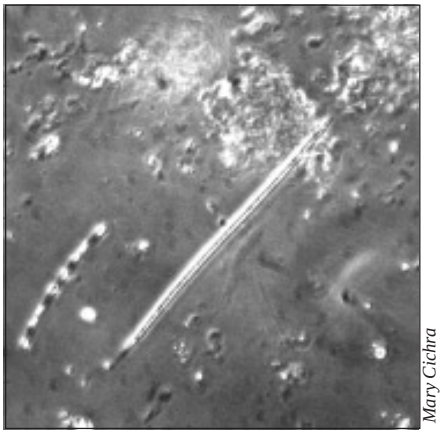
Florida
LAKEWATCH
Dedicated to Sharing Information About Water Management and the Florida LAKEWATCH Program Vol XX 2001

The Toxic Algae Threat in Florida
A Tempered View

by Ed Phlips
Professor

The past year has seen a number of media accounts concerning toxic algae in the state of Florida, including the recent special report by the Orlando Sentinel entitled 'Health Menace Lurks in Lakes' (Aug. 26, 2001). I was asked to contribute information to this article as it relates to 23 lakes sampled by the Sentinel staff. My own laboratory examined these samples for algal composition and the results were provided to their reporters along with an extensive discussion about the meaning of the results. Unfortunately, the newspaper article did not fully reflect my interpretation of the data.

The following report provides a more thorough review of the results and their meaning, particularly as it pertains to our current state of understanding about the threat of algal toxins to Florida residents.



Mary Cichra

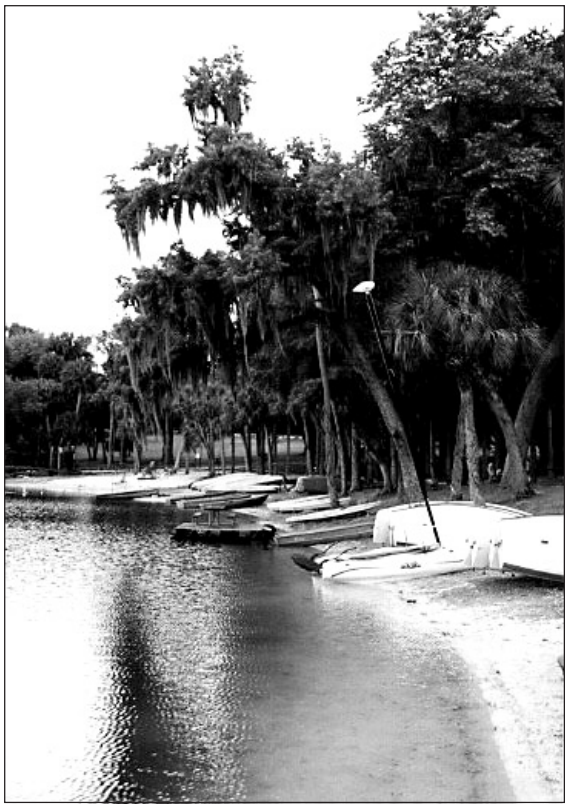
Cylindrospermopsis, a species of blue-green algae that is being studied for toxicity.

Over the past few decades, research on water quality in the state of Florida has revealed numerous lakes that contain high concentrations of blue-green algae, also known as **cyanobacteria**. While the name may sound ominous, these algae are, in fact, important components of aquatic food webs throughout the world and in Florida. As the oldest algal group on earth — dating back 3.2 billion years — they have long played a critical role in photosynthetic production in aquatic ecosystems.

In Florida, **cyanobacteria** are often the most abundant form of algae in lakes. This is not surprising considering Florida's sub-tropical climate and the high concentrations of nutrients present in many waterbodies.

August is prime time for these blue-green algal blooms in Florida and it was during this time frame that water samples were collected from 23 lakes in the Orlando area by Sentinel staff. The samples were delivered to my laboratory for analysis, and we were asked to perform rudimentary counts of the major blue-green algae species in the samples with emphasis on two taxonomic groups, *Microcystis* and *Cylindrospermopsis*. Both genera contain algal species shown to be toxic in other regions of the world.

