

VIRGINIA SAVE OUR STREAMS

# VOLUNTEER WATER QUALITY MONITOR MANUAL


**VIRGINIA SAVE OUR STREAMS**

VASOS.org

**IZAAK WALTON LEAGUE OF AMERICA**

IWLA.org/water

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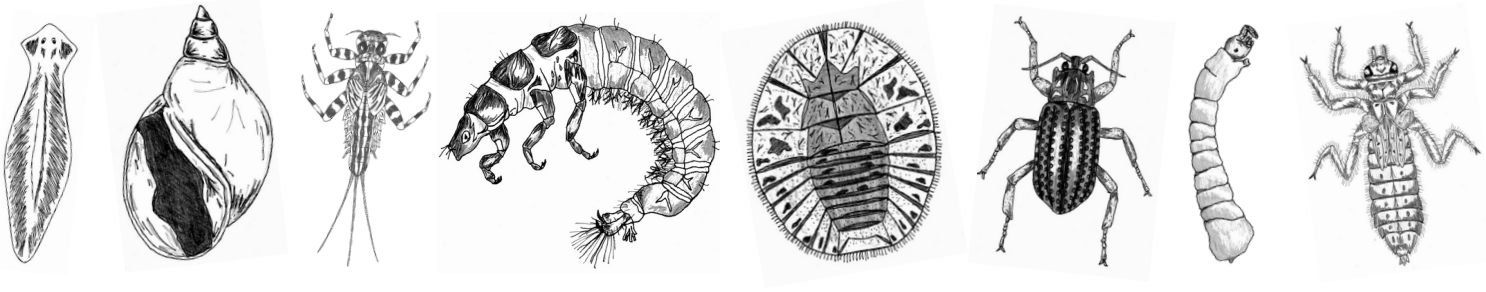
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# IWLA Overview

**The Izaak Walton League** is one of America's oldest and most successful conservation organizations. The Izaak Walton League has been at the forefront of every major clean water battle in the United States, from a decades-long push for federal water pollution control in the 1940s to efforts today to restore Clean Water Act protections for critical streams and wetlands. League leaders helped conceive the Wild and Scenic Rivers Act of 1968 and broke the political ground necessary for passage of the landmark 1972 Clean Water Act. Community members around the country use our pioneering Save Our Streams program to monitor local waterways, plan restoration projects, and report water quality problems. Today, our clean water priorities include engaging youth in the outdoors, cleaning up nonpoint source pollution, and halting the spread of invasive species.

The Izaak Walton League's **Save Our Streams program** is the only nationwide program training volunteers to protect waterways from pollution and to bring information about water quality to their communities. The program began in 1969 when water pollution problems were easy to see – like massive oil spills and burning rivers. Early Save Our Streams volunteers cleaned up trash from their local waterways and reported problems like streams becoming clogged with silt. In the 1980s, the League recognized that with the right training, volunteers could collect scientifically valid data to assess water quality in local streams – a conviction that has proven true. Ever since, the League has been teaching volunteers to study stream health and report their findings to decision-makers. Today, trained volunteer stream monitors across the country are uncovering pollution problems and urging their local leaders to take action on water quality. The work of these volunteers also creates a critical record of water quality over time, making it possible to quickly identify pollution problems that develop in the future.

# VA SOS Program Overview

## What pollutes Virginia's Waterways?

Trash, oil spills, runoff – we know there are many different toxins that can pollute our water. But where does this pollution come from, and how can we stop it? Pollution enters our freshwater from either point or nonpoint sources. Point source pollution has a clear cause you can point to, like a broken pipe. Nonpoint source pollution is harder to identify and doesn't have one clear source. Nonpoint source pollution is the most prevalent threat to water quality today.




*Point Sources versus Nonpoint Sources from Indiana County Conservation District*

How does nonpoint source pollution get into our water? Every time it rains or snows, natural and man-made pollutants on the land are washed into streams and wetlands. These pollutants include pesticides, fertilizers, metals, plastics, manure, road salt, and motor oil from farms, lawns, roads, and landfills. Eroded soil from construction zones, logging operations, and land disturbances clogs streams, and bacteria from septic tanks and animal waste runoff can make wildlife and humans sick.









## Volunteer Water Quality Monitoring

Every state in the US is required under the federal Clean Water Act to report on water quality to Congress in a 305(b) report. If a state reports that a waterway is impaired or polluted, the federal government can provide funding and other resources to help restore and protect it. Unfortunately, less than 30% of waterways in the US are monitored professionally, leaving a huge gap in knowledge of our water quality status. This is where volunteer water quality monitors come in. Because they regularly visit and monitor the same sites year after year, VA SOS volunteers are often the first ones to discover and report at-risk streams and creeks – ensuring that their site becomes a state priority.

Virginians have the right to know whether or not streams are safe for swimming, fishing, playing, and drinking. VA SOS monitors help achieve that goal by collecting water quality data in Virginia's streams and educating the public about the importance of clean water.






## Benthic Macroinvertebrate Monitoring

Hundreds of VA SOS volunteers collect stream quality data from over 300 stream sites across the state. Monitors collect, identify, and sort benthic macroinvertebrates from the stream. By identifying which macroinvertebrates live in a local stream, volunteers can calculate a stream health score.

# Aquatic Benthic Macroinvertebrates

The macroinvertebrates we collect in the VA SOS program are animals that are:

- **AQUATIC** - live in water
- **BENTHIC** - bottom dwelling
- **MACRO** - large enough to see without magnification
- **INVERTEBRATES** - do not have a backbone, such as crustaceans, insect larvae, and worms






Macroinvertebrates are monitored to assess the water quality conditions in a stream. Macroinvertebrates spend much or all of their life in a stream, and the number and diversity of organisms living in the stream are influenced by:

1. the quality of the water
2. the availability and condition of in-stream habitat

Macroinvertebrate populations are threatened by chemical and thermal pollution, sedimentation, and habitat loss. Different types of macroinvertebrates tolerate different levels of pollution and stream conditions – some are tolerant to poor conditions and others are highly sensitive. Healthy streams have an abundant and diverse macroinvertebrate population, which contributes to a healthy ecosystem. Macroinvertebrates are most abundant in riffles (areas of fast-moving water), where oxygen is more plentiful or in areas around banks or in-stream structures that provide more protection.

**By collecting, counting, and identifying macroinvertebrates we can calculate a stream health score.**

## Quality Assurance Project Plans

VA SOS has QAPP's with VA DEQ and the Chesapeake Bay Program that establishes the quality of our methods and data. By certifying in and following VA SOS protocols, the data you collect is considered reliable and useful to these agencies. The VA SOS program utilizes two different benthic macroinvertebrate collection protocols depending on stream type:

- **Rocky Bottom**



- **Muddy Bottom**



## Data Use

Data collected by certified VA SOS monitors are accepted at the **Tier 2 level by VA DEQ**. This means that they will use your findings to:

- Track progress towards the restoration of waters
- Put an unacceptable site on DEQ priority list
- Target waters for future DEQ monitoring
- Educate land-owners on the water quality impacts of land use activities

**Data is quality assured and sent to DEQ at the start of each calendar year.**



# Chesapeake Monitoring Cooperative (CMC)

The CMC connects water quality monitoring initiatives across the region in order to amplify voices and enhance our understanding of the Chesapeake Bay Watershed. To accomplish this, we provide technical, programmatic, and outreach support in order to integrate volunteer-based water quality and macroinvertebrate monitoring data into a centralized data hub, the Chesapeake Data Explorer. These data are publicly available and used by the Chesapeake Bay Program to assess the health of the Chesapeake Bay and watershed. Through the CMC, SOS data collected within the Chesapeake Bay watershed will also be sent to the Chesapeake Bay Program.

Chesapeake Bay Program
Science. Restoration. Partnership.

Chesapeake Monitoring Cooperative

## CMC Partners

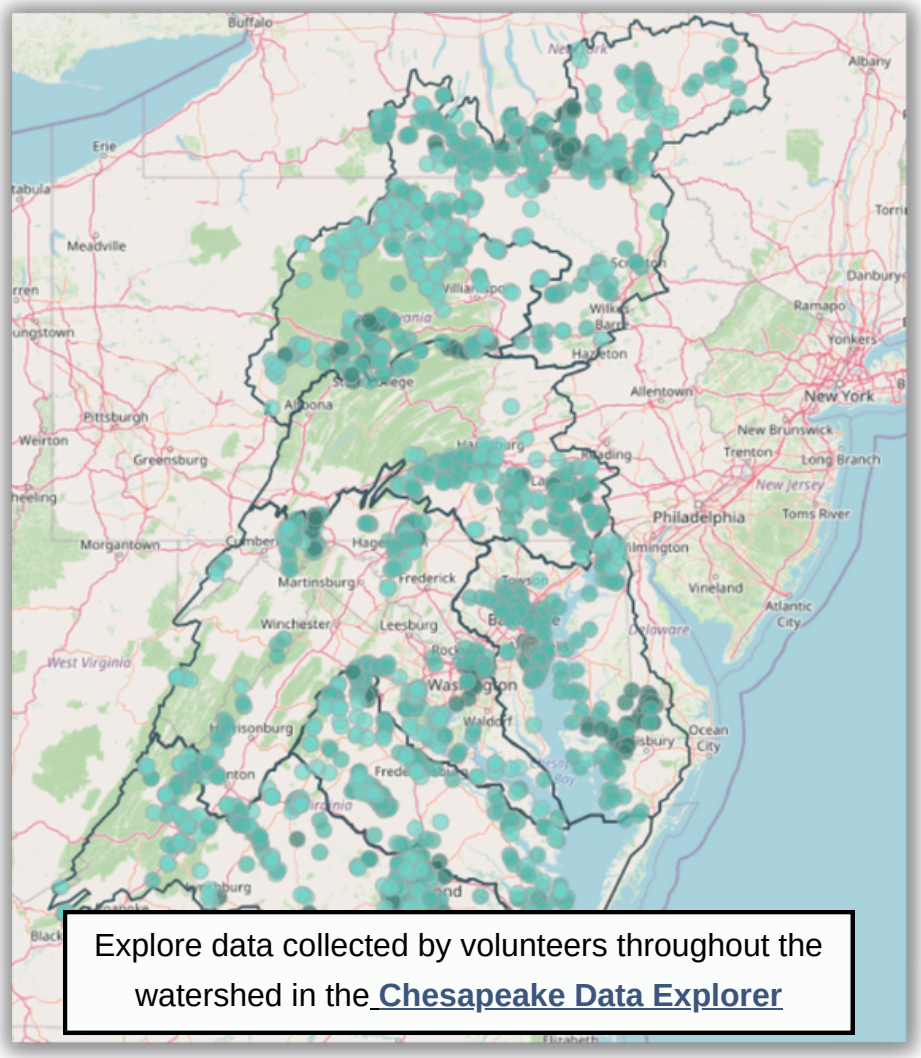
The Izaak Walton League of America

ALLIANCE for the Chesapeake Bay

Alliance for Aquatic Resource Monitoring ALLARM est. 1986

University of Maryland
Center for Environmental Science
Integration and Application Network

VIMS
Virginia Institute of Marine Science




Explore data collected by volunteers throughout the watershed in the Chesapeake Data Explorer

# VA SOS Certification

By successfully completing all requirements of the Virginia Save Our Streams Quality Assurance and Quality Control Program, we are able to ensure that the data you collect are reliable and meet the standards of the Izaak Walton League of America, the Virginia Department of Environmental Quality, and the Chesapeake Bay Program.




