# The Water Monitor

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*Texas Commission on Environmental Quality-Water Quality Planning Division/Monitoring and Assessment Section*


## National Coastal Condition Assessment

By Christine Kolbe

The National Coastal Condition Assessment (NCCA) is one of a series of water assessments being conducted by states, tribes, the U.S. Environmental Protection Agency (EPA), and other partners. In addition to coastal waters, the National Aquatic Resource Surveys (NARS) also focus on rivers and streams, lakes, and wetlands in a revolving sequence. The purpose of these assessments is to generate statistically-valid reports on the condition of our Nation's water resources and identify key stressors to these systems.

TCEQ has been involved in the national freshwater studies since 2004 with the initial phase, the National Wadeable Streams Assessment. In 2007, the Surface Water Quality Monitoring (SWQM) staff led the Texas effort in the National Lakes Survey and in 2008-2009, the National Rivers and Streams Assessment (NRSA).

The National Coastal Condition Assessment (NCCA) was the next phase of EPA's multiphase monitoring initiative in 2010. The NCCA has three main objectives: (1) Assess the condition of the Nation's coastal and estuarine waters at national and regional scales, including the Great Lakes, (2) Indentify the relative importance of selected stressors to coastal and estuarine water quality, and (3) Evaluate changes in conditions from the original NCA, 2000-2007.

The parameters measured in the NCCA will be used to evaluate the ecological condition, and recreational potential of coastal waters. Additionally, information was collected on a number of key stressors. The sampling used consistent procedures at all sites to ensure that the results can be compared across the country.

**Ecological Integrity Indicators**

- Benthic Macroinvertebrates
- Whole fish contaminants
- Sediment toxicity

**Recreational Indicator**

- Pathogen indicator (enterococci)

*NCCA* continued on page 2

## Manager's Note

By Laurie Curra

2010 was another great year for surface water quality monitoring in Texas. Through the collective efforts of numerous individuals, we loaded approximately 2,000,000 results from 1,650 stations. This represents the work of staff from the TCEQ central and regional offices, the Clean Rivers Program, Texas State Soil and Water Conservation Board, Texas Parks and Wildlife Department, the USGS, and many more. These results demonstrate true dedication to the protection of water quality. Thank you very much for your hard work. We look forward to another successful year.

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**Stressor indictors**

- Temperature, pH, dissolved oxygen (DO), salinity
- Light attenuation
- Water chemical quality and nutrient concentrations
- Chlorophyll a, Secchi disk depth
- Sediment chemistry and composition
- General habitat assessment

NCCA training took place in April 2010 at the Louisiana Wildlife and Fish Department facility on Grand Isle.

Surface Water Quality Monitoring (SWQM) Program staff in the Water Quality Planning Division led this effort for the TCEQ. The University of Houston Clear Lake-Environmental Institute of Houston (UHCL-EIH) provided expertise in water, sediment, fish tissue, and benthic community sample collection under contract to TCEQ.

Under the study design, 53 sites were identified in Texas from Sabine Lake to Lower Laguna Madre. Seven sites were resampled (for quality assurance) resulting in a total of 60 events. Sampling began in July and was completed the first week of October, 2010.

A late start, rough water, tropical storms, heat, jelly fish, and a range of other obstacles never dampened the spirit and determination of the UHCL-EIH staff to complete this work on time. Key project staff, Jenny Wrast, Misty Shepard, Kristen Condra, and Lynne Ray were instrumental to the success of this project. Thank you. Also, thank you to additional staff from UHCL-EIH and volunteers from the TCEQ SWQM Program and Field Operations Division.

For additional information contact Christine Kolbe, <ckolbe@tceq.state.tx.us>.

*See page 11 for additional photos of NCCA activities*.

