How Does Water Chemistry Vary Spatially in the Congamond Lake System?

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In its history, no one has ever conducted testing to determine the differences in water quality between ponds in the Congamond Lake System.

WHY STUDY WATER QUALITY?

The health of the water in ecosystems impacts many different factors:

- **Wildlife**
- **Plants**
- **Recreation**
- **Drinking Water**
- **Agriculture**
- **Ecotourism**

Objective

To collect depth profile data in multiple locations in the Congamond Lake System to evaluate how the spatial differentiation in the health of the North, Middle, and South Ponds compare.

CONGAMOND LAKE SYSTEM

NORTH POND

- **Area: 19,0202 m²**
- **Average Depth: 6.4 m**
- **Maximum Depth: 14 m**

- **Generally muddy bottom**
- **Heavily developed along shoreline**
- **Heavy recreation and fishing use during summer**
- **Naturally occurring spring-fed lake**

MIDDLE POND

- **Area: 1.149x10⁶ m²**
- **Average Depth: 6.7 m**
- **Maximum Depth: 12.8 m**

SOUTH POND

- **Area: 59,0841 m²**
- **Average Depth: 4.9 m**
- **Maximum Depth: 8.2 m**

MATERIALS AND METHODS

Field Testing

- **Location:** Congamond Lake in Southwick, MA
- **Sampling Period:** August 17 to September 23, 2017
  - Early morning to afternoon to avoid commotion
  - Conducted in a canoe
- **Total of 64 Sites**
- **Results presented to Citizens Restoring Congamond**

Procedure and Study Parameters

1. **Log Waypoint on Track-Kit App on Cell Phone**
2. **Sonar Fish Finder Depth Detector**
   - Measure depth from surface to bottom
   - *Depth*: How many meters from surface to testing point
3. **Glass Sampling Tubes and Turbidity Meter**
   - Collected water sample
   - Clean bottle and place into meter and scan
   - *Turbidity*: Clarity of the water
4. **Waterproof Field Notebook**
5. **YSI Professional Plus Multi-Parameter Meter**
   - Take data every 1 m and save
   - *Temperature*: The amount of heat present in the water
   - *Barometric Pressure*: The weight of air pressing down on the earth
   - *Conductivity*: The ability to transmit heat, sound, and electricity
   - *Dissolved Oxygen*: Amount of oxygen for aquatic respiration
   - *pH*: The acidity or alkalinity based on a 1-14 logarithmic scale
6. **Properly store all equipment and supplies**

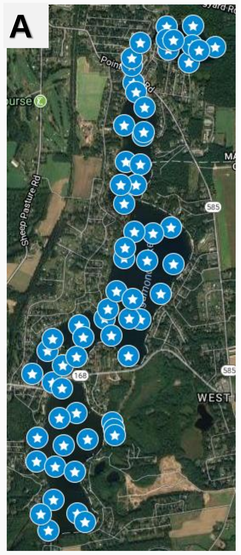

Fig A. Total number of sites tested at Congamond Lake.

RESULTS

Each pond differs from the others, but do not variate within themselves.

The variations was determined by primarily four water quality trends in which the ponds are stated from best to worst :

1. **North Pond**
2. **Middle Pond**
3. **South Pond**

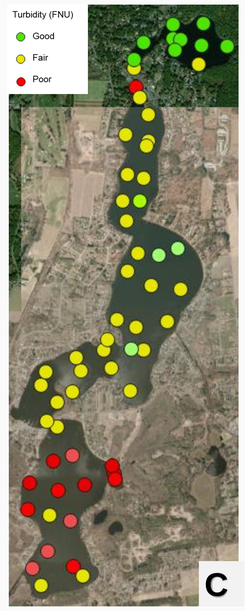

Fig B. Deepest to shallowest: North, Middle, South.
Fig C. Lowest to Highest Turbidity: North, Middle, South.
Fig D. Least to Greatest DO Levels: South, Middle, North.
Fig E. Lowest to Highest Conductivity: North, Middle, South.

Conductivity at 1 m Above Bottom

CONCLUSIONS

Potential Reasons For Variation

- **The water flows from North to South Pond and exits out of a canal**
- **North Pond is the smallest and has little development and a large forest area**
- **Middle Pond incurs heavy use, has two boat launches, and a marina**
- **South Pond endures heavy use, has a lot of development, is smaller than Middle Pond, and the canal is blocked so water has trouble draining**
- **Culverts cause large isolation**
- **Large detention time (approx. 1 year)**

Implications

- **The succession of lake eutrophication can increase poor water quality**
- **The depleted dissolved oxygen portions can mix with the rest of the lake and cause fish kills when the thermocline breaks**

Management Recommendations

- **The current data acquisition procedure is sufficient**
- **Conduct more thorough invasive species assessments on watercraft**
- **Perform an alum treatment to reduce excess algae**
- **Develop individual action plans that addresses each pond's needs**
- **Maintain the forest cover and decrease development**

REFERENCES

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