

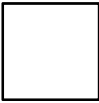
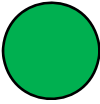
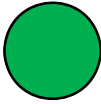
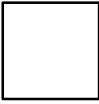
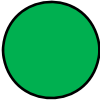
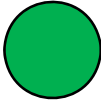
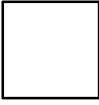














**Water Quality in Buckingham Pond-  
What Have We Learned  
thru CSLAP?**

**Scott Kishbaugh, P.E.  
Lake Monitoring and Assessment Section  
NYS Dept. of Environmental Conservation**

# Water Quality

	2011	All Years	Trend
Trophic Status			
pH Balance			
Deepwater Oxygen			

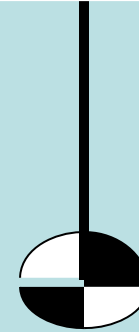
	Excellent
	Good
	Threatened
	Poor
	Not Known
	Highly Improving
	Improving
	Stable
	Degrading
	Highly Degrading

## Buckingham Pond vs. Other Lakes and “Standards”

- Buckingham Pond- 1-2 m
- Washington Park Lake- 0.5-1.0m



- Class C Lake- 2-3 m
- Lower Hudson River Basin Lake- 2-3 m
- Typical NYS Lake – 2-3 m
- 12% Buckingham Pond readings below state DOH guidance for swimming beaches (=4 ft)



## Total Phosphorus: Buckingham Pond vs. Existing WQ Standards?

- State Guidance Value = 20  $\mu\text{g}/\text{l}$  (= 20 ppb)- This is Equivalent to “Highly Productive” (*Eutrophic*) Lakes
  - All 8 Buckingham Pond Samples > 20 ppb (31-260 ppb)
  - All 8 Washington Park Lake Samples > 20 ppb (54-97 ppb)
  - Typical Lower Hudson Basin Lake = 21 ppb
- Moderately Productive (*Mesotrophic*) Lakes: 10-20 ppb
  - No Buckingham Pond Samples 10-20 ppb
  - Typical NYS Lake = 15 ppb
  - Typical Class C Lake = 14 ppb
- Unproductive (*Oligotrophic*) Lakes : < 10 ppb
  - No Buckingham Pond Samples < 10 ppb