1. Complete Macroinvertebrate and Water Quality Training
2. Attend a Field Protocol Training
3. Pass Protocol Exams
4. Receive Certificate and Start Monitoring!

## Maintaining VA SOS Monitor Certification

Monitors must submit data at least **once every 2 years** in order to maintain active certification. To ensure monitors get credit for monitoring, **be sure to list all certified monitors on your data submissions**. If your certification lapses, you will need to recertify.

# Volunteer Pledge

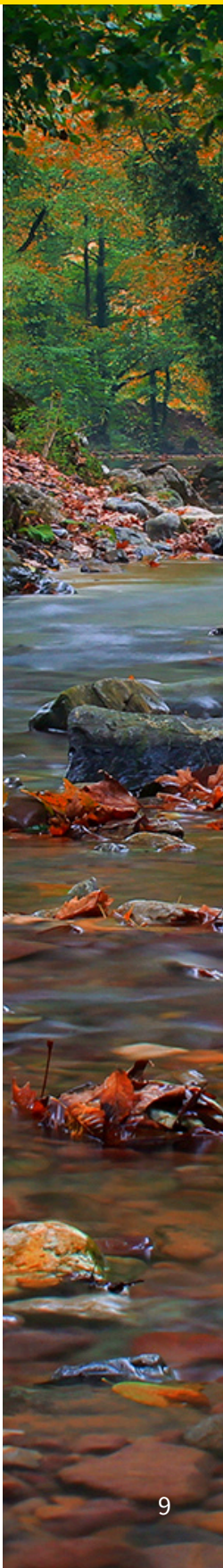
As a Save Our Streams monitor, I pledge to:

- Collect and submit stream health data so that it may be shared with my community, government officials and agencies, and stakeholders.
- Monitor consistently to establish a reliable timeline of my stream's health.
- Follow sampling and identification protocol to produce the highest quality data possible.
- Ensure the safety of myself and my team whenever sampling in the field.
- Respect landowners and always ask for permission before accessing private land for monitoring.
- Respect sampling sites by minimizing physical impact on wildlife habitat.
- Carry a copy of a state permit for monitoring during every monitoring event.
- Behave respectfully and cordially whenever interacting with the public.
- Represent Save Our Streams and the Izaak Walton League of America in a professional manner, and...

Serve as a voice for my local streams and waterways.

# 10 Reasons to Monitor a Stream

1. To help the state assess the health of the many miles of streams in Virginia.
2. To establish baseline stream health data. This is helpful when discussing whether land-use changes have impacted your stream.
3. To evaluate impacts of up-stream land use practices on your stream.
4. To keep track of changes in your stream – seasonally and over a period of time.
5. To assist local agencies in determining the effectiveness of Best Management Practices (BMPs) and where more BMPs are needed.
6. To observe and record changes at your site - erosion, loss of trees, increased litter, etc.
7. To identify and report significant pollution events like oil or sewage spills - you are the eyes and ears of your site!
8. To build community pride or community concern for a local streams' condition.
9. To raise awareness about potential health and safety concerns in streams where children and pets may play.
10. To connect your friends, family, or community members to their local natural spaces.



# Monitoring Car Sign

Place this sign on your car dashboard or window to let curious people passing by know that you are parked there in order to conduct stream monitoring.

# Stream Water Quality Monitoring in Progress

Certified volunteer monitors are sampling the health of this local waterway. Please contact the Save Our Streams coordinator with any questions or concerns: vasos@iwla.org

What's Save Our Streams? Find out at **VASOS.org**

# Monitoring Equipment

You can find a **list of recommended equipment on our website** with suggested links to purchase.

## For Both Rocky and Muddy Bottom Streams

- Tape measure
- Waders or close-toed shoes
- First aid kit
- Aquatic thermometer
- Folding Table
- Table Cloth – White plastic works best
- Sorting tray – White ice cube trays work best
- Sorting utensils – spoons, tweezers, pipettes, spray bottle, paint brush
- Magnification – hand lens, microscope, etc.
- Neoprene Gloves
- SOS Identification Key and **datasheets**
- Pencils/pens
- Clip Board
- **Identification materials**
  - Voshell: A guide to Common Freshwater Invertebrates of North America
  - IWLA: Guide to Aquatic Insects and Crustaceans
  - Creek Critters App
- VA SOS DWR Collection Permit
- **Unknown Specimen Form**
- Landowner permission forms if applicable





## For Rocky Streams

- 3×3 Kick Net (1/32 or 500 micron mesh)
- 2 Net poles (Wood dowels; 1.25” x 48”)

## For Muddy Streams

- D-net
- Sieve bucket

## Check Your Equipment Before Going Out in the Field

Before each monitoring session, check to make sure all of the materials are clean and in good condition.





## Equipment Reimbursement

VA SOS has funds to reimburse you for your equipment purchases. Before purchasing, you must **Submit a Request** with your items and estimated cost for approval. VA SOS cannot guarantee reimbursement for any equipment purchased without approval. Funding is available on a first come, first serve basis.

**Reimbursement funds are dependent on grant funding and are not guaranteed every year.*





# Equipment Cleaning & Storage

## Help Stop Aquatic Hitchhikers!

Stopping the spread of invasive species and bacteria is critical to protecting our stream habitats. It is important to clean and disinfect your boots and equipment before moving from one stream site to another. You can do any of the following to prep your equipment between sites:

- Wash with biodegradable soap or 10% bleach solution
- Leave in full sun for several days
- Let equipment dry completely before sampling another site

***Felt bottomed waders/boots are NOT recommended, as they can easily carry invasive species from site to site.***



## Storing Equipment

Once equipment is fully dry, store in a cool dry space. If possible, store waders lying flat or hanging to avoid weakening the material.





# Establishing a New Site

**For guidance on selecting a new site, visit vasos.org.**

## Permission

When finding a new site to monitor, ensure that you have all of the needed permissions to use that property. If it is county/city/state/federal land be sure to have the proper additional permits. If it is private property, be sure to have written permission from the landowner (permission and liability release form on page 16).



## Site Requirements

Monitoring sites should meet the following requirements for use in the VA SOS program:

- At least 1/4 mile from another site
- Easy and safe access into the stream site
- Has the necessary habitat to sample within a 100 meter span

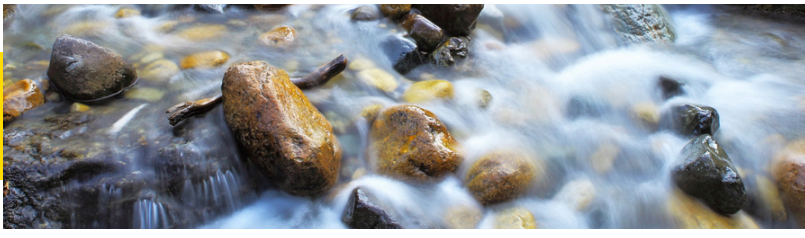
### Rocky Habitat - 4 riffles within 100 meters

- A riffle: a shallow, fast-moving area of water with a depth of 3 to 12 inches and cobble-sized stones (2 to 10 inches) or larger

### Muddy Habitats - at least one of the below within 100 meters

- Woody snags: areas where tree trunks or limbs have fallen into the stream.
- Stream banks: the edge of the stream - may be vegetated, bare soil, undercut, or eroded.
- Riffles: shallow, fast-moving areas of water flowing over cobble-sized stones and rocks.
- Submerged aquatic vegetation: any plant growing under or out of the water of the stream.

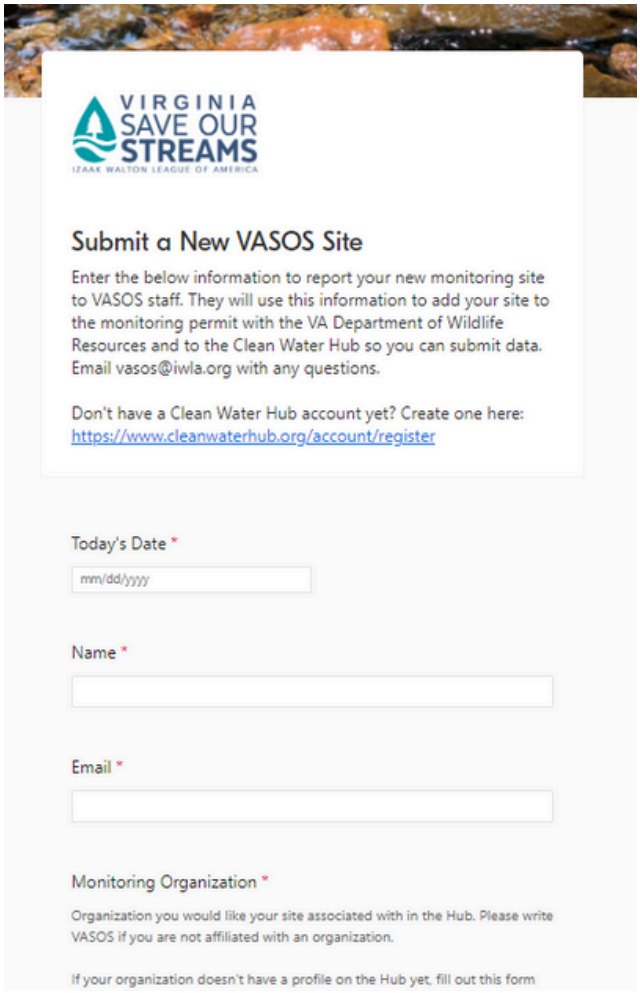






## Reporting Your Site

- You must **Report Your Site to VA SOS** staff using the form on the website in order to have it added to the VA SOS monitoring permit and the **Clean Water Hub.**
- VA SOS staff will assign your site a unique ID and create the site on the **Clean Water Hub** database. They will email you your site's ID and the link to the site on the Hub once they've done so.




