SAVE OUR STREAMS

THE IZAAK WALTON LEAGUE OF AMERICA

SOS CHEMICAL MONITORING MANUAL

IZAAK WALTON LEAGUE OF AMERICA
www.IWLA.org/sos

Table of Contents

Clean Water Hub

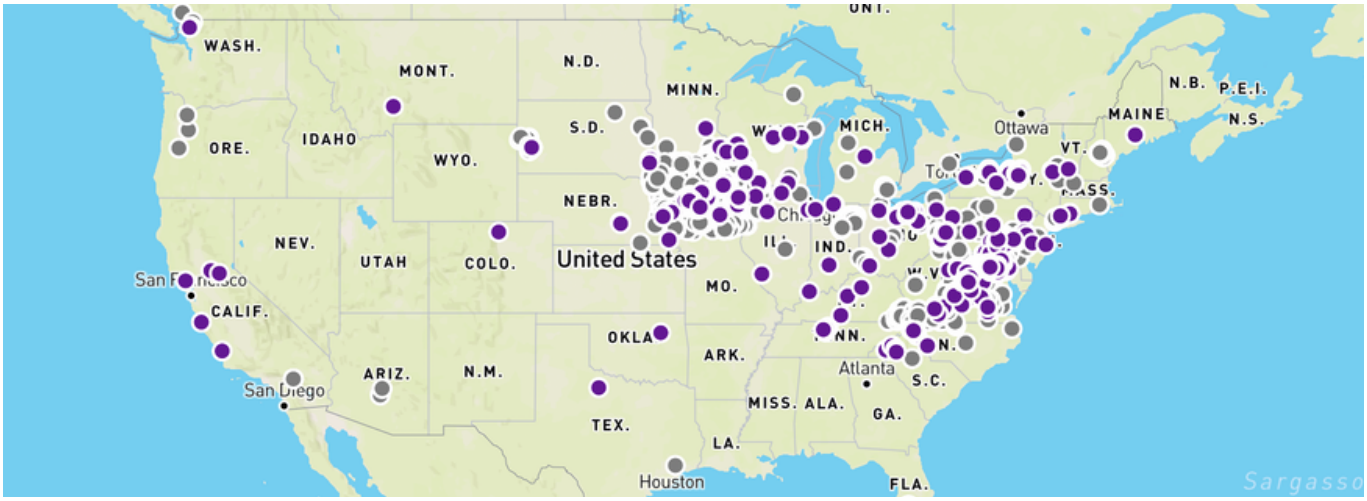
What is the Clean Water Hub?

The Clean Water Hub is a 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;

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

Visit **www.cleanwaterhub.org** to explore the map, create an account, and add your data.



Request a Clean Water Hub Group/Organization Profile

To see all of your sites in one place and access downloads of your data, you can request an organization profile be made for your monitoring group/chapter/organization. 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 a profile using this online form, or by emailing **sos@iwla.org**.

Chemical Monitoring Equipment

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

Transparency Tube

Phosphate Test Kit

Dissolved Oxygen Test Kit

Nitrate/Nitrite Test Strips

pH Test Strips

Chloride Test Strips

Additional supplies:

- Waste container
- SOS datasheets and instructions
- Pencils/pens
- Clipboard

Aquatic thermometer

Check Your Equipment Before Going Out in the Field

Before each monitoring session, check to make sure all of the materials are clean, in good condition, and not expired.

SOS Chemical Datasheet

SAVE OUR STREAMS IZAAK WALTON LEAGUE OF AMERICA

Chemical Monitoring Data Form for Stream Monitors

Name of Stream: _____ Name of monitoring site: _____

Name of Certified Monitor(s): _____

Group/Organization: _____ Number of participants: _____

City/State: _____ Latitude: _____ Longitude: _____

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 monitoring event.

WEATHER CONDITIONS (check all that apply)

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

COLLECTED DATA

Dissolved Oxygen: _____ mg/L _____ % saturation (*See page 2 of this form to calculate % saturation)*

pH: _____ pH units

Chloride: _____ Quantab Units _____ mg/L *(Convert Quantab Units to mg/L using the chart provided on the bottle)*

