

Georgia Adopt-A-Stream Chemical Monitoring



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Georgia Adopt-A-Stream

- What is it?

Georgia's volunteer water quality monitoring program

- Program Goals

A: Increase public **awareness**

D: Collect quality baseline water quality **data**

O: Gather **observations**

P: Encourage **partnerships** between citizens & local government

T: Provide **tools & training**

Physical/Chemical Monitoring

- Purpose: Gather info about specific water quality characteristics
- In addition to the basic visual observations and weather information, AAS recommends monitoring these core parameters:
 - ❖ Temperature
 - ❖ Dissolved Oxygen
 - ❖ pH
 - ❖ Conductivity (Stream and Lake)
 - ❖ Clarity (Coastal and Lake)
 - ❖ Salinity (Coastal)
- Nutrient testing, alkalinity, and settleable solids monitoring may be added to your list as interest and equipment allows.



EPA Quality Assurance Project Plan

- Quality Assurance
Quality Control (QA/QC)
- Only individuals are certified
- Certification is valid for one year
- Volunteers must attend an annual recertification workshop
- Only certified volunteers can submit data!



To Become a Certified QA/QC Volunteer...

- In the field, volunteers' methods must achieve results within the duplicate precision rules of those obtained by the trainer
- Volunteers must pass a written evaluation with a score of at least **80%**

What is a Watershed?

- A watershed is the land area from which water, sediment, and dissolved materials drain to a common point along a stream, wetland, lake or river.
- Its boundaries are marked by the highest points of land around the waterbody.



Where, When and How Often?

Where - Same site location and in a **well mixed area** of flowing water

When - **Same time of day** and during normal flow conditions

How often - At least **once a month**



Safety Considerations

If conditions are too dangerous to sample...

DON'T SAMPLE!

- Wait until storm has stopped and strong flow has subsided
- Never sample alone
- Remember to wear gloves and boots
- Use waste bucket to dispose of chemicals!
- Receive permission from land owner before going onto private property

Temperature (°C)

Measurement:

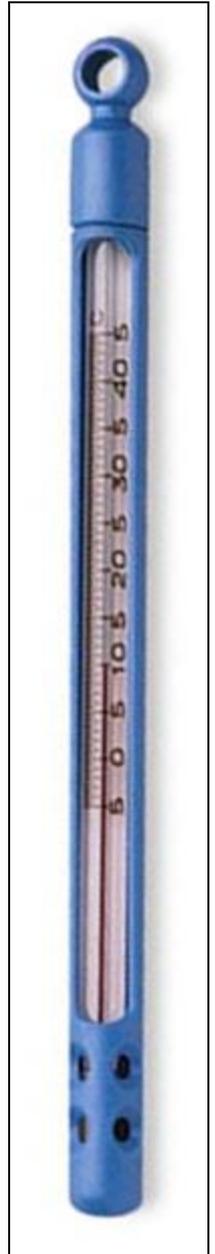
- **In the shade**, away from direct sunlight.
- **Take air temperature before water temperature.**
- Single measurement for each parameter
- Measured in degrees Celsius (°C)

State Standards for Water Temperature:

- Less than 32.2°C (90°F)

Importance:

- Temperature affects **feeding, respiration, and aquatic metabolism.**
- Life adapts to a narrow range of temperatures. Changes of only a few degrees can affect the life in a stream.
- Temperature/dissolved oxygen relationship:
The higher the temperature, the less oxygen water can hold.



Dissolved Oxygen

(mg/L or ppm)

Measurement:

- Rinse sampling bottles twice before collecting sample
- Submerge bottle completely in stream and cap under water
- Take two samples for duplicate precision.
 - **Two samples must be within +/- 0.6 of each other**
 - **If not, take another sample until two are within that range.**
- Measured in mg/L or ppm (1 mg/L = 1 ppm)

State Standards for DO levels:

- **Average of 5 mg/L**
- A minimum of 4 mg/L
- Trout streams: Average of 6 mg/L and a minimum of 5 mg/L

Importance:

- Needed for respiration for all aquatic life
- Can be altered by other physical/chemical parameters