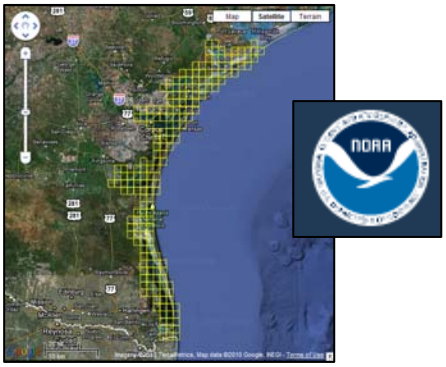
# Benthic Habitat Atlas of Coastal Texas

The *Benthic Habitat Atlas* contains shallow-water habitat information for over 190 miles of Texas coastal bays. The maps are useful for public meetings, field activities, and planning related to dredging, prop scar management, habitat change detection, and other outreach activities. Users can also access supplemental information on data development techniques.

The atlas features the extent of benthic habitats for coastal Texas, allows users to indentify an area of interest, and provides access to source benthic data. Users can access individual maps via a web viewer and download/print them as PDF documents.

The atlas is a digital volume of map sheets for the Texas coastline from Pass Cavallo south to the Mexican border at South Bay. Texas bays included are Aransas, Baffin, South, Nueces, Copano, Corpus Christi, Espiritu Santo, Redfish, San Antonio, and Upper/Lower Laguna Madre.

The individual map sheets consist of high-resolution natural color images with an overlay of the derived benthic habitat polygons that can be printed on standard 8.5 x 11 paper. Also included is background information on the types of habitat present in the area, methods used to derive the habitat data, and summary statistics by bay system. The map sheets are tiled according to the United States Geological Survey's Digital Ortho Quarter Quad index.



*Benthic Habitat Atlas* continued on page 5

# TCEQ Hosts Training for Biological Monitoring

By Anne Rogers, TCEQ

The SWQM Team hosted a Biological Monitoring Training in Austin at the TCEQ Central Office on June 21-23, 2010. The training was a big success according to the majority of evaluations received at the end of the training. It had been several years since the last biological training and turnout was far more than expected with a total of 73 participants. Several staff from the TCEQ water programs, including Bill Harrison from the SWQM Team, Dakus Geeslin from the Resource Protection Team, Peter Schaefer from the Standards Implementation Team, and Jason Godeaux from the Water Quality Standards Group, made excellent presentations on how the TCEQ uses biological data in its regulatory decision making. Other TCEQ staff provided support during the field sessions.

The training consisted of one day in the classroom with several sessions on site selection, collection methods for fish, benthic macroinvertebrates, and physical habitat. Participants were able to ask questions and see visual examples of how field collection techniques would be employed.

The second day was spent in the field on beautiful Bull Creek in west Austin. The morning session consisted of the entire group rotating between three stations with trainer-led demonstrations on fish shocking and seining, benthic macroinvertebrate collecting, flow measurement, and physical habitat collection methods. After lunch, the class split into four groups and traveled to four sites on Bull Creek to begin sampling on their own with instructors providing guidance and answering questions. This part of the training enabled participants to obtain hands-on practice using the various equipment and problem solving techniques in situations where field conditions were different from the morning location.

As indicated by the online survey provided after the training, the format of this training was highly effective in preparing participants to gain a deeper knowledge of how these methods should to be conducted in the field under varying conditions. Even long-time monitoring staff found useful information that will be implemented in future monitoring efforts.

If you have ideas for future biological trainings, please forward them to Anne Rogers, at anrogers@tceq.state.tx.us; 512-239-4597.

*Left-Lythia Meztmeier, TCEQ Region 12, demonstrates a benthic macroinvertebrate sample collection method; Top right-participants make instream physical habitat measurements; Bottom right-benthic macroinvertebrate field processing equipment.*

# Annual SWQM Workshop Review

By Anne Rogers, TCEQ

The twenty-fourth annual SWQM Workshop was held October 11-14, at the Mayan Ranch Conference Center in Bandera, Texas. The workshop was another success according to the majority of evaluations reported to date. Highlights this year were the continually improving SWQM Challenge course that provided challenging stations; including a navigation station using global positioning system (GPS) units to located items hidden around the ranch, a station using SWQMIS various reports, and an algae identification station. The Data Management & Analysis Team hosted a fun session of "Cash Canoe" for audience members to test their knowledge of the SWQMIS database and other surface water topics.

