

US EPA ARCHIVE DOCUMENT

State Data in Context:

Comparing Volunteer Monitoring Results with the National Lakes Assessment

John Kiddon, Henry Walker & Bryan Milstead
USEPA Atlantic Ecology Division, Narragansett RI

Linda Green & Elizabeth Heron
URI Watershed Watch Program

Alternate title.....

National Lakes Assessment: What's in it for the States?

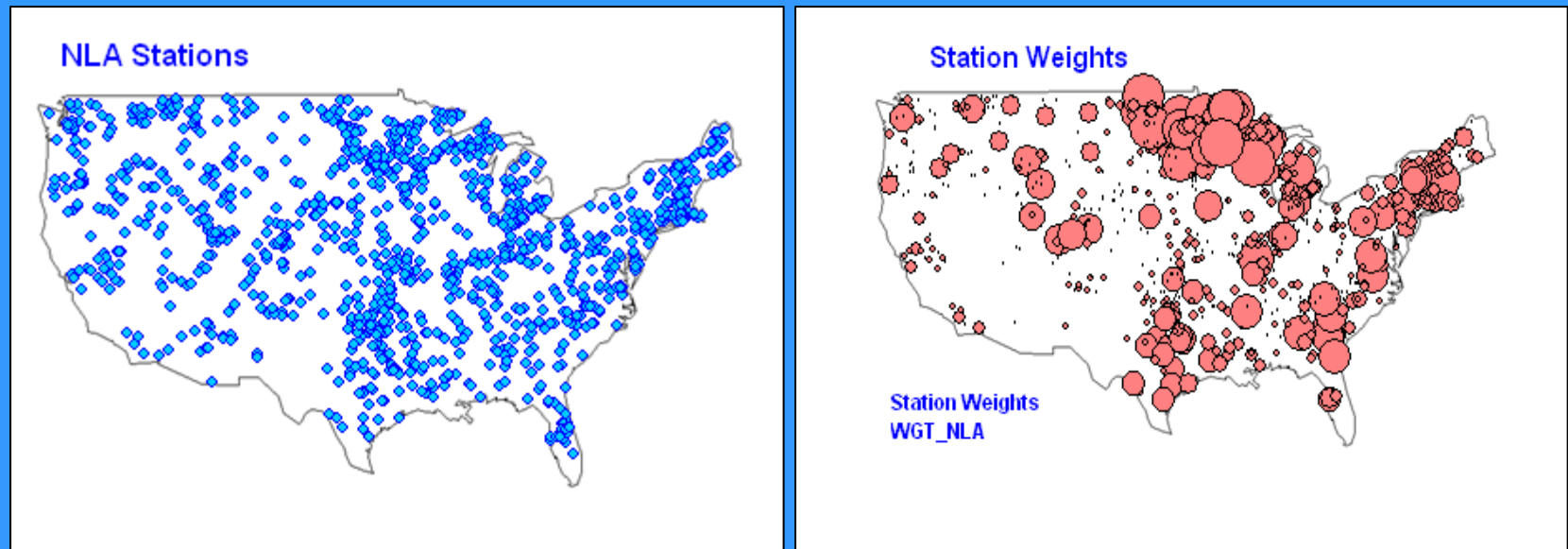
John Kiddon, Henry Walker & Brian Milstead
USEPA Atlantic Ecology Division, Narragansett RI

Linda Green & Elizabeth Heron
URI Watershed Watch Program

Talk Objectives

- ❖ Review National Lakes Assessment (NLA) data at the national & regional scales
- ❖ Focus on New England lakes
- ❖ Compare RI volunteer survey data with NLA results
- ❖ (Illustrate utility of Excel-generated graphics)

National Lakes Assessment (NLA)

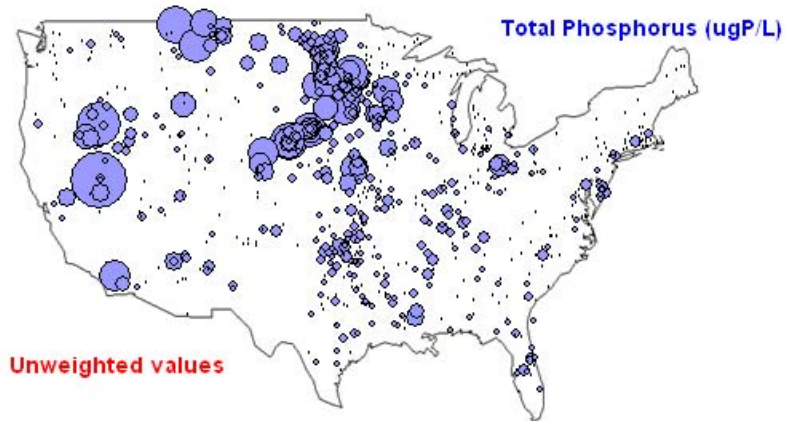


Unbiased sampling design, stratified by state inclusion and lake size

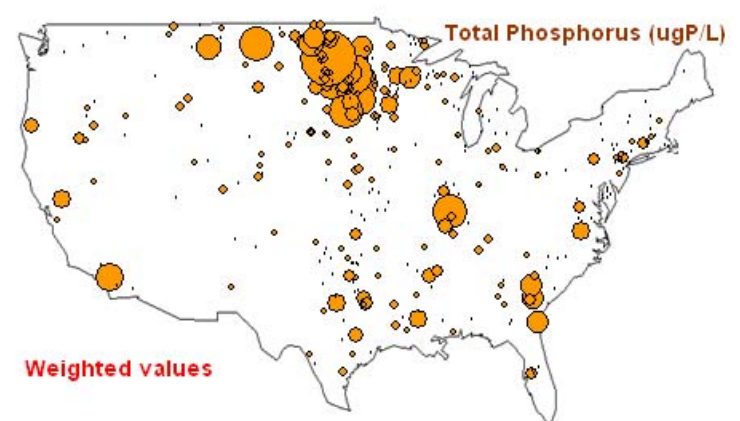
Weighted results accurately represent conditions at national, regional & state scales

National & Regional view: Total Phosphorus

Unweighted Bubble Plot: Symbol Area Proportional to Unweighted Value

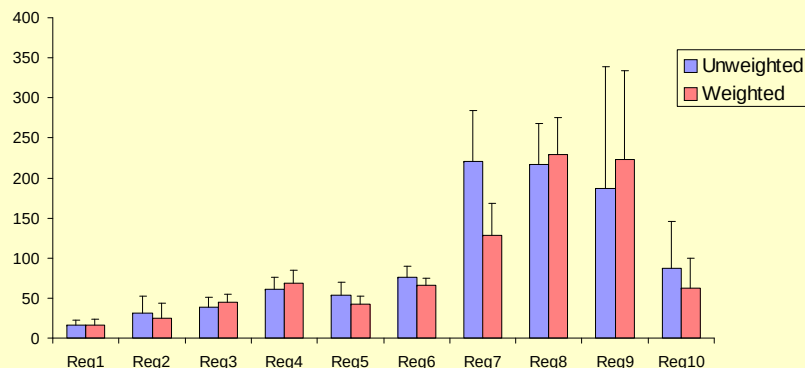


Weighted Bubble Plot: Symbol Area Proportional to Weighted Value



Weighted & unweighted averages, by EPA Region

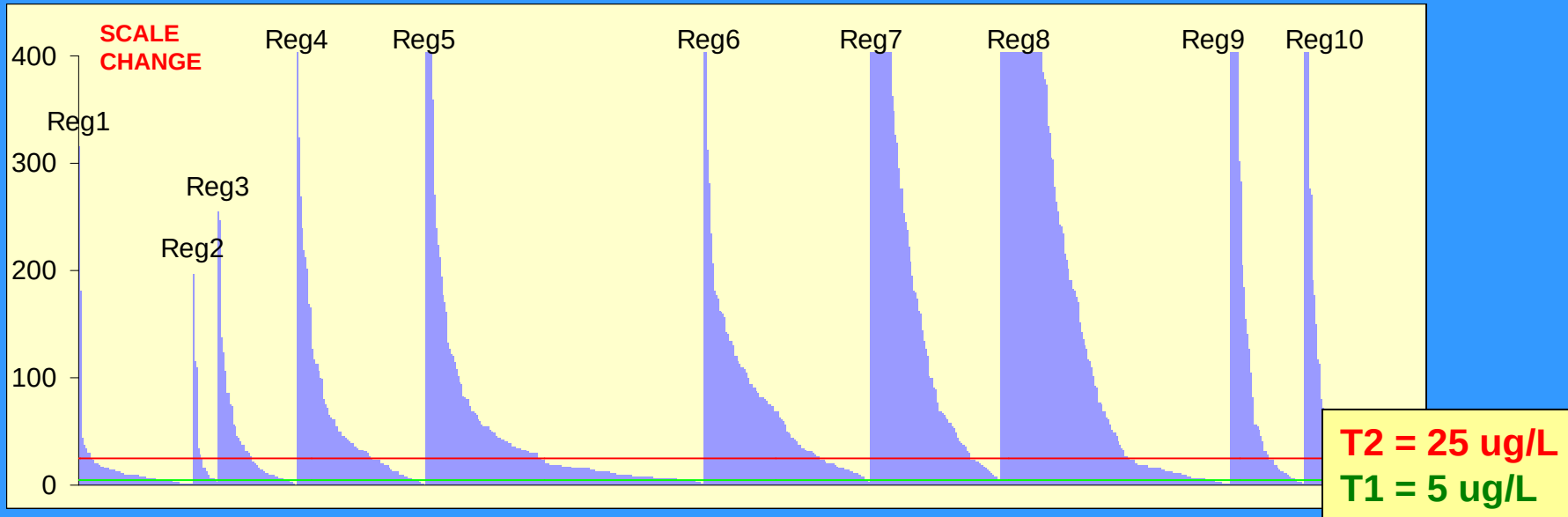
Total Phosphorus (ugP/L)



