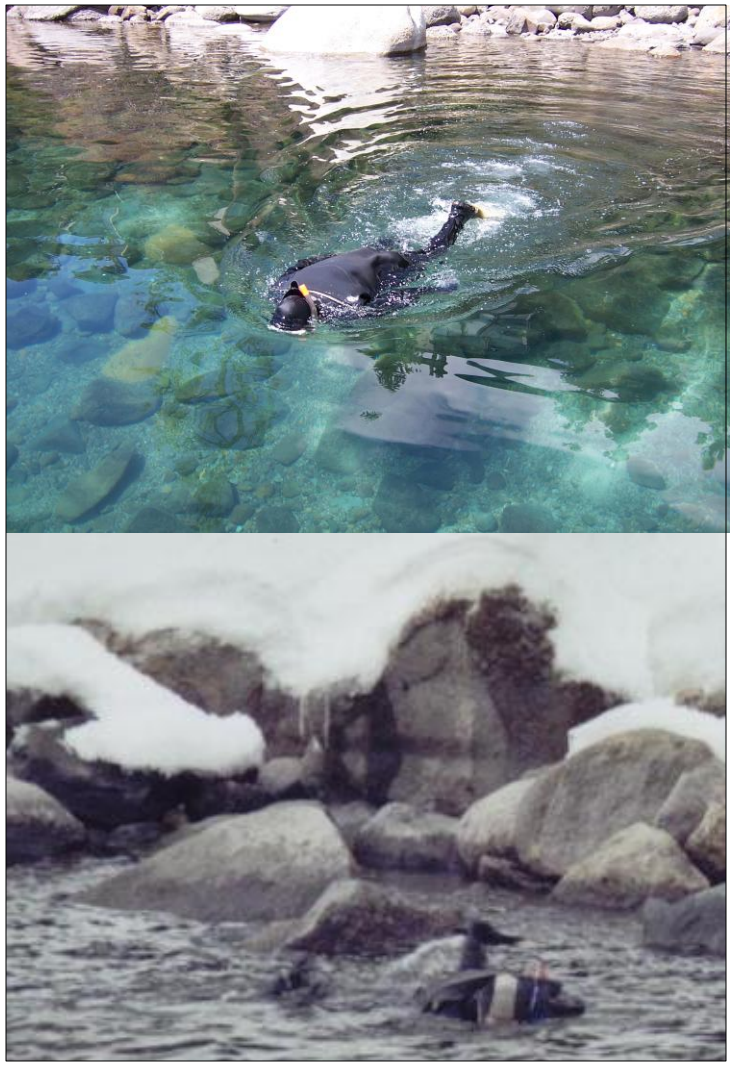

# Periphyton Biomass Index: A New Metric for an Old Indicator

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Tahoe Environmental Research Center

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UCDAVIS
TAHOE ENVIRONMENTAL RESEARCH CENTER

# Background

1. Nuisance periphyton indicator of water quality and eutrophication with aesthetic and ecological ramifications

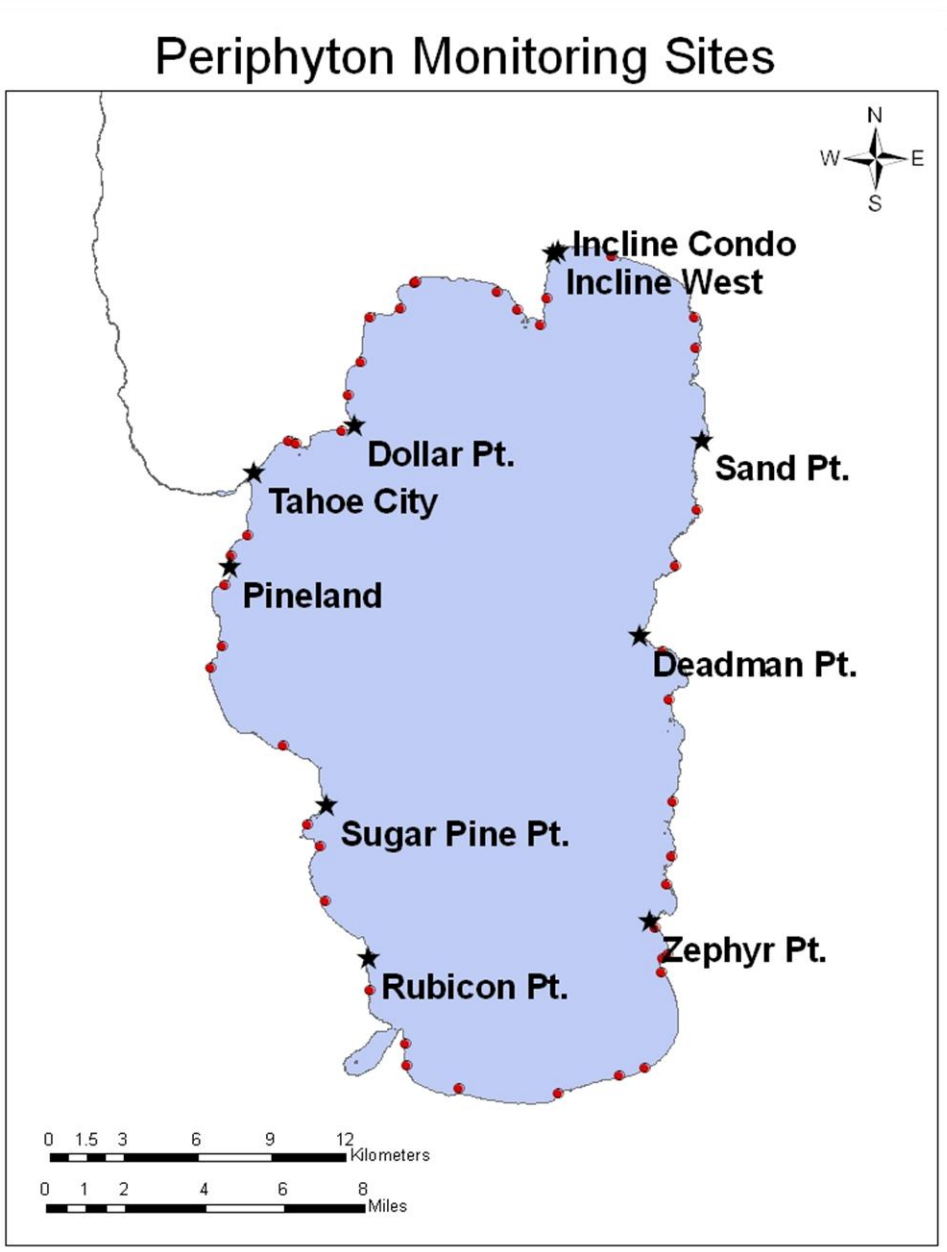
2. Critical metric for nearshore condition, yet quantitative targets are rare in literature

