A Field Manual for Evaluating Sampling Sites used in the Columbia Habitat Monitoring Program

2014 Working Version

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Section 1: Introduction

The Columbia River Habitat Monitoring Program (CHaMP) is designed as a Columbia River basin-wide habitat status and trends monitoring program for assessing basin-wide habitat conditions. When coupled with biological response indicators, this status and trends information will be used to evaluate habitat management strategies. This program will be integrated with ongoing Pacific Northwest Aquatic Monitoring Program (PNAMP) recovery planning efforts and will be part of the collaborative process across Columbia Basin fish management agencies, tribes and other state and federal agencies that are monitoring anadromous salmonids and/or their habitat. The implementation of CHaMP will characterize stream responses to watershed restoration and/or management actions in at least one population within each steelhead and spring Chinook Major Population Group (MPG) which have, or will have, "fish-in" and "fish-out" monitoring (identified in RPA 50.6), thereby meeting the requirements of RPA 56.3, RPA 57, and RPA 3. CHaMP was designed to deliver trends in habitat indicators and requires that monitoring occurs for three cycles of a three-year sampling panel (see section 1.6), at least 9 years.

Columbia River Basin anadromous salmonids have exhibited precipitous declines over the past 30 years, with several populations now protected under the Endangered Species Act (ESA) (Schaller et al. 1999; McClure et al. 2002). Data collected from current and historical monitoring programs are generally not adequate or reliable enough for the purposes of ESA assessments and recovery planning (Tear et al. 1995; Campbell et al. 2002; Morris et al. 2002). In addition, monitoring programs for anadromous salmonids in the Columbia River Basin have typically been initiated to evaluate the effects of specific management actions, such as the demographic effects of hatcheries. As such, data are most appropriately viewed at the scale of the subpopulations and populations for which they were derived. However, the ESA requires assessments of species and their habitat at multiple spatial scales – from specific reaches, to subpopulations, populations, and the ESA management unit of Pacific salmon, the Evolutionary Significant Unit (ESU), which is a distinct population or group of populations that is an important component of the evolutionary legacy of the species.

Watersheds selected for the CHaMP will be linked by a cohesive study design outlined within this protocol. This design contrasts many current monitoring programs for Pacific salmon which rely on the aggregation of existing data from a myriad of independent projects and are often difficult to assemble into meaningful results for spatially complex questions. These problems arise because information is often not collected in a randomized fashion (Larsen et al. 2004); sampling techniques and protocols are not standardized across programs; and abundance, distribution, population dynamic, and demographic data for species and their habitat is often not available (Tear et al. 1995; Campbell et al. 2002; McClure et al. 2002). As recovery planning has focused more effort on tributary habitat restoration to mitigate for the mortality resulting from the Federal Columbia River Power System (FCRPS) the limitations of historic and ongoing sampling programs have become increasingly apparent. Recovery planning for fish populations was led by Technical Recovery Teams (TRT) (Northwest Fisheries Science Center, NOAA-Fisheries, Seattle, WA).

The CHaMP response design (described in the companion protocol, Bouwes et.al. 2011,develops metrics of fish rearing and spawning habitat quality and quantity for ~45 sites randomly distributed across the supporting stream network within CHaMP watersheds. At each CHaMP site, stream physical habitat is quantified in terms of structure, complexity, and function, as well as the biological characteristics that support fish productivity at the scale of individuals (growth) and populations (survival). The overall habitat quantity and quality is estimated for each TRT fish population by summarizing site specific habitat metrics as a function of TRT fish population scale covariates such as land-use, management strategies and geomorphic/climate classification. Ultimately, the site- and watershed-scale habitat metrics and indicators will be used to predict salmonid productivity. The connection from habitat metrics and indicators to fish population processes will be done through three fundamentally different analytical frameworks: watershed-scale experiments, where a formal experimental manipulation of habitat condition is related to fish productivity response variables to demonstrate cause-and-effect connections between contrasts in fish and habitat; watershed-scale productivity models, where a fish population process model such as SHIRAZ is populated with habitat quality and quantity dependent capacity and productivity terms to predict fish population response to habitat conditions; and, correlation models where large-scale gradients in habitat condition are related to fish population process data to quantify patterns of co-variance. The Integrated Status and Effectiveness Monitoring Program (ISEMP) is pursuing these models and in all three cases, CHaMP habitat metrics and indicators will be used in decision support models to determine the physical and biological aspects of stream habitat that are strong determinants of fish population processes and that can be manipulated by management and restoration strategies.

This document was created as a guide to various aspects of the study design (spatial and temporal) and site evaluation process for field practitioners, project sponsors and managers, data managers, and analysts working within BPA's CHaMP during the 2011-2013 field seasons conducting habitat surveys at status and trend sites.

Section 2: Spatial and Temporal Design for Habitat Surveys

The **domain of inference** for CHaMP (or the **target population** in the statistical sense) is the stream habitat used by rearing and spawning salmonids at the scale of TRT fish populations. For this target population, *the primary objective of CHaMP study designs is to characterize the status and trends of selected habitat indicators at two spatial scales: across all CHaMP watersheds, and within each watershed.*

Status is generally described as a frequency distribution of the metric scores (defined in the response design) inferred from the spatial/temporal design with indicators derived from these distributions such as: mean, median, achievement of a particular criterion; spatial pattern, differences among component watersheds. At its simplest, **trend** is expressed as an underlying consistent (e.g., linear) change over the duration of the study; as more data are collected over time, it might be possible to describe patterns of change, in addition to an underlying linear change (at both the watershed scale, and aggregate across watersheds).

All spatial and temporal CHaMP study designs are driven primarily by these objectives:

- Estimate the yearly status (as well as across the three years) for each habitat metric in each CHaMP watershed's target domain, i.e., estimate the habitat metric's frequency distribution and statistics (indicators) derived from it (mean, variance, percentiles, etc.).

- After three years, estimate each metric's trend (as feasible), and the relevant indicator's trend.

- After three years, estimate the following variance components: site, year, interaction, and residual. Use these to evaluate power to detect trends of specified sizes, and to evaluate sensitivity to detect differences among subpopulations (e.g., geomorphic types within watersheds; treated vs. untreated sites)

- After three years evaluate the relation between fish population processes and habitat condition via the three analytical frameworks described in the introduction to this guidance document: a) watershed scale experiments; b) watershed-scale productivity models; and c) correlation models.

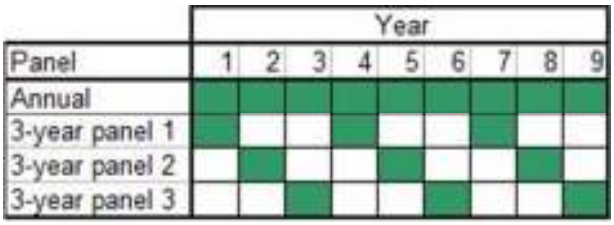
To achieve these objectives, CHaMP will use a randomized, spatially balanced selection of sites within each target population domain by applying the Stevens and Olsen **generalized random tessellation stratified (GRTS)** site selection algorithm (Stevens and Olsen 2003, 2004). As indicated in Stevens and Olsen, a randomized design prevents bias in the selection of sites; spatial balance achieves an even spread of sites across the target domain. Independent random sampling and systematic sampling both have disadvantages with respect to adequately representing natural resources (see Stevens and Olsen 2004). The flexibility of the GRTS algorithm allows stratification and replacement of sites that are deemed non-target, or cannot be sampled for reasons such as access denial or safety.

The flexibility of the GRTS algorithm allows modifying the basic design to meet some additional specific objectives as might be proposed in each CHaMP watershed, yet retaining achievement of the basic CHaMP objectives across all watersheds. First, each CHaMP watershed's subset of the region-wide master sample (see section 2.4) is extracted and trimmed to the target frame and sites outside of this frame are considered non-target and eliminated. Legacy sites previously sampled by monitoring programs with a random spatial component within the watershed are trimmed to the same target frame as the master sample. This watershed-specific set of sites, both legacy and master sample, is divided into panels (retaining a spatially balanced order within each panel), such as Annual, Rotating Panel 1, Rotating Panel 2, or Rotating Panel 3. Each panel contains a list of sites that is to be used in order from the GRTS output, to preserve spatial balance. Sites that are rejected (e.g., Non-Target and Target, Not Sampled) are replaced by the next site available in the sequence. See the section on site evaluation procedures for details on the process on the site evaluation and replacement process.

Section 2.1 CHaMP temporal design

The CHaMP survey design is constructed to detect temporal patterns (trends at individual sites and common to all sites), spatial patterns (variability in metrics across watersheds and within process domains such as geomorphic class, or land ownership), and spatio-temporal patterns (interactions of site and year within a year as well as over the entire sampling period). To meet these objectives, each CHaMP TRT fish population watershed is allocated 25 samples per year in a split, rotating panel **temporal design** that repeats roughly half of the sites each year (annual panel sites) and revisits half of the sites once every three years (rotating panel sites). As a result, 15 sites will be visited every year in a watershed, and another 10 will be visited once every three years (note that specific watersheds may deviate slightly from this due to site characteristics). Figure 1 illustrates this panel structure. The resulting data contains sites that are to detect temporal patterns (annual or trend site) and sites that are to detect spatial patterns (rotating or status sites). In a typical watershed, a full panel cycle of 3 years would result in 45 unique locations being visited, and as the cycle is repeated, temporal patterns could be evaluated over all 45 sites. In addition, 10% of all CHaMP sites will be revisited each year. These within-year revisits serve as quality assurance data for protocol and crew variation as well as necessary data for estimating site by year interactions. The design of the site revisits is forthcoming and will be outlined in each watershed's design documentation.

