2013 CHaMP Scouting Protocol

Introduction

The 2013 CHaMP field season will include establishing new sites and revisiting annual sites. This protocol describes the process scouts will follow to ensure the efficiency of survey crews during site layout. At annual sites, scouts will assess the integrity of previously completed topographic surveys by evaluating benchmark locations, point distributions and densities. They will also download data from the air and stream temperature loggers; relocate (if necessary) and flag site markers, monuments and benchmarks; and capture new GPS coordinates where benchmark and monument relocation is necessary. Control points may also need to be identified.

At new sites, scouts will establish benchmark, monument, bottom of site, and marker locations (crews will establish top of site markers). Scouts will install air and stream temperature loggers at all new sites and define the extent of survey on aerial photos that they will provide to crews. Scouts will document driving directions, hiking directions, landowner information, and other pertinent site descriptions.

Scouts need to know the two main principles of surveying: 1) Redundancy- A well conducted survey needs to have redundancy between the benchmarks and control points--- moving a Total Station requires shooting from a known location to another known location and occupying the new location. These properly distributed points will give a higher degree of accuracy and integrity to the survey; 2) Well Ordered- Too much clutter between benchmarks and control points could confuse the survey crew and compromise the survey data.

Every field season, roughly 25 sites will be surveyed in each CHaMP basin. Of the 25 sites, 15 will be annual revisit sites and 10 will be rotating panel sites (see Table 1 below). In the first year a CHaMP subbasin is surveyed (e.g. 2011), all scouts will generally follow the scouting criteria for *establishment of new sites*[1]. Over the next two visits to the site (e.g. 2012 and 2013), 15 of the surveys will follow the *reoccupation of existing* site scouting criteria and 10 of the surveys will follow the *establishment of new sites* scouting criteria to establish rotating panel sites. By the fourth year of CHaMP sampling in a subbasin, scouts will follow the *reoccupation of existing* site scouting criteria at all sites.

[1] An exception to this may be in basins where past survey efforts have established a control network at sites, which will be occupied, augmented and that coordinate system used as a basis for all subsequent surveys.

Table 1. Example of CHaMP Subbasin GRTS Rotating Panel Sample Design

Site Type	2011	2012	2013	2014	2015	2016
Annual Sites	15	15	15	15	15	15
Rotating Panel 1	10			10		
Rotating Panel 2		10			10	
Rotating Panel 3			10			10

Pre-Scouting Activities

Pre-scouting activities involve identifying, assessing and preparing all revisit annual surveys. Scouts can refer to CHaMP Monitoring (Champmonitoring.org) for all necessary survey data. Benchmarks need to be assessed and evaluated for proper spatial distribution, following is a step-by-step process for obtaining necessary information:

To fulfill the scouting responsibilities efficiently, the scout will complete a variety of pre-scouting activities. Before heading out in the field, the scout should collate, study and print out:

- several copies of a scouting map
- All site information including UTM coordinates.
- Photos of site markers, temp probes (air and water), monuments, and benchmarks, repeat photos for transects 1, 11, 21 looking both upstream and downstream.

In the case of *establishment of new sites*, the scout review aerial photographs to identify reasonable bottom of site locations and more commonly criteria that might preclude a particular location from being a bottom of site (e.g., confluence with a tributary). For the *reoccupation of existing sites*, the scout should review the adequacy of the previous visit in characterizing the site and providing a robust basis for change detection. For example, the scout may be able to determine from looking at the previous year's survey that the survey extents (laterally) were inadequate, or that the distribution of benchmarks was inappropriate. In all instances, the scout should be arriving at the site well prepared and with a reasonable anticipation of what to expect and how they might address anticipated problems. Below, some of the pre-scouting activities related to CM.org are described.

Pre-Scouting survey preparation Instructions

Site Geodatabase

The site geodatabase is a data product new for CHaMP in 2013. A site Geodatabase contains GIS data compiled from all previous surveys/visits to a site as well as important metadata about the site. Since this data is contained in a geodatabase, it can be easily used in GIS to aid in data processing, planning and making quality comparisons.

A Site Geodatabase contains the following:

- Channel Units (from the last survey)
- Control_Points (merged from all visits)

- OrthogInfo and SiteInfo tables
- SurveyExtentIntersect (Minimum area of all visits)
- SurveyExtentUnion (Maximum area of all visits)
- SurveyExtent (from previous surveys)
- TopoPoints (from previous surveys)

New Site Geodatabases are generated by the RBT on cm.org, only after *all* surveys pass data validation. The 2013 CHaMP toolbar can utilize the information in the Site Geodatabase during data processing. It is highly recommended to use the Site Geodatabase if available, however it is not required.

Preparing a Scout/Site-Surveying Map

A scout map is used to help a scout or survey crew navigate a previously visited site. The CHaMP Toolbar provides a tool to generate a basic scout map, which you can modify or add-to to meet your crew's specific needs.

