

Vermont Citizens Advisory Committee

Long-term chloride trends for Lake Champlain and its tributaries



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Lake Champlain long-term monitoring program

How is the lake's water quality? Is it changing?

Multi-decadal monitoring reveals salinization impacts of road de-icing salt application in the Lake Champlain watershed

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² Paul Smith's College Adirondack Watershed Institute, Paul Smiths, NY, USA

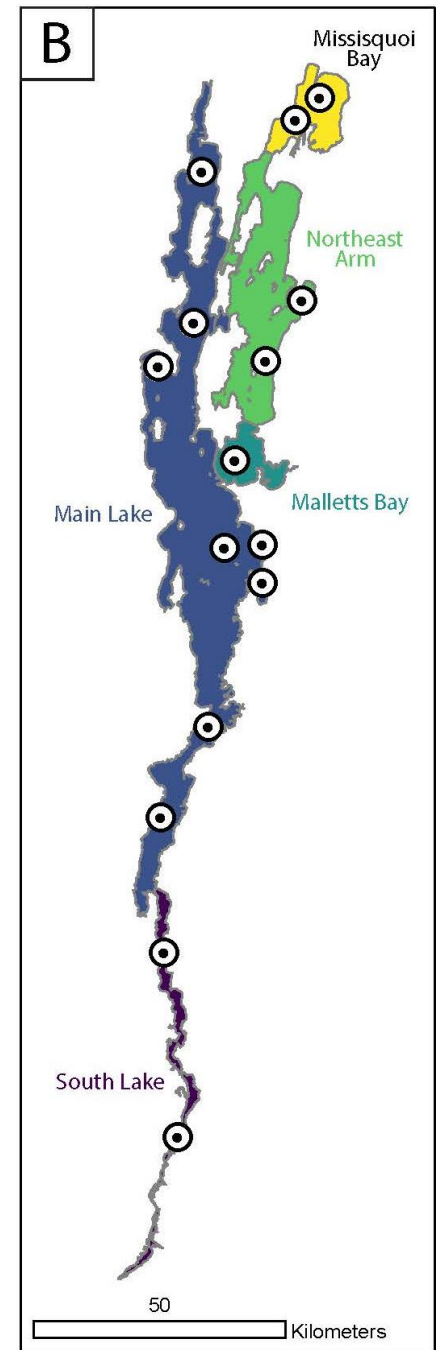
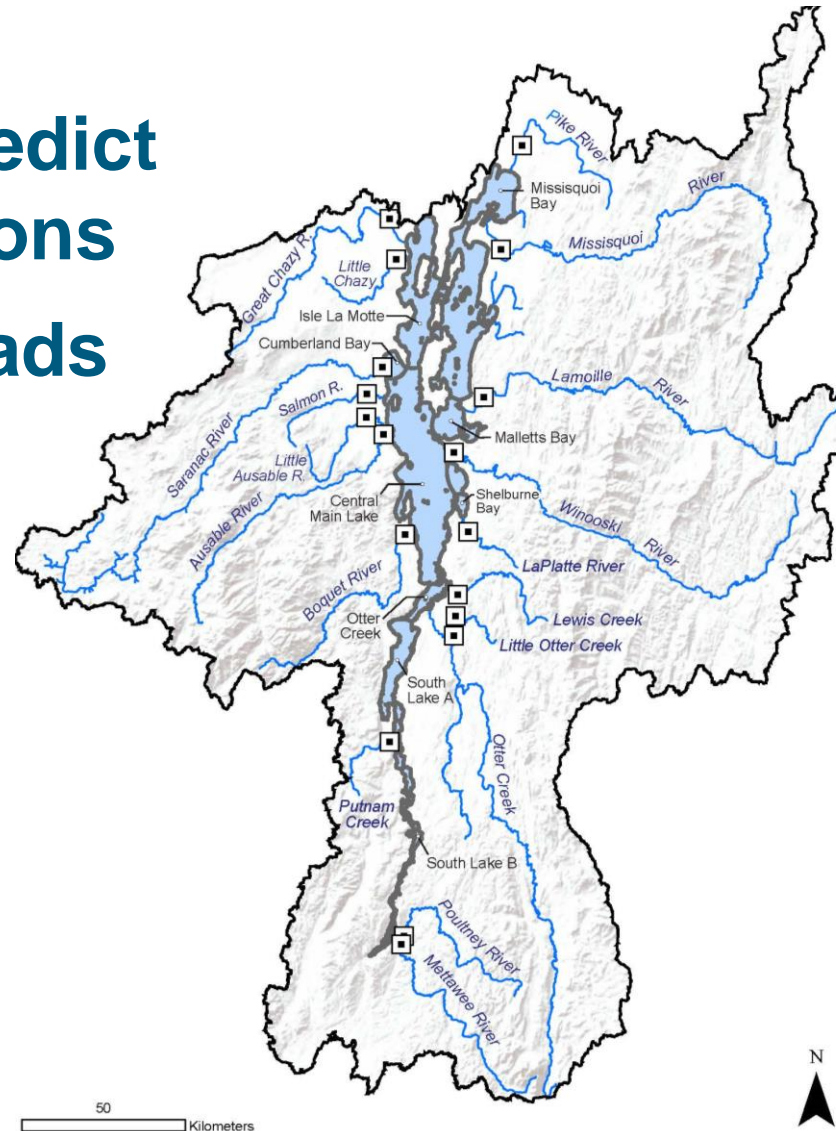
³ University of Vermont, Burlington, VT, USA

