Lake Oscawana Management Advisory Committee
Town of Putnam Valley, NY
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Lake Oscawana Management Plan

Northeast Aquatic Research, LLC

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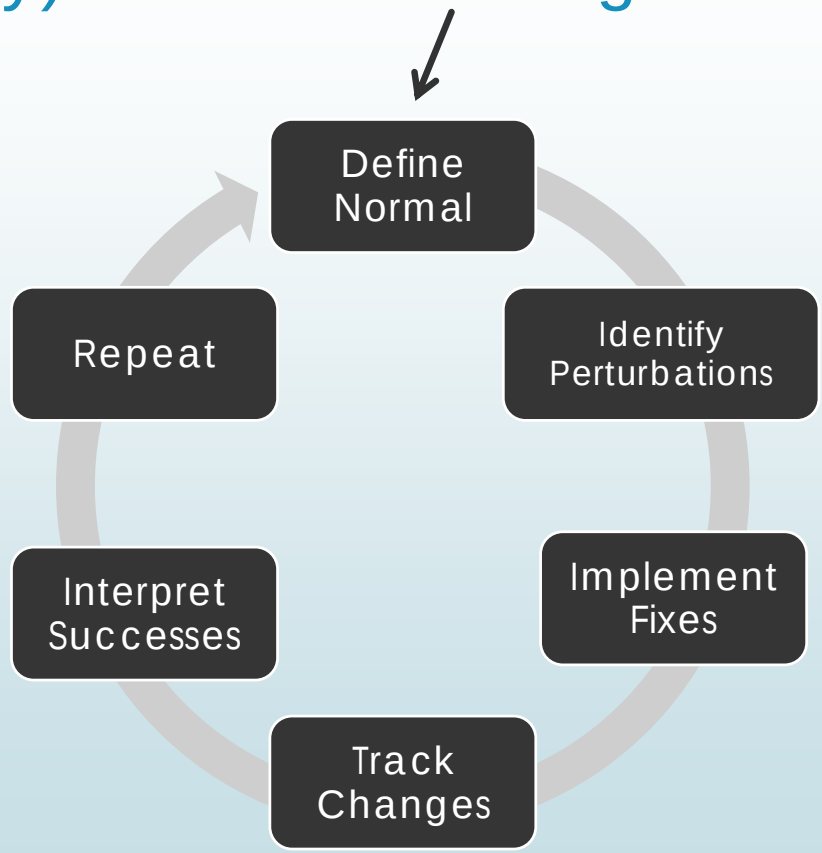
Lake Science (Limnology) vs. Lake Management

- Lake management = manipulating nature to suit human uses
  - Requires scientific data, can get messy, expensive
  - As long as humans and lakes coexist, there will need to be ongoing management

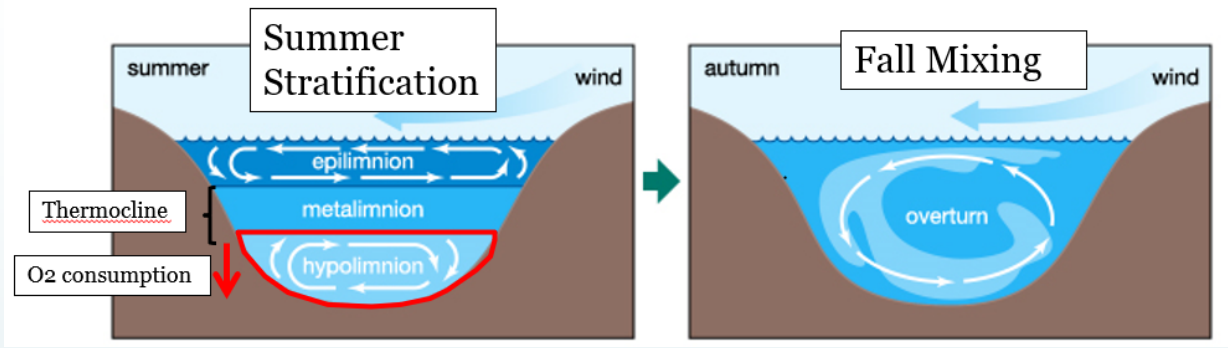


Review of Water Quality Monitoring Parameters Important to Lake Management…

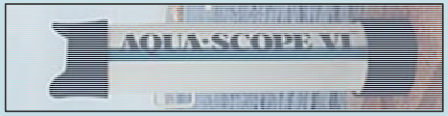
Water Quality Monitoring Parameters

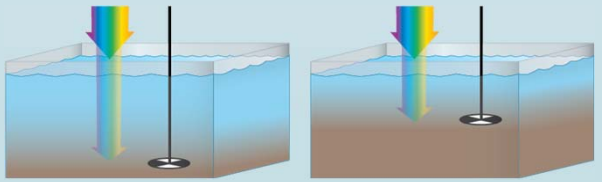
- Thermal
- Visual
- Chemical
- Biological

Temperature Profiles / Stratification



Secchi Disk Transparency (water clarity)





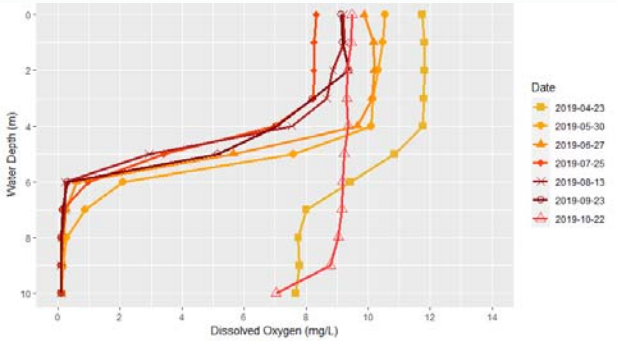
Visual | Thermal

Water Quality Monitoring Parameters

Chemical | Biological

Chemical: What compounds are in the water? What forms? How much?