3. Portions of Tahoe shoreline virtually free year-round while others have distinct seasonal blooms.

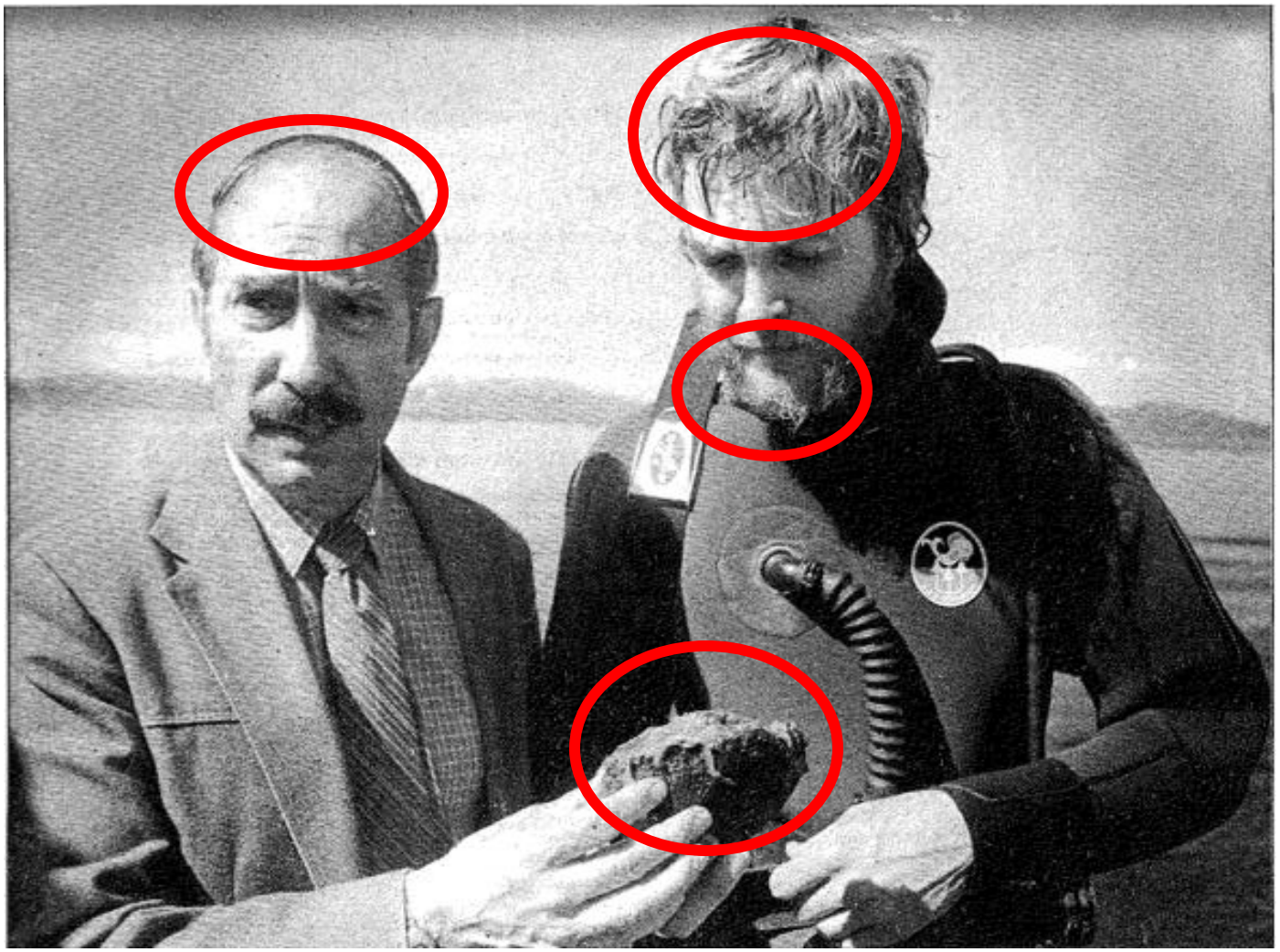
4. Linked to localized nutrient load, lake level, wave action, etc.

# Monitoring Program

- Long-term sampling: 1982-1985, 89-92, 2000-2011
- Up to 10 routine sites 5-8x/yr, year-round
- Lake-wide, synoptic survey (n=45-50) during spring biomass maximum
- Natural rock substrate at 0.5 m



# Artificial Substrates

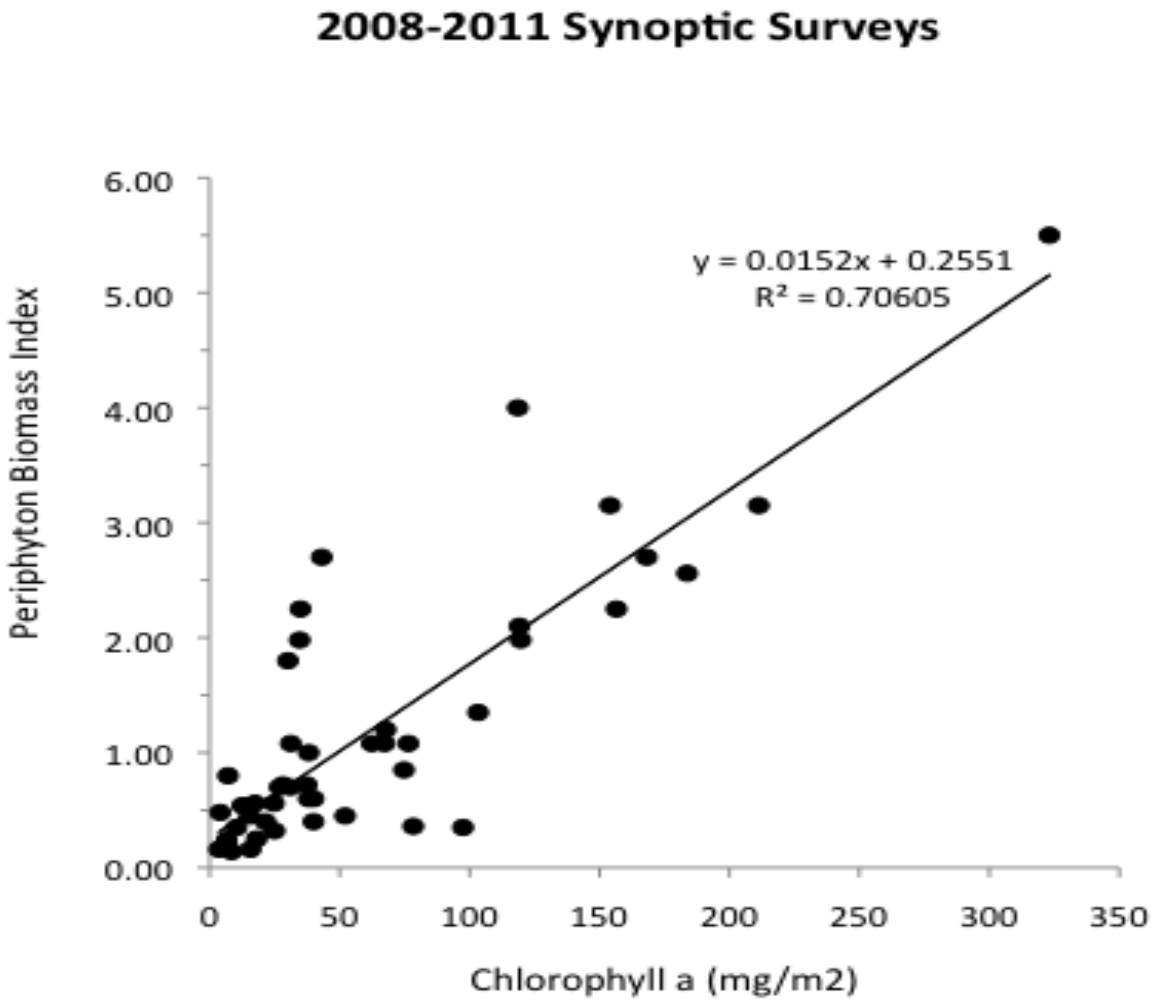


From: *Tahoe World*, May 28, 1982.
'Alarming Deterioration' In Lake Tahoe Clarity