1) Obtain the Site or Survey GDB for the site (this is generally facilitated by the CHaMP Data Broker). Ideally you want to use the Site Geodatabase if available. You can also use a Survey Geodatabase if a Site Geodatabase is unavailable.

2) Run the Export Scout Map tool
- Provide the Site ID or Map Name
- Select a Site or Survey Geodatabase
- Inputs
    - Stream Temp Logger .csv for the site (Download from cm.org)
    - Air Temp Logger .csv for the site (Download from cm.org)
    - Monument .csv for the site (Download from cm.org)
    - Site Marker .csv for the site (Download from cm.org)

Note: these files need to be downloaded to your hard drive from CHaMP Monitoring

3) The new map will open. The base imagery is turned off by default to save time. You can turn it on (if you are connected to the internet) from the table of contents, or provide your own imagery.

4) Adjust the map symbology as needed. Save and print your map(s).

Preparing and Exporting Control Points

Crews returning to a previously visited site will need to export a cleaned and updated set of control points to load on the total station. Optionally, they may include base layers to overlay on the total station display while surveying.

1) Obtain the Site or Survey GDB for the site (this is generally facilitated by the CHaMP Data Broker). Ideally you want to use the Site Geodatabase if available. You can also use a Survey Geodatabase if a Site Geodatabase is unavailable.

2) If using a Site GDB, run the Control Network Check Tool. (If using Survey GDB, proceed to Step 4)

This tool will analyze the control points/benchmarks to find duplicate points, names, and invalid codes and select points to be included in the control file.

3) Open the control points attribute table and check the following:

Control Status Field:

Message	Cause	Action*
Valid	Unique point with a valid code.	None - The point should be included in the control file.
Invalid Code	Description code is invalid (2012 standards).	None - The Point should ***not*** be included in control file.
Duplicate Point	Point has the same description code and spatial location as a previous point.	None - This "extra representation" of the point should ***not*** be included in the control file.
Duplicate Name	Point has the same description code as another point, but they are in ***different*** spatial location. This often indicates that surveys are using two different transformations.	**1.** Use the Transformation Repair Tools to adjust a visit (or visits) to match the primary transformation of the site. **2.** Retired points should not be included in the control file. **3.** Check for possible naming, surveying, or duplication errors.

*Note: Permanent repairs should be made to the corresponding survey Geodatabase and re-uploaded to cm.org. A new site geodatabase will be generated that reflects these updates.

Control File field:

This field indicates which points will be exported in the control file.

- Points that contain a "1" are included in the control file.
- Points that contain a "0" are not included in the control file.

You can adjust the values in this field to include or remove points in the control file as needed.

4) Run the Export Control File Tool.

- Provide a Site Name
- Select the "Control_Points" feature class from a Site or Survey Geodatabase
- Choose to export only "benchmarks", or "all" of the features in the Control_Points Feature Class (Note: only features with a '1' in the Control_File Field will be exported).
- Optional: Select Feature layer(s) to include include as baselayers on the total station
- Optional: Select Raster Dataset(s) to include as basemaps on the total station.

5) Load the file(s) on your total station:

- Control_File.txt
- Baselayers.DXF (one file that contains multiple layers)
- Basemaps.jpeg (one jpeg per basemap)

Preparing and exporting Site Directions and Photos

Print the following photos located in the folder to help relocate the locations of:

a. Bottom and Top of Site
b. Monument(s)
c. Air and Stream Temp
d. Site Map photos
e. Transect photos 1, 11, 21 looking both upstream and downstream.

Scouting Activities

The scout should refer to section 6.1 Establishing a New Site Survey and section 6.2 Site Revisit Survey of the CHaMP protocol for implementing steps 1, 3, 4, 5 and 6 of new site layout and implementing steps 1, 3 and 4 of site layout revisits. Here we provide some additional detail on establishing control points, defining the extent of site and survey limits, developing suggested survey workflow for crew, installing air and stream temperature loggers, and documenting the site.

- Define the approximate upstream extents of the site and survey limits.
- Establish potential control points, and a survey workflow for crew. Delineate on survey plan maps crew priorities for survey effort within survey limits
- Install air and stream temperature loggers
- Document site descriptions, driving directions, hiking directions, landowner information, etc.

For the reoccupation of an existing CHaMP site, the scout's responsibilities shift from establishment of control and survey limits to a mix of relocating previous infrastructure and assessing their integrity and suitability for change detection. Thus, for reoccupation the scout:

- Defines a survey workflow for crew and delineates on survey plan maps crew priorities for survey effort within survey limits
- Downloads data from and service air and stream temperature loggers
- Updates site descriptions, driving directions, hiking directions, landowner information, etc. if necessary

Establishing/Verifying Control Points

The process of establishing and verifying control points should:

- Establish potential control points, and a survey workflow for crew
- Attempts to recover all benchmarks where possible, and establish a survey workflow for crews.