Chloride concentration data

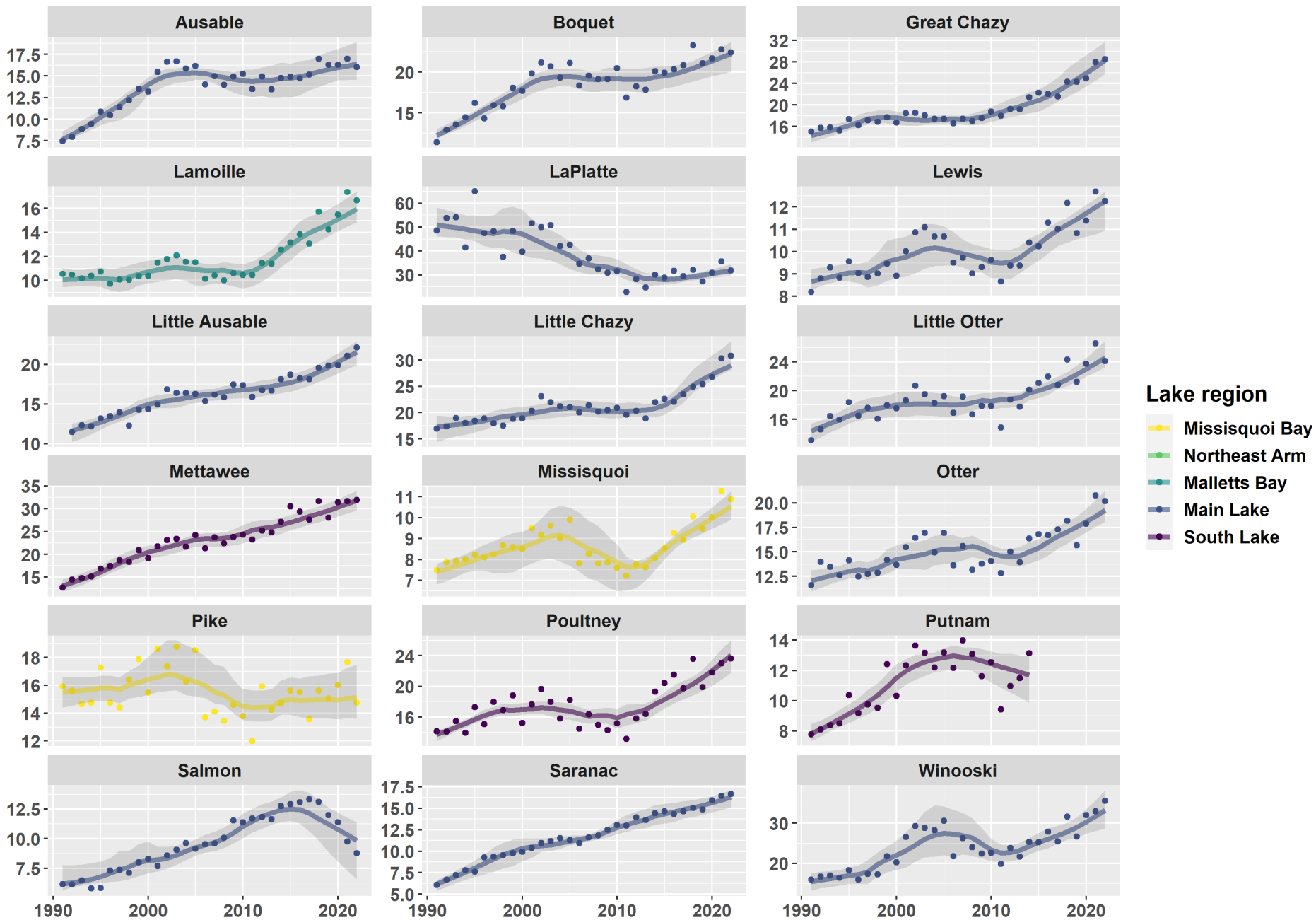
- Starting 1991
- 18 tributaries
 - 8,000 samples
- 15 lake sites
 - 7,250 epilimnion or unstratified samples

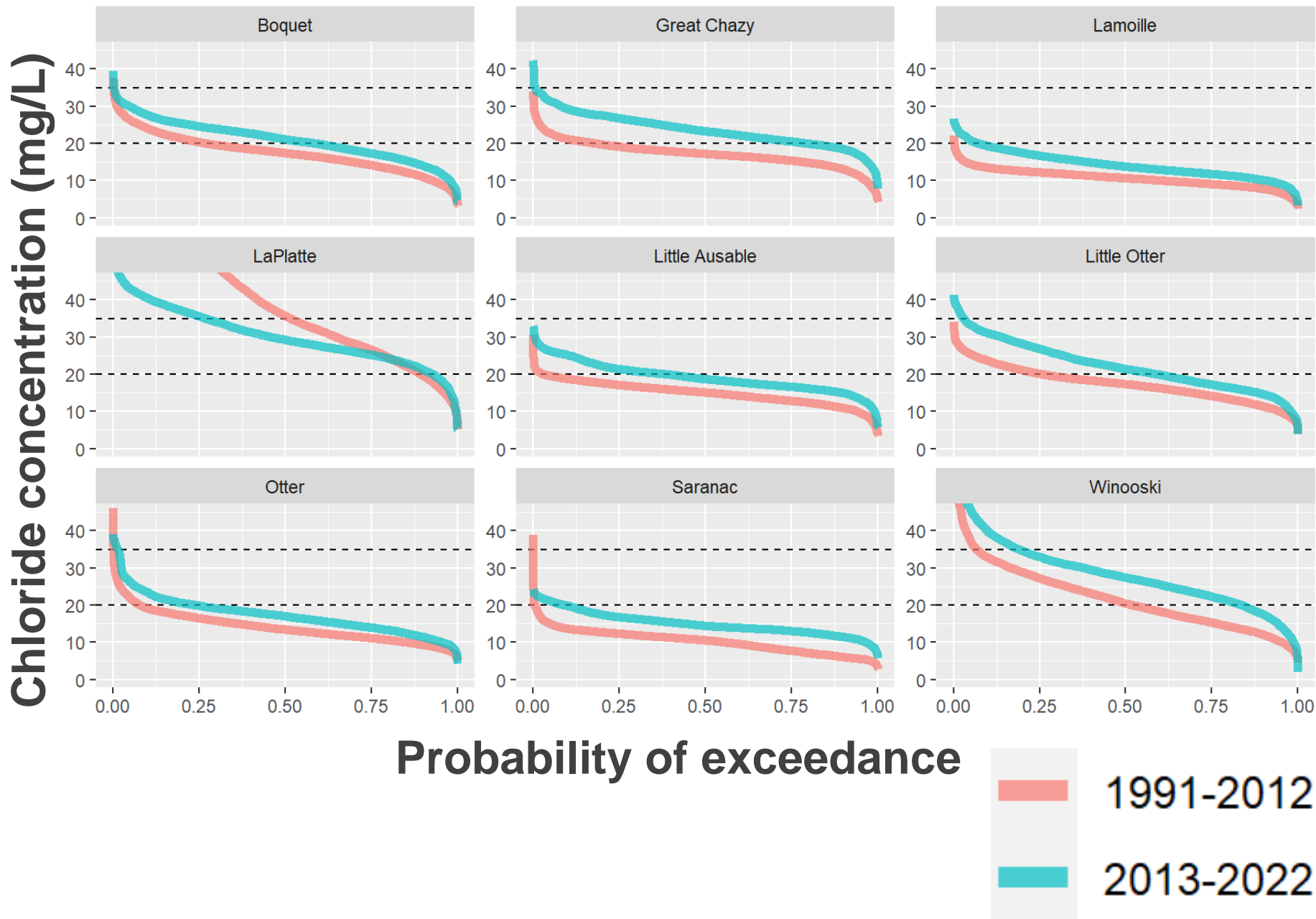


- Combine with streamflow
- Model to predict concentrations
- Estimate loads
- Trends