Dissolved Oxygen

Inversely related to temperature:

- **As temperature increases, DO decreases**
- **As temperature decreases, DO increases**

DO is introduced into water via:

- **diffusion from the atmosphere**
- **plant metabolism** as a waste product of **photosynthesis**
- **turbulent mixing (riffles)**

DO levels may **decrease** due to

- rising temperatures
- **an overload of decaying organic matter** (due to excess nutrients)
- slow moving, deep water



pH

A measure of hydrogen ions (H⁺)

Measured on a 0-14 scale with 7 being neutral

Pure water has equal amount of H⁺ and OH⁻ ions (pH of 7)

Measurement:

- Rinse sampling bottles twice before collecting sample
- Take two samples for duplicate precision.
 - **Two samples must be within +/-0.25 of each other**
 - **If not, take another sample until two are within that range.**

State Standards for pH:

- **Between 6 and 8.5**
- **Some south Georgia waters may have pH as low as 3.5**
- **In coastal waters, pH increases (becomes more basic) with increasing salinity and is still within state standards.**

Importance:

- Aquatic organisms are sensitive to pH fluctuations



Conductivity

(mS/cm)

A measure of water's ability to pass an electrical current

Indicates the presence of ions in the water

Measurement:

- Single measurement for conductivity
- Measured in microSiemens per centimeter ($\mu\text{S}/\text{cm}$)
- **Conductivity meter should be calibrated within 24 hours prior to each monitoring event.**
- Record calibration information on data sheet

State Standards:

- No regulated level in Georgia
- Georgia waters generally range from 50 to 1500 $\mu\text{S}/\text{cm}$
- AAS advises volunteers to find normal background levels
 - Closely monitor any deviations



Conductivity

Is primarily affected by the geology of the area through which water flows

- Water that flows through granite tends to have lower conductivity
- Water that runs through limestone and clay has higher conductivity

What else affects baseline conductivity levels?

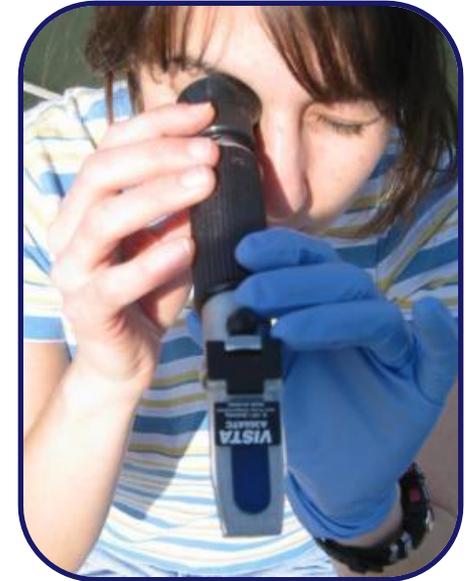
- **Mining operations** – release of iron, copper and cadmium
- **Agriculture** – adds nutrient ions
- **Sewage effluent** – chloride, nitrates and phosphate
- **Urban runoff** – auto fluids, salts and other chemicals

Salinity (ppt)

Measures amount of dissolved salts in water

Measurement:

- Measured in parts per thousand (ppt)
- **Refractometer should be calibrated within 24 hours prior to each monitoring event.**
- Record calibration information on data sheet
- Take two samples for duplicate precision.
 - Two samples must be within **+/-1.0 ppt** of each other
 - If not, **take another sample until two are within that range.**



State Standards:

- No regulated level in Georgia
- Salinity of seawater is about 35ppt
- **Salinity varies depending on tidal stage and freshwater inputs**

Importance:

- Aquatic plants and organisms are sensitive to changes in salinity

Water Clarity

Measures the transparency or clearness of the water
Is affected by algae growth and the amount of suspended particles

Measurement:

- Instrument: Secchi Disk
- Measures Secchi Disk Depth in cm
- Take two samples for duplicate precision:
 - **Two samples must be within +/-10cm of each other**
 - **If not, take another sample until two are within that range.**

State Standards:

- No regulated value in Georgia



Water Clarity

Importance:

