Southeast Coast Network

National Park Service
Inventory and Monitoring Division

Standard Operating Procedure 1.2.16

Wadeable Stream Reach-Scale Field Data Collection—Version 1.1

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Summary

The following standard operation procedure (SOP) outlines the procedure for collecting physical habitat data from previously selected and benchmarked wadeable streams. The purpose of this SOP is to ensure that data are collected using methods that are consistent between reaches and years. Using the methods described in this SOP will also ensure that the data will be comparable to data collected by other DOI agencies as well as non-governmental monitoring efforts. This SOP provides step-by-step directions and field data sheets tailored to the collection activities. The techniques and procedures outlined in this SOP were based on methods used by the United States Geological Survey (Fitzpatrick et al. 2008), the United States Environmental Protection Agency (EPA 2013), and the United States Department of Agriculture (Harrelson et al. 1994) and were modified for the Piedmont and Coastal Plain rivers in SECN parks.

Revision Log

Revision Date	Author	Changes Made	Reason for Change	New Version #
2022/03/24	Cooper, C. S.	Minor procedural changes, specificity	Operational Review	1.1

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Equipment/Materials List

- GPS or maps
- Magnetometer (to relocate buried benchmarks with magnets installed)
- Metal detector (optional; in case magnetometer fails)
- Data sheets (use water resistant paper)
- Clipboards (2)
- First aid kit
- Cell phone with camera (in case digital camera fails) and calculator capability
- Digital camera
    - Batteries
- Total station and accessories [1]
    - Prism
    - Measuring tape
    - Compass
    - Batteries
    - Tripod
    - Bipod
    - Pole
    - Trimble TSC3 data collector (handheld)
    - Hand-held clamp and cradle (to attach to pole)
    - Radio-link antenna (for hand-held)
- 100 meter (328 feet [ft]) reel tape (2)
- Flags/Flagging for cross-section identification
- Stadia rod
- Gravelometer

- Ruler/Meter stick
- Compass-clinometer-inclinometer
- Spherical densiometer
- Backpacks for transporting equipment
- Pencils
- Machete (and pole-saw if necessary)

[1]See SOP 1.2.17 *Setting Up and Configuring a Total Station—Version 1.1* (McDonald et al. 2022a) and SOP 1.2.18 *Using a Total Station to Conduct a Stream Survey—Version 1.1* (McDonald et al. 2022b) for additional detail on use of total station.

Prior to Conducting Field Work

Be sure appropriate park personnel have been notified of your activities. See park communication SOP 3.1.07 *Communicating Field Operations with SECN Parks—Version 3.0* (DeVivo and Corbett 2013) for the minimum level of notification and SOP 1.2.13 *Wadeable Stream Field Season Preparation—Version 1.0* (Gregory et al. 2022) for protocol specific instructions.

Reach assessments need to be done during low flow (baseflow) conditions. Check weather and flow conditions of the area you plan to visit; stream habitat assessments cannot be conducted during stormflow and runoff conditions.

Forms for each reach need to be prepared ahead of time for efficiency and to ensure that they are consistent with past surveys (see SOP 1.2.13 for detailed instructions on field season preparation). If this is not the first survey of the reach, print off a copy of the previous survey's Form 2 so that it can be used after the current survey is completed to make sure similar geomorphic surface interpretations were used. Also be sure to bring a spreadsheet containing the benchmark-to-benchmark distances and azimuths for each site as this will greatly reduce the amount of time necessary to locate benchmarks.

Field Assessments

Work Flow

Field assessments may occur in two concurrent work-flows accomplished by three to five people (Figure 1). Workflow A is focused on stream habitat assessment and standard transect data collection, Forms 1 and 2 (Figures A-1 and A-2 in Appendix A). Workflow B is focused on using the total station to survey the detailed transects and longitudinal profile of the stream, Form 3 (Figure A-3 in Appendix A). The stream map, Form 4 (Figure A-5 in Appendix A) should be drawn after all other data collection activities have been completed. Figure 1 shows the ideal reach-scale data collection workflow. However, due to reach conditions and field personnel, actual workflow may differ.