Dissolved Oxygen



Nutrients – Nitrogen & *Phosphorus*

Surface

High (>30ppb P)

Moderate (10-30ppb P)

Low (< 10ppb P)

Nutrients should be relatively **low** (to ensure good clarity & prevent algae blooms)

Biological Parameters Measured at Oscawana

Aquatic Plants – diversity, abundance, locations

Phytoplankton – algae & cyanobacteria

Zooplankton

Fisheries

Bacteria – Coliform at beaches

Each own interconnected science

Updated Lake Management Plan: How/why it came to fruition…

- Town confusion about Oscawana's "Impaired Status" in NY
  - Impaired by "Invasive plants & algae growth" – impaired designated lake uses defined by NY
- NY DEC required to evaluate lakes based on their legal Water Quality Standards; part of the Clean Water Act Section 303(c)
- 2008 Total Maximum Daily Load (TMDL) for Phosphorus – but disregarded internal load
- 2010 follow-up initial LMP – much has changed since then

Impaired Waters NOT Included on the NYS Section 303(d) List

Not all impaired waters of the state are included on the Section 303(d) List. By definition, the List is limited to impaired waters that require development of a Total Maximum Daily Load (TMDL). A list of Other Impaired Waterbody Segments Not Listed (PDF, 83 KB) on the 303(d) List Because Development of a TMDL is Not Necessary is also available. The purpose of this supplemental list is to provide a more comprehensive inventory of waters that do not fully support designated uses and that are considered to be impaired. (NOTE: This list will be updated upon USEPA approval of the Proposed Final 2016 List.)

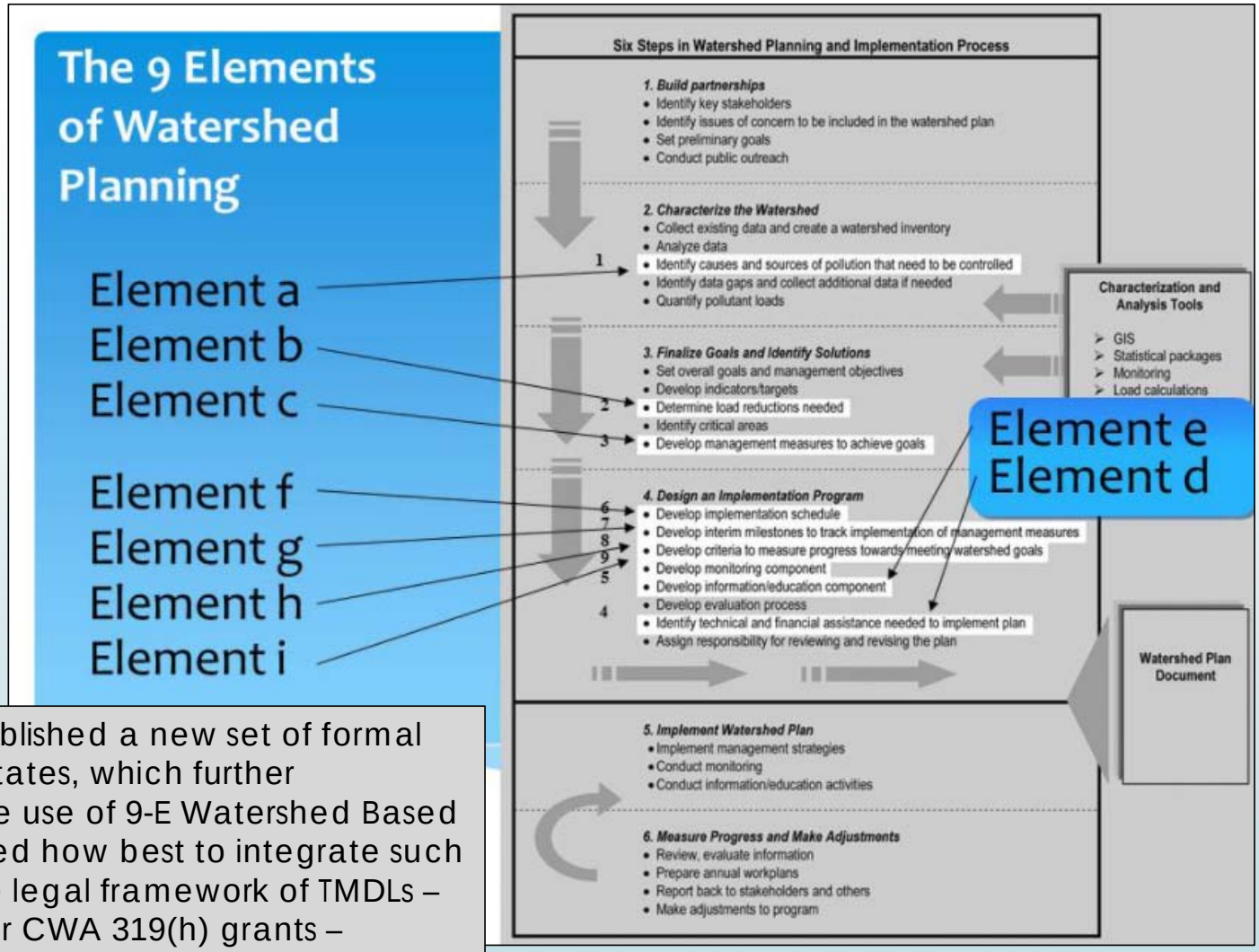
There are three (3) categories of justification for not including an impaired waterbody on the Section 303(d) List:

- Category 4a Waters - TMDL development is not necessary because a TMDL has already been established for the segment/pollutant.
- Category 4b Waters - A TMDL is not necessary because other required control measures are expected to result in restoration in a reasonable period of time.
- Category 4c Waters - A TMDL is not appropriate because the impairment is the result of pollution, rather than a pollutant that can be allocated through a TMDL.

TMDL
VS.
9-Element Watershed Based Plans

9 Element Watershed Based Management Plans

- US EPA is required by law to implement the Clean Water Act – which specifies the need for TMDL's for "impaired" waterbodies (1972 & 1987)
- In 2008 EPA published a Handbook for Developing Watershed Plans to Restore and Protect Our Waters
- The goal of this document was to set a uniform structure for projects funded by the CWA Sec. 319 – Nonpoint Source Pollution (Stormwater) Grant Program
- From this document, EPA (circa 2010) took 9 of their bullet points and made them the "minimum requirements" for a Watershed Management Plan



In 2013, EPA published a new set of formal guidelines for States, which further emphasized the use of 9-E Watershed Based Plans – explained how best to integrate such plans within the legal framework of TMDLs – require them for CWA 319(h) grants – **Plan Implementation $$$**

Oscawana Lake (& Watershed) Management Plan

1. Water Quality Analysis & Management Recommendations

- In-depth water quality data analysis
  - New information to answer lingering questions
  - Acquired harvesting & watershed data
- New loading model estimates - greater watershed importance vs. internal nutrient inputs compared to 2010 estimate

2. Watershed Management Plan – EPA 9E format

- Mapped catch basins around Oscawana – assigned priority SW areas
- Reviewed Highway Dept maintenance files
- Reviewed MS4 reports
- Mesh MS4 requirements with Oscawana Management Plan
- Aided LOMAC in following up with Town septic pump-out enforcement
- Investigated for nutrient “Hot Spots”
- Addressed EPA’s 9 Key Elements – Plan to be accepted by NY/EPA, Putnam Valley can apply for 319 watershed implementation grants

Oscawana Lake (& Watershed) Management Plan

Parts of Plan in Action!