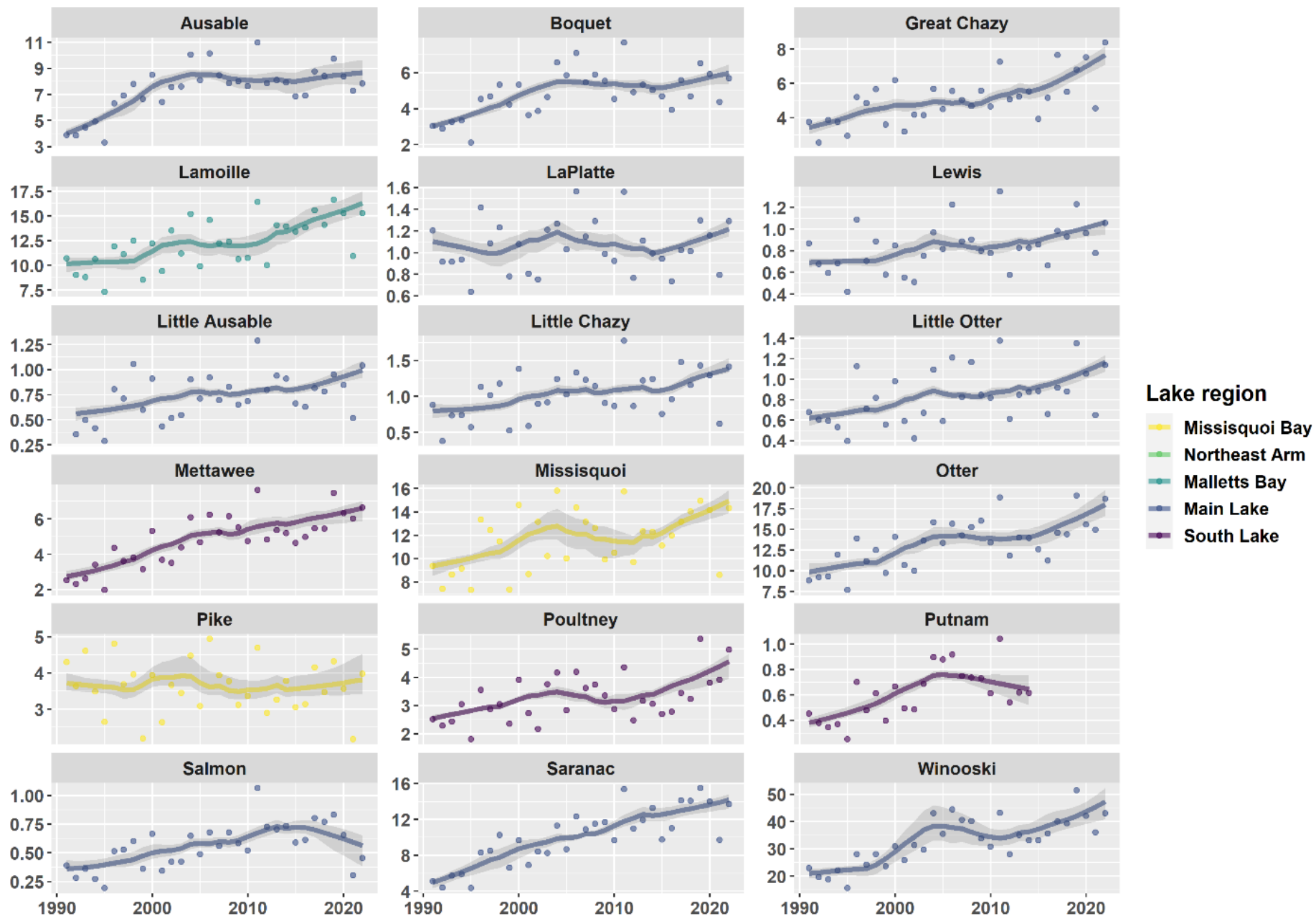
Time-weighted annual mean chloride concentration (mg/L) by tributary





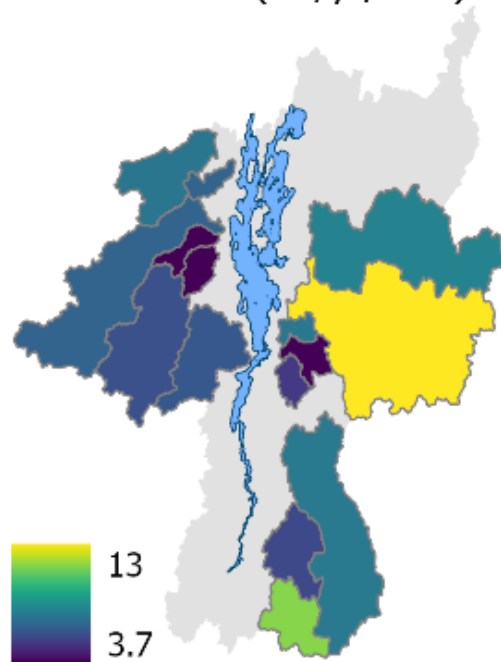
Chloride load (thousand mt / yr)

by tributary

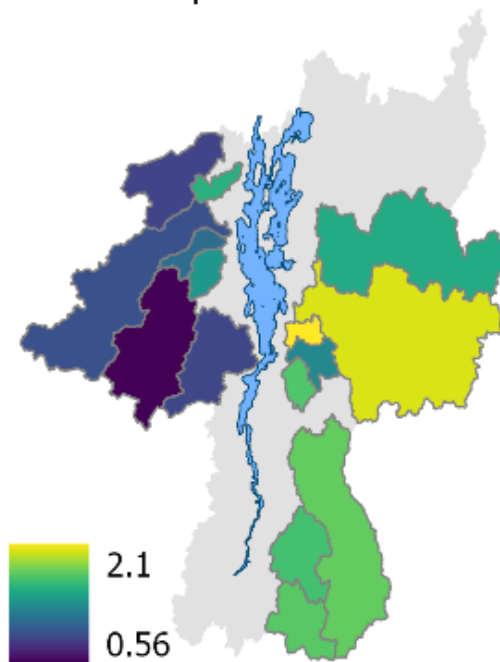


How does chloride loading relate to
impervious land cover?

