Chapter 3

DIRECTIONS FOR COMPLETING FORMS

- General Monitoring Information
- Basic Visual Form
- Photo Points
- Stream Habitat Survey
- Stream Flow
- Channel Cross-Section
- Wentworth Pebble Count
- Sketch of Monitoring Site
- Visual Biological Survey
- Example Forms

General Monitoring Information

This chapter directs the volunteer step by step through the process of completing the Georgia Adopt-A-Stream Visual Stream Survey forms. Before you get started, pull your visual survey forms out and photocopy them, or download them from our website so that you have extra blank forms to work with in the future. Example completed forms are shown at the end of this chapter.

When you complete any of the surveys in this manual, please fill out the Basic Visual Form, the first form in the previous chapter. The following is a description of how to complete all the visual forms and surveys.

Basic Visual Form

SITE INFORMATION

Group Name: Choosing a group name is covered in the Georgia Adopt-A-Stream's introductory manual, Getting to Know Your Watershed, and registration of this group should be completed online in the database. Each of your monitoring sites will be registered to your group name.

Group ID: This is the ID number provided to you by the Georgia Adopt-A-Stream online database after you register your group. It will be in the format AAS-G- ###.

Site ID: When you register each of your monitoring sites, the online database will send you your site number, in the format AAS-S- ####. This site number allows you and the State to identify the exact location of your monitoring site.

Stream Name: List the stream name that you registered with the online database.

Monitors: List all QA/QC volunteers who assisted with monitoring.

Number of Participants: List the number of people who joined you as you monitored (both certified and non-certified volunteers).

Event Date (MMDDYYYY): The time of year you conduct your survey is very important. List the date of your sampling event in the MMDDYYYY format.

Time Sample Collected (HHMM): Document the time of day you began sampling. Try to be consistent and go out at about the same time each time you monitor.

Time Spent Sampling (in minutes): Report the time spent monitoring. Include preparation time for sampling and processing of samples. This is required information. *Example:* 1 individual went sampling from noon-1pm, this would be 60 minutes of sampling time. Or if 4 individuals sampled from noon-1pm, this would still be 60 minutes of sampling time.

Total Time Spent Traveling (in minutes; optional): Report the time spent traveling to/from sampling site. *Example*: 1 individual traveled 10 minutes to and 10 minutes from the site, this would be 20 minutes of travel time reported. Or, if there is more than one individual traveling to and from the site, report the sum of each monitor's to/from travel time. So if Mary traveled 20 minutes, Larry 10 minutes, and Dan 30 minutes, the total time to report would be 60 minutes.

Furthest Distance Traveled (in miles; optional): Your mileage to and from your site. This can be reported a few different ways. *Example*: 1 individual traveled 10 miles to and 10 miles from the site; this would be 20 miles reported. Or, if there is more than one individual traveling to and from the site, report the longest distance traveled. So if Mary traveled 20 miles, Larry 10 miles, and Dan 30 miles, you would report Dan's mileage, since it was the furthest.

WEATHER

Present Conditions: Please select all that apply: Heavy Rain, Steady Rain, Intermittent Rain, Overcast (no blue sky between any of the clouds), Partly Cloudy (clouds present but also some blue sky), or Clear/Sunny (no clouds).

Amount of Rain, if Known: Please check your local weather station or go to wunderground.com to find out the most recent rain levels in the past 24-48 hours in inches. If you have a rain gauge at your site, you may also use this for your measurement.

OBSERVATIONS

Note: You will need a clear cup or bottle and a white background to determine water color, water clarity and water odor. To evaluate these three parameters, take a water sample from your monitoring site.

Flow/Water Level
Even if your waterway is flooded or completely dry, that is valuable information and data. Please still fill out the datasheet as completely as possible (weather, air temperature, flow, comments section) and submit your information to the Adopt-A-Stream database.

Select one of the following:

- **Dry:** The stream or lake is dry with no visible pools.
- **Stagnant/Still (streams only):** This occurs when the water body is not flowing downstream. You should also check this box if there are pools of water in the stream or river bed that are not connected by flowing water (the bed is dry in between pools).
- **Low:** This is when the water level is lower than normal. There are a few indicators that the level is low: some parts of the creek or lake bed are dry between the water surface and the shoreline plants, or aquatic plants/algae are now exposed and lying out of the water.
- **Normal:** Based off of your observations and opinion, this is what your water body's level normally looks like.
- **High:** This is when the water body is higher than normal. Look for partially submerged shoreline vegetation, which is usually out of the water.
- **Flood (over banks):** Please do not sample when it is flooding, but a record of this level is important to note.

***NOTE:** With major changes in weather patterns, our waterways may exhibit periods of time not conducive to base flow water quality testing, including periods of extreme drought or flooding. Georgia Adopt-A-Stream encourages citizens to remember safe monitoring practices when major storms appear and waterways rise to unsafe levels.

Water Clarity
Select one of the following that describes the relative cloudiness of the water:

- **Clear/Transparent:** Water can transmit light rays and one can see through the water.
- **Cloudy/Somewhat Turbid:** Water can transmit some light rays, but one cannot see through the water.
- **Opaque/Turbid:** Neither clear nor cloudy; water cannot allow light to pass through most likely due to stirred up sediment.
- **Other**

Water Color
Select one of the following that describes the relative color of the water:

- **No Color**
- **Brown/Muddy**

- **Green**
- **Milky/White**
- **Tannic**
- **Other**

Water Surface
Select any of the following that describes the appearance of the water surface which can be a physical indicator of water pollution:

- **Clear:** No appearance of anything on the water surface.
- **Oily Sheen:** This is a multicolored reflection that may indicate oil floating in the stream. Some sheens are natural (a byproduct of iron bacteria), and may break into geometric patterns when touched (you can use a stick). Test if the oily sheen breaks when disturbed and select “yes” or “no.”
- **Algae:** Note if any types of algae are present in your stream. Algae are simple plants which do not grow true roots, stems, or leaves and which live mainly in water. They can be brown, green, reddish and can grow on rocks, the streambed or float on the surface.
- **Foam:** The presence of foam can be natural or due to pollution (e.g. detergents or nutrients). Foam that is several inches high and does not brush apart easily is generally due to some sort of pollution.
    - **If Foam is Present:**
      Select if it is more than 3 inches tall and/or if it is pure white in color.
- **Other:** Explain what you see on the water surface.

Water Odor
Select one of the following:

- **Natural/None**
- **Gasoline**
- **Sewage**
- **Rotten Egg**
- **Fishy**
- **Chlorine**
- **Other**

***NOTE:** DO NOT SMELL if there is a strong chemical odor or there is an appearance of chemical spill.

Trash
Trash is a form of pollution and is not only unsightly, but can affect the health of our waterways including aquatic life. Removing trash from streams is a simple way to protect and improve your waterways and can be done individually or with a larger group such as Rivers Alive (RiversAlive.org) and Georgia Adopt-A-Stream. The information you collect will support the efforts of these programs to identify sites across the state needing a cleanup.

Select any of the following:

- **None:** What a luxury, you monitor at a trash free site!
- **Yes, I did a cleanup:** Great, you successfully cleaned your site!
- **This site needs an organized cleanup:** Help! There is more trash present than our group can handle, and a larger effort needs to be conducted.

COMMENTS
This section is open to your personal observations of your site. Please write down information not captured by the datasheets including alterations to your site that are new since you last monitored ("*ATV tracks were seen up and down the stream channel*" or "*site access has changed to the west side of the bank*") or biological observations ("*algal growth was tremendous"* or "*fishes were seen*") as well as any other significant changes.

Photo Points

Photo point monitoring is a standardized method for taking photographs of resources so they can be compared over time. The goal of photo point monitoring is to have images to compare over time at your site. Images of your site can be submitted online.

Streams are dynamic systems that naturally change over time. However, in some cases, these changes can be caused by unnatural influences (i.e. land disturbances, instream dredging). Photo points provide a reference of conditions from the time you start monitoring, into the future. These images are intended to be repeated over time and are both a qualitative and quantitative tool that can assist in detecting natural and unnatural influences on streams. If changes are noticed, corrective actions may be taken before they become severe or irreversible.

You can also take opportunistic images, or images that are not intended on being repeated that support your observations (i.e. color of water is white, ATV tracks in your stream, destabilized stream banks, trash, etc.). These images can be posted on your site page for educational purposes or simply for documentation of observed activities at your site (i.e. erosion activities, foam, surface oil, etc.).

Below you will find the materials and directions on how to go about taking photo points at your site, including how to submit the images to the online database.

<u>Materials</u>

- Basic Visual Data Form
- Camera (try to use the same model of camera each time, at the widest depth of field)
- Tripod (optional)
- Tape measure
- Pencil/pen for taking notes
- GPS unit

- Compass

Procedure

First, we recommend selecting an area of your stream that is representative of your stream reach (12 times the bankfull width of the stream). Plan to take photo points at your site 2-4 times/year.

1. **Determine your permanent photo point location (see figure 3.0)**
   a. Pick Your Reference Point (RP): Your *reference point* is an arbitrary point in the riparian zone that will help you find the *permanent photo point location (PPL)* within the stream channel to which you will return each time for taking images. The *reference point (RP)* is a permanent structure/object located in the riparian zone such as a tree, boulder or metal rod. Make sure the reference point will be an easily located structure/object and is not in an erosion-prone area. We suggest taking a GPS location of this point and recording this in your notes.

