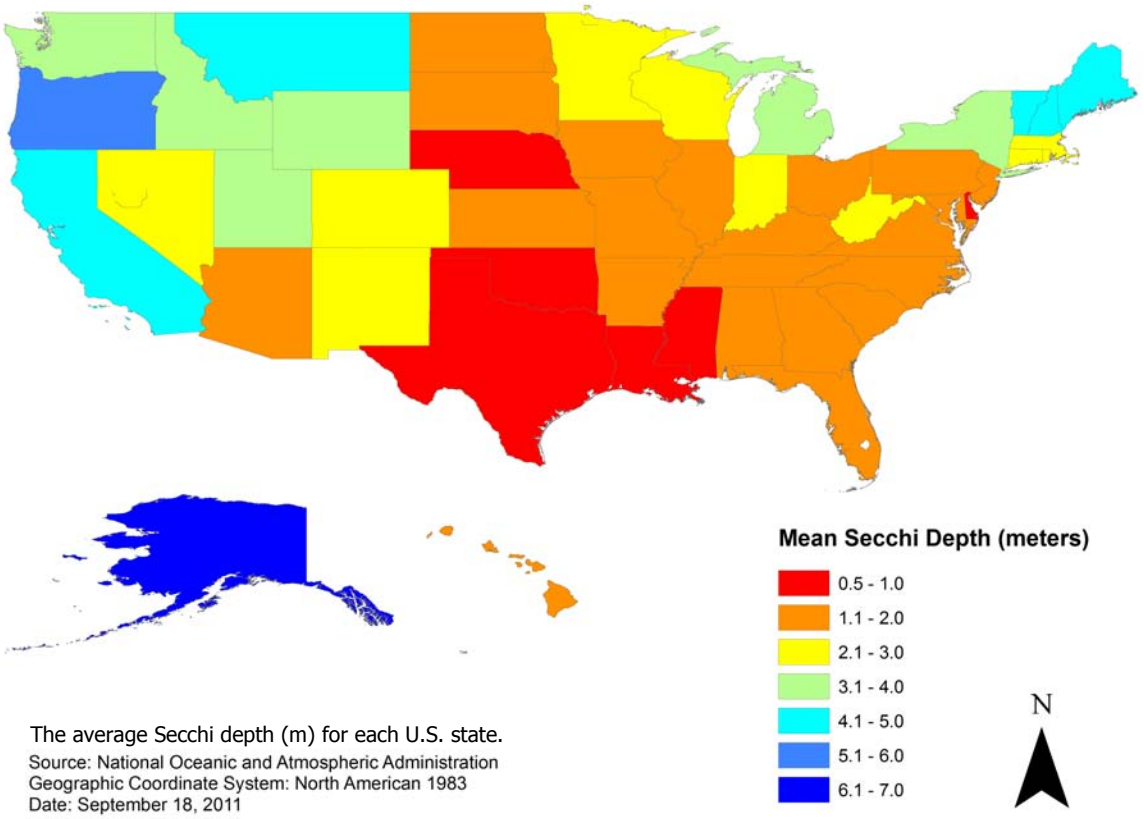
Florida LAKEWATCH

Dedicated to Sharing Information About Water Management and the Florida LAKEWATCH Program Volume 55 (2011)



The average Secchi depth (m) for each U.S. state.
Source: National Oceanic and Atmospheric Administration
Geographic Coordinate System: North American 1983
Date: September 18, 2011

THE SECCHI DISC

Daniel E. Canfield Jr. and Robert E. Carlson

The physical attribute of a water body that is most remembered by first-time visitors is the clarity of the water. Early descriptions of Lake Superior by Ferris in 1856 emphasized the great purity of the water (but noted not good for doing laundry) and seeing pebbles on the bottom of the lake at over 8 m (Ferris 1856). In Florida, Heilprin wrote in 1887 how turbid the waters of Lake Okeechobee were after storms (not good for drinking).

In 1865, Pietro Angelo Secchi SJ created the Secchi disc to measure water clarity in oceans and lakes.

