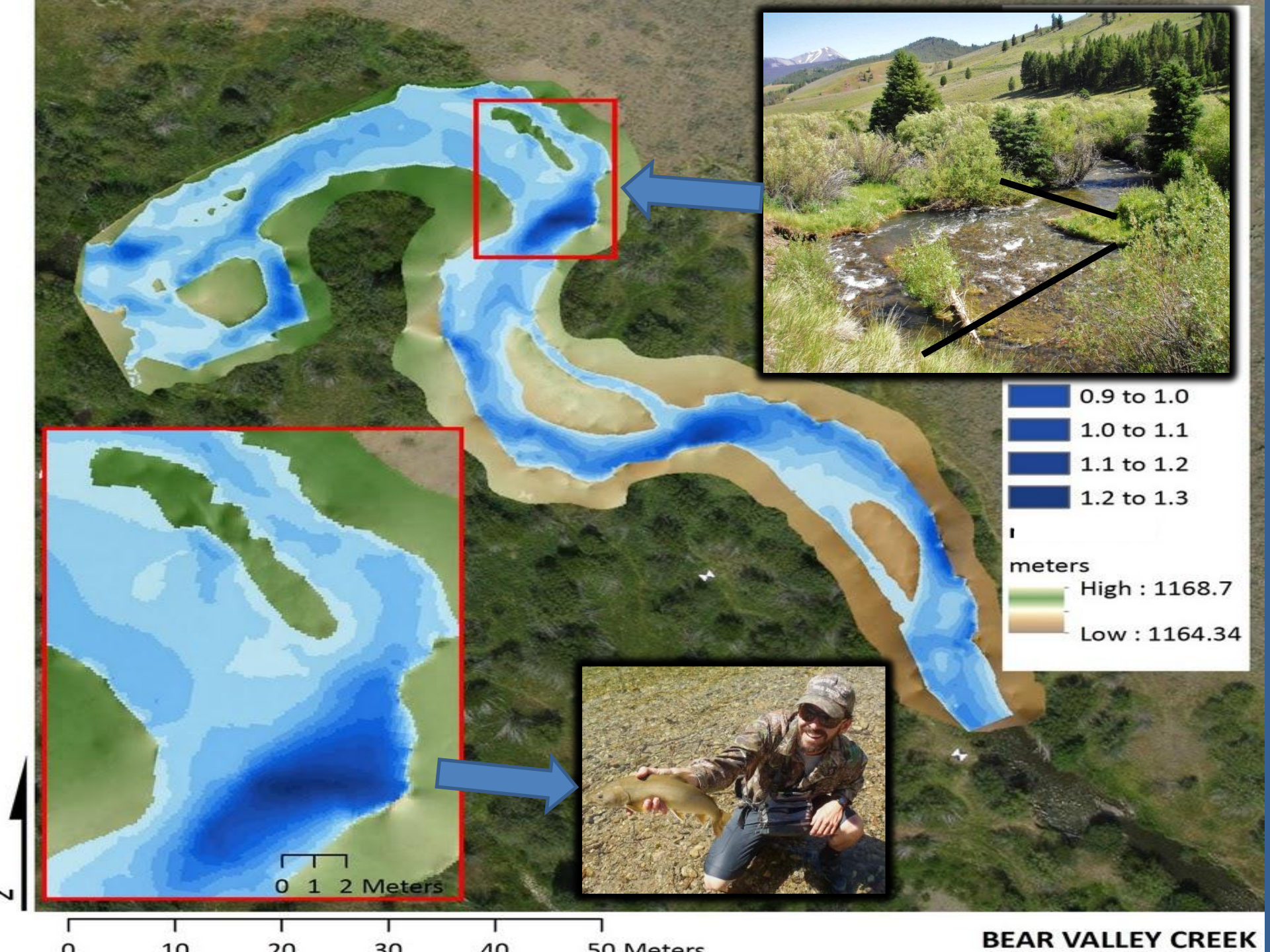
CHaMP Program

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

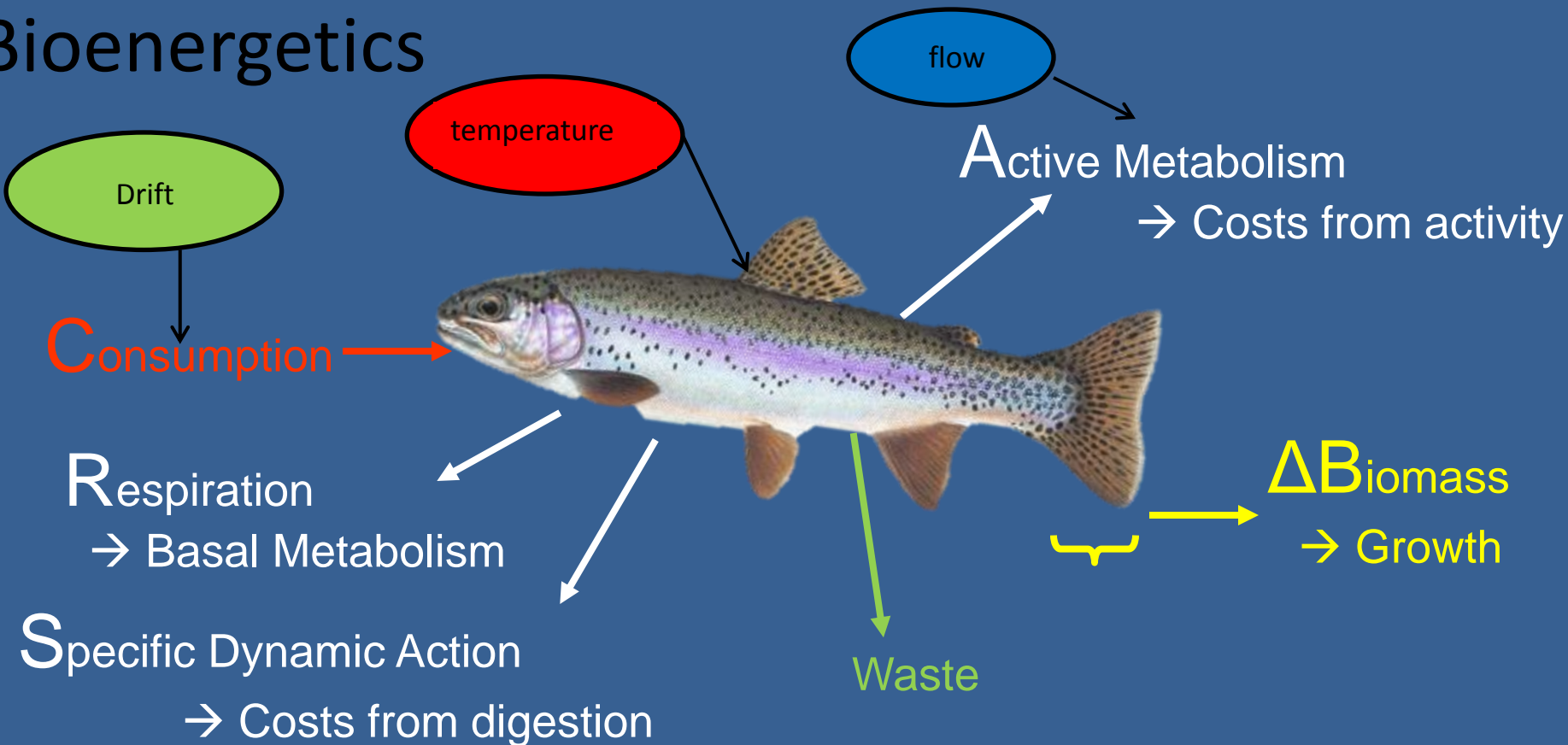
CHaMP Protocol

An aerial photograph of a stream is shown at the top of the slide. A semi-transparent map is overlaid on the stream, using a color scale from blue (low suitability) to yellow and orange (high suitability) to indicate different habitat quality levels. The map shows a network of channels and tributaries.

