

Tools of the Trade: Georgia's Water Quality Database

Harold L. Harbert

Introduction

- Adopt-A-Stream initiated in 1992
 - Georgia Environmental Protection Division
- Created a quality assurance plan
- Data was logged in a Paradox database, 1997
- Housed in networked Microsoft Access database, 2000
- Data displayed in Google Earth, 2005
- Contracted with Cooperative Extension Service, 2007

Programming and Software

Programmer on contract, 1 hour a day

- MS Access to store all data
- Google Maps for mapping data
- Flot for graphing data

- All online AAS tables and charts are created in JavaScript + HTML through queries to the Access database

- Run a Windows Server with IIS, and use ASP to query the database from within a web page



Live Database

- House database on a server that allows for instant access
- Supports Chrome, IE, Firefox, Opera, Safari
- Use nonproprietary, open software that required no downloads
 - Advantages & disadvantages
- Maintenance / Programming



Privacy

All monitoring data is public

Contact information is screened

- By default, phone numbers, e-mails, and addresses are hidden

• **Exceptions:**

- **AAS staff** - everyone
- **Trainers** - trainees
- **Group leaders** - group members
- **Volunteers** - coordinators and trainers
- **Volunteers** – e-mails of other members in their groups

Database Priorities

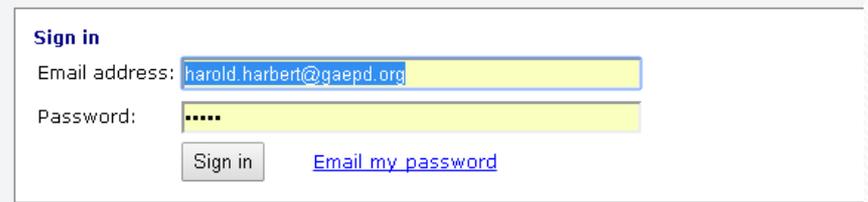
- User friendly and intuitively simple to navigate with limited training
- Volunteers can “see” their data
- Involve end user in all phases of design, development and after going live

Database Priorities

- Focus on program information
 - Training workshops
 - Certification and contact information
 - Levels of activity
 - New groups and sites
 - Participant information
- Captured monitoring data

Database Priorities

- Data access control by e-mail address
- Auto generated forms (names, e-mail, cities, watersheds, dates, etc.)
- Updates & edits take affect immediately
- Data is “read” in every workday around 6 PM



The screenshot shows a sign-in form with the following elements:

- Sign in** (header)
- Email address:** A text input field containing the email address `harold.harbert@gaeprd.org`.
- Password:** A text input field containing six asterisks (`*****`).
- Sign in** (button)
- [Email my password](#) (link)

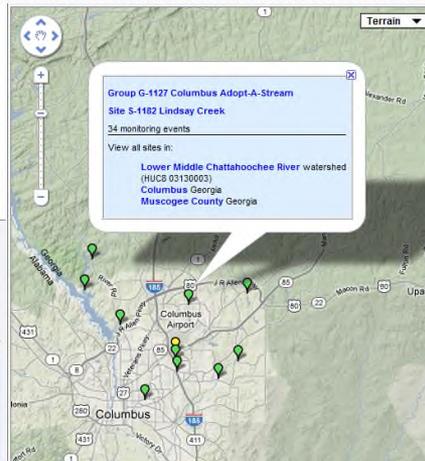
Your **Email address** is the address we have on file.

- **If this is your first visit, or if you've forgotten your password:**
Enter your email address and click **Email my password**. Your password will be sent to you. If you don't see it, be sure to check your Junk Mail or Spam folder.
- **Do you get an "Unknown email address" warning?**
Contact your [local Adopt-A-Stream Coordinator](#), who can help you register.
- **Has your email address changed?**
Log in with your original address, and then make changes on the **People** screen. You'll need to use your original address for future log ins.

The Adopt-A-Stream Database supports Internet Explorer, Firefox, Safari, Chrome, and Opera. It works on these browsers but still has problems with the program, [let us know](#).