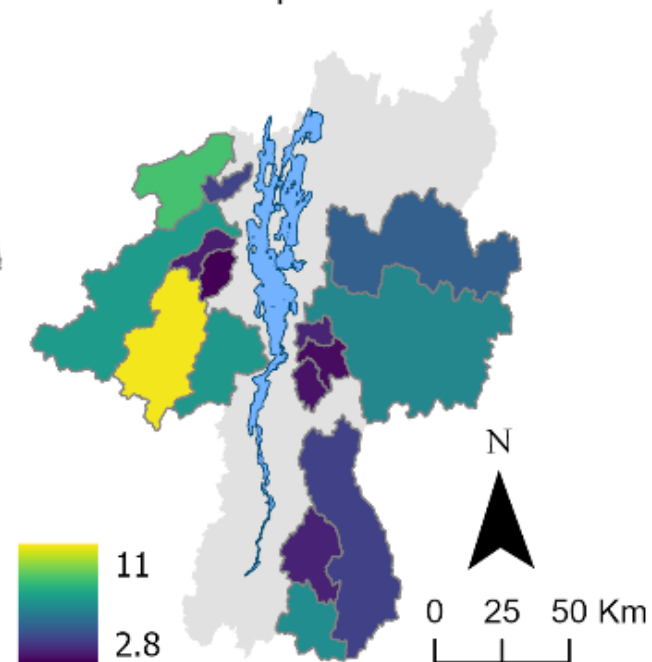
Yield (mt/yr/km²)



