Warmer Water Impacts on Nearshore Ecology at Lake Tahoe

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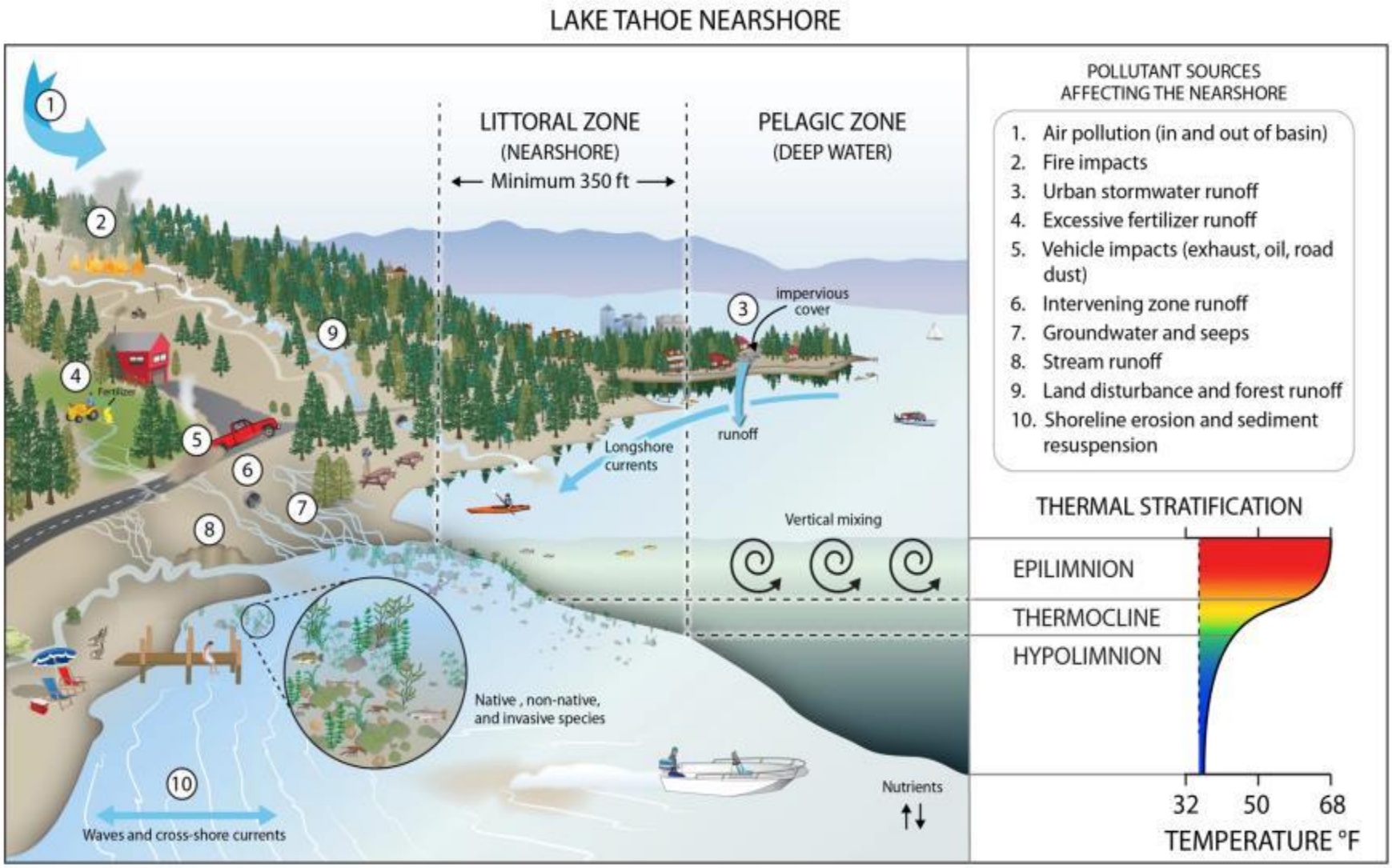
Desert Research Institute

UCDAVIS TAHOE ENVIRONMENTAL RESEARCH CENTER

Research and Management Focus Increasing on the Nearshore

- Most visitor and resident experiences in close proximity to the nearshore.
- Increasing anecdotal testimony and data about nearshore degradation.
- Growing stakeholder interest in better nearshore monitoring and management.