Figure 1. Annual panel and rotating panel design for status/trend monitoring within CHaMP watersheds.



* Shading indicates the years in which sites within each panel are sampled. For example, sites in the annual panel are visited every year, while sites in panel 1 are visited only in years 1, 4, and 7assuming a 9-year sampling frame.

Sites are chosen in a roughly equi-probable fashion that maintains a natural balance of public/private ownership and stream process domains across the entire TRT fish population watershed. As a result, the program balances status and trends (spatial and temporal) pattern detection across each TRT fish population watershed and by maintaining design consistency across multiple TRT fish populations, can evaluate patterns of fish habitat across gradients of habitat condition, restoration, and artificial fish production impacts. Trends in metrics (site-level) and indicators (TRT fish population level) can start to be evaluated after three years, when each site in teh design will have been sampled at least once.

Section 2.2.1 CHaMP Target Frame

The default CHaMP target frame (domain of inference) is represented by the population of all stream reaches that are accessible to spawning and rearing steelhead and Chinook populations (NOAA-defined). The following specific criteria are used to trim the NHD Plus 1:100,000 scale digital hydrography to an operational frame:

1. Strahler order > 1
2. Wadeable (Strahler order < 5)
3. Perennial (FCODE = 46006 in NHDPlus hydrography)
4. Downstream of permanent natural barriers, e.g. impassible waterfalls, or stream gradients >12% (as coded in a GIS file from Beechie's (in review) geomorphic channel types.
5. Downstream of permanent human-made barriers
6. Accessible to adult and juvenile TRT populations as represented by the NHDPlus 1:100,000 scale digital stream hydrography.

Sites within this frame are called **Target Sites** and this default frame was used for most CHaMP watersheds. Conversely, the following stream reaches are EXCLUDED from the default CHaMP target frame and sites within these areas are **Non-Target Sites** (Table 1). Departures from this frame are allowed when specific watershed objectives require alternative frame rules or there is significant documented a priori knowledge of the watershed that improves definition of the frame rules over the default exclusion calculations. Experts within CHaMP watersheds may refine the default locations of barriers and fish accessibility criteria with local knowledge. Refinements should be well documented in either narrative or GIS files. Default exclusion rationale are above the dashed line and improvements or watershed-specific exclusion rationale are below the dashed line in Table 1.

Table 1. Non-target exclusion rationale codes for a priori GIS evaluation of sites for target frame.

Code	Exclusion rationale	Description	Calculation
NP1	Non-perennial waters	Non-perennial stream, canal, ditch	NHDPlus hydrography FCODE not 46006.
SO1	Strahler 1st order streams	Strahler 1st order streams	NHDPlus hydrography, SO =1
NW1	Not wadeable	Non-wadeable streams (no previous field knowledge)	NHDPlus hydrography, SO > 5
NSO1	Undefined Strahler order	Undefined Strahler order in source dataset	NHDPlus hydrography, SO = null
NCT1	Undedfined channel type	Undefined channel type in source dataset	Geomorphic channel type layer (Beechie 2010), Channel_Ty = null
NACF1	Barrier-natural	Streams above natural barriers	Geomorphic channel type layer (Beechie 2010), slope > 0.12 (12%)

NACF2	Barrier-human	Streams above natural barriers as determined by previous field experience	Shapefiles submitted by collaborators
BH1	Barrier-human	Streams above human barriers	Shapefiles submitted by collaborators
NW2	Not wadeable by experience	Stream not wadeable as determined by previous field experience	Shapefile submitted by collaborators
NP2	Intermittent flow	Non-perennial stream as determined by previous field experience	Shapefile submitted by collaborators
IMW	Within Intensively Monitored Watershed	Site falls within Intensively Monitored Watershed area (Entiat and Asotin only)	Shapefile submitted by collaborators
NWSF	Not within Steelhead frame	Site not within Steelhead frame (John Day and Lemhi only)	Shapefile submitted by collaborators
NWCF	Not within Chinook frame	Site not within Chinook frame (Grande Ronde and Tucannon only)	Shapefile submitted by collaborators
NPW	Not within Priority Watershed	Site not within Priority Watershed (Lemhi only)	Shapefile submitted by collaborators

Section 2.2.2Watershed-specific target frames

Several CHaMP watersheds have specific objectives that require modest changes to the general CHaMP target frame. If this is the case, design objectives and modifications must be well-documented and agreed upon by both CHaMP design personnel and local collaborators to ensure both watershed-specific sub-objectives and overarching CHaMP objectives design needs are met. For example, a watershed may be particularly interested in whether various geomorphic classifications (e.g., Montgomery and Buffington; Beechie) have different habitat status and trends, or whether the habitat condition in sub-domains that have received substantial restoration treatment differ from that in sub-domains that have received minimal restoration treatment.

Collaborators further refining the CHaMP target frame to meet watershed design needs use the watershed-specific exclusion rationale outlined in Table 1. Use of these rationales must be pre-approved with CHaMP design personnel.

Since the inception of CHaMP in 2011, a monitoring resources website (www.monitoringresources.org and a web-based "Sample Designer" within it have been developed to facilitate GRTS design development and documentation. In 2013 the CHaMP team is moving all documentation of existing and future CHaMP designs to the Sample Designer. Documentation of CHaMP frames in GIS is directly available from CHaMP staff and will ultimately reside with Sample Designer documentation.

Section 2.3.1 CHaMP Spatial Design and Strata

To meet project objective needs, stratification, or assignment of sites to a specific strata, is often needed. **Stratification** serves two important roles. One is statistical, allowing improvement in precision in population estimates if variance differs substantially among candidate strata (classes). However, stratification can be counter-productive if stratification does not account for variance differences. Therefore stratification must be carefully evaluated, especially when few samples are allocated to each stratum. The other is "administrative" aimed at the need to characterize particular strata with a desired precision, hence requiring a specific sample size to meet the target precision. Both roles of stratification will be evaluated in the selection of CHaMP sites.

All CHaMP watersheds will use a geomorphic valley classification based on geomorphic channel type classifications by Beechie et al. (manuscript in review) as the basis for strataification. Channel types determined by Beechie et al. were reclassified into three categories of **Valley Class** (Source, Transport, and Depositional) based on preliminary analyses of habitat data in the Wenatchee and Lemhi watersheds (Table 2, ISEMP 2011). If site allocation to the geomorphic valley class strata cannot be balanced appropriately within the target frame or watersheds have similar spatial strata of interest, then geomorphic valley class is not used as a strata for the design. The default CHaMP watershed design will include ownership strata (public/private) to preserve the natural distribution of sites on public and private land. Stratifying by ownership will reduce bias toward sampling one type of ownership class (e.g. continual rejection of sampling on private lands will bias sampling to public lands and can offset the desired spatial balance of the sample). Note that ownership stratification was done post-GRTS selection, so as not to bias the GRTS selection process with land ownership variables. Watersheds may be stratified by additional variables and these watershed-specific design criteria are explored and finalized during design discussions with CHaMP personnel.

Table 2. Classification of Beechie et al. (in review) channel types (ISEMP 2011)

Valley Class	Channel Type (Beechie et al. in review)
Source	Plane-bed, cascade, step-pool
Transport	Pool-riffle
Depositional	Meandering, straight, confined, braided-meandering, island-braided, and braided

Use of strata must be carefully considered as excessive stratification can result in few sites within a panel. Stratification can be accommodated by first dividing the CHaMP specific target sites into the desired strata, then assigning panels within each stratum. For example, sites assigned to stratum A would be divided into 4 panels; sites assigned to stratum B would be divided into 4 panels. A general guide is to impose a limit of three strata, which would yield 8 –

9 sites per stratum per year. If three strata were selected, five sites would be "annual" and 3-4 would be "3 yr cycle").

Section 2.4 Master Sample Sites

CHaMP will use a master sample that represents the stream-river resource across the Columbia River Basin as a basis for the selection of target sites within each watershed. This regional master sample consists of GRTS selected sites (from the NHDPlus 1:100K digital network) at an average density of one site per kilometer. Subsetting this discrete population of sites (a list frame) allows selection of sites to meet specific design objectives. Larsen et al. (2008) describe the concept of a master sample and its advantages for integrating monitoring needs among different agencies and across different spatial domains.

Section 2.5 Legacy sites

In many cases probability surveys have already been conducted in CHaMP watersheds. Carrying a subset of these sites over into the CHaMP surveys is both desirable and can be accommodated; these sites are called **legacy sites**. To determine whether legacy sites should be included in the design, the process is first to evaluate whether the legacy sites meet the CHaMP target criteria, then assign the legacy sites to CHaMP strata. An R function has been written that allows combining the legacy and master sample sites such that the spatial pattern is preserved. After this combining function has been run, the legacy sites are usually prioritized for sampling at the top of the list, as the most valuable information will be collected by sampling the legacy sites. It is also possible that other probability surveys (possibly GRTS based) are being designed in CHaMP watersheds. These designs can be integrated, sometimes with a bit of adjustment. See specific design descriptions, such as the Tucannon, for more information (Appendix .A).