3. Aquatic Plant Management Plan

- Evaluate mechanical harvesting as plant management technique at Oscawana (success vs. setbacks)
- Cost-benefit inquiry of alternative plant management control methods
- Emphasize **INTEGRATED** plant management – don't use just one technique
- Evaluate grass carp present & future – address public misconceptions throughout the US & NY
- Identify potential areas where alternative plant management methods could be explored – provides scenarios
- Educate LOMAC → engage residents in future decisions
  - Disclaimer: 2020 lack of harvester was not part of the plan… but it did provide good follow-up information to the Plan

Key (1.)Water Quality & (2.)Watershed Conclusions & Recommendations

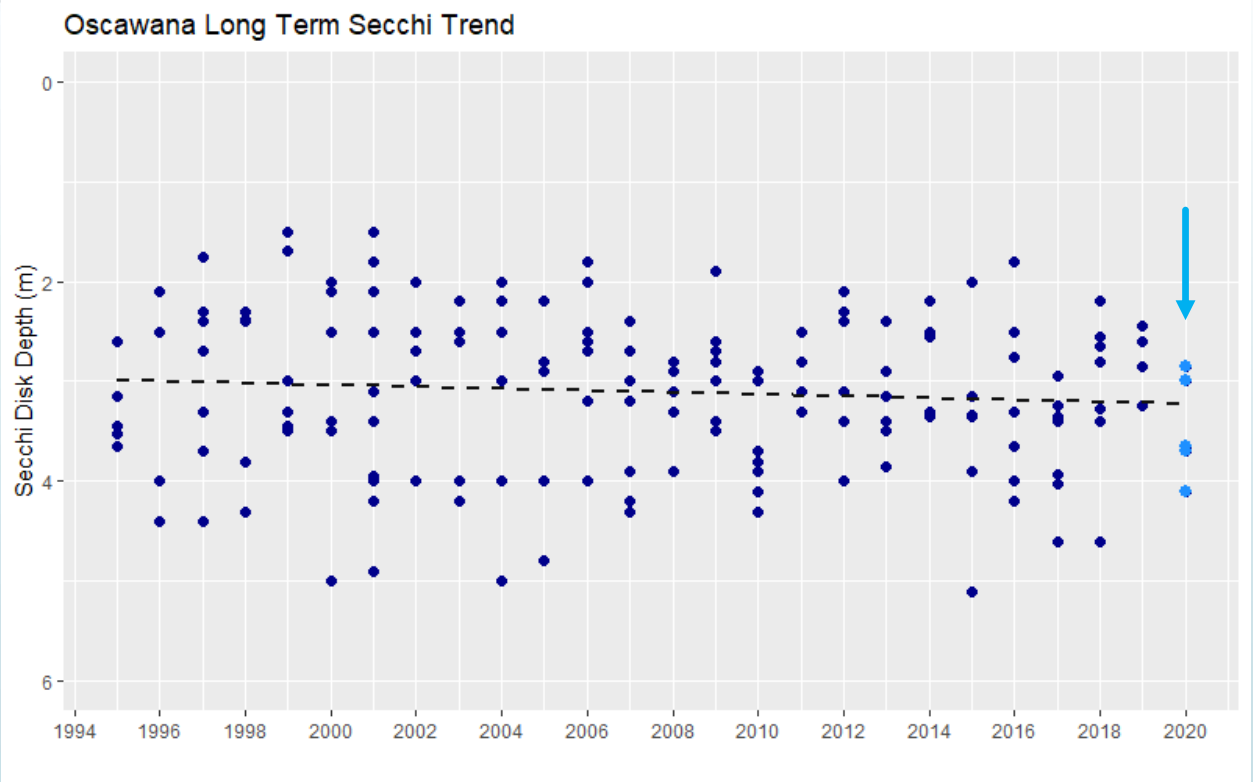
Conclusions

- Water clarity impacted by mechanical weed harvesting – likely also related to nutrient loading
- Total nitrogen has decreased substantially since 2010
  - Likely related to decreased lawn fertilization & septic system updates – nitrate leaches rapidly in groundwater/soils
  - Aquatic plant growth related to nitrogen seepage from shoreline
- Bottom phosphorus/ internal load not consistent overtime (strange!) – affected by external factors
- Emphasize E. coli & fecal coliform bacteria testing in Inlets 4 & 7 – high density onsite wastewater / high groundwater nutrient seepage area