There were also several excellent speakers who gave scientific presentations on a variety of topics, including:

*Annual SWQM Workshop* continued on page 11

# Green Algae Sees Red!

By Stephen Twidwell, TPWD

Last fall as part of my job with the Texas Parks and Wildlife Department's Kills and Spills Team in San Marcos I took my boat to a local shop for repair. When I went to pick up the boat, I engaged the owner in conversation about how the brutally hot summer was causing inland fish kills and how red tide along the coast was keeping coastal fisheries personnel busy. When the owner mentioned he had a "red tide" problem of his own, I immediately investigated.

When customers brought in wave runners or jon boats for repair, they often had to remain outside the cover of the building due to space limitations. Following storms, the foot wells in wave runners and the jon boat hulls would partially fill with rainwater. The owner began noticing that about two weeks later, as these pools began to dry, they would almost always turn a bright watermelon-red color (see Photo 1).

I found that the red coloration in the foot wells was due to a red, slimy layer adhering to the sides and bottom and not due to material suspended in the water. I collected a sample of the pooled water and made a scraping of the slime layer for microscopic examination. That exam turned up a very unusual green alga, *Haematococcus pluvialis.* This alga exists in two distinct forms. The vegetative form is solitary, biflagellate, ovoid in shape and generally light-green in color (shown in lower foreground in Photo 2, page 7). The other form, the resting cell (akinete), attains a diameter three or four times that of a vegetative cell and becomes densely packed with a red pigment, astaxanthin.

*Haematococcus* has the unique ability to sense when environmental conditions (reduced water volume, high temperature, and changes in salinity and nutrient supply) are becoming unfavorable. When these conditions develop (in the case of jon boats and wave runners, about two weeks after a rainfall) the alga begins rapidly producing akinetes. The watermelon-red pigment which is produced is thought to protect the resting cells from the detrimental effect of UV-radiation, when exposed to direct sunlight. If environmental conditions improve, the akinetes germinate releasing zoospores which eventually form vegetative cells.

*Photo 1 Haematococcus growing in pool of rain water.*

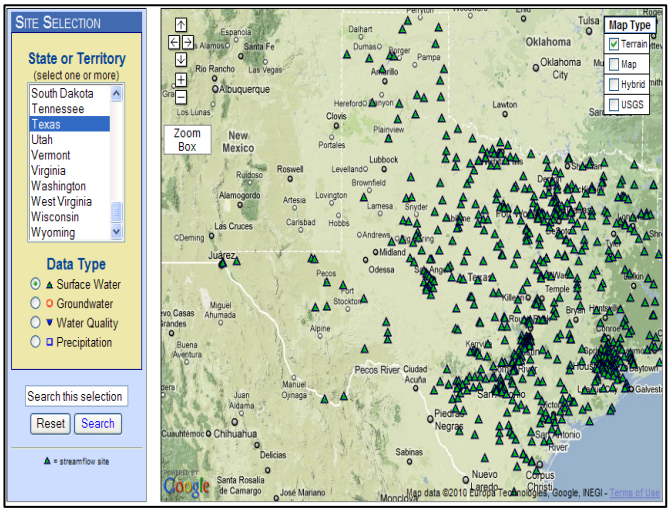
*Green Algae Sees Red! continued* on page 7

# USGS WaterAlert Service

The U.S. Geological Survey (USGS) now offers a subscriber service, WaterAlert, that sends e-mail or text messages when values at a USGS data-collection station exceed user-defined thresholds. Near real-time data from USGS gages are transmitted via satellite or other telemetry to USGS offices at various intervals; in most cases, once every one or four hours.

Emergency transmissions, such as during floods, may be more frequent. Notifications will be based on the data received at these site-dependent intervals.

You may subscribe to this service by visiting the web at < http://water.usgs.gov/wateralert/>




*Screenshot of the USGS WaterAlert Service web page.*

## Lake Shoreland Protection Resources

### Online Clearinghouse for Information on Lakeshore Protection and Restoration

The U.S. Environmental Protection Agency's 2010 National Lakes Assessment finds that lakes with poor lakeshore habitat are three times more likely to be in poor overall biological condition than lakes with good quality shorelands. Scientists looked at the amount and type of lakeshore vegetation, such as grasses, shrubs, and trees, in making their assessment of lakeshore habitat conditions. This shoreland vegetation protects the lake from the effects of polluted runoff, stabilizes the soil along the lake's edge, and provides habitat, shelter, food, and cooling shade for fish. This resources page provides practitioners links to key resources to protect and restore fragile lake shorelands and to promote better lakeshore stewardship by property owners.