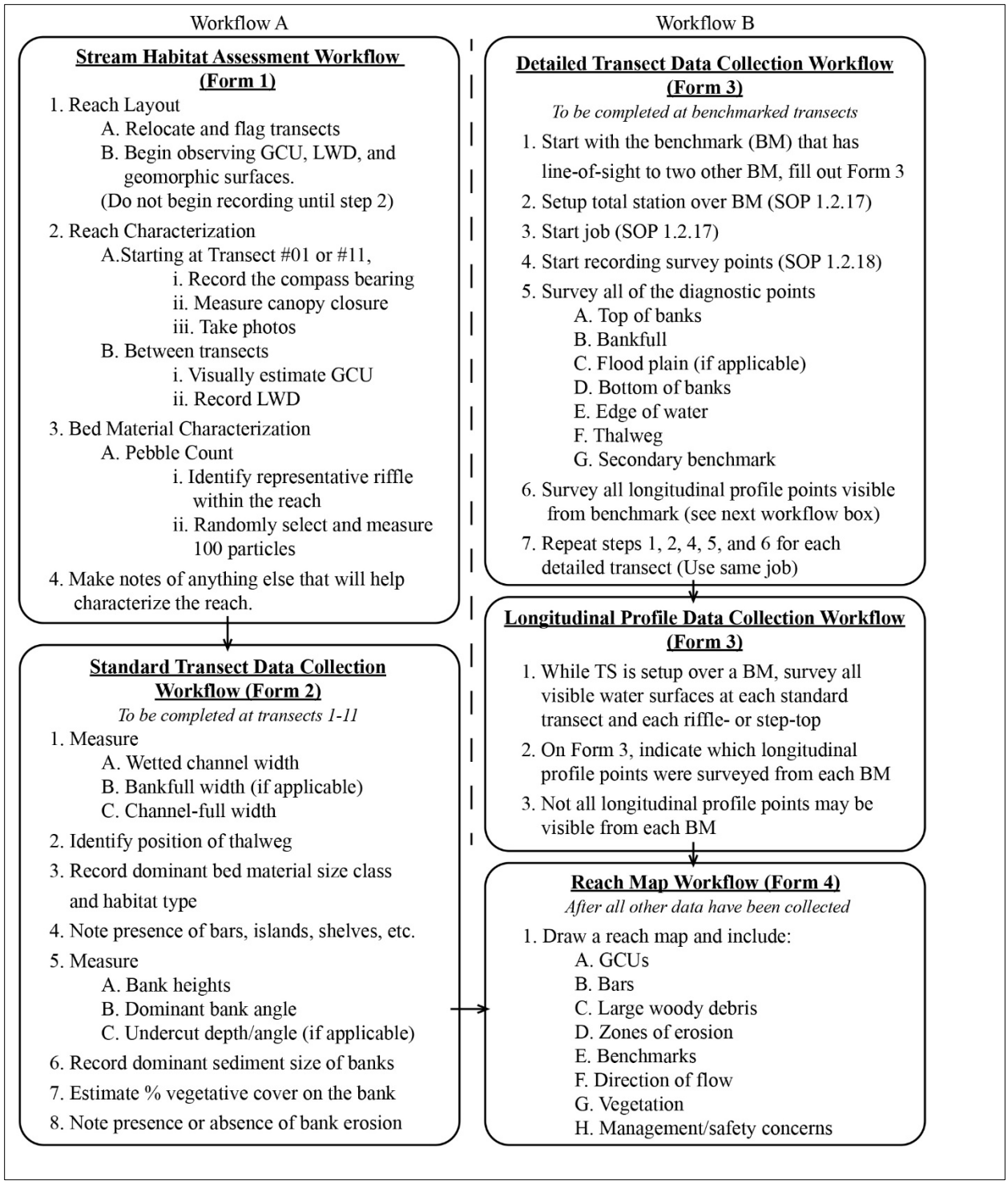

Figure 1. Ideal reach-scale data collection workflow. Due to reach conditions and field personnel, actual workflow may differ.

Procedures

Upon returning to the selected sample reach, locate a central location to unpack gear. Ideally this will be a flat place on the floodplain or historical terrace. Locating the staging area in a central, easily accessible area will minimize reach disturbance and reduce the amount of time that is needed to complete the assessment. Locate primary and secondary benchmarks (and tie points, if applicable) using the distances/azimuths table and magnetometer.

Prior to conducting the survey, the field crew will walk the entire reach to ensure that it is still wadeable and safe to survey and to properly recognize and identify diagnostic reference points such as active channel, bankfull (floodplain) levels, and channel full. In the event that the reach is no longer able to be safely surveyed (e.g., if colonized by beavers, or large tree fall has created a nonwadeable pool), the survey needs to be deferred to a later date. The protocol lead will make the decision to sample the reach later in the same season or to defer to the following year. If a reach cannot be surveyed for two consecutive years, the long-term viability of the site needs to be re-evaluated.

The total station will need to be set up over each permanent benchmark (including any potential tie-in points), so other equipment needs to be placed away from the benchmarks. It is best to unpack equipment so that it is easily accessible to all crew members. Crew members should discuss an optimal data collection strategy and divide the tasks amongst the members. The optimal division of labor will depend on whether there are three or more people available to conduct the survey.

The person conducting the detailed survey will need to be skilled in operating the total station. Additionally, the detailed transect surveyor needs to have identified appropriate diagnostic reference points during the initial site walkthrough so that they can be accurately surveyed.

Reach Layout and Characterization (Stream Habitat Assessment Form 1)

Much of the header information on Form 1 (see data sheets below) should be filled out during field season preparation (e.g., latitude/longitude of each reach). Once the middle benchmark (BM 2) has been located, begin the survey by recording the following information:

- Date and time of survey.
- Initials of persons involved in field data collection.
- Weather conditions at the time of sampling including cloud cover, wind, and temperature.

Once the supplementary data have been recorded, begin laying out the reach using the 100-meter (328 ft) reel tape (Figure 2). While finding and flagging transects, begin observing the geomorphic channel units (GCU), presence of large woody debris (LWD), and important surfaces (i.e., point bars, floodplains, and historical terraces).

