National Lake Assessment: Michigan Lake Shorelines

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Shoreline and Shallows Conference

- What is the National Lake Assessment
- MI NLA involvement
- 2017 MI NLA results, Shoreline focus

EPA National Lake Assessment

- National Aquatic Resource Survey
- Report on the condition of the nation's lakes
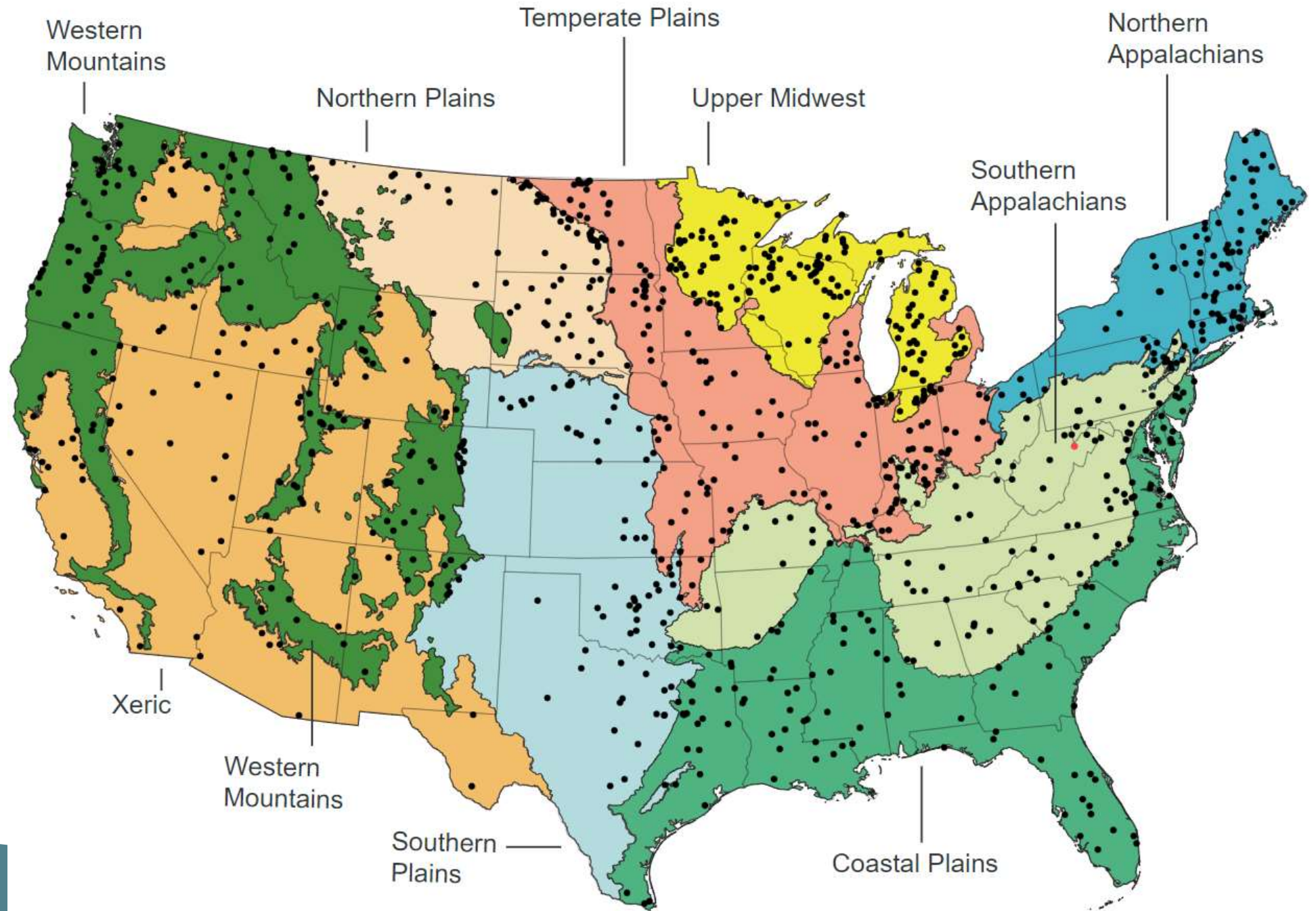- 5 year rotation
- NLA: 4 surveys 2007-2022

National Lake Assessment: Questions

- What are the current biological, chemical, physical, and recreational condition of lakes?
- Is the proportion of lakes in the poor condition changing?
- Which environmental stressors are most strongly associated with degraded biological condition in lakes?

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National Lake Assessment: Lakes

- ~ 1000 lakes sampled per survey
- >1 hectare & 1 meter depth
- >1000 m^2 open water
- Exclude: Great Lakes, Great Salt Lake, water treatment ponds, tidal impacted lakes
- Random selection: characterize subset populations (location, size)
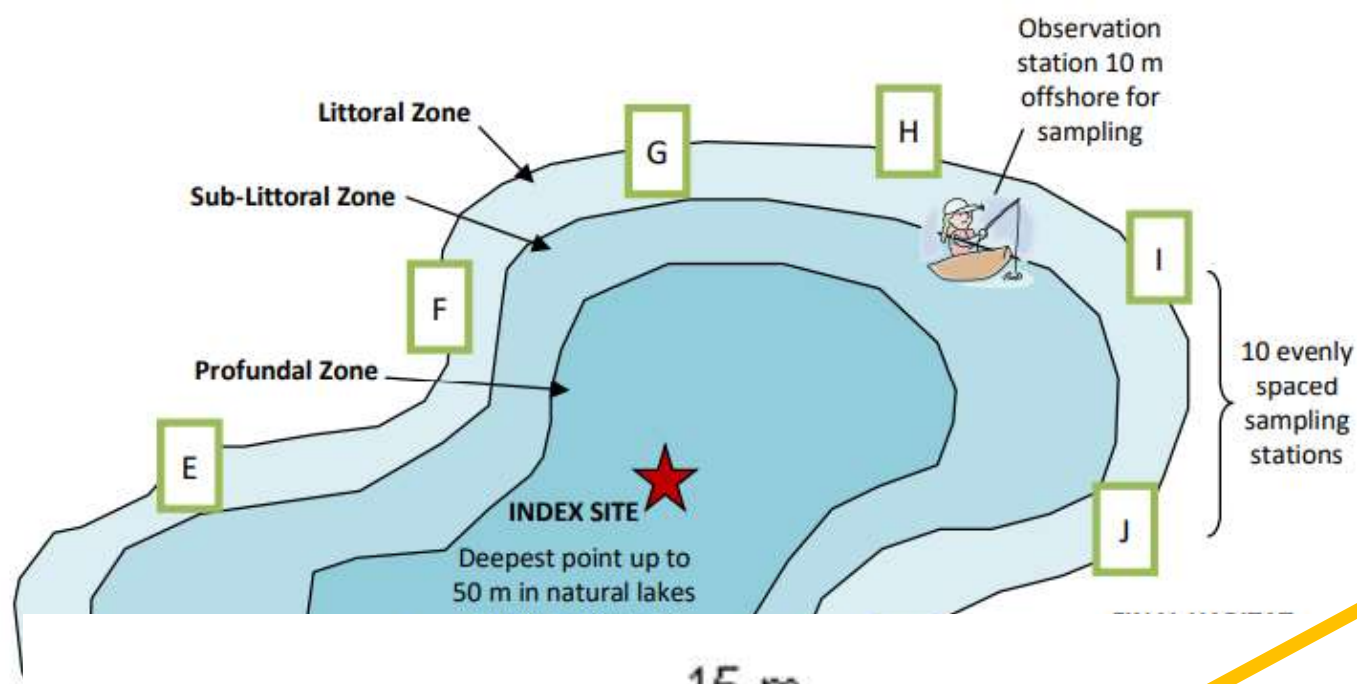
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2017 NLA Sites and Ecoregions

2017 NLA Indicators

| Chemical	Trophic State	Biological	Physical	Recreational
•Dissolved oxygen •Nitrogen •Phosphorus •Atrazine	•Trophic State	•Benthic macroinvertebrates •Chlorophyll a •Zooplankton	•Drawdown •Human disturbance •Lakeshore habitat •Physical habitat complexity •Shallow water habitat	•Algal toxins •Cyanobacteria •Enterococci

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Riparian Zone
Shoreline Substrate
Ground Cover
Understory
Canopy
Human Influence
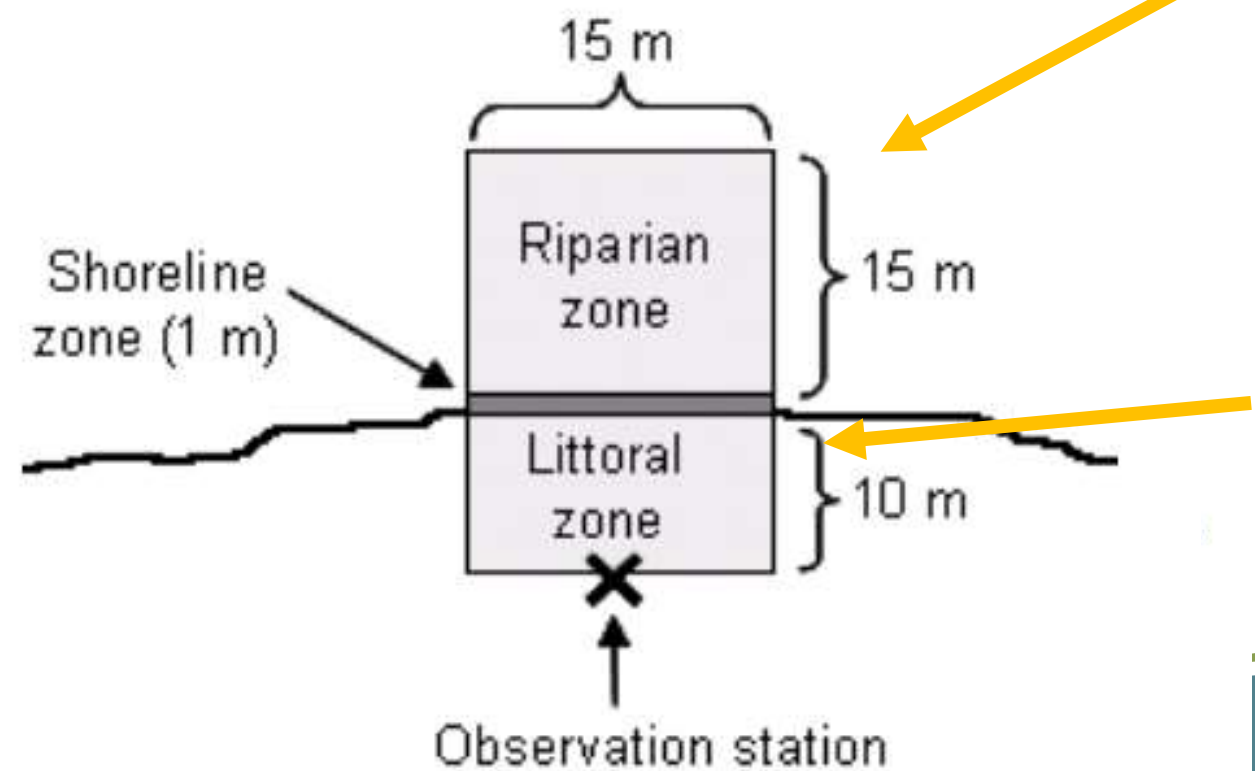
**Littoral Zone**
Bottom Substrate
Macrophytes
Fish Cover
Collect macroinverts.

