

Contents

	Page
Summary	1
Revision Log	1
Contents	2
Required Materials	3
Overview	3
Tabular Data Entry	4
Reach Characterization (Form 1)	5
Standard Transect Characterization (Form 2)	5
Tabular Data Verification and Certification	6
Photograph Naming and Storage	7
Geospatial Data Management	8
Export survey data from TSC3	8
Literature Cited	16
Appendix A. Field Forms	17
Appendix B. Data Dictionary	23
Form 3: Detailed Cross Section Description of Transects	31
Form 3a: Survey Tie-in Points	31
Form 4: Wadeable Stream Habitat Assessment Reach Map	31
Form 5: Post Survey Report	31

Required Materials

- Paper field data sheets
- Computer
- Microsoft Excel*
- TSC3 data collector*
 - Survey data
 - USB connection
- ArcMap 10.5* or newer

*Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Overview

The Southeast Coast Network (SECN) will develop a formal relational database to store and manage the tabular data collected as part of this protocol after the protocol has been fully implemented and final data needs are itemized. This system will consist of a number of user interface (front-end) features (i.e., data entry forms) that will automatically populate a back-end database. Report services will also be built, allowing tables and datasets to be exported for use in appropriate analysis software and used in the data reports. Until these finalizations occur, all tabular data will be entered into Microsoft Excel worksheets and stored on the local SECN file server.

Two appendices are included as part of this SOP: Appendix A contains data sheets referenced in this document and Appendix B contains a data dictionary that defines data types and fields for the variables collected as part of this protocol. The data descriptions in the dictionary are intended to serve as a guide for development of tables in the database back-end and will be updated during database scoping and development. All spatial data (raw and post-processed) will be organized and stored on the local SECN GIS file server. The following standard operating procedure (SOP) provides instructions that will ensure proper and consistent data entry and storage.

Field Form Storage

Immediately upon returning to the office, all original paper field sheets (Forms 1–5, Appendix A) need to be scanned and saved to:

SECN share drive:\NEW DIRECTORY
STRUCTURE\Monitoring\StreamHabitat\Wadeable\Data\PARK\B_Scanned-Forms\

The scanned forms must be bundled together and named:

PARK###_YYYYMMDD_Forms_A_1-5_INI.pdf.

The ### is the reach number, YYYYMMDD should be the survey date, and the INI should be the initials of the SECN intern or staff member that scanned the forms.

Note, Form 3 (1 per detailed transect), 3a (tie-in point locations), and 4 (reach map) are scanned and used for reference in data processing and reach-scale reports and Form 5 (post survey report) is scanned and then used for reference prior to reach revisits. None of these forms are entered in Microsoft Excel.

Tabular Data Entry

Original paper field data sheets (Forms 1 and 2) are transcribed into a Microsoft Excel workbook and saved to the SECN file server by a SECN intern or staff member who collected the data immediately upon returning to the office following field work. This task shall be completed within a week of sampling if possible. Thirty days is the maximum time allowed and this is only permissible under extreme circumstances. Once the paper field sheets have been entered in the Microsoft Excel workbooks, they are to be archived in physical files in the SECN office.

The data entered into the Microsoft Excel workbooks will go through a series of quality control (QC) procedures to ensure the data are complete and that they accurately represent the area that was surveyed. An SECN aquatic ecology staff member will verify each data set no more than 90 days after the stream survey and the SECN protocol lead will certify each data set annually (Figure 1). Data certification is discussed in more detail below.

All data should be saved on the SECN file server at the following pathway:

SECNshare: NEW DIRECTORY
STRUCTURE\Monitoring\StreamHabitat\Wadeable\Data\PARK (four-letter code where the data were collected)\FolderName (referring to type of data, e.g., A_RawData, B_Scanned-forms, or C_Certified)

For example, field data from Chattahoochee River National Recreation Area entered into the appropriate workbook will be saved in the following server file path folder:

SECNshare: NEW DIRECTORY
STRUCTURE\Monitoring\StreamHabitat\Wadeable\Data\CHAT\A_RawData

An aquatic ecology staff member will compile metadata to accompany the certified data files on an annual basis (at minimum). Metadata will be reviewed by the protocol lead and uploaded to the IRMA Data Store upon completion of the annual summary report. The following sections describe how the field data should be entered into the Microsoft Excel worksheets, how the worksheet should be named, and where the data should be saved.

Reach Characterization (Form 1)

The reach characterization paper data sheet (Figure A-1) contains data that describes day-of-survey reach conditions, reach-scale geomorphic channel unit (GCU) occurrence, large woody debris (LWD) presence, pebble count results, densiometer readings, photograph metadata, and any notes taken by the field crew. These data must be entered into a Microsoft Excel workbook with each portion of the data sheet entered into its own worksheet (Entry.data) tab. There are seven worksheet (Entry.data) tabs—survey conditions, GCU, pebble count, LWD, densiometer and compass bearing, photo metadata, and notes.

A data entry template for the reach characterization form can be found on the local SECN file server at:

SECNshare: NEW DIRECTORY
STRUCTURE\Monitoring\StreamHabitat\Wadeable\Data\Form_1_Data_Entry_
Processing_and_Reporting_Template.xlsx

Once the data have been entered, save the Excel workbook using the following naming structure:

PARK###_YYYYMMDD_F#_raw_INI (of person who entered the data)

Using this naming structure, if reach CHAT 001 was surveyed on 20 September 2016, and Form 1 was entered by a staff member with the initials “JMM”, the file would be named:

CHAT001_20160920_F1_raw_JMM.xlsx

Save the file to:

SECNshare: NEW DIRECTORY
STRUCTURE\Monitoring\StreamHabitat\Wadeable\Data\CHAT\A_RawData\

Standard Transect Characterization (Form 2)

The transect characterization paper data sheet (Figure A-2) contains the standard transect survey data (11 cross-sections). These data will be entered in a Microsoft Excel workbook that has two Entry tabs named Entry.Data and Entry.Notes. The first tab will contain the survey data and the second tab will contain any notes that were taken while doing the survey.

A data entry template can be found at:

SECNshare: NEW DIRECTORY
STRUCTURE\Monitoring\StreamHabitat\Wadeable\Data\Form2_Data_Entry_Processing_and_Reporting_Template.xlsx

Once the data have been entered, use the following naming structure. If reach CHAT001 was surveyed on 20 September 2016, and Form 2 was entered by a staff member with the initials “JMM”, the file would be named:

CHAT001_20160920_F2_raw_JMM.xlsx;

Save the file to:

SECNshare: NEW DIRECTORY

STRUCTURE\Monitoring\StreamHabitat\Wadeable\Data\CHAT\A_RawData\

Tabular Data Verification and Certification

After Forms 1 and 2 have been entered into Microsoft Excel, the data will be verified by the aquatic technician. This verification should be done by someone other than the person who initially entered the data. The verification process will ensure that the digitized records accurately reflect the original source and ensures that recording errors are corrected. Verification/quality control steps include (Figure 1):

1. Verification that 100% of the records accurately reflect data recorded on the datasheets.
2. Verification that all data are logical and are within the expected range for a given stream.
 - a. The data collected at each reach should be compared to similar reaches to make sure erroneous recordings (e.g., 0.001 meter recorded when it should have been 0.01 meter) are not included in the final dataset.
 - b. As multiple years of data become available, additional data verification techniques can be used to compare multiple surveys at the same reach to determine if the measurements fall within an expected range of variability.
3. Documentation of errors, inconsistencies, and amended data.
4. Once verified, notification to the protocol lead that data is ready for certification.

