Section 2

Section two is a multipurpose section. This section of the NRCS Watershed Education package is designed as forms, guides, surveys, instructions and tools to be used along with the projects outlined in section one of the package. Additionally, section two is designed as a outline for a continual monitoring program for schools, organizations and clubs to use for watershed education/ conservation and environmental studies. If you have any question about using this section in combination with the projects in section one, please visit us on the web at www.la.nrcs.usda.gov, or contact LA NRCS Public Affairs at 318.473.7762

(To be considered - There are numerous positive education aspects in starting a Watershed *Research and Monitoring Program.* A Watershed Research and Monitoring Program will provide a way for students to observe changes to a watershed over time. It can also lead to group projects towards improving your watershed, which can be conceptualized through a Watershed Research and Monitoring Program. To learn more about a Watershed Research and Monitoring Program, please contact LA NRCS Public Affairs at 318.473.7762)

For more information to help you with soil, soils identification and soil quality visit our national NRCS teacher's education website at http://www.nrcs.usda.gov/wps/portal/nrcs/asr/national/students/?atype=Students and Educators.

Getting Started ***Watershed***

- Identify a Stream Segment, Wetland or Lake Area to Monitor
- Determine the Official Name of Your Water body
- How To Obtain Maps and Other Information
- Determine Which Watershed You Are In
- Determining Your Lat/Long
- Sample Delineated Watershed
- Name Your Group
- Why Am I Monitoring? Setting Goals
- Determine What Equipment and Resources You Need
- Find Local Partners
- Determine What Data Will Be Collected
- Make a "Who To Call" List
- Inform a Local Official
- Public Outreach

Identifying a Stream Segment, Wetland or Lake to Monitor

Some general guidelines to follow for selection of a stream segment, wetland or lake:

Select a water body meaningful to you or your group.
Select a location that has **easy, safe, and legal** access.
Select a project that meets your monitoring goals.

Stream

Choose a stream that is meaningful to you and your group. Do you want to learn more about a stream that flows near your home or school? Many communities study an entire watershed and monitor several sites. Comparing the effect of land uses on water quality can be interesting (sample upstream and downstream of a farm, an urban area, etc.). We suggest that you choose a ½ mile segment of stream to monitor. During the watershed survey, you will locate one monitoring point that is representative of your stream segment. From this location, you will conduct the visual surveys, chemical and biological monitoring.

Wetland

Wetlands are not as common and easy to find as streams and creeks. For this reason, it is advisable to work with a local partner who may own land where a wetland is located or contact a government agency for permission to work on publicly owned land. By purchasing a USGS topographical quadrangle of the area of interest, you may learn if a wetland is present. A better estimation of wetland location will be found on a NWI map (National Wetland Inventory). These quadrangles correlate to the USGS topographic maps and are specifically made to identify and classify wetlands.

Lake

In Maine there are many small and large lakes ranging from farm ponds to large reservoirs. Do you want to monitor a small pond, a larger lake or one or more sites on a large reservoir?

Determine Official Name of Your Watershed

Many streams, wetlands and small ponds are not named on the maps. If this is the case for your water body, contact your county or city water or utilities department and ask them if they have named the water body. Some groups make up their own names, but if this does not correspond to the name used by the municipality or State, it will be hard to associate your data to the appropriate water body. If you are looking at a stream or wetland associated with a larger stream that is named, you should call the stream "a tributary to (name of bigger stream)" or "wetland adjacent to (name of water body)." For example, a small tributary running into Orono Creek would be called "unnamed tributary to Onon Creek." Also include the location such as, "flows under Main Street in Downtown Orono".

How To Obtain Maps And Other Information

Stream headwaters, length, tributaries, final stream destination, and watershed boundaries are best determined through maps. Of greatest value are U.S. **Geological Survey 7.5- minute topographic maps** (on a 1:24,000 scale where 1 inch = 2,000 feet). They depict landforms, major roads and political boundaries, developments, streams, tributaries, lakes, and other land features. Sporting goods stores and bookstores often carry these maps, especially for recreational areas that are likely to be hiked or camped. The maps can also be ordered through the U.S. Geological Survey (see Obtaining USGS Topographic Maps below). Small versions are available online at http://www.topozone.com. **Road, state, and county maps** might also prove helpful in identifying some of these stream and watershed features. **Hydrologic unit maps**, also available from the U.S. Geological Survey but at a 1:100,000 scale of resolution (less detail than the 7 1/2-minute maps cited above) might also help you determine hydrologic watershed boundaries. **Atlases** and other reference materials at libraries can prove helpful in determining facts about population in the watershed. Land uses in the stream watershed might also be depicted on maps such as those discussed above. You will verify this information in the second half of the watershed survey, when you are actually in the field observing land around your water body. Information from maps is particularly useful in developing a broad statement about general land use in the watershed (e.g., land use in the hypothetical Volunteer Creek watershed is 60 percent residential, 20 percent parkland/recreational, and 20 percent light industrial). Much information about your local watershed can be obtained form the internet. **EPA Surf Your Watershed** (http://www.epa.gov/surf3/states/MA/) is a good place to start, however there are other sources for obtaining detailed maps, both topographical and aerial views. Check with your local government, library and the internet for your options.

Name Your Group
On the forms that follow this introduction, a few different names are requested. The first is the official name of your water body. The next name is the lead coordinator. That will be the main contact person for the group, and his or her address and phone number should be written on the form. The next name is the name of your group. This can be a fun name or the official name of your organization that is monitoring a water body. Once you have chosen a name, be consistent. This name will be used to track your data forms throughout the year.

Why Am I Monitoring? Setting Goals
Generally, a *goal* is a broad statement that encompasses the purpose of your involvement in watershed monitoring. An *objective* is a specific, measurable, action oriented activity that will help you achieve your goals. Don't get weighed down with the definition of goals and objectives. What is important here is that you have a clear picture of why you are adopting a stream, wetland or lake and what you hope to achieve from your efforts. Then you can decide which activities you will conduct. As you can imagine, the goals and objectives of each group may be very different. Below are examples of goals and activities that you may consider for your program.

Goals:
- To learn more about my local stream and watershed.
- To educate the community about water quality, watersheds and nonpoint source pollution.
- To collect baseline water quality or stream morphology data.
- To get the community involved in a hands-on effort to protect the lake.
- To form a watershed alliance.
- To work in partnership with local governments and businesses to protect our water.
- To teach aquatic biology to students.

Objectives:
- Conduct the watershed survey and map assessment.
- Speak at the neighborhood association or local church about your watershed
- Obtain $400 sponsorship from a local business to purchase monitoring equipment.
- Conduct Visual Surveys four times a year.
- Collect data on pH, dissolved oxygen, temperature and nitrate-nitrogen once a month for three years.
- Organize two cleanups this year.
- Ask someone at the local water authority to act as your technical advisor.
- Send a letter to a local official, informing him or her of your intentions.
- Write an article in your local paper with information on "Who to Call" if someone sees a water quality problem.

- Collect data that will be useful to at least three entities (watershed organization, county water authority, local college).

Determine What Equipment and Resources You Need
Think about the equipment and resources you will need to accomplish your goals. This may include topographic maps, boots, chemical test kits, nets, garbage bags or information on how to form a watershed group.

Equipment List for Watershed Survey and Map Assessment
Watershed Forms
Topographic map
Transparency paper
Land use map
Camera
Tape measure
First aid kit
Boots
Gloves

Equipment List for Visual Stream Survey
Watershed forms
Camera
Tape measure
8 – 10 ft. measuring stick
An orange
Calculator
Twine
Line level
Rebar
Pencil
Waterproof paper
Clear jar

Equipment List for Chemical Monitoring
Eye protectors
Boots
Gloves
First aid kit
Test kits for pH, Dissolved Oxygen, Nitrate-nitrogen, Phosphate, Alkalinity
Thermometer
Imhoff cone
Waste bucket
Chemical data forms

Equipment List for Biological Monitoring
Watershed Forms
D-frame or kick seine net
Buckets
Forceps
Spoons
Pipettes
Sorting trays
Macroinvertebrate key (laminated)
Collecting jar with alcohol

Equipment List for Wetland Monitoring
Tape measure
Shovel
Soil color chart (laminated)
Local plant ID book
Wetland survey forms

Equipment List for Lake Monitoring
Secchi Disk
All equipment listed under Chemical Monitoring

Find Local Partners
Local partners can help make your project a success in many ways. They can offer technical advice, donate equipment, or facilitate access to the water body. The more partners you have, the more your efforts will be magnified throughout your community.

Examples of local partners:
- Large private landowners such as timber companies who may have wetlands on their property.
- Government agencies like the NOAA Fisheries, US Fish and Wildlife, USDA, the Extension Service or the US Geological Survey.
- Municipalities who may have an interest in working with citizen monitoring groups.
- Environmental education centers.
- Professors at colleges or universities.
- A local bank that will sponsor your group.
- A corporation interested in promoting and supporting environmental stewardship.

Watershed **Monitoring Package**

Complete the following form for each stream segment, wetland or lake you monitor. We must have a completed form on file at the state office in order to include your efforts on our web site and database.

This form is to register the monitoring of a:

STREAM WETLAND LAKE
(Circle one)

Name of stream / wetland / lake you are monitoring (official name)

_____

Lead Coordinator / Contact _____

Complete Mailing Address _____

_____

Phone Number(s) _____

E-mail Address _____

Topographic Map Quadrangle (**include copy of map**) on which your water body can be located Watershed (Latitude / Longitude, County, Today's Date).