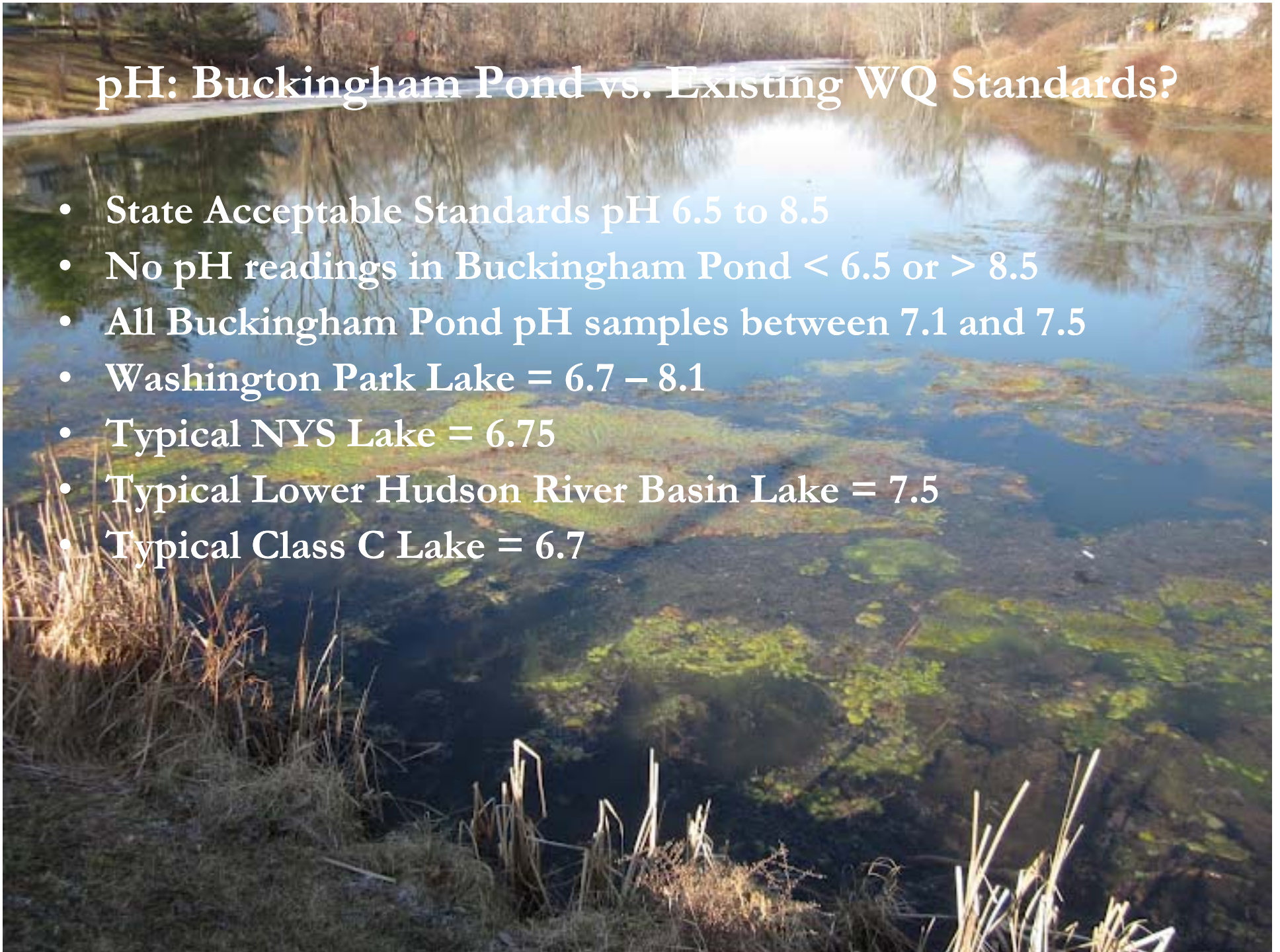
## Algae (Chlorophyll *a*): Buckingham Pond vs. Existing WQ Standards?

- No State Standards
- “Highly Productive” (*Eutrophic*) Lakes > 8 ppb
  - 38% Buckingham Pond Samples > 8 ppb (10-19 ppb)
  - 75% Washington Park Lake Samples > 8 ppb (24-80 ppb)
  - Typical Lower Hudson Basin Lake = 10 ppb
- Moderately Productive (*Mesotrophic*) Lakes: 2-8 ppb
  - 38% Buckingham Pond Samples 2-8 ppb
  - Typical NYS Lake = 6 ppb
  - Typical Class C Lake = 5 ppb
- Unproductive (*Oligotrophic*) Lakes : < 2 ppb
  - 25% Buckingham Pond Samples < 2 ppb



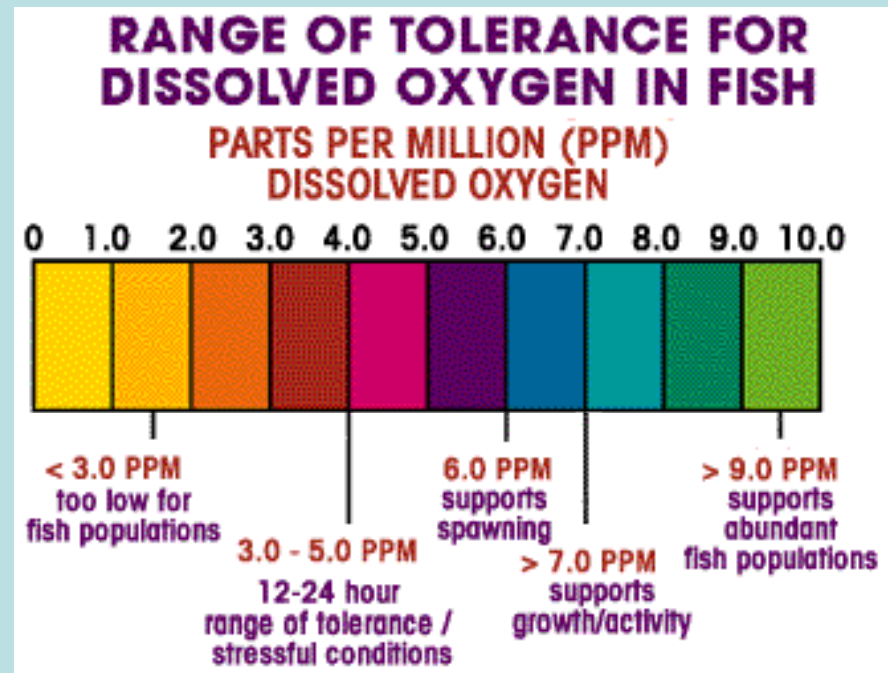
## pH: Buckingham Pond vs. Existing WQ Standards?