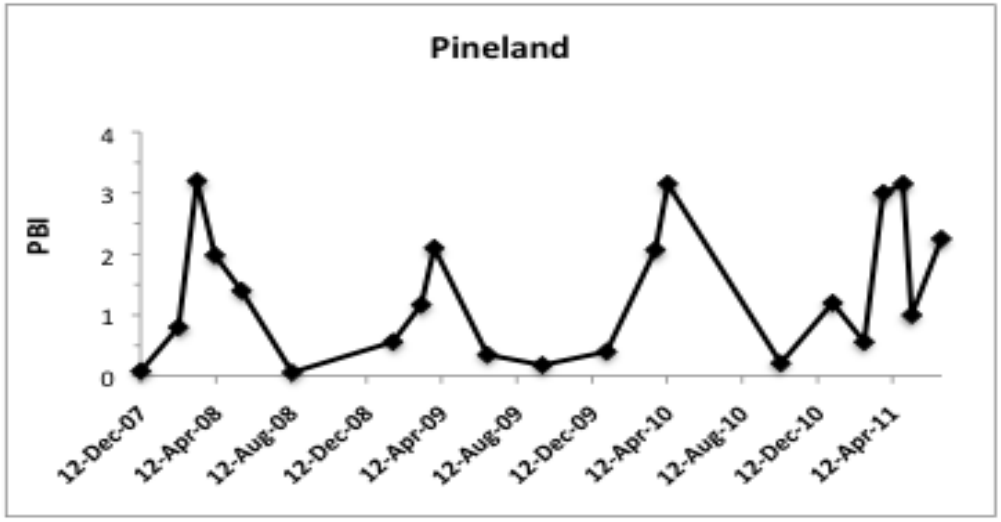
# Periphyton Biomass Index (PBI)

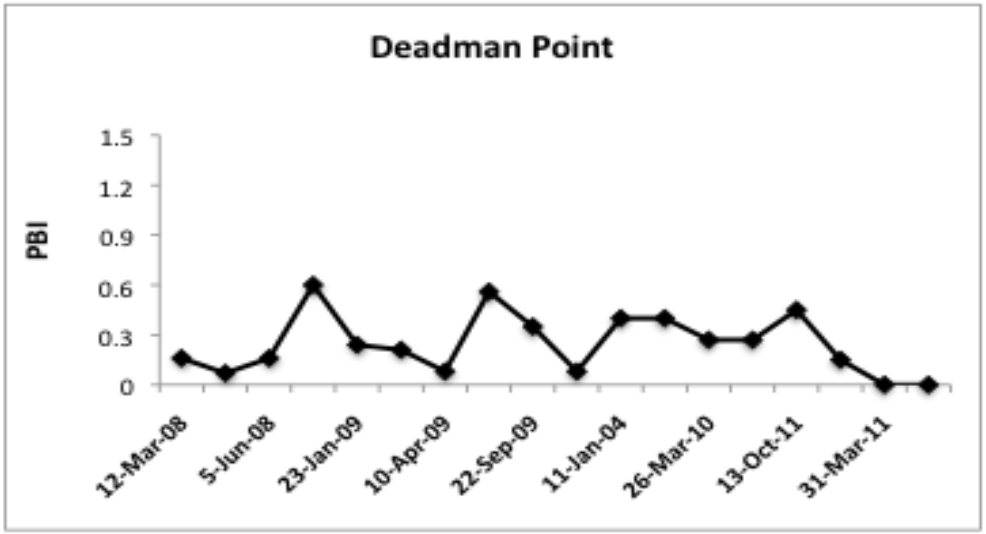
- Developed PBI as a low-cost, time-saving surrogate to current method
- PBI = % bottom area covered *x* average filament length or thickness (cm)
- Example – 40% coverage with 2 cm algal filaments = PBI of 0.8
- Based on direct field observations – more sites sampled for same time and less cost
- Supported by literature

