Appendix A
PaSEC Forms

PERMISSION FORM

Water Quality Monitoring Authorization

I, [property owner]_____ do hereby authorize and agree to permit [volunteer monitor] _____ to enter my property for the purpose of conducting a water monitoring program on [specific waterway]_____ accessible from my property beginning [specific date]_____ .

This permission is to be renewed on an annual basis and allows the above-named individual or his/her designee(s) to carry out monthly/semiannual/annual water quality tests while exercising due diligence in protecting my property and personal safety and health. The below-named individual and his/her designees agree to hold me harmless against any liability for injury suffered in the carrying out of this water quality monitoring on my property.

_____Property Owner Signature _____ Date

_____Volunteer Signature _____ Date

_____ Property Owner Name (Printed)

_____ Volunteer Name (Printed)

Equipment Maintenance Needs

(Submit to your PaSEC equipment manager.)

Equipment Name _____

What's wrong with it?

_____

_____

_____

Replacement Needed?

_____

Contact Information:

Volunteer Name _____

Volunteer Phone Number _____

Volunteer Email _____

Date _____

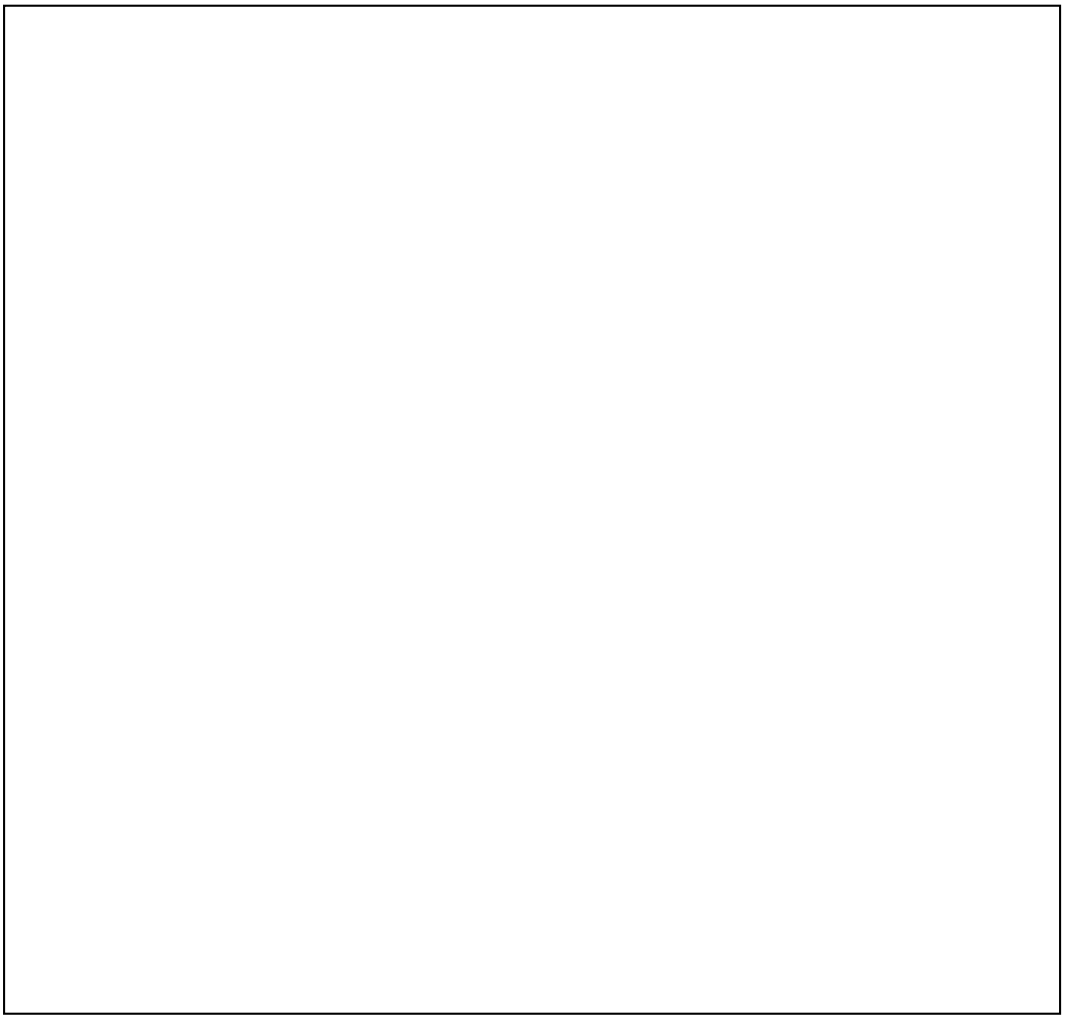
(Master Sheet - make duplicates for submission)

Site Map Master Form

Sketch below the outlines of your monitoring site and any unusual and/or manmade characteristics and/or landmarks.

N

W



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S

Waterway Name _____
Site Name _____
Site ID # _____
(Use this sheet as a master copy for all your site maps)

Site Description (complete annually per site, or more often if you notice changes) (page 1 of 2)

County of PaSEC _____County where Site is _____

Site Name: _____

Site ID# _____ (if new site, please contact Jim at Nature Abounds)

Stream Information

Watershed Name _____

Waterbody Name_____

Township_____ County_____ State _____

Stream Code (from PA Gazetteer)_____ HUC Code (refer to page 44) _____

Latitude: _____ _____ _____ N Longitude: _____ _____ _____ W

Degrees Minutes Seconds (to 2 decimals) Degrees Minutes Seconds

If possible, use a GPS unit to find out the Latitude and Longitude, but if you do not have access to a GPS unit, you can also find a Latitude and Longitude by entering a nearby address into on-line sites (www.msrmaps.com, www.terraserver.com) A GPS reading is preferred.

