

**Antietam-Conococheague Watershed Alliance \ Beaver Creek
Watershed Association**

Citizen Science Information Packet

2020

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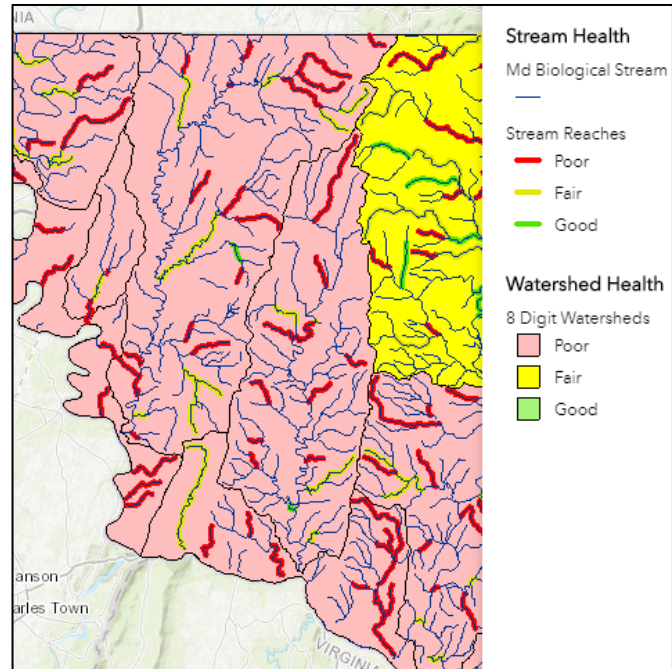
acwamaryland.org

www.beavercreekwatershedassociation-md.org/

Background Information and Website References

For more information about Stream and Watershed Health:

- MD DNR Stream Health Interactive Map <https://geodata.md.gov/streamhealth/>

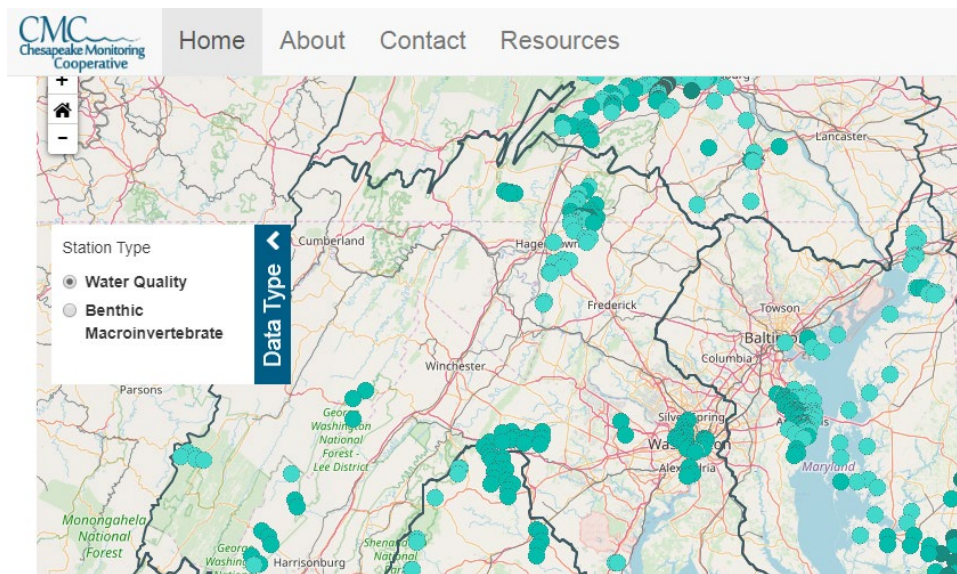


Where to learn more about sampling methods, QA procedures, and other info about volunteer monitoring:

- Chesapeake Monitoring Cooperative (CMC) <https://www.chesapeakemonitoringcoop.org/>

Where to find our data online:

- CMC Data Explorer <https://www.chesapeakemonitoringcoop.org/services/chesapeake-data-explorer/>



Benthic Macroinvertebrates: many, many fun and informative resources and keys online.