- 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.



Bioenergetics



$$\text{Consumption} = (\text{Metabolism}) + (\text{Waste}) + (\text{Growth})$$



Measure in the Lab

Measured in the Field



CHaMP DEM

Surface
Roughness

Hydraulic Model
Drift Transport

Net Rate
Energy Intake

Carrying
Capacity

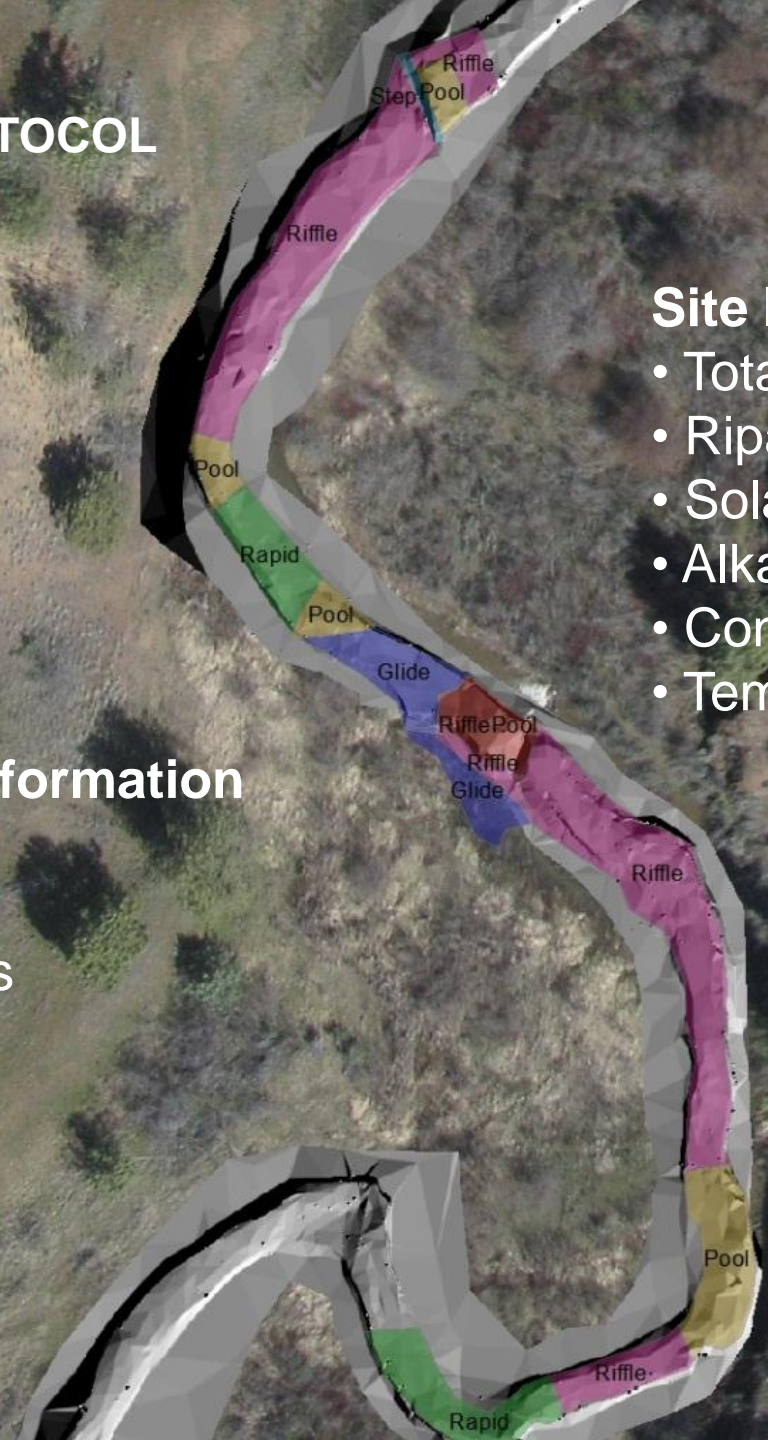
CHAMP PROTOCOL

Channel Unit Information

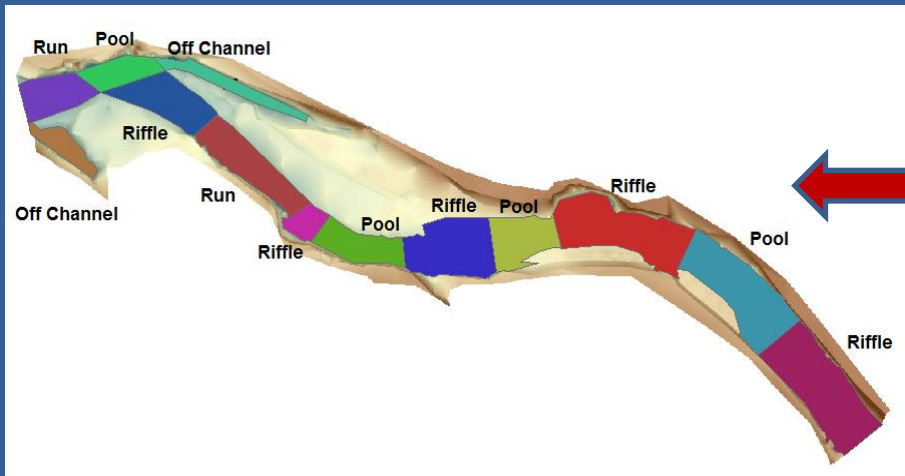
- Large wood
- Substrate type
- Undercut banks
- Fish cover