UF UNIVERSITY of FLORIDA IFAS

The first disc was lowered from the papal yacht, l'immacolata Concezion (Immaculate Conception), on April 20, 1865.

The first Secchi disc measurements in the United States were made by Le Conte at Lake Tahoe (60 m) in September of 1873. Since that first measurement limnologists, fisheries biologists and other aquatic scientists have used the simple Secchi disc to measure water transparency, assess the trophic status of surface waters, system productivity, and assess fisheries potential.

Scientific interest in water clarity has remained strong since 1865 because the Secchi disc remains one of the most common, inexpensive and efficient tools in the study of limnology. It is also the limnological tool that has been used basically the same way whereas methods for measuring nutrients (total phosphorus and total nitrogen) and algal biomass as measured by chlorophyll have changed over the years. Finally hundreds of thousands of Secchi disc measurements have been made (many by citizen-scientists like you) in waters located across the United States.

This year, Florida LAKEWATCH has teamed-up with Dr. Robert Carlson, the founder and director of the Great American Dip-In (also the developer of the Trophic State Index, the TSI) to assemble Secchi data from all of the United States and create a "Living" repository for water clarity measurements. We are also working with Dr. Carlson to ascertain long-term trends in water clarity and the impact of catastrophic events such as hurricanes and great floods. Dr. Carlson chose to work with Florida LAKEWATCH because of the great Secchi database created by LAKEWATCH's citizen scientists.

So far we have assembled over 975,000 Secchi depth measurements were from 13,840 water bodies located throughout the United States. Water clarity ranged from less than 0.1 m to 31.6 m. Average Secchi readings (see Map) were less than 1.1 m in 25% of the water bodies and less than 3.4 m in 75% of the waters. Only 10% of the water bodies had average Secchi readings exceeding 4.8 m. The seven states with the greatest (> 4 m) average water clarity were Alaska (6.4 m), Oregon (5.1 m), Montana (4.8 m), Maine (4.7 m), Vermont (4.5 m), California (4.2 m) and New Hampshire (4.1 m). The six states with the lowest ($\leq$ 1 m) average water clarity were Delaware (0.7 m), Louisiana (0.7 m), Mississippi (0.8 m), Nebraska (0.8 m), Oklahoma (0.8 m), and Texas (1.0 m).

Professionals with groups like the U.S. Environmental Protection Agency or the Florida Department of Environmental Protection Agency have typically been focused on developing a protocol for identifying national or statewide trends in water quality. However, it is not these trends that are the primary concern for most individuals. They want to know what is happening in "My Lake." Because of the excellent work done by citizen scientists working with groups like Florida LAKEWATCH in other states, a very large database has been created that now permits an examination of long-term trends in individual water bodies while placing any changes in context of what might be happening at the state or national level.

We urge you, the volunteers, to continue your great work. You are not only contributing information that is important for the management of your water body, but to a "living" record that will finally permit an assessment of the multitude of environmental factors that may be affecting our lakes at different scales of analysis, the national, statewide, or local level.

Keep up the good work and please know that ***YOU*** are contributing to knowledge about your water body as well as being an integral part of something much bigger than just your own water body!

Dr. Robert Carlson

Dr. Dan Canfield

Why are nutrients so important? - Total Nitrogen

Dan Willis

Nitrogen is a necessary nutrient for the growth of algae and aquatic plants.

In volume 54 of the Florida LAKEWATCH newsletter we introduced you to total phosphorus and why total phosphorus was important to your waterbody. In this volume we will continue our discussion on nutrients by introducing you to total nitrogen. We will start, as we did with phosphorus with the different forms of total nitrogen.

About Nitrogen

Nitrogen is a necessary nutrient for the growth of algae and aquatic plants. Various forms of nitrogen can be found in water including organic and inorganic forms.

Organic forms of nitrogen are derived from living organisms and include amino acids and proteins.

