

Lake Wingra Aquatic Plant Restoration Demonstration Project

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Alternative States in Shallow Lakes:

Clear-Water, Aquatic Plant State

- Clear water
- Carp absent/sparse
- Aquatic plants abundant (with high biodiversity?)
- Bottom sediment resuspension & phosphorus recycling low
- Blue-green algae densities low (Algal toxin concentrations low)

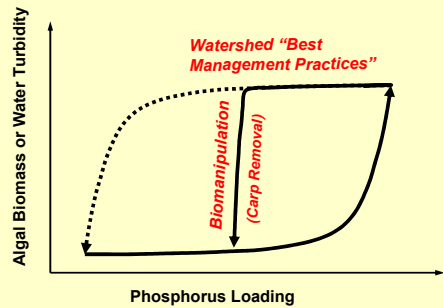
Turbid Algal State

- Turbid green water
- Carp population dense
- Aquatic plants sparse
- Bottom sediment resuspension & phosphorus recycling high
- Blue-green algae densities high (Algal toxin concentrations high?)



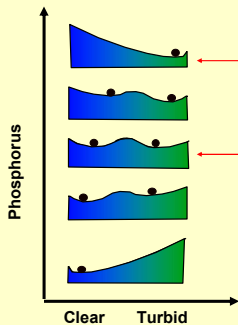
Shallow Lake Restoration: Biomanipulation after Phosphorus Input Reductions

(modified from E. Jeppesen, pers. comm. 2001)



Alternative States in Shallow Lakes:

(Modified from Scheffer 1990)

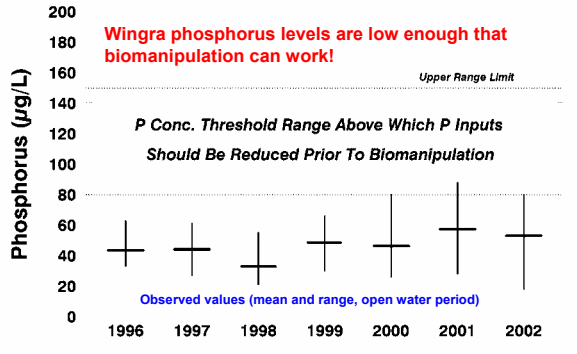


Phosphorus levels must not be too high, otherwise biomanipulation cannot cause a shift from the turbid to the clear-water state

Moderately fertile shallow lakes like Lake Wingra have two alternative states: clear-water & turbid

Lake Wingra Total Phosphorus 1996-2002

1996-2002



Data Source: NTL-LTER database

P Threshold Range of 80-150 µg/L from Jeppesen et al. (1991)

Carp Removal by Seining

Lake Wingra, 1953-1955



Carp density:

Before intensive seining = 466 kg/ha

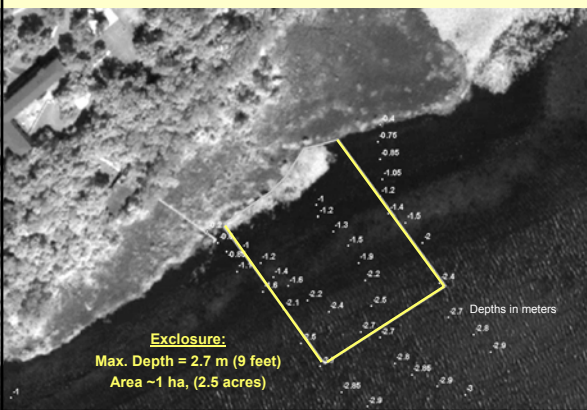
After 3 years intensive seining = 85 kg/ha

Proposed Experimental Enclosure with Carp Removed to Test Aquatic Plant Response to Clear Water



Proposed location of 2.5-acre (1-ha) enclosure in Lake Wingra

Enclosure Location near Edgewood College Pier



21 Aquatic Plant Species in Lake Wingra:

•Eurasian water milfoil (*Myriophyllum spicatum*) – the bad one!

- Coontain (*Ceratophyllum demersum*)
- Muskgrass (*Chara* spp.)
- Common waterweed (*Elodea canadensis*)
- Northern water milfoil (*Myriophyllum sibiricum*)
- Slender naiad (*Najas flexilis*)
- Bullhead pond lily (*Nuphar variegata*)
- White water lily (*Nymphaea tuberosa*)
- Sago pondweed (*Potamogeton pectinatus*)
- Curly leaf pondweed (*Potamogeton crispus*)
- Leafy pondweed (*Potamogeton foliosus*)
- Floating leaf pondweed (*Potamogeton natans*)
- Flat stemmed pondweed (*Potamogeton zosteriformis*)
- Richardson's pondweed (*Potamogeton richardsonii*)
- Illinois pondweed (*Potamogeton illinoensis*)
- Stiff water crowfoot (*Ranunculus longirostris*)
- Bullrush (*Scirpus validus*)
- Bladderwort (*Utricularia*)
- Wild celery (*Vallisneria americana*)
- Horned pondweed (*Zannichellia palustris*)
- Water stargrass (*Zostera dubia*)

The enclosure would test the response of desirable aquatic plants vs. Eurasian water milfoil if clear water were restored in the lake.

Most native plants are expected to do well vs. milfoil if their growth is not limited by lack of light in the water column.

Data Source: NTL-LTER database

Proposed Timetable:

- Applied for Lake Shoreline Restoration Grant – Spring 2003
Grant funds obtained: \$37,000 state; \$4,200 Madison Fishing Expo
- Obtain final approvals/permits & order enclosure – Winter/Spring 2005
- Install enclosure & remove fish – Summer 2005
- Re-establish aquatic plants (+ plantings) – 2005-2006
- Restock fish – Summer/Fall 2005
- Track carp in lake for carp removal potential – Fall 2005-Summer 2006
- Monitor water quality, aquatic plants, algae, & fish – 2006-2008
- Promote public education program – 2005-2008
- Discuss potential & methods for whole-lake restoration – 2006-2008
- Remove Enclosure – Fall 2008?



Goals for a restored Lake Wingra:

- Low densities of blue-green algae resulting in reduced exposure risk to algal toxins
- Good water clarity
- Aquatic plants dominated by a diverse community of low-growing native species
- Carp populations drastically reduced
- Improved growth and size structure of desirable sight-feeding fish species
- Improvement in overall lake aesthetics