Site Information

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



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

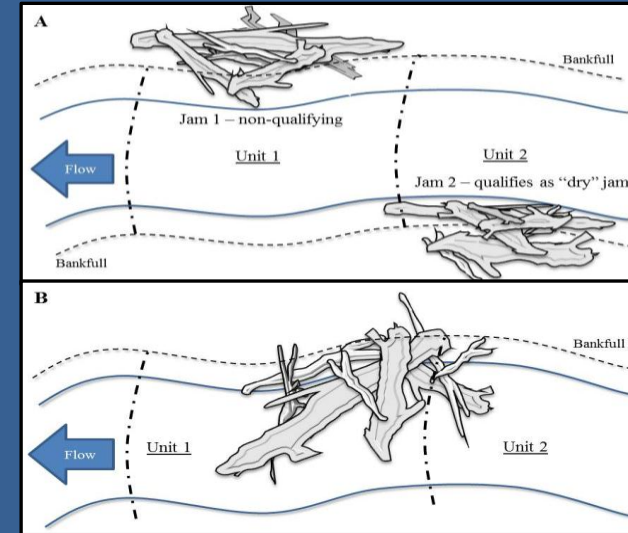


Auxiliary Data



Channel Unit Attributes

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



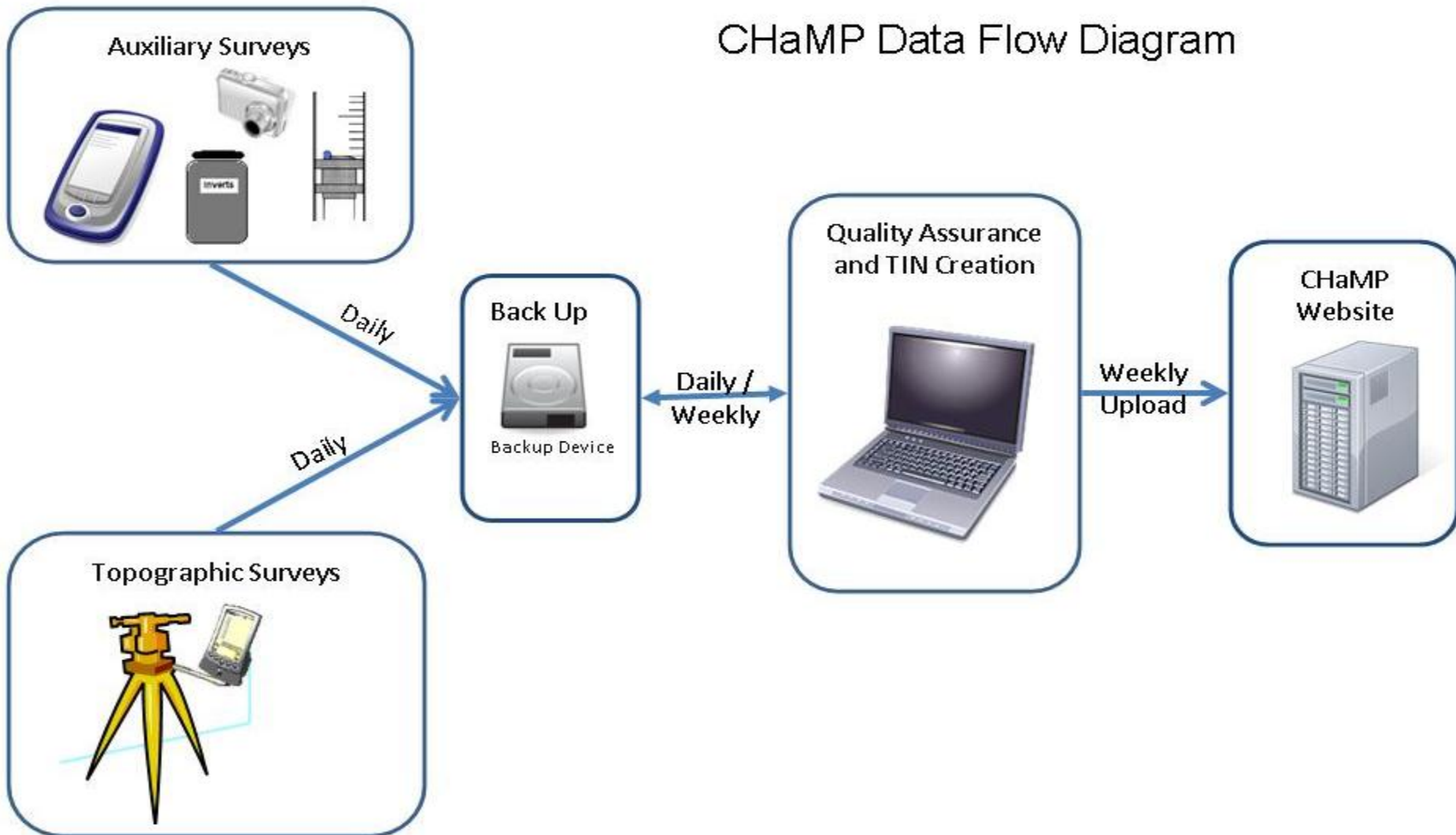
Site Level Attributes

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

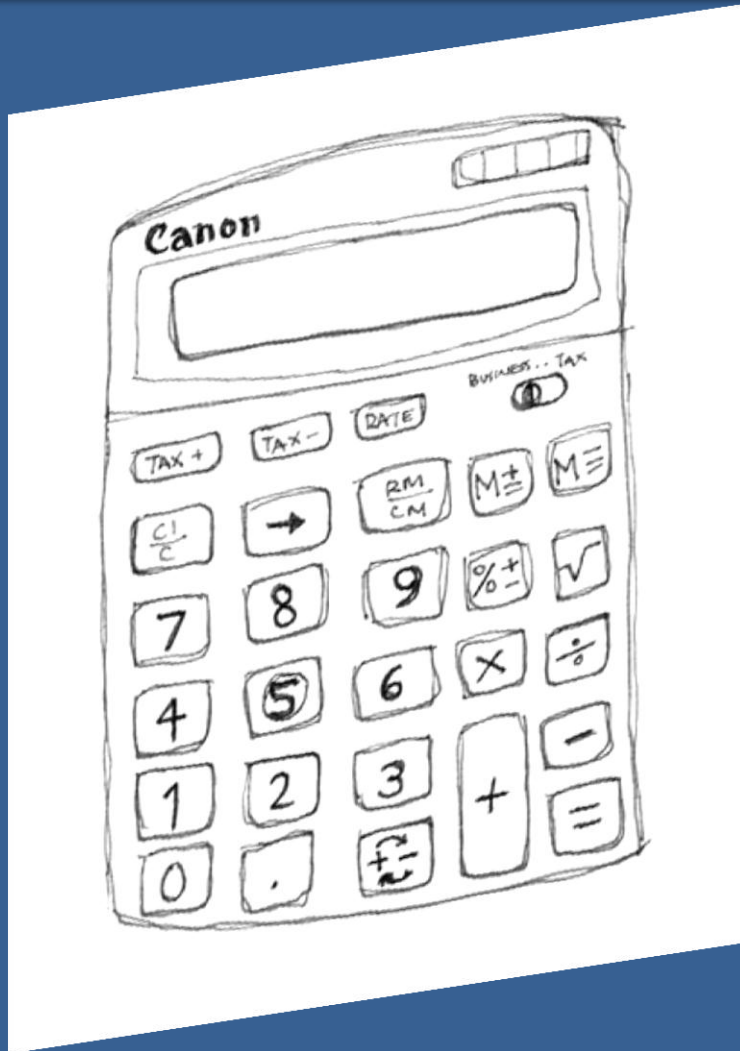


CHaMP Data Flow

CHaMP Data Flow Diagram



RBT = Gnomes with calculators

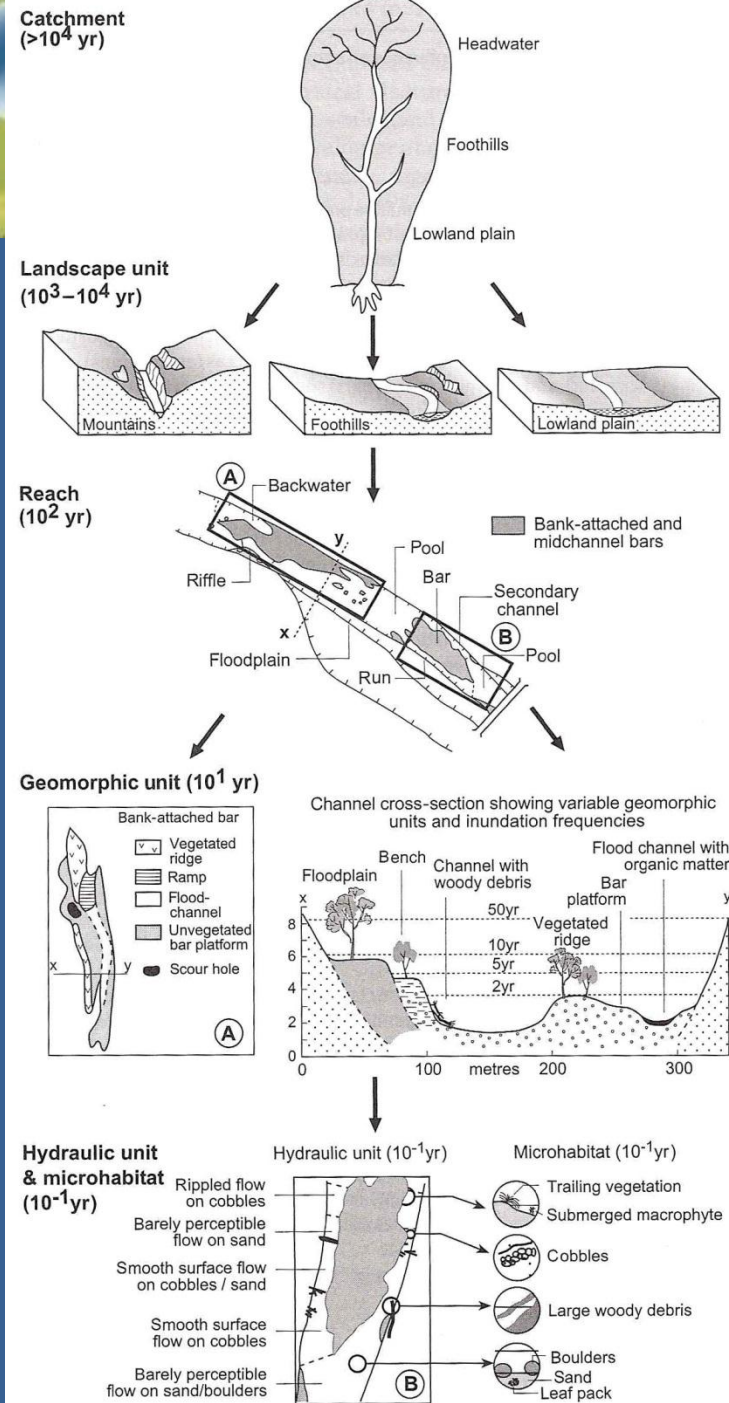


RBT Metrics and Indicators for CHaMP

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

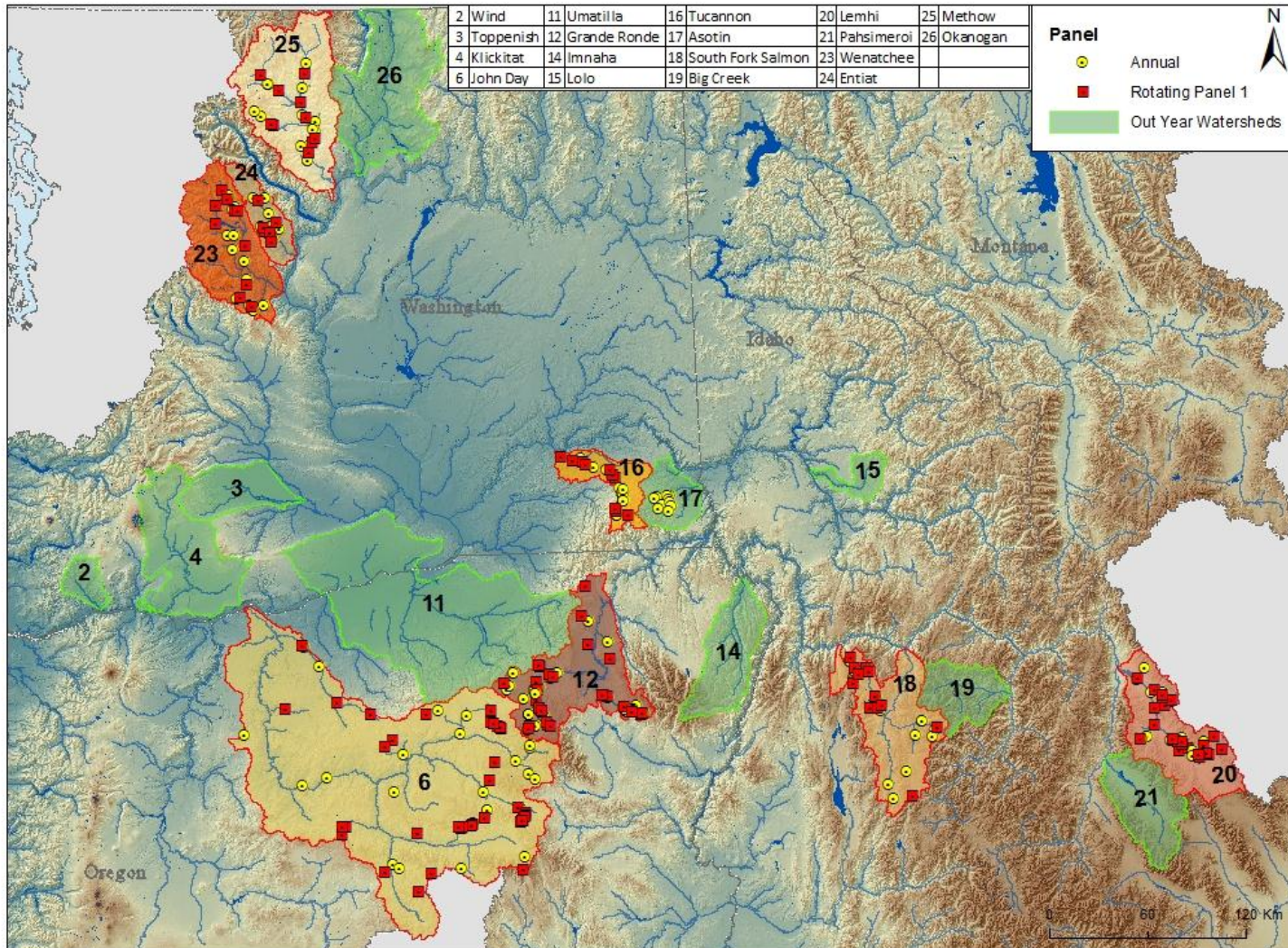
Sample Designs

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



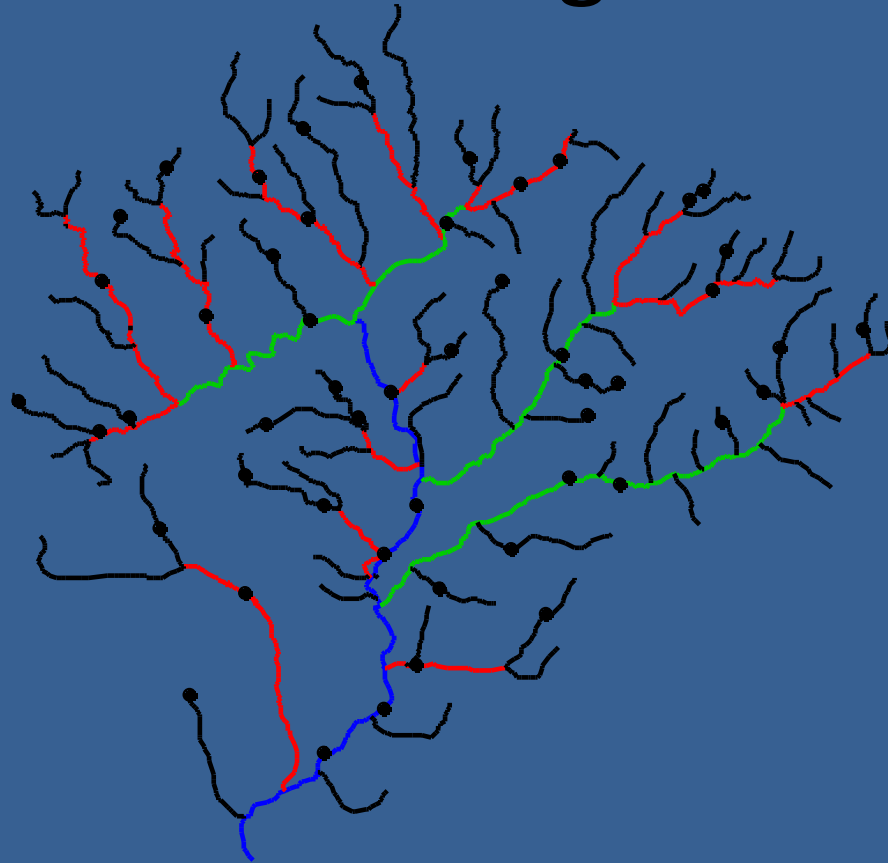
Sample Designs

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



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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

CHaMP Designs

Temporal Design | Spatial Design