Inorganic forms are composed of materials other then plants or animals (i.e., mineral based) and include nitrate ($N0_3^-$), nitrite ($N0_2^-$), unionized ammonia (NH_4), ionized ammonia (NH_3^+), and nitrogen gas (N2). **Total nitrogen** (abbreviated **TN**) is a measure of all the various forms of nitrogen found in a water sample, except nitrogen gas. Not all forms of nitrogen can be readily used by algae — especially nitrogen bound with particulate organic matter. In general, algae and aquatic plants directly utilize inorganic forms of nitrogen such as nitrates, nitrites, and ammonia.

Nitrogen finds its way into aquatic environments from both natural and man-made sources including:

♦ **the air** — some algae can "fix" nitrogen, or pull nitrogen out of the air in its gaseous form and convert it to a form they can use;

♦ **stormwater run-off** — nitrogen can even come from "natural" run-off from areas where there is no human impact because it is a naturally-occurring nutrient found in soils and organic matter;

♦ **fertilizers**; and

♦ **animal and human wastes** (sewage, dairies, feedlots, etc.).

Nitrogen As A Limiting Nutrient

Like phosphorus, nitrogen is an essential nutrient for all aquatic plants. In some cases, an inadequate supply of TN in waterbodies has been found to limit the growth of free-floating algae (i.e., phytoplankton). This is called **nitrogen limitation**, and occurs most commonly when the ratio of total nitrogen to total phosphorus is less than 10. In other words, the TN concentration divided by the TP concentration is less than 10 (TN/TP < 10).

HEALTH CONCERNS

Like many people throughout the world, Floridians are concerned about water quality. Water quality is sometimes defined in terms of human health effects and toxicity to aquatic organisms. With regard to nitrogen, total nitrogen in surface waters does not reach high enough levels to pose a direct threat to human health. The maximum allowable level of nitrate, a component of the total nitrogen measurement, is 10 mg/L in drinking water. Generally, concentrations of nitrates in surface waterbodies do not reach this level because nitrates are readily taken up by plants and used as nutrients. Most forms of nitrogen are harmless to fish and aquatic organisms except unionized ammonia and nitrite, which can be toxic.

Dan Willis

A LAKEWATCH volunteer sampling for TN on Skiwatch Lake in Santa Rosa County.

However, nitrites are usually not a problem in waterbodies; if there is enough oxygen available in the water, nitrites oxidize and are readily converted to nitrates.

Total Nitrogen and Trophic State

When ONLY the average concentrations of total nitrogen (TN) from the Florida LAKEWATCH database are used, Florida lakes were found to be distributed into the four trophic states as described below.

♦ Approximately 14% of the lakes (those with TN values less than 400 µg/L) would be classified as **oligotrophic**. *Oligotrophic lakes have very low levels of biological productivity.*

♦ About 25% of the lakes (those with TN values between 401 and 600 µg/L) would be classified as **mesotrophic**. *Mesotrophic lakes have moderate levels of biological productivity.*

♦ 50% of the lakes (those with TN values between 601 and 1500 µg/L) would be classified as **eutrophic**. *Eutrophic lakes have moderately high levels of biological productivity.*

♦ Nearly 11% of the lakes (those with TN values greater than 1500 µg/L) would be classified as **hypereutrophic**. *Hypereutrophic lakes have very high levels of biological productivity.*

This distribution of trophic state is based solely on total nitrogen values without utilizing information on total phosphorus concentrations, chlorophyll concentrations, Secchi depth, or aquatic plant abundance.

So you can see why phosphorus is so important in managing Florida's waterbodies and how important it is to know how much phosphorus is in each lake. This is why the work of all of the LAKEWATCH volunteers is so important not only for their own lakes but for understanding and managing all of Florida's waterbodies.

Living With Sand Hill Cranes

By The Florida Fish and Wildlife Conservation Commission

Sandhill cranes are cherished members of the Florida ecosystem. They stand almost 4 feet tall and their bugling or rattling calls are haunting and beautiful. Sandhill cranes occur in pastures, open prairies and freshwater wetlands in peninsular Florida from the Everglades to the Okefenokee Swamp.

Florida sandhill cranes are present in many urban areas and some unlikely places such as golf courses, airports and suburban subdivisions. This is probably due in part to the rapid development of their native habitat by humans. Cranes are probably attracted by the open setting (mowed grass) and availability of some foods (acorns, earthworms, mole crickets, turf grubs).