**NOTE: Enter your latitude and longitude coordinates in decimal format.**

**For example, IWLA headquarters lat/long in decimal format is:**
**39.121004, -77.220614**

**Do NOT use minutes/seconds format:**
**39° 7' 15.6138" N, -77° 13' 14.2098" W**

**Need help finding your site's coordinates? This guide can help.**

**Turn to page 27 for more information on using the Clean Water Hub!**

# Property Owner Permission and Liability Release Agreement

_____(organization/monitor) is participating in the Virginia Save Our Streams program to monitor the condition of local rivers and streams, to collect baseline data and ensure that water quality is properly maintained. As part of the survey, trained local volunteers collect biological samples to assess stream health conditions on a biannual basis at consistent specific sites. This monitoring will last approximately 1-4 hours per site. This agreement is intended to grant permission to volunteers to access private property for site-specific data collection in the watershed, as well as to release and hold harmless the property owner from liability arising from that access.

I, _____ the property owner, hereby grant permission to _____(name of organization/monitor), its volunteers, and necessary project partners, to enter my property for the sole purpose of site-access and water monitoring that takes place on or near my property to accomplish regular baseline data collection.

Address:_____
Monitoring Dates: (or until program completion) _____

I agree that my permission is granted on a voluntary basis, can be revoked at any time, and I have neither received or expect to receive any form of compensation in exchange for my permission.

I agree to hold the organization listed above, its volunteers, and necessary project partners, harmless from and forever discharge them from any and all liability for damages, injury, or loss which may be sustained as a result of their entry into the private property described in this agreement.

In addition, the organization listed above hold harmless and forever discharge me, the property owner, from any and all liability for any damage, injury, or loss which may be sustained as a result of their entry into the private property described in this agreement.

Property Owner_____ Date: _____

Stream Monitor _____ Date: _____

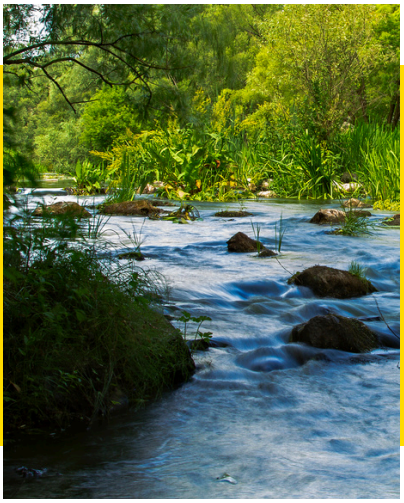
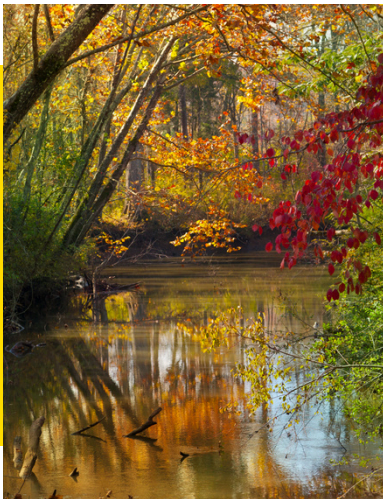
# When to Sample

**Frequency:** Your site should be monitored 2 times a year: spring and fall. You may also choose to monitor your site at other times during the year to measure impacts of a significant event in your watershed, or to host a community outreach event. It is very important you do not monitor your site too often – we don't want to impact the macroinvertebrate community in your stream.

**Conditions:** Volunteers are not to conduct their normal sampling within one week of heavy rainfall (approximately more than 1 inch of rainfall in rural areas or ½ inch of rainfall in urban areas). During drought conditions, it is fine to monitor as long as water is flowing over riffles and is at least 3 inches deep. Do not monitor if water is standing or too low to flow. The best time to sample a stream is during its average conditions for that season.

**Safety:** Do not monitor alone, during thunderstorms or heavy rain, if banks are too steep or slippery, during posted health warnings, or if a sewage or oil spill is apparent.



The Virginia Department of Environmental Quality utilizes VA SOS data collected within these seasonal windows:

- **March 1 - May 31**
- **September 1 - November 30**

# VA SOS DWR Permit

## Department of Wildlife Resources

## Scientific Collection Permit



The Izaak Walton League of America holds a DWR Scientific Collection permit that covers all certified monitors. Once a monitor is certified they are added to the permit as a sub-permittee. When monitors create a new site they must report it to the VA SOS Coordinator to add to the permit (see page 15 for instructions). New counties and sites are added to the permit as they are submitted. The VA SOS Coordinator will send updated permits to all monitors via the monthly VA SOS newsletter.

**Monitors must have the DWR monitoring permit with them at every sampling event.**




VA DWR recommends that all permittees display at least 100 square inches of solid blaze orange material at shoulder level within body reach and visible from 360 degrees, especially during hunting season.

## Notify DWR of Monitoring Date



Certified monitors MUST notify DWR within the 7 day period prior to each sampling event. Notification must include the VA SOS permit number (#069945), site station ID, stream name, county, and anticipated sampling date. This information can be submitted to: **collectionpermits@dwr.virginia.gov**.

This notification allows DWR an opportunity to advise against monitoring at your site in the event of health hazards, spawning events, invasive species issues, or state monitoring efforts. If your monitoring plans change you do not need to inform them of your monitoring cancellation.

**Find an email template to DWR on our website.**

# Datasheets

VIRGINIA SAVE OUR STREAMS

Chesapeake Monitoring Cooperative

***Biological Monitoring Data Form for Rocky Bottom Method***

Name of Stream: _____ Station ID: _____

Name of Certified Monitor(s): _____

Group/Organization: _____ Number of Participants: _____

Latitude: _____ Longitude: _____

County/State: _____

Survey Date: _____ Start Time: _____ End Time: _____

Description of Site Location: _____

**Record stream site information here. Be sure to list ALL certified monitors present at each collection.**

**Record Net Times for Rocky Bottom Protocol**

**ROCKY BOTTOM SAMPLING**

Using a kick-siene net, take up to four samples in the riffle area of 20 to 90 seconds each (75% of the time rubbing rocks, 25% of the time disturbing the streambed). Adjust the length of the sampling period to ensure you collect at least 200 macroinvertebrates. Write the length of each sampling period in seconds and place a check mark next to the net mesh size used

*(Note: If sample does not reach 200 organisms, three nets must be 90 seconds for approval).*

_____Net 1 _____Net 2 _____Net 3 _____Net 4 Net Mesh Size: ☐ 1/32" ☐ 1/50"

**Record Habitat Jabs for Muddy Bottom Protocol**

**MUDDY BOTTOM SAMPLING**

Record the number of jabs taken from each habitat type (20 jabs total). Total jabs taken from a particular habitat type should be proportionate to the overall percentage of the habitat type in the sample area.

Banks _____ Woody Snags _____

Riffles (Cobble Areas) _____ Submerged Aquatic Vegetation _____

**PHYSICAL CONDITIONS** (check predominate condition for each day)

Today: ☐Sunny ☐Overcast ☐Intermittent Rain ☐Steady Rain ☐Heavy Rain ☐Snow

Yesterday: ☐Sunny ☐Overcast ☐Intermittent Rain ☐Steady Rain ☐Heavy Rain ☐Snow

Day Before Yesterday: ☐Sunny ☐Overcast ☐Intermittent Rain ☐Steady Rain ☐Heavy Rain ☐Snow

Water Temperature: _____ C° Avg. Stream Width _____ ft.

Flow Rate: _____ (high, normal, low) Avg. Stream Depth _____ in.

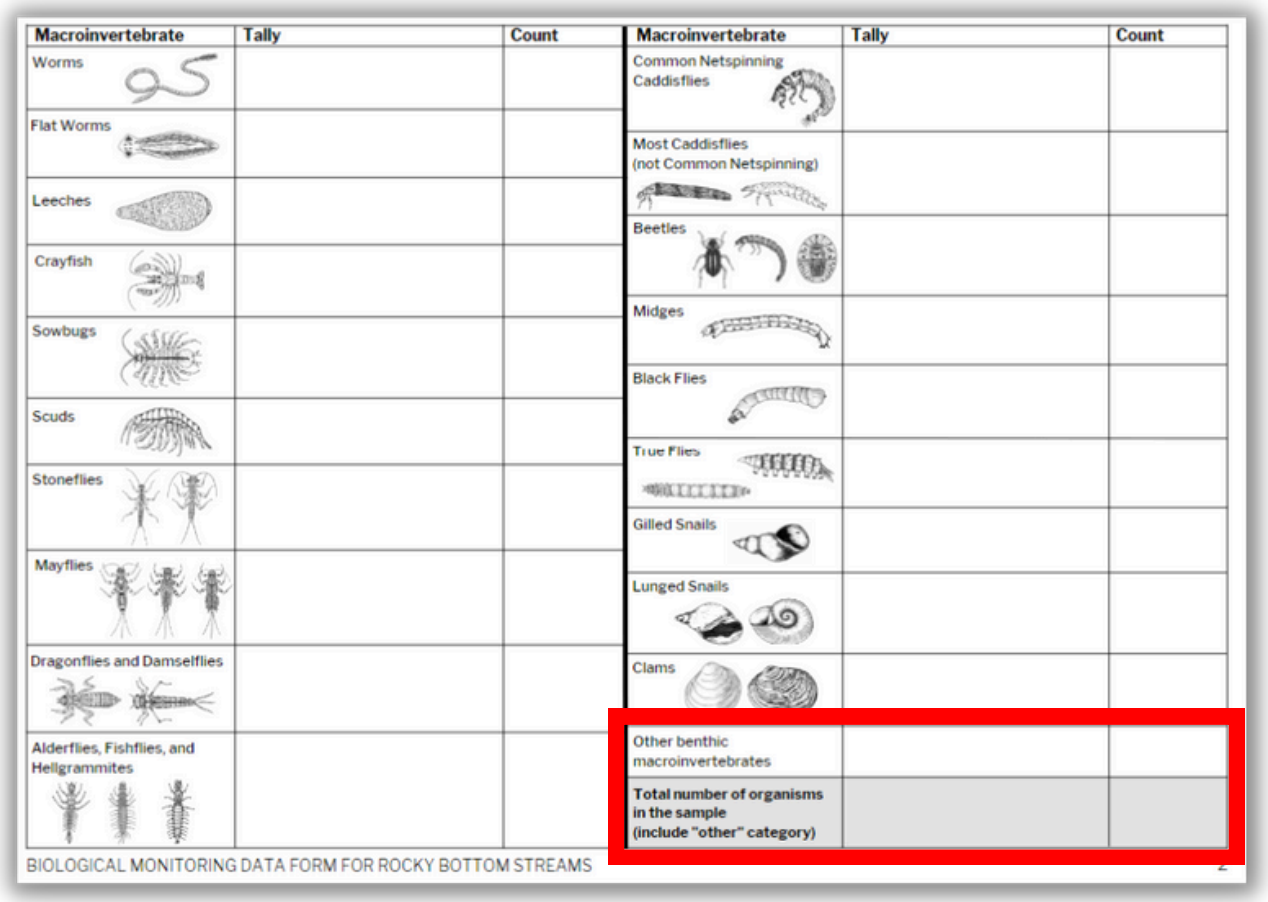
**SAMPLING NOTES**

**Recent weather and additional comments provide extra context for your results!**

BIOLOGICAL MONITORING DATA FORM FOR ROCKY BOTTOM STREAMS 1

# Tallying Your Sample

Tally and count all of your macroinvertebrates on your VA SOS datasheet.



