SCORE Water Quality Monitoring Program

- Sponsored by SCDNR
  - Co-sponsor: Friends of the Rivers
- Open to any interested citizens
- Training and equipment provided
- Data collected is available to all on our website
- Data supplements that collected by SCDNR

Why Does SCORE Monitor Water Quality?

- Document water quality effects on restoration
  - Explain differences among reefs
  - Determine factors which make a "good" site
  - Develop site selection decision matrix
  - Refine site selection by pre-construction monitoring
- Document restoration effects on water quality

Monitor Responsibilities

- Reliability
  - If you cannot make a scheduled monitoring session, notify the coordinator or find a substitute
- Careful observation and recording
- Instrument calibration
- Care/cleaning of instruments
- Return kit to central location after use
- Report problems to us or Friends of Rivers
- Enter data (or send to us)

When to monitor

- Weekly
  - If we have 4 teams per site, each team goes once a month
- Daylight - noon is best
- Tide - any
- Year round
- Not during rain
- Increased frequency after rain events

Where to monitor

Sites in Beaufort County

- Haig Landing, Pinckney Island
- Trask Landing, Sawmill Creek Road, Bluffton
- Sugar Mill Dock, Callawassie Island
- The Sands Landing, Port Royal
- Dataw Island Marina

Where is the equipment?

Waddell Mariculture Center, Sawmill Creek Road

Discovery Museum, Hilton Head

LowCountry Institute, Spring Island

LowCountry Estuarium, Port Royal

Dataw Marina

What is monitored

- Weather conditions
- Water clarity
- Temperature (air and water)
- Dissolved oxygen
- Salinity
- pH

Plan your trip

- Go during your assigned week

  Take:

  - Distilled water (available at grocery store for $1)
  - Empty plastic drink bottle
  - Paper towels or towel
  - Writing instrument, pad of paper
- Pick up the water quality kit
- Check the kit for all supplies before leaving
- Calibrate the pH probe

Kit contents

The following items should be in each kit:

- Data notebook with blank datasheets(should be in a ziplock bag)
- Plastic beaker (for sample collection)
- 1 liter bottle of distilled water (refill each time)
- Small drink bottle to use for disposal of glass (replace as needed)
- Pencils (replace if needed)
- pH probe with small screwdriver and spare batteries
- 500 ml bottle of pH 7.0 buffer
- 500 ml bottle of pH 10.0 buffer
- Two 100 ml plastic cups with lids
- Salinity refractometer with plastic pipet
- Thermometer with string and float
- Dissolved oxygen kit (in a black box)
- Secchi disk with calibrated rope
- Towel or paper towels (replace as needed)

pH Probe Calibration Pointers

- Only fill the cup about halfway
- If the pen does not stabilize or will not calibrate, try soaking in tap water for 5 minutes and repeat the calibration
- If the pen still will not calibrate, follow the troubleshooting instructions
- If the pen still will not calibrate, do not read pH that day, leave a note in the kit that the pen is not working, and notify us as soon as possible so that we can replace the pen

Weather Conditions

- Day and time allows us to determine exact tidal height
- Wind affects dissolved oxygen and water clarity
- Cloud cover affects water clarity
- Rainfall affects many parameters
- Tidal height affects salinity, temperature, dissolved oxygen, water clarity
- Current speed may affect water clarity and dissolved oxygen
- Water conditions may alert us to a special situation

Temperature

- Affects the amount of oxygen which can be dissolved in the water
- Affects metabolic rates
- Affects algal growth rates
- Promotes chemical reactions
- Affects sensitivity of organisms to disease, parasites and pollutants

Temperature

In addition to normal seasonal variations these factors may affect temperature:

- Industrial discharges
- Runoff from warm paving
- Suspended solids (from runoff)
- Removal of shoreline vegetation (reduces shade)

Temperature Pointers

- Air temperature must be measured with a dry thermometer (do this first)
- Make sure the thermometer is not in direct sunlight
- Allow ~ 5 minutes to stabilize
- Water temperature can be measured in the creek itself or in a sample taken with the 1 liter beaker
- If using a sample, measure temperature immediately, before the sample has a chance to warm up (or chill down)

Water Clarity

What is water clarity

- Ability of light to penetrate water
- Indirect measure of suspended solids in the water
- Water clarity is also affected by algae in the water

Importance of water clarity

- Suspended solids may result in low dissolved oxygen
- Suspended solids settle out on reefs, smothering oysters
- Suspended solids block sunlight, limiting phytoplankton
- Suspended solids can interfere with oyster feeding
- Suspended solids may indicate runoff which may have other negative effects

Water Clarity

Factors which affect water clarity

- Runoff and erosion
- Excess nutrients (e.g. from fertilizers) can cause algal blooms which decrease water clarity
- Dying algae decreases water clarity and dissolved oxygen
- Wind and currents can stir up bottom sediments and keep particles in suspension
- Water clarity is greater at lower temperatures because particles do not stay in suspension as well
- Oyster reefs may affect water clarity by physical or biological removal of particles
- Oyster reefs may reduce erosion and related suspended solids

Secchi Disk Pointers

- Do not wear sunglasses!
- Measure on the shaded side of the dock (reduces glare off water) with your back to the sun
- Tie the line to your wrist so you won’t lose the disk
- If the disk hits the bottom, record depth as > whatever mark you are at
- A clothespin or other clip may be used to mark the line to facilitate reading
- If possible, rinse the secchi disk and rope with fresh water after use
- Dry the secchi disk as much as possible before storing. It may be useful to keep it in a plastic bag