Many Affects on Nearshore Relate to Climate

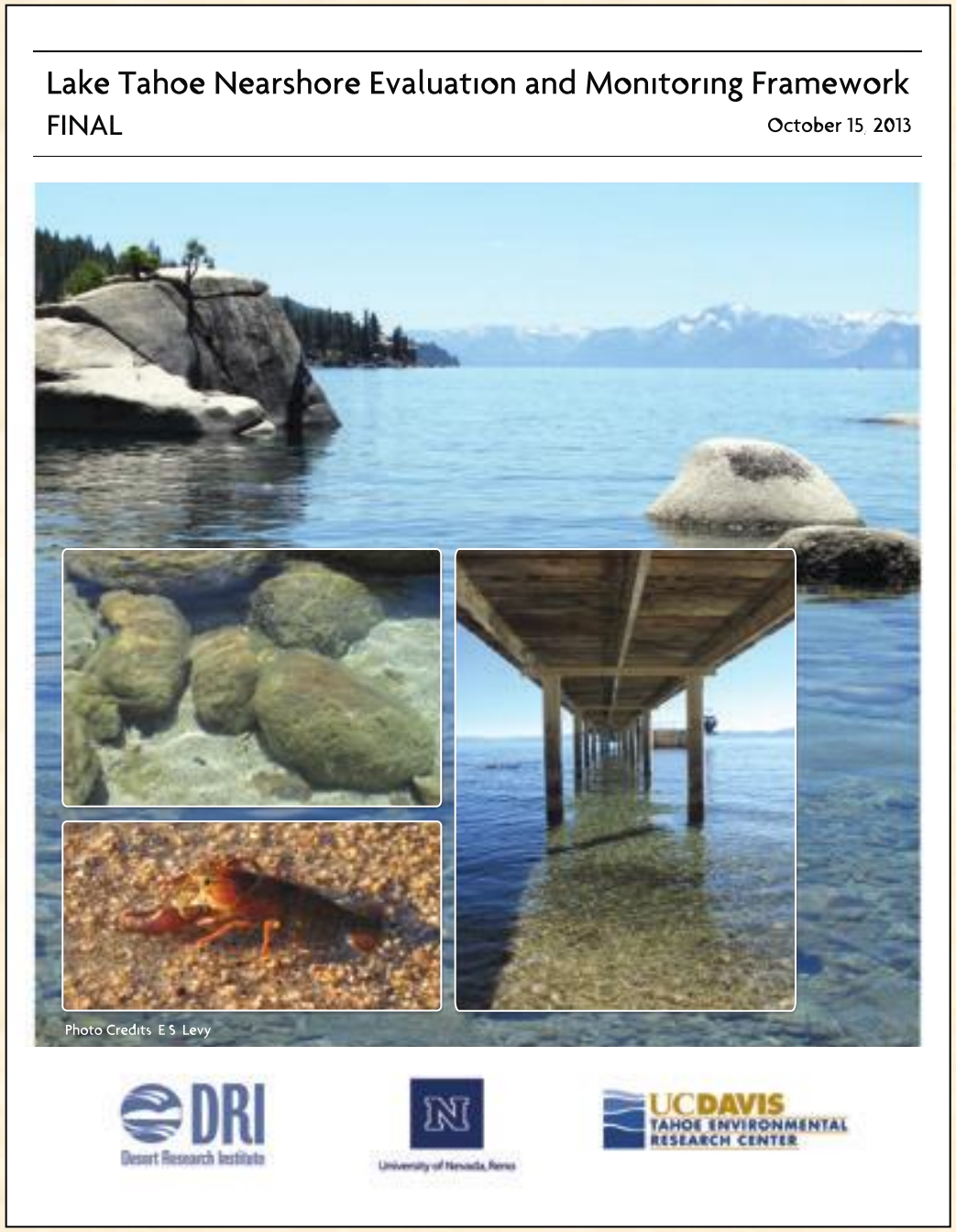


Illustration, LJ Wable and A Heyvaert (Desert Research Institute), with additonal clip art contributions courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science (ian.umces.edu/symbols/).