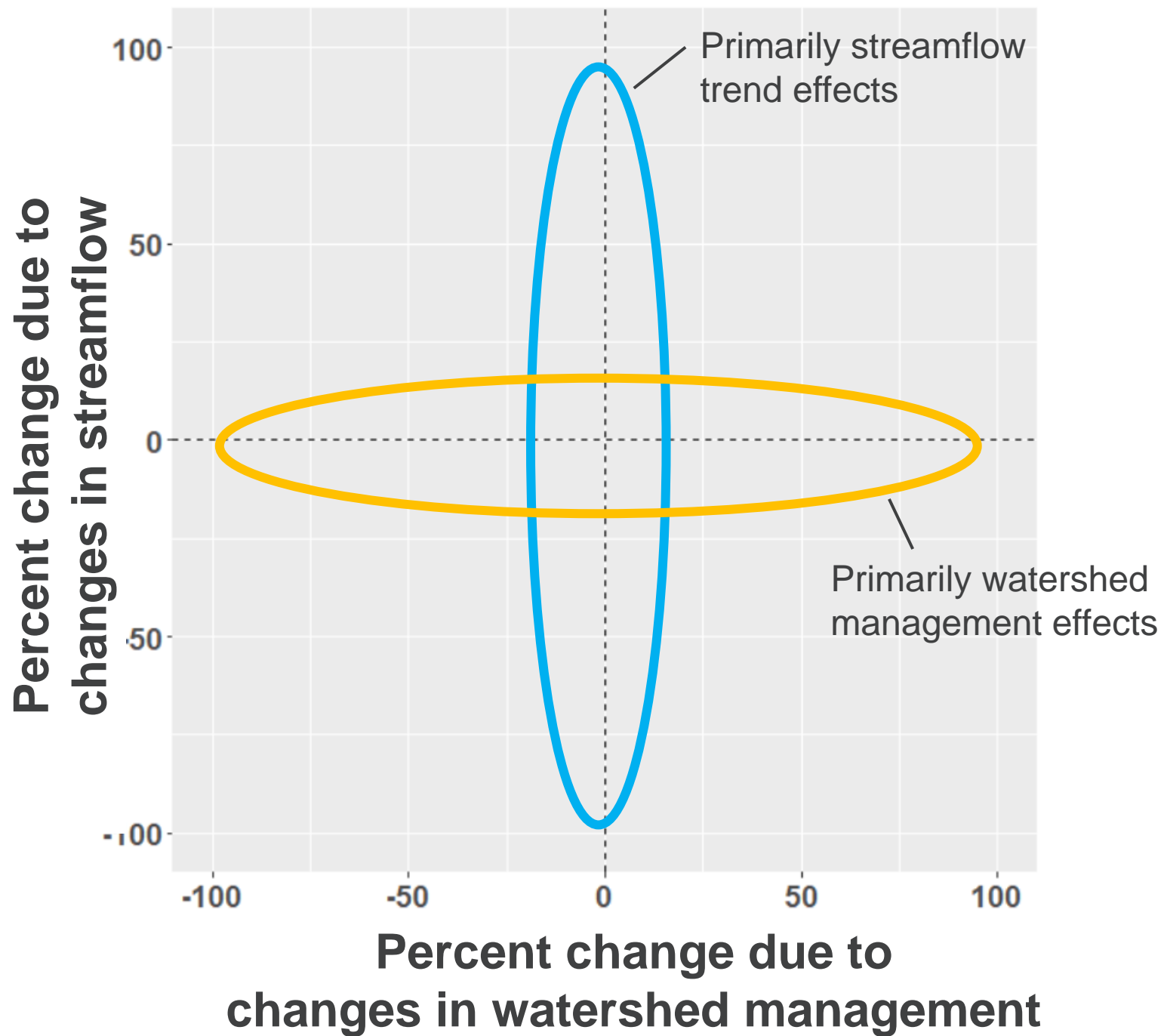
% Impervious Cover



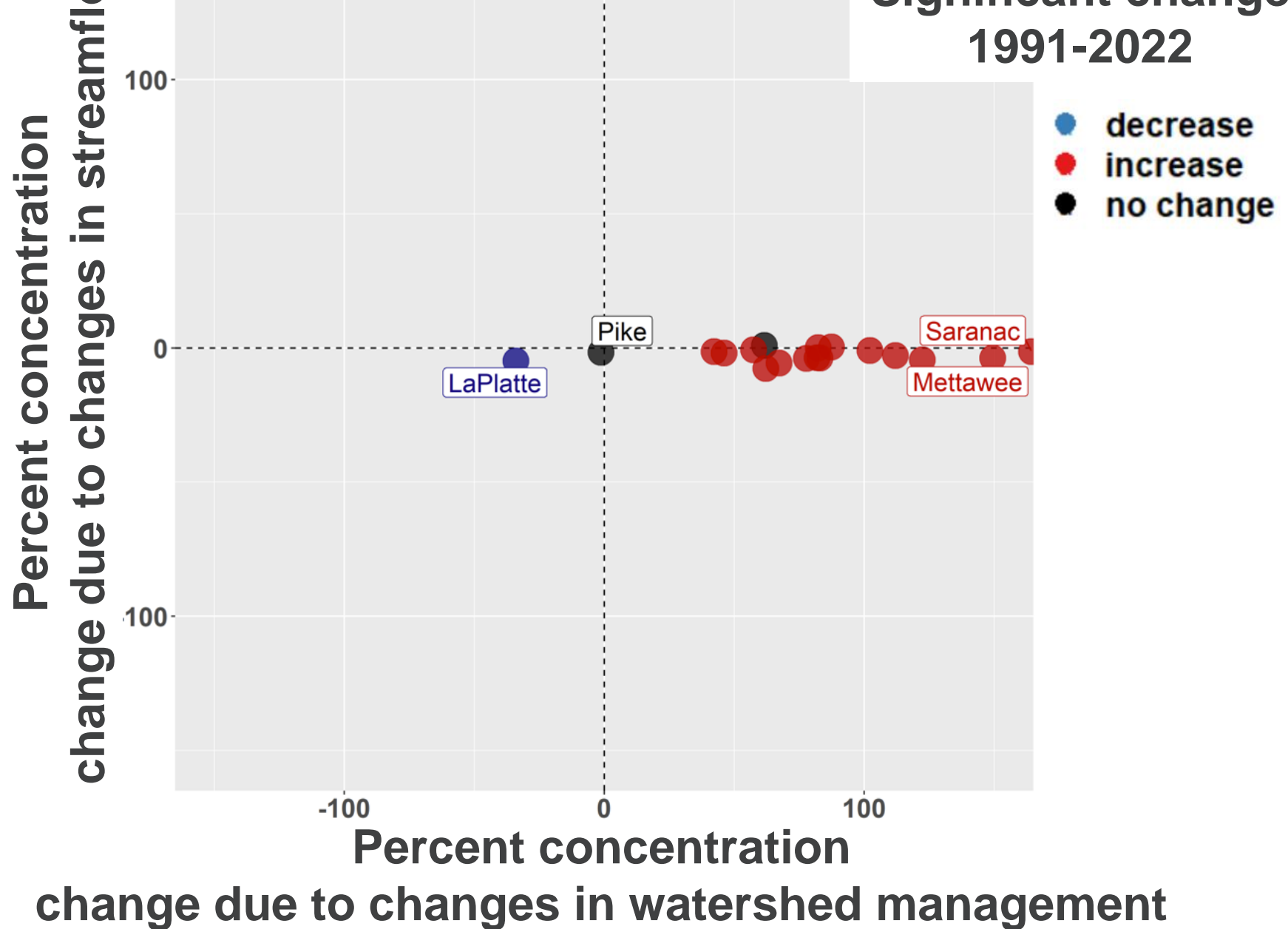
Yield:Impervious Cover



What portion of trends are driven by changes in **streamflow** vs. **watershed management**?



