



MONITORING PROTOCOL
for
Riparian Plant Community Composition

objectives of the
LEFT HAND WATERSHED CENTER ADAPTIVE MANAGEMENT FRAMEWORK
AUGUST 2, 2021

This document describes the monitoring protocol for plant community composition in riparian areas of the St. Vrain Basin. This research protocol addresses plant community composition and reduces surveyor subjectivity by using a point-intercept approach. Recommendations are for typical and expected conditions. Professional judgment will be necessary for exceptions to the norm. In these cases, alterations to the design and their basis should be recorded in field notes. Adhere to the adjustment in ensuing monitoring cycles.

Site Information

Describe each site by Site Name, Creek Name, and Watershed Zone (Canyons, Foothills, Plains). Plots will be labeled by site name, transect number, bank (river left or river right), and riparian zone (upland, creek edge, or other). These descriptors are important for data analysis.

Transects – RIPARIAN SITES

Each reach or site (reaches are stream length measured by 20X the wetted width) will have three transect locations that span the length (equidistant to each other) of that reach or site. Each transect will be established from the river left bank. Place transects perpendicular to, and crossing, the stream. Endpoints should be approximately the same elevation for bilateral height similarity. Length of transects will vary slightly, but should extend from an riparian upland plant community on one river side to an riparian upland plant community on the other river side.

Monument transect endpoints with capped rebar and GPS. As a contingency for inadequate satellite signals, take photographs and provide a written description of the transect location (e.g., “Left bank endpoint next to box-elder ~25 yards downstream of footbridge”). Surveyor’s flagging may be helpful along the course of the transect (for example, the upstream transect of Reach 1, Canyon Restoration Project, benefits from intermittent flagging).

Plot location – RIPARIAN SITES

Each transect will be established from the river left bank and have 1-2 plots for each riparian zone. At minimum, plots will be established on each bank representing the creek edge and upper riparian zones (totaling 4-8 plots at four riparian zones, see Figure 1 for illustration). Additional zones and plots may be established depending on presence/absence of other riparian transition zones and will be grouped as “other” in data analysis. Plots are 6-ft in width X 12-ft long and are centered along the transect tape. Locate plots along each transect at the following locations on both sides of the channel, guided by landform:



- Creek Edge Plot 1: One plot at the edge of the channel on one bank, indicated by the first occurrence of perennial vegetation closest to open water, eg. “creek edge”. The 12-ft length of each plot runs parallel to the creek and the 6-ft width runs along the perpendicular transect tape. First, locate where the transect tape (to the nearest half-foot) overlaps the creek edge. From this location, establish the 12-ft plot length by extending 6-ft upstream and 6-ft downstream from the transect tape. Then extend the plot width 6-ft away from the creek edge along the transect tape and create the other 12-ft plot length. Record the center point measurement from the transect tape (in feet).
- Upland Plot 1: An upland plot will be established in the upland riparian zone on one bank. It is site-specific and should be discernable according to landform and/or vegetation. Typically, the upland zone plots will be classified as upland or floodplain. Plot 1 should be placed where the transition in vegetation occurs along the transect.
- Intermediate riparian zone plots may also occur and should be discernable according to landform. These plots may be classified as floodplain, terrace, vegetated island, overflow, or upper/lower riparian, depending on landform. Plot locations should be selected and named following the same method for upland plots described above.
- In the event that any plot overlaps with a plot representing a different zone, adjust the position of the upper plot so that there is no overlap.
- Identify each monitored zone in data sheets.

The center point of each plot is on the transect tape. Record the center footage of each plot on your data sheet and with a GPS. Additionally, record the start and end locations of each transect in feet on the data sheet, where 0 ft is the transect endpoint on the left bank. For example, a plot located along the upland zone that’s center point is established at 10 ft from the left bank endpoint would be recorded at 10 feet and a second plot (optional) would be recorded at four feet (remember, you are moving away from the creek for the second plot and, in this case, towards the left bank endpoint).