The end result of the CHaMP design process and master sample + legacy sample combination function is a draw of spatially balanced sites called the **sample** and **over sample.** The **sample** is the set of sites to be evaluated for sampling. The **over sample** is the set of sites that can be drawn from if a site within the **sample** is not accepted for sampling during the evaluation process (e.g. rejected because of access permission denial, physical inaccessibility, etc). A unique **Use Order** is assigned to the sample and over sample sites within a **Block**, which is the set of sites that fall within a specific Strata and Panel. Sites are evaluated and sampled in the Use_Order to preserve the spatial balance created by the GRTS process.

Section 2.6 Rationale for the proposed design

The CHaMP survey design is based on extensive experience with GRTS sampling across salmon population watersheds in the Upper Columbia (ISEMP sampling 2004 – 2010) and on the Oregon coast (ODFW coho habitat sampling 1998 – 2010). Analyzing these data has shown that spatial and temporal pattern detection is expected within 5 years, and that spatial, temporal and their interaction variance components are present in large-scale habitat monitoring data and must be explicitly accounted for in the survey and inference design.

The linear model found to best fit (model selection criteria) habitat monitoring data is:

$$X_{hij} = \alpha_h + \beta_h t + s_j + \varepsilon_{jih}$$

where X_{hij} is the estimated response for site *j*, region *h*, and year *i*. The terms α_h and β_h represent region-specific fixed effects (intercept and slope, respectively). The intercept at each site is treated as a normally distributed random effect, $s_j \sim \text{Normal}(0, \sigma_s)$, and residual error is included as $\varepsilon_{jih} \sim \text{Normal}(0, \sigma)$. Biologically, these parameters mean that after accounting for variability between sites within a region, there are regional specific trends and regional differences in mean values, reflecting shared overall patterns within sites in a given region.

The sample size of 25 sites per year for a total of 45 unique sites over the three year period inference domain follows from the general rule of thumb that to characterize variance, 20 – 30 samples are required. The CHaMP survey design must characterize a number of variance terms (site, year, site*year, residual), so sampling is partitioned into site, strata, year and repeat and within year repeat categories. Applying the above rule of thumb would suggest ~75 sites if each component were evaluated independently, but the survey design affords some efficiencies through a spatial-temporal revisit plan that allows simultaneous estimation of all potential variance components. Figure 2 shows, through bootstrap resampling of existing data from ISEMP-Wenatchee, that estimates for the mean and variance of LWD counts stabilize with ~50 samples to represent the spatial variation across the watershed. Rather than sample 50 sites per year, CHaMP will sample only 25 sites per year, but over three years will visit 45 unique locations, again using a spatio-temporal design to achieve program efficiencies.

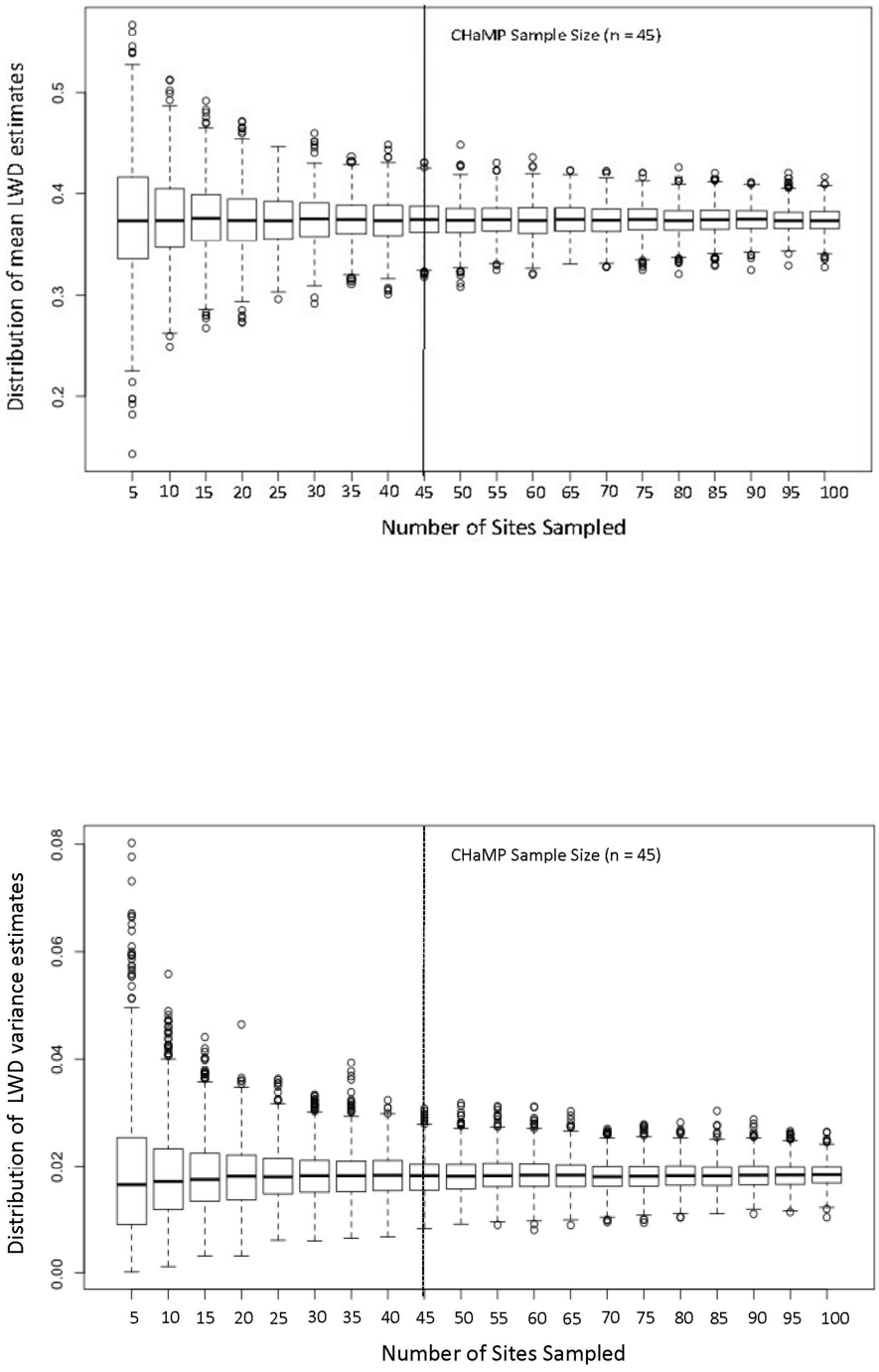


Figure 2. Box plots displaying the distribution of mean (top) and variance (bottom) estimates of log(X+1) transformed Large Woody Debris volume/stream km for the Wenatchee sub-

basin. Plots are based on varying site sample sizes (5-100 sites; X axis). For each site sample size, the Wenatchee ISEMP site data were sub-sampled 1,000 times and the variance calculated from those sub-samples. Sites with more than one sample (either within or across years) were only allowed to occur once within each sub-sample. The dashed line indicates the annual site sample size for CHaMP.

CHaMP needs to develop data that characterizes fish habitat quality and quantity across the entire Columbia River basin. However, stream habitat conditions vary spatially, within and across watersheds so an explicit spatial design at multiple scales is required. At the TRT fish population scale, the CHaMP survey design incorporates spatial covariates that we know determine within watershed patterns such as ownership and stream power. At the Columbia River basin scale, CHaMP will sample in TRT fish populations that represent three gradients: artificial production levels, natural geomorphic and climate conditions, and anthropogenic disturbance of stream habitat. In addition, because the CHaMP indicators will be used to predict the fish-habitat relationships, it is important to consider co-locating sampling with population-scale fish monitoring and habitat restoration programs. It does not appear that having chosen candidate CHaMP watersheds from all possible watersheds to meet spatial and management representational objections biases the sample of CHaMP watersheds (Figure 3). Figure 3 shows candidate CHaMP and non-CHaMP watersheds are not separated by an ordination based on geomorphic, climate, human disturbance and hatchery impacts metrics. If the CHaMP watersheds were systematically different than the pool of all possible watersheds, Figure 3 would show distinct clustering of CHaMP and non-CHaMP watersheds.