| Macroinvertebrate | Tally | Count |
|---|---|---|
| Worms | | |
| Flat Worms | | |
| Leeches | | |
| Crayfish | | |
| Sowbugs | | |
| Scuds | | |
| Stoneflies | | |
| Mayflies | | |
| Dragonflies and Damselflies | | |
| Alderflies, Fishflies, and Hellgrammites | | |

| Macroinvertebrate | Tally | Count |
|---|---|---|
| Common Netspinning Caddisflies | | |
| Most Caddisflies (not Common Netspinning) | | |
| Beetles | | |
| Midges | | |
| Black Flies | | |
| True Flies | | |
| Gilled Snails | | |
| Lunged Snails | | |
| Clams | | |
| Other benthic macroinvertebrates | | |
| **Total number of organisms in the sample (include "other" category)** | | |

BIOLOGICAL MONITORING DATA FORM FOR ROCKY BOTTOM STREAMS

# Other Benthic Macroinvertebrates

In both the Rocky and Muddy Bottom protocols, there is a section called “Other Benthic Macroinvertebrates.” This is where you can tally benthic macroinvertebrates that are not part of the SOS count, like aquatic caterpillars. You can also use this section to tally macros that you cannot identify in the field. Take detailed notes and photos to assist you later. Be sure to identify all unknown macros and adjust your tallies before submitting your data (refer to pages 24 and 25 for instructions on unknown specimens). **You will include the number of "Other Benthic Macroinvertebrates" in the “Total Number of Organisms”.**

You may find organisms in your net that should not be tallied in the VA SOS protocol. Organisms like water striders, whirligig beetles, water boatmen, and predaceous diving beetles are surface breathers and do not provide any indication of water quality with the VA SOS protocol. If a critter wants to stay above water and moves across the water’s surface, do not count it. Mosquitos also breathe from the surface in both their larvae and adult stages and should not be counted.

## MUDDY BOTTOM MACROINVERTEBRATE COUNT

| Macroinvertebrate | Tally | Count |
|---|---|---|
| Worms | | |
| Flat Worms | | |
| Leeches | | |
| Crayfish | | |
| Sowbugs | | |
| Scuds | | |
| Shrimp (Freshwater) | | |
| Stoneflies | | |
| Mayflies | | |
| Dragonflies (*not* Gomphidae) and Damselflies | | |
| Gomphidae (clubtail) Dragonfly | | |

| Macroinvertebrate | Tally | Count |
|---|---|---|
| Alderflies, Fishflies, and Hellgrammites | | |
| Common Netspinning Caddisflies | | |
| Most Caddisflies (not Netspinning) | | |
| Beetles | | |
| Midges | | |
| Black Flies | | |
| True Bugs | | |
| [illegible] | | |
| Gilled Snails | | |
| Lunged Snails | | |
| Clams | | |
| Other benthic macroinvertebrates | | |
| Total number of organisms in the sample (include "other" category) | | |

2

**NOTE:**

- **In the Muddy Bottom Protocol you will count True Bugs (i.e. backswimmers, water scorpions, etc.). These are more prevalent in muddy bottom streams and are not counted in the Rocky Bottom Protocol.**
- **In the Muddy Bottom Protocol you will count the Gomphidae "Clubtail" Dragonfly separately from the other dragonflies and damselflies due to their differing pollution tolerance. You can distinguish them by their paddle shaped antennae, as opposed to the thin antennae of other dragonflies.**

**Most dragonflies: thin antennae**





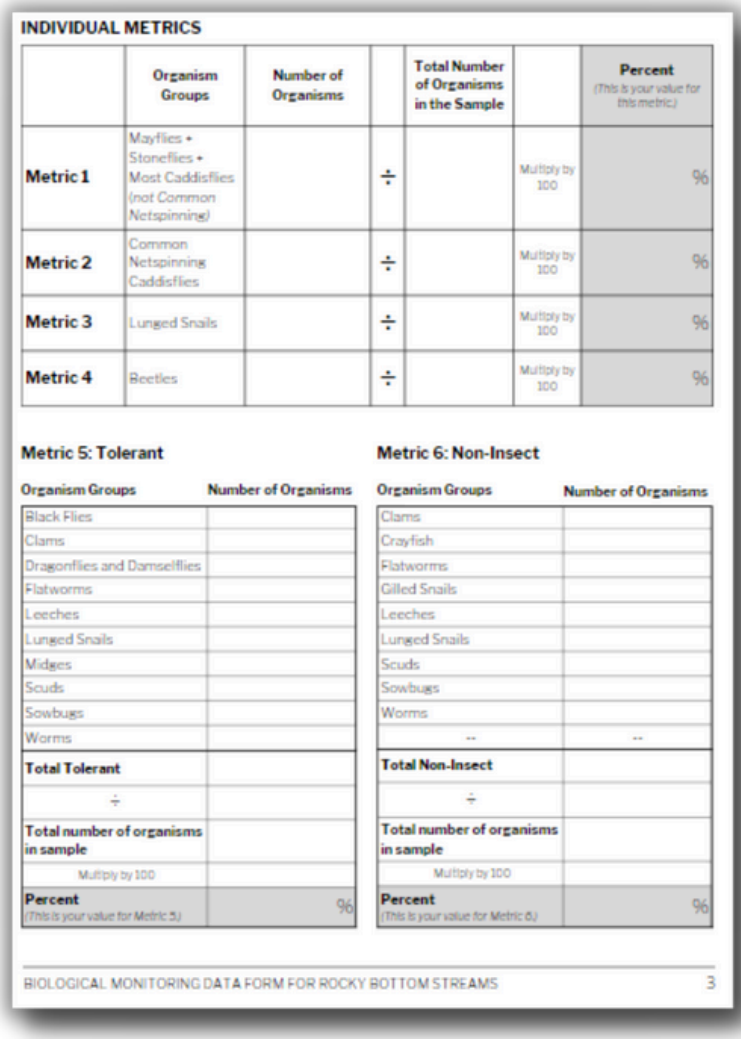
**Gomphidae dragonflies: paddle-shaped antennae**

*Photos by: Macroinvertebrates.org*

# Multimetric Index Calculation

In both the Rocky and Muddy Bottom protocols, you will calculate a stream health score using the Multimetric Index. To calculate, you will tally the total number of organisms in each metric listed on your datasheet. Divide the total number of organisms in each metric by the total number of organisms overall. Then, multiply by 100 to find the percent of each. This percentage is your Metric Value.

Once you have your Metric Values for each metric, you will go to the next page and determine if your percentage for that metric is worth 2, 1, or 0 "points." (Rocky) or 6, 3, or 0 “points” (Muddy). A high percentage of pollution sensitive macros or a low percentage of pollution tolerant macros are worth more "points" because they are indicators of good water quality. You will use the chart to check the boxes for each metric value and its coinciding "point" amount. Follow the multiplication steps at the bottom of the chart to determine the Save Our Streams Multimetric Index Score and determine whether the site has Acceptable, Grayzone, or Unacceptable ecological conditions.



**INDIVIDUAL METRICS**

| | Organism Groups | Number of Organisms | | Total Number of Organisms in the Sample | | Percent (This is your value for this metric.) |
|---|---|---|---|---|---|---|
| **Metric 1** | Mayflies + Stoneflies + Most Caddisflies (not Common Netspinning) | | ÷ | | Multiply by 100 | % |
| **Metric 2** | Common Netspinning Caddisflies | | ÷ | | Multiply by 100 | % |
| **Metric 3** | Lunged Snails | | ÷ | | Multiply by 100 | % |
| **Metric 4** | Beetles | | ÷ | | Multiply by 100 | % |

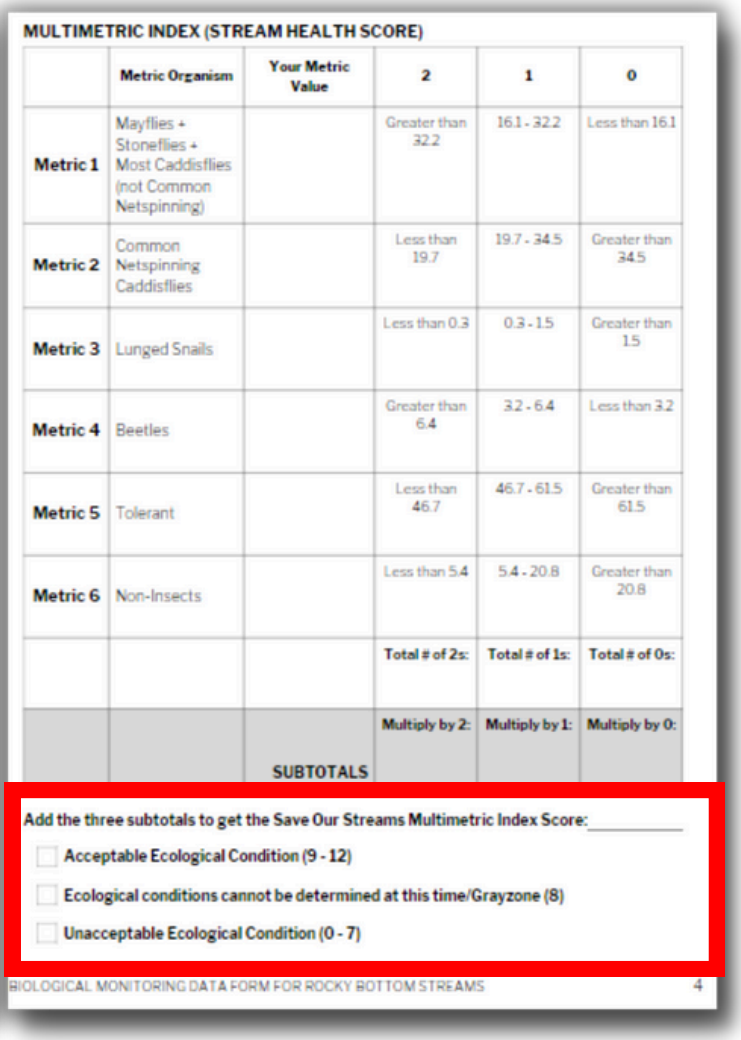
**Metric 5: Tolerant**

| Organism Groups | Number of Organisms |
|---|---|
| Black Flies | |
| Clams | |
| Dragonflies and Damselflies | |
| Flatworms | |
| Leeches | |
| Lunged Snails | |
| Midges | |
| Scuds | |
| Sowbugs | |
| Worms | |
| **Total Tolerant** | |
| ÷ | |
| **Total number of organisms in sample** | |
| Multiply by 100 | |
| **Percent** (This is your value for Metric 5.) | % |