Type of Waterbody: □ stream □ river □ other _____

Length of Assessed Area in meters (The assessed Area is the area that is being monitored. This area should be up to 30 meters in length, or as large as an accessible area as the site allows):

_____meters

Site Description **(page 2 of 2)**

Site Description (if remote, use nearest landmark's address or intersection)

Describe your site's terrain. For example, is the area you are observing flat or are there hills?

Describe human impacts at your sight. For example, is your site in an urban area, suburban area, or rural area? Is it in a residential area or are there businesses, factories, or farms in area. How about other human impacts like coal mining or timbering?

What species of wildlife, tree species and plants can typically be found at your site? Are there any endangered species found here?

Any other notes about your site?

Water Monitoring Field Data Sheets *(p 1 of 12)*

The following data sheets MUST be filled out entirely. Make sure to include all of the monitors' names, and be sure to write clearly and to use a pencil or waterproof pen.

County of PaSEC_____

Site Name: _____Site ID#_____

Date: year_____month_____day_____ Time: _____hour_____minute

(NOTE: Time hr./min. on 24-hour clock, as 10:10 for AM or 22:10 for PM)

Air Temperature (in Fahrenheit) _____ degrees

Monitor Information:

Lead Monitor

Name_____

Phone (_____)_____Email_____

Monitor #2 (if applicable)

Name_____

Phone (_____)_____Email_____

Monitor #3 (if applicable)

Name_____

Phone (_____)_____Email_____

Data Recorder

Name_____

Phone (_____)_____Email_____

Date _____/_____/_____

Site ID# _____

Water Monitoring Field Data Sheet *(p 2 of 12)*

Physical and Chemical Observations

Precipitation (Check One)

In the past 24 hours:

____ Storm (heavy rain > 2.5 cm)
____ Rain (steady rain .85 to 2.5 cm)
____ Showers (intermittent rain up to .85 cm)
____ Overcast
____ Clear

Current:

____ Storm (heavy rain > 2.5 cm)
____ Rain (steady rain .85 to 2.5 cm)
____ Showers (intermittent rain up to .85 cm)____
____ Overcast
____ Clear

PHYSICAL CHARACTERISTICS ASSESSMENT *(check all items that apply)*

Water Appearance *(choose at least one)*

____ Clear
____ Orange/red
____ Dark brown
____ Green
____ Foamy
____ Milky/white
____ Muddy/cloudy
____ Multi-colored (oily sheen)
____ Non-wadable stream
____ Other (explain)
_____

Water Odors *(choose at least one)*

____ Chlorine
____ Sulfur (rotten eggs)
____ Musty
____ Moldy
____ Fishy
____ Sewage
____ Earthy
____ Spicy
____ Non-wadable stream
____ Other (explain)
_____
____ No unusual smells

Soil Odors *(in stream bed at test site, scoop up with a spoon to smell) (choose at least one)*

____ Chlorine
____ Sulfur (rotten eggs)
____ Musty
____ Moldy
____ Fishy
____ Sewage
____ Earthy
____ Spicy
____ Non-wadable stream
____ Other (explain)
_____
____ No unusual smells

Date _____/_____/_____
Site ID# _____

Water Monitoring Field Data Sheet *(p 3 of 12)*

Sediment Deposits *(Examine the stream bottom visually, by looking through the water.) (choose at least one)*

____ Sludge
____ Sawdust
____ Paper fiber
____ Sand
____ Other_____
____ No unusual sediments
____ Non-wadable stream

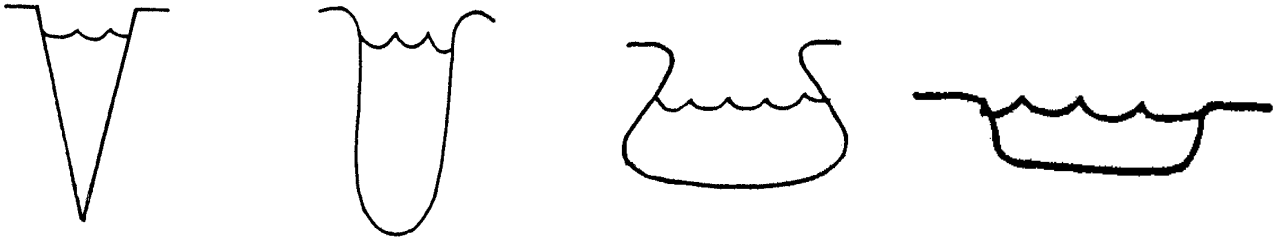
Stream Type *(Look upstream and downstream) (choose at least one)*

____ Straight
____ Meandering/curving
____ Braided (small islands present)
____ Channelized (human made sides or bottom)
____ Pool/riffle (calm pools/fast moving rocky areas)

Are there any dams present? ____ yes ____ no

Level of high water mark above present stream level: _____ *(Numeric meters)*
Check here if this is an estimate. ____

Stream/Bank Cross-section Shape *at site (check one)*



____ V-shaped ____ U-shaped ____ banks undercut ____ Rectangular

Stream Bank Erosion *(Check One)*

____ No sign of erosion
____ Occasional areas of erosion
____ Extensive erosion
____ Artificial stabilization present

Date _____/_____/_____
Site ID # _____

Water Monitoring Field Data Sheet *(p 4 of 12)*

Stream Bottom *(at least one entry in each category required)*
(Inorganic and Organic combined should total 100%. Begin by estimating the percentage of the stream bottom that is inorganic and that which is organic. Determine this by looking at the surface area that is covered by inorganic or organic materials. For example, if most of the stream bottom is covered by algae or other aquatic plants, the percentage of organic materials would be rated higher overall than the percentage of inorganic. Continue to break down the percentages into specific types of inorganic and organic stream bottom categories based on your visual observations