1. Describe the location of your monitoring site (i.e. 25 yards downstream of Smallville crossing in Smallville Village).

2. What is the name of your monitoring group? (i.e. Science Club, Smallville High School , Smallville Science Club)?

3. If associated with a larger group (i.e. NOAA Fisheries) please list them here.

4. Who are your partners (partners may contribute equipment, provide skills or services, provide technical support or grant you access across their land)?

5. What are the goals you hope to accomplish with the on going community watershed monitoring program?

6. What equipment or supplies do you need to achieve your goals?

7. Where will you send the data you collect?

8. Name of the local official or agency that you have informed about your program.

9. Name the QA/QC data collectors in your group.

Watershed Survey and Map Assessment

Group name: _____ Investigator(s):_____

Type of water body: stream / wetland / lake_____

Water body name:_____ County(ies):_____

Approximate size of drainage/study area:_____ acres

Date: Time: Picture/photo documentation?
Yes/No_____ _____

I. CREATE A MAP OF YOUR WATERSHED

(create or generate a map of your water shed. Mark locations and key points of interest. Provide a legend at the bottom of your map)

II. LAND USES/ACTIVITIES AND IMPERVIOUS COVER

1. Identify land uses and activities in the watershed, which have the highest potential to impact water bodies:

Check all boxes that apply, describe the location of the activity(ies) under Notes on Location & Frequency of Activities and also mark the locations on your map. If too frequently occurring to record locations, so note. If you don't know some of the information below, write DK under Notes.

Please indicate if you: ❑ surveyed only adjacent to the water body
❑ surveyed the whole watershed
Provide notes as necessary

Land Disturbing Activities & Other Sources of Sediment	Adjacent to Water	In Watershed	Notes on location & frequency of activity
Extensive areas disturbed by land development or construction of utilities, roads & bridges	_	_	_____
Large or extensive gullies	_	_	_____
Unpaved roads near or crossing streams	_	_	_____
Croplands	_	_	_____
Pastures with cattle access to water bodies	_	_	_____
Commercial forestry activities including harvesting and site-preparation	_	_	_____
Extensive areas of streambank failure or channel enlargement	_	_	_____
Other Agricultural Activities			
Confined animal (cattle or swine) feeding operations and concentrations of animals	_	_	_____
Animal waste stabilization ponds	_	_	_____
Poultry houses	_	_	_____
Highways and Parking Areas			
Shopping centers & commercial areas	_	_	_____
Interstate and controlled access highways and interchanges	_	_	_____
Major highways and arterial streets	_	_	_____
Other extensive vehicle parking areas	_	_	_____
Mining			
Quarries with sediment basins in live flowing streams	_	_	_____

Transportation and Motor Vehicle Services activity	Adjacent to Water	In Watershed	Notes on location & frequency of
Truck cleaning services	_	_	_____
Public and private automobile repair facilities	_	_	_____
Car washes and large auto dealers	_	_	_____
Rail or container transfer yards	_	_	_____
Airports with fuel handling/aircraft repair	_	_	_____
Business & Industry, General			
Activities with exterior storage or exchange of materials.	_	_	_____
Activities with poor housekeeping practices indicated by stains leading to streams or storm drains or on-site disposal of waste materials	_	_	_____
Heavy industries such as textiles & carpet, pulp & paper, metal, and vehicle production or fabrication	_	_	_____
Dry cleaners/outside chemical storage	_	_	_____
Food & Kindred Products			
Fertilizer production plants	_	_	_____
Feed preparation plants	_	_	_____
Meat and poultry slaughtering or processing plants	_	_	_____
Construction Materials			
Wood treatment plants	_	_	_____
Concrete and asphalt batch plants	_	_	_____

Waste Recycling, Movement & Disposal	**Adjacent to Water**	**In Watershed**	**Notes on location & frequency of activity**
Junk and auto salvage yards	_	_	_____
Solid waste transfer stations	_	_	_____
Landfills and dumps (old & active)	_	_	_____
Recycling centers	_	_	_____
Drum cleaning sites	_	_	_____
Illicit Waste Discharges*			
Sanitary sewer leaks or failure	_	_	_____
Overflowing sanitary sewer manholes due to clogging or hydraulic overloading	_	_	_____
Bypasses at treatment plants or relief valves in hydraulically overloaded sanitary sewer lines	_	_	_____
Domestic or industrial discharges	_	_	_____
Extensive areas with aged/malfunctioning septic tanks	_	_	_____
Dry-weather flows from pipes (with detectable indications of pollution)	_	_	_____
Streamside areas of illegal dumping	_	_	_____

* If found (most likely during stream surveys), these activities should be immediately reported to the local government.

II Percent impervious surface *acre overlay, example map and acreage calculating grid.*

Coverage category for LANDUSE MAP method	impervious Quotient	times	percent of...	percent of impervious cover
Forest/open land/undeveloped land /vacant/land owned by institutions	.005	x		%
Agriculture/pasture/cropland	.005	x		%
Single family residential % (1.1 - 5 acre lot or no more than 1 dwelling per acre)	.12	x		
Single family residential % (.5 - 1 acre lot or 0 – 2 dwellings per acre)	.19	x		
Low density residential / single % family residential (.25 - .5 acre lot or 0 – 4 dwelling units per acre)	.26	x		
Low/medium density residential (.25 acre lot or smaller or 0 –8 dwelling units per acre)	.48	x		%
Medium density residential (0 –12 dwelling units per acre)	.56	x		%
High density residential (18 – 30 dwelling units per acre)	.65	x		%
Townhouse/apartment.	.48	x		%
Office/light industrial (assembly, finishing, packaging products)	.70	x		%
Heavy industrial (timber, chemical, cement, brick plants, lumber mills)	.80	x		%
Commercial (business districts, commercial strip development, shopping centers, warehouses, parking lots, office buildings	.85	x		%
Major roads	.90	x		%
	Total percent of watershed covered by impervious surfaces			%

III. WATERBODY AND WATERSHED CHARACTERISTICS

This information will be gathered from your wetland, lake or stream segment.

1. Note the number of hydrologic modifications on your water body:
structures that alter water flow

None	_____	Beaver dams	_____
Dams	_____	Dredge spoils	_____
Bridges	_____	Pipes	_____
Waterfalls	_____	Other	_____

2. **Note the approximate length of the stream that is affected by the following:** *if assessing a wetland, lake or pond, some of the following may also affect your water body.*

Stream culvert	_____ feet or	_____ mile or	_____ %	of stream length
Stream straightening	_____ feet or	_____ mile or	_____ %	
Concrete streambank/bottom	_____ feet or	_____ mile or	_____ %	
Dredging/channelization	_____ feet or	_____ mile or	_____ %	
Riprap/gabion	_____ feet or	_____ mile or	_____ %	
Cattle crossing	_____ #			
Stream crossing *(for vehicles)*	_____ #			

3. Note extent of vegetative buffer along the banks: *at a minimum of 5 sites*, at regular intervals (every 500 ft. in a ½ mile. section) note the following*

#	**Width In Feet**	**Location** (Left bank, Right bank or N,S,E, W, side of wetland or lake	**Characteristics and Comments**
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

4. Check the categories that best describe the general appearance of the water body:

Litter:

_ No litter visible
_ Small litter occasionally (i.e., cans, paper)
_ Small litter common
_ Large litter occasionally (i.e., tires, pallets, shopping carts)
_ Large litter common

Special Problems:

_ Spills of chemicals, oil, etc.
_ Fish kills
_ Wildlife, waterfowl kills

Erosion:

_ No bank erosion or areas of erosion very rare; no artificial stabilization
_ Occasional areas of bank erosion
_ Areas of bank erosion common
_ Artificial bank stabilization (i.e., riprap) present

5. Comments on general water body and watershed characteristics: (e.g. date and size offish kill, increased rate of erosion evident, litter most evident after storms)
* Fish kills should be immediately reported

6. Summarize notable changes that have taken place since last year (if this is not your first year conducting the Watershed Survey).

IV. PIPE AND DRAINAGE DITCH INVENTORY

In this section, provide information on pipes and drainage ditches found on the banks or in the water body. These pipes/ditches can be abandoned or active. Note the information for each pipe or drainage ditch you observe. *Make additional copies as necessary.*

Pipe #	Location	Type	Size	Flow	Water body condition	Comments

1. **Number each pipe/ditch** for mapping/locating purposes

2. **Location of pipe/ditch:** note whether in water, bank, near water body or other. Describe location.

3. **Identify type of pipe (list all that apply):** PVC, iron, concrete, galvanized; industrial outfall, sewage treatment plant outfall, storm drain, combined sewer overflow; agricultural field drainage, paddock or feedlot drainage, settlement basin/pond drainage, parking lot drainage, unknown, other

4. **Size: measure approximate diameter of pipe:** inches or centimeters

5. **Describe the discharge flow:** Rate of flow: none, intermittent, trickle, steady, heavy. Appearance: clear, foamy, turbid, oily sheen, color, other. Odor: none, rotten eggs/sewage, chemical, chlorine, other

6. **Water body condition: describe the bank/water body below pipe or drainage ditch:** no problem evident, eroded, sewage litter (e.g. toilet paper), litter (e.g. bottles, cans), lots of algae, other

7. **Comments of pipes and drainage ditches:** Use this space to explain or expand on information provided on pipes and discharges you have identified above. For example, you may want to identify particular facilities, or discuss in more detail the condition of the water body below the discharge. Use separate page if necessary.