Phosphate: _____ mg/L

Nitrate-N: _____ mg/L

Transparency (record whole numbers only): _____ centimeters

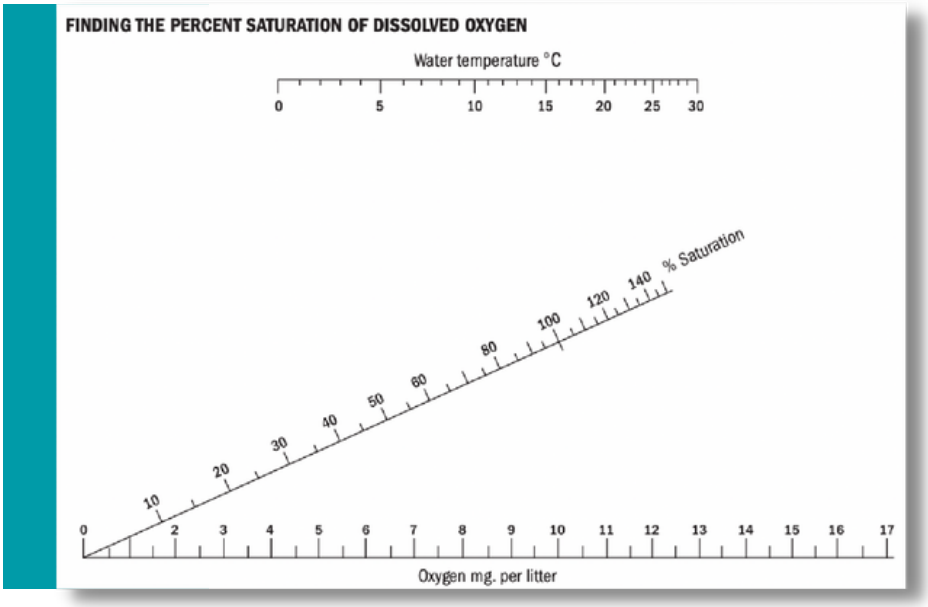
Water temperature: _____ °C

Other Stream Assessment Observations and Notes: _____

_____

Determining Dissolved Oxygen Percent Saturation

Use the chart on the back side of the Chemical Monitoring Data Form to determine dissolved oxygen percent saturation. Place a straight edge on the concentration (mg/L) of dissolved oxygen you measured at your site, then place the other end of the straight edge on the water temperature. The point where the straight edge passes through the line labeled "% Saturation" is your dissolved oxygen percent saturation.



Water Quality Summation

Compare your chemical readings to the values on the Water Quality Summation table on the back side of the Chemical Monitoring Data Form.

WATER QUALITY SUMMATION for Chemical Tests

	Excellent	Good	Fair	Poor
Dissolved Oxygen (% saturation)	80-120	70-79 121-140	50-69 >140	<50
pH (units)	7.0-7.5	6.5-6.9 7.6-8.5	5.5-6.4 8.6-9.0	<5.5 >9.0
Chloride (Cl) (mg/L)	0-20	21-50	51-250	>250
Reactive Phosphate (PO_4X^3) (mg/L)	0-0.2	0.3-0.5	0.6-2.0	>2.0
Nitrate (NO_3) (mg/L)	0-3	>3-5	>5-10	>10
Transparency (cm)	≥65.0	64.9-35.0	34.9-15.5	<15.5

Chemical Monitoring Protocol

Objective:

Perform chemical tests on a water source to determine if environmental conditions are influencing the water chemistry. Use the SOS chemical datasheet to record your results and determine water quality.

Dissolved Oxygen

For use with the CHEMetrics dissolved oxygen test kit

1. Remove the 25 ml sample cup from the kit and rinse it three times with stream water.
2. Wade out to the spot with the greatest flow of water.
3. Lower the sample cup down to wrist depth while holding it upside down. Turn the opening downstream so that the cup backfills with water, then turn the cup upstream and carefully remove cup and water sample from stream.
4. Place a glass ampoule in the sample cup, tilting it so the tip is wedged in one of the spaces along the side of the sample cup.
5. Snap off the tip of the ampoule by pressing it against the side of the cup, allowing it to fill with water.
6. Remove the ampoule from the cup and mix the water by inverting the ampoule several times. Be careful not to touch the broken end, as it will be sharp.
7. **Two minutes** after you break off the ampoule tip, compare the ampoule to the color standards provided in the kit. Remove sunglasses before making a color determination. NOTE: It's important to read the ampoule exactly at two minutes – it will continue to change color.
8. Hold the comparator nearly flat while standing directly beneath a bright source of light. Place your ampoule between the color standards moving it from left to right until the best color match is found. Record your result on the Chemical Data Form.

