White Oak Pond Watershed Association
Water Sampling Committee Report - July 19, 2007
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Since the last annual meeting, the pond water was sampled in June 06, July 06, spring runoff (March 23) 07 and June 07. We are attempting to sample based on our 2006 recommendations of sampling tributaries in spring and summer runoff , sampling the lake deep spot in June, July and August and resampling any tributaries that indicate problems. The August, 06 and the 06 summer runoff samples were missed due to oversight and we endeavor to complete all the recommended sampling in 2007.

The data was not statistically analyzed in 2006 as it was in 2005 for significant historical trends. The statistical analysis is done every 2 years so we will have the results for statistical trends again in 2007. The statistical trend analysis is helpful and we have suggested to the VLAP program that it be done every year. The following is a synopsis of the summer 06 and spring 07 result (links to the full report can be found at the web site www.whiteoakpond.com):

- ✓ Conductivity, which has been increasing, was at lower levels than last year at the pond deep spot but still approximately 20% higher than the state median level. In the pond epilimnion (upper layer), it has steadily increased about 30% since 1995 and in the hypolimnion (lower layer) it has been variable but the 2006 levels are nearly 50% higher than the lowest levels measured in 1993 and approximately 12% higher than 1989 levels. Spring runoff sampling of the tributaries was performed as recommended to help pinpoint possible sources of pollution. The dump tributary, which showed very high levels in June, 2006, showed higher levels than other tributaries in March, 2007 (66 Mhos/cm) but not nearly as high as in June, 2006 (264 Mhos/cm).

  The decreases are good news, but the conductivity levels still remain relatively high. Typical sources of conductivity are failed or failing septic systems, agricultural runoff, spring road runoff containing road salt, and new development which can alter runoff patterns. We will sample for chloride (road salts) in our next runoff sampling to help determine whether it is a major factor influencing the conductivity levels.

- ✓ The pond data continues to show that the process of 'internal phosphorous loading' is occurring in the pond and that the pond is phosphorous limited near the surface. This indicates that the pond is sensitive to additional inputs of phosphorous and additional phosphorous will stimulate plant and algal growth, possibly to undesirable levels. Sources of phosphorous typically include failed or failing septic systems, animal waste, lawn fertilizer, road and construction erosion and natural wetlands

  As a reminder of this delicate balance, a small amount of cynobacteria was found in the lake during the June, 2007 sampling. Cynobacteria, if present in large amounts, can be toxic to animals and humans. Working to reduce sources of phosphorous will reduce the chances of the presence of nuisance levels of cynobacteria and other plant and algal growth.

Lake Protection Tips
Some Do's and Don'ts for Maintaining Healthy Lakes

Activities that increase the input of phosphorus and sediment erosion into lakes are not good; however those that decrease these inputs will greatly help prolong the health of lakes. Listed below are activities that lake residents and others can do to help reduce phosphorus and sediment inputs.

- Pump out your septic tank every three to five years, or whenever the sludge level exceeds one-third of the tank capacity.

- Maintain your septic system properly (Contact the NHDES to obtain several free informational brochures). Be sure your system is designed to handle the load it receives. A leach field should be increased in size whenever the frequency (seasonal to year-round) or volume (additional people, washing machines, etc.) of use increases.

- Check your leach field for soft or wet areas or septic smells. Replace faulty systems.

- Do not bathe, shampoo, or wash boats, pets, or other objects in the lake with soap or phosphorus-containing detergents. Do not wash automobiles near lakes where the detergent can run into the water.

- Use low or non-phosphate detergent. Take your clothes to a laundromat located outside the lake's drainage area.

- Keep land clearing to a minimum. Revegetate bare areas to minimize erosion to the lake. Roads and paths leading to the lake should be curved to reduce erosion.

- Maintain a buffer zone of natural vegetation along the shore to contain erosion and assimilate nutrients before they reach the lake.

- Do not use fertilizer near the lake shore. Encourage shore fronts with natural vegetation, rather than green, manicured lawns.

- Do not burn brush or leaves near the shore; the nutrients remain behind to be washed into the lake during the first rain. Do not dump leaves or grass clippings in or near the lake. They also add nutrients to the water.

- Do not urinate or defecate in the lake, and don't allow pets to do the same. Cows, horses, or other groups of animals should not be housed near the lake where the phosphorus in their manure can be washed into the lake by rain.