Determining Your Latitude and Longitude

So that others can find the exact location of your monitoring site, you will need to know how to determine the latitude and longitude of your site. To locate the coordinates, you will need to work with a topographic map and have access to the web. You can find maps on the web at www.topozone.com. Scroll down to the bottom of the screen and type the official name of your water body in the area designated "Place Name." If you are working with an unnamed tributary to a larger stream, type in the name of the larger stream. Select your state (ME) on the pull-down menu, and click "Search." This should bring up a list of all sites with that name. Select your site by clicking on the link, which will take you to a topographic map of the area. Locate your exact data collection point as closely as possible and click on it, using the green arrows at the edges of the map to change the view if necessary. A small red mark should appear where you click, allowing you to keep track of your site. Now go to the top of the map and click on the 1:25,000 scale option, which will zoom in on the red mark. Adjust its position if necessary. At the bottom of the map, three coordinate format options will appear. Select the one-labeled "DD.DDDD" for decimal degrees. The latitude and longitude of your site and the name of the quadrangle will appear above the map. Print this map for your records, noting the scale, coordinates, quadrangle, and date of production, which may be obtained by clicking "Quad Info" in the upper right corner of the screen.

To obtain a hard copy of the topographic quadrangle map, contact the US Geological Survey may be reached at 1-800-USA-MAPS. Maps cost $4 each plus shipping and handling. To order the map, you will need the name of the quadrangle, the scale of the map and the date it was printed. NOTE: Your water body may cover more than one quadrangle. While topozone.com provides lovely maps, its coordinates may not be precise. Therefore, to determine the exact latitude and longitude of your site (important for future studies!), you should now visit http://tiger.census.gov. Scroll down and click on "The TIGER Mapping Service." This will bring up a default map. About three quarters of the way down the page, enter the latitude and longitude you obtained from topozone.com in the designated spaces under BOTH "Place a Marker on this Map" and "Enter Precise Coordinates." Set the map width to 0.022 and the map height to 0.009, and click "Redraw map." Locate your data collection site, which should be fairly close to the marker. To the right of the map, under "Click on the image to:" select "Place Marker" and click on your site as precisely as you can. When the map reloads, scroll down to

the original "Place a Marker on this Map," which will now show the new, more accurate coordinates of your marked site. Record these coordinates for your final data sheets, and print this map for your records.

Macroinvertebrate Count Forms

To be conducted quarterly

Group name: _____ County: _____

Site ID _____ Topo Map Quadrant: _____

Investigators: _____

Stream name: _____

Date:_____ Time: _____ Photo Documentation? yes / no

Site/location Description: _____

Rain in last 24 hours
heavy rain steady rain heavy rain

Present conditions (circle response)
steady rain intermittent rain

intermittent rain none overcast partly cloudy clear/sunny

Amount of rain, if known?———— Inches in last ———————— hours/days

Use letter codes (**A**=1-9, **B**=10-99, **C**=100 or more) to record the numbers of organisms found in a total sample. Then add up the number of letters in each column and multiply by the indicated value. The following columns are divided based on the organism's sensitivity to pollutio

Method used:
___ Muddy Bottom
___ Rocky Bottom

Habitat selected for sampling:
___ riffle
___ leaf pack/woody debris
___ streambed with silty area (very fine particles)
___ streambed with sand or small gravel
___ vegetated bank
___ other (specify) _____

SENSITIVE	**SOMEWHAT-SENSITIVE**	**TOLERANT**
___ caddisfly ___ hellgrammite ___ mayflynymphs ___ gilled snails ___ riffle beetle adult ___ stonefly nymphs ___ water penny larvae	___ beetle larvae ___ clams ___ crane fly larvae ___ crayfish ___ damselfly nymphs ___ dragonfly nymphs ___ scuds ___ sowbugs ___ fishfly larvae ___ alderfly larvae	___ aquatic worms ___ blackfly larvae ___ leeches ___ midge larvae ___ pouch snails
# of letters times 3 = _____	# of letters times 1 = _____	# of letters times 2 = _____
Now add together the three index values = _____ total index value		

The total index value will give you an indication of the water quality of your stream. Good water quality is indicated by a variety of different kinds of organisms, with no one kind making up the majority of the sample.

WATER QUALITY RATING

__ Excellent (>22) __ Good (17-22) __ Fair (11-16) __ Poor (<11)

Visual Survey Forms

To be conducted every 3 months

Group name: _____ County: _____

Site ID _____ Topo Map Quadrant: _____

Investigators: _____

Stream name: _____

Date:_____ Time: _____ Photo Documentation? yes / no

Site/location Description: _____

_____

Rain in last 24 hours *Present conditions (circle response)*

heavy rain steady rain heavy rain steady rain intermittent rain

intermittent rain none overcast partly cloudy clear/sunny

Amount of rain, if known? _____ Inches in last _____ hours/days

I. IN-STREAM CHARACTERISTICS

1. Stream reach: The total-distance upstream to downstream of your monitoring point from which you will be collecting your data. The stream reach is 12 times your stream width, bankfull to bankfull.

bankfull width _____ ft. x 12 = stream reach _____ ft.

2. Water flow: Present conditions:

_ in channel _ flooding over banks _ dry / no flow / pooling

Number of pools _____ Number of riffles _____ Number runs _____

3. Flow rate: where Flow = Area X Speed X coefficient

(Turn for stream flow calculating form.)

CALCULATING **STREAM FLOW**

Flow = Area X Speed X Coefficient

CALCULATE AREA

Area = depth x width

It is advisable to take multiple depth and width measurements always start at the waters edge with a first measurement of zero all data should be recorded in feet, with inches replaced by increments of 10

Depth measurements	1. 0 ft	2.	3.	4.	5.	6.	7.	8.	sum

Average depth [ ] = [ ] / [ ] (sum of depth measurements / number of measurements)

Width measurements	1.	2.	sum

Average width [ ] = [ ] / [ ] (sum of width measurements / number of measurements)

Area [ ] = width [ ] X depth [ ]

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 run*

length in [ ] feet 20 feet is recommended

Time In seconds	1.	2.	3.	4.	sum

Average time [ ] = [ ] / [ ] (sum of time measurements / number of measurements)

Speed [ ] = [ ] / [ ] (length in feet / average time in seconds)

CALCULATE STREAM FLOW

Flow _____ cfs = _____ **Area** X _____ **Speed** X _____ **Coefficient**

Flow in cubic feet per second

.9 coefficient for muddy bottom stream
.8 coefficient for rocky bottom stream

Measure **Channel Cross Section**:

Drawing a stream cross section allows you to observe/track changes in your stream channel shape. Forms are found on the last page of this section.

4. Tidal range: *(complete only if site is affected by tide)*

Is waterway influenced by tides? _ Yes _ No If yes, when? _____

If tidally influenced: Tide was: _ Rising _ Falling

Tide was: _ High _ Mid-range _ Low

5. Embeddedness: Pick the category that best describes the extent to which gravel, cobbles, and boulders on the stream bottom are embedded (sunk) in silt, or mud. *Observations should be conducted from the riffle section of your stream as opposed to run or pool areas. Only complete if applicable to your stream.*

_ somewhat/not embedded (0 - 25%) _ mostly embedded (75%)
_ halfway embedded (50%) _ completely embedded (100%)

Pebble count: This is an easy way to determine the percentage of silt, sand, gravel, rocks and boulders on your streambed.

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

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

7. Water odor: 8. Water surface:

_ natural/none _ gasoline _ clear _ natural oily sheen
_ sewage _ chlorine _ foamy _ other
_ rotten egg _ chemical _ oily sheen (petroleum product)
_ other _____
_____
_____

8. Water clarity: check all that apply *(determine by viewing sample water in a clear container)*

_ turbid - suspended matter in water _ sediment
_ blue/green algae _ other

_ tannic - clear water that is naturally stained orange/brownish due to organic acids in water

_ no staining / no suspended matter _ other (i.e. chemical discharge, dyes)

Notes: _____

9. Bank erosion:
How vegetated is the left bank, looking down stream, for the length of your reach (circle a percentage)?

Vegetated banks Bare/eroded banks
100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0

What are the visual indicators you used to assess the percentage above (check all that apply)?
_ exposed soil _ obvious loss of soil _ soil covered with vegetation
_ steep slopes (banks are U shaped) _ gentle slopes
_ exposed roots _ no exposed roots

How vegetated is the right bank, looking down stream, for the length of your reach (circle a percentage)?