- State Acceptable Standards pH 6.5 to 8.5
- No pH readings in Buckingham Pond  $< 6.5$  or  $> 8.5$
- All Buckingham Pond pH samples between 7.1 and 7.5
- Washington Park Lake = 6.7 – 8.1
- Typical NYS Lake = 6.75
- Typical Lower Hudson River Basin Lake = 7.5
- Typical Class C Lake = 6.7












# CSLAP Dissolved Oxygen Levels










- Dissolved oxygen not measured directly through CSLAP
- Most shallow, unstratified lakes have sufficiently high oxygen levels throughout lake
- Deepwater TP, NH<sub>3</sub>, NO<sub>x</sub>, Fe, Mn, As give an indication of elevated dissolved oxygen levels (“inferred” DO)



## Lake Perception

	2011	All Years	Trend
Water Quality			
Aquatic Plants			
Recreation			

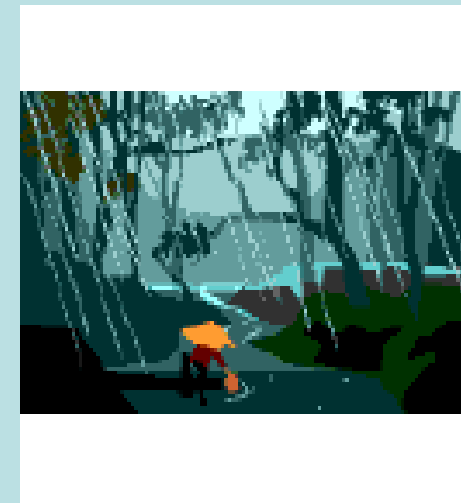
  

	Excellent
	Good
	Fair
	Poor
	Highly Improving
	Improving
	Stable
	Degrading
	Highly Degrading



# CSLAP Use Survey Questions

- “How Does the Lake Look”- Responses Range from 1 (“Crystal Clear”) to 5 (“Severely High Algae Levels”)
- “Aquatic Plant Coverage”- Responses Range from 1 (“Not Visible from the Surface”) to 5 (“Dense Plant Growth Throughout the Lake”)
- “Recreational Suitability of the Lake”- Responses from 1 (“Could Not Be Nicer”) to 5 (“Recreational Use Impossible”)



# What About Water Quality at Buckingham Pond?

- “Crystal Clear”:  
= 0% Samples
- “Not Quite Crystal Clear”:  
= 50% Samples
- “Definite Algal Greenness”:  
= 38% Samples
- “High Algae Levels”:  
= 12% Samples
- “Extremely High Algae Levels”:  
= 0% Samples



# What About Plant Coverage at Buckingham Pond?

- “No Plants Visible”:  
= 87% Samples
- “Plants Visible Below the Surface”:  
= 13% Samples
- “Plants Grow to Lake Surface”:  
= 0% Samples
- “Dense Plant Growth at Surface”:  
= 0% Samples
- “Plants Completely Cover Lake Surface”:  
= 0% Samples