**Metric 6: Non-Insect**

| Organism Groups | Number of Organisms |
|---|---|
| Clams | |
| Crayfish | |
| Flatworms | |
| Gilled Snails | |
| Leeches | |
| Lunged Snails | |
| Scuds | |
| Sowbugs | |
| Worms | |
| -- | -- |
| **Total Non-Insect** | |
| ÷ | |
| **Total number of organisms in sample** | |
| Multiply by 100 | |
| **Percent** (This is your value for Metric 6.) | % |

BIOLOGICAL MONITORING DATA FORM FOR ROCKY BOTTOM STREAMS 3



**MULTIMETRIC INDEX (STREAM HEALTH SCORE)**

| | Metric Organism | Your Metric Value | 2 | 1 | 0 |
|---|---|---|---|---|---|
| **Metric 1** | Mayflies + Stoneflies + Most Caddisflies (not Common Netspinning) | | Greater than 32.2 | 16.1 - 32.2 | Less than 16.1 |
| **Metric 2** | Common Netspinning Caddisflies | | Less than 19.7 | 19.7 - 34.5 | Greater than 34.5 |
| **Metric 3** | Lunged Snails | | Less than 0.3 | 0.3 - 1.5 | Greater than 1.5 |
| **Metric 4** | Beetles | | Greater than 6.4 | 3.2 - 6.4 | Less than 3.2 |
| **Metric 5** | Tolerant | | Less than 46.7 | 46.7 - 61.5 | Greater than 61.5 |
| **Metric 6** | Non-Insects | | Less than 5.4 | 5.4 - 20.8 | Greater than 20.8 |
| | | | **Total # of 2s:** | **Total # of 1s:** | **Total # of 0s:** |
| | | **SUBTOTALS** | **Multiply by 2:** | **Multiply by 1:** | **Multiply by 0:** |

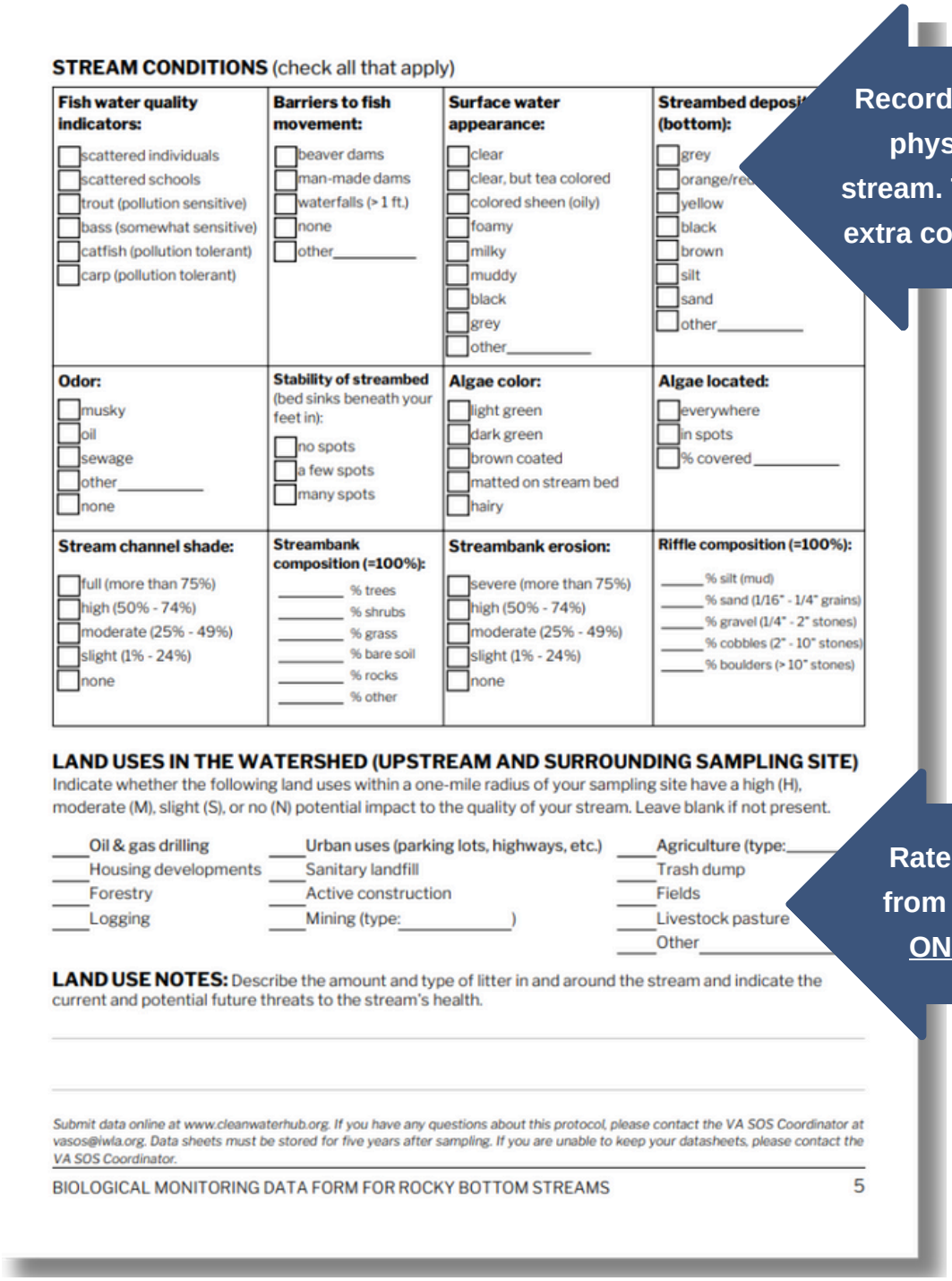
**Add the three subtotals to get the Save Our Streams Multimetric Index Score:** _____

- ☐ **Acceptable Ecological Condition (9 - 12)**
- ☐ **Ecological conditions cannot be determined at this time/Grayzone (8)**
- ☐ **Unacceptable Ecological Condition (0 - 7)**

BIOLOGICAL MONITORING DATA FORM FOR ROCKY BOTTOM STREAMS 4

# Stream Conditions

Volunteers should complete a qualitative streamside visual analysis that assesses the general conditions in the stream every time they conduct a biomonitoring session. The assessment can help identify sources of stress to the macroinvertebrate community in your stream and is an important water quality assessment tool. These data serve as a monitor's record of physical conditions and can be used to identify observable changes over time. **Find a detailed habitat assessment manual online.**



**STREAM CONDITIONS** (check all that apply)

| **Fish water quality indicators:** | **Barriers to fish movement:** | **Surface water appearance:** | **Streambed deposit (bottom):** |
|---|---|---|---|
| ☐ scattered individuals<br>☐ scattered schools<br>☐ trout (pollution sensitive)<br>☐ bass (somewhat sensitive)<br>☐ catfish (pollution tolerant)<br>☐ carp (pollution tolerant) | ☐ beaver dams<br>☐ man-made dams<br>☐ waterfalls (> 1 ft.)<br>☐ none<br>☐ other_____ | ☐ clear<br>☐ clear, but tea colored<br>☐ colored sheen (oily)<br>☐ foamy<br>☐ milky<br>☐ muddy<br>☐ black<br>☐ grey<br>☐ other_____ | ☐ grey<br>☐ orange/re<br>☐ yellow<br>☐ black<br>☐ brown<br>☐ silt<br>☐ sand<br>☐ other_____ |
| **Odor:** | **Stability of streambed** (bed sinks beneath your feet in): | **Algae color:** | **Algae located:** |
| ☐ musky<br>☐ oil<br>☐ sewage<br>☐ other_____<br>☐ none | ☐ no spots<br>☐ a few spots<br>☐ many spots | ☐ light green<br>☐ dark green<br>☐ brown coated<br>☐ matted on stream bed<br>☐ hairy | ☐ everywhere<br>☐ in spots<br>☐ % covered _____ |
| **Stream channel shade:** | **Streambank composition (=100%):** | **Streambank erosion:** | **Riffle composition (=100%):** |
| ☐ full (more than 75%)<br>☐ high (50% - 74%)<br>☐ moderate (25% - 49%)<br>☐ slight (1% - 24%)<br>☐ none | _____ % trees<br>_____ % shrubs<br>_____ % grass<br>_____ % bare soil<br>_____ % rocks<br>_____ % other | ☐ severe (more than 75%)<br>☐ high (50% - 74%)<br>☐ moderate (25% - 49%)<br>☐ slight (1% - 24%)<br>☐ none | _____ % silt (mud)<br>_____ % sand (1/16" - 1/4" grains)<br>_____ % gravel (1/4" - 2" stones)<br>_____ % cobbles (2" - 10" stones)<br>_____ % boulders (> 10" stones) |

**LAND USES IN THE WATERSHED (UPSTREAM AND SURROUNDING SAMPLING SITE)**

Indicate whether the following land uses within a one-mile radius of your sampling site have a high (H), moderate (M), slight (S), or no (N) potential impact to the quality of your stream. Leave blank if not present.

| | | |
|---|---|---|
| ____ Oil & gas drilling | ____ Urban uses (parking lots, highways, etc.) | ____ Agriculture (type:_____ |
| ____ Housing developments | ____ Sanitary landfill | ____ Trash dump |
| ____ Forestry | ____ Active construction | ____ Fields |
| ____ Logging | ____ Mining (type:_____) | ____ Livestock pasture |
| | | ____ Other_____ |

**LAND USE NOTES:** Describe the amount and type of litter in and around the stream and indicate the current and potential future threats to the stream's health.