The results obtained by our laboratory, are as follows:



Joe Richard

- Five of the lakes tested – Beresford, Griffin, Jessup, Harris and Howell – had high concentrations of *Cylindrospermopsis* (> 4000 trichomes/ml).
- Four lakes – Harney, Maitland, Apopka and Triplet – contained moderate levels of *Cylindrospermopsis* (1000-4000 trichomes/ml).
- Three lakes – Jessup, Beresford and Griffin – had high concentrations of *Microcystis aeruginosa* (>4000 colonies/ml).

Continued on pages 2 and 3.

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Institute of Food and Agricultural Sciences

❁ Seven lakes – Toho, Apopka, Harney, Holden, Harris, Howell and Clear lake — had moderate concentrations of *Microcystis aeruginosa* (900 – 4000 colonies/ml).

As might be expected, samples with high concentrations of these key algal groups all came from lakes that are known to be **eutrophic** (e.g., a term used to describe lakes that are rich in nutrients, after the Greek term meaning "well-fed").

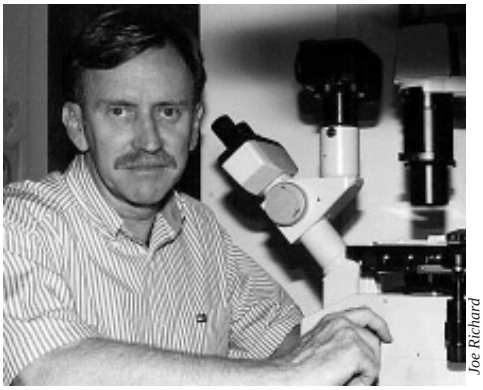
Two other groups of blue-green algae, *Oscillatoria* and *Microcystis incerta* also proved to be major elements of the algal community within the 23 lakes studied. Within the group *Oscillatoria*, only a few species have been confirmed as producers of potent toxins. *Microcystis incerta* has not been associated with toxin production.

What the results mean

Eleven of the 23 lakes had moderate to high concentrations of the two algal groups of greatest concern at the time of sampling (i.e., >25,000 cells/ml). However, it remains to be seen whether these levels of *Cylindrospermopsis* and *Microcystis aeruginosa* are typical of these lakes.

It is also uncertain whether the specific strains of *Cylindrospermopsis* and *Microcystis aeruginosa* observed in these lakes are toxin producers. If they prove to be toxin producers, the question of how much toxin is actually produced by these strains under the environmental conditions found in each lake system will have to be determined. Therefore, at this point, these counts can only be labeled as *potential* toxin producers.

It is clear that these systems would be candidates for toxin and plankton monitoring research in the future. It is important to note that even in Australia, where extensive toxic algal research has been going on for over a decade, the achievement of certain cell counts does not necessarily allow for a determination of risk. As stated in the current Australian Water Association government web site, "If the water quality exceeds a trigger value (e.g., for cell counts), it is advisable to investigate further to determine the level of risk."



Joe Richard

Dr. Ed Phlips

Current Knowledge on the Toxic Algae Threat In Florida

As a matter of perspective, it is important to realize that prior to the 1990s, research on toxin-producing forms of blue-green algae was primarily limited to a relatively small group of scum-loving scientists like myself. This changed with the occurrence of several well-publicized incidents involving toxic algae, primarily in Australia. Such incidents demonstrated that the problem of toxic algae warrants serious attention and as a result, the past decade has seen a rapid growth in toxic algae research efforts throughout the world. Major efforts to study toxin production by blue-green algae in freshwater ecosystems in Florida began several years ago, even though research on toxic marine algae has been going on for several decades. The first preliminary results of this research are just now being reported. I use the word 'preliminary' for several reasons:

1 The number of lakes and rivers that have been tested for toxins is relatively small and the time period over which the sampling has been carried out is relatively short. This means that we are in the early stages of understanding the scope of this phenomenon in Florida.

2 Although detectable levels of several blue-green algal toxins have been observed in some of these initial samples, there remains controversy over differences in the concentrations of the toxins reported by different independent labs (as described in a recent report by Burns et al. 2001). With time, these methodological issues will undoubtedly be resolved.

3 Most of the information obtained in Florida has yet to pass the test of peer-review in respected scientific journals. This means that the current interpretations of the preliminary results have yet to be fully examined by the scientific community.