Plot naming

Each plot should be named with the following convention:

SiteName_TransectNumber_BankSide_CommunityType/RiparianZone_Replicate Number

Example: 63rd_Transect1_LeftBank_CreekEdge_1

Example shortened: 63rd_T1_LB_CrkEdg_1

Plant community composition protocol (Point-Intercept Method)

1. In each 6-ft X 12-ft plot, create a grid or mini-transects (Figure 1) using measuring tapes extended 12-ft from edge to edge every foot along the 6-ft width.
2. Measure hits at each point where tapes crosses using a grid or every foot along the six 12-ft mini transects. For each 12-ft grid line or mini transect (Figure 1) you should have 12 hits. Since there will be 13 possible hits, alternate first hit along upstream edge in grid or on mini transect from 0-ft and 1-ft to ensure only 12 hits are collected along each line.
3. To measure a hit, slowly move a pin flag down from the air (using your hand the whole way, not dropping it) to help you to identify the top plant in the layered "canopy". Canopy is measured from breast height and down.
 - a. Every species touching a pin flag at a designated point is recorded with tallies on the data sheet. ID all plants to species, with the exception of the groundcover layer, which may be to genus in the case of mosses, liverworts etc. List species using 6 letter code- first three letters of genus and of species. Example CARATH for *Carex atherodes*.
 - b. If you come across an unknown species: collect a specimen outside the sample unit area and list species as Unknown X (replace X with number or letter), place specimen in a plastic bag and label with site, plot, replicate and unit number. In field notebook give description of unknown species.
 - c. If the flag reaches the ground surface, i.e. did not pierce a dense patch of plant growth at the bottom, ground surface substrate (bare ground, litter, lichen, moss, or rock) is recorded. Describe ground layer using the following cover classes: rock, fragment (pieces of rock), gravel, sand, clay, moss, debris (woody origin), or litter (leaves/organic not woody and dead). Typically, all senesced plant biomass that was clearly from a previous year's growth is identified as 'litter'.
4. At the end of each plot, check that tallies total to 100 hits. If below the number of hits, use the pin flag to randomly add the extra hits needed. If above the number of hits, use best judgement to remove some extra tally points from the most abundant species.
5. After point intercept you will conduct a timed search. The search will be for 2-minutes. Conduct a timed search for species within each plot that were not hit using the point-intercept methods. Set a timer for three minutes and record any species present that were not hit in the point-intercept method with a "P" instead of a tally. This will equate to 0.01% abundance.
6. Then, record woody age classes present in each plot. Record the number of woody age classes at the bottom of your timed search species list using the following classifications: No. of age classes (seedling, <6 in.; juvenile , 6 in- 3 ft; mature, >3 ft; decadent/dead).