Volunteer Monitor Info from CMC

1 Safety, Equipment List, and Volunteer Responsibilities

1.1 Safety – General Precautions

- a) Always perform water-monitoring activities under the guidance of an adult.
- b) Read all instructions to familiarize yourself with the test procedure before you begin. Note any precautions in the instructions.
- c) Keep all equipment and chemicals out of the reach of young children and pets.
- d) Avoid contact between chemicals and skin, eyes, nose and mouth.
- e) Read the label on each reagent container prior to use. Some containers include precautionary notices or antidote information on the back of the container.
- f) In the event of an accident or suspected poisoning, immediately call the Poison Control Center phone number in the front of your local telephone directory or call your physician. Be prepared to give the name of the reagent in question and its code number. Most kit reagents are registered with POISINDEX, a computerized poison control information system available to all local poison control centers.

1.2 Protect Yourself & Your Equipment: Use Proper Technique

- a) Wear safety goggles or glasses when handling reagent chemicals.
- b) Use the test tube caps or stoppers, not your fingers, to cover test tubes during shaking or mixing.
- c) When dispensing a reagent from a plastic squeeze bottle, hold the bottle vertically upside-down (not at an angle) and gently squeeze it (if a gentle squeeze does not suffice, the dispensing cap or plug may be clogged).
- d) Wipe up any reagent spills, liquid or powder, as soon as they occur. Rinse area with a wet sponge, and then dry.
- e) Thoroughly rinse test tubes before and after each test. Dry your hands and the outside of the tubes.
- f) Tightly close all reagent containers immediately after use. Do not interchange caps from different containers.

- g) Avoid prolonged exposure of equipment and reagents to direct sunlight. Protect them from extremely high temperatures. Protect them from freezing.

THINGS TO WEAR OR BRING WITH YOU:

- Sturdy shoes or boots.
- Knee boots \ waders (if you are willing to access the water)
- Drinking water
- Snacks
- Sunscreen and bug repellent
- Change of clothes in your car (in case you slip and get wet\muddy)
- Towel in car – just in case!
- Hat (for sun or cold protection)

1.3 Monitor Responsibilities (Team Leaders)

Choose a regular sampling day: Choose a convenient day of the week for sampling. Samples should be taken at regular weekly or monthly intervals. If it is not possible to sample on the same day each week, try to sample within 2 days (either side) of your regular day spacing the sampling dates, 5 to 9 days apart. Sample at the same time of day each week; if you are sampling multiple locations, be sure to always sample your sites in the same order each monitoring run to achieve similar sample timing.

Record your test results: Record data on a data collection form provided. Always record the test results as you go along. Keep a copy of the data collected for your records and to provide a backup copy should the original be lost.

Provide comments as necessary: The "Comments" section can be used to record general observations about the site especially changes due to erosion, recent notable weather, and any problems you had with the sampling procedures.

Submit data to database: If you have access to the internet, submit your data to the project's online database.

Send datasheets once every three months. Mail the data sheets to the Alliance or your Watershed Coordinator every three months so that we can maintain a current database.

Stay certified: Attend a recertification session every other year to maintain your skills and learn new information and techniques. You can also attend any training session to refresh yourself of the concepts and procedures between re-certifications.

2.0 Water Quality Fact Sheets

From



https://www.chesapeakemonitoringcoop.org/wp-content/uploads/2018/08/Temperature_factsheet_final.pdf

- [Bacteria](#)
- [Conductivity & TDS](#)
- [Dissolved Oxygen](#)
- [Nitrogen](#)
- [pH](#)
- [Phosphorus](#)
- [Temperature](#)
- [Total Water Depth](#)
- [Water Clarity & Turbidity](#)

3 Field Sampling Procedures

3.1 Best Practices

- a) Use of protective gloves. Gloves serve a dual purpose: 1) protecting the sample collector from potential exposure to sample constituents and 2) minimizing accidental contamination of samples by the collector. Wearing protective gloves at all times while sampling is recommended. Latex or nitrile gloves may be used for common sampling conditions.
- b) Safety always comes first. All sampling should be conducted with the proper equipment and least amount of danger to field personnel.
- c) Permission must be obtained from landowners before entering private property.
- d) Care should be taken not to disturb the bottom when sampling. When entering a stream, always walk in an upstream direction.
- e) Surface water should always be collected facing upstream and in the center of main area of flow. Therefore, unless safety is an issue, samples should be obtained from a bridge or instream.
- f) Samples should be collected in the main flow representative of the stream you are monitoring (for small streams, this is usually mid-channel) just below the water surface, about 0.3 meters (1 foot) deep.
- g) Whenever possible, collect field measurements directly from the sample site, not from bucket. If the field parameters need to be measured in the bucket, collect water quality samples (nutrients, etc.) first before placing the multi probe instrument in the bucket.
- h) When there are obvious standing pools of water during low or no flow conditions, do not collect samples or field measurements. Make a note of this on the data sheet.