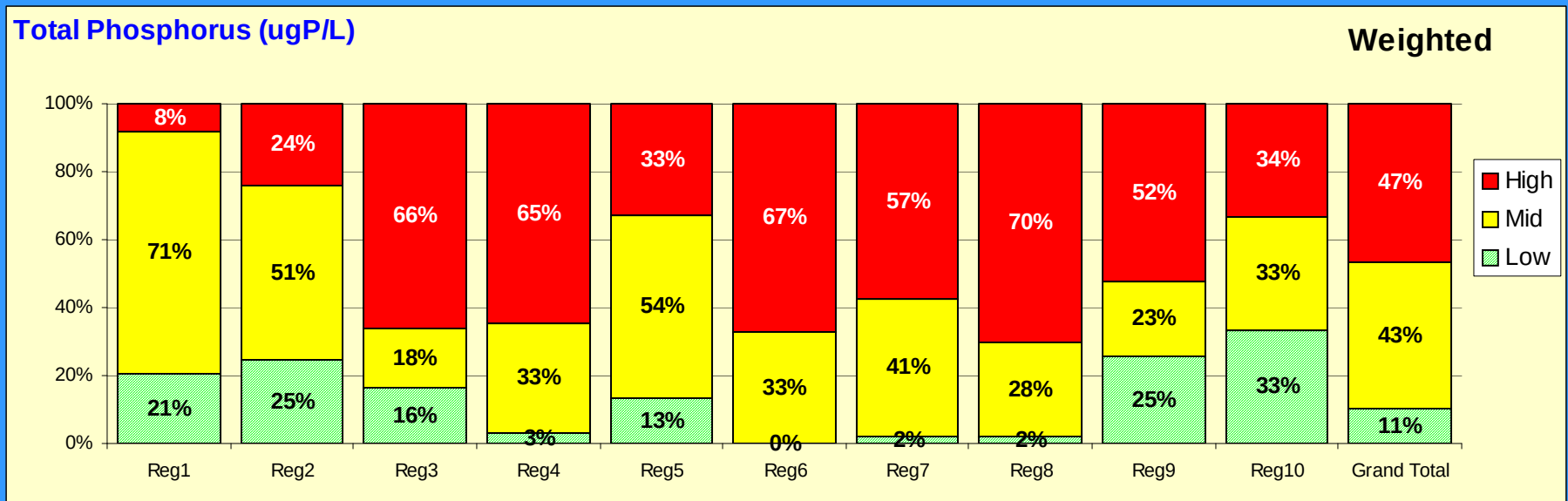
EPA Regions



National & Regional view: Total Phosphorus (ug/L)



With weighted data can estimate condition in entire population

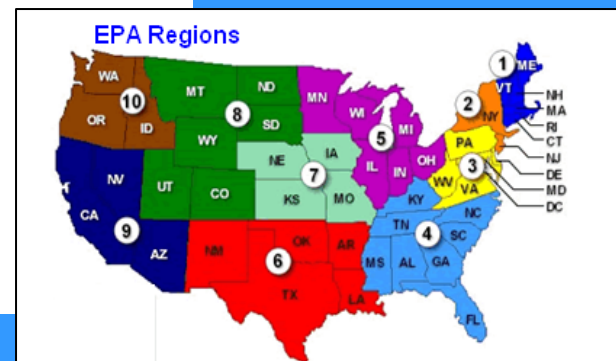
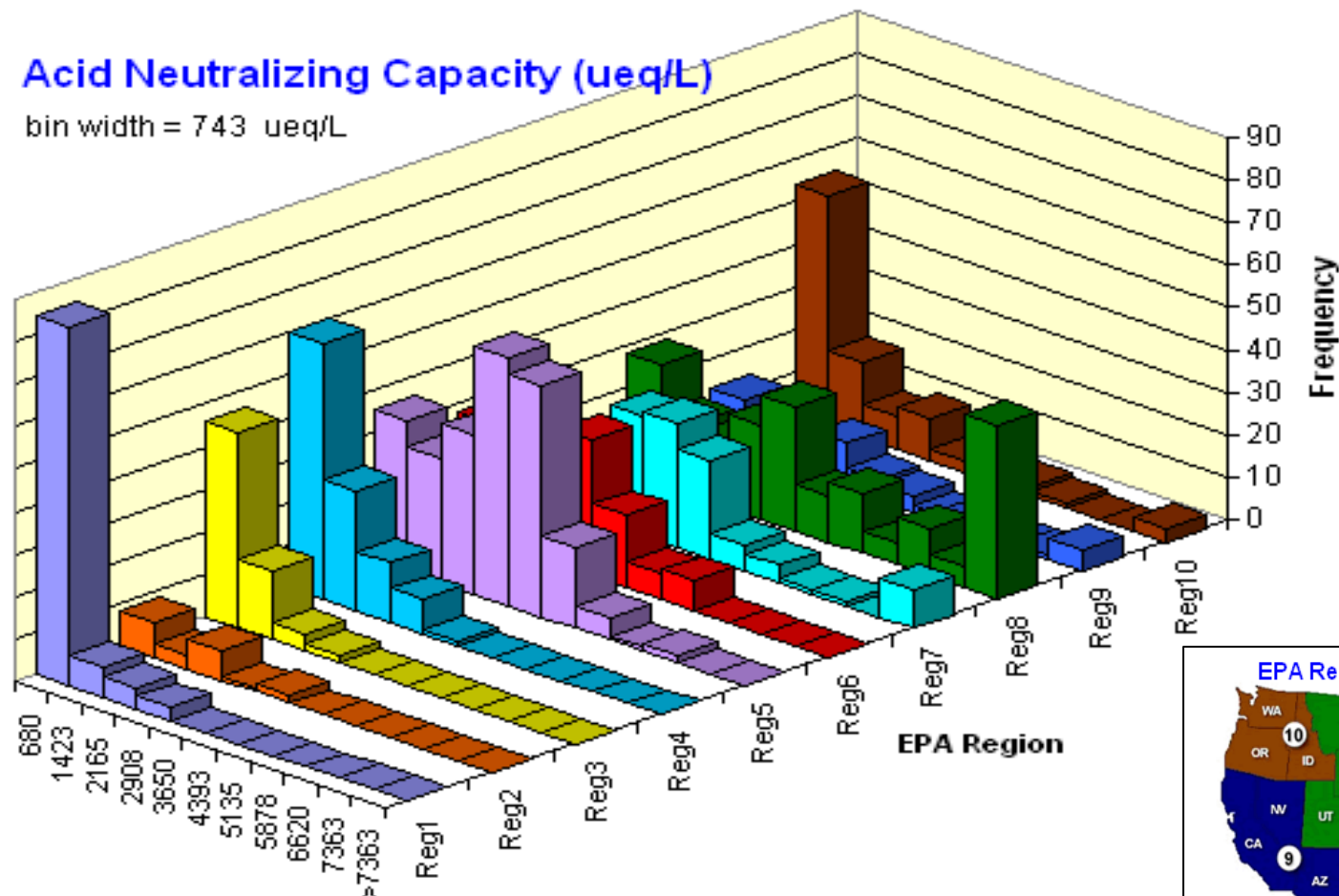