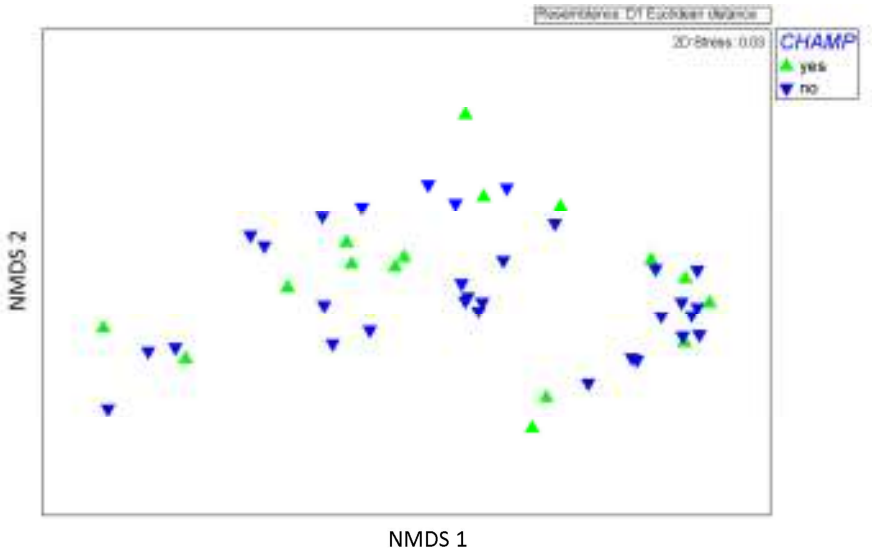


Figure 3. Are CHaMP watersheds distinct from all possible TRT fish population watersheds in the Columbia River basin? There is no separation of CHaMP (green) from non-CHaMP (blue) watershed in terms of non-metric multidimensional scaling based on measures of geomorphic, climate, human disturbance and fraction of hatchery origin spawners in the wild.

Section 2.6. Review of Study Design Development Logistics

To summarize the development of CHaMP study designs, collaborators from each CHaMP watershed work with CHaMP study design personnel to develop the objectives, frame, and strata, to develop a set of 'sample'sites that meet watershed-specific, CHaMP, and statistical needs.

Table 3. Study design development steps

Order	Task Description	Personnel
1	Review of CHaMP-wide objectives	CHaMP collaborators and design team
2	Define watershed-specific objectives	CHaMP collaborators
3	Define target frame meeting both CHaMP and watershed-specific objectives	CHaMP collaborators and design team
4	Develop target frame GIS layer and exclusion rationale for pre-field frame review	CHaMP collaborators and design team
5	Submit previously sampled (legacy sites) to CHaMP design personnel	CHaMP collaborators
6	Assign master sample and legacy sites to target frame (GIS exercise)	CHaMP design team
7	Review CHaMP-wide strata	CHaMP collaborators
8	Define watershed-specific strata	CHaMP collaborators
9	Assign master sample and legacy sites to strata	CHaMP design team
10	Review site counts per strata	CHaMP design team
11	Run GRTS R scripts to combine master sample and legacy sites and create a CHaMP spatially balanced sample based on strata	CHaMP design team
12	Review map of sample and over sample	CHaMP collaborators and design team
13	Assign sites to panels and blocks	CHaMP design team
14	Load sample and over sample to champmonitoring.org	CHaMP design team

15	Begin site evaluation through champmonitoring.org	CHaMP collaborators/site evaluators

Section 3: Site Evaluation Procedures

Section 3.1: Overview of Site Evaluation

The goal of site evaluation is to assess the sample frame relative to on-the-ground reality and to assess conditions that may limit field crew's access to sites. The GIS layers used in defining the target frame and strata may not accurately represent on-the-ground reality. During site evaluation, a local biologist evaluates sites to verify the site lies within the range of the target population and the site was correctly assigned to a stratum. If a site was incorrectly assigned, the site is sampled and noted as 'miscalssified'. The site evaluation process provides information about error in the sample frame and supports statistical procedures to account for underlying error in the sample frame. The site evaluation process does not aim to "correct" site attributes determined from the GIS, but instead to simply note the error. The second objective of site evaluation is to assess conditions that may limit the ability of field crew's to access the site. The two primary concerns are crew safety and landowner permission. An example of a safety constraint is to only sample sites within 5 miles from vehicle access along a trail or within ½ mile from any established trail or roadway. Each institution may have its own policies regarding field crew safety and sites should be evaluated against the institutional constraints of the field crew who will be conducting field sampling. Private landownership may also limit access to individual sites. Prior to sampling sites that require access through private lands, access permission must be obtained directly from the land owner.

Site evaluation occurs in two phases - pre-field season evaluation (Section 3.3) and in-season evaluation (Section 3.5). Pre-field season evaluation may include office evaluation and field reconnaissance (scouting), but definitely occurs prior to sending sampling crews to the site. The strata assignments, access constraints, and landowner permission are all evaluated during pre-field season evaluation. Pre-field season evaluations are completed entirely within the Site Evaluation utility on www.champmonitoring.org. In-season evaluation occurs when field crews are sent to the site with the purpose of collecting measurement data. In-season evaluations may result in sites being dropped from sampling. Evaluations completed during in-season field sampling are entered into the [SampledStatus] field on the data collection event form on the auxiliary handheld data logger.

After pre-field season evaluations have been completed, sites will be exported (Section 3.4) from www.champmonitoring.org and uploaded to both a GPS unit and the handheld data logger. The GPS unit is used to navigate to the site using UTM coordinates. The handheld data logger will be used to capture in-season site evaluations and to capture auxiliary data as described in the CHaMP protocol. Additionally, the site export utility exports a file called

SiteNotes_Printout.pdf. This file contains one page per site and should be printed on write-in-the-rain paper. The Site Notes printout can be taken to the field to capture additional details about the site, driving direction, and other challenges associated with field sampling.

Section 3.2: Orientation to the CHaMP Site Evaluation Utility: www. Champmonitoring.org

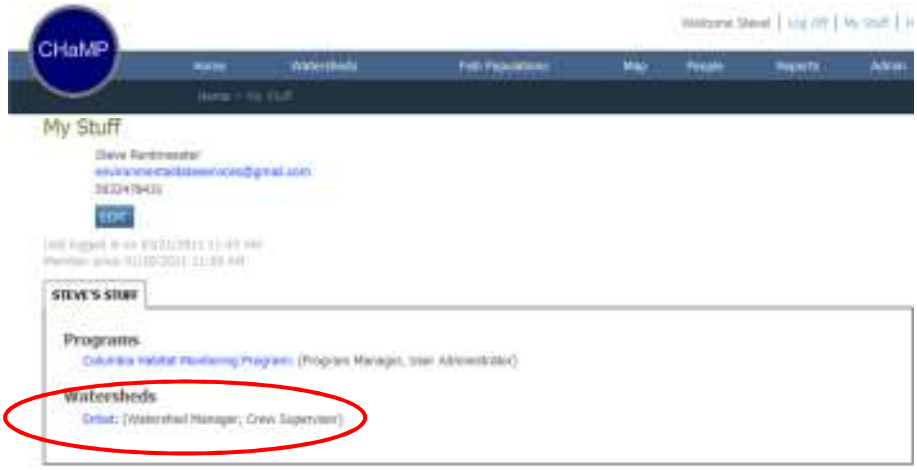
1. Navigate to Site Evaluation Utility

To begin site evaluation, you will navigate to the watershed details page for your watershed and then click the "Site Evaluation" tab. The watershed details page can be accessed through one of three paths.

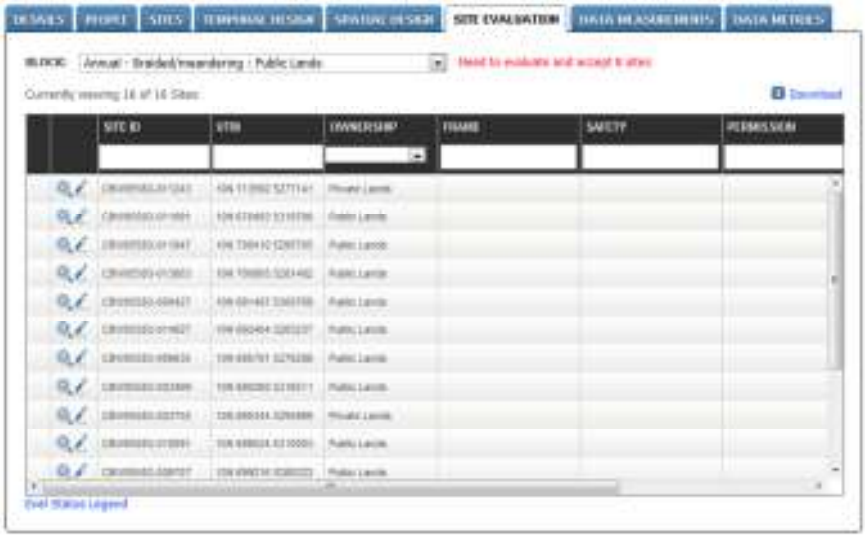
a. Click the "Watersheds" menu on the main navigation bar to display a table of watersheds. Click the name of a watershed (in blue text) to display the watershed details page for that watershed

b. Hover your mouse over the "Watersheds" menu on the main navigation bar and then click a watershed name from the dropdown menu.

c. Click the "My Stuff" link located in the upper right corner of the website. On the "My Stuff" page, find the Watersheds section and click the name of a watershed (in blue text).



Once the watershed details page is displaying, scroll to the bottom of the page and click the "Site Evaluation" tab.



