Instructions for Completing
Visual Assessment Data Sheets

One of the main purposes in setting up a volunteer monitoring program is to get more eyes out into the watershed to see what is going on, in other words, to collect data. Volunteer Monitoring promotes a strong sense of stewardship. Whether that data is used by the volunteers at the local level to provide information to their municipality, at the watershed level to identify or follow-up on problem areas in need of attention, at the State level to identify impaired waterways or in a study to provide baseline information, it needs to be consistent and structured so that the people using it can easily understand it and compare data from different sites.

There are four data sheets, the General Sheet, Monitoring Sheet, the Assessment Sheet and the Pipe/Drainage Ditch Inventory Sheet. In addition to these sheets, it is recommended that some form of a reference map, either a hand drawn map, USGS topographic map or aerial photograph is used to mark the approximate locations of the reach and each notable feature.

The General Sheet is meant to determine where you are performing your assessment and the weather conditions surrounding your monitoring event. In the past, it has been difficult to determine where monitors have accessed their site, and where the monitors have walked. To insure the quality of your data, this sheet should be filled out completely. This sheet should be filled out in the field.

The Assessment Sheet is meant to obtain general information about the entire reach you are monitoring and general information about the surrounding watershed. There are two sections to the sheet, **Assessment within 50 feet of the bank** and **Assessment within ¼ mile of the stream**. The Assessment within 50 feet of the bank can be filled out at your site. The Assessment within ¼ mile of your stream will need to be filled out as your drive, bike, or walk around you stream.

This will be submitted per monitoring event and is intended to be filled out prior to and after the assessment is performed. The Assessment Sheet will stay relatively the same from monitoring event to event. The data you will be collecting on this sheet is extremely useful to water quality data users because it allows data users to assess streamside land use in a more frequent manner.

The Monitoring Sheet is meant to obtain specific information. All the information asked for on this sheet will allow for a more thorough investigation and description of the health of your stream. This sheet is to be completed after your whole stretch has been walked and when you are still present at your site.

The Pipe/Drainage Ditch Inventory Sheet should be completed for every pipe and drainage ditch you find along your stretch. The pipe/ditch should also be marked on your reference map. There are many more pipes/ditches draining into our streams than we know. The data collected here is critical in determining point sources and non-point sources of pollution entering into the stream.

The following is a line-by-line explanation of how to fill out your data sheets, the techniques used for collecting the data, and the ways to obtain necessary information for your data sheets. This instruction booklet also contains a reference source section, definition section, a line by line instruction guide, a quick reference field sheet, a canopy cover chart, and a watershed map.

General Reach Sheet

Segment ID #:
This ID will be assigned to you by the group and will be used to identify the stream segment. It may also be referred to as the stream id#. The number allows the group to locate what water quality segment you are assessing.

Stream Name:
The name of the stream can be determined from the USGS quadrangle maps, street maps or if there is a local name for the stream. If no name is available the stream should be identified as an unnamed tributary to the nearest stream that the name is known.

Segment Identification
GPS Coordinates: Should be taken at the beginning point and ending point of your assessment.
Latitude and Longitude: If you have access to a GPS unit, please provide the coordinates of your starting point. This will allow for the group to easily identify your stream segment. If you do not have access to a GPS unit, you can identify latitude and longitude on a USGS topographic map.

Survey Team:
Names of the people involved in this survey.

Time:
Time of day when the assessment was performed.

Date:
Date on which the assessment was performed.

Weather:
Fill in the appropriate number:
(1. Clear, 2. Overcast, 3. Light rain/Showers, 4. Steady Rain, 5. Heavy Rain, 6. Snow, 7. Heavy Snow Melt) that best describes the weather conditions on the day of the assessment, within the last 48 hours before the assessment and during the week preceding the assessment.

Days Since Last Rain:
The number of days since the last rainfall prior to the day of the assessment.

Current Air Temperature:
Enter the air temperature in F at the time of the assessment.