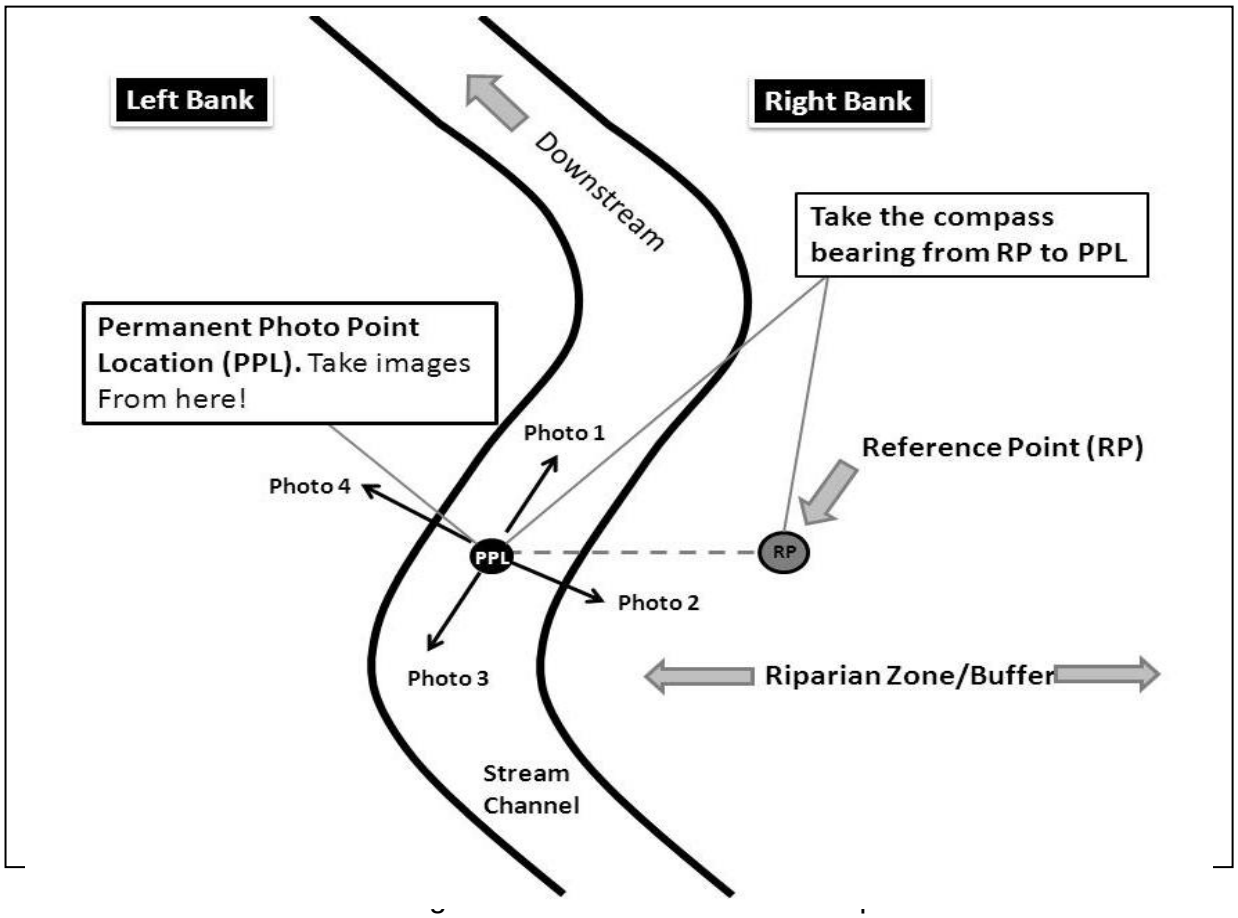
   b. Find the Permanent Photo Point Location (PPL): This is the location to which you will return each time to take your set of photo points. Because it is within the stream channel, you will use the *reference point (RP)* to locate it each time. To do this the first time, get out a tape measure (in feet) and from your *reference point (RP)*, run this out to the center of the stream channel (bankfull to bankfull). The point in the center of your stream channel will be your *permanent photo point location (PPL)*. Record this distance. Note, you will want to have a compass to find your bearing for running the tape measure consistently on your future photo point monitoring visits. See below for instructions on how to take a bearing.
2. **Determining height for taking images:** Using a tripod, set the height to take your images (record this height) or simply make sure you take the images from the same estimated height each time (i.e. same volunteer each time taking from their eye level).
3. **Taking the images:** You will take 4 images as follows, setting your camera for the widest depth of field.
   Photo Point 1: Looking downstream
   Photo Point 2: Will be 90 degrees clockwise and should capture the right bank, looking into the riparian zone
   Photo Point 3: will be 180 degrees clockwise from photo point #1, and should be looking upstream
   Photo Point 4: will be 270 degrees clockwise from photo point #1, and should capture the left bank

   NOTE: It is best to take photos early in the morning, late in the afternoon, or on slightly overcast days when the sun is less intense.
4. **Submit your images!** You can upload these images to the online dataset at: www.GeorgiaAdoptAStream.org

TAKING A BEARING WITH A COMPASS (see figure 3.1)

1. From the Reference Point (RP) in the riparian area, look to your Permanent Photo Point Location (PPL), and face it (see Figure 3.0)

2. Hold your compass at waist level and allow the north needle to position itself (using magnetic north). If you're using a map style compass with a rotating face, turn it so that the north marker lines up with the needle and the direction of travel arrow on the baseplate is pointing toward the PPL.
3. Find the degree marker that lines up with your compass baseplate arrow.
4. The marking that lines up with your landmark is your compass bearing. Record this reading on your basic visual data form.



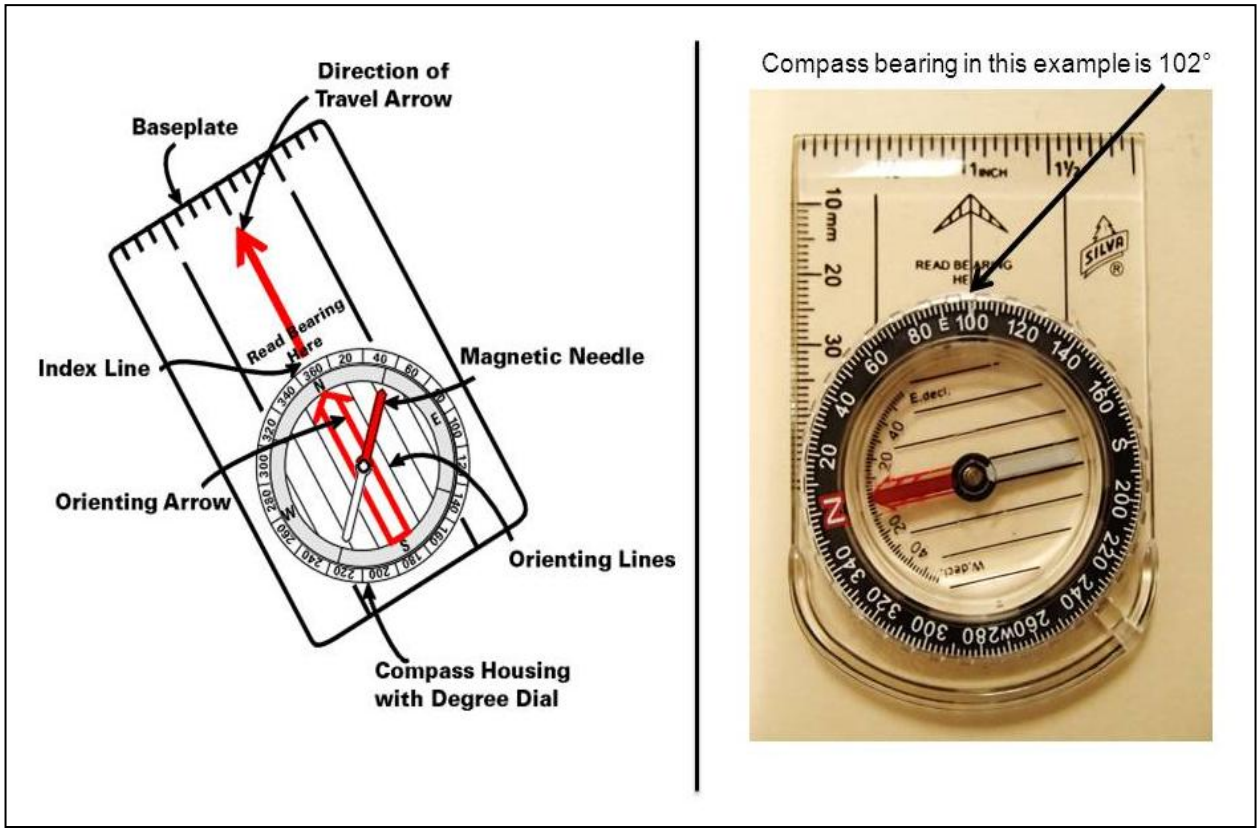


Figure 3.1 How to Take a Compass Bearing

Stream Habitat Survey

INTRODUCTION

Stream habitat includes the physical and chemical conditions of this ecosystem and plays a large role in the aquatic life you will find. By conducting this survey, you will be able to qualitatively document the condition of instream habitat and the riparian zone. By conducting this on a quarterly basis, changes over time and a good snapshot of the stream's health will be achieved. Stream habitats will be evaluated looking upstream and downstream and into the riparian zone on both sides of the channel. The survey rates parameters including channel bottom materials, sinuosity, bank stability, streamside vegetation and many more. It is intended for wadeable streams only, and it is recommended that you read this guide first before completing the survey. Training workshops are also available, and can be found on our website's calendar at www.GeorgiaAdoptAStream.org or call/email us to schedule one in your area.

USING THE SURVEY

Before you begin conducting the survey, there are some important concepts and ideas to keep in mind:

- **Stream Reach:** At your adopted site, determine a section of stream you will walk and survey. The reach is defined as twelve (12) times the average width of the stream. Figure out the most upstream and downstream points, and perhaps place a permanent marker so you remember this area for future surveys. Be sure to walk the entire reach, getting in the stream and riparian zone when completing the survey to achieve a better idea of the overall condition.
- **Reference Stream:** This survey works best if you have identified a local reference stream for comparison. This is a stream that has had minimal disturbance from human interactions, or is as healthy a stream you can find in your area and can serve as a benchmark for the survey and other streams your evaluate.
- **Total Score***:* After you have evaluated and scored each parameter, sum up the total points to determine your final score and rating for your stream.
- **Rocky Bottom vs. Muddy Bottom Streams:** Determine which type of stream you have (one with riffles/rocks vs. one with a more sandy/muddy bottom). Evaluate only those parameters that are appropriate for that type (i.e. #2 refers to only rocky bottom streams, #7 refers to only muddy bottom streams).
- **The assessment should be completed at least four (4) times a year**: Intended as a compliment to the AAS Macroinvertebrate Monitoring Program, this survey will help you better understand and interpret the water quality index score. Both should be completed four times a year or seasonally.
- **Photo Points:** Take four (4) images of your site, 1 upstream, 1 downstream, 1 looking at the left bank/riparian zone, and 1 looking at the right bank/riparian zone. Take a set of these each time you conduct the habitat survey. To setup your photo points, see the Photo Points section in this document.

SCORING THE PARAMETERS

Each habitat parameter is rated with a value of 0 to 10, and in some cases (Numbers 8, 9 and 10) you will be asked to evaluate each bank separately, scoring each from 0 to 5. Using the Adopt-A-Stream Stream Habitat Survey data form, record the score that best

fits the observations you have made based on the narratives, drawing, images and description provided in the following page of this guide. See the example form at the end of this document to assist you in completing the survey.

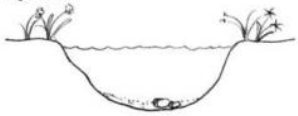
HOW DO I INTERPRET MY TOTAL SCORE?

Based on your total score, your stream will range from ‘poor’ to ‘excellent’ condition. This can change through the seasons and in varying weather and climatic patterns. It is good to have baseline data through the seasons and over time compare the total. It is also good to look at each parameter individually over time and perhaps see if there are any ‘weak’ parameters that may warrant further investigation or intervention such as restoration initiatives. Additionally, if the survey is completed in conjunction with the macroinvertebrate survey, this should give insight into the results of the water quality index score in regards to overall habitat condition and availability at your site.

STREAM HABITAT SURVEY GUIDE

In the following pages you will find a more in-depth guide to scoring each parameter, including what to look for, why is it important, how to score the parameter and a definition of terms.

#1 EPIFAUNAL SUBSTRATE: What types of submerged materials are on the channel bottom?

Habitat Parameter	Excellent ---------- Poor			
1. Epifaunal Substrate	**Abundant stable** habitat cover for colonization by macroinvertebrates and fish: submerged roots, woody and vegetative debris, cobbles, leaf packs and undercut banks. 	**Adequate stable** habitat cover for colonization by macroinvertebrates and fish: submerged roots, woody and vegetative debris, cobbles, leaf packs and undercut banks. 	**Little or no stable** habitat cover available for colonization by macroinvertebrates and fish: submerged roots, woody and vegetative debris, cobbles, leaf packs and undercut banks; habitat may move during high flows. 	What did you see?
What types of submerged materials are on the channel bottom?	10 9 8 7 6 5 4 3 2 1 0			Score

What to Look for: This parameter looks at the amount of habitat or cover available for critters such as macroinvertebrates and fish living in the water. It looks at the quantity and variety of natural materials in the channel including submerged roots, woody and vegetative debris, cobbles, leaf packs and undercut banks.

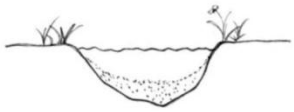
Why is it Important? These types of available cover provide refuges as well as breeding and feeding grounds for aquatic life. An abundance and variety of habitat can support a diversity of organisms and also provide for more stability following a disturbance such as flooding.

How to Score this Parameter: Rated on a scale from 0-10, choose a value that reflects the variety and abundance of habitat materials present ranging from 'little to abundant' such as submerged roots, woody and vegetative debris, cobbles, leaf packs and undercut banks.

