Water quality trends in reservoirs and streams: 1994-2018

Purpose

- Examine available COA monitoring data to identify potential temporal trends
- Evaluate general character of trends and identify key areas that need further clarification and investigation

Background

Population growth

Monitoring programs:

- **Streams, Environmental Integrity Index**
- **Reservoirs, Austin Lakes Index**

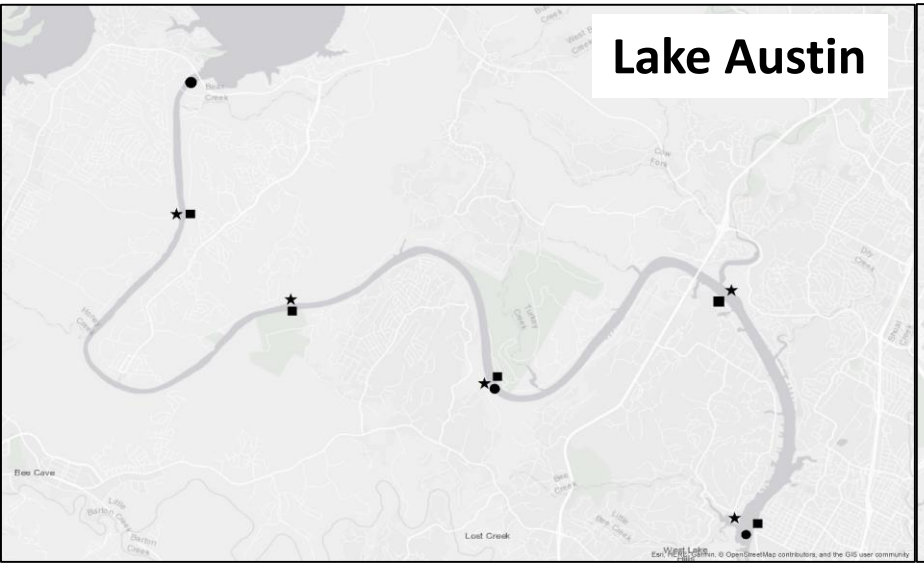
Regulatory environment:

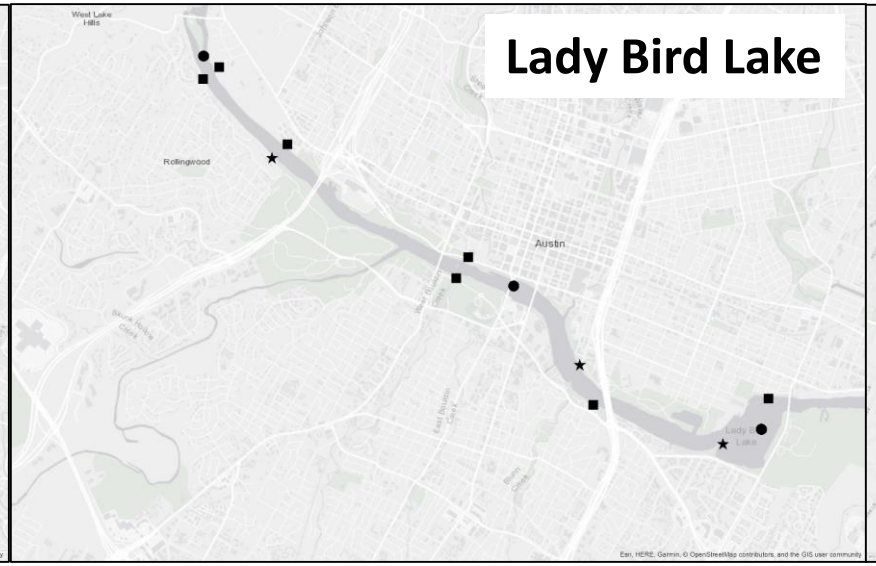
- **Pre-regulatory development – Older than 1986.**
- **Post Regulatory:**
  - 1986, CWO (Comprehensive Watershed Ordinance)
    - 1991, UWO (Urban Watershed Ordinance)
    - 1992, SOS (Save Our Spring Ordinance)
  - 2013, WPO (Watershed Protection Ordinance)