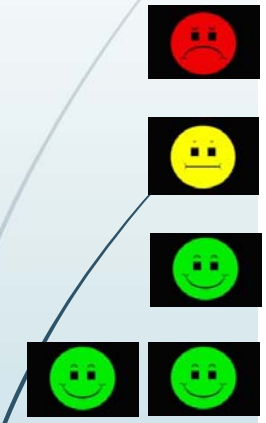
Recommendations

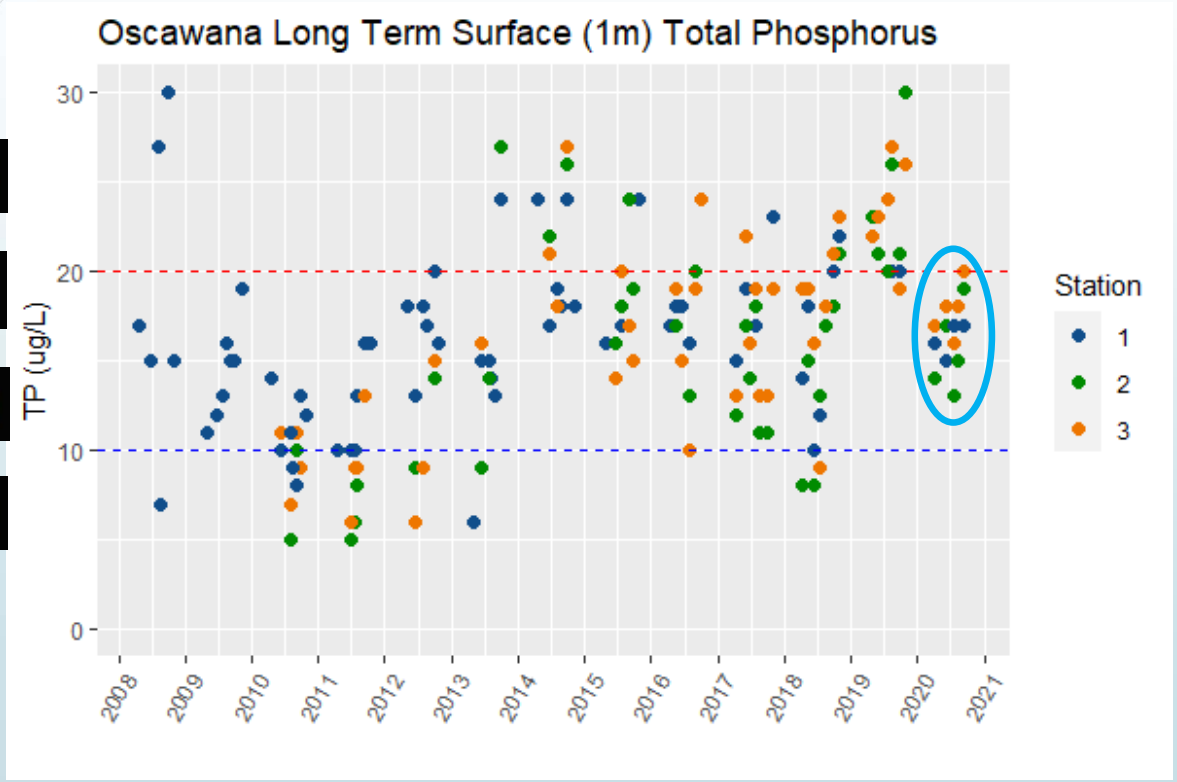
- External (watershed) nutrient reductions should be prioritized over controlling the internal load from bottom sediments
  - Don't focus on aeration, oxygenation, Alum, Phoslock for now… all have infeasibilities and not best use of funds for Oscawana
- Prioritize septic system pump-outs and upgrades to old/inadequate systems
- Prioritize stormwater infiltration and LID in watershed
  - Lee Ave area septics
  - Winnebego/Chippewa Rds. stormwater
  - Community Place & Hilltop Park
  - Lakefront Rd. area septics
  - Various illicit discharge pipes
  - West Shore Drive erosion/stormwater
  - Cayuga Rd catch basins
  - Sunken Mine Rd erosion
  - Unadilla & Seneca Dr. infiltration
  - Leave West Shore Biofilter alone
- Prioritize public education & improve private land-use

Updated 2020 Data:
Water Clarity (Secchi Transparency)



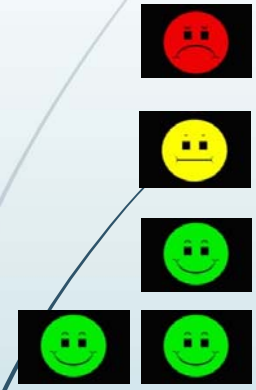
Updated 2020 Data: Nutrients (Phosphorus)

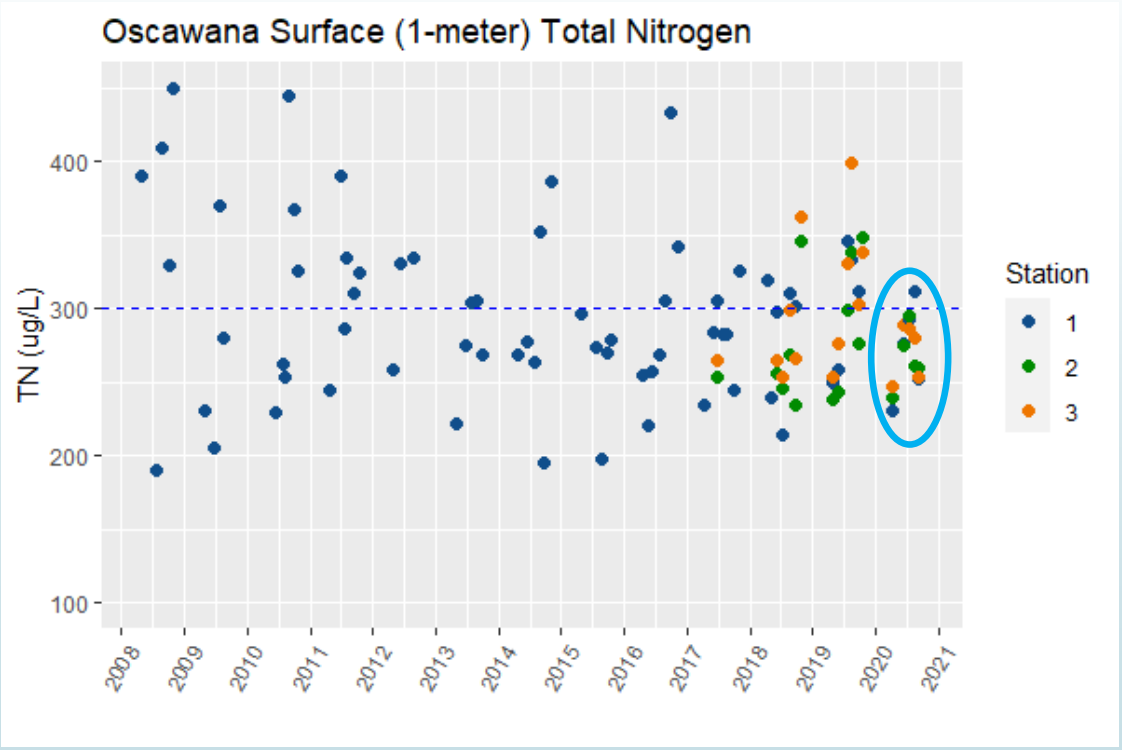




- Bottom P & lake-wide P mass not yet analyzed for 2020

Updated 2020 Data: Nutrients (Nitrogen)





Emphasize Vulnerable Septic Areas

- Systems >15+yrs likely not functioning adequately (let alone 30-50+ yr old systems!)
- <2ft above typical water level line…..
- Natural fluctuation in ground water may prevent proper leach field nutrient treatment

NY Technical Onsite Wastewater Standards*: "Highest groundwater level shall be at least two feet below the proposed trench bottom," meaning that a minimum of 24 inches of usable soil is required for conventional septic system leaching fields.*

3. Aquatic Plant Management Plan
Alternative Plant Control Methods Exist

- Pros and cons of mechanical harvesting as a primary plant control method
- Review alternatives:
  - **Grass carp** – non-selective, potentially irreversible ecological damage, the fish avoid highly populated areas (where you'd actually want plant control)
    - Conservative stocking recommended, alongside other control methods; LOMAC applied for additional 600 fish permit in 2020
  - **Benthic barriers** - appropriate for beaches or private dock areas, small areas – DEC permit
    - Must be taken out for winter & cleaned annually
  - **Diver hand harvesting or suction harvesting** (swimming areas) – DEC permits
    - Some residents say they already take it upon themselves to hand-remove milfoil in their swim areas a couple times per season
    - Diver suction harvesting will disturb sediments, but only once per season because hand removal gets roots, while mechanical weed-harvesting does not
  - **Aquatic herbicides** – also DEC permits

Unfortunate cons:
Time, money, plant fragmentation, insufficient control, sediment disturbances, impact on water quality – cannot be used as dredging to clear Abele Cove

Combinations.... Cheaper & more environmentally sound than weed-harvesting over and over again!