Database Design and Creation

- Database driven website
- Real time data update



The screenshot shows the Georgia Adopt-A-Stream website, which is Georgia's volunteer water quality monitoring program. The page features a navigation menu with options like 'Adopt-A-Stream', 'Get Involved', 'Groups', 'Sites', 'People', 'Data Views', 'Data Entry', 'Materials & Resources', 'Teacher's Corner', 'Contact us', and 'Herbert Sign out'. Below the navigation is a banner with photos of volunteers. The main content area includes a 'NEW Online Data Entry, Data Forms & QC Measures 2014' section, a 'Meet Anne Stahley' profile, and a 'Did you know?' tip. A table displays statistics for April 25, 2014, and a calendar for the month. On the right, there is a map showing the locations of 531 active sites across Georgia, with a legend for the number of events per site (1-2, 3-4, 5-6, 7-8, 9+).

Apr 25, 2014	Groups	Sites	Events	Data	Volunteers	Newsletters
Currently active	196	505	4249	18531	2479	Jan-Mar 2014
Database totals	664	1451	23565	121906	20085	Archived

Friday, April 25

Saturday, April 26
Forsyth County - Amphibian Workshop

Saturday, May 3
9:00am Chemical and Bacterial Workshops, Augusta, GA

Wednesday, May 14
6:00pm Cobb Co. Bacteria Monitoring Workshop

AAS Coordinators and Trainers can post on the calendar. Contact the State Office for more information: aas@gaepd.org.

Data Display and Access

Download Excel files of all data

Search groups:

Columbus Adopt-A-Stream

Group ID: AAS-G-1127
Date of first monitoring event: 01/05/2009

Sites breakdown	
Muscogee County	2 sites
Lower Middle Chattahoochee River watershed	2 sites

Monday, May 14

Saturday, May 19

2:00pm **Gwinnett County-Chemical Monitoring**

Saturday, June 2

9:00am **Columbia Co- Biological Monitoring**

Saturday, June 9

9:00am **Columbus - Bacterial Monitoring**

10:00am **DeKalb Co-Chemical Monitoring**

Announcements

Become an AAS Trainer

Print the NEW AAS Who to Call List

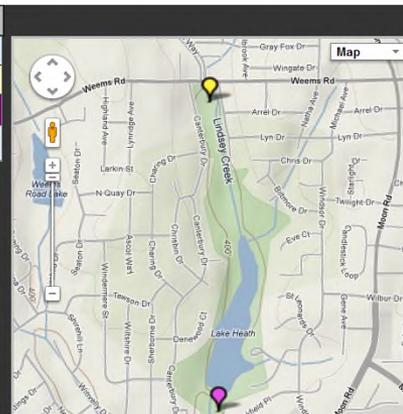
Watch a new AAS video by Tom Mills from Greenshortz.com

Like AAS on Facebook!

Sites Members

"Inactive" sites haven't had events submitted within the past 365 days. If new events are submitted, they will become active again.

All sites	Adopt-A-Stream	Rivers Alive	Both programs	No events
1	S-1182	Lindsay Creek	34	01/05/2009-02/15/2012
2	S-1647	Lindsay Creek	1	10/29/2010
Total Monitoring Events:			35	



[S-1182] Lindsay Creek is one of two sites monitored by group Columbus Adopt-A-Stream.

Site description: Our site is in Heath Park, adjacent to Weems Road, at the manhole cover(3 feet high) just before the second foot bridge.

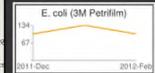
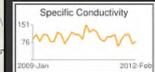
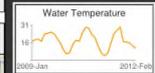
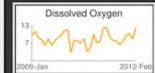
This site has thirty-four recorded monitoring events.

