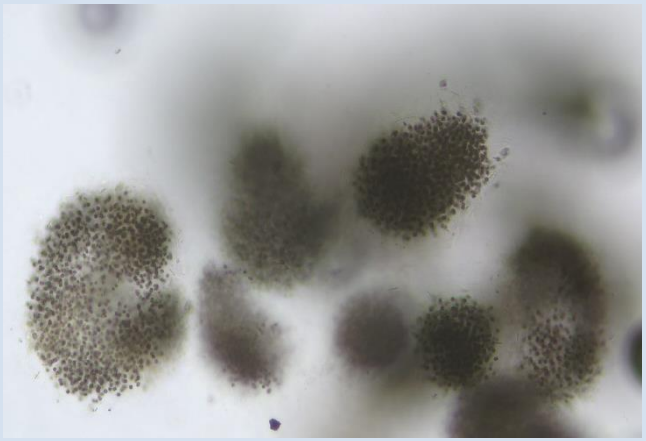
Cyanobacteria in Connecticut Lakes and Ponds



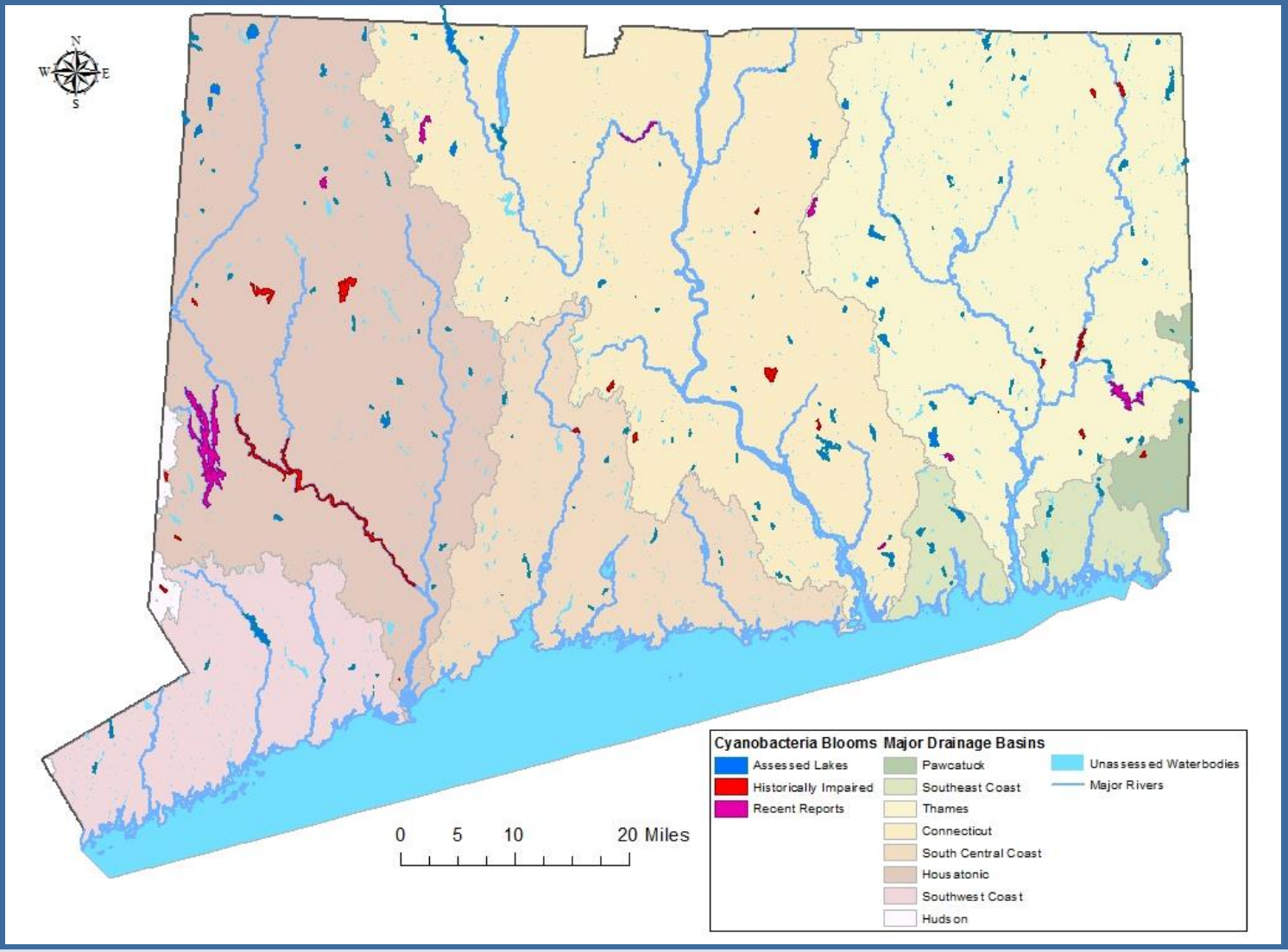
September 20, 2022
Coventry Lake Meeting

