UF IFAS UNIVERSITY of FLORIDA

Florida LAKEWATCH

Dedicated to Sharing Information About Water Management and the Florida LAKEWATCH Program Volume 80 (2018)

Florida LAKEWATCH is Fundraising to Establish an Endowed Assistantship for Graduate Students.

By Mark Hoyer, LAKEWATCH Director

Florida LAKEWATCH was started in 1986 when Lake Santa Fe residents started asking for science based information on their lake to help become better stewards and lake managers. Many other lakes soon followed also asking questions about the most important lake in Florida "My Lake." While LAKEWATCH has strong research and extension components the third leg of LAKEWATCH is teaching, primarily in the form of Graduate Students (more than 35 students since 1986). All of these components are important and complement one other, however, many of the questions asked by our volunteers are answered with research conducted by LAKEWATCH graduate students. LAKEWATCH volunteers continue to ask questions that require graduate student research but the cost of supporting graduate students has been increasing and the money for graduate student funding has been shrinking. Currently, the average cost of a University of Florida graduate student is approximately $45,000/year.

To make sure graduate students are always available for research, LAKEWATCH is fundraising to establish an endowed assistantship. Gifts to support an endowed assistantship will be invested in perpetuity to provide permanent annual support for LAKEWATCH graduate students. Our initial goal is to establish a Master's endowment.

- MS Endowment: Gifts totaling $350,000 will support $14,000/year
- PhD Endowment: Gifts totaling $500,000 will support $20,000/year

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The first $30,000 raised will be matched by the University of Florida and once established, an assistantship will be augmented with tuition support from the Dean of the UF College of Agricultural and Life Sciences through the '41 Fellows Initiative, valued at $11,000/year. While we grow the endowment to $350,000 spendable interest may be used to provide program support for LAKEWATCH. A LAKEWATCH endowment will support a graduate student addressing volunteer questions on aquatic systems, covering such topics as aquatic plants (herbicides, grass carp) exotic species (plants, fish, invertebrates), harmful algae blooms, bacteria, water clarity, and more.

How You Can Help?

- Share with others the impact your work has on Florida lakes, streams and estuaries
- Identify neighbors, community organizations and businesses with an interest in Florida's water resources and a willingness to support LAKEWATCH
- Make a personal or business gift to support LAKEWATCH:
    - Cash, Stocks, Real Estate
    - Pledge over multiple years
    - Estate planning, insurance policy, trust

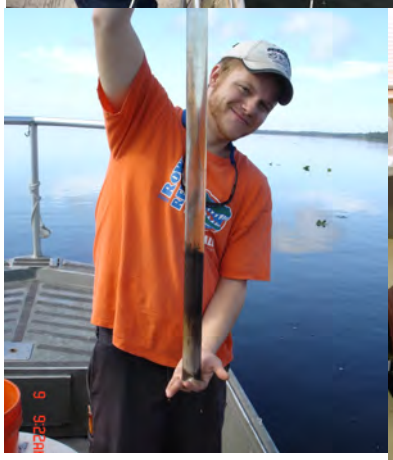
Checks to support this endowment should be made payable to the UF Foundation, Inc. with "LAKEWATCH assistantship" in the memo line.

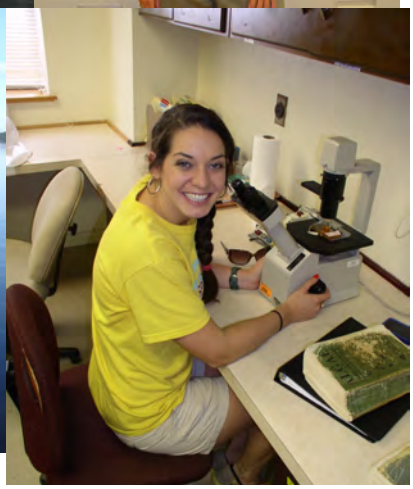
- Please direct gifts to UF/IFAS Advancement, PO Box 110170, Gainesville, FL 32611.
- Gifts can also be made online at www.uff.ufl.edu/give/LW41

For more information, please contact John Hooker at 352-294-7868 or jdhooker@ufl.edu

I thank you for helping LAKEWATCH with this important endowed fellowship project.

