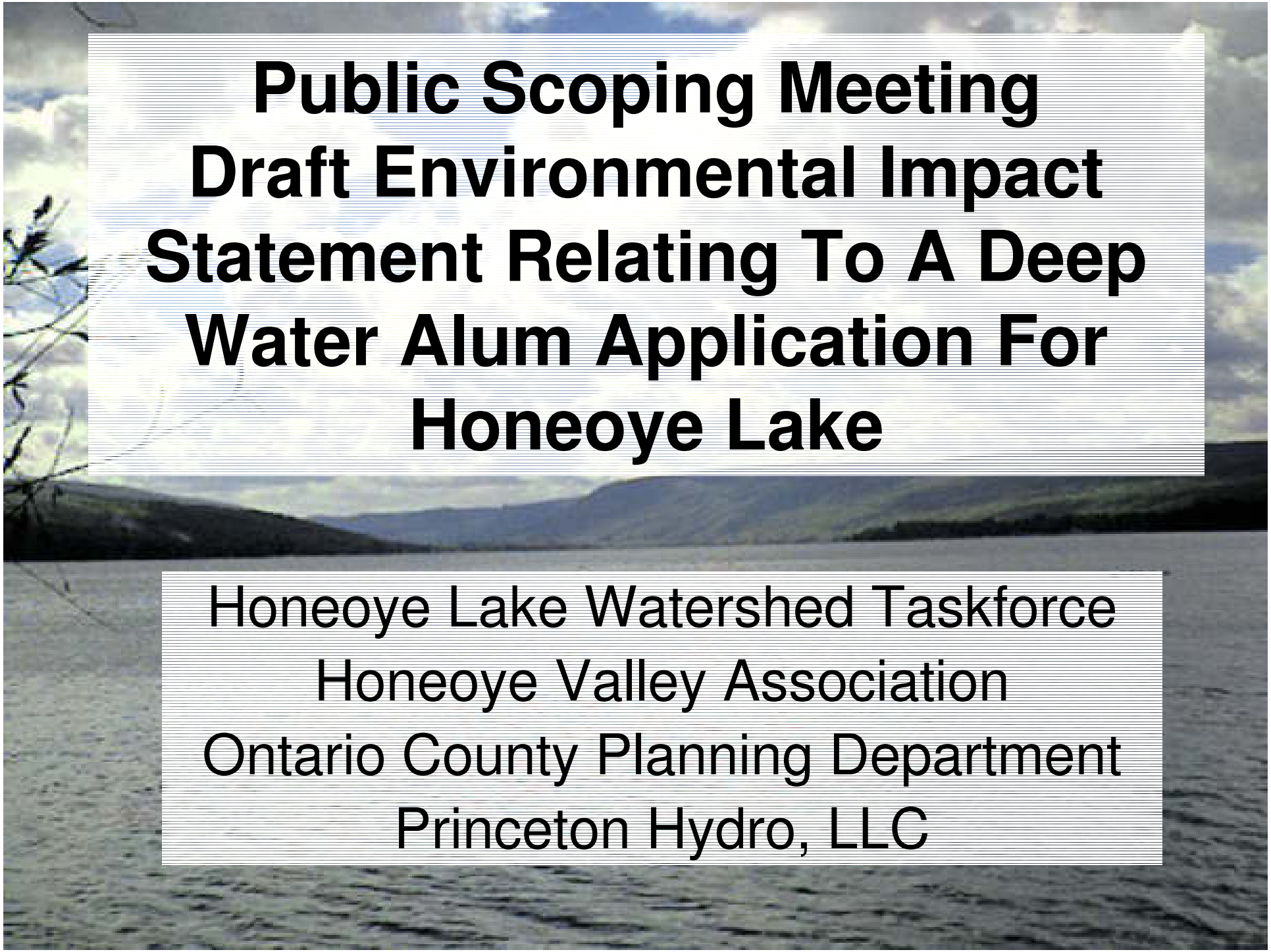
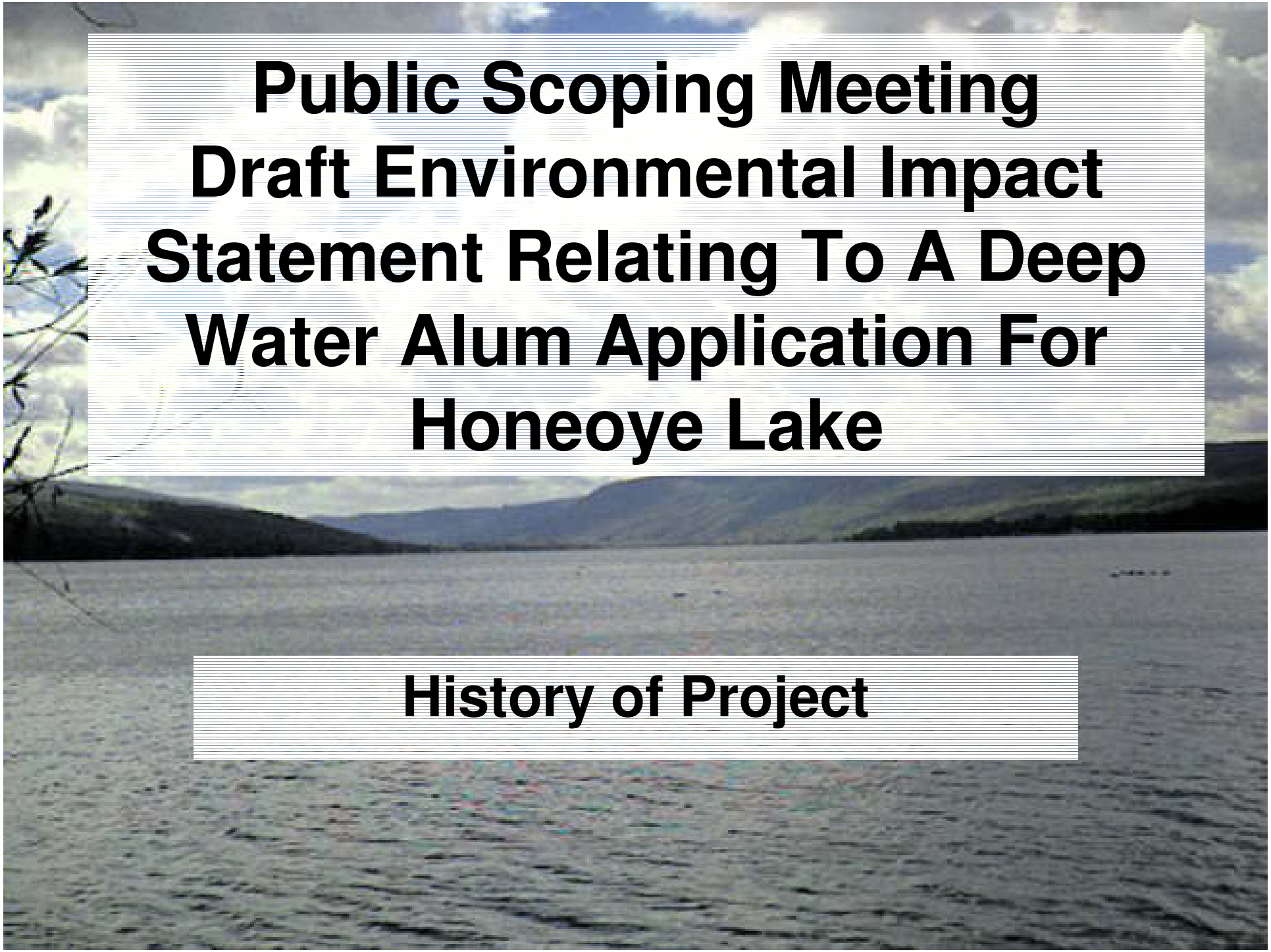


Public Scoping Meeting Draft Environmental Impact Statement Relating To A Deep Water Alum Application For Honeoye Lake

Honeoye Lake Watershed Taskforce
Honeoye Valley Association
Ontario County Planning Department
Princeton Hydro, LLC

Meeting Agenda

- History of project & role of HLWTF
- Overview of the SEQR process
- Discuss the role of internal phosphorus loading in the dynamics of lake eutrophication
- Overview of the utility of alum in the control of internal phosphorus loading
- Why is this appropriate for Honeoye Lake?
- Public comments: Additions/Scope/Alternatives, Environmental Impact Statement