- Suspended particles can lower water clarity which can:
 - **Limit the amount of sunlight available for photosynthesis**
 - Damage gills of fish and macroinvertebrates
 - Suffocate fish and oysters
 - Disturb filter feeding of organisms

- What can affect water clarity?
 - Natural influences: rainfall, tidal stage, wind and algae growth
 - Human influences: nutrient additions, development, boating and dredging activities

Nutrients

Nitrates

- A nutrient found in the water from fertilizers or animal waste. Sewage is the main contributor.
- Normal background levels are below 1ppm

Phosphates

- A nutrient found in water from soaps, fertilizer, animal waste, industrial effluent and sewage
- Normal background levels are below 0.1ppm

Excess nutrients can cause algal blooms, affect sensitive macroinvertebrates, and decrease dissolved oxygen levels

Chemical Kit Maintenance & Disposal

- **Store chemical kits in a cool, dark place.**
- **Replace chemicals when expired or contaminated**
- **Disposal of chemicals:**
 - **Used:** flush down drain with water (goes to a water treatment facility)
 - **Contaminated/expired:** Hazardous waste day or return to AAS/AAW office for disposal
- **Contact your local coordinator or the Georgia Adopt-A-Stream office for replacement equipment or reagents**



GEORGIA ADOPT-A-STREAM: Chemical Form

To be conducted every month

All monitoring programs

Chemical specific

SITE INFORMATION	Group Name: _____		Event Date: _____ (MMDDYYYY)						
	Group ID: G-_____ Site ID: S-_____		Time Sample Collected: _____ (HHMM am/pm)						
WEATHER	Present conditions (check all that apply)								
	<input type="checkbox"/> Heavy Rain		<input type="checkbox"/> Steady Rain						
	<input type="checkbox"/> Overcast		<input type="checkbox"/> Partly Cloudy						
	<input type="checkbox"/> Intermittent Rain		<input type="checkbox"/> Clear/Sunny						
		Amount of rain, if known?							
		Amount in Inches: _____							
		In Last Hours/Days: _____							
		*Refer to wunderground.com for rainfall data							
OBSERVATIONS	Flow/Water Level: <input type="checkbox"/> Dry <input type="checkbox"/> Stagnant/Still <input type="checkbox"/> Low <input type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Flow (over banks)								
	<small>(check all that apply)</small>								
	Water Clarity: <input type="checkbox"/> Clear/Transparent <input type="checkbox"/> Cloudy/Somewhat Turbid <input type="checkbox"/> Opaque/Turbid								
	Water Color: <input type="checkbox"/> No Color <input type="checkbox"/> Brown/Muddy <input type="checkbox"/> Green <input type="checkbox"/> Milky/White <input type="checkbox"/> Tannic <input type="checkbox"/> Other: _____								
	Water Surface: <input type="checkbox"/> Clear <input type="checkbox"/> Oily sheen: Does it break when disturbed? Yes/No (circle one) <input type="checkbox"/> Algae								
	<input type="checkbox"/> Foam <input type="checkbox"/> Greater than 3" high <input type="checkbox"/> It is pure white Other: _____								
	Water Odor: <input type="checkbox"/> Natural/None <input type="checkbox"/> Gasoline <input type="checkbox"/> Sewage <input type="checkbox"/> Rotten Egg								
	<input type="checkbox"/> Fishy <input type="checkbox"/> Chlorine <input type="checkbox"/> Other: _____								
	Photos: Please take images to document your observations and changes in water quality conditions. Photo point directions can be found in the manuals. Images can be submitted online with your other data.								
	Trash: <input type="checkbox"/> None <input type="checkbox"/> Yes, I did a cleanup <input type="checkbox"/> This site needs an organized cleanup								
CHEMICAL	Conductivity Meter Calibration (within 24hrs of sampling)								
	Date _____ Time _____ Standard Value _____ Initial Meter Reading _____ Meter Adjusted to _____								
	Reagents: Are any reagents expired? <input type="checkbox"/> Yes <input type="checkbox"/> No List any expired: _____								
	Core Tests		Test 1	Test 2	Units	Other Tests	Test 1	Test 2	Units
	Air Temp				°C				
	Water Temp				°C				
	pH (+/-0.25)				Standard unit				
Dissolved Oxygen (+/-0.6)				mg/L or ppm					
Conductivity				uS/cm					
COMMENTS	Any changes since you last sampled at this site? If yes, please describe.								