Mark Hoyer
Director Florida LAKEWATCH





All pictures are of Graduate students working on some form of aquatic resource management. Photo credit LAKEWATCH.

Meeting the resource needs of the private well owner community after extreme flooding events

Andrea Albertin is the UF/IFAS Regional Water Resources Agent for the Northwest Extension District

An estimated 2.5 million Floridians (approximately 12% of the population) rely on private wells for home consumption. While public water systems are regulated by the U.S. Environmental Protection Agency to ensure safe drinking water, private wells are not regulated. Private well users are responsible for ensuring the safety of their own water. Few public data exist on how many well users regularly test their water or drink from contaminated wells, and it is suspected that the risk of contamination increases after flooding events.

In response to widespread damage and flooding caused by Hurricane Harvey in Texas and Irma in Florida in August and September 2017, Virginia Polytechnic Institute and State University (VT) received a Rapid Research Response Grant from the National Science Foundation to offer free well water testing to homeowners impacted by flooding. They partnered with Texas A&M AgriLife Extension's Well Owner Network (run by Diane Boellstorff and Drew Gholson) and us, at UF/IFAS Extension to provide this service. The effort at VT was led by members of Marc Edward's lab in the Civil Engineering Department: Kelsey Pieper,

Kristine Mapili, William Rhoads, and Greg House.

VT made 1,200 sampling kits available in Texas and 500 in Florida, and offered free analysis for total coliform bacteria and *E. coli* as well as inorganic analytes including nitrate, lead, arsenic, iron, chloride, sodium, manganese, copper, fluoride, sulfate, and hardness (calcium and magnesium). Homeowners were also asked to complete a needs assessment questionnaire regarding their well system characteristics, knowledge of proper maintenance and testing, perceptions of the safety of their water and how to best engage them in future outreach and education efforts.

Response in the aftermath of Irma

Although the sampling kits were available, a major challenge in the wake of Irma was getting the word out as counties were just beginning to assess damage and many areas were without power. We coordinated the sampling effort out of Quincy, Florida, where I am based, and spread the word to extension agents in the rest of the state primarily through a group texting app, by telephone and word of mouth. Extension agents in 6 affected counties (Lee, Pasco, Sarasota, Marion, Clay and Putnam) responded with a need for sample kits, and in turn advertised sampling to their residents through press releases. Residents picked up sampling kits and returned water samples and surveys on specified days and the samples were shipped overnight and analyzed at VT, in Blacksburg. Anyone from nearby counties was welcome to submit samples as well. This effort complemented free well water sampling offered by multiple county health departments throughout the state.

In all, 179 water samples were analyzed at VT and results of the bacterial analysis are shown in the table below. Of 154 valid samples, 58 (38%) tested positive for total coliform bacteria, and 3 (2%) tested positive for *E. coli*. Results of the inorganic parameters and the needs assessment questionnaire are still being analyzed.

Table 1. Bacterial analysis of private wells post-Irma.

County	Number of samples (n)	Positive for total coliform (n)	Positive total coliform (%)	Positive for *E. coli* (n)	Positive for *E. coli* (%)
Citrus	1	0	0%	0	0%
Clay	13	5	38%	0	0%
Hernando	2	1	50%	0	0%
Hillsborough	1	1	100%	0	0%
Marion	19	5	26%	1	5%
Monroe	1	0	0%	0	0%
Pasco	40	19	48%	1	3%
Putnam	61	19	31%	0	0%
Sarasota	16	8	50%	1	6%
Overall	**154**	**58**	**38%**	**3**	**2%**

Of 630 samples analyzed in Texas over the course of 7 weeks post-Harvey, 293 samples (47% of wells) tested positive for total coliform bacteria and 75 samples (2%) tested positive for E. *coli*.

Following Florida Department of Health (FDOH) guidelines, we recommended well disinfection to residents whose samples tested positive for total coliform bacteria, or both total coliform and *E. coli*. This is generally done through shock chlorination by either hiring a well operator or doing it yourself. The FDOH website provides information on how to shock chlorinate as well as potential contaminants and how to maintain your well to ensure the quality of your well water (http://www.floridahealth.gov/environmental-health/private-well-testing/index.html).