Connecticut Department of Energy and Environmental Protection

Today's Take Aways

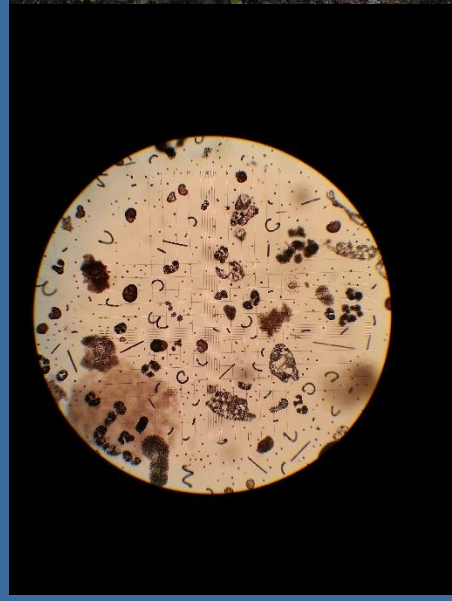
- What are Cyanobacteria- "The good, the Bad and the Ugly"
- What we have learned from cyanobacteria monitoring at bathing beaches
- CT DPH Guidance to Local Health Departments for Blue-Green Algae Blooms in Recreational Freshwaters
- What can we do to help manage the water quality in lake as lakeshore homeowners?

Cyanobacteria Blooms in CT over the last 10 Years



What are Cyanobacteria (AKA=Blue Green Algae)?

- One of the oldest living microorganisms and are considered important contributor to the formation of earth's atmosphere
- Microscopic organisms that occur naturally in all lakes and ponds throughout CT
- Can multiply rapidly under the right conditions and cause "blooms"
- Can produce toxins and become a health concern
- Toxic blooms are sometimes referred to as HABs or Hazardous Algal Blooms.



“The Good”

