

Wolfeboro Water Summit III
May 11, 2019
The Great Hall Wolfeboro Town Hall

NEXT STEP

Cyanobacteria Bloom Identification Workshop

Dr. Hilary Snook (USEPS) and Dr. Shane Bradt (UNH)

- With USEPA Mobile Laboratory
- Brewster Academy Boathouse
- Wednesday June 26, 2019
- 9:30am-11:am (plus 11:30-1:00pm, if necessary, i.e. more than 50)

Welcome: Anne Blodget (President, Lake Wentworth Watershed Association)

- First two water summits focused on water quality and storm water run-off
 - NH DES 319 grants have supported storm water installations in Wolfeboro
- Last year and continuing this year, there is help available for landscaping your property via Don Kretchmer
- Your property can be assessed for good management practices if you'd like. Pat Tarpey (Lake Winnepesaukee Watershed Association) can arrange that. Trained volunteers come to your home.
- Summit III (today) is focused on cyanobacteria in response to the outbreak in Winter Harbor
- Community teams will be established to track and fight cyanobacteria
- Summit IV: May 9, 2020

Presentation: Dr. Jim Haney (UNH)

“What are Cyanobacteria and How Do They Threaten Lakes and Our Health?”

- Until 1970s called “blue green algae” No longer correct
- Correct name: Harmful Cyanobacteria Blooms (HCBs)
 - Bloom-forming cyanobacteria (BFC) is what concerns us
- Among the first organisms on earth-first to use the sun for photosynthesis
 - Have not “invaded” our lakes; we need to learn how to live with them
 - This is not a toxin we have put into the water-they are an organism that lives in the water
 - Article: *Blooms Like It Hot* describes the conditions blooms prefer
- Cyanobacteria dominate when
 - Nutrients are present (high levels of phosphorus)
 - Warm temps
 - Thermocline stability
 - Low light (low water clarity)
- Cyanobacteria feeds on the bottom and then travels
- Typical seasonal patterns
 - Winter:
 - cyano resides on the bottom
 - Spring:
 - clear water phase
 - Summer:
 - Nutrients are on the rise combined with warmth, thermal stability. Cyanobacteria float up and aggregate then become highly toxic (i.e. spoonful can kill a dog.)

- Since global warming, there has been an increase in blooms and with even more warming additional blooms are expected. It is anticipated that the NH climate will be more like that of Virginia or the Carolinas.
- The threats of cyanobacteria
 - Blooms in New Zealand can go on for months or years and Dr. Haney did a sabbatical to study cyanobacteria there.
 - Blooms do not contribute to other organisms in the lake i.e. doesn't help fish, but if blooms or their residue are consumed, they can be dangerous toxins for wildlife.
 - After a bloom dies, within a couple of days the whole colony breaks up and is available to go into the food web (thereby contributing toxins to the food web)
 - Can be lethal within hours
 - Dogs and fish can be “canaries in the coal mine”
 - Toxins from cyanobacteria are being found in loons
- Liver toxin and neurotoxins connected to cyanobacteria
 - ALS seems to occur in clusters and also the clusters are often by bodies of water with blooms
 - Common theme: proximity of ALS and proximity to *certain* lakes
 - Example: Guam has 100 times the level of neurological disorders in a particular tribe (Chamarros) due to eating bats that feed on algae on trees
 - But these neurotoxins appear other places where people do not eat bats
 - Amino acid BMAA seems to be the problem as a Neurotoxic Amino Acid leading to
 - Alzheimer's, Parkinson's, ALS
 - Correlation established between water quality and non-alcoholic liver disease
 - Not enough known yet to prove a direct correction
- How is cyanobacteria transferred to the public?
 - Most likely aerosols transfer cyanobacteria (in the air)
 - Don't need wind for transfer; can't be seen
- Dr. Haney showed a picture of Mirror Lake from underneath the water showing a very dense layer of cyanobacteria below the surface
 - Sabrina has done her masters on this
 - Not seeing high levels of toxins on Mirror Lake
 - Results of Mirror Lake study available in early summer 2019 via Sabrina's thesis paper
- Citizen Science
 - The data and information from groups of citizens contributes greatly to the science and feeds information to scientists and physicians to add to the body of knowledge
 - Citizen science tends to move faster than traditional science
 - How citizens can identify blooms and levels of toxicity: attend the June 26 workshop and get training. (There were sign up sheets throughout the Great Hall and a fair number signed up.)