Inorganic *(estimated by percentage)*
____% Bedrock (solid)
____% Boulder (>25 cm diameter)
____% Cobble (6.25 cm - 25 cm)
____% Gravel (.25 cm - 6.25 cm)
____% Sand (up to .25 cm)
____% Silt (soft, fine sand)
____% Clay (fine sand with a sticky texture)
____% Other

Organic *(estimated by percentage)*
____% Muck-mud (black, very fine)
____% Pulpy peat (unrecognizable plant parts
____% Fibrous peat (partially decomposed plants)
____% Detritus (sticks, wood, coarse plant material)
____% Logs, limbs
____% Marl (gray, shell fragments)
____% Other

- or - _____ Non-Wadeable Stream

____% **Total (Inorganic + Organic = 100%)**

Predominant Surrounding Land Use *(at least one entry required)*
(estimated by percentage - should total 100%)
Tip: Estimate the surrounding land use based on your assessment of the area, a distance of 30 meters back from the edges of the stream on both sides in your monitoring area.

____% Wetlands
____% Forest
____% Cropland
____% Pasture
____% Residential
____% Commercial
____% Industrial
____% Unused/abandoned
____% Overgrown shrubs and small trees
____% Other (explain)
_____

____% **Total (100%)**

Date _____/_____/_____
Site ID # _____

Water Monitoring Field Data Sheet *(p 5 of 12)*

Stream Flow Volume or Discharge Check to see if the United States Geological Survey (USGS) has the information for Stream Flow Volume or Discharge for your site. Check this Internet address:

water.usgs.gov/
"USGS Water Resources of the United States"
Look under "Water Data"; "Real-time"

If stream discharge data is available for your site, you can use this information rather than performing the procedures on the following pages (stream width, depth, and velocity). Make sure to check for this information BEFORE you go out to the stream site.

If the USGS does not have this information for your site, make sure to do all of the physical assessments and all of the math to save yourself or your SEC's designated Web Host time.

Stream Width Determine the average width of wadeable streams by measuring at 5 places within your sampling area and dividing the total by 5. For the purpose of converting feet to meters use: feet x 0.3048 = meters.

_____	+ _____	+ _____	+ _____	+ _____	= _____	÷ 5 = _____
meters	*meters*	*meters*	*meters*	*meters*	*meters*	*meters*
Sample 1	*Sample 2*	*Sample 3*	*Sample 4*	*Sample 5*	*Total*	*Average Width*

____ Non-wadeable Stream
For non-wadeable streams, if you have recorded stream width, note WHAT you have done below.
Notes: _____
_____
_____

Stream Depth Determine the average depth for wadeable streams by measuring at 5 equal intervals along the width of the stream and dividing the total by 5. For the purpose of converting use: inches x 2.54 =centimeters centimeters ÷ 100 = meters.

_____	+ _____	+ _____	+ _____	+ _____	= _____	÷ 5 = _____
meters	*meters*	*meters*	*meters*	*meters*	*meters*	*meters*
Sample 1	*Sample 2*	*Sample 3*	*Sample 4*	*Sample 5*	*Total*	*Average Depth*

____ Non-wadeable Stream
For non-wadeable streams, if you have recorded stream depth, note WHAT you have done below.
Notes: _____
_____
_____

Date _____/_____/_____
Site ID # _____

Water Monitoring Field Data Sheet *(p 6 of 12)*

Surface Velocity

Complete the following steps to determine the surface velocity of wadeable streams:

1. Measure and mark a 10 meter distance at your stream site, using the depth management line as the up stream mark. Each of the 5 intervals marked off to measure stream depth should be used as starting points for the weighted bobber.

2. Release the bobber at each of the 5 intervals, and time how long it takes the bobber to travel from the upstream mark down 10 meters to the downstream mark.

3. Divide the 10 meter distance by the travel time of the bobber to determine the stream's surface velocity.

4. Run the test 5 times, once at each of the 5 intervals you used for measuring depth along the transect, and take the average.

Trial #1: _____ meters ÷ _____ time (seconds) = _____ meters per second

Trial #2: _____ meters ÷ _____ time (seconds) = _____ meters per second

Trial #3: _____ meters ÷ _____ time (seconds) = _____ meters per second

Trial #4: _____ meters ÷ _____ time (seconds) = _____ meters per second

Trial #5: _____ meters ÷ _____ time (seconds) = _____ meters per second

Total = _____ ÷ 5 = _____ meters per second

Average Velocity

_____ Non-wadeable stream

For non-wadeable streams, if you have recorded surface velocity, note WHAT you have done below.

Notes: _____

_____

_____

Date _____/_____/_____

Site ID # _____

Water Monitoring Field Data Sheet *(p 7 of 12)*

Stream Flow Volume or Discharge
Calculate the streamflow volume (cubic meters/second - cms) using the above measurements.
Check here if stream discharge data was obtained from the USGS. ____
Enter this data below as the Stream Flow Volume in cubic meters/second.
(You will need to convert cubic feet/second to cubic meters/second.)
For the purpose of converting cfs (cubic feet/second) to cms use: cfs x 0.0283 = cms

w x **d** x **v** x **k** = **cms**

_____	X	_____	X	_____	X	_____	=	_____ cms
Avg. Width (meters)	/	Avg. Depth (meters)	/	Avg. Velocity (meters sec.)	/	k * (stream bottom constant)		Streamflow Volume

*k = stream bottom constant (0.8 if it's rubble/gravel or 0.9 if it is sand, mud, silt or bedrock)

Ice Coverage, if any (refer to page 46) _____%

Snow Depth, if any _____inches

Wildlife seen (alive or dead) or heard – Please identify species (see Extras Appendix) when possible, and/or take a photo when able.