Water Sample Collection Pointers

- Rinse the 1 liter beaker with the sample water
- Tip the beaker sideways and submerge slowly to approximately 1 foot depth (up to your elbow)
- Turn the beaker upright and slowly remove from the water
- Take care not to splash which will introduce oxygen

Dissolved oxygen

- Amount of oxygen dissolved in the water
- Most critical parameter for aquatic life
- Can come from air (wind, waves) and from algae
- Affected by many other parameters
  - temperature
  - suspended solids
  - plant growth
  - excess nutrients (fertilizer)
  - chemical reactions
  - removal of shoreline vegetation (increases erosion and raises temperature)
- Oysters may indirectly effect dissolved oxygen by removal of algae and suspended solids

Dissolved oxygen pointers

- The sample ampoule and the standards should be dry when reading
- Remove the comparator from the box to use
- Always start your comparisons at the low end of the scale and work up
- Dispose of ampoule in empty soda bottle - now safe to put in any trash receptacle
- Replace the soda bottle as needed
- Normal range of DO for our sites is 4 to 10. Readings will be highest in the winter.

Salinity

- Measure of the salts in water
- Salinity is needed to interpret dissolved oxygen
- Most animals have preferred salinity ranges. Oysters occur in 10 ppt to 35 ppt but prefer 25 ppt
- Some oyster diseases are related to salinity
- Salinity affects algal growth (food for oysters)
- Freshwater runoff will lower salinity
- Runoff may be accompanied by pollutants, solids, etc

Salinity Pointers

- Measured with a refractometer in parts per thousand (ppt)
- Refractometer must be calibrated with distilled water
- Do not submerse the refractometer
- Do not drop the refractometer
- If you do not get a sharp differential, try loading the refractometer again
- Rinse only the lens after use and pat dry (do not rub)
- Salinity will likely be in the range of 20 to 35ppt at our sites but may be lower after rainfall

pH

- Measure of the acidity or alkalinity of water
- 7.0 is neutral: greater than 7 is basic and lower than 7 is acid
- Logarithmic scale: a pH of 6.0 is ten times more acidic than 7.0
- Most organisms have narrow range of optimal pH
- pH effects rate of reactions
- Chemical pollutants affect pH
- Algal blooms affect pH - these can be cause by excess nutrients in runoff or by sewage outfalls

pH Pen Pointers

- Normal seawater has a pH of ~8. pH will be lower if salinity is lower. Typical ranges you will see are 7.0 to 8.5
- The pen must be calibrated before use
- If the pen will not calibrate follow the troubleshooting procedure in your manual
- Do not record pH if the pen is not calibrating properly. Note on the sheet that it would not calibrate.
- Notify us as soon as possible if the pen is not working
- The upper part of the pen is very sensitive to water - do not submerge above the connector seam.
- The cap must be removed before use and replaced after use.
- Place a few drops of the pH 7 buffer in the cap before you replace it to keep the probe moist.

Data Entry

- Website :http://www3.csc.noaa.gov/scoysters
- Path to data entry: click on Monitoring Data in upper left
- Entry options: Choose enter data online for water quality
- Choose your site
- Enter the data
- Click on review and make sure your data is correct. If not, click edit and make changes.
- When you are satisfied the data is correct, click on Submit
- If you notice a mistake after you submit the data, notify us. Do not reenter as this will just add another record.

SCORE!
South Carolina Oyster Restoration and Enhancement
A Community-Based Restoration Project

SCORE Wins Two Prestigious Awards

The SCORE program was recently honored with two prestigious awards: a 2004 Coastal America Partnership Award and the Theodore M. Sperry Award. The Coastal America Partnership Award is a yearly award given to select programs across the country for their outstanding efforts to restore and protect coastal environments through the use of extensive partnerships. The Theodore M. Sperry Award is given by the international Society for Ecological Restoration to individuals who are recognized as innovators and pioneers in restoration and who truly set examples for other practitioners to follow. The recipients of this year's Sperry award were Dr. Loren Coen and Nancy Hadley from the South Carolina Department of Natural Resources (SCDNR) for their work on the SCORE project.

On behalf of the SCORE program, SCDNR staff would like to extend a special thank you to all of its dedicated volunteers, who have donated over 10,000 hours of hard, sweaty labor to move literally hundreds of tons of oyster shell, and to its many partners who have provided funding and logistical and technical support. These awards are as much yours as ours.

Volunteer Opportunities

To learn about the various ways in which you can become involved in the SCORE program, visit Volunteer Opportunities. For additional volunteer information, contact Nancy Hadley at hadleyn@mrd.dnr.state.sc.us or (843) 953-9841, or Michael Hodges at hodgesm@mrd.dnr.state.sc.us or (843) 953-9241.

Last updated: September 24, 2004

Quick Links


Project Brochure


Video Gallery


Photo Gallery


Press Coverage


Glossary


Volunteer Form

Monitoring - SCORE

http://www3.csc.noaa.gov/scoysters/monitor/monitor.asp

Google

Tides Online | Login to xiph....state.sc.us | South Carol...nhancement | Marine Resources Library | Tide/Current Predictor

Project Description
Background Information
Restoration Sites
Monitoring Data
Volunteer Opportunities
Educational Activities
Related Information
Partners

SCORE!

South Carolina Oyster Restoration and Enhancement

Monitoring Data

Home

Collecting Site Data

Enter data online for:

- ○ Reef Observations and Boat Traffic

View and print forms for:

Sampling Protocols

Observations Data Entry Form

Boat Traffic Data Entry Form

- ◉ Water Quality (salinity, water clarity, etc.)