# Agreement Between PBI and Chlorophyll Biomass Methods

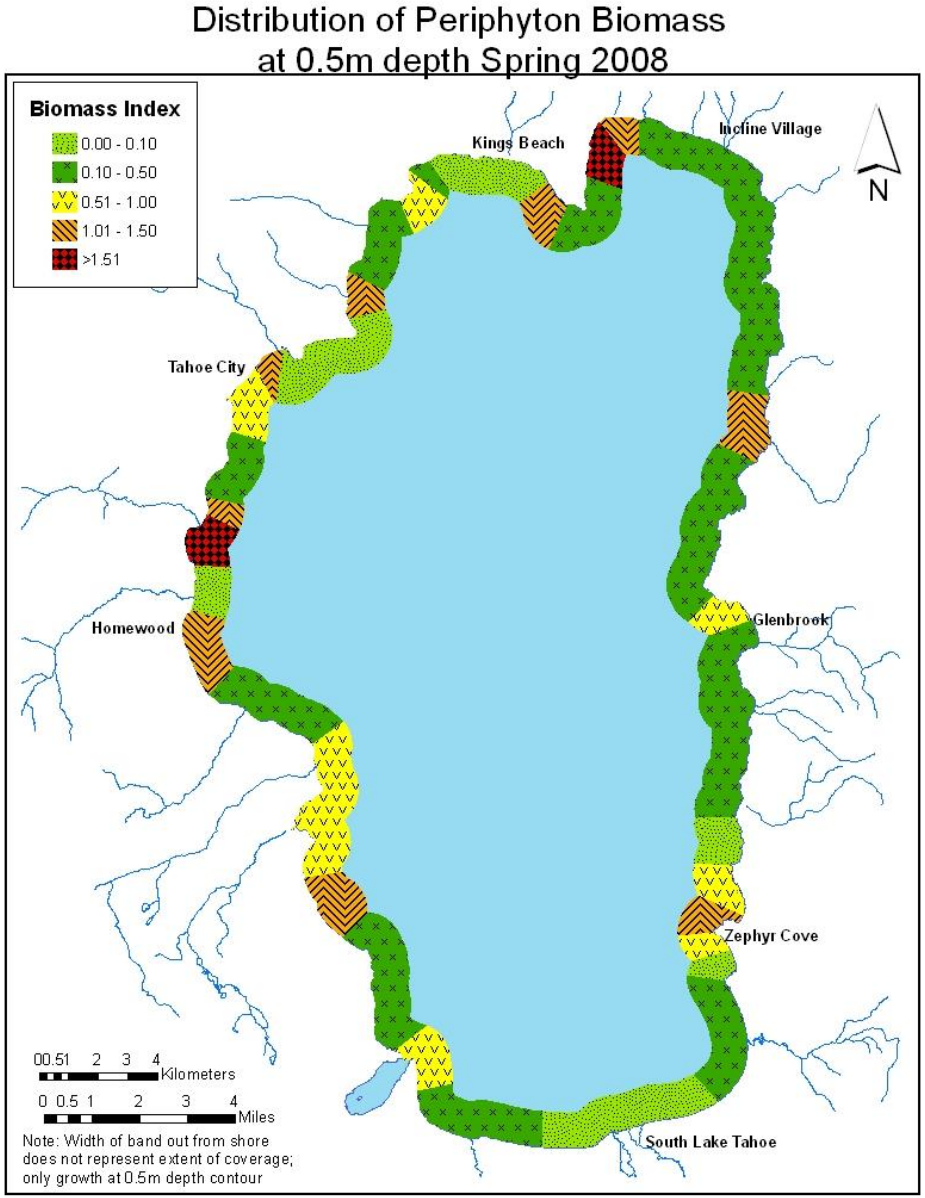


# PBI shows typical seasonal patterns

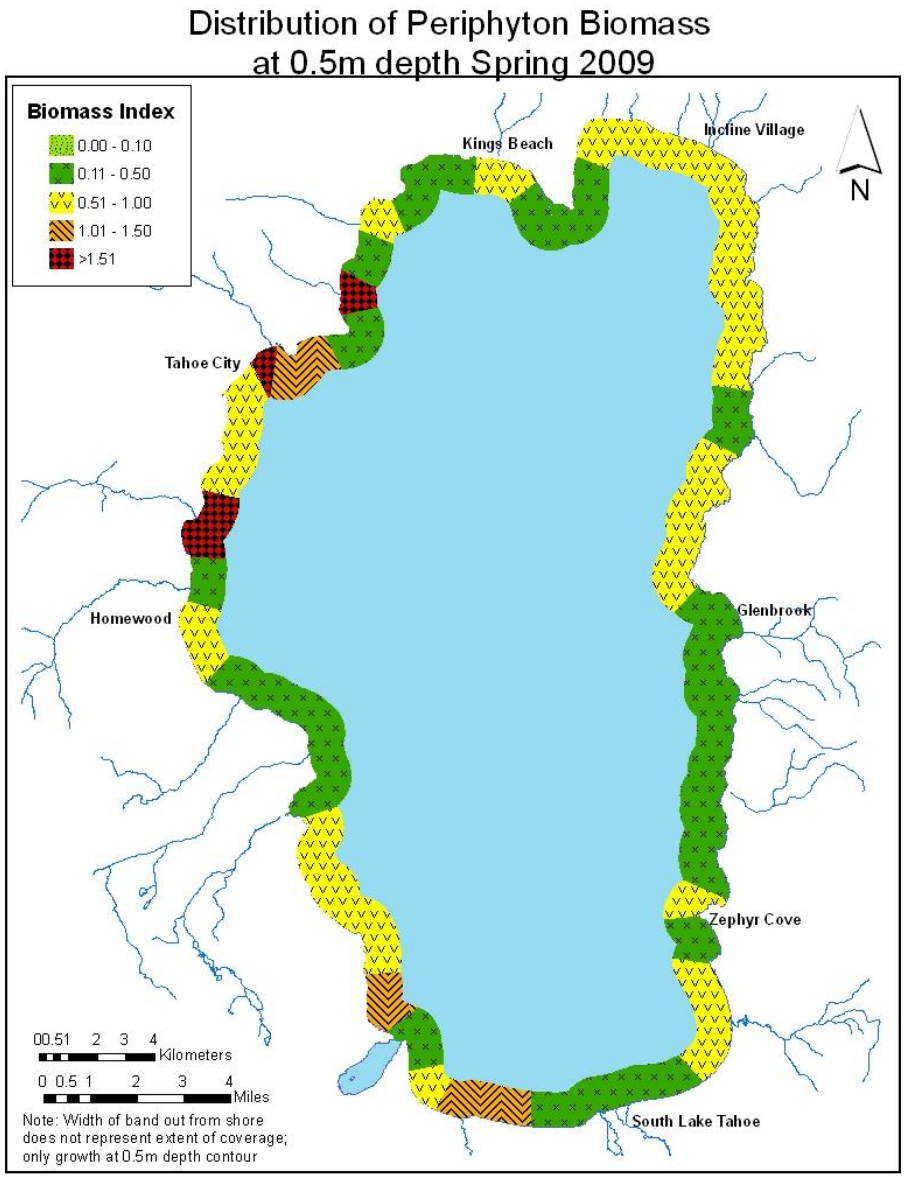


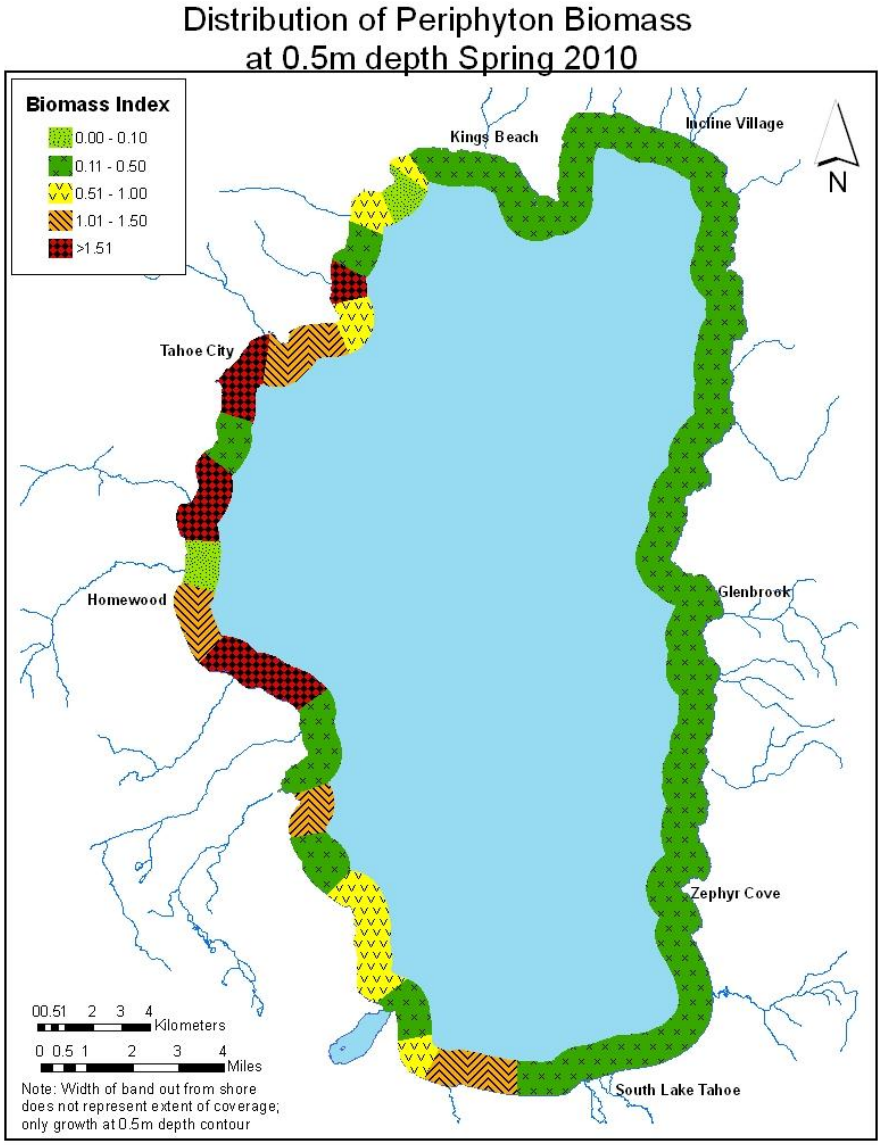
# Synoptic Annual Biomass Maximum



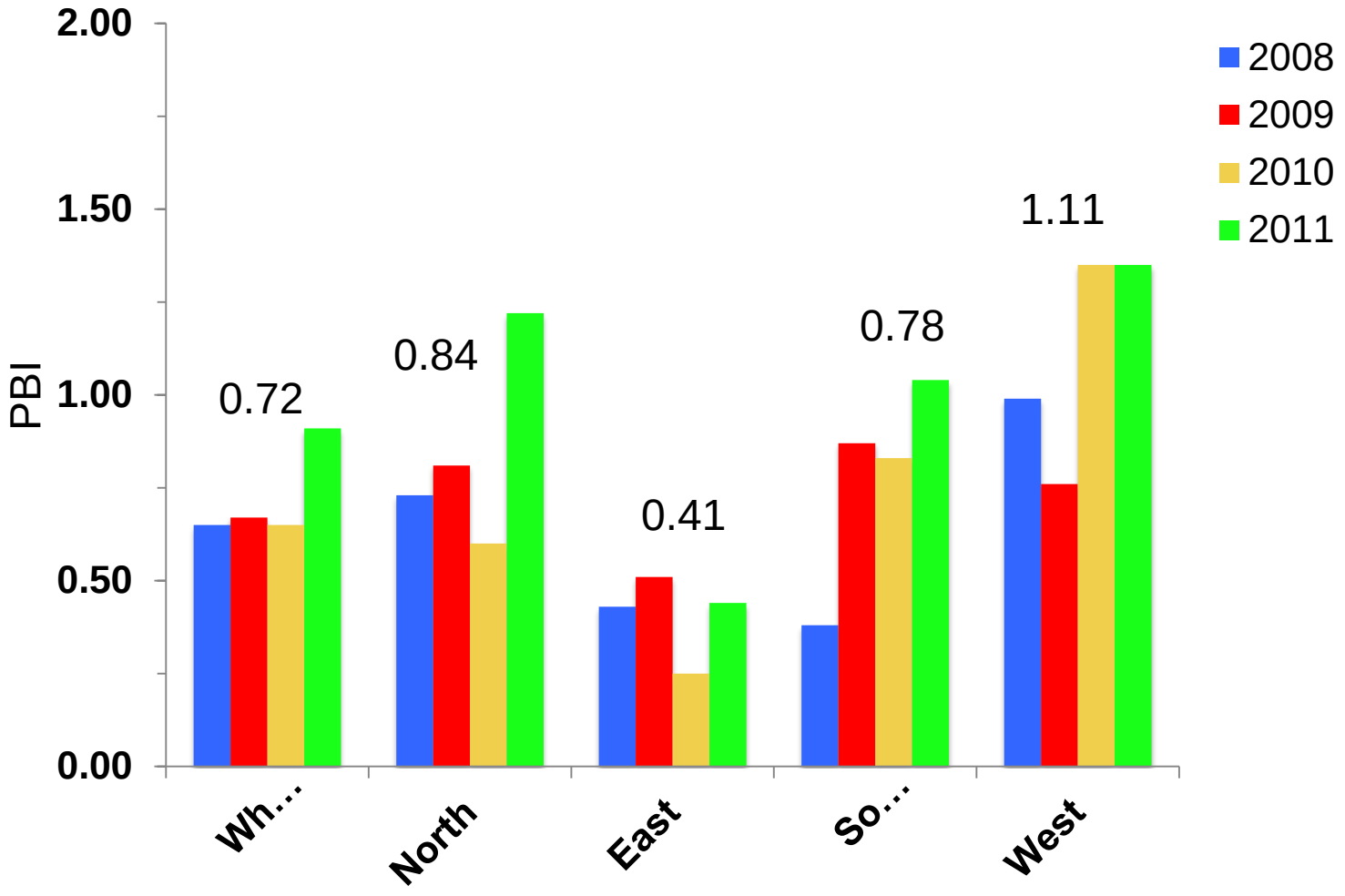