Site Sketch:
This should be a hand drawn map of your stream segment. This should not be a substitute of your USGS topography map or GIS digital map. Your hand drawn map will allow you more room to add notes and mark such features as pools, riffles, runs, road crossings, transect locations, outfalls, ditches, stream confluences, flocks of waterfowl, etc. Please be sure to include anything you may see along your stream walk.

Monitoring Sheet

There are two predominate types of streams, high gradient and low gradient streams. High gradient streams are found in areas that have some elevation above sea level like the Highlands or the Piedmont region. Low gradient streams are found in low-lying areas like the Coastal Plains or the Pinelands. Your monitoring sheet results will depend upon if you are in a low or high gradient stream. Which type of stream you are monitoring will influence descriptions 1-10. For example, embeddedness may not be a determination you can make if you are in a low gradient stream, however, sediment in the stream will be something that you can assess in a low gradient stream and it will give data users the same information as embeddedness.

Stream Width and Depth

Stream Width:
There are two ways to complete this description, one for wadable streams and one for streams you can not safely walk cross or non-wadable.

For Non-Wadable Streams:
Fill in the number that best identifies the overall reach.

1. Constant means that the width remains fairly uniform throughout the entire reach.
2. Widening means that the stream gradually but noticeably widens from upstream to downstream.
3. Mild constrictions mean that at one or more locations in the reach narrows slightly then widens out again.
4. Sharp constriction means that at one or more locations in the reach the stream narrows to at least half the normal width of the stream and then widens out again.

For Wadable Streams:
Using the tape measure in feet or meters, take several measures of stream width at

different points in the reach being surveyed. The width should be taken at same location as the stream depth (see below). Record each width as **W1, W2**, etc. Then divide the sum of the widths by the number measurements taken +1(Sum of the depths/Number of measures +1). This is the Stream Width average.

Stream Depth:

For Non-Wadable Streams:
Fill in the number that best identifies the overall reach.

1. Constant means that the depth for the entire reach remains constant.
2. Variable (pools and riffles) means that the depth varies because the stream is made up of a series of pools and riffles.
3. Variable (constrictions) means that the depth varies in the reach because constrictions in the stream channel cause ponding.

For Wadable Streams: Stream velocity and stream depth can greatly affect the aquatic life of a stream. The best stream habitat includes all of the following combinations of velocity and depth:
Slow (<1ft/sec), shallow (<1.5ft) Slow, deep Fast, deep Fast, shallow
EPA, Volunteer Stream Monitoring Manual. 1995

First, measure stream velocity by marking off a 10 foot section of stream run, on a straight section of stream bank and measuring the time (with a stop watch) it takes a stick, orange, or any other biodegradable object to float the 10 feet. Repeat 5 times using the same floating tool, in the same 10foot section, and determine the average time. Divide 10 (the distance; D) by the average time (T) to determine velocity in feet per second (V=D/T).

Second, measure the stream depth by using a meter stick and taking readings. Take measurements at various points within the stream segment, riffles, pools, and runs. Your sample points need to be collected within the same 10-foot section as the velocity. Mark how many combinations are in your stretch.

Stream Sinuosity:
Sinuosity refers to the natural tendency for a stream to meander. Characterize the stream sinuosity by filling in the number that best identifies the overall reach.

1. Straight-natural means that the channel is fairly straight with no visible evidence of artificial bank stabilization.
2. Straight-channelized means that the channel is straight and has obviously been channelized with an artificial lining or bank stabilization.
3. Slight Bends
4. Moderate Bends
5. Sharp bends (oxbows)

Stream Flow:
This is referring to the flow appearance of the surface water of the stream. Fill in the number

that best identifies the reach.

1. Slow means that when looking at the stream the water does not appear to be moving or is barely moving.
2. Moderate means that when looking at the stream, the water appears to be moving but the surface still appears flat.
3. Swift means that the water is moving fast and the surface of the water is not flat.
4. Combination means that the flow in the reach varies because the reach is made up of pools and riffles and/or constrictions that are causing ponding of the water.