National & Regional view: ANC

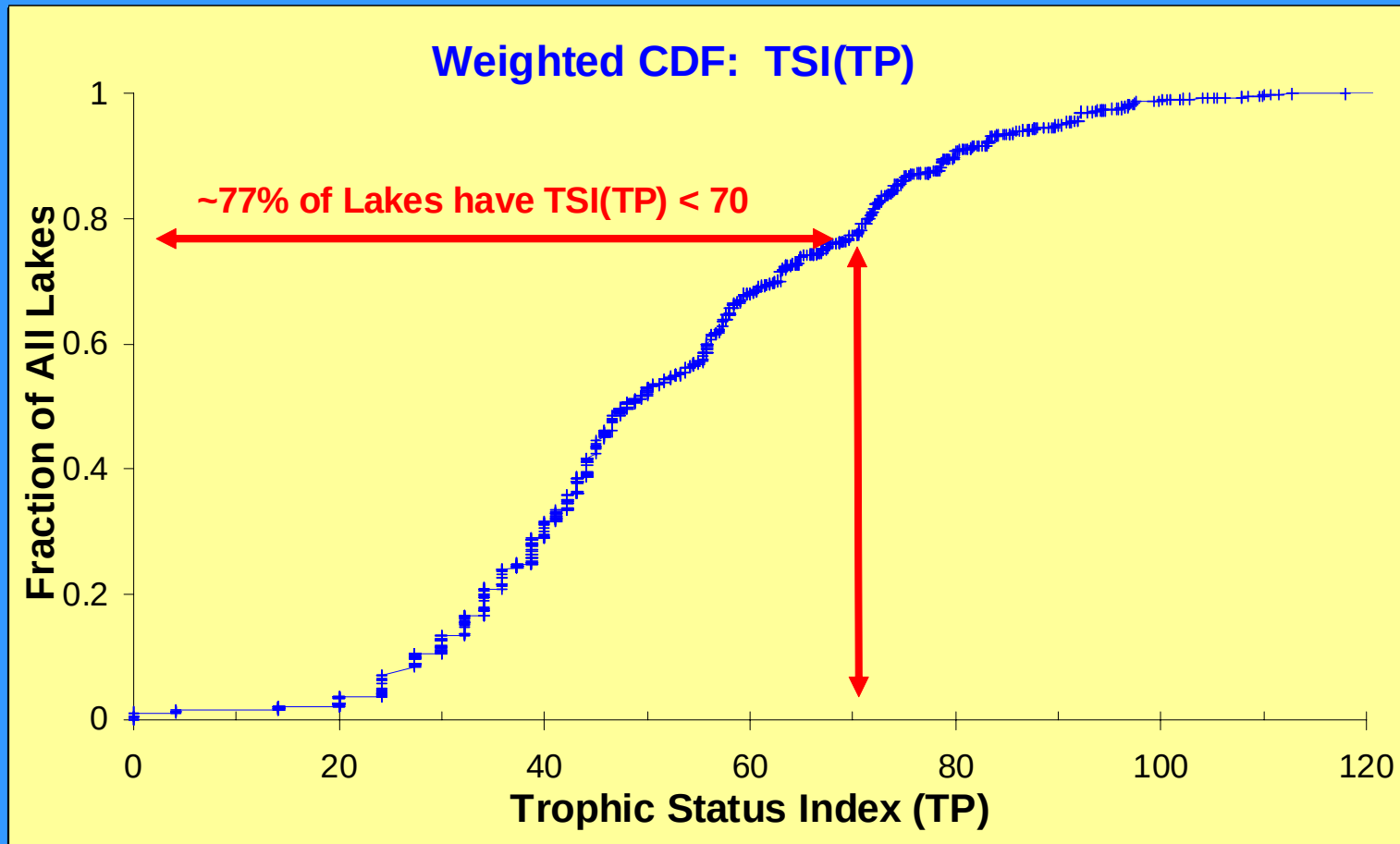
Histograms

Acid Neutralizing Capacity (ueq/L)

bin width = 743 ueq/L



Weighted Continuous Distribution Function (CDF)

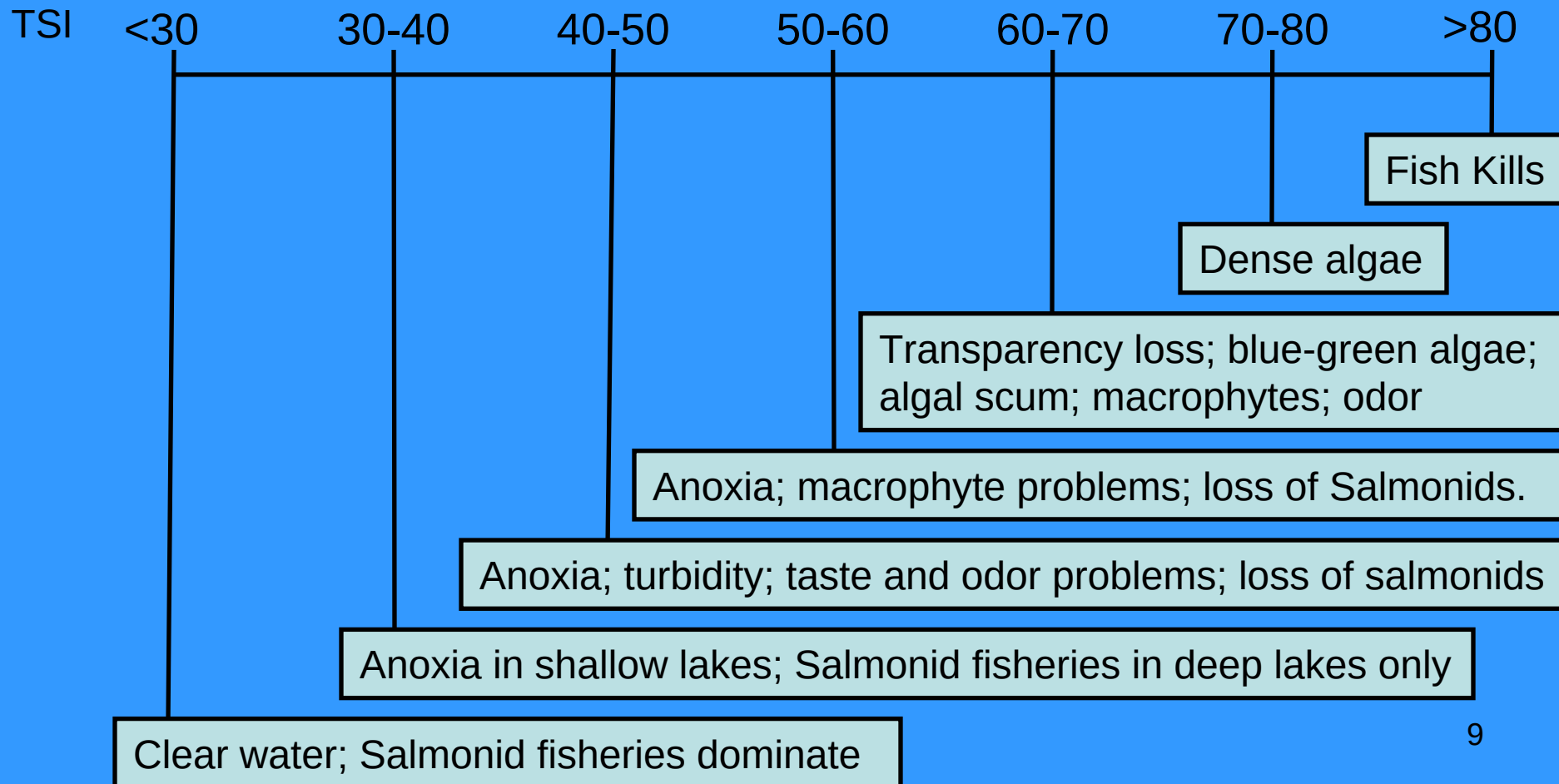


With probabilistic survey data..... can make statements regarding all lakes in nation