People inadvertently put them in harms way when they attract these birds to their yards with feed. Some "feeding" is accidental such as when bird seed is spilled from feeders by other animals onto the ground below making a nice feeding station for cranes. But, some people deliberately feed sandhill cranes. In 2002, the Florida Fish and Wildlife Conservation Commission made it illegal to feed sandhill cranes (Florida Fish and Wildlife Code 68A-4.00(3)).

Why is feeding cranes prohibited?

Cranes fed by humans can become aggressive toward people. In several instances, children have been attacked by cranes. Cranes fed by humans also have been known to damage window screens and do other property damage. This behavior is probably a response of the birds to seeing their reflection, bringing out a territorial defense behavior (scratching at windows or shiny automobiles). Cranes also are more likely to tangle in human garbage in areas populated by people. Cranes are more likely to crash into power lines in urban areas where such aerial hazards are concentrated. Cranes attracted to people's yards for feed are put at risk as they walk across roads. Many sandhill cranes are killed each year on Florida roads (see photo). Attracting cranes to urban areas increases the threat of predation (especially to young cranes) by dogs or cats. Further, the cranes' diets, which normally are quite diverse, are disrupted when they eat one food item (such as corn), consistently. Heavy pesticide use in urban lawns also is of concern. Young sandhill cranes have died from pesticide poisoning.

A Florida Sandhill Crane and chick.

www.birdphotos.com

Conclusion
It's never a good idea to feed wildlife. People inadvertently put cranes in harms way when they attract these birds to their yards with feed. Florida sandhill cranes have an abundance of natural foods (insects and small animals) and they do not need handouts from humans. There are many reasons why cranes should not be intentionally fed by humans. For the good of the cranes, please do not feed them.

Four things you can do to better coexist in "Crane Country"

- Never feed cranes and encourage your neighbors not to feed cranes. Cranes are less likely to inhabit urban areas if easy meals are not provided.
- Cover or move automobiles so that cranes cannot see their reflections in the shiny surfaces. Windows or glass doors that the cranes attack can be temporarily covered with material so that the birds do not see their reflections.

musicalpeace.org

www.morningsidemom.com

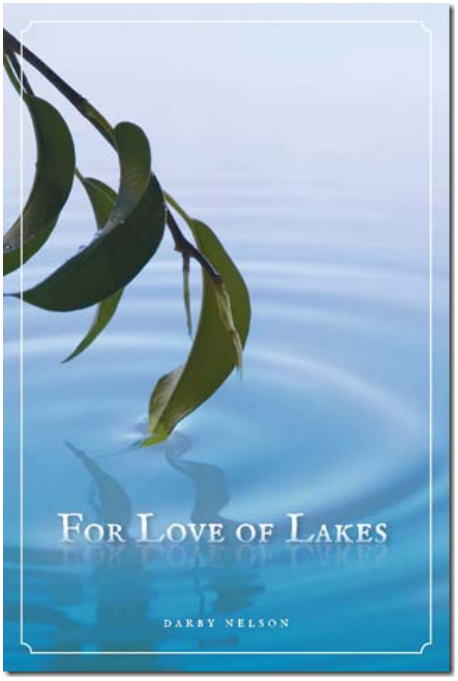
Never feed cranes and encourage your neighbors not to feed cranes.
Cranes are less likely to inhabit urban areas if easy meals are not provided.

- Temporarily cover windows or screens. A string mounted on stakes about 2.5 feet off the ground will provide an exclusion "fence" around the parts of homes (window or pool screens) that are being damaged by cranes.
- Accept some digging for food. Cranes sometimes damage lawns and gardens as they dig for food such as mole crickets and beetle grubs. The birds, in this case, provide natural "biological control" of these common pests of turf.

www.thebestvillas.com

Our mission: Managing fish and wildlife resources for their long-term well-being and the benefit of people.