Observations

- Flow/Water Level
- Water Clarity
- Water Color
- Water Surface
- Water Odor
- Photos
- Trash



OBSERVATIONS	Flow/Water Level: <input type="checkbox"/> Dry <input type="checkbox"/> Stagnant/Still <input type="checkbox"/> Low <input type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Flood (over banks) <small>(check all that apply)</small>
	Water Clarity: <input type="checkbox"/> Clear/Transparent <input type="checkbox"/> Cloudy/Somewhat Turbid <input type="checkbox"/> Opaque/Turbid
	Water Color: <input type="checkbox"/> No Color <input type="checkbox"/> Brown/Muddy <input type="checkbox"/> Green <input type="checkbox"/> Milky/White <input type="checkbox"/> Tannic <input type="checkbox"/> Other: _____
	Water Surface: <input type="checkbox"/> Clear <input type="checkbox"/> Oily sheen: Does it break when disturbed? Yes/No (circle one) <input type="checkbox"/> Algae <input type="checkbox"/> Foam <input type="radio"/> Greater than 3" high <input type="radio"/> It is pure white Other: _____
	Water Odor: <input type="checkbox"/> Natural/None <input type="checkbox"/> Gasoline <input type="checkbox"/> Sewage <input type="checkbox"/> Rotten Egg <input type="checkbox"/> Fishy <input type="checkbox"/> Chlorine <input type="checkbox"/> Other: _____
	Photos: Please take images to document your observations and changes in water quality conditions. Photo point directions can be found in the manuals. Images can be submitted online with your other data.
	Trash: <input type="checkbox"/> None <input type="checkbox"/> Yes, I did a cleanup <input type="checkbox"/> This site needs an organized cleanup

Chemical Data Form

- Use Chemical data form (Chemical/Bacterial combo data form may also be used)
- Remember:
 - Check expiration dates of reagents
 - Duplicate precision for pH and Dissolved Oxygen

CHEMICAL	Conductivity Meter Calibration (within 24hrs of sampling)							
	Date _____ Time _____ Standard Value _____ Initial Meter Reading _____ Meter Adjusted to _____							
	Reagents: Are any reagents expired? <input type="checkbox"/> Yes <input type="checkbox"/> No List any expired: _____							
	Core Tests	Test 1	Test 2	Units	Other Tests	Test 1	Test 2	Units
	Air Temp			°C				
	Water Temp			°C				
	pH (+/-0.25)			Standard unit				
Dissolved Oxygen (+/-0.6)			mg/L or ppm					
Conductivity			uS/cm					

Submit the Data

As soon as possible after monitoring is complete

Data should be submitted to the state program's **online database:**

AdoptAStream.Georgia.gov

Share your data with partners, local governments and your local Adopt-A-Stream coordinators