Among the thousands of species of blue-green algae that have been identified (a.k.a. cyanobacteria), some groups are known to produce toxins under certain conditions. These include several taxonomic groups commonly found in Florida, including *Microcystis aeruginosa*, *Anabaena flos-aquae*, *Cylindrospermopsis spp.* and *Aphanizomena flos-aquae*.

Many media accounts of toxic algae have left the impression that these species are recent arrivals to Florida's lakes and rivers. Our research shows that they have been important members of phytoplankton communities within Florida lakes since at least the 1980s. It is also likely that they have been part of Florida's aquatic environments for a long time, although the paucity and often primitive quality of data available before the 1970s makes it difficult to establish a definite date. Establishing the presence of these groups in Florida is, however, only the first step in identifying the toxic risk they represent. This is true for a number of reasons:

Florida LAKEWATCH

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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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http://lakewatch.ifas.ufl.edu

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Joe Richard

●It is well known that a group of algae that has been shown to produce toxins in certain ecosystems may not produce toxins in other ecosystems.

For example, while *Microcystis aeruginosa* have been shown to produce toxins within certain lakes around the world, algae identified as the same species in other lakes have been shown not to produce toxins. For this reason the scientific community commonly uses the terms 'toxic and non-toxic strains' to define these differences. In addition, even strains of algae species known to produce toxins vary in the amount of toxin they produce, depending on genetic differences and differences in environmental conditions. These nuances are sometimes lost in the translation when communicating with the media or the public.

●Identification of algae species is a complex and sometimes controversial process.

For example, the taxonomy of the genus *Cylindrospermopsis* has been an issue of discussion between the experts for several decades. The species that has been associated with toxic events in Australia has been identified as *Cylindrospermopsis raciborski*. There is still considerable disagreement about whether the form of *Cylindrospermopsis* found in Florida belong to the same species.

This issue has a direct bearing on the toxic threat that *Cylindrospermopsis* may pose in Florida. If the species or strains of *Cylindrospermopsis* found in Florida are not the same as those associated with severe toxin production in other areas of the world, it will take researchers even longer to establish the toxic threat to Floridians.

Research is currently underway at several labs around the world to develop genetic markers for toxic strains that will ultimately make this task much easier and more precise.

In summary, the presence of blue-green algae in Florida lakes that are similar to those that have been associated with toxic events in other locations around the world clearly requires serious investigation. The fact that preliminary research has revealed the presence of detectable levels of blue-green algal toxins in certain Florida ecosystems places further weight on the need for this research. However, it will take considerable time and effort to determine the real risk that these potentially toxic species of blue-green pose to the health of ecosystems and people.

What Should People Do?

Don't panic

While newspapers and television media have focused public attention on the issue of toxic algae, the public must realize that many uncertainties remain about the actual threat that algal toxins represent to human health in Florida. Research dealing with these issues is underway and in time there will be a clearer picture of this threat.

Meanwhile it is important to keep in mind that people have been using a wide range of lakes and rivers in Florida for recreation for over a hundred years without reports of any overwhelming human health catastrophe involving toxic algae. After the research community has arrived at a definitive picture of the toxic algae threat it should be possible to establish reasonable guidelines to help prevent such catastrophes in the future.

Use Common Sense

Until reasonable and justifiable guidelines for exposure to algal populations in Florida's lakes are established, the public will need to apply common sense in their recreational activities. For instance:

❁ If you encounter a lake with a nasty surface scum of algae you might choose not to swim in it, as it probably would not be a pleasant experience anyway.

❁ Don't drink pond scum. Trust me, it tastes and smells awful and may not be good for your health.

❁ If you become ill while recreating in a lake or river, go home. Seek medical attention if it is serious. If possible, report the incident to your local health authority so that data can be accumulated to serve the public good. Remember however, that the illness may or may not be linked to toxic algae. Such reactions can be associated with a wide range of issues including allergic reactions bacterial or chemical contamination, pre-existing medical conditions and in rare cases the over- consumption of intoxicating substances.

Stay Well-Informed

Instead of relying exclusively on popular media, take the extra effort to seek out information from local and state agencies (i.e., Water Management Districts, Florida Fish and Wildlife Conservation Commission, Department of Environmental Protection, etc.), public health organizations and university research and public education programs like Florida LAKEWATCH.

Dr. Ed Phlips is a professor at UF/IFAS' Department of Fisheries and Aquatic Sciences. For almost 20 years, he's focused his research on the biology, ecology, and management of algae and aquatic microorganisms in Florida waters.