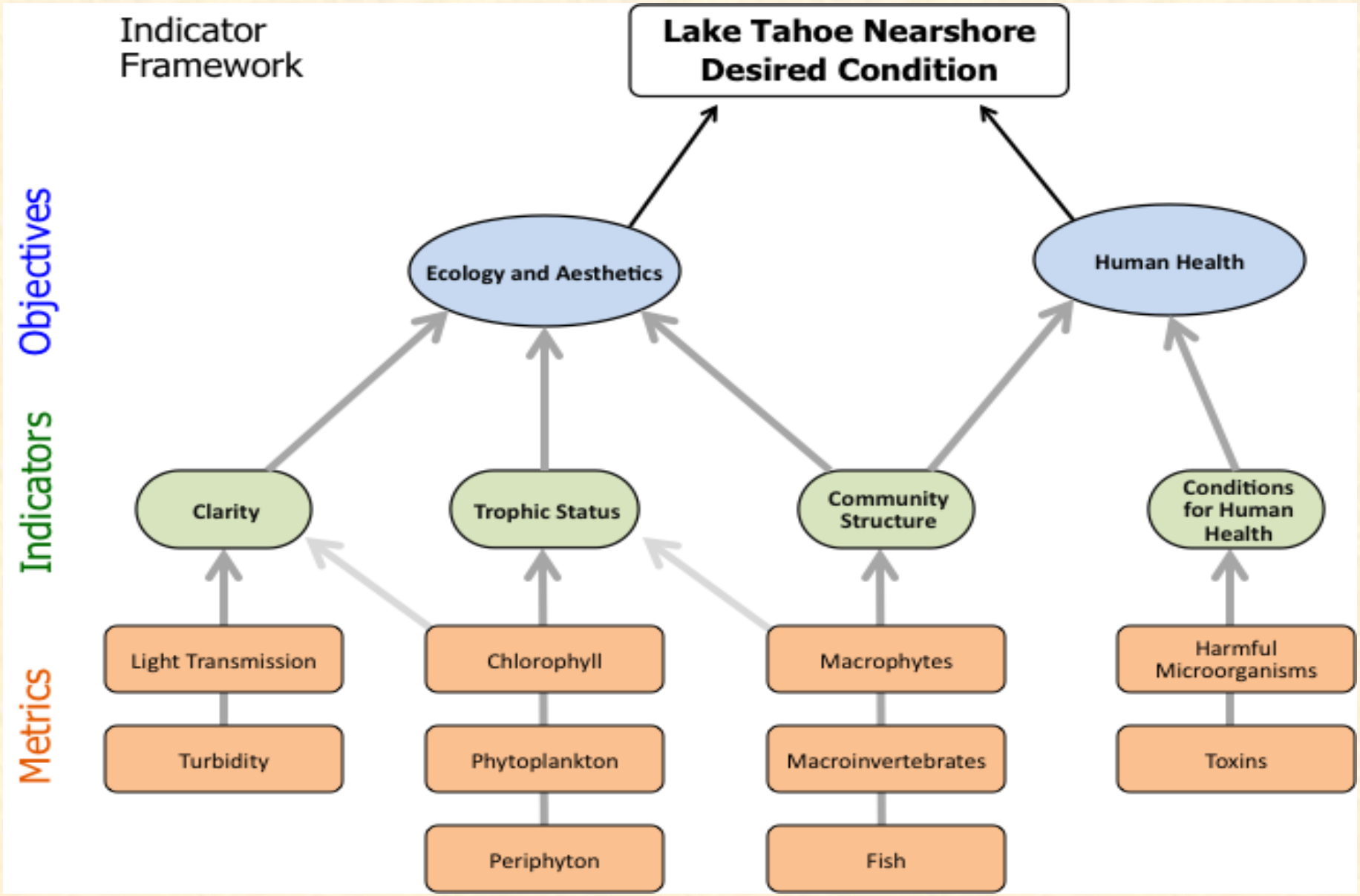
Project Overview

- **Background:**
  - ❑ Historically few studies focused on the nearshore of Lake Tahoe.
  - ❑ Needed a comprehensive review of existing research and monitoring data on the nearshore.
  - ❑ Also required an evaluation of existing standards and indicators relevant to nearshore condition.
- **Major Products:**
  - ✓ Conceptual model and indicator framework.
  - ✓ Assessment of exiting standards and indicators.
  - ✓ Framework for an integrated nearshore monitoring design.