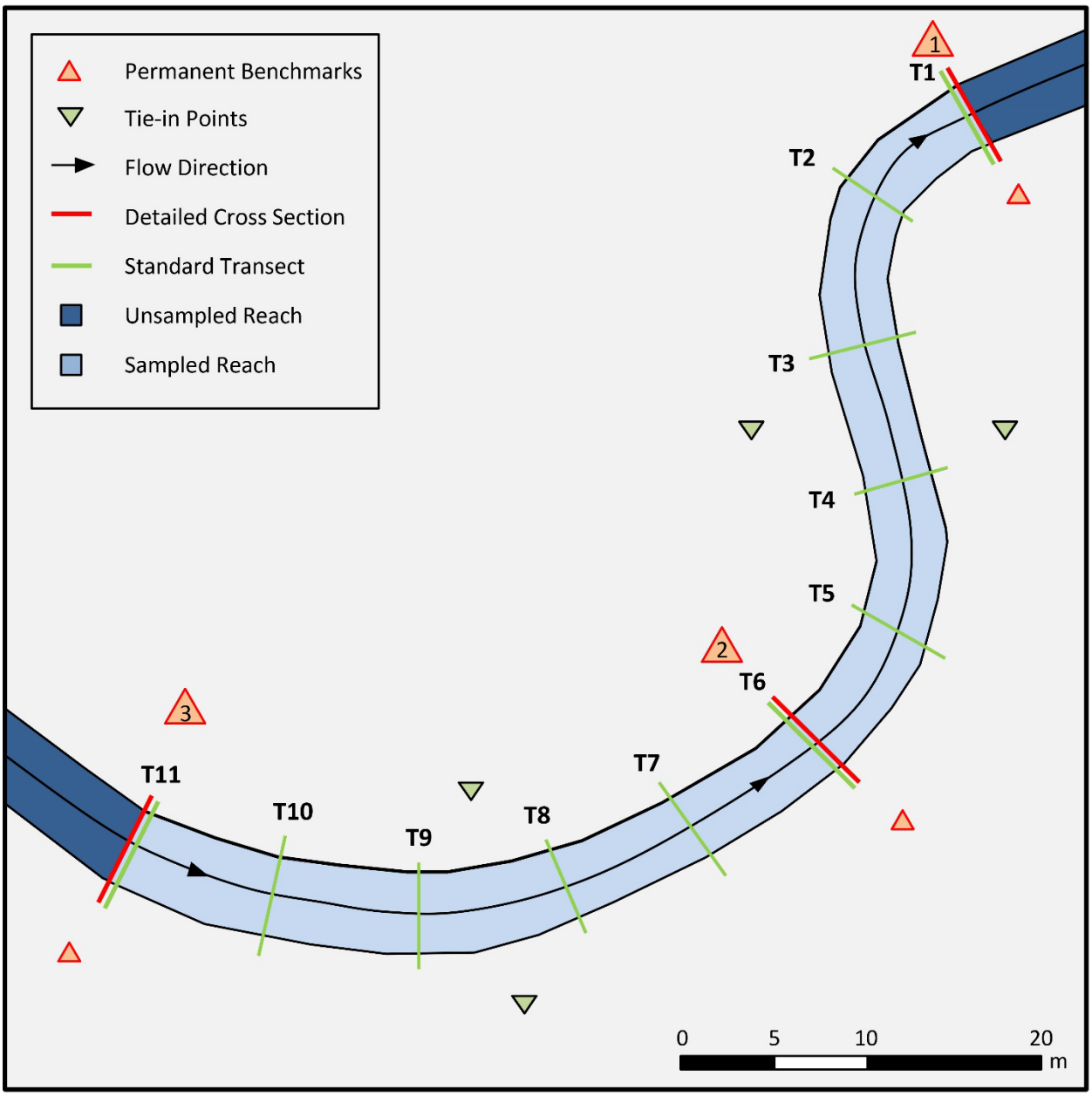

Figure 2. Hypothetical stream layout. Permanent benchmark 1 should be the most downstream benchmark (transect 1) and permanent benchmark 3 should be the most upstream benchmark (transect 11). Permanent benchmarks should preferentially be installed on river left as all future transects will be standardized based on distance from the left benchmark. Note, tie-in points are not always required and are only needed if impenetrable vegetation prevents line-of-sight between benchmarks.

- During this initial setup, do not attempt to record any observations. In addition to flagging the 11 transects, the purpose of this initial setup is to become familiar with the stream. This will help ensure that once surveying begins, the measurements and identification of GCU and geomorphic surfaces will be consistent.

Once all 11 transects have been flagged, begin the survey at transect 1 (most downstream transect). Record the compass bearing from the middle of the transect to the middle of the next upstream transect (bearing is not recorded for transect 11). Use the modified spherical densiometer (Platts et al. 1987) to measure canopy closure from the center of the channel. Canopy closure is measured by counting and recording the number of line intersections on the densiometer that are covered by vegetation facing: (1) upstream, (2) the left bank, (3) downstream, and (4) the right bank (Figure 3).

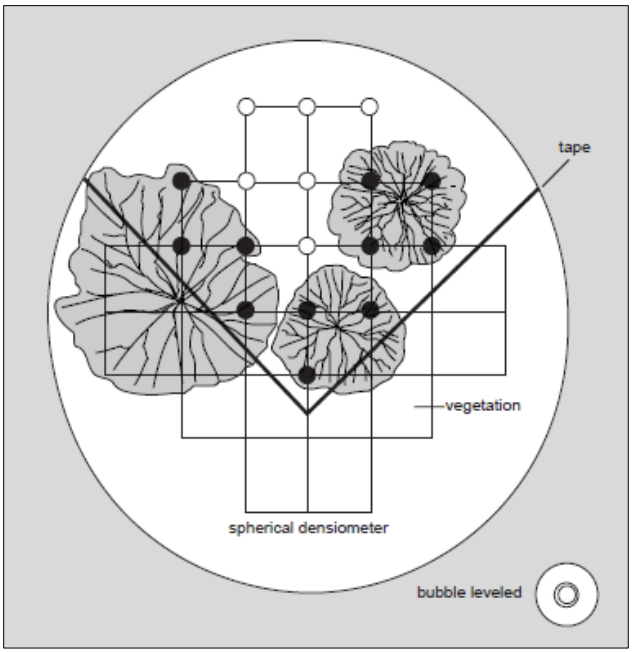

Figure 3. A concave spherical densiometer with bubble level, tape, and 17 points of observation. Lines of intersections at both open and closed circles are examined. Closed circles represent line intersections counted in the measurement of canopy closure (11 out of 17 points) (from Fitzpatrick et al. 1998). Observer stands in the center of the stream with the point of the taped-V towards the observer.

Before traversing to the next transect, from the middle of the channel, take pictures looking upstream, downstream, and at each bank. Have a field crew member hold a small white board in each photograph labeling the photograph (e.g., T1 up, T1 down, T1 left, or T1 right).

The last observation that needs to be recorded before moving to the next transect is to make a visual estimate of the GCUs (Table 1) that are present between this transect and the next transect (e.g., 50% riffle, 10% run, and 40% pool). Record their percentages (to the nearest 5%) on Form 1.

Table 1. Types and descriptions of geomorphic channel units (GCU).

Geomorphic Channel Unit	Abbreviation	Description
Riffle	rf	Relatively shallow areas of the channel where water flows swiftly over completely or partially submerged obstructions creating surface turbulence.
Rapid	rp	Areas where stream gradient is relatively high and water flows swiftly over completely or partially submerged obstructions creating 'white water' areas.
Run	rn	Areas with moderate depth that are flowing with moderate velocity and have no surface turbulence. Typically found in the transitional area between riffles and pools.
Glide	g	Relatively deep portions of the stream that are free-flowing and have no surface turbulence. Similar to a run though the water depth will be greater (relatively rare GCU).
Pool	p	Portions of the stream that are slow moving and relatively deep.
Step	s	Created when a blockage (due to bedrock or large woody debris) is created in the stream creating a step-like structure in the longitudinal profile of the stream.

Once all of the above measures have been recorded for each transect, traverse downstream from T1 recording the location, diameter (at mid-point), and length of all in-channel large woody debris (LWD). Record all pieces of LWD that have a diameter greater than 10 centimeter (3.9 in) and are greater than 1 meter (3.3 ft) in length. Record the location of a piece of LWD based on its mid-point. If the midpoint of a piece of large woody debris is between two transects, record its location as the closest downstream transect. Additionally, record the function and position of each piece of LWD using the LWD type codes listed on Form 1 and presented in Tables 2 and 3 in this document.

Table 2. Large woody debris positions used in wadeable stream assessments.

LWD position	Abbreviation	Description
Free	FR	A free piece is completely within the channel and is not anchored by the banks or buried in alluvium. It is free to be transported downstream given suitable transporting conditions.
Bridge	BR	A bridge piece is elevated above the water, resting on both banks. These pieces are not immediate in-stream habitat but may be recruited into the channel in the future and, depending on size, may provide cover and shading.
Ramp	RA	A ramp piece has one end in the channel and one resting on the bank. This often occurs in cut banks.
Buried	BU	A buried piece is partially buried in streambed alluvium making it more stable that a free piece. A piece may also be classified as buried if it is pinned under other logs.
Jam	J	A jam refers to three or more pieces that are touching.

