SFBBO Habitats Surveillance Protocol – Summer 2018

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Purpose

This survey is designed to track the germination and establishment dynamics of species from an overview perspective. It also intends to generally describe vegetation structure throughout large stands. It does not provide quantitative data for use in statistical analyses. It provides observations that can be summarized to create a generalized model of the plant community that is similar to quantitative data at the coarse scales required.

Site Description

Site must be described so that observations can be considered in the context of site history, landscape setting, topography, soils, hydrology, and propagule pressures (particularly all active vegetation management). Site description shall also include a layout map showing relevant information for implementing the protocol. Example:

Figure 1. Treatment sections and transect locations. Image source: Google Earth Pro, 2017.

Surveying Methods

This protocol uses permanent transects evenly spaced across the elevational gradient (1-D tessellation). The methodology is not designed to detect or control for any subtle patterns along the length of the seeded areas, as these are expected to be negligible in comparison to the very strong gradient expected along the slope due to the interaction of ground surface elevation and tidal hydrology.

Plot placement along transects are intended to sample within habitat zones. Zones are based on the interaction of tides and topography. Based on work by Thomson et al. (2013) and citations therein the zones are as follows:

High Marsh – MHW to MHHW plus 0.5m (Point Blue uses 0.3m above MHHW as their boundary)
Upland Transition – MHHW +0.5m to EHT plus 0.3m (tidal range varies throughout the estuary)
Upland – above EHT +0.3m (to wherever it ends, or create a convention to limit the survey)

Practical field delineation of these zones are done as follows: the hydrology of some restoration sites may evolve over time as breaches widen and channels scour, therefore datum should be assumed unstable and checked regularly. The wrack line is assumed to mark MHHW except following "King Tides" or extreme events. If these have occurred then use the most recent normal tidal wrack line measurement along each transect. The remainder of plot placement is detailed below.

Installation of Anchors:
In order to stably define a section for laying a transect tape, stakes are installed along the edge of each section, and at the midpoint. The number of stakes along each transect can vary but the goal is for observations to tend towards "permanent plots". Since plots can shift relative to the wrack line over time they should be considered anchored within a habitat zone rather than distance along a transect.

Transect Setup Points:
- Numbered sections are 100 meter lengths denoted by stakes
- Each section is divided into subsections every 50 meters, also denoted by stakes
- At each transect the zero-point should be defined by a convention to simplify data management

Sampling Set-up:
Locate the stakes for the section or subsection being sampled. Started at your 0-point, pull the transect tape towards the other stake. Make sure the markers match the locations recorded in your Table 1.

Quadrats are placed in zones as follows: every 10m in the upland zone, every 5m in transition, and one quadrat in high marsh (depicted in Figure 2 below). Quadrat placement should be based on uniform distance along each transect, evenly spaced (stratified) within each zone, and opposite to the side walked.

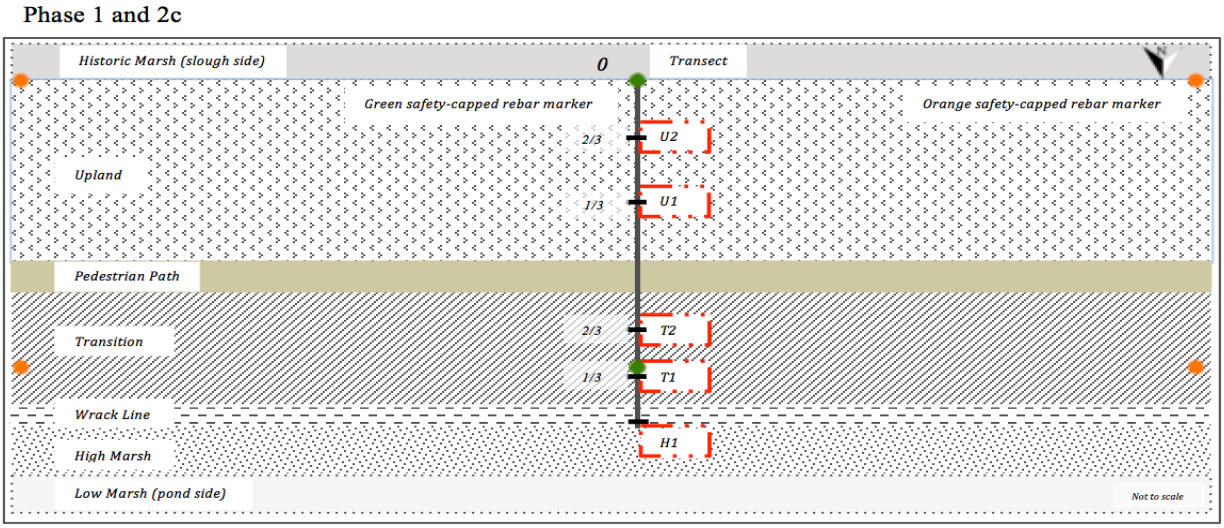

Figure 2. Quadrat location concept map for a wide site.

This generalized layout can vary, depending on the layout of the site, such as in Figure 3 below.