Significant change 1991-2022



Percent load change due to
changes in streamflow

100
0
-100

Percent load change due to
changes in watershed management

-100

0

100

**Significant change
1991-2022**

- decrease
- increase
- no change

LaPlatte

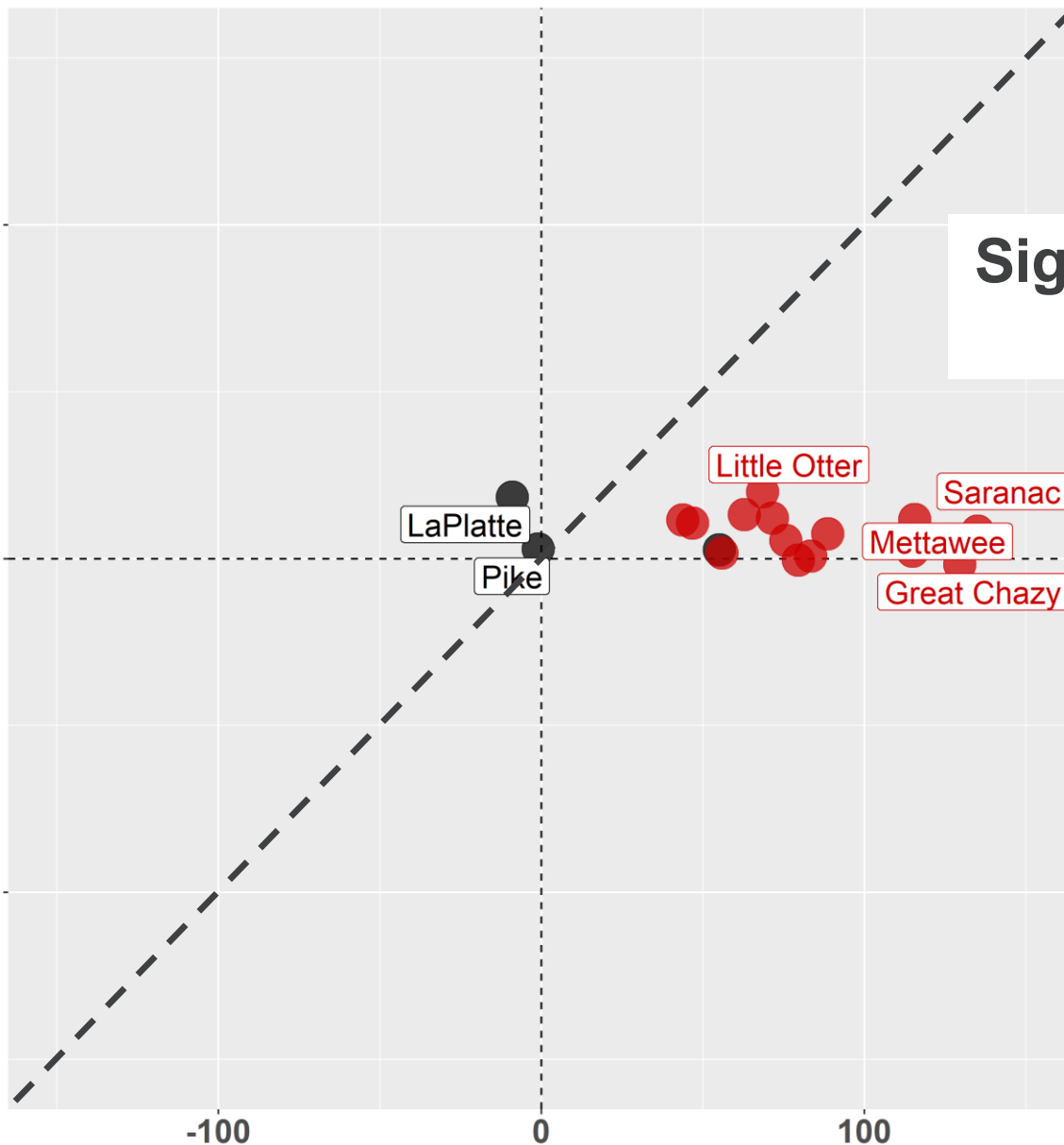
Pike

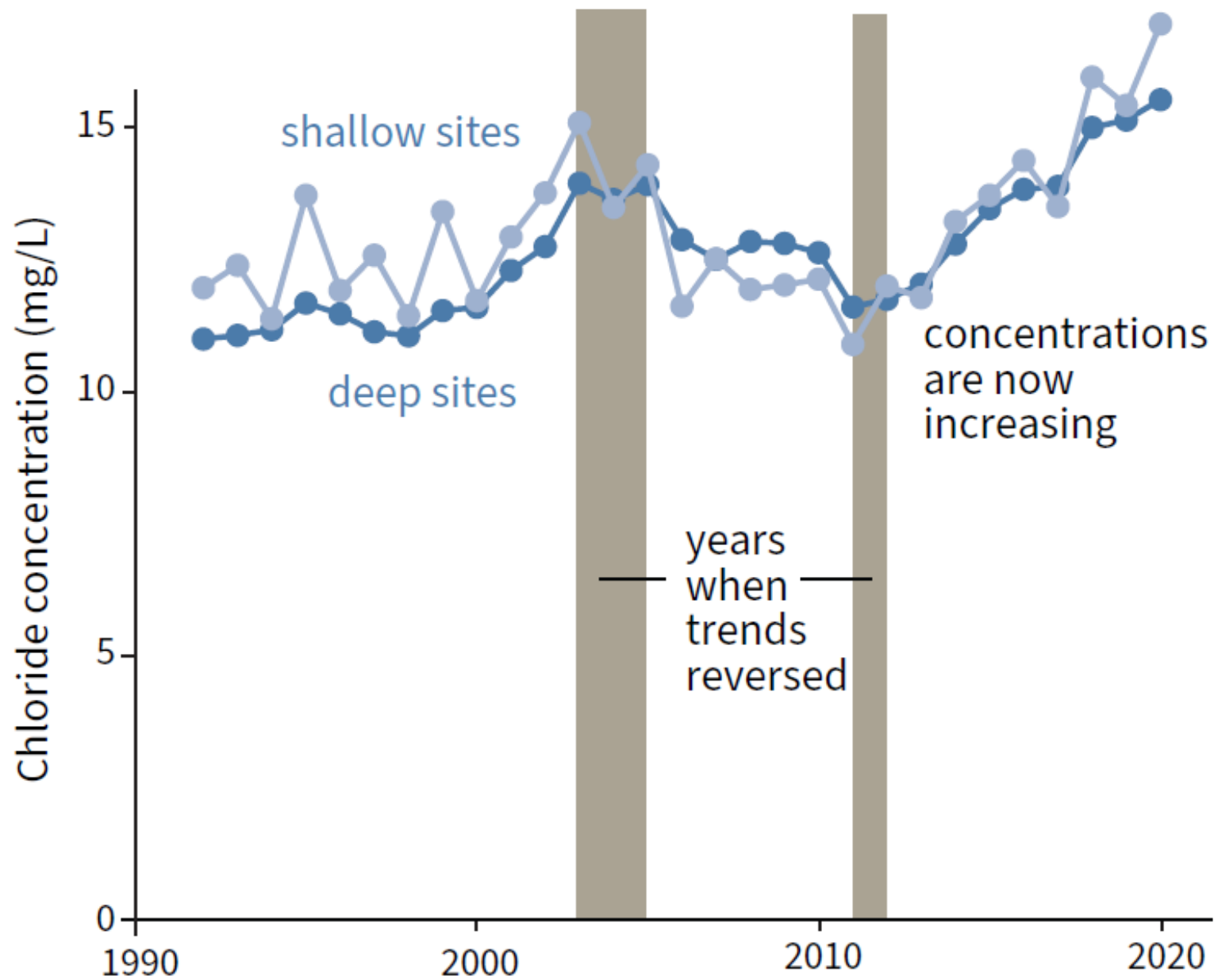
Little Otter

Saranac

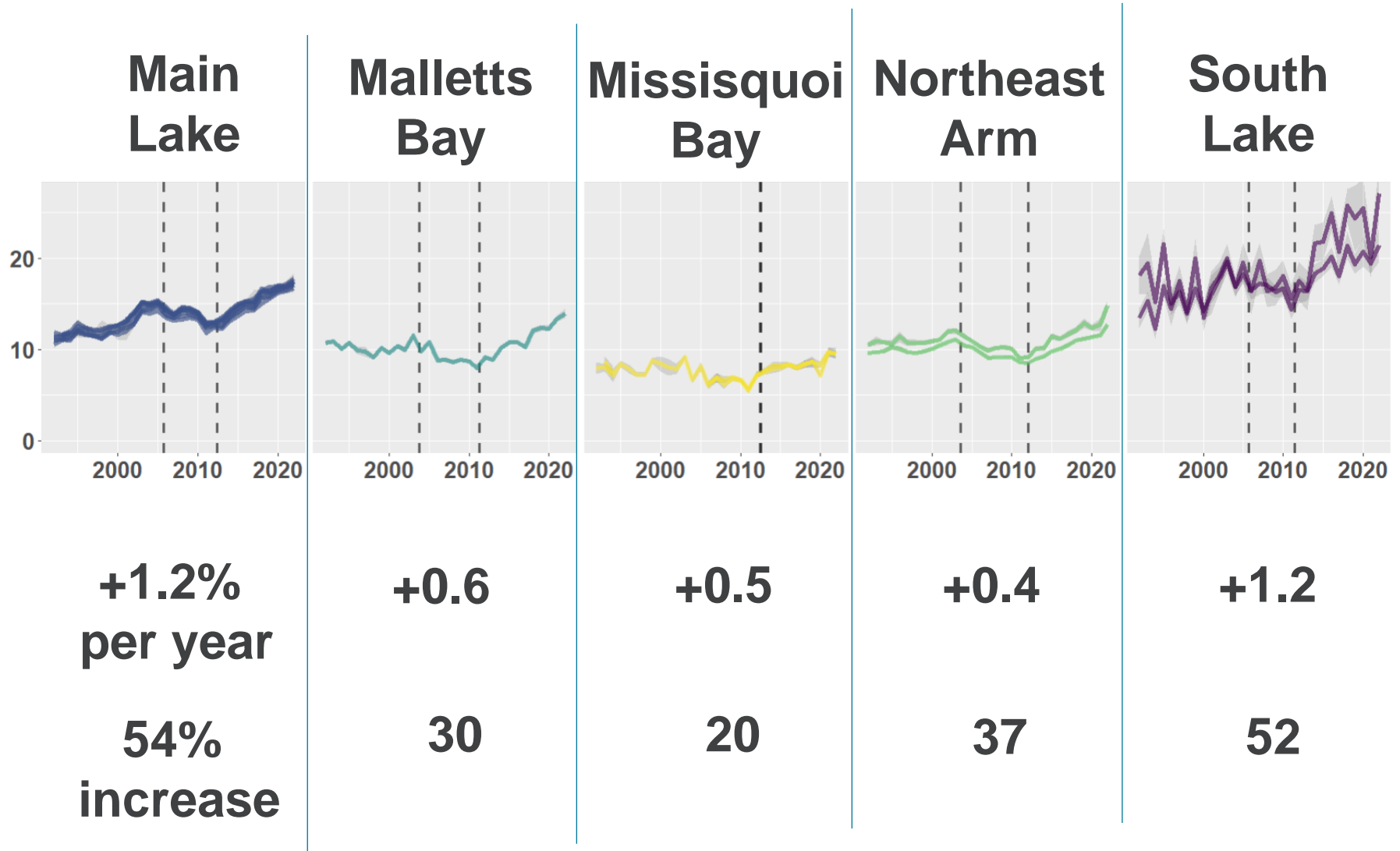
Mettawee

Great Chazy