Georgia Adopt-A-Stream

Georgia's Volunteer Water Quality Monitoring Program

Search this site



Get Involved

Confluence

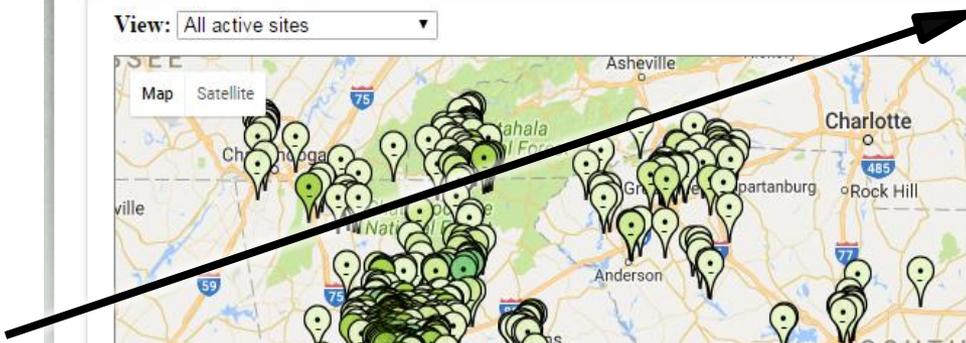
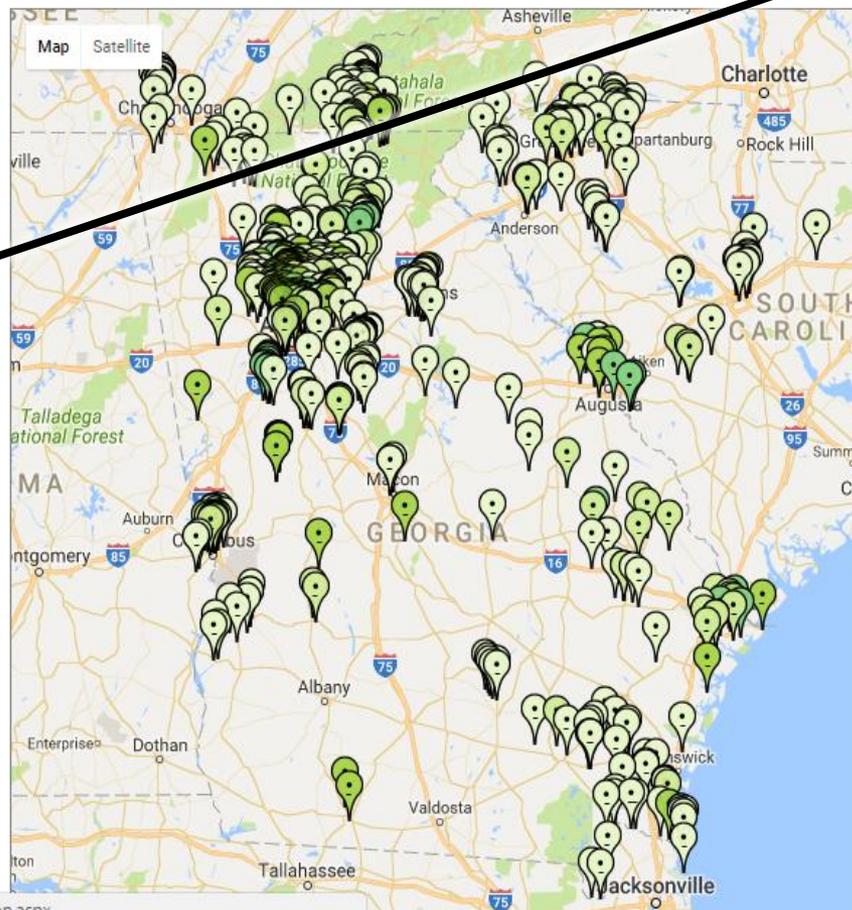
Citizen Monitoring

Data Views

Data Entry

Materials & Resources

View: All active sites



Data Submission Form

Register Group or Site

Trainers: Enter Workshop Data

Trainers: Certificates & Letters

Trainer Workshop History

Events shown in time zone: Eastern Time [GoogleCalendar](#)

Check out our most recent newsletter!

GEORGIA Adopt-A-Stream

Congratulations to the 2015 Adopt-A-Stream Award Winners!

Georgia Adopt-A-Stream is proud to honor the dedicated, volunteer water quality monitors who have taken time and energy to protect and improve Georgia's waterways. We are honored to recognize the following individuals and groups for their achievements and for their efforts and hard work for the good of the program.

2015 Trips: Volunteer of the Year
Shelby River: Volunteer of the Year
2015 Adopt-A-Stream Volunteer of the Year

1

Announcements

AAS Volunteer Monitoring Conference - Confluence 2017

Learn More About Getting Started With Adopt-A-Stream

From the website's Home Page, select "Data Submission Form" under the Data Entry tab.