Aquatic Herbicides

- **Aquatic herbicides**
  - Spot treatments in recreationally important areas
  - Start with potential test cases to prove efficacy
  - Needs more public education –**EPA & NY registered herbicides are the most well-studied and successful forms of plant control.** More science behind herbicides than any other method.
  - Recommend: **SONAR** or **ProcellaCor**
    - both highly effective at targeting Eurasian milfoil
    - Less impact to native pondweeds when treated with low dose
    - 2+ years of control in one treatment
    - No sediment disturbance
    - Will not harm anything that isn't a plant
    - We do NOT sell treatments – that would be a conflict of interest – we would help you hire the right **licensed applicator**

Image 2: Potential Locations for Test Herbicide Treatments

~$25,000 for two years of excellent plant control

SONAR aquatic herbicide:

- Active ingredient: Fluridone
- Widely used across the US, for over 30 years; no adverse health impacts to animals or humans
- Approved for use in drinking water reservoirs
- Mode of Action:
  - Inhibits formation of carotenoids in plants, leading to the rapid degradation of chlorophyll by sunlight, which stops the plant from being able to produce carbohydrates
- Highly effective on Eurasian watermilfoil
  - Effective on pondweeds at higher doses

- Typical concentrations used 4-10 ppb
- Fluridone does require long contact times, ~45-90 days, so multiple treatments are needed in one season
- Multiple year control (personal experience)
  - Tyler lake, CT
  - South Spectacle lake, CT
  - Copake Lake, NY

ProcellaCOR aquatic herbicide:

- Active ingredient: Florpyrauxifen-benzyl
- Originally for weeds in rice fields
- Mode of action: Auxin mimic
  - Plant hormones that artificially and rapidly heighten plant activity, resulting in abnormal growth leading to cell and plant tissue death.
- Highly effective on Eurasian watermilfoil – without harming other plants
  - Requires less herbicide than SONAR, only 3.oz to 12 oz per acre depending on water depth.

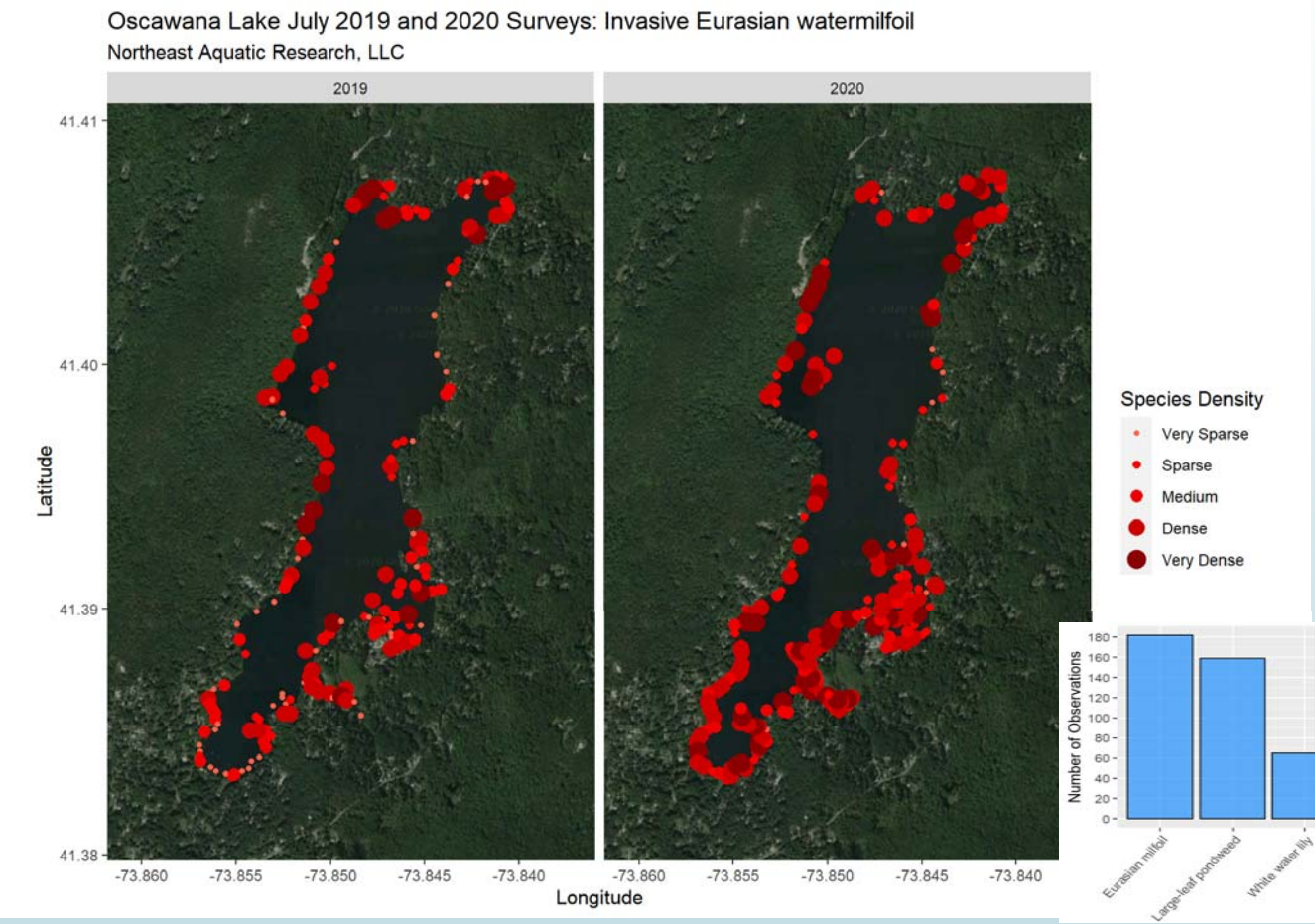
- Short exposure requirements
  - 6 hours or less
  - Better for lakes with high outflow rates
- Successful control
  - Lake Meahagh, NY
  - Pond 3, NY
  - Paugus Bay, Lake Winnipesaukee, NH
    - 1.5 to 2 miles upstream of a drinking water source

