Hot Topics in Pond Management

- Presented by

Triangle Pond MANAGEMENT

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Topic: #1 Plants

- Questions
  - What is this plant?
  - I've got algae what can I do?
  - My water is green what can I do?
  - Are chemicals safe in my pond?
  - Will the treatment hurt my fish, turtles, ect…?

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Algae and Nuisance Plants

- Types of Algae
- Contributing Factors
- Plant ID
- Potential Impacts
- Management Approaches

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Planktonic

- Free floating plants
- Microscopic
- In large quantities turn the water color green, blue-green, brown, ect…
- Considered the base of the food chain and desirable depending on the situation and species
  - *Green algae

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Blue-Green Algae (Cyanobacteria)

- Not really an algae but type of prokaryotic bacteria that can perform photosynthesis
- Can be unicellular, filamentous, or colonial
- Can turn water blue, green, or brownish in coloration
- Can produce cyanotoxins which are harmful to fish, animals, and humans

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Filamentous (String Algae)

- Single celled plants that form chains, threads, or filaments
- When they become dense they form mats that float
- Can provides some habitat for micro and macro invertebrates
- Examples…
- *“Spirogyra, Pithophora spp., Anabaena, Oscillatoria, Lyngbya.*

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Advanced Algae

- Examples *Chara spp.* and *Nitella spp.*
- They are more advanced algae that look like a submersed aquatic weeds
- They can provide habitat for species within the pond
- Often if left unchecked they grow to be very dense in ponds

Nitella spp.

Chara spp.

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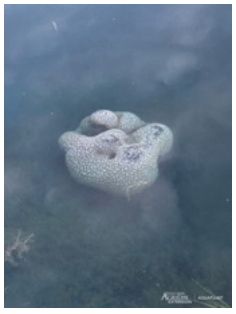
What's this?

- Bryozoans
- Colonies of small aquatic invertebrates
- The animals extend tentacles to filter food from the water
- Considered harmless and if found in your pond it's an indicator of good water quality



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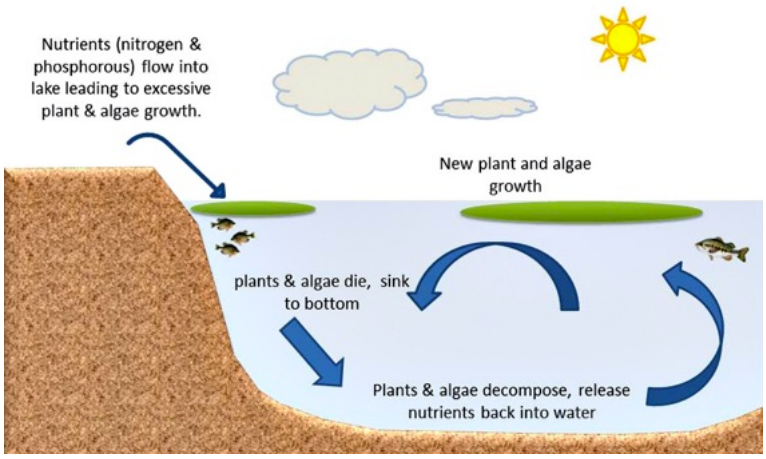
Factors Related to Algae Growth



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Light

- Varying intensities can result in blooms
- Some algae are affected adversely by increased light
- Others like cyanobacteria have pigments that protect them from intense UV
- Many algae have resting stages where they can bloom in optimal conditions but be “dormant” until conditions are optimal.

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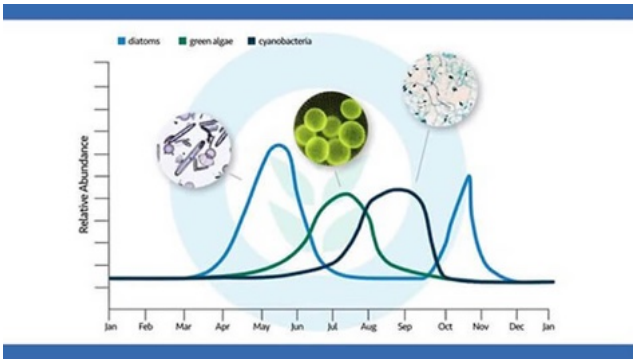
Temperature