Definition of Terms

- *EPIFAUNAL SUBSTRATE*: The organic and inorganic material that is available within the stream for organisms to live in or on. Otherwise known as 'available cover.'

#2 EMBEDDEDNESS: Are fine sediments being deposited in the riffle/run area? (Score for ROCKY BOTTOM streams only)

Habitat Parameter	Excellent ---------- Poor			
2. Embeddedness * For ROCKY BOTTOM streams only **Are fine sediments being deposited in riffle/run area?**	Gravel and cobble are **slightly** embedded in riffle area. 	Gravel and cobble are **partially** embedded in riffle area. 	Gravel and cobble are **completely** embedded in riffle area. 	What did you see?
	10 9 8 7	6 5 4 3	2 1 0	Score

What to Look for: This is a measure of how much the bottom substrate materials (cobbles, boulders and other rock) are surrounded and covered by fine sediment (silt and sand). The more the bottom is covered in silt and sand, the more embedded it is. This parameter is only to be scored if evaluating rocky bottom streams and in an area where riffles are a natural feature.

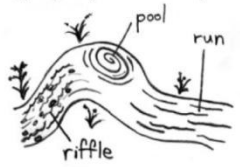
Why is it Important? Embeddedness tells us if there is enough suitable habitat available for aquatic life including macroinverterbates, fish and amphibians. Generally, as cobbles and gravel become embedded, the surface area available to these critters for shelter, spawning and egg incubation decreases.

How to Score this Parameter: Rated on a scale from 0-10, choose a value that reflects the degree to which cobble and gravel are embedded ranging from 'slightly to completely.' Evaluate this parameter by picking up gravel or cobble out of the streambed with your fingertips, and estimating what percentage of the particle was buried. Observations should be taken in the upstream and central portions of riffles.

Definition of Terms

- *EMBEDDEDNESS*: The amount of silt and sand that surrounds and covers the gravel and cobbles found in a stream.
- *RIFFLE:* A shallow section in a stream where water is breaking over rocks, cobble, wood or other substrate in the streambed causing surface agitation.

#3 RIFFLE/RUN/POOL: Is a diversity of instream habitats available: riffle, runs and pools?

Habitat Parameter	Excellent ---------- Poor			
3. Riffle/Run/Pool **Is a diversity of instream habitats available: riffle, runs and pools?**	Yes, all **three (3)** habitat types (riffle, run, pool) are present and frequent. 	**Two (2)** habitat types are present. 	Only **one (1)** habitat type present and dominant. 	What did you see?
	10 9 8 7 6 5 4 3 2 1 0			Score

What to Look for: In this parameter we are looking at the diversity and frequency of different instream habitat types including riffles, runs and pools.

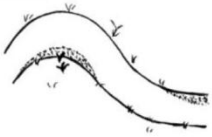
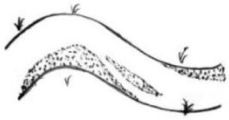
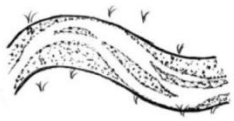
Why is it Important? The presence of these different flow regimes and habitat types relates to a stream's ability to provide and maintain a stable aquatic environment through the distribution of nutrients and oxygen, movement of materials and dispersion of energy.

How to Score this Parameter: Rated on a scale from 0-10, choose a value that reflects the amount of habitat types available ranging from one type as dominant, to all three types present and frequent.

Definition of Terms

- *RIFFLE:* Shallow areas of a stream or river with a fast-moving current bubbling over rocks.
- *RUN:* These areas differ from riffles in that depth of flow is typically greater and slope of the bed is less than that of riffles. Runs will often have a well defined thalweg.
- *POOL*: A deeper area of a stream with slow moving water.
- *Thalweg:* The line defining the lowest points along the length of a river bed or valley; the deepest part of the channel.

#4 SEDIMENT DEPOSITION: Are point bars and islands present?

Habitat Parameter	Excellent ---------- Poor			
4. Sediment Deposition Are point bars and islands present?	**Point bars and islands stable** and of small size and frequency with some vegetation. Composed mostly of gravel and cobble. 	**Point bars and islands less stable** and of moderate size and frequency with some sparse vegetation. Composed mostly of some gravel ad finer sediment. 	**Point bars and islands unstable** and of a large size with little or no vegetation. Composed almost entirely of fine sediment. 	What did you see?
	10 9 8 7	6 5 4 3	2 1 0	Score

What to Look for: This parameter relates to the amount of sediment that has gathered in the channel and the changes that have occurred because of sediment deposits. Deposition can cause the formation of islands, point bars, shoals or result in the filling of pools. Sediment typically comes from bank erosion within the stream and watershed as a result of land disturbance.

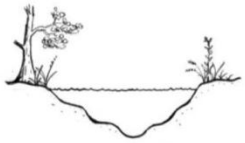
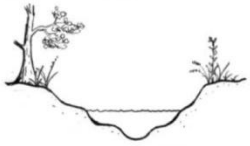
Why is it Important? Deposition of sediments naturally occurs in slow-low flow sections. High levels of sediment deposition create a dynamic and unstable system, making habitat unsuitable for aquatic life by smothering available cover and lowering oxygen levels. This parameter is a reflection of the stability of the point bars and islands.

How to Score this Parameter: Rated on a scale from 0-10, choose a value that reflects the size and composition, as well as frequency of vegetated islands and point bars in the channel.

Definition of Terms

- *POINT BARS:* Deposits of sediment on the inside of a meander or bend of stream.
- *VEGETATED ISLANDS:* A small islet or sandbar within a river having a grouping or thicket of trees.

#5 CHANNEL FLOW STATUS: How much water is in the stream channel?

Habitat Parameter	Excellent ---------- Poor			
5. Channel Flow Status How much water is in the stream channel?	Water reaches base **of both lower** banks; little substrate exposed. 	**Some substrate is exposed** and water partially fills channel. 	**Most substrate is exposed** and very little water in channel. 	What did you see? Score
	10 9 8 7	6 5 4 3	2 1 0	

What to Look for: This is the degree to which the channel is filled with water during base or average annual flow, and how much, if any, of the stream substrate is exposed.

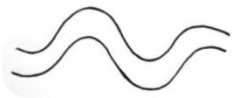
Why is it Important? The more water covering available habitat within the substrate, the better for aquatic organisms.

How to Score this Parameter: Use the vegetation line on the lower bank as your reference point to estimate channel flow status. Rated on a scale from 0-10, choose a value that reflects the amount of water reaching the base of both banks from 'very little water' to 'reaches both banks,' and look at how much the stream substrate is exposed from 'most to little.'

Definition of Terms

- *SUBSTRATE:* The mineral or organic material that forms the bed (bottom) of a stream.

#6 CHANNEL ALTERATION: Is the stream channel altered by humans?

Habitat Parameter	Excellent ---------- Poor			
6. Channel Alteration **Is the stream channel altered by humans?**	**No evidence** of channelization (straightening) or alterations such as dredging, agriculture, concrete banks or construction activities. 	**Some evidence** of channelization (straightening) and/or alterations such as dredging, agriculture, concrete banks or construction activities. 	**Most of stream reach** channelized and/or many alterations present such as dredging, agriculture, concrete banks or construction activities. 	What did you see?
	10 9 8 7	6 5 4 3	2 1 0	Score

What to Look for: This parameter examines changes in sinuosity and if the shape of the channel and/or the instream habitat have been impacted by alterations. Examples of alterations include: riprap, artificial embankments or stabilization structures, impoundments, diversions, straightening or the presence of dams and bridges.

Why is it Important? Streams tend to follow a normal and natural meandering pattern. Streams that have been altered typically have fewer natural habitats for aquatic organisms and have an unnatural shape that leads to major differences in energy distribution, structures, and flow regimes.

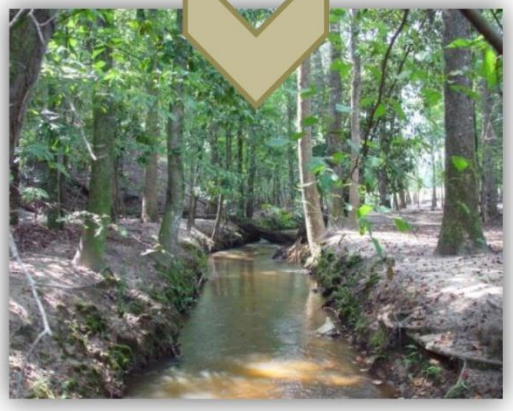
How to Score this Parameter: Rated on a scale from 0-10, choose a value that reflects the occurrence of bends (sinuosity) in the channel ranging from 'most of the stream reach is channelized to no evidence of channelization.' Look for evidence of alterations to score this parameter including: dredging, agriculture, concrete banks or construction activities.

Definition of Terms

- *CHANNELIZATION:* Straightening of a stream channel.

#7 CHANNEL SINUOSITY: Does the channel have lots of curves and bends? (Score for MUDDY BOTTOM streams only)

Habitat Parameter	Excellent ---------- Poor			
7. Channel Sinuosity * For MUDDY BOTTOM streams only **Does the channel have lots of curves and bends?**	Yes, bends in the channel are **frequent.** 	There are **more bends than straight** sections. 	There are **more straight sections** than sections with bends or channel is entirely straight. 	What did you see?
	10 9 8 7 6 5 4 3 2 1 0			Score



What to Look for: This parameter is a measure of how much the stream meanders, or its sinuosity. These meanders or bends can be measured using aerial views and maps of the stream channel. This parameter is only to be scored if evaluating muddy bottom streams.

Why is it Important? More meanders in a stream provide for a higher diversity of habitat and aquatic critters. The bends absorb energy from higher and faster flows, protecting the stream from excessive flooding and erosion.

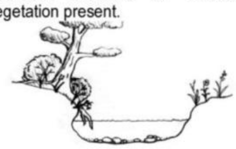
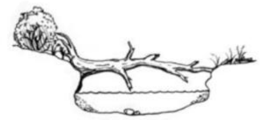
How to Score this Parameter: Rated on a scale from 0-10, choose a value that reflects the occurrence of bends in the channel ranging from 'straight sections to frequent bends.'

Definition of Terms

- *CHANNEL SINUOSITY:* The frequency of bends that occur in a stream.

#8 BANK STABILITY: How stable are the streambanks?

(Look at both left and right banks)

Habitat Parameter	Excellent -Poor			
8. Bank Stability **How stable are the streambanks?** Determine right/left bank by facing downstream	**Bank stable**; erosion, scouring, undercutting or bank failure absent or minimal. Vegetation overhanging the stream is abundant. 	**Bank moderately stable**; evidence of small areas of erosion, undercutting and scouring, or bank failure present. Moderate amounts of overhanging vegetation present. 	**Bank unstable**; many eroded and scoured areas with undercutting; bank failure present; steep banks. Little over hanging vegetation present. 	What did you see?
Left bank	5 4.5 4 3.5	3 2.5 2 1.5	1 .5 0	**Score** (Add both banks)
Right bank	5 4.5 4 3.5	3 2.5 2 1.5	1 .5 0	

What to Look for: This parameter is a measure of the potential for soil to detach from the upper and lower streambanks and move into the stream.

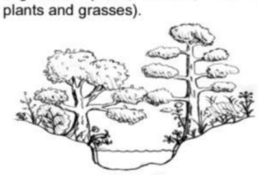
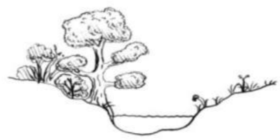
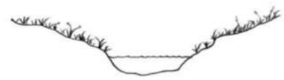
Why is it Important? Steep banks, considered more unstable, are more likely to collapse from erosion and cause channel widening than gently sloping banks. Eroded banks indicate scarcity of cover and organic inputs to the stream as well as problems with sediment movement and deposition.