Table 3. Functions of large woody debris used in wadeable stream assessments.

LWD Function	Abbreviation	Description
Bank Protection	BP	The piece is protecting the bank from erosion.
Sediment Trap	S	Sediment is being trapped behind the piece.
Organic Trap	O	Organic matter (e.g., leaves) is being trapped behind the piece.
Pool Formation	P	A pool has been created behind the piece.
None	N	No function.

Finish characterizing the reach by recording any additional information (e.g., animal activity or evidence of riparian clearing) that will help interpret the data that were recorded. Once the above measures have been recorded, use the steps in the following section to characterize bed material.

Bed Material Characterization (Stream Habitat Assessment Form 1)

The type and size of bed material can be an important indicator of geomorphic processes occurring at multiple spatial scales and can reflect interactions between basin characteristics, climate, and land use/land cover. A Wolman pebble count will be used to describe the size and distribution of bed material (pebble count) from a representative riffle within each reach (Wolman 1954). Use the following steps to conduct the pebble count:

- Identify a riffle within the study reach that is representative of the reach. If the reach has been surveyed previously, then select the same representative riffle when extant.

- Individually and indiscriminately select 100 particles from the riffle, and measure (in millimeters) the b-axis of the particle using a meter stick or gravelometer. The b-axis refers to the axis that would prevent the particle from passing through a sieve (Figure 4).

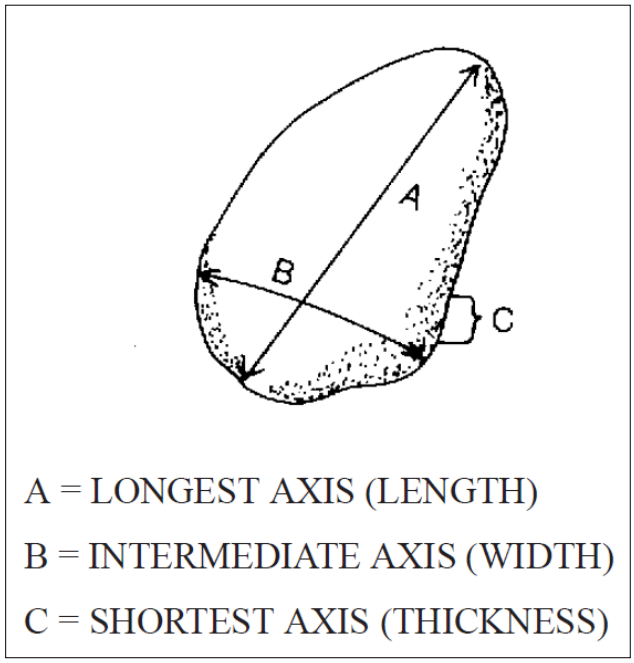

Figure 4. Particle axes. Measure and record the b or intermediate-axis when conducting the pebble count on the representative riffle (from Harrelson et al. 1994).

- An unbiased method that can be used to select particles is to select the first particle encountered at the end of your big toe (Wolman 1954). Do not preferentially select by size class (e.g., don't pick only large particles or small particles).

- Walk back and forth across the riffle randomly selecting and measuring sediment until 100 particles have been recorded.

- If the randomly selected particle is finer than sand (silt or clay), record the particle size as 0.062 millimeters. Standardized measurements will be used because a measurement of less than one millimeter for silt and clay can't be used when calculating the statistics.

Mandatory Water Break

- Upon the completion of Stream Habitat Assessment Form 1, personnel conducting standard transect surveys must return to the staging area to consume water.

- This water break should last approximately 10 minutes.

- The purpose of this break is to ensure the surveying team are operating within safe hydration levels. This helps to improve both situational awareness and morale; ultimately improving the quality of the data the team collects.

- Upon conclusion of the water break, the standard transect surveying team should gather equipment and begin Stream Habitat Assessment Form 2.

Standard Transect Data Collection (Form 2)

Standard transect data collected at each of the 11 transects will be recorded on Form 2. The majority of the header information should be filled out prior to conducting the survey.

The following measurements or observations should be made at each standard transect. The order that the data are collected need not be in the order that they are listed but based on field testing are listed in the optimal order. All width and height measurements should be made with a stadia rod or survey tape (or a similar surveying instrument) and recorded in meters to two decimal places.

- Measure the wetted channel, active channel, bankfull, and channel full widths (perpendicular to flow; Figure 5).

Figure 5. Annotated photo showing where wetted, active channel, bankfull, and channel full width measurements are measured. On the right hand side of the figure, active channel width and wetted width are measured at the same spot. Additionally, notice that the floodplain is discontinuous so bankfull width would only be measured on that lower surface where the surveyor can stand flat footed. Channel full width is also measured from where the bank flattens out away from the stream. The bottom of the bank corresponds to the active channel width line and is emergent (above the water surface) on the left side of the photo, where a bar is present (water depth at base is negative). The top of the bank in the middle of the photo (where a bankfull surface is present) should be measured at the bankfull surface; whereas, on the extreme left and right of the photo, the top of the bank corresponds to the channel full level.

  - Wetted channel width is measured where water is flowing (including undercuts)

    - Active channel width is measured to the beginning of vegetation within the stream channel
    - Bankfull widths should only be measured if there is a floodplain (or incipient floodplain) present.
    - Channel full widths are measured from the top of the lowest bank that is not a floodplain.

- If a mid-channel bar is present, subtract the width of the bar from wetted width. Only subtract the width of the bar from active channel width if the height of the bar is above active channel width height.
- If a floodplain is present, measure the width of the floodplain.
    - If a floodplain is present on both river left and river right, measure them separately.
- Identify the position of the thalweg (% distance of wetted width from left water edge) and its depth.
- Separately measure all of the bank characteristics for the left and right banks.
    - The top of the bank (bankfull and/or channel full) corresponds with the first continuous flat surface.
    - The bottom of the bank is emergent (above the water surface) ONLY when an in-channel feature (e.g. bar, bench) is present (Figure 5).
    - There will be no bankfull height measurement if bankfull width wasn't measured (no floodplain is present).
    - Record bank characteristics.
    - Bank heights are measured from bottom to top of bank using the stadia rod. Water depth at base (of bank) is recorded as the water depth on the stadia rod, while placed to measure bank heights. Water depth at base will be a negative number ONLY if and when the bottom of the bank is emergent (see above).
    - Measure the dominant bank angle with an inclinometer and stadia rod. If the bank is undercut, note the presence of the undercut and measure the angle of the bank overhanging the stream (Figure 6).