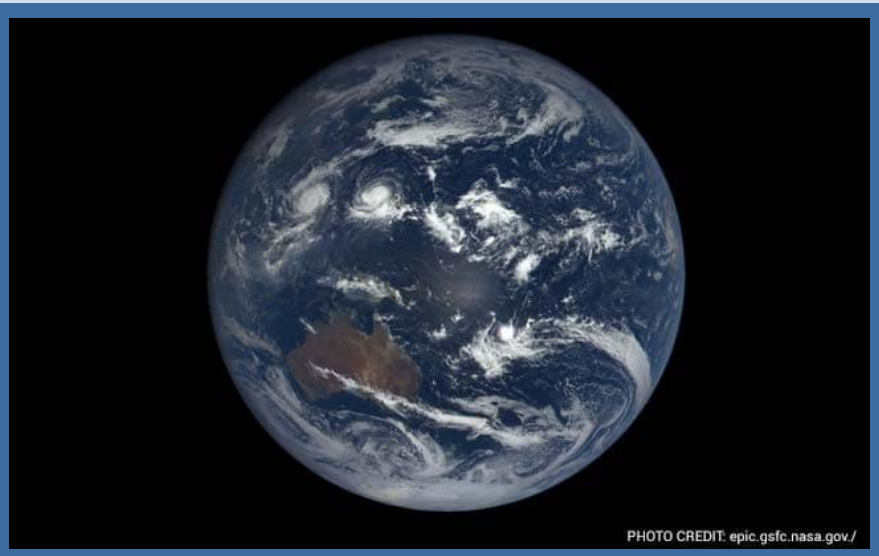
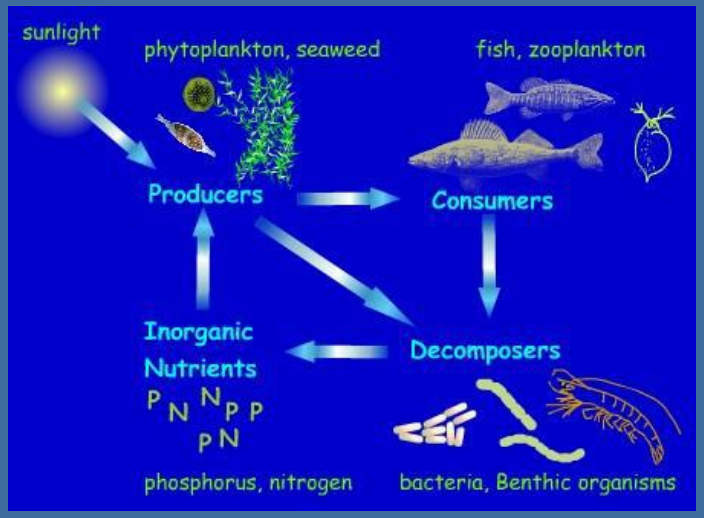
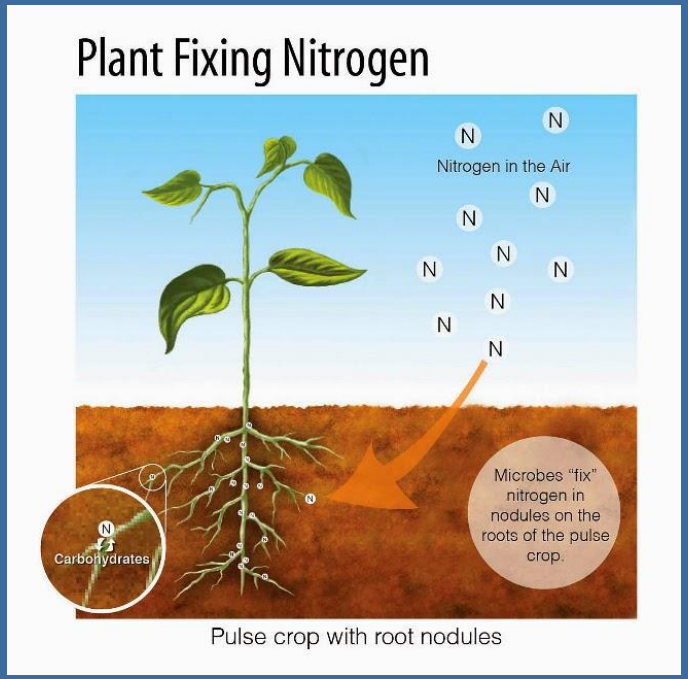


PHOTO CREDIT: epic.gsfc.nasa.gov/


sunlight
phytoplankton, seaweed
fish, zooplankton
Producers
Consumers
Inorganic
Nutrients
P N N P P
P N
Decomposers
phosphorus, nitrogen
bacteria, Benthic organisms


Plant Fixing Nitrogen
Nitrogen in the Air
Microbes “fix” nitrogen in nodules on the roots of the pulse crop.
Carbohydrates
Pulse crop with root nodules