Sampling Protocols

Field Data Entry Form

Enter Data

How are the Restored Oyster Reefs Doing?
Data Disclaimer

Volunteers have been monitoring physical characteristics of the reefs, bank erosion, water quality, boat traffic, recruitment of spat, and survival and growth of juvenile oysters. This information helps scientists to understand how and why oyster reefs form and survive, and to evaluate the restoration techniques used. So, how are the sites doing so far? Follow the links below to view the data for a particular reef site or to compare data from multiple sites.

Monitoring – SCORE

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Google

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Monitoring – SCORE

http://www3.csc.noaa.gov/scoysters/monitor/waterqua.asp

Google

Tides Online | Login to xiph....state.sc.us | South Carol...nhancement | Marine Resources Library | Tide/Current Predictor

SCORE!

South Carolina Oyster Restoration and Enhancement

Monitoring Data

Home

Water Quality

Collection Information
*required information

Sampling Date* – / – / –

Time of Arrival* – (HH:MM)

Time of Departure* – (HH:MM)

Site Location* –

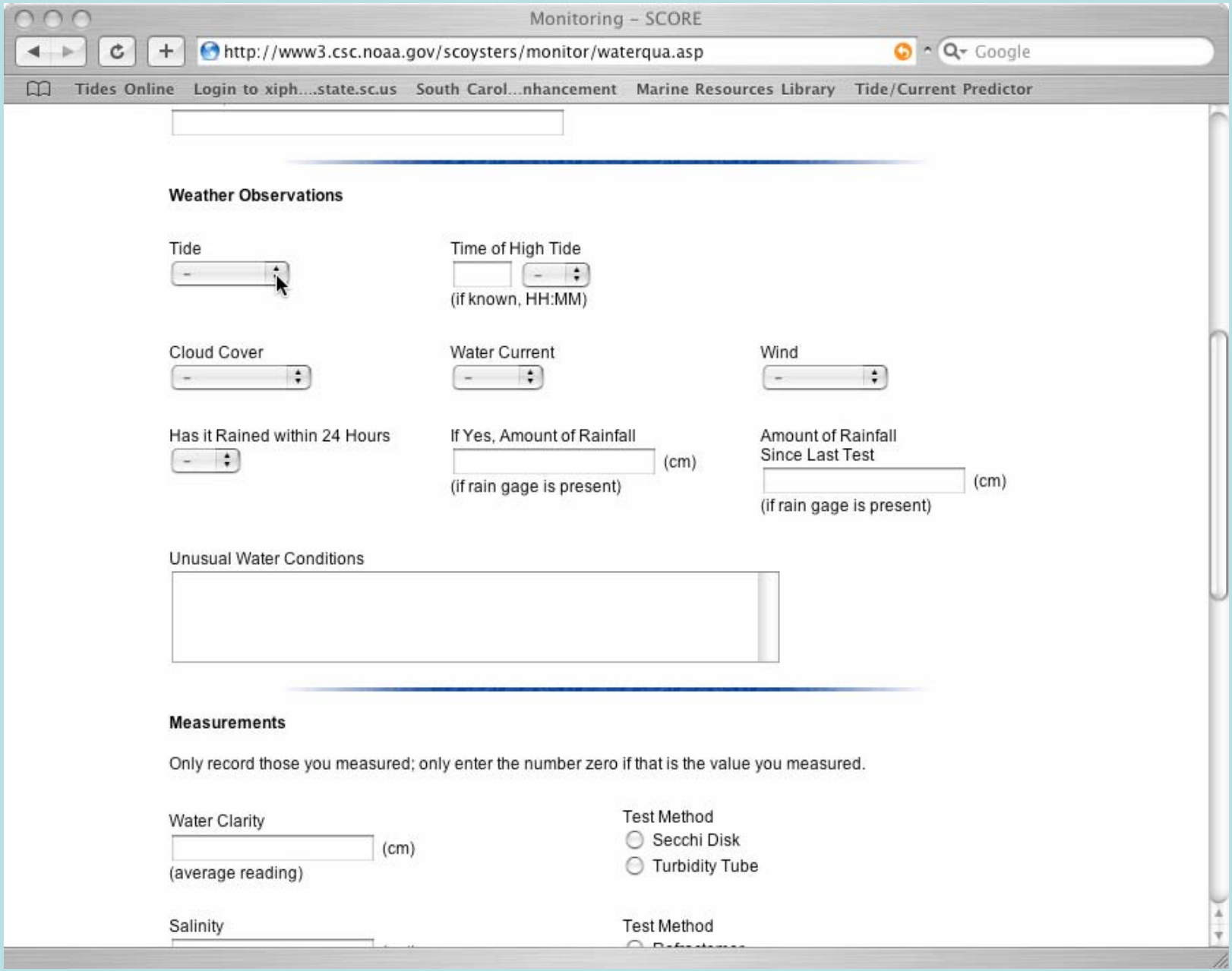
Samplers' Names / Affiliation*

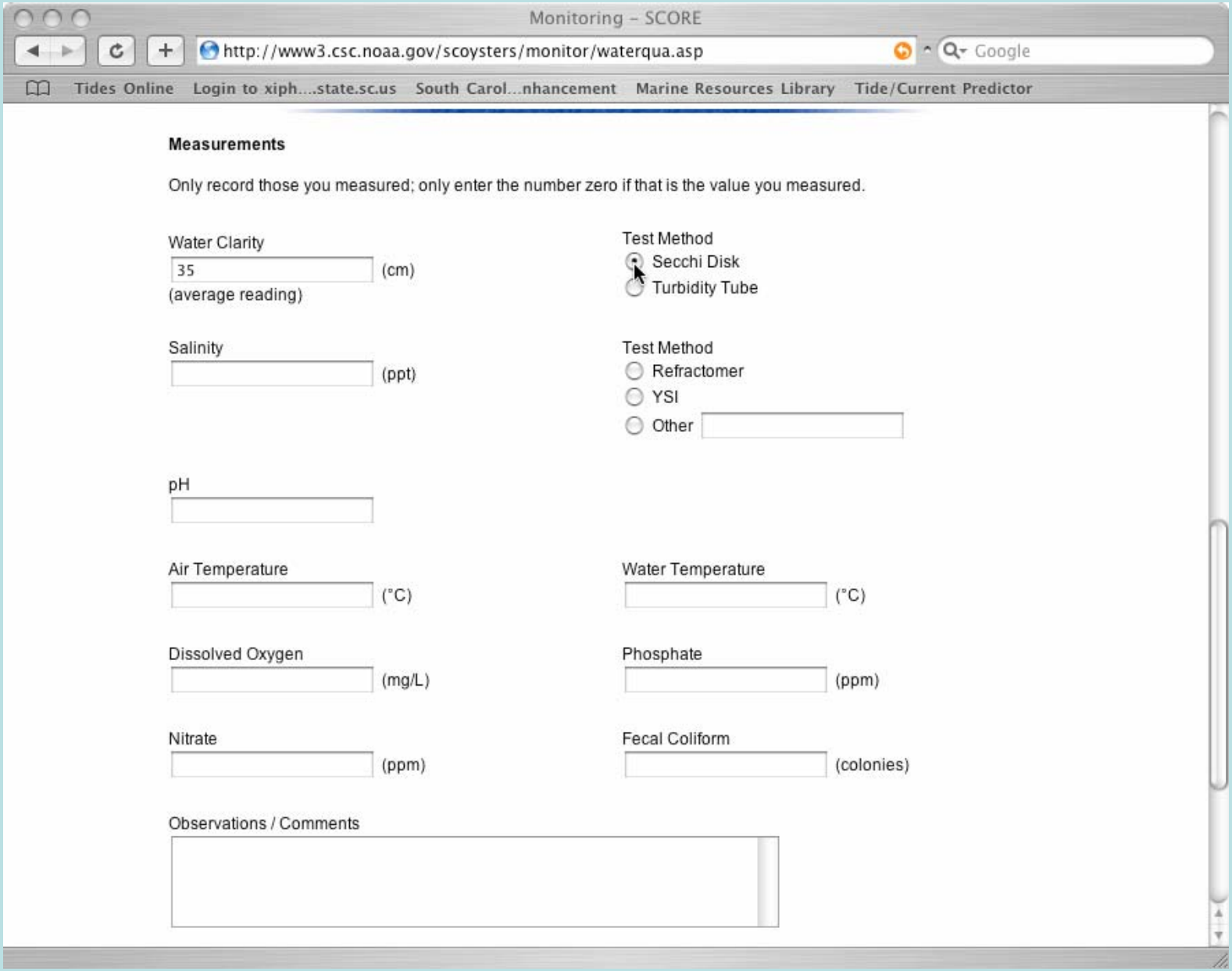
If Other, Enter Site:

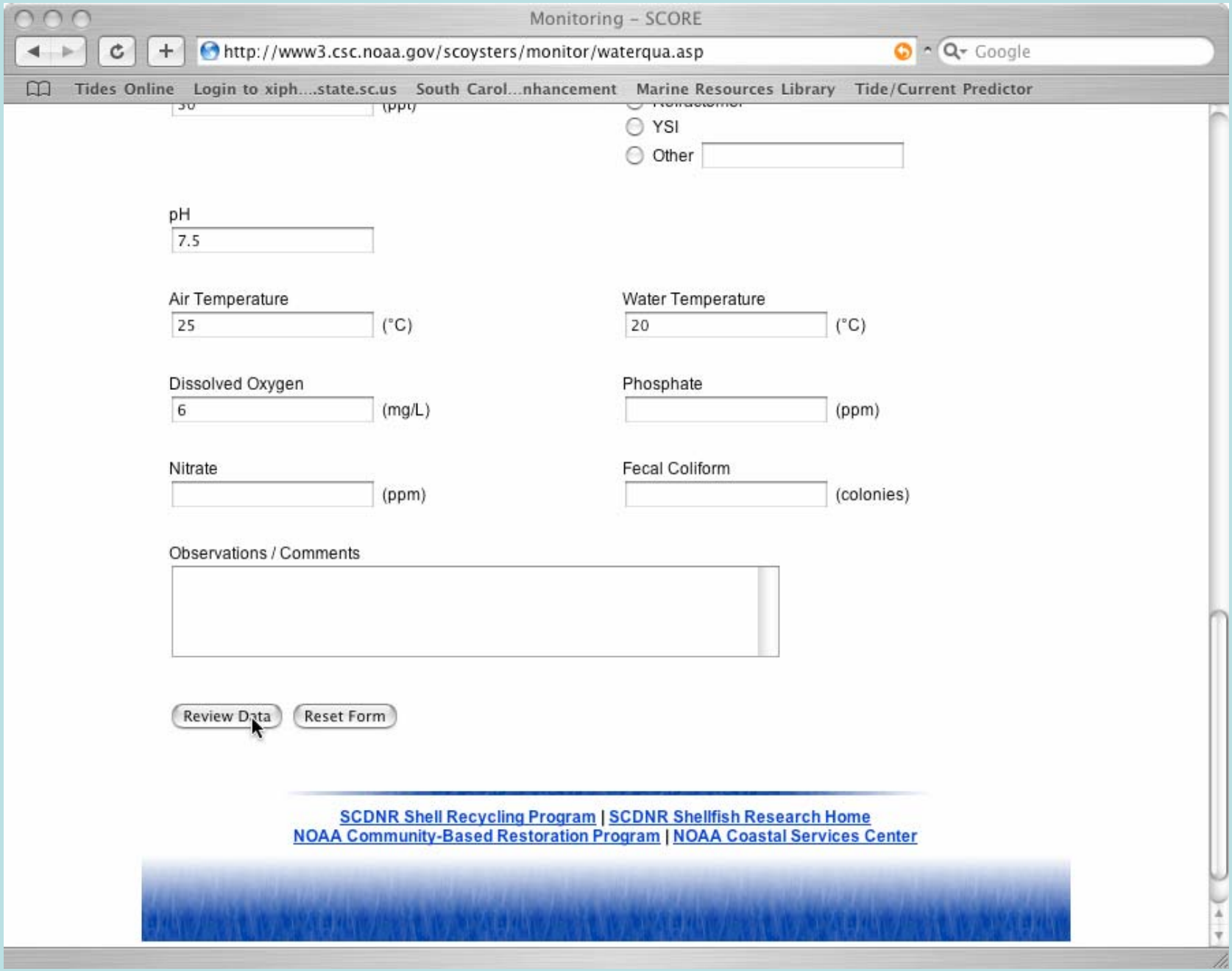
Weather Observations

Tide –

Time of High Tide –


Monitoring – SCORE
http://www3.csc.noaa.gov/scoysters/monitor/waterqua.asp
Google
Tides Online
Login to xiph....state.sc.us
South Carol...nhancement
Marine Resources Library
Tide/Current Predictor
Weather Observations
Tide
Time of High Tide
(if known, HH:MM)
Cloud Cover
Water Current
Wind
Has it Rained within 24 Hours
If Yes, Amount of Rainfall
(cm)
(if rain gage is present)
Amount of Rainfall
Since Last Test
(cm)
(if rain gage is present)
Unusual Water Conditions
Measurements
Only record those you measured; only enter the number zero if that is the value you measured.
Water Clarity
(cm)
(average reading)
Test Method
Secchi Disk
Turbidity Tube
Salinity
Test Method


Monitoring - SCORE
http://www3.csc.noaa.gov/scoysters/monitor/waterqua.asp
Google
Tides Online
Login to xiph....state.sc.us
South Carol...nhancement
Marine Resources Library
Tide/Current Predictor
Measurements
Only record those you measured; only enter the number zero if that is the value you measured.
Water Clarity
35
(cm)
(average reading)
Test Method
Secchi Disk
Turbidity Tube
Salinity
(ppt)
Test Method
Refractomer
YSI
Other
pH
Air Temperature
(°C)
Water Temperature
(°C)
Dissolved Oxygen
(mg/L)
Phosphate
(ppm)
Nitrate
(ppm)
Fecal Coliform
(colonies)
Observations / Comments


Monitoring - SCORE
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Google
Tides Online
Login to xiph....state.sc.us
South Carol...nhancement
Marine Resources Library
Tide/Current Predictor
(ppt)
YSI
Other
pH
7.5
Air Temperature
25
(°C)
Water Temperature
20
(°C)
Dissolved Oxygen
6
(mg/L)
Phosphate
(ppm)
Nitrate
(ppm)
Fecal Coliform
(colonies)
Observations / Comments
Review Data
Reset Form
SCDNR Shell Recycling Program | SCDNR Shellfish Research Home
NOAA Community-Based Restoration Program | NOAA Coastal Services Center