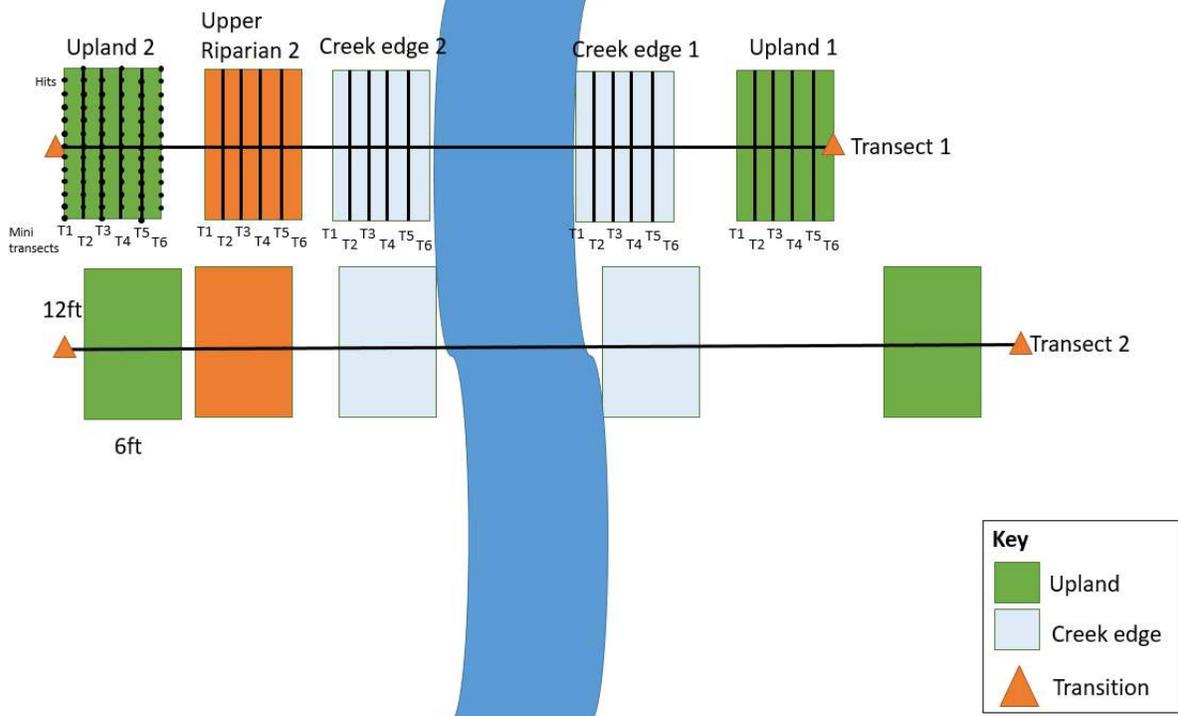


Figure 1. Illustration of mini transect set up for each plot. Imagine a lateral grid line where hit points are illustrated if creating a grid. Be sure to alternate first hits along 12-ft transect/grid lines to ensure you are taking 12 hits per line.

Data

Data sheets are organized by site information for each transect, plot information along the transect, and species information for each plot. Each sheet has room for three plots, and, therefore, more than one sheet may be needed to document all plots on a transect. Each column is plot-specific information and each row will be . Additionally, each species will also have descriptive information including species origin, life history, and growth. For each plot on the same transect, ensure that the tally number of hits for all species for each plot is equal to 72 after each plot's data have been entered. Collect data annually during late July or August, depending on snowmelt. Temporal data collection should occur for multiple years after restoration to assess trends over time.

Table 1. Site information descriptors and Parameters to be measured for vegetation monitoring.

Site Info or Parameter	Measurement or Description
Site Information	
Site Name	Reach Name
Creek Name	Left Hand, South St. Vrain, North St. Vrain, Middle St. Vrain, St. Vrain
Watershed Zone	Canyons, Foothills, Plains
Transect Number	Datasheets are organized by Transects for each site. Up to three transects per site.
Plots	
Plot Name	Data for three plots along the same transect can be recorded on one datasheet. For each plot record the name using the naming convention described above. Please log each plot in your GPS using the same naming convention.
Plot Location	Location of the center point of each plot along the transect, recorded in feet.
Plot Comments	Relevant comments for each plot, included coordinates for newly established plots.
Species	List of species or bare ground type. Record hits or tallies for each "hit" in your plot and a P if you found the species in your 2-minute Presence, "P", search. Species lists can be used for the four plot columns on your datasheet. If you do not see a species in one of your plots, leave the hit column blank or write in "N/A"
Species Origin	For each listed species, record its origin as Introduced or Native
Species Life History	For each listed species, record its Life History or Duration as Annual, Biennial, or Perennial
Species Growth Form	For each listed species, record its Growth Form as Forb, Grass (including sedges and rushes), Shrub, or Tree
Woody age class count	No. of age classes (seedling, <6 in.; juvenile ¹ , 6 in- 3 ft; mature, >3 ft; decadent/dead)

¹ Juvenile shrub species defined as ≤3ft in height.