*Submit data online at www.cleanwaterhub.org. If you have any questions about this protocol, please contact the VA SOS Coordinator at vasos@iwla.org. Data sheets must be stored for five years after sampling. If you are unable to keep your datasheets, please contact the VA SOS Coordinator.*

BIOLOGICAL MONITORING DATA FORM FOR ROCKY BOTTOM STREAMS 5

**Record observations of various physical characteristics of stream. These conditions provide extra context to your macro data.**

**NOTE: For categories asking for percentage values, work with your team to come to a reasonable estimate. You are not expected to calculate precise percentages.**

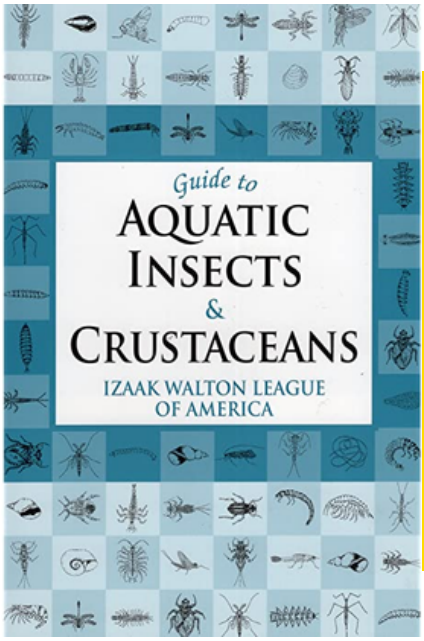
**Rate level of potential impact from specific land uses within ONE MILE RADIUS of site.**

# Macroinvertberate Identification

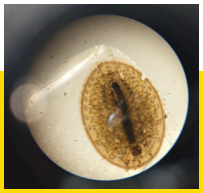
## Sorting Your Sample

When you first get started monitoring, it may be easiest to start by simply sorting critters by similar appearances. Place organisms that share similar characteristics in the ice cube tray together. After picking your sample, go through the ice cube tray and spend more time magnifying, identifying, and recording your organisms.

As you get more practice and your macroinvertebrate identification skills improve, you can potentially identify as you pick them off of the net and call your organisms out to another monitor to record your findings.











## Identifying Macroinvertebrates

We identify to the Order level in the VA SOS program. The accuracy of VA SOS stream health score data relies on the accuracy of macroinvertebrate identification. Monitors should take care to identify all macroinvertebrates correctly. Utilize identification resources and magnification tools to ensure that your identifications are correct. When in doubt, put the critter under the microscope to be sure! **Many macroinvertebrates share similar characteristics to others, so monitors should take the time to identify multiple characteristics on each bug that confirm your identification.** You can view various macroinvertebrate ID resources on our website.

## Returning Your Sample

Return the macroinvertebrates to the stream and rinse all of your supplies to be sure all organisms are returned. You are now ready to begin calculating the stream health score using the VA SOS Multimetric Index.

**REMEMBER: To increase the chance of survival, return the macroinvertebrates to the stream as soon as possible after identification.**



## Handling Unknown Specimens

If you find that you and your monitoring group cannot identify an organism after using **macroinvertebrate ID resources**, you will need to do the following to secure an accurate identification:

1. Photograph and write down a detailed description of the organism
2. Fill out the Unknown Specimen Form (page 25)
3. Send the information to VA SOS Staff at **VASOS@iwla.org**

You may also choose to preserve the organism in a jar or vial of ethanol and mail the sample and form to the VA SOS office for identification.

**Izaak Walton League of America**
**ATTN: VA SOS Coordinator**
**707 Conservation Lane**
**Gaithersburg, MD 20878**

VIRGINIA SAVE OUR STREAMS
IZAAK WALTON LEAGUE OF AMERICA

Chesapeake Monitoring Cooperative

# Unknown Specimen Submittal Form

Name and Email Address of submitting volunteer(s) _____

_____

_____

**Sample Information:**

Survey Date: _____ Station ID: _____

County/State: _____

Latitude: _____ Longitude: _____

Location (be specific): _____

_____

_____

Please describe the physical characteristics of this organism (including any identifiable movements):

_____

_____

_____

Do you have any thoughts on what this organism might be? _____

_____

_____

_____

**If you would like to send the SOS office this organism to assist with identification, please fill out the information below in pencil and include in your preservation jar or vial.**

Date Collected: _____ Submitter Name: _____

County/State: _____ Station ID: _____

Latitude: _____ Longitude: _____

Location (please be specific): _____

# Clean Water Hub

## What is the Clean Water Hub?

The Clean Water Hub is collaborative data visualization tool to help water quality monitors and communities track water quality in local creeks and streams.

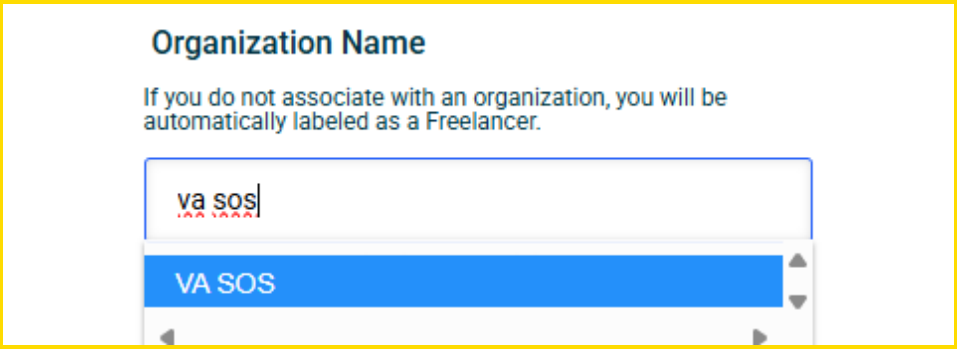
The Clean Water Hub currently hosts the following types of water quality data;

- VA SOS & Chesapeake Bay SOS benthic macroinvertebrate data
- National SOS benthic macroinvertebrate data
- Chemical water quality data
- Salt Watch & Nitrate Watch results
- Macroinvertebrate data collected by the Creek Critters app



## Create Your Clean Water Hub Account

- Visit **CleanWaterHub.org** and create a free account.
- In the "Organization Name" field, search for the **VA SOS organization page**. Open the page and click "Join Organization".







## Request a Clean Water Hub Group/Organization Profile

If you are part of a monitoring group or organization, we recommend you create an organization page where all of your sites can be associated with your group. This will allow you to see all of your sites in one place and access downloads of your data. This profile is a great way to manage data for multiple sites and can serve as a communication tool for you to share your results with your community.

**Request an organizational profile using this online form**, or by emailing **VASOS@iwla.org.**

## Request a New Site in the Hub

**Request a new site using this online form.**

Instructions on **page 15.**



# Submitting Data

If this is your first time monitoring a new site, you will need to report the site to the SOS coordinator so they can add it to the Hub before you can submit data. See more info on **page 15.**



1. Log in to the **Clean Water Hub.**
2. Find your site by searching the site ID (provided by VA SOS Coordinator) in Explore Data-> All Sites. *Once you've entered data at a site it will appear on your list of "My Sites"*
3. Click "Create a Reading" and select either the VA SOS/CMC Muddy Bottom or VA SOS/CMC Rocky Bottom protocol.
4. Enter information from your datasheet into the online submission form.
5. Click "Save Changes."

**NOTE: Be sure to list every certified monitor that was present at the sampling on your data form. This is how they will receive credit to maintain active certification.**

## Viewing Data in the Clean Water Hub



1. Go to "My Sites" and use the "Search Sites" search bar to locate your site. Click on the site ID to open it.
2. Select the protocol that you would like to view (Rocky or Muddy Bottom) to generate a graph of your multimetric scores over time.
3. Scroll below the graph to view a sequential list of your data submissions. Click "View" to see the full datasheet and click "Edit" to make any changes.

**Data are quality assured and sent to DEQ at the start of every calendar year.**

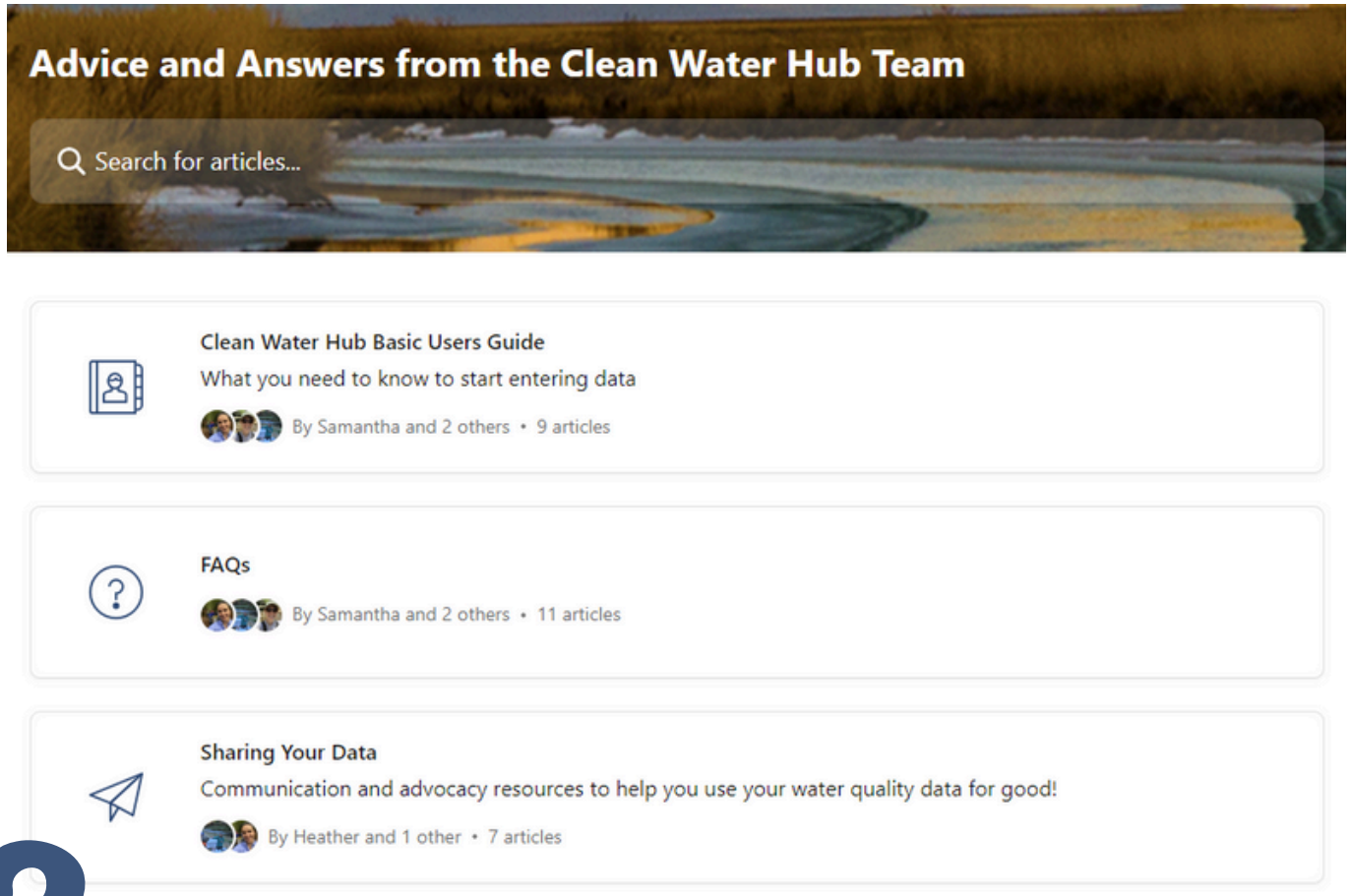
**NOTE: You must keep a physical or digital copy of your datasheet for at least 5 years after your sample is taken. This protects our data from being lost to any potential database malfunctions.**