3.2 Electronic Meters\Probes

Temperature

We have two pieces of equipment that can measure temperature. The HANNA records in Fahrenheit; YSI records in Celsius. Be sure to record the units you are measuring.

Method Description (Surface Sampling):

1. Ensure your equipment has been calibrated as per CMC QA manual (for temp once/year)
2. Place your probe or thermometer 0.3 m beneath the surface of the water
3. Wait for the probe or thermometer to stabilize
4. Record your reading



Dissolved Oxygen

We use a YSI probe to measure Dissolved Oxygen. Readings are recorded in mg/L

Method Description:

1. Ensure your equipment has been calibrated per CMC QA manual each day prior to taking measurements.
2. Place your probe 0.3 m beneath the surface of the water
3. Wait for the probe to stabilize, and then record your reading

pH

We use a HANNA probe to measure pH. ***IMPORTANT NOTE***- When traveling to a sample station, keep the probe tip stored in the protective cap. This will keep the glass sensor hydrated.

Method Description:

1. Ensure your equipment has been calibrated per CMC QA manual each day prior to taking measurements.
2. Turn the probe on.
3. Dip the electrode about 2 to 3 cm either directly into the water or in your sampling bucket. Let the reading stabilize. This may take about 2 to 3 minutes.
4. Once the reading has stabilized record the reading on your datasheet.
5. Turn off the probe and replace the protective cap.



Measure salinity, conductivity & TDS

We have a digital Tracer PocketTester to measure these parameters. The font is very small on this meter. Only the tip of the meter should be submersed under water.

1. Ensure your equipment has been calibrated per CMC QA manual each day prior to taking measurements.
2. Prior to sampling, rinse the probe with deionized or distilled water.
3. Select the appropriate mode (and range) on the meter.
4. Place the probe into the sample water, and read the salinity, conductivity or TDS of the water sample on the meter's scale.

3.3 “Laboratory” Testing

Bacteria (Coliscan Easygel Kit)

Method Description:

Note the amount of rainfall within 48 hours prior to sampling and record in the bacteria section of the datasheet.

Collecting by wading:

1. Wade into the main flow of the stream
2. Take a few steps upstream with minimal disturbance;
3. Un-cap the sterile and pre-labeled bottle without touching the inside of the lid.
4. Do not rinse the bottle. Be sure any sediment or debris disturbed from your movement in the streambed is not present where you will collect the sample
5. Using a U motion dip the bottle into the water down and away from yourself allowing the bottle to fill $\frac{3}{4}$ full.
6. Cap the bottle and place sample on ice in cooler immediately (cooler temperature should be 1°C to 4°C. NOTE: Do not freeze your sample.

3.4 Field Test Kits

Water Clarity (Turbidity)

We use turbidity tubes – one for stream water, the other for clean water (tap or bottled is fine).

Method description:

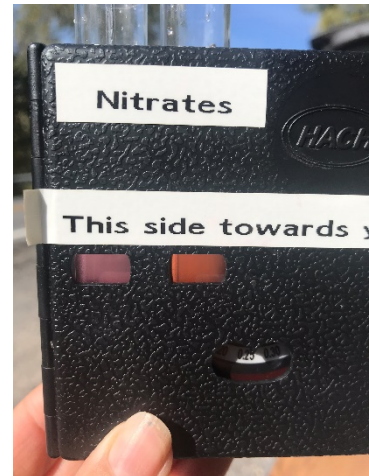
This test is performed by comparing the turbidity of a measured amount of the sample with an identical amount of turbidity-free water containing a measured amount of standardized turbidity reagent. The readings are made by looking down through the column of liquid at a black dot. If turbidity is present, it will interfere with the passage of light through the column of liquid. Small amounts of turbidity will cause a “blurring” of the black dot in the bottom of the tube. Large amounts of turbidity may provide sufficient “cloudiness” so that it is not possible to see the black dot when looking down through the column. Any color that may be present in the sample should be disregarded. This determination is concerned only with the haziness or cloudy nature of the sample.