We at IFAS Extension are working on using results from this sampling effort and the needs assessment questionnaire filled out by residents to develop the UF/IFAS Florida Well Owner Network. Our goal is to provide residents with educational materials and classes to address gaps in knowledge regarding well maintenance, the importance of testing and recommended treatments when pathogens and other contaminants are present.

UF/IFAS extension agents that led the sampling efforts in their respective counties are: Roy Beckford – Lee County; Brad Burbaugh – Clay County; Whitney Elmore – Pasco County; Sharon Treen – Putnam and Flagler Counties; Abbey Tyrna – Sarasota County and Yilin Zhuang - Marion County.

For more ionformation on bacteria see LAKEWATCH Information Circular 106- A Beginners Guide to Water Mangement Bacteria. (http://lakwatch.ifas.ufl.edu/pubs/circulars/Circ106BacteriaLR.pdf)

Andrea Albertin is the UF/IFAS Regional Water Resources Agent for the Northwest Extension District

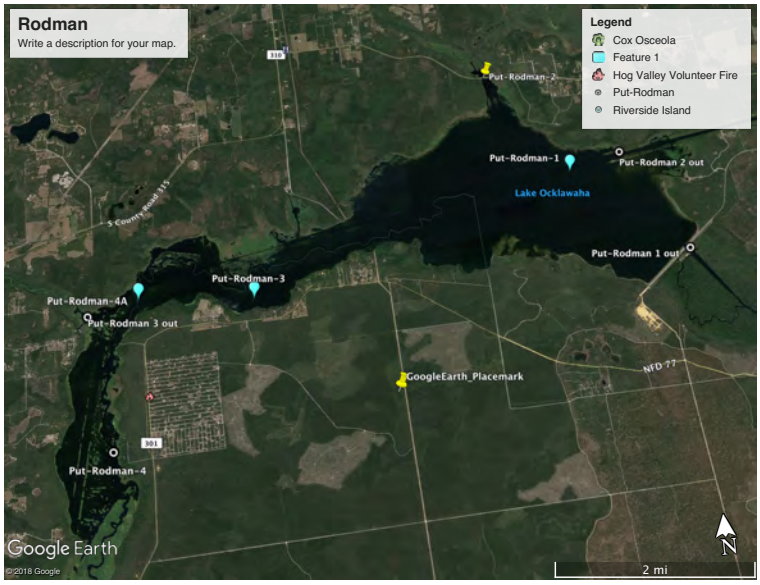
A Beginner's Guide to Water Management — Bacteria

Information Circular 106

Florida LAKEWATCH
Department of Fisheries and Aquatic Sciences
Institute of Food and Agricultural Sciences
University of Florida
Gainesville, Florida

February 2003
1st Edition

Volunteer Bulletin Board



The water samples I am collecting this December complete 17 years of sampling Rodman's waters for me. For the past three or four years I have been doing it pretty much by myself with only occasional help. I'm eighty and tired!

Back in the year 2000, Dr Canfield made it possible for us to join Lakewatch and the data harvested from the water samples provided statistics proving the plant life in Rodman removed major amounts of nutrients from the water as it passed through the reservoir. This information was very helpful in the fight to save the reservoir. Those of us that wish for the reservoir to remain will be forever grateful to Dr Canfield for his assistance.

The ruckus seems to have become much more legal and less environmental over the years.

It's time for me to pack it in. This December's samples are my last to send to you. I will pack up my equipment and leave it at the sample drop station in Silver Springs, unless you wish me to do otherwise.

Please keep me on your data distribution list until you have processed all of 2017's water samples. I would like to work up an analysis of the reservoirs effect on the water's nutrients for 2017.

Thank you again for the opportunity to be a part of your program.
Thank You!
Bob Andry

Florida LAKEWATCH thanks you for all of your service.

Shellfish, Sportfish and Aquatic Plants, More Than Just an Energy Company

Authors: Rhett Gehring, Justin Branch, and Enrique Latimer

In 1991 the Crystal River Mariculture Center (CRMC) began operation as result of a collaborative effort between former Florida Power (now Duke Energy), the Florida Department of Environmental Protection (FDEP) and the Environmental Protection Agency (EPA). At that time, two coal fired and one nuclear electric generation units utilized water from the Gulf of Mexico for their once-through condenser cooling systems. This withdraw can cause both entrainment and impingement of marine species. A committee of biologists developed a mitigation plan to ameliorate these impacts. In combination with intake flow reduction and construction of helper cooling towers, the concept of a multi-species mitigation hatchery was realized.