The Bad

Blooms can

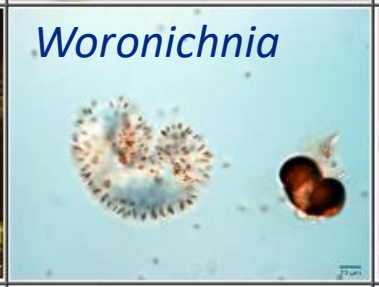
- Degraded swimming conditions/recreational conditions
- Cause Taste and/Odor problems
- Disrupt a lakes ecosystems – cause dissolved oxygen problems

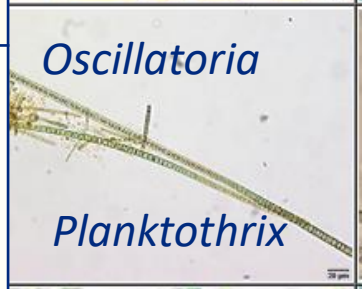
..and the Ugly

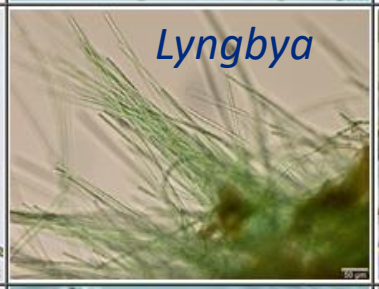
- They can cause Hazardous algae blooms (HABs)
- **Hepatotoxins** or liver toxins
  - Common toxins: microcystin, cylindrospermopsin
  - Symptom of exposure: Vomiting, Diarrhea, Fever, Cramps
- **Neurotoxins**
  - Common toxins: anatoxin,saxitoxin
  - Symptom of exposure: Paralysis, seizure
- **Dermatoxins**
  - Common toxins: lipopolysaccharide, lyngbyatoxin
  - Symptoms of exposure: Irritation to eyes, ears, and throat, rashes, skin lesions

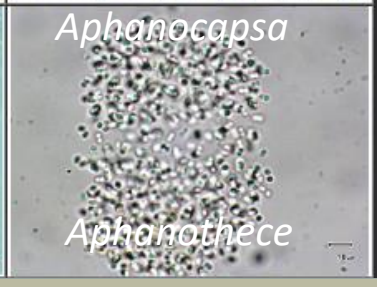
The New England "Dirty Dozen"

Organism	Toxin
Anabaena, Lyngbya	Anatoxin, Microcystin, Cylindrospermopsin
Woronichnia	Anatoxin, Microcystin
Amphanizomenon	Neosaxitoxin, Microcystin, Cylindrospermopsin
Aphanocapsa/ Aphanothece, Coelosphaerium, Gloeotrichia, Gloeocapsa/ Chroococcus, Oscillatoria/ Planktothrix, Microcystis, Merismopedia, Nostoc	Microcystin