Monitoring Data

Home

Water Quality

Collection Information

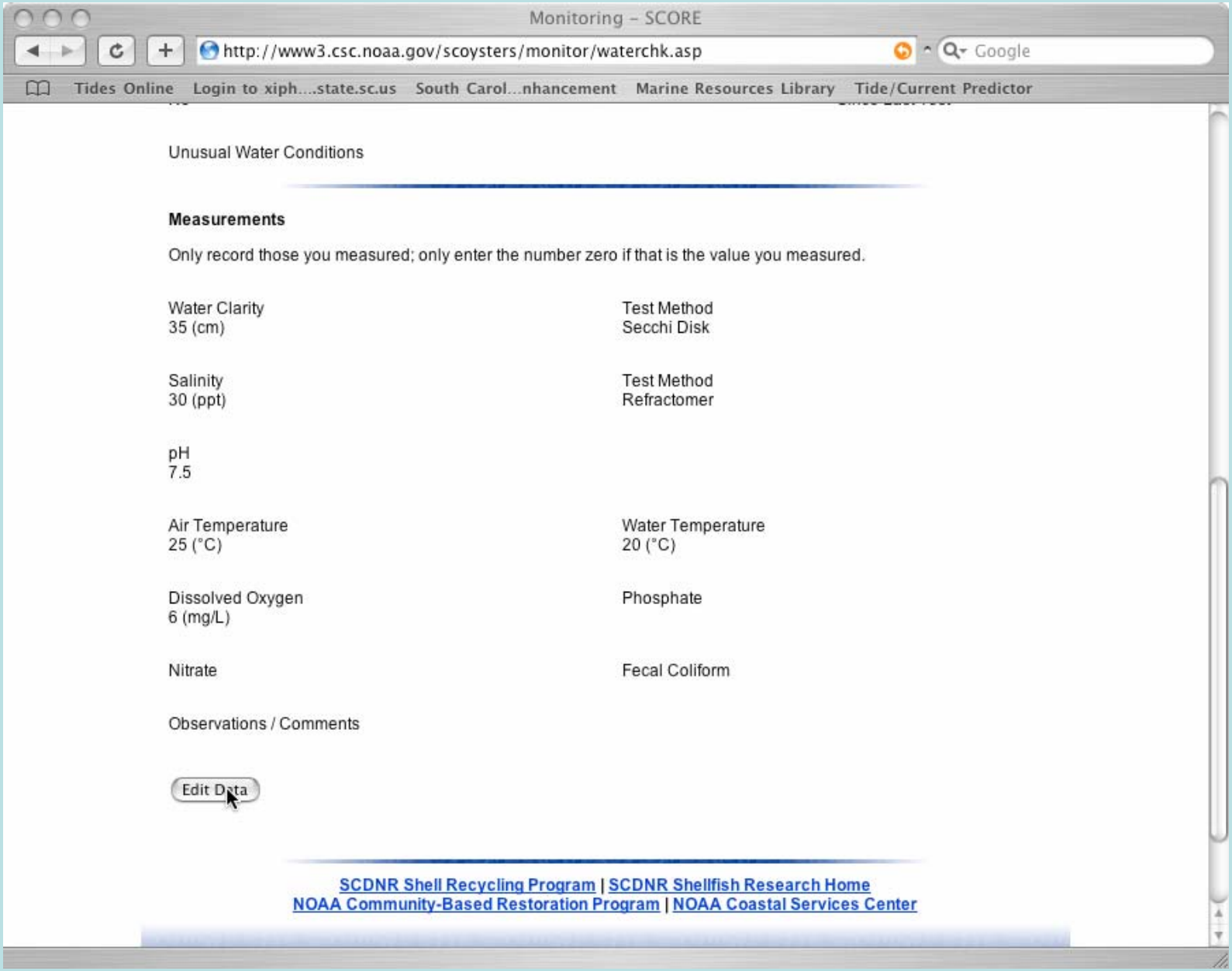
Samping Date	Time of Arrival	Time of Departure
10/21/2004	10:15 AM	10:45 AM

Site Location
Pinckney Landing

Samplers' Names / Affiliation
This item may not be left blank.

Weather Observations

Tide	Time of High Tide	
Coming in	03:00 PM	
Cloud Cover	Water Current	Wind
Partly Cloudy	Strong	Breezy
Has it Rained within 24 Hours	If Yes, Amount of Rainfall	Amount of Rainfall Since Last Test
No		


Monitoring - SCORE
http://www3.csc.noaa.gov/scoysters/monitor/waterchk.asp
Google
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Login to xiph....state.sc.us
South Carol...nhancement
Marine Resources Library
Tide/Current Predictor
Unusual Water Conditions
Measurements
Only record those you measured; only enter the number zero if that is the value you measured.
Water Clarity
35 (cm)
Test Method
Secchi Disk
Salinity
30 (ppt)
Test Method
Refractomer
pH
7.5
Air Temperature
25 (°C)
Water Temperature
20 (°C)
Dissolved Oxygen
6 (mg/L)
Phosphate
Nitrate
Fecal Coliform
Observations / Comments
Edit Data
SCDNR Shell Recycling Program | SCDNR Shellfish Research Home
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Water Clarity
35 (cm)

Test Method
Secchi Disk

Salinity
30 (ppt)

Test Method
Refractomer

pH
7.5

Air Temperature
25 (°C)

Water Temperature
20 (°C)

Dissolved Oxygen
6 (mg/L)