Vegetated banks Bare/eroded banks
100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0

What are the visual indicators you used to assess the percentage above (check all that apply)?
_ exposed soil _ obvious loss of soil _ soil covered with vegetation
_ steep slopes (banks are U shaped) _ gentle slopes
_ exposed roots _ no exposed roots

10. Additional comments/observations:

II. VISUAL BIOLOGICAL SURVEY

1. Wildlife in or around the stream:
_ amphibians _ waterfowl _ reptiles _ mammals
_ mussels/clams/oysters _crustaceans

2. Fish in the stream: *(Check all that apply)*
_ no _ yes, but rare _ yes abundant
_ small (1-2") _ medium (3-6") _ large (7" and above)

Are there barriers to fish movement?
_ none _ beaver dams _ waterfalls > 1ft
_ dams _ road barriers _ other :

3. Aquatic plants in the stream: *(Check all that apply)*
_ none

attached plants	**stream margin/edge**	**pools**	**near riffle**
occasional	_	_	_
plentiful	_	_	_
free-floating plants	**stream margin/edge**	**pools**	**near riffle**
occasional	_	_	_
plentiful	_	_	_

4. Extent of algae in the stream: Are the submerged stones, twigs, or other material in the stream coated with a layer of algae? *(Check all that apply)*
_ none

brownish:	light coating	heavy coating	
occasional	_	_	
plentiful	_	_	
greenish:	light coating	heavy coating	
occasional	_	_	
plentiful	_	_	
other _____:	light coating	heavy coating	
occasional	_	_	
plentiful	_	_	

Are there any filamentous (string-like) algae?

	none	occasional	plentiful
brownish	_	_	_
greenish	_	_	_
other :	_	_	_

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

	none	occasional	plentiful
brownish	_	_	_
greenish	_	_	_
other :	_	_	_

5. 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

6: Additional comments/observations:

III. SKETCH OF MONITORING SITE / STREAM REACH

On the back of this page, 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 **exact location of stream reach** (e.g. Cricket Creek stream reach begins 57 feet north of Cormorant Bridge.)
Include comments such as changes or potential problems, e.g. spills, new construction, type of discharging pipes, etc.

Stream Channel Cross-section **Measurement Data**

Group name: _____ County: _____

Site ID _____ Topo Map Quadrant: _____

Investigators: _____

Stream name: _____

Date: _____ Time: _____ Photo Documentation? yes / no

Site/location Description: _____

Rain in last 24 hours
heavy rain steady rain heavy rain

Present conditions (circle response)
steady rain intermittent rain

intermittent rain none overcast partly cloudy clear/sunny

Amount of rain, if known? _____ Inches in last _____ hours/days

CROSS-SECTION			
Distance from LEFT Pin		Measurement Depth	Comments
Point	Ft.	Ft.	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

CROSS-SECTION			
Distance from LEFT Pin		Measurement Depth	Comments
Point	Ft.	Ft.	
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
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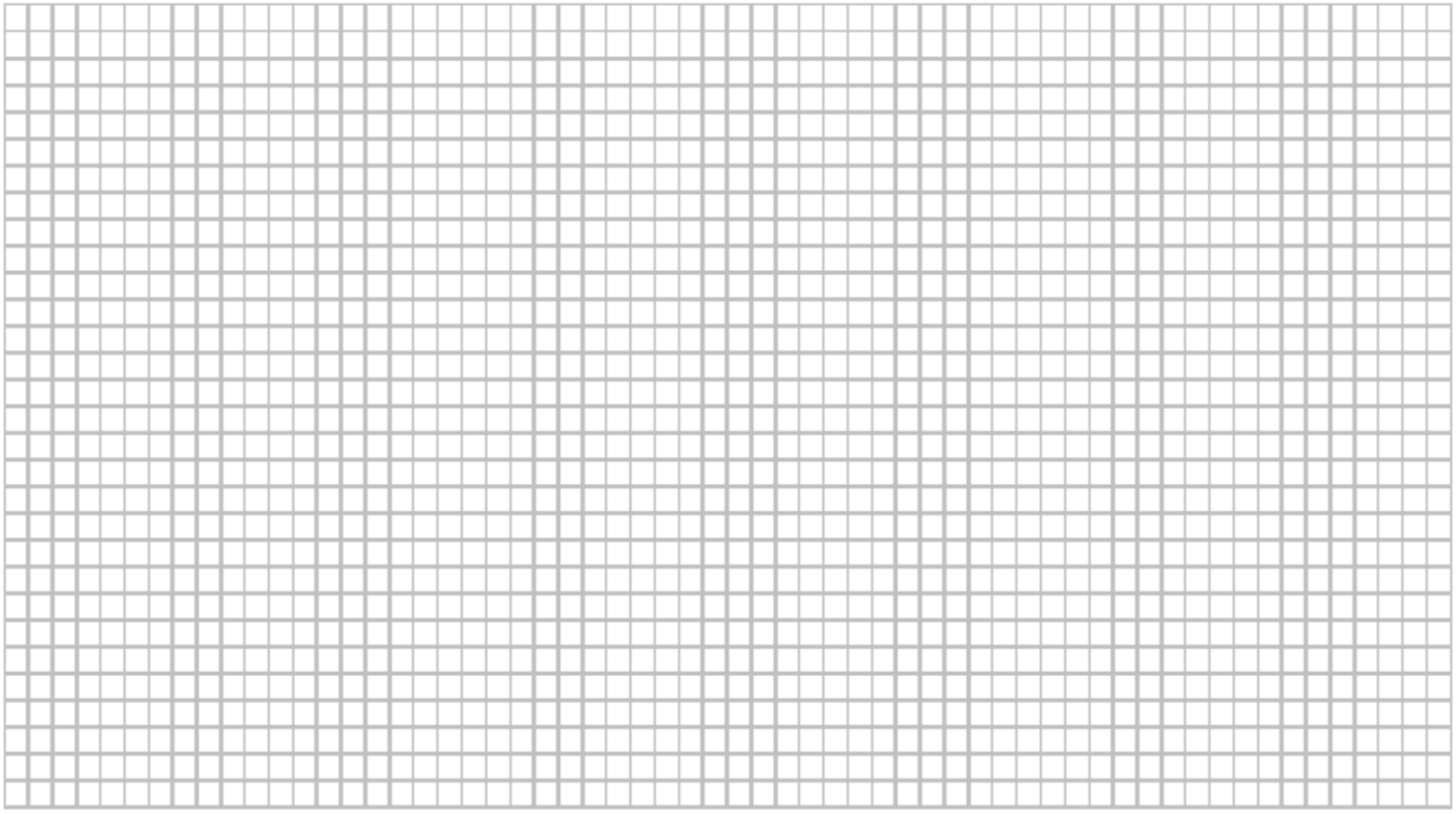
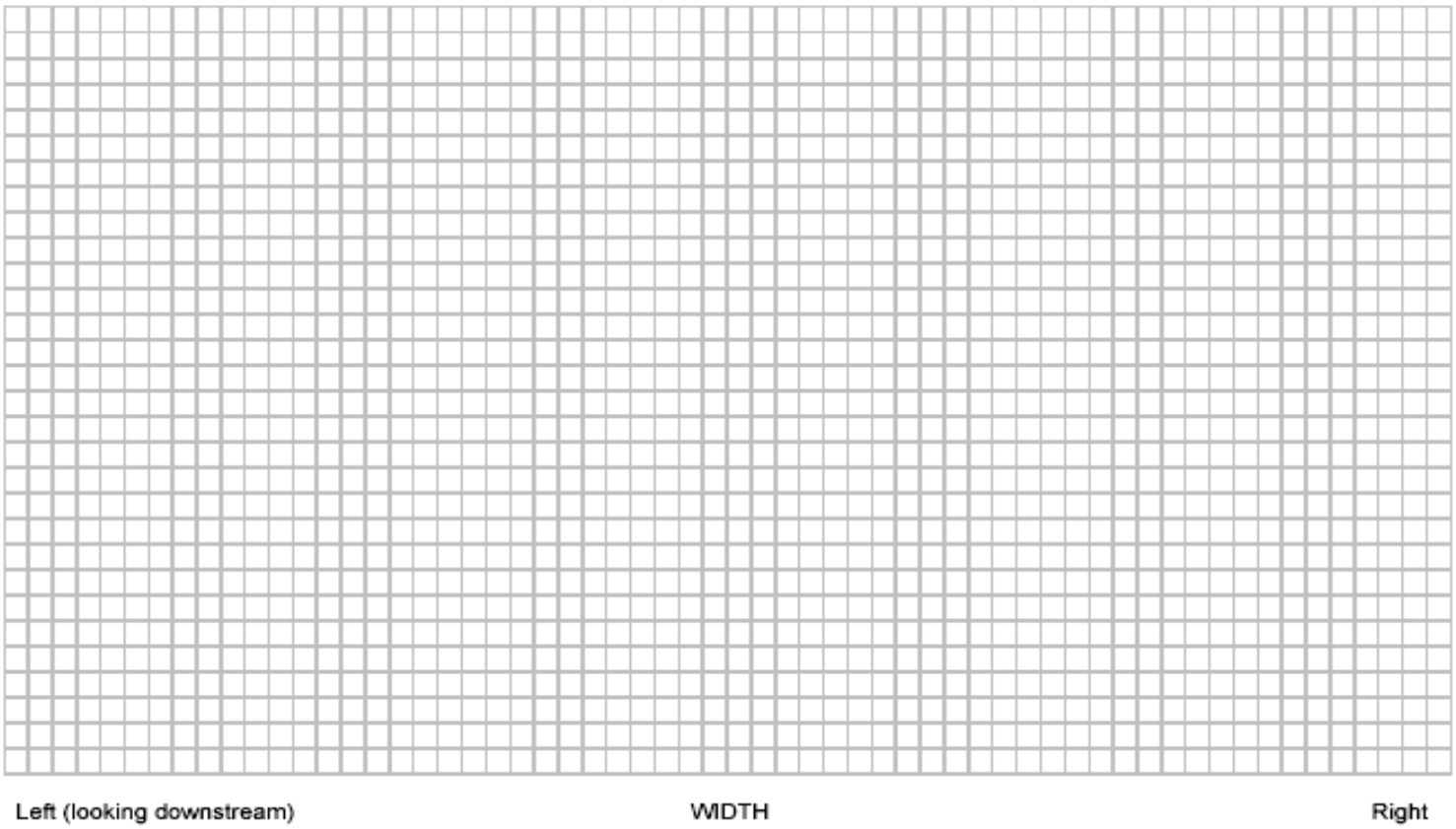
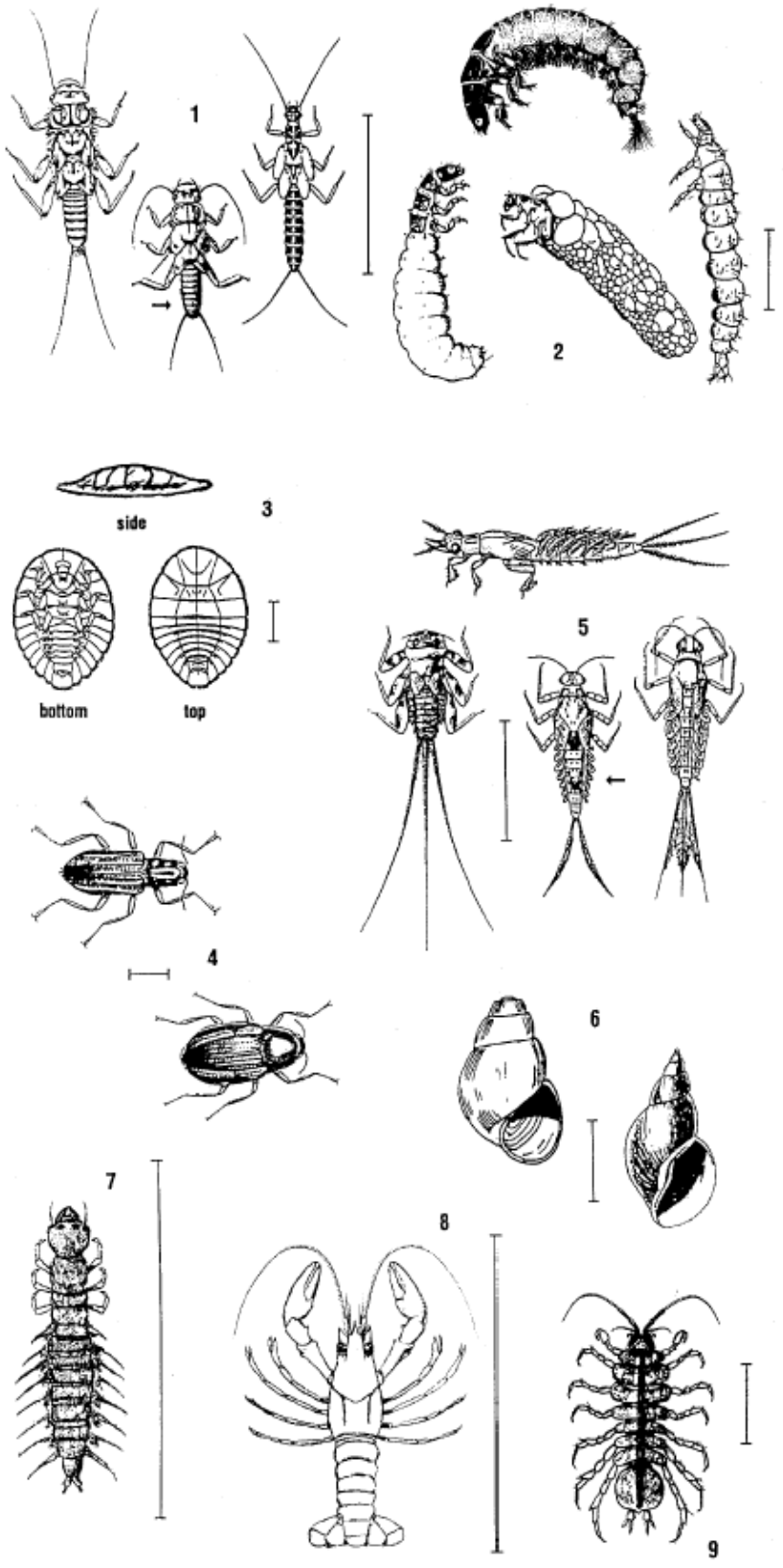
50			