[Site](#) [Chemical](#) [Bacterial](#) [Macroinvertebrate](#) [Stream Habitat Survey](#)

GEORGIA ADOPT-A-STREAM Data Submission Form

[Trainings calendar](#)

[Errors and Warnings list](#)

You must enter Site information and click "submit" at the bottom of the page before moving on to the chemical, bacterial, macroinvertebrate, or stream habitat survey forms. You must click submit on each page on which you enter data.

Below six parameters required

AAS monitors, Total participants, Site, Event Date, Event Time, Time Spent Sampling

You *cannot* submit a form that has **Errors** or missing **Required Data**.

You *can* submit a form that has **Warnings**, but it will be flagged as out of compliance with the AAS quality assurance plan.

Site, Weather, and Observations

Site Information

Site:

Enter the site name or site number without the S-, and select from the list.
Note that you must be a member of a group before you can submit data for its sites.

Event date: mm/dd/yyyy <input type="text"/>	Time sample collected: 03 :02 PM hh:mm am/pm	Total number of participants: <input type="text"/>	Time spent sampling: <input type="text"/> minutes	Total time spent traveling: <input type="text"/> minutes <i>Optional</i>	Furthest distance traveled: <input type="text"/> miles <i>Optional</i>
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Participants

Adopt-A-Stream monitors

Enter one at a time, and select from the drop-down list.

Other participants

Enter your site information as well as any weather and observation information on this page.



Georgia Adopt-A-Stream

[Return to Home Page](#)

Georgia's Volunteer Water Quality Monitoring Program

User: **Jennings**

[Citizen Monitoring](#) | [Data Views](#) | [Data Entry](#) | [Reports](#) | [Outreach Staff](#) | [My Profile](#)

[Site](#) | [Chemical](#) | [Bacterial](#) | [Macroinvertebrate](#) | [Stream Habitat Survey](#)

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Site, Weather, and Observations

Site Information

Site:

(scroll to the bottom of the page...)

Comments

Any changes to note since you last sampled at this site?
If so, please describe. Otherwise, please leave blank.

Large text area for entering comments.

Email

Clear check box if you don't want email confirmation.

Click "Submit" at the bottom of the page to record your data. You must submit your site data before you can enter chemical data



GEORGIA ADOPT-A-STREAM Data Submission Form

[Trainings calendar](#)

[Errors and Warnings list](#)

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Site, Weather, and Observations

Site Information

Site:

Enter the site name or site number without the \$-, and select from the list.
Note that you must be a member of a group before you can submit data for its sites.

Event date: <small>mm/dd/yyyy</small> <input type="text"/>	Time sample collected: <input type="text" value="03 :02 PM"/> <small>hh:mm am/pm</small>	Total number of participants: <input type="text"/>	Time spent sampling: <input type="text"/> minutes	Total time spent traveling: <input type="text"/> minutes <small>Optional</small>	Furthest distance traveled: <input type="text"/> miles <small>Optional</small>
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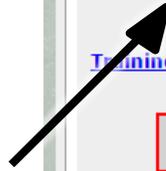
Participants

Adopt-A-Stream monitors

Enter one at a time, and select from the drop-down list.

Other participants

After clicking "Submit," click on the Chemical tab to continue entering data



Chemical Data

Did you calibrate your meter and/or probe?

Yes
 No, please explain:

Reagents

Select any expired reagents:

Alkaline Potassium Iodide Azide
 Manganous Sulfate Solution
 pH Wide Range Indicator
 Sodium Thiosulfate
 Starch Indicator
 Sulfuric Acid 1:1
 Other:

Contact the State office at AAS@gaepd.org to obtain replacement reagents.