Algae data for the 23 lakes sampled this past summer can be obtained from the LAKEWATCH website:

http://lakewatch.ifas.ufl.edu

Volunteer Bulletin Board

Wings Over Florida

Need a little extra incentive to birdwatch? **Wings Over Florida** is a free award program that offers birdwatchers the opportunity to be recognized for identifying as many Florida bird species as possible within the state. As your skills increase and you identify more birds, you can apply for higher levels of achievement. Full color certificates are awarded at five levels, beginning at a life list of 50 Florida species and ending at 350 species. Checklists and applications are available on-line or by contacting the Florida Fish and Wildlife Conservation Commission (FWC).

Wings Over Florida Program
FL Fish & Wildlife Conservation Comm.
3900 Drane Field Road
Lakeland, FL 33811-1299
Phone: (863) 648-3203
E-mail: WOF@fwc.state.fl.us
Web address:
http://wld.fwc.state.fl.us/wof/whatiswings.htm

Back-up samplers, take note!

Just because you aren't the primary sampler doesn't mean you can't have a copy of your lake's data. As a matter of fact, LAKEWATCH data are available to anyone that wants it. So, if you have an interest in a particular waterbody, give us a call and we'll be glad to provide you with the data we have.

Fresh or Salt?

When you pick up supplies from your local collection center please be sure to grab the correct bottles and data sheets. Fresh water samplers should be using the smaller bottles and white data sheets. Saltwater samplers should be using the larger bottles and blue data sheets. If you are unsure which is right for you, call us at 1-LAKE-WATCH (1-800-525-3928) and we'll be happy to clarify things.

Thanks for your continued dedication and keep up the good work!

saltwater **freshwater**

A reminder to water samplers:

Dessicant bottles can be used for storing several month's worth of filtered chlorophyll samples. Please be sure to consolidate your samples into one dessicant bottle when possible.

For a complete update of collection centers in your area, call the LAKEWATCH office at 1-800-LAKEWATCH.
(1-800-525-3928)

Setting the record straight

In our salute to Mary Carter (volunteer extraordinaire) in the previous issue, it was reported that Mary was a member of "The Friends of Istokpoga." While she was never a member of the Istokpoga group, she has been a member of the Highlands County Lakes Association since 1992.

Friends of Lake Istokpoga Honored for Conservation Efforts

Our LAKEWATCH hats are off to the Friends of Lake Istokpoga, who were honored recently as 'Conservation Organization of the Year 2001' by the Florida Wildlife Federation. The award was given to the group for their "successful conservation and public education efforts to save their beloved lake."

The Friends of Lake Istokpoga was formed in 1998 over concerns about large areas of tussocks (floating mats of vegetation) and muck problems on the lake. Recently, the group was instrumental in the implementation of a $3 million aquatic enhancement project for the lake in the Spring of 2001. Members of the association cooperated by providing access to the lake and disposal sites for the collected organic material. Now that millions of cubic yards of tussocks and muck have been removed, the lake will be allowed to refill when sufficient rain returns.

Bill Dwinell, who is currently serving as the group's president, is also a LAKEWATCH volunteer along with Dave Boyer, James Reed, John Grant, Robert Irvine, Ted Clay, James Wilburn, Jim Wilkins and Lee Henderson. While we're certainly proud of these individuals, we're not surprised as LAKEWATCH volunteers tend to be people who are always willing to roll up their sleeves and take an active role in the management of their lake.

Congratulations for a job well done!

Collection Center Changes

Leon County
UF/IFAS Cooperative Extention Office freezer is broken
and the office is no longer able to serve as a collection center.
615 Paul Russell Road
Tallahassee, FL 32301
Contact: Cindy Boyer (850) 487-3003

Marion County
Silver River State Park is now open as a collection center
1425 NE 58th Avenue
Ocala, FL 34470
Directions: Silver River State Park is located east of Ocala, just off Baseline Road, 1.25 miles south of S.R. 40.
Contact: Bob Lamont (352) 236-7148

A Reminder for All LAKEWATCH Volunteers

If you haven't been sampling due to low water levels and your lake has returned to normal or is at least accessible, we'd like to encourage volunteers to return to their monthly sampling routine.

Are you seeing color changes in your lake?