_____
_____
_____
_____

Seasonal Changes Observed
_____
_____
_____

Weather Notes (example: our county is under a drought watch, tornados touched down in area earlier this week)
_____
_____
_____
_____

Date _____/_____/_____ Site ID # _____

Water Monitoring Field Data Sheet *(p 8 of 12)*

CHEMICAL AND TEMPERATURE PARAMETER ASSESSMENT

Quality Control (QC): The Colorimeter and the Oakton Multi-parameter Meter should be used as much as possible, but if your SEC is using a combination of equipment and includes the older Hach "visual" kits, the Colorimeter tests should be performed every three months (quarterly) at a minimum, as a means of checking the precision and accuracy of the field test kit readings. Doing so assures the quality of the data being recorded.

Other quality control checks for the visual test kits include: Field Duplicates, Calibration Standards, Field Blanks, and Standard Checks.

Tip: If using the older Hach "visual" kits, when monitoring for the first time, use the lowest range and move to the higher range, if needed. The next time you monitor, test each parameter in the range in which you expect your results to fall.

Temperature *(This test is always performed in the field.)*
Quality Control (QC): (Take the air and water temperature twice each monitoring visit.)

Result	Air _____ ^{o}C or _____ ^{o}F	Water _____ ^{o}C or _____ ^{o}F
Field Duplicate	Air _____ ^{o}C or _____ ^{o}F	Water _____ ^{o}C or _____ ^{o}F

Average Temperature (Take the average Air Temperature and Water Temperature and record this data in the database.)

Average	Air _____ ^{o}C or _____ ^{o}F	Water _____ ^{o}C or _____ ^{o}F

Dissolved Oxygen *(This test is always performed in the field.)*
QC:

- Every 6 monitoring visits take a **field duplicate** (repeat the test twice on two different samples of water).
- If still using the old Hach "Visual" kits, every 6 monitoring visits, perform the test with a **Colorimeter**

Result _____ *Results can range from 0.2 to 20 mg/L,*
Field Duplicate _____ *but anything <5 mg/L should be questioned.*

_____ *Colorimeter Used Today* _____*Old Hach Visual Kit Used Today*

Date _____/_____/_____
Site ID # _____

Water Monitoring Field Data Sheet *(p 9 of 12)*

pH *(This test is always performed in the field.)*
QC:

- Every 6 monitoring visits take a **field duplicate** (repeat the test twice on the same sample of water). Each visit, test the meter with a **calibration** standard and recalibrate as necessary
- **NOTE:** Immediately before testing, calibrate the pH Tester streamside with a pH 4.0 or 7.0 standard (dependent on your local area's streams measurements.

Result _____
Field duplicate _____
Calibration standard _____

Results can range from 0 to 14, but anything <5 or >9 should be questioned.

Specific Conductance *(This test is always performed in the field.)*
QC:

- Every 6 monitoring visits take a **field duplicate** (repeat the test twice on the same sample of water).
- Every 6 monitoring visits do a field **blank** - test deionized water as a sample to identify errors or contamination in sample collection and analysis.
- Each visit test the meter with a **calibration** standard and recalibrate as necessary.
- **NOTE:** Immediately before testing, calibrate the conductivity tester streamside with the Sodium Chloride calibration standard solution. There are 2 types of conductivity meters. To determine your type of meter, look at the top left hand corner of the display window. If the number ten is displayed you must multiply your reading by 10. If the unit μS is displayed, record the reading directly.

Result _____
Field duplicate _____
Calibration standard _____
Field blank _____

Your meter reading can range from 10 to 1,990 μS/cm*. Anything >600* μS/cm *should be questioned. The conductivity of PA's waterways normally ranges from 20-600* μS/cm*, however normal is specific to the stream and its geological makeup.*

Date _____/_____/_____
Site ID # _____

Water Monitoring Field Data Sheet *(p 10 of 12)*

Care of the Multi-Parameter Meter: After you record your findings, rinse the meter off with distilled water. Meters should be stored dry. Remember to turn the Meter off!

_____ Check here upon completion of this task.

Nitrates *(If not done in field, the water sample must be taken in plastic bottle, immediately refrigerated in dark, and test must be done within 48 hours.)*

QC:

- Every 6 monitoring visits or at least once a year take a **field duplicate** (repeat the test twice on the same sample of water).
- Every 6 monitoring visits or at least once a year do a **field blank** - test deionized water as a sample to identify errors or contamination in sample collection and analysis.
- Every 6 monitoring visits or when using new reagents perform a **standards check**. To test with the Nitrate-Nitrogen Standard Solution, use the standard as though it is the sample of stream water and run the test as normal, making sure to use the appropriate test range. Your results should be close to the concentration on the bottle!
- If using the old Hach "visual" test, every 6 monitoring visits perform the test with the **colorimeter**. Also, when instructed to shake in the Nitrate test, it is very important to shake vigorously!

NOTE: Store the waste in a container marked "Toxic Waste - Nitrate" to be disposed of at a later date. DO NOT dispose of this waste in the sink!
_____ Check here after having disposed of the waste properly.