- Cold vs Warm Water
- Different species prefer different temperatures
- Cooler temps usually have a mix of algae



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Water Mixing

- Aeration systems, fish movement , wind action…
- Mixing can add dissolved oxygen, decrease temperatures
- Some good algae's… like green algae and diatoms can benefit from mixing
- Other cyanobacteria might be discouraged from growth
- Generally speaking mixing is good and adds benefits but some cyanobacteria can thrive in warmer conditions

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Nutrients

- Nitrogen and Phosphorus
- Washing in
  - Fertilizing lawns or fields
- Leaves
  - Nearby trees, grass clippings
- Wildlife Excretion
  - Geese, waterfowl, pets
- Nutrients in sediments
  - Build up and release overtime

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Potential Impacts

- Cyanobacteria can release toxins
- Can make the body of water less useable for recreation
- Increased potential for fish kills
- Increased algae growth can inhibit other growth of submersed plants potentially decreasing useable habitat
- Matted algae is unsightly
- Planktonic blooms can result in a “pea soup” looking pond

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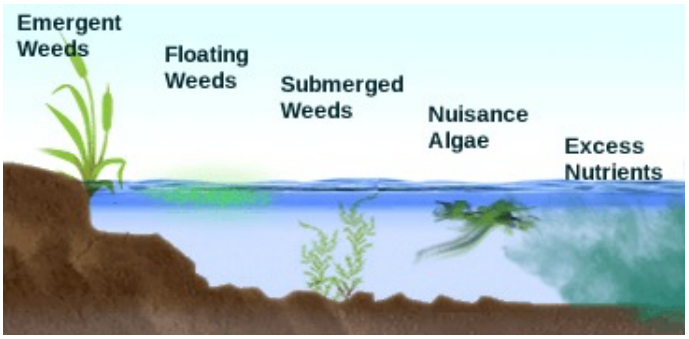
Other Nuisance Plants

- Submerged Plants
  - Rooted, Under the water
  - Hydrilla, Naiads, Pondweeds, Milfoils, Parrot's Feather
- Emergent Plants
  - Rooted, Come out of the water
  - Alligator Weed, Lotus, Cattails, Smartweed, Spikerush, Primrose
- Free floating
  - Not rooted
  - Azolla, Duckweed, Watermeal



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Slender Spikerush

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Slender Pondweed

American Pondweed

Pondweeds

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Hydrilla

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Southern Naiad

European Naiad

Naiads

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Duckweed

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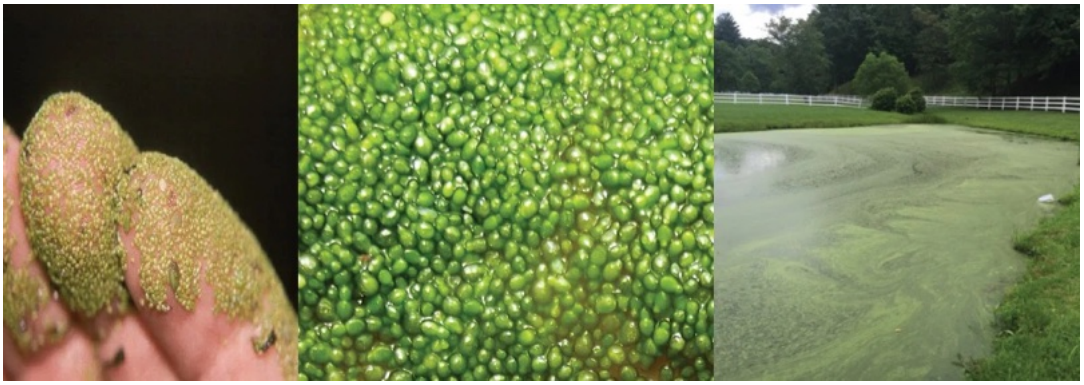
Watermeal



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Azolla

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Watershield

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Cattail

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Creeping Water Primrose

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Smartweed

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Alligatorweed

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Parrots Feather

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Bladderwort

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Potential Impacts

- Access for recreational use
  - Fishing
  - Boating
  - Swimming
- Unsightly
  - Can get dense quick
- Dissolved Oxygen swings
  - Fish Kills
- Mosquito Breeding
- Blockage of inlet and outlets

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Excessive Algae or Aquatic Plants… Options for Remediation