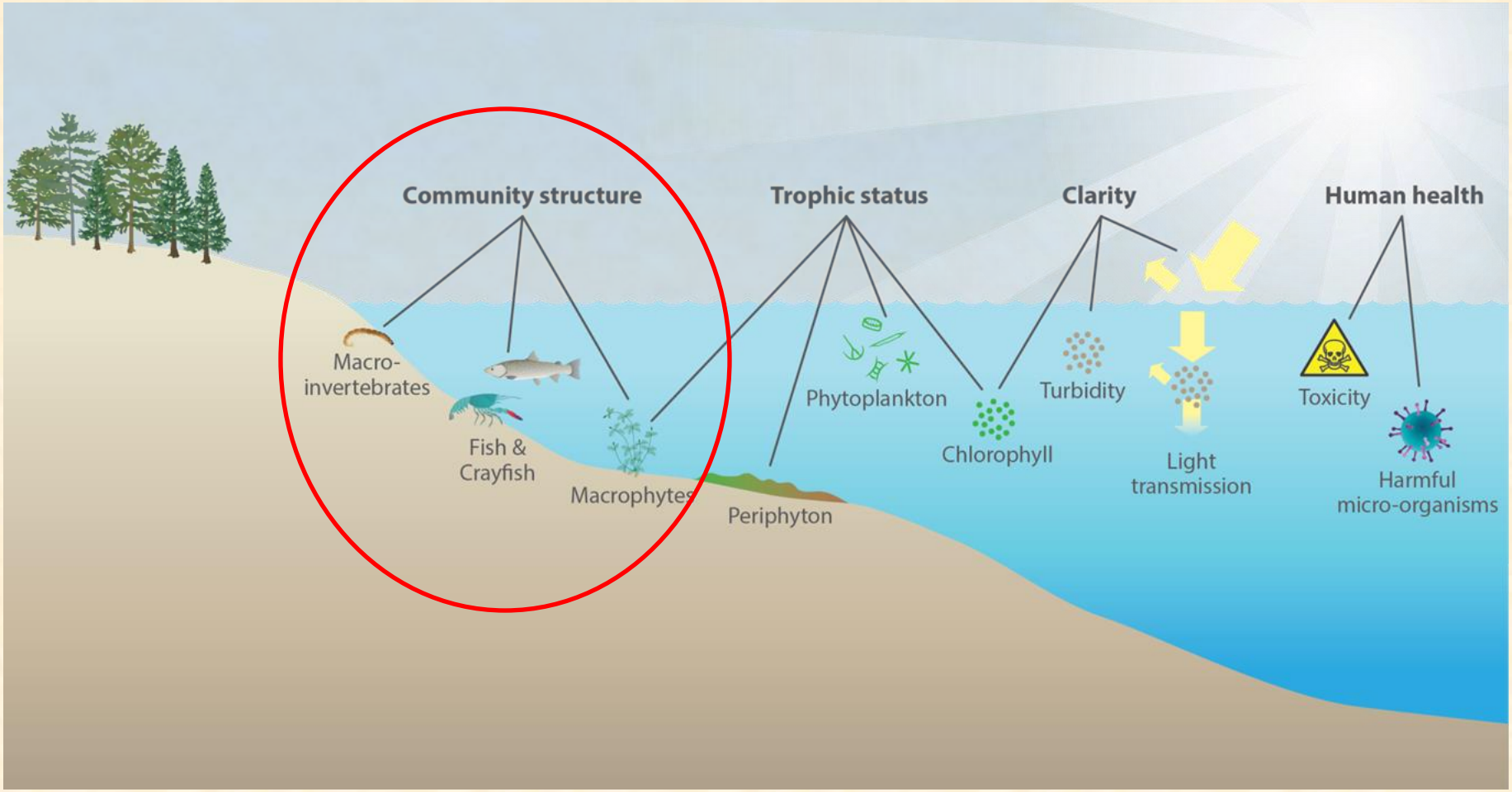
http://www.dri.edu/cwes



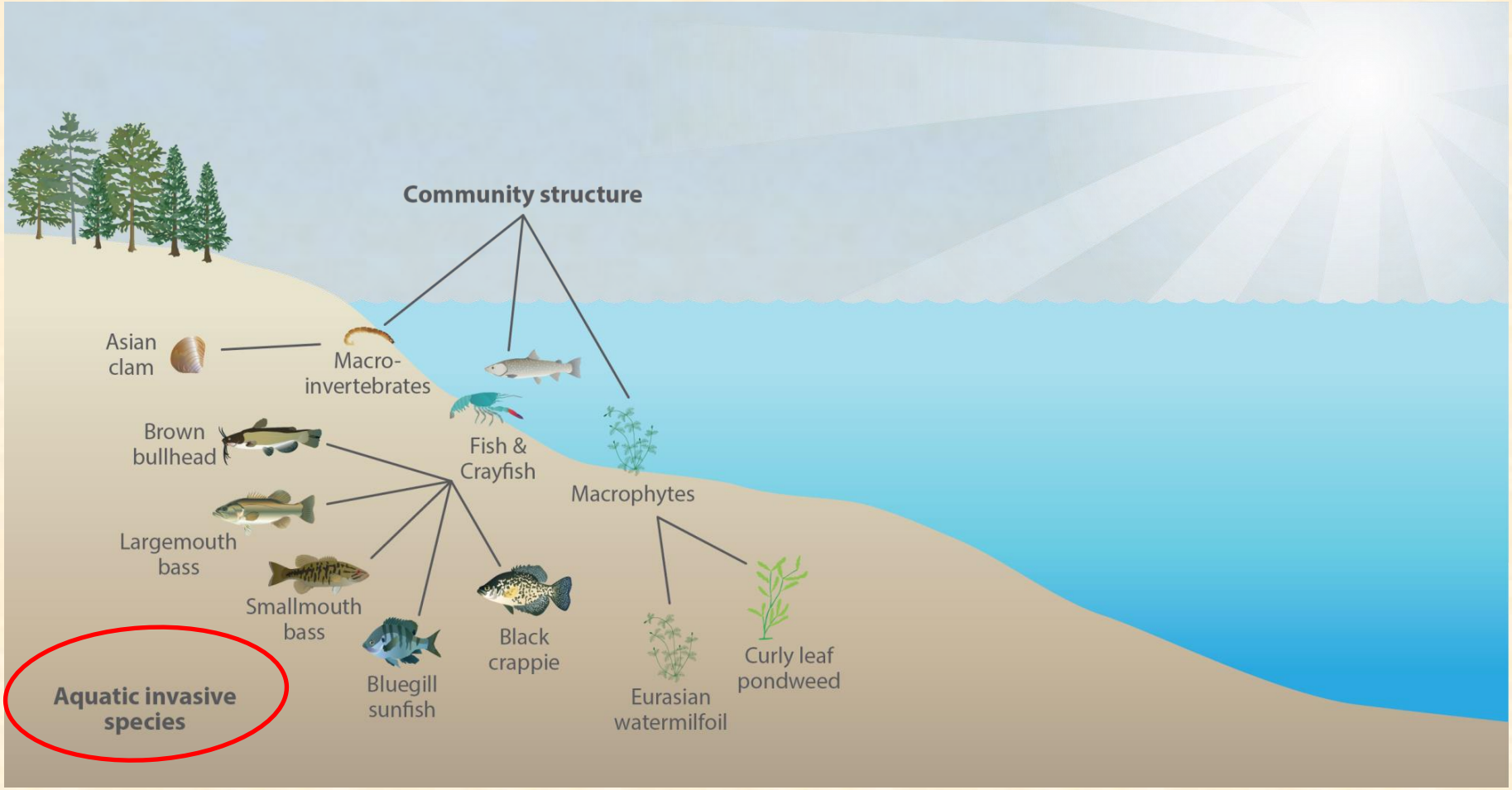
Indicator Framework for Monitoring