Defining/Confirming Site Extents & Survey Limits

The process of defining the extent of site and survey limits should:

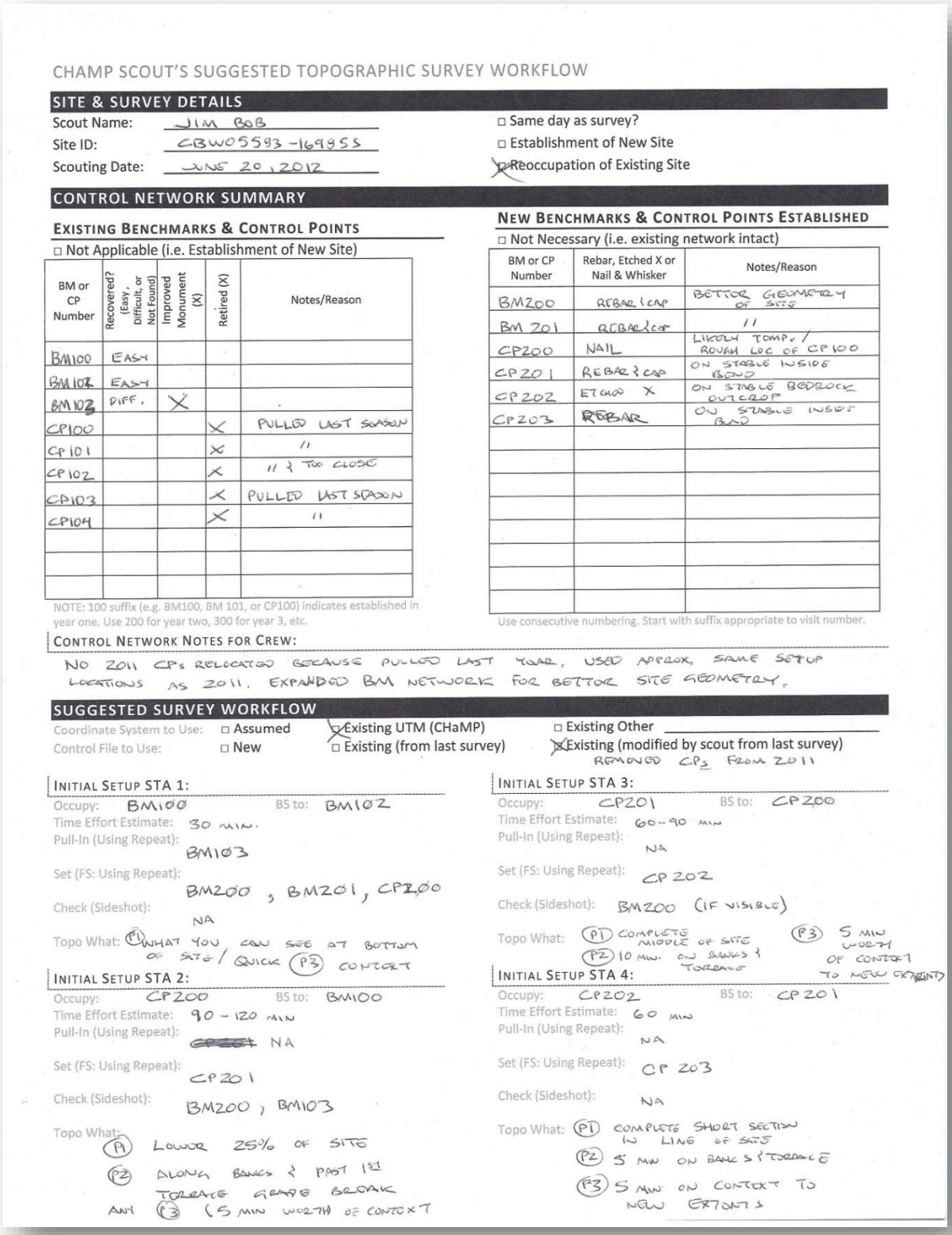
- Define the extents of the site and survey limits
- Establish bottom of site location (crews will establish top of site markers)
- Marker locations

Developing a Survey Workflow for Crew

A survey workflow for the crew is simply a suggested plan for how the crew could complete the survey that the scout judges to be realistic and most effective. To encourage consistency in how this information is communicated to the crews, it is recommended that scouts use the 'Scout's Suggested Topographic Survey Workflow' form. An example of how this form is filled out is shown in Figures 1 and 2. The form consists of three key elements:

1. Site & Survey Details
2. Control Network Summary
3. Suggested Survey Workflow
4. Suggested Survey Priorities

The suggested site and survey details simply indicate who the scout was, the site ID and whether or not this is an establishment of a new site or reoccupation of an existing site. The control network summary lays out survey benchmarks and the suggested survey workflow.