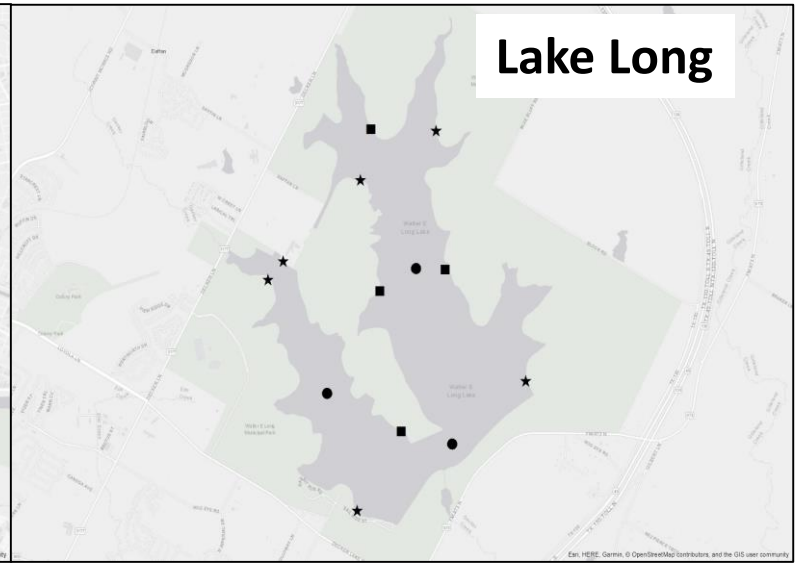
Education and Outreach

Water Quality Retrofit Program

Best Practices



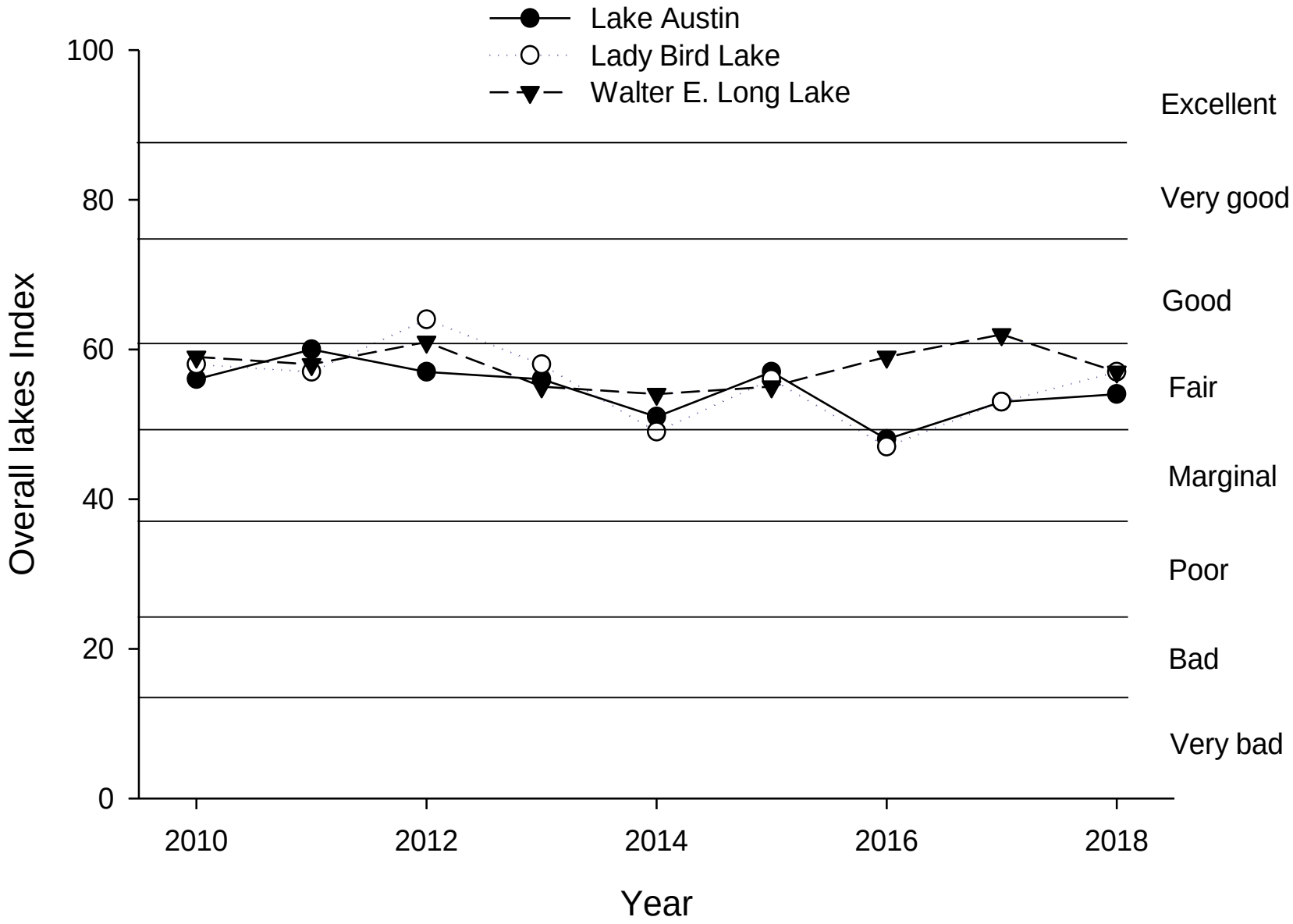


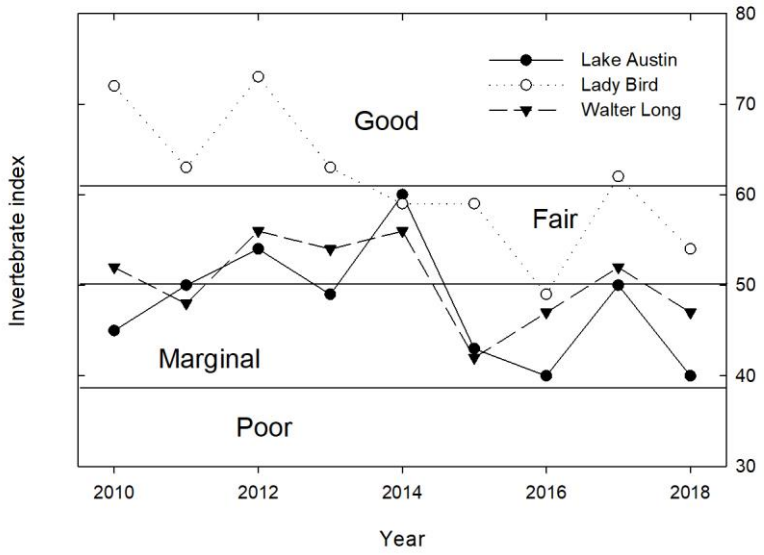


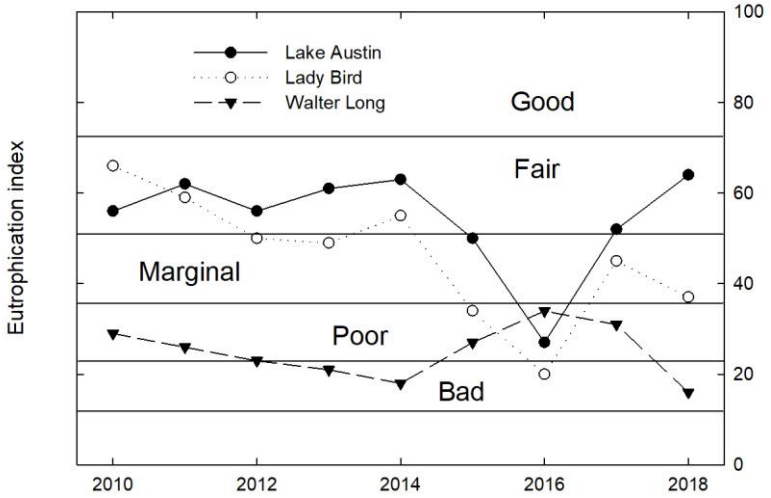
■ Water quality sites

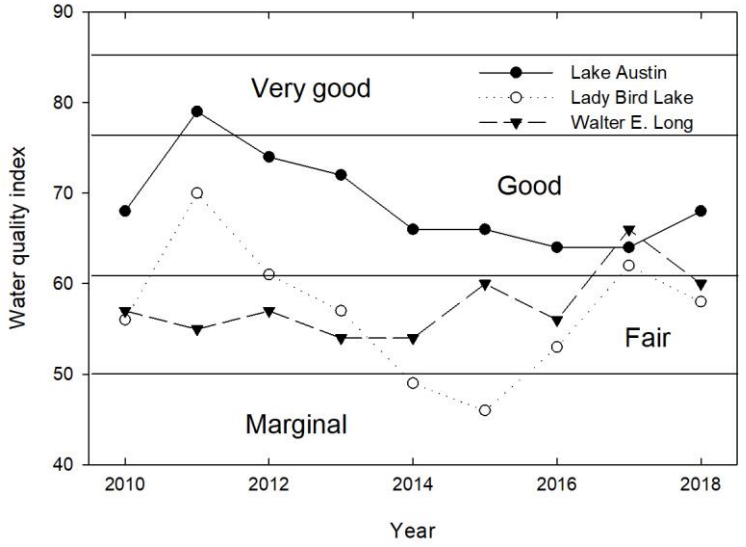
