

An aerial photograph of Sebago Lake, showing a large body of water with a prominent sandy beach on the left side. The surrounding area is densely forested with green trees. The text "Protecting Sebago Lake" is overlaid in large black font, and "One Subwatershed at a Time" is overlaid in white font with a blue outline below it.

# Protecting Sebago Lake

## One Subwatershed at a Time

Paul Thomas Hunt  
Environmental Manager  
Portland Water District

An aerial photograph of a large body of water, Sebago Lake, surrounded by dense green forest. In the foreground, a narrow, light-colored sandbar or spit extends into the water. The background shows rolling hills and more forested land under a clear sky.

# Overview

- About Sebago Lake
- Tipping Point
- The Subwatershed Idea
- Method
- Summary



An aerial photograph of a large, deep blue lake surrounded by dense, forested land. The forest shows some autumnal colors, with patches of orange and red. Several small, forested islands are scattered throughout the lake. In the far background, a range of mountains is visible under a clear blue sky. The text "Nearly a trillion gallons of water" is overlaid in the center of the image.

**Nearly a trillion gallons of water**

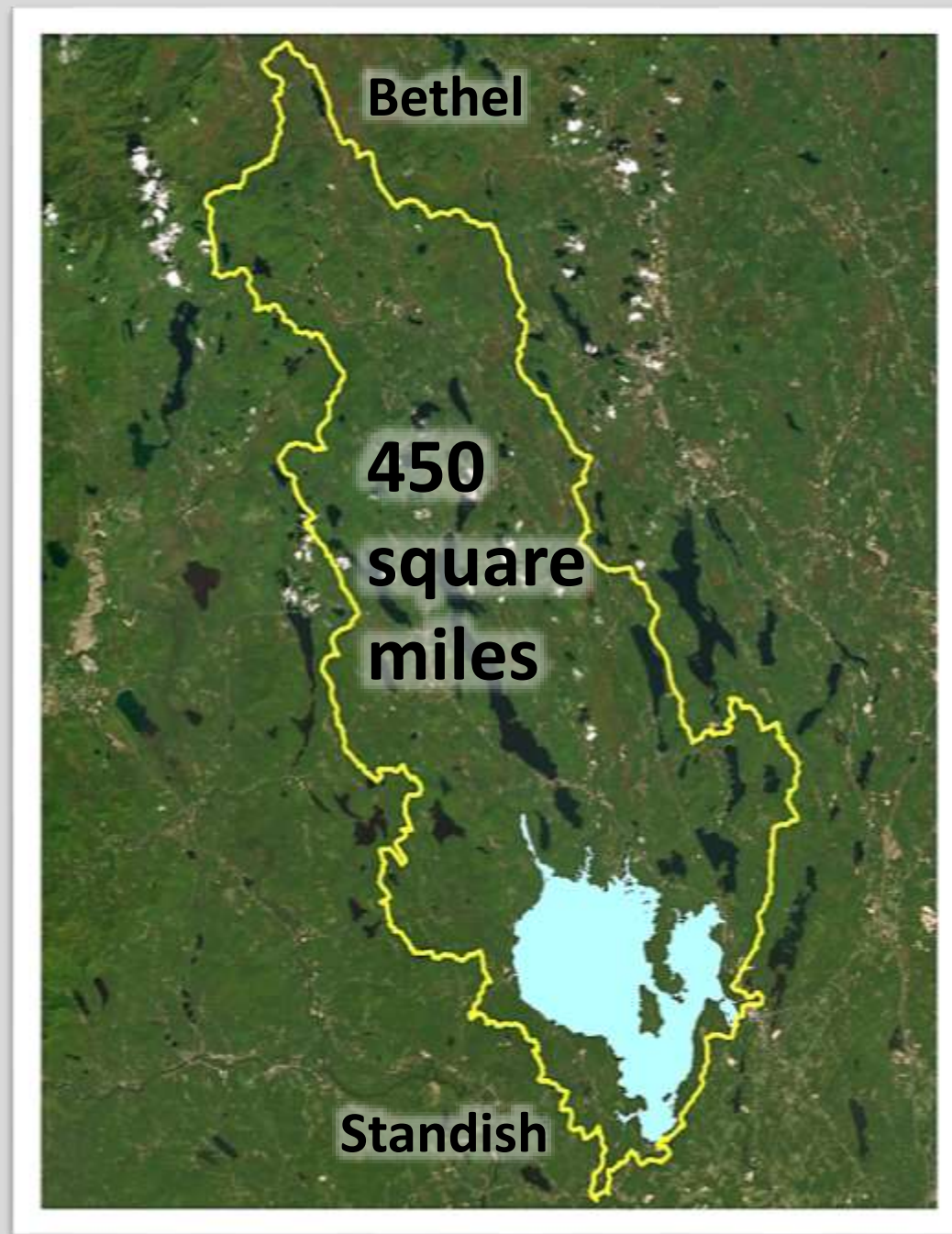


A large, dense crowd of people, many holding small flags, fills the background. In the center, a blue plastic pallet holds a stack of 12 large blue water jugs, arranged in three rows of four. Overlaid on the jugs is the text "100 gallons for every human being on Earth." in white, bold, sans-serif font.

100 gallons  
for every  
human  
being on  
Earth.







**Maybe Sebago Lake is too big to fail?**



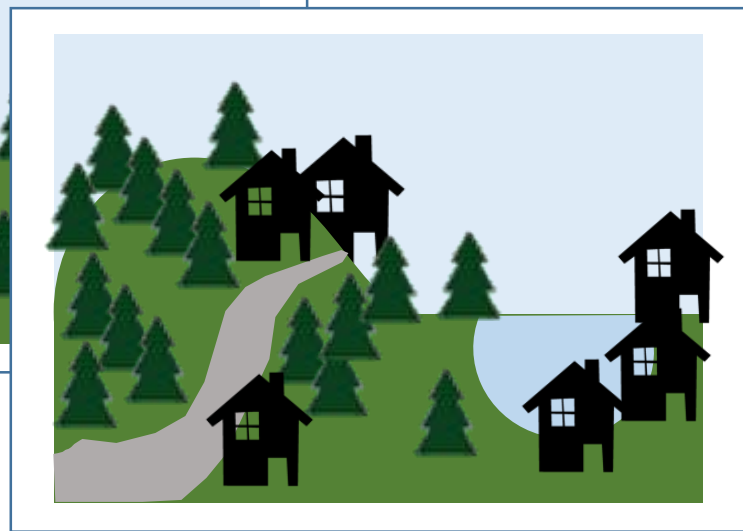
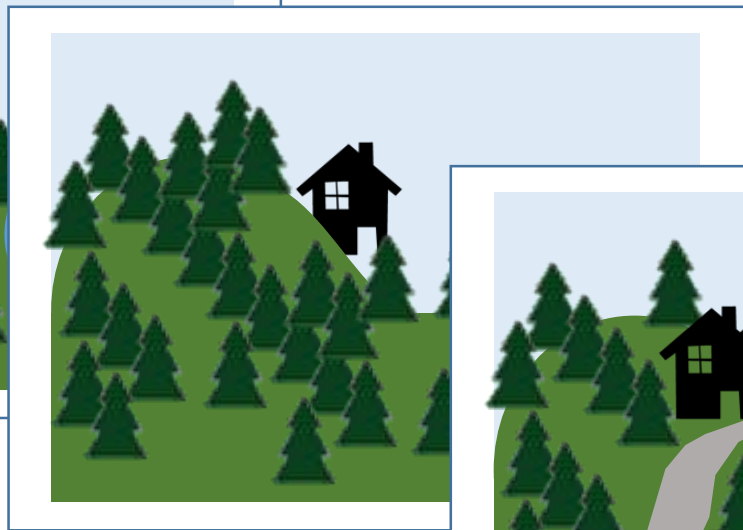
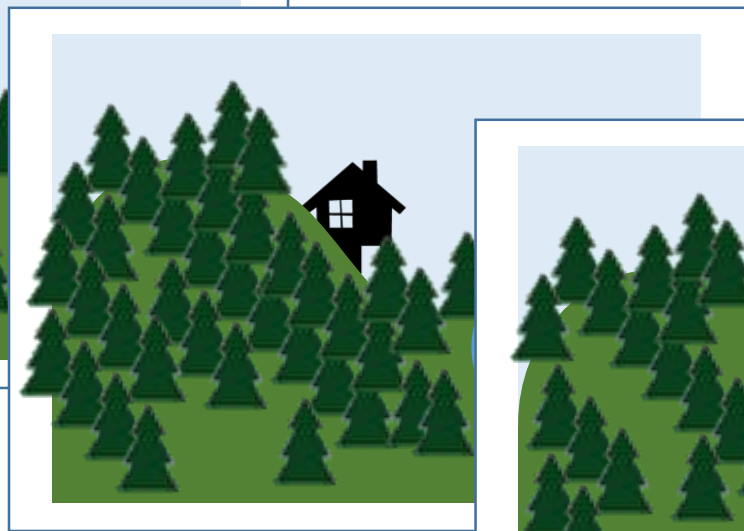
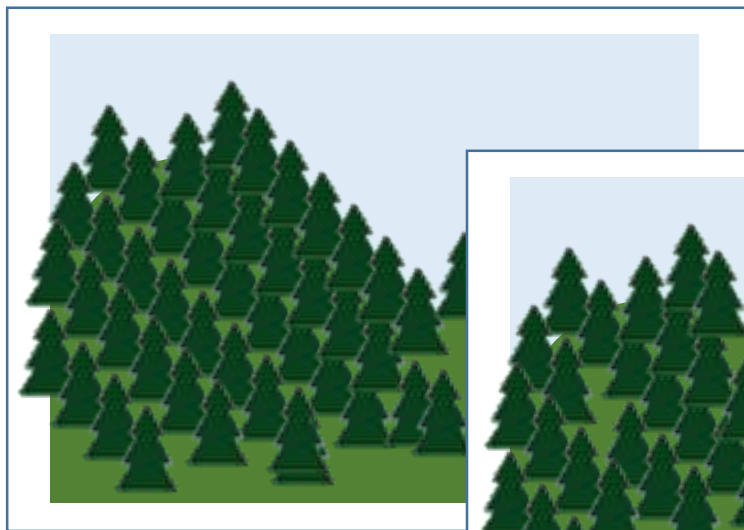
A satellite image of Lake Michigan, showing its characteristic shape and surrounding land. The water is a deep blue, while the surrounding land is a mix of green and brown. The text "27 trillion gallons" is overlaid in the center of the lake. In the bottom left corner, there is a small inset map showing the location of Lake Michigan within the Great Lakes region of North America.

**27 trillion gallons**











**TIPPING  
POINT**

The logo consists of the words "TIPPING" and "POINT" stacked vertically. "TIPPING" is in blue and "POINT" is in orange. Both words are in a bold, sans-serif font and are tilted at an angle. Below the text is a horizontal blue line, which is slightly tilted to match the text. Underneath this line is a small orange triangle, representing a fulcrum or a tipping point.