CHAMP SCOUT'S SUGGESTED TOPOGRAPHIC SURVEY WORKFLOW

SITE & SURVEY DETAILS

Scout Name: JIM BOB
Site ID: CBW05583-169955
Scouting Date: JUNE 20, 2012

☐ Same day as survey?
☐ Establishment of New Site
☒ Reoccupation of Existing Site

CONTROL NETWORK SUMMARY

EXISTING BENCHMARKS & CONTROL POINTS

☐ Not Applicable (i.e. Establishment of New Site)

BM or CP Number	Recovered? (Easy, Difficult, or Not Found)	Improved Monument (X)	Retired (X)	Notes/Reason
BM100	EASY			
BM102	EASY			
BM103	DIFF.	X		
CP100			X	PULLED LAST SEASON
CP101			X	"
CP102			X	" & TOO CLOSE
CP103			X	PULLED LAST SEASON
CP104			X	"

NOTE: 100 suffix (e.g. BM100, BM 101, or CP100) indicates established in year one. Use 200 for year two, 300 for year 3, etc.

NEW BENCHMARKS & CONTROL POINTS ESTABLISHED

☐ Not Necessary (i.e. existing network intact)

BM or CP Number	Rebar, Etched X or Nail & Whisker	Notes/Reason
BM200	REBAR/CAP	BETTER GEOMETRY OF SITE
BM 201	REBAR/CAP	"
CP200	NAIL	LIKELY TEMP. / ROUGH LOC OF CP100
CP201	REBAR & CAP	ON STABLE INSIDE BEND
CP202	ETCHED X	ON STABLE BEDROCK OUTCROP
CP203	REBAR	ON STABLE INSIDE BEND

Use consecutive numbering. Start with suffix appropriate to visit number.

CONTROL NETWORK NOTES FOR CREW:

NO 2011 CPs RELOCATED BECAUSE PULLED LAST YEAR, USED APPROX. SAME SETUP LOCATIONS AS 2011. EXPANDED BM NETWORK FOR BETTER SITE GEOMETRY.

SUGGESTED SURVEY WORKFLOW

Coordinate System to Use: ☐ Assumed ☒ Existing UTM (CHaMP) ☐ Existing Other _____
Control File to Use: ☐ New ☐ Existing (from last survey) ☒ Existing (modified by scout from last survey) REMOVED CPs FROM 2011

INITIAL SETUP STA 1:

Occupy: BM100 BS to: BM102
Time Effort Estimate: 30 MIN.
Pull-In (Using Repeat): BM103
Set (FS: Using Repeat): BM200, BM201, CP200
Check (Sideshot): NA
Topo What: (P1) WHAT YOU CAN SEE AT BOTTOM OF SITE / QUICK (P3) CONTEXT

INITIAL SETUP STA 2:

Occupy: CP200 BS to: BM100
Time Effort Estimate: 90 - 120 MIN
Pull-In (Using Repeat): ~~CP201~~ NA
Set (FS: Using Repeat): CP201
Check (Sideshot): BM200, BM103
Topo What: (P1) LOWER 25% OF SITE
(P2) ALONG BANKS & PAST 1ST TERRACE GRADE BREAK
ANY (P3) (5 MIN WORTH OF CONTEXT