Have you ever noticed how the water in some lakes appears to be tea-stained, while in other lakes it can be quite green in color? Ever wonder why?

Much of it has to do with the presence, or lack of, suspended and dissolved organic and inorganic matter in the lake. Most of this material is the result of natural biological, chemical, and physical processes that occur in the lake system and/or surrounding watershed. It's commonly defined in two ways:

♦ **Apparent color** refers to the color of a water sample that has not had particulates filtered out. For instance, runoff from road construction or the use of limerock near the water's edge may cause lake water's apparent color to be milky or even rusty, if it's in an area where the soil contains red clay. An abundance of phytoplankton (free-floating algae) can give water a greenish tinge and during certain times of the year, large amounts of pollen can even give lake water a yellowish hue.

♦ **True color** is a measurement of the amount of dissolved substances (i.e., humic acids or tannins) that are released into the water from surrounding wetlands or wooded areas. For the purposes of this brief article, we'll concentrate on true color, as it is a measurement commonly used by lake scientists.

To determine a lake's true color, a water sample must first have all the particulates filtered out (i.e., algae, pollen, sediments, etc.). The water sample is then compared to a spectrum of standard colors. Each of the standard colors has been assigned a number on a scale of Platinum-cobalt units (abbreviated as PCU or Pt-Co units). Using the PCU scale, Florida lakes have shown true color values ranging from 0 to as high as 400. On a PCU scale, higher values represent water that is darker in color.

For lakes that are located in lowland marshy areas, rainfall, or the absence of it, seems to have the most noticeable impact on the true color of lake water. As rainwater collects and soaks into the surrounding vegetation, it can cause the runoff to darken to the color of freshly brewed tea.

Depending on the amount of rainfall, the amount of color can increase and even appear to be almost black —hence the term for Florida's famous "darkwater" or "blackwater" lakes. During periods of low rainfall or drought, these same lakes will tend to have very clear water, with little to no true color. (You may have noticed this on your own lake.) However, the minute rain returns, the water begins to darken.

So why is the 'true color' of a lake so important?

A lake's true color can play a signficant role in influencing the amount of phytoplankton (i.e., free-floating algae) and/or macrophytes (i.e., aquatic plants) in the system. For example, after periods of heavy rainfall, some darkwater lakes may experience more than simply an increase in true color: When water levels increase, submerged aquatic plants on the bottom may experience a critical reduction in the amount of sunlight that is able to reach them. This can lead to a plant die-off and subsequently result in greener water, as phytoplankton could become more dominant in the lake. Of course, if the lake's true color becomes dark enough, it can also prevent algae from growing and result in water that is darkly stained but "clear."

True color measurements from LAKEWATCH lakes have also gone a long way to help us to learn more about the influences that a lake's surrounding geology and plant life can have on a lake system. For instance, this type of information was instrumental in helping to define 47 different lake regions in Florida for a project completed a few years ago (***Lake Regions of Florida***, Griffith, G.E., et al. 1997).

With your help, LAKEWATCH continues to collect and analyze supplemental water samples for *true color* so that we can learn more about this intriguing phenomenon.

Do you know the true color of your lake? Be sure to check out your lake's data sheet in the annual LAKEWATCH Data Report that is provided on our website:

http://lakewatch.ifas.ufl.edu/data2000.htm

Featured fish: **Largemouth bass** ~ *Micropterus salmoides*

Joe Richard

In this issue, we're paying homage to the largemouth bass — possibly one of the most widely recognized sport fish in the world.

The largemouth bass is the largest member of the sunfish family *Centrachidae* and is recognized by its light greenish/brown colored sides with dark green coloration along the top portion of its body. A dark greenish-black stripe extends along the lateral line all the way to the tail and its belly is pearlescent white. The spiny dorsal fin appears to be almost separated from the soft dorsal fin along its back.

Its name *largemouth* was inspired by the fact that its upper jaw extends beyond the rear edge of the eye when its mouth is closed. This rather large mouth is used to prey mostly on other fish. However they are also known to feed on insects, crustaceans, amphibians, birds and even small mammals. Of course, the size of their prey increases as the bass grows larger.

