The background of the slide is a brown spiral-bound notebook with a light-colored, textured cover. The spiral binding is on the left side. A white rectangular box with a red border is centered on the page, containing the main title.

NJDEP
Ambient Lake Monitoring
Network

Alfred L. Korndoerfer, Chief

NJDEP/WM&S - Bureau of Freshwater &
Biological Monitoring

Presented at: NJ Water Monitoring Council Meeting

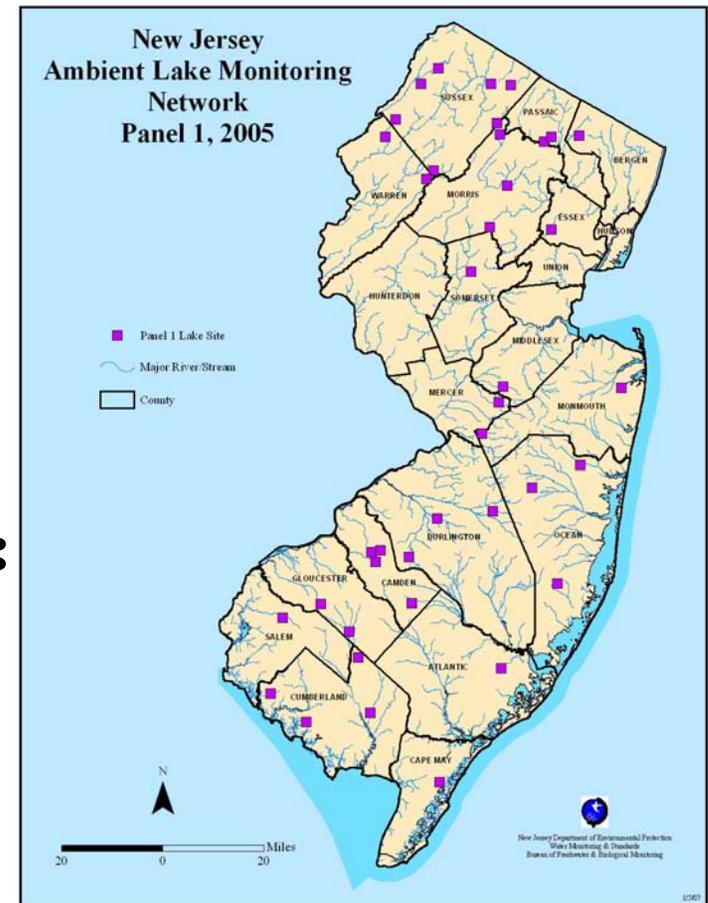
May 30, 2007

Ambient Lakes Monitoring Network

Network Stations

- ✓ 200 lakes, each sampled once every five years.
- ✓ 40 lakes (Panel) sampled per year.
- ✓ Sampling Frequency: each lake sampled 3 times during the year.

(Spring, Summer, and Fall).



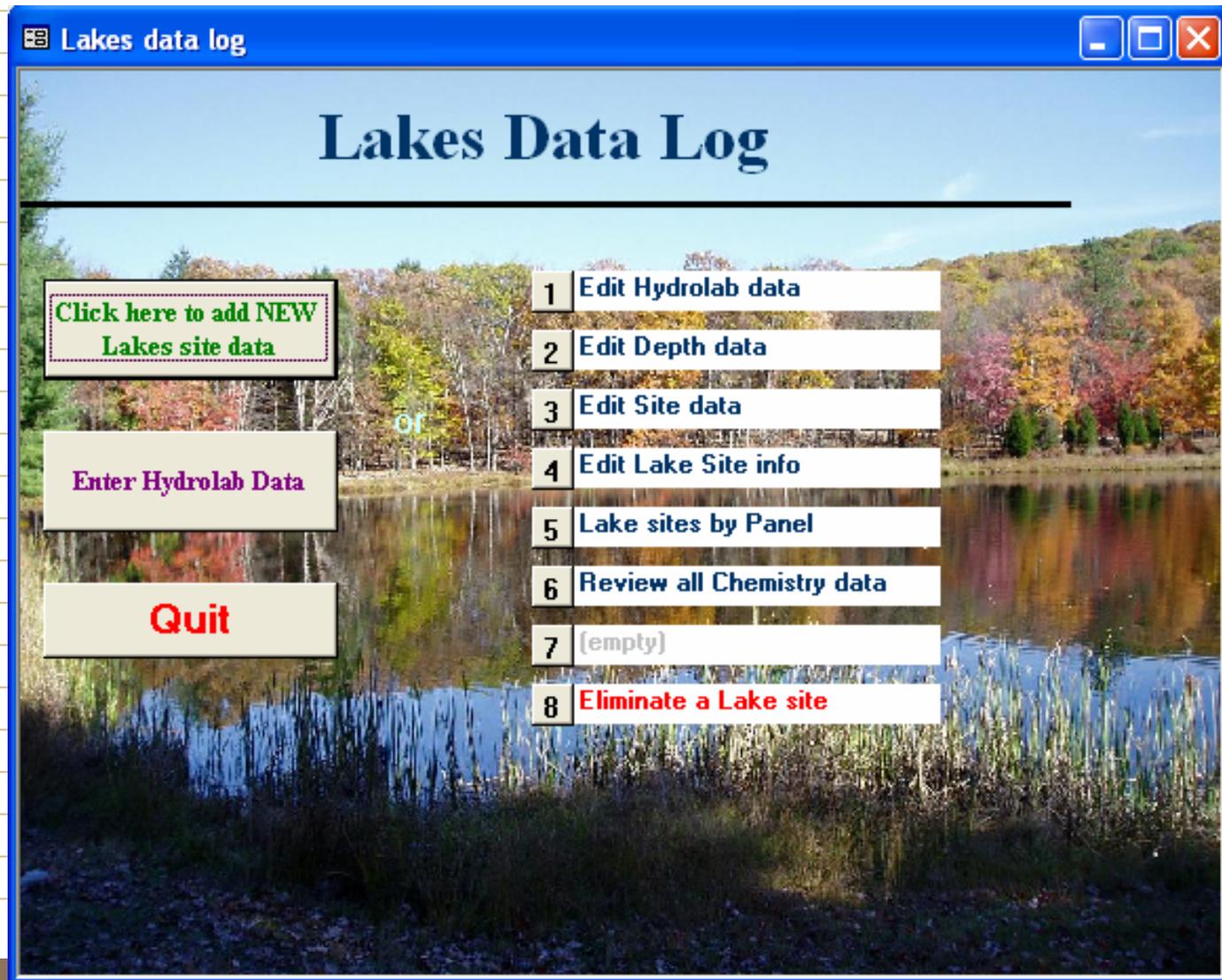
Ambient Lakes Monitoring Network
Sample Parameters

- ✓ Total Phosphorus
- ✓ Total Kjeldahl Nitrogen
- ✓ Nitrite+Nitrate Nitrogen
- ✓ Ammonia Nitrogen
- ✓ Dissolved Oxygen
- ✓ Temperature
- ✓ Specific Conductance
- ✓ pH
- ✓ Alkalinity
- ✓ Hardness
- ✓ Turbidity
- ✓ Secchi depths
- ✓ Chlorophyll "a"

Ambient Lakes Monitoring Network
-Total Phosphorus Analysis-

- ✓ Low level Total Phosphorus analysis performed by QC Labs, Inc.
- ✓ OQA review of QC Labs: SOP, QA/QC, etc..
- ✓ 3 week turnaround time for results.
- ✓ No anomalous or suspect results.

Ambient Lakes Monitoring Network Database Development



Ambient Lakes Monitoring Network

Database Development

Sample Data Entry form

Lake Data Entry

SITEID: NJW04459-006

Sample Date:

Equip Blank Time:

Equip Blank Field #:

AirTemp:

Barometer:

Sampler (initials):

Meter person (initials):

Notes:

Equipment

Meter type	Equipment sampler#
1 Hydrolab 1	<input type="checkbox"/> #1 <input type="checkbox"/> #5
2 Hydrolab 2	<input type="checkbox"/> #2 <input type="checkbox"/> #6
3 Hydrolab 3	<input type="checkbox"/> #3 <input type="checkbox"/> #7
4 individual meters	<input type="checkbox"/> #4 <input type="checkbox"/> #8

Boat type	Boat motor
1 14' boat	1 electric
2 16' boat	2 gas
3 inflatable	3 none used

Season

1 Spring
2 Summer
3 Fall

Photos taken

PhotoOutlet	<input type="checkbox"/>
PhotoOutfall	<input type="checkbox"/>
PhotoLake	<input type="checkbox"/>
Other	<input type="checkbox"/>

Continue

Cancel

Ambient Lakes Monitoring Network



NJ Department of Environmental Protection
Water Monitoring and Standards



AMBIENT LAKES MONITORING NETWORK

Panel 1 Lakes Report

Volume 1 of 2



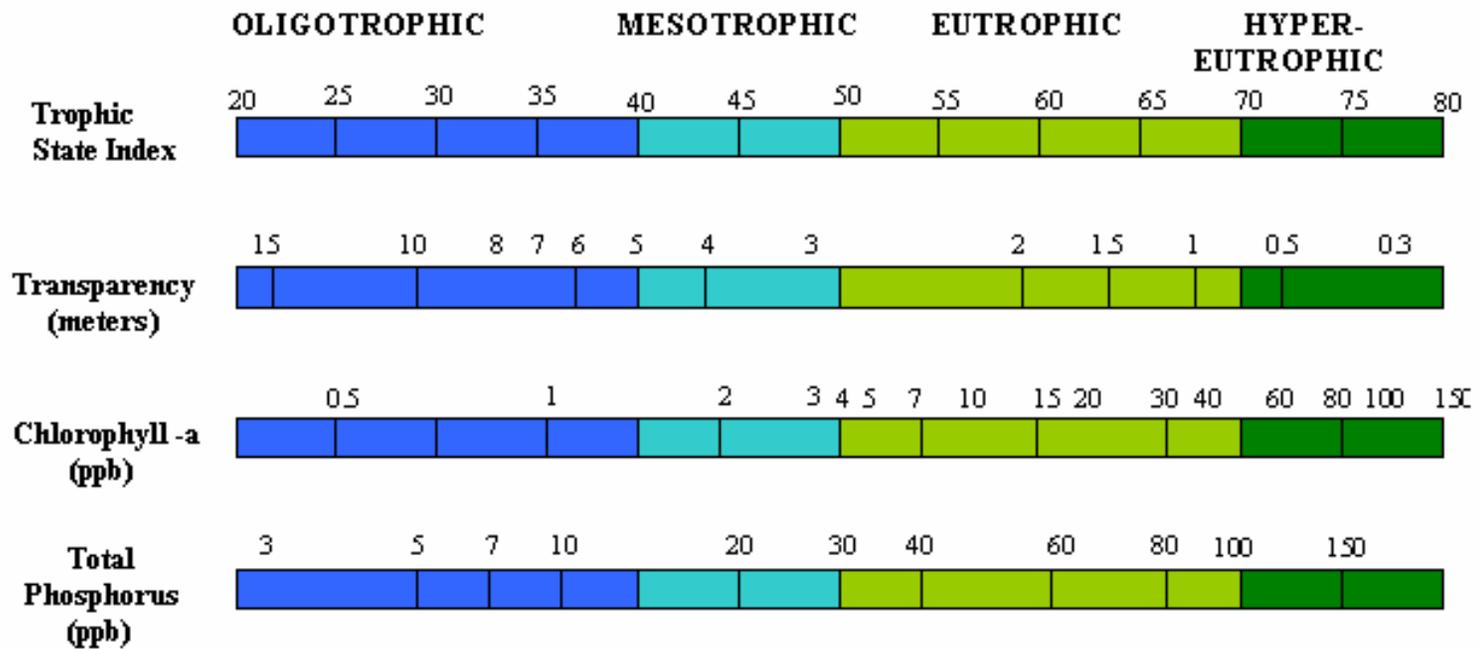
January 2007

State of New Jersey
Jon S. Corzine, Governor

NJ Department of Environmental Protection
Lisa Jackson, Commissioner

- ✓ Panel 1 draft report preparation in progress.
- ✓ Panel 2 sampling completed Oct. 2006.
- ✓ Panel 3 sampling began March 2007.
- ✓ On schedule for 2005-2009 implementation plan.

Panel 1 Findings



Carlson's Trophic State Index (TSI)

Panel 1 Findings

■ **Oligotrophic. TSI values range from 0 to 40.**

Lakes have low nutrient levels, are usually deep, and have high oxygen levels in the bottom waters. These lakes have very few algal blooms.

■ **Mesotrophic. TSI values range from 41-50.**

Lakes are in the "middle" of the trophic scale. They have increasing amounts of nutrients and slightly lower amounts of dissolved oxygen. There are temporary algae and aquatic plant problems.

■ **Eutrophic. TSI values range from 51-70.**

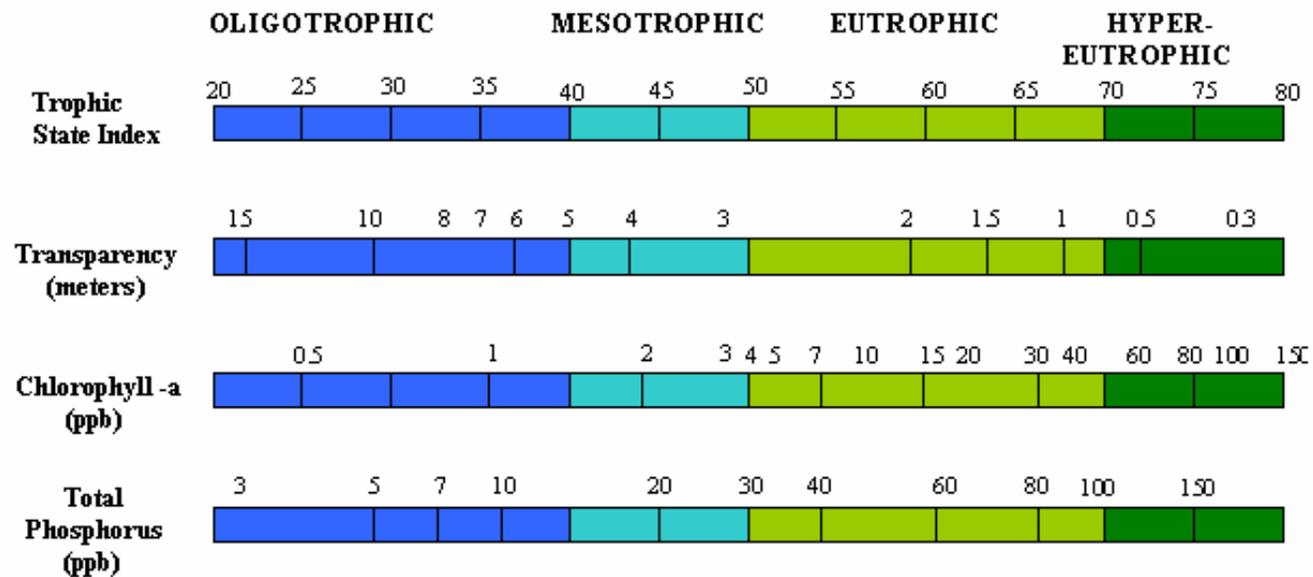
Lakes are nutrient rich. They are usually shallow, "green" lakes that have limited oxygen levels in the bottom waters. They have persistent algae and aquatic plant problems.

■ **Hypereutrophic. TSI range is >70.**

Lakes are very green and have little or no oxygen in the bottom layers. There are extreme algae and aquatic plant problems.

Panel 1 Findings

Formulas to convert TSI parameters to standard units



- **Total Phosphorus TSI (TSIP) = $14.12 \ln(\text{TP}) + 4.15$**
- **Chlorophyll “a” TSI (TSIC) = $9.81 \ln(\text{Chl } a) + 30.6$**
- **Secchi Disk TSI (TSIS) = $60 - 14.41 \ln(\text{SD})$**

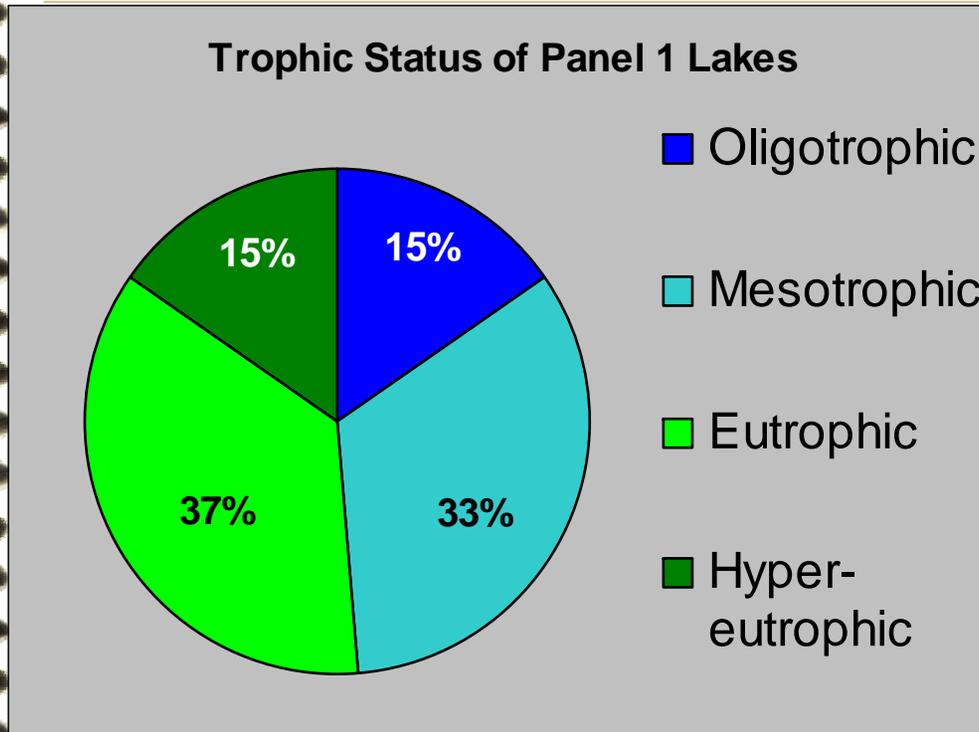
Panel 1 Findings

Example of Trophic Status Reporting

Season	TSIP	TISC	TSIS	TSI
Summer Station 1	63.45	68.75	65.17	65.78 Eutrophic
Summer Station 2	65.58	70.16	63.22	66.32 Eutrophic
Fall Station 1	39.64	37.77	NA	38.71 Oligotrophic
Fall Station 2	41.91	41.87	46.23	43.34 Mesotrophic

Panel 1 Findings

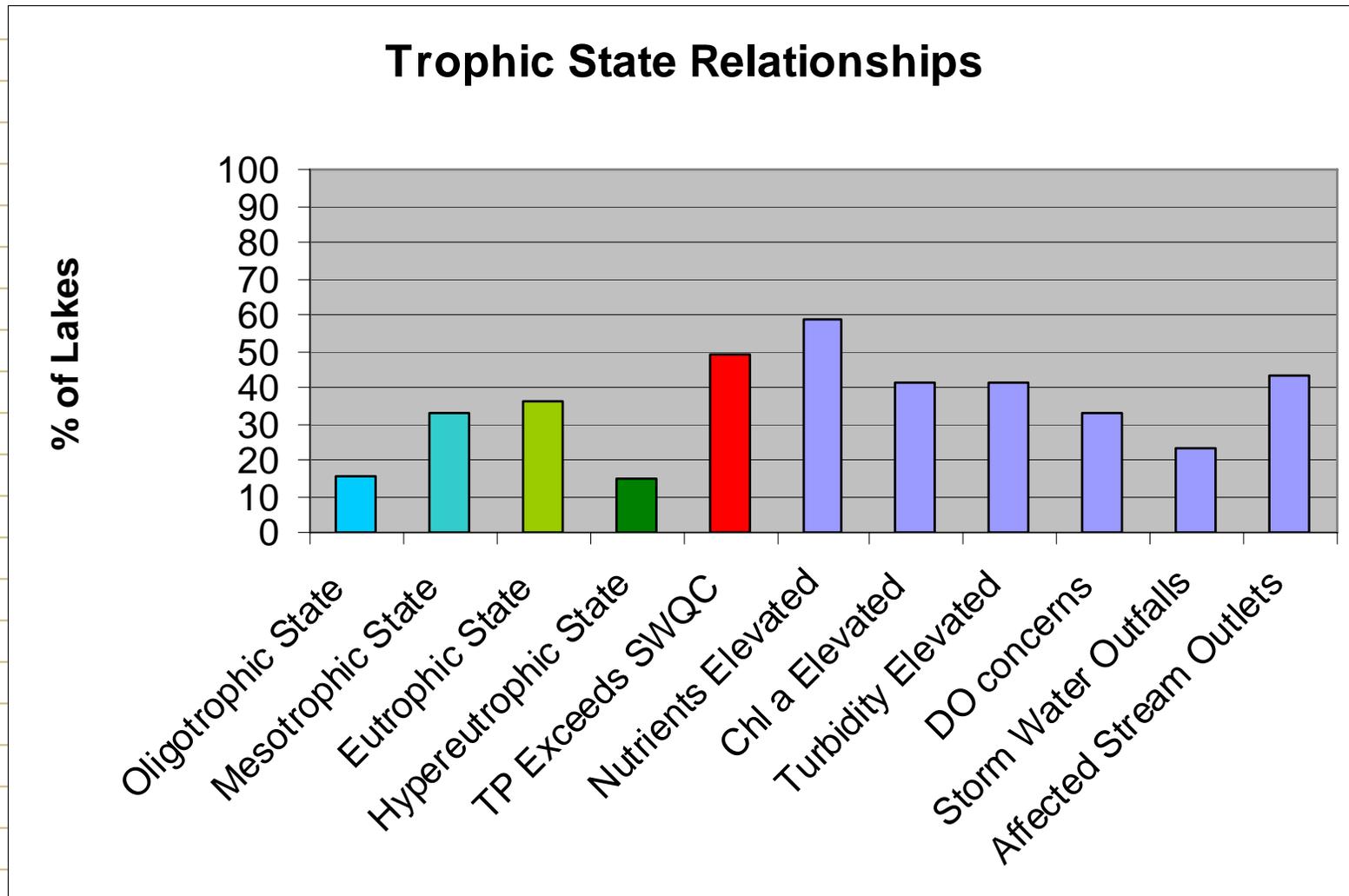
State Status



- 6 -Oligotrophic.
- 13-Mesotrophic.
- 14-Eutrophic
- 6 -Hypereutrophic

No lake was
Oligotrophic
at all times.

Panel 1 Findings



Panel 1 Findings

Relating Trophic State to Results

TP - A Lake was always in eutrophic or hypereutrophic state when TP levels exceeded SWQC.

TP levels in 2 instances exceeded SWQC in a eutrophic state and improved to oligotrophic status with TP SWQC being met.

TP levels correlated very well with Chl-a concentrations.

Panel 1 Findings

Relating Trophic State to Results

- DO - 5 lakes showed super-saturation, also had high Chl-a concentrations.
 - Diurnal studies necessary to study fluctuations in DO.
 - pH - Elevated with higher algae concentrations. Highest levels associated w/ algae and supersaturated DO.
 - Turbidity - Strong correlation with trophic state. Turbidity values rose in direct proportion to the degree of eutrophication.
 - Season - Oligotrophic and Mesotrophic (w/ 1 exception) states only occurred in fall.
-
-
-

Panel 1 Findings

Relating Trophic State to Results

Outfalls

- 8 lakes had stormwater outfalls
- No lake w/ an outfall had an oligotrophic state
- All but 2 lakes w/ outfalls exceeded SWQC (5) for TP and/or had elevated nutrients levels(1)

Panel 1 Findings

Relating Trophic State to Results

- Nutrients(N) - Although elevated levels were observed, did not correlate well with trophic state.
- Aquatic Vegetation - Minimal to extensive over the range of trophic states. Lake treatment further confuses relationships.

Panel 1 Findings

Affects on Outlet Streams

- Approximately 43% of outlet streams showed affects of the lake at the sample point.
- Generally, parameters that were high in the lake were also high in the stream.

Progress Toward Gaps / Enhancements

✓ Need for short-term trend monitoring

Watershed Management

- Volunteer Lake Monitoring Survey
 - QAPP status
 - parameters/ frequency
 - training
 - funding
 - equipment
 - needs
 - GIS coverage of this information is currently being developed by Princeton Hydro.
- Lake Shawnee pilot project
 - Oversight by Watershed Mgmt. & Princeton Hydro

Progress Toward Gaps / Enhancements

- ✓ Water Watch Network Internal Council.
- ✓ Evaluate feasibility, Provide Guidance.

2007 Priorities

- ✓ Monitor next panel of lakes
- ✓ Fine tune database
- ✓ Stream line management of DHSS data
- ✓ Accelerate report preparation process

National Lake Survey

- The U.S. Environmental Protection Agency (EPA), state environmental agencies, and other partners are conducting a nationwide survey of the condition of lakes.
 - Total of 909 lakes included in Survey
 - Includes natural and man-made freshwater lakes, ponds, and reservoirs greater than 10 acres and at least one meter deep
 - Sampling begins in June 2007 and runs through September 2007.

National Lake Survey

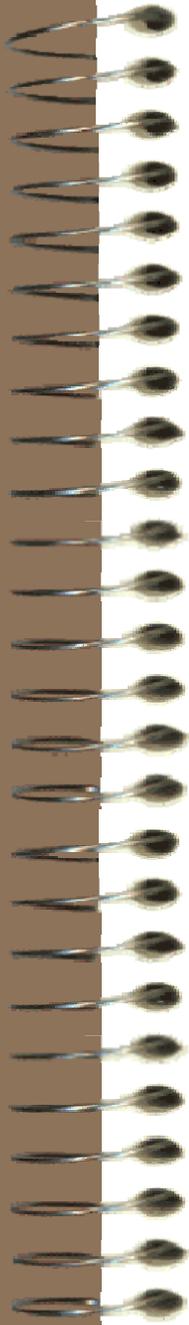
Site Selection

- **Design Objectives** – select lakes so that the study will:
 - Determine the proportion of lakes (+/-5%) in the conterminous U.S. that exceed a threshold of concern using selected indicators with 95% confidence.
 - Determine the proportion of lakes (+/-15%) in a specific eco-region grouping that exceed a threshold of concern using selected indicators with 95% confidence.

National Lake Survey

Site Selection

- The selection of sampling locations for the Survey of the Nation's Lakes was completed using a probability based design
- Rules for selection were developed to meet certain distribution criteria, including:
 - The National Hydrography Dataset (NHD) used to derive list of lakes
 - For purposes of this survey “lakes” refers to natural and manmade freshwater lakes, ponds, and reservoirs greater than 10 acres (4 hectares) in the conterminous U.S., excluding the Great Lakes



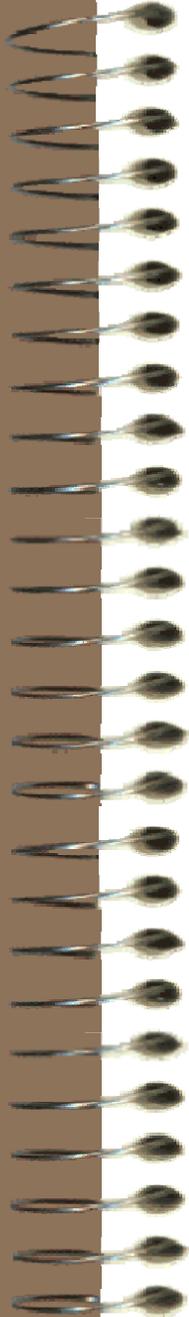
National Lake Survey

Site Selection

- Rules for selection were developed to meet certain distribution criteria, including:
 - Sample size set to include 1,000 lake sampling events
 - The design includes a representative subset of the lakes that were included in the 1972 National Lake Eutrophication Study (NES).
 - Lake selection for the survey provided for 5 size class categories, as well as spatial distribution across the lower 48 states and 9 aggregated Omernik Level 3 ecoregions.
-
-

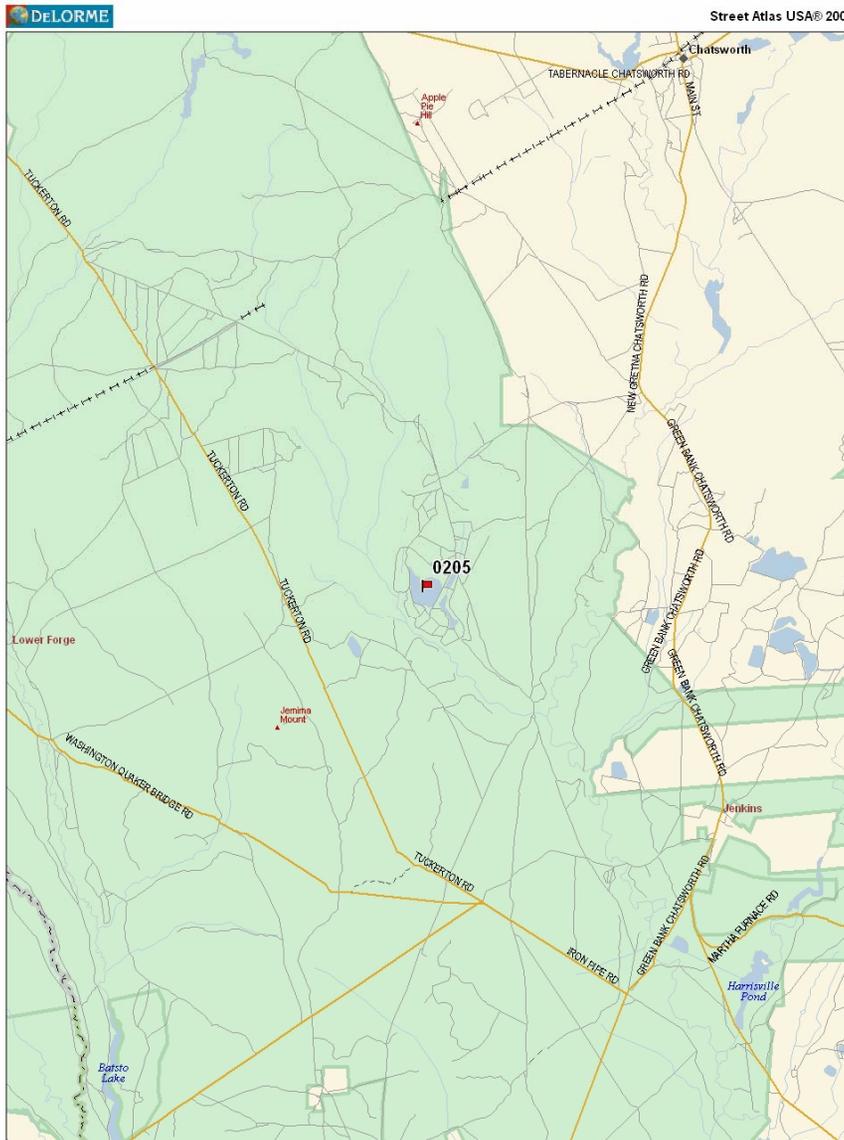
What is being measured?

- Field crews will be measuring the following:
 - Temperature, dissolved oxygen, nutrients, turbidity, chlorophyll a, water clarity, and color
 - Condition of the habitat along the shoreline
 - Zooplankton and Phytoplankton
 - Benthic macroinvertebrates in the littoral zone
 - Bacteria



Survey of the Nation's Lakes: *New Jersey Lakes*

- There are 8 randomly selected lakes in New Jersey to be sampled.
 - Mirror Lake, Burlington Co.,
 - Mount Hope Lake, Morris Co.
 - Friendship Bog, Burlington Co.
 - Round Valley Recreation Area, Hunterdon Co
 - Orange Reservoir, Essex Co.
 - Lake Tranquility, Sussex Co.
 - Duhernal Lake, Middlesex Co.
 - Swimming River Reservoir, Monmouth Co.
-



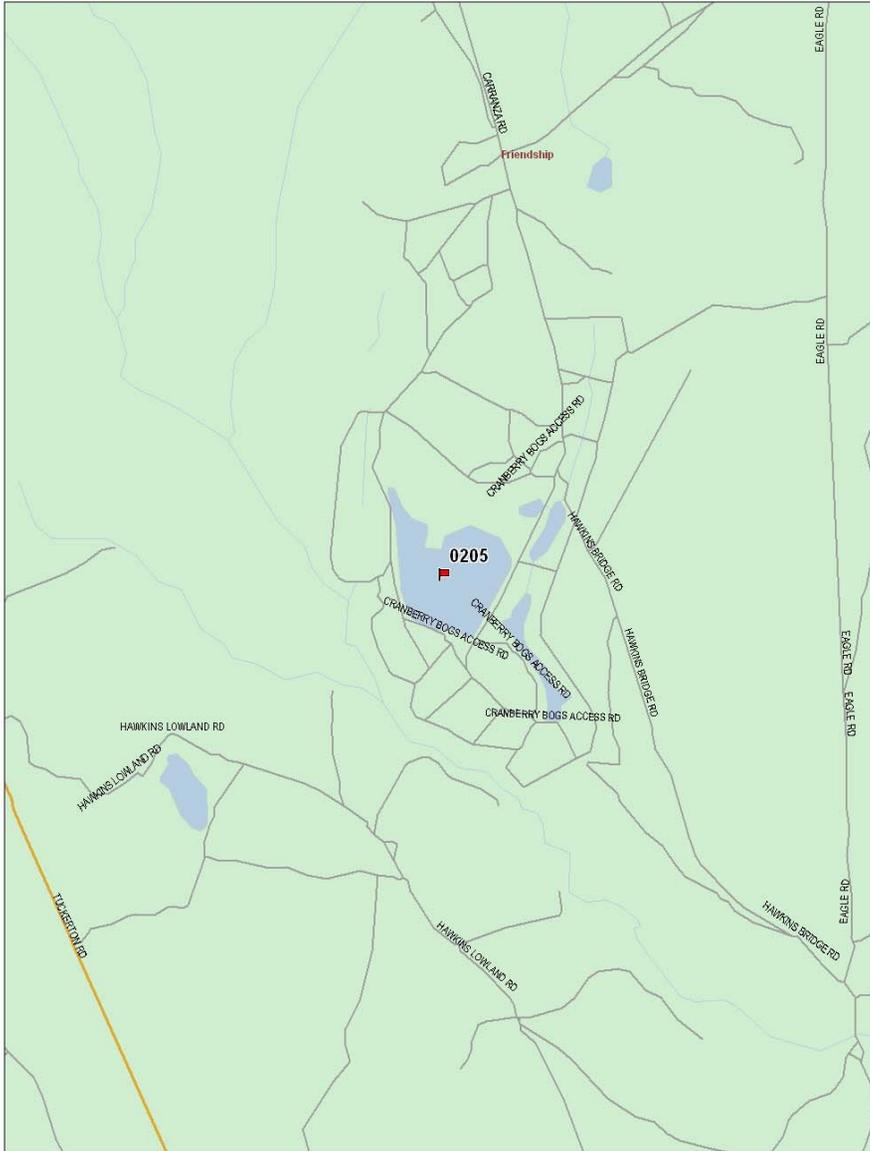
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 MN (12.5° W)

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 Data Zoom 11-3

Friendship Bog

Burlington
 County, Wharton
 State Forest

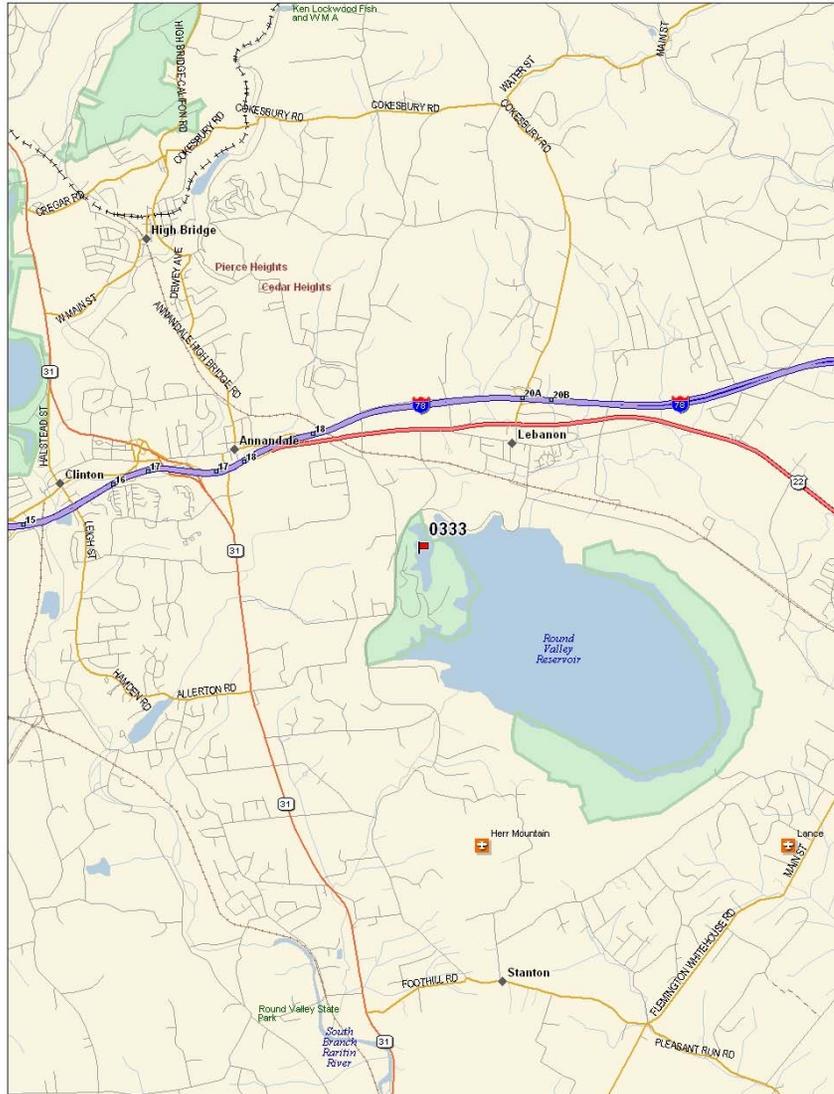


Friendship Bog

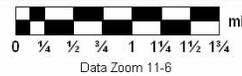
Burlington
County, Wharton
State Forest

Friendship Bog





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Round Valley Recreation Area, Hunterdon County

Round Valley Recreation Area



Any Questions?

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