What helps fuel cyanobacteria blooms

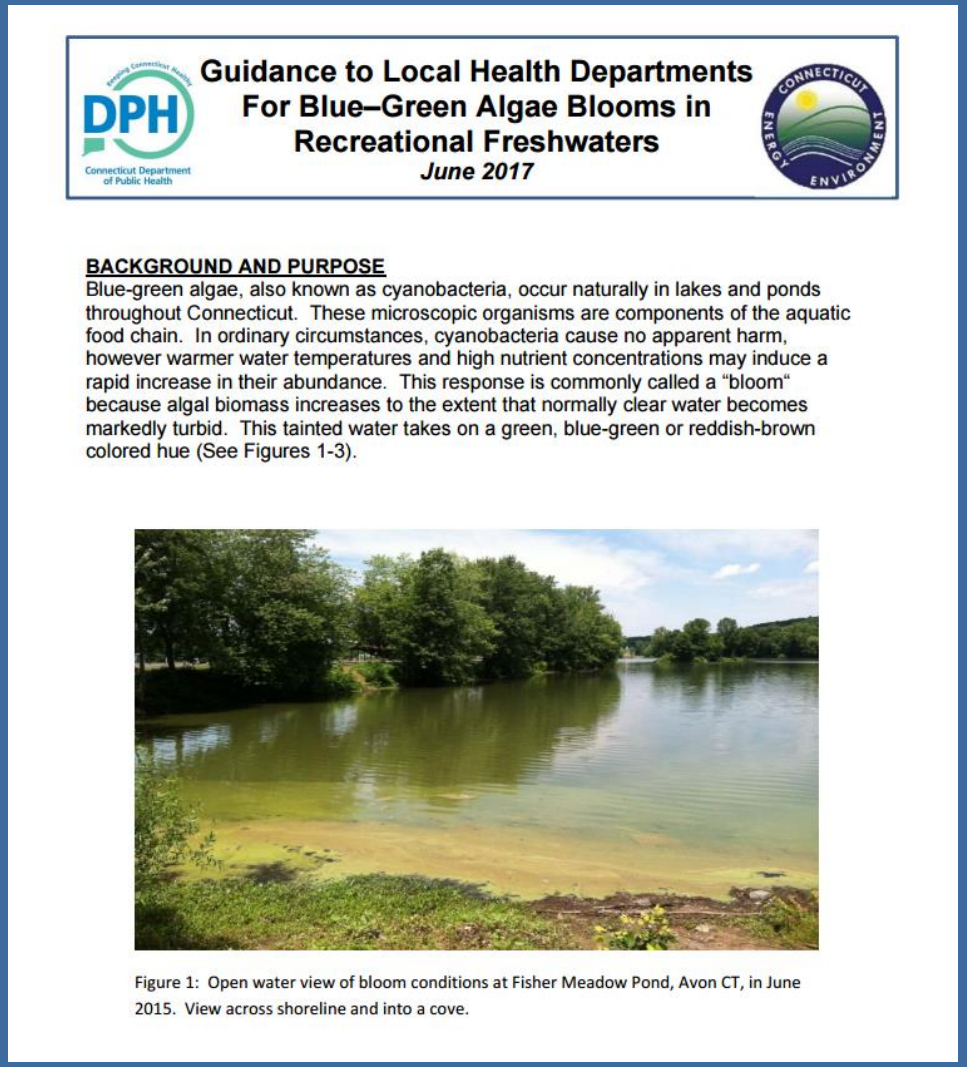
- Water temperature – cyanobacteria can multiply more rapidly in warm water and there is a expected increase in blooms due to climate change
  - blooms have occurred in some water bodies for decades, but now occurring in new areas
- Nutrient concentration
- Light intensity
- Lack of water movement – stagnation
- Changes in wind patterns

Results of DEEP Water Monitoring

- Cyanobacteria are in every lake and pond
- Blooms are most frequent June-September, but…
- Blooms can last days or weeks
- Cell counts do not correlate with toxin levels
- Most toxin levels occur below EPA recreational thresholds

DPH/DEEP Joint Guidance

- Collaboration between DEEP, State DPH, Eastern Highland Health District DPH to produce first edition in 2013
- Modified annually as needed



Guidance to Local Health Departments For Blue–Green Algae Blooms in Recreational Freshwaters

June 2017

BACKGROUND AND PURPOSE

Blue-green algae, also known as cyanobacteria, occur naturally in lakes and ponds throughout Connecticut. These microscopic organisms are components of the aquatic food chain. In ordinary circumstances, cyanobacteria cause no apparent harm, however warmer water temperatures and high nutrient concentrations may induce a rapid increase in their abundance. This response is commonly called a "bloom" because algal biomass increases to the extent that normally clear water becomes markedly turbid. This tainted water takes on a green, blue-green or reddish-brown colored hue (See Figures 1-3).