⋆ Habitat sites

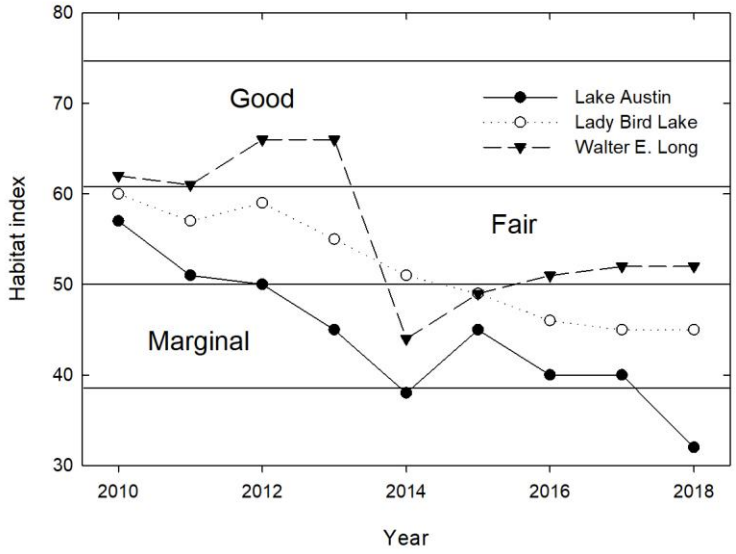
● Macro-invertebrate sites

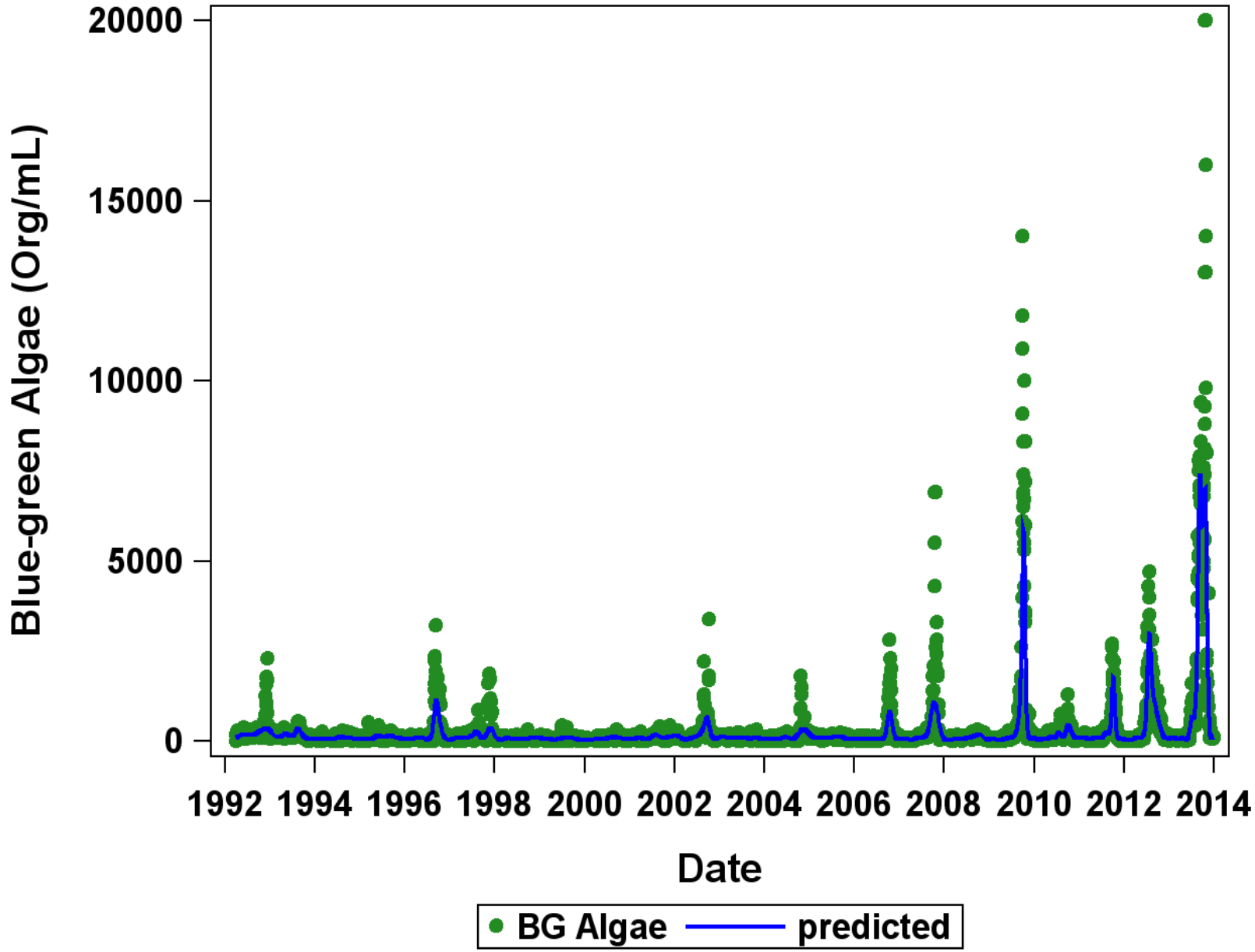

Lake Austin
Lady Bird Lake
Walter E. Long Lake
Overall lakes Index
100
80
60
40
20
0
2010
2012
2014
2016
2018
Year
Excellent
Very good
Good
Fair
Marginal
Poor
Bad
Very bad