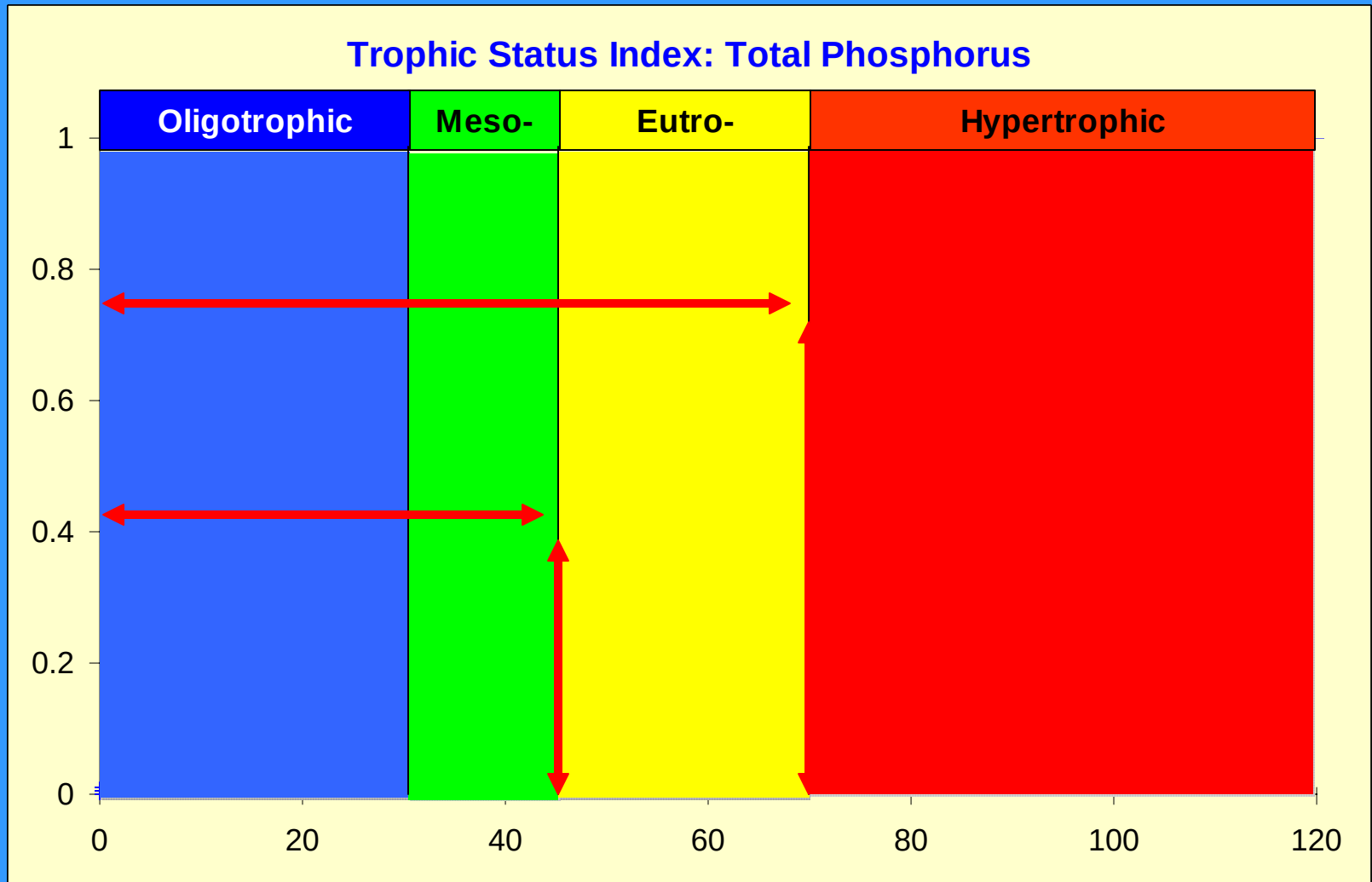
Trophic Status Indicator for Total Phosphorus

$$\text{TSI}(\text{TP}) = 14.42 \ln(\text{TP}) + 4.15$$

<http://castlehs.com/users/johlsen/ecology/A%20Trophic%20State%20Index.doc>

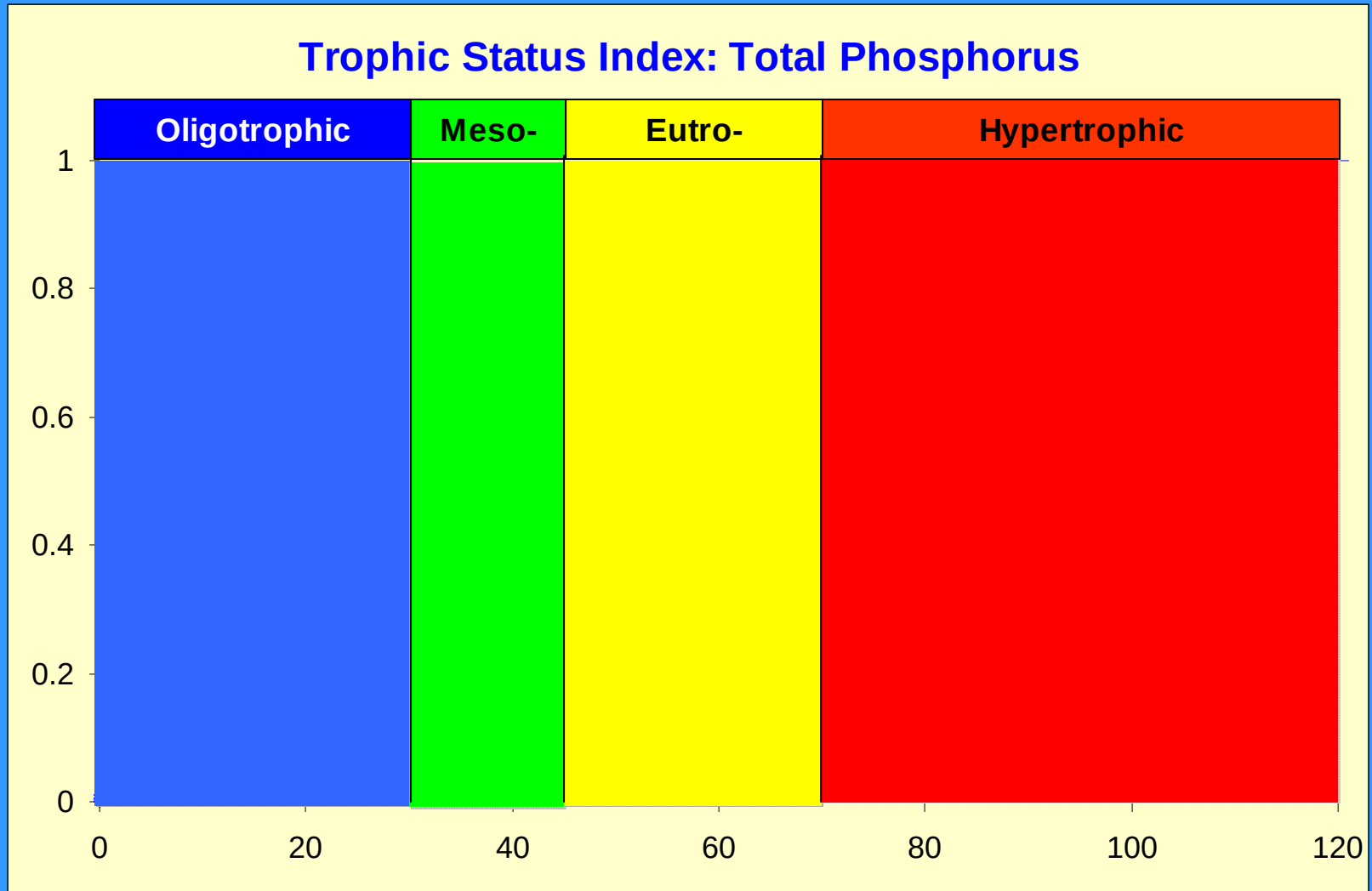


Weighted CDF: Trophic Status Index (TP)



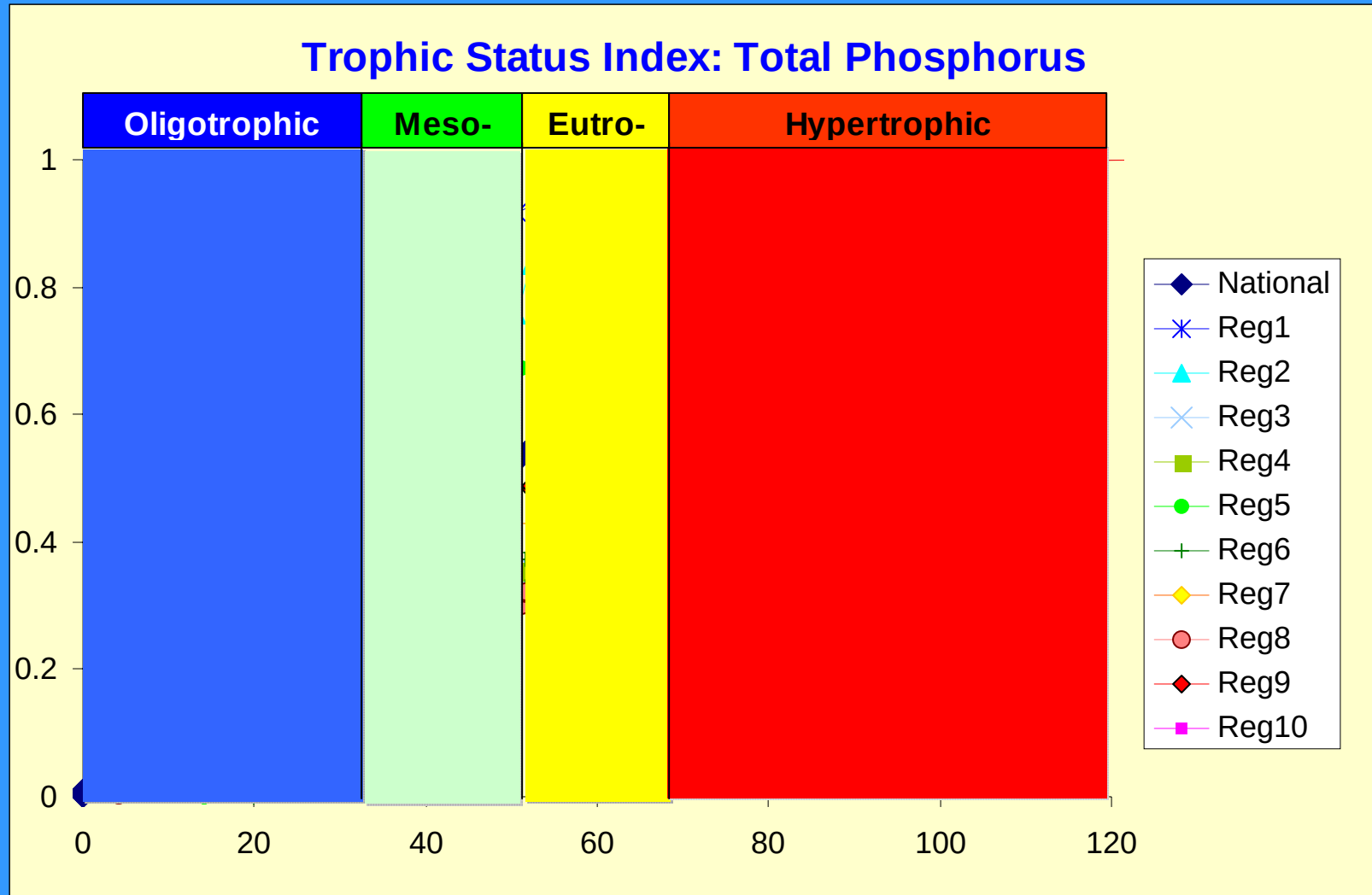
About 1/3 of Nation's lakes are classified as eutrophic by TSI(TP)