2-meter integrated sample

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2017 Michigan NLA Lakes
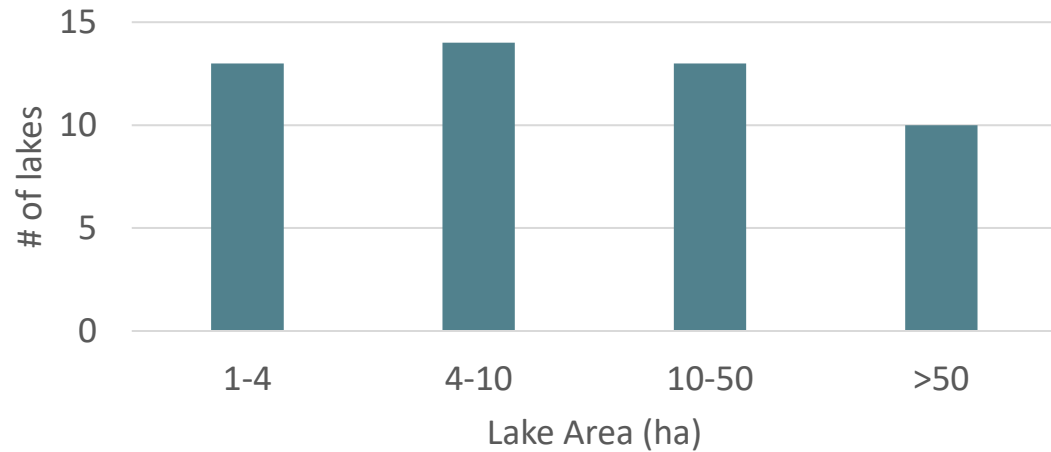
Lake	County	Area (ha)
Lake Mitchell	Wexford	1061
Crooked Lake	Emmet	969
Pere Marquette Lake	Mason	242
Palmer Lake	St. Joseph	198
West Lake	Kalamazoo	133
Saddle Lake	Van Buren	110
Au Sable Lake	Ogemaw	107

Legend
- 2012 NLA Lakes
- 2017 NLA Lakes

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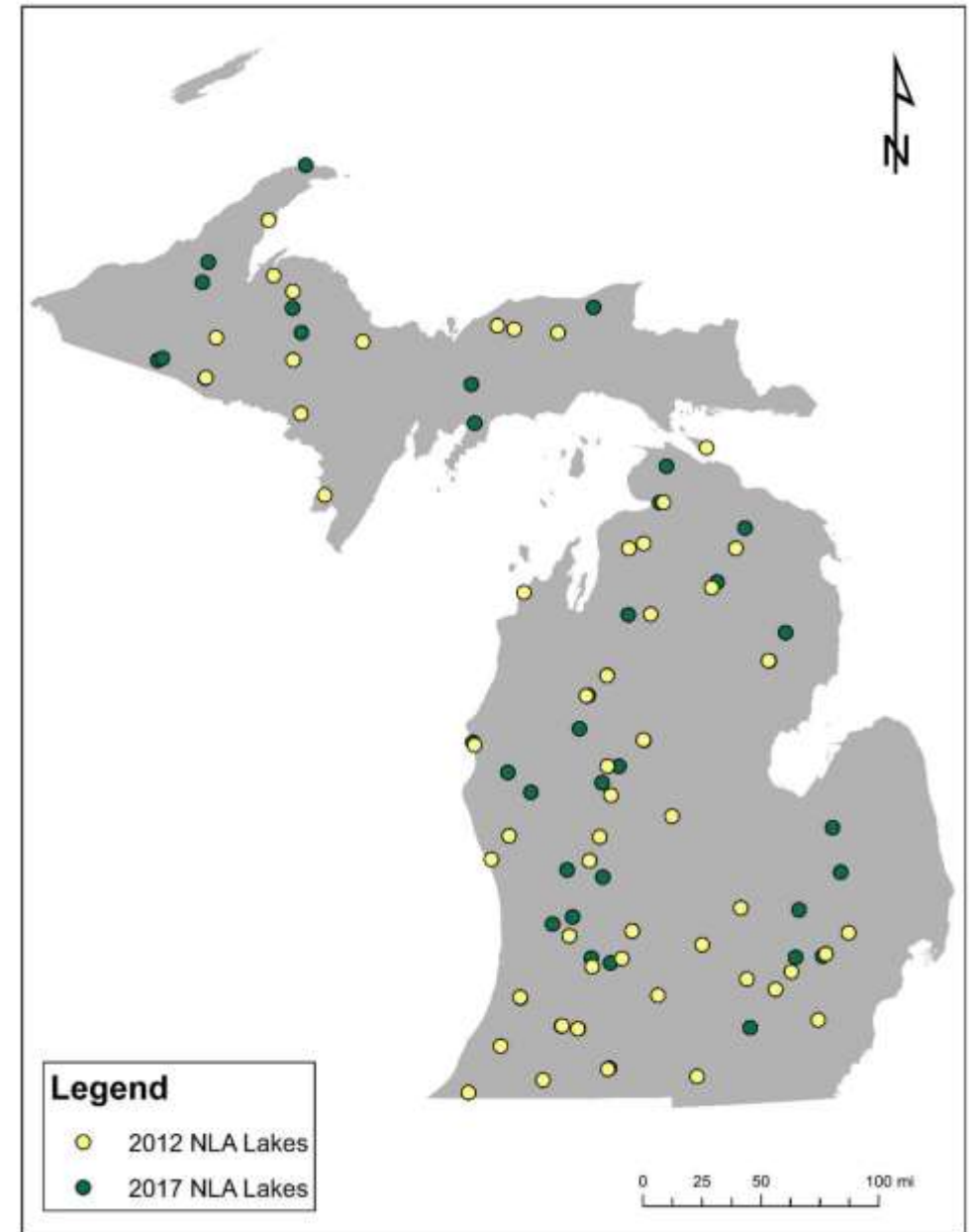
2017 MI NLA Results

- EPA uses reference site data to classify data into Good, Fair, or Poor condition categories.
  - Good > 75% reference
  - Fair 75-95% ref
  - Poor < 95% reference

- 2017 Results: 2017 MI vs national condition estimates and MI conditions from 2007, 2012, and 2017
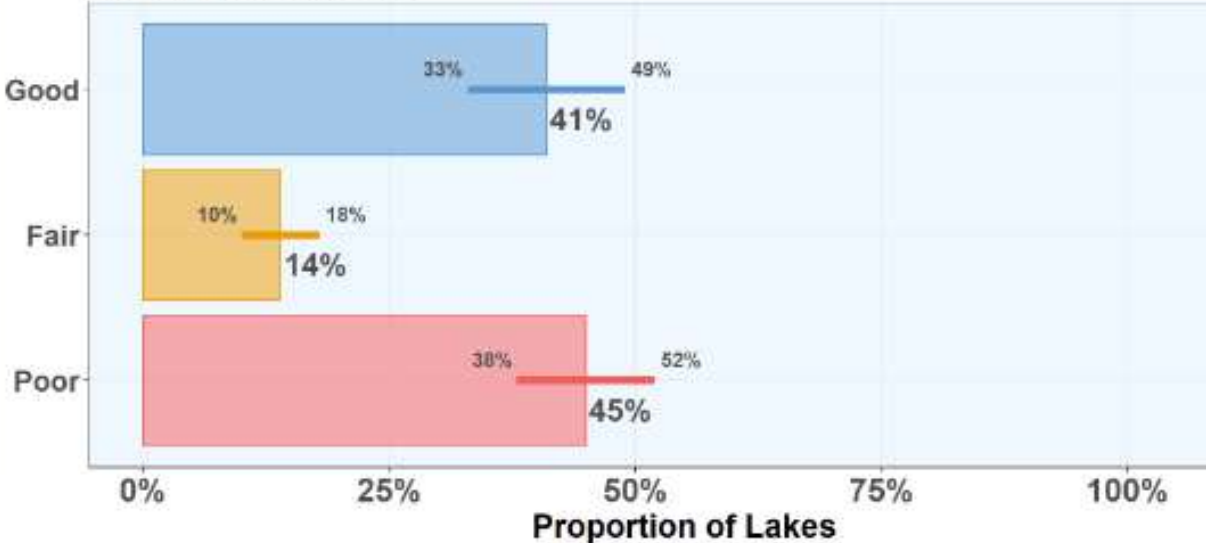- Phosphorus, Trophic State, Shoreline

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2017 Condition – Total Phosphorus