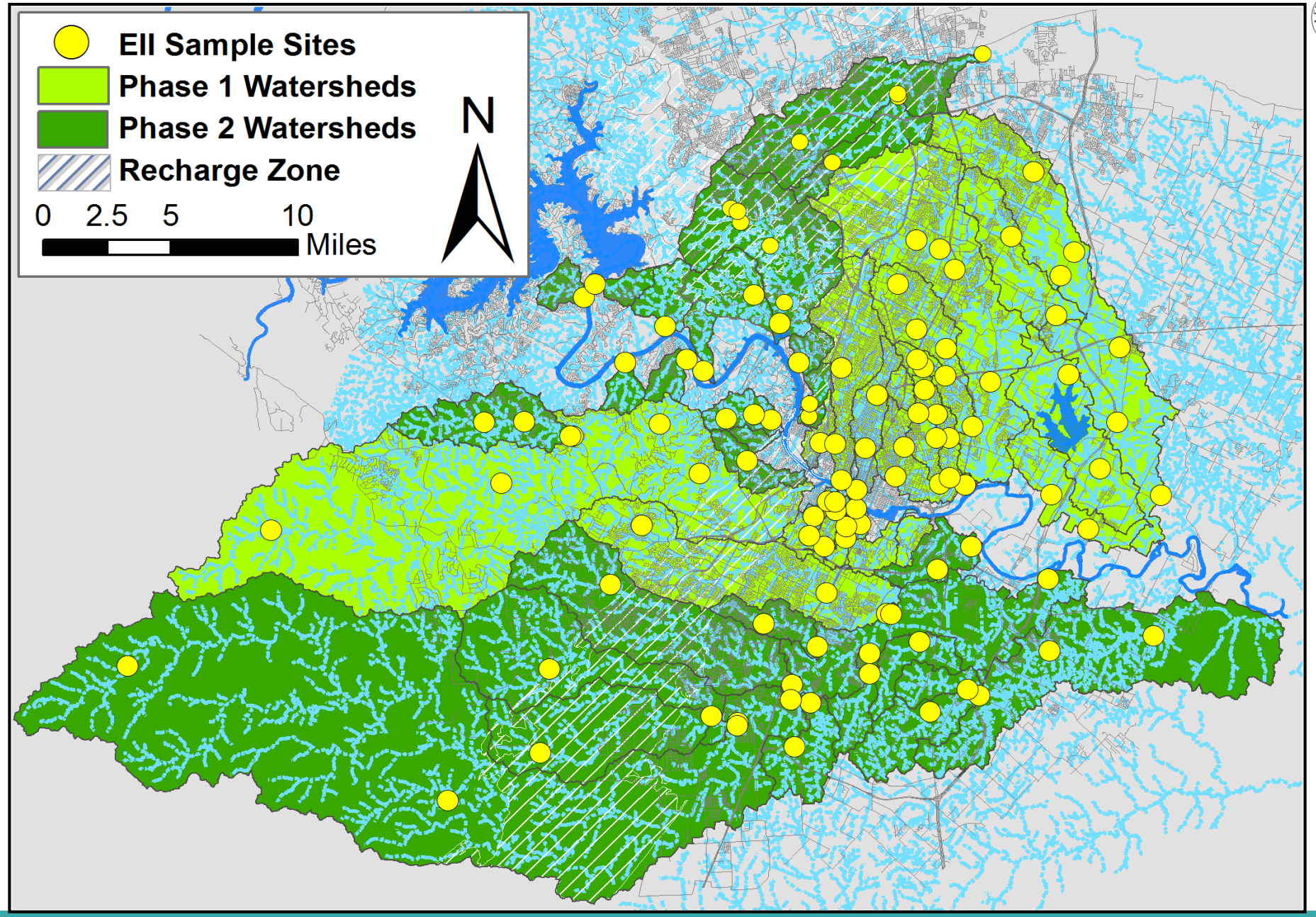

Invertebrate index
Lake Austin
Lady Bird
Walter Long
Good
Fair
Marginal
Poor
80
70
60
50
40
30
2010
2012
2014
2016
2018
Year