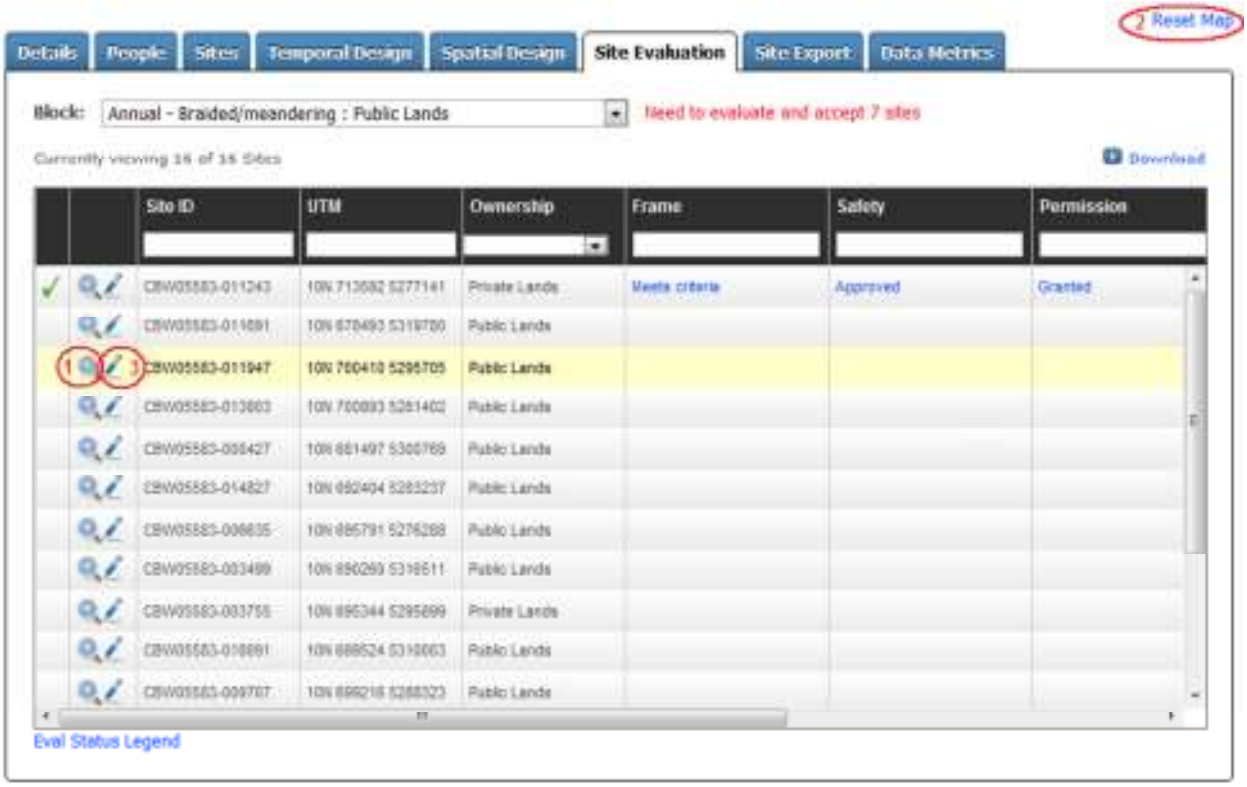
2. Navigate Between Blocks

The site evaluation process will be completed by block, where a block is the unique combination of a stratum and a panel (for example, transport sites on public lands in the annual panel). Details about blocks for a given watershed can be viewed under the "Spatial Design" tab on the watershed details page. The study design for most CHaMP watersheds includes approximately 16 to 24 blocks. Evaluators are required to evaluate all blocks; however, blocks can be evaluated in any order. To navigate between blocks, use the "Block" dropdown menu located at the top left of the "Site Evaluation" tab.

As you navigate between blocks, the map will refresh the color of the site symbols. The map legend can be view by hovering your mouse over the blue "Map Legend" text locate above the top center of the map. Note that your progress for a given block is reported in red or green to the right of the dropdown menu.

3. Navigate Between Sites within Blocks

So far, you have navigated to the "Watershed Details" page for you watershed, navigated to the "Site Evaluation" tab, and learned how to navigate between blocks using the dropdown menu. The next step is to navigate between sites within blocks. After selecting the appropriate block from the dropdown menu, select a row from the site list.



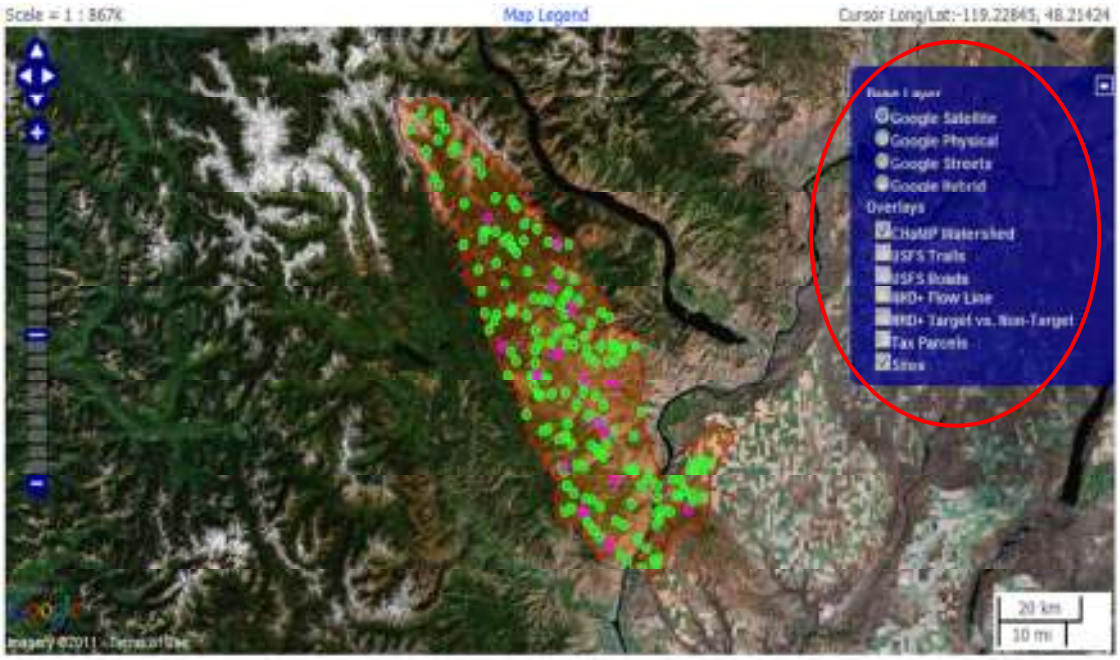
As you select records in the "Site" list, notice the site is highlighted in yellow on the map. Sites within the block are highlighted in pink, while other sites are green. Use the arrow keys to move between records in the list as you watch the map.

1. To zoom the map to a site, click the magnify glass icon.
2. To reset the zoom at the scale of the watershed, click the "Rest Map" text located to the lower right of the map.
3. To start a site evaluation or edit an existing evaluation, click the edit pencil icon located in the left column of the site list.

4. Navigating on the Map

The map has many layers of information that can be displayed. These are divided into base layers and overlays. Only one base layer can be displayed at a time; however multiple overlays can be displayed. To set the background layers, click the white plus sign in the upper right side of the map. To set the base layer, select one toggle button. To set overlays, click one or more check boxes.

- The map can be zoomed using the scale bar on the upper left side.
- To pan around the map, click and drag the mouse.
- To identify a feature, single click that feature.



Section 3.3: Pre-field Season Evaluation Procedures

Sites must be evaluated within each block based on local watershed knowledge to ensure the site was assigned to the proper strata, to ensure that access to the site conforms to the access constraints defined by the data collection organization, and to acquire appropriate permission from the landowner. This evaluation will largely be completed by reviewing base layers and overlays directly in the web-based Site Evaluation Utility (See section 3.1). The evaluation process will result in sites being either accepted or rejected for field visits during the sampling season.

In limited cases it may also be necessary to consult paper maps or perform pre-field season reconnaissance. Any pre-field season reconnaissance will be considered as part of the site evaluation process. Site evaluations performed by scouts should be entered in to www.champmonitoring.org with a note describing the scout's report. In limited cases, sites that were accepted during the pre-field season evaluation process may be rejected for sampling when visited by the field crew during the sampling season.