MI Condition – Total Phosphorus
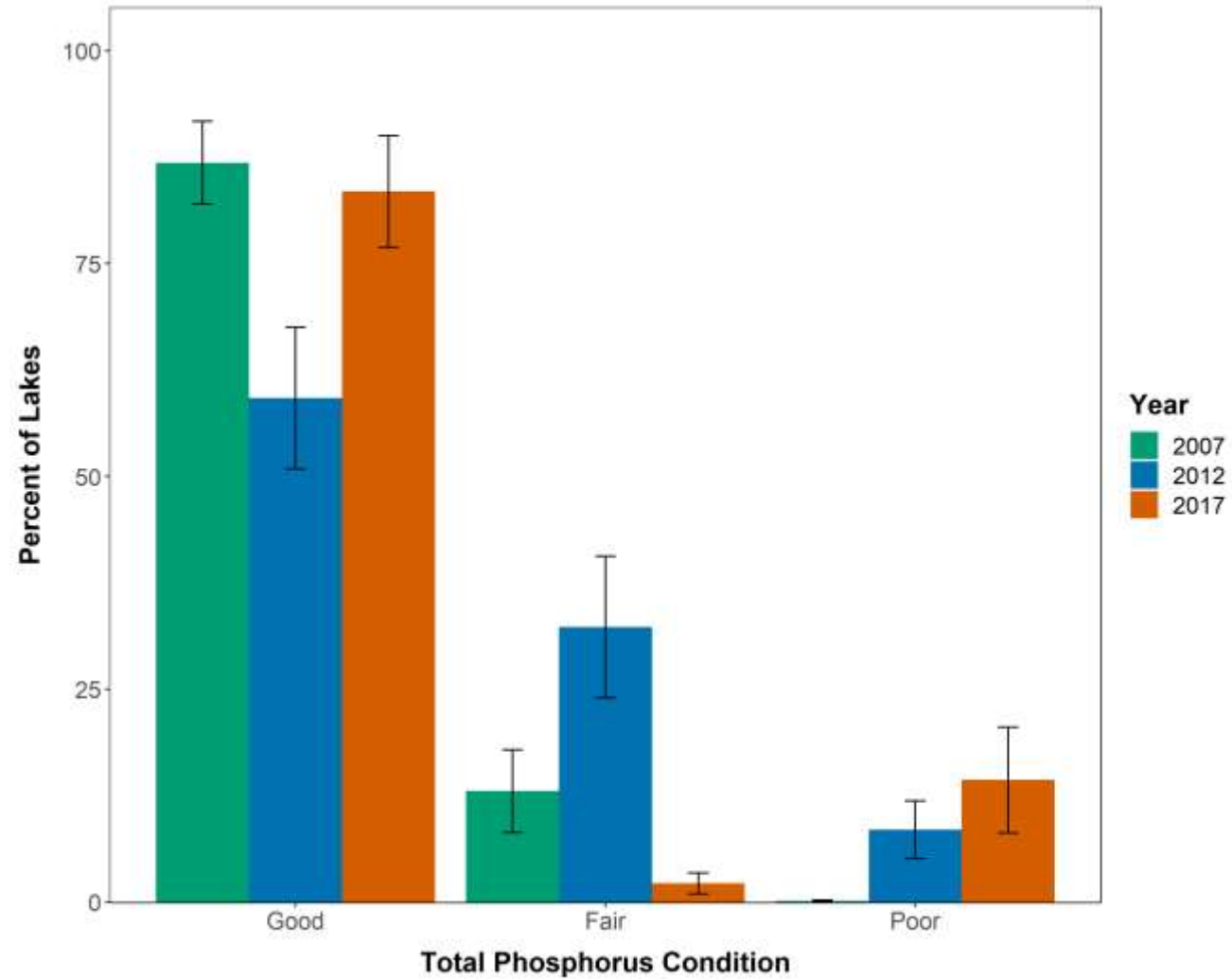

Good ≤24.8;   Poor >40 ug/L

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2017 Condition - Trophic State

MI Estimates
Indicator: TROPHIC_STATE

Oligotrophic	2% ... 26%	14%
Mesotrophic	15% ... 45%	30%
Eutrophic	17% ... 66%	42%
Hypereutrophic	4% ... 25%	14%

Proportion of Lakes
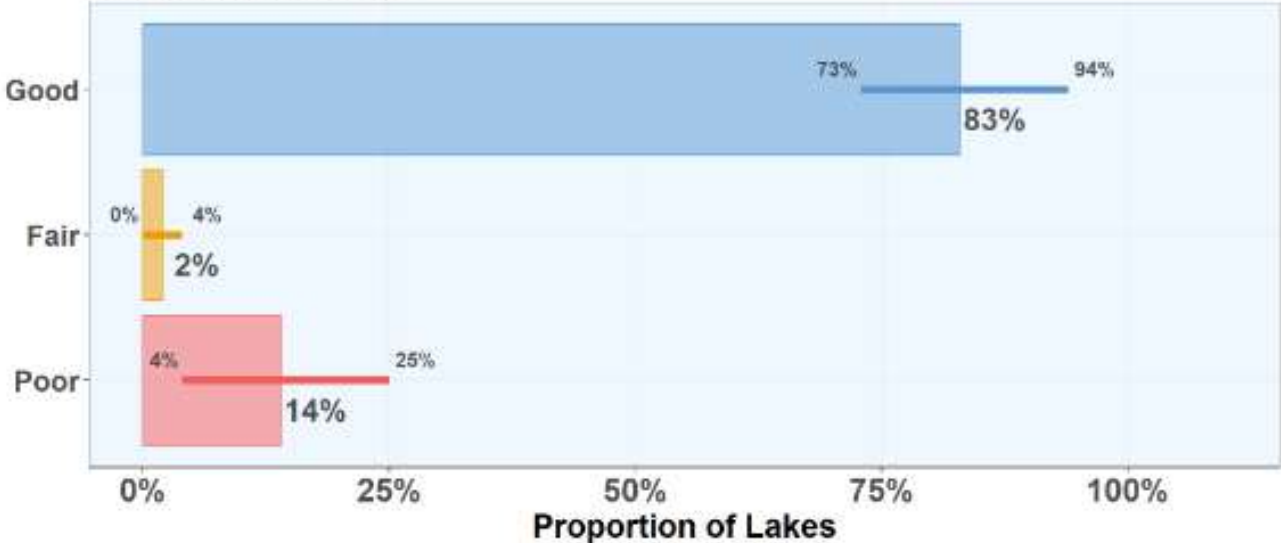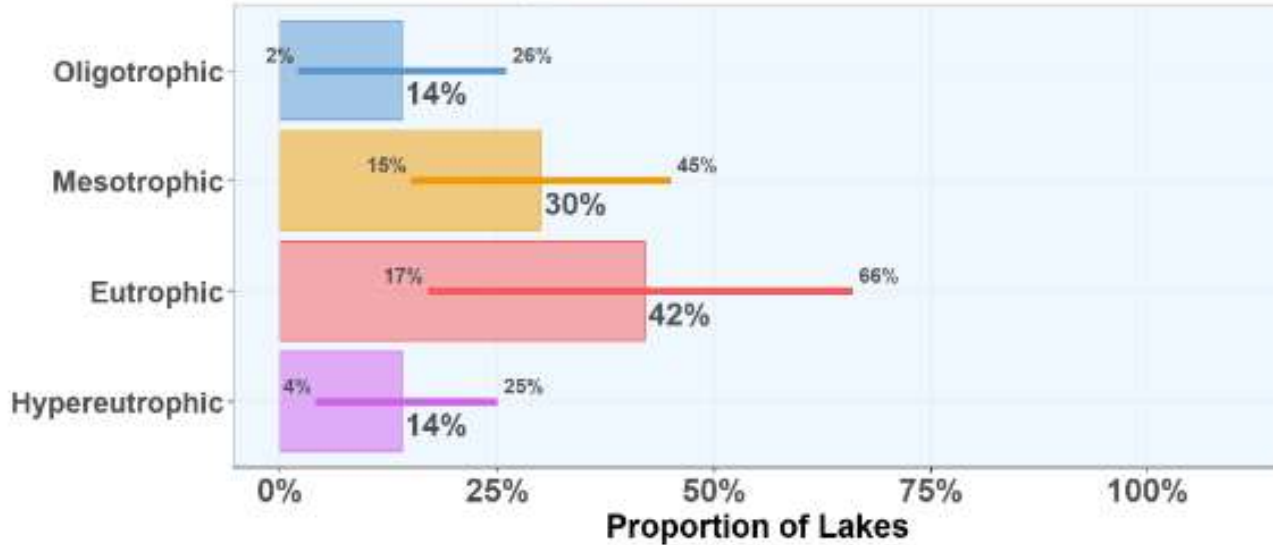
National Estimates
Indicator: TROPHIC_STATE
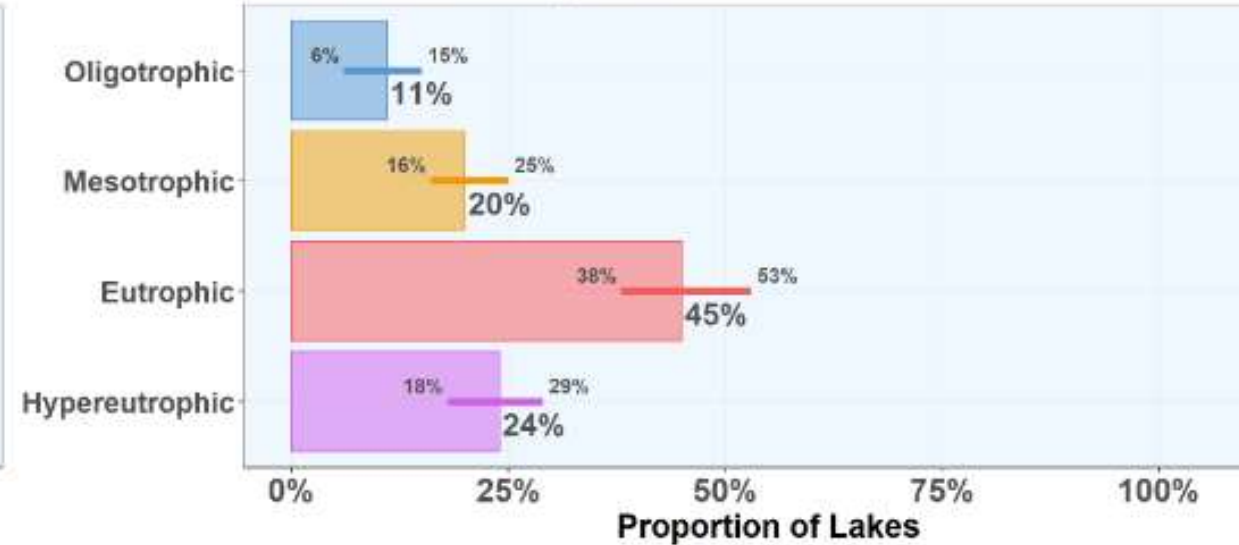
Oligotrophic	6% ... 15%	11%
Mesotrophic	16% ... 25%	20%
Eutrophic	38% ... 53%	45%
Hypereutrophic	18% ... 29%	24%

Proportion of Lakes

Oligotrophic	≤2	ug/L
Mesotrophic	>2 and ≤7	ug/L
Eutrophic	>7 and ≤30	ug/L
Hypereutrophic	>30	ug/L

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Condition - Trophic State

(Chlorophyll a)

Oligotrophic	≤2	ug/L
Mesotrophic	>2 and ≤7	ug/L
Eutrophic	>7 and ≤30	ug/L
Hypereutrophic	>30	ug/L