Public Scoping Meeting Draft Environmental Impact Statement Relating To A Deep Water Alum Application For Honeoye Lake

History of Project

Honeoye Lake Watershed Taskforce (HLWTF)

- Formed in 1998
- Purpose
  - Protect and Improve the Water Quality of Honeoye Lake
- Voting Members
  - Gene Koehnlein, Richmond Town Supervisor
  - Kris Singer, Canadice Town Supervisor
  - Dan Marshall, South Bristol Town Supervisor
  - Al Favro, Bristol Town Councilman
  - Phil Faber, Naples Representative
  - Jack Starke, Honeoye Valley Association

HLWTF

- **Permanent Professional Support**
  - Ontario County Planning Department
  - Soil & Water Conservation District
  - Finger Lakes Community College
- **As Needed Professional Support**
  - NYS- Department of Environmental Conservation
  - Cornell Cooperative Extension
  - Ontario County Water Resource Council
  - Honeoye Public Water District
  - Honeoye Sewer District
  - Others as needed

HLWTF

- Education
  - Honeoye Lake Book
  - Workshops
- Data Collection
  - Lake and Tributary Testing
- Implementation
  - Best Management Practices
  - Model Regulations

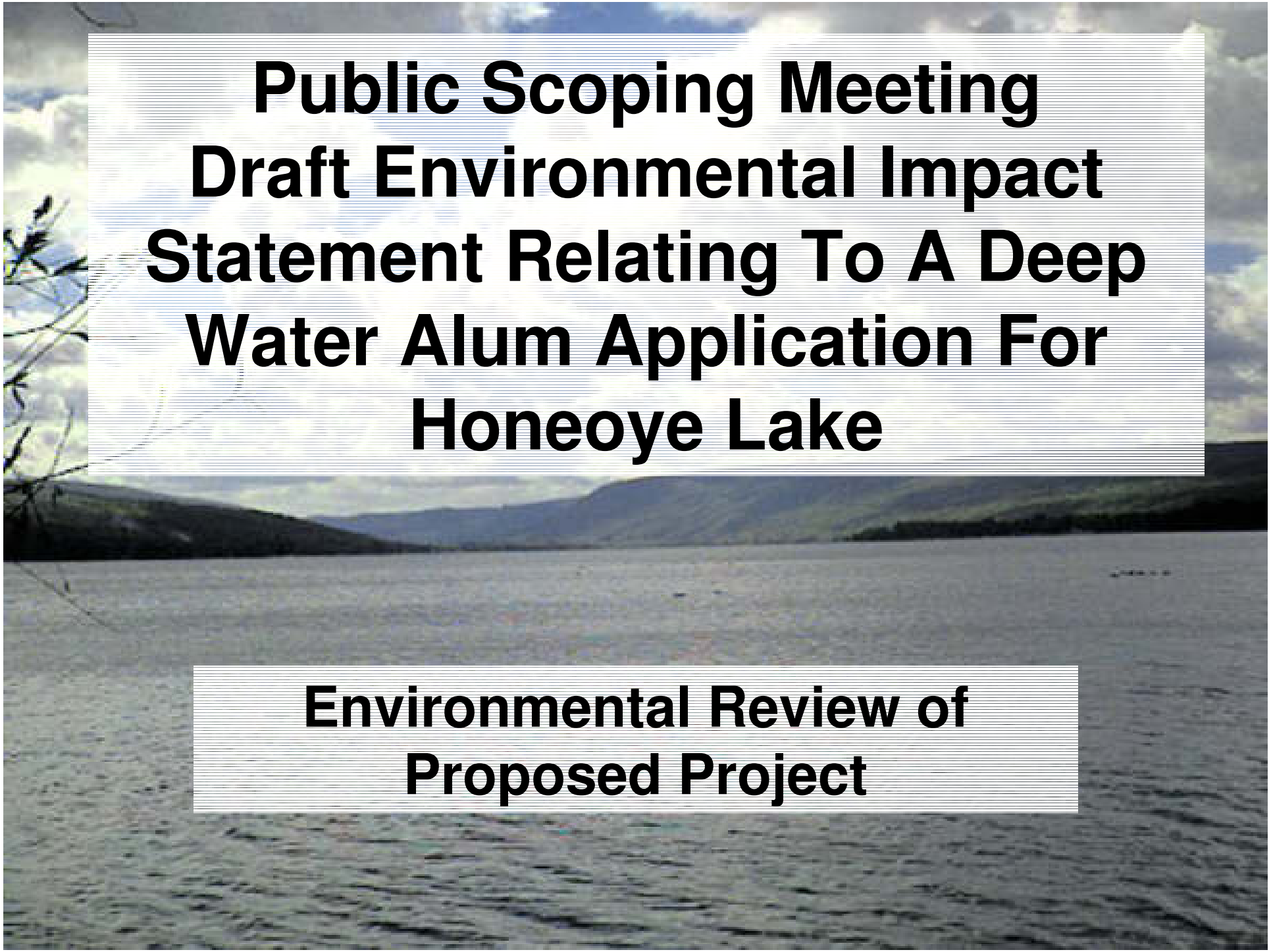
History of Alum Project

- **Algae and weeds historical problem**
- **Severe algae and weeds 2002**
- **HVA formed water quality Committee fall ‘02**
- **Princeton Hydro hired to prepare lake restoration recommendations**
- **Canadice & Richmond funding and support**

…many additional steps…

- **HLWTF involvement**
  - **Develop and implement Honeoye Lake watershed management plan**
  - **Complete nutrient/hydrologic model for**
  - **Alum project oversight**

Goal: Alum Application in May 2006



Public Scoping Meeting Draft Environmental Impact Statement Relating To A Deep Water Alum Application For Honeoye Lake

Environmental Review of Proposed Project

Environmental Review of Alum Project

I. A Type I Action under the NYS Environmental Quality Review Act (SEQR)
   A. Affects approximately 800 acres
   B. Requires a State Pollution Discharge Elimination System Permit (SPDES)

II. Type I actions requires a coordinated review between all agencies

III. Preparation for SEQR Process
   A. Honeoye Lake Watershed Task Force (HLWTF) is project sponsor
   B. HLWTF: Writing a Draft Environmental Impact Statement (DEIS), Using Princeton Hydro as a consultant

   C. Scoping: HLWTF inviting all comments for what to include in DEIS

   D. HLWTF: Submit DEIS to Ontario County Planning Department

SEQR PROCESS
Honeoye Lake Alum Project

I. Submission of DEIS by HLWTF to County Planning will initiate

II. Lead Agency Request sent out by Planning to:
- U.S. Army Corps of Engineers
- NYS Dept. of Environmental Conservation
- NYS Office of General Services
- NYS Dept. of Parks, Recreation, & Historic Preservation
- NYS Dept. of Health
- All the Towns in the Watershed
- Ontario County Board of Supervisors
- Ontario County Water Resources Council
- Ontario County Soil & Water Conservation District
- Richmond Water District

III. Initiate 30 day waiting period for agreement on Lead Agency Status

SEQR PROCESS
Honeoye Lake Alum Project

IV. Designation of Lead Agency

IV. Certification that DEIS is Ready for Public Review

V. 30 day Public Comment Period
- Mandatory Public Hearing, Public Notices

VI. FEIS preparation
- DEIS amended as necessary
- Written & Verbal Comments added
- Responses added to comments received

VII. FEIS submitted to Lead Agency

VIII. FEIS accepted as complete by Lead Agency

IX. 10 Day Public Review Period

SEQR PROCESS
Honeoye Lake Alum Project

X. Lead Agency Issues Findings

XI. SPDES Application Made

XII. Findings Issued by Other Involved Agencies

XIII. Decisions by other Agencies

Environmental Impact Statement Outline

Executive Summary

- Introduction
- Quantification Honeoye Lake Phosphorus Budget
- Description of Proposed Project
- Natural Resources: Potential Impacts And Mitigation
- Human Resources: Potential Impacts And Mitigation
- Alternative Management and Restoration Options
- Irreversible And Irretrievable Commitments Of Resources
- Growth-Inducing Aspects Of Proposed Project
- Literature Cited

Appendices

SEQR Process Schedule
Honeoye Lake Alum Project

Scheduled Goals

Have DEIS Public Hearing in July this summer

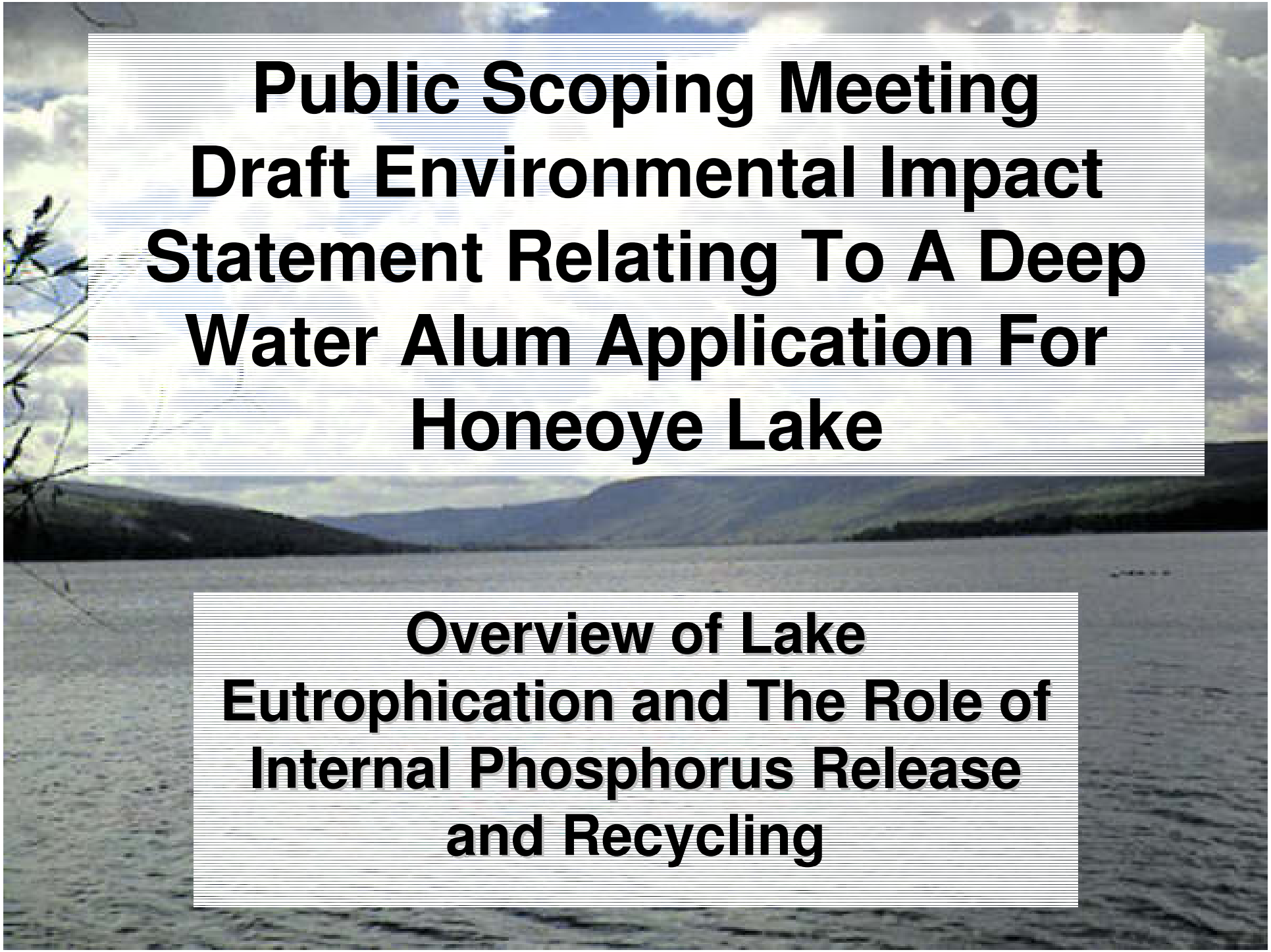
Have FEIS Finalized late this summer or in early Fall

Have SPDES Application Completed in Late this Fall

SEQR Public Scoping Meeting
Honeoye Lake Alum Project

Purpose is to ensure that the DEIS is as complete as possible

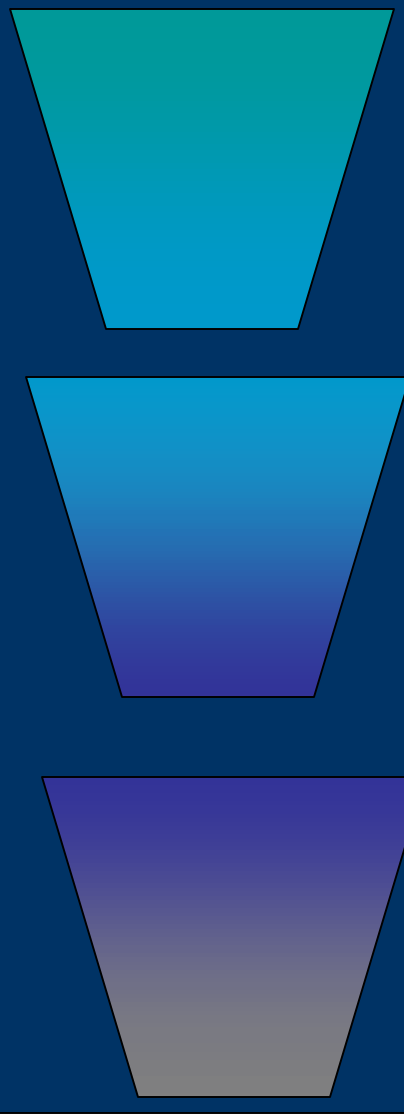
Meeting is to seek input as to what Issues the DEIS should address



Public Scoping Meeting Draft Environmental Impact Statement Relating To A Deep Water Alum Application For Honeoye Lake

Overview of Lake Eutrophication and The Role of Internal Phosphorus Release and Recycling

Lake Eutrophication



Oligotrophic

Low Productivity

Mesotrophic

Accelerated by Watershed Development

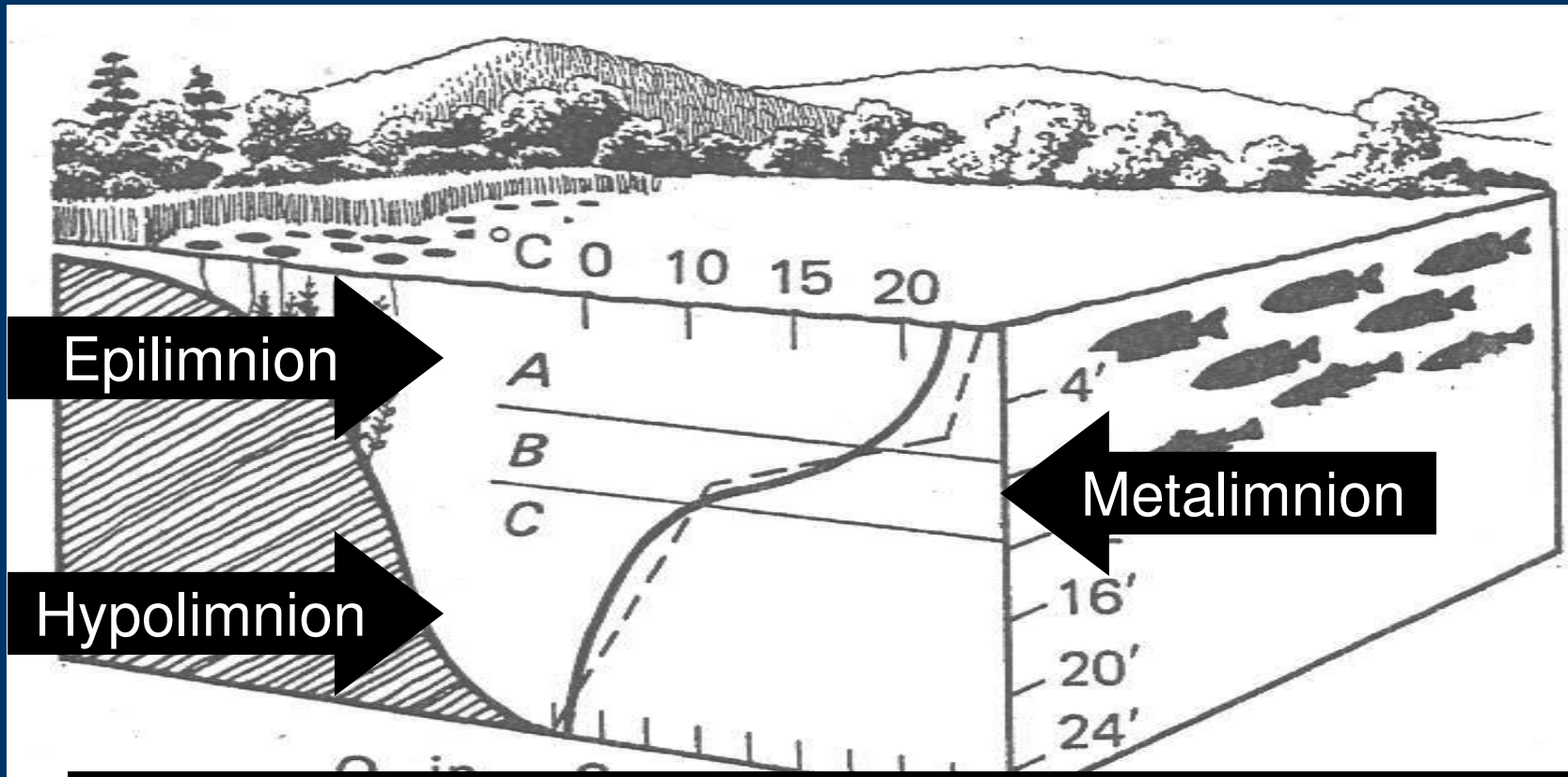
Eutrophic

High Productivity

Lake Eutrophication

- A lake's phosphorus (TP) load strongly regulates the productivity (of a lake.
- Algae and weed growth are directly affected by the magnitude and timing of the TP load.
- Loading can vary seasonally and originate from both internal and external sources.
- Internal phosphorus load often overlooked.
- Impacts greatest during the summer when algal productivity usually peaks.

Physical Zones of a Lake

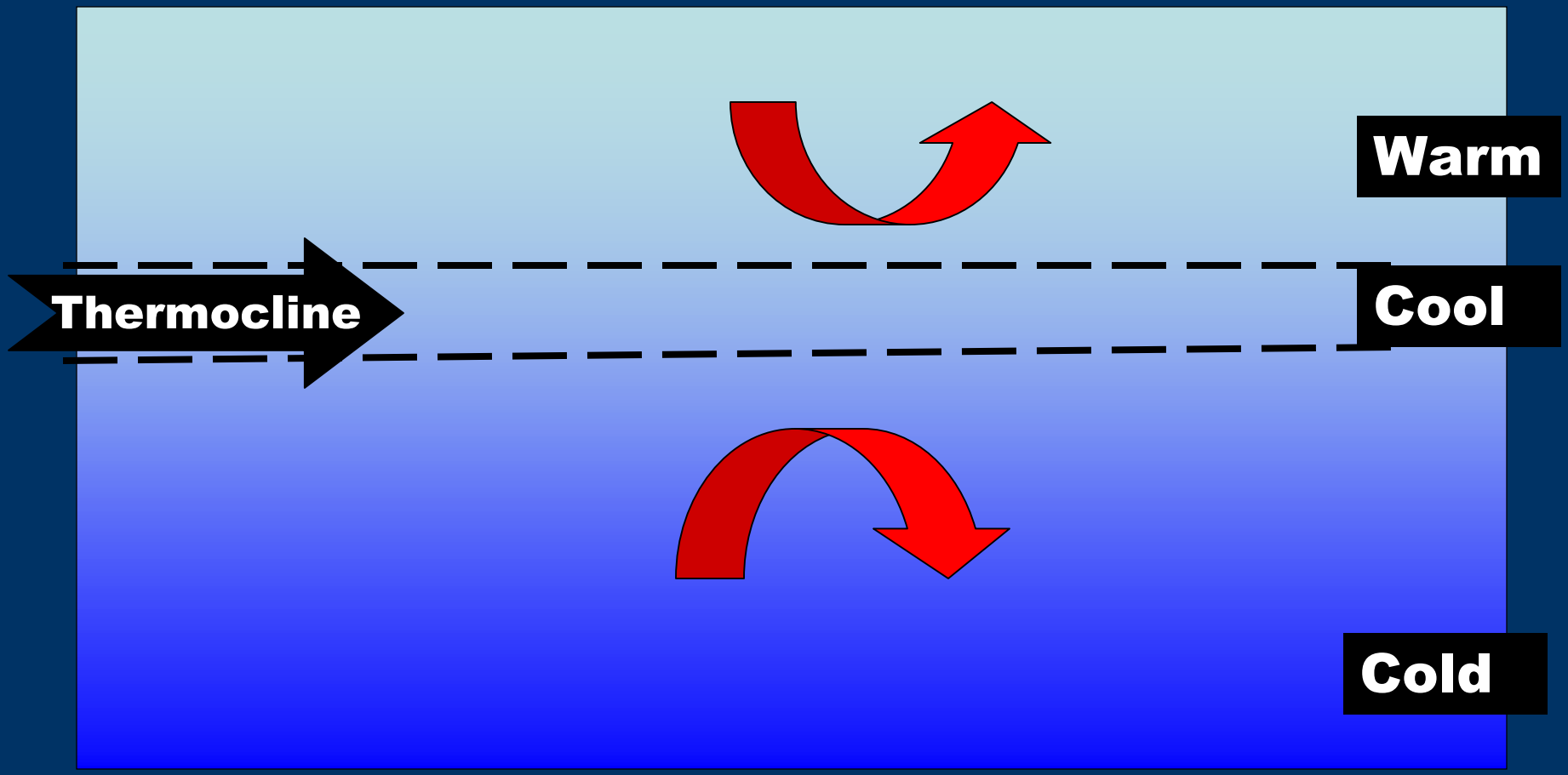


Algae blooms occur in epilimnion and metalimnion

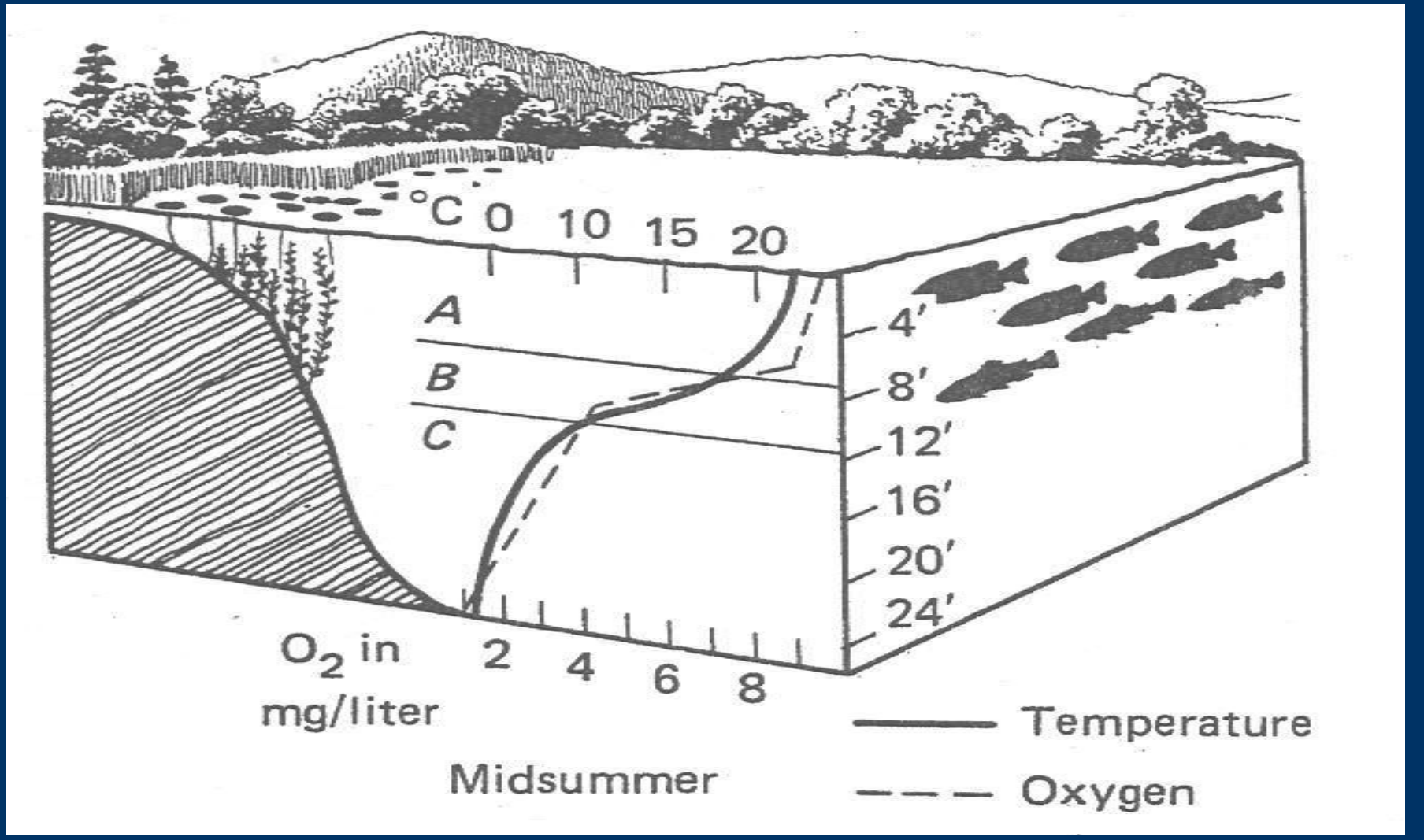
Water Depth and Stratification

- In general, lakes greater than 6 feet deep can potentially stratify
- Stratification results in the formation of distinct thermal regimes that lead to the formation of density segregated layers
- These layers resist mixing
- This in turn can lead to oxygen depletion
- Anoxic conditions lead to the internal recycling of phosphorus
- Recirculation phosphorus into euphotic zone leads to algae blooms

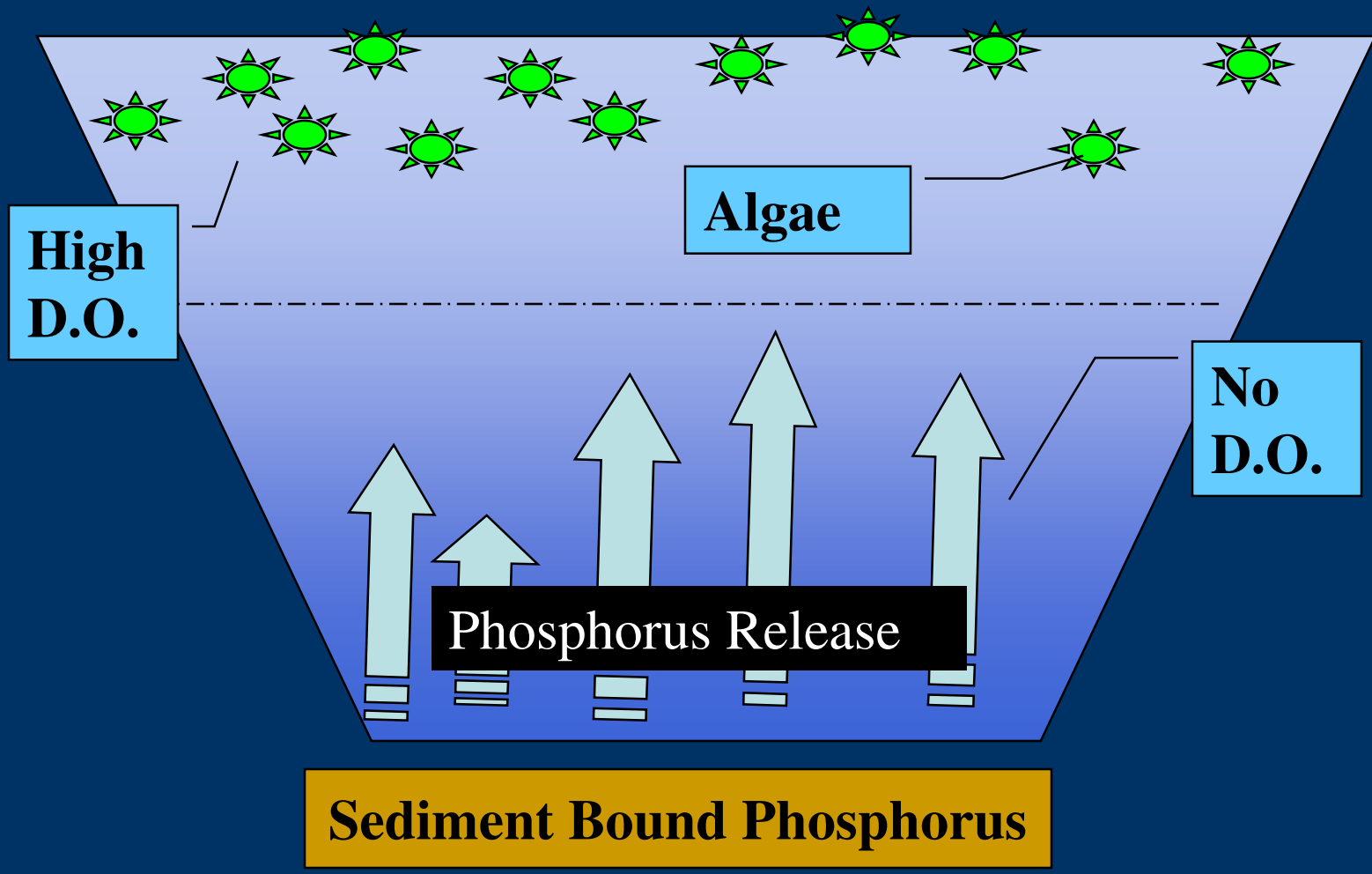
Stratification



Temperature, DO and Phosphorus



Temperature, DO and Phosphorus



Internal Phosphorus Loading

- Stratification typically strongest in summer
- Due to extensive amount of benthic productivity, deep water DO reserves can be quickly exhausted, leading to rapid onset of anoxia and subsequent phosphorus release
- Recycling or pulsing of this phosphorus back into euphotic zone causes algae blooms
- 1lb of phosphorus can create 1,100 lbs of algae

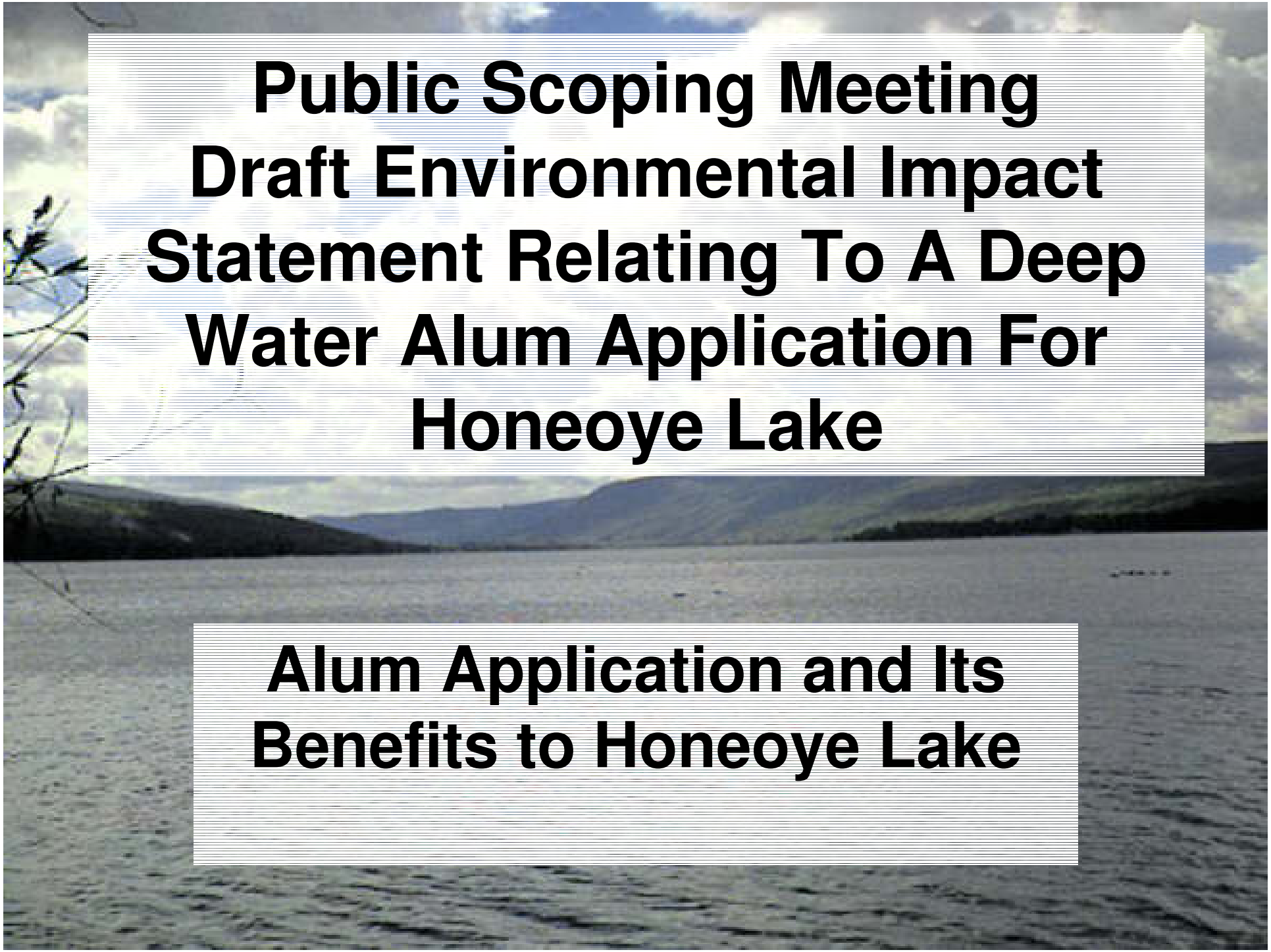
Controlling Internal P Loading

- Maintain oxic conditions
- Prevent stratification, maintain mixing
- Remove phosphorus rich sediments
- Prevent phosphorus from being released from sediments

In-Lake

- Control external phosphorus loading
- Control external sediment loading

Watershed



Public Scoping Meeting Draft Environmental Impact Statement Relating To A Deep Water Alum Application For Honeoye Lake

Alum Application and Its Benefits to Honeoye Lake

Available Data

- Wide variety of valuable water quality data exists for Honeoye Lake.
- These data provide a very good history of the lake's overall water quality.
- The data are especially insightful with regard to the dynamic interactions of stratification, internal phosphorus loading and algal bloom formation.

Available Data

- Data collected on a routine steady basis by a number of researchers and volunteers
- Dr. Bruce Gilman, Finger Lake Community College
- Jack Starke and other volunteer monitors from Honeoye Lake Watershed Taskforce
- NYSDEC

Lake Morphology

Length	4.25 mi
Width max	0.88 mi
Depth maximum	30 ft
Depth average	18.5 ft
Maximum volume	10.2 B gallons
Total surface acres	1670 ac
Length of shoreline	9.6 mi

Temperature Profiles
Late Summer Depth

Water Column Temperature Fairly Uniform From Surface to Bottom

-

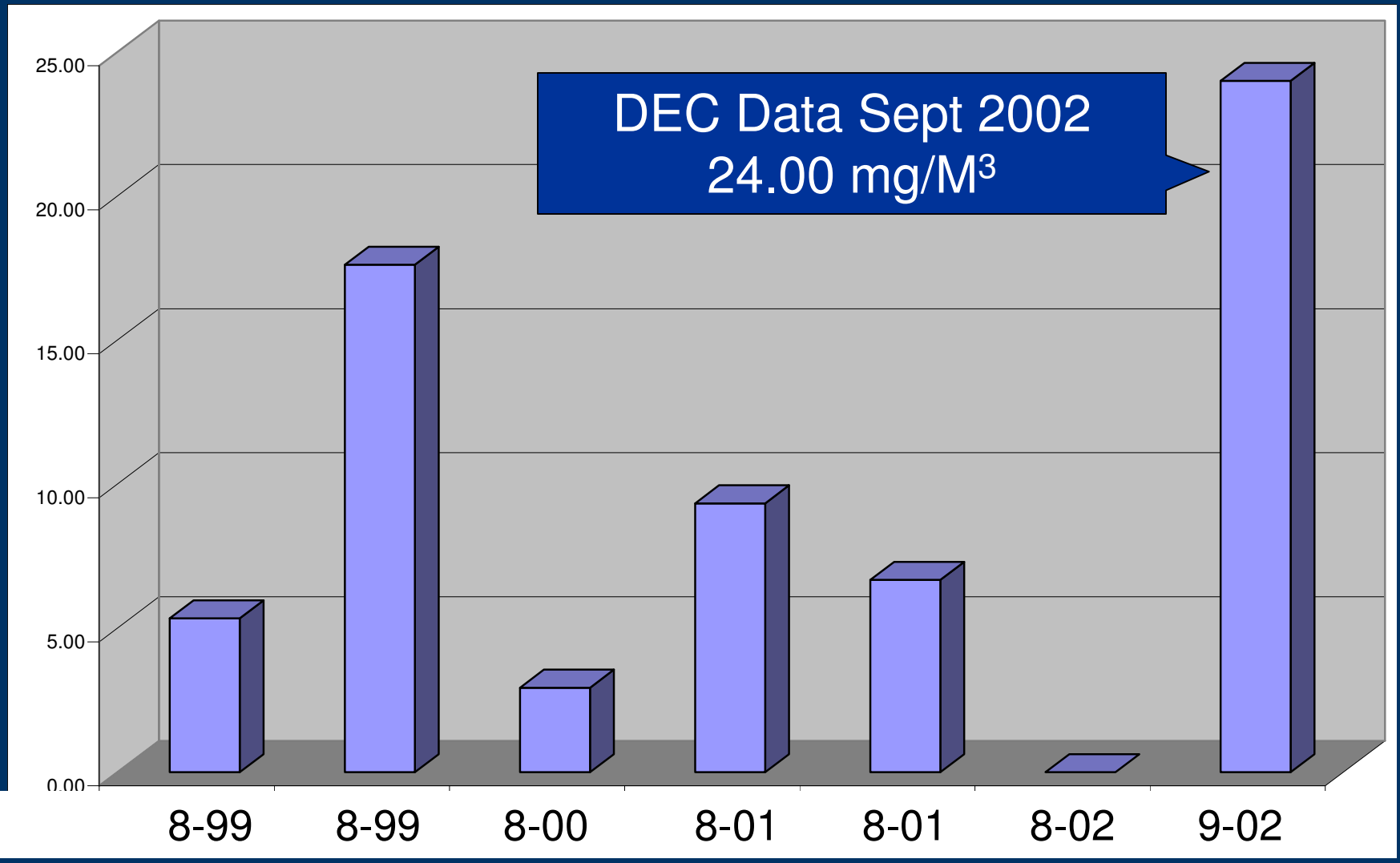
Non-Stratified to Weakley Stratified Lake System

	Date					
		8-00	8-01	8-01	8-02	9-02
		24.3		24.2	25.4	23.3
		24.2	24.1	24.1	25.4	23.3
		[illegible]2	24.0	24.1	25.4	23.3
		24.2	23.8	24.1	25.4	23.2
4	24.8	23.2	24.2	23.8	24.0	25.2	23.1
5	24.8	23.1	24.2	23.7	24.0	24.7	23.0
6	24.8	23.0	24.2		24.0	24.1	23.0
7	24.8	22.6	24.2		24.0	23.6	23.0

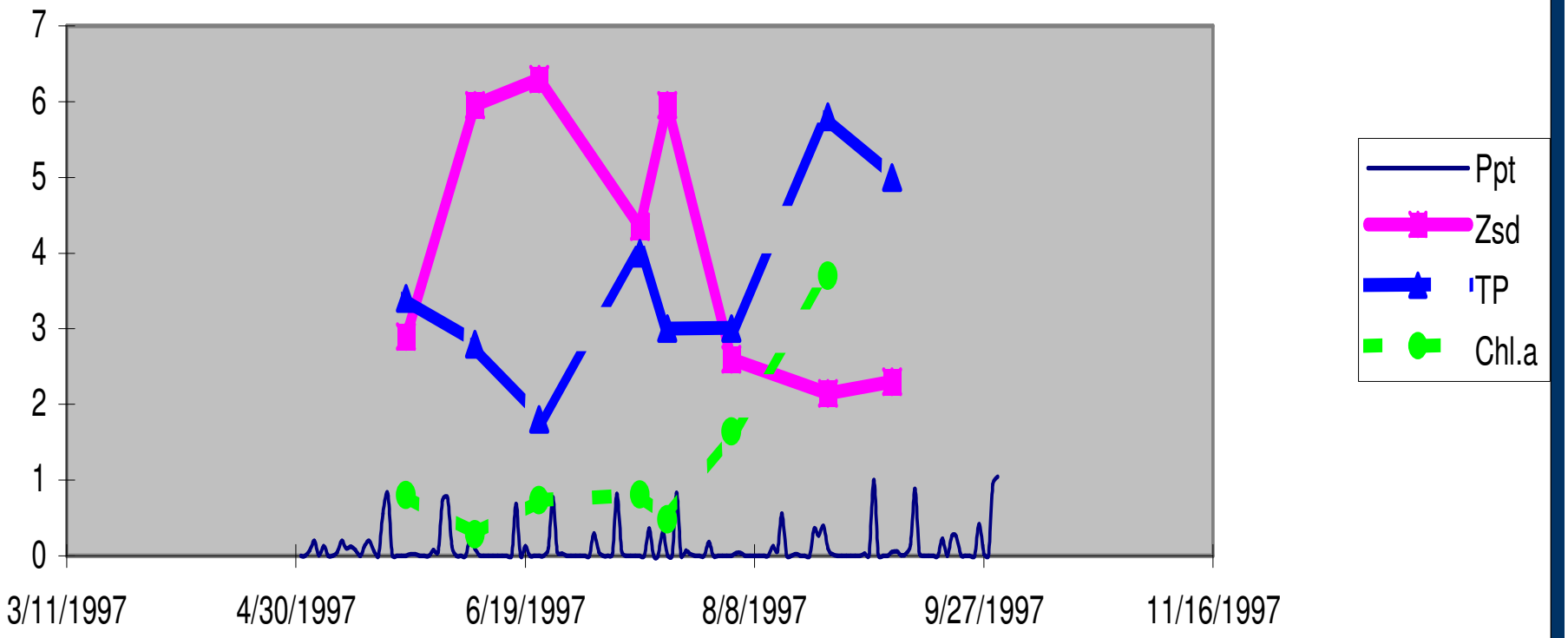
Dissolved Oxygen – Late Summer Concentrations Over Depth

	Date						
Z	8-99	8-99	8-00	8-01	8-01	8-02	9-02
0	6.19	9.71	8.29		8.22	10.62	9.24
1	6.48	9.51	8.37	10.15	8.16	9.82	8.69
2	6.35	9.53	8.48	9.83	8.00	9.59	8.46
3	6.26	9.38	8.63	9.07	7.79	9.42	8.24
4	6.34	9.42	8.66	9.08	7.58	8.60	8.07
5	6.19	8.74	8.66	7.78	6.81	6.45	7.92
6	6.29	8.61	8.68		6.52	4.92	7.79
7	6.14	6.64	8.74		6.42	2.79	7.62

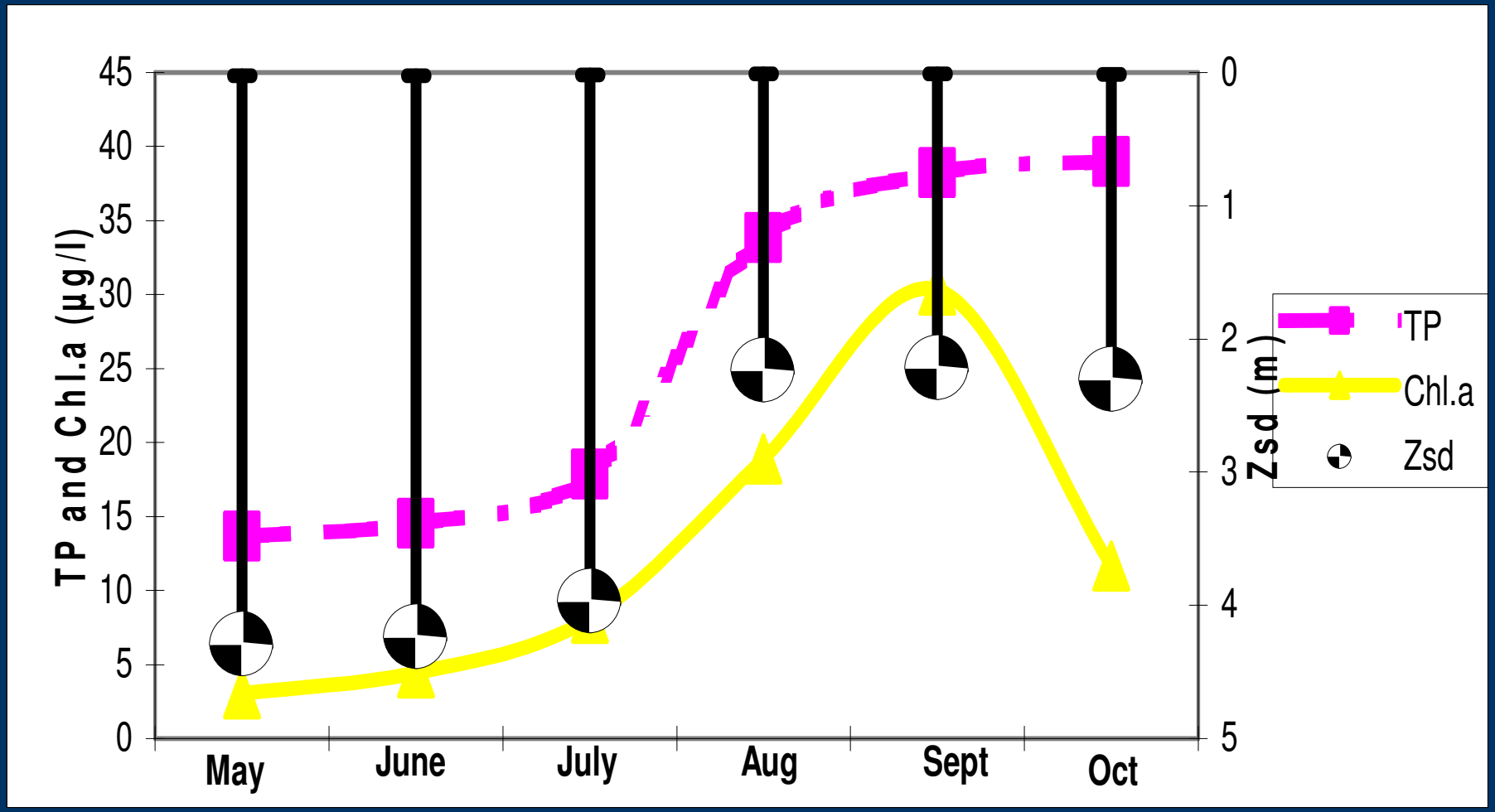
Chlorophyll *a* – Mid-summer Conc.