Figure 1: Justin Branch holds a large mat of *Vallisneria americana.*

The CRMC targeted species for cultivation based on ecological, recreational, and commercial importance. This included pink shrimp, pinfish, pigfish, mullet, stone and blue crab. The hatchery and its staff currently cultivate spotted seatrout (*Cynoscion nebulosus*) and red drum (redfish) (*Sciaenops ocellatus*). Broodstock for each species is housed in individual photothermally controlled rooms. Each spawn room has a bio-filtration system, UV sterilization, and egg collection system. Hatchery staff integrate knowledge of marine ecology and biology with aquaculture techniques in order to achieve controlled reproduction of these selected species. Upon spawning, eggs are placed in special incubation tanks until successfull completion of hatching and larval yolk sack absorption. The larvae are then moved to one of the eight, one million gallon outdoor ponds (one acre), where they feed on both natural and prepared diets and grow into harvestable sizes. Prior to harvest, the young fish are health certified and a release permit is obtained from the Florida Fish and Wildlife Conservation Commission (FWC). The minimum size at release

is 75 millimeters or approximately three inches. Spotted seatrout and redfish are not the only aquaculture endeavors that the hatchery team pursues.

The bay scallop (*Argopecten irradians*) is a new and developing effort for CRMC. The grass flats of Crystal River are an extremely productive fishery, rich with native seagrasses and an abundance of species diversity. This area is highly regarded for its water clarity and draws thousands of people to Citrus County annually to enjoy scalloping, or as many call it, the "adult Easter egg hunt". The staff hopes to successfully spawn and culture bay scallops allowing for an increased rate of survival of larvae as compared to wild spawning, where mortality rates can be high. Restoration efforts have been implemented in other parts of Florida due to a significant decline in bay scallop population from both environmental conditions and over harvest. As stock enhancement of this species grows in popularity, the CRMC staff hopes to be part of the bay scallop recreational sustainability goals of Citrus County.

Another focus of CRMC environmental stewardship initiatives includes lake and spring system restoration. CRMC maintains cultures of various "tape" or "eel-grass" (*Vallisneria americana)* biotypes for submerged aquatic vegetation (SAV) restoration projects. The "Rockstar" of the show is an all-female cross developed by Dr. Lyn Gettys at the University of Florida. This particular cross has an extremely fast vegetative growth rate and quickly establishes itself under proper conditions. The plant was named "Rockstar eel-grass" by Dr. Lyn Gettys. This name is very popular with the hundreds of Crystal River Primary School children that the CRMC staff works with, as each class gets to plant a tank with "Rockstar eel-grass". The plants are grown in the classroom and at the end of the school term CRMC staff help the kids plant the eelgrass where it really counts, Kings Bay.

Working with Dr. Carrie Adams and Dr. Laura Reynolds of the University of Florida, Soil and Water Science Department, hatchery staff are providing technical assistance and mesocosm location to studies involving Lake Apopka restoration. In conjunction with Dr. Savannah Barry with the University of Florida, Nature Coast Biological Station, CRMC staff plans to provide technical assistance and provide a home for a *Spartinia alterniflora* donar population

Figure 2: Rhett Gehring releases a 26" hatchery raised redfish (*Sciaenops ocellatus*).

This population will also be used in restoration and mitigation projects around the Nature Coast, as well as for worthwhile initiatives such as living shorelines. Living shorelines are described as a natural wave action barrier that will not only provide additional habitat for coastal species but reduce sediment erosion and increase aesthetics.

The mission of the Crystal River Mariculture has since evolved from a strict regulatory necessity to an applied science center for environmental stewardship. CRMC works with multiple non-governmental organizations (NGO's) at the local, state, and national level. These include Save Crystal River, a local restoration effort in Kings's Bay; The University of Florida, in many studies and education collaborations; Costal Conservation Association (CCA) Florida as provider of redfish and transportation/release team for the STAR tournament, a tournament that generates a state wide push for conservation of costal resources; and the Audubon Society, where shorebirds are a primary focus. These collaborations are all functioning parts of the Duke Energy CRMC environmental stewardship mission. The end goal is to produce and assist in effective environmental awareness, education, research, and restoration efforts as part of the largest utility company in the United States.