How to Score this Parameter (score each bank separately): Rate both the left and right banks separately (facing downstream). Rated on a scale from 0-5, choose a value that reflects the stability of each bank from 'unstable to stable.' Are there any of the following signs of erosion: bare exposed soil, crumbling banks, exposed tree roots and undercutting? Combine these scores when finished for a cumulative score ranging from 0-10.

Definition of Terms

- *UNDERCUTTING:* A type of erosion which occurs when soils are swept away by the action of the stream, especially on the outer banks of curves. The result is an unstable, overhanging bank.

#9 VEGETATIVE PROTECTION: Are streambanks covered & shaded by a variety of vegetation? (Look at both left and right banks)

Habitat Parameter	Excellent -Poor			
9. Vegetative Protection **Are streambanks covered & shaded by a variety of vegetation?** Determine right/left bank by facing downstream	Most streambank surfaces covered and shaded by a **large variety** of vegetation (trees, shrubs, flowering plants and grasses). 	Some streambank surfaces covered and shaded by **some variety** of vegetation (trees, shrubs, flowering plants and grasses). 	Few streambank surfaces covered and shaded by vegetation. **Little variety** of vegetation. Streambank dominated by one type of vegetation (trees, shrubs, flowering plants and grasses). 	What did you see? Did you see any nonnative vegetation? Check here if YES ☐
Left bank	5 4.5 4 3.5	3 2.5 2 1.5	1 .5 0	**Score** (Add both banks)
Right bank	5 4.5 4 3.5	3 2.5 2 1.5	1 .5 0	

What to Look for: This is a measure of the amount of vegetation covering the streambanks and the near-stream portion of the riparian zone. It provides information on the ability of the banks to resist erosion.

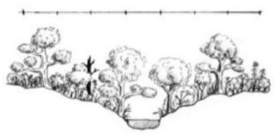
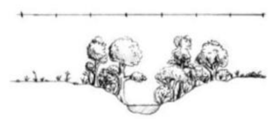
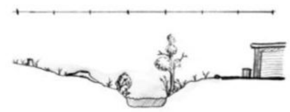
Why is it Important? Banks with full plant growth are more beneficial for aquatic life, as the root systems of plants growing in the streambanks help hold soil in place, control erosion/undercutting, provide shade and habitat, and lessen the amount of runoff coming into the waterway.

How to Score this Parameter (score each bank separately): Rate both the left and right banks separately (facing downstream). Rated on a scale from 0-5, choose a value that reflects the **amount** of streambank surfaces covered by a **variety** of healthy, living vegetation (i.e. trees, shrubs, flowering plants and grasses) from 'few to most' surfaces. Factors to consider when scoring this parameter include the balance of upper/under/lower story cover presence and during which season the assessment is being conducted. Also, please note if any nonnative vegetation is present, if known. You will combine these scores when finished for a cumulative score ranging from 0-10. To learn about nonnative species in the Southeast visit http://www.invasive.org/eastern/srs

Definition of Terms

- *NONNATIVE:* A species living outside its native distributional range, which has arrived there by human activity.
- *UNDERCUTTING:* A type of erosion which occurs when fine sediment are swept away by the action of the stream, especially around curves. The result is an unstable overhanging bank.
- *RIPARIAN VEGETATIVE ZONE:* The vegetated area along the stream channel.

#10 RIPARIAN VEGETATIVE ZONE WIDTH: What is the amount of buffer available? (Look at both left and right banks)

Habitat Parameter	Excellent -Poor			
10. Riparian Vegetative Zone Width **What is the amount of buffer available?** Determine right/left bank by facing downstream	Buffer present; a large variety of vegetation extends at least **three channel widths** on each side. 	Some buffer present; some variety of vegetation extends **two to one channel width** on each side. Human activities have impacted buffer zone. 	Little or no buffer present; vegetation extends **less than one channel width** on each side. Human activities substantially impact buffer zone. 	What did you see? Did you see any nonnative vegetation? Check here if YES ☐
Left bank	5 4.5 4 3.5	3 2.5 2 1.5	1 .5 0	**Score** (Add both banks)
Right bank	5 4.5 4 3.5	3 2.5 2 1.5	1 .5 0	

What to Look for: This parameter is a measure of the amount of the vegetation from the edge of the streambank into the riparian zone (buffer).

Why is it Important? The riparian zone performs many important functions such as removing pollutants from runoff, providing shade to cool the water, controlling erosion by reducing the velocity and volume of runoff and by providing habitat for aquatic life (i.e. organic matter inputs). Depending on the stream size and order, the width of the riparian zone may vary.

How to Score this Parameter (score each bank separately): Rate both the left and right banks separately (facing downstream). Rated on a scale from 0-5, choose a value that reflects the width of the riparian zone from 'less than one channel width to at least three channel widths.' Also, please note if any nonnative vegetation is present, if known. You will combine these scores when finished for a cumulative score ranging from 0-10. To learn about nonnative species in the Southeast visit http://www.invasive.org/eastern/srs

Definition of Terms
- *RIPARIAN VEGETATIVE ZONE:* The vegetated area along the stream channel.
- *BUFFER:* A vegetated area near a stream, usually forested, which helps shade and partially protect a stream from the impact of adjacent land uses.
- *NONNATIVE:* A species living outside its native distributional range, which has arrived there by human activity.

Stream Flow

Stream flow, or discharge, is the volume of water that moves over a designated point in a fixed period of time. It is often expressed as cubic feet per second (cfs). To determine your stream flow rate, follow the directions below. These measurements can also be taken when doing your channel cross-section survey.

Materials

- Tape measure (in feet and tenths of feet)
- Waterproof yardstick or other implement to measure water depth (in feet and tenths of feet)
- An orange or other flotation device, and a fishing net to scoop the float out of the stream
- Stopwatch (or watch with a second hand)
- Calculator
- Stream Flow data form

Procedure

All data should be recorded in feet and tenths of feet.

1. AREA – Calculate the area of a cross section of your stream in square feet. Area = depth x width. To do this, determine the average depth of your stream (Figure 3.1). Multiple depth measurements should be taken, starting at the water's edge and in the stream substrate. Take the average of all the depth measurements. Now run the tape measure across your stream (from water's edge to water's edge). Measure the width of the flowing stream at two locations. Multiply the average width and average depth of your stream to get area in square feet.

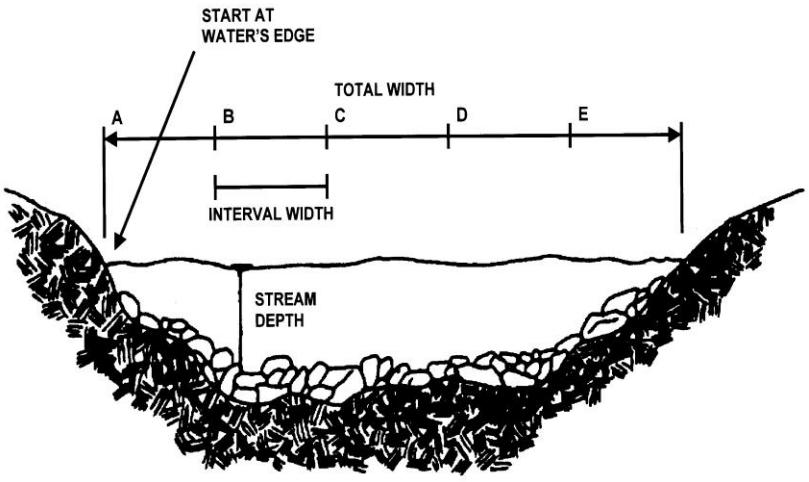


Figure 3.1 Calculating stream area

AREA = Depth x Width

2. SPEED – Calculate the speed at which your stream is flowing in feet per second (ft/sec). Starting from the point where the stream area measurements were taken, mark off a 20-foot section downstream (Figure 3.2). Use a stopwatch to time how many seconds it takes for a flotation object, such as an orange, to float the 20-foot distance.

The volunteer who lets the flotation object go at the upstream transect should position it so that it starts a little upstream of starting point and then flows into the fastest current. This "time of travel" measurement should be conducted at least three times and the results averaged – the more trials you do, the more accurate your results will be. Discard any float trials in which the object gets hung up in the stream (by cobbles, roots, debris, etc.). After obtaining the average time, divide the distance in feet by the number of seconds it took the object to travel that distance. This is the speed in feet per second.

SPEED = 20 ft / # seconds

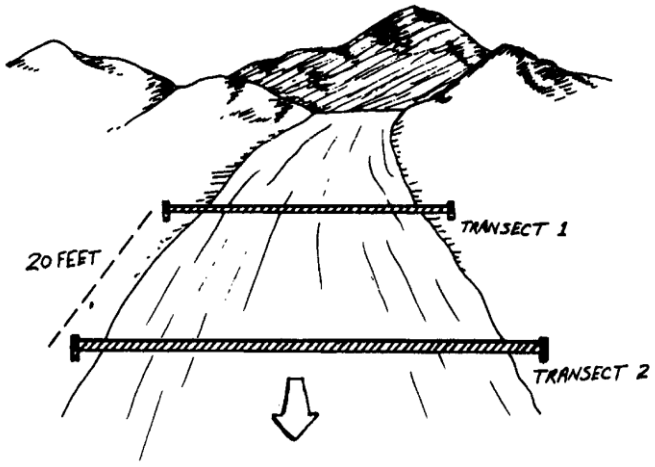


Figure 3.2 Calculating time between transects

3. COEFFICIENT – Scientists have determined a coefficient or correction factor for muddy bottom and rocky bottom streams. This allows you to correct for the fact that water at the surface travels faster than near the stream bottom due to resistance from gravel, cobble, etc. Multiplying the surface velocity by a correction coefficient decreases the value and gives a better measure of the stream's overall velocity. The coefficient or correction factor is 0.8 for rocky-bottom streams or 0.9 for muddy-bottom streams.

COEFFICIENT = 0.8 for rocky-bottom streams

COEFFICIENT = 0.9 for muddy-bottom streams

4. FLOW – To determine flow rate, multiply your stream area and your stream speed. Then multiply that answer by 0.8 or 0.9, depending on whether you have a rocky or muddy bottom stream.

FLOW = AREA X SPEED X COEFFICIENT

For those who are interested, the flow equation is:

FLOW = ALC / T

Where:
A = Average cross-sectional area of the stream in feet (average stream width multiplied by average water depth).
L = Length of the stream reach measured (usually 20 ft.)
C = A coefficient or correction factor (0.8 for rocky-bottom streams or 0.9 for muddy-bottom streams).
T = Time, in seconds, for the float to travel the length of L

Channel Cross-Section

Drawing a channel cross-section allows you to observe and track changes in your stream channel shape. Forms are found in the previous chapter. Measuring your stream channel cross-section is a simple and easy method of documenting changes in your stream channel shape, or stream profile.

This involves stretching a tape across the stream and taking measurements of the stream channel and banks. Twenty to thirty depth measurements are recommended to accurately portray most streams, with more measurements needed for broad or structurally complex sites (such as stream channels with islands in the middle). Measure all significant changes that occur across the channel, with an emphasis on elevation and structural changes.

All measurements are taken from the left bank, when facing downstream. All data should be recorded in feet and tenths of feet.