Graph Paper for Stream Channel Cross-section Measurements



Graph Paper for Stream Channel Cross-section Measurements





Bar lines indicate relative size

Stream Insects & Crustaceans

GROUP ONE TAXA

Pollution sensitive organisms found in good quality water.

1 *Stonefly: Order Plecoptera.* 1/2" - 1 1/2", 6 legs with hooked tips, antennae, 2 hair-like tails. Smooth (no gills) on lower half of body. (See arrow.)

2 *Caddisfly: Order Trichoptera.* Up to 1", 6 hooked legs on upper third of body, 2 hooks at back end. May be in a stick, rock or leaf case with its head sticking out. May have fluffy gill tufts on lower half.

3 *Water Penny: Order Coleoptera.* 1/4", flat saucer-shaped body with a raised bump on one side and 6 tiny legs on the other side. Immature beetle.

4 *Riffle Beetle: Order Coleoptera.* 1/4", oval body covered with tiny hairs, 6 legs, antennae. Walks slowly underwater. Does not swim on surface.

5 *Mayfly: Order Ephemeroptera.* 1/4" - 1", brown, moving, plate-like or feathery gills on sides of lower body (see arrow), 6 large hooked legs, antennae, 2 or 3 long, hair-like tails. Tails may be webbed together.

6 *Gilled Snail: Class Gastropoda.* Shell opening covered by thin plate called operculum. Shell usually opens on right.

7 *Dobsonfly (Hellgrammite): Family Corydalidae.* 3/4" - 4", dark-colored, 6 legs, large pinching jaws, eight pairs feelers on lower half of body with paired cotton-like gill tufts along underside, short antennae, 2 tails and 2 pairs of hooks at back end.

GROUP TWO TAXA

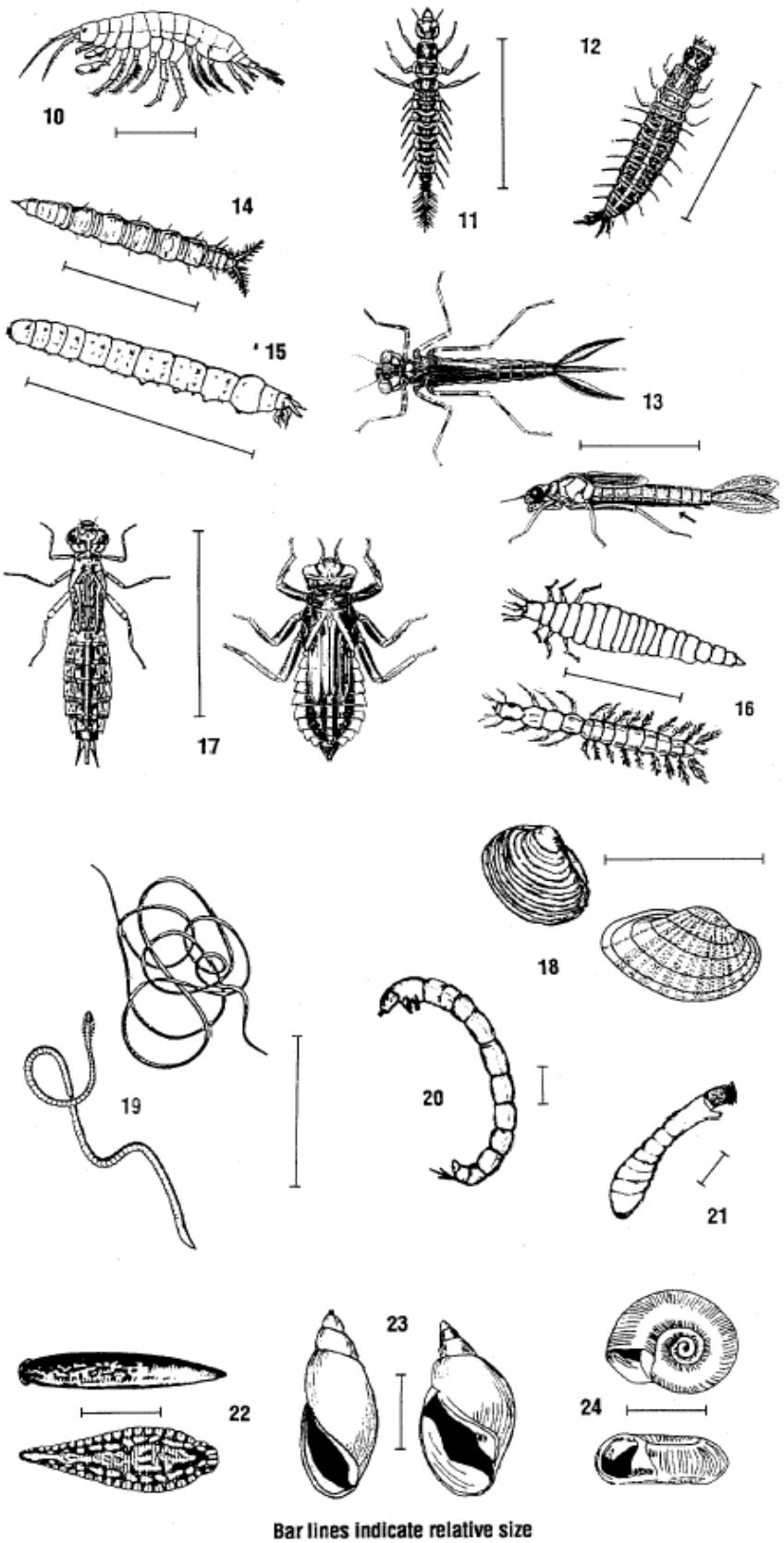
Somewhat pollution tolerant organisms can be in good or fair quality water.