- Do not feed ducks or other aquatic organisms; there is plenty of natural food available. Nutrients in the feed material, which is produced outside the lake's watershed, will be added to the lake through the organism's feces. Also, by discouraging the duck population, you can reduce the risk of swimmers' itch in your area.

- Do not use powerful outboard motors in shallow areas. The nutrient-laden bottom sediments can be churned into the overlying water to support increased algae growth.

Cyanobacteria in New Hampshire Waters
Potential Dangers of Blue-Green Algae Blooms

What are Cyanobacteria?

Cyanobacteria are microorganisms that are bacteria that photosynthesize. Many species of cyanobacteria may accumulate to form surface water "blooms". They are blue-green in color and may consist of thousands of individual cells.

Cyanobacteria are some of the earliest inhabitants of our waters, and they are naturally occurring in all of our lakes. However, research indicates that their abundance increases as the nutrients in a lake increase. They are part of the aquatic food web and can be eaten by various grazers in the lake ecosystem, such as zooplankton and mussels.

Although they are most often seen when floating near the surface, many cyanobacteria species spend a portion of their life cycle on the bottom of the lake during the winter months. As spring provides more light and warmer temperatures, cyanobacteria move up the water column and eventually rise toward the surface where they can form dense blooms or scums, often seen in mid to late summer and, weather permitting, sometimes well into the fall.

Why are Cyanobacteria a Concern?

Some cyanobacteria produce toxins that adversely affect livestock, domestic animals, and humans. According to the World Health Organization (WHO), toxic cyanobacteria are found worldwide in both inland and coastal waters. The first reports of toxic cyanobacteria in New Hampshire occurred in the 1960 and 1970s. During the summer of 1999, several dogs died after ingesting toxic cyanobacteria from a blue-green algae bloom in Lake Champlain. WHO has documented acute impacts to humans from cyanobacteria from the U.S. and around the world as far back as 1931. While most human health impacts have resulted from ingestion of contaminated drinking water, cases of illnesses have also been attributed to swimming in waters infested with cyanobacteria.

The possible effects of cyanobacteria on the "health" of New Hampshire lakes and their natural inhabitants, such as fish and other aquatic life, are under study at this time. The Center for Freshwater Biology (CFB) at the University of New Hampshire is currently examining the potential impacts of these toxins upon the lake food web. The potential human health hazards via exposure through drinking water and/or during recreational water activities are also a concern to the CFB and the state.

Do Cyanobacteria Exist in New Hampshire Waters?

Yes, they occur in all lakes, everywhere. In New Hampshire, four of the most common cyanobacteria include: *Anabaena, Aphanizomenon, Oscillatoria, and*

Microcystis. *Anabaena* and *Aphanizomenon* produce neurotoxins (nerve toxins) that interfere with the nerve function and have almost immediate effects when ingested. *Microcystis* and *Oscillatoria* are best known for producing hepatotoxins (liver toxins) known as microcystins. *Oscillatoria* and *Lyngbya* (another blue-green algae) also produce dermatotoxins, which cause skin rashes.

Should You be Concerned about Swimming in or Drinking from a New Hampshire Lake?

Both DES and UNH have extensive lake monitoring programs. Generally, the water quality of New Hampshire's lakes is very good. However, the state strongly advises against using lake water for consumption, since neither in-home water treatment systems nor boiling the water will eliminate cyanobacteria toxins if they are present.

If you observe a well-established blue-green algae bloom or scum in the water, please comply with the following:

- Do not wade or swim in the water!
- Do not drink the water or let children drink the water!
- Do not let pets or livestock into the water!

Exposure to toxic cyanobacteria scums may cause various symptoms, including nausea, vomiting, diarrhea, mild fever, skin rashes, eye and nose irritations, and general malaise. If anyone comes in contact with a blue-green algae bloom or scum, they should rinse off with fresh water as soon as possible.

If you observe a blue-green algae bloom or scum, please call DES at 271-2304. DES will sample the scum and determine if it contains cyanobacteria that are associated with toxic production. An advisory will be posted on the immediate shoreline indicating that the area may not be suitable for swimming. DES will notify the town health officer, beach manager, and/or property owner, and the N.H. Department of Health and Human Services. DES will continue to monitor the water and will notify the appropriate parties regarding the results of the testing. When monitoring indicates that cyanobacteria are no longer present at levels that could harm humans or animals, the advisory will be removed.