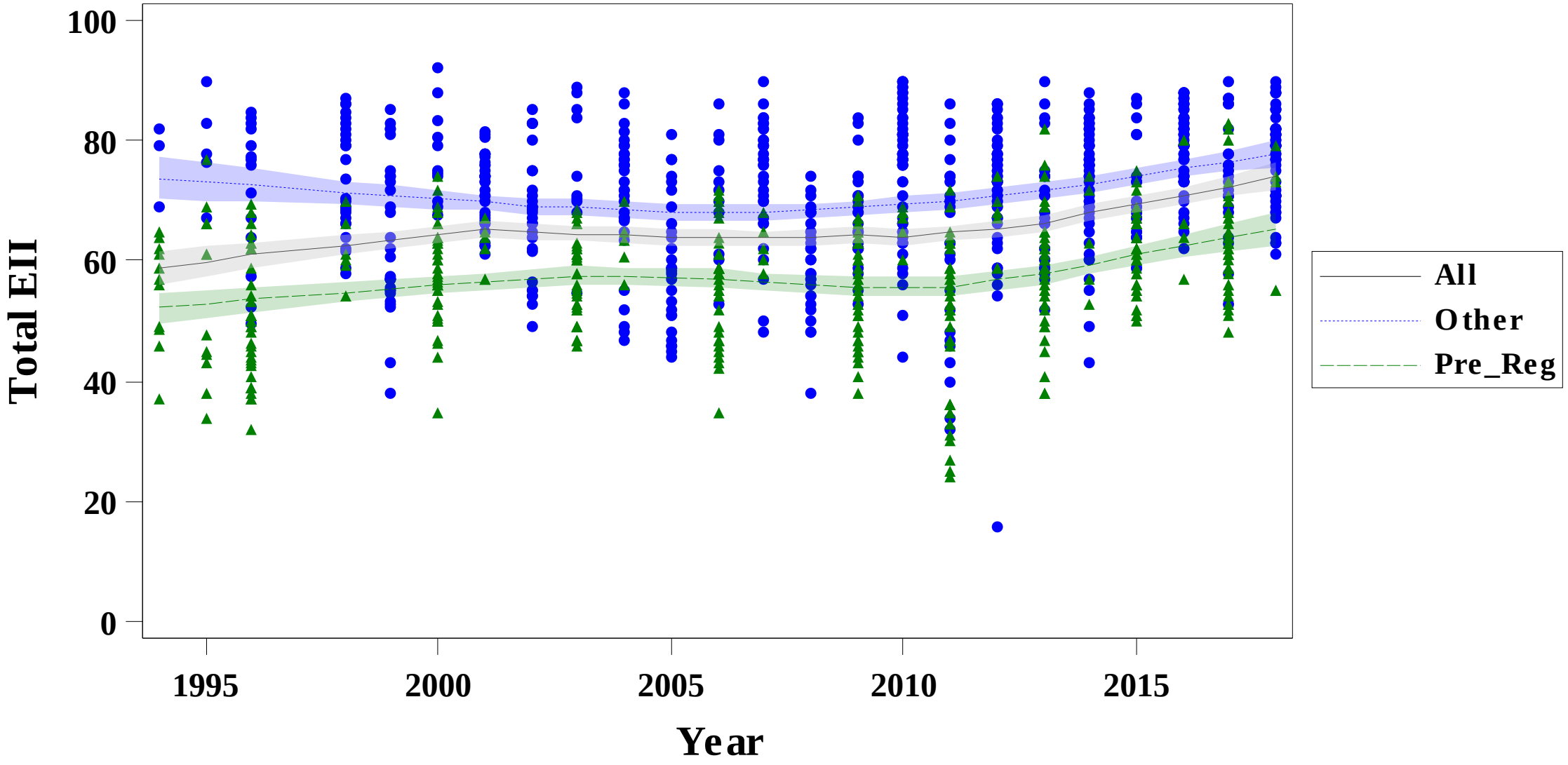

Eutrophication index
Lake Austin
Lady Bird
Walter Long
Good
Fair
Marginal
Poor
Bad
100
80
60
40
20
0
2010
2012
2014
2016
2018