Presentation: What are We Doing About Cyanobacteria in Wolfeboro: Dr. Warren Muir (Served as chemist with Executive Director for National Academies Division of Earth and Life Studies; Wolfeboro Cyanobacteria Task Force) **and Bob Craycraft** (Lakes Monitoring Coordinator, UNH Cooperative Extension)

Warren Muir

- **Dr. Muir** has been on the lake since 1950s and he described how the water quality has changed over the decades. He discussed the Winter Harbor bloom last year (Sept 5, 2018) complete with pictures and video. Although the bloom was rather large, the analysis showed there were no significant toxins within the bloom. Surprisingly, results showed the Winter Harbor water quality is very good compared with

other waters in NH. The Winter Harbor bloom was a particular (and unusual) cyanobacteria bloom called *Gloeocapsa*

- Wolfeboro has organized a Cyanobacteria Task Force with the mission of:
 1. assessing water quality
 2. identifying and mitigating stormwater run off
 3. informing the general public
 4. creating protocols to evaluate and respond to blooms

Bob Craycraft

- **Bob Craycraft** been involved with water monitoring in this regions since 1988 when he was a UNH student
- Good monitoring has been going on for a number of years which provides good historical. Only Fish and Game has provided early data (1930s.) Good tracking picked up again in the 1980s.
- The volunteers can help catch the problems which can arise very quickly and be moved quickly as well. Rainfall and wetter years can be more problematic.
 - Frequent samplings are critical
- The Winnepesaukee association is expanding the monitoring
- Although you do not get immediate results, you can track long term trends, seeing which areas of the lake are more problematic etc.

Questions and Answers

1. **What is the effect of boiling water on cyanobacteria, using ultraviolet light, and can you wash dishes?**
 - a. Boiling does not break down the toxins, but does release them into the water; doesn't protect at all and could make it worse. **DO NOT BOIL LAKE WATER**
 - b. Can raise the level of disinfectant to treat the water but the level of disinfectant required is higher than what is typically used.
2. **Is it possible for cyanobacteria to be present in groundwater?**
 - a. Yes, especially in sandy areas. But there is not enough information on that yet.
3. **How do researchers and citizens stay safe when collecting samples?**
 - a. Protective gloves
4. **Are blooms more prevalent in shallow areas and are draw-downs impacting blooms?**
 - a. More prevalent in shallow areas
 - b. When light has contact with the sediment blooms are possible
 - c. (the draw down issue was not addressed as a break was scheduled)
5. **Are there any natural enemies for cyanobacteria and are they vulnerable at any phase?**
 - a. Other plankton can be enemies. Diatoms compete for phosphorus which cyanobacteria also need so they can be an enemy. There is much more to learn.
6. **Do you have to ingest cyano through the mouth and nose or are there other ways to absorb cyanobacteria?**
 - a. Aerosols seem to be significant; air quality connection is important
 - b. Lung exposure is 10 times more effective in harming live animals including humans
 - c. Can become a rash on skin

PANEL

- **Julie Brown** (Executive Director, Wentworth Watershed Association)
- **Keith Simpson** (Rust Pond water monitor; President Rust Pond Association)

- **Pat Tarpey** (Executive Director, Lake Winnepesaukee Association)
- **Larry Gil** (Mirror Lake)
 - Have about 50 years of lake data
 - Had a cyanobacteria outbreak in 2007
 - Conducted a study with a 319 Grant and have implemented a plan
 - No invasive plants
 - Have seen a reduction in phosphorus but still at levels that we would like to see get lowered

Questions and Answers

- 1. Does the source of the phosphorus matter?**
 - a. No, cyanobacteria will flourish with any phosphorus.
- 2. Stormwater improvements in Winter Harbor...how is that going?**
 - a. There is a development from the Forest Grove area and storm water is flowing into Winter Harbor and Carrie Beach. We are putting in rain gardens to slow the flow from the hill. There is another structure to also stem the flow.
- 3. Are the other towns around the lake active in addressing the issue?**
 - a. Yes, the other towns are involved with watershed management. Meredith is very active now and on June 18th there is an Information Fair for two hours of various techniques homeowners can institute for storm water controls. Moultonborough has a septic system initiative. There is a 319 Grant from Moultonborough, Meredith (\$125,000 grant plus monies from the towns.) Merrymeeting River residents have developed a plan.
 - b. The Wentworth Watershed Association (Julie Davis) has purchased an instrument to test cyanobacteria blooms. All are invited to bring samples to the office (591 Center Street, Wolfeboro.) The results are immediate.
- 4. Does boating spread cyanobacteria? (from lake to lake)**
 - a. Probably, but they are so small wildlife, the wind etc can also transport. Not particularly attributed to boats. Remember, cyano is in all bodies of water.
- 5. Can lake associations finance UNH students to do studies.**
 - a. Yes, and that has been done. If you use a masters level student you can get good detail on a report.
 - b. A masters level student has studied Mirror Lake and that report will be forthcoming soon.
- 6. Does a bloom feed itself?**
 - a. Yes, to some degree it does and other species can also feed it.
- 7. Is there a connection between milfoil and cyanobacteria?**
 - a. Milfoil is a consumer of phosphorus. If you cut away the milfoil there will be more light available, but milfoil takes up phosphorus. So, if you eliminate milfoil you may increase cyanobacteria.

Next Year: Water Summit IV May 9, 2020