<http://water.epa.gov/type/lakes/shoreland.cfm>

*Benthic Habitat Atlas* continued from page 2

The benthic habitat data in the atlas were developed using semi-automated methods supported by extensive field training and validation. These data are available in digital form through the Digital Coast. The Atlas was developed by the NOAA Coastal Services Center, in cooperation with the Texas Parks and Wildlife Department, Texas A&M University-Corpus Christi, and Fugro EarthData. <http://www.csc.noaa.gov/digitalcoast/tools/texasatlas/index.html>

*Benthic habitat cover data map showing shallow-water benthic habitats of Redfish Bay, Texas. Greens illustrate seagrass meadows, reds are mangrove areas, and yellow are unconsolidated sediments.*

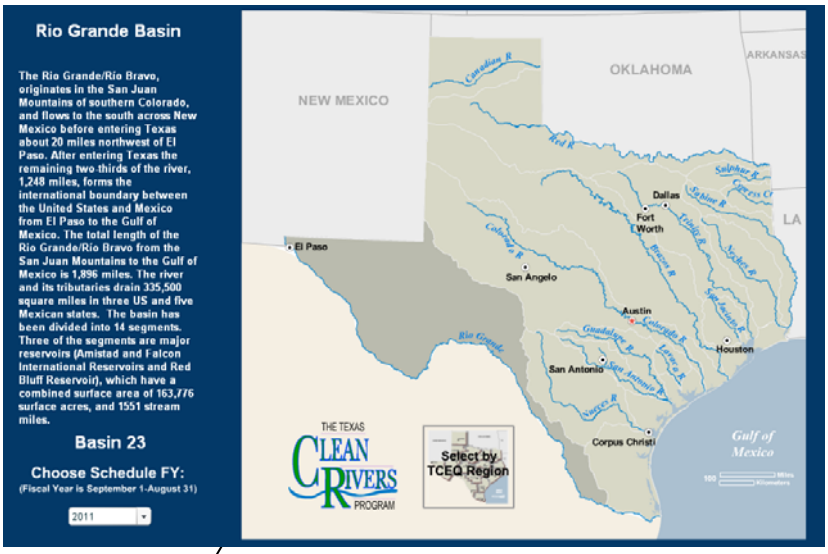
## What's in a Word?

How many words can you make from "***Benthic Macroinvertebrates***" in 10 minutes or less? First try only words with four letters or more without using the "s" as a fourth letter. See what we came up with on page 7.

# Coordinated Monitoring Schedule

Coordinated monitoring makes collecting and analyzing data on surface water more efficient for the SWQM Program and its participants—TCEQ, CRP, other state and federal agencies, municipalities, and others. Those participating are willing to comply with TCEQ requirements for collecting quality assured water quality data—resulting in comparable data of known quality. This process reduces duplication of effort and maximizes resources by strategically planning monitoring throughout the state. The coordinated monitoring schedule (CMS) is planned and developed from March through May of the preceding fiscal year. The TCEQ supports coordinated monitoring with guidance for site selection and for sampling requirements for routine and special study monitoring. The most recent information on all surface water monitoring being conducted by participants can be found on the CMS. To view the FY 2011 CMS online go to <http://cms.lcra.org

The site was created and is maintained by the Lower Colorado River Authority-Clean Rivers Program under contract to TCEQ.