[Download to Excel]

At a glance

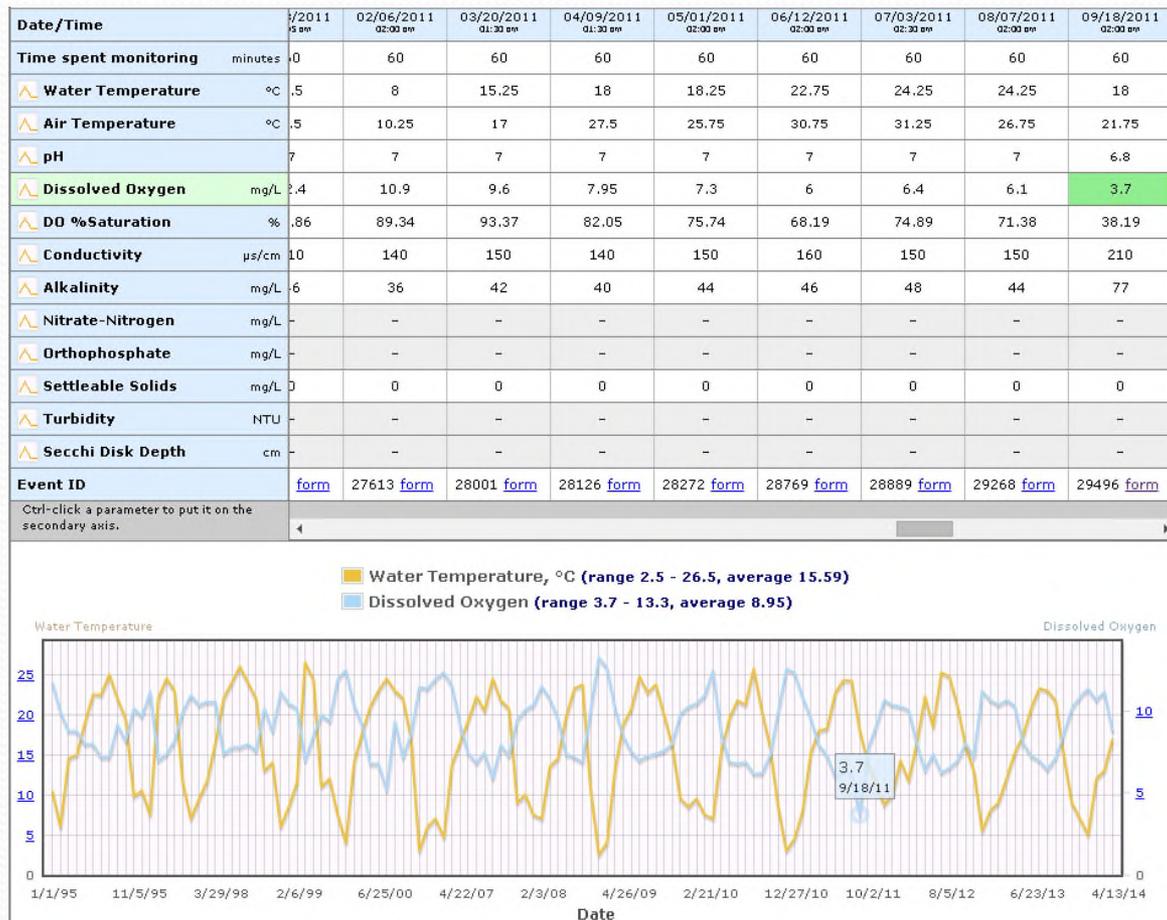
Site	S-1182
Group	C-1127 Columbus Adopt-A-Stream
Latitude	32.5387
Longitude	-84.9331
Altitude	117 meters (384 feet)
Watershed	Lower Middle Chattahoochee River
City	Columbus
County	Muscogee
Events	34
First sampled	01/05/2009