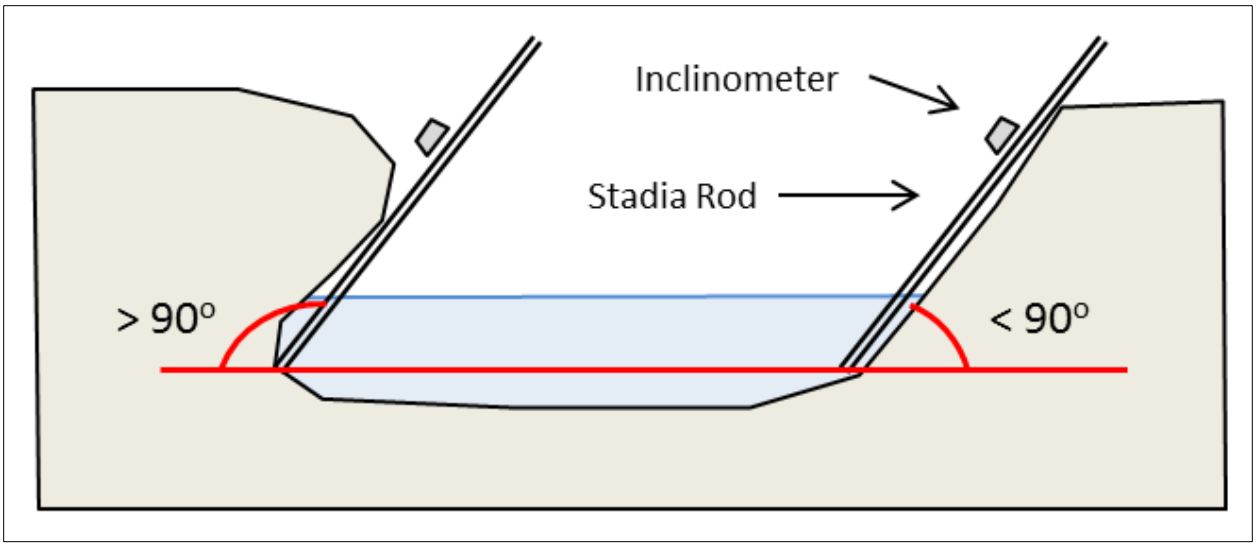

Figure 6. Examples for how to properly measure bank angle with and without an undercut.

- Determine the dominant bank sediment, both visually and texturally (by rubbing between thumb and fingers), and categorize using bank sediment codes given in Table 4.

Table 4. Bank sediment types and codes (modified from Fitzpatrick et al. 1998).

Bank Sediment	Code
Bedrock, artificial	BdR
Boulder,cobble	BdRC
Clay	Clay
Silty Clay	SiC
Silt	Si
Sandy Silty Clay	SSiC
Silty Clayey Sand	SiCS
Sand	S
Gravel/sand	GS

- Visually estimate the vegetative cover (including roots but not including leaf litter) and ground cover (including leaf litter) of each bank.
    - These estimates should be done on the transect and encompass an area about 1 meter (3.3 ft) wide from the bottom of the bank to the top of the bank.

        - Use the example cover figures at the bottom of the form and record the estimates to the nearest 5%.
    - Note the presence or absence of bank erosion as Y or N and note the type of erosion.
        - Lateral – lateral reworking/erosion of the bank
        - Slump – vertical movement/reworking of the bank
        - Undercut – the bank is undercut
- Determine the dominant habitat type (GCU) of the area 1 meter (3.3 ft) upstream and downstream of transect.
- Make a visual estimate of dominant particle size that characterizes the bed of the channel.
- Note any in-channel features present at the transect (e.g., bars, islands, shelves).
- Once the transect is measured, make any additional notes that will help characterize the transect or this portion of the stream.
    - Additional notes may include:
        - Presence of animal trails
        - Proximity to trees near to failure
        - Any other interesting characteristics that will help explain potential outlying measurements on the transect.

Detailed Transects Data Collection (Form 3)

In addition to the standard transect survey (Form 2), additional data will be collected at the detailed transects (optimally on standard transects 1, 6, and 11). The purpose of the detailed transect surveys is to collect data that can be used to characterize the cross-sectional morphology of the transect, allowing for the identification and quantification of erosion and fluvial development. These measurements also provide an understanding of the out-of-channel features/habitats that characterize/influence the reach. The detailed transects are surveyed with a total station setup on a permanent benchmark. If tie-in points are needed to complete the survey network, their coordinates will have been recorded on Form 3a (Figure A-4 in Appendix A) during reach set up (and should have been uploaded to the data collector prior to conducting the survey). See SOP 1.2.18 *Using a Total Station to Conduct a Stream Survey—Version 1.1* (McDonald et al 2022b) for more details about tie-in points.

For each detailed transect, fill out Form 3 to provide a context for the points that will be surveyed along each transect. Information that should be recorded on Form 3 includes (but is not limited to) the presence/absence of diagnostic geomorphic surfaces (e.g., floodplain or terrace) and a short description of the riparian habitat on each side of the stream (i.e., ground cover and presence/absence

of woody plants). A quick sketch of the surveyed cross-section with annotations (see point codes on Form 3) will help identify channel-full, bankfull, bottom of bank, etc. when the data are being processed.

Refer to SOP 1.2.17 *Setting Up and Configuring a Total Station* (McDonald et al. 2022a) for additional details and more specific instructions for setting up the total station. Refer to SOP 1.2.18 *Using a Total Station to Conduct a Stream Survey* (McDonald et al. 2022b) for more detailed instructions on how to properly survey each detailed transect and transfer the data from the data collector to the database. Follow the instructions in SOP 1.2.18 to conduct the detailed transect surveys and:

- **Be absolutely sure** to survey the benchmark on river left (if this isn't where the total station was set up) as all surveys will be standardized using the location of each point relative to the benchmark on river left.
- Record the file name used on the data collector on the bottom of Form 3.

Stream Reach Maps (Stream Habitat Assessment Form 4)

Once all data have been collected, draw a reach map that clearly defines areas characterized by riffles, runs, pools, and any other distinguishing in-stream features. This map should be drawn roughly to scale and in the correct orientation relative to the cardinal directions (include a compass-confirmed north arrow on the map).