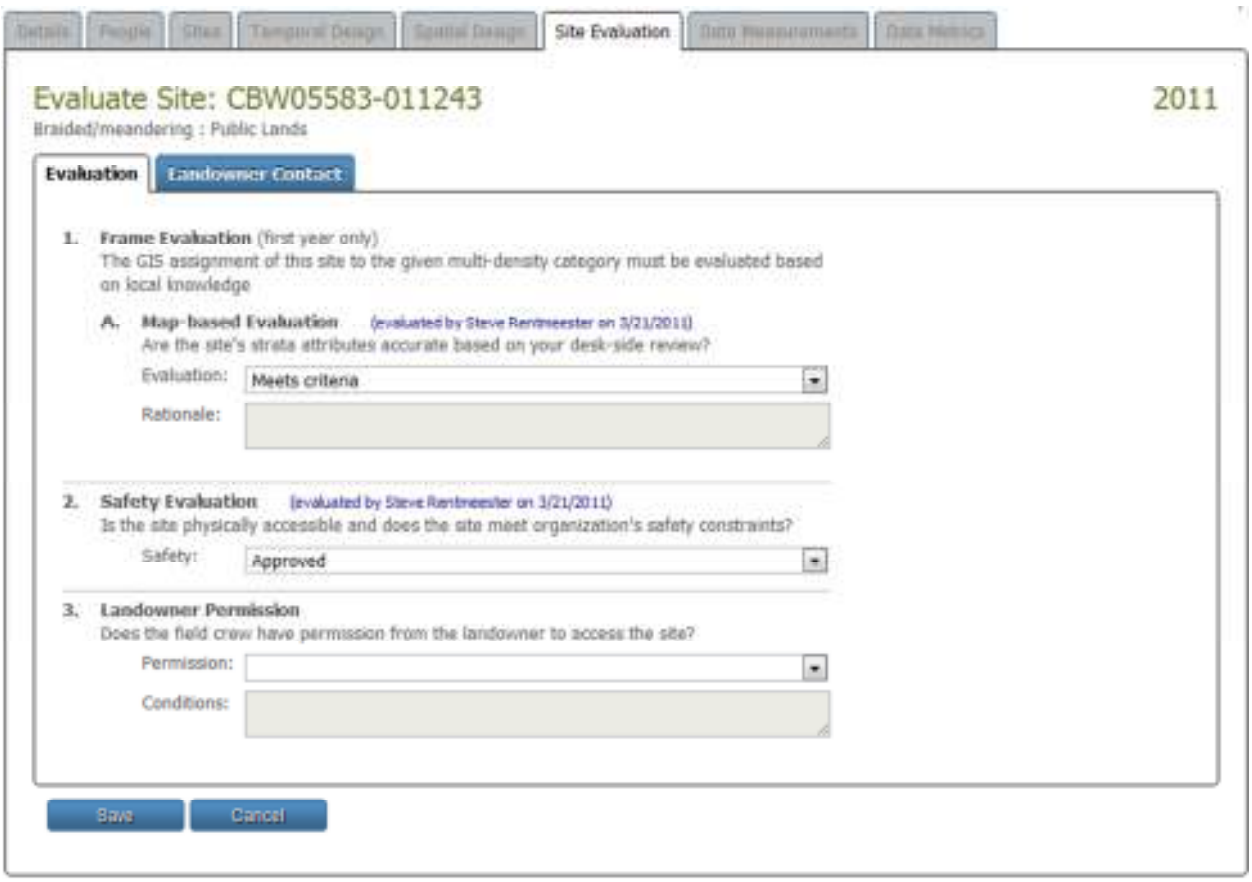
The goal of pre-field season evaluation is to evaluate enough sites to ensure an adequate list of "accepted" sites for field visits. The number of "accepted" sites should be 1.5 to 2 times the number of target sites required to be sampled for a given block. The over-evaluation will ensure enough replacement sites are available in the case that sites are rejected for sampling by field crews during field visits. For example, if the goal is to sample 6 sites within a block, the evaluator should evaluate enough sites to ensure at least 9 sites are accepted during the evaluation process. This may involve evaluating 16 sites for a block.

During the evaluation process, progress will be reported below the "Block" dropdown in red text and will indicate the number of sites that an "accepted" evaluation is still needed. Once a sufficient number of sites have been evaluated to "accepted" status, the text will turn green. Evaluators must evaluate sufficient sites in all blocks. Sites must be evaluated in the order they appear in the list. Start with the first site in the list and work your way down the list sequentially. **Working sequentially (sorted by Use_Order) down the list is imperative to maintaining the spatial balance of the sample.**

If too many sites are rejected during the pre-evaluation process, it is possible to run out of sites to sample within a block. If this occurs, we suggest contacting the CHaMP design team (Carol Volk and Phil Larsen) to discuss site replacement options, as different watersheds may have different design needs.

Open Site Evaluation Form

Start site evaluation by selecting a block from the pull down menu. It is suggested to start with the first block in the list and work your way down the list in order. Select the first site in the list, click the magnify glass icon to zoom the map, and then click the pencil icon. Clicking the pencil icon will open the "Evaluate Site" form.



Step 1A. Frame Evaluation – Map-Based Evaluation

Using the available base layers and overlays determine if the site "meets criteria" or "does not meet criteria". Reasons to assign "Does not meet criteria - …" are listed below and are based on inconsistencies between the map layer and real life conditions. These are the only valid reasons to assign "Does not meet criteria". ". If the site does not meet criteria, provide a more detailed description within the rationale text box and then click the "Save" button to close the form. If these conditions can absolutely not be determined from resources available in the office, then select "Requires field reconnaissance", provide a rationale, and then move on to step 1B.

Table 4. Evaluation Rationale

Evaluation Status	**Evaluation Rationale**	**Description**
	Meets Criteria	

Does not meet criteria	In water body	Site lands in a lake, pond, or reservoir.
Does not meet criteria	In ditch or canal	Site lands in a ditch or a major side channel as seen at the 1:100,000 layer maps. This can only apply if there is an error in the map layer. If it is discovered during a visit to the site, then monument the x-site, or center point, at the nearest point in the main channel and sample.
Does not meet criteria	Not wadeable	Previous field experience suggests site is not safely wadeable by crew members.
Does not meet criteria	Dry-not perennial	Previous field experience within 1km of site strongly suggests site does not have flowing water but may have water early in the season or in wet years.
Does not meet criteria	Permanently dry	Previous field experience within 1km of site strongly suggests site does not have flowing water and is likely permanently dry. Indicators of this include highly vegetated channels (e.g. sagebrush)
Does not meet criteria	Barrier-natural	Previous field experience on the stream strongly suggests the stream is blocked by a natural barrier and not accessible to fish. Description and coordinates of the barrier location must be submitted to South Fork Research (Carol Volk) when this rationale is utilized.
Does not meet criteria	Barrier-human made	Previous field experience on the stream strongly suggests the stream is blocked by a man-made barrier and not accessible to the migrating fish of interest. Description and coordinates of the barrier location must be submitted to South Fork Research (Carol Volk) when this rationale is utilized.
Does not meet criteria	No defined channel	Site may be wet, but channel edges not defined. Examples include a lake or wetland.

Meets criteria but exclude	Sampled by alternate program	Site sampled by alternate program and would result in replicated effort if sampled.
Meets criteria but exclude	Too close to another site	Site is too close to another site and would result in site overlap if sampled. In most cases, standard CHaMP sites within 1km of each other should be rejected. Standard may differ if site sampled for effectiveness monitoring.
Meets criteria but exclude	Provide justification	Site excluded for rationale not covered within this list.
Requires field reconnaisance		Site requires field reconnaisance to determine frame inclusion. This may be necessary when evaluators have some familiarity with a location but cannot confidently determine if site meets frame requirements.

For sites where the stratum is not consistent with local knowledge, select "meets criteria" and explain the inconsistency in the rationale text box. Recording the inconsistency will support the calculation of an error rate between GIS assignment versus on-the-ground observation.

Step 1B. Frame Evaluation – Field-Based Evaluation

In cases where site conditions cannot be determined from resources available in the office, then a field-based reconnaissance is warranted if funding is available. Reconnaissance is performed during the site evaluation process and prior to the field sampling season. The objective of reconnaissance is to determine if the site "meets criteria" or "does not meet criteria" following the same decision criteria used in step 1A. After returning from field reconnaissance, select the appropriate value from the dropdown under step 1B. If the site does not meet criteria, provide a more detailed description within the rationale text box and then click the "Save" button to close the form.

Sites should be assigned to "meets criteria" even if the stratum assignment is not consistent with on-the-ground reality (for example the site was assigned to "pool-riffle" category, however, on-the-ground observation indicates the site is in a plane bed reach). This logic is also true for land ownership anomalies (e.g. site labeled as Private but falls on Public lands). Evaluate the site as if it were part of the listed stratum.

Step 2. Safety Evaluation

For sites that meet criteria, the "safety evaluation" dropdown will become active. Use the available layers and other resources to determine if site can be safely accessed and sampled. Use the following criteria to make the appropriate selection from the dropdown.