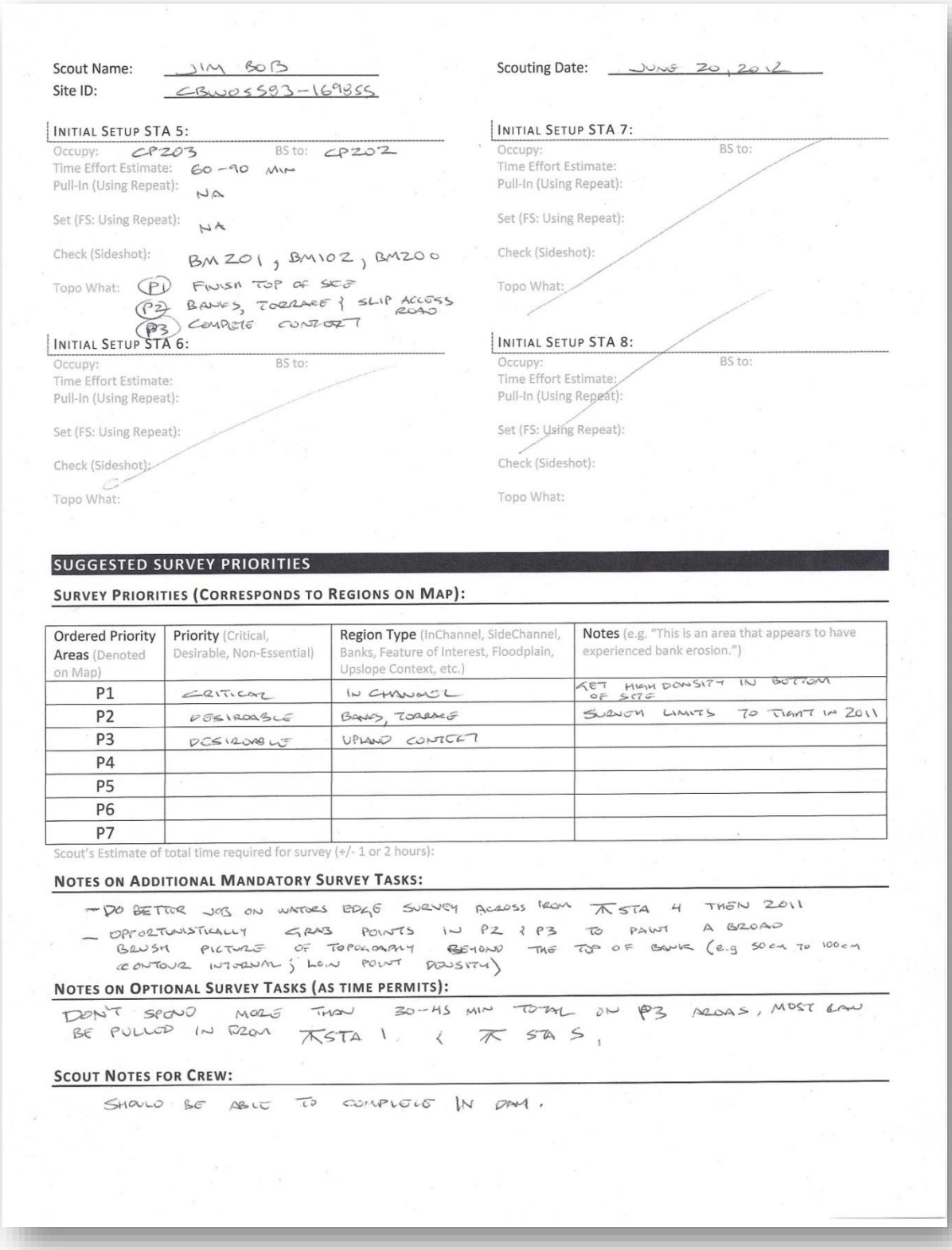
INITIAL SETUP STA 3:

Occupy: CP201 BS to: CP200
Time Effort Estimate: 60-90 MIN
Pull-In (Using Repeat): NA
Set (FS: Using Repeat): CP202
Check (Sideshot): BM200 (IF VISIBLE)
Topo What: (P1) COMPLETE MIDDLE OF SITE (P3) 5 MIN WORTH OF CONTEXT TO NEW EXTENTS
(P2) 10 MIN. ON BANKS & TERRACE

INITIAL SETUP STA 4:

Occupy: CP202 BS to: CP201
Time Effort Estimate: 60 MIN
Pull-In (Using Repeat): NA
Set (FS: Using Repeat): CP 203
Check (Sideshot): NA
Topo What: (P1) COMPLETE SHORT SECTION IN LINE OF SITE
(P2) 5 MIN ON BANKS & TERRACE
(P3) 5 MIN ON CONTEXT TO NEW EXTENTS

Figure 1 - Example of a Page 1 of a Scout's 'Suggested Topographic Survey Workflow ' form showing the control recovered and set by the scout, as well as the suggested workflow for the field crew.



Scout Name: JIM BOB
Site ID: CBW05593-169855
Scouting Date: JUNE 20, 2012

INITIAL SETUP STA 5:
Occupy: CP203 BS to: CP202
Time Effort Estimate: 60-90 MIN
Pull-In (Using Repeat): NA
Set (FS: Using Repeat): NA
Check (Sideshot): BM201, BM102, BM200
Topo What: (P1) FINISH TOP OF SITE
(P2) BANKS, TORRACE & SLIP ACCESS ROAD
(P3) COMPLETE CONTEXT

INITIAL SETUP STA 6:
Occupy: BS to:
Time Effort Estimate:
Pull-In (Using Repeat):
Set (FS: Using Repeat):
Check (Sideshot):
Topo What:

INITIAL SETUP STA 7:
Occupy: BS to:
Time Effort Estimate:
Pull-In (Using Repeat):
Set (FS: Using Repeat):
Check (Sideshot):
Topo What:

INITIAL SETUP STA 8:
Occupy: BS to:
Time Effort Estimate:
Pull-In (Using Repeat):
Set (FS: Using Repeat):
Check (Sideshot):
Topo What:

SUGGESTED SURVEY PRIORITIES

SURVEY PRIORITIES (CORRESPONDS TO REGIONS ON MAP):