Other important reference information to document on the maps includes:

- general stream heading and direction of flow;
- areas of bank erosion and undercutting;
- riparian zone disturbances (e.g., tree falls or manmade clearances);
- location of trees along the bank;
- any in-channel features (i.e., bars, benches, and islands);
- geomorphic channel units; and
- any other distinguishing features (e.g. large exposed roots in bank cut or presence of historical terrace or floodplain).

Detailed transect benchmarks and transect locations should also be included on the map.

See Figure 7 for an example stream habitat map. Reach maps will be scanned and archived with reach information in the database. Any symbols used in these maps needs to be described in the comments section of Form 4 so that they can be interpreted once in the office.

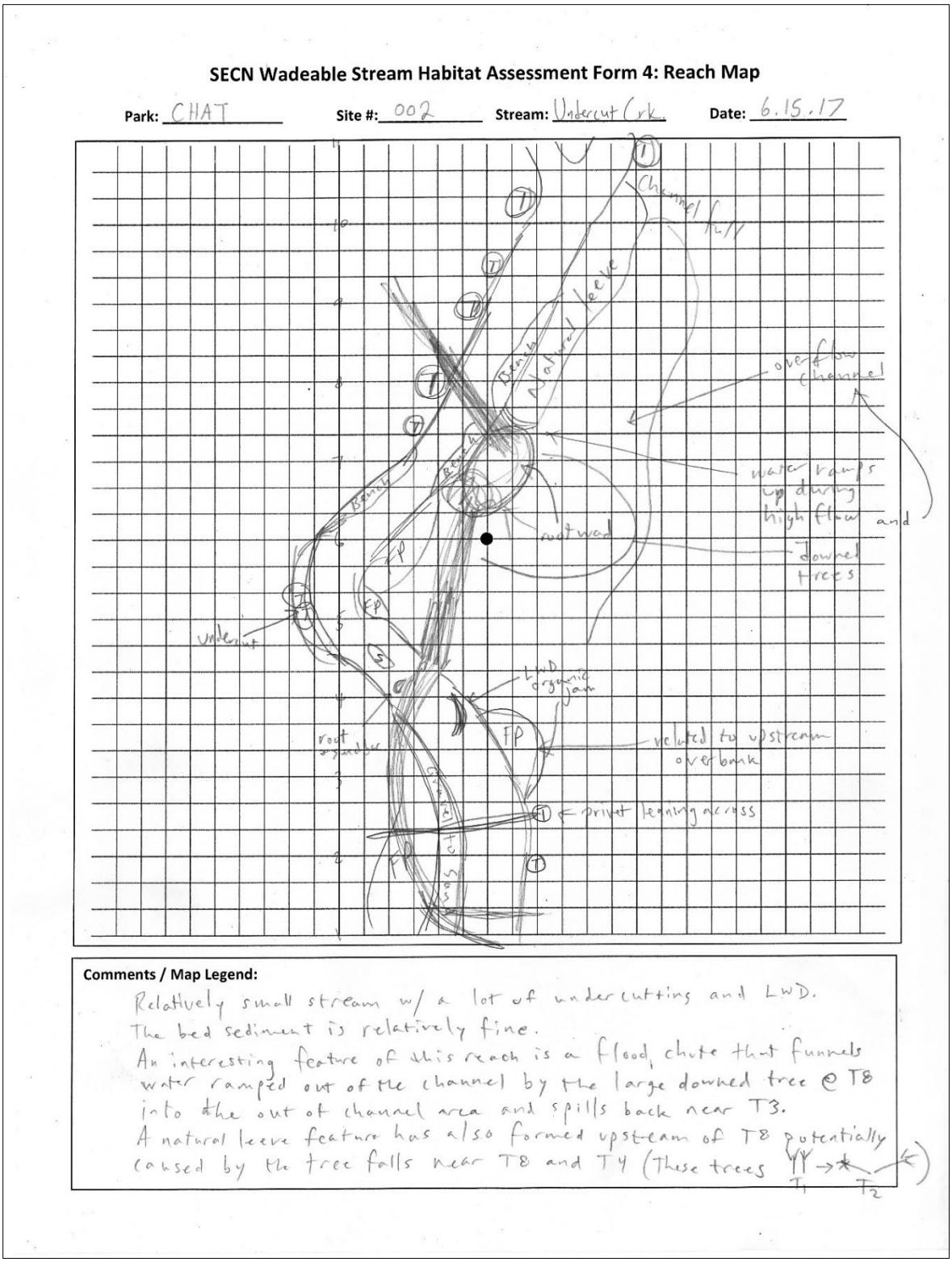

Figure 7. An example of a hand-drawn stream map showing some relevant habitat and geomorphic features.

Completing the Reach Assessment

Complete the reach assessment by doing the following:

- After all forms have been filled out, check to make sure all of the forms are numbered as page XX of XX pages and the pages are in the correct order.
- If it is not the first survey, compare Form 2 to the previous survey's Form 2 to insure similar interpretations of geomorphic surfaces were used (e.g., if a floodplain was measured previously, a floodplain (bankfull) probably should be measured on the subsequent survey).
- It is the responsibility of the crew leader to review all of the forms before leaving the reach to validate that all forms are filled out completely and correctly.
- Remove the temporary transect marking flags and examine the worksite for any equipment/trash associated with the reach visit.
- Fill out the post-survey form to help inform future surveys (Form 5).

Post Field Work Procedures

Decontamination of Sampling Equipment

The Southeast Coast Network seeks to prevent the introduction and dispersal of aquatic invasive species. Therefore, the network requires all equipment used during stream sampling to be decontaminated prior to entering a waterbody in another park. Procedures have been modified from the Great Lakes Network – large rivers water quality monitoring protocol v1.0 (Elias 2005).

When finished with work in a park, minimum decontamination procedures are:

1. Rinse and scrub mud, vegetation and other debris from sampling equipment using onsite river water. If available on site, tap water may be used as long as debris are not rinsed into another waterbody.
2. Allow waders, stadia rods, and other equipment to fully dry before proceeding to another park. Given high humidity in the southeast region, equipment may need more than 48 hours to dry. Placing equipment in direct sunlight will speed the process.
3. Visually inspect all gear to verify that all equipment and gear has been cleaned and rinsed.

In general, field work will not be conducted in multiple parks in the same day; however, if multiple parks will be visited within the same day the following procedures must be followed:

1. Rinse equipment as indicated above.
2. Soak all waders and boots in a 2% Sparquat 256 solution for 10 minutes or spray a 10% Sparquat 256 solution on equipment and let stand for 5 minutes; Sparquat is preferred over

bleach since it is less harsh on nets and wader material. Sparquat is available as a commercial cleaner manufactured by the Spartan Chemical Company, Inc.

