

**June 8, 2020**

**To:**

**From: David Crow, Laurie-Ann Flanagan, David Beaudreau**

**Re: NCFAR Lunch-N-Learn Seminar: Slowing the Spread of Harmful Algal Blooms**

On June 8, the National Coalition for Food and Agricultural Research (NCFAR) hosted a virtual seminar titled “Slowing the Spread of Harmful Algal Blooms” to discuss the current state of preventative efforts to control the effects of toxic cyanobacteria as well as potential solutions to be pursued at a national level.

**Overview of Cyanobacteria:**

Dr. Wagner began by defining the issue of Harmful Algal Blooms (HAB) as any elevated concentration of algae that can negatively impact a given waterbody or its uses. While toxicity is the primary concern of such blooms, Dr. Wagner also noted that secondary negative effects of HAB include depressed oxygen levels, altered pH levels, as well as added taste, and color. He noted that the greatest risks of HAB are associated with cyanobacteria, also known as blue-green algae. Although cyanobacteria are a native and natural part of functioning aquatic systems, –preferring warm water, elevated phosphorus concentrations, and higher pH levels– imbalanced quantities of these bacteria can lead to production of toxins. While they pose an issue when forming surface-level scums, cyanobacteria can control their buoyancy, allowing them to fall to the floor as sediment, and begin reproductive germination. Additionally, even though stored sugars are their primary energy reserves (allowing them to survive through winter climates), the bacteria can utilize atmospheric nitrogen gas as energy, and to a lesser extent photosynthesis, meaning that they always have some source of energy in the water bodies they inhabit. Dr. Wagner identified dermatotoxins, hepatotoxins, and neurotoxins as the three main categories of harmful toxins that can be produced by the blue-green algae, noting that all or none of these can be produced by the bacteria, and that the triggering mechanism for toxin production is still not well understood.

**Increasing Attention to HAB:**

Harmful Algal Blooms are becoming both more frequent and more severe. Although the cause of the production of the toxins associated with the cyanobacteria are still not well-understood, research into the impacts that they have on their eco-systems as well as humans are better documented. Dr. Wagner notes that the bacteria should not be feared as it is not imminently dangerous, stating that the drinking water industry is capable of handling and working around such obstacles as HAB, but that we should be aware of the long-term costs of HAB and its impact on recreational water use. Negative effects of Harmful Algal Blooms for humans includes contaminated water supplies, which leads to increased health risks and treatment costs that are transferred to the consumer, and impaired recreational uses as the toxins are susceptible to aerosolization, making them a health-concern even when people are physically removed from the contaminated water bodies. HAB also damages the inhabited ecosystems, leading to a decrease in mussels, fish, birds, other dependent wildlife, and even farm animals and pets. These effects in turn contribute to loss of property value and a decreased tax base.

**Factors that Spread HAB:**

Dr. Wagner identified increased temperatures, increased nutrient inputs, and internal recycling as the three leading causes of spread. Warmer temperatures cause faster growth rates for the bacteria. Excess phosphorus from the watersheds offers an easy energy source for cyanobacteria, and legacy inputs from internal recycling can cause watersheds to cease being the primary source of nutrients for bacteria, allowing for the cyanobacteria to thrive while other, balancing bacteria die off.

**How to Limit HAB:**

In order of priority, Dr. Wagner suggests watershed management to limit nutrient inputs, control of legacy nutrients sources, and targeted use of algaecide as effective means of limiting the spread of HAB. To control watershed inputs, he highlights the efficacy of catch basins, water detention facilities, cover crops, and smarter irrigation strategies, as means of managing the nutrient inputs to vulnerable water systems. He notes that federal research has shown that dredging, the removal of legacy sources, oxygenation, binding of phosphorus to the present sediment, and phosphorus inactivation, to lower the availability of the energy source in the first place, as three effective means of controlling legacy inputs. Although algaecide has been a controversial treatment, Dr. Wagner supports its use as an immediate solution when applied in a controlled and well-timed manner.

**Solutions:**

Dr. Wagner signaled that because HAB is not coincidental with regional governmental boundaries, the solution should not be either, advocating in favor of a strong federal initiative modeled by the state efforts that have been successful thus far. Commending governmental programs from New York, Vermont, Ohio, and New Jersey, Dr. Wagner recommended that the federal effort assimilate the state-level initiatives and dissemination of info to other states. Additionally, he recognized the expertise of national organizations including EPA, NOAA, USGS, and USACE, as well as professional organizations like the Aquatic Plant Management Society (APMS) and the North American Lake Society (NALMS), which should be consulted in designing and implementing solutions to this problem. In conclusion, Dr. Wagner highlighted the growing concern about HAB, the substantial costs they impose, as well as the necessity for national initiatives and coordination to both raise awareness and coordinate the solutions for Harmful Algal Bloom.