**A lake can only  
take so much....**



The



for Sebago Lake



-- Daigneault and Strong, 2019

An Economic Case for the Sebago Watershed  
Water & Forest Conservation Fund





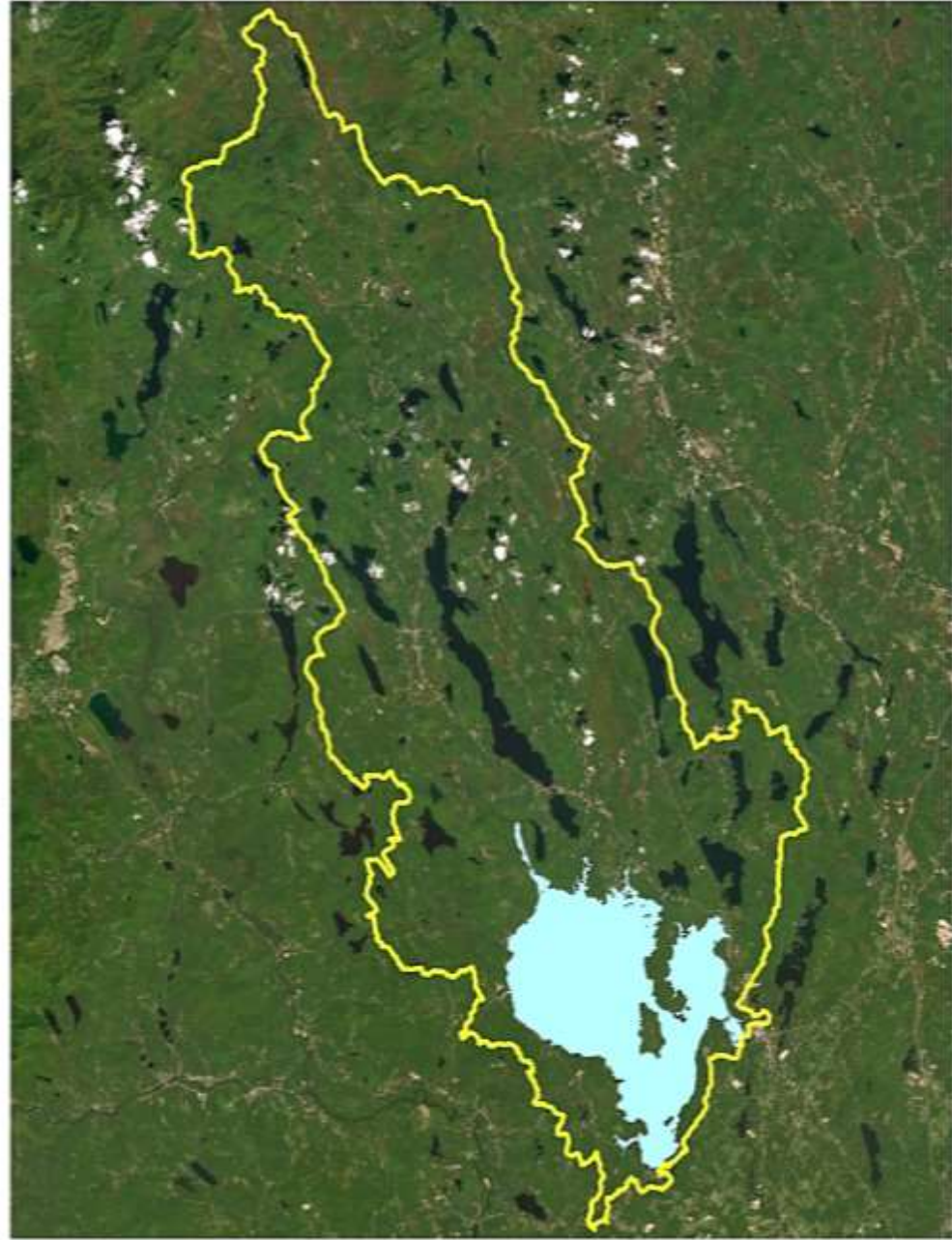
**Enormous area**

**Beautiful rural communities**

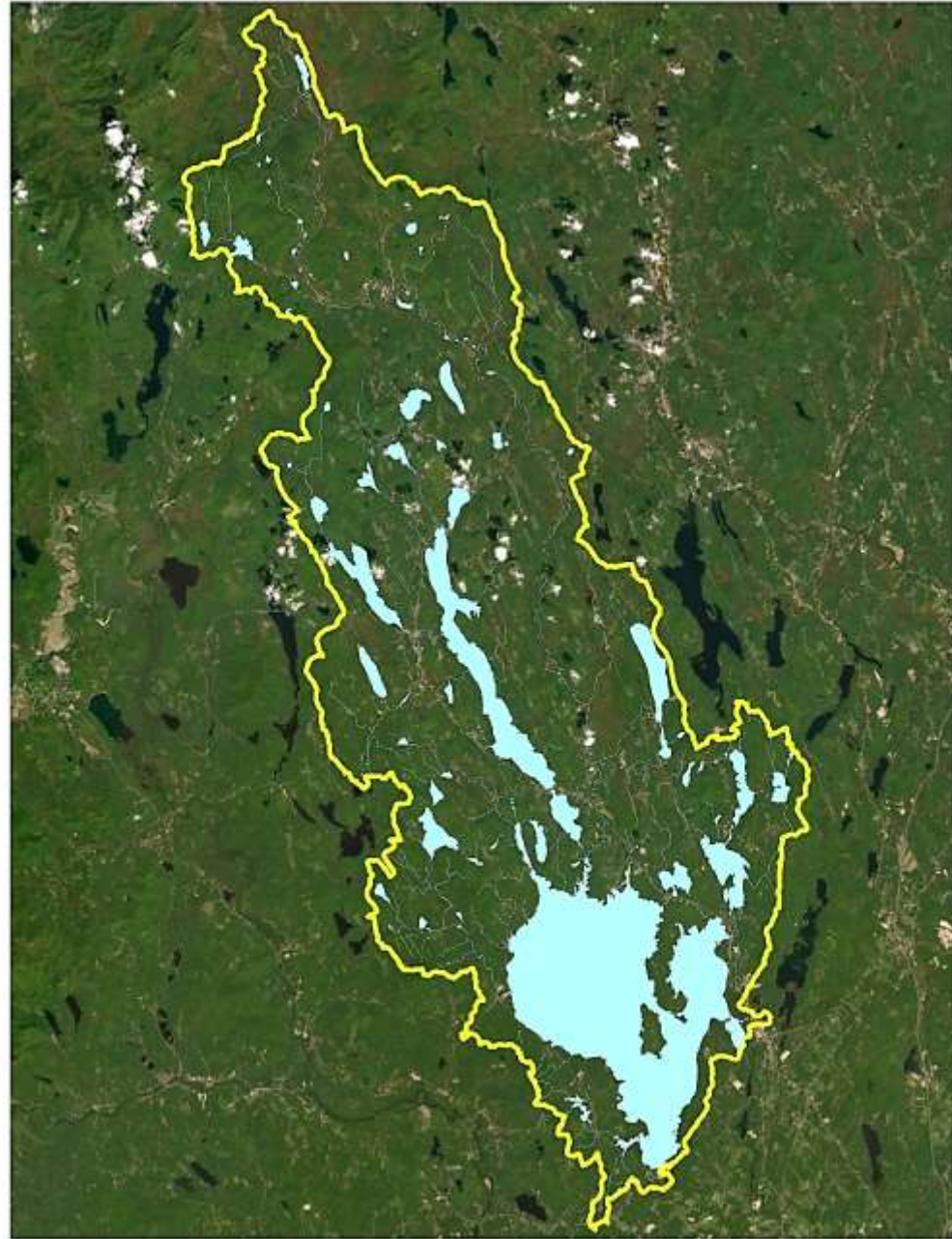
**Largely forested**

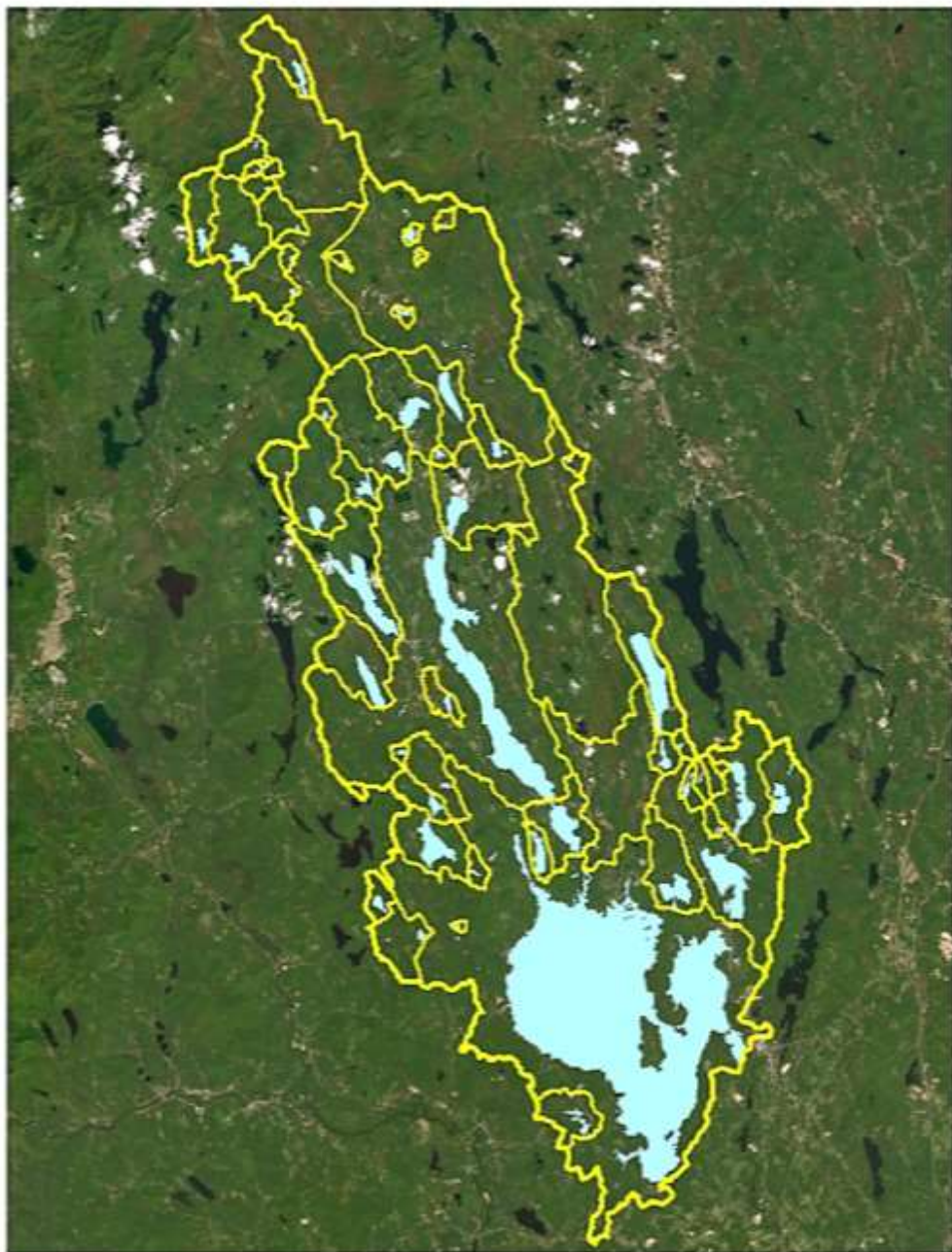
**No crisis**



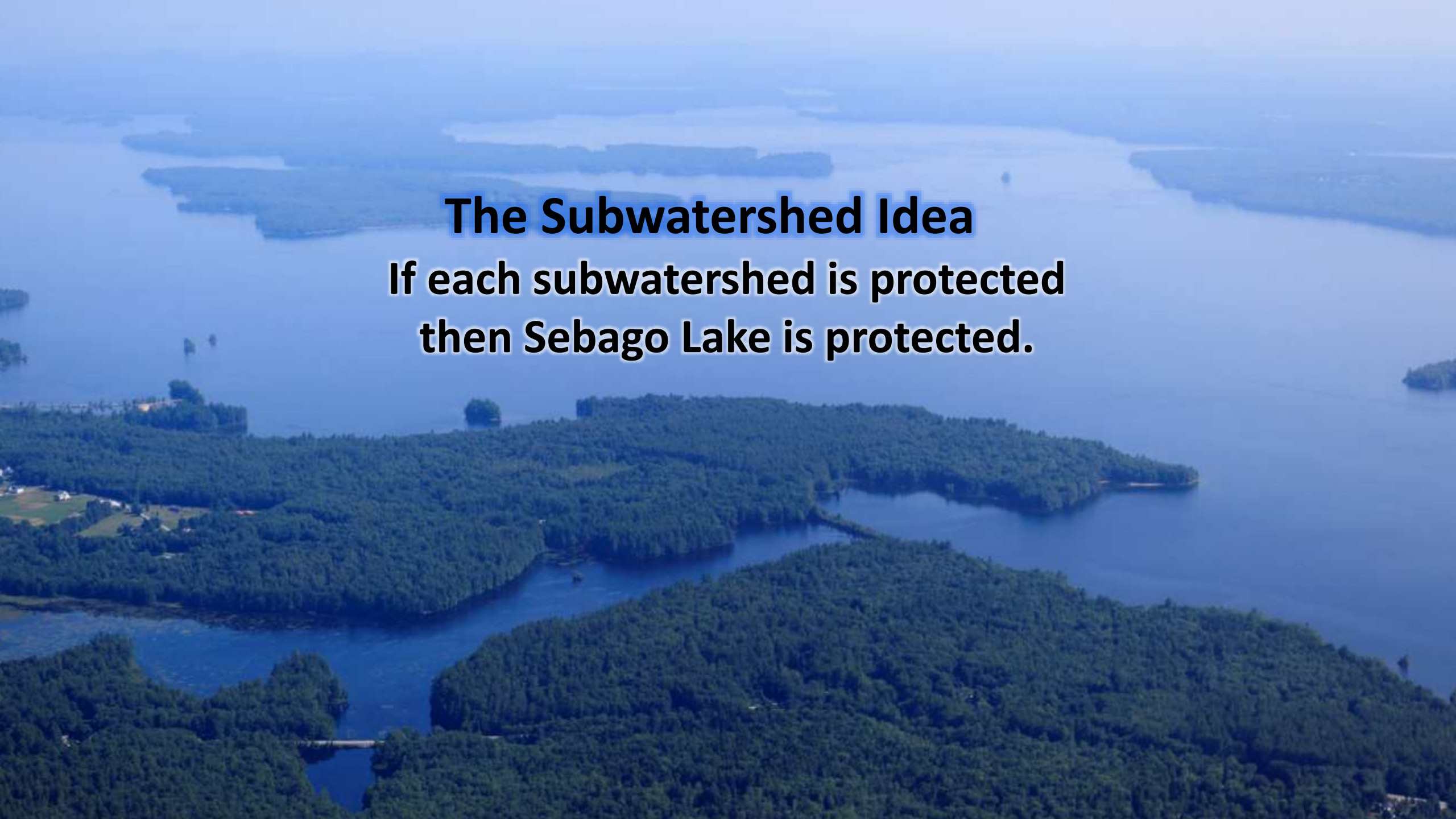










An aerial photograph of a large body of water, likely Sebago Lake, featuring numerous forested islands and peninsulas. The water is a deep blue, and the land is covered in dense green trees. The text is overlaid in the center of the image.