Weighted TSI(TP) EPA Regions 1 & 2

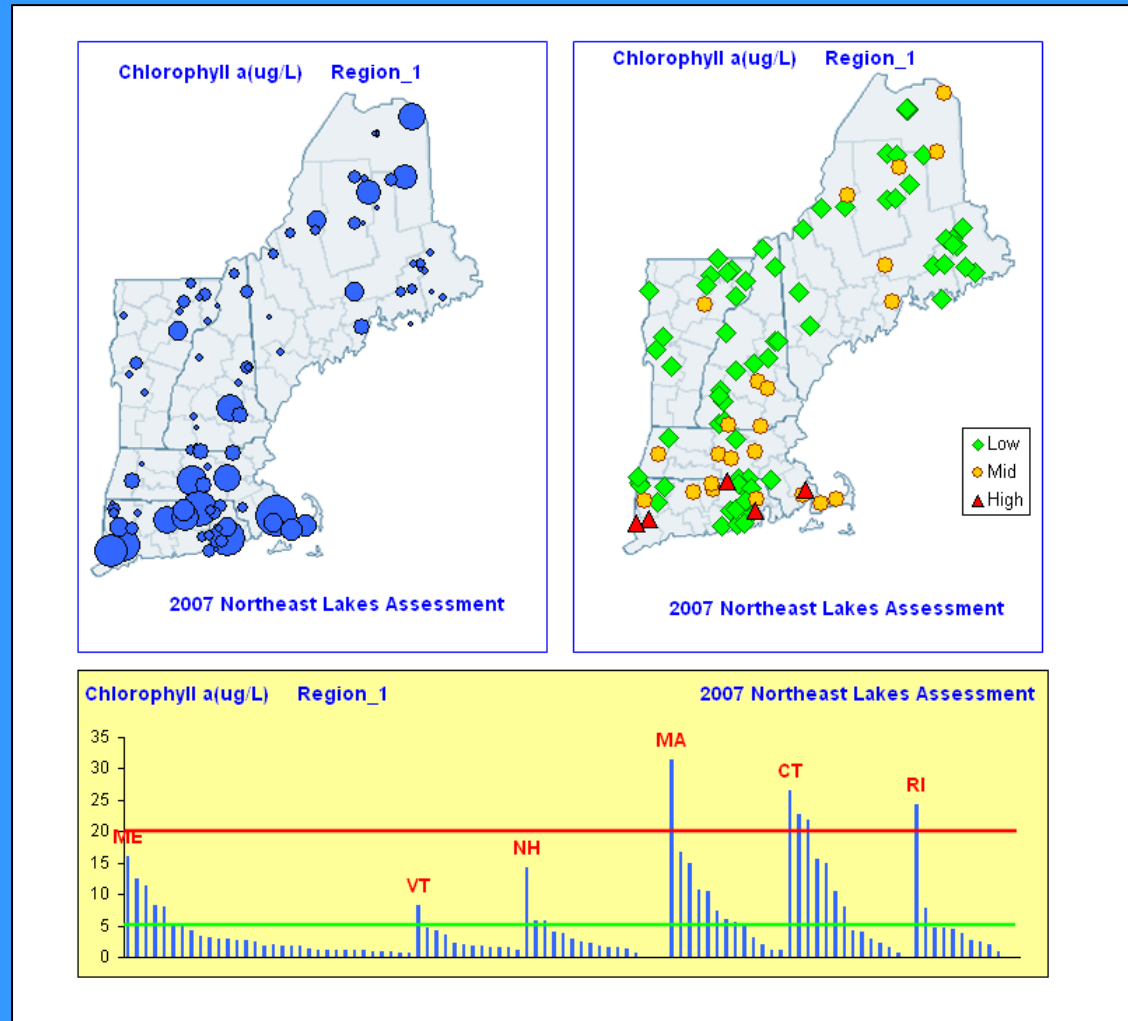


Northeast states are in better shape than most by this measure

Weighted TSI(TP) All EPA Regions



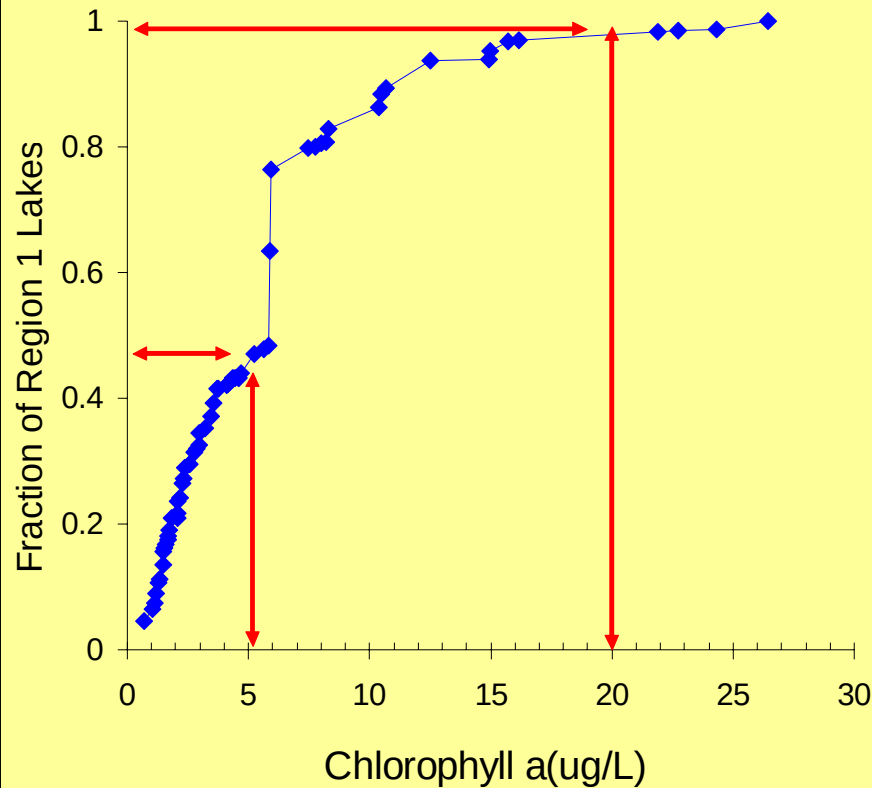
Region 1 NLA Lakes : Chlorophyll a



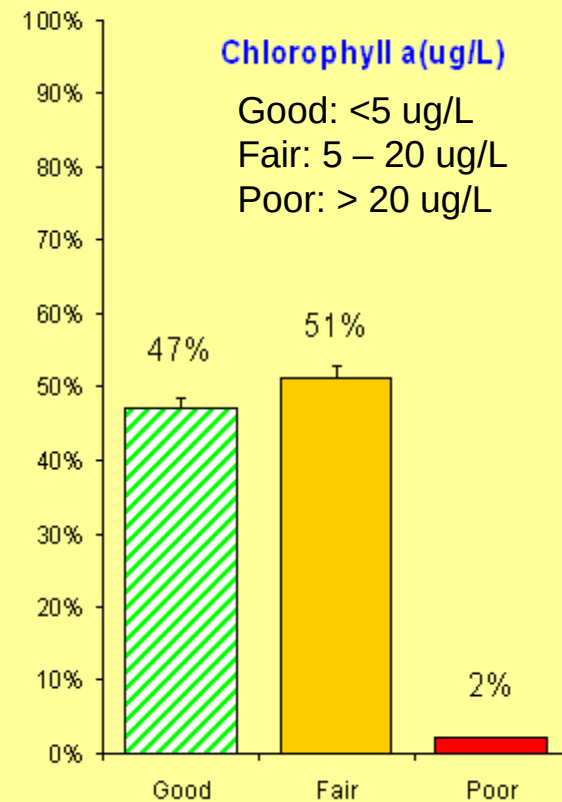
Justified statement based on unweighted data:
5 of 62 measured stations (8%) have [Chla] > 20 ug/L