Guidance Document Establishes

- Monitoring Strategy for cyanobacteria blooms
- Sampling and analysis protocols
- Communication strategy with local health officials
- Interagency Efforts
  - Identify lead agency on issues
  - Establishes key contacts at each agency
  - Coordinates joint responses

CT DEEP Responsibility

CT DEEP

- Responsible for 22 beaches at State Parks
- Monitoring and assessment of ambient waters (lakes, streams, state owned beaches) under the Clean Water Act

Statutory Authority

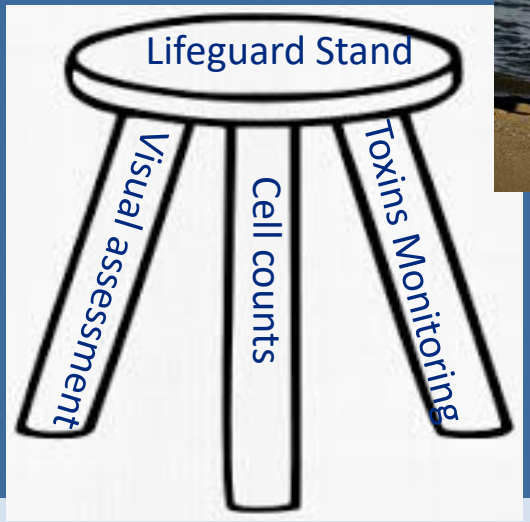
The Connecticut General Statutes outlines enforcement authority under Chapter 98, Municipal Powers. Section 7-148 states that municipalities have the power to "control and operate" recreation places, public beaches and beach facilities. They also have the power to "regulate and prohibit swimming or bathing in the public or exposed places within the municipality"

The CT Public Health Code does not include a pertinent regulation specific for lakes and ponds, however; section 19a-36-B61 may apply to impoundments.

** From Guidance to Local Health Departments For Blue–Green Algae Blooms in Recreational Freshwaters

CT DPH/DEEP HAB Beach Protocol

- Visual Evidence of Bloom = Beach Advisories & Closures
- Why visual based response ?
  - Sampling and analysis takes time
  - Not all toxins analyzed and analysis is costly
  - Not practical to sample all waters at all times
  - Blooms are dynamic
  - Decision can be immediate



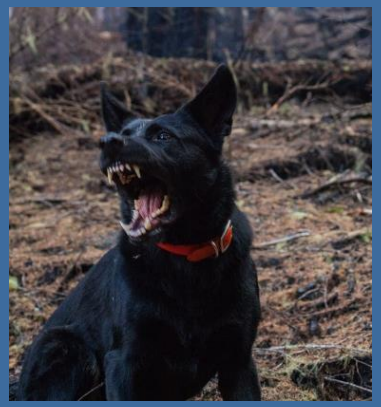
Complex Conversation …..

- A variety of species that produce toxins are present in CT waterbodies
- Uncertainty when toxins get released
- Spatial location of bloom can vary…..
  - hour to hour or day to day
- Toxin exposure pathway - oral
- Analysis not readily available for all toxins
- EPA Recreational Criteria only for 2 toxins
- Public/Press Awareness is increasing

Key message

- Kids and pets have highest risk
- When in doubt, stay out
- Report it to deep.algalblooms@ct.gov

