MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

Salty Water? Not in MY State!

How Regulations, Standards, and Monitoring Keep the Fresh Coast FRESH

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Water Resources Division

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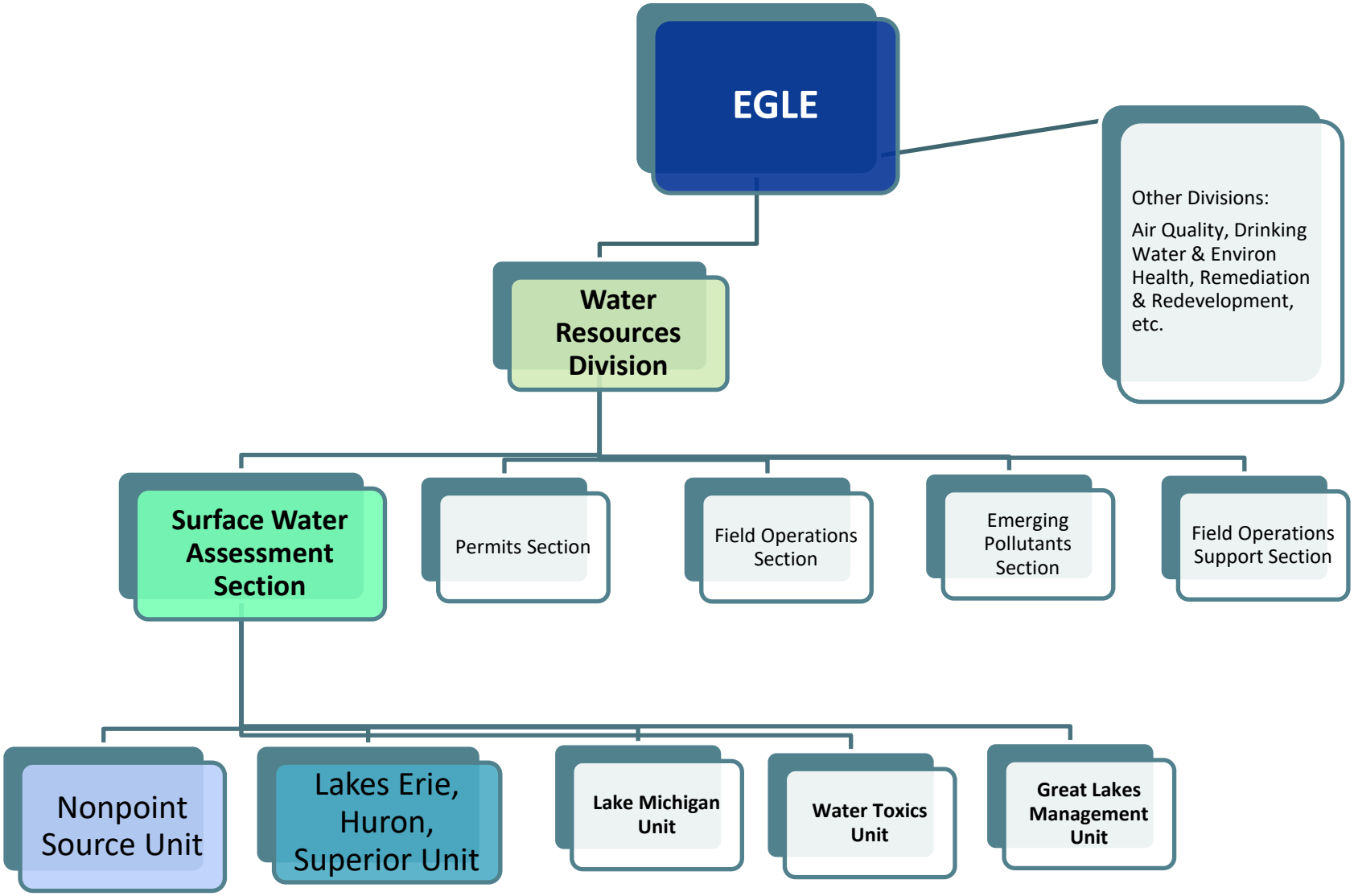
Objectives