Phosphate

Nitrate

Fecal Coliform

Observations / Comments

Submit Data | Edit Data

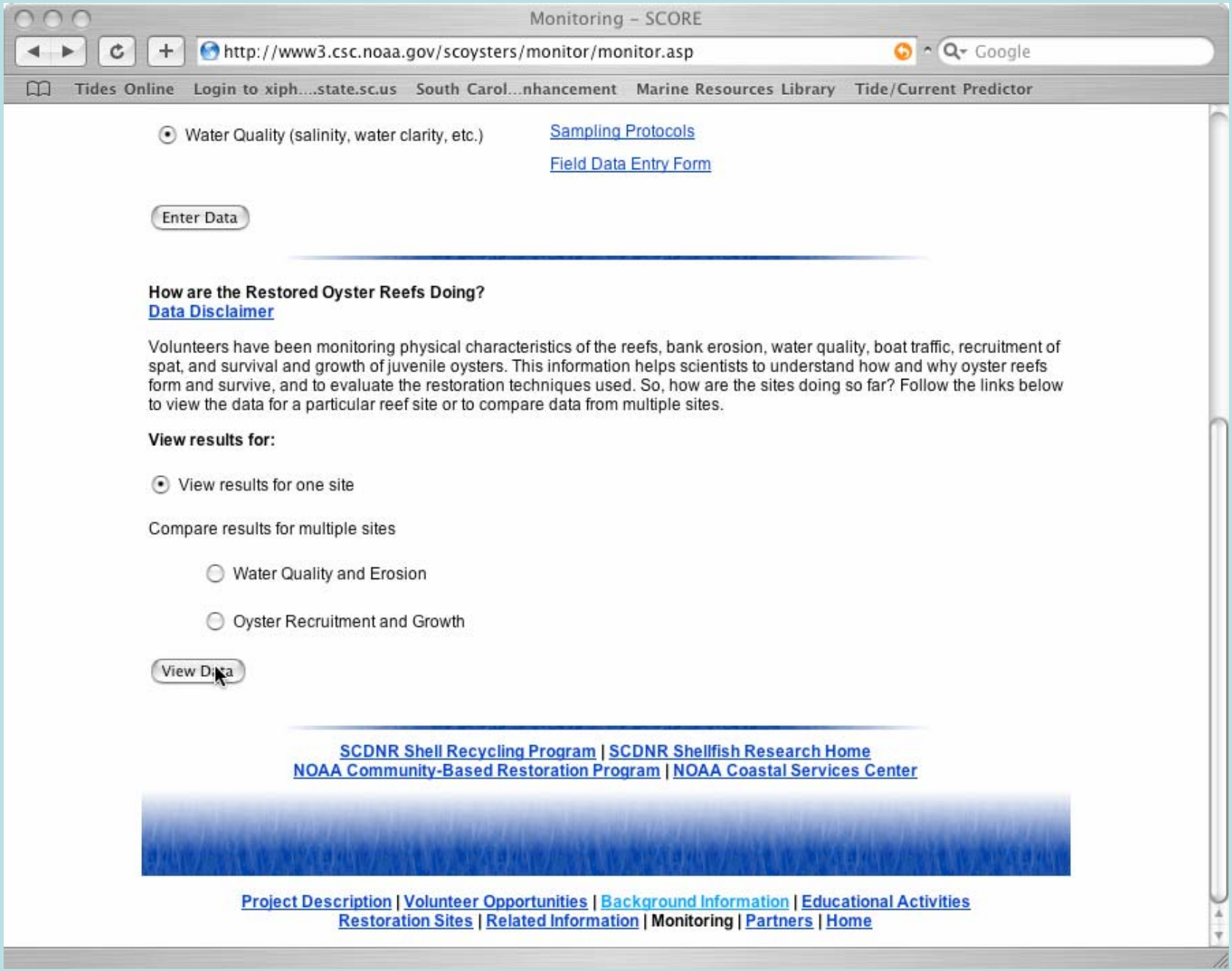
Examining the Data

Click on Monitoring Data

Scroll to bottom of page and choose view data

You have many options (one site, multiple sites; one parameter, multiple parameters; graph or table)

This area of the website is being updated so it may change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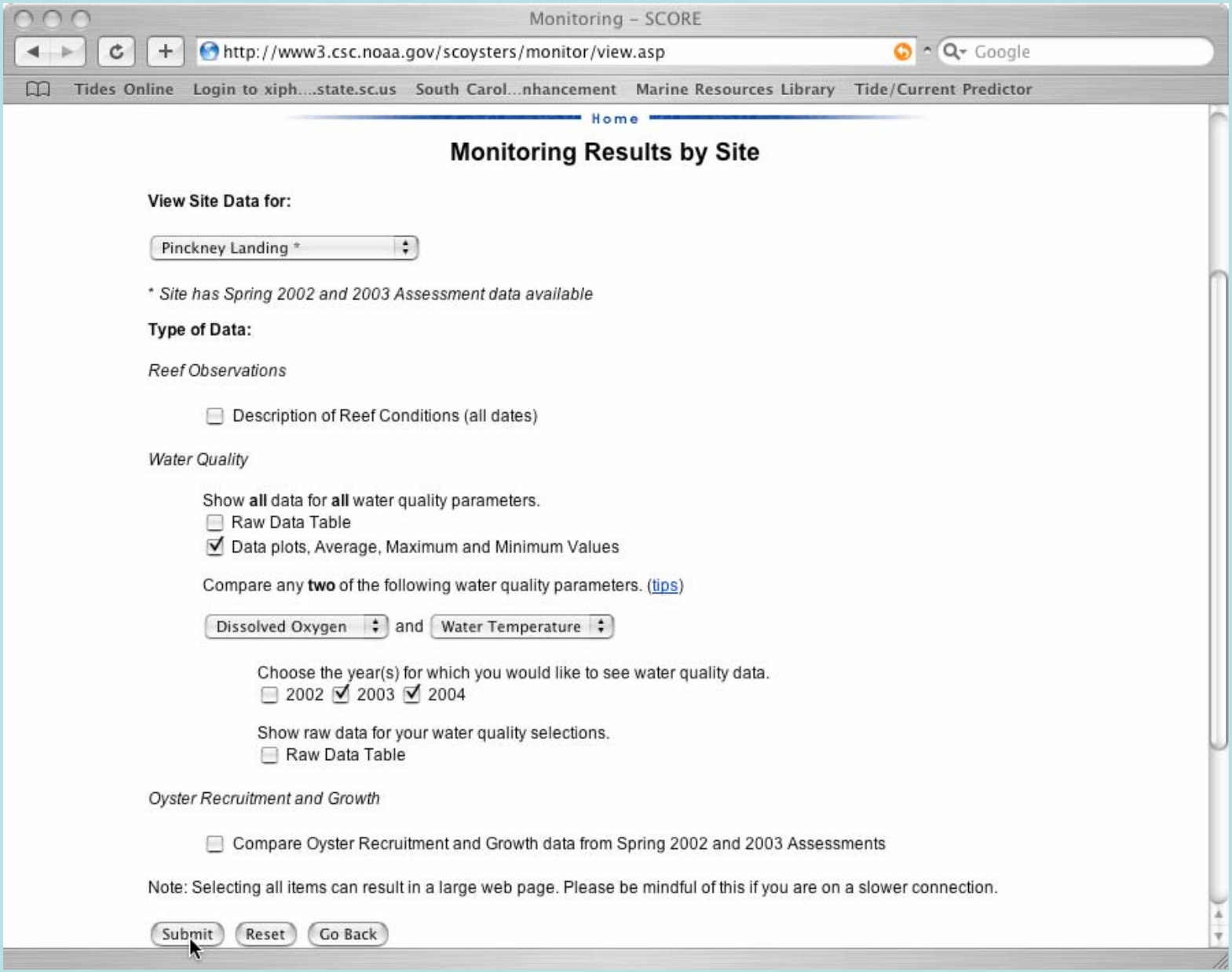
View results for:
View results for one site
Compare results for multiple sites
Water Quality and Erosion
Oyster Recruitment and Growth
View Data
SCDNR Shell Recycling Program | SCDNR Shellfish Research Home
NOAA Community-Based Restoration Program | NOAA Coastal Services Center
Project Description | Volunteer Opportunities | Background Information | Educational Activities
Restoration Sites | Related Information | Monitoring | Partners | Home