After the data have been verified, the protocol lead will review and certify the data by following the steps described below.

1. Review the data to check for logical data values and ensure data is within the expected range for a given stream.
2. Review summary statistics that might highlight data errors (minimum, maximum, standard deviation, etc.)
3. Document errors, inconsistencies, and amended data.

Once all of the data have been properly checked and certified, the data should be saved on the SECN share drive in PARK's C_Certified folder. For example; Form 1 data, certified by a staff member

with initials MBG, collected at Chattahoochee River NRA reach 001, on 20 September 2016 should be named:

CHAT001_20160920_F1_cert_MBG.xlsx

Save the file to:

SECNshare: NEW DIRECTORY
STRUCTURE\Monitoring\StreamHabitat\Wadeable\Data\CHAT\C_Certified\

Once the data have been properly verified, certified, and saved onto the SECN server, they are ready to be processed and analyzed (described in SECN SOP 2.2.14 *Wadeable Stream Data Processing and Analysis—Version 1.0* [McDonald et al. 2018a]) and included in data reports (SECN SOP 2.2.15 *Wadeable Stream Reporting Guide—Version 1.0* [McDonald et al. 2018b]).

Photograph Naming and Storage

Photographs that are taken as part of the survey (see SOP 1.2.16 *Wadeable Stream Reach-Scale Field Data Collection—Version 1.0* [McDonald et al. 2018c]) must be uploaded to the SECNshare drive in the following location:

SECNshare:\NEW DIRECTORY
STRUCTURE\Monitoring\StreamHabitat\Wadeable\Photos\PARK\PARK###_Survey_YYY
YMMDD

A tab in the workbook (Reporting.Photos) will automatically generate the name for each photo. Rename the photographs with the name from Reporting.Photos. Each photograph should be named using the following naming convention:

PARK###_YYYYMMDD_T#_ID.jpg

The T# refers to transect number (i.e., 1-11). The ID for the photo will be one of the following: “Upstream,” “Downstream,” “LeftBank,” or “RightBank.” See SECN Digital image management—Version 3.1. Standard Operating Procedure for more information on data image naming convention (SECN 2017).

General and miscellaneous photos for each reach should follow the naming convention for general (non-data) images found in SOP 2.1.07 *Digital Image Management—Version 3.1* (SECN 2017).

PARK###_YYYYMMDD_BriefTitle_\$\$\$.jpg

PARK—four character park code of where picture or file was taken or created

###—reach number

YYYYMMDD—date image was taken or GPS file was created in year, month, day format.
The date must be eight characters long.

BriefTitle—a very short title, up to 15 characters long.

\$\$\$—when necessary to ensure unique file names, a three digit sequential number used at the end of the file name.

In addition, all photos should adhere to the metadata standards outlined SOP 2.1.07 (SECN 2017).

Geospatial Data Management

Geospatial data will be used to select the reaches that will be monitored and to describe the upstream basin characteristics of these reaches. Geospatial data (shapefiles) will also be created while surveying the detailed cross-sections and longitudinal profile. All of the spatial data will be stored by park on the local SECN file server on the SECN GIS drive in the following location:

SECN GIS: \GIS\projects\StreamHabitat\Wadeable\PARK\Data

Within each park's Data folder will be two additional folders named:

- Basin
- Site
 - Within this folder, each site (PARK###) will have its own folder

All of the data used and produced to derive the upstream basin characteristics (described in SECN SOP 1.2.15 *Wadeable Stream Basin- and Segment-Scale Data Summary—Version 1.0* [McDonald et al. 2018d]) of each park's surveyed streams will be saved to the Basin folder, and all of the survey data exported from the TSC3 data collector will be saved to the PARK### specific folder within the Site folder

Export survey data from TSC3

The following procedure should be used to export the survey data from the TSC3 data collector to the SECN file server on the SECN GIS drive. Using the TSC3 data collector, access:

1. General Survey (Figure 2) → Jobs (Figure 3) → Open job (Figure 4) → Navigate to job (Figure 5) → Jobs (Figure 3) → Import/Export (Figure 4) → Export fixed format (Figure 6)
 - a. Choose file format (ESRI Shapefiles) (Figure 7).
 - b. Choose the export location (default is export folder).
 - c. Using the same reach example from CHAT, rename the file:
 - i. CHAT001_20160920_Detailed_JMM.shp; (Date is not day of export but day of survey)
 - d. Choose Coordinates (Grid)
 - e. Hit Accept to create the file in the specified folder.

Upon returning to office, connect the TSC3 to a computer (don't setup device in Windows Mobile Center) and use File Manager to navigate to the exported file.

1. Trimble Data → National Park Service (or username) → Export.
2. Make sure to copy all three files (.dbf, .shp, and .shx) and place them in the proper folder.
 - a. Using the same example as before, save the files to
 - i. SECN
GIS:\GIS\projects\StreamHabitat\Wadeable\CHAT\Data\Site\CHAT001
3. In ArcCatalog, go into the Properties of the shapefile (Figure 8) and on the XY Coordinate System tab (Figure 9) define the projection (NAD_1983 UTM zone 16N for HOBE, KEMO, and CHAT and 17N for OCMU and CONG)

The total station survey data (shapefile) will be used to determine the cross-sectional area of the three detailed transects and the longitudinal profile of the surveyed reach. The methods used to quality control, verify, and process these data can be found in SOP 2.2.14 *Wadeable Stream Data Processing and Analysis—Version 1.0* (McDonald et al. 2018a).