# Using the Clean Water Hub

Looking for help getting started on the Clean Water Hub? Visit [help.cleanwaterhub.org/](help.cleanwaterhub.org/) to find the following resources:

- **Clean Water Hub Basic Users Guide** - all the information you need to get started entering data into the Hub
- **FAQs** - answers to frequently asked questions from Hub users
- **Sharing Your Data** - Communication and advocacy resources to help you use your water quality data for good!

**[help.cleanwaterhub.org/](help.cleanwaterhub.org/)**

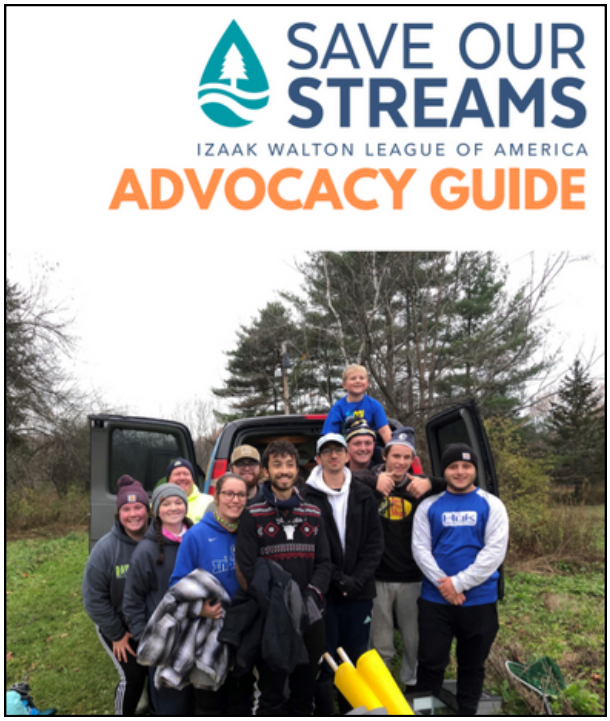



Still stuck? Email [support@cleanwaterhub.org](mailto:support@cleanwaterhub.org) and we will get back to you!

# Advocacy Guide

## Use Your Data!

Stream monitoring is one step of many that you can take to protect your waterways. The **Save Our Streams Advocacy Guide** shows you how to take action at the local, state or federal level to protect the waterways you monitor. You'll find valuable tips and advice on how to organize your community, influence policymakers, and create positive change for your streams. Plus, read inspiring success stories from fellow monitors and other League members.









ADVOCACY TIPS FOR URBAN & SUBURBAN VASOS MONITORS

Advocacy can seem daunting in urban and suburban environments because there are often many different sources of pollution. It can be difficult to know what to advocate for! As a VASOS monitor, you have the data, knowledge, and passion to advocate for clean water in your community. Here are some ideas and resources to help you get started, some of which you can do without even leaving your house!

VIRGINIA DEQ OPPORTUNITIES

- In the United States it is illegal to discharge point source pollution into "Waters of the United States" without a permit under the Clean Water Act. In most states, including Virginia, the EPA delegates authority to issue these permits to the state. The public can review and comment on each new permit.
- When water bodies are identified as impaired, cleanup plans called Total Maximum Daily Loads are developed and public input is requested
- Between January 1 and April 30 each year, you can nominate a water body to be monitored by DEQ's Water Monitoring and Assessment Program
- Join a watershed roundtable and work together with others to achieve water quality improvement goals
- Review and comment on the draft Water Quality Assessment Integrated Report every other year. VASOS data has a direct impact on this report!

Get on Virginia DEQ's Public Notice Email List to be notified whenever there's an opportunity to comment!

GET TO KNOW YOUR DISTRICT SUPERVISOR

- Check your county's website to find out when Board of Supervisors and Planning Commission meetings and public hearings are and how you can attend.
- You can also schedule your own meeting with your District Supervisor - share your data with them to show that you are a constituent who is dedicated to local water quality!
- Submit comments on relevant board items.

Sign up to be notified of Virginia Regulatory Town Hall meetings happening near you!

**New!** Advocacy Tips for Urban & Suburban VASOS Monitors! This mini-guide will help you figure out where to start advocating for water quality in urban and suburban environments.

If you take any action, big or small, to try to improve water quality in your community, we want to know about it! Share your advocacy actions with us using this form.

# Other Monitoring Opportunities

## Salt Watch




IWLA sends **free kits** to volunteers to track levels of road salt (chloride) in their local streams throughout the year and submit their data to a national database. Volunteers can share and use these data with their local watershed groups, neighbors, and local government. Interested in partnering? We can send you bulk kits for your monitoring or education groups.

## Creek Critters




Perfect for classes, families, public programs, and even as a solo activity, Creek Critters is easy and fun. Collect bugs by following simple step-by-step instructions, and identify your bugs with an interactive identification key. The app automatically calculates your Stream Health Score based on your findings. The score tells you how healthy your stream is – plus your results are added to the Clean Water Hub, our public database of water quality in America.

## Chemical Monitoring




In addition to benthic data, measuring dissolved oxygen, phosphate, pH, nitrate, chloride, and clarity can create a more complete picture of stream health. IWLA offers datasheets, **manuals**, and instructional videos to get you started. If you are based within the Chesapeake Bay Watershed, you can also become a certified monitor through the Alliance for the Chesapeake Bay's **RiverTrends program.**

## Nitrate Watch



Nitrate Watch is the newest community science program from the IWLA Clean Water team. It mobilizes volunteers across the country to track nitrate levels in surface water and drinking water. Request your Nitrate Watch kit and find educational resources and advocacy actions at **www.NitrateWatch.org**.

# Become an IWLA Member

## National Membership

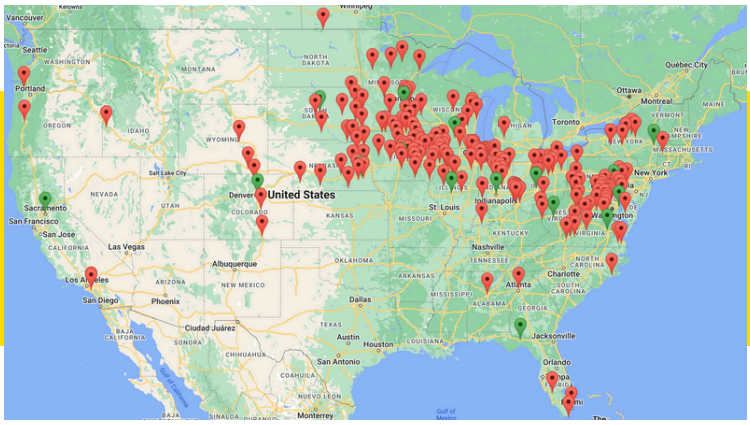
The Izaak Walton League doesn't take a "doom and gloom" approach to conservation. We work for practical solutions that balance conservation with sustainable use of natural resources. Want to help find common-sense solutions to today's environmental problems? Join the League as a national member to support our conservation and advocacy work.

**Become a National Member** and receive:

- Outdoor America magazine, the League's award-winning quarterly magazine
- E-news you can use each month to defend America's outdoors
- Advocacy on your behalf to protect clean water, fish and wildlife, and outdoor recreation
- Networking with League members
- Scholarships that are only open to League members and their families
- Supporting the only organization training volunteers to protect clean water nationwide

## Join a Local Chapter

Volunteers are the heart and soul of the League's brand of community-based conservation. Much of that volunteer work happens at our more than 200 chapters, where you can find opportunities to enjoy outdoor America – and protect it for the enjoyment of others. Some chapters offer hiking trails, fishing ponds, and shooting sports facilities. Many chapters organize stream clean-ups, youth programs, and conservation education events.




**Find a Chapter Near You**

# Reporting a Pollution Problem

## Reporting Pollution Incidents to VA DEQ

VA SOS monitors are the eyes and ears of their chosen sites and are often the first to discover and report pollution events. If you find evidence of a significant pollution event like a sewage or oil spill, please do not go into the water and notify the Virginia Department of Environmental Quality immediately.

If you observe a pollution incident, **submit a Pollution Report using DEQ's Online Form**. Take note of details that will help the agency investigate or follow up on the report and provide the information when submitting a report. The information you provide will be forwarded to a Pollution Response Coordinator for investigation and follow up.

- Who is responsible for the incident
- What is the issue (e.g., illegal disposal of waste, discharge of pollutants to surface water)
- When did the incident happen and if it is on-going
- Where it happened
- What has been impacted (e.g., soil, surface water, groundwater)
- Other information (e.g., weather conditions, site conditions)

**NOTE:** If you would like to make an anonymous complaint, please do not provide your name or contact information. However, if you do not provide sufficient or accurate information, the agency may not be able to follow up on or investigate the complaint. If you have any questions, please contact the Pollution Response Program in one of **the six regional offices**.