There are two types of largemouth bass predominately found in Florida: ***Micropterus salmoides*** and a sub-species known ***Micropterus salmoides floridanus***. While the *Micropterus salmoides* is commonly found across the southeastern United States, the sub-species *Micropterus salmoides floridanus* is endemic to Florida. It's also the darling of trophy bass fisherman as this species is known to grow to 20-plus pounds. Other states such as California and Texas have been enthusiastic about utilizing this species to expand the size range of their bass populations — allowing fish in their state to approach or even surpass the 20-lb. benchmark. It should be noted that Florida biologists are working diligently to maintain the integrity of the subspecies *Micropterus salmoides floridanus* so that it will maintain its genetic integrity far into the future.

In Florida, these fish spawn mostly in March and April but can be found spawning from January through May. Males are the nest builders, building saucer-shaped nests with diameters approximately two times the length of the fish. They prefer to build their nests in hard-bottom areas along shallow shoreline or in protected areas such as canals and coves.

Largemouth bass populations are extremely robust and stable in Florida and can be found in a variety of lakes including oligotrophic lakes in north central Florida, green algae-rich lakes to the south and even in many rivers. This is largely due to the ability of these fish to adapt and use many different habitats and sources of food.

The largemouth is easily Florida's most popular freshwater game fish due to its willingness to strike a lure or bait with explosive force. According to the American Sportfishing Association's 1996 report, *Economic Impacts of Sport Fishing in Florida*, bass fishing trips accounted for 69% of the angling trips made in Florida that year — numbering 663,000! In 1996, it's estimated that the total of all these freshwater recreational fishing trips generated 18,873 jobs with earnings of $392 million. (This figure can be adjusted to $445 million for 2001.)

Florida's certified state record largemouth bass weighed 17.27 pounds and was caught by Billy O'Berry in an un-named lake in Polk County in 1986. There is an uncertified Florida record fish that was caught in a private pond in Pasco county in 1923. It's weight was estimated to be 20.13 lbs., using the length and girth formula, and was caught by Frederick Joseph "Fritz" Friebel.

When fishing for largemouth bass, remember that specific bag and size limit regulations apply. For more information about freshwater fishing rules and regs, be sure to check out the Florida Fish and Wildlife Conservation Commission website:

http://floridafisheries.com/rules.html

Attention Anglers

Looking for another excuse to fish? How about contributing to LAKEWATCH's Angler Diary program. All you need to do is give us a call and we'll send you an angler diary to fill out during your fishing trips. (Each diary contains 10 pages to document 10 separate fishing "events.") Data compiled from the diaries will help us learn more about fish populations and angling activities on Florida lakes. For a copy of the diary and a free measuring tape sticker call:

1-800-LAKEWATCH
(1-800-525-3928)

Three Ways To Birdwatch With LAKEWATCH

Our birdwatching program is taking flight and we could use your help. There are three levels of involvement, each of them different and based on what you are willing and able to do.

The first and least intensive level asks that volunteers go out into their backyard or on a dock and observe what birds are there and how many. Simple as that.

A second, slightly more involved level of participation requires a boat and at least one monthly excursion around the waterbody. During this lake jaunt, volunteers are asked to record what birds they see and how many.

The third and most intensive level of participation also involves monthly boat excursions around the lake. However, in addition to recording the species and number of birds seen, volunteers will be asked to keep record the names of plants that the birds are found near or "in" as well as the land-use zone they are found closest to. This will tell us much about whether or not birds are affected by a human presence around the lake.

If you wish to include more detail on any of these methods such as comments on behavior, weather conditions,anything you may feel is of importance, by all means, feel free to include those in your data.

Birdwatchers will be provided with data sheets appropriate to the level of involvement, but a few other items might also come in handy:

♦ A comprehensive field guide, such as an Audubon Guide, Peterson's Guide or something similar is helpful, especially if you're trying to differentiate between a grackle, a starling or a brown-headed cowbird.

♦ While a good pair of binoculars is not absolutely necessary for the first level of involvement, it can help in identifying birds from a distance without disturbing theming. The Florida Fish and Wildlife Conservation Commission has a website that offers detailed suggestions on guides and binoculars for beginners:
http://wld.fwc.state.fl.us

For specific details, please call the LAKEWATCH office at 1-800-525-3928. And if you have birding tips of your own, please be sure to let us know so we can share them with others.

If you'd like to participate in our lakeside bird monitoring project call us at 1-800-LAKEWATCH (1-800-525-3928).