- Proactively treat or reduce the factors that support growth
- Proactively introduce biological controls such as sterile grass carp
- Reactively remove growth mechanically or by hand
- Reactively treat with approved aquatic labeled herbicides
- Combination of the above

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Proactive Approach

- Mitigate factors related to plant growth…
- Control Nutrients entering the pond
  - Forebays/Settling Pools
- Incorporate pond dyes
- Install aeration systems
- Apply products such as beneficial bacteria
- Apply products such as Phoslock and EutroSORB

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Biological Control

- Triploid Grass Carp
  - 10-15/Acre for control
- Effective on submersed weeds
  - Hydrilla, Chara, Elodea, Bladderwort, Fanwort, Coontail, Pondweed, Naiads
- Less effective
  - Duckweed, Milfoils, Parrotfeather, Algae
- Not Recommended
  - Watermeal, Eelgrass, Smartweed, Lotus, Lilys, Cattails.

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Physical Removal

- Remove plant growth by hand or with machines
- Remove source of nutrients by hand or with a machine

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Herbicide Application

- Quick results in most cases
- Can be economical when compared to physical removal
- Doesn't always treat the cause
- Applied with a sprayer system using a boat or ATV
- Smaller systems using a backpack sprayer
- Most treatments getting excellent coverage is key to great results

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Herbicide Application

2 weeks post application

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Herbicide Application

- 2 Weeks Post Application

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Systemic Herbicides

- Absorbed into the plant after application and translocated through the plant including the roots
- Slower acting but provide longer lasting control
- Used on emergent and woody vegetation
- Select systemic herbicides used on floating and submerged vegetation

- 2,4-D (1959)
- Glyphosate (1977)
- Fluridone (1986)
- Triclopyr (2002)
- Imazapyr (2003)
- Penoxsulam (2007)
- Imazamox (2008)
- Bispyribac-sodium (2012)
- Florpyrauxifen-benzyl (2018)

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Contact Herbicides and Algaecides

- Quick acting and kill plant tissue on direct contact
- Applied in sections to discourage fish kills from low DO
- Does not translocate meaning regrowth may occur from roots or rhizomes
- Typically used on algae and submersed plants

- Copper (1950's)
- Endothall (1960)
- Diquat (1962)
- Peroxides (2002)
- Carfentrazone (2004)
- Flumioxazin (2011)

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Herbicide Considerations

- Label for Restrictions and Usage
- Off site movement
- Irrigation
- Drinking
- Recreation/Swimming
- Livestock Usage
- Fish Kills
- *Read the Label
- **PPE

- Treating during the summer or cloudy days can lead to low oxygen levels in ponds.
- Target plant may grow back in the season without preventative measures
- Once target plant is gone others may take its place…

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Combination Approach

- Proactively treat water bodies for nutrients early in the season
- Mitigate incoming nutrients
- Stock Sterile Grass Carp
- Utilize aeration
- Minor application of herbicides during the season
- Water sample to check for water quality factors

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Topic #2: Water Quality

- Questions
  - How is my water quality?
  - How does it affect my fish?
  - How does it affect my pond?
  - What can I do to better my water quality?

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Water Quality Parameters

- Dissolved Oxygen
- pH
- Temperature
- Alkalinity
- Hardness
- Turbidity

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Dissolved Oxygen (DO)

- “the amount of oxygen gas present in a water body”
- O2 gets in the water from the atmosphere and plant photosynthesis
- DO is essential for fish and aquatic life
- Levels lower than 3 ppm will stress and kill some species
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- Ideal levels would be between 5-10 mg/L (ppm)

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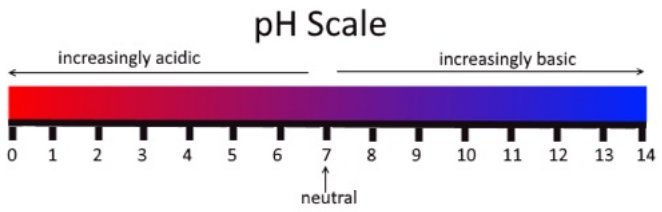
pH

- "A scale that measures how acidic or basic a substance is"
- Based on scale from 0-14
- Many ponds in NC are on the acidic side
- We like ponds between 6-9 on the scale