**The Subwatershed Idea**  
**If each subwatershed is protected**  
**then Sebago Lake is protected.**

# Evaluation

**Water Quality**

**Existing**

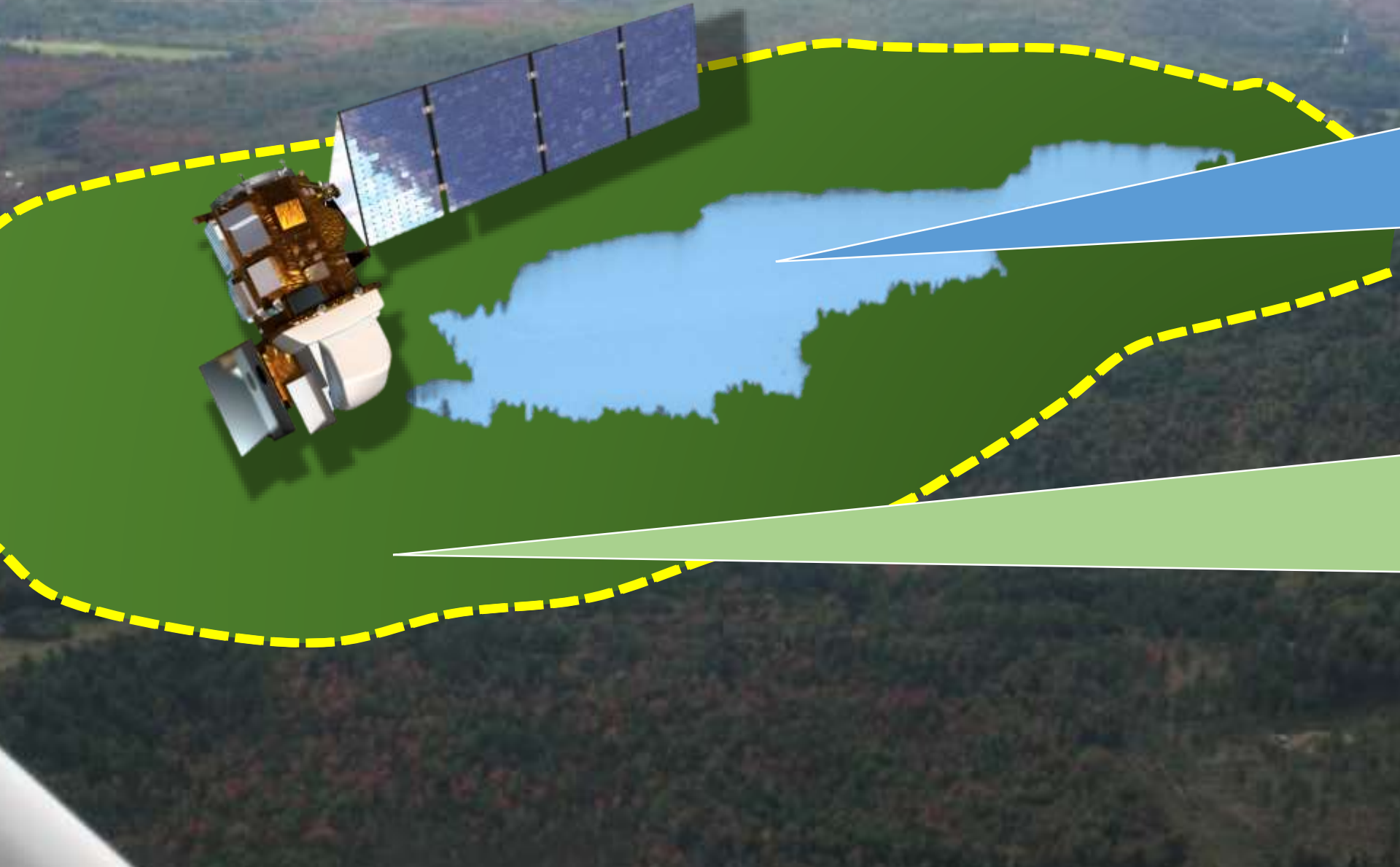


**Trending**





# Evaluation

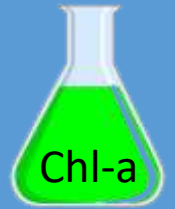


## Water Quality

Existing



Trending



## Land Cover

Existing



Trending



# Interpreting the Scores

<b>5</b>	<b>Best</b>
<b>4</b>	<b>Favorable</b>
<b>3</b>	<b>Neutral</b>
<b>2</b>	<b>Unfavorable</b>
<b>1</b>	<b>Worst</b>
<b>ID</b>	<b>Insufficient Data</b>

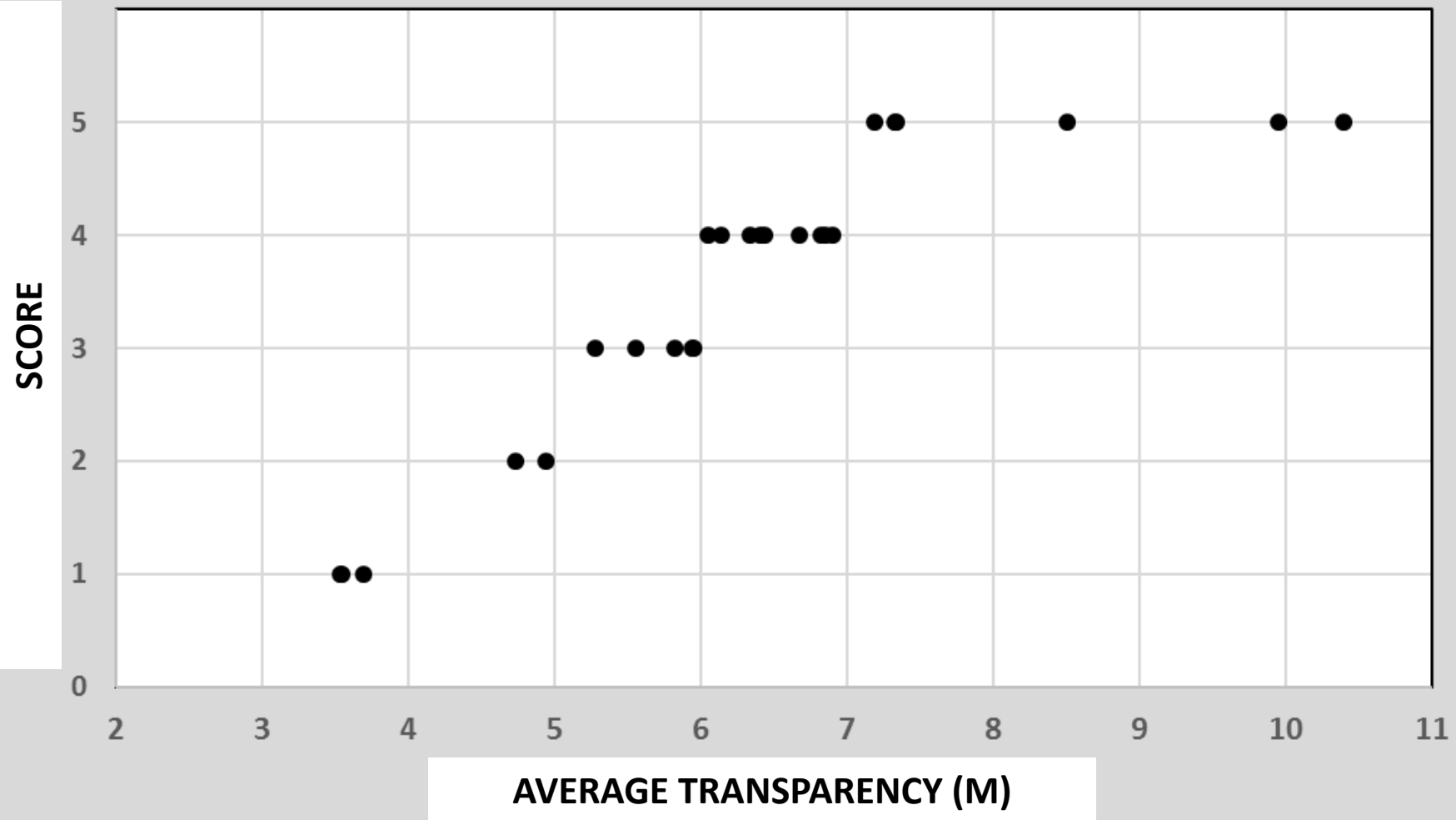




# EXISTING Water Quality

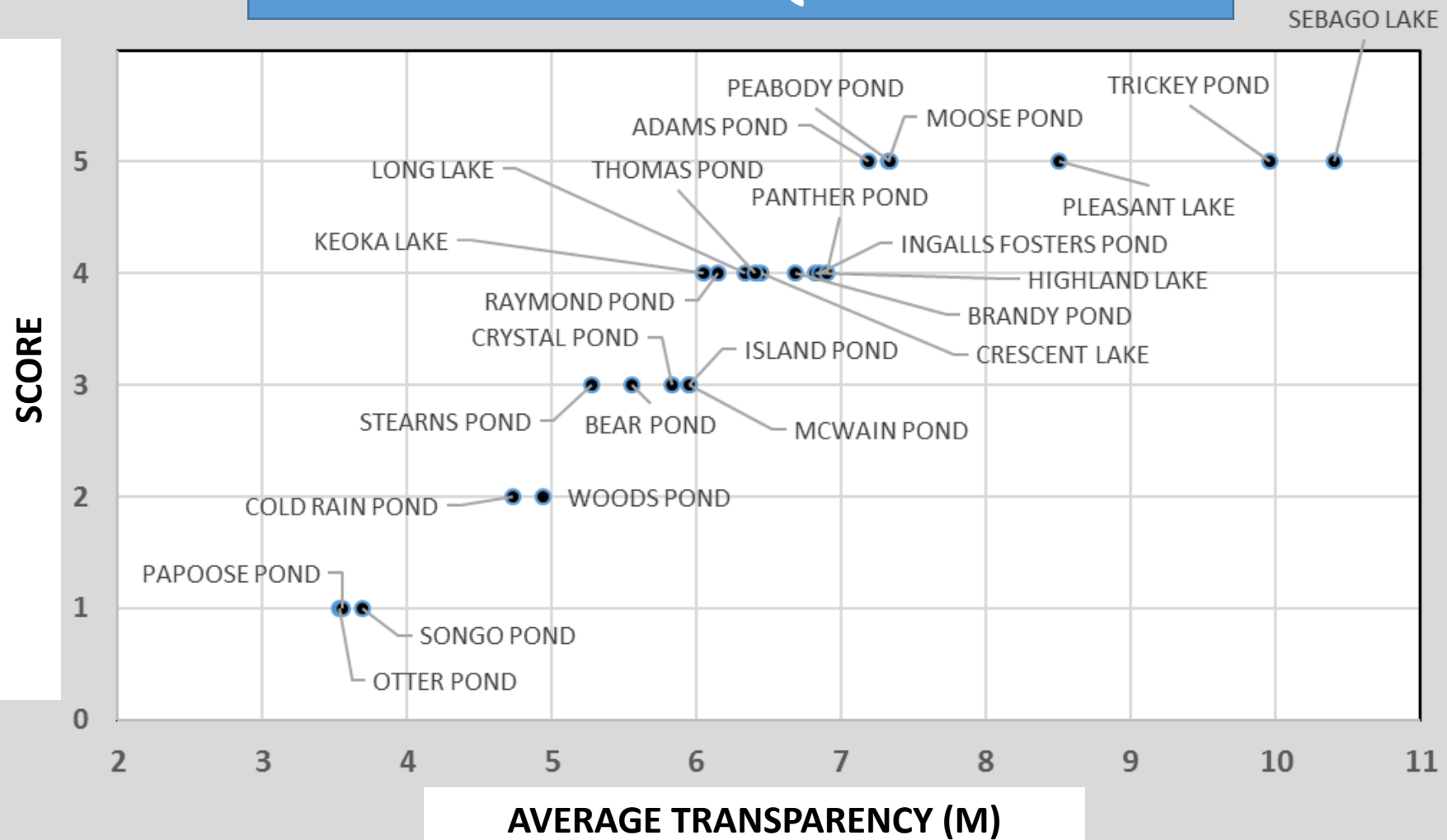
**Average Secchi  
transparency over the  
most recent 10+  
years**