Materials

- 100-foot measuring tape (or longer, depending on your stream)
- 8- to 10-foot measuring stick in increments of feet and tenths (you can construct one from materials available at the hardware store)
- Thick twine (preferably non-stretch builders' quality)
- Line level
- 2- to 3-foot lengths of rebar, nails, and hammer (for first measurement)
- Clips or vise grips to fix tape to rebar or nails.
- Channel Cross-section: Part 1 data form
- Channel Cross-section: Part 2 graph paper
- Pencil

Procedure

A. Locate a representative section of your stream. Make sure there are no stream hazards—think safety first. Ideally, your site will have some

Figure 3.3. Preparing to measure channel cross section

permanent marker that will help you identify it in the future, e.g. a large tree, concrete structure, etc. If a permanent marker is not available, use rebar to mark the endpoints on each bank or hammer a nail in a large tree. The end points should be set back from your stream, behind the bankfull stage on either side (Figure 3.4).

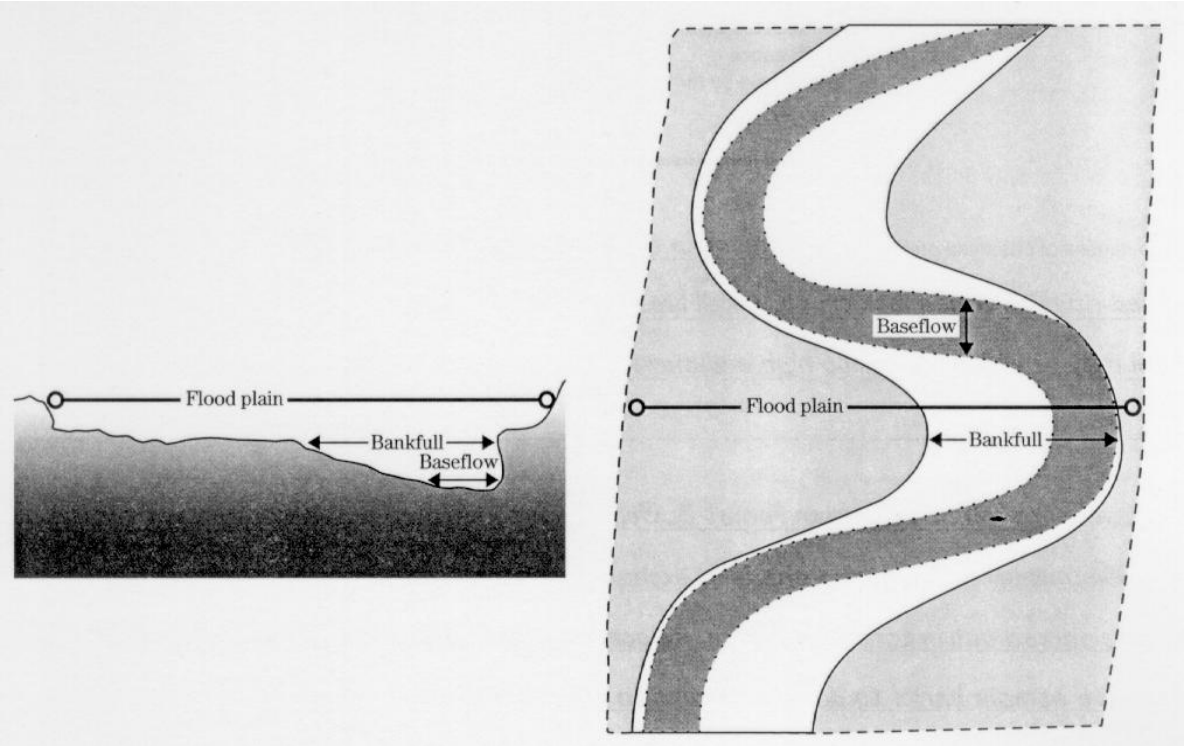


Figure 3.4 Cross-section measurements should begin in the flood plain.

B. Stretch your twine between your permanent markers. Using the line level, make sure the twine is perfectly level. If the twine is not level, your vertical measurements (elevation) will not be accurate. Stretch the measuring tape between both endpoints directly beside your twine. Attach the zero end of the tape to the left permanent marker (when looking downstream). Stretch the tape tight and level above the water. You will be taking vertical measurements from the stream substrate to the twine and horizontal measurements along the measuring tape.

Figure 3.5 Eying line level to ensure accurate measurements

C. Starting with the left endpoint at zero, measure horizontal distance along the measuring tape every 1 or 2 feet and at each change in each important feature (Figure 3.6). Always measure the bankfull stage (see Appendix A), edge of water, deepest point, sandbars, etc. At those horizontal distances,

measure the vertical distance (or elevation) from bank or stream bottom to twine. Continue across the channel to the right endpoint. Under **Comments**, note when you are at the bankfull stage, edge of water, and other significant features.

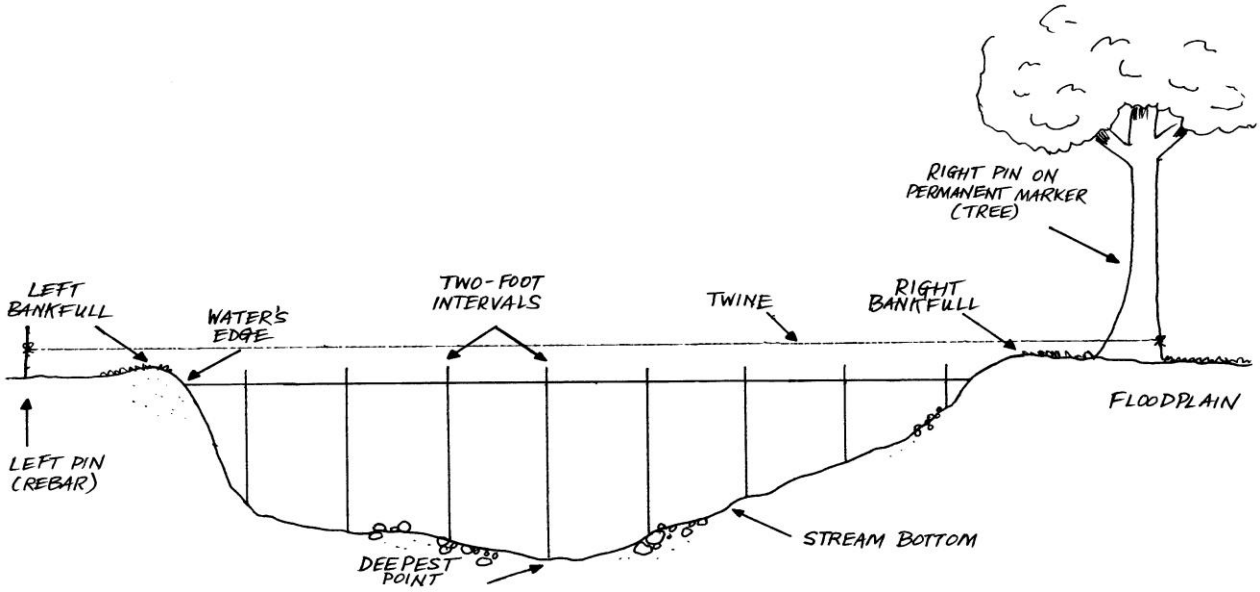


Figure 3.6 Stream profile depth measurements every 1 to 2 feet and at each important stream feature

D. Record the distance and elevation measurements to 0.1 feet (e.g. 3.7 ft.) on the Channel Cross-section: Part 1 data form found in the previous chapter.

E. On the Channel Cross-Section: Part 2 graph paper provided with your Visual Stream Survey forms, graph your stream profile to compare with future and past measurements.

Wentworth Pebble Count

The Wentworth pebble count provides a method for quantitatively characterizing the substrate particles in your streambed by determining the percentage of silt, sand, gravel, cobbles and boulders. The results can be used to evaluate the amount of sediment entering your stream. The method requires a minimum of two people, but can also be done in larger groups.

Materials

- Metric Ruler with a 2mm mark
- Size Chart (provided)
- Wentworth Pebble Count data form
- Pencil

Procedure

1. Select a member of your group to record the results on the data form. The remaining members of your group will be counters. You may wish to rotate these positions periodically throughout the pebble count. You may also wish to work in pairs of a counter and a note-taker.
2. Select a cross-section of your stream to sample. Look for an area of the stream with a representative number of pools, riffles, and/or runs. Make sure the area you choose is safe and wadeable.
3. Begin by wading through the stream. Make sure to cover all areas of the stream cross-section up to the bankfull mark, the highest point water reaches on the banks before it spills into the floodplain. If only one person is counting, walk upstream in a zigzag from bankfull to bankfull. If a whole group is counting, walk upstream in a line formed from bankfull to bankfull.
4. When the recorder says "stop," each counter picks up the pebble closest to his/her right big toe. To avoid the natural tendency to pick up larger pebbles, you should pick a point on your toe or boot to use as a reference point. You should also use a reference point on the finger that descends into the water. The first particle touched by this point should be measured.
5. Using a ruler and the Size Chart, each counter determines if s/he has silt/clay, sand, gravel, cobble, boulder or bedrock. The pebble is measured at its middle length. This is not the longest or the shortest cross-section of the pebble, but in between.
6. Call the size out to be recorded on the data sheet.
7. Repeat the process until you have counted approximately 100 times.
8. Calculate the percentage that are silt/clay, sand, gravel, cobble, boulder or bedrock (See example).
9. Graph the number of pebbles versus pebble size.

The following table contains particle size classes. Use the descriptions if you are making visual estimation. If more accurate measurements are taken, it is possible to obtain a clearer picture of changes in substrate composition over time.

Wentworth Pebble Count Size Chart

Size Class	Size Range (mm)	Description
Silt/Clay	< 0.062	Smooth when rubbed between fingers
Sand	0.062 – 2.0	May have some clay in it but you will feel the gritty texture.
Gravel	2.0 – 64.0	This line is just over 2 mm
Cobble	64.0 – 256.0	This line is about 64 mm. This page is just over 256 mm tall.
Boulder	256.0 – 4096.0	These are big.
Bedrock		Bare/exposed rock.

Sketch of Monitoring Site

On the Site Sketch form, or on a separate page, note the physical features of the stream reach, such as: riffles, pools, runs, streambanks (bare or eroded), changes to stream shape (rip-rap, gabions, cemented banks), vegetation, stream flow obstructions (dams, pipes, culverts), outfalls, tributaries, landscape features, paths, bridges and roads.

As accurately as possible, identify the location of **channel cross-section** measurements and provide information on the **location of stream reach** (e.g. 034.6772 N, 083.6823 W, or Cricket Creek stream reach begins 57 feet north of Cormorant Bridge.)

Include comments such as observed stream physical characteristic changes or potential problems, e.g. spills, new construction, type of discharging pipes, etc.

Visual Biological Survey

1. Wildlife in or around the stream: Make note of the wildlife you see or hear.
2. Fish in the stream: Check all that apply. Note any barriers that may keep fish from moving up or downstream.
3. Aquatic plants in the stream: Attached plants are those that are rooted in the streambed.
4. Extent of algae in the stream: Note the color of algae, the thickness of the coating and the distribution of algae covering on submerged material. A stream should have a light coating of algae on the rocks and other submerged material, visible only when standing within a few feet of the rock.

5. Presence of naturally occurring organic material in stream: This assessment measures availability of physical habitat for aquatic organisms, including fish and macroinvertebrates. The potential for the maintenance of a healthy fish community and its ability to recover from disturbance is dependent on the variety and abundance of suitable habitat and cover available.

Look for logs, fallen trees, or parts of trees that provide structure and attachment for aquatic macroinvertebrates and hiding places for fish. Thick root mats from trees and shrubs at or beneath the water surface also provides ideal habitat for aquatic animals.

6. Stream shade cover: Vegetative cover of the water's surface (i.e. trees and shrubs overhanging the stream, not algae covering the surface of it) reduces the amount of direct sunlight and also provides organic matter for the stream's food chain. Review the information on the River Continuum Concept (pages 16 and 17) to learn more.