3. Thoroughly rinse disinfectant solution off sampling equipment.

4. Visually inspect all gear to verify that all equipment and gear has been cleaned and rinsed

Equipment Storage

Following the field season, equipment will be stored at SECN headquarters. Non-electrical equipment, including PVC, cement, survey caps, clip boards, reel tapes, etc. are stored in well-marked plastic bins. Organization of equipment will ease field preparation for the following season and prevent damage caused by improper storage. Electronic equipment, including GPS units, cameras and the total station, will have their batteries removed during the winter months to prevent corrosion and leaking, and will be stored in cabinets in the SECN aquatic lab.

Total Station and Handheld

1. Remove the batteries from the total station.

2. Fully charge the total station and handheld batteries.

3. Wipe any dust from the total station and handheld.

4. Remove any debris (leaves) that may have found their way into the total station or handheld case.

5. Arrange for the Total Station to be calibrated by a qualified dealer prior to the start of the following field season.

Literature Cited

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Appendix A. Data Sheets

SECN Stream Habitat Assessment Form 1 - Reach Characterization (Version 1.0, June 2018)

Park -	**Site # -**	**Date -**	**Start Time -**	**End Time -**
Crew leader -		**Sampling Crew -**		
Stream Order -	**Reach Length -**		**Distance between Transects -**	
Northing -	**Easting -**		**Elevation -**	**Datum -** **Zone -**
Sampling Conditions - **Weather**	**Water Color/Clarity:**			

Sky	Cloudy	P Cloudy	Clear		**Wind**	Calm	Light	Windy	Gusty
Temp	Cold	Cool	Warm	Hot	**Precip**	None	Light	Mod	Heavy

No. of days since last precipitation **Amount** mm in

Geomorphic Channel Units - % coverage between transects

Transect	Pool	Glide	Run	Riffle	Rapid	Cascade	Step	Type of Step
1 - 2								
2 - 3								
3 - 4								
4 - 5								
5 - 6								
6 - 7								
7 - 8								
8 - 9								
9 - 10								
10 - 11								

Pebble Count (mm) (representative riffle)

1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

Step Types	**LWD Function**	**LWD position**
BR - Bedrock	BP - Bank Protection	FR - Free
B - Boulder	S - Sediment Trap	BR - Bridge
C - Cobble	O - Organic Trap	RA - Ramp
L - Log Jam	P - Pool Formation	BU - Buried
O - Organic Jam	J - Jam	J - Jam
M - Mixed Jam	N - None	

Large Woody Debris (> 10 cm diameter and > 1 m in length)

Transect	Length	Diameter	Function	Position

Transect		1	2	3	4	5	6	7	8	9	10	11
Upstream Bearing												
Upstream Photo												
Downstream Photo												
Left Bank Photo												
Right Bank Photo												
Densiometer	UP											
	LB											
	DOWN											
	RB											

Notes:

Figure A-1. Example of Stream Habitat Assessment Form 1—Reach Characterization.

SECN Stream Habitat Assessment Form 2 - Standard Transect Assessments (Version 1.0, June 2018)

Site Name/Number: Crew Leader: Sampling Crew: Date:

Start Time: End Time:

Transect	Distance Upstream (m)	Wetted Width (WW) (m)	Active Channel Width (ACW) (m)	Bankfull Width (BfW) (m)	Channel-Full (ChW) (m)	Thalweg Position (% distance from Left Bank)	Thalweg Depth (m)	Dominant Particle Size (Code)	Dominant Habitat Type	Presence and Type of In-Channel Feature (Code)	Floodplain Width Left (m)	Floodplain Width Right (m)	Notes (# and write in Notes section)
1	0												
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													

Left Bank	1	2	3	4	5	6	7	8	9	10	11
Bankfull Height (m)											
Channel Full Height (m)											
Water Depth at Base** (m)											
Bank Undercut* Depth (m)											
Bank Undercut* Height (m)											
Bank Angle °											
Dom. Sediment											
Erosion (No or Type)											
Vegetative Cover (%)											
Ground Cover (%)											

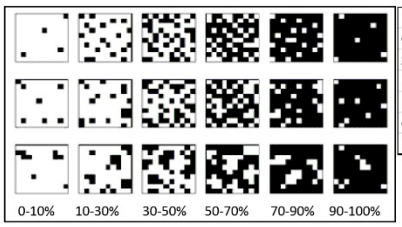
Right Bank	1	2	3	4	5	6	7	8	9	10	11
Bankfull Height (m)											
Channel Full Height (m)											
Water Depth at Base** (m)											
Bank Undercut* Depth (m)											
Bank Undercut* Height (m)											
Bank Angle °											
Dom. Sediment											
Erosion (No or Type)											
Vegetative Cover (%)											
Ground Cover (%)											

Notes:

* Undercut not part of ACW if below water at ACW water depth

** Negative if emergent

Dom. Sediment Codes	Size Range (mm)
BR- Bedrock	
B- Boulder	256.0-512.0
C- Cobble	64.0 -256.0
G- Gravel	2.0 - 64.0
S- Sand	0.063 – 2.0
SiC- Silt/Clay	<0.063
O- Organic	



Habitat Types
Cascade- waterfall >1m
Step- waterfall <1m
Riffle- relatively shallow with turbulent water
Run- relatively shallow with calm water
Glide- relatively deep but quickly flowing
Pool- relatively deep slow moving

In-channel Feature
L- Left
R- Right
M- Middle
BAR- Bar
B- Bench
O- Other (note decription)

Types of Erosion
L- Lateral
SL-Slump
U- Undercutting

Figure A-2. Example of Stream Habitat Assessment Form 2—Standard Transect Measurements.

SECN Stream Habitat Assessment Form 3 - Detailed Cross-Sections (Version 1.0, June 2018)

Park -	**Site # -**	**Date -**	**Start Time -**	**End Time -**
Crew leader -		**Sampling Crew -**		

BM #	**Transect # -**	**Bank Side -**	
Northing -	**Easting -**	**Elevation -**	**Datum -**
Site Description -			

Description of transect -

River Left - Out of Channel (Note - Presence/Absence of floodplain, terrace, vegetation, etc.)

River Left - Bank (Note - Presence/Absence of undercutting, slumping, etc.)