# Synoptic Annual Biomass Maximum



# Synoptic Annual Biomass Maximum

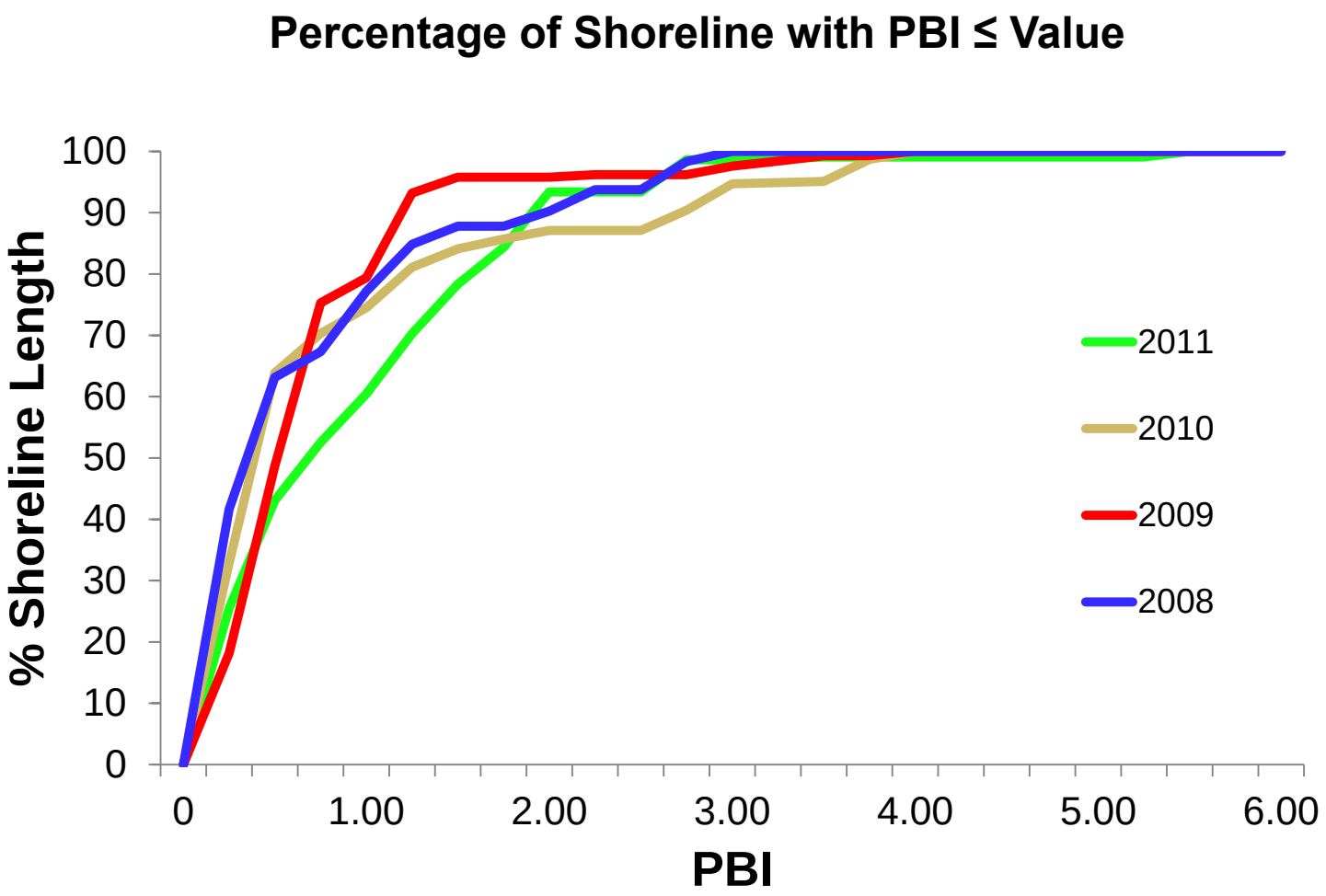


# Annual PBI Maximum by Region

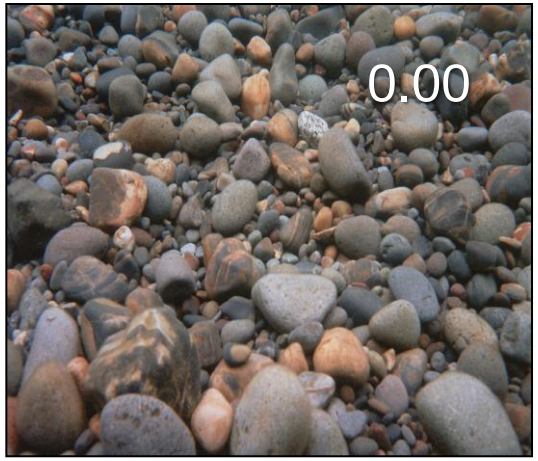


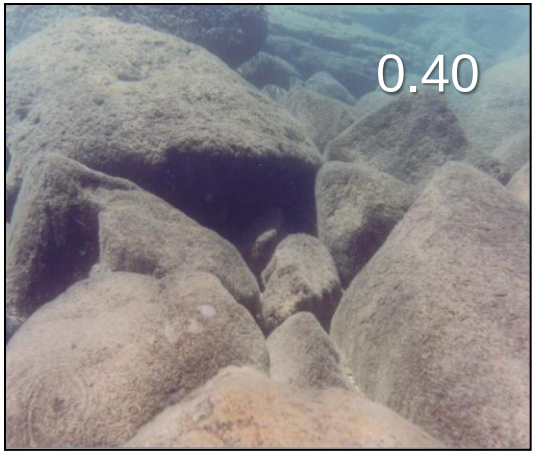

Weighted by km of shoreline

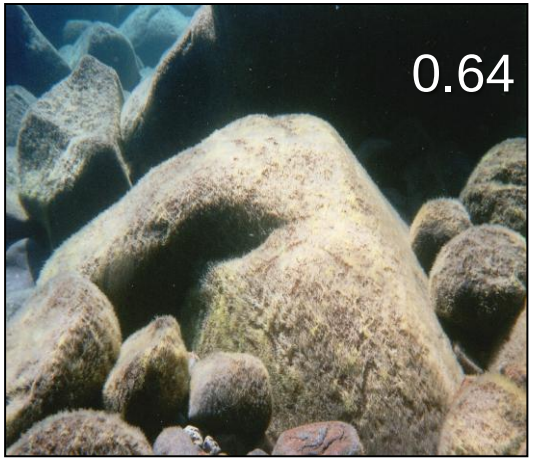
# Synoptic View of Annual Maximum Biomass