Nitrates (Nitrogen, Nitrate - As NO₃—N)

We use a HACH kit: NI-14 which is a chemical test with results compared to a color wheel. Test takes ~15 minutes.

Method description:

- Rinse the tubes with sample before the test. Rinse the tubes with deionized water after the test.
- Follow the steps on the method card.
- Hold the color comparator box in front of a light source. Turn the color disc to find the color match.
- If the color match is between two segments, use the value that is in the middle of the two segments.
- Undissolved reagent does not have an effect on test accuracy.
- To record the test result as mg/L nitrate (NO₃—), multiply the test result by 4.4.



Orthophosphates

We use a HACH kit: PO-19 which is a chemical test with results compared to a color wheel. The test takes ~10 minutes.

Method description:

- Rinse the tubes with sample before the test. Rinse the tubes with deionized water after the test.
- Follow the steps on the method card.
- Hold the color comparator box in front of a light source. Turn the color disc to find the color match.
- Undissolved reagent does not have an effect on test accuracy
- samples that contain turbidity should be filtered first. (Consult Team Leader)
- Read the value in the scale window. Divide the value by 50 to get the result in mg/L



ACWA Water Quality Field Data Sheet

Site Name & # _____ Stream Name: _____

Date: ___/___/___ Time(military) _____ Rainfall (mm last 48 hrs) _____

Sampler\Monitors Names: _____

Weather Conditions: Drizzle, Fog/haze, Intermittent rain, Overcast, Partly cloudy, Rain, Snow, Sunny

Parameter	Method Use	Enter Value or Circle Observation		
Stream Flow	Visual Observation	Low / Normal / High / Dry		
Stream Depth (M)				
Water Color	Visual Observation	Clear / Milky / Muddy / sheen / Oil slick / Other		
	Equip Cal Date:			
		1st reading	Duplicate	
Air Temp (°C)	Digital / Probe			
Water Temp (° F)	Digital / Probe			
Dissolved Oxygen (mg/L)	Probe: YSIPro20i			
pH	Probe: HANNA			
Conductivity (uS/cm)	Digital: Tracer PockeTester			
TDS (mg/L or ppm)	Digital: Tracer PockeTester			
Turbidity (JTU)	Turbidity tubes			
Orthophosphates (mg/L)	Hach PO-19 kit	/50	/50	
Nitrate (mg/L)	Hach NI-14 kit	*4.4	*4.4	
Coliform	Coliscan Easygel	Sample Collected: Y / N		
	At lab:	Enter sample size plated (ml):		
	Count after incubation:	# colonies	Sample Result # colonies * (ml plated/100)	
	Fecal coliform colonies counted:			

Other Notes:

4.0 Benthic Macroinvertebrates

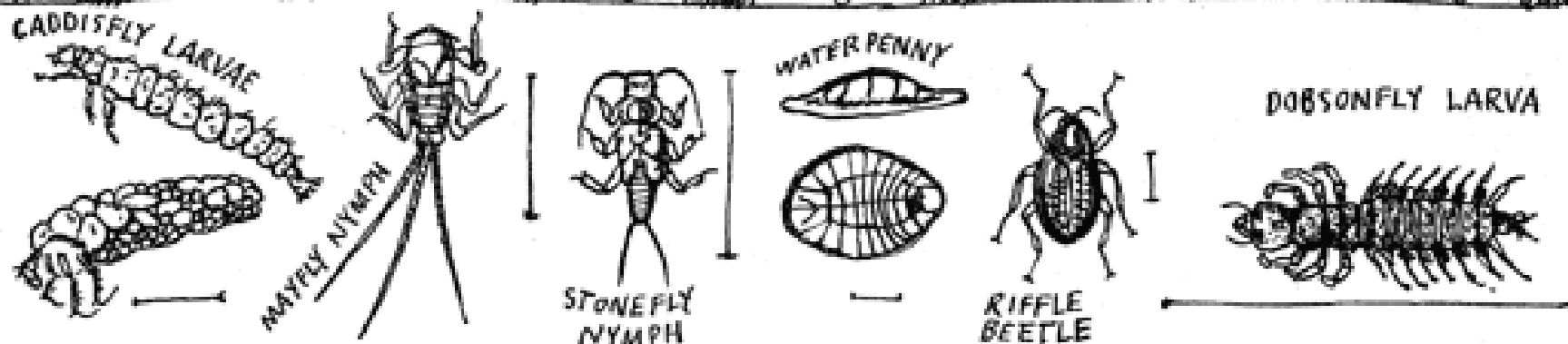
We collect aquatic insects (benthic macroinvertebrates) for two different departments\programs in Maryland Department of Natural Resources:

- 1) Fishing and Boating Services and
- 2) Stream Waders.