For Love of Lakes



For Love of Lakes

We say we love our lakes yet we not only allow but participate in their deterioration. Despite our professed love, nationwide more than 43 percent of surveyed lakes and 80 percent of urban lakes do not meet water quality standards. Aquatic ecologist Darby Nelson's puzzlement with this paradox finally bubbled over, leading him to set out on a lake journey to try to gain understandings. His cut-off blue jeans and soggy tennis shoes journey of paddling and wading, listening and sniffing, turning over stones and touching, took him to large lakes and small, from Minnesota to Canada, New England, and lakes in between seeking answers.

He has written a book describing his discoveries. *For Love of Lakes* is newly released by Michigan State University Press. The book weaves a delightful tapestry of history, science, emotion, logic, and lake natural history for all who love lakes or enjoy nature writing. *For Love of Lakes* is an affectionate account documenting our species' long relationship with lakes—their glacial origins, Thoreau and his environmental message, and the major perceptual shifts and advances in our understanding of lake ecology. This is a necessary and thoughtful book that addresses the stewardship void while providing improved understanding of our most treasured natural feature.

Darby's background in science and teaching initially led him to expect the paradox arose because of peoples' lack of understanding of how aquatic systems worked, that with expanded informational programs, our behavior toward lakes might improve, that inadequate knowledge could easily result in inadvertent actions that degrade lakes.

Nelson learned that though information can be helpful, there is more to the paradox than lack of education. A plethora of other factors can and do influence our behaviors toward lakes:

- Our strong innate landscape preferences.
- Our inability to fully perceive a lake because we can only see the shore and the lake surface, but not the 99 percent or more of a lake that is hidden from view.
- Our tendency to see what we want to see and hear what we want to hear.

Also, public health studies show that education efforts have failed miserably to change behavior compared to the much greater success of emotional engagement. Public health expert, Valerie Curtis, argues that "to break unhealthy habits, campaigns need to target emotions, because they are the decision makers. Where the heart leads, the habits will follow." Lake stewardship campaigns might well learn from the experience of the public health folks.

For Love of Lakes speaks from the heart of the author to the heart of the reader and so has the potential to change behavior toward better lake stewardship.

Darby Nelson, Professor Emeritus at Anoka-Ramsey Community College and aquatic ecologist, served three terms as a Minnesota state legislator, is past president of Conservation Minnesota, and serves on the Freshwater Society Board. He has numerous conservation and teaching awards. His website, darbynelson.com, will be live soon.

Asian Green Mussels

The Asian green mussel (Perna viridis) was found in Tampa Bay in late 1999.

The Asian green mussel (Perna viridis) was first found in Tampa Bay in late 1999. The Asian green mussel is not native to Florida's waters. The Florida Fish and Wildlife Conservation Commission (FWC) is concerned about the presence of this mussel and the effect that it may have on native Tampa Bay species and Tampa Bay's ecosystems. This mussel should also be of concern to boat owners; electric utilities; and anyone who maintains structures such as sea walls, docks, navigational markers, bridges, and intake and discharge structures. As larvae, the green mussel settles on hard, submerged surfaces and can form large masses of mussels. The mussel larvae are capable of swimming, and even in swift currents, they are able to settle onto surfaces. The mussels can restrict water flow in pipes and increase drag on other structures, such as boat hulls. The green mussel, which has a brown, yellow and bright emerald green or blue-green shell, apparently grows rapidly and can exceed six inches (160 mm). The green mussel has become widely distributed in Tampa Bay and Sarasota Bay. This invasive species had spread to Charlotte Harbor by 2000, Ten Thousand Islands and the Mosquito Lagoon by 2002, Jacksonville and Savannah, GA in 2003, and has been reported as far north as Charleston, S.C.

FWC

The green mussel is originally from the Indian and Pacific Oceans. It came into the Gulf of Mexico about ten years ago, presumably as larvae in the seawater ballast tanks of a large ship. Scientists suspect that the same method of transportation brought the green mussel to Tampa Bay. In China, the Philippines, and Malaysia the green mussel is highly prized as food. Note: Shellfish, including mussels, from most of Tampa Bay are not safe to eat: Shellfish harvesting in a large part of Tampa Bay is prohibited. There are two areas of Tampa Bay that are considered "conditionally approved." These two areas are usually open but periodically closed to shellfish harvesting based on pollution events, such as rainfall or increased river flow. See maps on the Department of Agriculture and Consumer Services Web site for Boca Ciega Bay and South Tampa Bay for current status.