Click a graph for an interactive version



Driving directions Enter starting location X

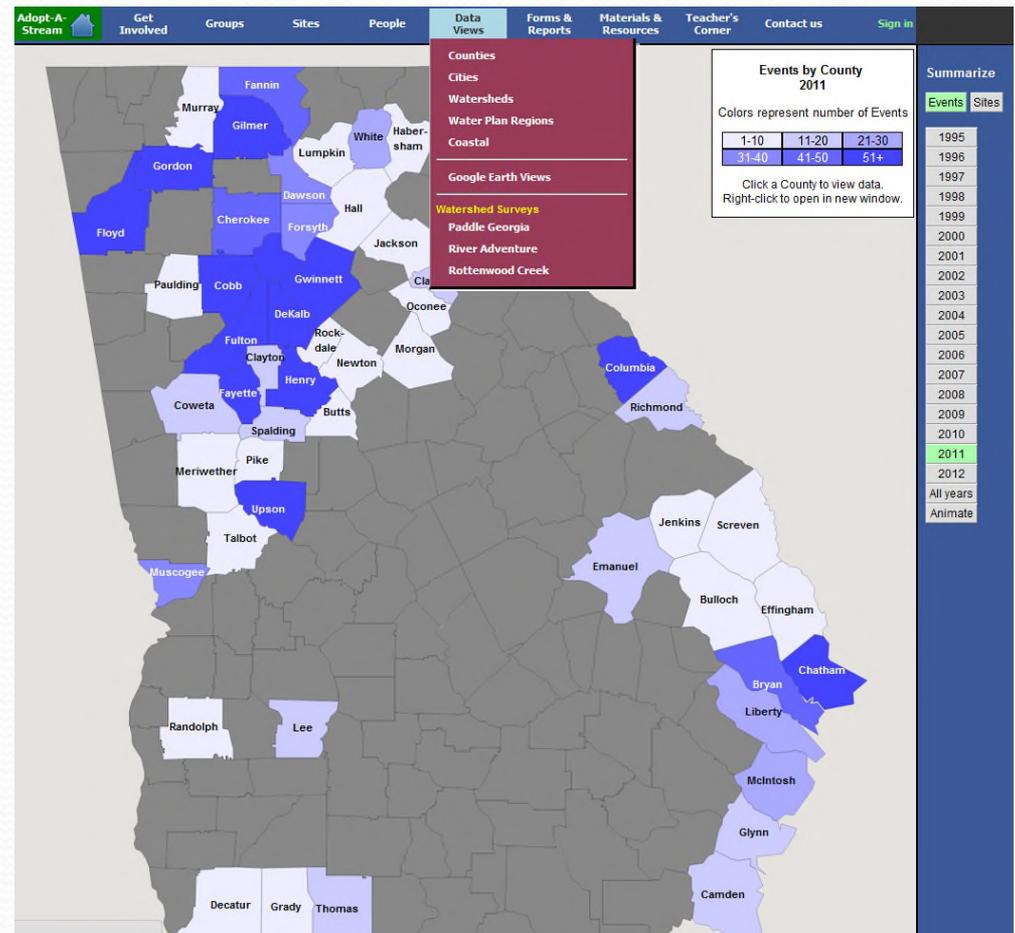
Data Display and Access



I suspect we have had a sewage spill since the last monitoring. Scum on top of the water, black sludge on streambed. Lots of flies on the surface of the water. Unusual gray algae on the stream bed.