[Download all 4699 sites in the Wenatchee Watershed](#) | [Download the Spatial Design](#)

Annual yearly panel, starting in 2011

Category	Valley Class ⁽¹⁾	Ownership ⁽¹⁾	# 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 ⁽¹⁾	Ownership ⁽¹⁾	# 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	-

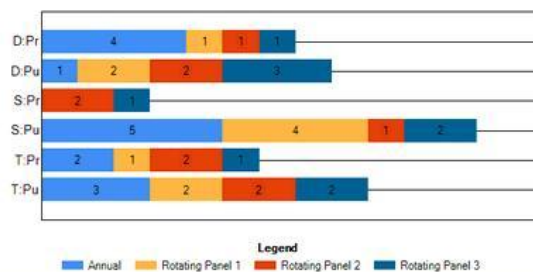
Rotating Panel 2 rotating panel measured every 3 years, starting in 2012

Category	Valley Class ⁽¹⁾	Ownership ⁽¹⁾	# 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 ⁽¹⁾	Ownership ⁽¹⁾	# 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



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CHaMP

Columbia Habitat Monitoring

Log in for full access
You can browse and read much of the site's content without an account. Registered users are able to view and manage watershed monitoring details.

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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](#)

[View the CHaMP Protocol](#)

News and Announcements

9/22/2011 **2011 Post-Pilot-Season Workshop**
CHaMP will be holding a 2011 Post-Pilot-Season Workshop on Tuesday, November 29 through Thursday, December 1, 2011 at the TA Event Center, 300 NE Multnomah St, Portland OR, from 8:00 until 5:00 each day. The purpose of this workshop will be to review the implementation of the Columbia Habitat Monitoring Program 2011 Pilot Year and to gather and discuss information that will later be used by program staff and managers who will be making decisions about the future implementation of the... [More](#)

[All News & Announcements](#)

About this Site

This web application serves as the system of record for CHaMP watersheds. It is designed to provide public access to CHaMP, but also as tool for CHaMP partners to use to manage the monitoring of their watersheds. For example, partners use this tool to specify their spatial design (e.g. strata and allocations), to conduct their GRTS site evaluations and load up their GPS devices before heading out in the field, and then to upload their measurement data so that metrics can be calculated at the individual site level.