Balancing the message

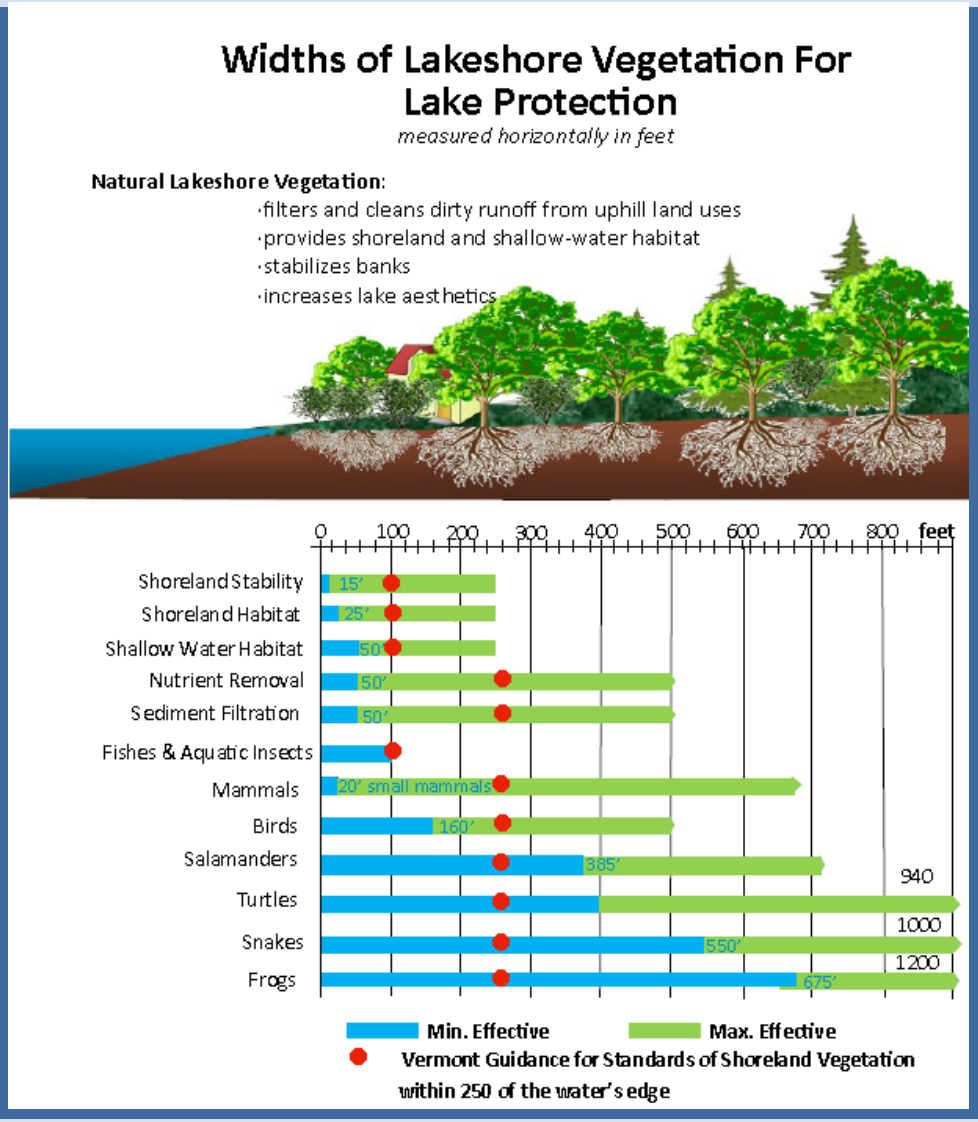


The challenge is finding the sweet spot in balancing protecting public health and tolerating some risk

What can lake shore home owners do

Reduce Lawn Area

- Create a filter strip by not mowing
- Reduce Runoff impacts
  - Install rain barrels
  - Rain gardens
  - Crowned Driveways/Open culverts
    - (Check with your municipal/wetland issues)



What can lake shore home owners do

Yard Maintenance

- Properly dispose of pet waste
- Reduce Fertilizer /pesticide usage
  - Leave grass clipping on lawn (puts nutrient back in soil naturally)

Septic System

- Maintenance, pump out, inspect

Vehicles

- Don't wash in driveway and use car washes that reuse wash
- Check cars/machinery for leaks and spills

Vegetated Lake Buffer provide:

Ecological Services:

- Slow nutrients, pollutants and sediments from reach the lake
- Stabilizes the banks and prevents erosion
- Provides better wildlife and fish habitats
- Enhances recreational opportunities

Questions