Note the occurrence of string-like algae. If it is present in your stream, you will notice it easily. Also note if there are clumps of algae floating on the water's surface. The presence of these types of algae is not typical in a healthy stream.

EXAMPLE FORM

GEORGIA ADOPT-A-STREAM: Basic Visual Form

To be used with: Photo Points, Wentworth Pebble Count, Cross Section, Bio Survey, Stream Habitat Survey, Stream Flow and Site Sketch

SITE INFORMATION

Group Name: Chattahoochee Hills Creek Keepers
Event Date: 05232013 (MMDDYYYY)
Group ID: G- 1214 Site ID: S- 1507
Time Sample Collected: 0900 (HHMM am/pm)
Stream Name: Little Bear Creek
Time Spent Sampling: 30 (Min)
Monitor(s): Mary and Matt Mayfly
Total Time Spent Traveling *(optional)*: 25 (Min)
Number of Participants: 2
Furthest Distance Traveled *(optional)*: 75 (Miles)

WEATHER

Present conditions (check all that apply)

☐ Heavy Rain ☐ Steady Rain ☐ Intermittent Rain
☐ Overcast ☐ Partly Cloudy ☑ Clear/Sunny

Amount of rain, if known?

Amount in Inches: 0.5
In Last Hours/Days: 3 days
*Refer to *wunderground.com* for rainfall data

OBSERVATIONS

Flow/Water Level: *(check all that apply)* ☐ Dry ☐ Stagnant/Still ☐ Low ☑ Normal ☐ High ☐ Flood (over banks)

Water Clarity: ☐ Clear/Transparent ☑ Cloudy/Somewhat Turbid ☐ Opaque/Turbid ☐ Other:

Water Color: ☐ No Color ☑ Brown/Muddy ☐ Green ☐ Milky/White ☐ Tannic ☐ Other:

Water Surface: ☐ Clear ☑ Oily sheen: Does it break when disturbed? Yes/No (circle one) ☑ Algae
☐ Foam ○ Greater than 3" high ○ It is pure white ☐ Other:

Water Odor: ☑ Natural/None ☐ Gasoline ☐ Sewage ☐ Rotten Egg
☐ Fishy ☐ Chlorine ☐ Other:

Trash: ☐ None ☑ Yes, I did a cleanup ☑ This site needs an organized cleanup

PHOTO POINTS

Photos: Please take images to document your observations and changes in water quality conditions.
Photo point directions can be found in the manuals. Images can be submitted online with your other data.

Reference Location (RL): Latitude (+) 33.5590 (DD.DDDD°) Longitude (-) 84.7002 (DD.DDDD°)

Compass bearing to permanent Photo Point Location (PPL): Degrees (°) 40°E

Distance to permanent Photo Point Location (PPL) from Reference Location (RL): Distance 24 ft 5 in (ft/in)

Camera height at permanent Photo Point location (PPL): Height 5 ft 3in (ft/in)

COMMENTS

Any changes since you last sampled at this site? If yes, please describe.

Yes. Noticed that a large area of the east bank has collapsed since my last monitoring visit. Also, there is now a beaver dam of just upstream of where we sample.

Please submit data to our online database at www.GeorgiaAdoptAStream.org

EXAMPLE FORM

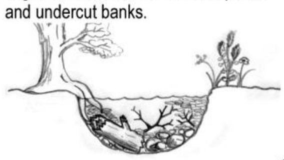
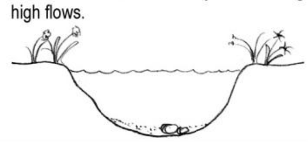
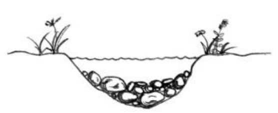
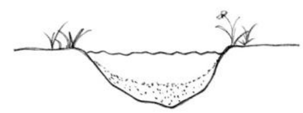
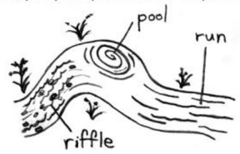
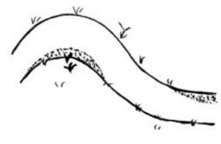
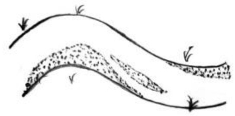
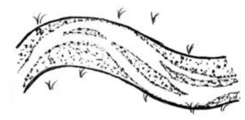
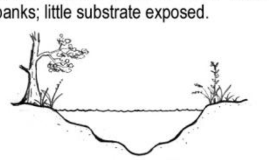
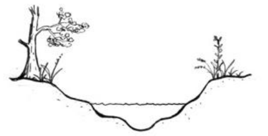
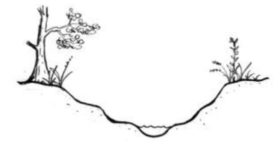
GEORGIA ADOPT-A-STREAM: Stream Habitat Survey

(Also fill out the Basic Visual Form when completing this survey)

Type of Stream:
☐ Rocky bottom
X Muddy bottom

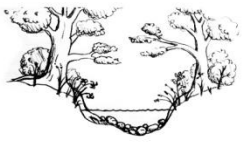
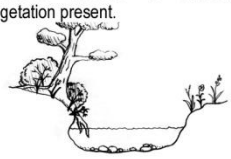
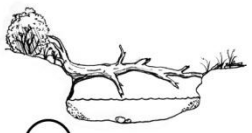
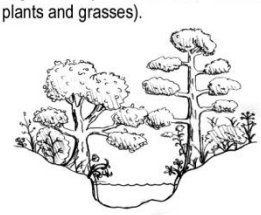
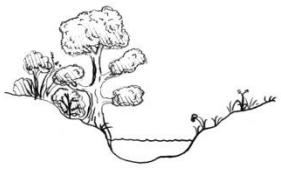
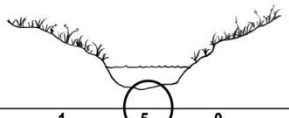
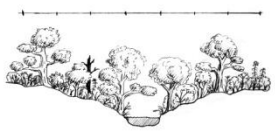
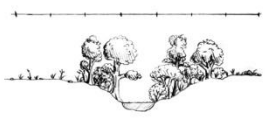
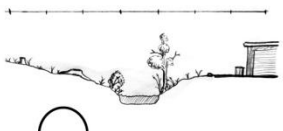
Stream habitat will be evaluated looking both upstream and downstream, and includes: channel bottom materials, streamside vegetation, slope, and other channel characteristics. You may choose a value between 0-10 for each parameter. Note #s 8-10 ask you to evaluate each bank separately.

All measurements should be taken during baseflow conditions. Stream reach is defined as 12 times stream width, bankfull to bankfull.

Habitat Parameter	Excellent -Poor			
1. Epifaunal Substrate **What types of submerged materials are on the channel bottom?**	**Abundant stable** habitat cover for colonization by macroinvertebrates and fish: submerged roots, woody and vegetative debris, cobbles, leaf packs and undercut banks. 	**Adequate stable** habitat cover for colonization by macroinvertebrates and fish: submerged roots, woody and vegetative debris, cobbles, leaf packs and undercut banks. 	**Little or no stable** habitat cover available for colonization by macroinvertebrates and fish: submerged roots, woody and vegetative debris, cobbles, leaf packs and undercut banks; habitat may move during high flows. 	What did you see?
	10 9 8 (7)	6 5 4 3	2 1 0	**Score** 7
2. Embeddedness * For ROCKY BOTTOM streams only **Are fine sediments being deposited in riffle/run area?**	Gravel and cobble are **slightly** embedded in riffle area. 	Gravel and cobble are **partially** embedded in riffle area. 	Gravel and cobble are **completely** embedded in riffle area. 	What did you see?
	10 9 8 7	6 5 4 3	2 1 0	**Score** NA
3. Riffle/Run/Pool **Is a diversity of instream habitats available: riffle, runs and pools?**	Yes, all **three (3)** habitat types (riffle, run, pool) are present and frequent.  	**Two (2)** habitat types are present. 	Only **one (1)** habitat type present and dominant. 	What did you see?
	10 9 8 7	6 5 (4) 3	2 1 0	**Score** 4
4. Sediment Deposition **Are point bars and islands present?**	**Point bars and islands stable** and of small size and frequency with some vegetation. Composed mostly of gravel and cobble. 	**Point bars and islands less stable** and of moderate size and frequency with some sparse vegetation. Composed mostly of some gravel and finer sediment. 	**Point bars and islands unstable** and of a large size with little or no vegetation. Composed almost entirely of fine sediment. 	What did you see?
	10 (9) 8 7	6 5 4 3	2 1 0	**Score** 9
5. Channel Flow Status **How much water is in the stream channel?**	Water reaches base **of both lower** banks; little substrate exposed. 	**Some substrate is exposed** and water partially fills channel. 	**Most substrate is exposed** and very little water in channel. 	What did you see?
	10 9 8 7	(6) 5 4 3	2 1 0	**Score** 6

Total first side 26

EXAMPLE FORM

Habitat Parameter	Excellent ---------- Poor			
6. Channel Alteration **Is the stream channel altered by humans?**	**No evidence** of channelization (straightening) or alterations such as dredging, agriculture, concrete banks or construction activities. 	**Some evidence** of channelization (straightening) and/or alterations such as dredging, agriculture, concrete banks or construction activities. 	**Most of stream reach** channelized and/or many alterations present such as dredging, agriculture, concrete banks or construction activities. 	What did you see? **Score** 5
	10 9 8 7 6 **(5)** 4 3 2 1 0			
7. Channel Sinuosity * For MUDDY BOTTOM streams only **Does the channel have lots of curves and bends?**	Yes, bends in the channel are **frequent.** 	There are **more bends than straight** sections. 	There are **more straight sections** than sections with bends or channel is entirely straight. 	What did you see? **Score** 4
	10 9 8 7 6 5 **(4)** 3 2 1 0			
8. Bank Stability **How stable are the streambanks?** Determine right/left bank by facing downstream	**Bank stable**; erosion, scouring, undercutting or bank failure absent or minimal. Vegetation overhanging the stream is abundant. 	**Bank moderately stable**; evidence of small areas of erosion, undercutting and scouring, or bank failure present. Moderate amounts of overhanging vegetation present. 	**Bank unstable**; many eroded and scoured areas with undercutting; bank failure present; steep banks. Little over hanging vegetation present. 	What did you see? Bank developed on left side
Left bank	5 4.5 4 3.5 3 2.5 2 1.5 **(1)** .5 0			**Score (Add both banks)** 5
Right bank	5 4.5 **(4)** 3.5 3 2.5 2 1.5 1 .5 0			
9. Vegetative Protection **Are streambanks covered & shaded by a variety of vegetation?** Determine right/left bank by facing downstream	Most streambank surfaces covered and shaded by a **large variety** of vegetation (trees, shrubs, flowering plants and grasses). 	Some streambank surfaces covered and shaded by **some variety** of vegetation (trees, shrubs, flowering plants and grasses). 	Few streambank surfaces covered and shaded by vegetation. **Little variety** of vegetation. Streambank dominated by one type of vegetation (trees, shrubs, flowering plants and grasses). 	What did you see? Lots of privet on left-bank Did you see any nonnative vegetation? Check here if YES ✓
Left bank	5 4.5 4 3.5 3 2.5 2 1.5 1 **(.5)** 0			**Score (Add both banks)** 5
Right bank	5 **(4.5)** 4 3.5 3 2.5 2 1.5 1 .5 0			
10. Riparian Vegetative Zone Width **What is the amount of buffer available?** Determine right/left bank by facing downstream	Buffer present; a large variety of vegetation extends at least **three channel widths** on each side. 	Some buffer present; some variety of vegetation extends **two to one channel width** on each side. Human activities have impacted buffer zone. 	Little or no buffer present; vegetation extends **less than one channel width** on each side. Human activities substantially impact buffer zone. 	What did you see? Did you see any nonnative vegetation? Check here if YES ☐
Left bank	5 4.5 4 3.5 3 2.5 2 1.5 **(1)** .5 0			**Score (Add both banks)** 6
Right bank	**(5)** 4.5 4 3.5 3 2.5 2 1.5 1 .5 0			