Result	_____	*Your test kit reading can range from ND*
Field duplicate	_____	*(non-detectable) to 10 mg/L Nitrate-Nitrogen;*
Field blank	_____	*multiplied by 4.4, your results can range from ND*
Standards Check	_____	*(non-detectable) to 44 mg/L Nitrates. Anything >8 mg/L Nitrates should be questioned.*

_____ *Colorimeter Used Today* _____*Old Hach Visual Kit Used Today*

Date _____/_____/_____
Site ID # _____

Water Monitoring Field Data Sheet *(p 11 of 12)*

Ortho-Phosphate (also known as Phosphorous Reactive) (*if not done in field, water sample must be taken in a plastic sample bottle, immediately refrigerated in dark and test must be done at room temperature within 48 hours.)*

QC:

- Every 6 monitoring visits or at least once a year take a **field duplicate** (repeat the test twice on the same sample of water).
- Every 6 monitoring visits or at least once a year do a **field blank** - test deionized water as a sample to identify errors or contamination in sample collection and analysis.
- Every 6 monitoring visits or when reagents are replaced perform a **standards check**. To test with the Phosphate Standard Solution, use the standard as though it is the sample of stream water and run the test as normal, making sure to use the appropriate test range. Your results should be close to the concentration listed on the bottle!
- Every 6 monitoring visits perform the test with the **colorimeter** unless your PaSEC has chosen to monitor total phosphates quarterly with the colorimeter.

Result _____ *Results can range from ND (non-detectable)*
Field duplicate_____ *to 50 mg/L, but anything >0.1 mg/L*
Field blank _____ should *be questioned.*
Standards check _____

_____ *Colorimeter Used Today* _____*Old Hach Visual Kit Used Today*

Tips: After you have established the test range likely needed for your site, mark the Hach instructions for that range so you won't use the procedure for the wrong range.

If the find an ortho-phosphate reading to be out of it's normal range, please re-sample the water using the process for Total Phosphorous (prior to 2011, the SECs were required to do Total Phosphates using the boiling and acid digestion process). Make sure you mark on your Field Shield which process (ortho or total) that you used to reach your results.

Tip for Total Phosphates: Remember that the Acid Persulfate Digestion procedure comes before all other parts of the Total Phosphate test procedure.

Result _____ *Results can range from ND (non-detectable)*
Field duplicate_____ *to 50 mg/L, but anything >0.1 mg/L*
Field blank _____ should *be questioned.*
Standards check _____
Colorimeter _____

Date _____/_____/_____ Site ID # _____

Water Monitoring Field Data Sheet *(p 12 of 12)*

Sulfate (*if test not done in field, water sample must be taken in a plastic sample bottle, immediately refrigerated in dark and test must be done within 28 days.)*
QC:

- Every 6 monitoring visits or at least once a year take a **field duplicate** (repeat the test twice on the same sample of water).
- Every 6 monitoring visits or at least once a year do a **field blank** - test deionized water as a sample to identify errors or contamination in sample collection and analysis.
- Every 6 monitoring visits or when reagents are replaced perform a **standards check**. To test with the Sulfate Standard Solution, use the standard as though it is the sample of stream water and run the test as normal, making sure to use the appropriate test range. Your results should be close to the concentration listed on the bottle!
- If regularly using the old Hach Visual Kits, every 6 monitoring visits perform the test with the **colorimeter**.

Result _____ *Results can range from 50 to 200 mg/L.*
Field duplicate _____
Field blank _____
Standards check _____

_____ *Colorimeter Used Today* _____*Old Hach Visual Kit Used Today*

NOTE: Store the waste in a container marked "Toxic Waste - Sulfate" to be disposed of at a later date. DO NOT dispose of this waste in the sink!
____ Check here after having disposed of this waste properly.

Total Alkalinity (*if not done in field, water sample must be taken in a plastic sample bottle, immediately refrigerated in dark and test must be done within 14 days.)*
QC:

- Every 6 monitoring visits take a **field duplicate** (repeat the test twice on the same sample of water).
- If regularly using the old Hach Visual Kits, every 6 monitoring visits perform the test with the **colorimeter**.

Result _____ *Results can range from 5 to 400 mg/L,*
Field Duplicate _____ *but anything <20 mg/L should be questioned. (Note: sometimes natural conditions will be less than 20 mg/L due to the geology of the local area.)*

_____ *Colorimeter Used Today* _____*Old Hach Visual Kit Used Today*

Date _____/_____/_____ Site ID # _____

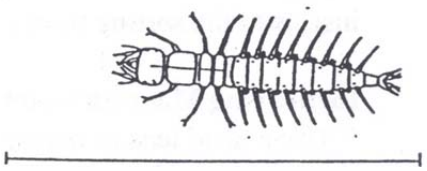
Biosurvey: Identification Chart *(p 1 of 6)*

Bar lines next to each organism |——| *indicate relative size.*

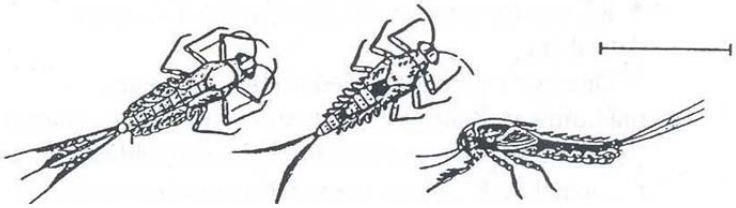
Group I – sensitive

Water Penny Larvae - Order Coleoptera:
4-6 mm flattened disclike forms, found clinging to rocks a dorsal plate conceals the head and 6 legs.

Dobsonfly Larva (Hellgrammite) - Order Megaloptera: 25-90 mm, dark colored, 6 legs, well developed chewing mouthparts, 2 short antennae, 8 abdominal segments each with a pair of filaments; 2 anal prolegs with hooks; has gill tufts at base of legs.