14
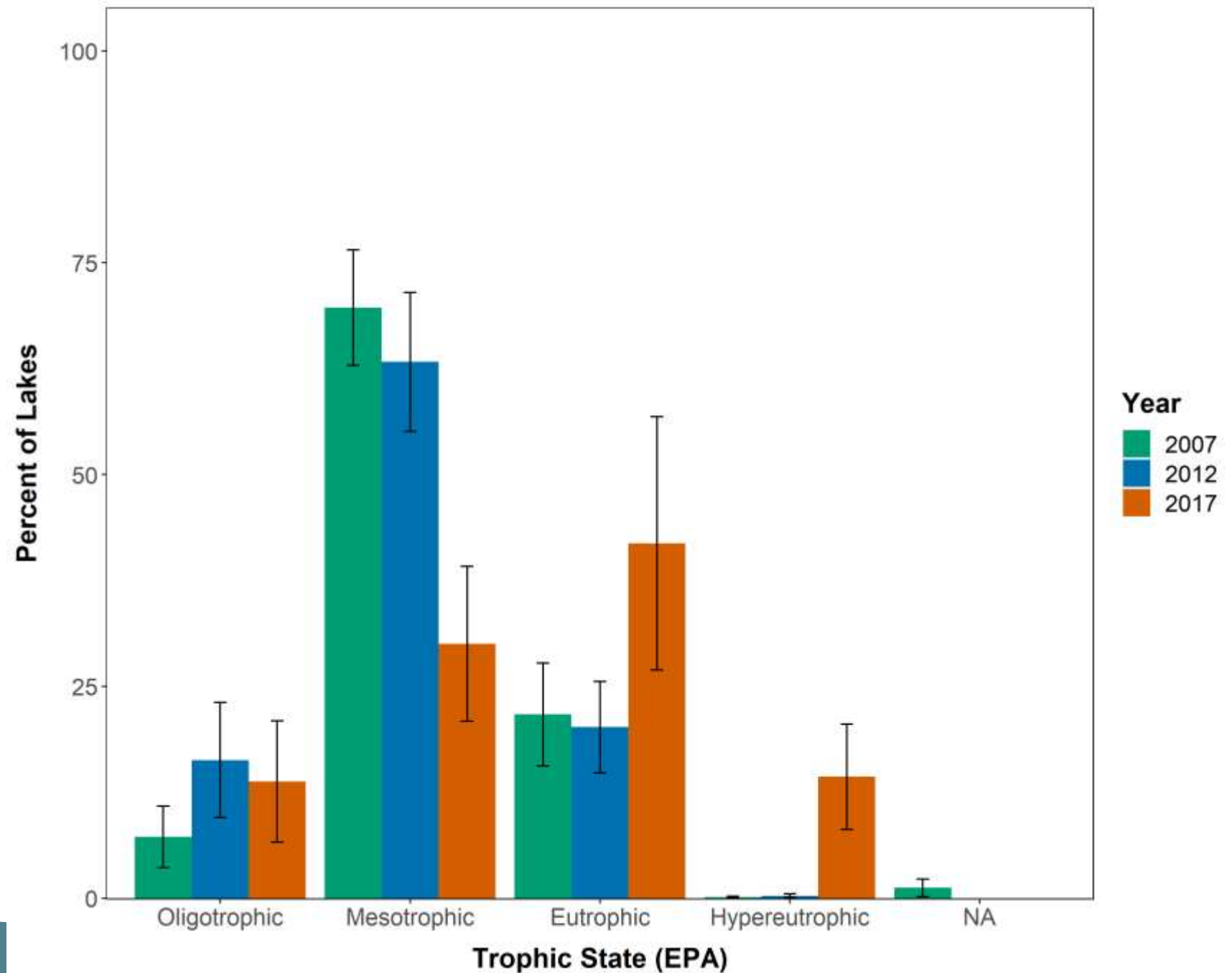
2017 NLA Riparian Indicators

Lakeshore Disturbance	Riparian Vegetative Cover
Direct human alteration of the lakeshore	• Understory (<0.5m) • Mid-story (0.5-5m) • Overstory trees (>5m)
Loss of vegetation structure and complexity	Best condition: vegetation cover is high in all layers
Modifications to substrate types	

5.0m

0.5m

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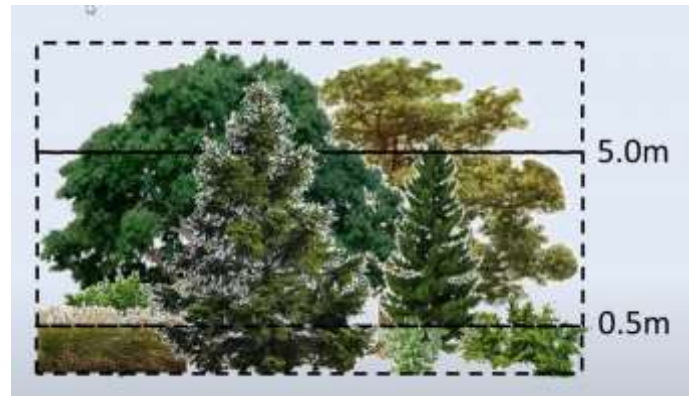
Shoreline Construction

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Hardened Shoreline

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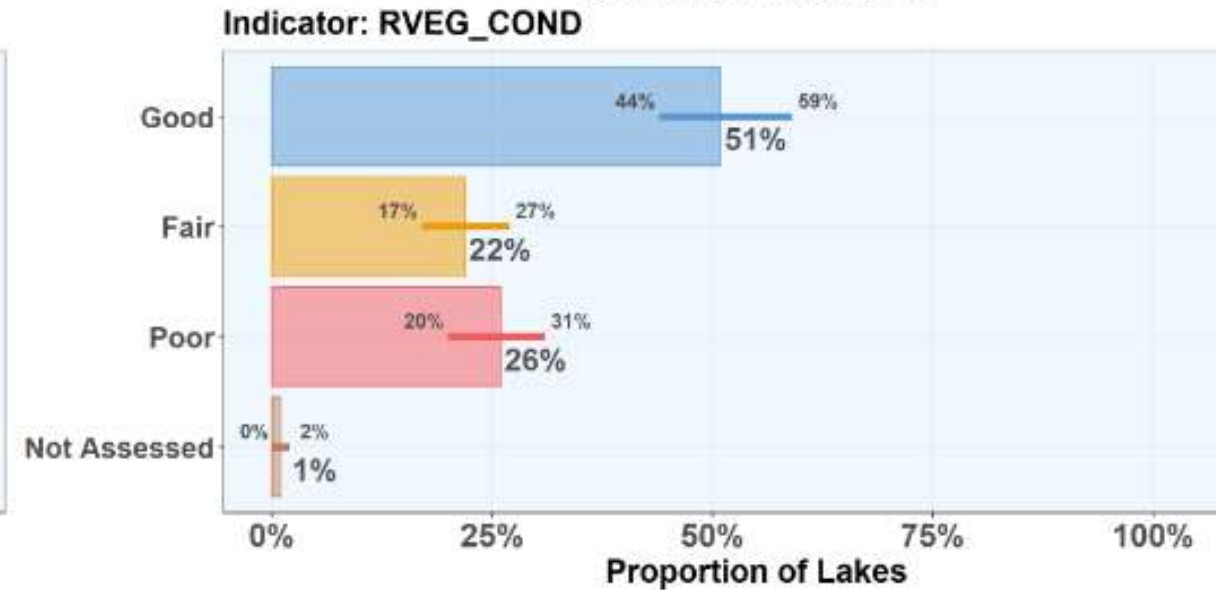# 2017 Lakeshore Conditions- Lakeshore Disturbance