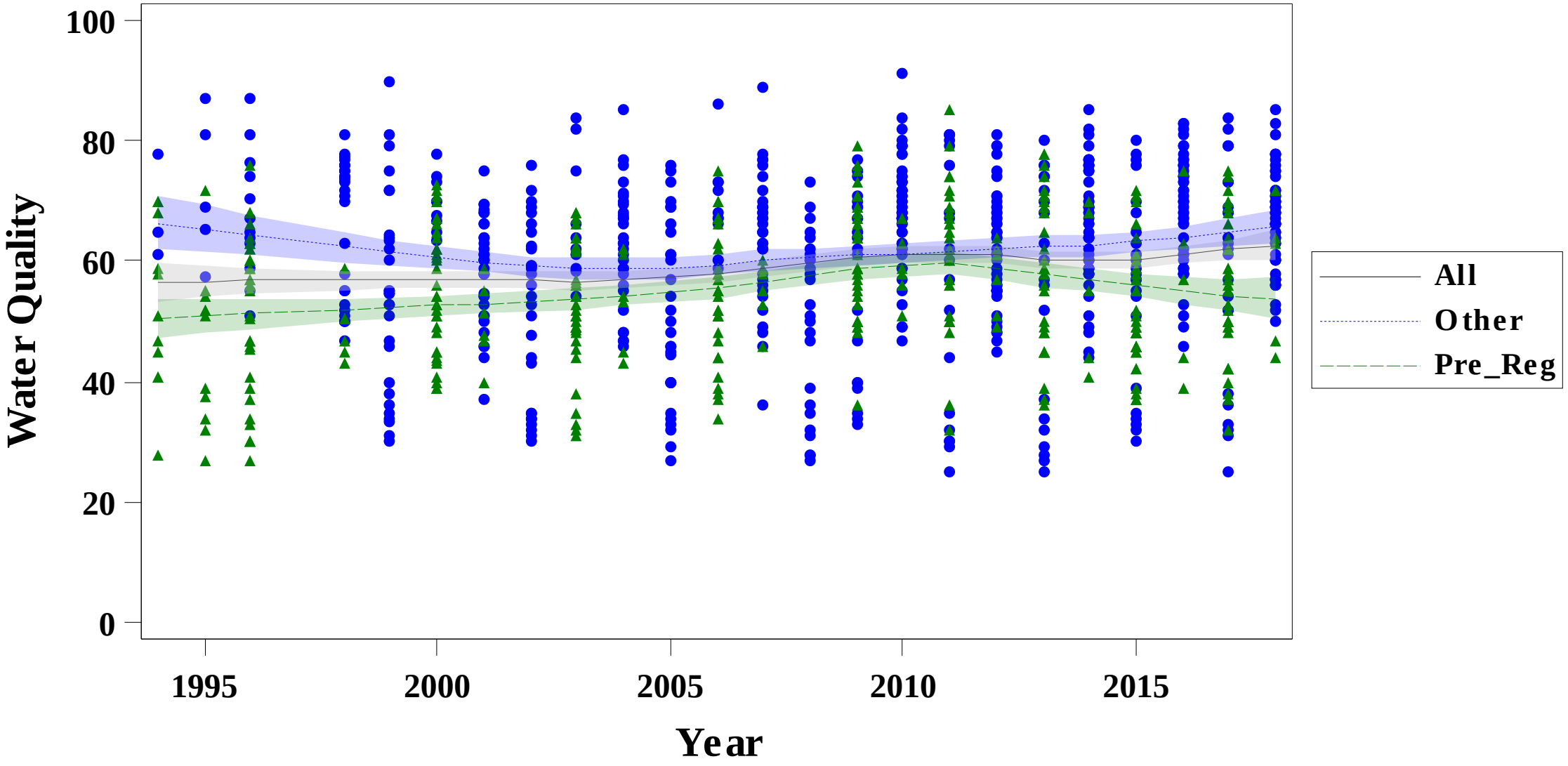

Water quality index
Lake Austin
Lady Bird Lake
Walter E. Long
Very good
Good
Fair
Marginal
90
80
70
60
50
40
2010
2012
2014
2016
2018
Year

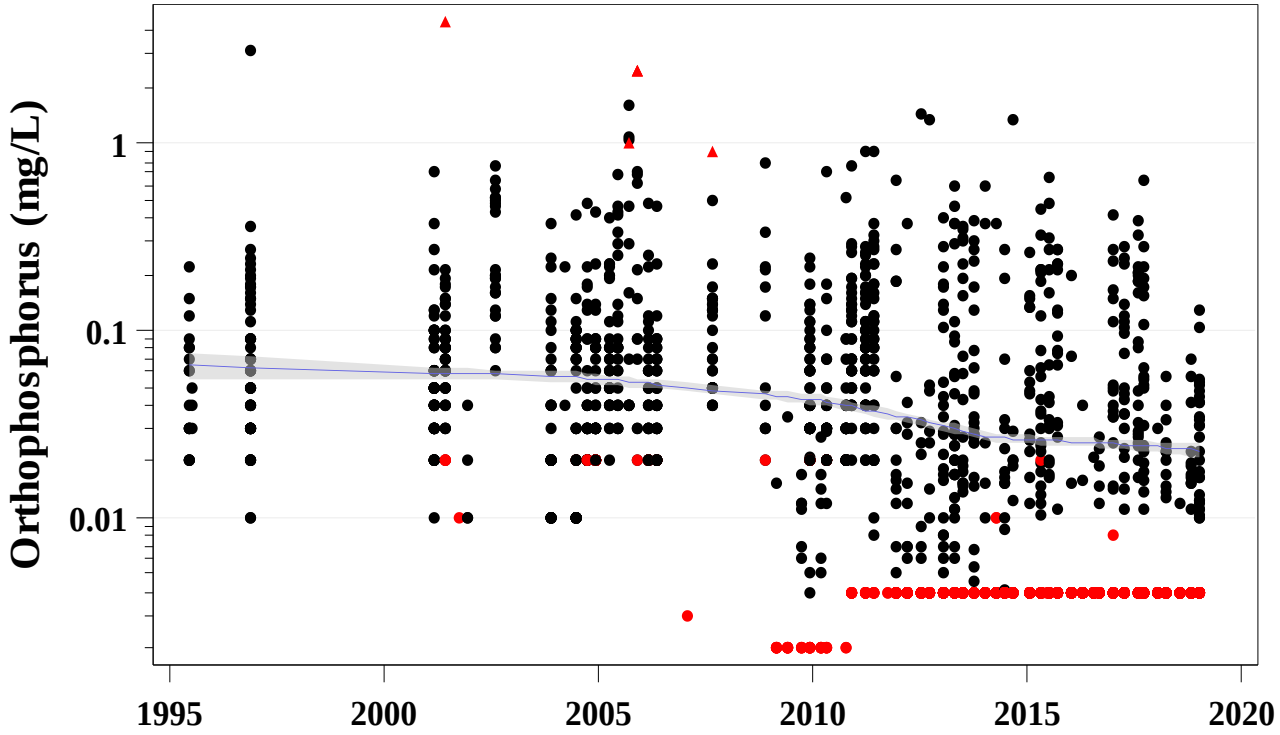

Habitat index
Lake Austin
Lady Bird Lake
Walter E. Long
Good
Fair
Marginal
80
70
60
50
40
30
2010
2012
2014
2016
2018
Year