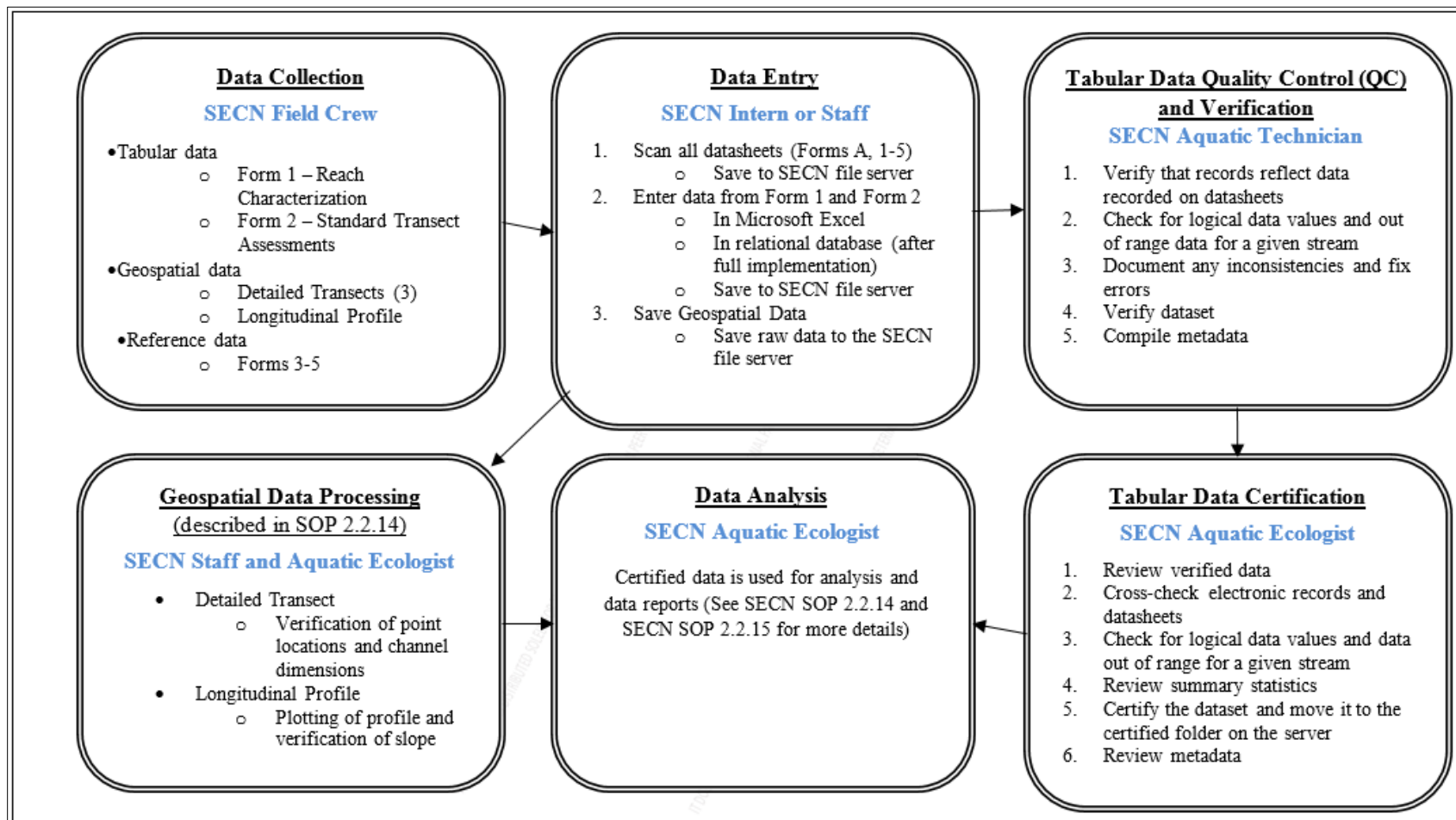


Figure 1. Data entry, quality control, and certification process. Staff responsible for each process is denoted in blue. Data entry should be completed within 30 days of data collection, and verification within 90 days. Data certification is done on an annual basis.



Figure 2. Trimble Access main screen.



Figure 3. Trimble Access: General Survey menu.



Figure 4. Trimble Access: General Survey > Jobs menu.

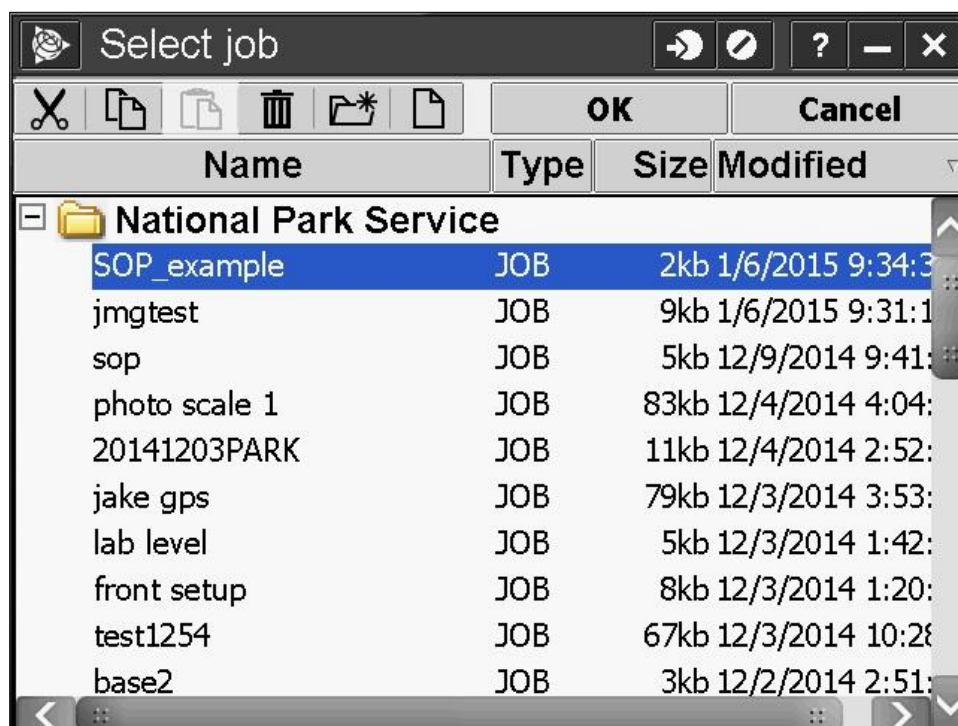


Figure 5. Trimble Access: General Survey > Jobs > Open job menu.

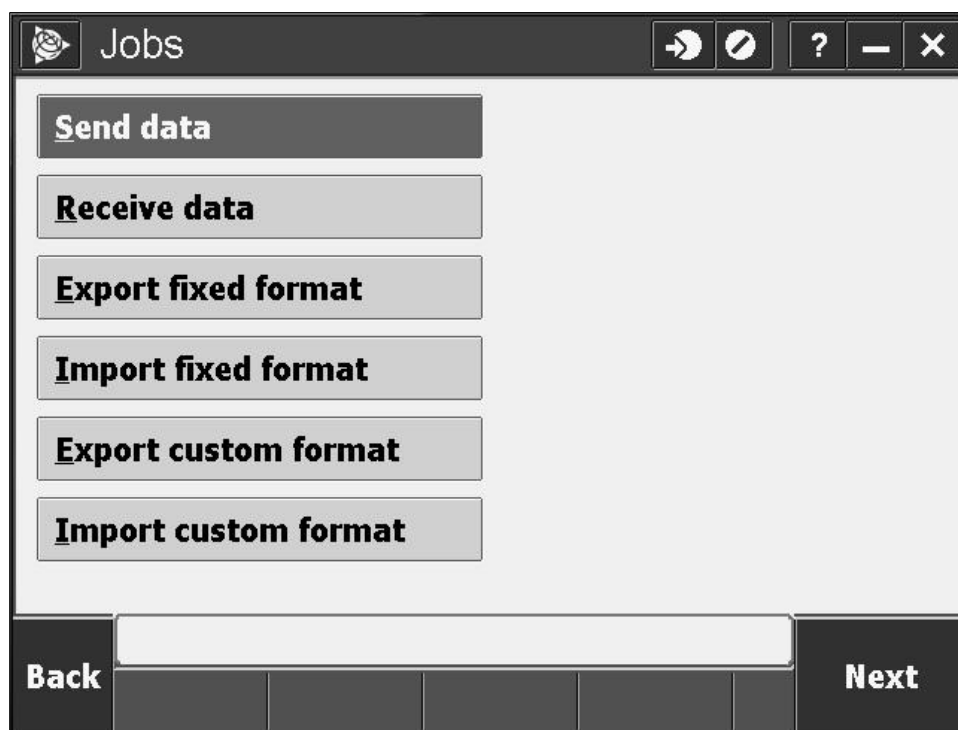


Figure 6. Trimble Access: General Survey > Jobs > Import/Export menu.