- WHO: Are we?
- HOW: Are protective Chloride values developed?
- WHAT: ..are we doing with them?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Other Divisions:
Air Quality, Drinking Water & Environ Health, Remediation & Redevelopment, etc.
Water Resources Division
Surface Water Assessment Section
Permits Section
Field Operations Section
Emerging Pollutants Section
Field Operations Support Section
Nonpoint Source Unit
Lakes Erie, Huron, Superior Unit
Lake Michigan Unit
Water Toxics Unit
Great Lakes Management Unit

1972 “The Clean Water Act”

- Established the basic structure for regulating and protecting water quality

- Required each state to adopt ***water quality standards (WQS)*** for all surface waters and provided for EPA review & approval/disapproval

Clean Water Act Objective

- "restore and maintain the chemical, physical and biological integrity of the Nation's waters (CWA 101(a))

- Interim goal: "water quality which provides for the protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the water" wherever attainable (CWA 101(a)(2))

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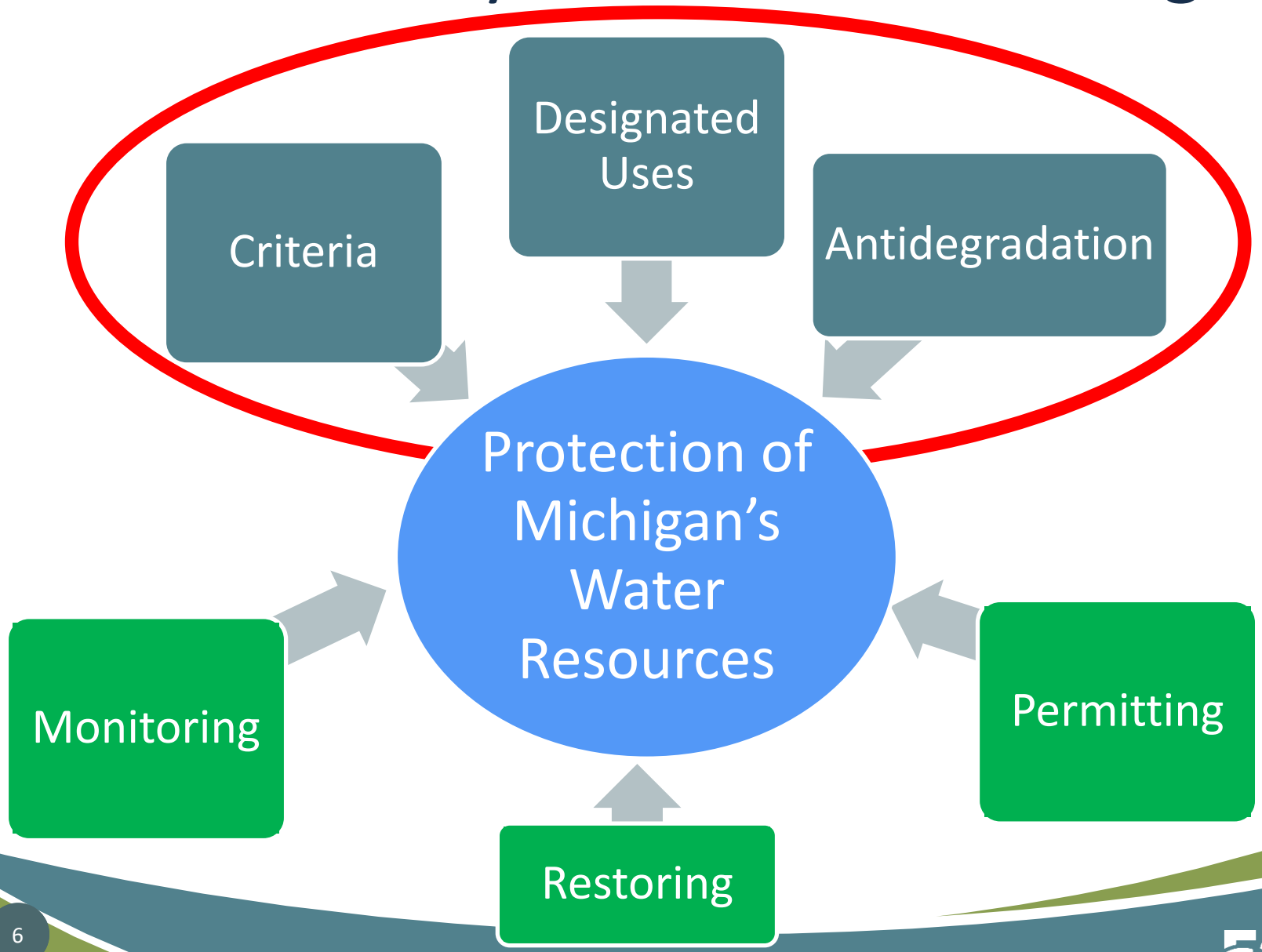
Water Quality Standards in Michigan