Note: For each chemical test, check the expiration dates on all test strips, ampoules, etc. If materials have expired, DO NOT USE them.

pH

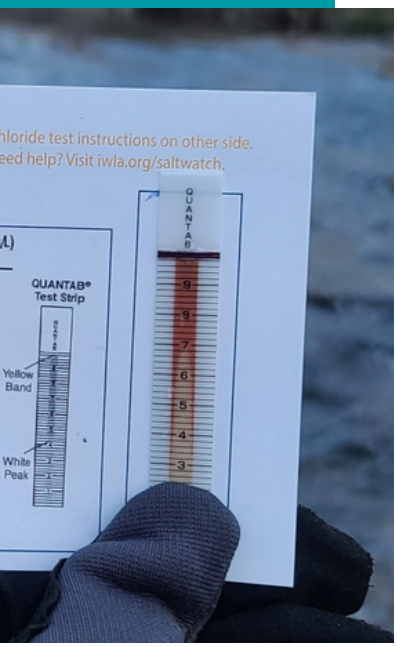
For use with Hach® pH test strips

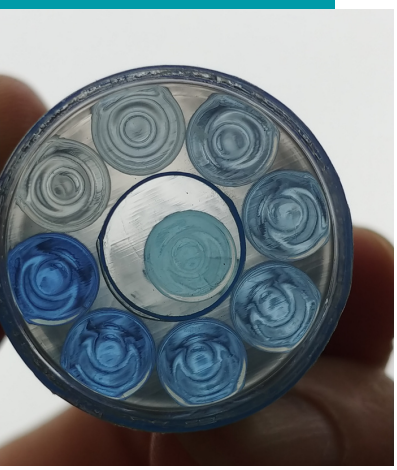
1. From your monitoring station, wade straight out to the spot with the greatest flow of water and, facing upstream, dip the test strip in the water and remove it immediately.
2. Hold the test strip level for **15 seconds**. DO NOT SHAKE excess water from the test strip.
3. Estimate pH by comparing the test strip to the color chart on the test strip bottle. Remove sunglasses before reading the strip. The strip will continue to change color, so it is important to make a color determination immediately after 15 seconds.
4. Record results on the Chemical Data Form.

Chloride

For use with Hach Chloride QuanTab® titration strips

1. Rinse a sample cup three times with stream water.
2. From your monitoring station, wade straight out to the spot with the greatest flow of water and, facing upstream, fill the sample cup with approximately 1 inch of water.
3. Remove a test strip from bottle and replace the cap immediately.
4. Insert the lower end of the test strip into the sample cup filled with water. Do not submerge past the yellow line at the top of the titrator.
5. Allow the sample water to completely saturate the wick of the titrator. There is no time limit for this test – the reaction is complete when the yellow line turns dark (this will take a few minutes).
6. Note where the tip of the white chloride peak falls on the numbered QuanTab scale. This represents the QuanTab unit value.
7. Refer to the table on the QuanTab test strip bottle to convert the QuanTab units into a chloride concentration (units of ppm or mg/L). Record the result on the Chemical Data Form.
8. If the QuanTab unit value is below the smallest value on your test strip bottle, report the chloride concentration as the lowest concentration listed on the test strip bottle and make a note in the comments section.





Phosphate

For use with CHEMetrics phosphate test kit

1. Remove the 25 ml sample cup and black lid from the kit and rinse them three times with stream water.
2. Wade out to the spot with the greatest flow of water.
3. Lower the sample cup down to wrist depth while holding it upside down. Turn the opening downstream so that the cup backfills with water, then turn the cup upstream and carefully remove the cup and water sample from the stream.
4. Gently tip the sample cup to pour off excess water. The cup should be filled to the 25 mL mark.
5. Add 2 drops of A-8500 Activator Solution, place the black cap on the sample cup, and shake to mix the contents.
6. Place a glass ampoule in the sample cup, tilting it so the tip is wedged in one of the spaces along the side of the sample cup.
7. Snap off the tip of the ampoule by pressing it against the side of the cup, allowing it to fill with water.
8. Remove the ampoule from the cup and mix the water in the ampoule by inverting it slowly several times. Be careful not to touch the broken end, as it will be sharp.
9. **Two minute**s after you break off the ampoule tip, compare the ampoule to the color standards provided in the kit. Remove your sunglasses before making a color determination. NOTE: It's important to read the ampoule exactly at two minutes – it will continue to change color.
10. Based on the color of your ampoule, use the appropriate color comparator to estimate the phosphate concentration.
    a. The low-range circular comparator measures concentrations ranging from 0 to 1 mg/L. To use the circular comparator, place your ampoule, flat end downward, into the center tube. Direct the top of the comparator up toward a good light source while viewing from the bottom. Rotate the comparator to match your ampoule to the standards and record your results on the Chemical Data Form.
    b. The high-range comparator in the lid of the kit measures concentrations ranging from 1 to 10 mg/L. Hold the high range comparator nearly flat while standing directly beneath a bright source of light. Place your ampoule between the color standards moving it from left to right until the best color match is found. Record result on the Chemical Data Form.