# PBI used to Assess Public Preference



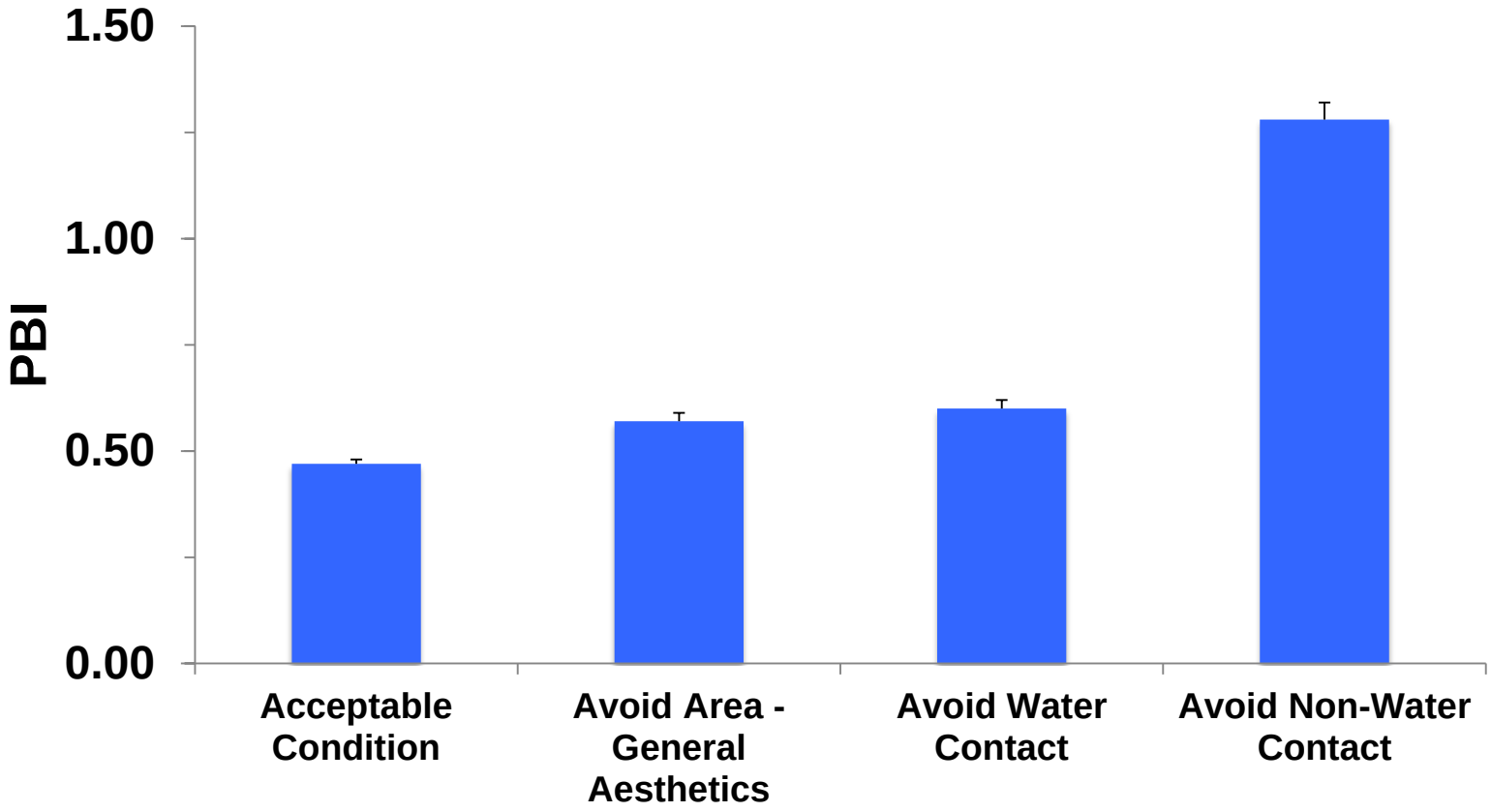



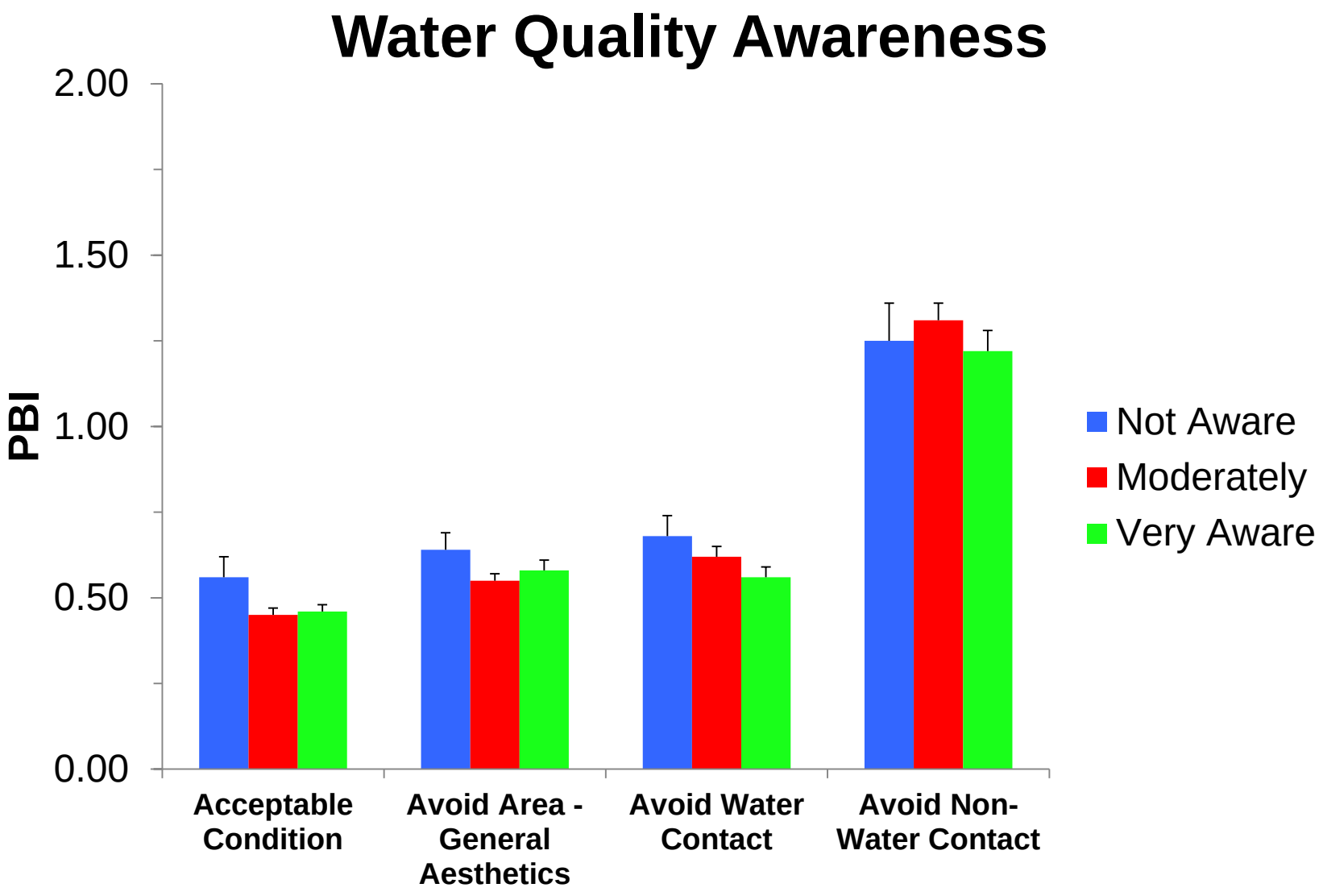


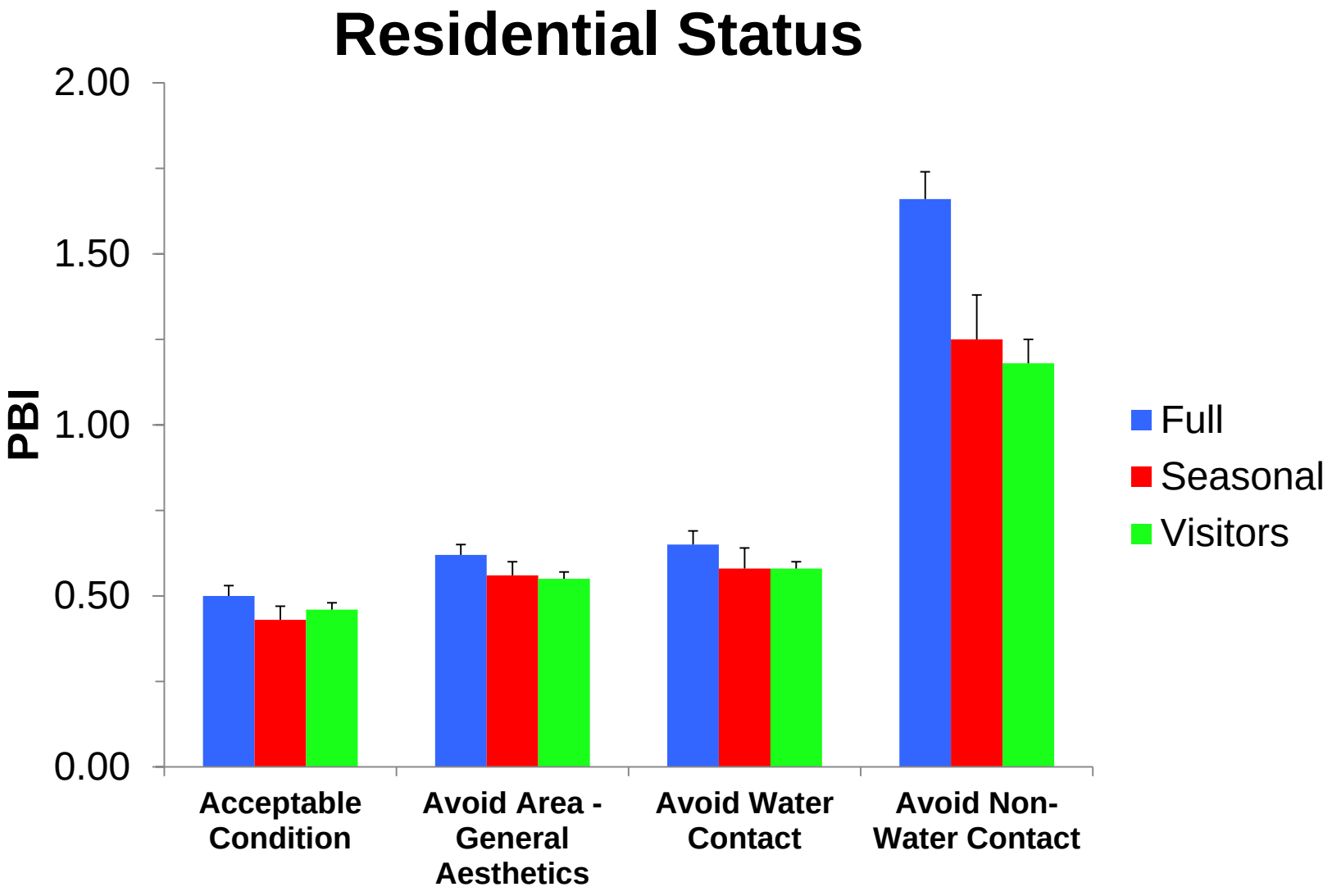

**TERC Pilot Survey**

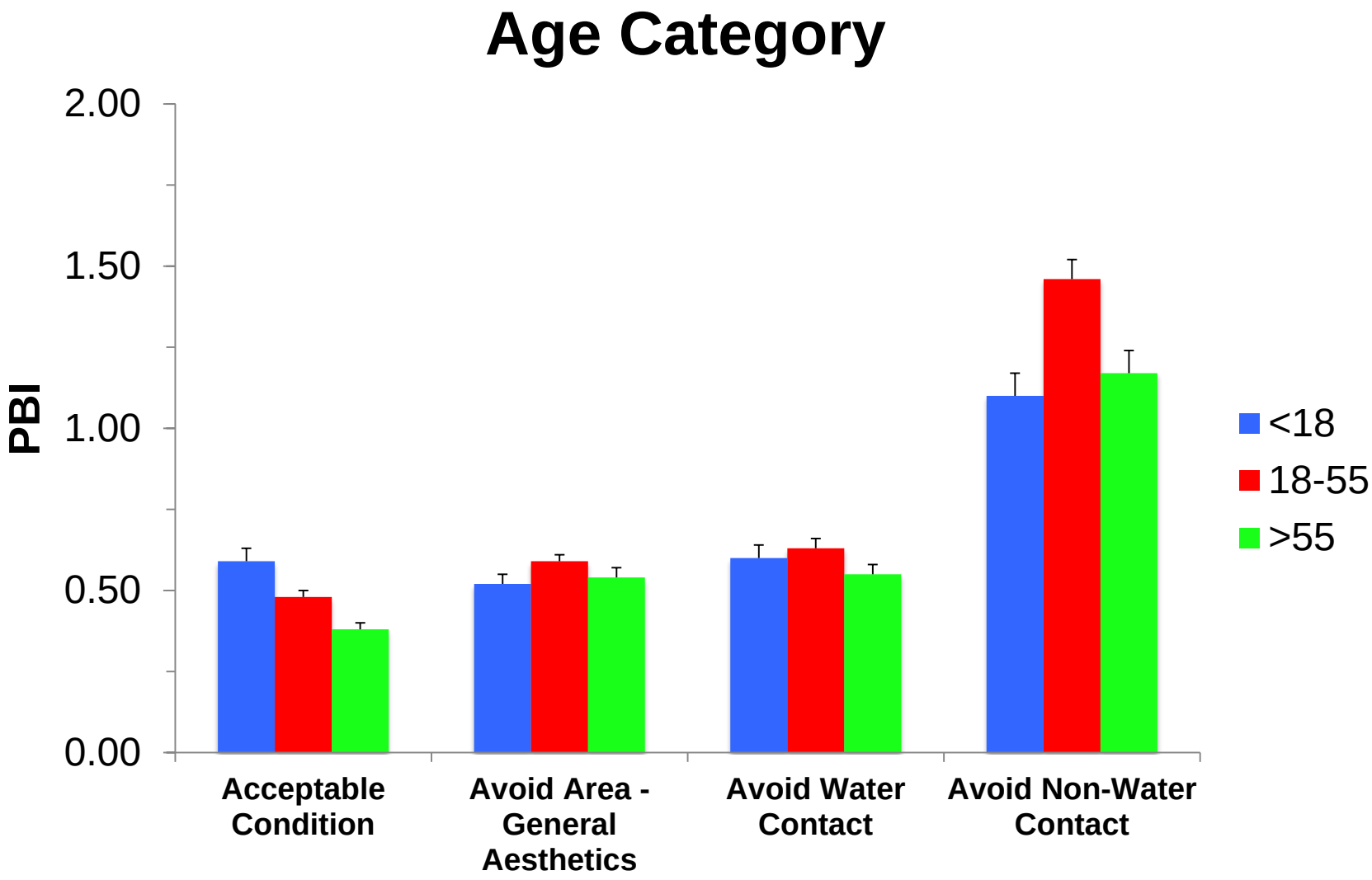
**N=147**

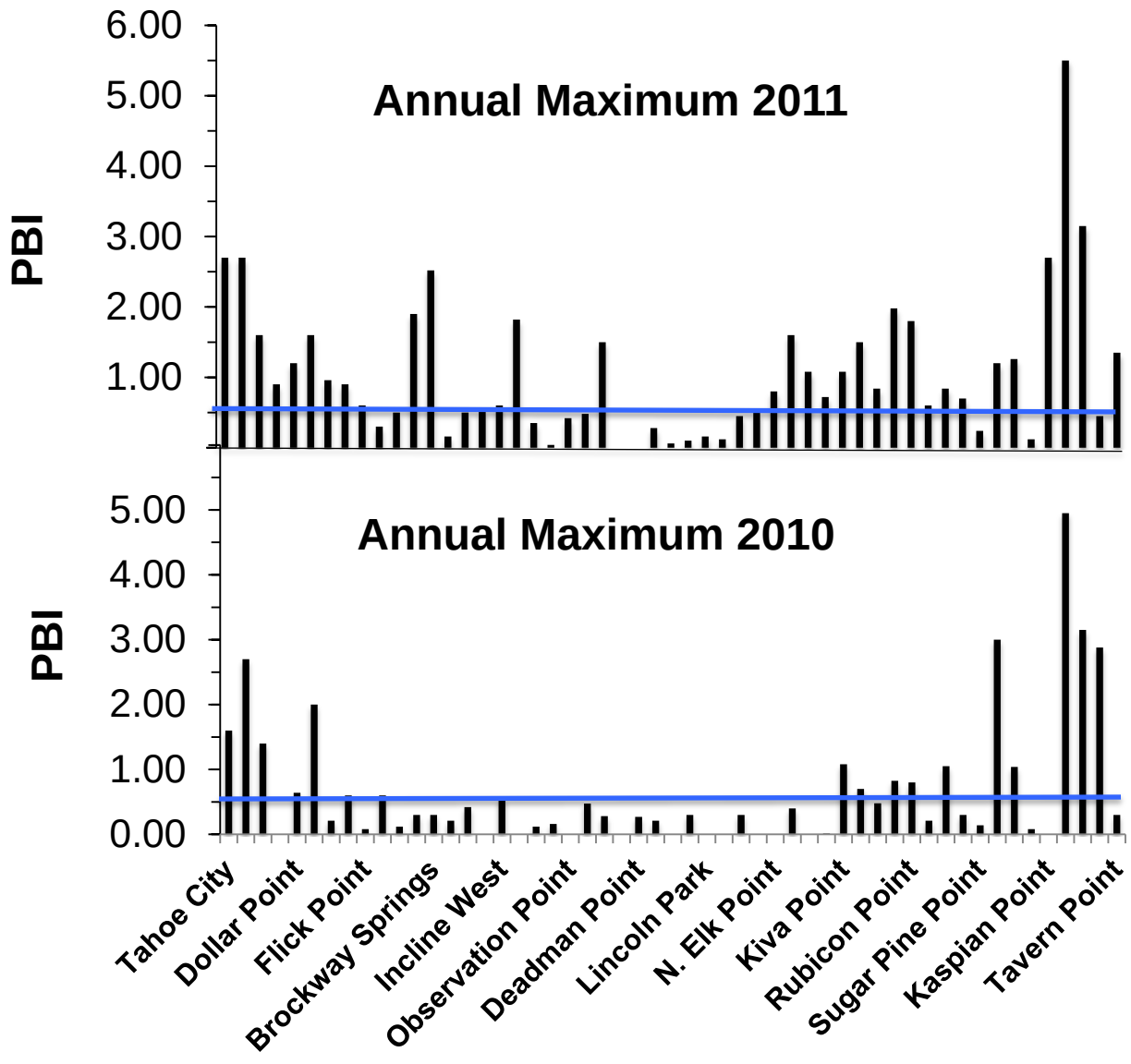
# All Respondants




Water Quality Awareness
PBI
2.00
1.50
1.00
0.50
0.00
Acceptable Condition
Avoid Area - General Aesthetics
Avoid Water Contact
Avoid Non-Water Contact
Not Aware
Moderately
Very Aware


Residential Status
PBI
2.00
1.50
1.00
0.50
0.00
Acceptable Condition
Avoid Area - General Aesthetics