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How are criteria developed

- Toxicological data – freshwater aquatic organisms

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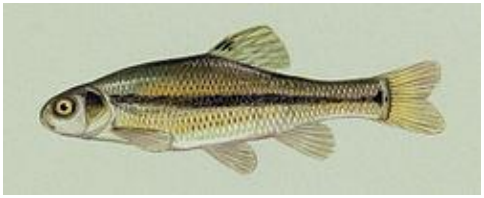

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- More, diverse data = better
- Acute – short term exposure impacts
- Chronic – longer term exposure impact
- **Process in Rule, follows Great Lakes guidance, & approved by USEPA**

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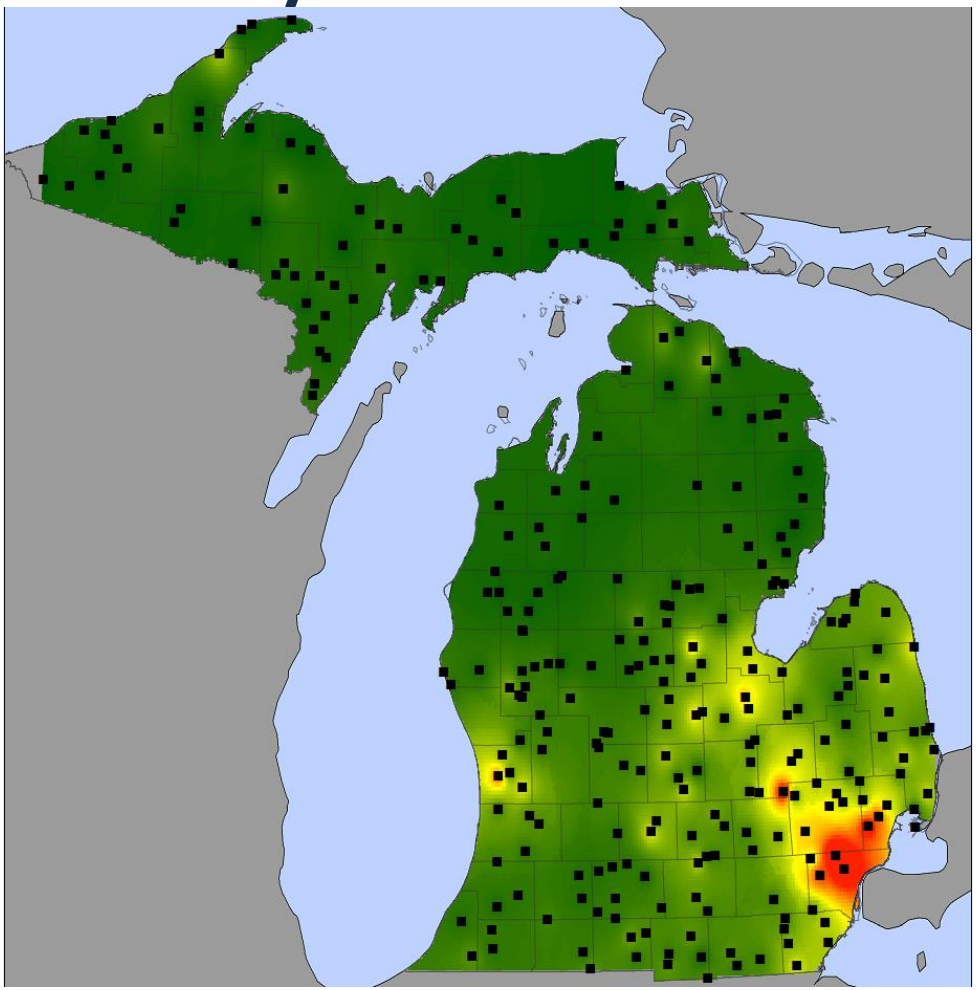
Why Chloride?