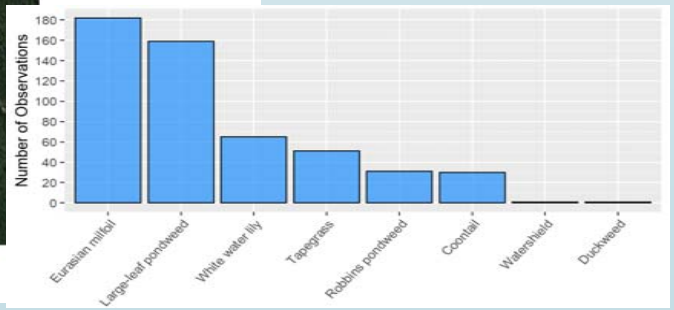
Grass Carp & Aquatic Herbicides

- Grass carp should be used conservatively
- Many of the NY lakes with high grass carp populations have problems with cyanobacteria blooms because it can throw a lake out of balance – algae vs. plants phenomenon

- Selective nature of aquatic herbicides, allow for targeted control in specific areas (while carp cannot and are a more general approach)
- Recent observations indicate that Grass carp do not readily eat the Milfoil stems, instead pick off the leaves, particularly new shoot tips
  - Meaning carp could be more effective after an herbicide treatment and may knock back regrowth – possibly increasing longevity of treatment effects

Recent Aquatic Plant Survey Results





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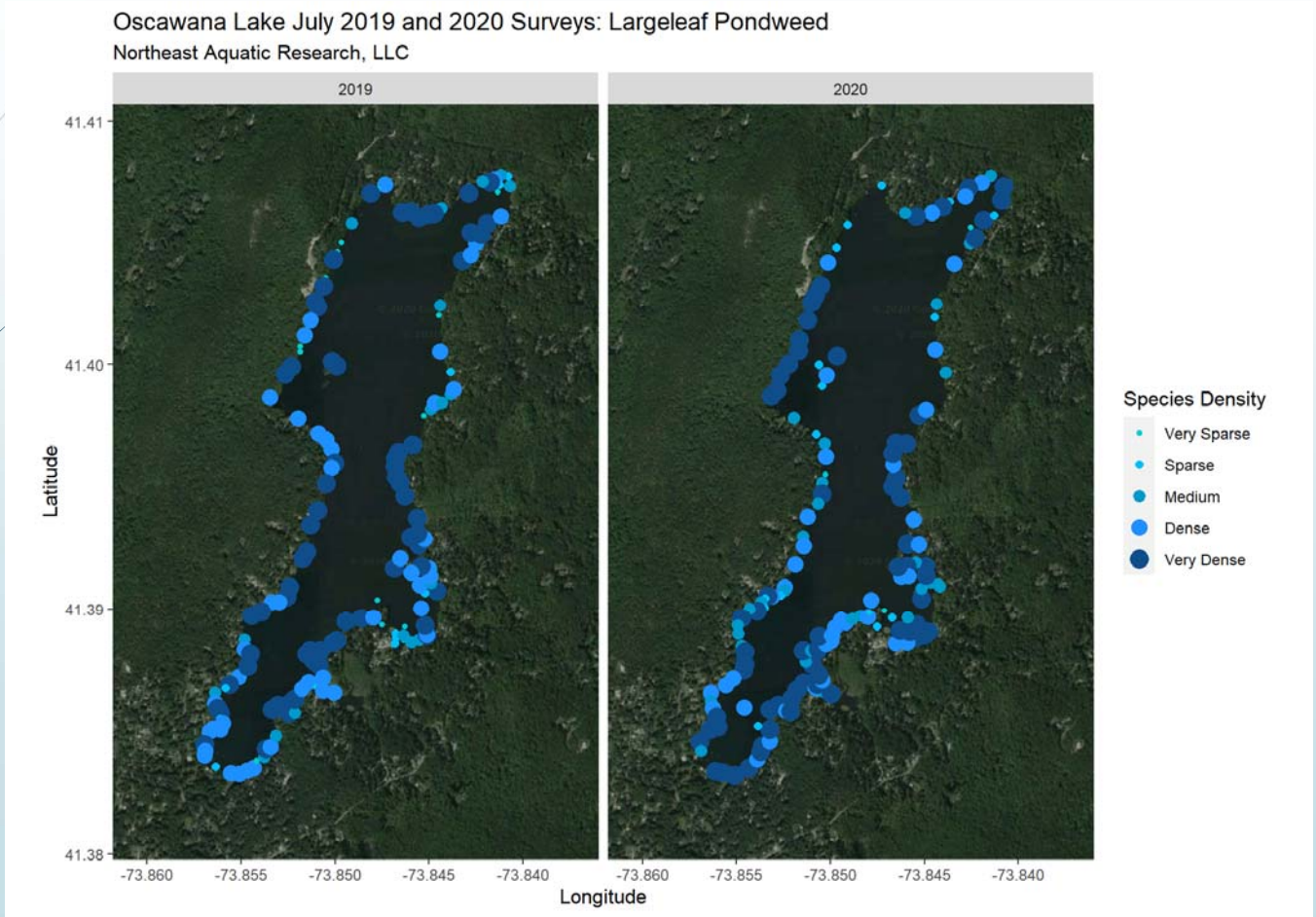
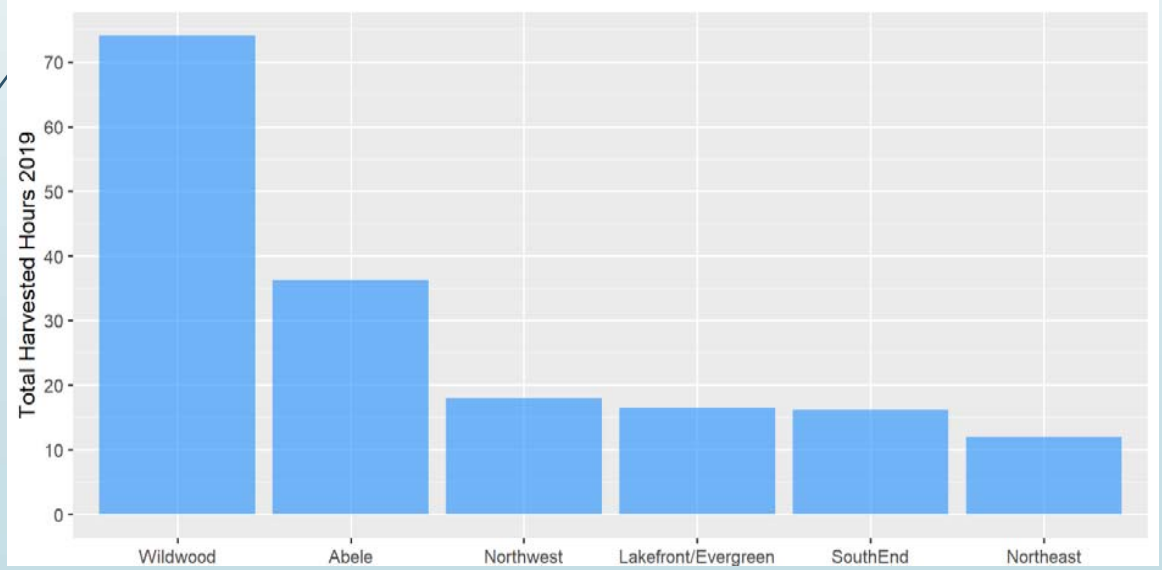
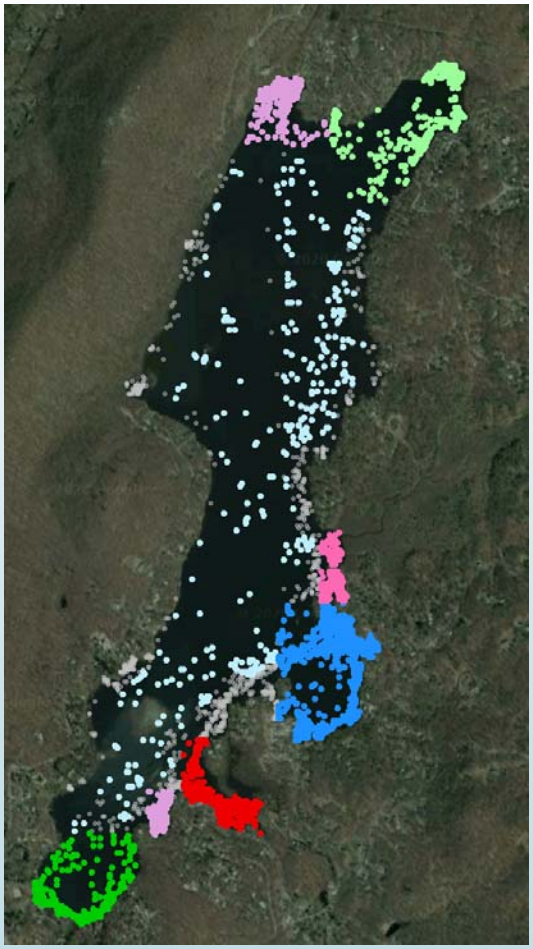