Figure3: Crystal River Mariculture Center grow-out ponds.

Freshwater benthic ecology and invasive species research program at the University of Florida

Lindsey Reisinger is a Research Assistant Professor in the School of Forest Resources and Conservation's program in Fisheries and Aquatic Sciences at the University of Florida

My name is Lindsey Reisinger and I am a new faculty member in the School of Forest Resources and Conservation's program in Fisheries and Aquatic Sciences at the University of Florida. My research is broadly focused on freshwater benthic ecology, or the study of organisms that live on the bottom of lakes and streams, with an emphasis on freshwater crayfish. My research also focuses on the impacts of invasive species in freshwater ecosystems.

Freshwater crayfish are a diverse group of organisms, with over 600 species in the world. Crayfish originated about 200 million years ago when an ancestor of lobsters invaded freshwater ecosystems on the supercontinent Pangaea. Today, they can be found in a wide variety of habitats including wetlands, streams, lakes, ditches, caves, and springs. Some species of crayfish can even live in terrestrial ecosystems far from bodies of water by constructing deep burrows that reach below the water table. 75% of the world's crayfish species live in North America, and the southeastern United States has the greatest diversity of crayfish in the world. There are 56 different crayfish species in Florida, with the greatest diversity occurring in the panhandle.

Crayfish play a central role in freshwater food webs. They are extremely omnivorous and their diets often consist of a variety of foods such as algae, leaf litter, aquatic plants, aquatic insects, snails, and fish eggs. They are large compared to most other freshwater invertebrates (such as snails and freshwater insects) and can be present at high densities, so they often make up more than half of the biomass of freshwater invertebrates in lakes and streams. Crayfish can be an

The creole painted crayfish is a non-native crayfish present in the Flint River in southern Georgia.

important food source for fish as well as terrestrial animals such as wading birds. They are typically active and night and spend the day hiding in a burrow or underneath a rock, log, or undercut stream bank. If you shine a flashlight into the water at night, you are likely to see many more crayfish than you would during the day.

Humans have transported crayfish to new locations throughout the world. In Europe, for example, native crayfish abundance has declined by 85% in several countries due to the introduction of several species of crayfish from the United States. These crayfish were originally introduced for aquaculture due to the demand for crayfish as a food source. Crayfish can move over land in damp conditions and can easily escape from outdoor aquaculture ponds. In addition, numerous invasive crayfish are present within the United States, and many of these invasions are the result of people releasing crayfish that were used as bait for fishing, were used in school projects, or were pets in aquariums.

Different species of crayfish can have dramatically different ecological impacts. For example, in lakes in the midwestern United States, invasive rusty crayfish replace native northern crayfish. Rusty crayfish are more aggressive and exclude northern crayfish from shelter, so that northern crayfish are more vulnerable to predators. This species replacement can lead to substantial increases in crayfish densities along with a 90% reduction in aquatic plant abundance and a 99% reduction in snail abundance in some lakes. In addition, the abundance of bluegill and pumpkinseed sunfish can decline, likely due to the reduction of aquatic plants that provide refuge and foraging habitat for young fish. There are currently not any known invasive crayfish in Florida, but because crayfish can replace one another, if non-native crayfish are introduced they could have major impacts on native crayfish and on lake and stream ecosystems. Non-native crayfish are present in some streams in southern Georgia, and I will investigate whether these crayfish are also present in northern Florida.

The rusty crayfish is an invasive crayfish in the Midwest.

I am excited about the potential to collaborate with LAKEWATCH to study benthic ecology in Florida's lakes. I am particularly interested in the diversity of crayfish in Florida's waters, their life history characteristics, and the factors that promote the coexistence between species. I am also interested in studying the interactions between crayfish and other freshwater species. For example, because crayfish can have major impacts on the organisms they consume, they may control the abundance of invasive freshwater species such as plants and snails. Finally, I am interested in evaluating different freshwater invasive species management techniques and their impacts on benthic ecological communities. I appreciate this

The devil crayfish is a common burrowing species in Florida.

opportunity to introduce myself and my research program to the LAKEWATCH community. Please feel free to contact me using the information provided below if you would like any more information.

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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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.

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