Based on 2005-2014 Surface Water Sampling

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Why Chloride?

- Long overdue, questions and concerns based on monitoring
- New available data helps produce better criteria
- More information for making Permitting decisions

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1
0.9
0.8
0.7
0.4
0.1
Argia sp.
Anguilla rostrata
a reticulata
us sp.
teus aculeatus
kansae
Elliptio complanata
Ceriodaphnia dubia
Chloride Species Mean Acute Value

Chloride Aquatic Life Values

Acute = 640 mg/L

Final Acute Value (FAV; Permits)

Acute = 320 mg/L

Aquatic Max Value (AMV; Surface Water)

Chronic = 150 mg/L

Final Chronic Value (FCV; Permits and Surface Water)

What does it mean?

- Thresholds relevant to protecting aquatic life in ALL water
- Able to set goals where problems in surface water are identified
- Better guiding permitting decisions

Chloride Monitoring

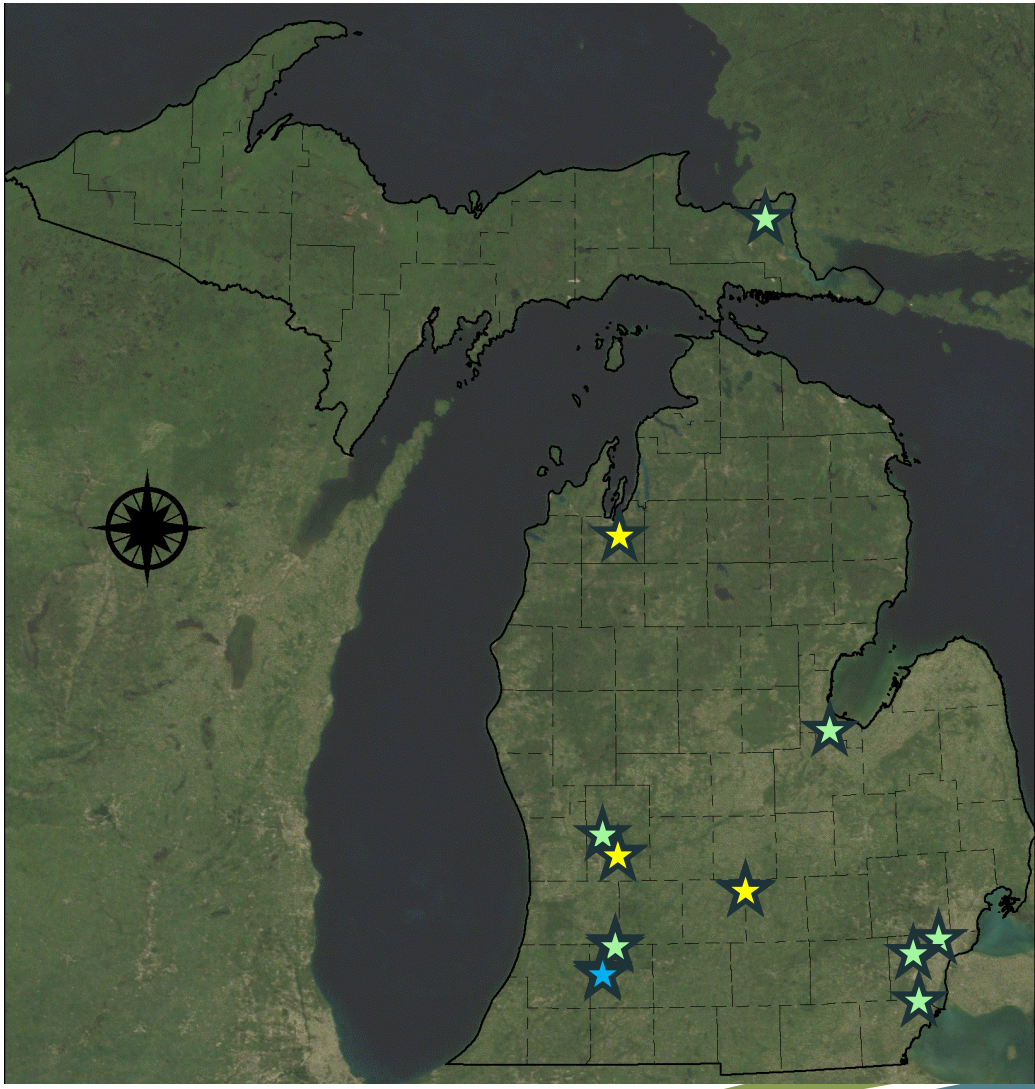
Urban Lakes :
Kalamazoo; chloride inputs and patterns in small urban lakes