The FWC wants to prevent green mussels from becoming a nuisance species in other Florida habitats. It is possible for boaters to inadvertently move mussels from Tampa Bay to other waters. The mussel larvae may be in bilge water and adult mussels may be attached to boat hulls.

www.jaxshells.com

Asian Green muscles on the underside of a pontoon boat, Vilano Beach, St. Johns County, FL 6/28/2004

To help prevent the spread of these mussels, boaters can follow these suggestions:

Inspect any boat that has been in Tampa Bay unprotected (without fresh bottom paint); remove and dispose of mussels if you see them.

Prior to transporting boats to other water bodies, drain the bilge at an appropriate disposal station or, if no oil is present in the bilge water, into Tampa Bay.

Spread the word; make others aware of the problem non-native species can cause in our natural ecosystems.

The Molluscan Fisheries project at the Florida Fish and Wildlife Research Institute will be surveying the distribution of green mussels in Tampa Bay and conducting investigations on the reproductive cycle of the mussels. Research staff members are distributing informational posters to various user groups around Tampa Bay.

The FWC is particularly interested in reports of this mussel from the Panhandle and western Gulf of Mexico as well as southeastern Florida. If you suspect that you have seen green mussels or have questions, please call:

Florida Fish and Wildlife Conservation Commission
Florida Fish and Wildlife Research Institute
Dr. Steve Geiger
727-896-8626

For more information about this species or other non-indigenous species see

http://greenmussel.ifas.ufl.edu/gm-distribution.html
http://nas.er.usgs.gov/
http://nis.gsmfc.org/

Volunteer Bulletin Board

Collection Center Changes in Lake County

The Collection Center at the Ocala National Forest Fire Dispatch Office (off of State Road 19) has been moved. The new location is at:

Ocala National Forest
Pittman Visitor Center
45621 County Road 19
Altoona, FL 32702.

The new collection center will be open Tuesday through Sunday. The freezer is located on the back porch of the building and can be accessed by volunteers through the visitor center.

Monthly Sampling Is Back!

LAKEWATCHer's, we are requesting that all samplers who sample fresh water lakes, springs, rivers, etc. begin to sample your water body on a monthly basis again. Because LAKEWATCH's water lab is now in position to handle more freshwater samples we are able to process freshwater samples on a monthly basis once again. Sorry all of you salt-water LAKEWATCHer's, due to the extra time and personnel involved with salt-water analysis, we are not able to resume monthly sampling for you at this time so you should continue to sample every other month.

Lab Reminder!

Please remember to pour out excess water down to shoulder of your sample bottle. This will allow for expansion of your water sample upon freezing and the bottle will not be stressed.

Outstanding LAKEWATCH Volunteer

In every newsletter LAKEWATCH produces we try to honor an outstanding volunteer in an appreciation article. The volunteer either has been a long-term volunteer, was active in water related environmental causes, or was instrumental in helping their waterbody with management solutions. James (Jim) Griffin excemplifies all of the above criteria for being honored in an article as an outstanding volunteer. Jim has been the volunteer on Lake Forest in Hillsborough County since 1999.

USF

Dr. Jim Griffin

Jim was originally from Pennsylvania but his parents moved to Winter Park, FL when he was in 5th grade. He earned his BA degree in Chemistry from University of South Florida (USF) where he was a member of the USF ski team. Graduated from USF in December of 1968. While at school he participated in USF Co-Op Education program and met future wife, Nella Bryant. Jim went to work for the Food and Drug Administration in Washington DC and in March of 1969 married Nella. He joined the US Navy and entered Naval Flight Officer Candidate School in Pensacola Florida in July of 1969.