Nearshore Community Structure Metrics

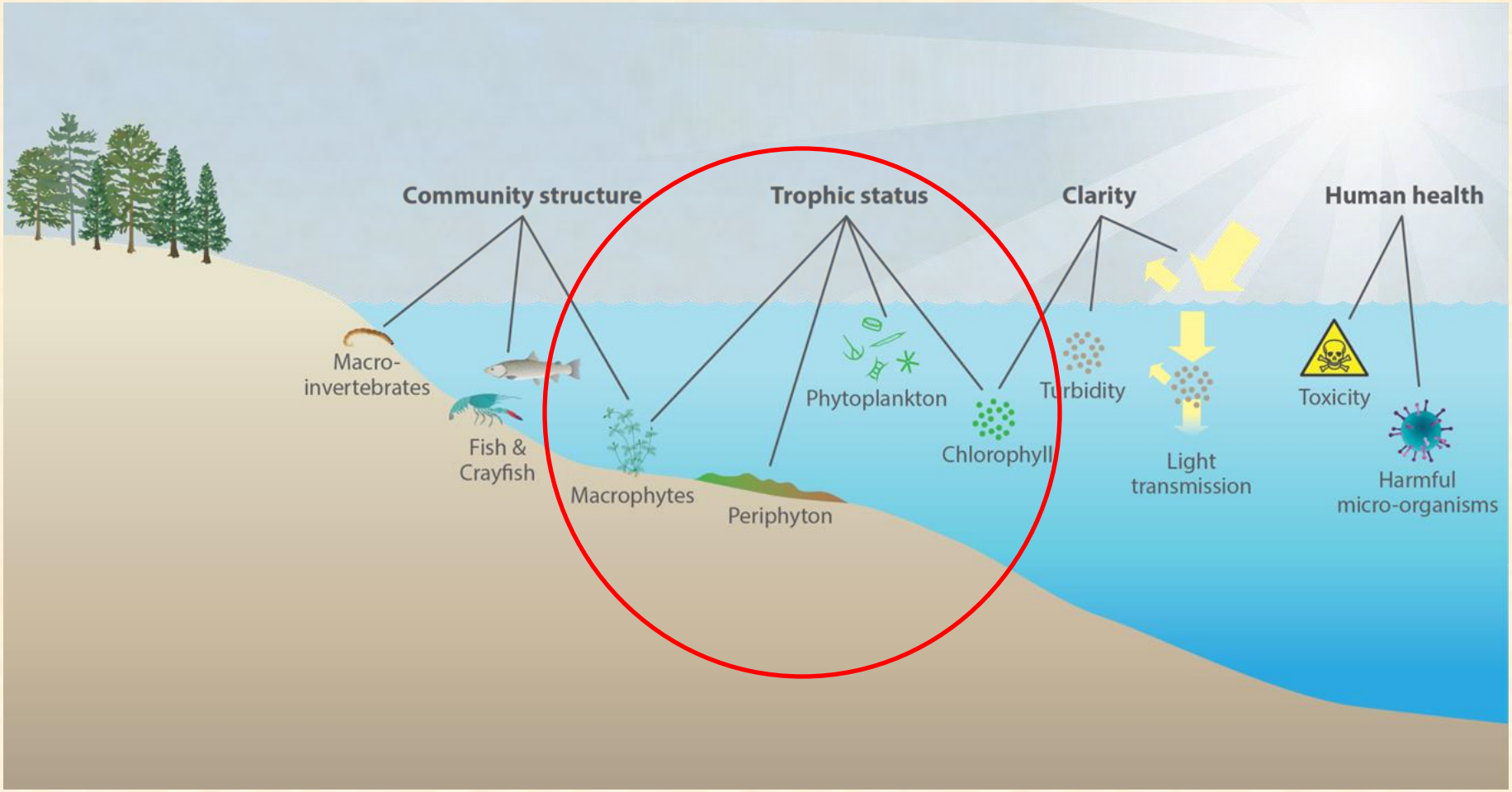


Nearshore Aquatic Invasive Species (including warm water AIS)