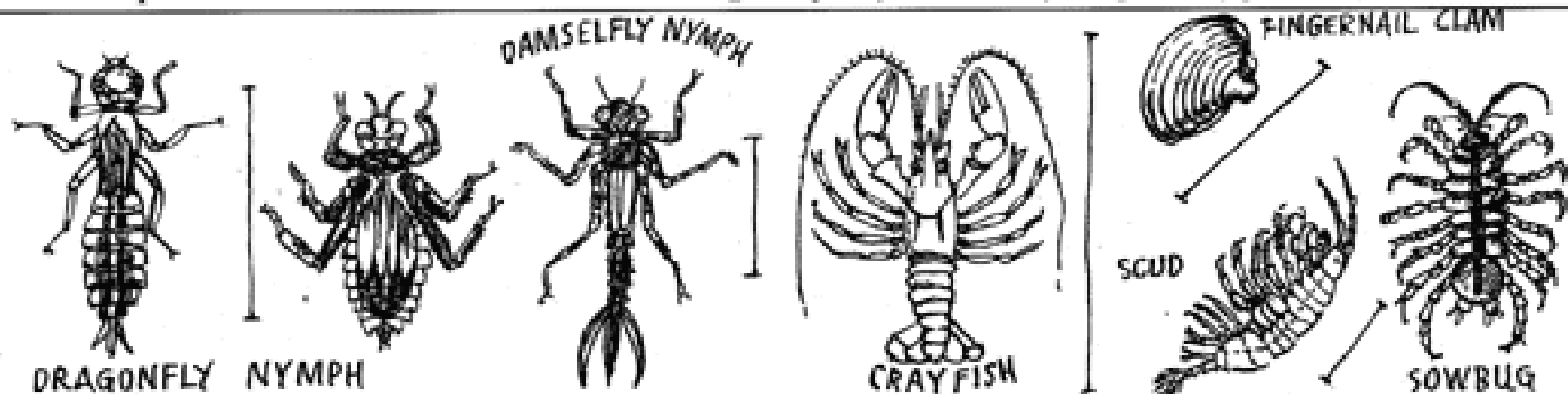
Each program has their own method to sample and send in insects, as well as field sheet to complete. Your “benthic” team leader will instruct you which method you will use at each site.

We do not need to identify the insects, but it is worthwhile getting to know species you will be looking for. The guides that follow are for your information.