## EXISTING WATER QUALITY SCORE

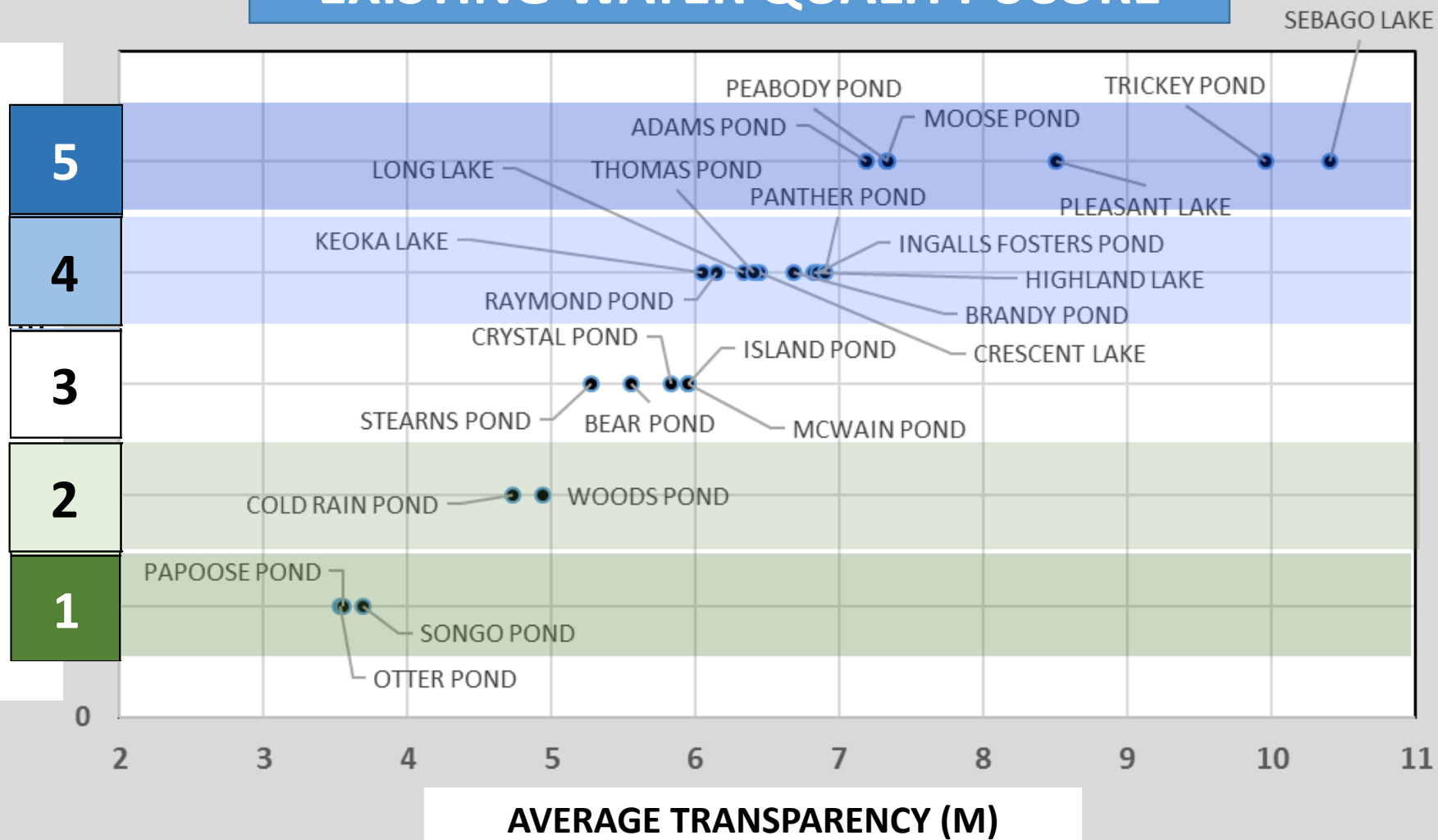




## EXISTING WATER QUALITY SCORE



# EXISTING WATER QUALITY SCORE



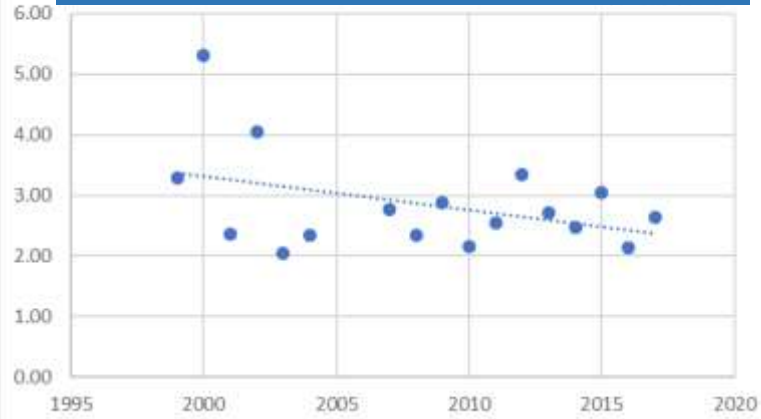




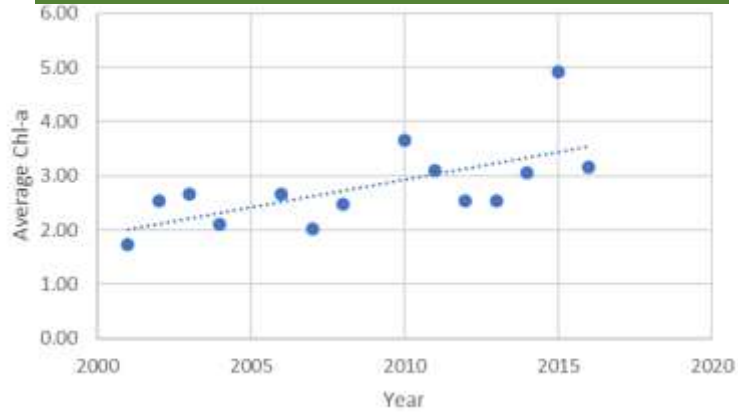
# Water Quality TREND

**Trend in chlorophyll  
concentration over the most  
recent 10+ years**

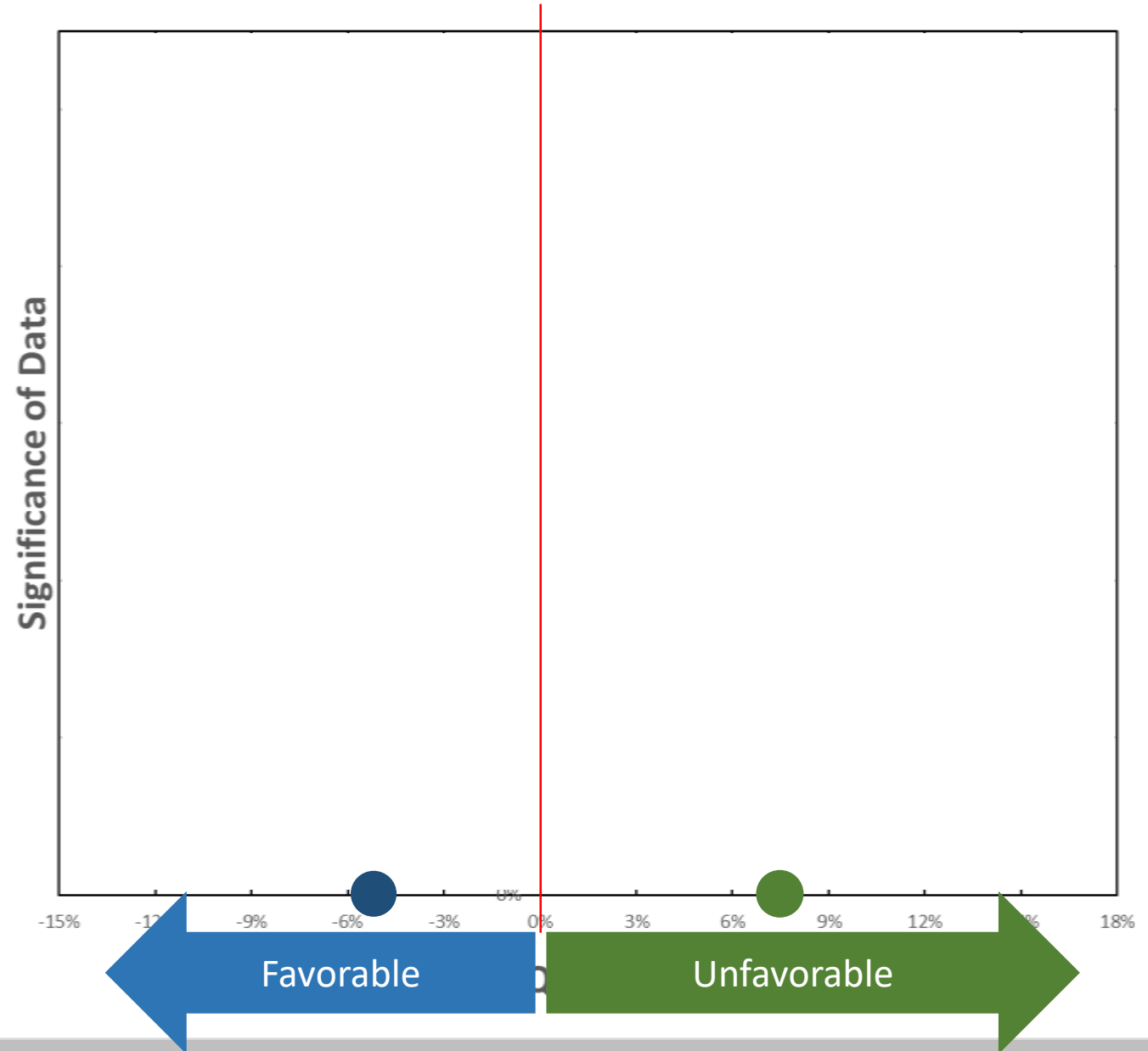
### HIGHLAND LAKE



### ADAMS POND

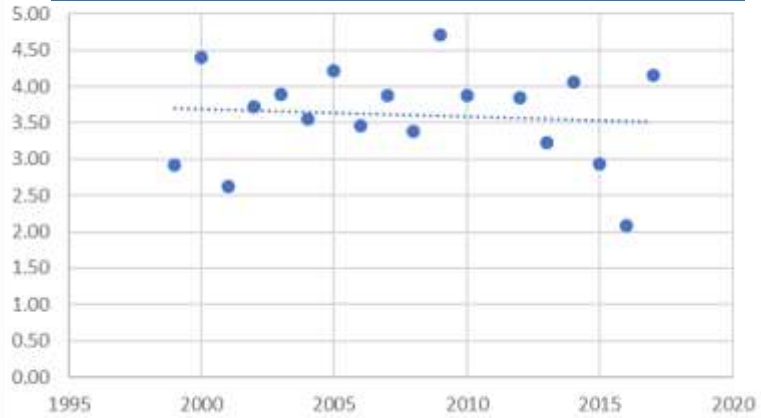


## WQ Trend and Data Significance

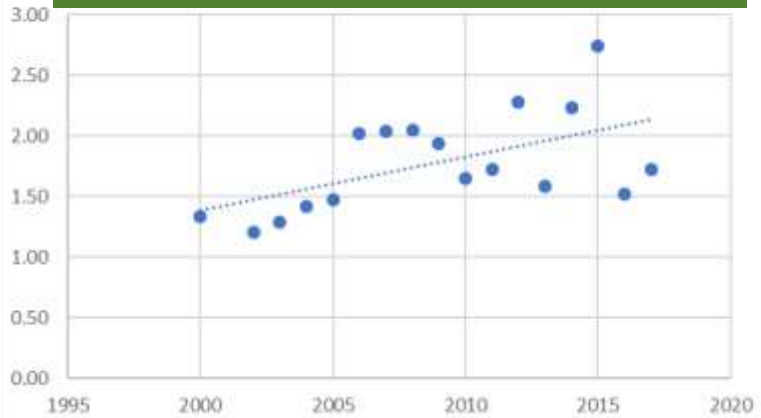




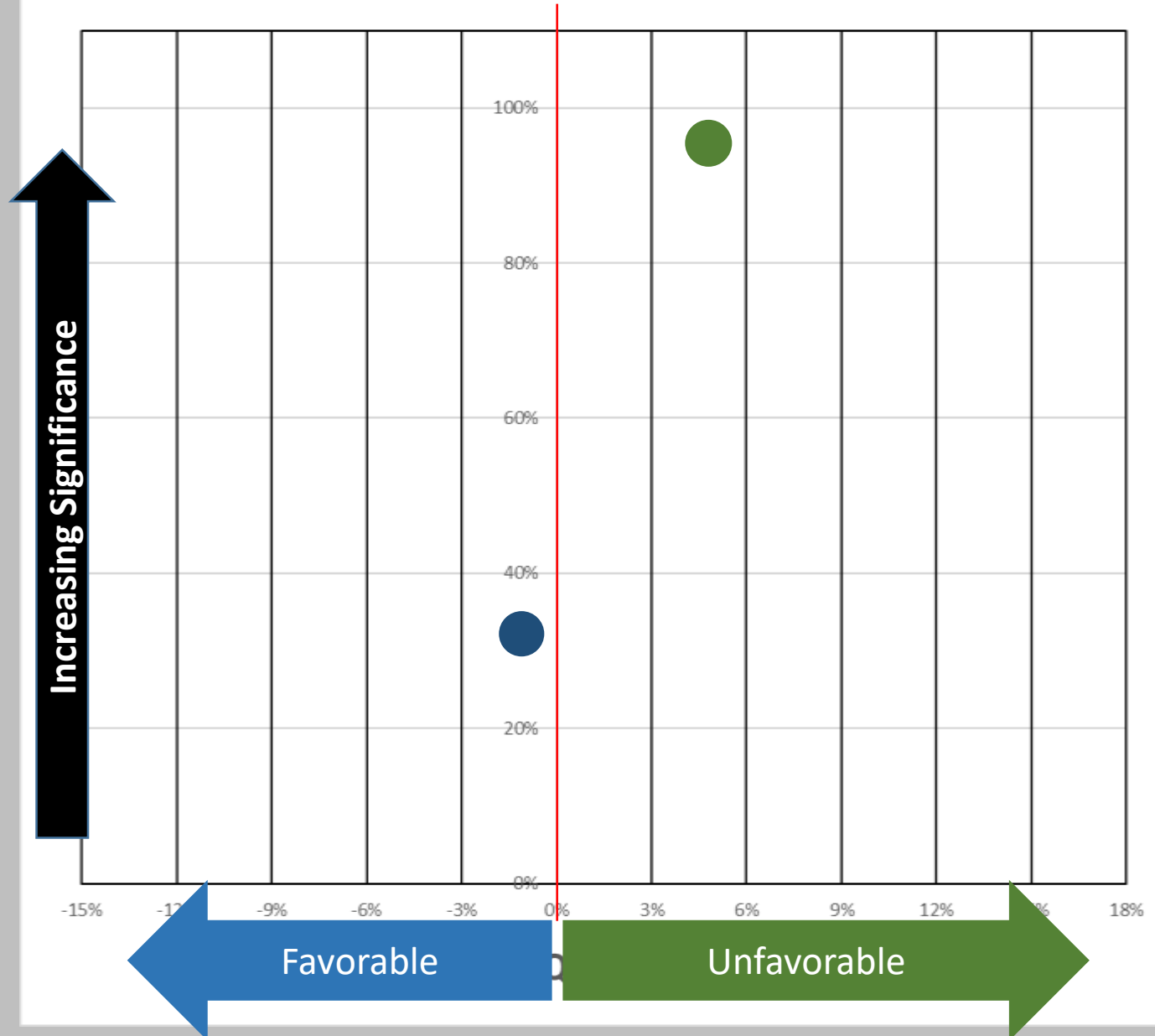
### KEOKA LAKE



### TRICKEY POND

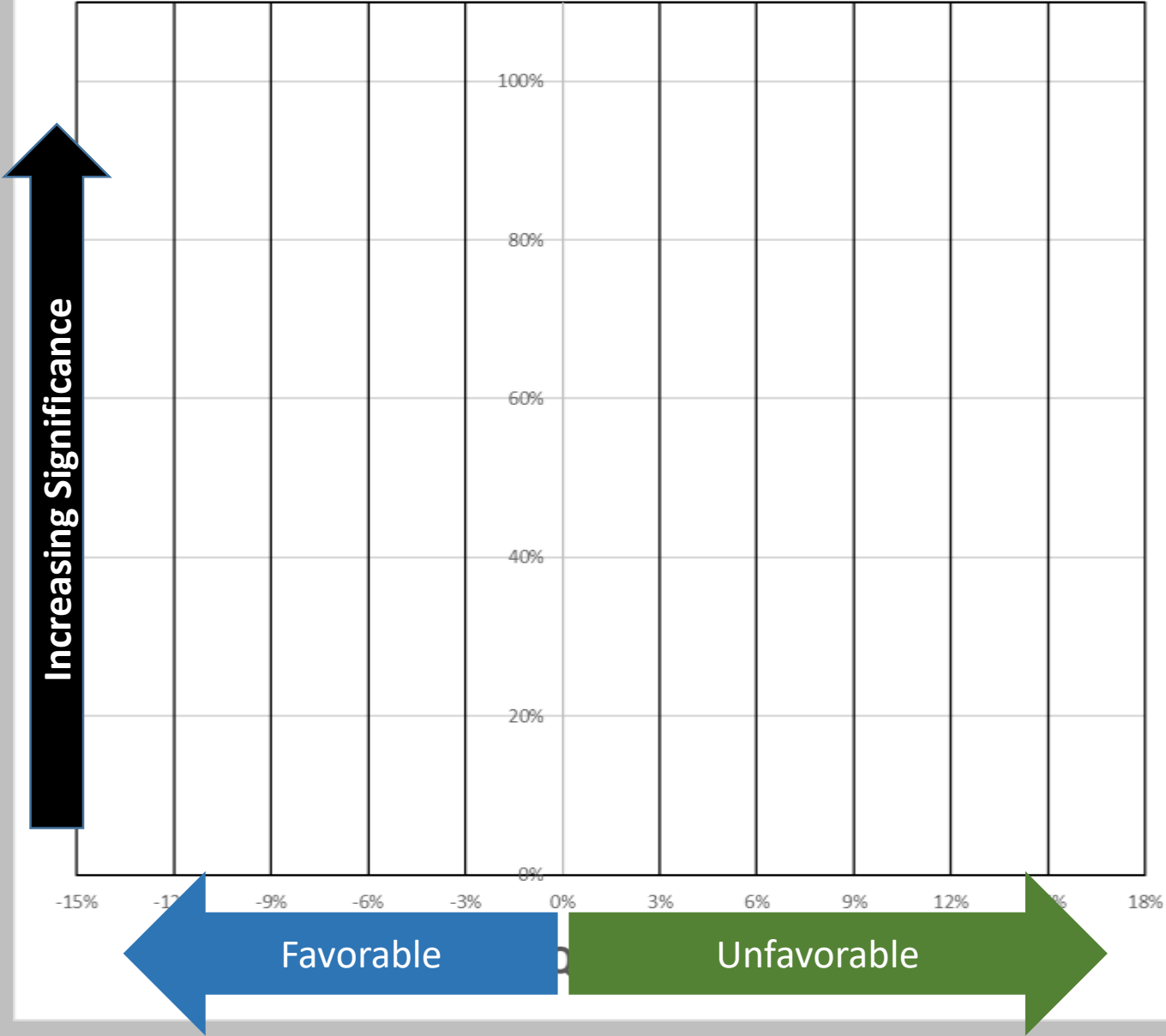


## WQ Trend and Data Significance



# WQ Trend and Data Significance

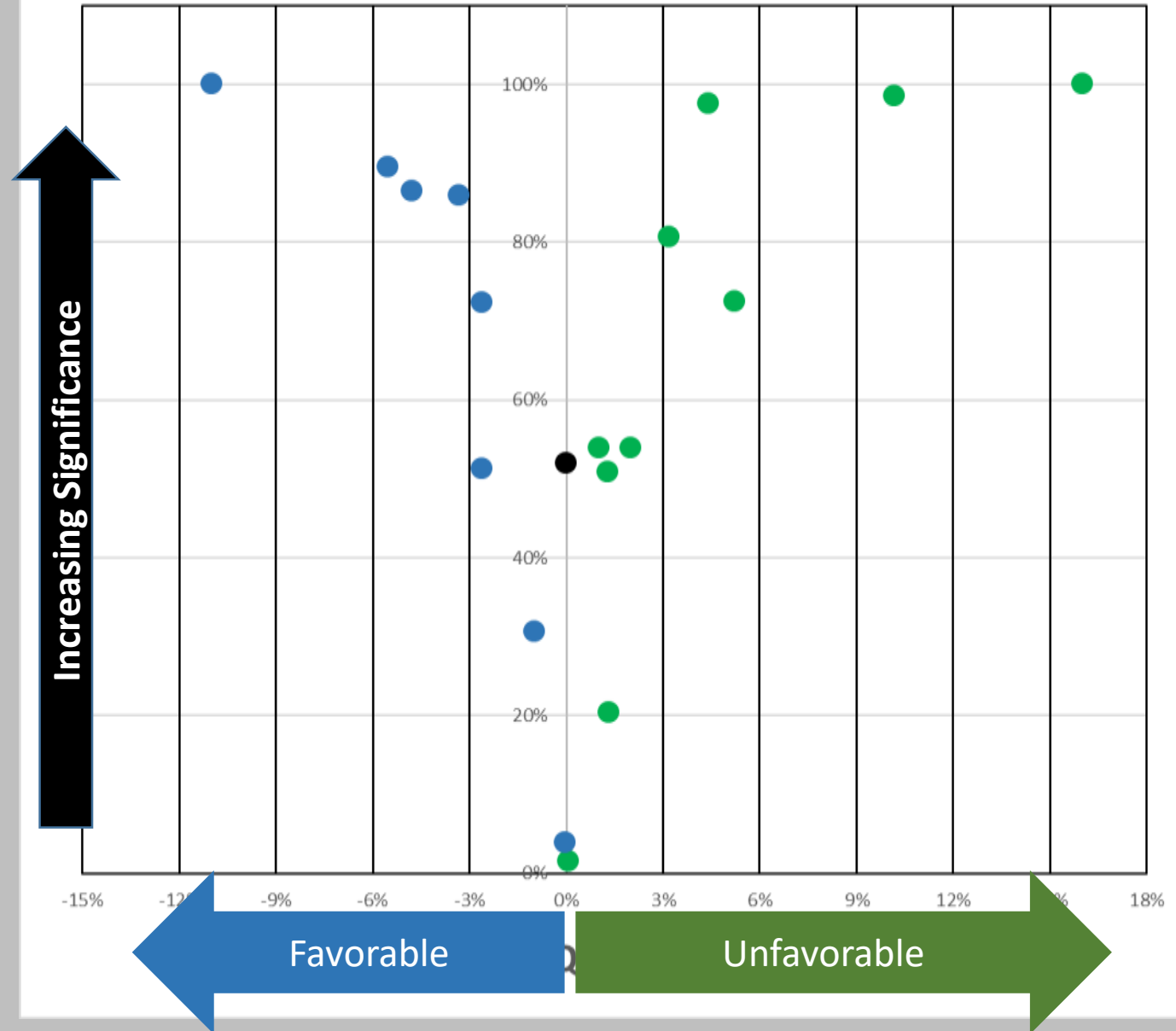
- Lakes with Favorable WQ Trend
- Lakes with Unfavorable WQ Trend