Ordered Priority Areas (Denoted on Map)	Priority (Critical, Desirable, Non-Essential)	Region Type (InChannel, SideChannel, Banks, Feature of Interest, Floodplain, Upslope Context, etc.)	Notes (e.g. "This is an area that appears to have experienced bank erosion.")
P1	CRITICAL	IN CHANNEL	GET HIGH DENSITY IN BOTTOM OF SITE
P2	DESIRABLE	BANKS, TORRACE	SURVEY LIMITS TO TIGHT IN 2011
P3	DESIRABLE	UPLAND CONTEXT	
P4			
P5			
P6			
P7			

Scout's Estimate of total time required for survey (+/- 1 or 2 hours):

NOTES ON ADDITIONAL MANDATORY SURVEY TASKS:

- DO BETTER JOB ON WATERS EDGE SURVEY ACROSS FROM STA 4 THEN 2011
- OPPORTUNISTICALLY GRAB POINTS IN P2 & P3 TO PAINT A BROAD BRUSH PICTURE OF TOPOGRAPHY BEYOND THE TOP OF BANK (e.g. 50cm TO 100cm CONTOUR INTERVAL; LOW POINT DENSITY)

NOTES ON OPTIONAL SURVEY TASKS (AS TIME PERMITS):

DON'T SPEND MORE THAN 30-45 MIN TOTAL ON P3 AREAS, MOST CAN BE PULLED IN FROM STA 1, & STA 5,

SCOUT NOTES FOR CREW:

SHOULD BE ABLE TO COMPLETE IN DAY.

Figure 2 - Example of a Page 2 of a Scout's 'Suggested Topographic Survey Workflow ' form showing the rest of the suggested workflow for the field crew and outlining priorites.