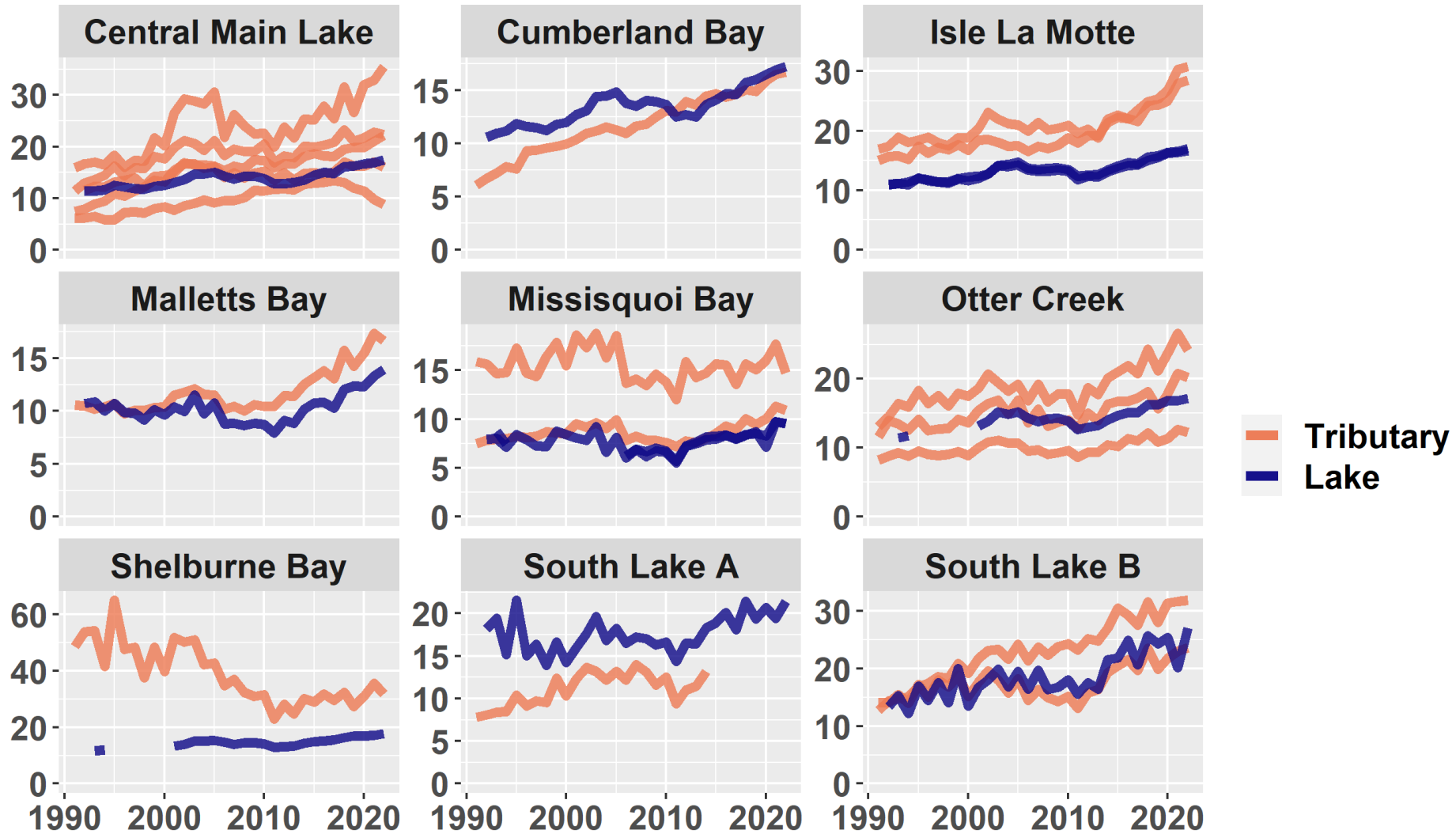




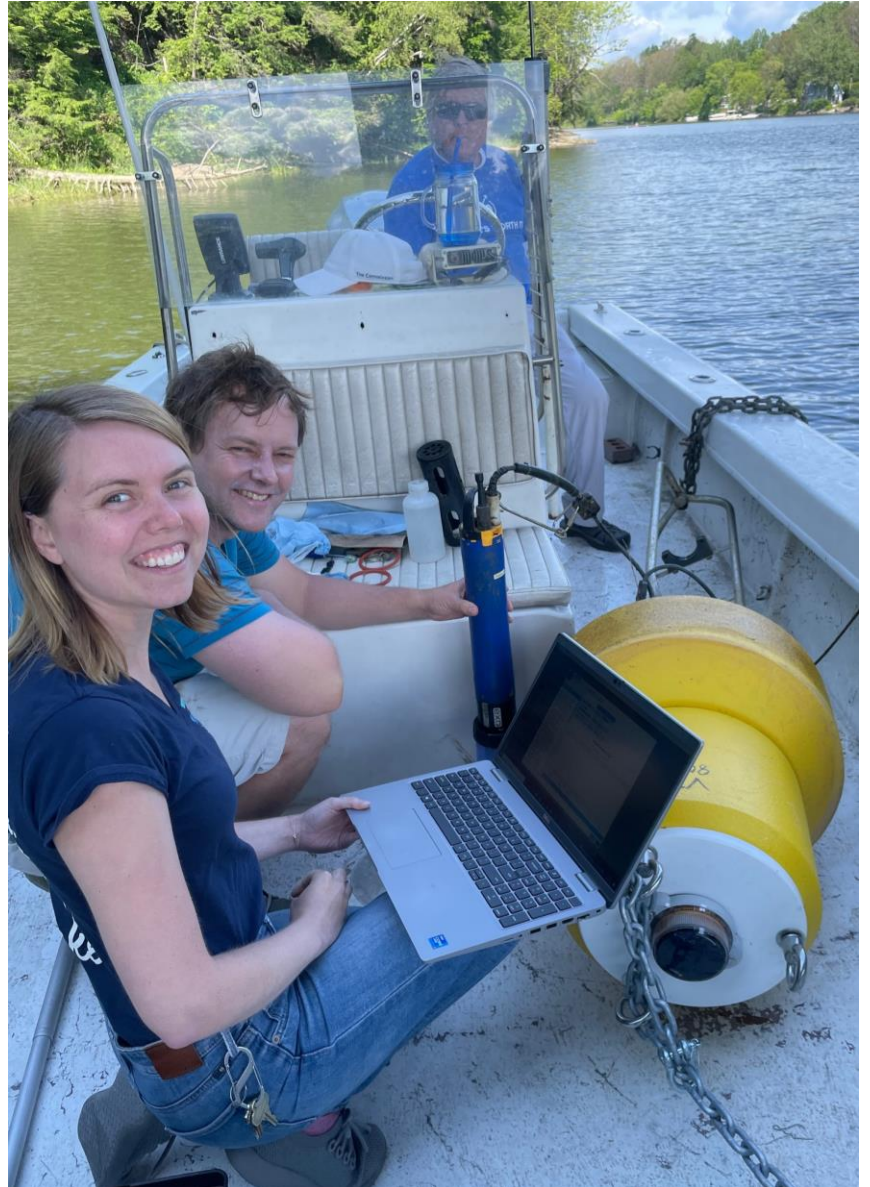
Annual mean chloride concentration (mg/L) by lake region



Annual mean chloride concentration (mg/L) by lake segment



Water quality monitoring buoys



data.lcbp.org

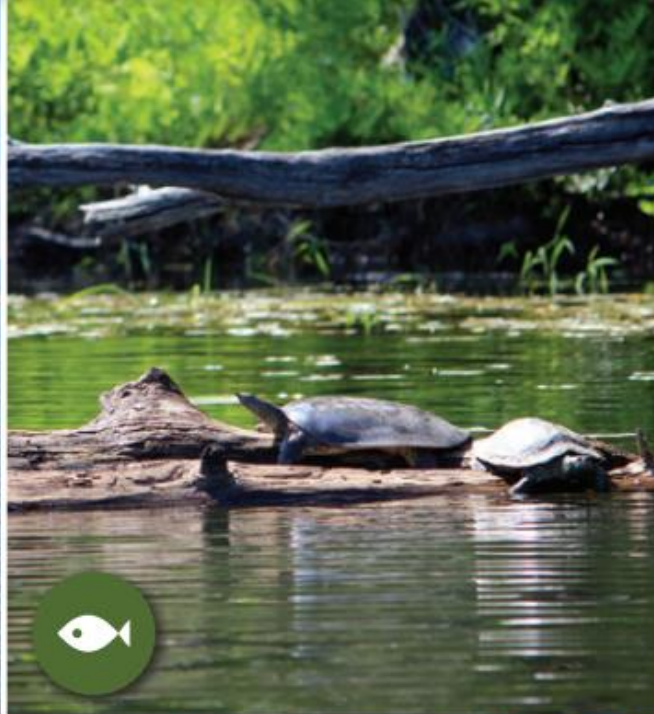
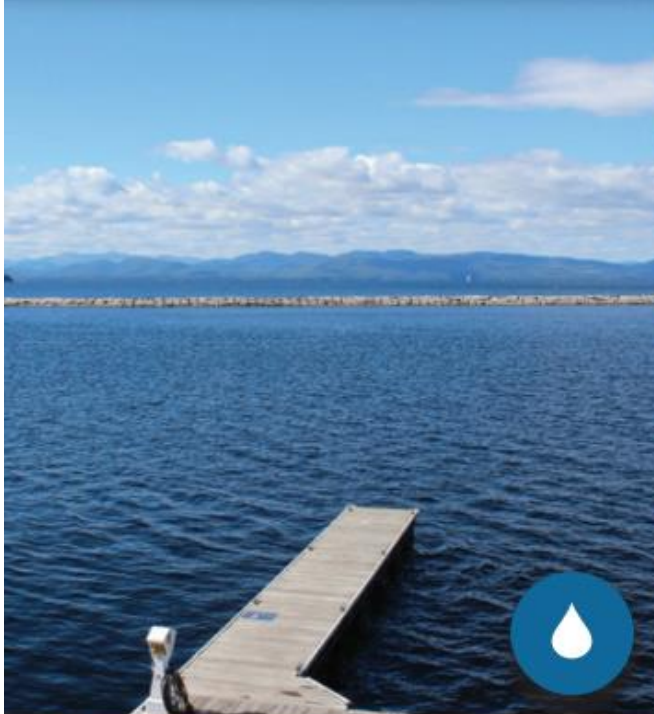


CLEAN WATER

Overview of LCBP ongoing chloride research

- Journal article
- Mirror Lake study and monitoring (AsRA, AWI)
- Basin-wide study of chloride data - long-term trends, inform BMP implementation (AWI)
- Forecast future road salt use with downscaled climate models (AWI)
- Study on chloride sources and impacts to macroinvertebrates (Middlebury College)





~~2024~~
~~2021~~
**Lake
Champlain**
STATE
of the
LAKE
and
**Ecosystem
Indicators
Report**



Lake Champlain
Basin Program

Questions?



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