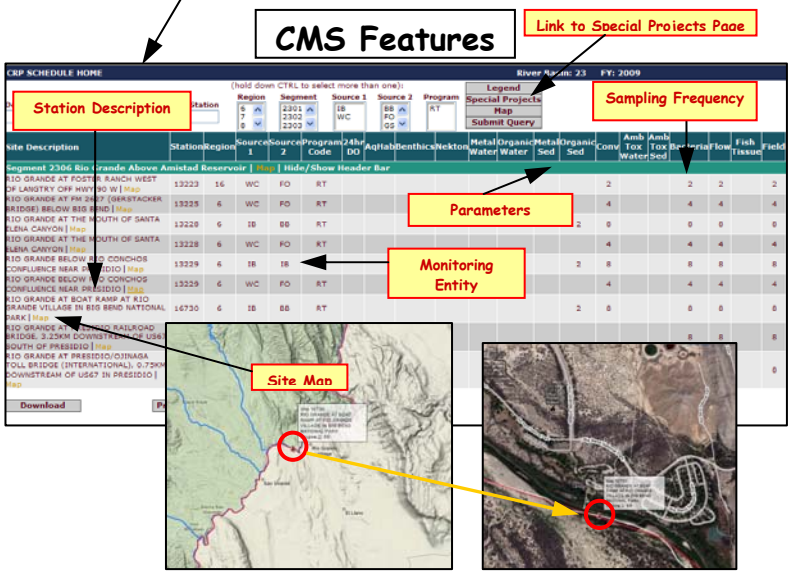



## CMS Features

The CMS web site displays an interactive database that contains more than 1,800 sites monitored in Texas. The CMS is searchable by TCEQ Region, river basin, segment, monitoring entity, and fiscal year (2003-2011).

Information and features available on the CMS include,

- parameters and frequency of monitoring
- who is doing the monitoring
- sort and download monitoring schedules
- special projects for each river basin
- maps of all sites within a river basin
- map of all sites within a water body segment
- map of each monitoring station location



"Nothing is softer or more flexible than water, yet nothing can resist it"
Lao Tzu (600 BC-531 BC)

*Green Algae Sees Red! continued* from page 4

*Haematococcus* is found world-wide in temperate regions and their resting cells are often responsible for the watermelon-red color seen in the bottom of dried out rock pools, bird baths, and small ponds. *Haematococcus* is thought to accumulate the highest levels of astaxanthin in nature. Astaxanthin is a carotenoid with a lot of potential for commercial usage, since the anti-oxidant activity is 1,000 times greater than vitamin E.

The pigment has been useful in production of various pharmaceuticals for prevention and treatment of neural damage associated with age-related macular degeneration and is effective in treating Alzheimer's disease, Parkinson's disease, and spiral cord injuries. Astaxanthin is commercially produced in Hawaii, Sweden, and Israel.

*Haematococcus* is an amazing alga, for at the single cell stage it is able to sense when surrounding environmental conditions are becoming hostile. By then producing akinetes, packed with the protective pigment, astaxanthin, the alga takes steps to help ensure its survival until conditions improve.

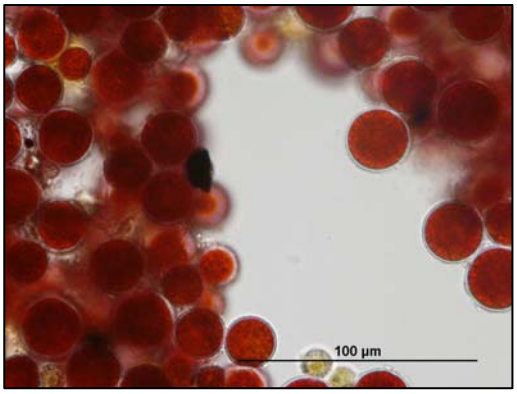



*Photo 2 Haematococcus cells*

# TCEQ Watershed Characterization Project

Last year the TCEQ procured the services of the USGS to automate a process for acquiring the watershed attributes for the network of state surface water quality monitoring stations. The project is referred to as the *Watershed Characterization Project*.

The goal of this project is to delineate watershed boundaries, calculate drainage area, compute other standard watershed characteristics, and develop draft documentation on the delineation/ characterization process for 3,000 or more active surface water quality monitoring sites. This project will also address the need for watershed delineations, drainage area, and watershed characteristics for Use Attainability Analyses (UAA), permit actions, and other special projects that arise and may require sampling at stations not currently in the database.

To accomplish this, these stations will be prioritized ahead of the sites already in the database, and delineation/characterization will be provided on an as-needed basis for these special projects.