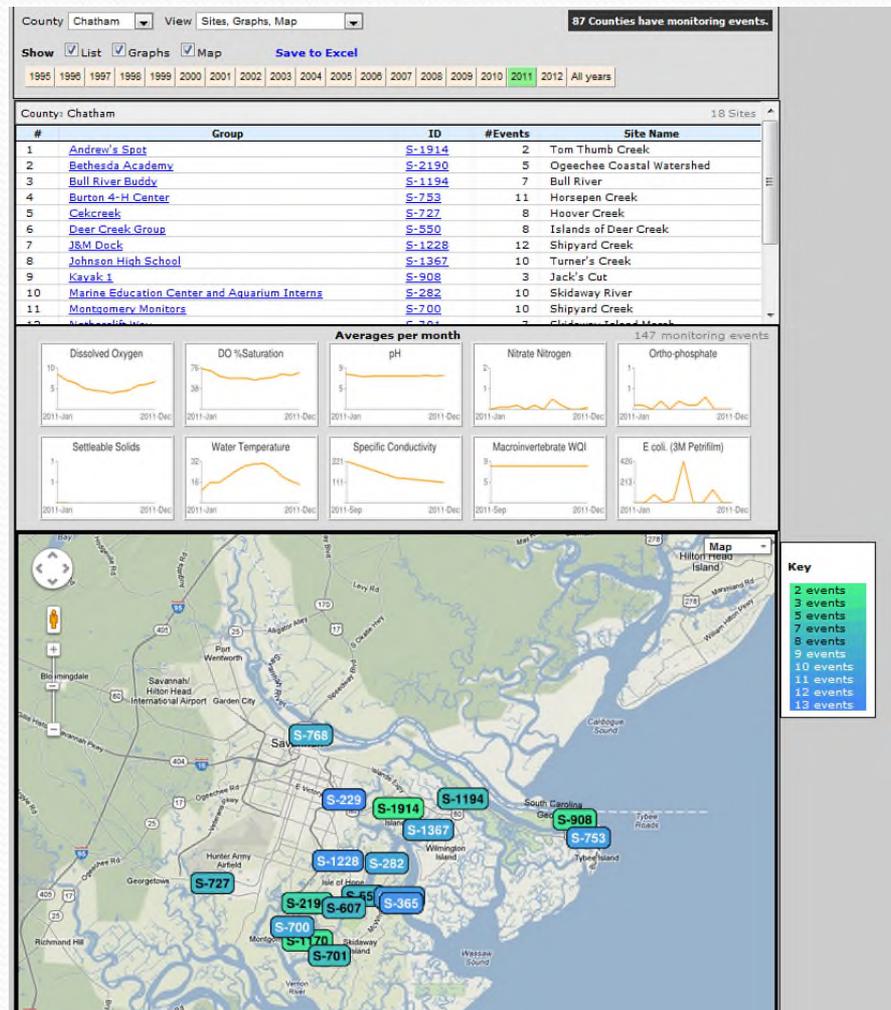
Data Display and Access

- Different views to search for and access data



Data Display and Access

- Displays active and historical sites, regional graphs that provide a snapshot



Data Display and Access

- Site display with Google Earth layers

Georgia Adopt-A-Stream
GEORGIA'S VOLUNTEER WATER QUALITY MONITORING PROGRAM

WATERSHED PROTECTION BRANCH

Adopt-A-Stream Get Involved Groups Sites People **Data Views** Forms & Reports Materials & Resources Teacher's Corner Contact us Sign in

Go to address: Submit

Download Google Earth

Primary Layers

Description	Layer	Google Earth
Active Sites (5/15/2011 - 5/14/2012) (Sites with 5 or more events are green.)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
All Sites with data (Sites with 10 or more events are green.)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GA Combined Stations	<input type="checkbox"/>	<input type="checkbox"/>
National Pollutant Discharge Elimination System (NPDES)	<input type="checkbox"/>	<input type="checkbox"/>
HUC8 Watersheds	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
HUC10 Watersheds	<input type="checkbox"/>	<input type="checkbox"/>
USGS Topo Layer	<input type="checkbox"/>	<input type="checkbox"/>
Roads Layer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Black background	<input type="checkbox"/>	<input type="checkbox"/>

Other Layers

Description	Layer	Google Earth
All layers	<input type="checkbox"/>	<input checked="" type="checkbox"/>
USGS Nationwide Streamflow Gauges	<input type="checkbox"/>	<input type="checkbox"/>
High-Bandwidth (34MB) HUC12 Watersheds	<input type="checkbox"/>	<input type="checkbox"/>
305(b)/303(d) Listed Water 2010	<input type="checkbox"/>	<input type="checkbox"/>
GA Land Application Sites --- through 1999	<input type="checkbox"/>	<input type="checkbox"/>
GA Landfills --- through 1999	<input type="checkbox"/>	<input type="checkbox"/>
GA Surface Mines --- through 1999	<input type="checkbox"/>	<input type="checkbox"/>

Data Display and Access

- Activate 303(d) listed streams
- NPDES sites
- EPD monitoring sites
- Landfills, land application sites and mines
- USGS stream gauges
- 8, 10, 12 digit HUC watersheds

Go to address: Submit

North Branch South River (aka McDaniel Branch)

North Branch South River (aka McDaniel Branch)	
Reach_ID	R030701030112
Reach_Name	North Branch South River (aka McDaniel Branch)
Reach_Location	Atlanta
River_Basin	Ocmulgee
Criterion_Viol	FC
Potential_Causes	UR, CSO
Data_Source	2
County	Fulton
Waterbody_Type	Stream
Water_Use	Fishing
Evaluation_Use	Not Supporting
Category_Tier	4a
Stream_Extent	3
Beach_Extent	
Extent_Units	miles
Priority_Year	
Notes	TMDL completed FC (2002 & 2007).
ReachHUC8	03070103
ReachHUC10	0307010301