8 *Crayfish: Order Decapoda.* Up to 6", 2 large claws, 8 legs, resembles small lobster.

9 *Sowbug: Order Isopoda.* 1/4" - 3/4", gray oblong body wider than it is high, more than 6 legs, long antennae.

Save Our Streams

Izaak Walton League of America
1401 Wilson Blvd. Level B
Arlington, VA 22209



Bar lines indicate relative size

GROUP TWO TAXA continued

10 *Scud: Order Amphipoda.* 1/4", white to grey, body higher than it is wide, swims sideways, more than 6 legs, resembles small shrimp.

11 *Alderfly larva: Family Sialidae.* 1" long. Looks like small hellgrammite but has 1 long, thin, branched tail at back end (no hooks). No gill tufts underneath.

12 *Fishfly larva: Family Corydalidae.* Up to 1 1/2" long. Looks like small hellgrammite but often a lighter reddish-tan color, or with yellowish streaks. No gill tufts underneath.

13 *Damselfly: Suborder Zygoptera.* 1/2" - 1", large eyes, 6 thin hooked legs, 3 broad oar-shaped tails, positioned like a tripod. Smooth (no gills) on sides of lower half of body. (See arrow.)

14 *Watersnipe Fly Larva: Family Athericidae (Atherix).* 1/4" - 1", pale to green, tapered body, many caterpillar-like legs, conical head, feathery "horns" at back end.

15 *Crane Fly: Suborder Nematocera.* 1/3" -2", milky, green, or light brown, plump caterpillar-like segmented body, 4 finger-like lobes at back end.

16 *Beetle Larva: Order Coleoptera.* 1/4" 1", light-colored, 6 legs on upper half of body, feelers, antennae.

17 *Dragon Fly: Suborder Anisoptera.* 1/2" - 2", large eyes, 6 hooked legs. Wide oval to round abdomen.

18 *Clam: Class Bivalvia.*

GROUP THREE TAXA

Pollution tolerant organisms can be in any quality of water.

19 *Aquatic Worm: Class Oligochaeta.* 1/4" - 2", can be very tiny; thin worm- like body.

20 *Midge Fly Larva: Suborder Nematocera.* Up to 1/4", dark head, worm-like segmented body, 2 tiny legs on each side.

21 *Blackfly Larva: Family Simulidae.* Up to 1/4", one end of body wider. Black head, suction pad on end.

22 *Leech: Order Hirudinea.* 1/4" - 2", brown, slimy body, ends with suction pads.

23 *Pouch Snail and Pond Snails: Class Gastropoda.* No operculum. Breathe air. Shell usually opens on left.

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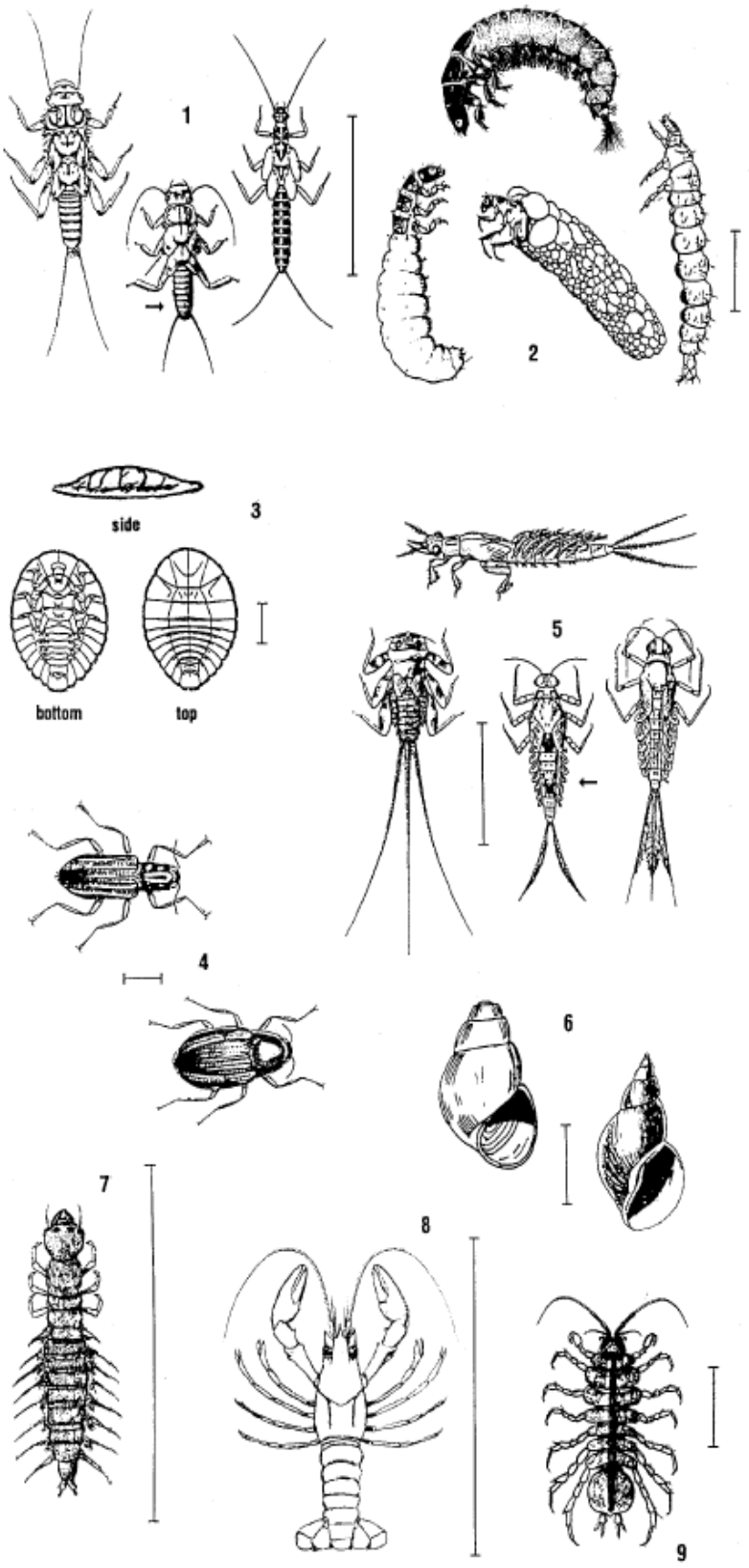

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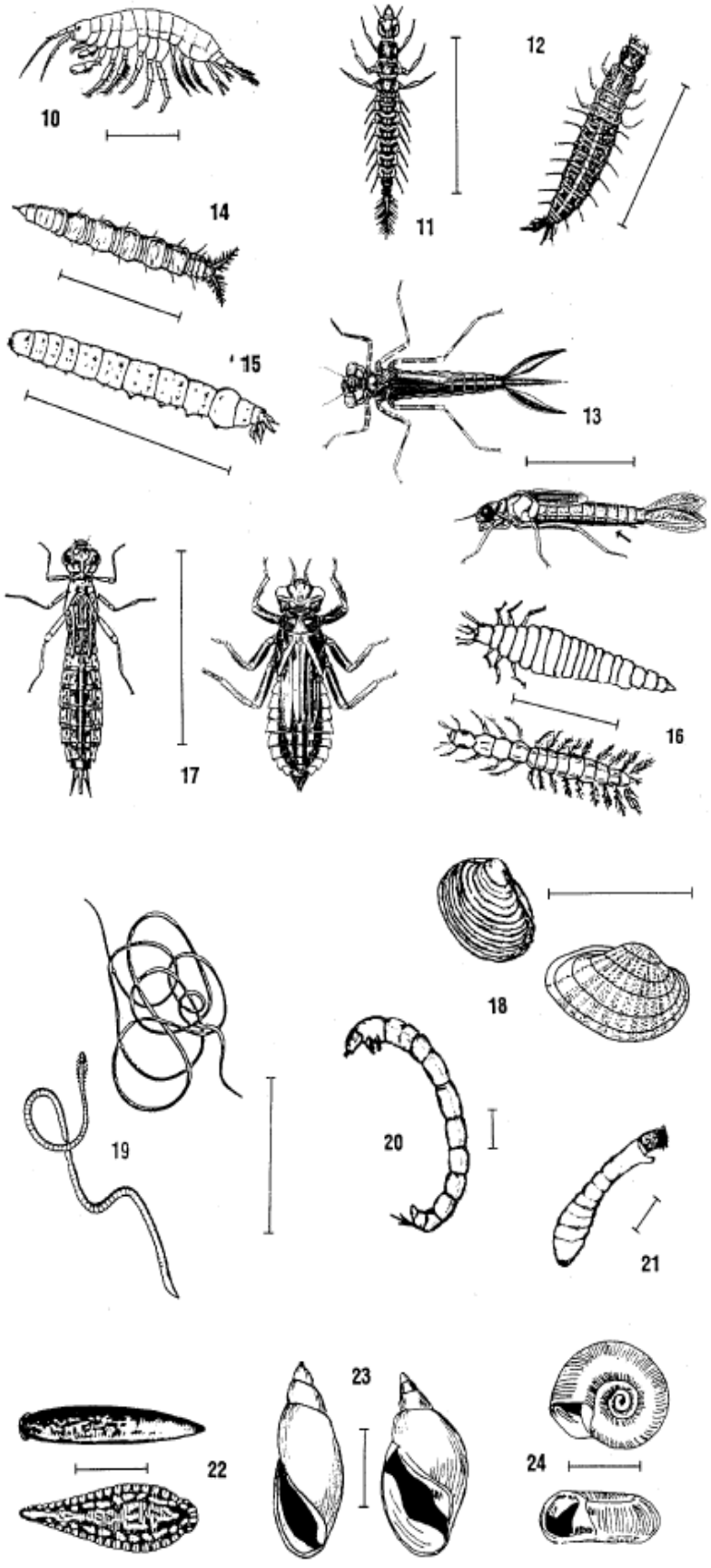