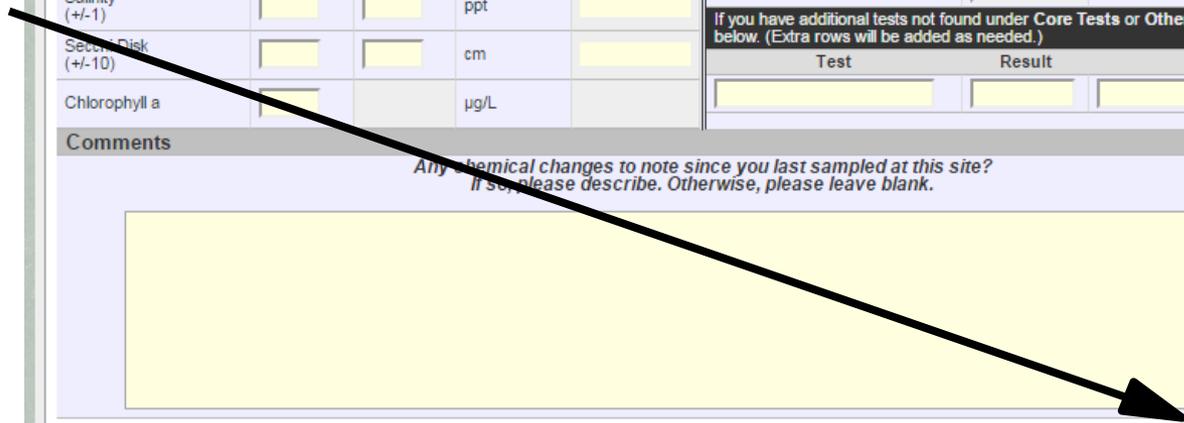
Tests

Core Tests	Test 1	Test 2	Units	Average	Other Tests	Result	Units
Air Temp	<input type="text"/>	<input type="text"/>	°C	<input type="text"/>	Alkalinity	<input type="text"/>	mg/L (ppm)
Water Temp	<input type="text"/>	<input type="text"/>	°C	<input type="text"/>	Ammonia-N	<input type="text"/>	mg/L (ppm)
pH (+/-0.25)	<input type="text"/>	<input type="text"/>	Standard unit	<input type="text"/>	Nitrate-N	<input type="text"/>	mg/L (ppm)
Dissolved Oxygen (+/-0.6)	<input type="text"/>	<input type="text"/>	mg/L (ppm)	<input type="text"/>	Orthophosphate	<input type="text"/>	mg/L (ppm)
Conductivity	<input type="text"/>	<input type="text"/>	µS/cm	<input type="text"/>	Sampling Depth	<input type="text"/>	cm
Salinity (+/-1)	<input type="text"/>	<input type="text"/>	ppt	<input type="text"/>	Settleable Solids Enter T for Trace	<input type="text"/>	mg/L (ppm)
Secchi Disk (+/-10)	<input type="text"/>	<input type="text"/>	cm	<input type="text"/>	Turbidity	<input type="text"/>	NTU
Chlorophyll a	<input type="text"/>	<input type="text"/>	µg/L	<input type="text"/>	If you have additional tests not found under Core Tests or Other Tests, enter them below. (Extra rows will be added as needed.)		
					Test	Result	Units
					<input type="text"/>	<input type="text"/>	<input type="text"/>