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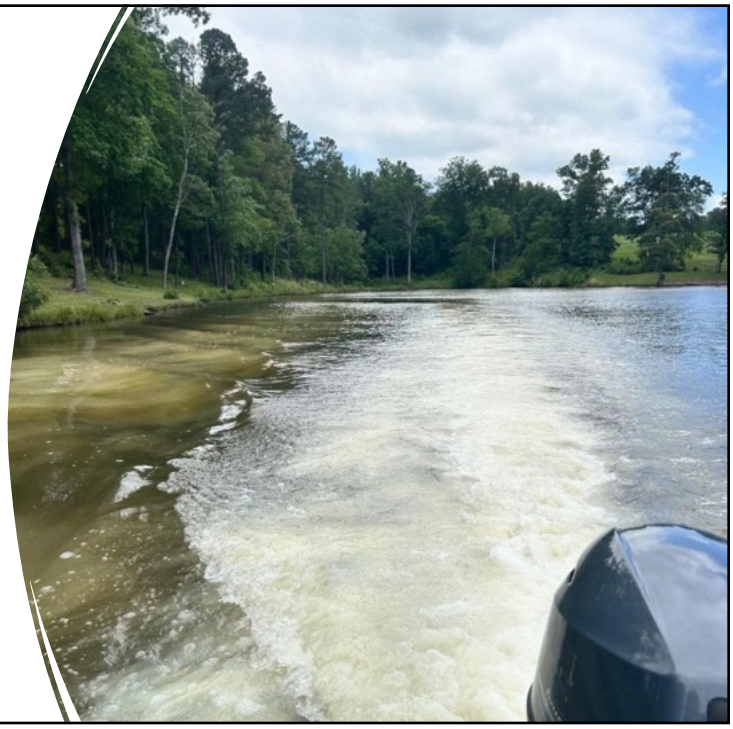
Alkalinity

- "Alkalinity is the buffering capacity of water"
- Affected by the presence of dissolved substances like bicarbonate and carbonate
- Higher alkalinity allows ponds to resist large swings in pH
- Alkalinity at or above 20ppm would be ideal



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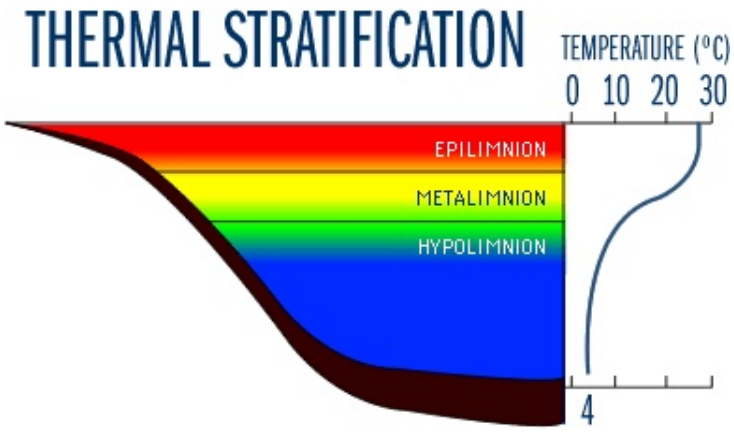
Temperature

- "How hot or cold the water is"
- Affected by pond depth, amount of shade, time of year…
- Important for herbicide consideration
  - Copper
  - Target plant location
- Stratification affects the usable water column for aquatic life



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Turbidity

- "the cloudiness or muddy look caused by suspended particles"
- Can be caused by runoff and erosion upstream
- Livestock
- Organic matter like algal growth
- May affect certain herbicide treatments
  - Diquat

*Aluminum Sulfate Application

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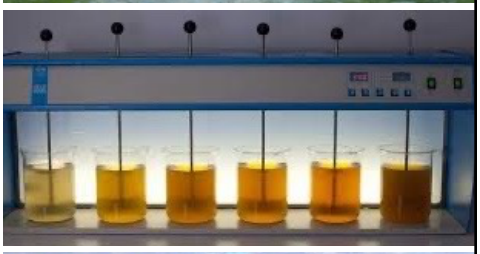
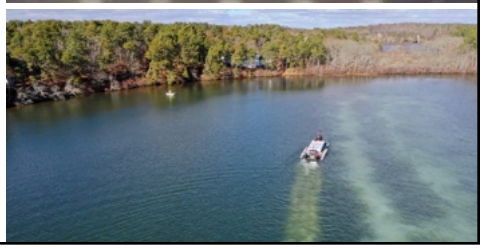
Poor Water Quality… Options for Remediation