[Frequently Asked Questions \(FAQs\)](#)



[Full size map](#)

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Version 1.23.521.0 | Compiled 2011-09-15 16:55:46 | PID 6216

Designed, built, and maintained by Sitka Technology Group 

CHaMP Resources



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Columbia Habitat Monitoring Program

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CHaMP Documents and Files

Overview

- | | |
|---|-----------------------|
| 20100818 CHaMP Briefing Materials to PNAMP SC (389.4 KB)
Program briefing materials | Updated on: 6/20/2011 |
| CHaMP_SiteEvaluationProtocol_2011_20110616 (805.1 KB)
GRTS, site evaluation, CHaMP, salmon | Updated on: 6/17/2011 |
| CHaMP Site Selection Protocol (1.8 MB) | Updated on: 5/11/2011 |
| Header/footer (3 MB) | Updated on: 1/25/2011 |

GIS Processing

- | | |
|---|-----------------------|
| CHaMP_Tools_1.51.zip (411 KB) | |
| Generating a TIN (Manual Process).pdf (311.5 KB) | Updated on: 6/21/2011 |
| Video_DigitizingPolygonsPart2(HabitatUnits).zip (35.6 MB) | |
| CHaMP GIS Processing Tutorial V1.5.pdf (1.3 MB) | Updated on: 7/1/2011 |
| Video_ImportingDataInArcGIS.zip (30.1 MB) | |
| Video_EditingCrossedBreaklines.zip (25 MB) | |
| CHaMP GIS Data and Geodatabase Descriptions.pdf (628.3 KB) | Updated on: 7/1/2011 |
| Tutorial for Transformation of CHaMP Repeat Surveys (692 KB)
A quick refresher for crews about the crew variability study, and how geoprocessing fits into this. | Updated on: 8/24/2011 |
| Generating a DEM (Manual Process).pdf (588.9 KB) | Updated on: 6/24/2011 |
| Adjusting Rod-Heights in ForeSight (883.9 KB)
ForeSight, CHaMP, GIS Processing | Updated on: 8/10/2011 |
| Video_CheckPolygonsTool.zip (10.1 MB) | |
| Video_DigitizingPolygonsPart1.zip (56.3 MB) | |
| Video_CoordinateTransformation.zip (48.8 MB) | |

Protocol Documents

- | | |
|--|-----------------------|
| CHaMP Habitat Protocol Version 1.1 - June 1, 2011 (3.5 MB)
This protocol describes the field methodology for capturing data on fish habitat for streams in the Columbia River Basin. Version 1.1 replaces the January 25, 2011 habitat protocol document. The original version is available by request. | Updated on: 7/8/2011 |
| CHaMP Habitat Protocol Addenda 1, July 11, 2011 (159.8 KB)
This document contains clarifications to the 2011 TRAINING VERSION 1.1 of the CHaMP Habitat Protocol (Version 1.1) that have arisen since the June 1 release of that document. | Updated on: 7/11/2011 |

Training Manuals

CHaMP Site Evaluation



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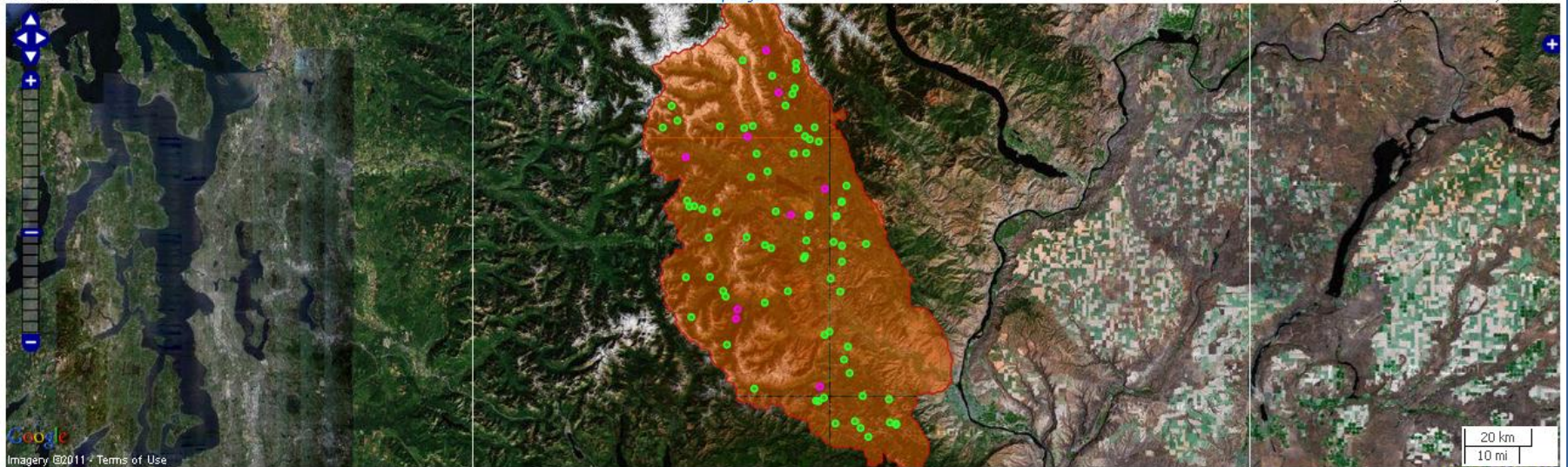
Home > Watersheds > Watershed "Wenatchee" > Details

Watershed: Wenatchee (ID: 23)

Scale = 1 : 867K

Map Legend

Cursor Long/Lat: -118.72221, 47.61626



Reset Map Hide Map

Overview Study Design Site Evaluation Status

Block: Annual - Depositional : Public Lands

Samples Evaluated: 1
Oversamples Evaluated: 1

Site Evaluation Tab
Sites must be evaluated within each block based on local watershed knowledge. The pre-field season evaluation process will result in sites either being accepted or rejected for field visits during the sampling season... [show more](#)