Monitoring - SCORE
http://www3.csc.noaa.gov/scoysters/monitor/view.asp
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Login to xiph....state.sc.us
South Carol...nhancement
Marine Resources Library
Tide/Current Predictor
Home
Monitoring Results by Site
View Site Data for:
Pinckney Landing *
* Site has Spring 2002 and 2003 Assessment data available
Type of Data:
Reef Observations
Description of Reef Conditions (all dates)
Water Quality
Show all data for all water quality parameters.
Raw Data Table
Data plots, Average, Maximum and Minimum Values
Compare any two of the following water quality parameters. (tips)
Dissolved Oxygen
and
Water Temperature
Choose the year(s) for which you would like to see water quality data.
2002
2003
2004
Show raw data for your water quality selections.
Raw Data Table
Oyster Recruitment and Growth
Compare Oyster Recruitment and Growth data from Spring 2002 and 2003 Assessments
Note: Selecting all items can result in a large web page. Please be mindful of this if you are on a slower connection.
Submit
Reset
Go Back

Monitoring - SCORE

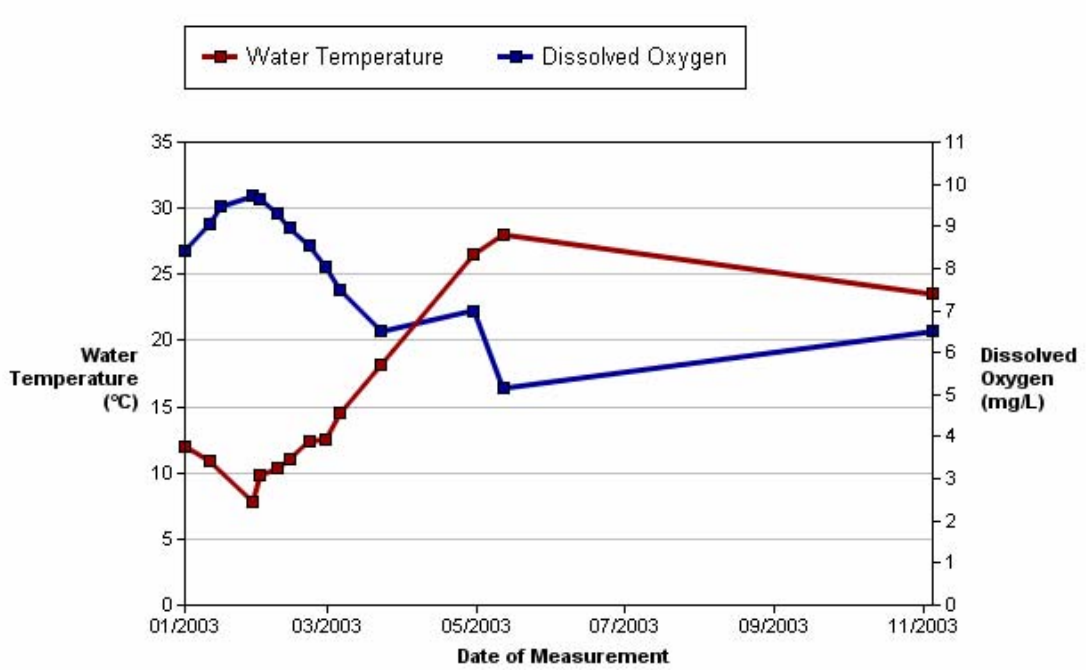
http://www3.csc.noaa.gov/scoysters/monitor/results.asp

Google

Tides Online | Login to xiph....state.sc.us | South Carol...nhancement | Marine Resources Library | Tide/Current Predictor

Water Quality Comparison Graph

Help with graph



Quality Assurance and Quality Control

- All volunteers are trained
- Instruments (pH probe, refractometer) should be calibrated each week
- DNR periodically checks the instruments against our electronic instruments
- DNR staff examine data monthly and note anomalies
- Volunteers may be contacted to determine cause of anomalies
- Retraining will be conducted if necessary
- Suspect data is deleted
- Notify us any time you have a doubt about your instruments

What we do with the data

- Compare water quality against oyster performance
- Watch for changes in water quality as oyster reefs mature
- Watch for adverse conditions that may harm oysters
- Learn what factors to look for in selecting a site