1. If a site is too remote (based on criteria defined by the data collection organization), then select "Not approved – Physically inaccessible" and click the save button to close the form.
2. If the site cannot be sampled safely, then select "Not approved – Not safe" and click the save button to close the form.
3. For all other cases, select "Approved"

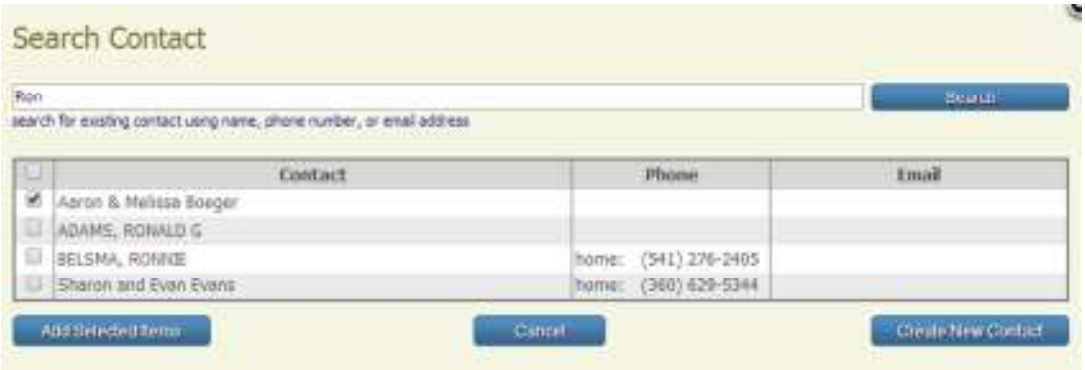
Step 3. Landowner Permission

For sites that are approved for safety, the "permission" dropdown will become active. Review the strata (label located below site identifier) to determine if the site is privately owned. Acquiring landowner permission is **required** for all privately held lands and advisable for public and tribal lands. For private sites, use the county tax parcel information to acquire the name and contact information for landowners. If the county tax parcel information is available, it will automatically appear in the "Landowner Contact" tab of the Evaluation form. For some sites, the landowner name, address, and contact information will already be available in the form. If the evaluator discovers more up-to-date information for landowner name or contact information, then the information should be updated in the form. For some sites, only the tax parcel identifier will be available. If only the parcel identifier is filled in, the evaluator will need to acquire the landowner name and contact information from the county assessor's office and then fill in the information it the form. Once the landowner contact information has been acquired, send a letter requesting permission to access the site with an estimated date range for when field sampling will occur (Sample in Appendix B). Follow up the letter with a phone call within 1-2 weeks of the letter. Enter that information into the "Landowner Contact" tab.

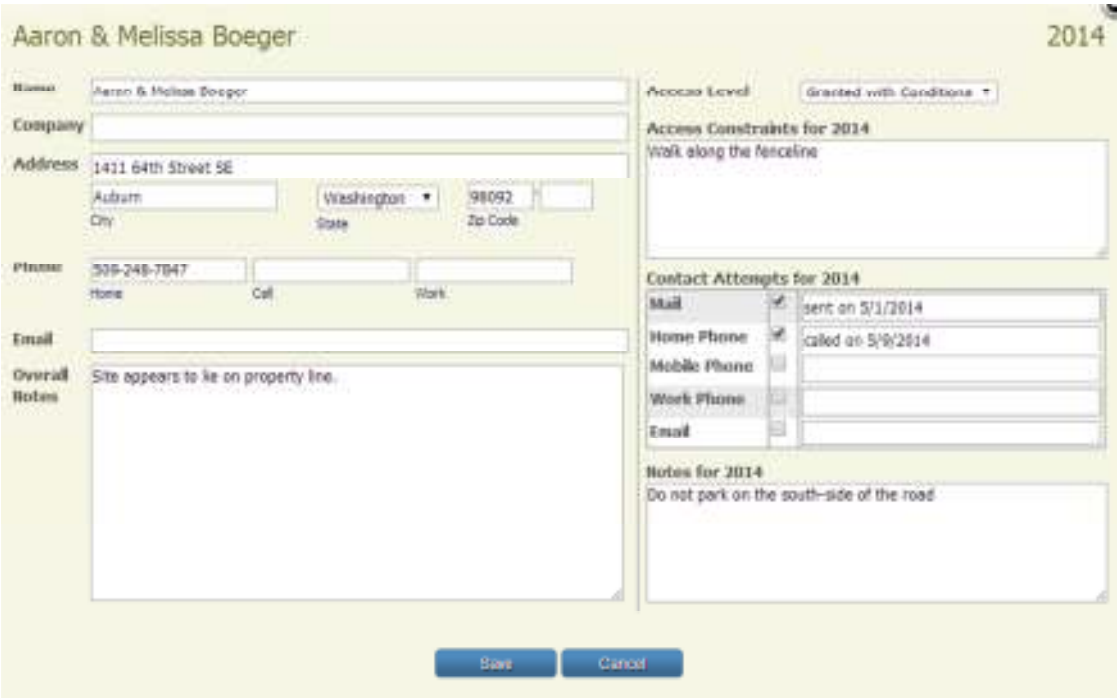
Multiple Landowner Contacts at One Site:

Starting in 2014, multiple landowners can be associated with a single site. The "Landowner Contact" tab displays a table of all landowners associated with a given site. To add a landowner contact to the site, click the "Add New Contact" button.

Clicking the "Add New Contact" button will open the "Search Contact" form. Enter a name and click search. A list of contacts matching the search will display. Click the checkbox in front of the name and then click the "Add Selected Items" button. This will add the landowner to the site.



Once the land owner is associated with the site, you can edit the contact information and record notes for the given year. The contact information (left-side of form) are permanently associated with the site. The notes for a given year are only active for that year. Access permission and constraints need to be re-affirmed and entered into CM.org on an annual basis.



Landowner Permission:
After communicating with all necessary landowners, you will need to summarize the access level from across the multiple landowner into a single decision for the site. Record this decision on the "Evaluation" tab by selecting the appropriate option from the "Landowner Permission" dropdown list. Click the save button to close the form.

Landowner Denial Notes:
It may be necessary to contact more than one landowner to gain access to the full site length and both banks of the site. If a large proportion of one bank is denied access, we suggest rejecting the site. If only a small proportion of a site bank (<20%) is not granted access and ownership boundaries are likely (e.g. fences), we suggest accepting the site and surveying around the area. At no time do we condone sampling on property where landowner permission has not been obtained. Similarly, we suggest rejecting the site if over 10% of the site LENGTH cannot be accessed (both banks) due to landowner denial. Field crews will also have an opportunity to shift the X site downstream at the time of sampling. If the landowner denial issues can be resolved by shifting the X site at the time of sampling then we suggest accepting the site for sampling. For example, if the upstream 100m of a site is rejected but the land downstream of the x site is Public, we suggest shifting the X site to allow the full site length to be sampled. See the CHaMP Habitat Protocol 2011 (Bouwes et al. 2011) for specific instructions on shifting X sites.

Frame Errors
Crews may discover Frame Errors during site evaluation. A **Frame Error** is when the pre-assigned information about the site or frame does not match the on-the-ground reality. For example, a site maybe labeled as having "Private" land ownership but the site actually falls within "Public" lands. A small proportion of these frame errors are expected. Land ownership frame errors should be noted for the site and evaluated as planned. If a site with a frame error is rejected, it should be replaced with a site within the same block as it is assigned, regardless of the error.

Step 4. Evaluate and Accept Sites for All Blocks
Continue evaluating sites until a sufficient number of sites have been accepted for sampling as indicated in the green text to the right of the block dropdown. Evaluators must evaluate sufficient sites in all blocks. Sites must be evaluated in the order they appear in the list. Start with the first site in the list and work your way down the list sequentially. **Working sequentially (sorted by Use_Order) down the list is imperative to maintaining the spatial balance of the sample.**

Section 3.3: Site Export Utility

The site export utility is used after pre-field season evaluation is completed for a set of sites. The export utility allows users to select (click check box) sites and download three files for the set of selected sites. The files include:

- GPS Unit – this file should get loaded to the GPS unit
- Handheld Data Logger – this file should get loaded to the handheld data logger
- Field Notes Printout = this pdf should get printed out as field forms.

The crew supervisor can select any set of sites to be included in the download, can download an infinite number of sets, and can include sites in as many downloads as needed. This flexibility is designed to support a wide variety of field planning scenarios. However, it should be noted that only sites which have been "accepted" during the pre-field season evaluation (i.e. frame meets criteria, safety is approved and landowner permission is granted) will appear in the site export utility. Sites will not advance to the site export utility unless safety has been approved and landowner permission granted.

The site export utility was design with considerable flexibility in mind to accommodate a range of field planning styles. The export utility will support crew supervisors in planning multi-day hitches or allow daily modifications to crew schedules. This flexibility requires crew supervisors understand the range of options available in the site export utility and increases the burden on crew supervisors to ensure that watershed-specific survey design criteria are met. The survey design defines the number of sites to be visited within each block (panel crossed with strata). The survey design for each watershed is displayed on the Spatial Design tab. **If a site is visited, but rejected from sampling, then the next non-sampled site in sequential order (sorted by Use_Order) within the block must be selected as the replacement site.** The final set of sampled sites within a block must form a continuous set based on the sequential order of the site list.

In the simplest workflow, the crew supervisor should click the list of sites that will be sampled during the next crew sampling effort, click the "Export Selected Items" button, and then type a name for this download set. The files then must be uploaded to the GPS unit and the handheld data logger. If there is a desire to layout hitches, the crew supervisor can use the [Sampling Notes] field. For a site, click the pencil in the sampling notes field. In the Site Notes form, type the word "Hitch 1" in the [Sampling Notes] field. Complete this for each site that will be included in Hitch 1. After all sites have been added to the hitch, then use the [Sampling Notes] filter to limit the list of sites showing in the list. Click the "Select All" button and then export the list of sites.

Section 3.4: Hitch Planning

Crew supervisors will be responsible for hitch (one or more continuous days of field sampling) planning. Each hitch should be planned to minimize travel and other logistics while maximizing the number of sites that can be completed within the hitch. Across the field season, hitches must be planned and executed to ensure that watershed-specific survey design criteria are met. The survey design defines the number of sites to be visited within each block (panel crossed with multi-density category). When planning a hitch, the crew supervisor must use the sites that have been approved during the site evaluation procedure and must maintain awareness regarding the sequential order of sites with blocks. In addition, to maintaining the integrity of the study

design the crew supervisors must also juggle on the ground logistics when considering how to dispatch crews.