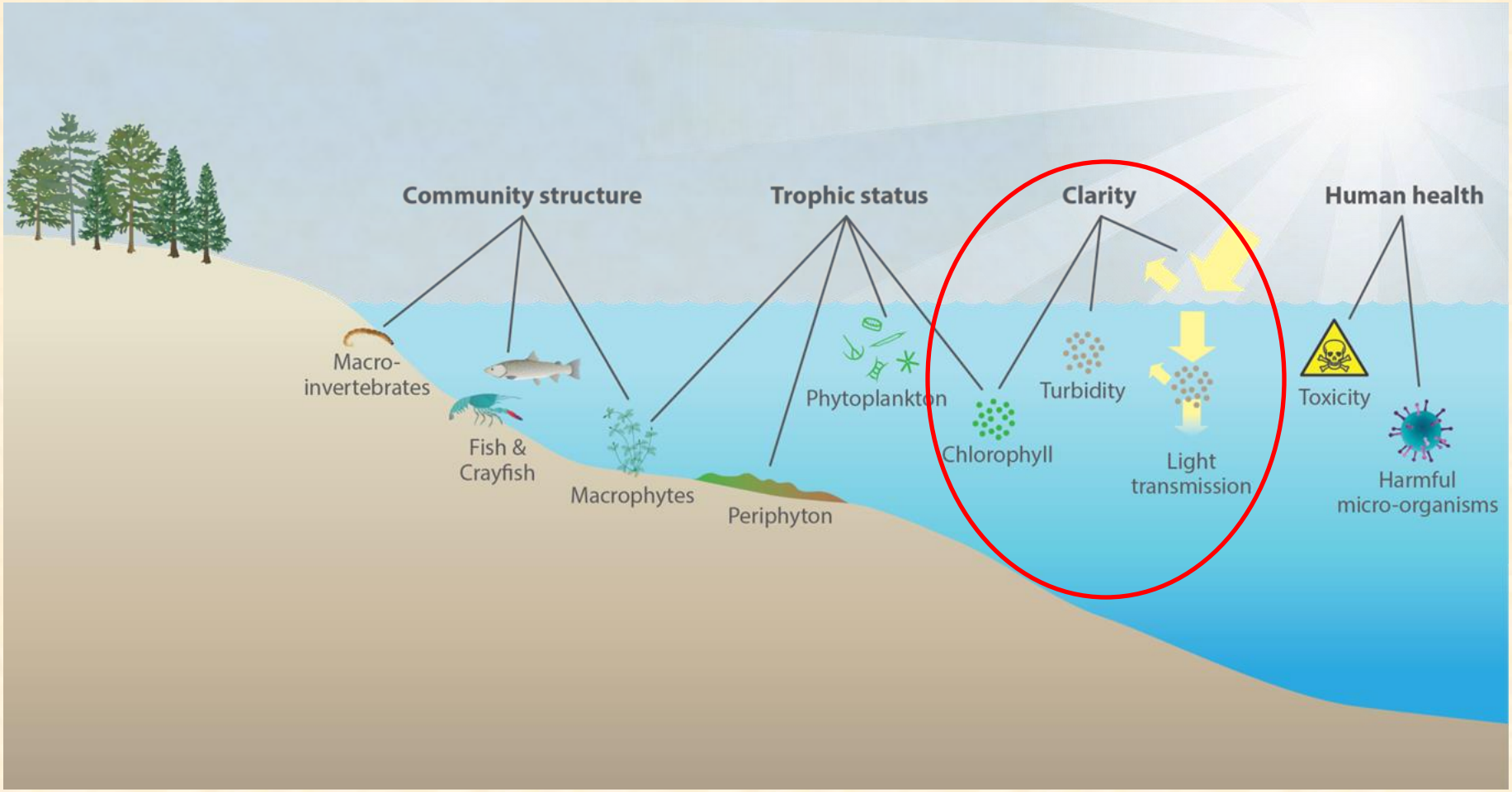
Composition, Distribution and Abundance

Nearshore Trophic