Pools and Riffles:

Pools and riffles refer to the mixture of flows and depths that create in-stream habitat for invertebrates and fish. Pools are deeper than the average stream depth with slower moving water than the average flow appearance. Riffles are shallower depth areas of the stream segment with faster, turbulent water running over gravel and/or rocks. This description will be dependent upon the stream gradient. Pools and riffles are typical of healthy high gradient streams; you may not find noticeable defined pools or riffles in a low gradient stream.

1. None present
2. Present

Stream Substrate:

This refers to the material on the stream bottom. You may have more than one but pick the dominant one for your stream segment and be sure to note the other types of substrate present. Choose the number that best describes the predominant bottom in the reach. If the bottom is composed of some material not listed, note the material in the "other" space.

1. Fine particles--silt/clay/mud. This substrate has a sticky, cohesive feeling. The particles are fine. The spaces between the particles hold a lot of water, making the sediments behave like ooze.
2. Sand— less than 0.25 cm particle size. A sandy bottom is made of tiny, gritty particles of rock that are smaller than gravel but coarser than silt.
3. Gravel—.25 cm to 5 cm particle size. A gravel bottom is made up of stones.
4. Cobble—5 cm to 25 cm
5. Boulder—25 cm or larger. These are the rocks that are too large to move by yourself.
6. Bedrock—Solid unbroken rock

Stream Substrate Stability:

This will help determine if the bottom of the stream is established or if new material is entering into the stream. While you are standing in the stream kick your feet around.

1. If you kick up a plume of fine particles and can move around the rocks easily the bottom is loose.
2. If your action does not kick up a large plume and you can feel the rocks are anchored, the bottom is stable.

Embeddedness (for High Gradient Streams):

Embeddedness is the extent to which rocks (gravel, cobbles, boulders) are sunken into the silt, sand, or mud of a stream bottom. Embeddedness is easier to identify in high gradient streams

than in low gradient streams. To estimate the embeddedness, observe the amount of fine particles overlying, in between, and surrounding the rocks. Generally, the more that rocks are embedded the less rock surface or space between rocks is available as habitat for invertebrates and spawning fish. To determine embeddedness pick up a rock within the stream. As you look at the side of the rock you will be able to see a line or discoloration that indicates where the sediment line was. There will be a difference in the color of the rock that was embedded and the color of the rock that was exposed.

1. 0-25% surrounded by fine sediment
2. 26-50% surrounded by fine sediment
3. 51-75% surrounded by fine sediment
4. 76% or greater surrounded by fine sediment

Sediment in the Stream (for Low Gradient Stream):

This description can be used for describing low gradient streams with little or no rocks to be able to check for embeddedness. Choose the number that best describes the reach.

1. None means that the natural streambed is visible.
2. Light means that there is some deposition of material in the slower moving portions of the channel.
3. Moderate means that the channel bed from bank to bank is covered by deposited material.
4. Severe means that sand bars have formed as islands.

Bank Stability Left and Right Bank:

Bank Stability refers to the existence of or the potential for detachment of soils from the stream banks and its movement into a stream. Excessive bank erosion occurs when the watershed surrounding the stream has been altered. An example of this may be a newly constructed parking lot on the stream bank. Precipitation will hit the parking area and rush off site quickly and towards the stream and cause the stream flow to rapidly increase which may cause the banks to erode. Left and right bank is determined by looking up stream. Signs of erosion may include exposed tree roots, undercut banks, unvegetated banks, evidence of vehicles, grazing areas, and walking paths. Pick the number that best describes what you see.

1. Stable-Evidence of erosion or bank failure absent or minimal; <5% of bank affected.
2. Moderately Stable-Small areas of erosion, mostly healed over; 5-30% of bank in reach has areas of erosion.
3. Moderately Unstable- 31-60% of bank in reach has areas of erosion, high erosion potential during flooding.
4. Unstable- many eroded areas, “raw” areas frequent; obvious bank sloughing; 60% or > of bank erosion scars.