Stream Habitat Score: **Excellent (69-90)** **Good (46-68)** **Fair (23-45)** **Poor (0-22)**

Total second side 25

Total first side 26

Total 51

Please submit data at: www.GeorgiaAdoptAStream.org
Or send to: 4220 International Parkway, Suite 101, Atlanta, Georgia 30354
Fax: 404-675-6245 Phone: 404-675-6240

EXAMPLE FORM

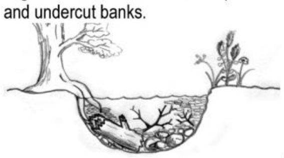
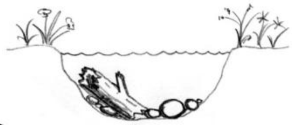
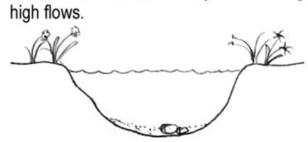
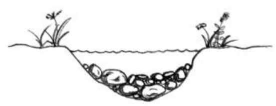
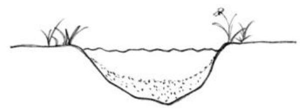
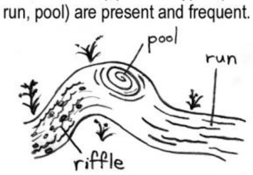
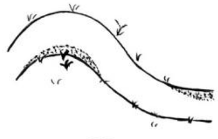
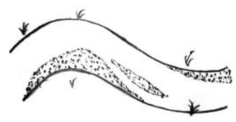
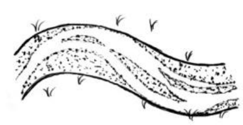
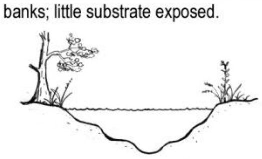
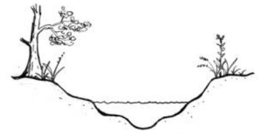
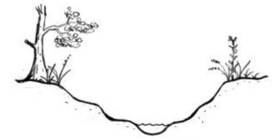
GEORGIA ADOPT-A-STREAM: Stream Habitat Survey

(Also fill out the Basic Visual Form when completing this survey)

Type of Stream:
X Rocky bottom
☐ Muddy bottom

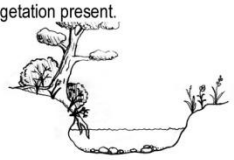
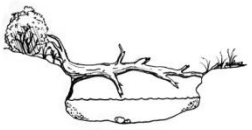
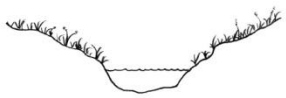
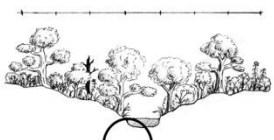
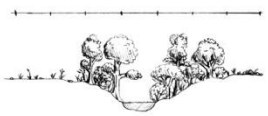
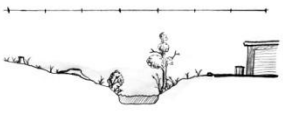
Stream habitat will be evaluated looking both upstream and downstream, and includes: channel bottom materials, streamside vegetation, slope, and other channel characteristics. You may choose a value between 0-10 for each parameter. Note #s 8-10 ask you to evaluate each bank separately.

All measurements should be taken during baseflow conditions. Stream reach is defined as 12 times stream width, bankfull to bankfull.

Habitat Parameter	Excellent -Poor			
1. Epifaunal Substrate **What types of submerged materials are on the channel bottom?**	**Abundant stable** habitat cover for colonization by macroinvertebrates and fish: submerged roots, woody and vegetative debris, cobbles, leaf packs and undercut banks. 	**Adequate stable** habitat cover for colonization by macroinvertebrates and fish: submerged roots, woody and vegetative debris, cobbles, leaf packs and undercut banks. 	**Little or no stable** habitat cover available for colonization by macroinvertebrates and fish: submerged roots, woody and vegetative debris, cobbles, leaf packs and undercut banks; habitat may move during high flows. 	What did you see?
	10 9 8 7	6 5 4 3	2 1 0	**Score** 7
2. Embeddedness * For ROCKY BOTTOM streams only **Are fine sediments being deposited in riffle/run area?**	Gravel and cobble are **slightly** embedded in riffle area. 	Gravel and cobble are **partially** embedded in riffle area. 	Gravel and cobble are **completely** embedded in riffle area. 	What did you see?
	10 9 8 7	6 5 4 3	2 1 0	**Score** 6
3. Riffle/Run/Pool **Is a diversity of instream habitats available: riffle, runs and pools?**	Yes, all **three (3)** habitat types (riffle, run, pool) are present and frequent. 	**Two (2)** habitat types are present. 	Only **one (1)** habitat type present and dominant. 	What did you see?
	10 9 8 7	6 5 4 3	2 1 0	**Score** 4
4. Sediment Deposition **Are point bars and islands present?**	**Point bars and islands stable** and of small size and frequency with some vegetation. Composed mostly of gravel and cobble. 	**Point bars and islands less stable** and of moderate size and frequency with some sparse vegetation. Composed mostly of some gravel and finer sediment. 	**Point bars and islands unstable** and of a large size with little or no vegetation. Composed almost entirely of fine sediment. 	What did you see?
	10 9 8 7	6 5 4 3	2 1 0	**Score** 9
5. Channel Flow Status **How much water is in the stream channel?**	Water reaches base **of both lower** banks; little substrate exposed. 	**Some substrate is exposed** and water partially fills channel. 	**Most substrate is exposed** and very little water in channel. 	What did you see?
	10 9 8 7	6 5 4 3	2 1 0	**Score** 6

Total first side 32

EXAMPLE FORM

Habitat Parameter	Excellent ---------- Poor			
6. Channel Alteration **Is the stream channel altered by humans?**	**No evidence** of channelization (straightening) or alterations such as dredging, agriculture, concrete banks or construction activities. 	**Some evidence** of channelization (straightening) and/or alterations such as dredging, agriculture, concrete banks or construction activities. 	**Most of stream reach** channelized and/or many alterations present such as dredging, agriculture, concrete banks or construction activities. 	What did you see? **Score** 9
	10 **9** 8 7 6 5 4 3 2 1 0			
7. Channel Sinuosity * For MUDDY BOTTOM streams only **Does the channel have lots of curves and bends?**	Yes, bends in the channel are **frequent.** 	There are **more bends than straight** sections. 	There are **more straight sections** than sections with bends or channel is entirely straight. 	What did you see? **Score** NA
	10 9 8 7 6 5 4 3 2 1 0			
8. Bank Stability **How stable are the streambanks?** Determine right/left bank by facing downstream	**Bank stable**; erosion, scouring, undercutting or bank failure absent or minimal. Vegetation overhanging the stream is abundant. 	**Bank moderately stable**; evidence of small areas of erosion, undercutting and scouring, or bank failure present. Moderate amounts of overhanging vegetation present. 	**Bank unstable**; many eroded and scoured areas with undercutting; bank failure present; steep banks. Little over hanging vegetation present. 	What did you see? **Score (Add both banks)** 7
Left bank	5 4.5 **4** 3.5 3 2.5 2 1.5 1 .5 0			
Right bank	5 4.5 4 3.5 **3** 2.5 2 1.5 1 .5 0			
9. Vegetative Protection **Are streambanks covered & shaded by a variety of vegetation?** Determine right/left bank by facing downstream	Most streambank surfaces covered and shaded by a **large variety** of vegetation (trees, shrubs, flowering plants and grasses). 	Some streambank surfaces covered and shaded by **some variety** of vegetation (trees, shrubs, flowering plants and grasses). 	Few streambank surfaces covered and shaded by vegetation. **Little variety** of vegetation. Streambank dominated by one type of vegetation (trees, shrubs, flowering plants and grasses). 	What did you see? Did you see any nonnative vegetation? Check here if YES ☐ **Score (Add both banks)** 8
Left bank	**5** 4.5 4 3.5 3 2.5 2 1.5 1 .5 0			
Right bank	5 4.5 4 3.5 **3** 2.5 2 1.5 1 .5 0			
10. Riparian Vegetative Zone Width **What is the amount of buffer available?** Determine right/left bank by facing downstream	Buffer present; a large variety of vegetation extends at least **three channel widths** on each side. 	Some buffer present; some variety of vegetation extends **two to one channel width** on each side. Human activities have impacted buffer zone. 	Little or no buffer present; vegetation extends **less than one channel width** on each side. Human activities substantially impact buffer zone. 	What did you see? Did you see any nonnative vegetation? Check here if YES ☐ **Score (Add both banks)** 8
Left bank	5 **4.5** 4 3.5 3 2.5 2 1.5 1 .5 0			
Right bank	5 4.5 4 **3.5** 3 2.5 2 1.5 1 .5 0			

Stream Habitat Score: Excellent (69-90) **Good (46-68)** Fair (23-45) Poor (0-22)

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Fax: 404-675-6245 Phone: 404-675-6240

Total second side 32
Total first side 32
Total 64

EXAMPLE FORM

GEORGIA ADOPT-A-STREAM: Stream Flow

(Also fill out the Basic Visual Form when completing this survey)

CALCULATE AREA

Area = depth x width

it is advisable to take multiple depth and width measurements
always start at the water's edge with a first measurement of zero
all data should be recorded in feet, with inches replaced by decimals

Depth Measurements	1.	2.	3.	4.	5.	6.	7.	8.	sum
	0 ft	0.6	1.1	0.7	0.3	0.6			3.3

Average Depth 0.55 ft = 3.3 (sum of depth measurements) / 6 (number of measurements)

Width Measurements	1.	2.	sum
	11.5 ft	14.6	26.1

Average Width 13 ft = 26.1 (sum of width measurements) / 2 (number of measurements)

Area $7.15ft^2$ = width 13 X depth 0.55

CALCULATE SPEED-measure the time it takes a float to travel a desired distance

it is advisable to take at least 2 measurements of current speed
take measurements from the stream <u>run</u>

length = 20 feet (20 feet is recommended)

time in seconds	1.	2.	3.	4.	sum
	23s	21	24		68

average time 22.7s = 68 (sum of time measurements) / 3 (number of measurements)

Speed 0.88ft/s = 20 (length in feet) / 22.7 (average time in seconds)

CALCULATE STREAM FLOW

			Area		Speed		Coefficient
Flow	5.03cfs	=	7.15	**X**	0.88	**X**	0.8

<u>Flow in cubic feet per second</u>

0.9 coefficient for muddy bottom stream
0.8 coefficient for rocky bottom stream

EXAMPLE FORM

GEORGIA ADOPT-A-STREAM: Channel Cross-Section: Part 1

(Also fill out the Basic Visual Form when completing this survey)

CROSS-SECTION			
Distance from LEFT Pin		Measurement Depth	Comments
Point	Ft.	Ft.	
1	*0*	*1.2*	*Left pin*
2	*2*	*1.7*	
3	*4*	*2.1*	
4	*5.3*	*2.3*	*Left bankfull*
5	*6*	*2.9*	
6	*7.2*	*3.8*	*Water's edge*
7	*8*	*4.2*	
8	*10*	*5.3*	
9	*12*	*5.4*	
10	*13.1*	*6.2*	*Deepest point*
11	*14*	*5.7*	
12	*16*	*4.5*	
13	*18*	*4*	
14	*20*	*3.5*	*Sandbar*
15	*22*	*3.9*	
16	*24*	*4.1*	
17	*26*	*4.3*	
18	*28*	*4.4*	
19	*29.8*	*3.9*	*Water's edge*
20	*30*	*3.6*	
21	*32*	*2.7*	
22	*33.9*	*2.4*	*Right bankfull*
23	*34*	*2.3*	
24	*36*	*2*	
25	*38*	*1.1*	