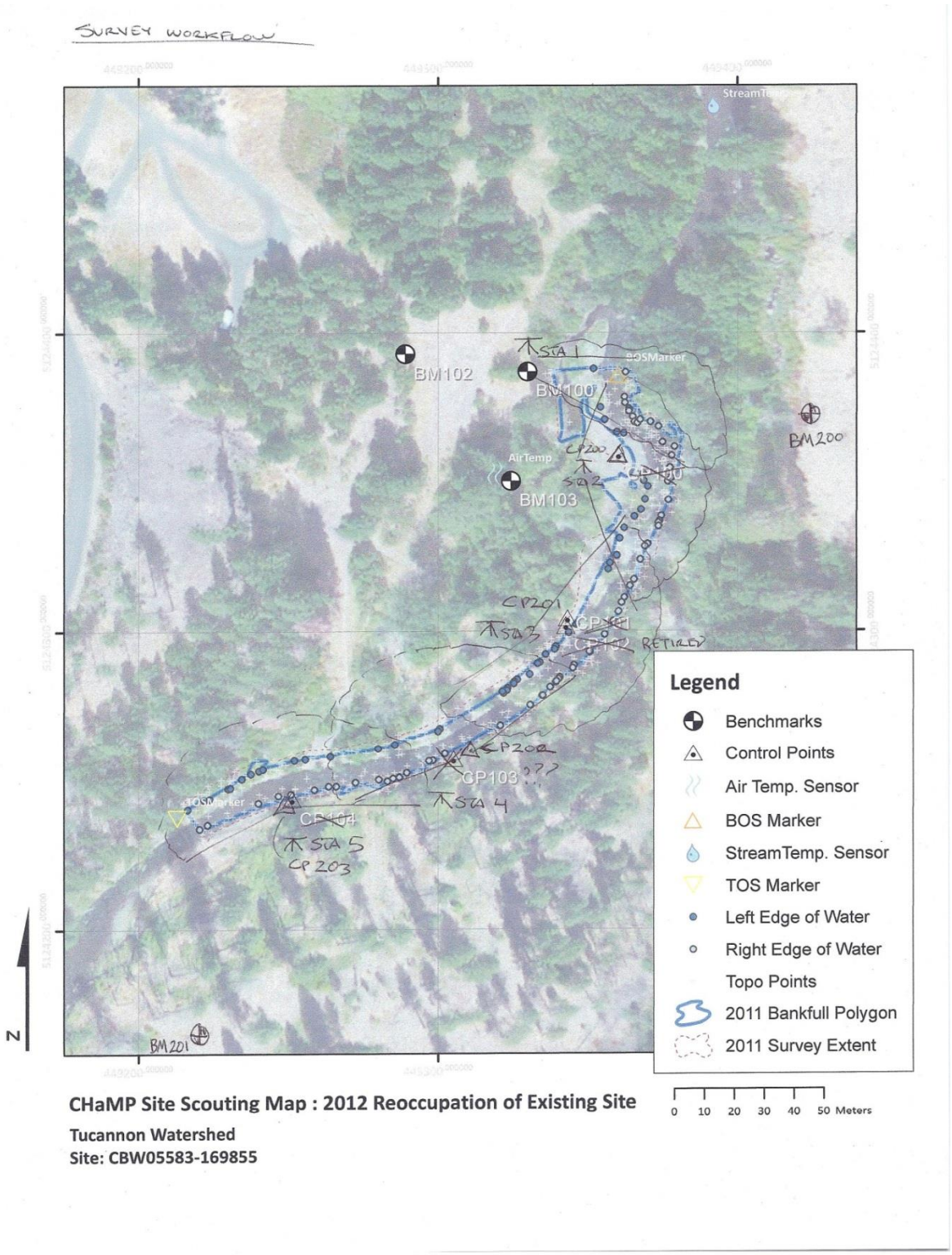


Figure 3 – The Site Scouting Map with an example of a Scout's sketch on top depicting the suggested Survey Workflow outlined in the form (Figures 1 & 2). The sktech outlines the individual setups and the workflow.

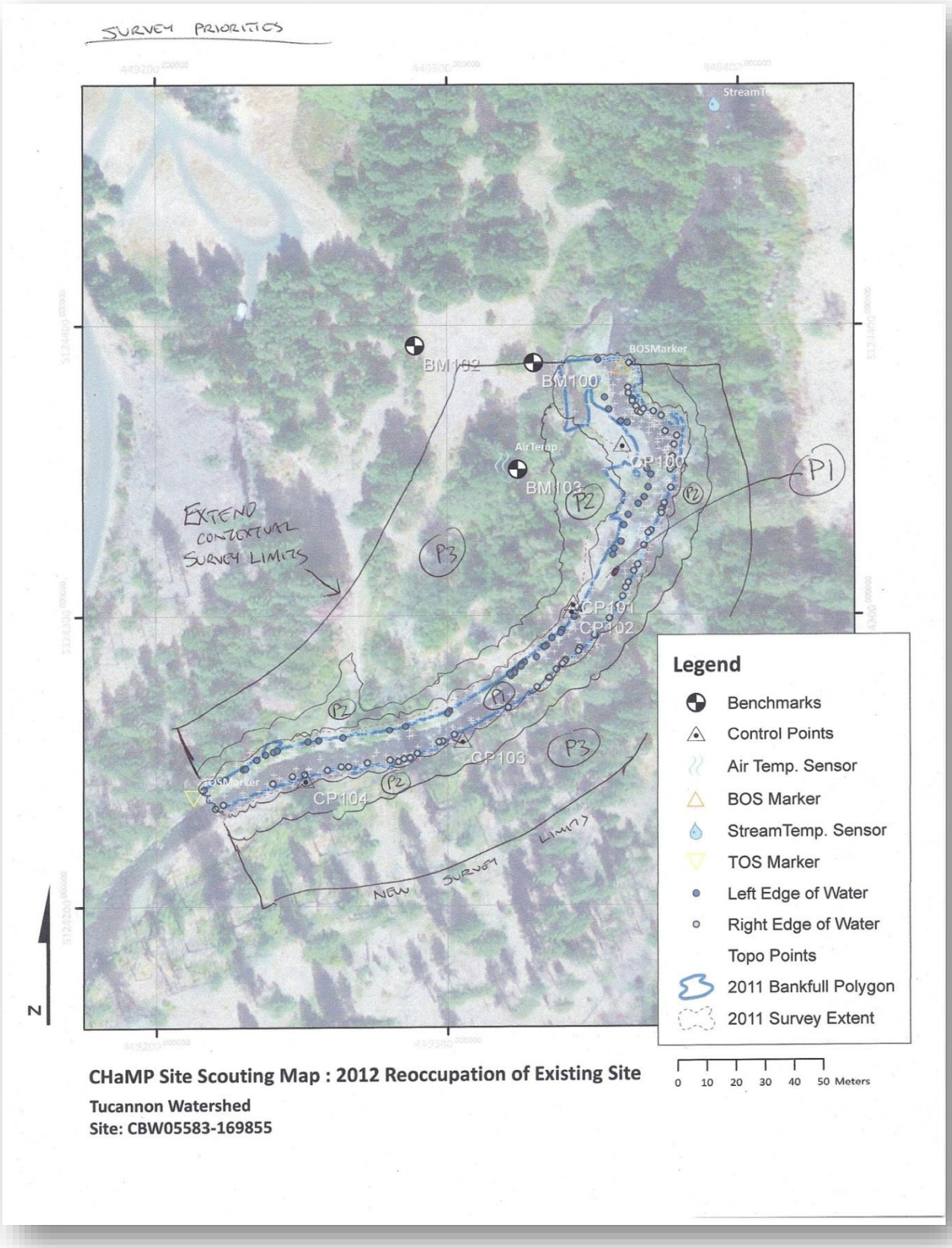


Figure 4 - The Site Scouting Map with an example of a Scout's sketch on top depicting the suggested Survey Priorities outlined in the form (Figure 2). The map depicts the survey limits and the priority of different survey areas.