This project is being conducted by the USGS Texas Water Science Center under contract with TCEQ. The project completion date is March 31, 2011. Additional project information can be found online at <http://txpub.usgs.gov/TCEQ/index.aspx>.

***What's in a Word?*** (continued from page 5)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| artist | beer | brother | crone | heave | mate | neat | shave | tent | train |
| atom | beet | cane | east | hectic | matte | neater | shaver | test | trait |
| bare | berate | center | either | hint | matter | neither | stain | tester | trance |
| bean | better | corn | enter | iconic | meat | nicest | strain | their | treat |
| bear | bitten | corner | entrance | inert | meet | other | strainer | there | vertebrate |
| beast | bother | crane | ethnic | inner | meter | rain | taste | thin | vest |
| beat | brain | crate | hair | invertebrate | mother | rare | taster | thinner | veteran |
| beater | brat | create | have | macaroni | near | rate | tectonic | tint | vine |

# Critter of the Quarter—*Portuguese Man-of-Water*

From The National Geographic

Anyone unfamiliar with the biology of the venomous Portuguese man-of-war (*Physalia physalis*) would likely mistake it for a jellyfish. Not only is it not a jellyfish, it's not even an "it," but a "they." The Portuguese man-of-war is a siphonophore, an animal made up of a colony of organisms working together.

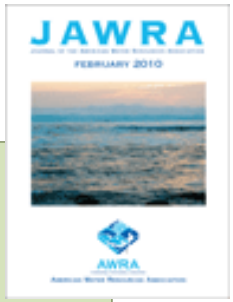
The man-of-war comprises four separate polyps. It gets its name from the uppermost polyp, a gas-filled bladder, or pneumatophore, which sits above the water and somewhat resembles an old warship at full sail. Man-of-wars are also known as bluebottles for the purple-blue color of their pneumatophores.
The tentacles are the man-of-war's second organism. These long, thin tendrils can extend 165 feet (50 meters) in length below the surface, although 30 feet (10 meters) is more the average. They are covered in venom-filled nematocysts used to paralyze and kill fish and other small creatures. For humans, a man-of-war sting is excruciatingly painful, but rarely deadly. But beware—even dead man-of-wars washed up on shore can deliver a sting.

Muscles in the tentacles draw prey up to a polyp containing the gastrozooids or digestive organisms. A fourth polyp contains the reproductive organisms.

Man-of-wars are found, sometimes in groups of 1,000 or more, floating in warm waters throughout the world's oceans. They have no independent means of propulsion and either drift on the currents or catch the wind with their pneumatophores. To avoid threats on the surface, they can deflate their air bags and briefly submerge.

*This entire article was taken from the National Geographic website.*
<http://animals.nationalgeographic.com/animals/invertebrates/portuguese-man-of-war/>.

*Portuguese Man-of-War washed up on Padre Island*




## Journal of the American Water Resources Association; Volume 46 Issue 1 (February 2010)—Special Issue

This is a special issue with articles on *Prymnesium parvum*. Many of the articles were authored by researchers in Texas including Texas Parks and Wildlife Department, Texas A&M, Baylor, and UT Arlington. Examples of articles in this issue include,

*-Prymnesium parvum: The Texas Experience*
*-Aspects of Origins, Ecology, and Control of Golden Alga Prymnesium parvum*
*-Comparative Toxicity of Prymnesium parvum in Inland Waters*
*-Prymnesium parvum Population Dynamics During Bloom Development: A Role Assessment of Grazers and Virus.*

To access these and other articles related to *Prymnesium parvum* go to, <http://www3.interscience.wiley.com/journal/118544603/home>.

# EPA Releases National Lakes Assessment Report

The U.S. Environmental Protection Agency (EPA) released its most comprehensive study of the nation's lakes to date. The draft report rated the condition of 56 percent of the lakes in the United States as good and the remainder as fair or poor. The report marked the first time EPA and its partners used a nationally consistent approach to survey the ecological and water quality of lakes. A total of 1,028 lakes were randomly sampled during 2007 by states, tribes and EPA.

The National Lakes Assessment (NLA) reveals that many lakes are in fair or poor condition. The results of this study describe the target population of the nation's lakes as a whole and are not applicable to a particular lake.