# What About Recreation at Buckingham Pond?

- “Could Not Be Nicer”:  
= 33% Samples

- “Excellent for All Uses”:  
= 53% Samples













- “Slightly Impaired”:  
= 33% Samples

- “Substantially Impaired”  
= 0% Samples










- “Lake Not Usable”:  
= 0% Samples



## Biological Health

	2011	Previous
Invasive Plants		
Harmful Algae		
Invasive Animals		
Fisheries Quality		
Plant Diversity		
Benthic Organisms		

**Legend:**













-  Favorable
-  Threatened
-  Unfavorable
-  Not Known
-  Highly Improving
-  Improving
-  Stable
-  Degrading
-  Highly Degrading













# Biological Health Criteria

- 1. Presence of Invasives
  - Animals: None observed at Buckingham Pond
  - Plants: Curlyleaf pondweed
  - Water Chem: Ca data/location indicates high susceptibility to zebra mussels
- 2. SUNY ESF Study of HABs
  - Low phycocyanin levels in all samples
  - Low microcystis-LR and other toxin levels
- 3. Plant Diversity
  - Low floristic quality indices (FQIs) from DFWI study
- 4. Fisheries or Benthos Quality
  - No “relative weight” or lake macroinvert data available

## Lake Use

	2011	All Years
<b>Potable Water</b>		
<b>Swimming</b>		
<b>Boating / Fishing</b>		
<b>Aquatic Life</b>		
<b>Aesthetics</b>		
<b>Fish Consumption</b>		

-  Supported
-  Threatened
-  Stressed
-  Impaired
-  Not Applicable
-  Highly Improving
-  Improving
-  Stable
-  Degrading
-  Highly Degrading

# Lake Use Criteria

A photograph of two women jumping into a lake. They are seen from behind, with their arms raised in a 'V' shape. The woman on the left is wearing a red one-piece swimsuit, and the woman on the right is wearing a black two-piece swimsuit. They are jumping from a rocky ledge into the water, which is a greenish-blue color. The background shows the vast expanse of the lake under a clear sky.

- 1. Potable Water

- Lake Not Classified for this Use

- 2. Contact Recreation

- Algae levels are moderate to high
- Microcystin levels are low
- Water clarity is low
- Recreational assessments are generally favorable

# Lake Use Criteria

- 3. Non-Contact Recreation
  - Aquatic plants usually don't reach lake surface
- 4. Aquatic Life
  - pH levels in acceptable range
  - Dissolved oxygen levels in acceptable range
  - Presence of exotic plants may threaten habitat and aquatic life
- 5. Aesthetics
  - No reports that the lake "looks bad"
- 6. Fish consumption
  - No consumption advisories





# Does this match what we see?

- Buckingham Pond suffers algae blooms throughout the year
  - Phosphorus levels high enough to support persistent algal blooms
  - Not enough information to know why blooms appear to be associated with green algae rather than cyanobacteria (blue-green algae)
  - Bloom lakes generally have less weed growth (due to light limitations) but are susceptible to invasive weeds (since these do well in turbid water)





# What can be done about high nutrient levels?

- Several usual sources of elevated nutrients
  - Stormwater runoff
  - Watershed septic leachate
  - Watershed lawn fertilization
  - Waterfowl
- Management actions to control nutrients
  - Maintaining shoreline buffers
  - Discouraging feeding of waterfowl
  - Continue to work with City to manage stormwater



# What other threats....?



*Hydrilla*  
*Hydrilla verticillata*  
Photo by Vic Ramey  
Copyright 1999 Univ. Florida



*Cabomba caroliniana*  
1996 Allison Fox




Questions?

## Overview of Buckingham Pond



### Legend

 Buckingham Pond

### Buckingham Pond

**Location:** Albany

**Surface Area:** 5 acres

**Mean Depth:** 3ft

**Length of Lake:** 0.46mi

Data obtained from:  
New York State Department  
of Environmental Conservation.  
Buckingham Lake Contour Map.  
[http://www.dec.ny.gov/docs/  
fish\\_marine\\_pdf/bckhmlkmap.pdf](http://www.dec.ny.gov/docs/fish_marine_pdf/bckhmlkmap.pdf).

ArcGIS.com