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Chemical Data Forms

Group name: _____ County: _____

Site ID _____ Topo Map Quadrant: _____

Investigators: _____

Stream name: _____

Date: _____ Time: _____ Photo Documentation? yes / no

Site/location Description: _____

Rain in last 24 hours
heavy rain steady rain intermittent rain none

Present conditions (circle response)
heavy rain steady rain intermittent rain overcast partly cloudy clear/sunny

Amount of rain, if known? _____ Inches in last _____ hours/days

BASIC TESTS	**Sample 1**	**Sample 2**	
Air Temperature	_____	_____	(^{0}C)
Water Temperature	_____	_____	(^{0}C)
pH	_____	_____	(1-14)
Dissolved Oxygen	_____	_____	(mg/L or ppm)
Settleable Solids	_____	_____	(ml/L)
ADVANCED TESTS			
Total Alkalinity	_____	_____	(mg/L or ppm)
Nitrate Nitrogen	_____	_____	(mg/L or ppm)
Ortho-phosphate	_____	_____	(mg/L or ppm)
OTHER TESTS			
Fecal Coliform	_____	_____	(cfu /100 mL)
Chlorophyll A	_____	_____	(mg/L or ppm)

Special Lab Analysis: Name of lab performing tests:

COMMENTS:

One **Year Record**

Physical/ Chemical and Biological Data

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Temperature												
Ph												
Dissolved Oxygen												
Settleable Solids												
Nitrate Nitrogen												
O-Phosphate												
Alkalinity												
Turbidity Meter or Secchi Disk												
Other												
Other												
Other												
Biological Index												

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Temperature												
Ph												
Dissolved Oxygen												
Settleable Solids												
Nitrate Nitrogen												
O-Phosphate												
Alkalinity												
Turbidity Meter or Secchi Disk												
Other												
Other												
Other												
Biological Index												

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Temperature												
Ph												
Dissolved Oxygen												
Settleable Solids												
Nitrate Nitrogen												
O-Phosphate												
Alkalinity												
Turbidity Meter or Secchi Disk												
Other												
Other												
Other												
Biological Index												

Chemical Monitoring Directions

Settleable Solids

1. Fill Imhoff cone to 1 litter mark. Set aside and wait 45 minutes.
2. Take direct reading in ppm (mg/l) from scale on side of cone.

Dissolved Oxygen

1. Carefully collect the water sample into the glass water sampling bottle, avoiding trapping air bubbles or bubbling air into the sample (which may add dissolved oxygen).***ADD THE REAGENTS HOLDING THE BOTTLES VERTICAL***
2. Add the next two reagents in quick succession. Add 8 drops of Manganous Sulfate Solution and 8drops of Alkaline Potassium Iodide Azide to the sample. Cap the sample and invert several times. Wait until the precipitate settles below the neck of the bottle before proceeding.
3. Next, add 8 drops of Sulfuric Acid 1:1. Cap and gently shake until the precipitate dissolves. The solution is now 'fixed' and may range in color from yellow to orange brown. ***Fixed Solution* -** Contact between the water sample and the atmosphere will not affect the test result because the dissolved oxygen has been bound into solution and no more oxygen will dissolve into the sample and no dissolved oxygen can be lost from the sample.
4. Place 20 mL of the fixed sample into the glass titration tube.

TITRATION STEPS * SWIRL AFTER EACH DROP IS ADDED *

5. Fill the titrator (small syringe) with Sodium Thiosulfate. Make sure no bubbles are in the titrator. Place the titrator into the hole in the cap of the glass titration vial or depending on, which kit is used, hold the eye dropper above the fixed sample.
6. Slowly add Sodium Thiosulfate from the titrator into the sample. Continue one drop at a time until the solution turns a pale straw color.**Hint-High light intensity degrades Sodium Thiosulfate - do not allow bottle to be exposed to the sun for long periods of time.**
7. Remove the titrator cap and syringe CAREFULLY so as not to lose any of the Sodium Thiosulfate (you will continue titrating in step 9).
8. Add 8 drops of Starch Solution to the titration vial that is holding the sample. The sample will turn dark blue.
9. Continue titrating with Sodium Thiosulfate **ONE DROP AT A TIME** until the solution turns from blue to clear.
10. Read the amount of dissolved oxygen in your sample directly from the syringe (direct reading titrator). Tick marks are in 0.2 ppm. Use the tip of the syringe plunger for dissolved oxygen value.

Temperature

1. Air temperature - place thermometer in shady area and record temperature after reading stabilizes. Record temperature as °C.
2. Water temperature - take the temperature reading of the water in the shade. It is best to take the temperature reading directly in the stream, but if you can not, place thermometer directly into a bucket of sample water (in the shade) and record temperature. Take reading after temperature has stabilized (about 2 minutes). Record temperature as ^{3}C.

pH

1. Fill test tube to the 5 mL line of the glass tube.
2. Add 10 drops of the pH wide range indicator (holding indicator bottle vertical). Cap and gently invert the sample several times to ensure mixing.
3. Use the color comparator box to determine pH.

Alkalinity

1. Fill titration tube to 5 mL line with water sample.
2. Add one Phenolphthalein indicator tablet/pillow into the sample. If the sample doesn=t turn red, the phenolphthalein alkalinity is zero (Skip to step 4). If sample turns red, proceed to step 3.

3. If the water becomes pink, add Sulfuric Acid Standard Solution (or the Alkalinity Titration Reagent B) drop wise, counting drops, until the water becomes colorless. Test result is read where plunger tip is located at the Titrator scale (on the syringe) in ppm.
4. Add one Bromcresol Green-Methyl Red (BCG-MR) tablet to the sample and swirl to mix.
5. Using syringe, begin titrating Sulfuric Acid Standard Solution (or Alkalinity Titration Reagent B) drop wise, counting drops and swirling the sample, until the solution flashes pink and holds purple color for at least 30 seconds (the end point). If no color change occurs after the titrator is emptied, refill and continue the titration, keeping track of the amount added.
6. Once this endpoint is reached, the alkalinity is calculated. The test result is read in ppm where plunger tip is located at the titrator scale (on the syringe).

Phosphate

1. Fill 3 test tubes (one sample and two blanks) to the 10 mL mark with sample water. Place in axial reader.
2. Using 1.0 mL pipet add 1.0 mL of Phosphate Acid Reagent to sample test tube. Cap and mix
3. Use 0.1 g spoon to add one level measure of Phosphate Reducing Reagent to sample test tube. Cap and mix until dissolved.
4. Wait 5 minutes.
5. Remove cap from test tube. Place test tube in comparator with axial reader. For accurate readings, fill 2 extra test tubes with sample water and place to the left and right of test tube sample. Insert ampole in Octet Comparator in square hole in front of test tube sample. Slide axial reader up or down to match sample color to a color standard. (Check diagram to the right.)

Nitrate Nitrogen

1. Fill test tube to 5 mL mark with water sample.
2. Add one nitrate #1 tablet. Cap and mix until tablet disintegrates.
3. Add one nitrate #2 CTA tablet. Cap and mix until tablet disintegrates.
4. Wait 5 minutes.
5. Insert nitrate nitrogen Octa-slide bar into Octa-Slide viewer. Insert test tube into Octa-Slide viewer. Match sample color to color standard. Record as parts ppm Nitrate Nitrogen. (To convert to Nitrate, multiply results by 4.4. Record as ppm nitrate.)

Salinity

To conduct the salinity titration, only a small amount of sample water is actually needed.

1. Fill the titration vial to the line with Demineralized water from the Demineralizer bottle. Be as precise as you can.
2. Using the pipette that ranges from 0 to 1.0, fill the pipette with sample water to the zero mark (volume = 1.0 mL). Wipe off any excess sample water from the pipette tip. Insert pipette into titration vial.
3. Add only 0.5mL of the sample water from the pipette (from the zero mark to the 0.5 mark). Remove pipette from vial and lay pipette aside.
4. Remove top from titration vial, and add 3 drops of the yellow-colored chromate indicator reagent; replace titration vial cap, and mix well.
5. Fill the other pipette (that ranges from 0-20) with Silver Nitrate titration reagent. (NOTE: Silver nitrate is clear, but when it dries, it leaves a dark brown or black stain. You might notice such spots on your hands and fingers and possibly clothes if not wearing gloves).
6. Place pipette in top of titration vial. Add silver nitrate solution one drop at a time, with plenty of swirl mixing after each drop. The end-point will be when the yellow solution turns orange and stays orange.
7. When the end point is reached, read the pipette to determine the volume of silver nitrate added. NOTE that the pipette “numbers” are in twos, and thus each small hash mark between numbers represent 0.4. The volume of silver nitrate added equals the numerical value of the salinity (in ppt).