Harvester Tracking Data / Analysis 2019

- Tracker data suggests that little to no harvesting occurs on western side of lake.
- ~50% of active (machine moving) harvesting time occurs in Wildwood & Abele Coves
- Harvester spends about same amount of time travelling to and from coves/off-loads as it does actually harvesting in each of the northern coves & south end – an overall inefficient plant control method





Fisheries Survey

- 3 main goals
  1. Assess Walleye Population
  2. Assess Alewife Population
  3. General Fishery Inventory
- Two Surveys
  - June survey was to capture walleye and gamefish
  - October survey was focused on walleye and black crappie
- Small electrical current stuns fish, brought on board to length and weigh. Fish are released unharmed.
- Analysis focused on fish presence and abundance, size distribution and relative weight

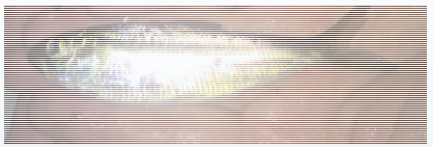
Biomanipulation Goal

(not always a reality)

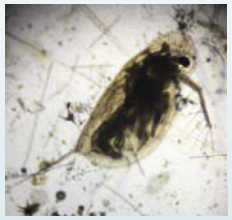
- Idea is to manipulate the food web to improve water clarity
- Strategy is to control planktivorous fish that is eating large zooplankton
  - Leads to cascading effects that increases water clarity
- Oscawana decades of **walleye stockings** to control alewife population

Top Predator

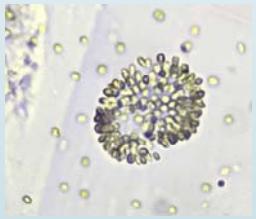
Planktivorous Fish



Large Filter Feeding Daphnia



Phytoplankton



Water Clarity

Evaluating Fisheries

What species?

- Species Diversity
- Presence of invasive fish?
- Rare or threatened species?
- Absence of a common fish?

How many?

- Relative Abundance Estimates (Catch per Unit effort)
- Population estimates
- Can provide insight about predation pressure and fishing opportunity

What sizes?

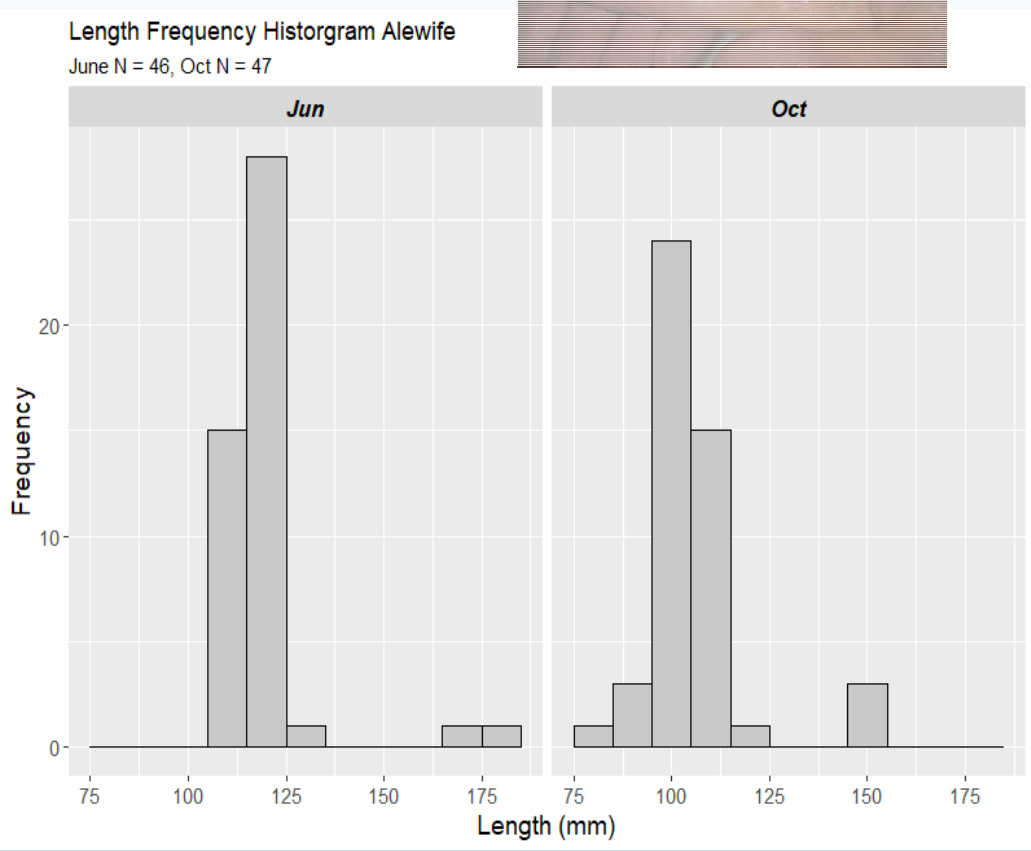
- Size distribution
- Proportional stock density
- Relative weight
- Potential food limitation, habitat issues, compensatory responses?