% of stream covered by tree canopy:

Shading of a stream is important for cold water fish species like trout because it keeps the temperature of the stream down. The time of year and time of day you are performing your assessment can affect your result. You may need to visit the site in mid-summer to determine the full canopy cover. Try to visualize the tall overhanging treetops as they will look when they have their leaves on in the summer. If you are in a predominate evergreen forest you should be able to determine this anytime of year. Stand at the streams edge and straight up toward the sky.

Use your best judgment in picking the number that best represents the estimated percentage of stream coverage.

1. 0-25%
2. 26-50%
3. 51-75%
4. 76% or greater

Riparian Vegetation:

Riparian vegetation refers to the vegetation contiguous with the stream bank. It can be any type of natural vegetation and must consist of a good mix of vegetation including aquatic plants, sedges, rushes, grasses, forbs, shrubs, understory trees, and large trees. A healthy riparian zone is critical to a healthy stream. Again, left and right bank is determined by looking up stream. Pick the number that best describes what is observed on both banks.

1. >50 ft width
2. 35 - 50 ft width
3. 15 - 35 ft width
4. < 15 ft width

Woody Debris:

Woody debris means fallen trees or tree limbs in the stream. Woody debris can create in-stream habitat for invertebrates and fish. Too much woody debris can negatively impact a stream by slowing down stream flow or by causing a barrier to fish movement. Pick the number that best describes what was observed.

1. None
2. In spots
3. Heavy throughout reach

Woody Debris:

This description will give more detail about the woody debris. If the debris is free floating, it may have recently floated down stream. If the debris is establish and attached it will provide habitat.

1. Free floating
2. Attached

Predominant Aquatic Vegetation:

Aquatic Vegetation is normal in streams. It provides food and habitat for aquatic life. However, excessive aquatic vegetation will affect the health of a stream. Plant respiration and decomposition uses dissolved oxygen in the water. If there are too many plants in the stream, the aquatic life in the stream may suffocate because of the lack of dissolved oxygen. Pick the number that best describes the predominant aquatic vegetation observed.

1. Rooted Submergent means the vegetation is completely underwater.
2. Rooted Emergent means vegetation is rooted in substrate and is partially exposed above the water surface.
3. Rooted Floating means vegetation is rooted into the substrate and is floating on

top of the water surface, an example is a lily pad.
4. Free Floating means vegetation is not rooted or attached to anything, an example is dick weed.

Algae Location:
The amount of algae in the stream will also affect the amount of available dissolved oxygen for aquatic life. Pick the number that best describes where algae are located.

1. None
2. On streambed
3. On surface
4. Both

Algae Color:
Pick the number that best describes the color of the predominate algae seen.

1. Light Green
2. Dark Green
3. Brown
4. Other, note other color

Channel Alteration:
Signs of channelization or straightening of the stream may include an unnaturally straight section of a stream, high banks, or lack of flow diversity (pools, riffles, runs), uniform-sized stream substrate, vegetation may be missing or lacking diversity or missing woody vegetation.

1. Stream with normal pattern
2. Some channelization present, usually in areas of bridges etc…
3. Channelization extensive, 40-80% of the stream reach
4. Over 80% of the stream channelized, gabion baskets and/or riprap, and/or concert present.

Structures:
Bridges, culverts, weirs, and dams are all examples of in-stream human made structures that will affect the stream's health. Please mark the structures observed in the stream within the reach. Identify any other structures observed above and below your stretch.

Water Condition:
This section is describing some basic fundamentals of water conditions without using a water quality test kit.

Odor:
The odor of the stream will be dependant upon the time of year you are assessing. You may notice an anaerobic smell in the summer when the stream flow is slow and the temperature is warm. This may indicate the dissolved oxygen in the stream is low. Fill in the number that best describes the general water odor along the reach of the stream.