Comments

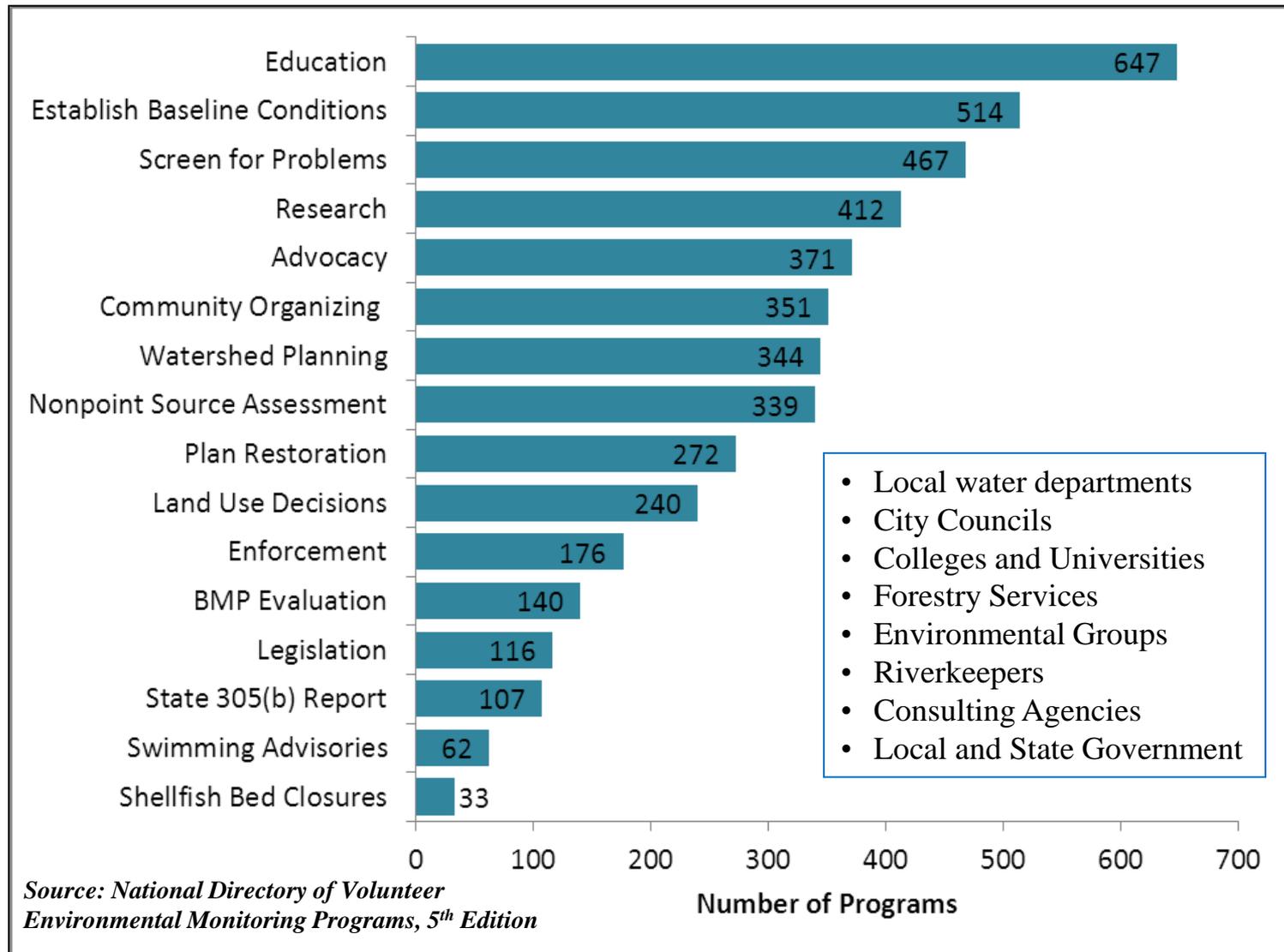
Any chemical changes to note since you last sampled at this site? If so, please describe. Otherwise, please leave blank.

Fill out the form and click "Submit" to record your chemical data!



Note: You must click "Submit" on each tab if you are entering data for multiple parameters

Volunteer Monitoring Data Uses



Just the Facts

- Raise **A**wareness
- Water quality **D**ata
- Gather **O**bservations
- Encourage **P**artnerships
- Provide **T**ools and **T**raining

Once a month

Well mixed area
and at the same
time of day

What is a
watershed?

Temperature
and DO

pH in South GA

Care for your kit

Water clarity and
plant growth

Data: on-line database as soon as possible, local program, city & county government & municipality, partners, county commissioners, universities, others?

Excess Organic Matter:
Causes a decrease in
dissolved oxygen levels

Conductivity: The ability of water to carry a current. Is affected by mining, agriculture, sewage effluent, urban runoff.

How is oxygen
introduced into
water?

Temperature:
importance of,
where to measure...

Parameter	State Standards	Duplicate Precision	Units
Dissolved Oxygen	Avg of 5, not <4	+/- 0.6	Mg/L or ppm
pH	6-8.5	+/- 0.25	
Salinity		+/- 1.0	ppt
Clarity (Secchi Disk)		+/- 10	cm

When to
calibrate?

← Coastal Volunteers

← Coastal and Lake Volunteers