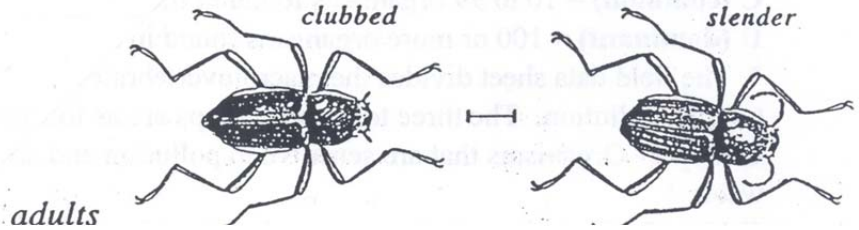


Mayfly Nymph - Order Ephemeroptera:
3-20 mm (not including tails), elongate, cylindrical to flattened form, head with slender antennae, 6 legs with one claw or no claw, wing pads present, platelike or feathery gills along abdomen, 3 long tails (sometimes 2).



Gilled Snail - Class Gastropoda:
vary in size; a thin, horny plat, the operculum, seals the opening to the shell when the foot is retracted.

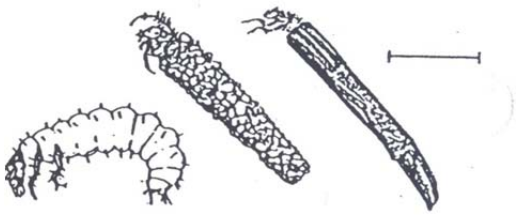
Riffle Beetle - Order Coleoptera: 1-8 mm, oval elongate body, 6 legs, crawl underwater; antennae usually slender but are sometime clubbed.



Stonefly Nymph - Order Plecoptera:
5-35 mm (not including tails), 6 legs with clawed tips, long slender antennae, 2 tails,gills may be present on mouthparts, thorax, and/or legs, gills, rarely present on abdomen,hardened thoracic segments.

Group I – sensitive *(continued)*

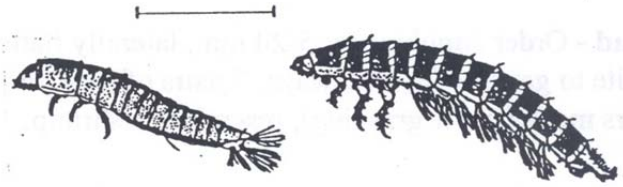
Non-Net Spinning (Case building) Caddisfly Larva – Order Trichoptera: 2-40 mm, usually found within a case attached to the bottom of rocks, case made of plant material or rock particles, long and caterpillar-like, distinct head, chewing mouthparts, antennae reduced or inconspicuous, 3 pairs of legs, no wing pads or tails, end of abdomen has prolegs each with a claw.



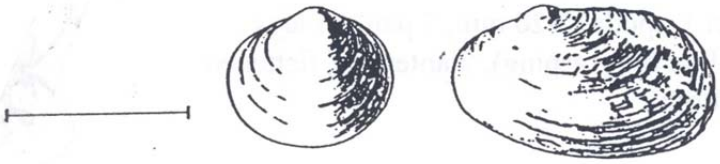
Biosurvey: Identification Chart *(p 3 of 6)*

Group II - somewhat sensitive

Beetle Larvae - Order Coleoptera: 2-60 mm, distinct head, 2 antennae, 6 legs, 8 to 10 segmented abdomen, may or may not have abdominal gills orlateral filaments.

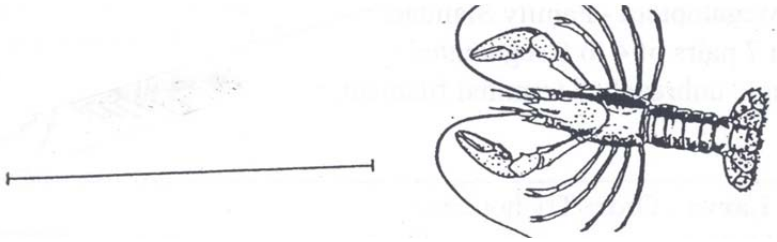


Clams - Class Pelecypoda: 2-250 mm, two-piece (bivalve) shell, commonly oval with concentric growth lines.

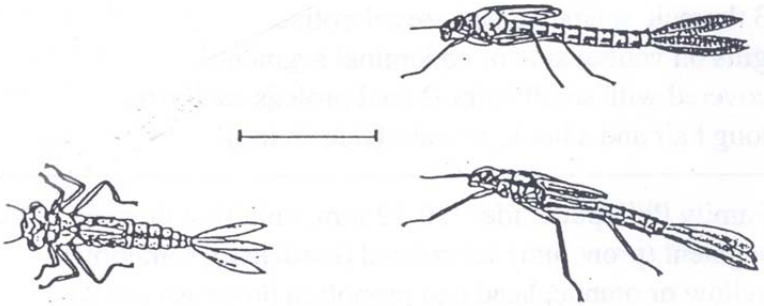


Cranefly Larva - Order Diptera - Family Tipulidae: 10 - 100 mm (sometimes larger), white, green or brown caterpillar-like body, segmented, abdomen may be bulbous or end in fleshy projections.

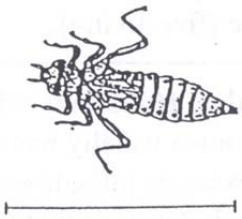
Crayfish - Order Decapoda: 10-150 mm, 2 large claws, 8 legs, 2 long antennae, resembles a tiny lobster.



Damselfly Nymph - Order Odonata -Suborder Zygoptera: 10-30 mm, elongate and slender forms, 2 antennae, 6 legs, 2 pairs of wing pads, no gills along body, 3 leaflike "tails" (actually the gills) on end of abdomen; distinctive lower lip is large and extendable.