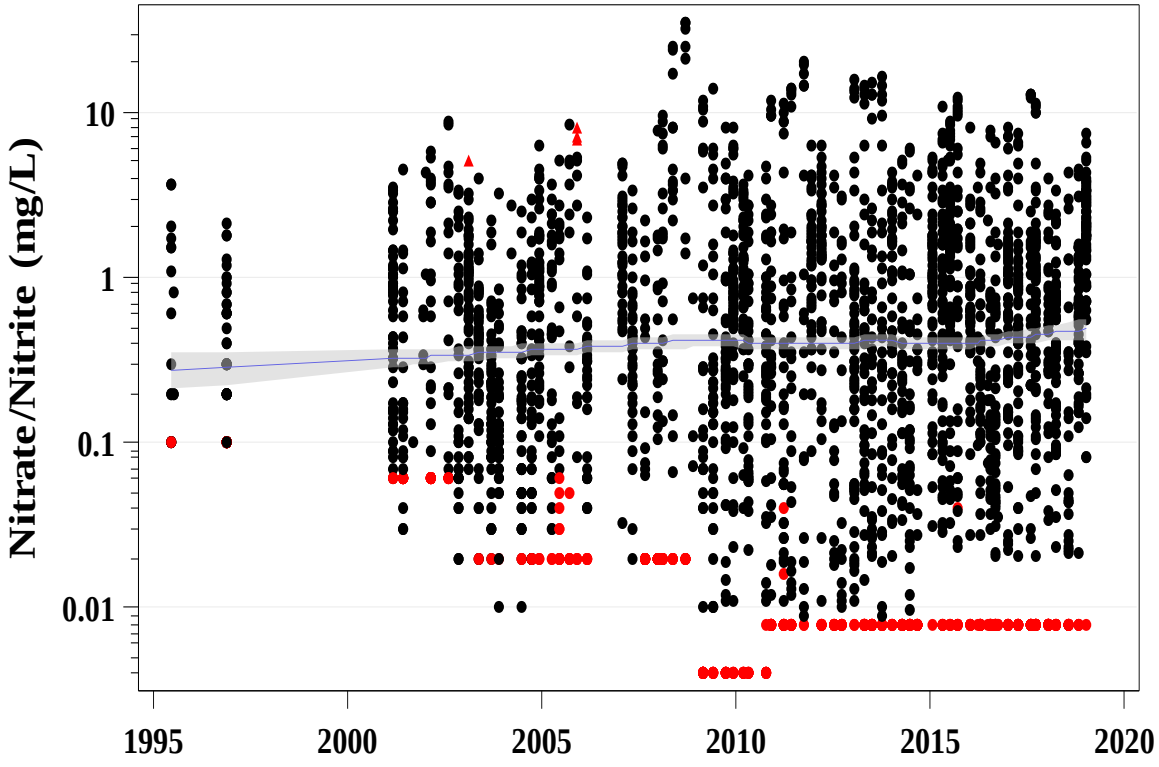

20000
15000
10000
5000
0
Blue-green Algae (Org/mL)
1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014
Date
BG Algae
predicted

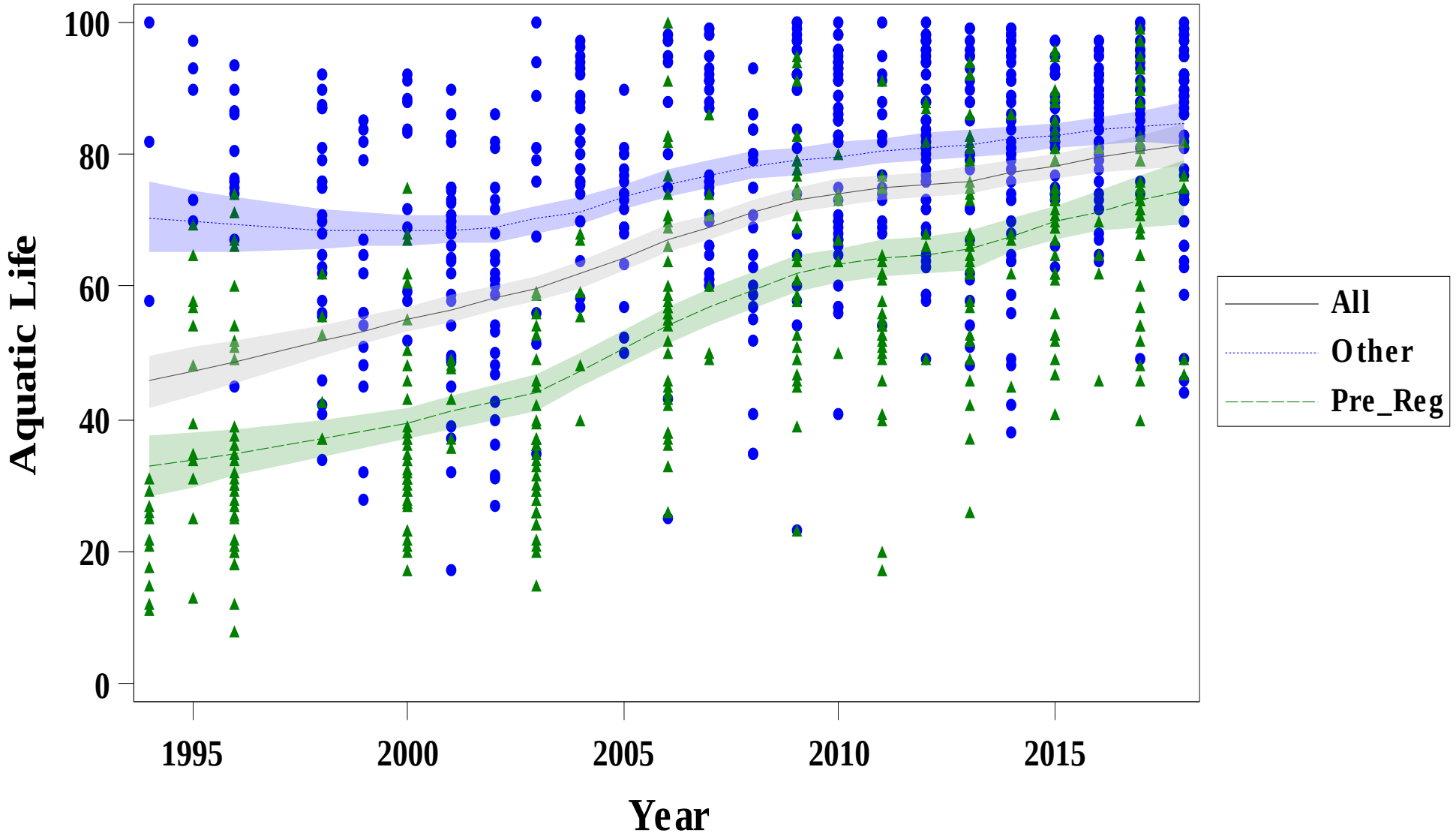

EII Sample Sites
Phase 1 Watersheds
Phase 2 Watersheds
Recharge Zone
0 2.5 5 10
Miles
N