- Always get a water quality test panel completed with the various factors
- Companies do this you can also get it completed at private labs

- Solutions for Common Issues…
  - DO → Aeration
  - pH → Application of lime or lime product
  - Alkalinity → Application of lime or lime product
  - Temperature → Pond Depth and Shade
  - Stratification → Aeration
  - Turbidity → Aeration, Settling, Alum/Lime Treatment





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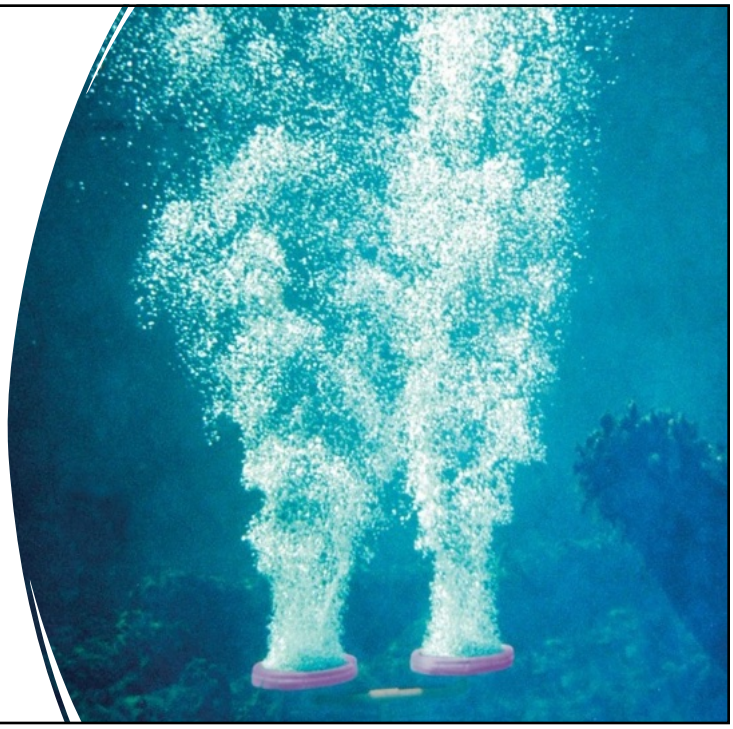
Topic #3: Fountains and Aerators

- Conversations or interest in these units usually are centered around wanting to increase water quality in a pond.
- Aeration can add great benefits to a ponds ecosystem and help create better water quality overtime.
- Benefits
  - Increases Dissolved Oxygen levels
  - Decreases stratification
  - Creates more useable area for fish
  - Helps reduce fish kills
  - Promotes aerobic bacteria
  - Reduces nutrient loading
  - Decreases mosquito activity



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Fountains and Aeration

- (3) Types…
- Display Fountains
- Surface Aerators
- Diffused or lakebed aerators

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Display Fountain

- Beautiful display but less total volume of water moved unlike the other two
- This Example
  - 2HP moves 160 GPM
  - 24' Display Height
  - 60' Wide

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Surface Aerator

- Much better choice for moving water in terms of aeration. Display varies by model
- This Example
  - 2 HP moves 350 GPM
  - 10’ Display Height
  - 36’ Wide

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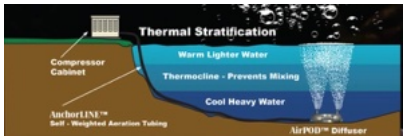
Lakebed Aeration

- Best all around for aeration but no display.
- Better for deeper ponds. (Ponds 10’ plus)
- This Example
  - .5HP Unit
  - 2 Diffusers
  - 2 Acres of Water at 20’



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Topic #4: Muck Build Up

- Questions
  - My pond is filling in what can I do?
  - There's a bunch of leaves all over my pond bottom…
  - The stream feeding my pond is depositing sediment …
  - I want to make my pond deeper what can I do?