Weighted Statistics for Region 1: Chlorophyll

Weighted CDF: Region 1 Lakes



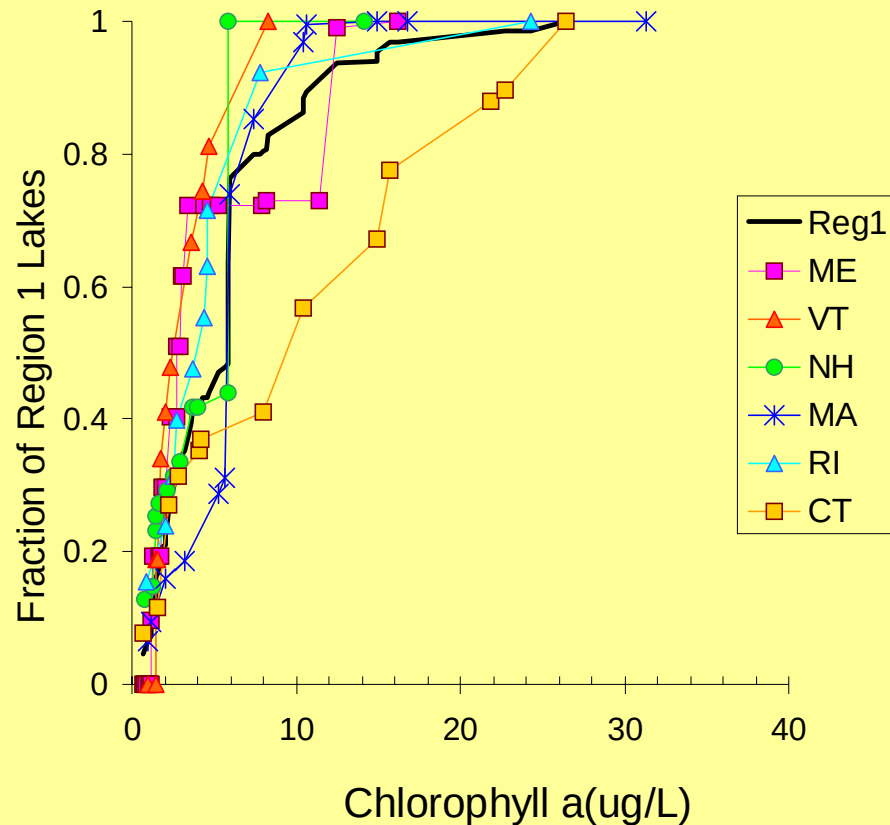
Estimated % of All Region 1 Lakes



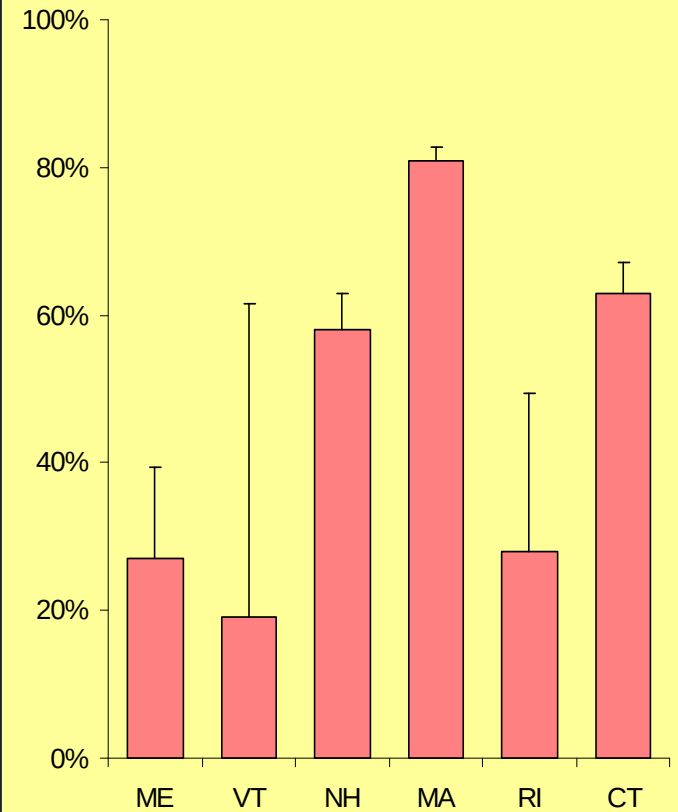
Justified statement based on probabilistic survey:
47 $\pm$ 2% of All Region 1 Lakes have [Chla] < 5 ug/L

State CDFs in Region 1: Chlorophyll

Weighted CDF: Region 1 Lakes by State



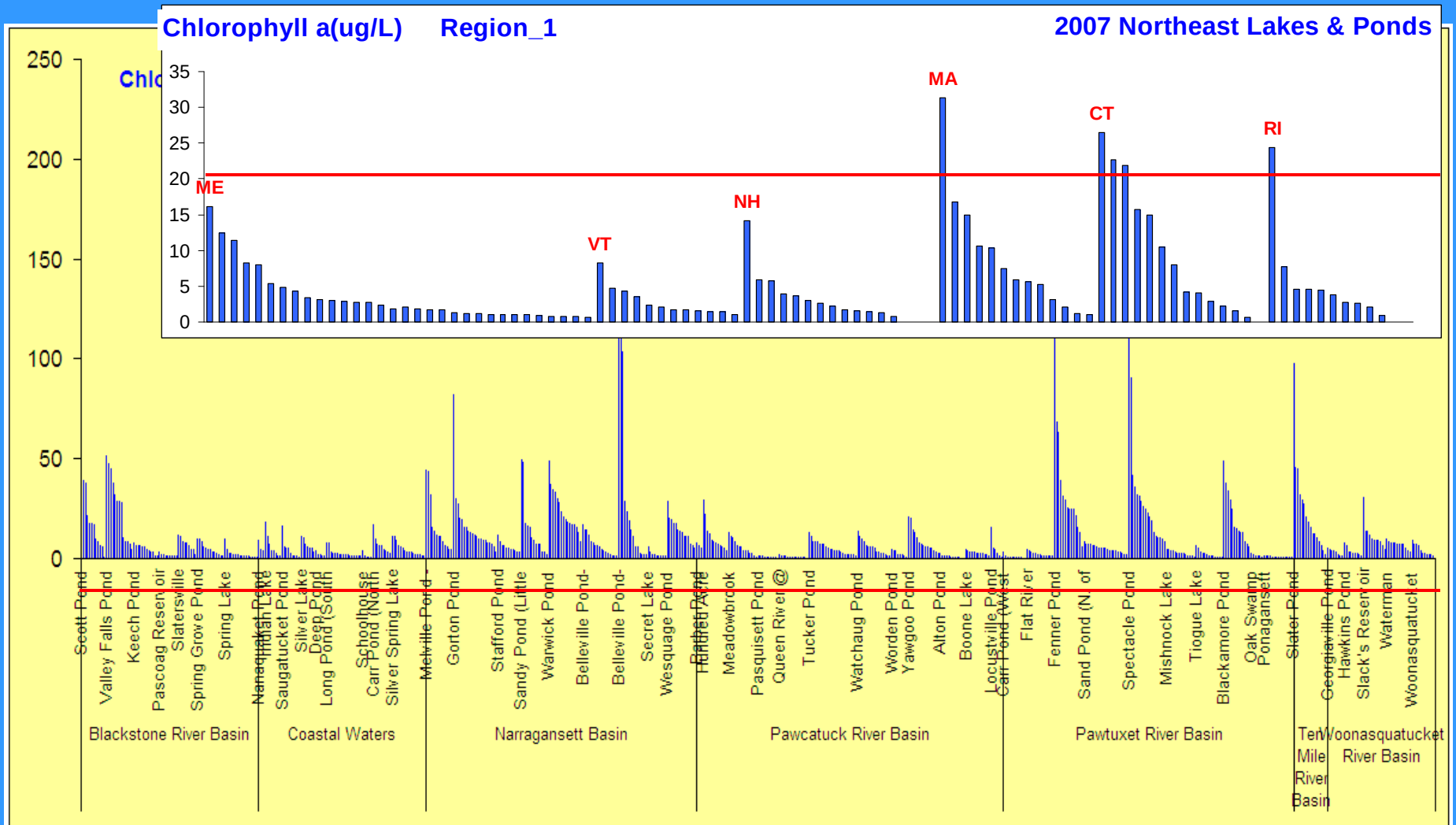
% of All Lakes with Chla > 5 ug/L



With NLA, can estimate extent of condition at the state level
Uncertainty in estimate can be large because of small "n".