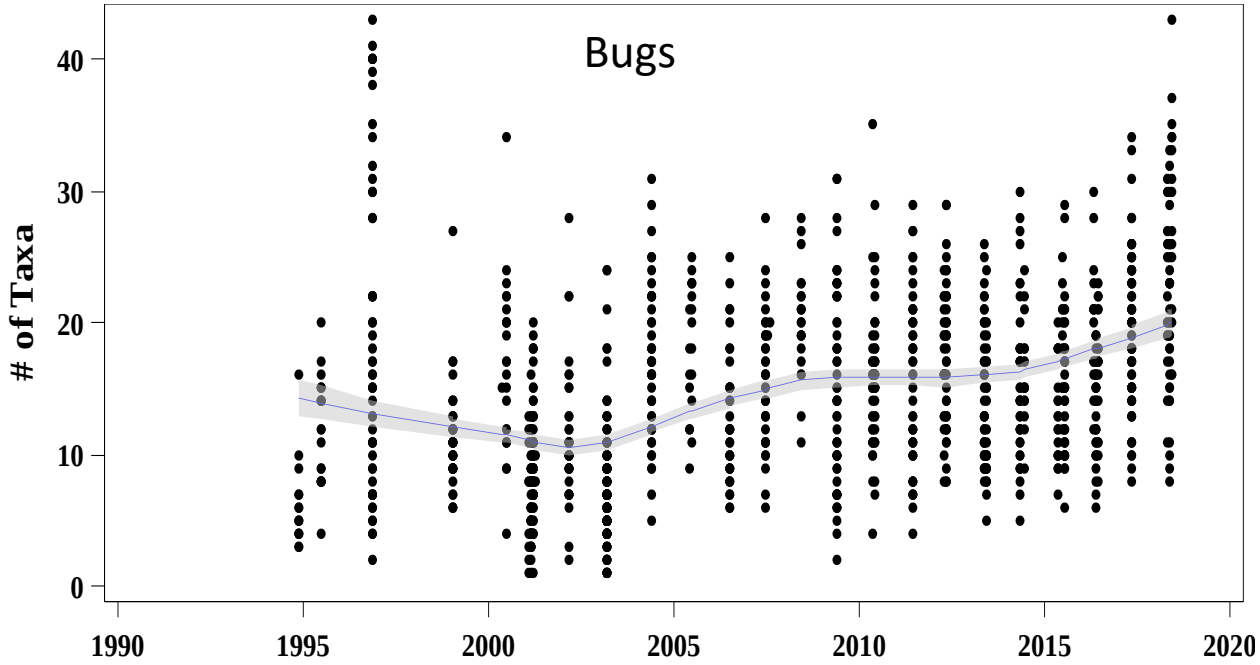

Total EII
100
80
60
40
20
0
1995
2000
2005
2010
2015
Year
All
Other
Pre_Reg

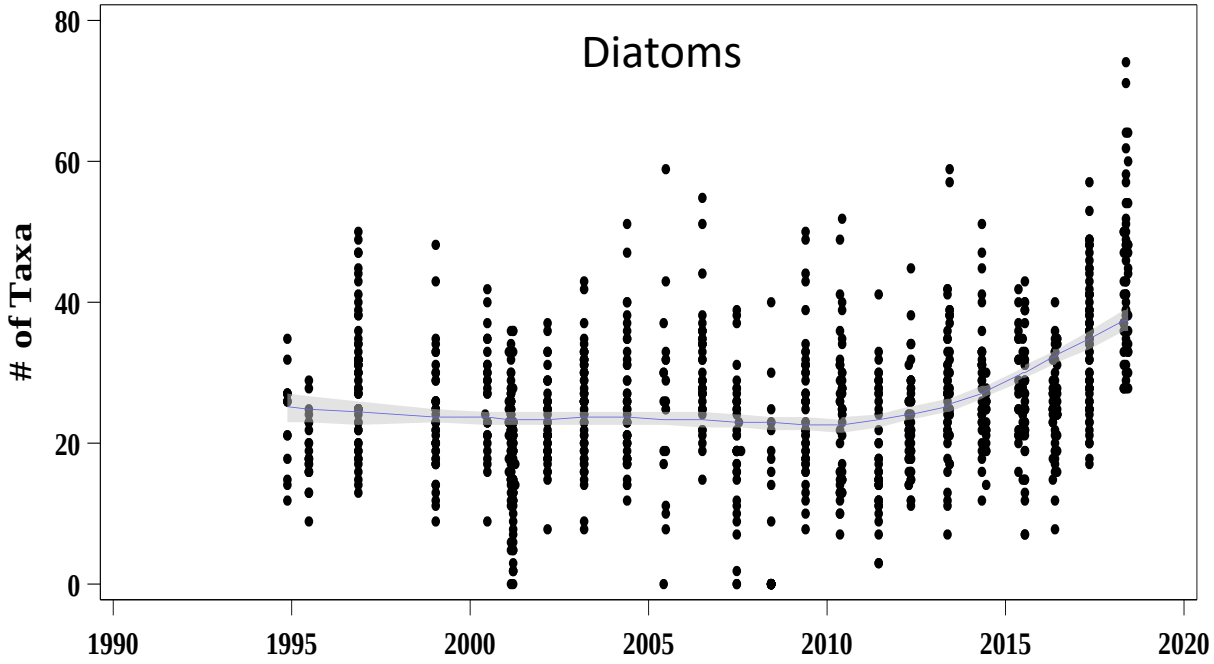

Water Quality
100
80
60
40
20
0
1995
2000
2005
2010
2015
Year
All
Other
Pre_Reg


Orthophosphorus (mg/L)
1
0.1
0.01
1995
2000
2005
2010
2015
2020


Nitrate/Nitrite (mg/L)
10
1
0.1
0.01
1995
2000
2005
2010
2015
2020


Aquatic Life
100
80
60
40
20
0
1995
2000
2005
2010
2015
Year
All
Other
Pre_Reg


Bugs
# of Taxa
0
10
20
30
40
1990
1995
2000
2005
2010
2015
2020


Diatoms
# of Taxa
0
20
40
60
80
1990
1995
2000
2005
2010
2015
2020

Key Findings

- Large population/development expansion
  - ~500K in 25 year study period
- Receiving waters/reservoirs are holding up
  - Blue green algae shift, invasive species
- Creeks appear to be improving
  - Many neutral and positive trends, very few negative trends.
- Need to look more deeply at development patterns, methods, key explanatory variables.

Recommendations/questions

- Be cautious with indexing.
- Climate, development, ecology and policies are variable.
- Older development needs retrofit programs.
- Trends are not predictive.
- Alternative hypothesis: Long-term recovery?
- More targeted special studies:
  - Specific stress/response relationships
  - Legacy land uses, vegetation, development patterns
  - Aquatic life response
  - Development patterns and the regulatory environment
  - E. coli bacteria solutions
  - Nitrate solutions

Questions?