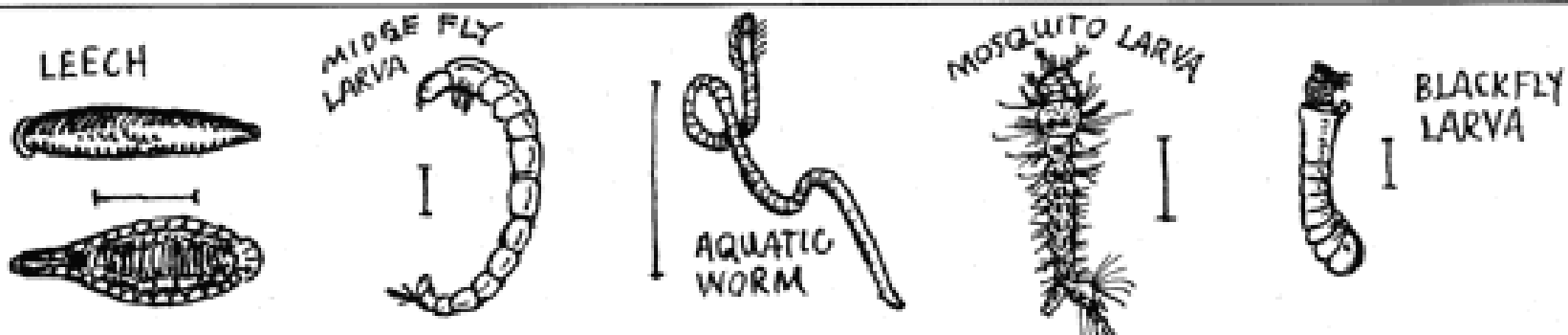
Biotic Index of Water Quality



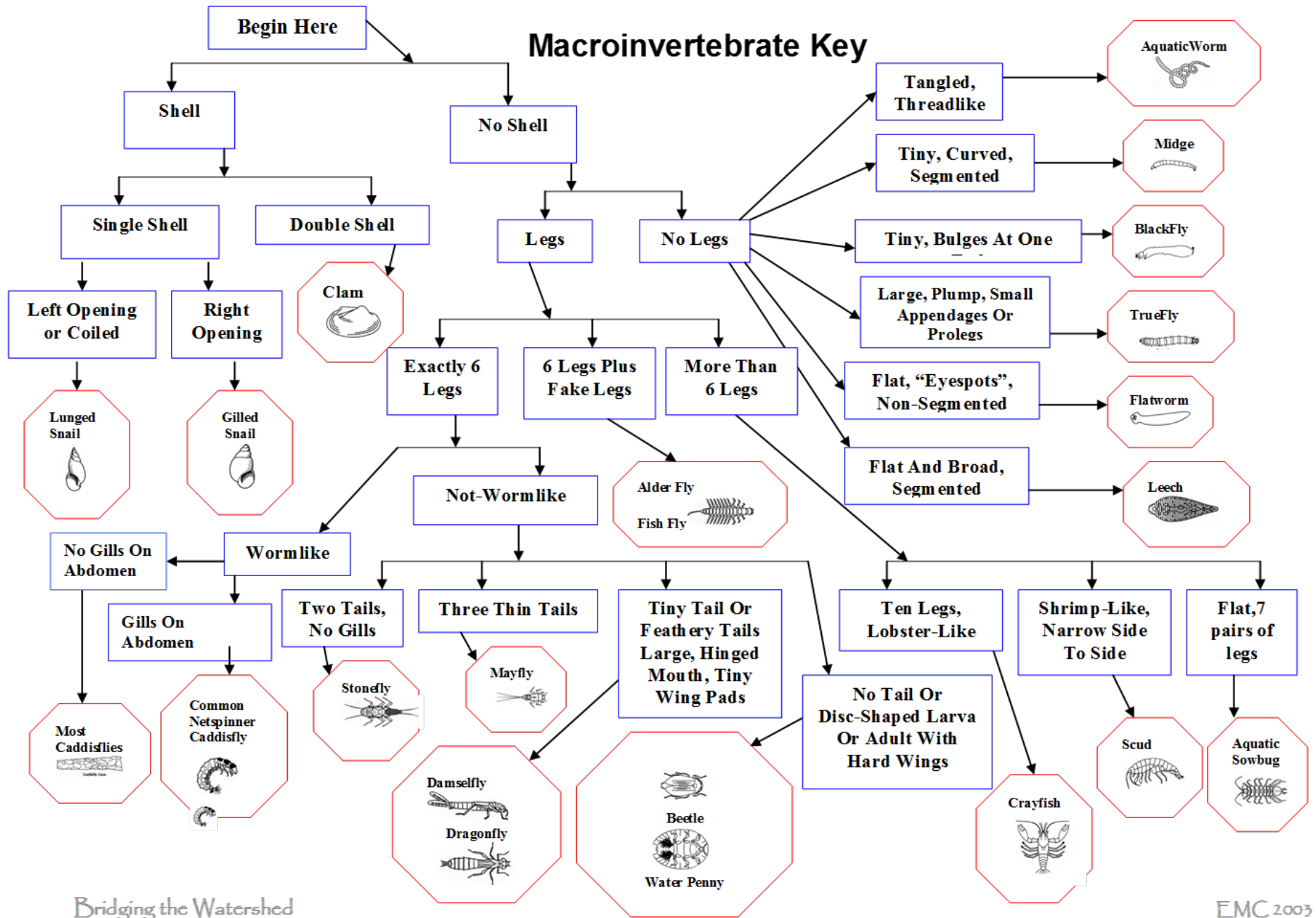
Group 1 - These benthic macroinvertebrates need good quality water. They are generally pollution intolerant.



Group 2 - These are benthic macroinvertebrates who can live in a wide range of water quality conditions.



Group 3 - These benthic macroinvertebrates can tolerate pollution and survive in poor quality water.



Notes: