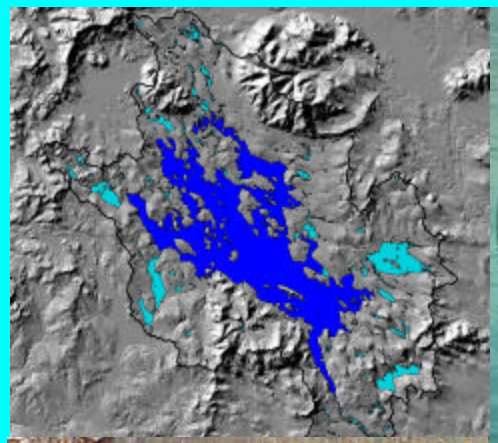
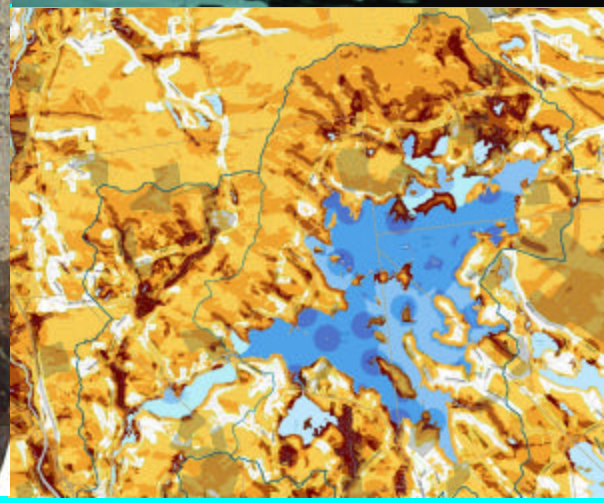
UsingVolunteer Monitoring Data to Help Communities Better Manage NPS Pollution: NROC and the NH LLMP





Jeffrey Schloss
Extension Professor
University of New Hampshire
UNH Center for Freshwater Biology

UNIVERSITY of NEW HAMPSHIRE
COOPERATIVE EXTENSION

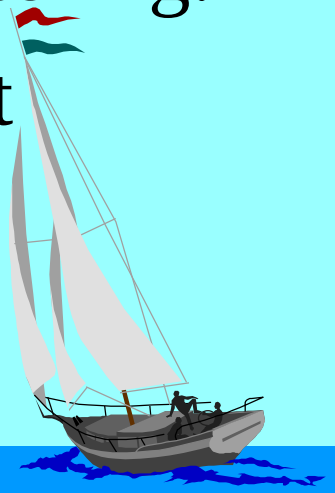
NH Lakes Lay Monitoring Program

Over 26 Years of Collaboration
between UNH and NH Communities

A Model of “Participatory Research” and
Community Empowerment

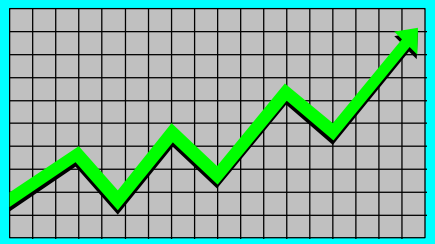
LLMP Program Objectives

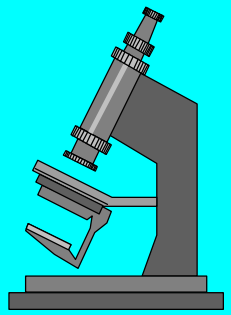
- Baseline monitoring for long-term trend detection.
- Locate problem areas and “hotspots”.
- Provide unbiased data for informed watershed management decisions.
- Develop protocols for citizen monitoring.
- Conduct participatory research that addresses concerns of participants.

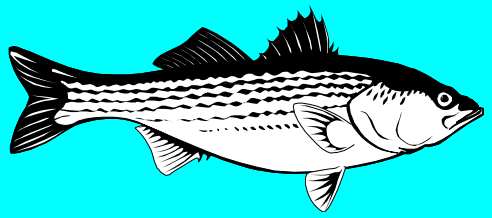


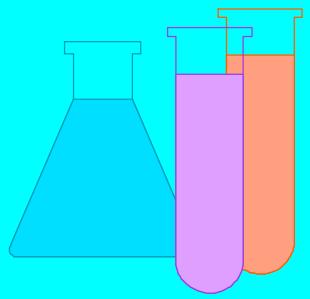
LLMP: Participatory Research

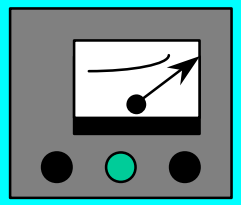
- **Determinants and Indicators of Water Quality:**
  - **Land Use / WQ Relationships / Watershed Assessment**
  - **Influence of Weather Events**
  - **Biological Assessments / Trophic Indicators**
  - **Blue Green “Algae” Toxins / Picoplankton**
  - **Recreational Impacts**
- **Long-term Trend Analysis**
- **Remote Sensing Applications**
- **Non-native Species (Milfoil, Zebra Mussel, Rock Bass)**
- **Species Condition / Habitat Change**

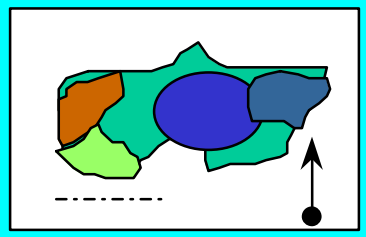




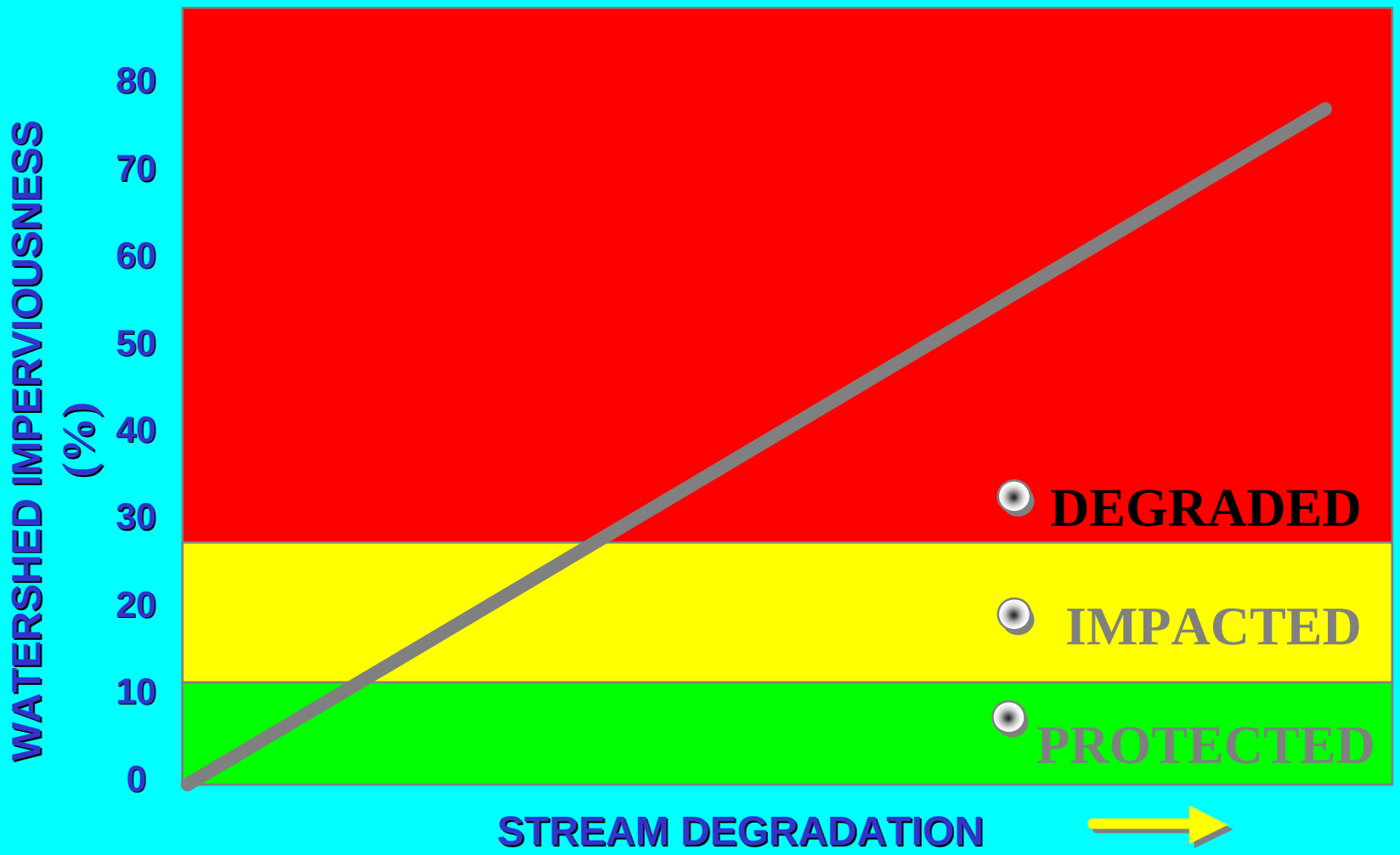








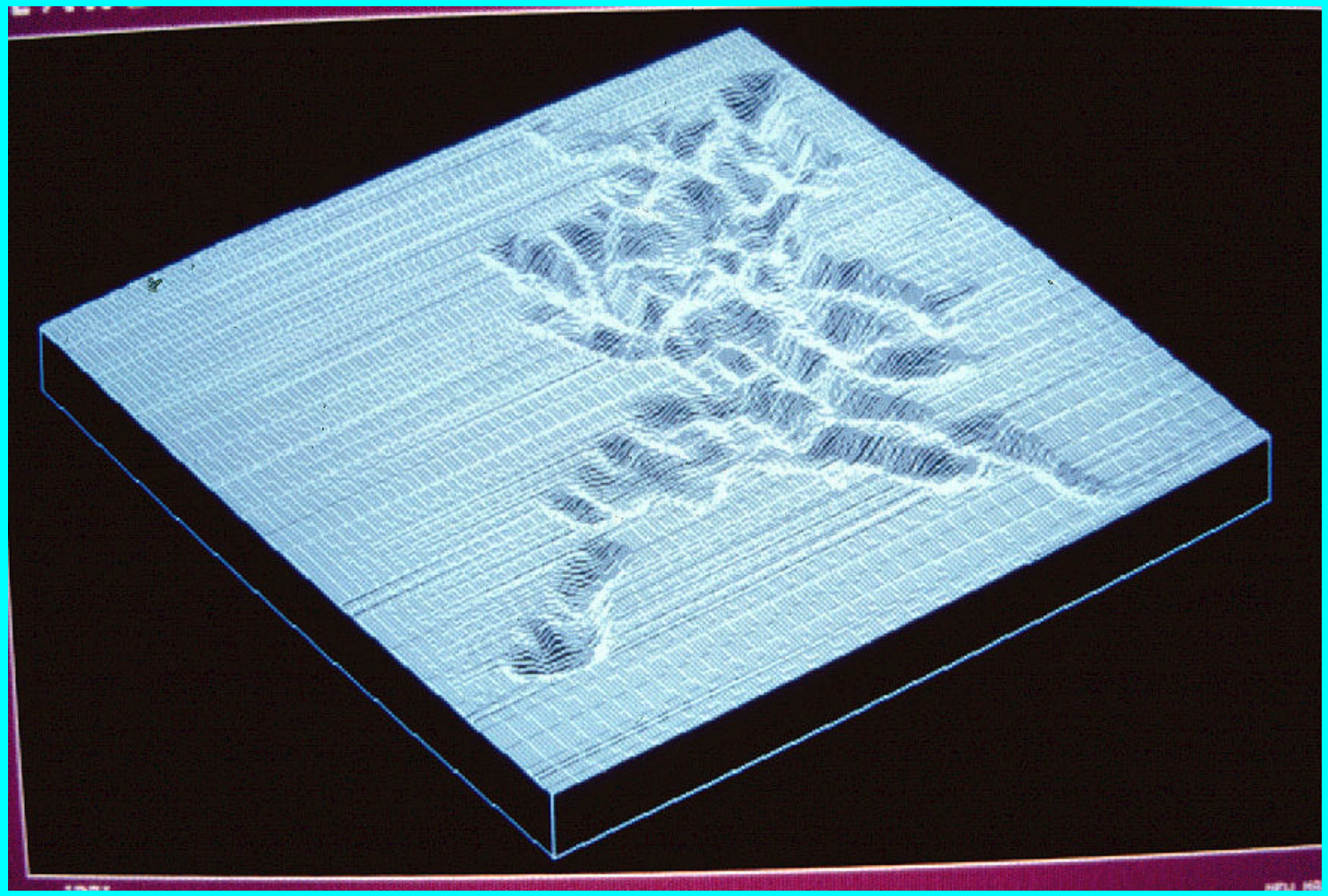
Waterway Health & Imperviousness



ADAPTED FROM SCHUELER, ET. AL., 1992, TOBIER AND WESTMACOT 1981)

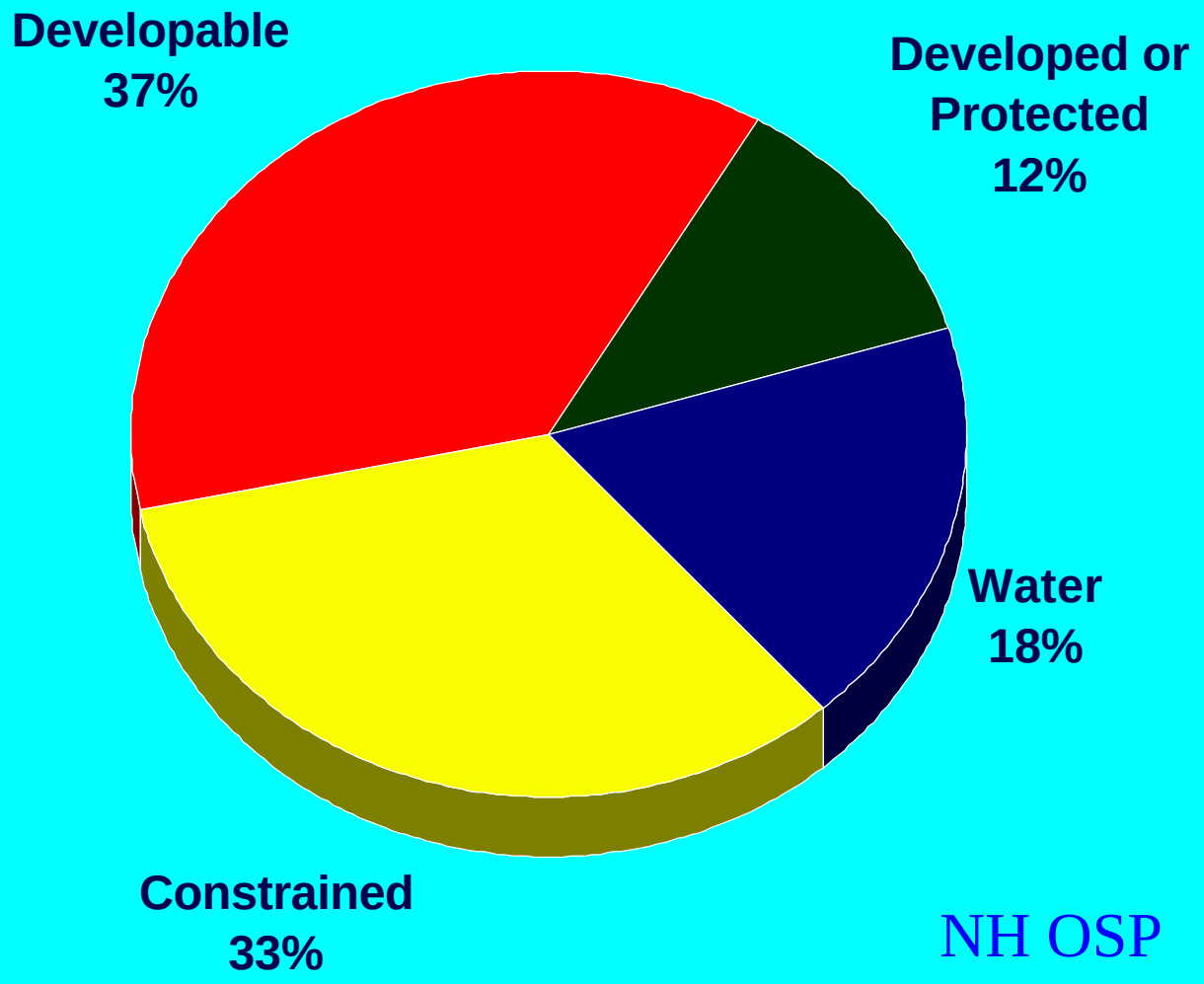
SQUAM LAKES, NH

Squam Lake Bathymetry Model

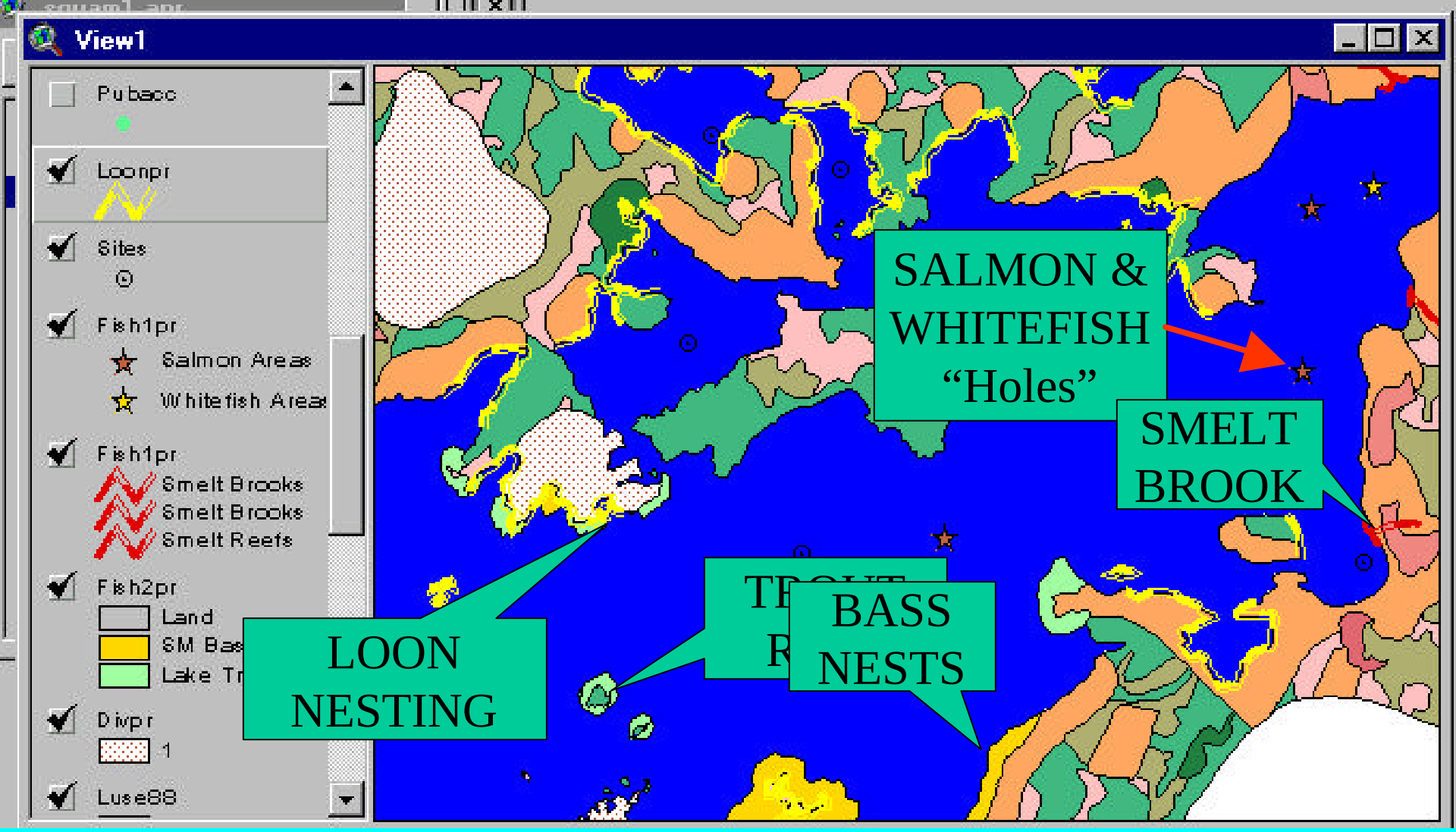


18 sub-basins with high sills to prevent exchange during stratification

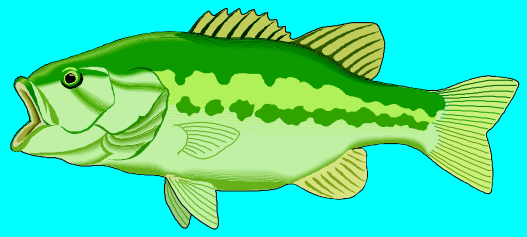
Squam Lakes Watershed "Build-Out Analysis"



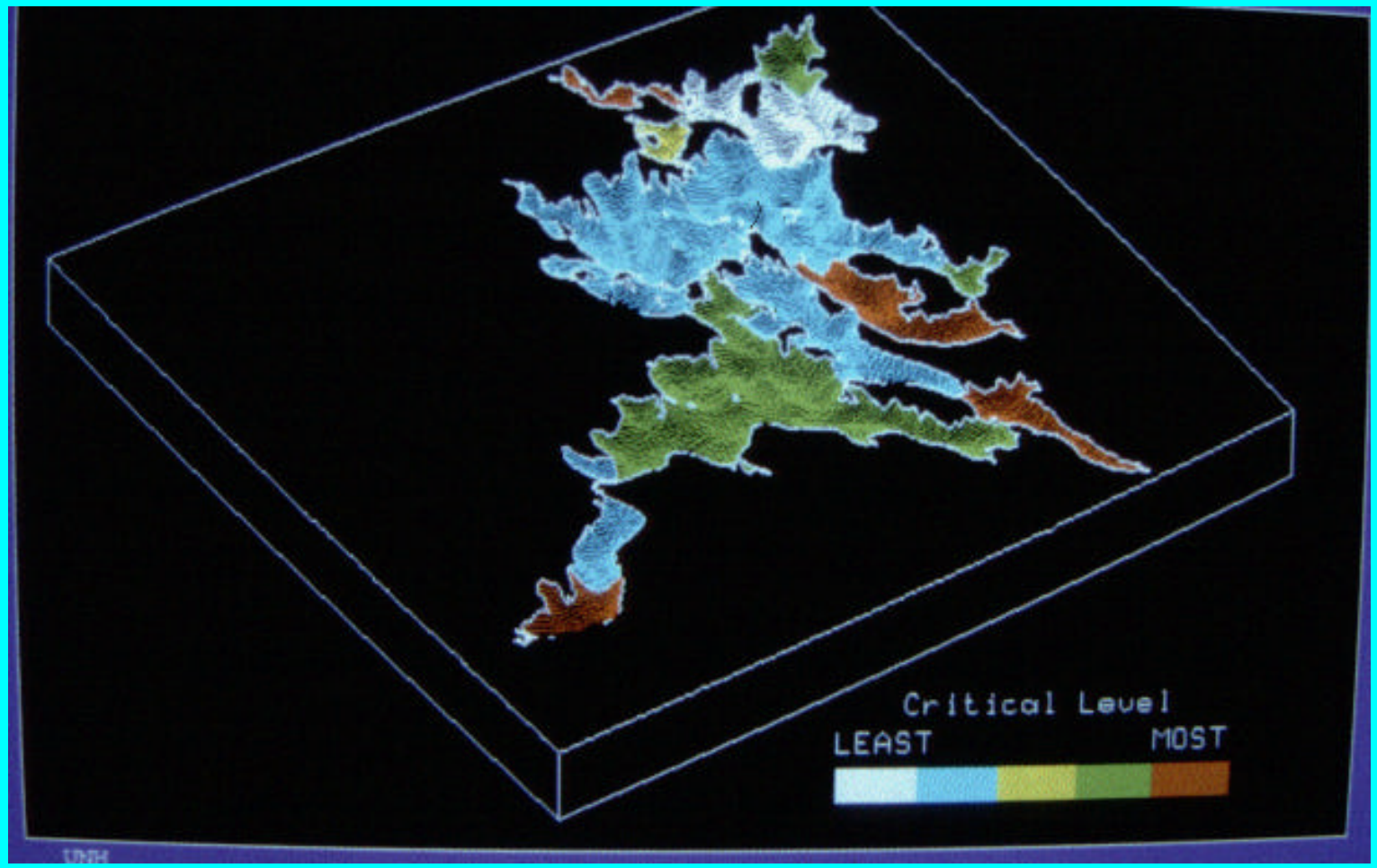
NH OSP



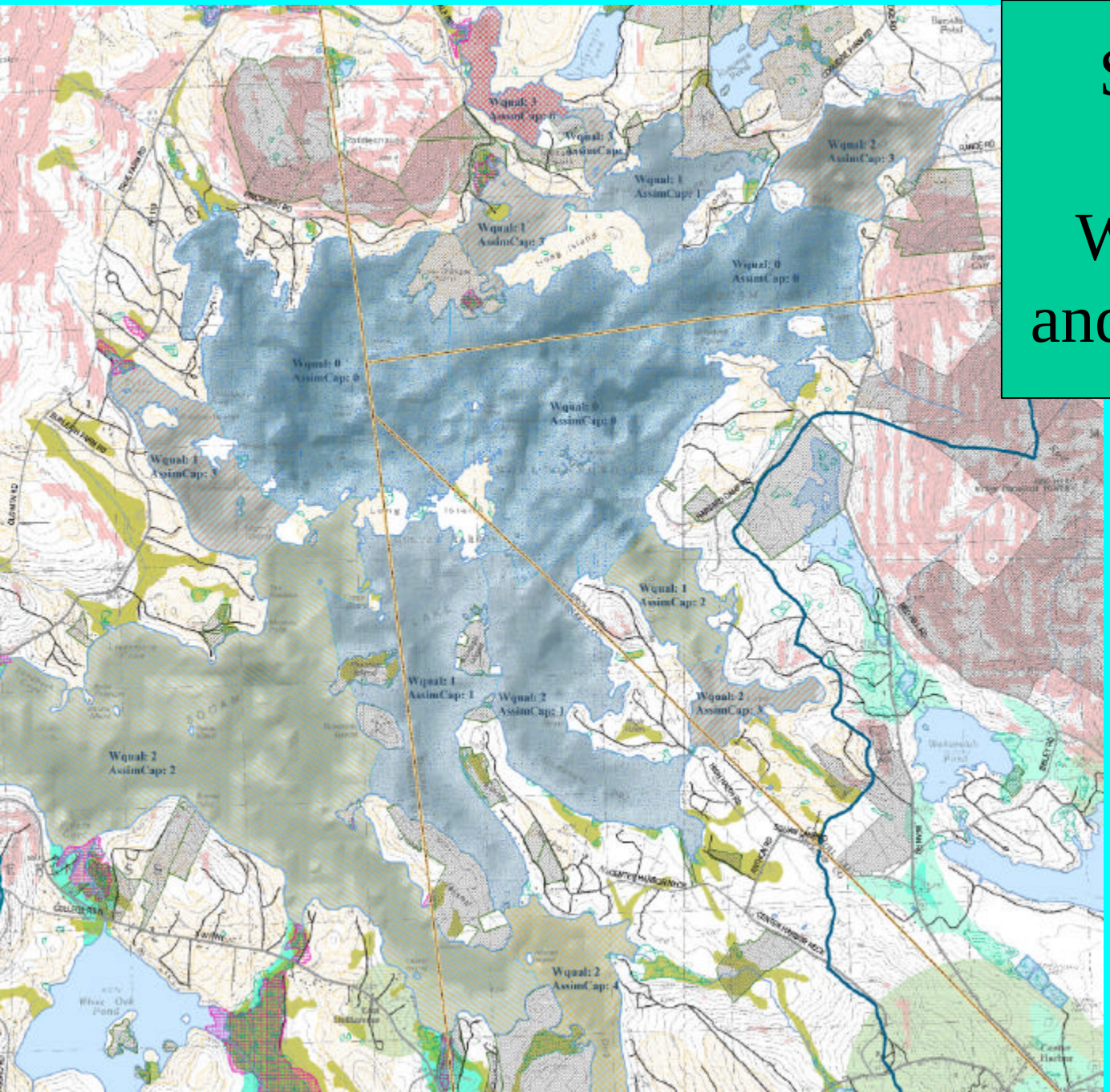
Squam Lake Wildlife Inventory



Weighted Analysis
Critical Sub-basins

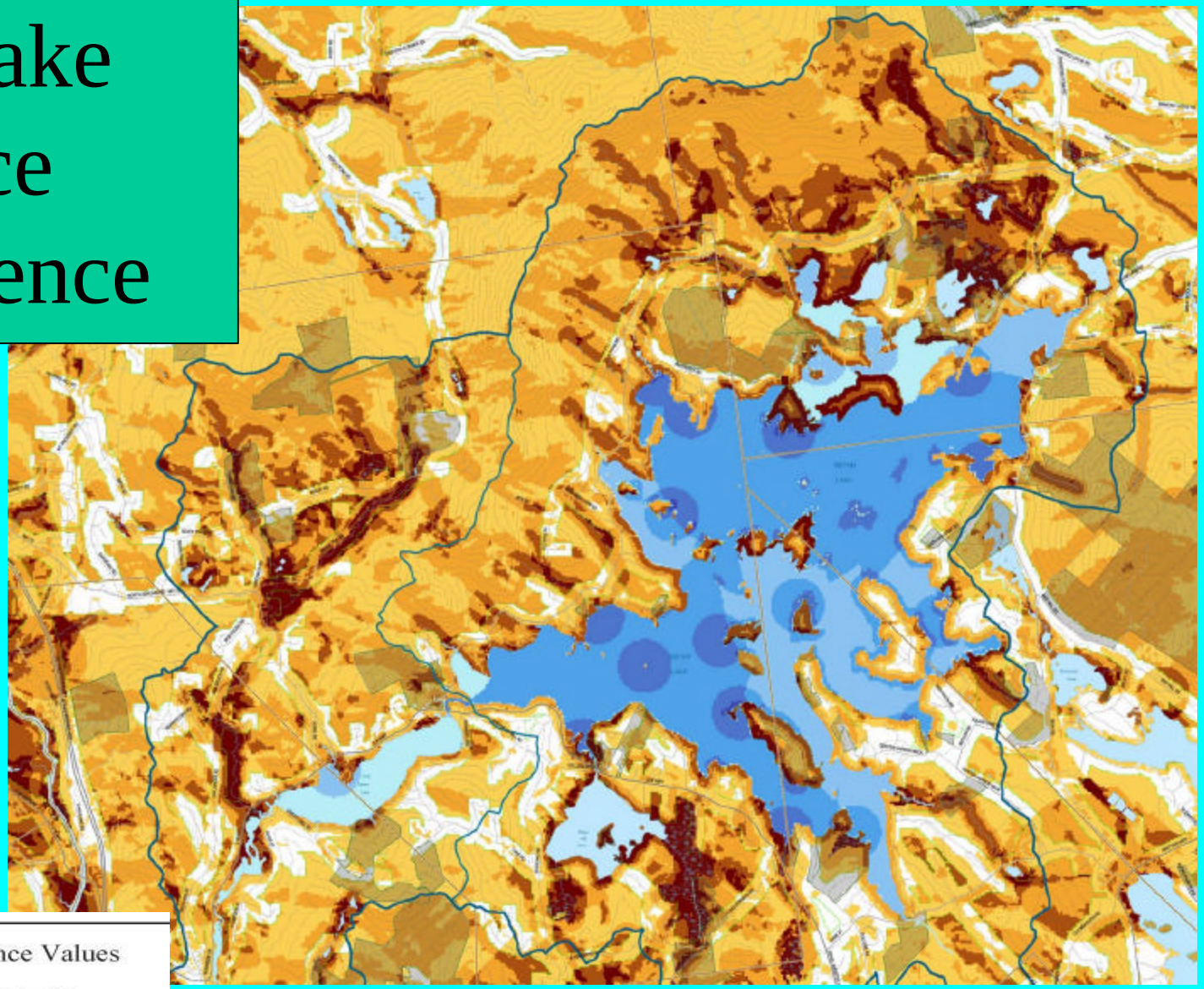


UNH Center for Freshwater Biology



Squam Lake Existing Water Quality and Vulnerability

Squam Lake Resource Co-occurrence



Natural Resource Co-occurrence Values

High : 8

Low : 1

High : 5

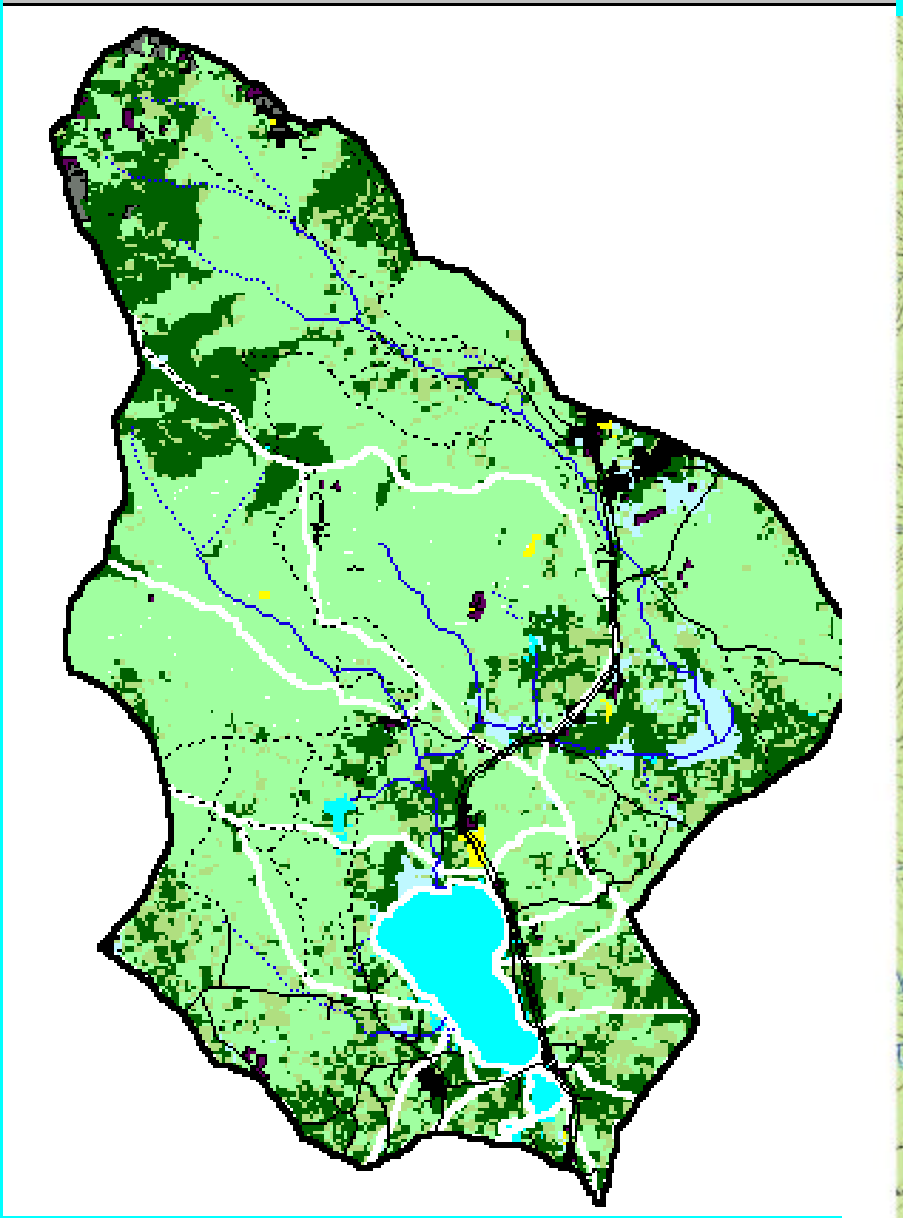
(in-lake)

Low : 1

Natural Resource co-occurrence scores are based on:

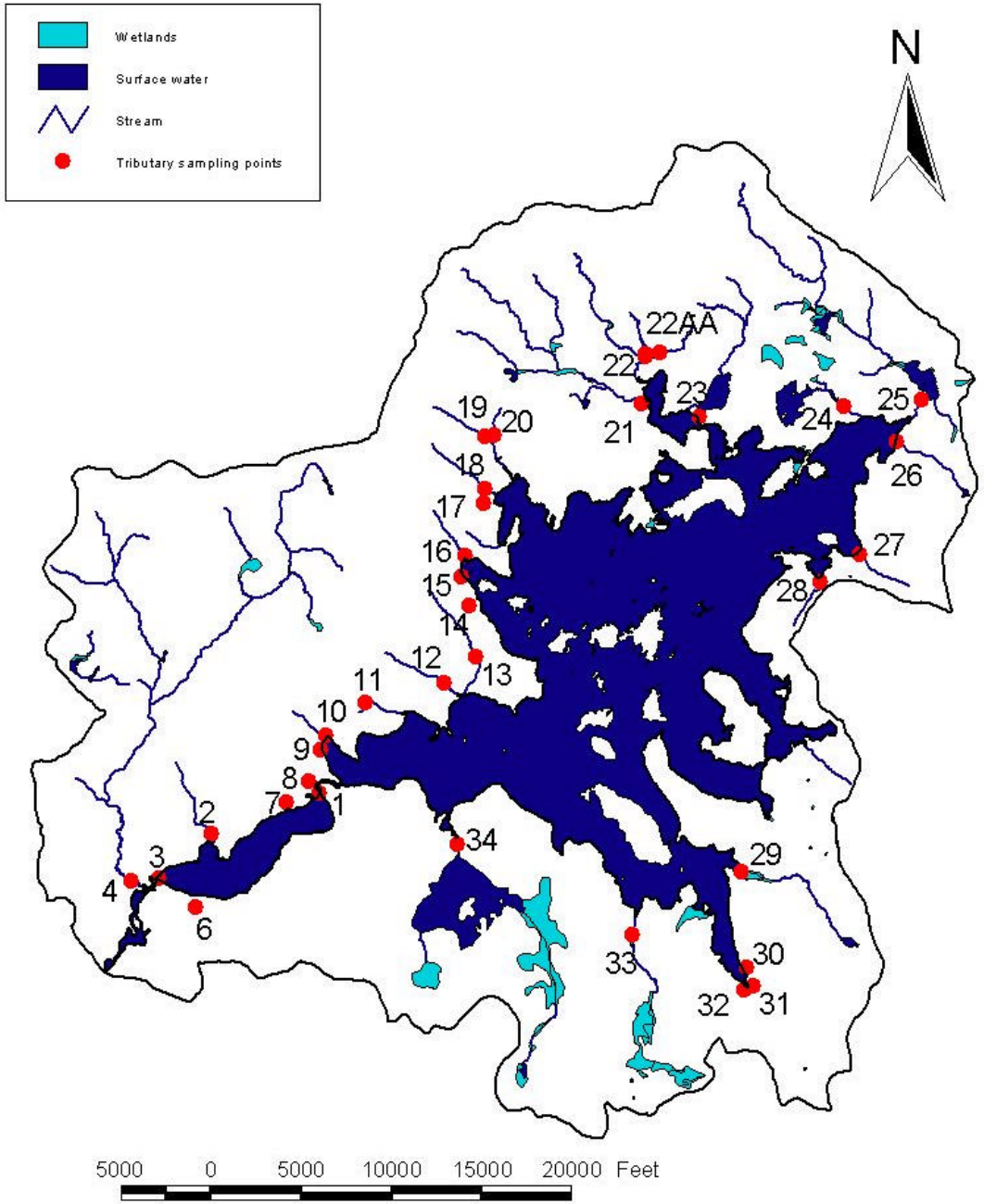
WATER RESOURCES

Tributary Sampling/Nutrient Budget

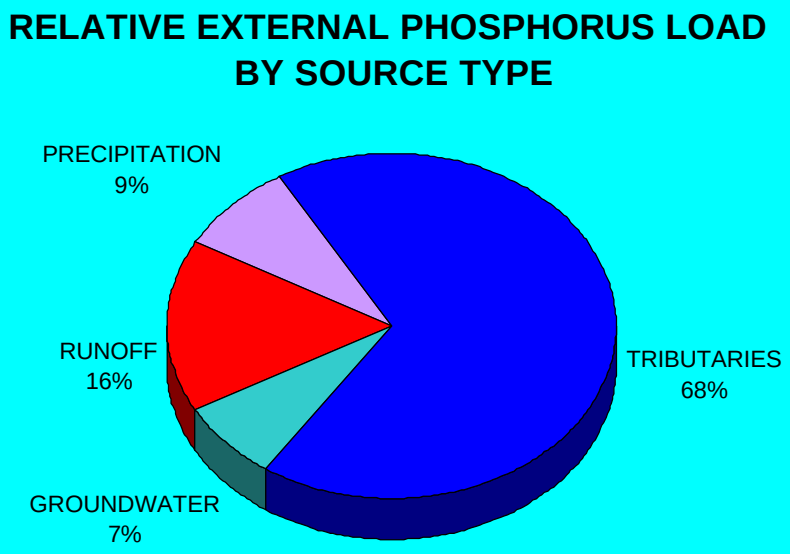



Chocorua Lake
Subwatershed Map
Northern Chocorua River
Stony Brook
Brandon Ledge Wetlands
Lonely Lake
NW Ungaged
Stratton Brook
Chocorua Lake
Beaver Pond
Little Lake Ungaged
SW Ungaged
Rt 16 Dwtl
Legend
Chocorua Subwatersheds
Monitored by Culvert(s)
Monitored by Staff Gage
Not Monitored
Stream
Intermittent Stream
Staff Gage Location
Culvert Location
0.5 0 0.5 Miles
0.5 0 0.5 1 Kilometers
UNIVERSITY OF NEW HAMPSHIRE COOPERATIVE EXTENSION

Tributary Sampling Sites

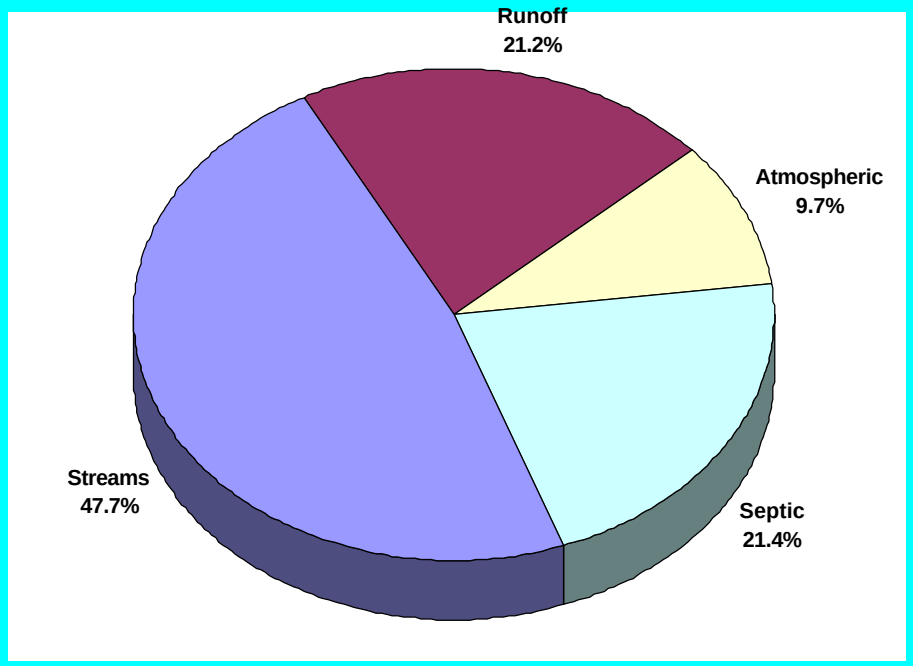


Where are the nutrients coming from?