Currently viewing 9 of 9 sites

Download

	Site ID	UTM	TRS	Use Order	Sample	Stream	Owner Type	Ownership	Frame	Safety	Permission	Evaluated By	Evaluated On	Sampling
✓	W5C503432-000032	10N 666497 5292854	26N 17E 7		1 Sample	Nason Creek	Public Lands		Meets criteria	Approved	Granted	Susan Dretke	05/18/2011 10:26	
✓	WENMASTER-000295	10N 657161 5308450	28N 16E 19		2 Oversample	White River	Public Lands		Meets criteria	Approved	Granted	Susan Dretke	05/18/2011 10:28	
	WENMASTER-000055	10N 663251 5317548	28N 16E 23		3 Not In Scope	Chiwawa River	Public Lands							
	WENMASTER-000061	10N 673437 5258045	23N 17E 34		4 Not In Scope	Ingalls Creek	Public Lands							

CHaMP Implementation Progress



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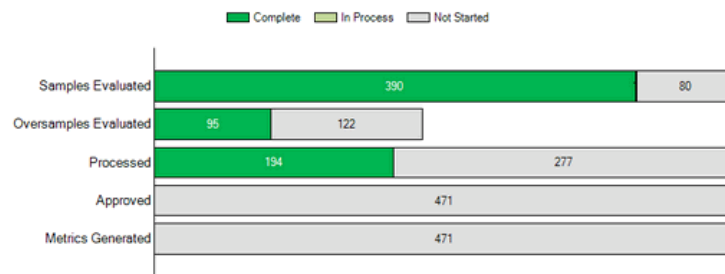
Columbia Habitat Monitoring Program

Overview Map People Protocol News & Announcements Documents GIS Processing Glossary Status

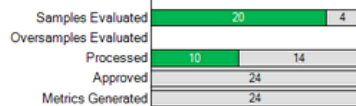
Field Season: 2011
Status as of 9/26/2011

Status Tab
These charts show the status of the monitoring effort from site evaluation through approval of site monitoring data across the program. [show more](#)

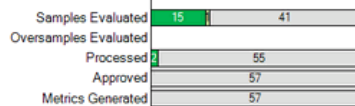
CHaMP Program - overall status



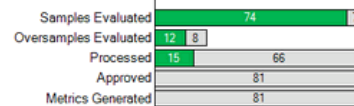
Asotin



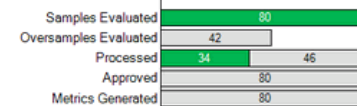
Big-Navarro-Garcia (CA)



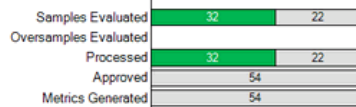
Entiat



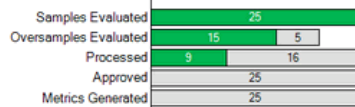
John Day



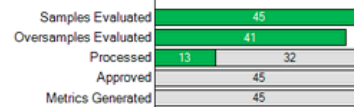
Lemhi



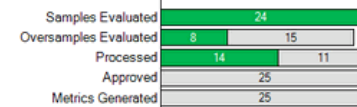
Methow



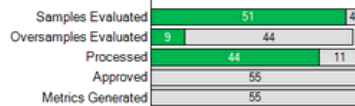
South Fork Salmon



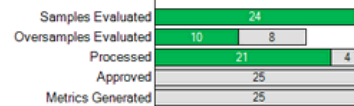
Tucannon



Upper Grande Ronde



Wenatchee



CHaMP Data Storage and Sharing



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Watershed: Wenatchee (ID: 23)

The Map is Hidden
Click [here](#) to show the map.

- [Overview](#)
- [Study Design](#)
- [Site Evaluation](#)
- [Site Export](#)
- [Data Upload](#)**
- [Visits](#)
- [Status](#)
- [Metrics](#)

Data Upload Tab

Below are the sites that were approved during site evaluation. A site may appear more than once if it was visited and sampled more than once. Once the field crew copies the site visit data to the field laptop and these data are synchronized with the server, data quality checks are initiated. Links will appear in the visit row if any action is needed. [show more](#) ▾

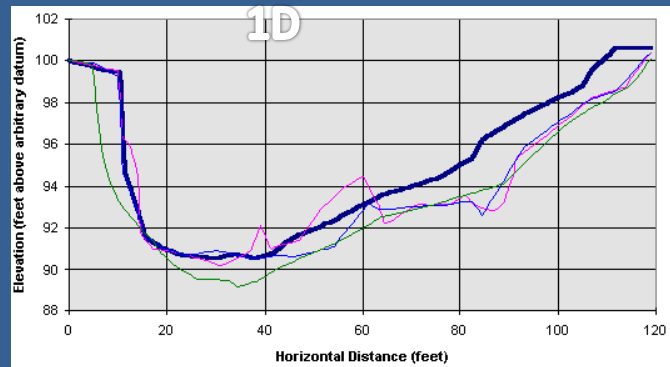
Currently viewing 46 of 46 site visits

As of: 9/26/2011 7:00:32 AM

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



Detrend a DEM to Remove Valley Slope



Create Wetted and Bankfull Polygons



Digitize Channel Unit Polygons



Create Stream Surface TIN, DEM and Water Depth



Create a Thalweg



Create a Centerline



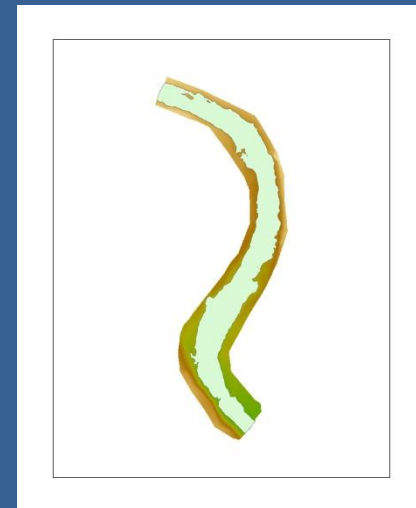
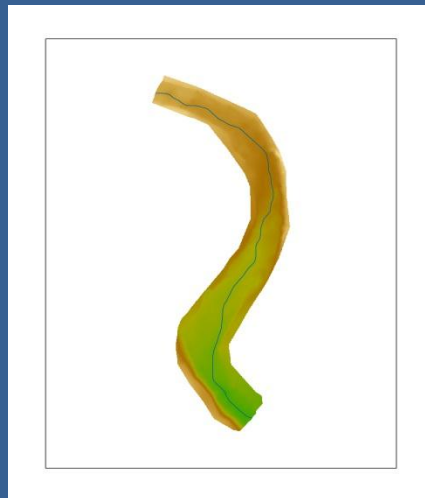
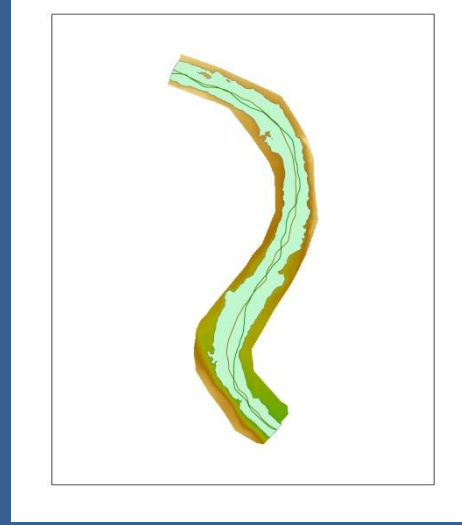
Create Cross Sections