1. Normal
2. Sewage

3. Petroleum
4. Chemical
5. Anaerobic
6. Other

Color:
The natural color of the stream will be dependant upon what region you are assessing. For example,
Pine Barren waterbodies are tea colored. This is caused by the ecosystem's chemistry.
Fill in the number that best describes the general watercolor along the reach of the stream:

1. Clear
2. Tea
3. Milky
4. Muddy
5. Other

Surface Coating: Fill in the number that best describes the general surface coating along the reach of the stream.

1. None
2. Oily-This can be natural or petroleum based. To tell the two types apart move the surface water around with a stick, if the oily coating is natural it will break up (like a puzzle) and stay part. If the oily coating is petroleum based, it will break up but then quickly move back together (like salad oil in oil and vinegar after you shake it up it will always separate out again.)
3. Foam-This can also be naturally occurring. One way that may help to tell the natural foam and the petroleum-based foam (usually soap or detergent) apart is by looking closely at the bubbles within the foam. If the bubbles have a noticeable iridescent shine to them, more than like it is not naturally occurring foam.
4. Scum
5. Other-please explain other

Other Observations: Fill in any other observations made about the reach. This can include wildlife observed, anything that appears out of the ordinary or information obtained by talking with local residents concerning the history of land use in the area. Observation locations should be marked on the map of the area that you prepare.

GPS reference location #'s: Assign a number to each GPS point or line and mark the location of the point on the working map.

Photo Reference #'s: Assign each photo taken a number, and mark the location and direction of the photo on the working map.

Watershed Management Areas

Map of Watershed or Subwatershed.

Pipe & Drainage Ditch Inventory Sheet

Outfall Pipe Reference #: Assign a reference number for each outfall that is observed and record it on the working map.

Pipe Diameter: Enter the estimated diameter of the pipe.

Type: Pick the number that best describes the type of discharge from the pipe. Storm drain means that the discharge is from storm sewers from an adjacent development or highway/road system. Residential discharge means a pipe from a nearby home discharging water from a sump, drain or washer. Industrial Discharge (#) means a permitted industrial discharge. These discharges will be clearly marked in the field and should be identified prior to going out. The permit number should be recorded here. Other means any other discharge that you observe whether or not you can identify the specific type.

Pipe Material: Pick the number that best describes the pipe material.

Pipe Location: Pick the number that best describes the location of the pipe in relation to the stream bank. In stream means that the end of the discharge pipe is located at the bottom of the stream bank or in the channel. Top of bank means that the end of the discharge pipe is located at or slightly behind the top of bank and discharges down the bank. Behind bank means that the end of the discharge pipe is located a distance away from the stream and the discharge is conveyed either in a channel or allowed to flow overland to the stream.

Pipe Flow/Appearance: Pick the number that best describes the flow coming out of the pipe.
Is the Stream bank at the outfall eroded? Enter yes or no. Yes means that the area around the discharge pipe is eroding.

Stream Channel Downstream: Pick the number that best describes the condition of the stream channel downstream of the outfall.

Drainage Ditch #: Assign a reference number for any drainage ditch found and record it on the working map.

Begins at: If possible, find the origin of the ditch and pick the number that best defines it.

Ditch Lining: Pick the number that best defines the lining of the ditch.

Ditch is: enter the appropriate number.

Ditch Flow: Pick the number that best describes the flow in the ditch.

Flow Appearance: Pick the number that best describes the appearance of the flow in the ditch.

Other Observations: Enter any other observations that are made to further explain the information that was entered on this sheet or were not listed on this sheet.

Photo Reference #'s: Assign each photo taken a number and mark the location and direction of the photo on the working map.

GPS reference location #'s: Assign a number to each GPS point or line and mark the location of the point on the working map.

References
Original documents from New Jersey Department of Environmental Protection – Division of Watershed Management http://www.state.nj.us/dep/watershedmgt/volunteer_monitoring_visual.htm