URI Watershed Watch Program 2006

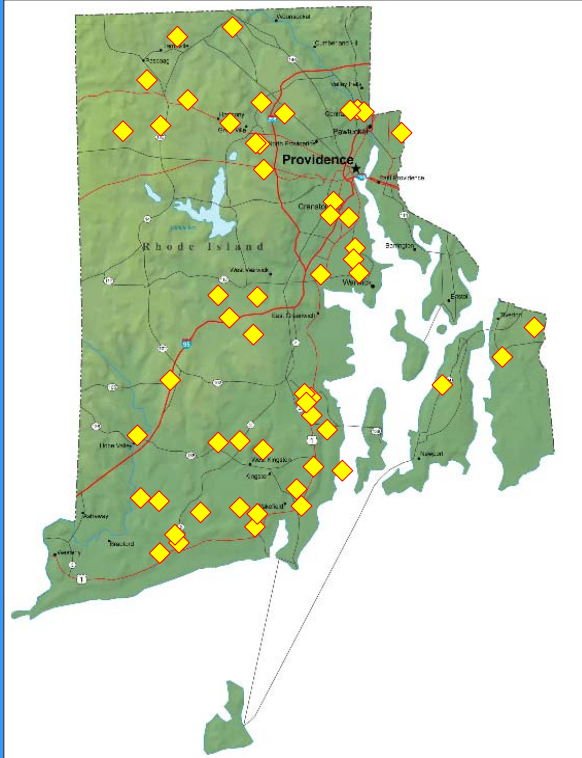
Volunteer (non-probabilistic) survey of RI Lakes



URI Watershed Watch Program 2006

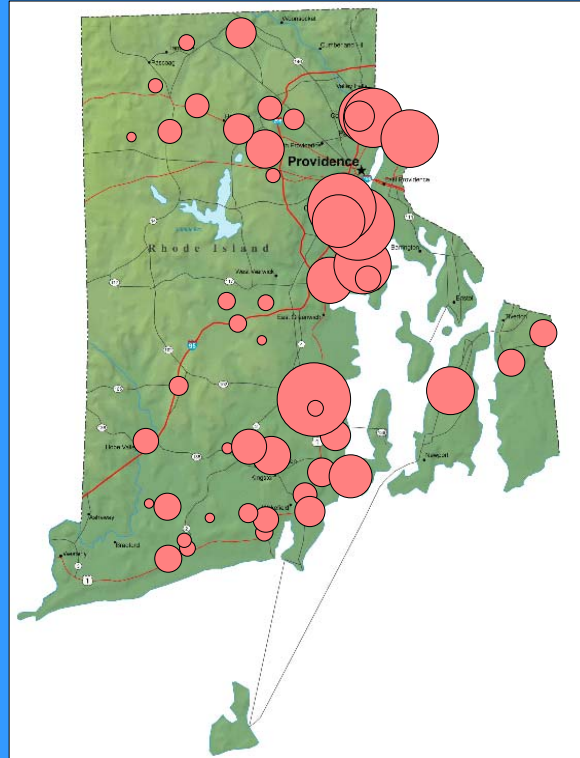
Volunteer (non-probabilistic) survey of RI Lakes

Chlorophyll a (ug/L)



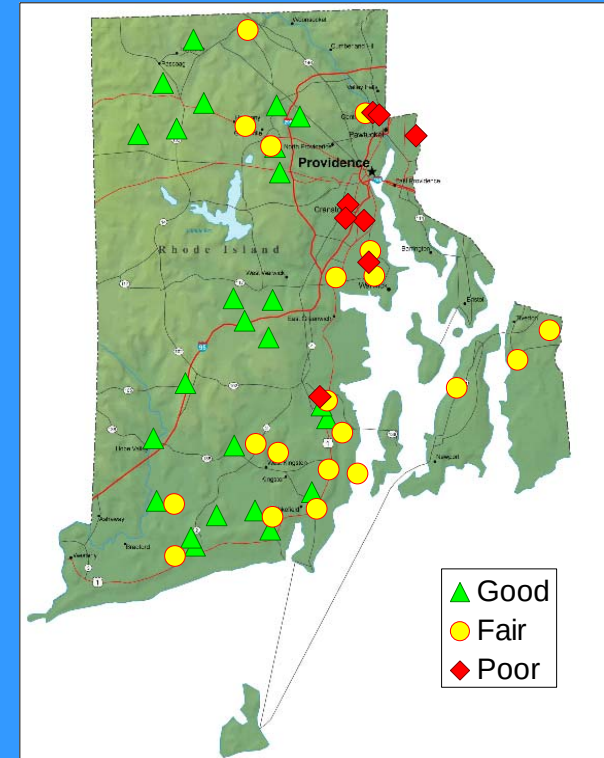
Watershed Watch Stations

Chlorophyll a (ug/L)



Average Unweighted Data

Chlorophyll a (ug/L)



Average Data

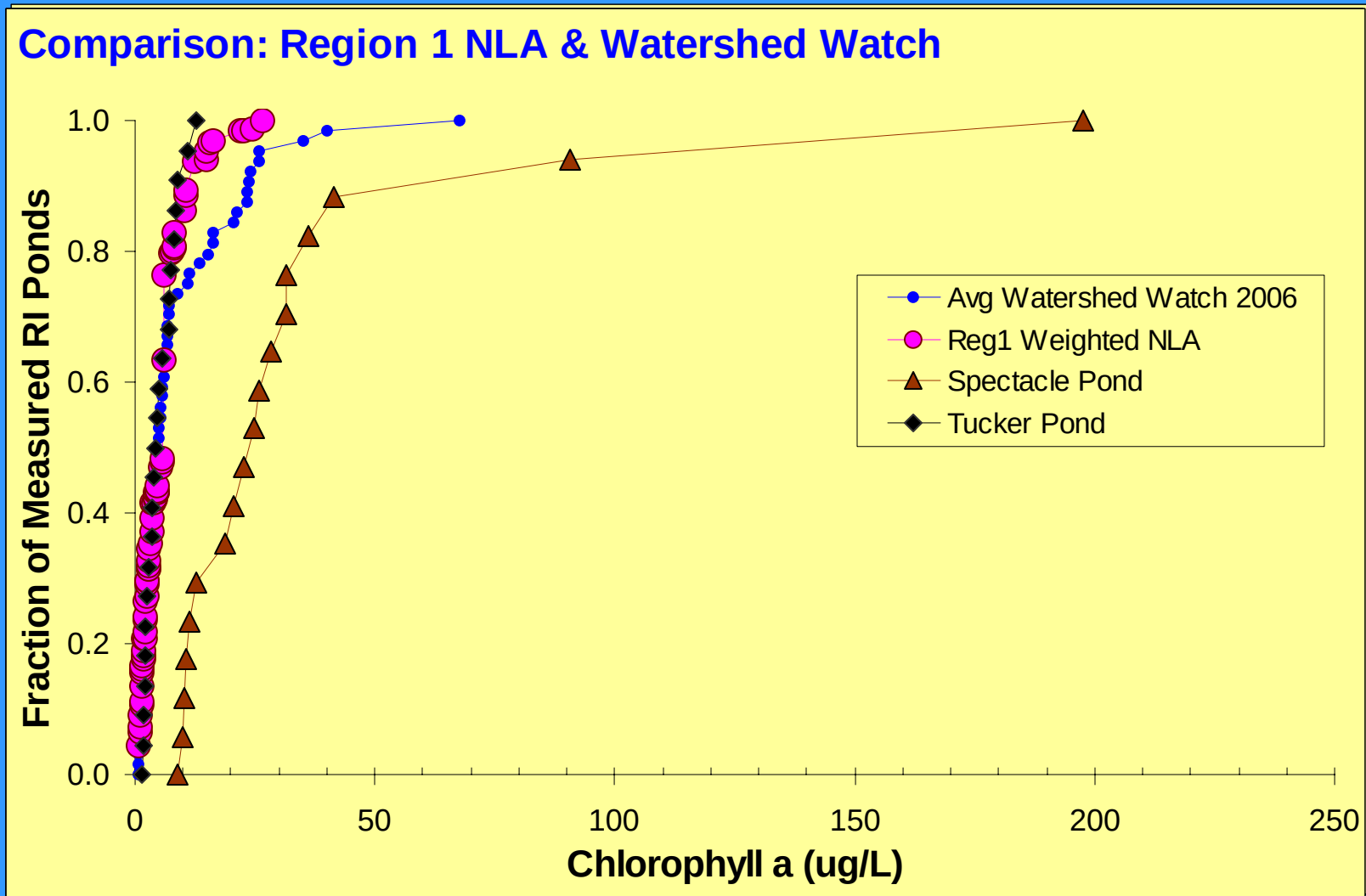
TH1 = 5 ug/L

Th2 = 20 ug/L

Non-probabilistic survey.....