Status Metrics



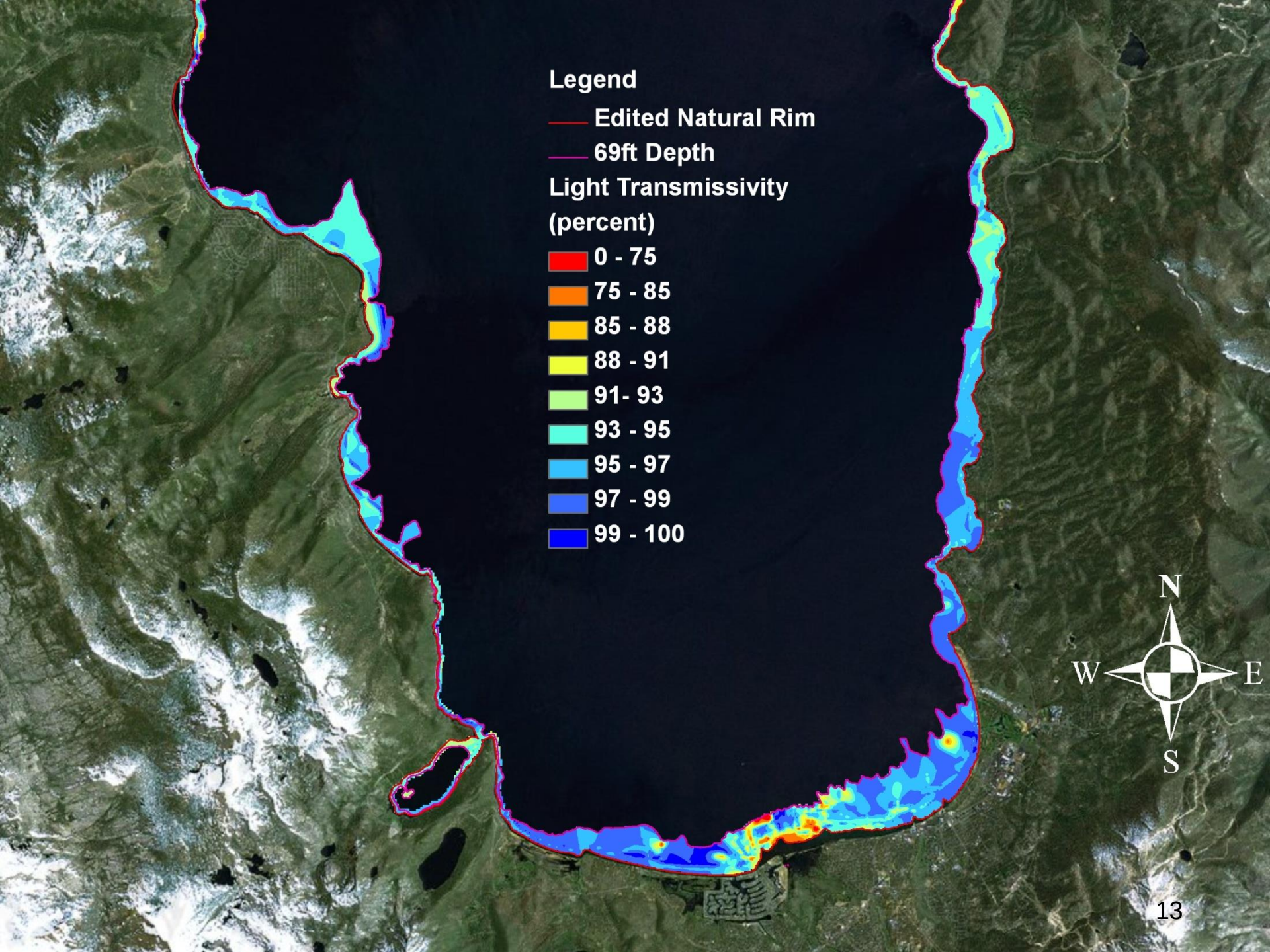
Periphyton (attached algae) in Lake Tahoe