Secchi Disk

The Secchi disk is a disk 20 centimeters in diameter with black and white quadrants (or solid white).

1. Attached to a calibrated line, the disk is lowered into the water until it just disappears from sight.
2. The depth (distance from disk to the surface of the water) is noted and the disk is slowly raised until it reappears.
3. The depth is noted again and the average of the two readings is recorded as “Secchi Depth,” usually measured in meters. It the Secchi disk reaches the bottom before disappearing, the Secchi Depth is greater than the water depth and cannot be accurately measured. When this occurs, a notation must be added to the Secchi Depth reading in your data.

How To Make A Kick Seine

For collecting macroinvertebrates (courtesy of the Tennessee Valley Authority)

Materials:
• 3 foot by 3-foot piece of nylon or metal window screening

• 4 strips of heavy canvas (6 inches by 36 inches)

• 2 broom handles or wooden dowels (5 or 6 feet long)

• finishing nails

• thread

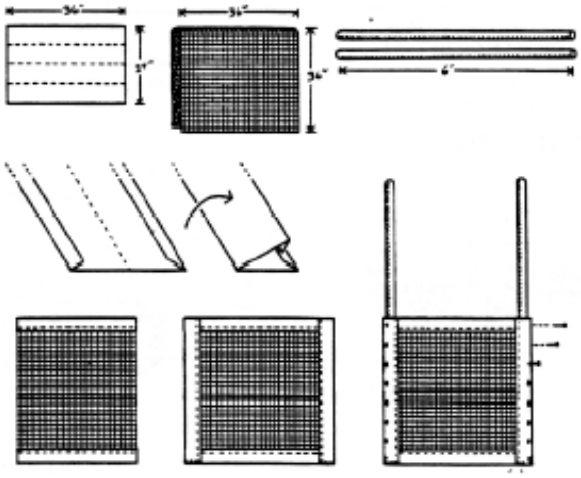
• sewing machine

• hammer

• iron and ironing board

Procedure:
1. Fold edges of canvas strips under, 1/2 inch, and press with iron.
2. Sew 2 strips at top and bottom and then use other 2 strips to make casings for broom handles or dowels on left and right sides. Sew bottom of casings shut.
3. Insert broom handles or dowels into casings and nail into place with finishing nails.

Speed method:
1. Lay 3 foot by 3-foot piece of screening over broom handles.
2. Staple or nail screen to broom handles.



Wetland Identification and Monitoring

Major Categories	General Location	Wetland Types
Coastal Wetlands		
Marine (undiluted salt water)	Open Coast	Shrub wetland, salt marsh, mangrove swamp
Estuarine (salt/freshwater mix)	Estuaries (deltas, lagoons)	Brackish marsh, shrub wetland, salt marsh, mangrove swamp
Inland Wetlands		
Riverine (associated with rivers & streams)	River channels & flood plains	Bottomlands, freshwater marsh, delta marsh
Lacustrine (associated with lakes)	Lakes & deltas	Freshwater marsh, shrub and forest wetlands
Palustrine (shallow ponds & freshwater wetlands)	Ponds, peatlands, uplands, groundwater seeps	Ephemeral ponds, tundra peatland, groundwater spring oasis, bogs

Classification system developed by Cowardin (1979) and used by U.S. Fish and Wildlife Service

Wetland Functions and Values

Now that you have determined the broad classification of your adopted wetland, ask yourself, "Just how important is this ecosystem?" Wetlands of any size have values and functions, which are beneficial to human society or are of intrinsic importance. Wetland **functions** are those processes that occur in a wetland system irrespective of human activity. Depending on the wetland type, functions include floodwater storage, erosion control, water purification, sediment trapping, chemical and organic waste processing, nutrient removal, groundwater discharge and recharge, and animal and plant habitat. These characteristics will continue to occur regardless of man's presence. Wetland **values** are those ecosystem processes that are perceived to have a positive impact on people. Values may change over time as the perception of human society changes over time. Wetland values and resources for humans may include food, fuel, timber and fiber harvest, recreation, aesthetics, and education. Of course, wetland functions can and should be "valued" by society, but that is not always the case.

Check off the Functions and Values of your wetland on the following chart. You may have to do a little research into local history and uses of your wetland to complete the chart. Consider how the community generally regards your wetland area. Remember, not all functions are necessarily values and vice versa!

Rank the characteristics from 1 - 5 (with 5 being the most important) to get an idea of which functions and values are considered more important. Photocopy the following chart and try to rank the functions and values of your wetland once a year.

Wetland Characteristic	*Wetland Function?*	*Value To Your Community?*
Recreational Values _ hunting permitted? _ fishing for food or sport? _ nature trails or wildlife observation points?		
Fish, Wildlife and Plant Habitat _ wetland in migratory bird pathway? _ nesting of birds in wetland? _ habitat for mammal, birds, fish, amphibians and reptiles?		
Intrinsic _ only "natural" or green area in community? _ site for scientific research? _ habitat for endangered or threatened species?		
Economic _ timber, fish, shellfish production? _ tourist attraction? _ timber or vegetation harvested?		
Educational _ nature preserve or county park? _ nature center or interpretive trail? _ historical artifacts in or around wetland?		
Flood Storage _ located in headwaters of the watershed? _ downstream in watershed? _ is it a riverine wetland? _ large enough to store and diminish flood waters?		
Groundwater Recharge and Discharge _ recharge for community's drinking water supply? _ does the community rely heavily on groundwater for water supply?		
Erosion Control: Channel and Shoreline _ does a prominent river of stream run through the community? _ wetland associated with river, coast or lake?		
Water Purification: Surface and Groundwater _ filter runoff water and release clean water? _ trap polluted runoff or excess nutrients?		

Visual Survey Form

Use this form to record important information about vegetation, soils, and hydrology in your wetland.

Wetland Name: **Group Name:**

Site Number: **Members Present:**

Date: **County:**

Weather Conditions: (circle one)

Clear Cloudy Rain Rain within last 24 to 48 hours?

Visual Survey

Water Source: ____ Precipitation ____ Groundwater ____ Stream/river /lake ____ Coastal ____ Other _____

Name of associated river/stream/lake: _____

Name General Wetland Classification: _____

Circle type of system

Open System	Close System

Surface Water Appearance:

___ clear
___ muddy
___ oily
___ foamy
___ scum
___ milky / gray
___ green
___ brown
___ black
___ other: _____

Odor:

___ none
___ natural
___ gasoline or oil
___ chlorine
___ rotten eggs
___ sewage
___ chemical
___ other: _____

Wetland Buffer: (within 25 ft. from wetland)	**Excellent**	**Good**	**Fair**	**Poor**
Natural Vegetative	_____	_____	_____	_____
Cover	_____	_____	_____	_____
Bank Stable- no erosion	_____	_____	_____	_____
Undisturbed land	_____	_____	_____	_____

Impacts To Wetland:

_____ Artificial water control (dam, dyke, etc)
_____ Eroded banks
_____ Dredging
_____ Algal blooms (Indicates nutrients)
_____ Dumping of sand, dirt, gravel
_____ Trash
_____ Clearing of vegetation
_____ Other:

Transect Locations

Location of transect upland point _____

Length of transect _____ ft.

Compass bearing along transect _____ (degrees)

Numbers of stations along transect _____

Location of transect wetland point _____

Vegetation Survey

At each sampling station, look at the area within a 5 foot radius from the point along your transect. Identify the 3 dominant species in each layer. Record species name (cypress, red maple, lizard tail, cattail, etc.) and wetland indicator status (obligate, FacWet, Fac, Upland) if known.

Layers	Station 1	Station 2	Station 3
Tree			
Shrub			
Herbaceous Layer			

Vegetation **Survey**

Layers	Station 4	Station 5	Station 6
Tree			
Shrub			
Herbaceous Layer			

How many plant communities (obvious changes in vegetation) do you see along your transect?

Soil Survey Form

To collect your soil sample, use a spade or small shovel to dig an 18-inch-deep hole at each transect station. Using the soil color chart, determine the representative color of the soil at each transect (including upland areas). Fill in your observations in the following table:

	Station 1	Station 2	Station 3
Color (from Color Chart)			
Smell			
Degree of wetness (wet, damp, dry)			
Texture (clay, sandy, sticky)			

Soil Survey Form

	Station 1	Station 2	Station 3
Color (from Color Chart)			
Smell			
Degree of wetness (wet, damp, dry)			
Texture (clay, sandy, sticky)			

Observations of wetland soil:
Are there any defined layers to the wetland soil? If so, describe.

Is there mottling (concentrated areas of red or yellow soil)?

How deep do the plant roots go? _____(Inches)
Is there standing water in the hole? _____How many inches to the surface? _____(Inches)
What organisms are living in the soil?

From *A World in Our Backyard*, with permission through the GA, Adopt a Stream Program

Hydrology Survey Form

Name of Wetland: _____

Date: _____

Answer the following questions. Depending on the time of year, precipitation amounts, and various other factors, a wetland may appear dry.

	Station 1	Station 2	Station 3
Depth of surface Water			
If no surface water, is water filling the hole?			
Surface Water Movement (slow, fast, none)			
If no water, name hydrology indicators (water marks, drift lines, sediment deposits, water stained leaves, drainage patterns)			
	Station 4	Station 5	Station 6
Depth of surface Water			
If no surface water, is water filling the hole?			
Surface Water Movement (slow,fast, none)			
If no water, name hydrology indicators (water marks, drift lines, sediment deposits, water stained leaves, drainage patterns)			