MI Lakeshore Conditions- Lakeshore Disturbance

2017 Lakeshore Conditions-Riparian Vegetation

MI Lakeshore Conditions-Riparian Vegetation

EGLE
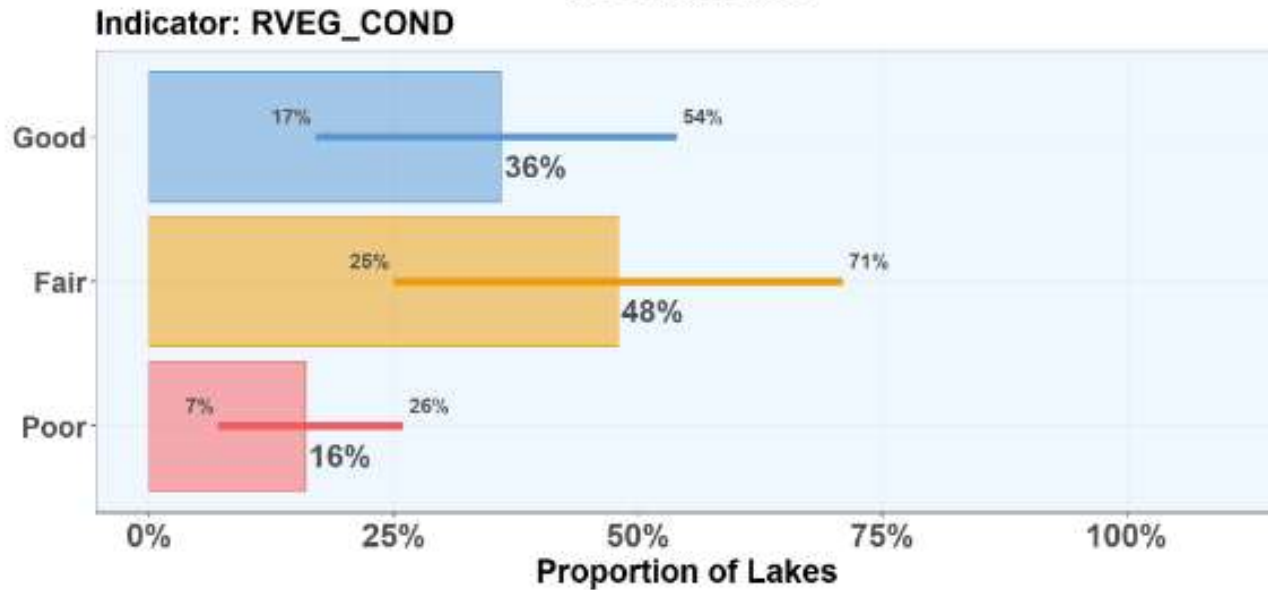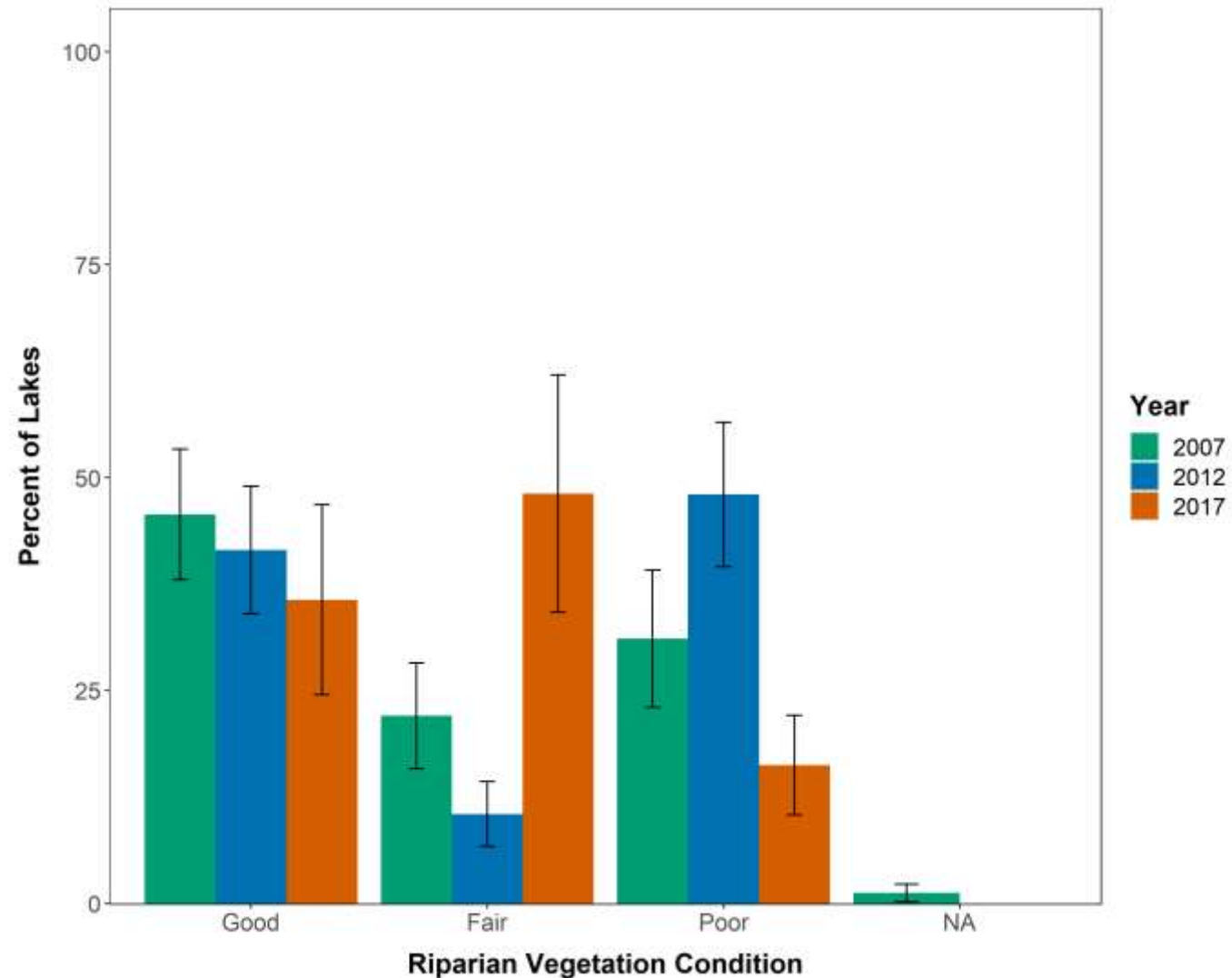
2017 NLA Littoral Indicators