Streams :
Grand Rapids, Lansing, Traverse City; Exploring high conductivity with sensors and chloride sampling, melt/storm events

Statewide chemistry sampling :
250 stream sites statewide; 4x/year, includes chloride

Watershed/Volunteer Groups, Universities :
Streams and Lakes, generally in urbanized watersheds; data range from chloride sampling to chloride rapid strips (Izaak Walton League Salt Watch)

All of these are ongoing…



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Chloride Monitoring

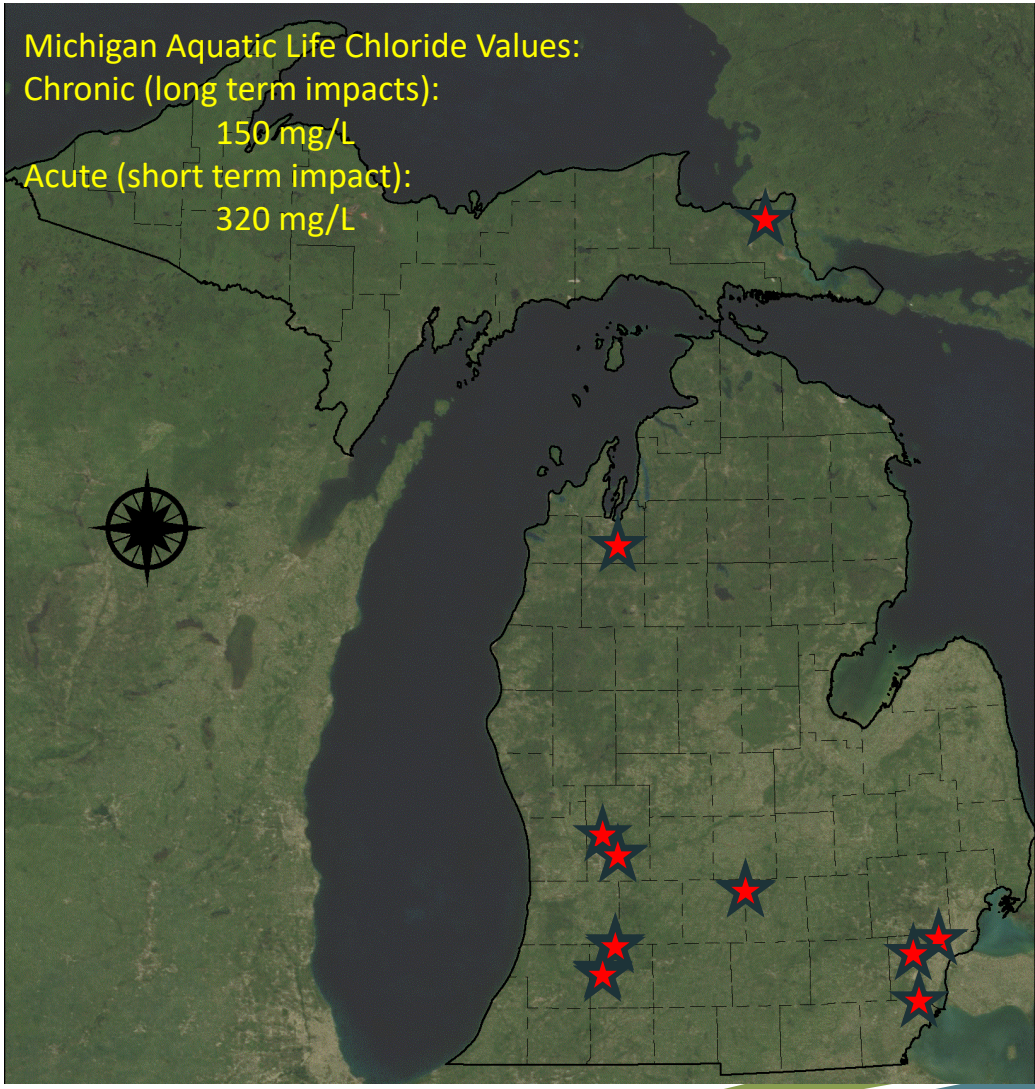
What is being found?

Urban Lakes :