Chocorua Lake

Squam Lakes

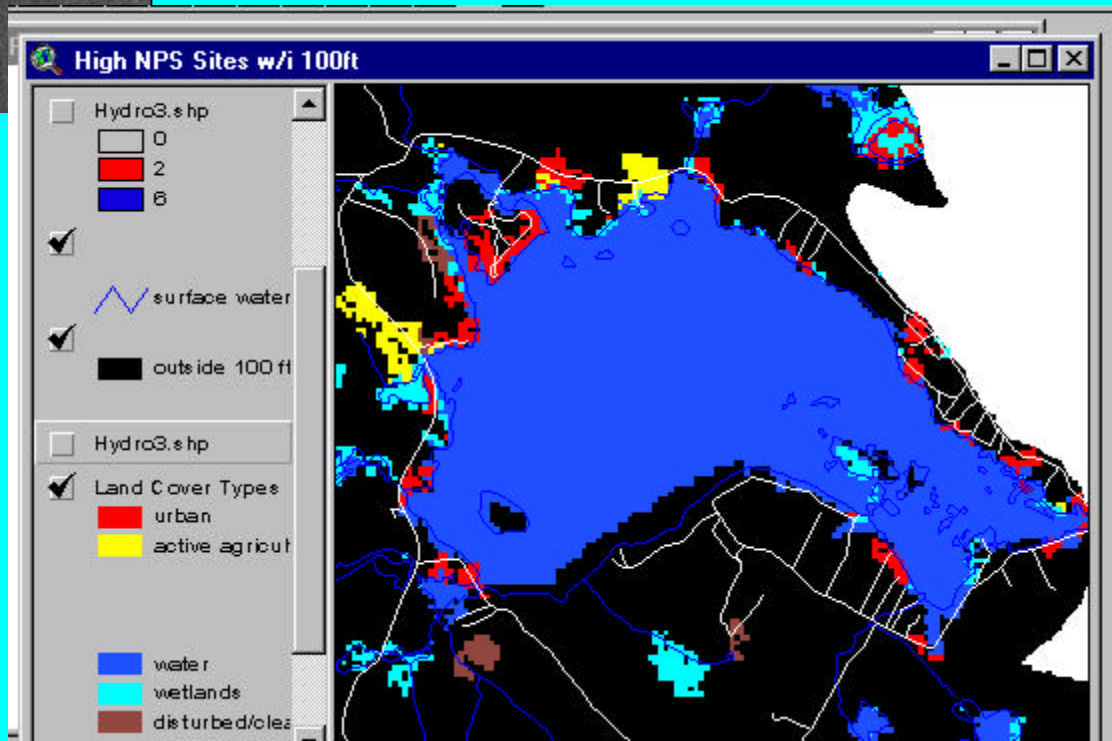


Relative TP Loading

BMPs: Are they working?

Bow Lake/Strafford

- Local Decision-makers
- Dealing with Growth
- Initially Skeptical
- Regs need updating



NROC/NHCP/ LLMP

- Squam Lakes Watershed (6 Towns)
- Lake Chocorua Watershed
- Wakefield (7 lakes)
- Somersworth (2 lakes and 1 river)
- Strafford (1 lake. 2 river)
- Swains Lake Watershed (2 Towns, Coastal Drainage)

Results

- Poorly designed development projects rejected
- Sewer bonds past
- No rafting zones approved
- Sensitive Lake and Wetland Areas protected
- Highway Road Drainages Mitigated
- Landscaping Practices Improved
- Data Used to Justify Qualification for State/Federal Assistance

Communities Better Informed on Local Issues

Gaining Clarity on Water Transparency Measurements

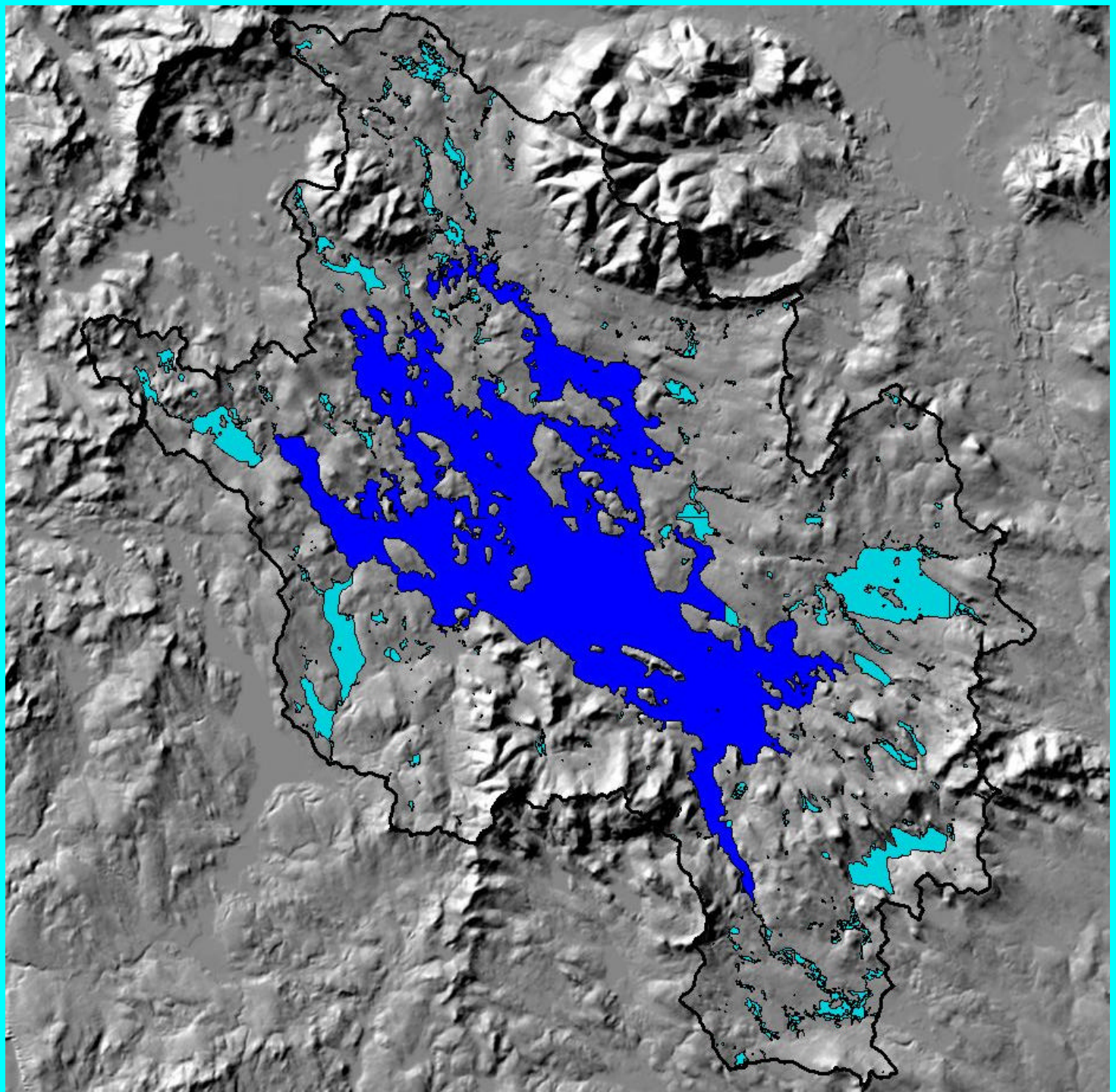
University of New Hampshire
Dept. of Resources Economics
Lakes Lay Monitoring Program
NH DES VLAP Program