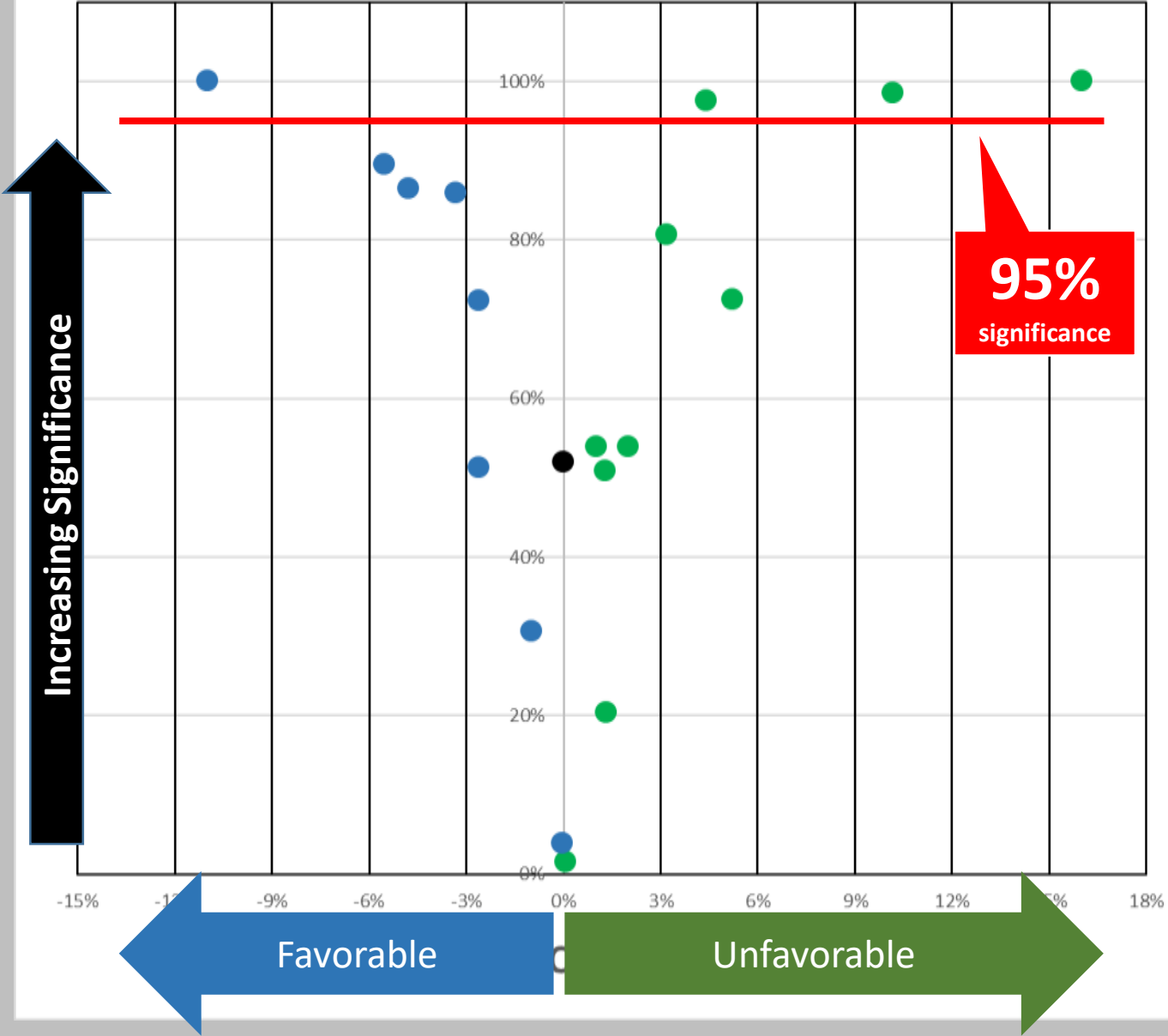
## WQ Trend and Data Significance

- Lakes with Favorable WQ Trend
- Lakes with Unfavorable WQ Trend



# WQ Trend and Data Significance

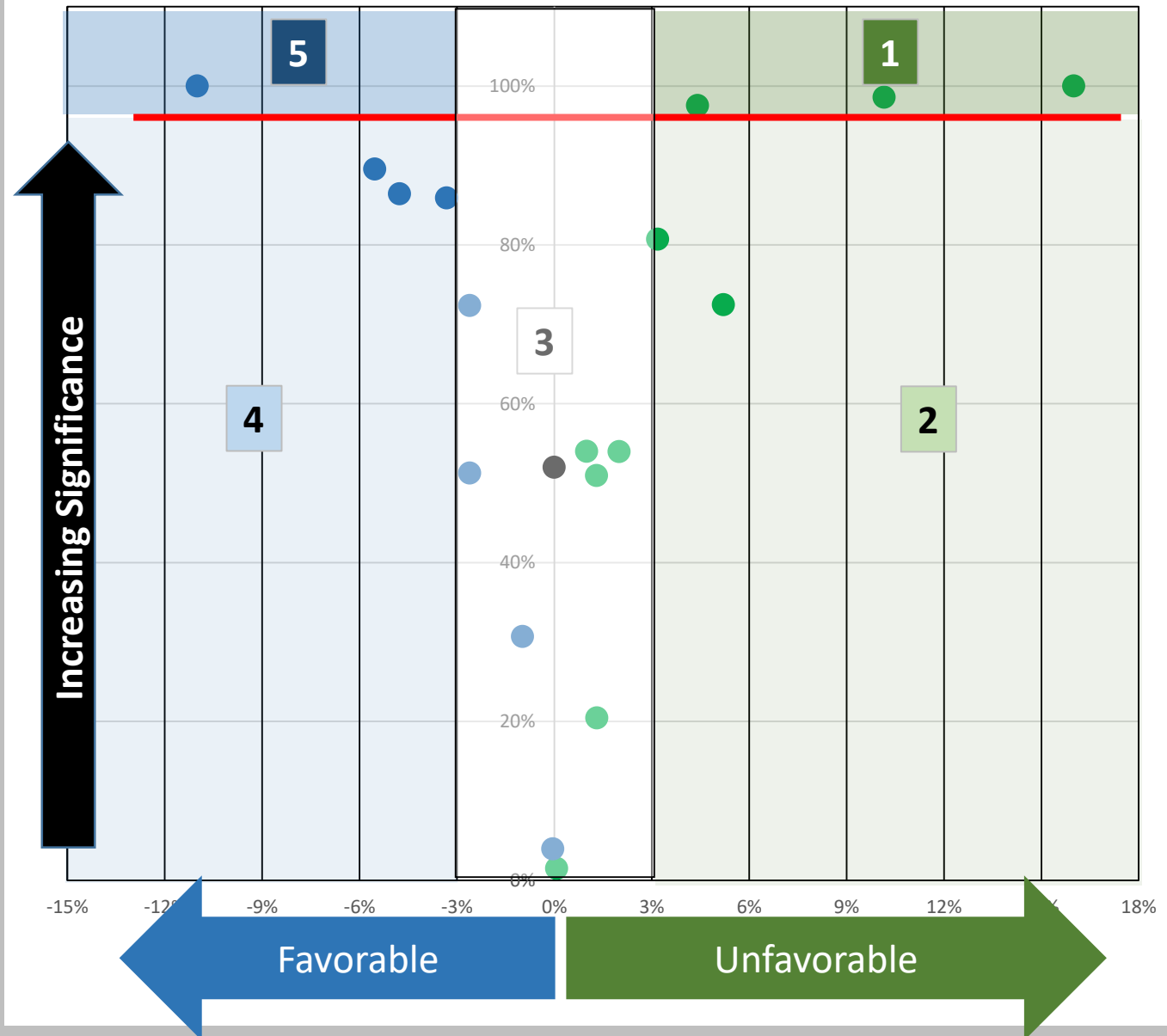
- Lakes with Favorable WQ Trend
- Lakes with Unfavorable WQ Trend