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Sediment, Leaves, and Muck

- Ponds naturally over time try and fill in
- "Eutrophication"
  - Excessive richness of nutrients, natural aging of the pond
- Each situation varies
- Contributing Factors
  - Leaf Debris
  - Erosion
  - Wash In
  - Development and Construction

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Negative Effects

- Excessive organics might lead to algae blooms
- Aquatic weeds could start to take over
- Bad Smells
- Less useable space for recreation or fish habitat
- Might affect fountain or pump operation

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Remediation Options

- Some products attack organic build up over time
  - Bacteria products, muck away, phosphorus lockers, ect…
- Aeration
  - Helps promote aerobic bacteria that help breakdown organic matter
- Mechanical Removal
  - Dredging
  - Excavator Removal
  - Pumping

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Topic #5: Fish Kills

- Questions
  - Some fish are dead in my pond, what happened?
  - My pond seems to have turned over?
  - What causes pond turnover and what can I do to prevent it?
  - Do I have to restock?

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Fish Kills

- Causes
  - Can occur in ponds naturally
  - Often happens when ponds “turnover”
  - Improper herbicide use
  - Most common cause is decreased or rapid change in dissolved oxygen

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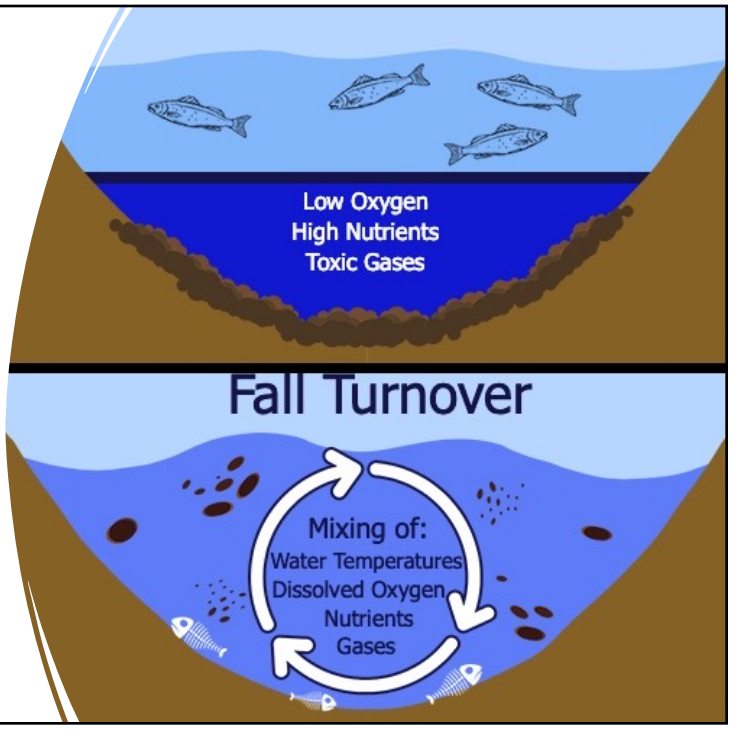
Pond Turnover

- Natural seasonal stratification happens in ponds.
- Summertime cooler and denser water settles at the pond bottom and becomes oxygen depleted
- Warmer water stays on top and has more oxygen
- During a turnover the layers of oxygen depleted water and oxygen rich water mix can lower overall DO levels resulting in fish kills
- Temperature changes, heavy rains, or strong winds could be the catalyst



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Herbicide Use

- Used correctly and per the label requirements herbicides generally aren't the reason for most fish kills
- That is the herbicide doesn't make the water toxic in most cases.
- Some products are more toxic to aquatic life than others. (copper products VS endothall products)
- Fish kills tend to occur from a change in DO as a result from the massive kill of off plankton or oxygen producing plants after an herbicide treatment
- "no o2 producing plants no DO"

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Fish Kills Final Thoughts

- Most of the time the entire pond is not killed. Some fish survive to reproduce
- Larger fish can be an issue and take longer to decompose.
- Smaller fish decompose quickly and are taken up by wildlife. (Birds, turtles, ect…)
- Proactive Measures
  - Adding aeration to discourage stratification
  - Proper herbicide usage
  - Careful timing and application of herbicides

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Resources and Acknowledgments

- https://content.ces.ncsu.edu/pond-management-guide
- https://aquaplant.tamu.edu/
- https://www.ncwildlife.org/

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Thank You!
Questions?

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