Jim became a Naval Flight Officer (Ensign) on November 21, 1969. He served in Navy for 22 years, serving aboard carriers America, Ranger, Forrestal, Enterprise and Nimitz. He flew as a Naval Flight Officer and Electronic Warfare Officer in the EA-3B and EA-6B aircraft (over 500 arrested landings without incident). While in the Navy Jim obtained his Masters degree in Electronics Systems Engineering/Technology at the Naval Postgraduate School in Monterey, California. Served as an action officer for the Chief of Naval Warfare (OP-59) staff at the Pentagon in Washington D.C. Last assignment was to the US European Command in Stuttgart, Germany and later in Saudi Arabia during the Gulf War. He retired from Navy after 22 years with the rank of Commander in Orlando Florida in August of 1991.

He then moved to Melbourne Florida where he attended the Florida Institute of Technology and earned a PhD in Environmental Science in December 1995. His major area of study was in water chemistry. Jim then began a second career as the Lake Manager for Hillsborough County where he developed and implemented the Hillsborough County Lake Management Program, the Hillsborough County Stream Water Watch Program, the County's Lake Assessment Program and the Hillsborough County Lake Atlas (that later became the Water Atlas).

After a few years at Hillsborough County he then moved to the South West Florida Water Management District. There he served as a senior environmental scientists and project manager, managing large lake and wetland restoration projects and developing watershed plans for the district. In 2004 he accepted a position at USF as an Associate Research Faculty conducting research and building an on-line education and data resources for lakes, streams and coastal bays and inlets and teaching Spatial Database Design and Geographic Information System Sciences.

He retired from USF at the end of June 2011 and now volunteers at USF 3 days a week continuing his work until a replacement professor can be found. Also volunteers for Florida LAKEWATCH program, is a director of the Florida Lake Management Society and past president of the society and is active as a Sunday School teacher at the Lake Magdalene United Methodist Church. He has lived on Lake Forest for 14 years and volunteers his expertise as chairman of Lake Forest's Lake Committee.

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Florida
LAKEWATCH

This newsletter is generated by the Florida LAKEWATCH program, within UF/IFAS. Support for the LAKEWATCH program is provided by the Florida Legislature, grants and donations. For more information about LAKEWATCH, to inquire about volunteer training sessions, or to submit materials for inclusion in this publication, write to:

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7922 NW 71st Street
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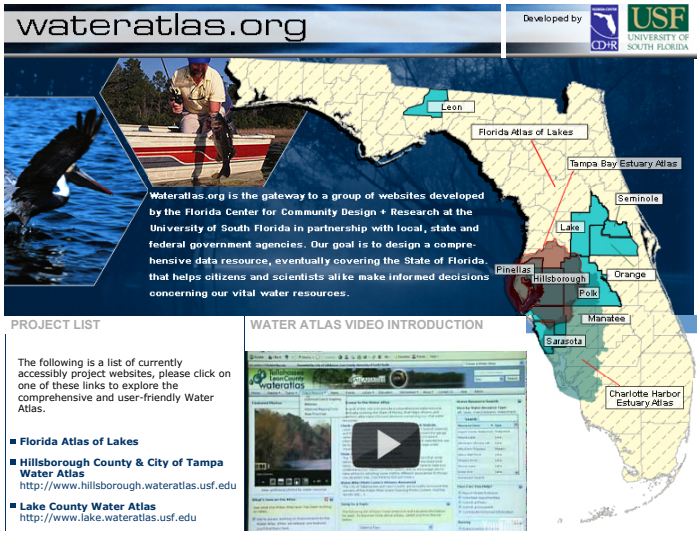
1-800-LAKEWATCH (800-525-3928)
(352) 392-4817
E-mail: fl-lakewatch@ufl.edu
http://lakewatch.ifas.ufl.edu/

All unsolicited articles, photographs, artwork or other written material must include contributor's name, address and phone number. Opinions expressed are solely those of the individual contributor and do not necessarily reflect the opinion or policy of the Florida LAKEWATCH program.

LAKEWATCH does not have very many volunteers that have had the careers Jim has had or volunteers that have done as much for the their lake or their field of expertise as Jim. We hope he has a long and happy retirement and LAKEWATCH is proud to have him as a volunteer and a friend.



The Water Atlas is a unique resource that serves eleven counties with detailed water information.