Primary Layers

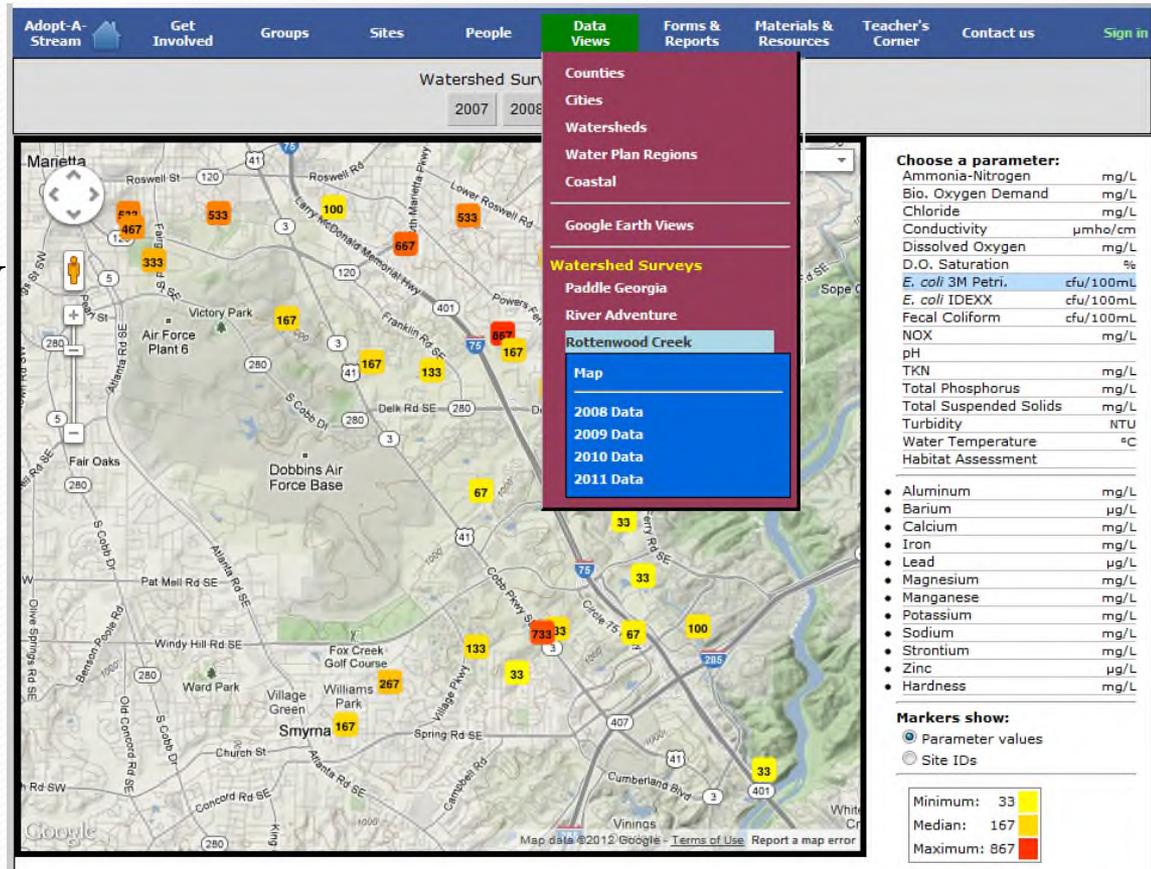
Description	Layer	Google Earth
Active Sites (5/15/2011 - 5/14/2012) <small>(Sites with 5 or more events are green.)</small>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
All Sites with data <small>(Sites with 10 or more events are green.)</small>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GA Combined Stations	<input type="checkbox"/>	<input type="checkbox"/>
National Pollutant Discharge Elimination System (NPDES)	<input type="checkbox"/>	<input type="checkbox"/>
HUC8 Watersheds	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
HUC10 Watersheds	<input type="checkbox"/>	<input type="checkbox"/>
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Other Layers