# WQ Trend and Data Significance

- Lakes with Favorable WQ Trend
- Lakes with Unfavorable WQ Trend

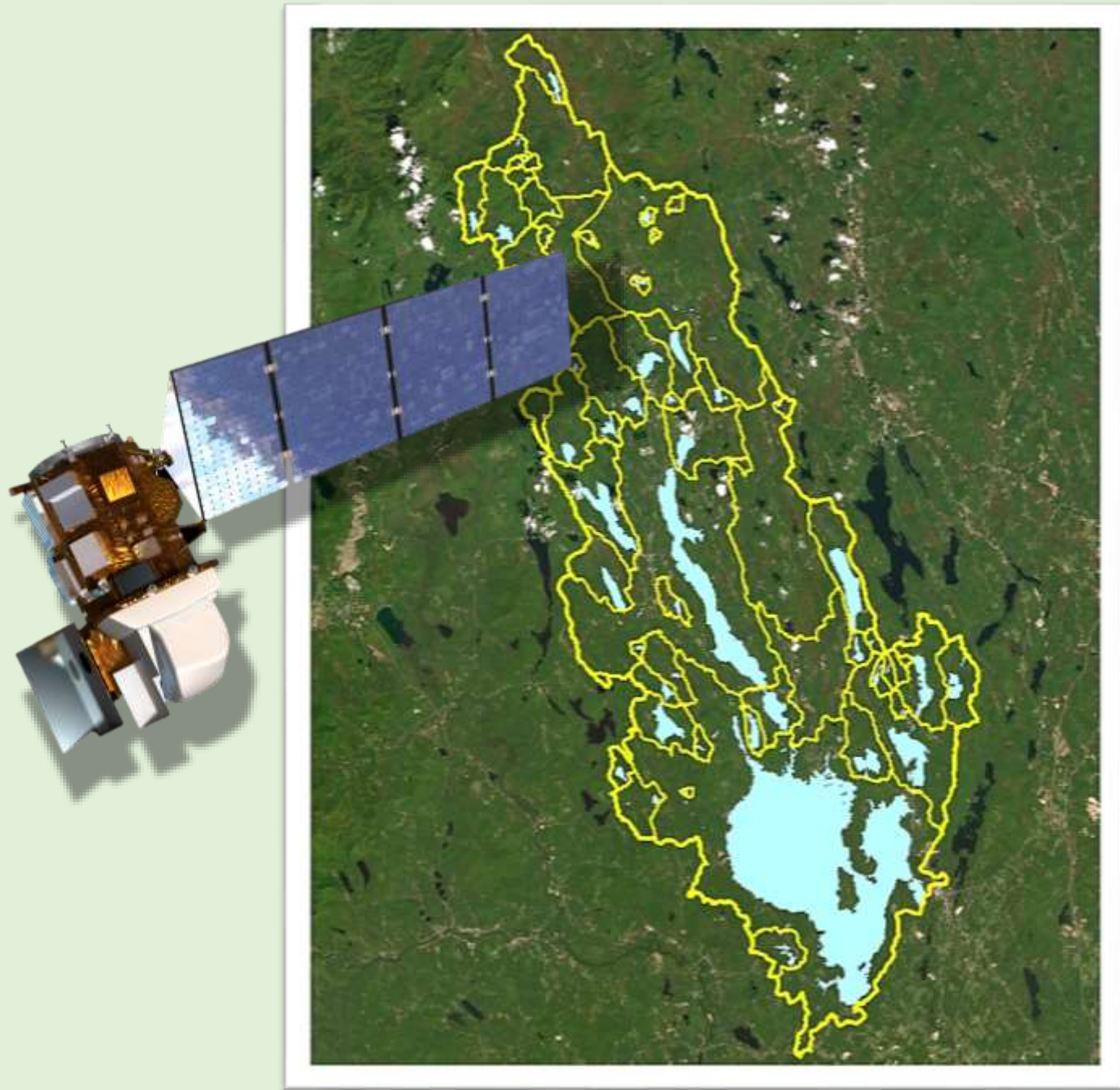




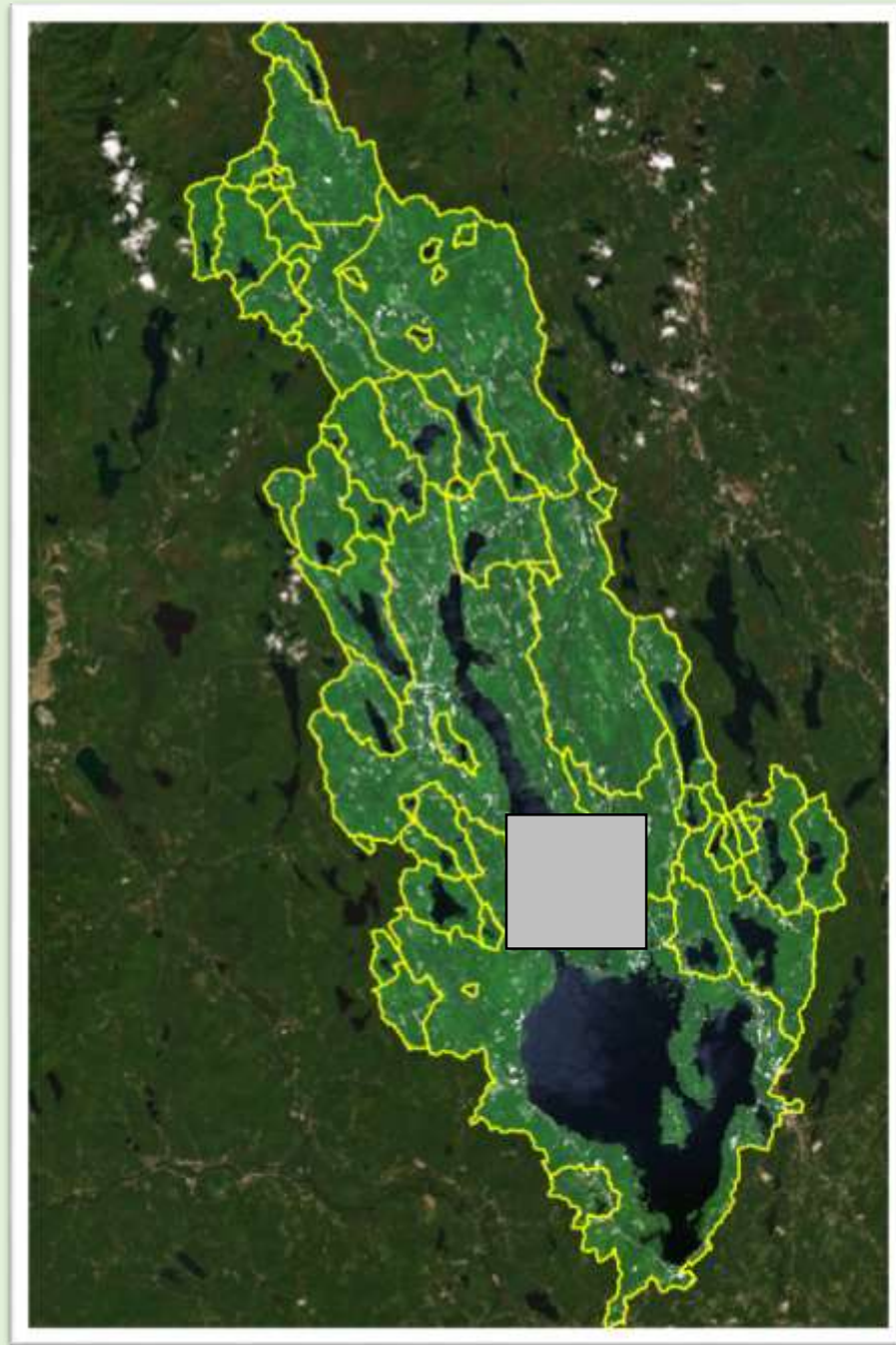
# EXISTING Land Cover

**Percent of each  
subwatershed that is  
“green” in 2018 LANDSAT  
imagery**





# Raw 2018 LANDSAT imagery



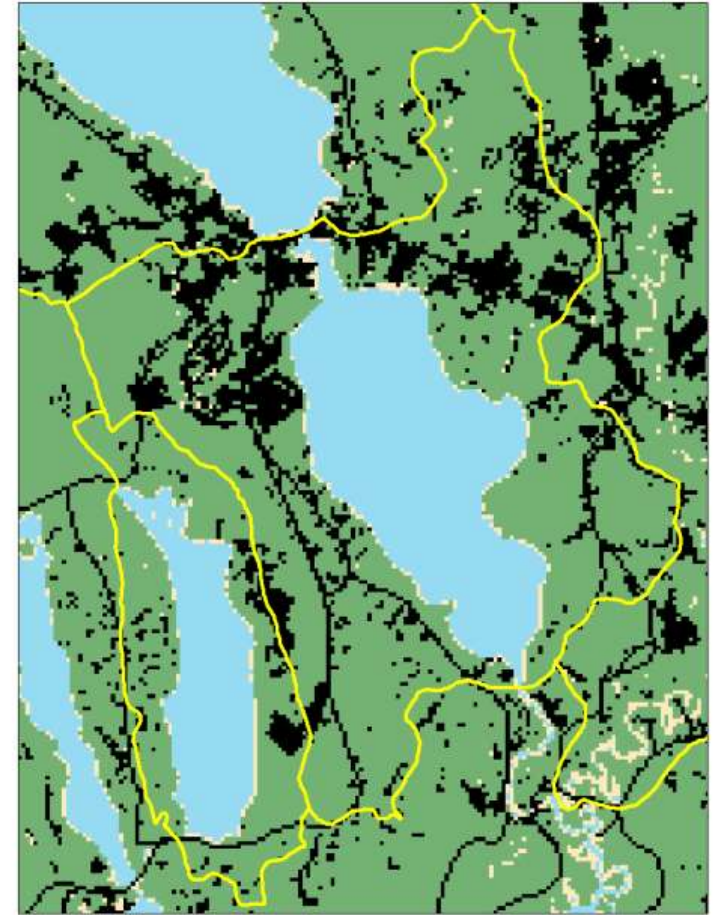




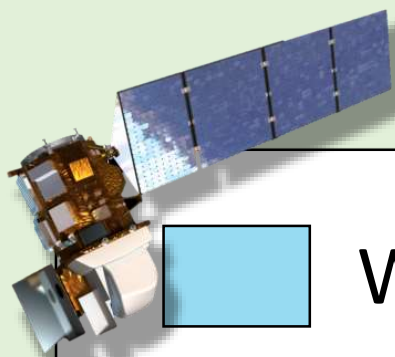
**Hi-res aerial imagery**



**Raw LANDSAT imagery**



**Classified LANDSAT imagery**



Water



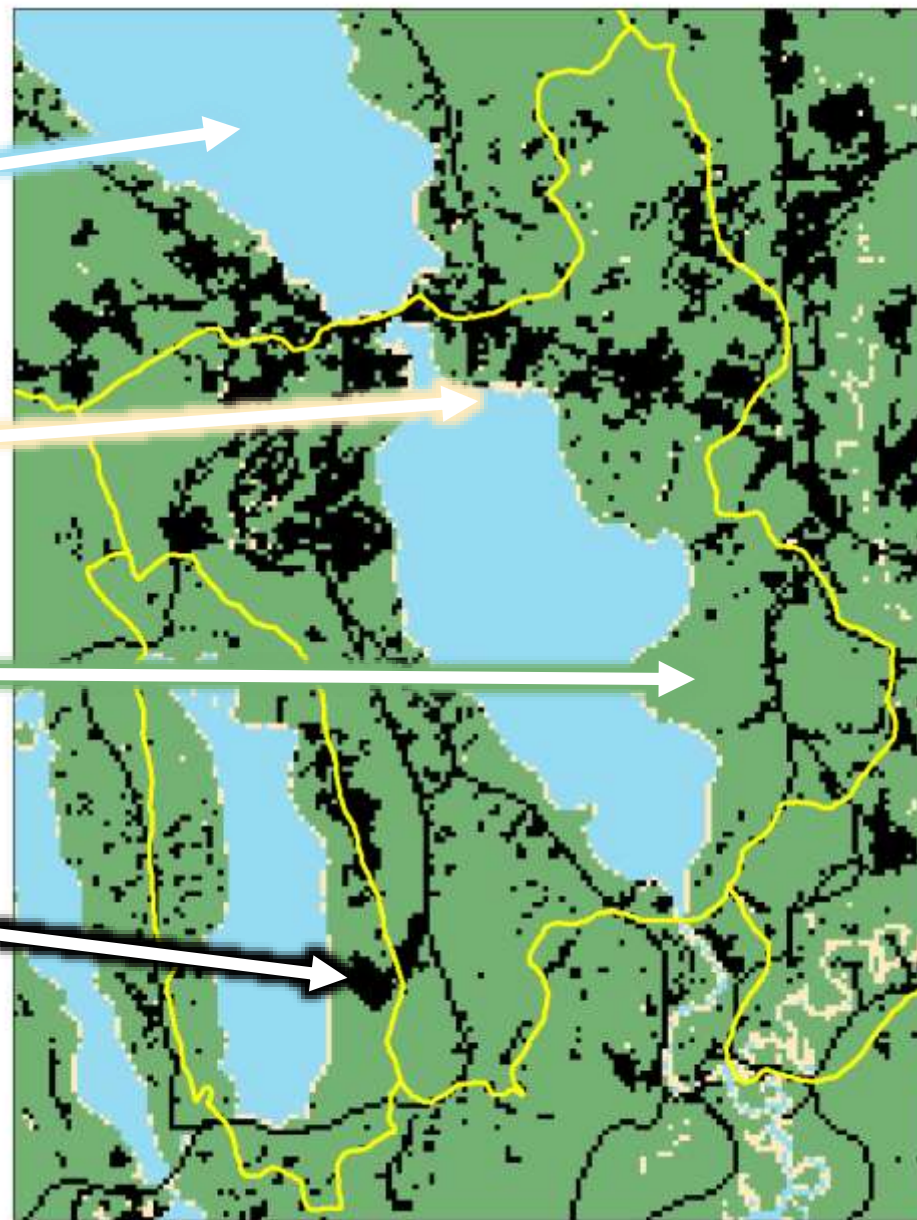
Bare Ground



"Green"



Developed