Results: Walleye

- Only two walleye caught between June and October (580-588 mm respectively)
- Most likely age 5+ based on no stocking in last few years and assumption of no natural spawning.

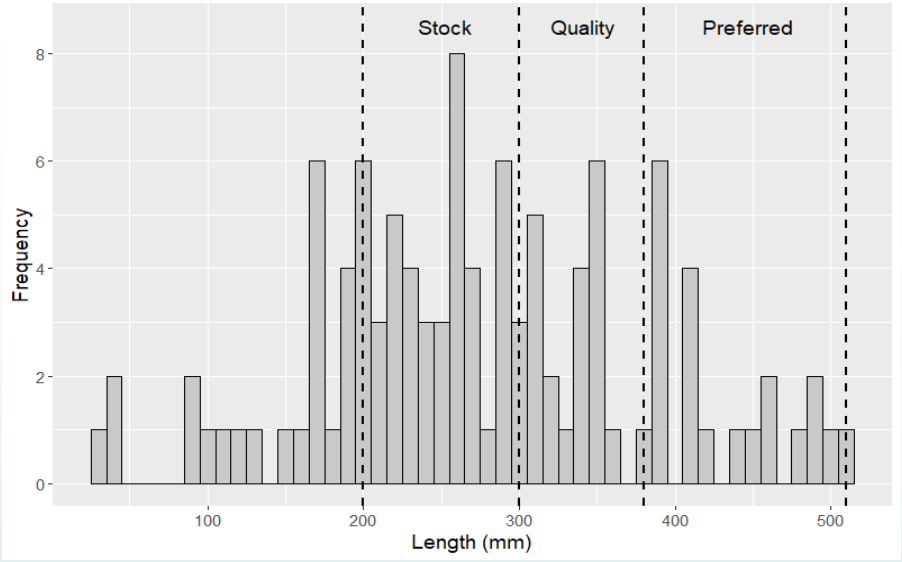
Results: Alewife

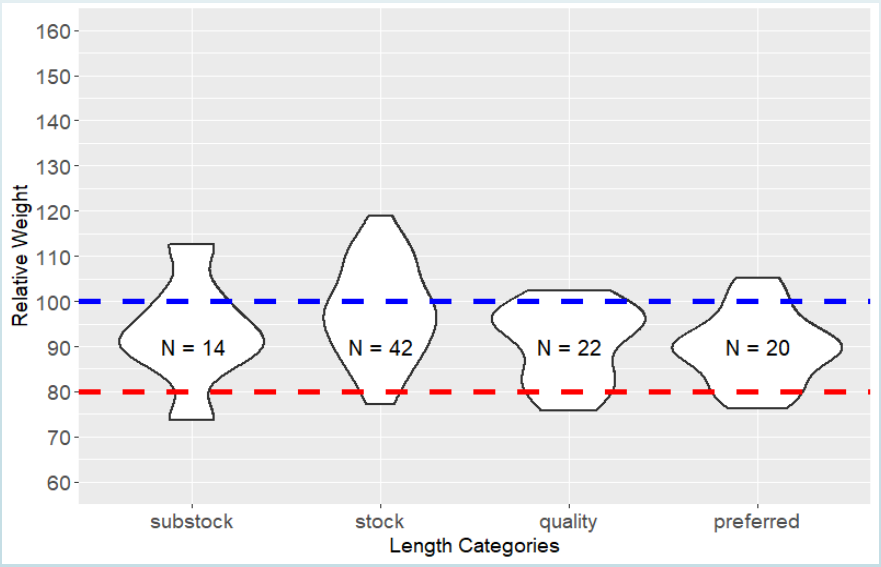
- 93 alewife found between both surveys.
  - Electrofishing normally does not capture a lot of alewife
- Alewife length frequency histogram shows one size class at 100-120mm with a very small class at 165-185 mm.
- May indicate stunting, but gill-net sampling needed to confirm.



Results: Largemouth Bass

- 108 Largemouth bass caught.
- Multiple size classes observed.
- Relative weight indicates healthy fish throughout all size classes.





Fisheries Conclusions

- Key conclusions from fisheries survey

1. Alewife are abundant throughout the lake
2. Walleye are in low abundance and most likely not reproducing
3. Largemouth bass are abundant lakewide, with a good size distribution and healthy fish.

- Biomanipulation efforts have not increased the walleye population to a level that can impact alewife populations and lead to a cascading effect eventually increasing water clarity
- Not worth the financial investment as a method of water quality improvement! (explained on next slide)

Infeasibility of Walleye stocking for Biomanipulation at Oscawana

Low stocking rate (for nearly 20yrs)

- Cayuta Lake (Schuyler county) stocked over 366,000 fish in 2 4- year periods
- Equates to **45,750** fish annually. Oscawana has never stocked more than **5,000** fish per year
  - No response from zooplankton and water clarity

Stocking 45,750 fish would cost ~ $85-90K annually

AJ is going to elaborate on this slide still.

Presumed high predation from largemouth bass

- Largemouth bass prey on juvenile walleye in lakes with large littoral zones relative to the open water zones.
- Most young walleye are consumed in the first few days of stockings.

Improved Management Direction & Public Outreach

- LOMAC moving towards educational articles in newsletters
- LOMAC plans to increase the use of social media to engage residents in future decisions
  - We hope that residents are open to learning & new ways of plant control
  - Need to make community decisions – best use of funds
- Apply for Watershed Improvement funding to implement some of the recommendations from the Plan
- Please see the 2019 presentation or the LMP document for more detailed information about watershed Low Impact Development on public and private property