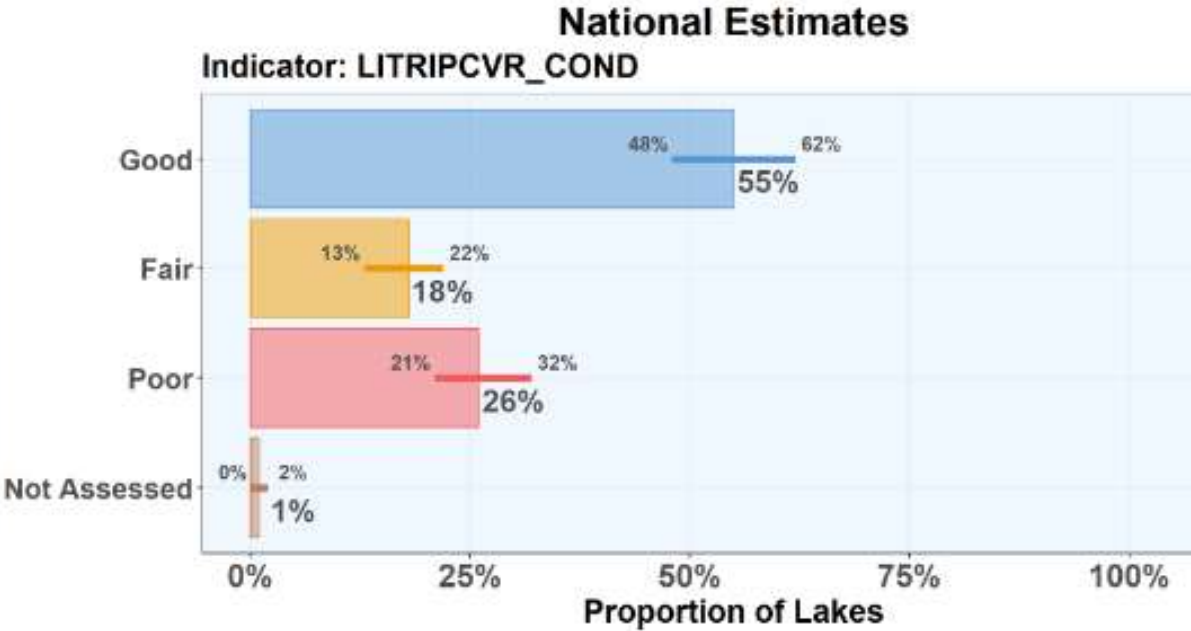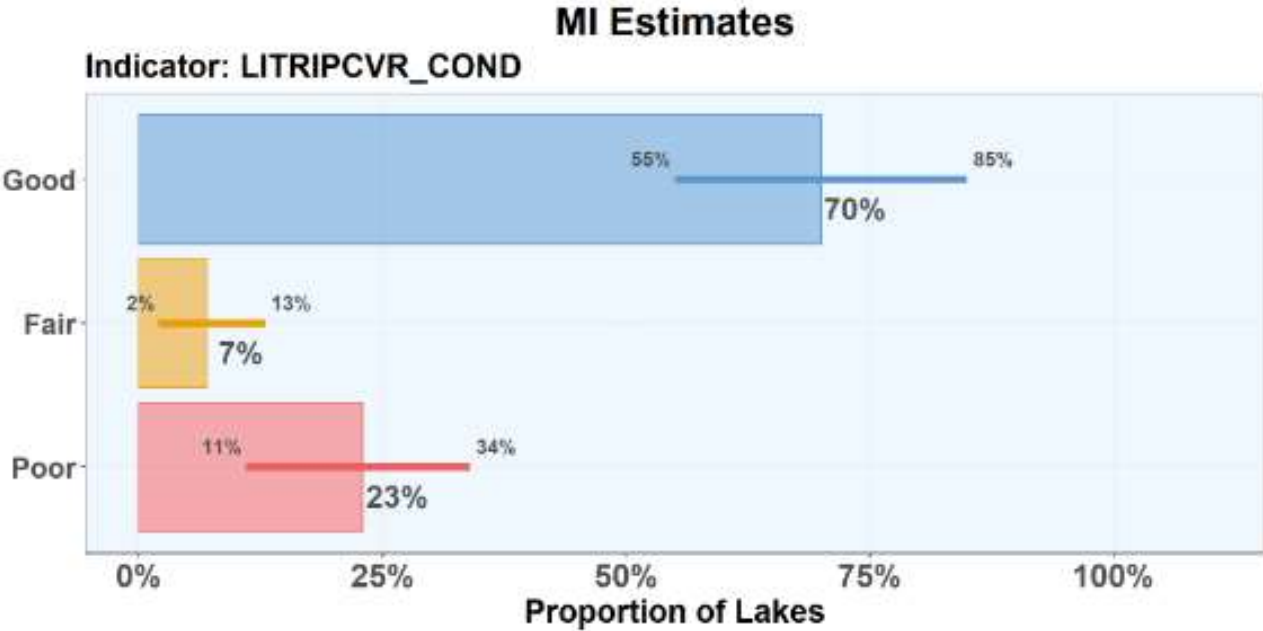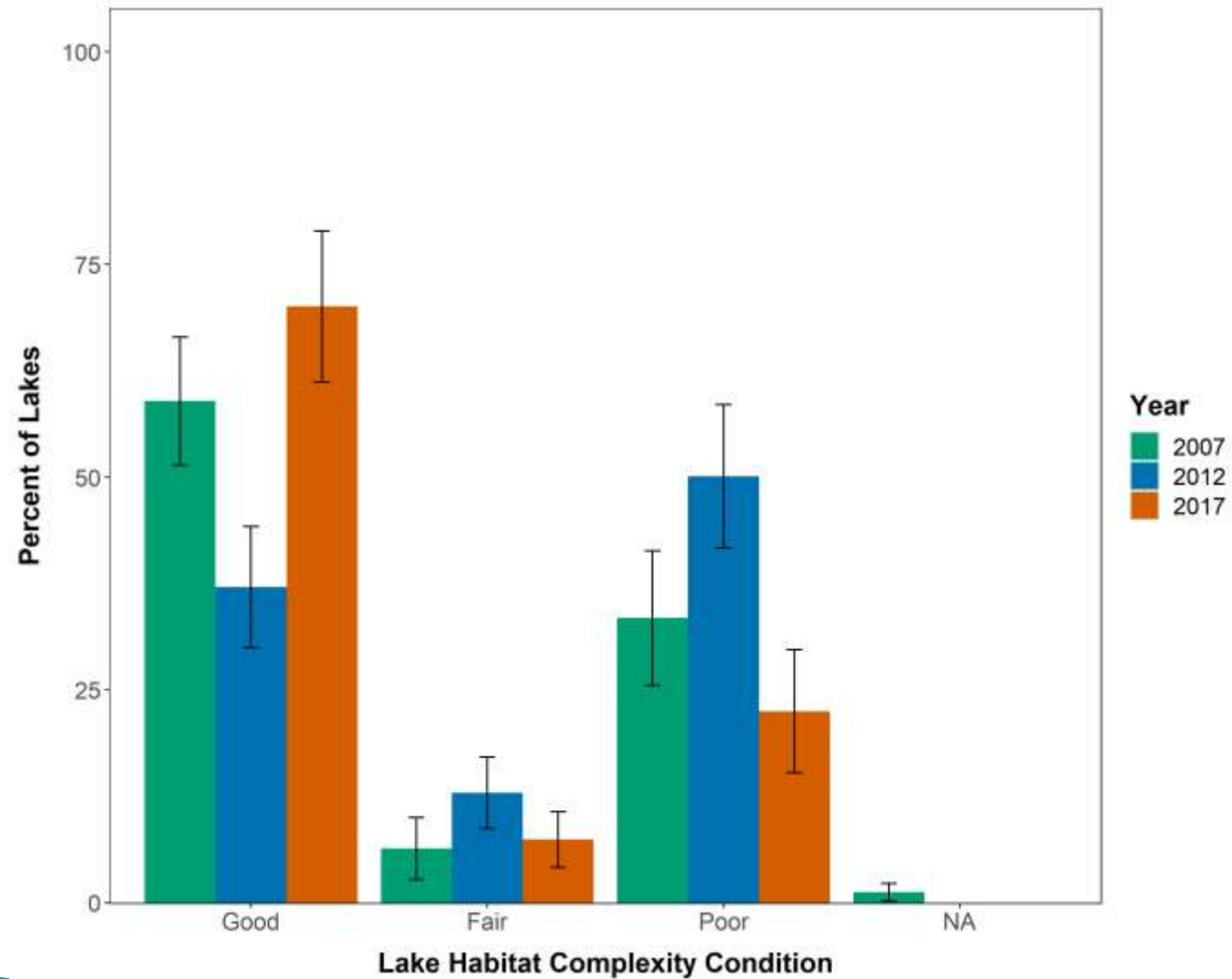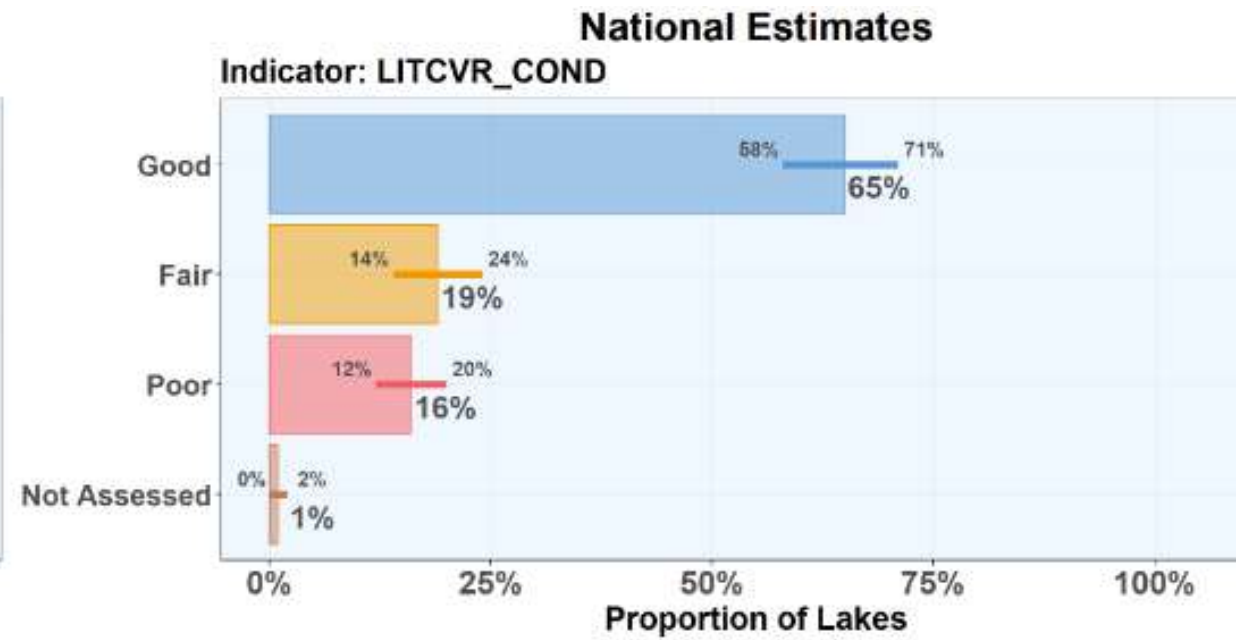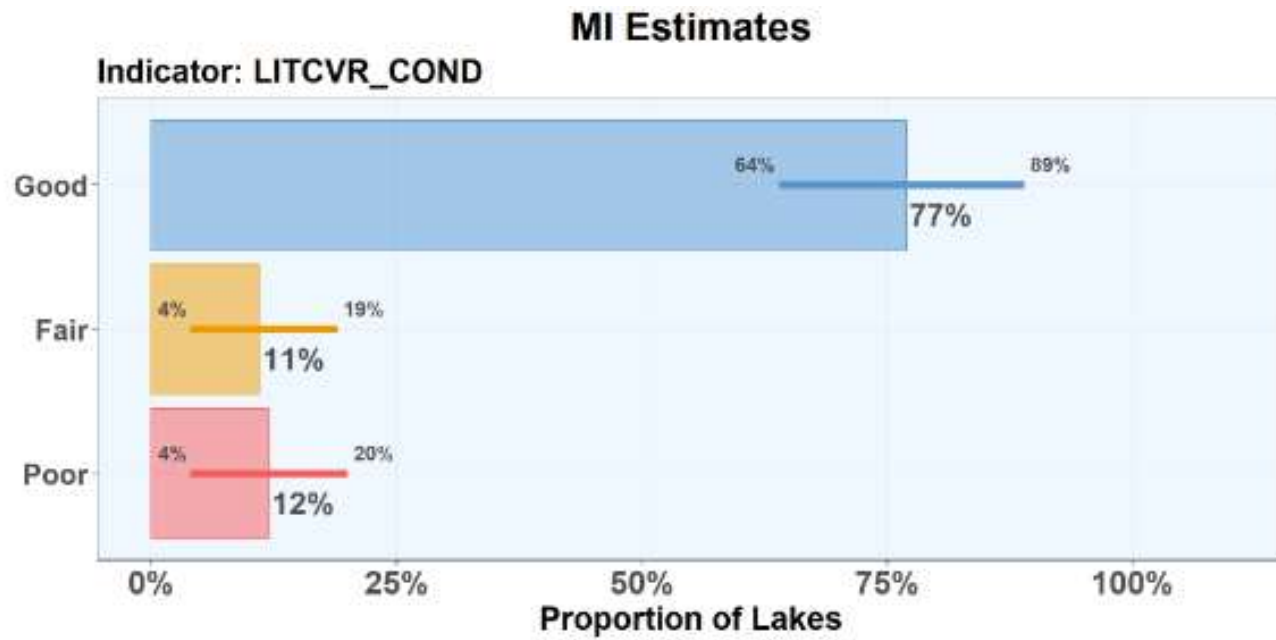| Shallow Water Habitat	Lake Habitat Complexity
Measures living and non-living features such as: • overhanging vegetation • aquatic plants • large woody snags • brush • boulders • rock ledges Variable shallow water habitat typically support more aquatic life	Combines riparian vegetation cover and shallow water habitat indicators to estimate the amount and variety of all cover types at the water's edge (land and water) High complexity creates more ecological niches for macroinvertebrates and fish