Nitrate

For use with Hach® nitrate-N/nitrite-N test strips

1. Dip the test strip into the water for one second and remove. DO NOT SHAKE excess water from the test strip.
2. Hold the strip level, with pad side up, for 30 seconds.
3. At exactly **30 seconds**, compare the NITRATE (upper) test pad to the nitrate-nitrogen color chart on test strip bottle, estimate the nitrate concentration in mg/L, and record your reading on the Chemical Data Form. (Remove sunglasses before reading the strip.) The pad will continue to change color, so make a determination immediately after 30 seconds.

Note: Each nitrate-N/nitrite-N test strip also has a second tab for measuring nitrite-N. Save Our Streams chemical monitoring does not collect nitrite-N data, so you may disregard this test pad.

Transparency

For use with transparency tube

1. Make sure the finger clamp on the hose is closed.
2. From your monitoring station, wade straight out to the spot with the greatest flow of water and, facing upstream, fill the transparency tube.
3. Hold the tube upright and in the shade. Use your body to shade the tube if nothing else is available.
4. With your back to the sun, look directly into the tube from the open top and release water through the small hose, regulating the flow with the finger clamp until you are able to distinguish the black and white pattern (Secchi pattern) on the bottom of the tube. Close the finger clamp.
5. Read the number on the outside of the tube that is closest to the water line. Record your reading in centimeters (cm).
6. If the Secchi pattern is visible when the transparency tube is completely full of water, record a transparency reading of 65.0 cm and make a note in the comments section.
7. Rinse the tube after each use so that the bottom Secchi pattern does not become dirty and clouded.

Water Temperature

For use with an aquatic thermometer

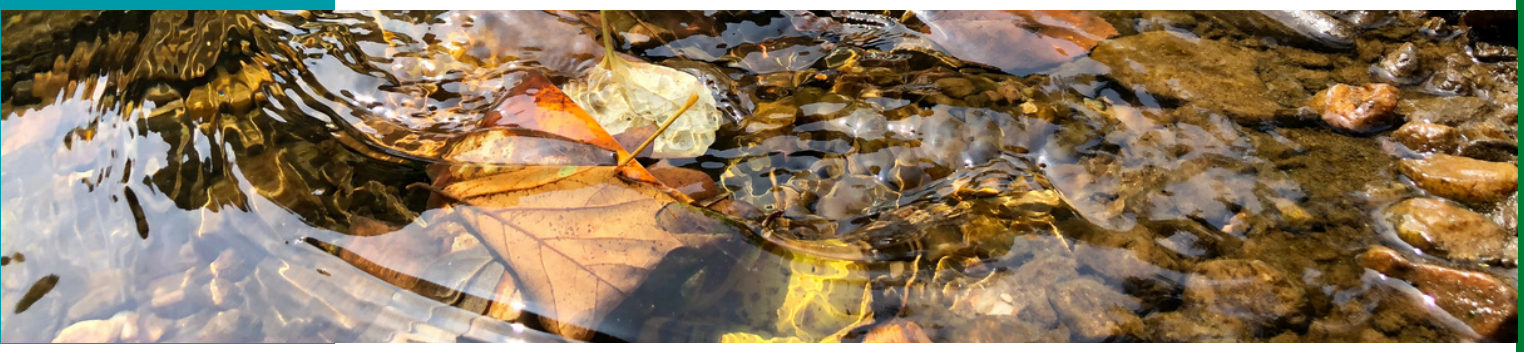
1. From your monitoring station, wade straight out to the spot with the greatest flow of water and place the thermometer or probe directly into the stream
2. Hold the thermometer underwater for at least **two minutes** so the reading can stabilize.
3. Record the temperature on your Chemical Data Form in degrees Celsius (°C).

Use and Storage of Chemical Testing Materials

Chemicals in test kits, though not dangerous, can cause mild skin and eye irritation and should be handled with care. Ampules are made of glass and can be very sharp. Test strips along with waste materials can be disposed of as you would any household item.

Store all chemical testing materials at room temperature. Dissolved oxygen and phosphate testing kits must be stored in the dark. Check expiration dates and avoid using expired materials (which could provide inaccurate results).

You can find links to purchase stream monitoring test kits and equipment on the Izaak Walton League website at **iwla.org/water/resources-for-monitors.**



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.

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**.

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.

Contact Us

Email us at SOS@iwla.org

Find us online at www.iwla.org/sos

Call us at 301-548-0150

Follow us on Social Media

- **facebook.com/SaveOurStreamsIWLA**
- **instagram.com/saveourstreams**

SAVE OUR STREAMS

IZAAK WALTON LEAGUE OF AMERICA