# Percent Green

Existing Land Cover score	% Green in 2018
5	90+
4	85-90
3	80-85
2	75-80
1	<75





# Land Cover TREND

**The pace at which  
“green” is changing to  
“developed”**





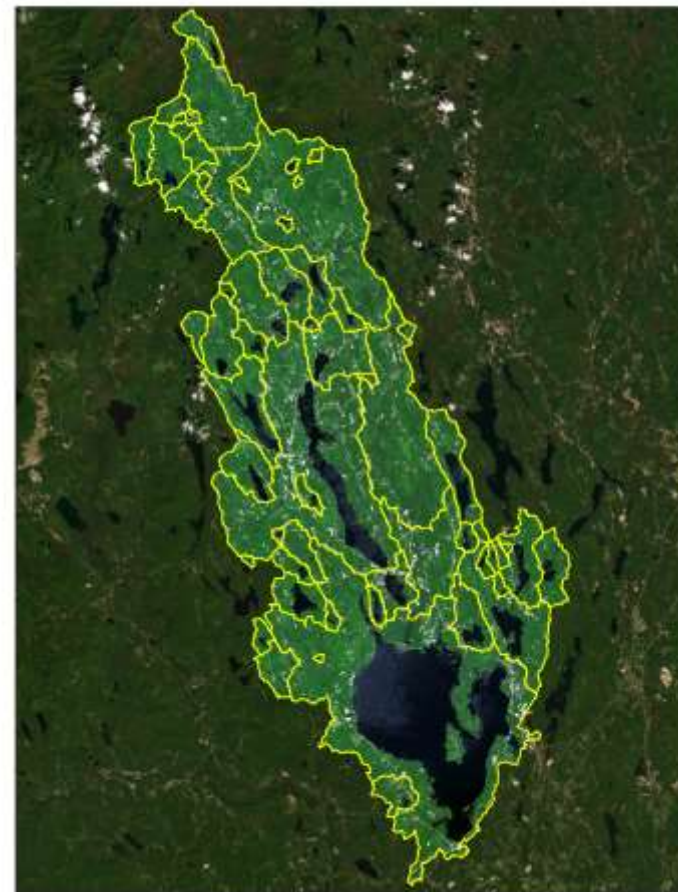
**1987**



**1995**

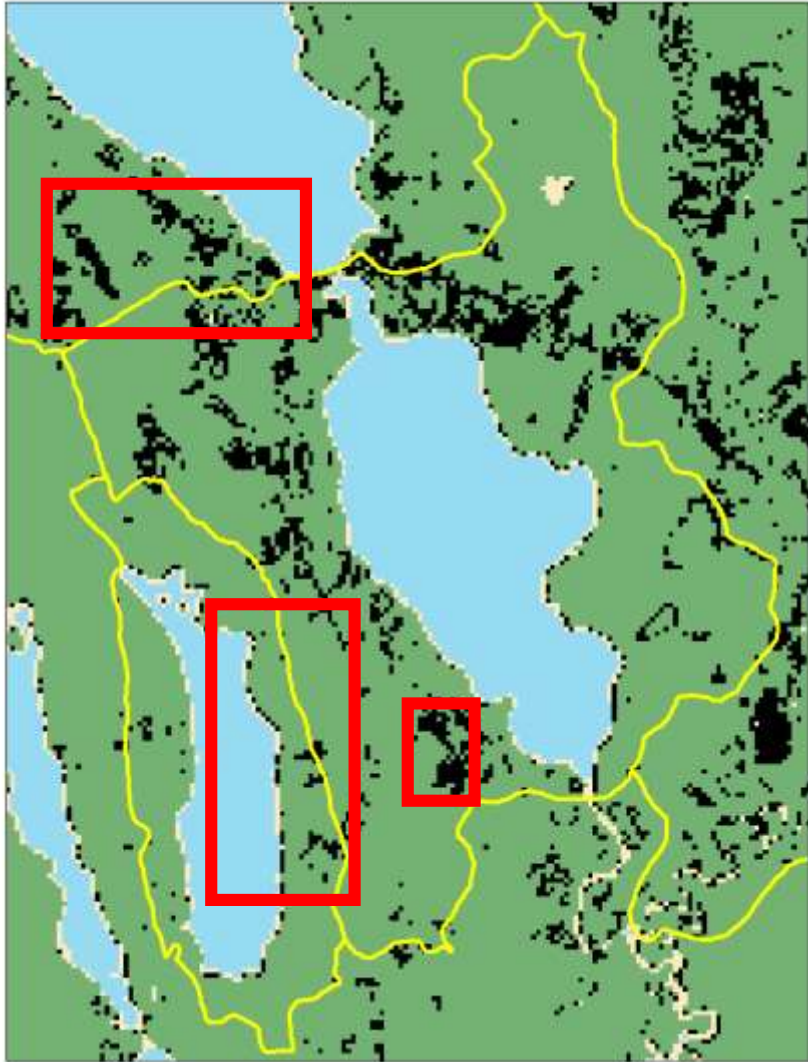


**2009**

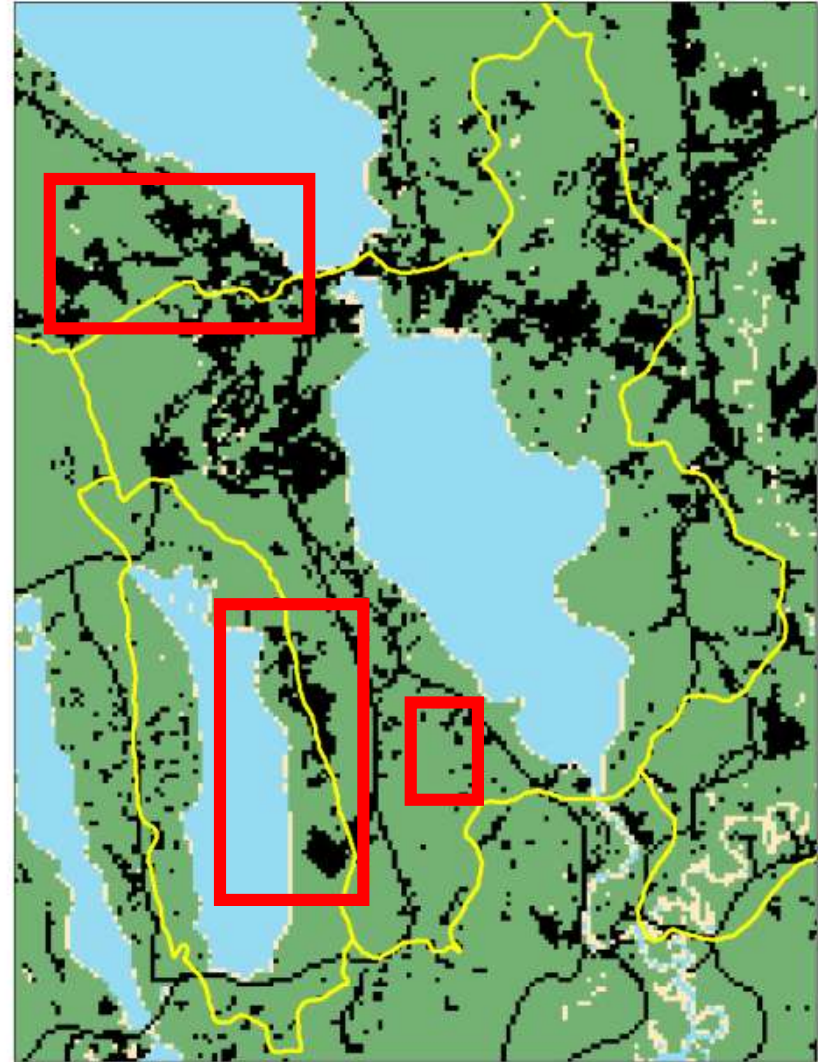


**2018**





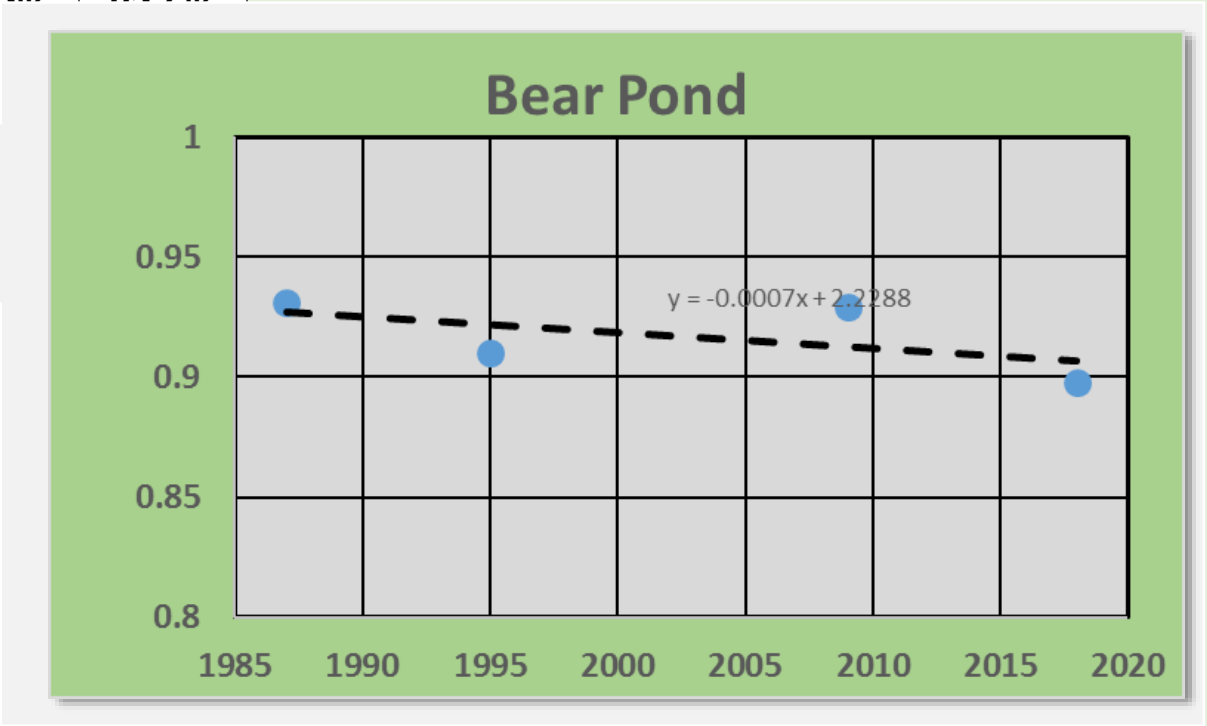
**1987**



**2018**



Subwatershed Name	1987	1995	2009	2018
ADAMS POND	91.2%	89.3%	88.7%	81.4%
BRANDY POND	87.1%	83.8%	76.9%	76.5%
BEAR POND	93.1%	91.0%	92.9%	89.8%
COLD RAIN POND	96.8%	95.3%	91.6%	92.5%
CRYSTAL LAKE	95.2%	90.1%	84.2%	82.6%