Installing/Maintaining Temperature Loggers

Pre-field season

Calibration. Temperature loggers need to be correctly calibrated to ensure data is precise, accurate, and meets quality standards. Calibration requires the use of a NIST-certified thermometer. A detailed description of calibration is available from the Oregon Department of Environmental Quality: (http://www.oregon.gov/odf/privateforests/docs/sttempprofromwqg.pdf)

Programming/initiating. Use a laptop with Onset software to interface with loggers.

- Program the logger to collect hourly temperature measurements
- Make sure the time / date are correct. If your laptop's time / date are incorrect, the loggers' will be too.
- Ensure units are set to °C, not °F.
- The loggers' battery life will be displayed, ensure it has adequate life for your needs.

Launching. Loggers that have been launched are collecting hourly temperature measurements. Loggers can be launched with a laptop and Onset software, or remotely in the field. Use the method that best matches your needs.

Field season

Training. Ensure technicians are adequately trained to place probes. It is a good idea to review correct installation with technicians; incorporate information relevant to streams they'll be placed in. For example, in larger streams techs need to place probes so they won't get washed away in high flows. If a stream's flows are really low in late summer, make sure the probe is placed close to the streambed. It is also a good idea to carefully train techs to download data; this has been an issue in the past with some crews.

Logger timeline. In order to correctly summarize data installation and removal dates must be correctly entered into the logger. It is a good idea to examine temp probes whenever a site is visited for any reason. It may be gone, need to be replaced, etc. Documentation of these events will allow temperature data to be 'trimmed', and help investigate suspicious readings during QA.

Reviewing data after hitches.

Step 1: It is highly recommended crews download air and water temperature data from sensor shuttles as close as possible after the site visit.

Step 2: Review water and air temperature data on laptop to quickly assess if new air or water sensors should be installed at the site. (see flow chart below) Additional data quality checks will be performed on CHaMPmonitoring.org after data upload.

a. Water Sensor
    i. Does sensor appear to be submerged continuously at the placement location throughout the year?
        1. Review water temperatures and identify daily fluctuations of more than 15°C for more than 3 consecutive days. This likely indicates the logger is out of the water.
        2. If so, how often does this occur? If this occurs for a combined period of over 10 days during a season, consider moving the sensor.

ii. Does the sensor appear to ice over during winter months?
    1. Review water temperatures during winter months and identify if temperatures become erratic or stabilize at 0C. This may be inevitable at some sites, but it is worthwhile to review the frequency and duration of the icing events, as loggers may become damaged during ice events.

b. Air Sensor
    i. Does sensor appear to experience direct sun exposure frequently and for extended periods of time?
        1. Review air temperature and identify the number of days with temperatures xx over the weekly mean for the month.
        2. Review air temperatures and identify the number of days with temperatures below xx under the weekly mean for the month (direct snow coverage or water submersion?)

Documenting Site

- Document (new site) or update (existing site) site descriptions, driving directions, hiking directions, landowner information, etc.
- Assesses qualitatively whether any major geomorphic changes occurred since previous visit, and scope areas upstream of site for potential changes/events that might have or could in the future contribute to site changes (e.g. new landslides, major landuse changes, etc.)

Post Scouting

After a scout finishes scouting they must upload and enter relevant data for each site. This will include downloading the temperature data loggers, entering site information into the CM database, preparing the Suggested Topographic Survey Workflow form and Site Scouting Maps as well as any other survey-specific items that the crew needs to know[2]. Below are the steps required for post-scouting.

Temp loggers (this needs to be figured out)

1) Stream temperature data will be on the shuttles, which will need to be uploaded on the field computers. Each site will need to be zipped and saved under the :site/ temperature folder.
2) Air temperature loggers will also need to be uploaded onto the field computers.

Site data

1) All scouting information filled out
2) Transformation of old sites

Improper Benchmark Location- Follow the procedures below for "retiring" improperly placed benchmarks:

[2] Note, if scouting takes place the day of the survey, the scout can simply provide the scouting forms and map to the crew in person.

1) Locate the existing benchmark rebar with a metal detector, if needed.
2) Remove the benchmark identifier cap and replace it with a Control Point (CP) cap-assign it a name according to agreed upon naming convention (year dependent, i.e., 100, 200, 300, 400).
3) Flag and cap the CP.
4) GPS the CP using the new name.
5) Designate as a "retired" benchmark and provide a short explanation on the scout form.
6) Find a location for the new benchmark following the steps below and record it properly on the scouting form.

Lost Benchmarks

1) Indicate which benchmark is lost on the scouting form. Include the benchmark number and year established.
2) Find a location for the new benchmark. Record all information on the scouting form.

New Benchmarks- New benchmarks will be established at revisited sites if it is determined that the pre-existing benchmarks were 1) Improperly placed or not well spaced in an equilateral triangle, or 2) Lost- the scout could not find the benchmark. In either case new benchmarks will need to be established.