The NLA findings suggest the following,

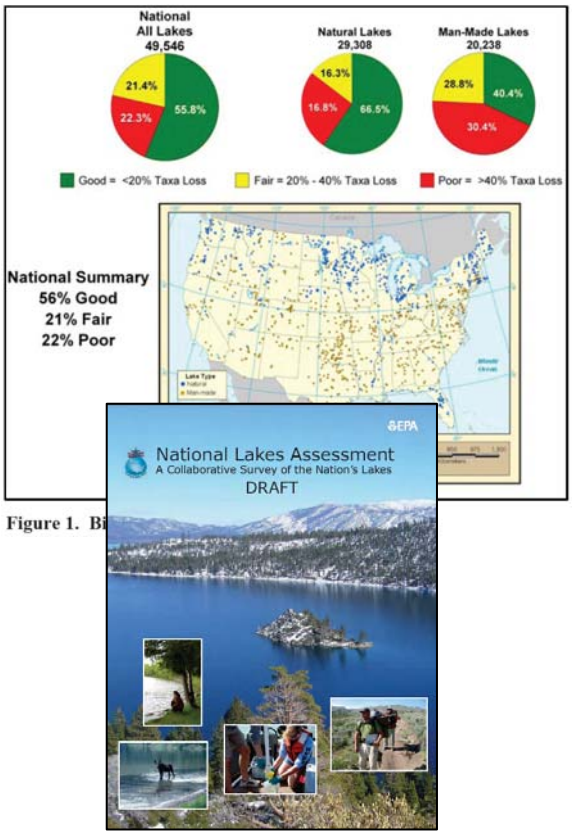



Figure 1. Bi

Poor lakeshore habitat condition imparts a significant stress on lakes and suggests the need for stronger management of shoreline development, especially as development pressures on lakes keep steadily growing.

Effective nutrient management continues to be needed in the nation's lakes. Excess levels of nutrients contribute to algae bloom, weed growth, reduced water clarity, and other lake problems. The adverse impact of nutrients on aquatic life, drinking water, and recreation remains a concern.

Local, state and national initiatives to protect the integrity of lakes should center on restoring the natural state of shoreline habitat – particularly vegetative cover and nutrient loading.

Texas collected data at a total of 54 sites during the NLA in order to complete a statewide probabilistic assessment of water bodies. Evaluation of this dataset is underway.

For additional information contact Bill Harrison at <bharriso@tceq.state.tx.us> or Anne Rogers at <anrogers@tceq.state.tx.us>

*Left to right, Pat Bohannon and Bill Harrison filtering a bacteria sample in the field at Lake Coleman.*

The final report is located online at <http://www.epa.gov/lakessurvey>. Hard copies of the report are available through EPA only.

# TWRI Announces New Online Texas Water Journal

Excerpts from TWRI Press Release 9-21-2010

The Texas Water Resources Institute (TWRI) and The Texas Water Journal, a nonprofit organization, announced the publication of the inaugural issue of an online, peer-reviewed journal that is devoted to Texas water resources management and policy issues.

"The *Texas Water Journal* provides in-depth analysis of Texas water resources management and policies from a multidisciplinary perspective that integrates science, engineering, law, planning, and other disciplines," said Dr. Todd Votteler, the journal's editor-in-chief and executive manager of intergovernmental relations and policy for the Guadalupe-Blanco River Authority.

"We created the Texas Water Journal to provide greater, timelier access to information on Texas water," Votteler said. "For example, the Texas Water Journal is free and articles are posted as they are completed."

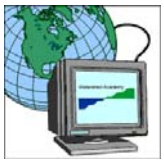
Votteler said the first issue has three articles: Climate Change Impacts on Texas Water; Condensing Water Availability Models to Focus on Specific Water Management Systems; and Desalination and Long-Haul Water Transfer as a Water Supply for Dallas, Texas.

"Our desire is that each issue and each article make a material contribution to improving water management in Texas," he said.

The free journal can be read at <http://journals.tdl.org/twj/>. Interested readers can register to receive an email each time an issue or article is published. Authors interested in publishing in the journal may submit their manuscript through the online submission link after registering.

The TWRI is part of Texas AgriLife Research, the Texas AgriLife Extension Service and the College of Agriculture and Life Sciences at Texas A&M University. The institute also publishes txH2O, a magazine, and New Waves, an e-mail newsletter, which highlight water resource research and education in Texas. Visit <https://twri.tamu.edu/publications/subscribe> to subscribe.

# EPA Online Watershed Management Training



EPA's Watershed Academy Distance Learning Program—***Watershed Academy Web*** offers a variety of self-paced training modules that represent a basic and broad introduction to the watershed management field. The modules are organized by the six themes listed below. Modules vary in the time they to complete, from ½ hour to 2 hours. There are 15 core modules for the Watershed Academy **Certificate Program**.

***Introductory/Overview Modules***: *These modules introduce the principles of the watershed approach and the value of working at a watershed level.*

***Watershed Ecology Modules***—*These modules show that watersheds are natural systems that provide substantial benefits to people and the environment when they are kept in good condition.*

***Watershed Change Modules***—*These modules describe both natural and human-induced changes in watersheds, and compare normal changes with changes of concern.*

***Analysis and Planning Modules***—*These modules address how watershed planning, monitoring and assessment are important first steps toward solving problems*

***Management Practices Modules***—*These modules show how watershed management challenges such as urban runoff, cropland management, forestry and other issues are addressed by techniques that reduce environmental impacts.*

***Community/Social/Water Law Modules***—*These modules cover social issues, communications, relevant laws andregulations. They concentrate on the human element of watershed management.*

A **Watershed Management Training Certificate** is available to those who complete 15 core modules and pass the self-tests. The modules can be found at <http://www.epa.gov/watertrain/>.

*Annual SWQM Workshop* continued from page 4

- Two excellent presentations on the value, function, and management of riparian areas adjacent to streams, rivers, lakes, and estuaries and the role of the Texas Riparian Association in Texas.
- An update on the recent expansion of the zebra mussel into Texas and the status of pending exotic algae permitting for biofuels.
- An overview of the Texas Stream Team and the various projects and data services they provide to the monitoring community.
- An in depth presentation on the Instream Flow Studies and the complex work that the Texas Instream Flow program is doing.
- A humorous look at the work the SWQM Program is doing in refining the assessment unit spatial coverage in Texas.

The evening Biorama session on Tuesday was also a big hit and many participants came away with some one-on-one instruction in identifying problematic species of both fish and aquatic insects. Quality assurance and data management were also a focus during the workshop. In all, 111 participants attended the workshop.

As always, there were great networking opportunities, in depth conversations about projects around the state and a genuine feeling of camaraderie among the various entities collecting water quality. For those unable to attend the workshop this year, copies of all presentations will be placed on the SWQM Web page soon. If you have ideas for next year's workshop please forward them to Anne Rogers, at anrogers@tceq.state.tx.us; 512-239-4597.

*Workshop participants work at the Algae Identification Station during the SWQM Challenge in Bandera, TX.*

## Biology and Ecology of *Prymnesium parvum* (golden alga) Study Findings Released

A team of Texas AgriLife Research, Baylor University, and University of Texas at Arlington researchers studied the biology and ecology of *Prymnesium parvum* (golden alga) in Lakes Granbury and Whitney using a three-fold approach that involved system-wide monitoring, experimentation at the microcosm and mesocosm scales, and mathematical modeling.

Conclusions, to date, regarding this organism's ecology and potential strategies for bloom mitigation can be found in the *Lake Granbury and Lake Whitney Assessment Initiative-Final Report* available online at, <http://twri.tamu.edu/reports/2010/tr392/tr392.pdf>

To sign-up for automatic notification of when new issues of the "The Water Monitor" **online** newsletter are posted, go to <www.tceq.state.tx.us>, click on the "sign up for e-mail updates" icon and follow the instructions.

Previous issues are also available on the web at, <http://www.tceq.state.tx.us/compliance/monitoring/water/newsletter.html>

If you have any suggestions for future newsletters or would like to contribute an article contact Christine Kolbe at <ckolbe@tceq.state.tx.us>.

# Photo Gallery—National Coastal Condition Assessment 2010