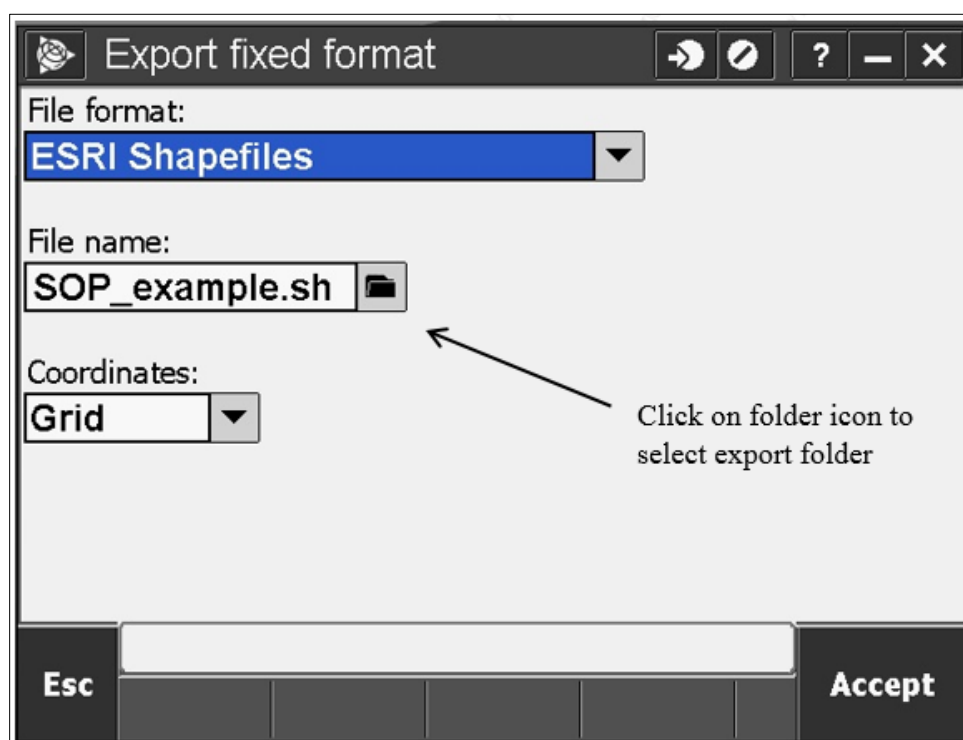


Figure 7. Trimble Access: Export fixed format menu.

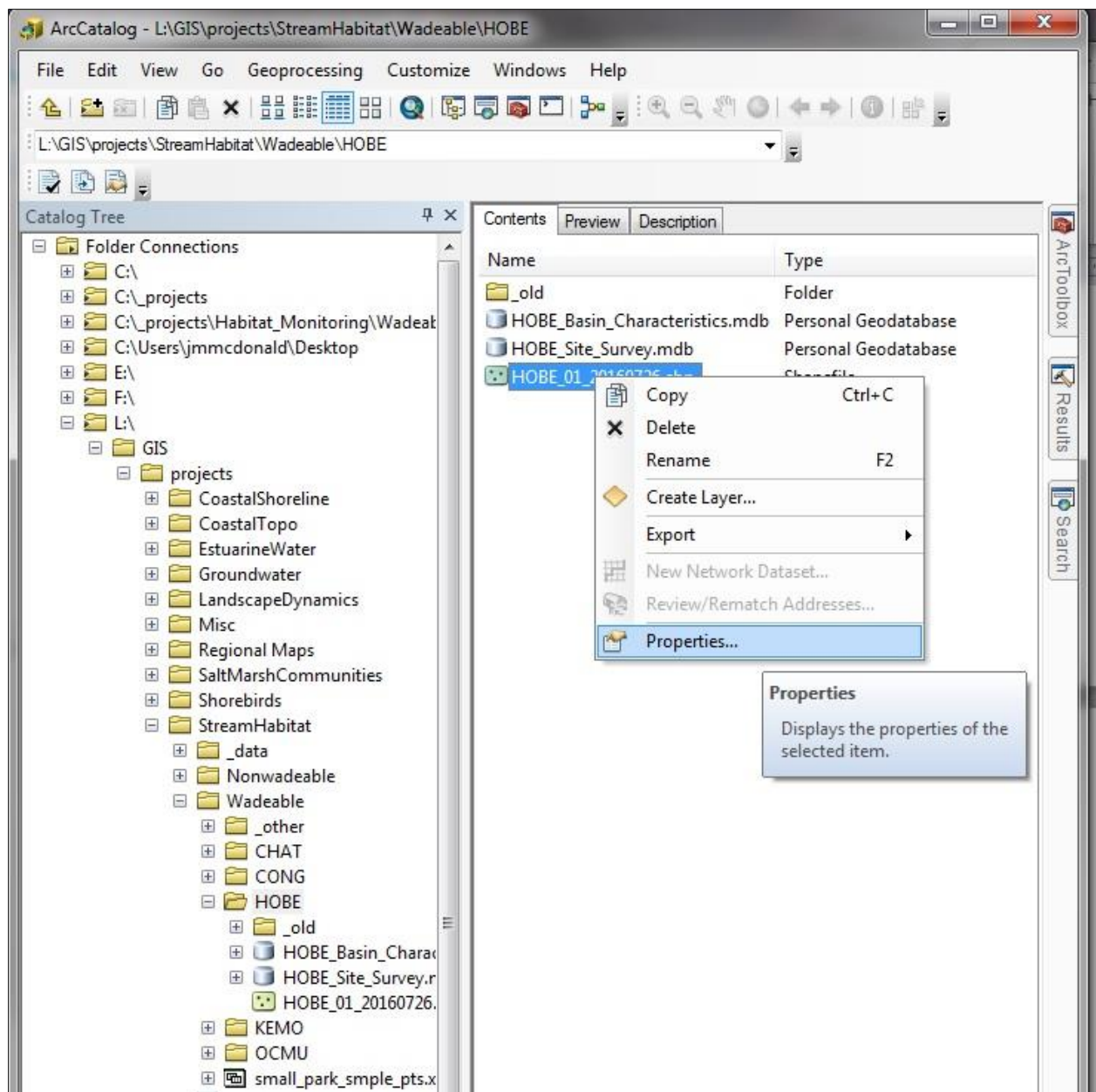


Figure 8. Open up the Shapefile Properties menu within ArcCatalog.