Description	Layer	Google Earth
All layers	<input type="checkbox"/>	<input checked="" type="checkbox"/>
USGS Nationwide Streamflow Gauges	<input type="checkbox"/>	<input type="checkbox"/>
High-Bandwidth (34MB) HUC12 Watersheds	<input type="checkbox"/>	<input type="checkbox"/>
305(b)/303(d) Listed Water 2010	<input type="checkbox"/>	<input type="checkbox"/>
Key: Supporting Not supporting Assessment pending	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GA Land Application Sites --- through 1999	<input type="checkbox"/>	<input type="checkbox"/>
GA Landfills --- through 1999	<input type="checkbox"/>	<input type="checkbox"/>
GA Surface Mines ---	<input type="checkbox"/>	<input type="checkbox"/>

Data Display and Access

- GIS display of water quality parameters in a watershed and by site over time
- Parameters also displayed in a table and graphed by lines, points and bars



Data Display and Access

- Hot spots

Sites of Interest

Show sites where **Dissolved Oxygen** is **less than** **4**

at least **3** times

over the past **1** year(s) year refers to a 365-day period, not a calendar year.

or

between **01/01/2012** and **12/31/2012** mm/dd/yyyy

1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013

Filter by:

County

City

Water Plan Region

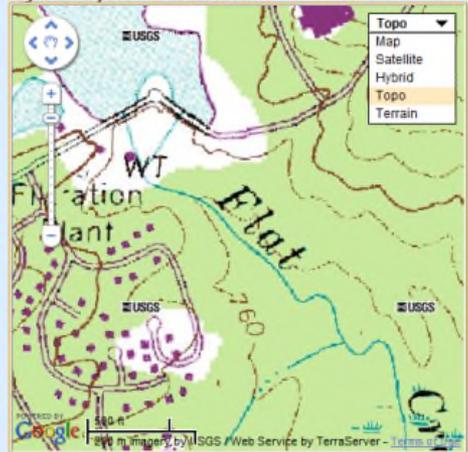
Watershed

Submit **Download to Excel**

Group	Site	County	City	Water Plan Region	Watershed	Lat	Lng	Dissolved Oxygen				
								Total Events	Events <4	Avg	Min	Max
G-516 SCJ Stream Team/Johnson High School	S-229 Placentia Canal	Chatham	Savannah	Coastal Georgia	Ogeechee Coastal	32.034	-81.0604	10	6	3.02	1.20	5.45

Data Display and Access

- Online registration captures site latitude and longitude
- Zoom in on site and right click location

<p>Group Information</p> <p>If this is an existing Adopt-A-Stream Group, select it from the AAS Group list. Otherwise, enter your group's name in the New Group field.</p> <p>AAS Group: McIntosh High School Adopt-A-Stream (714)</p> <p>New Group: <input type="text"/></p> <p>Site Information</p> <p>Georgia County: Fayette</p> <p>Georgia City: Peachtree City <small>If the city isn't in the list, let us know. If the site is outside city limits, enter Rural.</small></p> <p><small>If the site is not in Georgia, leave these fields blank, and enter the state, county, and city in the Site Description box.</small></p> <p>Waterbody type: Stream <small>(stream, wetland, lake, or coastal water)</small></p> <p>Waterbody name: Flat Creek</p> <p>Locate your site on the map, or enter the Latitude/Longitude if known.</p> <p>You can enter decimal degrees or degrees minutes seconds. Use spaces to separate degrees, minutes, and seconds. Omit the negative sign in the longitude.</p> <p>Latitude: Decimal: +33.3831 Degrees: +33° 22' 59.1594"</p> <p>Longitude: Decimal: -84.5725 Degrees: -84° 34' 21"</p> <p>HUC8: 03130005 (Upper Flint River Watershed)</p> <p>Site Description: 50 feet downstream of the dam</p>	<p>Save to Database</p> <p>To quickly locate your site, enter a nearby road or address: <input type="text"/> <input type="button" value="Locate"/></p> <p>latitude: +033.3848 longitude: -084.5673</p> <p>Right-click your site to select it:</p>  <p>Map showing site location with USGS markers and a legend for Topo, Map, Satellite, Hybrid, Topo, and Terrain.</p>
<p>Site Special Information:</p> <input type="text"/>	

Online Forms

- Warnings
- Errors

There are 3 steps
To data entry

1. Create your own data form!
Enter the data for one site.

2. Review your data entry!

3. Submit your data!

*You can have the submission emailed to you too!