Avoid Water Contact
Avoid Non-Water Contact
Full
Seasonal
Visitors


Age Category
PBI
2.00
1.50
1.00
0.50
0.00
Acceptable Condition
Avoid Area - General Aesthetics
Avoid Water Contact
Avoid Non-Water Contact
<18
18-55
>55


Annual Maximum 2011
PBI
6.00
5.00
4.00
3.00
2.00
1.00
Annual Maximum 2010
PBI
5.00
4.00
3.00
2.00
1.00
0.00
Tahoe City
Dollar Point
Flick Point
Brockway Springs
Incline West
Observation Point
Deadman Point
Lincoln Park
N. Elk Point
Kiva Point
Rubicon Point
Sugar Pine Point
Kaspian Point
Tavern Point

# Possible Use with Nearshore Indicators/Metrics

1. PBI meets needs for aesthetic metric
2. Sensitive to detect spatial differences in biomass
3. Can collect more data during periods of concern
4. PBI and chl *a* are being evaluated to assess reference conditions for setting numeric targets (annual maximum & mean)
5. Public perception of reference conditions for Lake Tahoe (PBI=0.47-0.64) less than or similar to US EPA statistical approach and literature guidance

# Questions & Acknowledgements

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SOUTHERN NEVADA
PUBLIC LAND MANAGEMENT ACT
www.blm.gov/snplma