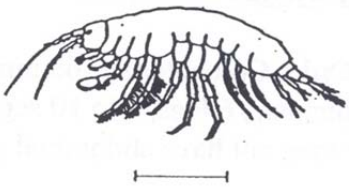


Dragonfly Nymph - Order Odonata - Suborder Anisoptera: 12-15 mm, large eyes, wide oval to round abdomen, 6 hooked legs, gills in rectum.

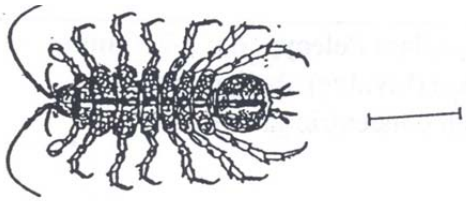


Group II - somewhat sensitive *(continued)*

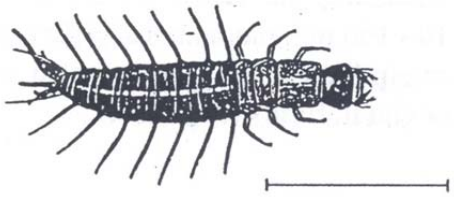
Scud - Order Amphipoda: 5-20 mm, laterally flattened, white to grey, swims sideways, 7 pairs of legs (first two pairs modified for grasping), resembles a shrimp.



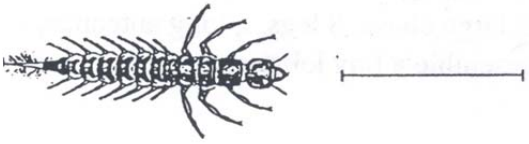
Sowbug - Order Isopoda: 5-20 mm, 7 pairs of legs (first pair modified for grasping), 2 antennae, flattened body, top to bottom.



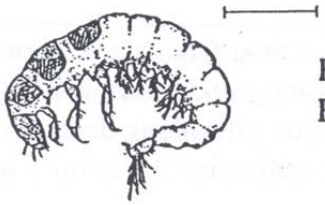
Fishfly Larva - Order Megaloptera - Family Corydalidae: 10-25 mm, reddish-tan often with yellowish streaks, no gill tufts underneath abdomen, resembles a small hellgrammite; have 2 breathing tubes on last abdominal segment; 2 anal prolegs with hooks.



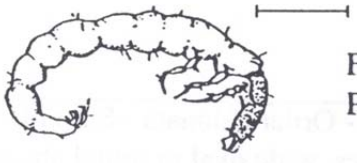
Alderfly Larva - Order Megaloptera - Family Sialidae: 10-25 mm, abdomen with 7 pairs of 4 to 5 segmented lateral filaments and a single unbranched terminal filament.



Net-Spinning Caddisfly Larva - Order Trichoptera Family Hydropsychidae: 10-16 mm, strongly curved body, 3 thoracic segments that are sclerotized (hardened), branched gills on ventral side of abdominal segments, (abdomen covered with small hairs), 2 anal prolegs each with tuft of long hair and a hook, no case (free-living).

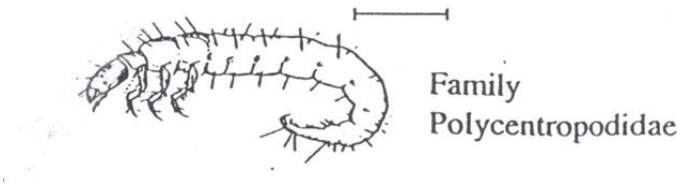


Family Philopotamidae: 10-12 mm, only first thoracic segment (pronotum) sclerotized (hardened), sometimes yellow or orange, head and pronotum brownish orange, pronotum bounded posteriorly by pronounced black line, 3 pairs of legs, no anal prolegs or abdominal gills, abdomen strongly curved, no case (free-living).



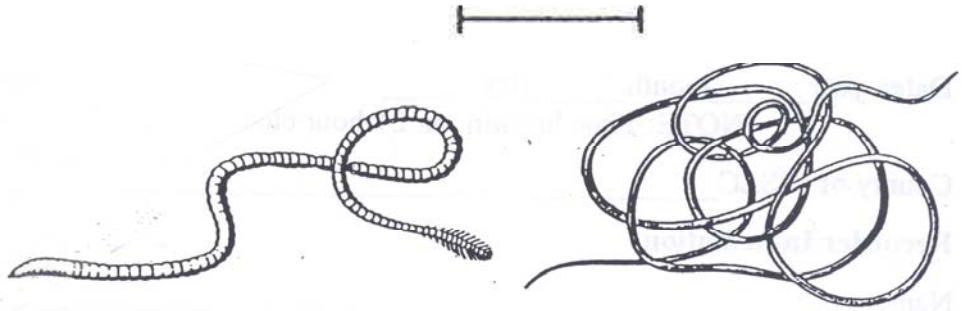
Group II - somewhat sensitive *(continued)*

Family Polycentropodidae: 10-25 mm, whitish color tinged with purple, abdomen usually has a lateral fringe of short hairs but never possesses gills, lower end of abdomen strongly curved; 2 anal prolegs.



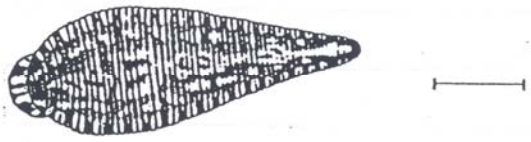
Group III - Tolerant

Aquatic Worm –
Class Oligochaeta: 1-30 mm (sometimes over 100 mm), elongate, cylindrical worms, segmented body (might be difficult to see segments), color variable.