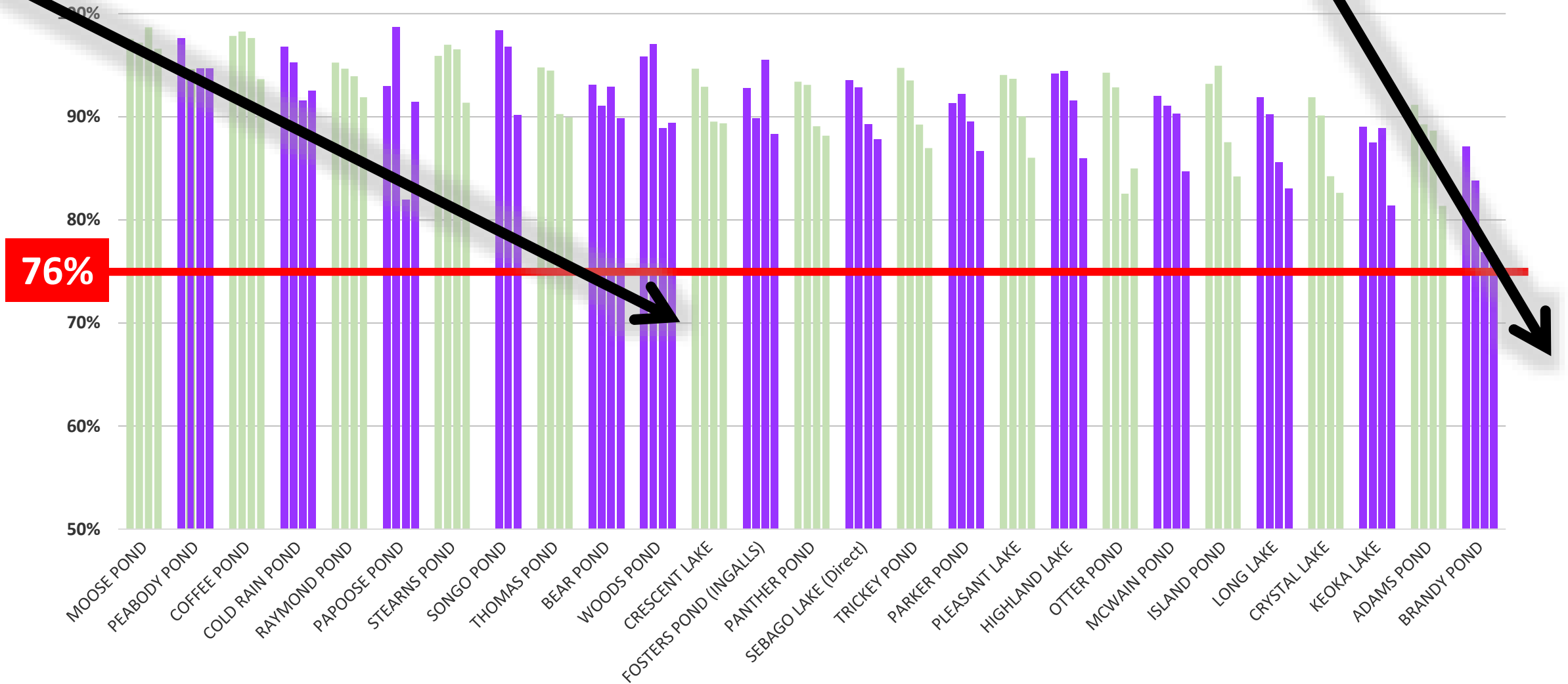
**TIPPING  
POINT**

The logo features the words "TIPPING" in blue and "POINT" in orange, both in a bold, sans-serif font. Below the text is a blue horizontal line representing a seesaw, which is tilted upwards to the right. An orange triangle, representing the fulcrum, is positioned at the base of the line.

**How many years until the tipping point?**



# PERCENT UNDEVELOPED WATERSHED LAND 1987-2018



Land Cover Trend score	Years to Tipping Point
<b>5</b>	<b>&gt;100 years</b>
<b>4</b>	<b>50-100 years</b>
<b>3</b>	<b>30-50 years</b>
<b>2</b>	<b>20-30 years</b>
<b>1</b>	<b>20 or fewer</b>

# Subwatershed SCORES

	MOOSE POND	PEABODY POND	RAYMOND POND	STEARNS POND	THOMAS POND	INGALLS (FOSTERS) POND	SEBAGO LAKE	BEAR POND	HIGHLAND LAKE	COLD RAIN POND	CRESCENT LAKE	PLEASANT LAKE	KEOKA LAKE	PANTHER POND	MCWAIN POND	TRICKEY POND	SONGO POND	LONG LAKE	WOODS POND	PAPOOSE POND	BRANDY POND	CRYSTAL LAKE	ISLAND POND	ADAMS POND	OTTER POND
Existing WQ Score	5	5	4	3	4	4	5	3	4	2	4	5	4	4	3	5	1	4	2	1	4	3	3	5	1
WQ Trend Score	3	3	ID	4	5	2	3	2	4	ID	ID	ID	3	1	3	1	3	3	4	ID	3	3	3	1	ID
Existing Land Cover Score	5	5	5	5	4	4	4	4	4	5	4	4	3	4	3	4	5	3	4	5	2	3	3	3	4
Land Cover Trend Score	5	5	5	4	3	5	3	5	2	4	3	2	3	3	3	2	ID	1	1	2	1	1	1	1	1



# OVERALL Score

Least Concerning

Most Concerning

	MOOSE POND	PEABODY POND	RAYMOND POND	STEARNS POND	THOMAS POND	INGALLS (FOSTERS) POND	SEBAGO LAKE	BEAR POND	HIGHLAND LAKE	COLD RAIN POND	CRESCENT LAKE	PLEASANT LAKE	KEOKA LAKE	PANTHER POND	McWAIN POND	TRICKEY POND	SONGO POND	LONG LAKE	WOODS POND	PAPOOSE POND	BRANDY POND	CRYSTAL LAKE	ISLAND POND	ADAMS POND	OTTER POND
Existing WQ Score	5	5	4	3	4	4	5	3	4	2	4	5	4	4	3	5	1	4	2	1	4	3	3	5	1
WQ Trend Score	3	3	ID	4	5	2	3	2	4	ID	ID	ID	3	1	3	1	3	3	4	ID	3	3	3	1	ID
Existing Land Cover Score	5	5	5	5	4	4	4	4	4	5	4	4	3	4	3	4	5	3	4	5	2	3	3	3	4
Land Cover Trend Score	5	5	5	4	3	5	3	5	2	4	3	2	3	3	3	2	ID	1	1	2	1	1	1	1	1
Total Score	18	18	17	16	16	15	15	14	14	14	14	14	13	12	12	12	12	11	11	11	10	10	10	10	9



# Summary





# Summary

- Lots of 4's and 5's
- Particularly “existing” conditions
- Less certainty regarding “trends”
- Most lakes aren't declining in WQ
- There are fewer trees

	Moose Pond	Pearbody Pond	Raymond Pond	Stearns Pond	Thomas Pond	Ingalls (Posters) Pond	Seabago Lake	Bear Pond	Highland Lake	Cold Rain Pond	Crescent Lake	Pleasant Lake	Keoka Lake	Panther Pond	McWain Pond	Trickett Pond	Songo Pond	Long Lake	Woods Pond	Papoose Pond	Brandy Pond	Crystal Lake	Island Pond	Adams Pond	Otter Pond
Existing WQ Score	5	5	4	3	4	4	5	3	4	2	4	5	4	4	3	5	1	4	2	1	4	3	3	5	1
WQ Trend Score	3	3	ID	4	5	2	3	2	4	ID	ID	ID	3	1	3	1	3	3	4	ID	3	3	3	1	ID
Existing Land Cover Score	5	5	5	5	4	4	4	4	4	5	4	4	3	4	3	4	5	3	4	5	2	3	3	3	4
Land Cover Trend Score	5	5	5	4	3	5	3	5	2	4	3	2	3	3	3	2	ID	1	1	2	1	1	1	1	1
Total Score	18	18	17	16	16	15	15	14	14	14	14	14	13	12	12	12	12	11	11	11	10	10	10	10	9



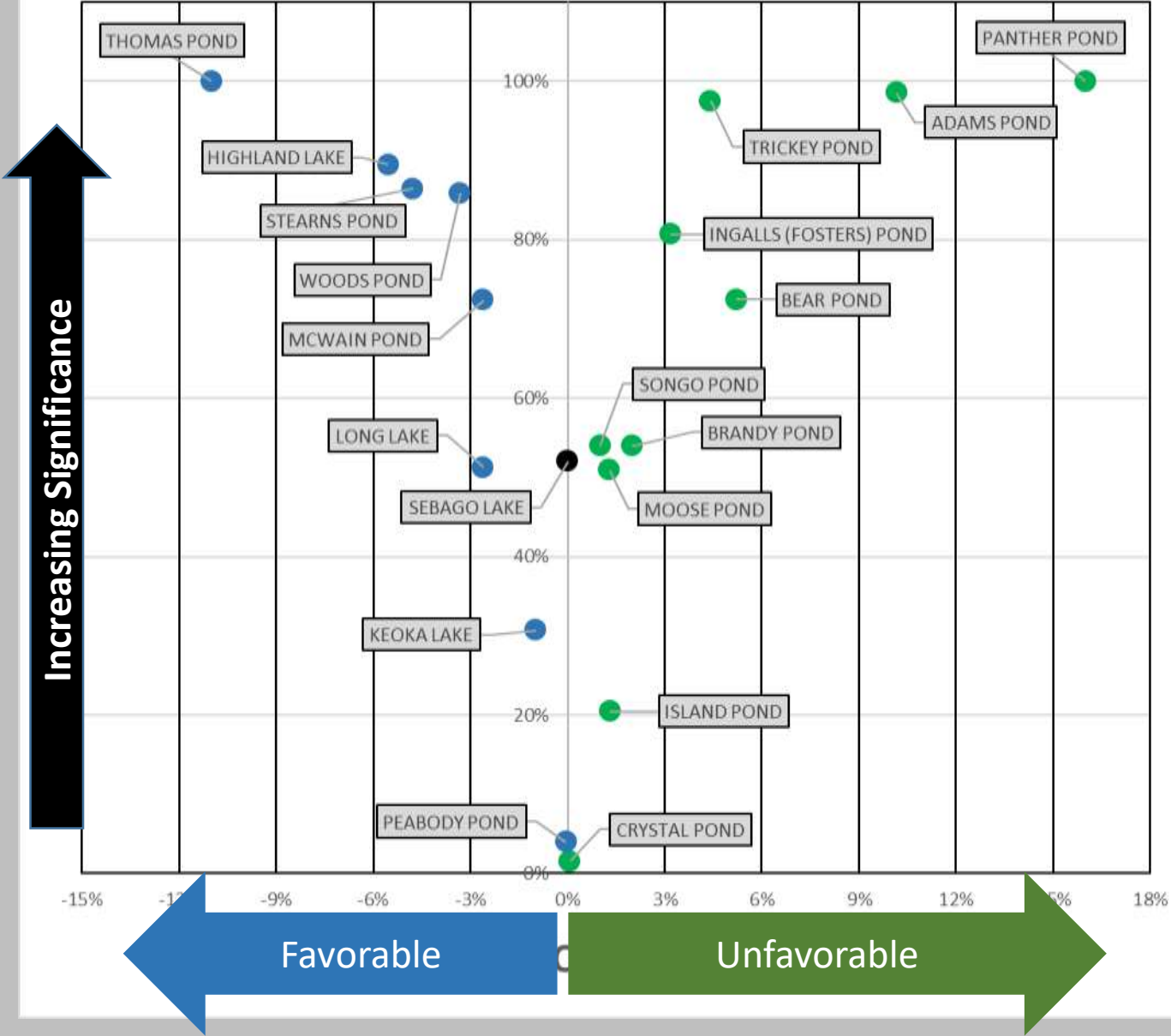


Questions?



# WQ Trend and Data Significance

- Lakes with Favorable WQ Trend
- Lakes with Unfavorable WQ Trend





## WQ Trend and Data Significance

- Lakes with Favorable WQ Trend
- Lakes with Unfavorable WQ Trend