Nearshore Water Clarity Metrics

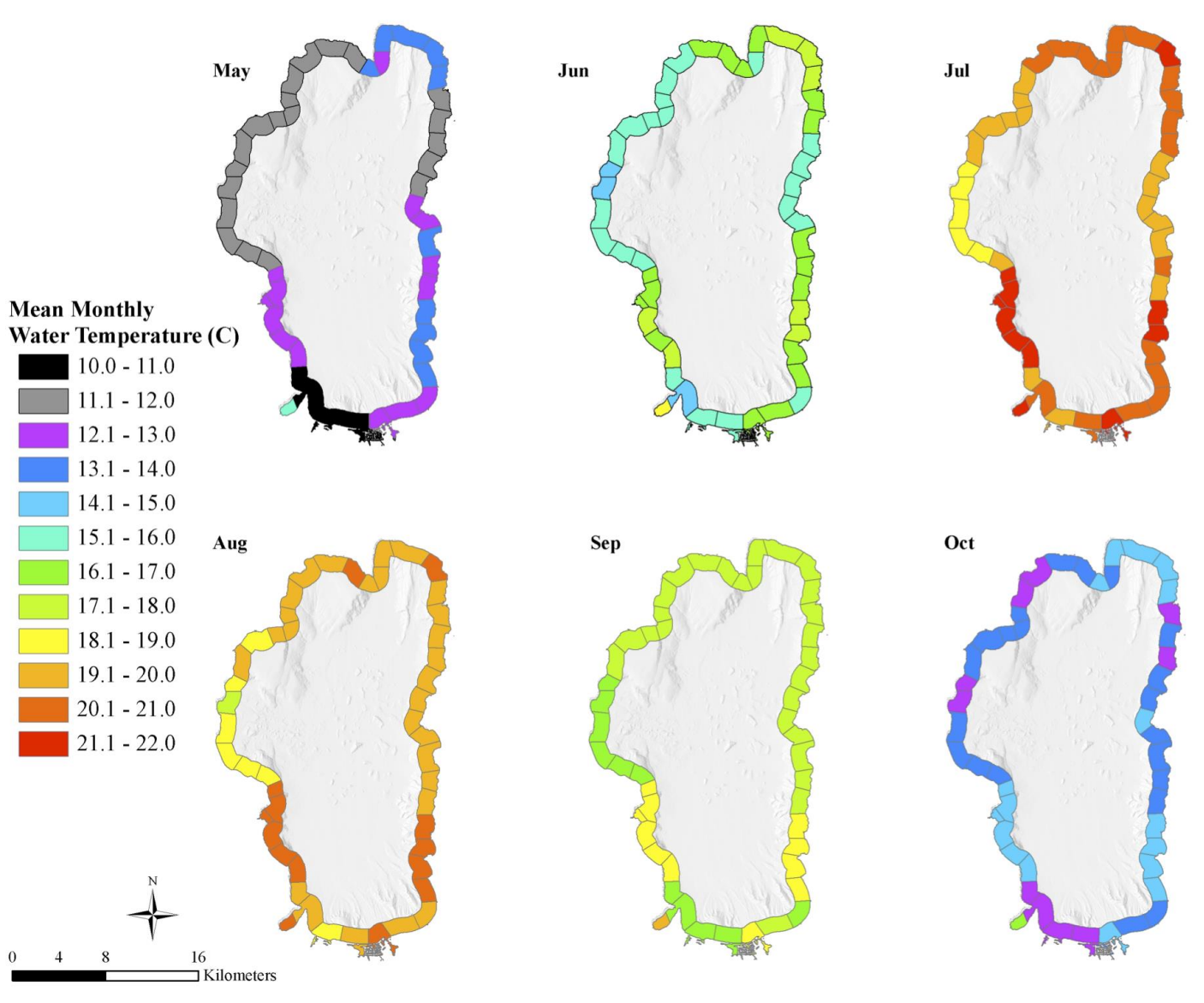


Fine Particle and Nutrient Loading to the Nearshore may Increase with Climate Change

(Photo credits C. Strasenburgh)


Legend
Edited Natural Rim
69ft Depth
Light Transmissivity
(percent)
0 - 75
75 - 85
85 - 88
88 - 91
91- 93
93 - 95
95 - 97
97 - 99
99 - 100
N
W
E
S

Nearshore Temperature Assessment



Kamarath et al:

Mean monthly temperatures at 50 nearshore sites. Calculated from weekly estimates based on remote sensing of offshore temperatures.

Used to predict potential AIS (bass) spawning sites.

Main points:

- Climate change will directly affect nearshore water temperatures.
- Runoff from precipitation events may increase nutrient and sediment loading if there is less snowfall and more thunderstorms.
- Affects will propagate through ecological interactions.
- Species composition will change as conditions become more or less accommodative for natives and non-natives.
- Useful indicators are represented by nearshore response metrics that integrate across multiple impacts (e.g. temperature, nutrients, clarity, habitat ….)
- Remote sensing combined with *in-situ* measurements and modeling will provide a cost-effective framework for tracking and predicting the trajectory of nearshore impacts associated with climate change.