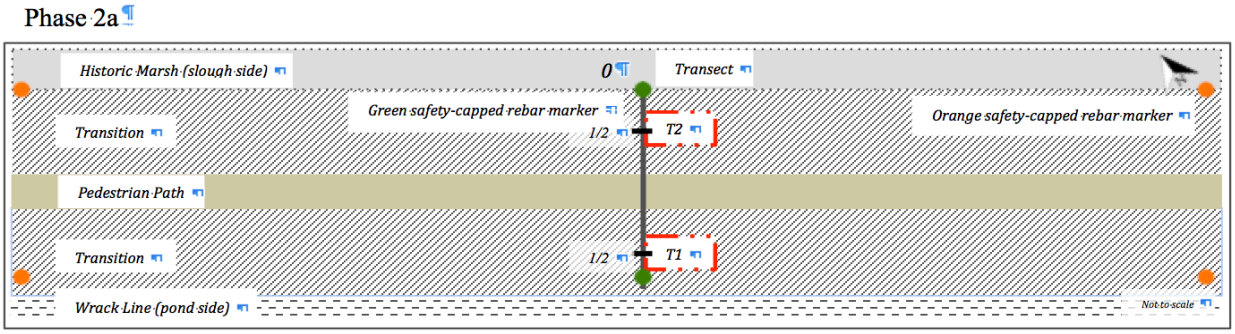

Figure 3. Quadrat location concept map for a narrow site.

Data Collection:

- Perform an ocular estimation of *Absolute Presence* and *Average Height* (Classes in Tables 1a & 1b) for each species found in the quadrat. Cover is estimated for vegetation and any other types. Cover can exceed 100% if layering occurs.
- If using a Daubenmire Frame (1/8m quadrat), then perform an ocular estimate of *Canopy Height* and *Relative Cover* (Tables 1c & 1d) within a meter radius at the quadrat's location by determining average height created by the bulk of the vegetation using a meter stick and cover vs. bare ground observed through the vegetation. The meter stick should also be used to delineate the 1m radius area.
- Priority weeds will be removed after estimating presence to track weed effort and efficacy (need weeding hours/effort for this assessment).
- Unidentified species should be photographed/sampled, and recorded on the datasheet (unk 1, unk 2), and identified for future classifications. Surveyors should try to correctly identify unidentified species when entering survey data.
- Monitoring will occur three times per year as follows:

    1) Winter Survey: first week of January (king tide season)
    2) Spring Survey: first week of May (peak veg for transitions)
    3) Fall Survey: first week of September (covers summer and fall seasons)

Absolute Presence Class	Range (%)
Rare	0 – 5
Uncommon	10 – 25
Common	33 – 100

Average Height Class	Range (cm)
Short	<30
OK	30-45
Good	45-60
Tall	>60

Average Canopy Height	Range (cm)
Short	<30
OK	30-45
Good	45-60
Tall	>60

Relative Canopy Class	Range (%)
Sparse	≤5
Low	10-25
Moderate	33-50
Dense	66-90
Closed	>95

Tables 1 a: cover classes, b: height classes, c: canopy height, and d: canopy classes.

Technical Note:
Presence and Canopy cover classes are "discrete", meaning they have space between the ranks. Traditionally ranks are essentially "continuous", which in this case implies a level of precision that is both inappropriate and unnecessary. The purpose of making the ranks discrete is to force the observer to make stronger decisions when the observed cover is close to a boundary between ranks. For example, compare the choice "is the cover less than or more than 33%" vs. "is the cover less than one-quarter or more than one-third".

This technique may cause consternation for some observers who believe they are able to discern fine-scale differences in plant cover. Some may wonder what about the values between the discrete ranks. But research has continuously shown that ocular estimations are not accurate unless the ranks are larger or less precise (Daubenmire, 1959). Humans are simply unable to perceive fine scale changes in plant cover without some visual aid, and in the case of describing the composition and structure of an entire plant community such detail is unnecessary and often clouds the description.

One additional benefit from reducing the level of detail to a suitable level for the questions asked is to reduce monitoring efforts to a minimum. The larger the ranks the faster the surveys occur because the observer takes less time deciding on a rank since the choices are less detailed. This allows project resources to be expended on increasing the quantity or quality of restoration instead of on collecting needless results detail.

Our conclusion is fine details are at best unnecessary, and at worst misleading for studies of whole plant community dynamics. We have worked to reduce the level of effort required for monitoring to the greatest extent possible in order to conserve project resources. By testing a wide variety of sampling methods and levels of effort, we found the method described here provides a description of the plant community's composition and structure that matches what higher effort methods provide.

Peer-reviewed publication in production.

References:
Daubenmire, Rexford. 1959. A canopy-coverage method of vegetational analysis. *Northwest Science* 33.1: 43-64.

Thomson, D. with input from: H. Shellhammer (SFSU Emeritus), C. Overton (USGS), C. Sloop (CDFW), L. Valoppi (USGS-SBSPRP), B. Traut (CCSF), K. Moffett (Stanford), M. Goman (Sonoma State), & B. Fulfrost (BKF & Associates). 2013. Critical Tidal Marsh Ecosystem Habitats at the Bay's Margin: a description. Technical Document submitted to the USFWS Coastal Program. 12p.