RBT QA Images

Water
Extent



Thalweg



Plain DEM

Long Lines

Center Line

Auxiliary Data Changes



**Hach Flow
meter**



GPS Pod



Gravelometer



Sun Eye

Data Flow Changes

- Data Broker
- Data Check-In

Watershed: Wenatchee

www.champonitoring.org/Watershed/Details/23#fieldsupport~#datacheckin

Reset Map Hide Map

Year : 2012

Overview Study Design Field Support Visits Measurements Metrics Status

Site Evaluation Hitches Hitch Planning Data Check In

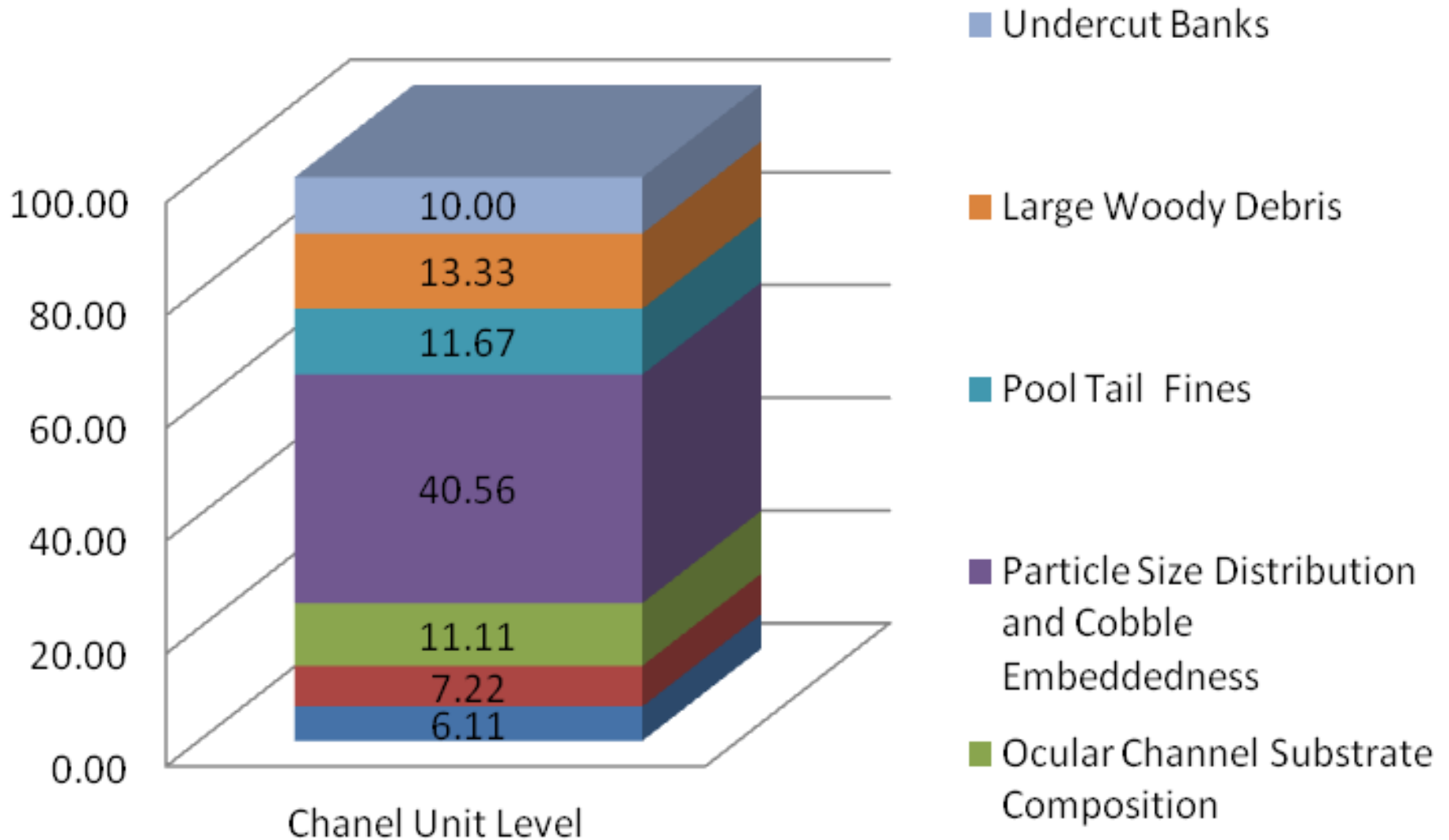
Currently viewing 26 of 26 visits

Site	Stream	Hitch	Sample	Auxiliary Data Files	Site Photos	Topographic Data	Air Temp Readings	Stream Temp Readings	Solar Input Photos	Visit
WC503432-000038	Chiwawa River	Hitch_8_JE_Wen_Aug27-31	8. Sample	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F
WC503432-000042	Chumstick Creek	Hitch_2_Wen_MN_July9to13	7. Sample	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F
WC503432-000049	East Fork Mission C	Wenatchee - scout - June 25	6. Sample	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F
WC503432-000049	East Fork Mission C	Hitch_2_Wen_MN_July9to13	7. Sample	Not Uploaded	Not Uploaded	Quality Assurance Measurements Persisted	Quality Assurance Measurements F	Quality Assurance Measurements F	Quality Assurance Measurements F	Not Uploaded
WC503432-000152	Tronsen Creek	Wenatchee - scout - June 25	6. Sample	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F
WC503432-000152	Tronsen Creek	RemoteHitch_4_SD_Wen_Aug	8. Sample	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F
WC503432-000155	Peshastin Creek	Hitch_5_Wen_MG_Aug1-Aug	7. Sample	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F
WC503432-000169	Little Wenatchee Riv	Hitch_7_Wen_MG_Aug21-24	8. Sample	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F
WENMASTER-000037	East Fork Mission C	Wenatchee - scout - June 25	6. Sample	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F	Quality Assuran Measurements F

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Desktop (7:57) 7:56 AM

Work Flow: Channel Unit Level Rating



Work Flow: Site Level Rating