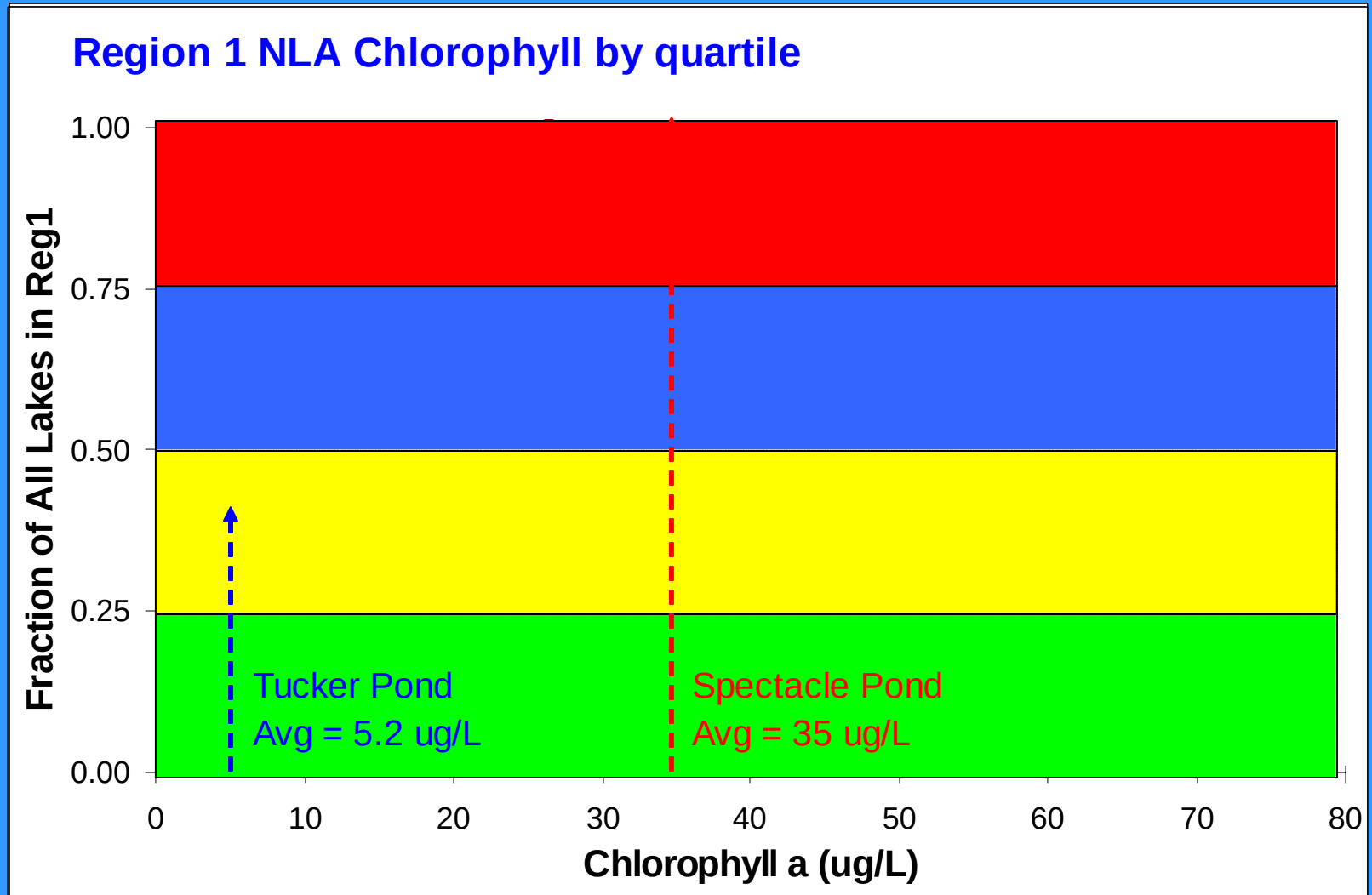
can't make statements about entire RI lake population

Comparing Watershed Watch Data with NLA



Non-probabilistic survey..... can't make statements about entire RI lake population

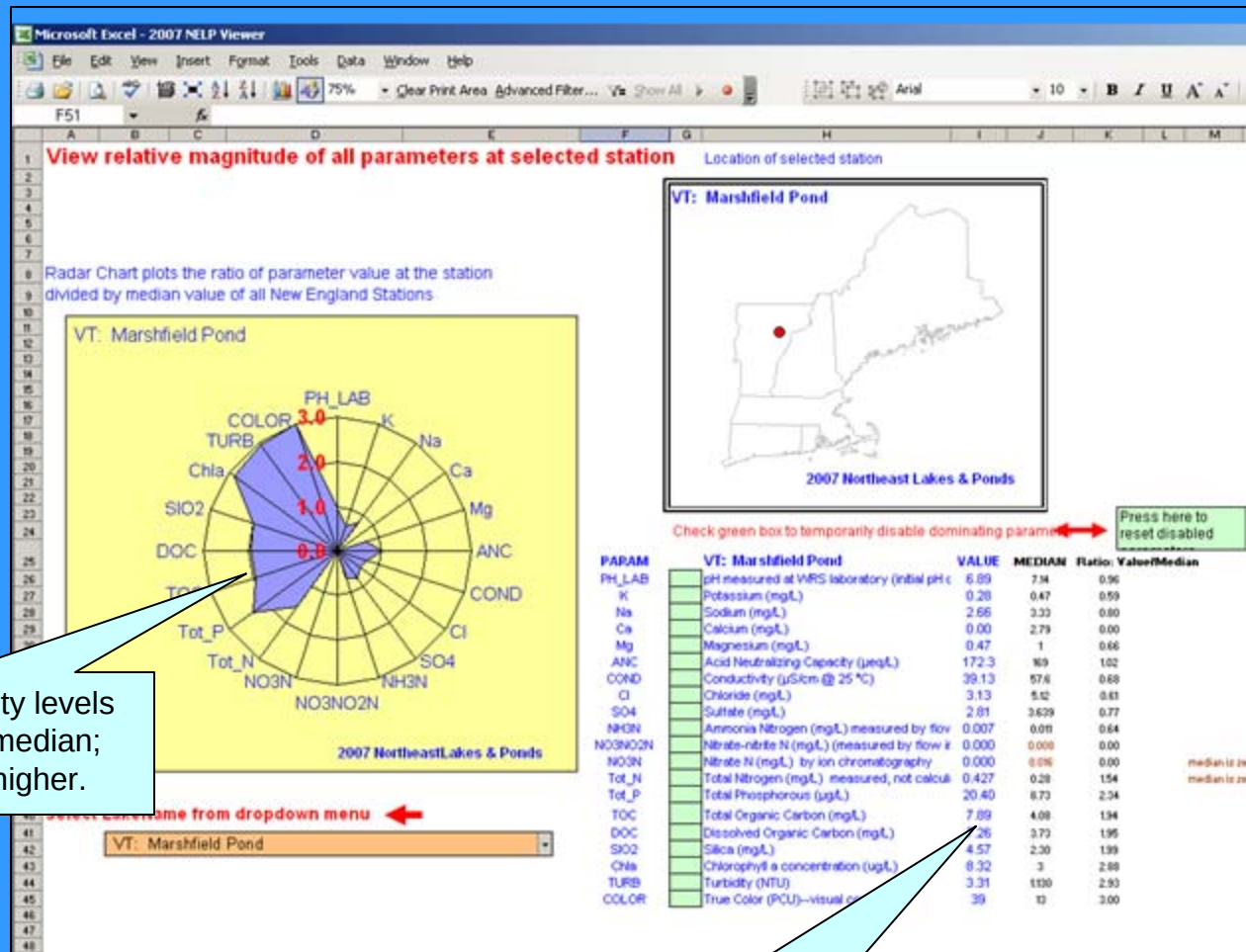
RI Volunteer Results vs Region 1 NLA Chla



Characterize volunteer result by NLA quartile

Radar Plot:

View all results at a lake relative to Regional average



Chlorophyll & turbidity levels about 3X regional median; Total P about 2X higher.

Summary of all data collected at selected lake

Summary: How are NLA data useful?

National scale

- Report on conditions by region, ecoregion
- Build baseline for future surveys

Regional scale, e.g., Northeast

- Provide consistent dataset for region
- Compare states with region & neighbors
- Form basis for future state probabilistic surveys

Local scale

- Provide context for local non-probabilistic surveys
- Focus on individual water body

Summary: Quick view of NLA results

Differences are evident among regions and states

Multiple views of data are helpful

Weighted CDFs are useful aid in comparisons

If probabilistic surveys are useful..... It may be advisable to build upon them at the state level



Excel “tool” to view survey data

- Familiar Excel environment

- Simple operation

- Data available on spreadsheet

- Can manipulate graphics for reports

- Offers multiple views of data

 - distribution plots

 - bubble plots

 - condition maps

 - percentage plots

 - basic stats

 - histograms

 - CDFs

Feedback is sought & appreciated

Is the approach advisable?

Who would use such a tool?

How would you use it?

Any component particularly useful.... or not?

What's missing?

Contact (at USEPA Narragansett)

John Kiddon kiddon.john@epa.gov 401-782-3044

Hal Walker walker.henry@epa.gov 401-782-3134