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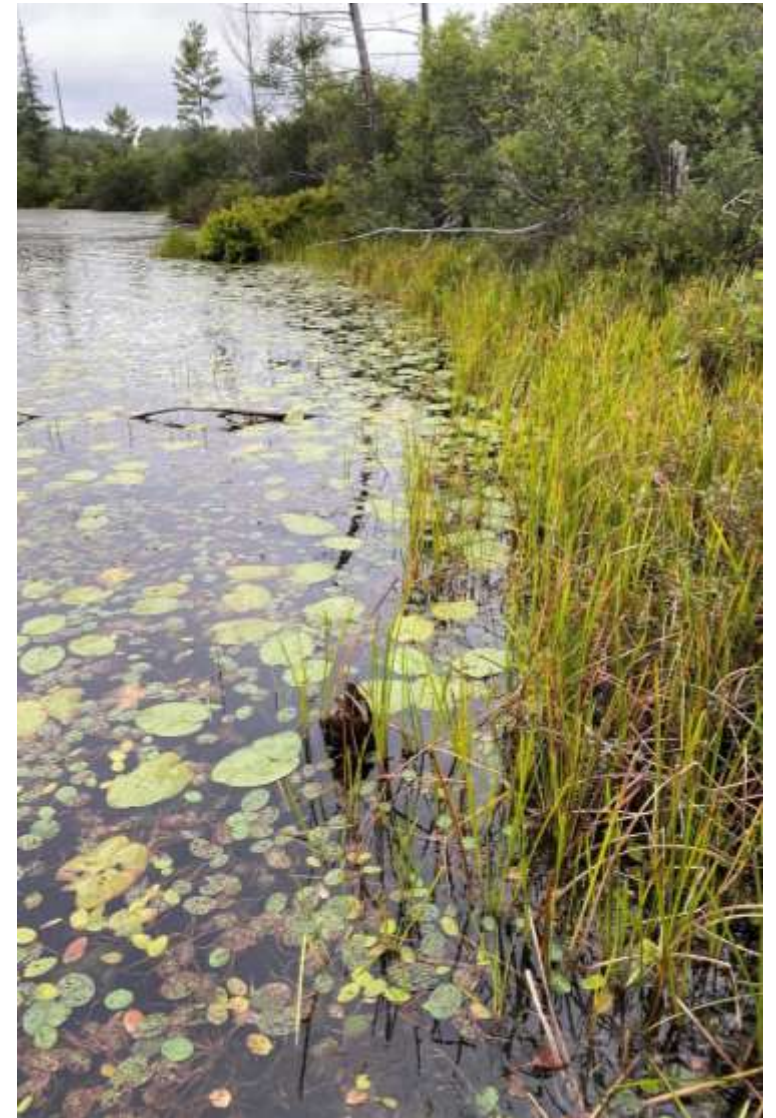
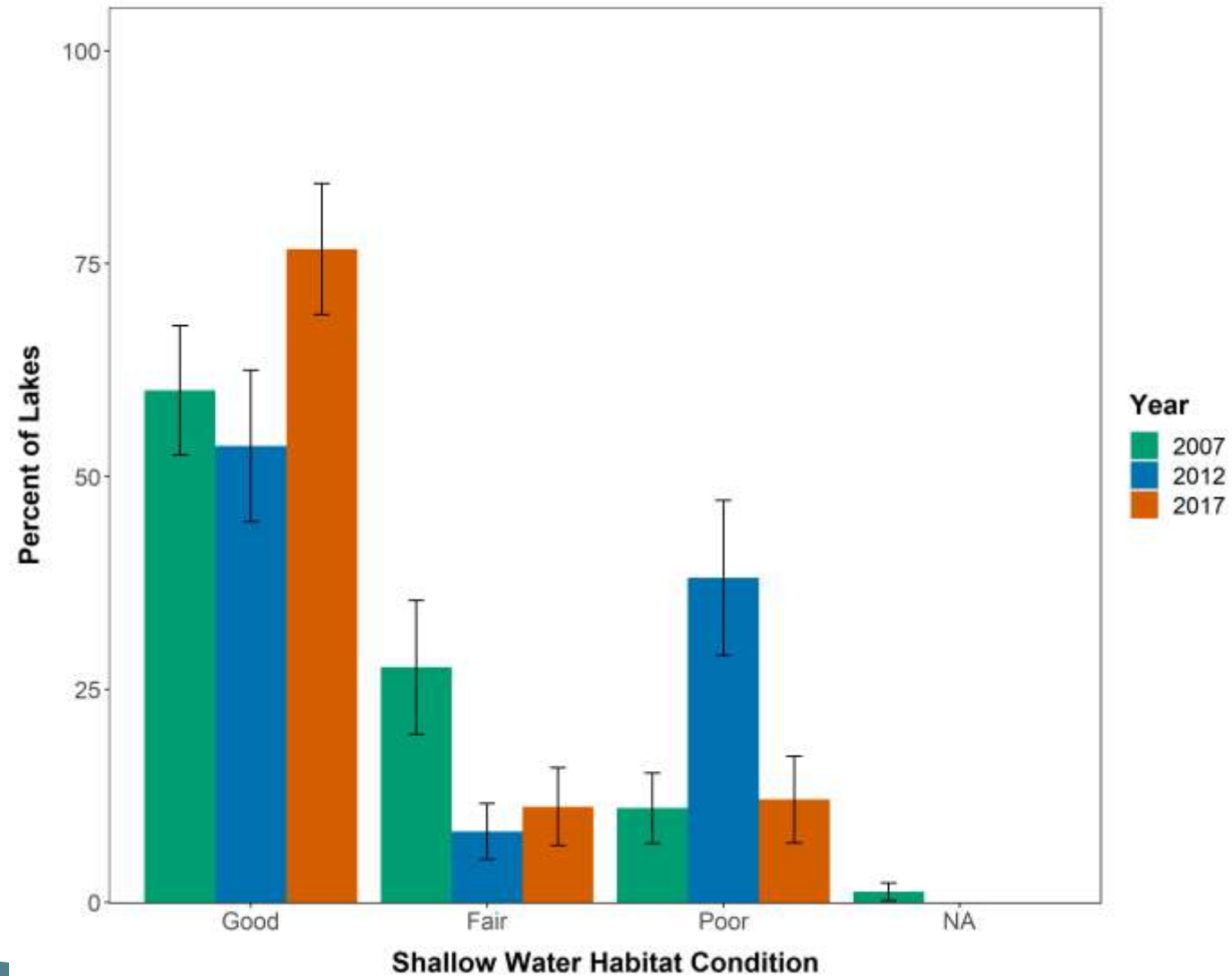# 2017 Littoral Conditions- Lake Habitat Complexity

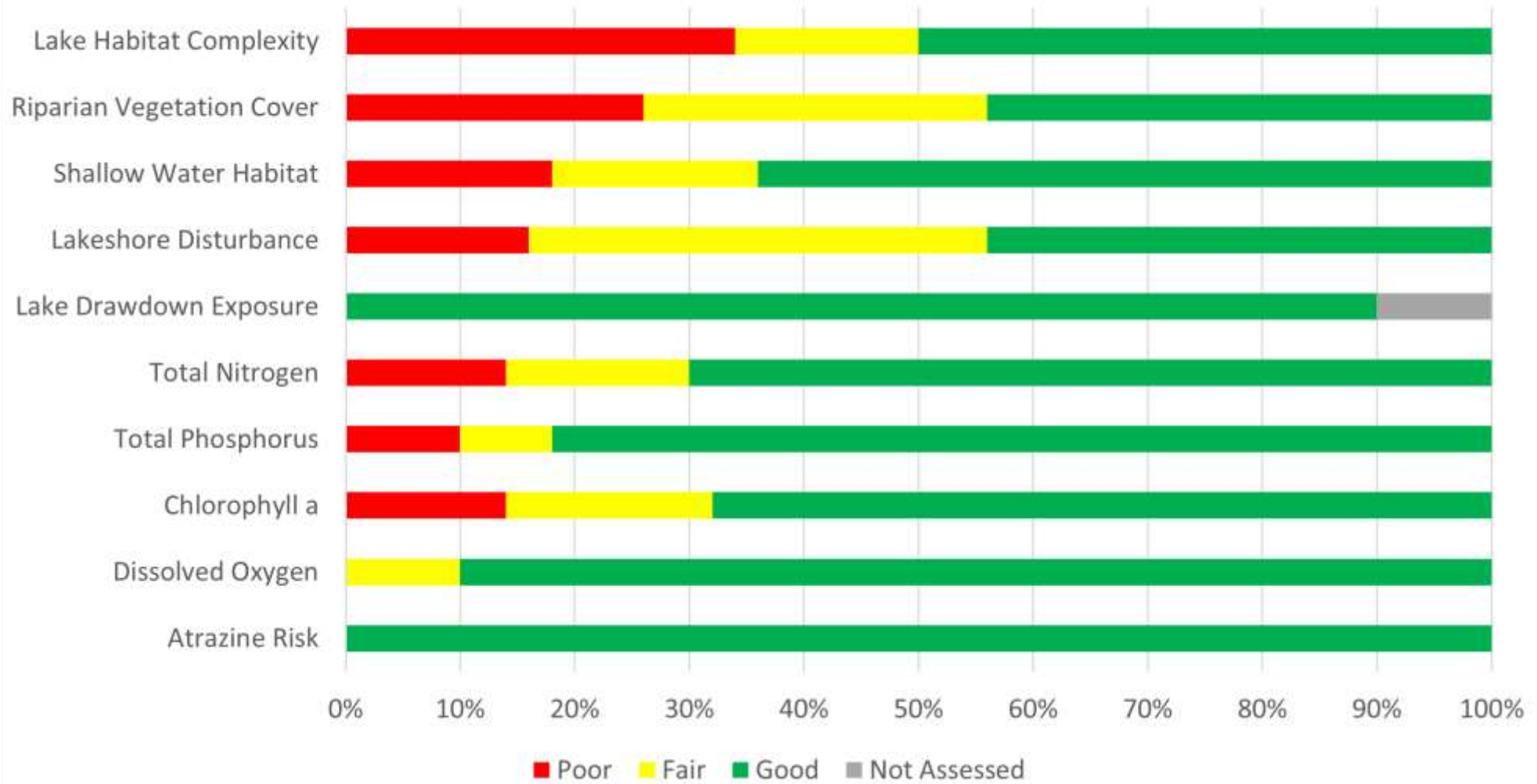# MI Littoral Conditions- Lake Habitat Complexity

2017 Littoral Conditions-Shallow Water Habitat Condition

MI Littoral Conditions-Shallow Water Habitat Condition

2017 Michigan NLA Lake Condition and Stressors
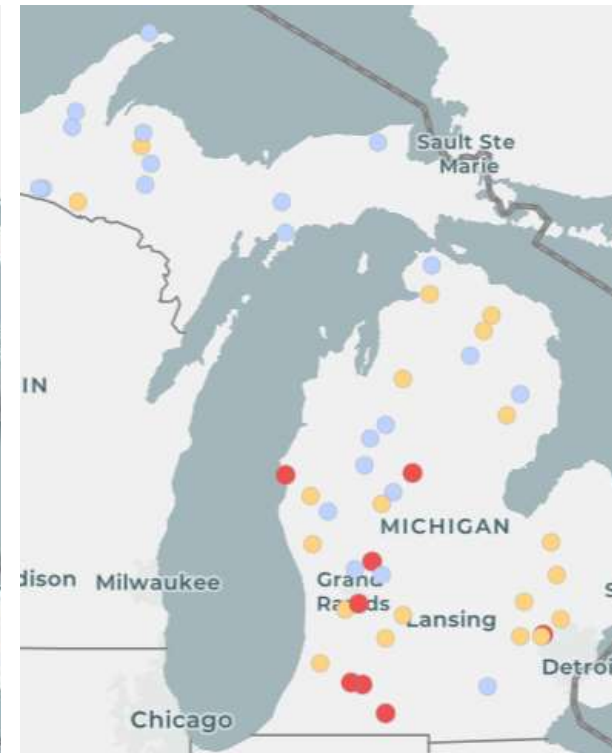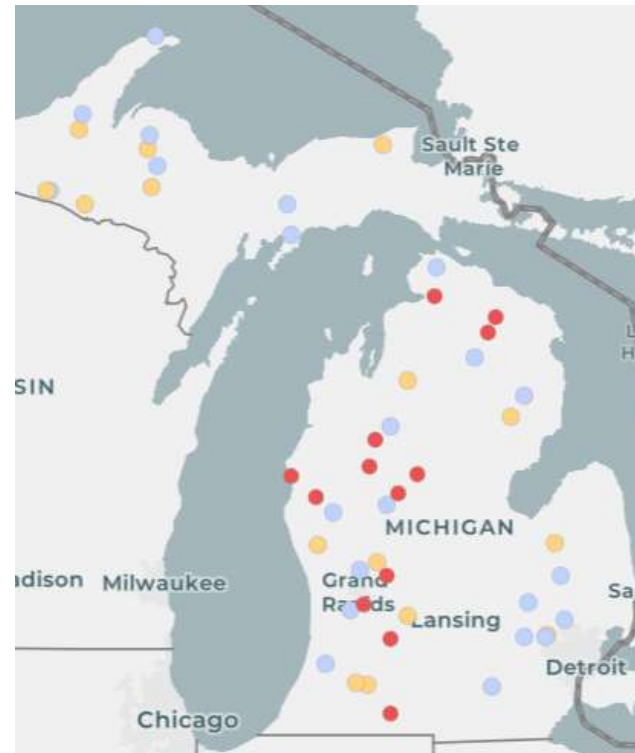
Littoral Zone - Condition