Clear Form
*You can enter data for multiple sites, just clear the form.

Georgia Adopt-A-Stream
GEORGIA'S VOLUNTEER WATER QUALITY MONITORING PROGRAM

WATERSHED PROTECTOR BRANCH

Adopt-A-Stream | Get Involved | Groups | Sites | People | Data Views | Data Entry | Materials & Resources | Teacher's Corner | Contact us | User Sign out

GEORGIA ADOPT-A-STREAM Data Submission Form

[Trainings calendar](#) | [Errors and Warnings list](#)

Expired certifications: Chemical, Macroinvertebrate

Site, Weather, and Observations

Site Information

Site S:

Enter the 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:	Time sample collected:	Total number of participants:	Time spent sampling:	Total time spent traveling:	Furthest distance traveled:
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> minutes	<input type="text"/> minutes	<input type="text"/> miles
mm/dd/yyyy	hh:mm am/pm			Optional	Optional

Participants

Adopt-A-Stream monitors:

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

Other participants:

Weather

Present conditions

Heavy Rain | Steady Rain | Intermittent Rain
 Overcast | Partly Cloudy | 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:
Select all that apply: Dry | Stagnant/Still | Low | Normal | High | Flood (over banks)

Tides:
Tide was: High | Low | Incoming | Outgoing
 Waterway was not influenced by tides

Water Conditions:
(for lake and coastal monitors) Calm/Smooth | Ripples | Waves | White Caps

Clear form

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.

Sign in to enter data.
You must currently be certified.

NEW Section!
Click here for instructions

NEW Observations Section!
Click here for instructions

Program Support

- Workshop registration

Adopt-A-Stream | Get Involved | Groups | Sites | People | Data Views | **Forms & Reports** | Materials & Resources | Teacher's Corner | Contact us | Harbert Sign out

Adopt-A-Stream Workshop Form

Save | Save and Print | Clear form | Instructions

Workshop Participants:

Look up: [New Contact](#)

#	Participant	Passed	Edit	Remove
1	Allison Hughes	<input checked="" type="checkbox"/>	edit	remove
2	Kathleen Snyder	<input checked="" type="checkbox"/>	edit	remove
3	Jo Adang	<input checked="" type="checkbox"/>	edit	remove
4	Sue Sturges	<input checked="" type="checkbox"/>	edit	remove

Trainers:

Trainer 1:

Trainer 2:

Trainer 3:

Trainer 4:

Trainer 5:

Type of workshop:

Chemical QA/QC
 Coastal Chemical QA/QC
 Biological QA/QC
 Bacterial QA/QC

Chemical Trainer
 Biological Trainer
 Bacterial Trainer

Amphibian Monitoring
 Freshwater Wetland Monitoring
 Visual Stream Survey
 Getting Started
 Intro to Monitoring

Location:

Date: (mm/dd/yyyy)

Duration: (minutes)

Quality Control And Program Data

- Provide summaries for state and local programs
 - Hours spent monitoring, number of volunteers, etc.
- Can estimate monetary value of the program

Monthly/Yearly Summaries

State of Georgia Region
 County
 City
 Watershed

Submit

	Events		Event Participants	New Sites	New Groups	Active Groups	Active Sites	Active Streams	Total				
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov		Dec			
2006	240	191	257	178	194	100	137	129	143	207	243	251	2270
2007	273	326	385	289	313	206	165	154	239	314	355	383	3402
2008	324	449	408	491	407	288	255	371	486	394	528	528	4929
2009	394	660	682	446	455	333	236	506	635	431	871	491	6140
2010	528	664	599	718	509	375	403	594	1156	620	687	561	7414
2011	498	705	710	936	753	555	324	406	754	793	647	526	7607
2012	678	788	745	553	74								2838

2013 - \$500,000 in match

The Next Step

- Better capture programmatic activities
- Better data display
- Who knows!

Since launching the database, there has been a two-fold increase in water monitoring