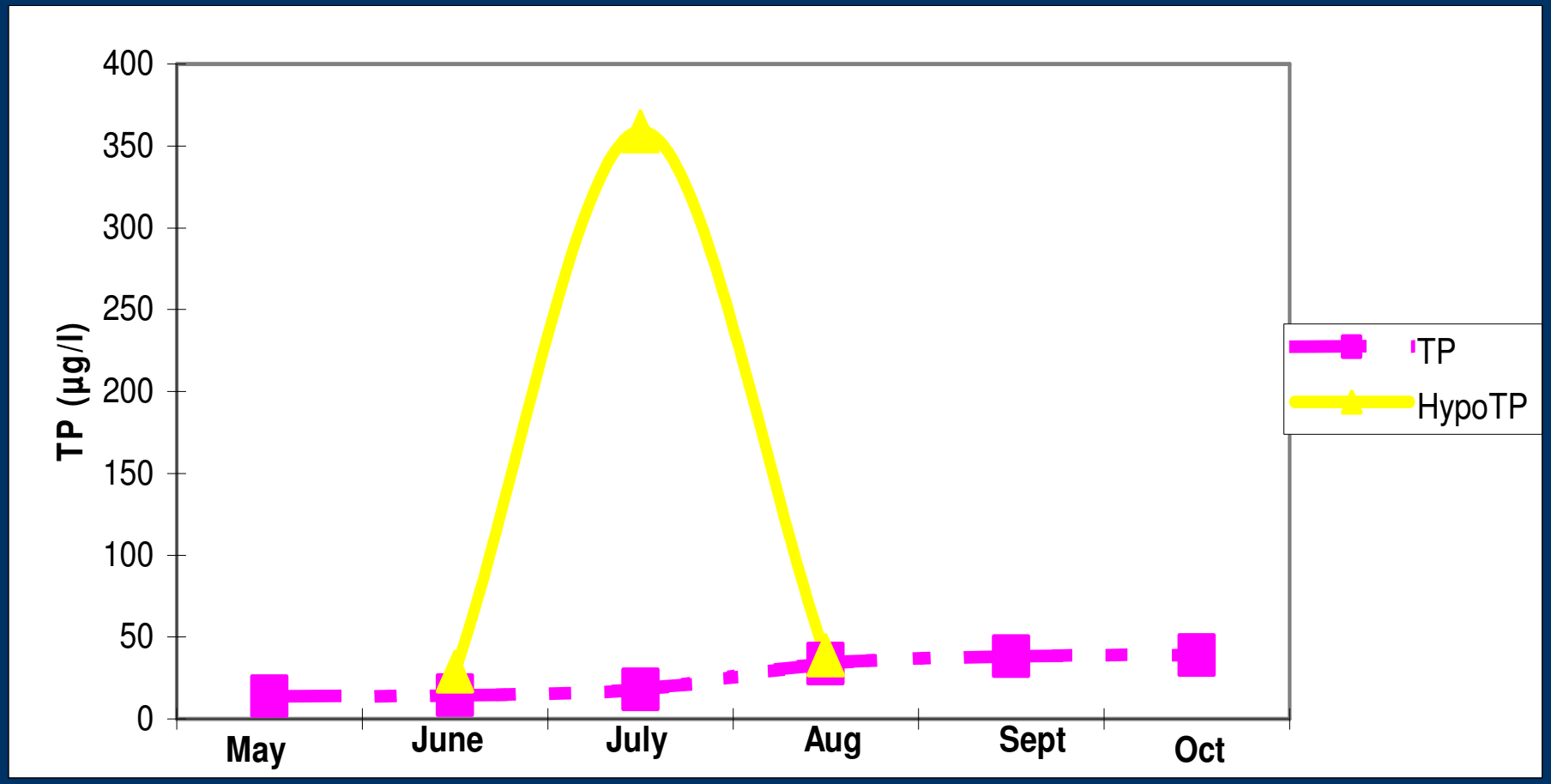
TP, Chlorophyll, Secchi Depth – ‘97



TP, Chlorophyll, Secchi Depth- '99



Hypolimnetic – Epilimnetic TP Concentrations



What Do These Data Tell Us?

- Recent historic data shows deep water TP concentrations in mid-summer are very high.
- Lake is polymictic, stratification not overly severe, fairly regular vertically mixing.
- Anoxic conditions, at least in the data collected from 1993 through 2004, occur fairly often near lake bottom (> 20 ft deep).
- Released TP circulated to surface.
- Algae blooms follow TP recycling events.

What Do These Data Tell Us?

- Historical and recent in-lake data, and the initial results of the internal loading model indicate that the internal load accounts for approximately 25-30% of total annual load.
- These data indicate that control of the lake's internal load will reduce the occurrence and severity of the lake's late summer algae blooms.
- Need to manage TP recycling.

Data Summary…

- Lake weakly stratified.
- Lake experiences anoxia in summer.
- Elevated TP concs. in late summer.
- TP loading not all a function of rainfall.
- TP released from anoxic sediments.
- Added TP stimulates algae blooms.
- Internally recycled TP needs to be managed and reduced.

Management Options

- Keep lake mixed with aerator
- Avoid anoxia with aerator
- Dredge deep water, TP rich sediments
- “Inactivate” internal TP load

Nutrient inactivation most cost-effective solution

Nutrient Inactivation Using Alum

- **Purpose** - Decrease availability of nutrients through chemical bonding or precipitation
- **Application** - Best suited for slow flushing lakes with significant internal TP load
- **Positive benefits** - Increased clarity, less severe algae blooms
- **Negative effects** – Possible Al toxicity, additional weed growth as lake becomes clearer

Why Use Alum ?

- For polymictic lakes, more effective than aeration.
- Unlike Iron-P bond, alum-P bond difficult to break, therefore P remains inactivated.
- Alum relatively cheap and extremely effective on a unit dose basis.
- Can avoid potential environmental impacts through careful pre-application bench testing.
- Need only treat anoxic portions of lake, leaving shallow littoral zone untreated.
- NOT AN ALGACIDE

Design of An Alum Treatment

- The dosage rate is based on two factors…
  - First, the bench test calculated "safety limit" for the introduction of alum in Honeoye Lake,
  - Second, in-lake phosphorus concentration and the internal phosphorus load.
- Data developed for Honeoye Lake indicates the appropriate dose is 150 – 200 gallons/acre.
- Significantly below bench test safety limit.

Issues Of Concern

- Significant pH shift due to inadequate alkalinity or naturally acidic pH.
- Impact to benthos.
- Elevated dissolved Al leading to fish kill.
- Excessive external TP loading.
- Excessive sedimentation.
- Insufficient longevity.
- Misunderstanding of human health impacts.

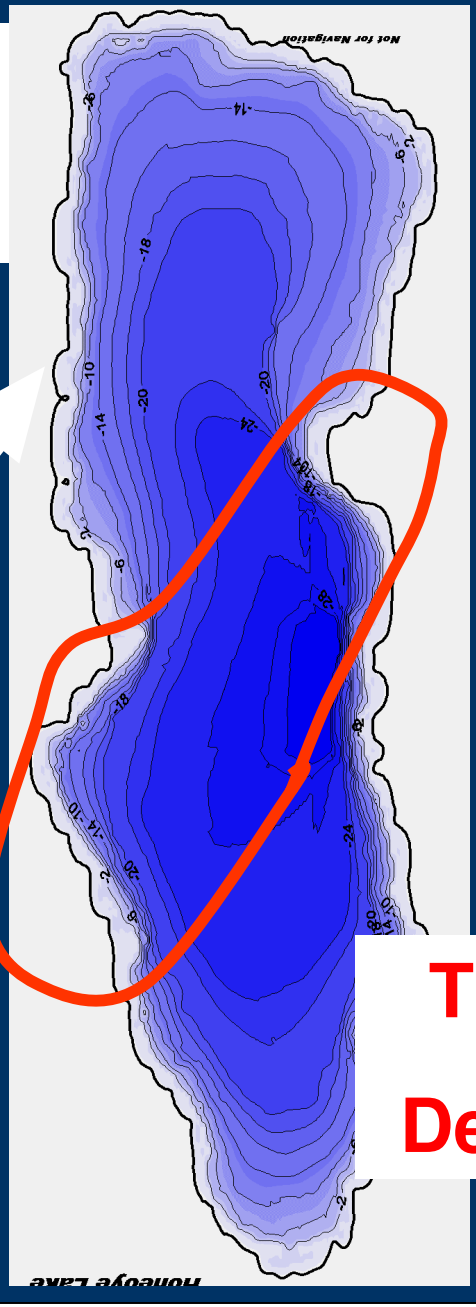
In-Lake Alum Treatments

In-Lake Alum Treatments

Weighted Application Lines

Pilot House
Navigation equipment
GPS, Alum meter

Treatment Zone



Treat ~800 ac

Depths 20+ Ft.

Overall Project Approach

- Treat only open water, deep portion of lake, target area totals ~800 acres.
- Apply sufficient alum to control the internal load.
- Implement along with alum, watershed management P control strategies to reduce external load.
- Continue to control weed growth and associated P load through harvesting.


Thank You –
Questions?