Some important logistical considerations when dispatching crews are stream flows, snow pack and accessability of sites, flows later in the field season, etc. In ideal situations crews could sample sites in the order in which they occur within the study design. However, the logistical reality requires adjusting the sample order of sites to accommodate flows and site availability. The best approach to this issue is to dispatch crews to sample site locations that the crew supervisor knows will get sampled within the field season. If the crew supervisor moves down the list of sites to sample that have lower flows and are accessible and saves some of the bigger sites for later in the season when flows are lower this will preserve the integrity of the study design but also provide the needed flexibility for crew supervisors.

At the completion of the field season, the full set of sites that were visited within a block must be a continuous set based on the sequential order of the site list. If a site is visited, but rejected from sampling, then the next non-sampled site in sequential order within the block must be selected as the replacement site. In order to support hitch planning, crew supervisors can download a list of sites by clicking the "download" link located to the upper right of the site list on the "Site Evaluation" tab. Evaluators should complete steps 1a, 1b, and 2 for all sites within all blocks prior to exporting a site list.

Section 3.5: In-Season Evaluation Procedures

1. Reject Site during Field Sampling

During the field sampling season (crews visiting sites with the intention to sample and carrying measurement equipment), sites can only be rejected from sampling for the following reasons. These are the only valid reasons to reject a site during field season. If one of these conditions occurs, **the crew leader must create a data collection event on the handheld data logger.** Once the event has been created in the data logger select the appropriate value from the "SampledStatus" dropdown menu (see Table 5). Enter any additional notes into the "DceNotes" field. Save the event and close the data logger application. Anytime a site is not sampled, the crew leader must report this to the crew supervisor.

Table 5. Reasons to reject site during field sampling

Table 5. Evaluation Rationale for in-season evaluation (e.g. rejections

Evaluation Status	Evaluation Rationale	Description
	Meets Criteria	

Does not meet criteria	In water body	Site lands in a lake, pond, or reservoir.
Does not meet criteria	In ditch or canal	Site lands in a ditch or a major side channel as seen at the 1:100,000 layer maps. This can only apply if there is an error in the map layer. If it is discovered during a visit to the site, then monument the x-site, or center point, at the nearest point in the main channel and sample.
Does not meet criteria	Not wadeable	Previous field experience suggests site is not safely wadeable by crew members.
Does not meet criteria	Dry-not perennial	Previous field experience within 1km of site strongly suggests site does not have flowing water but may have water early in the season or in wet years.
Does not meet criteria	Permanently dry	Previous field experience within 1km of site strongly suggests site does not have flowing water and is likely permanently dry. Indicators of this include highly vegetated channels (e.g. sagebrush)
Does not meet criteria	Barrier-natural	Previous field experience on the stream strongly suggests the stream is blocked by a natural barrier and not accessible to fish. Description and coordinates of the barrier location must be submitted to South Fork Research (Carol Volk) when this rationale is utilized.
Does not meet criteria	Barrier-human made	Previous field experience on the stream strongly suggests the stream is blocked by a man-made barrier and not accessible to the migrating fish of interest. Description and coordinates of the barrier location must be submitted to South Fork Research (Carol Volk) when this rationale is utilized.
Does not meet criteria	No defined channel	Site may be wet, but channel edges not defined. Examples include a lake or wetland.

Meets criteria but exclude	Sampled by alternate program	Site sampled by alternate program and would result in replicated effort if sampled.
Meets criteria but exclude	Too close to another site	Site is too close to another site and would result in site overlap if sampled. In most cases, standard CHaMP sites within 1km of each other should be rejected. Standard may differ if site sampled for effectiveness monitoring.
Meets criteria but exclude	Provide justification	Site excluded for rationale not covered within this list.

Access denied-Landowner denial	Upon arriving at the site, the landowner denies access to the site.
Physically inaccessible	The site is too remote based on criteria defined by the data collection organization or site is inaccessible due to outstanding circumstances, such as road construction or blocking, access denied because of redd presence , etc.
Not safe	The site cannot be sampled safely.
In water body	Site lands in a lake, pond, or reservoir.
In ditch or canal	Site lands in a ditch or a major side channel as seen at the 1:100,000 layer maps. This can only apply if there is an error in the map layer. If it is discovered during a visit to the site, then monument the x-site, or center point, at the nearest point in the main channel and sample.

2. Selection and Reporting of Replacement Site

If field crews are not able to sample a site for any of the above reasons, the crew supervisor is responsible to select an appropriate replacement site following these rules and for reporting the rejection and replacement site to the www.champmonitoring.org site evaluation utility. **Replacement sites must be selected from within the same block as the rejected site and must be the next sequential site in the list that meets criteria and is approved for sampling.** Selecting replacement sites must be completed by the crew supervisor immediately after the data collection events for the previous week have been uploaded to the champmonitoring.org system.

1. From the site evaluation utility, navigate to the same block as the rejected site
2. Select the next sequential site in the list that meets criteria and is approved for sampling

3. Click the pencil (edit) icon to open the site evaluation form
4. Click the "Replacement Site" tab in the site evaluation form
5. From the dropdown menu, select the site that was previously rejected
6. Click "Save" to close the form

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APPENDIX A: WATERSHED-SPECIFIC TARGET FRAMES

Watershed	Target Frame	Information Source
Entiat	Default CHaMP frame and exclusion of IMW area. Frame reduction in 2012 due to recon of barriers.	Terraqua
Grande Ronde	Custom, separate frames for steelhead (ODFW) and chinook (CRITFC) populations. Steelhead frames described as non-1st order streams within spawning and rearing streams. Chinook population area custom to CRTIFC's on the ground assessments and excludes areas of high landowner rejection (Vey Meadows).	CRITFC and ODFW
John Day	Frame split in 2. ODFW covered entire John Day in 2011 and 2012 based on custom steelhead distribtion knowledge. ELR covered Bridge Creek IMW and several small watersheds slated for intensive fish sampling. In 2012, ELR switched frames to focus on Murderers Creek (SFJD) and Middle Fork JD above Big Creek. In 2013, ODFW updated frame to focus on entire MFJD and Greater SFJD not covered by ELR.	ODFW and ELR
Lemhi	Custom frame. 1st order streams and low intrinsic potential streams excluded, as well as areas upstream of farthest fish distribution found in 2009/2010 fish sampling.	QCI
Methow	Default CHaMP frame	Terraqua
South Fork Salmon	Default CHaMP frame HUC 5s.	QCI
Tucannon	Custom frame focusing on	Lower Snake Comp and ELR

	mainstem Tucannon and areas planned for restoration. Limited tributary inclusion based on steelhead distribiton.	
Wenatchee	Default CHaMP frame. Frame reduced in 2012 due to recon of barrier locations.	
Minam	Custom frame covering areas relevant as 'reference' areas for Grande Ronde sampling based on geomorphic characteristics	CRITFC and ODFW
Asotin	Custom frame for Asotin IMW	ELR

Appendix B: Landowner Contact Example Letter

Date

Dear (Insert Landowner Name),

The Cascadia Conservation District is preparing to assist partner agencies with habitat monitoring in the Wenatchee River watershed. Survey sites have been selected throughout the watershed on both public and private lands. The stream channel adjacent to your property has been identified as a potential survey site. The purpose of this letter is to briefly explain the objective of the surveys and request permission from you to access the survey site via your property.

The intent of the habitat surveys is non-regulatory in nature. The surveys are part of a multi-year study developed to provide a baseline understanding of wadeable stream habitat within the (Wenatchee River) watershed. Survey data will be used to guide and monitor future fisheries restoration efforts in the basin. Each survey site includes a contiguous stream reach up to 600 meters in length and will be visited by a team of up to four technicians once during the course of the summer and only a few sites within the watershed will be visited twice. Technicians will be using topographic survey equipment as well as collecting invertebrate samples, water temperature, and substrate information. The surveys are scheduled to begin in June and continue through September. Additional information about the monitoring program can be found at www.champmonitoring.org.

Your feedback is needed as soon as possible. Please reply by **May 31** bycompleting the accompanying form and returning it to us in the self-addressed stampedenvelope enclosed or via fax at (509) 664-0255. You are also welcome to submit your response via phone at (xxx) xxx-xxxx or email (your email address).
Feel free to contact me if you have any questions or concerns regarding the project.

Your cooperation is greatly appreciated.

Sincerely,

Your name
Your agency

Columbia River Habitat Monitoring Program (CHaMP)

☐ YES, I would like to support the habitat monitoring by granting survey personnel access to my streamside property.

Please call before coming over: ☐ Yes ☐ Not necessary

☐ NO, I am not interested in participating.

Name:_____
Phone:_____
Comments or Questions:_____
_____
_____
_____
_____

Please fill out this feedback form and return it in the accompanying self-addressed and stamped envelope or fax it to (xxx) xxx-xxxx by **May 31, 2011.** You are also welcome to respond via phone (xxx) xxx-xxxx or email (your email address)