In-Channel (Note - Presence/Absence of bars, emergent boulders, large woody debris, etc.)

River Right - Bank (Note - Presence/Absence of undercutting, slumping, etc.)

River Right - Out of Channel (Note - Presence/Absence of floodplain, terrace, vegetation, etc.)

Total Station Codes
L - Left
R- Right
BM - Benchmark
OC - Out of Channel
Cf - Channel-full
FPm - Floodplain margin
Bf - Bankfull
BB - Bottom of Bank
WE - Water's Edge
CH - Channel
LONG- Longitudinal Profile
WS- Water Surface

Longitudinal Profile - (Circle points surveyed from this benchmark)

WS01 WS02 WS03 WS04 WS05 WS06 WS07 WS08 WS09 WS10 WS11

If the water surface at riffle tops/steps between transects was surveyed, indicate the position with an arrow between transect WS#s

Notes:

Figure A-3. Example of Stream Habitat Assessment Form 3—Detailed Transect Characterization.

SECN Stream Habitat Assessment Form 3a - Tie-in Points (Version 1.0, June 2018)

Park -	Site # -	Date -

Tie-in Point 1	Location -	Bank Side -	
Northing -	Easting -	Elevation -	Datum -
Site Description -			

Tie-in Point 2	Location -	Bank Side -	
Northing -	Easting -	Elevation -	Datum -
Site Description -			

Tie-in Point 3	Location -	Bank Side -	
Northing -	Easting -	Elevation -	Datum -
Site Description -			

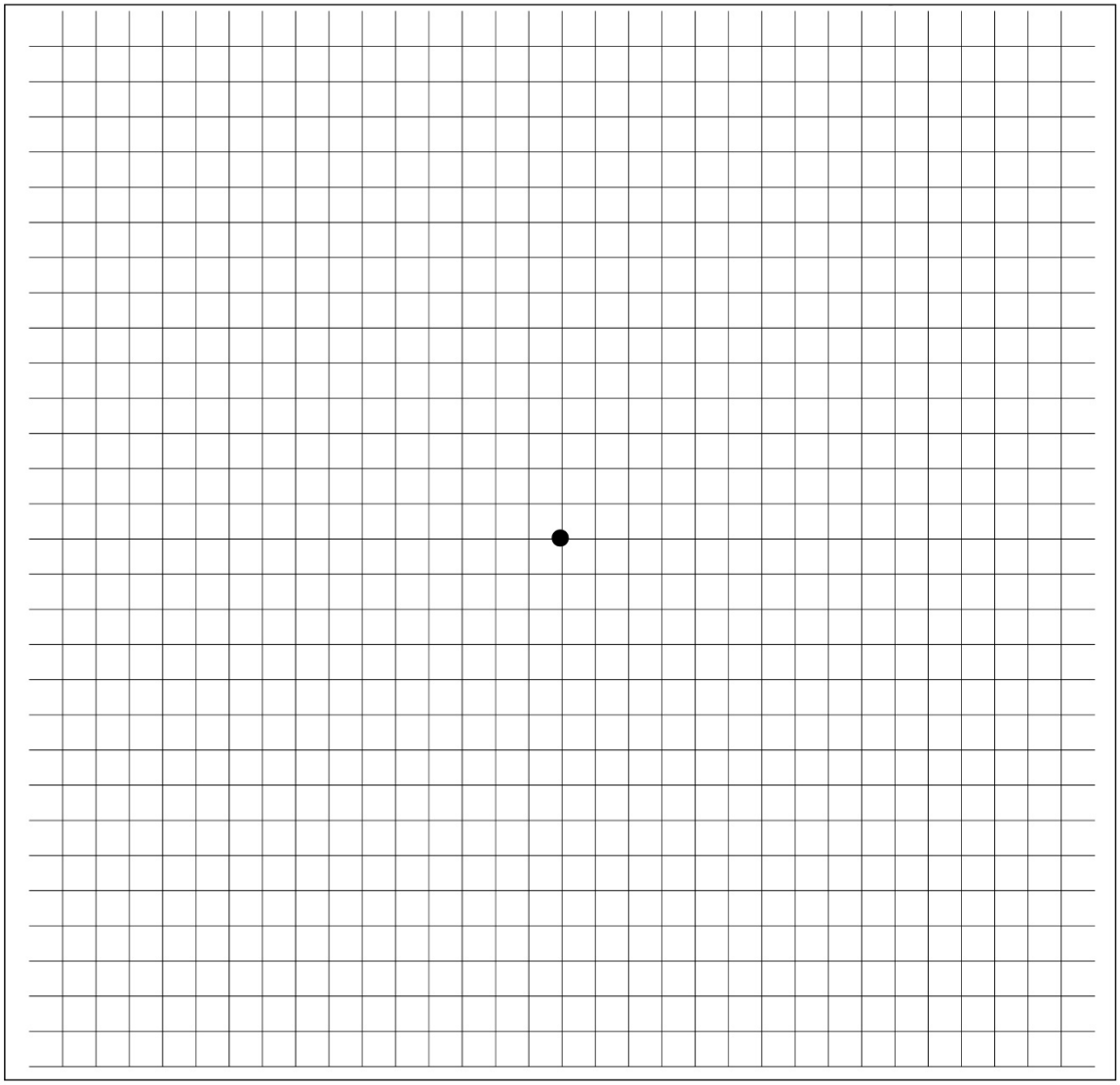
Tie-in Point 4	Location -	Bank Side -	
Northing -	Easting -	Elevation -	Datum -
Site Description -			

Tie-in Point 5	Location -	Bank Side -	
Northing -	Easting -	Elevation -	Datum -
Site Description -			

Figure A-4. Example of Stream Habitat Assessment Form 3a—Tie-in Points.

SECN Wadeable Stream Habitat Assessment Form 4: Reach Map (Version 1.0, June 2018)

Park: _____ **Site #:**_____ **Stream:** _____ **Date:** _____



Comments / Map Legend:

Figure A-5. Example of Stream Habitat Assessment Form 4—Reach Map.

SECN Stream Habitat Assessment Form 5 - Post-Survey Report (Version 1.0, June 2018)

Park -	**Site # -**	**Date -**	**Start Time -**	**End Time -**
Crew leader -		**Sampling Crew -**		

Route taken to site -

Parking instructions -

Site access - (instructions to get to middle benchmark)

Additional notes - (number of benchmarks/tie-in points and other info that will help locate site)

Figure A-6. Example of Stream Habitat Assessment Form 5—Post Survey Report.