## Emergencies

If you observe a significant pollution incident that presents an imminent threat to human health or the environment, report the pollution incident to the Virginia Emergency Operations Center at 1-800-468-8892. Do not use the online reporting tool.

# APPENDIX A

# Protocol Manuals

# Rocky Bottom Protocol

**Objective:**

Sampling up to four riffles, use kick net to collect 200+ macroinvertebrates to identify and tally. Use the VA SOS metrics datasheet to calculate a stream health score.

## Step 1: Identify Riffles

Identify which four riffles you will sample during your collection. Look for riffles where maximum bubbling action occurs and there are plenty of cobble sized rocks. Riffles can be aligned vertically moving upstream, horizontally across a wide stream, or both! The total distance between your riffles should not exceed 100 meters.

**Riffle: a shallow, fast-moving area of water with a depth of 3 to 12 inches and cobble-sized stones (2 to 10 inches) or larger**



## Step 2: Decide First Net Time

Net times should be anywhere between 20-90 seconds. The first net at a new site should be 20 seconds. Adjust net times as needed during protocol to best reach 200 bugs collected. No more than 4 nets can be taken.

## Step 3: Approach From Downstream

Start with the most downstream riffle and approach from downstream. Avoid disturbing riffle areas before your sample collection begins to avoid disrupting or double counting bugs.

## Step 4: Place Kick Net Below Riffle

Place your kick net downstream of the riffle you aim to sample. Kick net should be placed perpendicular to water flow and held at approximately a 45 degree angle. Be sure that water is flowing *through* the net, and not over the top. Spread net as widely as possible and allow direct flow of water into the center of the net.



## Step 5: Line Net Edge with Rocks

To avoid losing any macroinvertebrates beneath the net, place anchor rocks along the bottom edge of the net. Anchor rocks should be taken from OUTSIDE of the sample area and cleaned off of any bugs before placing.



**NOTE: Though the kick net is 3 feet wide, your sample area is only 1 square foot in front of the net. Use the net to approximate one foot width.**

## Step 6: Rub Stream Rocks

Spend 75% of your chosen net time rubbing rocks. Pick up cobbles in your sample area and rub them quickly and thoroughly underwater. Get to as many rocks as possible during your allotted time. The aim is to dislodge any macros that are clinging to the rocks and capture them in the net.



## Step 7: Disturb the Substrate




Spend 25% of your chosen net time disturbing the substrate of the stream within your 1 sq/ft sampling area. Use a clean rock, hand rake, or trowel to rigorously stir up stream bottom.

**Using your hand is not recommended to avoid injury. Using your feet is also not recommended.*

## Step 8: Clean and Remove Anchor Rocks



Your macros have evolved to cling to rocks as if their life depends on it - because it does. They may have grabbed onto your anchor rocks during your collection, so you must clean those rocks off into your net before removing.

## Step 9: Take Net to Table to Process

Take net back to your table to pick your macroinvertebrates. Be sure not to lose any of your sample on your way.



**NOTE: You may catch vertebrates like minnows and salamanders in your net. You can make a note of their presence on your datasheet, but you will not count them as part of the VA SOS calculation. Return them to the stream promptly.**

## Step 10: Processing Your Sample

Using forceps, spoons, or pipettes, pick ALL macroinvertebrates off of the net and place into ice cube trays. Periodically wet the net with a spray bottle to keep bugs alive and moving. Swap positions around the table to double check for bugs not picked yet.

When picking your net, start by completely picking bugs off of the top. Then roll the net away and pick any bugs stuck on the underside of the net. Once all bugs are off of the net, examine the tablecloth for any bugs that crawled through.

**TIP: Use the 5 minute rule! If 5 minutes pass without finding a bug, the net is fully picked.**

**NOTE: You must FULLY pick every net. Do not stop picking when you reach 200 organisms if there are still bugs on net. Picking every bug ensures that the composition of the stream is accurately reflected when calculating a stream health score.**





## Step 11: Count and Identify Macroinvertebrates

If your first net yields 200 or more bugs, you are done! If not, bring your net to your second riffle and take a second net. Repeat this process until you have reached 200+ bugs OR completed 4 nets.

***If 4 nets fail to collect 200 organisms the metric calculation should still be made with the total that is obtained. If 4 nets do not collect 200 bugs, 3 out of 4 nets must be 90 seconds for data to be approved and sent to DEQ.**

**NOTE: To avoid capturing an excessive number of bugs, 20 seconds is ideal for the first time monitoring a new station. Net times should be adjusted to ensure capturing 200+ organisms, but cannot exceed 90 seconds. No more than 4 nets can be taken.**



# Muddy Bottom Protocol

## Objective:

Use D-Net to take 20 jabs in the muddy bottom habitats available at the site, collect 100+ macroinvertebrates to identify and tally. Use the VA SOS metrics datasheet to calculate a stream health score.

## Step 1: Identify Habitat Composition

Identify which of the four Muddy Bottom habitats are available within the 100 meter site you have selected. The habitat areas are: woody snags, banks, submerged aquatic vegetation, and riffle areas (cobble-stone sized rocks).

Plan to divide your 20 jabs among the habitats available in proportion to their abundance at the site. For example, if 50% of your site is bank, 25% is woody snag, and 25% is submerged aquatic vegetation (SAV) - do 10 jabs in bank, 5 jabs in woody snag, 5 jabs in SAV.

Not all four habitats will always be present at every Muddy Bottom site.



**Woody Snag**



**Stream Bank**



**Submerged Aquatic Vegetation**



**Riffle Areas**

**NOTE: Riffle areas are the areas of highest oxygenation in a stream. When riffles are present, the highest concentration of macroinvertebrates will be found there. If you have four riffles at a site, you should use the Rocky Bottom protocol to get the most accurate and representative score. Use the Muddy Bottom protocol when fewer than 4 riffles are available.**

## Step 2: Perform 20 Jabs Along Site

A single jab consists of aggressively thrusting the net into the target habitat for a distance of approximately 1 meter; i.e. the distance the net can be swept while standing in one place. This initial “jab” is followed by 2-3 sweeps of the same area to collect the dislodged organisms.

The following techniques are recommended for sampling the four major productive habitats in muddy bottom streams.

- **Woody snags** – snags or submerged woody debris are sampled by jabbing in medium sized snag material (sticks and branches). Large material (e.g., logs) may be sampled by scraping the net along the surface. Woody debris may be picked up, held in the net, and rubbed by hand.

- **Banks** – stream banks with roots and snag material are sampled similar to snags. Vegetated banks are preferred over unvegetated banks. If the bank is undercut, be sure to jab back under the bank, drawing the net from the stream bottom to the top of the undercut bank.

- **Submerged aquatic vegetation** – submerged macrophytes are sampled in deep water by drawing the net through the vegetation from the bottom to the surface of the water. Macrophytes in shallow water are sampled by bumping the net along the bottom in the macrophyte bed.

- **Riffle areas** – riffles should be sampled by placing the net firmly along the bottom of the stream and using your hand to “rub” around the cobbles in the riffle.

The sample is transferred to the sieve bucket (or other seining device) by banging the net over the bucket opening or by inverting the net into a partially submerged bucket. Contents of the net are transferred into the sieve bucket after each jab. Mark on your datasheet how many jabs were done in each habitat.









## Step 3: Processing Your Sample

- Thoroughly mix the sample in the sieve bucket by swishing it around in shallow water. Be sure to keep the entire sample in the bucket!
- Empty the contents of your sieve bucket onto a flat, light-colored surface, such as a white sheet or table. Use a spray bottle to remove all organisms from the bucket. Examine bucket to ensure all bugs have been removed.
- Spread the sample across a square portion of your surface (as large an area as needed so that the material is not clumped into piles). Using a stick as a guide, divide your sample into 4 grids to make 4 squares of the same size. Randomly select one of these squares to start your picking.





- Using forceps, spoons, or pipettes, pick ALL macroinvertebrates from the first grid square and place into ice cube trays. Count the bugs collected from the grid. If you have collected 100+ organisms (not including scuds), you are done and do not need to pick the other grids. If you have not reached 100 organisms, proceed to the second grid. Repeat process until you have reached 100 non-scud organisms OR have fully picked all four grids.

**NOTE: You must FULLY pick each grid before continuing to the next. Do not stop at 100 non-scud organisms if there are more left in the grid. Picking every bug ensures that the composition of the stream is accurately reflected when calculating a stream health score.**

**NOTE: Because scuds can be so abundant in a muddy bottom stream, do not count them towards your 100 organism minimum. Collect at least 100 non-scud organisms from your grids to ensure a representative sample is being counted. When doing your metric calculations, you WILL include scuds in the total count.**

# APPENDIX B

# Tips for Interacting with Landowners

# Interacting with Landowners as a VA SOS Monitor



- All monitoring sites must be on public land unless you have written permission from the landowner
- When gaining permission from a landowner to monitor a stream site on their land, you should also determine if/how they would like to be notified when you are coming out to monitor and if they would like you to share your data with them
- Whenever you monitor - regardless of land ownership - ensure you have a printed copy of the DWR permit, car sign, and a high-visibility vest or other high-vis clothing item
- On the following page is an example script for asking permission from a landowner to monitor a stream site on their land. Even if you are monitoring on public land, you may encounter nearby landowners who have questions about what you are doing. The talking points in the example script may be helpful for these interactions as well.

VIRGINIA SAVE OUR STREAMS
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# Example Script:



“I am a certified volunteer stream monitor with the Virginia Save Our Streams program. Virginia Save Our Streams is a statewide program through the Izaak Walton League of America seeking to monitor and protect the health of Virginia’s streams. We do this by sampling the bugs that live in a stream, which we can use to calculate a stream health score.

I am interested in monitoring _____ stream that runs through your property because _____ _____. We have a permit through the Department of Wildlife Resources to do this sampling, and our data is sent to the Department of Environmental Quality. We won’t be directly reporting on anything related to your property or land management practices, though, because our results point to the health of the entire watershed and impacts from all the land upstream, not just what is happening on your property.

Would I have your permission to sample this stream once in the Spring and once in the Fall?”

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# Contact Us

**Email us at VASOS@iwla.org**

**Find us online at**

- **VASOS.org**
- **ChesapeakeMonitoringCoop.org**
- **IWLA.org/Water**

**Call us at 301-548-0150**

**Follow us on Social Media**

- **facebook.com/SaveOurStreamsIWLA/**
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Chesapeake Monitoring Cooperative