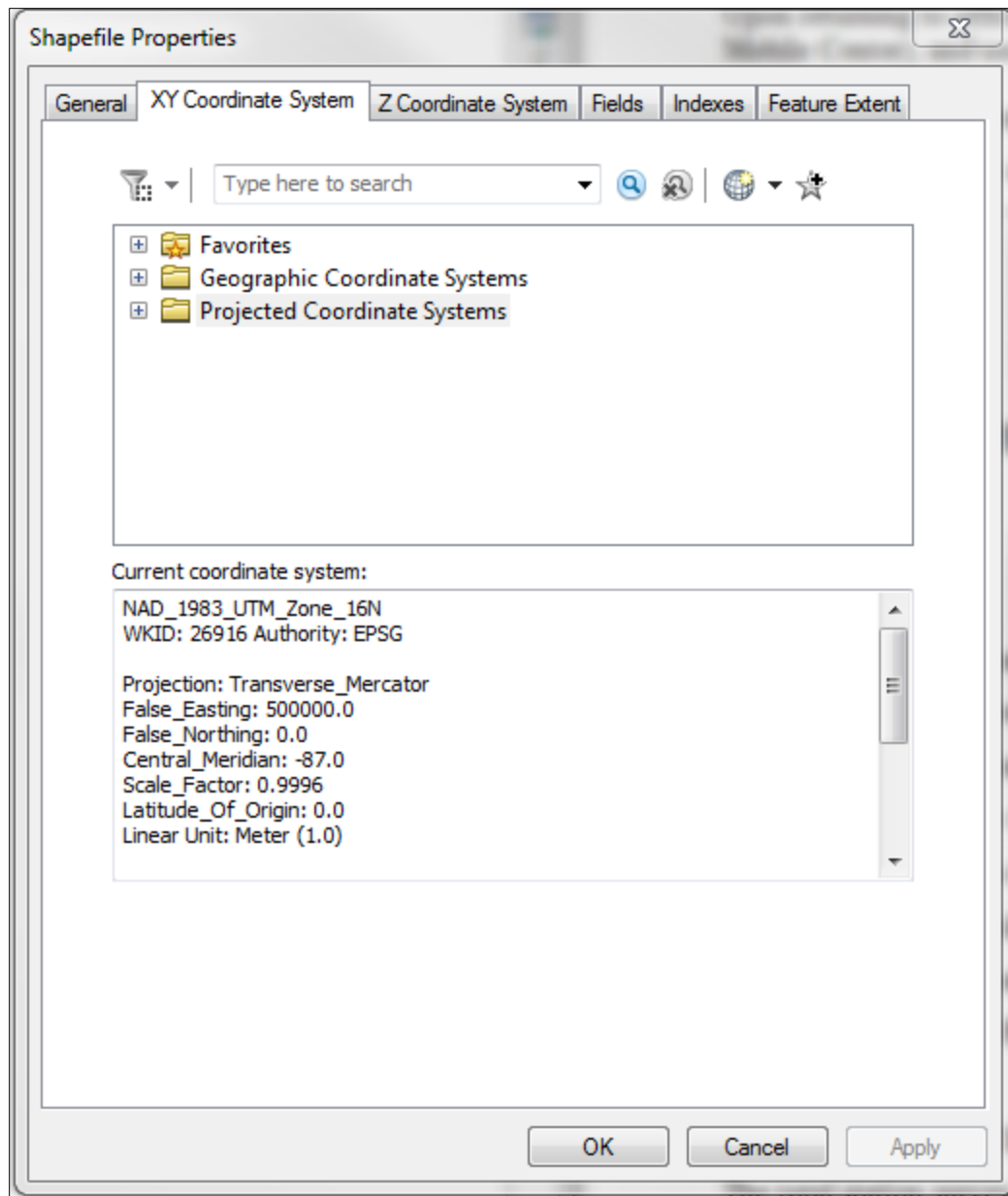


Figure 9. Define the coordinate system in the Shapefiles Properties menu in ArcCatalog.

Literature Cited

- Langbein, W. B., and Iseri, K. T., 1960, General introduction and hydrologic definitions—Manual of hydrology— Part 1. General surface-water techniques: U.S. Geological Survey Water-Supply Paper 1541–A.
- Lawlor, S. M., 2004. Determination of channel-morphology characteristics, bankfull discharge, and various design-peak discharges in western Montana. U.S. Geological Survey Scientific Investigations Report 2004-5263.
- Leopold, L. B., Wolman, M. G., and Miller, J. P., 1964, Fluvial processes in geomorphology: San Francisco, W.H. Freeman.
- McDonald, J. M., E. N. Starkey, and M. B. Gregory. 2018a. Wadeable stream data processing and analysis—Version 1.0. Southeast Coast Network Standard Operating Procedure NPS/SECN/SOP—2.2.14. National Park Service, Athens, Georgia. Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2254019> (last accessed July 2018).
- McDonald, J.M., E. N. Starkey, and M. B. Gregory. 2018b. Wadeable stream reporting guide—Version 1.0. Southeast Coast Network Standard Operating Procedure NPS/SECN/SOP—2.2.15. National Park Service, Athens, Georgia. <https://irma.nps.gov/DataStore/Reference/Profile/2254020> (last accessed July 2018).
- McDonald, J. M., E. N. Starkey, M. B. Gregory, and J. Riley. 2018c. Wadeable stream reach-scale field data collection—Version 1.0. Southeast Coast Network Standard Operating Procedure NPS/SECN/SOP—1.2.16. National Park Service, Athens, Georgia. <https://irma.nps.gov/DataStore/Reference/Profile/2254013> (last accessed July 2018).
- McDonald, J. M., M. B. Gregory, and J. Riley. 2018d. Wadeable stream basin- and segment-scale data summary—Version 1.0. Southeast Coast Network Standard Operating Procedure NPS/SECN/SOP—1.2.15. National Park Service, Athens, Georgia. <https://irma.nps.gov/DataStore/Reference/Profile/2254012> (last accessed July 2018).
- Southeast Coast Network (SECN). 2017. Digital image management—Version 3.1. Standard Operating Procedure NPS/SECN/SOP—2.1.07. Southeast Coast Network, Athens, Georgia. <https://irma.nps.gov/DataStore/Reference/Profile/2243092> (last accessed July 2018).

Appendix A. Field Forms

[illegible]

Figure A-1. SECN Stream Habitat Assessment Form 1–Reach Characterization.

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. SECN Stream Habitat Assessment Form 3—Detailed Cross-Sections.