Lake turnover affected in some, concerns for high nutrient concentrations from sediments leading to potential for algae blooms

Streams :
Exceedance of values for aquatic life, both acute and chronic in some urbanized waters

Extreme conductivity and very high chloride levels in some (>3,000 mg/L)

Salt Watch Strip Tests suggest exceedance of chloride values is potentially widespread – Grand Rapids and Southeast MI areas



How do we Monitor for Chloride?

- EGLE efforts originally focused on grab samples collected in 2021 May-November
  - Sampling for chloride involves
    - Labor
    - Lab costs
    - Frequency/timing

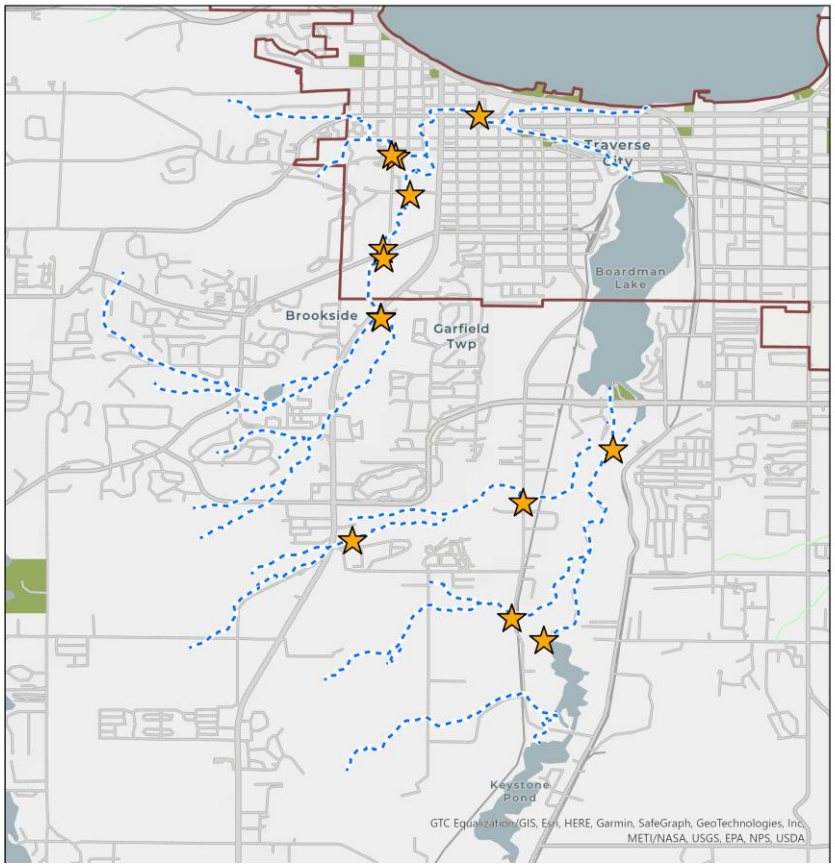
What did we find in 2021?