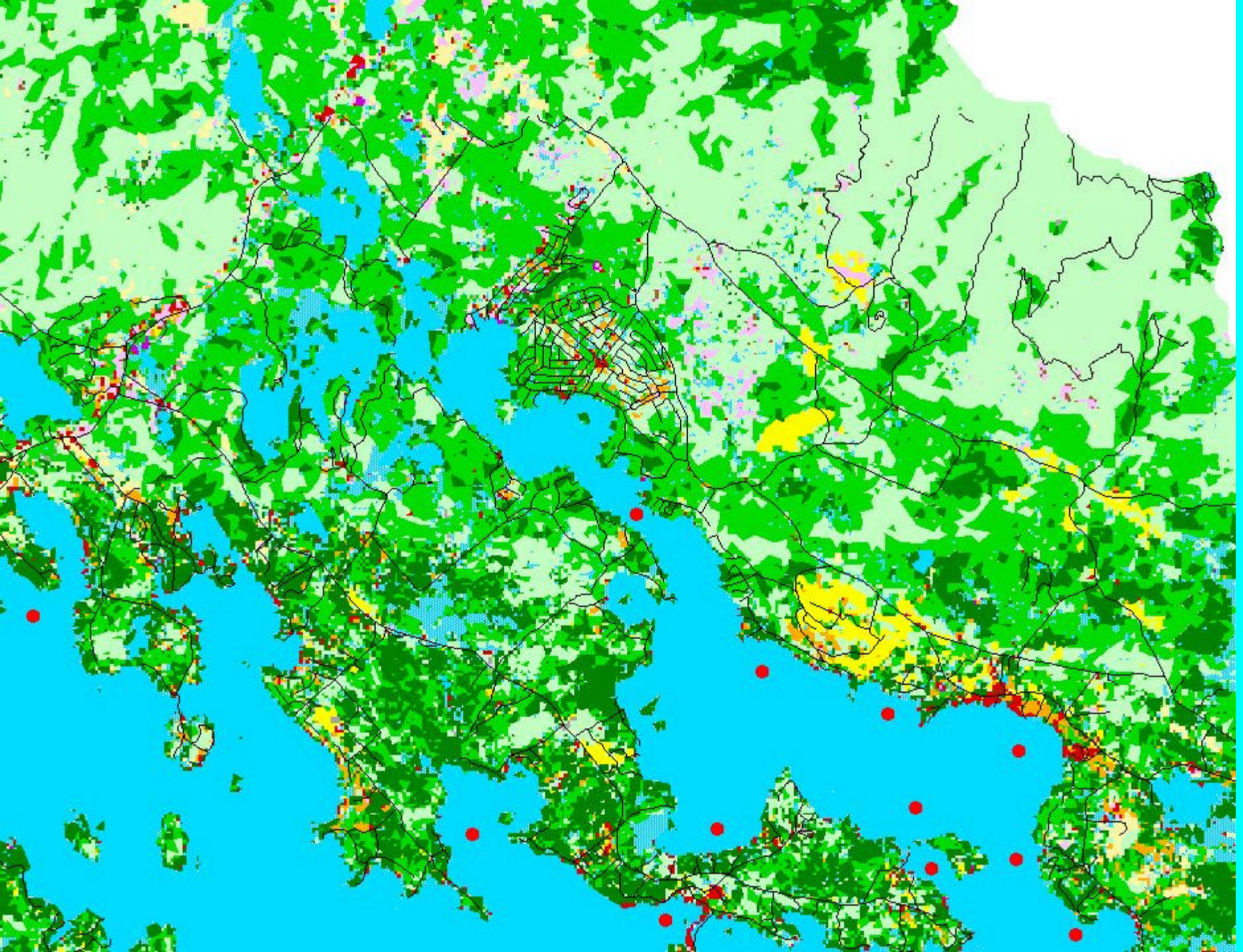
3 Foot loss of transparency = $6,000 to $19,000 loss in property value!

(the volunteer monitors were) ‘the “hub of the wheel” that made the project a success…They provided the factual data on which decisions were made. ’

-Sherry Godlewski

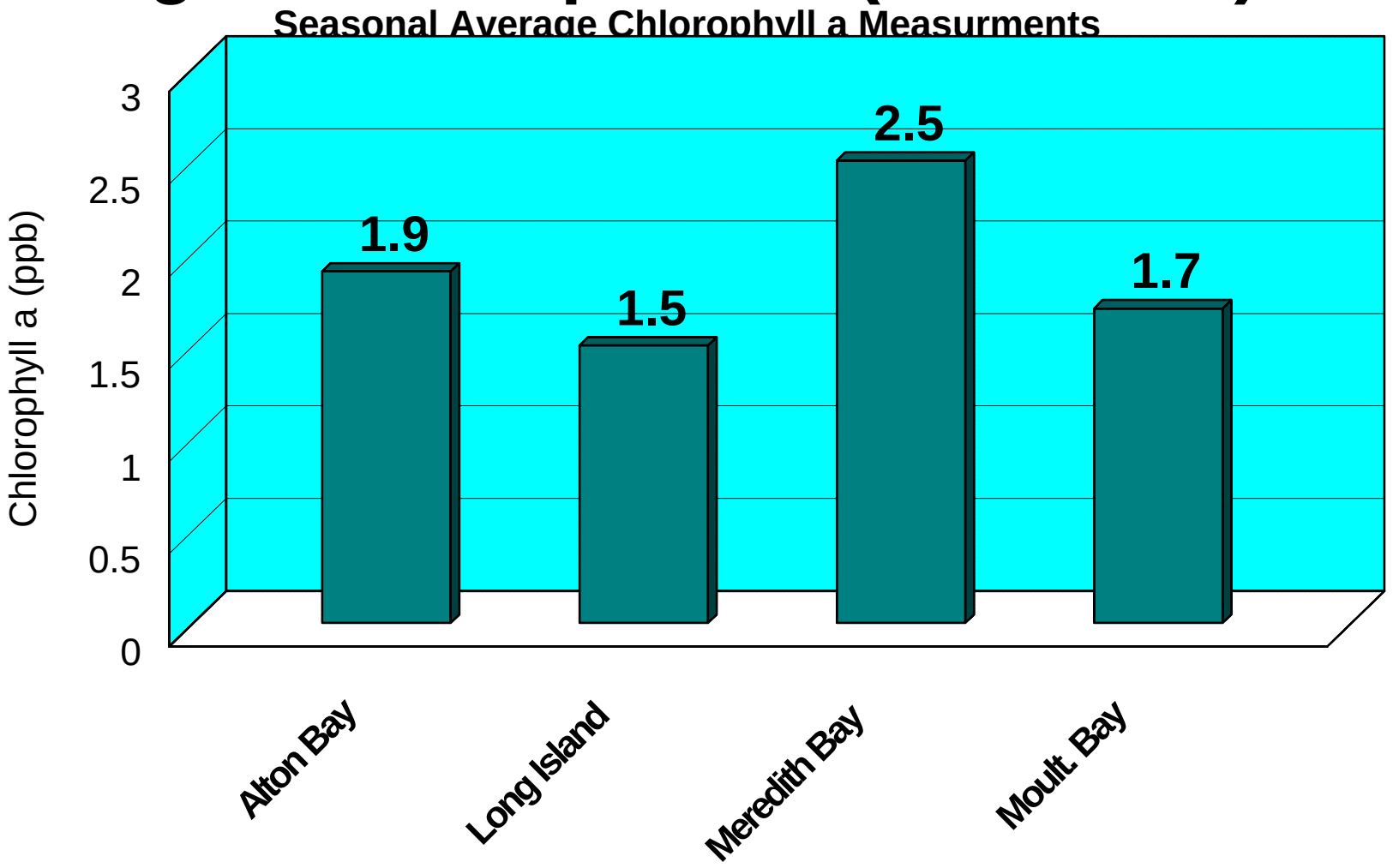
NH Department of Environmental Services





LAKE WINNIPESAUKEE

Regional Comparison (2000 Data)



Note: the higher value = "greener" water