Featured Bird: **Osprey** *Pandion haliaetus*

The osprey's nickname ***fish hawk*** is an apt description as this bird feeds almost exclusively on fish. There are reports however, that on occasion, the osprey has been known to feed on birds, turtles, snakes and small mammals.

Because of its preference for a fish diet, this handsome bird prefers to live near lakes, rivers, and coastal habitats.

Standing 21-24 inches tall and having a wingspan of 54 – 72 inches, the osprey is recognizable by the dark brown coloration on the back of its head, its back, nape, and tail. The top of the head appears to be white, although there is a small dark patch that is not always visible. A black eye stripe located behind the eye extends down the neck and fades into its brown neck and back feathers. Males are identifiable by their totally white under-feathers and females sport a 'necklace' of brown markings around the throat. Females are also slightly larger than males.

Because of its white head, the osprey is sometimes mistaken for a bald eagle. However, the black stripe behind the eye, a rather discernible crook in the osprey's wing, and a black "wrist" mark visible in flight, help observers differentiate this bird from the Bald Eagle. It can also be recognized audibly by its loud musical cry.

National Park Service

The osprey hunts by hovering over water, watching for a fish to move beneath the surface. When one is sighted, most fish don't stand a chance. The osprey is famous for its steep dive into the water, turning to a feet-first position just before going in to grab its prey. The soles of its feet are designed for this unique approach, with sharp spiny projections that help it hang onto its slippery fish meal.

Osprey are known to construct large, untidy nests of sticks and debris in a handy tree near the water, but are opportunistic and have also built nests on man-made platforms such as telephone poles, power poles — even on light fixtures in stadiums — as long as a waterbody is nearby. Some utility companies have obliged the osprey by making a deck for the birds to use on top of power poles.

Ospreys are found nesting from Alaska east to Newfoundland, south to Arizona and New Mexico and along the Atlantic coastline south to Florida. The northern-most birds move south to winter homes from the Gulf coast and California, some venturing as far as South America.

Many thanks to Debi Mosely for her writing and assistance in assembling information for this newsletter.

It's been raining, why isn't my lake level higher?

Audrey Reed

While some volunteers have reported dramatic water level increases in their lakes as a result of this summer's rain events, other lakes remain stubborn, refusing to rise to resume their former glory. Why is this?

What many people don't know is that the way in which a lake is "fed" influences the level of water within. For example, lakes that are part of a chain may not drop as quickly, or refill as quickly, since water volume from the other waterbodies may influence it. A river lake or one that is spring or stream fed may not have lost much water at all during the drought.

Seepage lakes gain water and lose water from underneath the lakebed. For many of these lakes, rainfall has to raise the water table BELOW the lakebed before the lake itself can begin to fill up.

The geology of a lakebed can also be a factor: A lake with a sand or porous rock bottom is more likely to lose water than a lakebed lined with clay. (Refer to the data for your lake region to determine if this could be influencing the rate of refill in your lake.)

Questions? Feel free to call us at 1-800-LAKEWATCH (1-800-525 -3928).

We need your inactive sampling materials!

If you are no longer sampling but still have sampling materials, we need your help! We need these items back so that we can add new volunteers to the program. Please bring your sampling materials to a collection center as soon as possible. Not sure where the nearest collection center is? Call:

1-800-LAKEWATCH
(1-800-525-3928)

P.S. This notice does NOT apply to volunteers who are inactive due to low lake levels.

Your name will be deleted from our mail list...

if we don't hear from you soon.

State law (Section 283.55 Florida Statutes) requires that we purge our mial list every other year and so we will be deleting the names and addresses of all those individuals who don't respond before January 1, 2002.

All it takes is one e-mail, note, fax or toll free call and you will continue to receive free LAKEWATCH newsletters, as well as invitations to meetings and LAKEWATCH events. Please let us hear from you soon.

Address: Florida LAKEWATCH
7922 NW 71st Street
Gainesville, FL 32653-3071

Phone: 1-800-LAKEWATCH (1-800-525-3928)
Fax: 352/392-4902
E-mail: lakewat@ufl.edu

Please be sure to provide the following information:

Lake name_____ **County Name**_____

Name_____

Address_____

City/State_____ **Zip Code**_____

E-mail_____ **Do you have LAKEWATCH sampling materials? Yes** _____ **No**_____