Chloride: AMV: 320 mg/L FCV: 150 mg/L *Sulfate*: AMV: 600 mg/L FCV: 370 mg/L

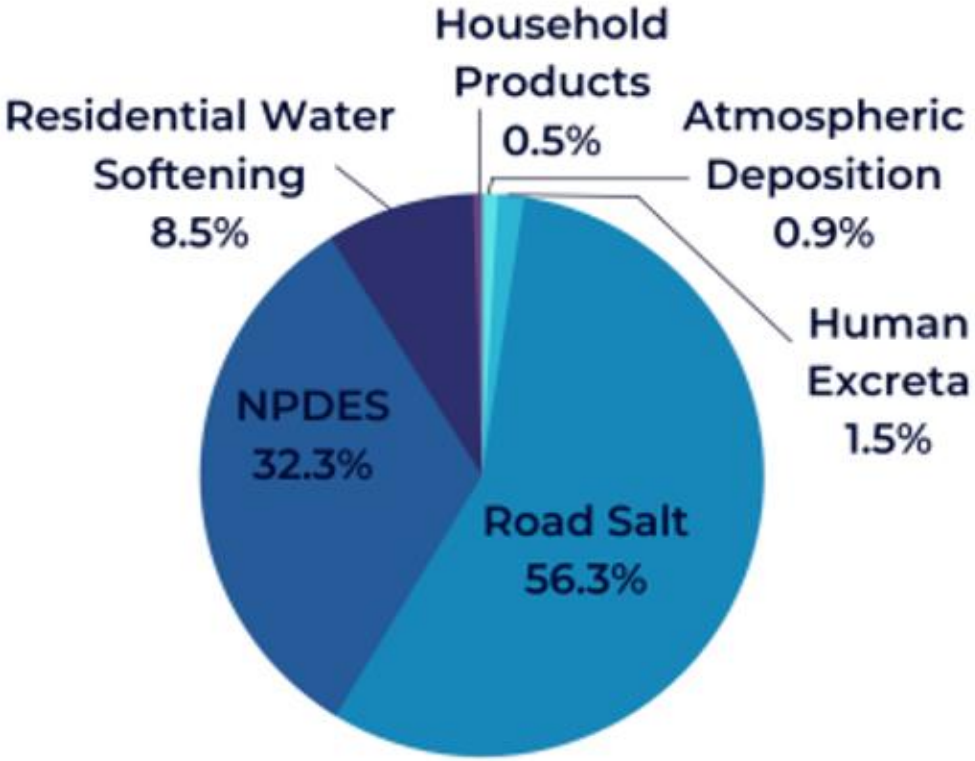
2021	May			July			Sept			Nov		
Site	Cl	SO4	Cond	Cl	SO4	Cond	Cl	SO4	Cond	Cl	SO4	Cond
Rush_Baldwin	83	85	900	66	71	748	94	82	906	82	90	858
Buck_Kent	150	120	1230	40	38	560	170	130	1300	130	110	1100
Sand_Luce	42	45	735	32	38	614	49	46	772	51	60	728
Pigeon_Olive	110	35	749	65	47	677	98	26		73	41	678
Kids_BigB	63	21	674	69	21	701	66	16	696	72	21	710
TribD_31	43	24	652	45	25	671	46	22	668	49	25	673
Kids_Silver	65	23	722	72	22	749	72	19	738	70	21	741
Kids_11th	57	22	695	46	24	643	62	20	714	64	23	722
TribA_Elmwood	41	23	619	63	23	725	51	19	659	47	23	566
Kids_Front	53	21	683	59	24	708	61	22	703	60	22	702
Galloway_Butler	410	41	1860	200	23	1030	230	27	1170	190	32	1100
Clinton_Riverwood	300	40	1500	170	24	954	190	24	894	160	23	957
Halfway_Smith	66	270	1050	61	290	1040	50	340	1050	49	150	826
Battle_Spiceville	62	64	828	24	44	556	84	110	994	35	57	687
Carrier_St.Joe	360	100	1920	160	42	992	250	93	1460	170	59	1150
Carrier_Saginaw	350	93	1900	170	41	1070	260	78	1510	180	69	1200
Carrier_RiverTrail	350	90	1900	180	40	1060	240	60	1330	170	56	1180
Mill_WhitePine	43	32	685	36	35	667	48	37	709	47	35	741
IndianMill_Tuner	100	54	967	87	43	931	120	59	992	110	49	958
Plaster_Freeman	210	110	1450	130	53	943	190	120	1360	130	69	1020