CROSS-SECTION			
Distance from LEFT Pin		Measurement Depth	Comments
Point	Ft.	*Ft.*	
26	40	*.6*	
27	42	*.2*	*Right pin*
28			
29			
30			
31			
32			
33			
34			
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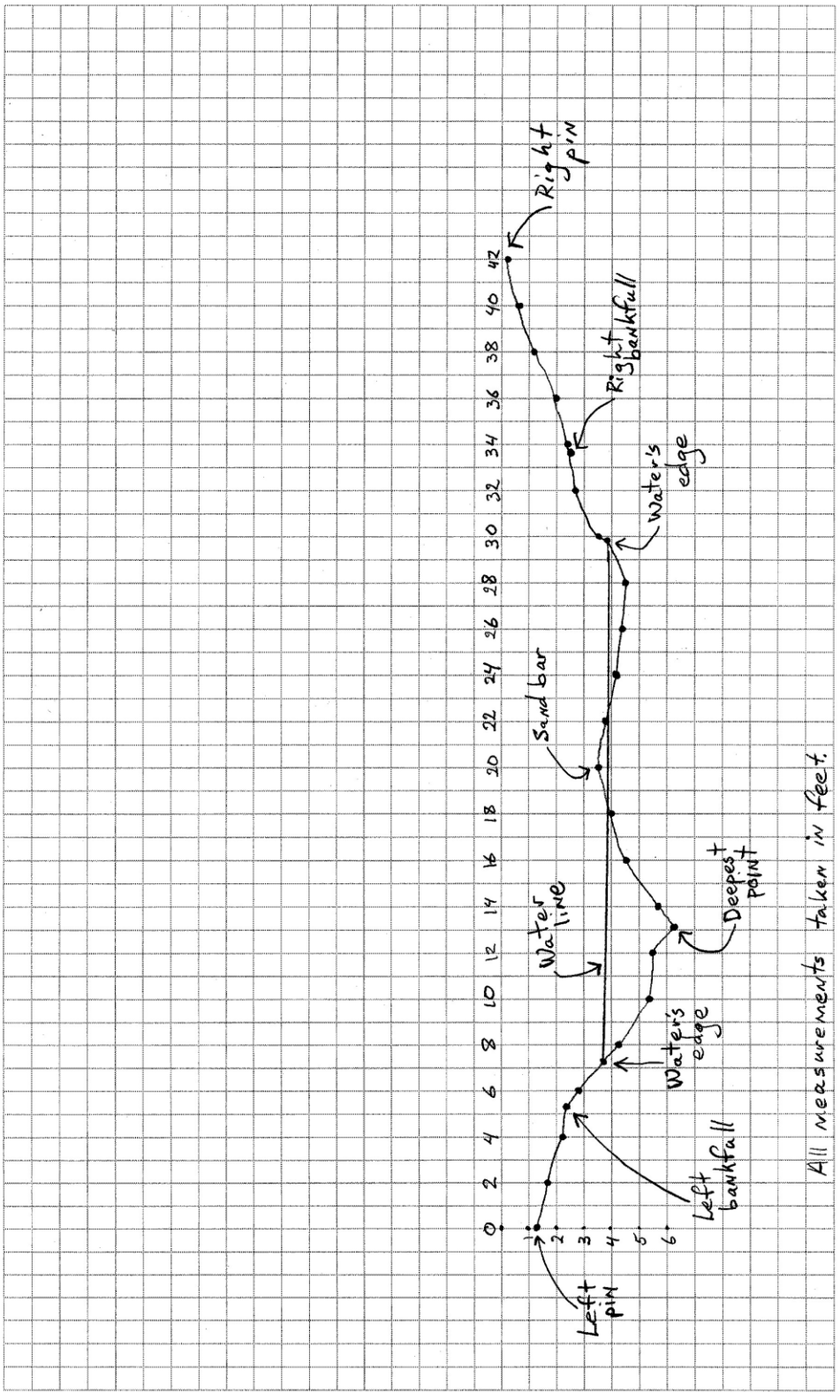
EXAMPLE FORM

GEORGIA ADOPT-A-STREAM: Channel Cross-Section: Part 2

(Also fill out the Basic Visual Form when completing this survey)

Graph Paper for Stream Channel Cross-section Measurements



EXAMPLE FORM

GEORGIA ADOPT-A-STREAM: Wentworth Pebble Count

This was completed by 5 individuals counting plus 1 recorder (20 rounds of counting)

(Also fill out the Basic Visual Form when completing this survey)

Count#/Size Class	Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
1	1	2		2		
2	1	3	1			
3		2	2	1		
4	1	3	1			
5	2	3				
6	1	2		2		
7	2	2	1			
8		2	2	1		
9	1	2		2		
10	1	3	1			
11	2	3				
12	1	2		2		
13	1	3	1			
14	2		3			
15	2	2	1			
16	1	2		2		
17		2	2	1		
18	1	2		2		
19	1	3	1			
20	2	3				
21						
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Count#/Size Class	Silt/Clay	Sand	Gravel	Cobble	Boulder	Bedrock
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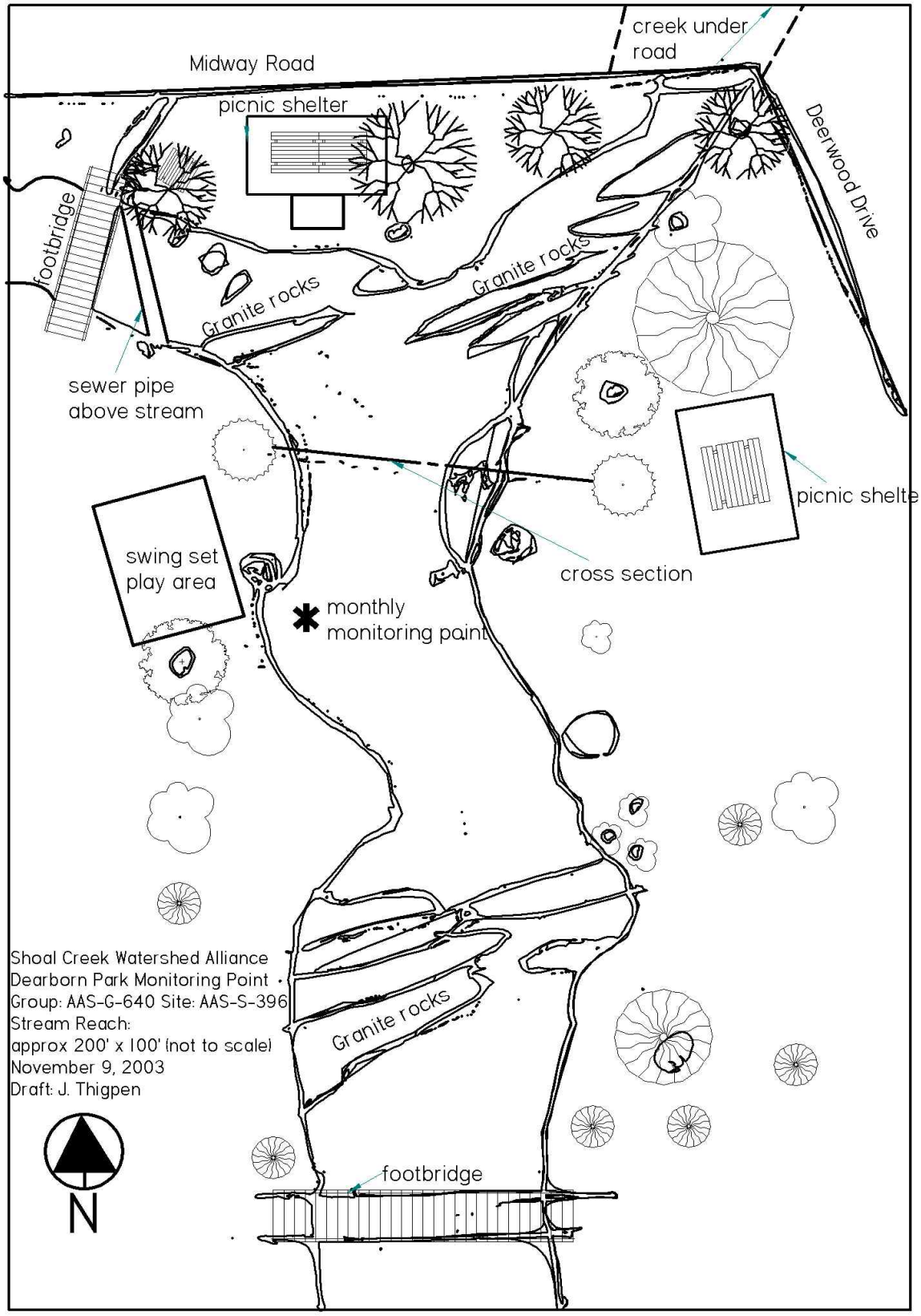
98						
99						
100						
Total in each column (%)	**23**	**46**	**16**	**15**	**0**	**0**

EXAMPLE FORM

GEORGIA ADOPT-A-STREAM: Site Sketch

(Also fill out the Basic Visual Form when completing this survey)



EXAMPLE FORM

GEORGIA ADOPT-A-STREAM: Visual Biological Survey

(Also fill out the Basic Visual Form when completing this survey)

1. Wildlife in or around the stream:

□ amphibians □ waterfowl **X** reptiles □ mammals **X** mussels/clams/oysters
□ crustaceans **X** birds

2. Fish in the stream: *(Check all that apply)*

□ no	□ yes, but rare	**X** yes abundant
X small (1-2")	**X** medium (3-6")	□ large (7" and above)

Are there barriers to fish movement?

X none	□ beaver dams	□ waterfalls > 1ft
□ dams	□ road barriers	□ other: _____

3. Aquatic plants in the stream: *(Check all that apply)*

□ none

	occasional	plentiful
X attached plants		
stream margin/edge	□	□
pools	□	□
near riffle	□	□
□ free-floating plants	occasional	plentiful
stream margin/edge	□	□
pools	□	□
near riffle	□	□

4. Extent of algae in the stream:

a) Are the submerged stones, twigs, or other material in the stream coated with a layer of algae? *(Check all that apply)*

□ none

	occasional	plentiful
□ brownish:		
light coating	□	□
heavy coating	□	□
X greenish:	occasional	plentiful
light coating	□	□
heavy coating	□	**X**
□ other: _____	occasional	plentiful
light coating	□	□
heavy coating	□	□

b) Are there any filamentous (string-like) algae?

	none	occasional	plentiful
brownish	**X**	□	□
greenish	□	□	**X**
other: _____	**X**	□	□

c) Are any detached “clumps” or “mats” of algae floating on the water’s surface?

	none	occasional	plentiful
brownish	□	**X**	□
greenish	**X**	□	□
other _____:	**X**	□	□

5. Presence of naturally occurring organic material in stream: *(Good habitat for aquatic organisms)*

Logs or large woody debris:	□ none	**X** occasional	□ plentiful
Leaves, twigs, root mats, etc.:	□ none	**X** occasional	□ plentiful

6. Stream shade cover: How well is the water surface shaded by vegetation?

Looking down stream:

Total shading No shading

100% 90% ——————————————————————————

80% 70% 60% 50% (40%) 30% 20% 10% 0