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

Park -	Site # -	Date -
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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 -		

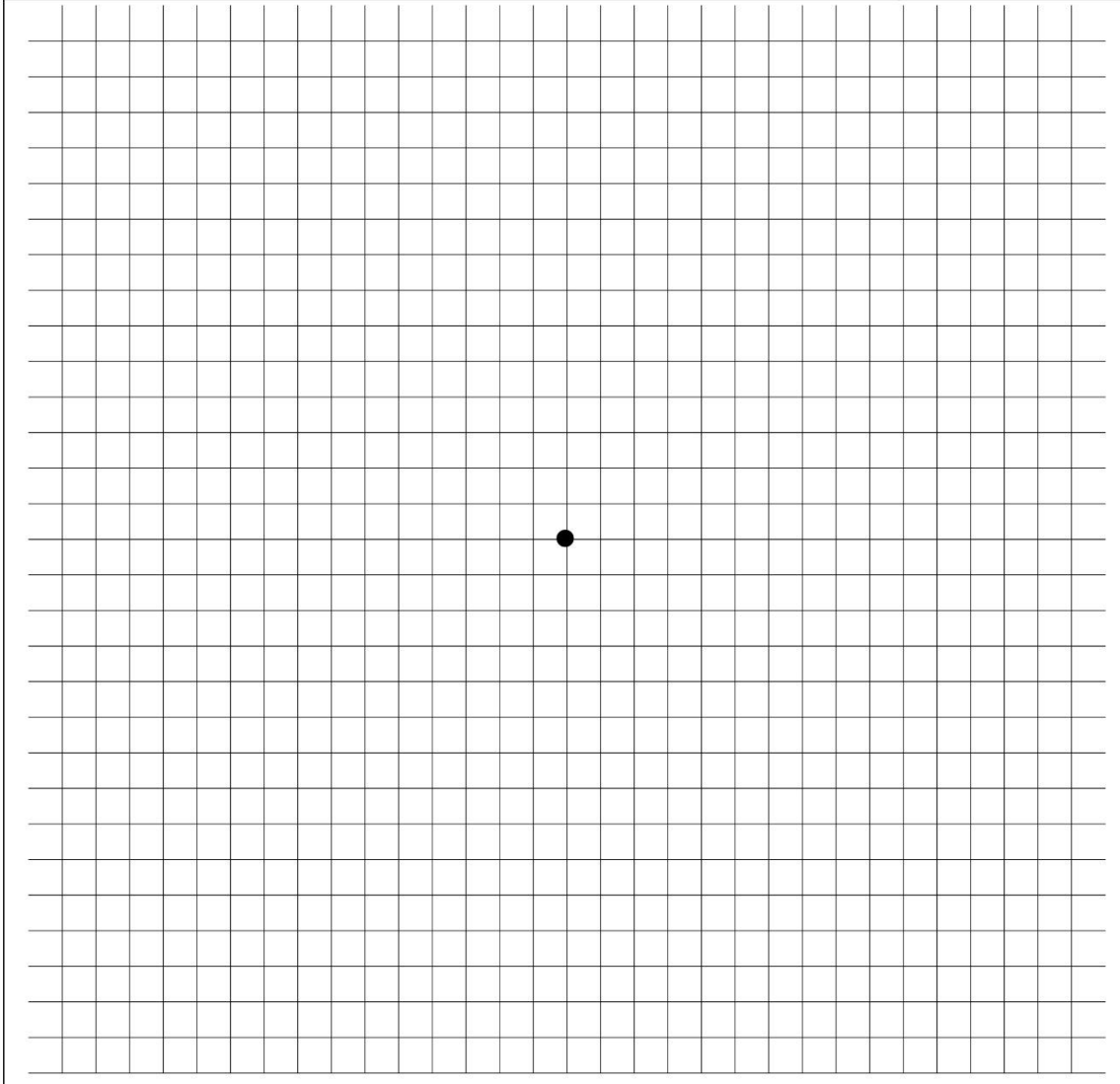
Tie-in Point 4	Location -	Bank Side -
Northing -	Easting -	Elevation - Datum -
Site Description -		

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

Figure A-4. SECN 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:

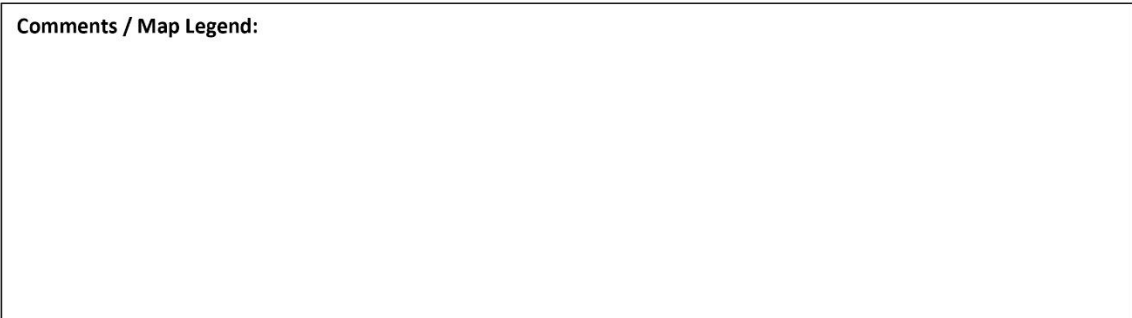


Figure A-5. SECN Stream Habitat Assessment Form 4—Reach Map.

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. SECN Stream Habitat Assessment Form 5—Post-Survey Report.

Appendix B. Data Dictionary

This data dictionary provides a description of fields found in the data entry forms (MS Excel) outlined in this SOP. The descriptions are intended to serve as a guide for development of tables in the database back-end file. As database development occurs, these tables and fields will be updated.

Table B-1. Data dictionary for Form 1: Entry Processing Reporting—Reach Characterization – Entry.SurveyConditions tab.

Field Name	DataType	Units	Required	Description
Park	char(4)	-	Y	Park unit code
Site	char(3)	-	Y	Unique number given to sample reach within a park unit. 3 digits long (001, 002, etc.) Site is equivalent to a reach.
Date	date	-	Y	Survey date (yyyy/mm/dd)
TimeStart	time	-	Y	Time Form 1 began to be populated (HH:MM:SS)
TimeEnd	time	-	Y	Time Form 1 was completed (HH:MM:SS)
CrewLeader	varchar	-	Y	Initials of Crew Leader
Crew	varchar	-	Y	Initials of Field Crew (not including Crew Leader)
StreamOrder	tinyint	-	Y	A ranking of streams within a watershed based on the nature and/or number of their tributaries. Range of acceptable values 1-6.
ReachLength	smallint	m	Y	The principal sampling unit for collecting stream habitat data. Determined during initial setup of a survey reach. Reach length is the mean wetted width multiplied by 20, rounded to the nearest meter. Maximum reach length is 500 m.
DistBtwnTransects	tinyint	m	Y	Distance from one standard transect to another. Calculated by dividing the reach length by 10. Maximum distance is 50 m.
CoordinateY	geography	m	Y	Latitudinal value of center benchmark, referred to as “Northing” in the Universal Transverse Mercator coordinate system used in this protocol.
CoordinateX	geography	m	Y	Longitudinal value of center benchmark, referred to as “Easting” in the Universal Transverse Mercator coordinate system used in this protocol.
Elevation	smallint	m	Y	Height of center benchmark above mean sea level
Datum	geography	-	Y	Datum. Set by default to NAD83
UTMZone	geography		Y	UTM zone (i.e., 16 N, 17 N)

Field Name	Data Type	Units	Required	Description
WaterColorClarity	varchar(10)	-	N	Qualitative description of water color and clarity (clear, turbid, stained, brown, red, etc.). Sets context for stream survey conditions but is not used for analysis.
Sky	varchar(15)	-	N	Qualitative description of cloud cover (clear, partly cloudy, mostly cloudy, overcast). Sets context for stream survey conditions but is not used for analysis. Clear = no cloud cover Partly Cloudy= Between 3/8 and 5/8 of the sky is covered by clouds. (NOAA) Mostly Cloudy= When the 6/8th to 7/8ths of the sky is covered by opaque (not transparent) clouds. (NOAA) Overcast = Sky completely covered by clouds
Wind	varchar(10)	-	N	Qualitative description of wind conditions (calm, light, breezy, windy). Sets context for stream survey conditions but is not used for analysis. Calm= A weather condition when no air motion (wind) is detected. (NOAA) Light= detectable air motion <15 mph Breezy= wind 15 to 20 mph (NOAA) Windy = wind 20 to 30 mph (NOAA)
Temp	varchar(10)	-	N	Qualitative description of air temperature (cold, cool, warm, hot). Sets context for stream survey conditions but is not used for analysis. Cold= <40°F Cool= 40-60°F Warm= 60-80°F Hot= >80°F
WeatherStation	varchar	-	N	Name of nearest weather station.
DaysSince Precip	tinyint	-	N	Number of days since measureable precipitation at the nearest weather station.
PrecipAmount	numeric(2,2)	in	N	Amount of precipitation measured during the last precipitation event at the nearest weather station.

Table B-2. Data dictionary for Form 1: Entry Processing Reporting—Reach Characterization – Entry.GCU tab.

Field Name	Type	Units	Required	Description
Transect Interval	varchar (50)	-	Y	Area between transects occupied by the geomorphic channel units. A transect is a line across a stream, perpendicular to the flow, along which measurements are taken to describe the morphological and flow characteristics of a channel. Transects are numbered 01-11.
Pool	tinyint	%	Y	Percentage of area designated as pool between transects x and y.
Glide	tinyint	%	N	Percentage of area designated as glide between transects x and y.
Run	tinyint	%	Y	Percentage of area designated as run between transects x and y.
Riffle	tinyint	%	Y	Percentage of area designated as riffle between transects x and y.
Rapid	tinyint	%	N	Percentage of area designated as rapid between transects x and y.
Cascade	tinyint	%	N	Percentage of area designated as cascade between transects x and y.
Step	tinyint	%	N	Percentage of area designated as step between transects x and y.
StepType	varchar	-	N	Description of step type (bedrock, boulder, cobble, large woody debris, organic)

Table B-3. Data dictionary for Form 1: Entry Processing Reporting—Reach Characterization – Entry.PebbleCount tab.

Field Name	Type	Units	Required	Description
PebbleCount	tinyint	-	Y	Running count of substrate particles arbitrarily selected from a riffle during a sample event. Range 1 to 100
Size	numeric(3,3)	mm	Y	Size of arbitrarily selected substrate (b-axis). Measured to the nearest millimeter. Range 0.062-999.

Table B-4. Data dictionary for Form 1: Entry Processing Reporting—Reach Characterization – Entry.LWD tab.

Field Name	Type	Units	Required	Description
RunningCount	tinyint	-	Y	Running count of the number of pieces of large woody debris encountered in a reach during a given sampling event. A piece of large woody debris (LWD) is defined as a piece of woody material greater than 1 meter in length and at least 0.1 meter in diameter.
Length	numeric(2,2)	m	Y	Length of large woody debris. Length must exceed 1 meter; (>1)
Diameter	numeric(2,2)	m	Y	Diameter of large woody debris (>0.1)
Midpoint Location	tinyint	-	Y	Location of the midpoint of a piece of LWD with respect to the closest downstream transect. For example a piece of LWD located in between transects 2 and 3 would be recorded as 2. Range 1-11.
Function	varchar(50)	-	Y	Qualitative description of the role and stability for a given piece of large woody debris in the stream. LWD functions: bank protection, sediment trap, organic trap, pool formation, jam, none.
Position	varchar(50)	-	Y	Qualitative description of the role and stability for a given piece of large woody debris in the stream. LWD positions: free, bridge, ramp, buried, jam.

Table B-5. Data dictionary for Form 1: Entry Processing Reporting—Reach Characterization – Entry.Densimeter_Bearing tab.

Field Name	Type	Units	Required	Description
Transect	char(2)	-	Y	Transect number 1-11
Up	tinyint	-	Y	Cover estimate facing upstream from the midpoint of the transect. Number of line intersections counted on the concave mirror during the measurement of canopy closure (0-17)
Left	-	-		Cover estimate facing the left bank from the midpoint of the transect. Number of line intersections counted on the concave mirror during the measurement of canopy closure (0-17)
Down	-	-		Cover estimate facing downstream from the midpoint of the transect. Number of line intersections counted on the concave mirror during the measurement of canopy closure (0-17)
Right	tinyint	-	Y	Cover estimate facing the right bank from the midpoint of the transect. Number of line intersections counted on the concave mirror during the measurement of canopy closure (0-17)
CompassBearing	smallint	degrees	Y	Degrees from north (0-359°). Not recorded for transect 11.

Table B-6. Data dictionary for Form 1: Entry Processing Reporting—Reach Characterization – Entry.Photos tab.

Field Name	Type	Units	Required	Description
Transect	char(2)	-	Y	Transect number 1, 6 and 11
Upstream	smallint	-	Y	File number from camera for photos taken looking upstream at transects 1, 6, and 11
Downstream	smallint	-	Y	File number from camera for photos taken looking downstream at transects 1, 6, and 11
LeftBank	smallint	-	Y	File number from camera for photos taken looking at left bank at transects 1, 6, and 11
RightBank	smallint	-	Y	File number from camera for photos taken looking at right bank at transects 1, 6, and 11

Table B-7. Data dictionary for Form 1: Entry Processing Reporting—Reach Characterization – Entry.Notes tab.

Field Name	Type	Units	Required	Description
Count	tinyint	-	N	Running count of the number of notes. This running count serves as the note ID which ties the note to a record on the Entry.Data sheet.
Note	text	-	N	Text. Notes corresponding to the reach characterization assessment Entry.Data tab.

Table B-8. Data dictionary for Form 2: Entry Processing Reporting—Standard Transect Assessments – Entry.Data tab.

Field Name	Type	Units	Required	Description
Transect	char(2)	-	Y	Transect number 1-11
DistanceUpStream	smallint	m	Y	Distance from transect n to the most downstream transect (Transect 1= bottom of reach, Transect 11= top of reach)
WettedWidth	numeric(2,2)	m	Y	Measure of wetted channel width at transect n.
ActiveChannel Width	numeric(2,2)	m	Y	The width of the active channel measured perpendicular to streamflow. The active channel, a short-term geomorphic feature formed by prevailing stream discharges, is typically narrower than the bankfull channel and is defined by a break in bank slope that also typically is the edge of permanent vegetation (Lawlor 2004).
BankfullWidth	numeric(2,2)	m	N	The width of the channel perpendicular to streamflow at which bankfull stage occurs. Bankfull stage is defined as the stage at which a stream completely fills its natural channel and typically occurs during floods with recurrence intervals of one to three-year (Langbein and Iseri 1960; Leopold et al. 1964). Bankfull widths should only be measured if there is a floodplain (or incipient floodplain) present. If no bankfull width is recorded, channel full width is required.
ChannelFullWidth	numeric(2,2)	m	N	Channel width will be the same as the bankfull width in non-entrenched streams; however, in some cases, the modern channel may be eroding into the historical terrace, creating a channel within the old channel.

Field Name	Type	Units	Required	Description
ThalwegPosition	tinyint	%	Y	% of active channel distance from the left bank e.g, if channel width is 5 m and deepest part of active channel is 1.5 m from the left bank, the thalweg position is 30%
ThalwegDepth	numeric(2,2)	m	Y	Depth of thalweg (deepest point along transect)
DominantParticleSizeClass	varchar(10)	-	Y	Most prevalent type of bed sediment (bedrock, boulder, cobble, gravel, sand, silt, clay, organic)
DominantHabitat	varchar(10)	-	Y	Dominant habitat type occurring 1m up and 1m downstream of the transect (Cascade, step, riffle, run, glide, pool)
PresenceAndTypeOfInChannelFeature	varchar(10)	-	N	In-channel features include: island, point bar, shelf, bench, or not present.
LeftFloodplainWidth	numeric(2,2)	m	N	If floodplain is present, measure of the floodplain width on the left bank. If floodplain is not present, record width as 0.
RightFloodplainWidth	numeric(2,2)	m	N	If floodplain is present, measure of the floodplain width on the right bank. If floodplain is not present, record width as 0.
Notes	tinyint	-	N	Denotes corresponding note found in Form 2, Entry.Notes tab. This serves as the note ID to tie the note back to the transects. One note may be associated with a single or multiple transects.
LeftBankHeight	numeric(2,2)	m	Y	The top of the bank corresponds with the first spot that you can stand flat-footed.
LeftWaterDepthAtBase	numeric(2,2)	m	Y	Water depth at the base of the bank. May be negative if emergent.
LeftBankUndercutHorizontal	numeric(2,2)	m	N	Distance undercut extends into the bank.
LeftBankUndercutVertical	Numeric(2,2)	m	N	Distance undercut extends above the water surface.
LeftBankAngle	smallint	degrees	Y	If bank is not undercut, the angle will be <90. If bank is undercut, the angle will be >90 and less than 180
LeftUndercutAngle	smallint	degrees	N	Angle of undercut (if present)
LeftDominantSediment	varchar(10)	-	Y	Most prevalent sediment type (bedrock, boulder, cobble, gravel, sand, silt, clay, organic)

Field Name	Type	Units	Required	Description
LeftBankSedimentCode	tinyint	-	Y	Code based on the dominant sediment type. Bedrock/artificial =1, boulder/cobble =3, clay = 4, silt =5, sand = 8 gravel/sand mix =10
LeftBankErosionPresence	boolean	-	Y	Presence of erosion Y = yes, N = no
LeftBankErosionType	varchar(10)	-	N	Type of erosion: L= lateral, SL = Slumping, U= undercutting
LeftBankVegetativeCover	tinyint	%	Y	Estimate of vegetative cover (not including leaf cover) recorded as a percentage.
LeftBankTotalCover	smallint	%	Y	Estimate of total bank cover (including leaf cover) recorded as a percentage.
RightBankHeight	numeric(2,2)	m	Y	The top of the bank corresponds with the first spot that you can stand flat footed.
RightWaterDepthAtBase	numeric(2,2)	m	Y	Water depth at the base of the bank. May be negative if emergent.
RightBankUndercutHorizontal	numeric(2,2)	m	N	Distance undercut extends into the bank.
RightBankUndercutVertical	Numeric(2,2)	m	N	Distance undercut extends above water surface
RightBankAngle	smallint	degrees	Y	If bank is not undercut, the angle will be <90. If bank is undercut, the angle will be >90 and less than 180
RightBankUndercutAngle	smallint	degrees	N	Angle of undercut (if present)
RightDominantSediment	varchar(10)	-	Y	Most prevalent sediment type (bedrock, boulder, cobble, gravel, sand, silt, clay, organic)
RightBankSedimentCode	tinyint	-	Y	Code based on the dominant sediment type. Bedrock/artificial =1, boulder/cobble =3, clay = 4, silt =5, sand = 8 gravel/sand mix =10
RightBankErosionPresence	boolean	-	Y	Presence of erosion Y = yes, N = no
RightBankErosionType	varchar(10)	-	N	Type of erosion: L= lateral, SL = Slumping, U= undercutting
RightBankVegetativeCover	tinyint	%	Y	Estimate of vegetative cover (not including leaf cover) recorded as a percentage.
RightBankTotalCover	tinyint	%	Y	Estimate of total bank cover (including leaf cover) recorded as a percentage.

Table B-9. Data dictionary for Form 2: Entry Processing Reporting Standard Transect Assessments – Entry.Notes tab.

Field Name	Type	Units	Required	Description
Count	tinyint	-	N	Running count of the number of notes. This running count serves as the note ID which ties the note to a record on the Entry.Data sheet. Notes may be associated with one or multiple transects.
Note	text	-	N	Text. Notes corresponding to the standard transect assessment Entry.Data tab. Notes may be associated with one or multiple transects.

Form 3: Detailed Cross Section Description of Transects

Description: Field notes and diagram for each detailed transect; will be maintained as a scanned and paper record for reference. This form will not be entered into the database but will be scanned and saved to the SECN share drive (see body of text for more details).

Form 3a: Survey Tie-in Points

Description: Record survey tie-in points when needed; maintained as a scanned and paper record for reference. This form will not be entered into the database but will be scanned and saved to the SECN share drive (see body of text for more details).

Form 4: Wadeable Stream Habitat Assessment Reach Map

Description: Overview reach map used to show relative position of channel features, benchmarks, and transects. The map will be digitized as well as maintained as a scanned and paper record for reference. This form will not be entered into the database but will be scanned and saved to the SECN share drive (see body of text for more details).

Form 5: Post Survey Report

Description: Used to record notes about route taken to the reach, parking instructions, directions to the middle survey benchmark, and other information useful to return to the reach; will be maintained as a scanned and paper record for reference. This form will not be entered into the database but will be scanned and saved to the SECN share drive (see body of text for more details).