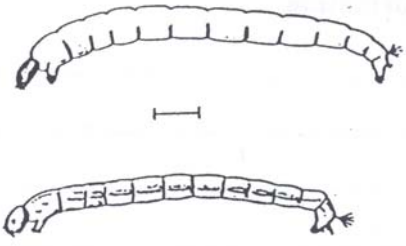


Blackfly Larva - Order Diptera - Family Simulidae:
3-12 mm, cylindrical body with one end wider, black head with fanlike mouth brushes.

Leech - Order Hirudinea:
5-100 mm, flattened segmented body, both anterior and posterior suckers.



Midge Fly Larva - Order Diptera -
Family Chironomidae: 2-20 mm, slender and cylindrical curved body, dark head with 2 prolegs on each side of the bottom of the first segment behind the head.



Other Snails - Class Gastropoda:
non-gill breathing snails, do not have an operculum to close the shell opening.

***Biosurvey: Field Data Sheets* (p 1 of 3)**

Date: year_____month_____day_____ Time: _____hour_____minute
(NOTE: Time hr./min. on 24-hour clock, as 10:10 for AM or 22:10 for PM)

Site ID#_____

Recorder Information
Name_____

Address_____

City_____State_____Zip_____

Phone (_____)_____ Fax (_____)_____

e-mail_____Identification Number_____

Monitor Information

Name_____

Address_____

City_____State_____Zip_____

Phone (_____)_____ Fax (_____)_____

e-mail_____Identification Number_____

Monitor Information
Name_____

Address_____

City_____State_____Zip_____

Phone (_____)_____ Fax (_____)_____

e-mail_____Identification Number_____

Monitor Information
Name_____

Address_____

City_____State_____Zip_____

Phone (_____)_____ Fax (_____)_____

e-mail_____Identification Number_____

Precipitation

In the past 24 hours:

___ Storm (heavy rain >2.5 cm)
___ Rain (steady rain .85 cm to 2.5 cm)
___ Showers (intermittent rain up to .85 cm)
___ Overcast
___ Clear

Current:

___ Storm (heavy rain >2.5 cm)
___ Rain (steady rain .85 cm to 2.5 cm)
___ Showers (intermittent rain up to .85 cm)
___ Overcast
___ Clear

***Biosurvey: Field Data Sheets* (p 2 of 3)**

Macroinvertebrate Survey

Type of Stream

____ Rocky-bottom ____ Muddy-bottom

Muddy-bottom Sampling Only: Record the number of jabs taken in each habitat type.

_____ Vegetated Bank Margin _____ Aquatic Vegetation Beds
_____ Snags and Logs _____ Silt/sand/gravel Substrate

Macroinvertebrate Count

Identify the macroinvertebrates (to order) in your sample using the identification sheets. We are only concerned with organisms that appear on the identification sheets. Record the number of organisms below and then assign them letter codes based on their abundance:

R (rare) = 1-9 organisms; **C** (common) = 10-99 organisms; **D** (dominant) = 100 plus organisms.
example: *20* (C) *WaterPenny larvae*

(Enter a whole number for each, 0-999)

Group I - Sensitive

_____ (____) Water Penny larvae
_____ (____) Hellgrammites
_____ (____) Mayfly nymphs
_____ (____) Gilled snails
_____ (____) Riffle beetle adults
_____ (____) Stonefly nymphs
_____ (____) Non-net spinning caddisfly larvae

Group II - Somewhat Sensitive

_____ (____) Beetle larvae
_____ (____) Clams
_____ (____) Cranefly larvae
_____ (____) Crayfish
_____ (____) Damselfly nymphs
_____ (____) Dragonfly nymphs
_____ (____) Scuds
_____ (____) Sowbugs
_____ (____) Fishfly larvae
_____ (____) Alderfly larvae
_____ (____) Net-spinning caddisfly larvae

Group III - Tolerant

_____ (____) Aquatic worms
_____ (____) Blackfly larvae
_____ (____) Leeches
_____ (____) Midge larvae
_____ (____) Snails

<u>Biosurvey: Field Data Sheets</u> *(p 3 of 3)*

The following letter codes will be assigned automatically to each count as it is entered into the database.

R (rare) = 1-9 organisms; C (common) = 10-99 organisms; or D (dominant) 100 plus organisms

The database will then calculate the water quality score for the stream site by adding together assigned index values (a factor by which each count is multiplied) for each group. The Water Quality Score for a stream site will fall into one of the following categories:

_____ Good > 40 _____ Fair 20-40 _____ Poor <20

Water Quality Rating *(done automatically by database)*

To calculate the index value, add the number of letters found in the three groups above and multiply by the indicated weighing factor.

Group I – Sensitive

(# of R's) x 5.0 = _____
(# of C's) x 5.6 = _____
(# of D's) x 5.3 = _____
Sum of the Index Value for Group I = _____

Group II – Somewhat Sensitive

(# of R's) x 3.2 = _____
(# of C's) x 3.4 = _____
(# of D's) x 3.0 = _____
Sum of the Index Value for Group II = _____

Group III – Tolerant

(# of R's) x 1.2 = _____
(# of C's) x 1.1 = _____
(# of D's) x 1.0 = _____
Sum of the Index Value for Group III = _____

To calculate the water quality score for the stream site, add together the index values for each group. The sum of these values equals the water quality score.

Water Quality Score = _____

Compare this score to the following number ranges to determine the quality of your stream site

Good > 40 Fair 20-40 Poor < 20

Note: The tolerance groupings (Group I, II, III) and the water quality rating categories were developed for streams in the Mid-Atlantic states.