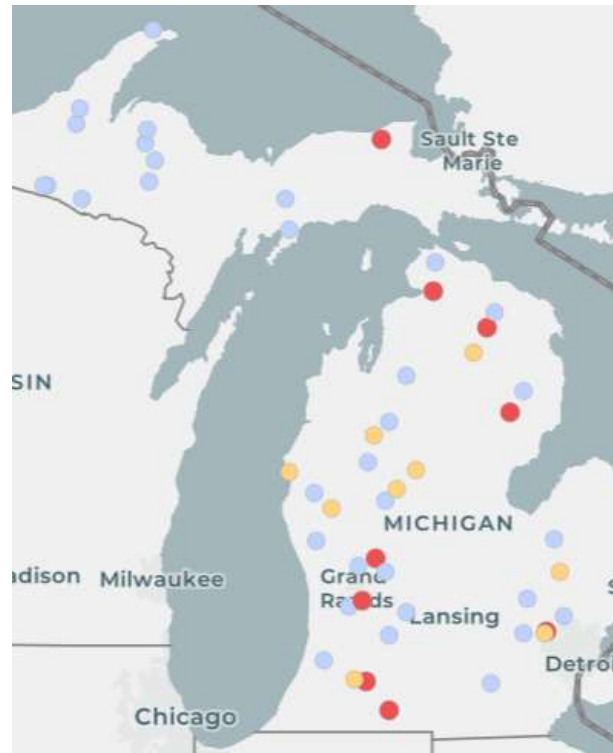### Lake Habitat Complexity

Shallow Water Habitat

Riparian Zone - Condition

Riparian Vegetation

Lakeshore Disturbance

- Good
- Fair
- Poor

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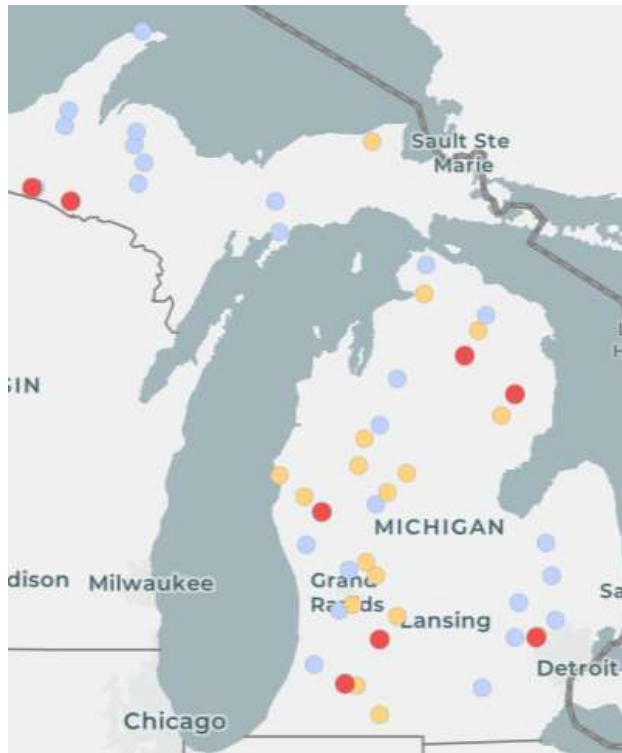
Extremes (all poor or all good)

2 lakes all "Poor"

9 lakes all "Good"

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Most Lakes NOT all poor or all good
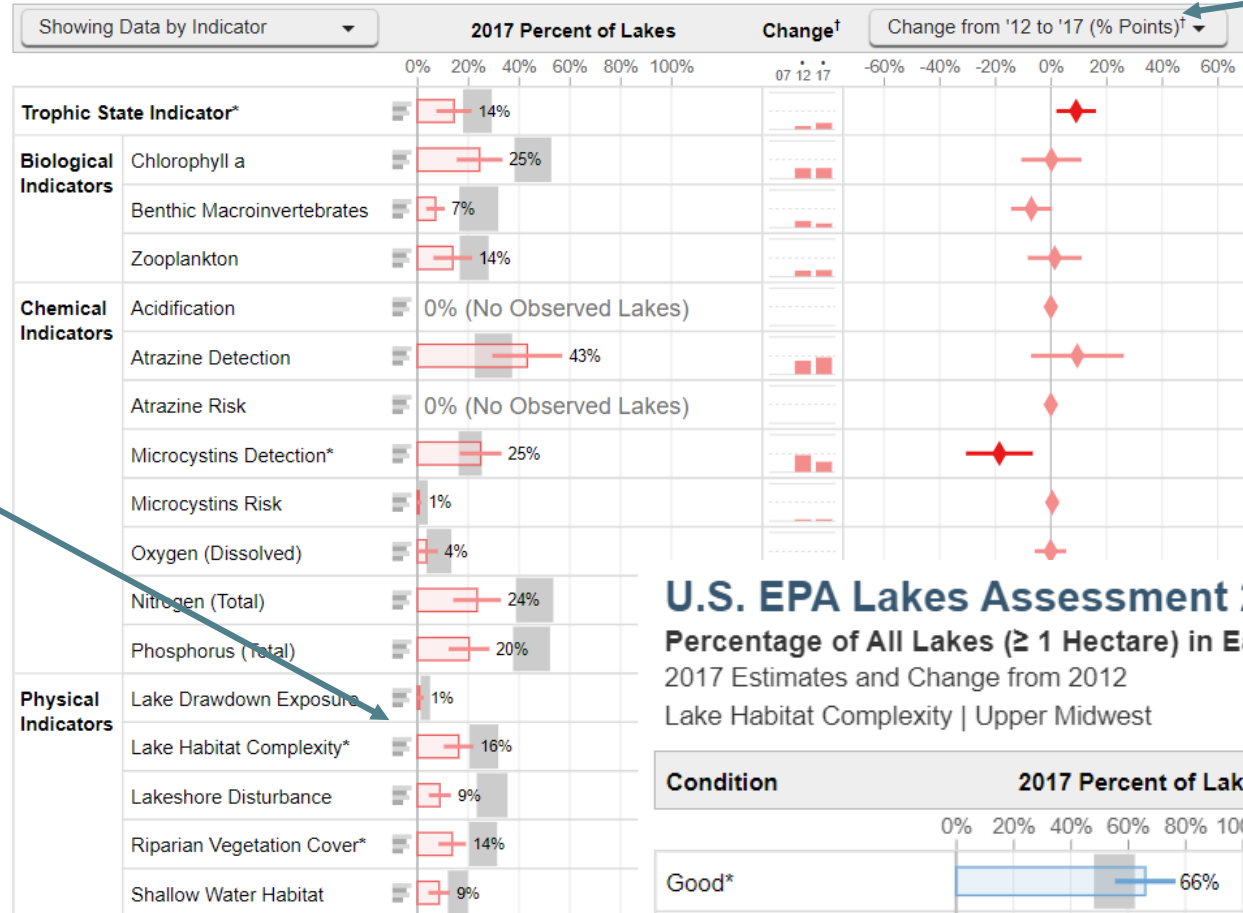

Fair, Fair, Fair, Poor

Fair, Fair, Good, Poor

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EGLE

Data Dashboard https://nationallakesassessment.epa.gov/

Timeframe

With or w/o Small Lakes

Condition

Region

Extra Graphs
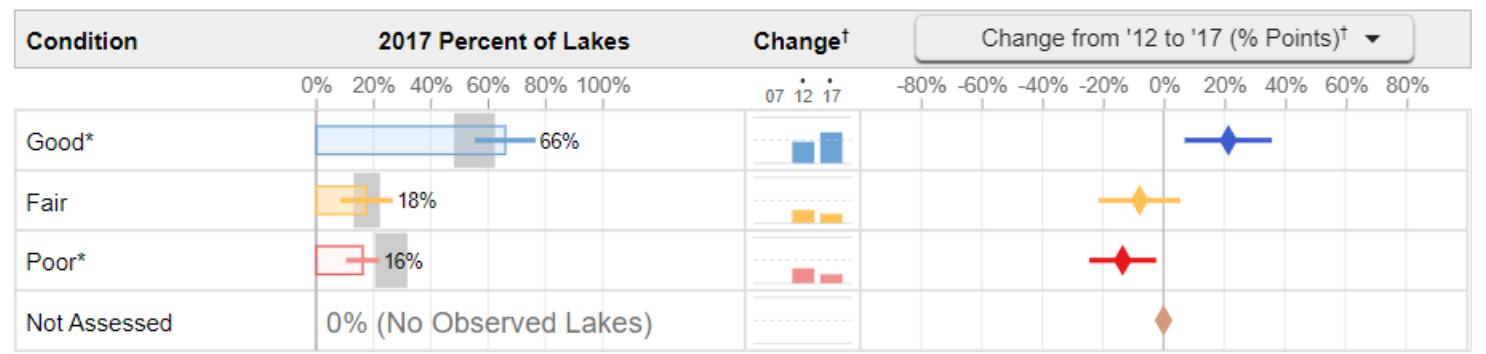
How Does Your Lake Compare to Other U.S. Lakes?

You reported that your lake in Michigan (MI) had an observed value of 24.0 µg/L for Total Phosphorus in 2022. The graphs below show how your lake ranks at the state, regional and national levels compared to representative data collected by the U.S. National Lakes Assessment in 2017. For Total Phosphorus, a lower percentile ranking is generally preferable.

In MI, your lake is in the 83rd percentile.*

0.0 µg/L   50.0   100.0   150.0   200.0   250.0   300.0   350.0   400.0

In Region 5, your lake is in the 44th percentile.*

0.0 µg/L   50.0   100.0   150.0   200.0   250.0   300.0   350.0   400.0

Nationally, your lake is in the 34th percentile.*

0.0 µg/L   50.0   100.0   150.0   200.0   250.0   300.0   350.0   400.0

*IMPORTANT: These population estimates are based on a weighted analysis of lake data from the U.S. EPA's 2017 U.S. National Lakes Assessment (NLA). Total Phosphorus was measured once at an open water location from May to October 2017. Sampled lakes were selected using a statistically representative approach that balances lake size with their distribution across the continental U.S. Results shown are weighted based on those factors. Percentiles are rounded to the nearest whole number. Estimated max. margin of error for MI percentile ranking, based upon limited observations: ±13.1.

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