Kids Creek: More to the Story

- According to chloride values , Kids Creek should be clean and supporting all designated uses
  - But what else do we know about this creek?
- Poor macroinvertebrates = poor water quality = poor aquatic life = impaired
- $ 9 million in restoration
- 2 dozen+ projects
- Still impaired…



Macroinvertebrate Score	Macroinvertebrate Rating	Habitat Score	Habitat Rating
5 to 9	Excellent	> 154	Excellent
-4 to 4	Acceptable	105 to 154	Good
-5 to -9	Poor	56 to 104	Marginal
		<56	Poor

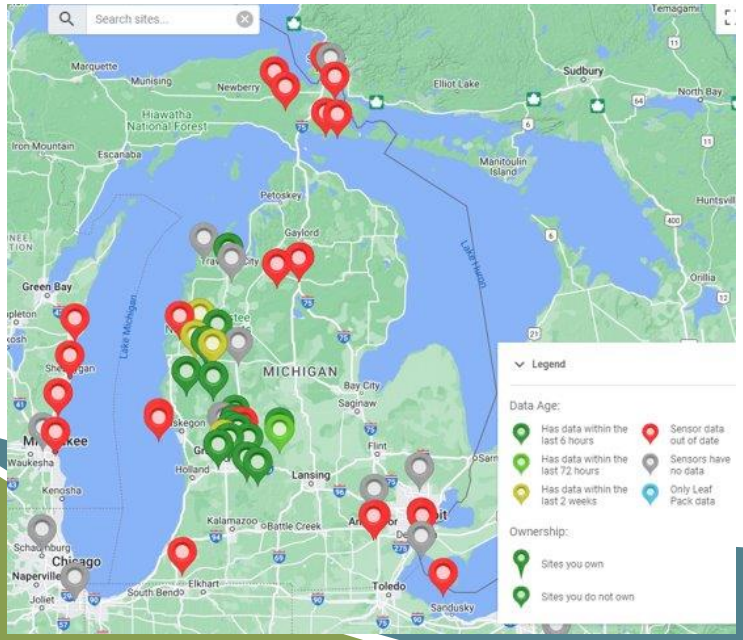


Average annual chloride contributions from point and nonpoint sources in Michigan.

(Pitzzu, Williamsen, Harrington, 2022)

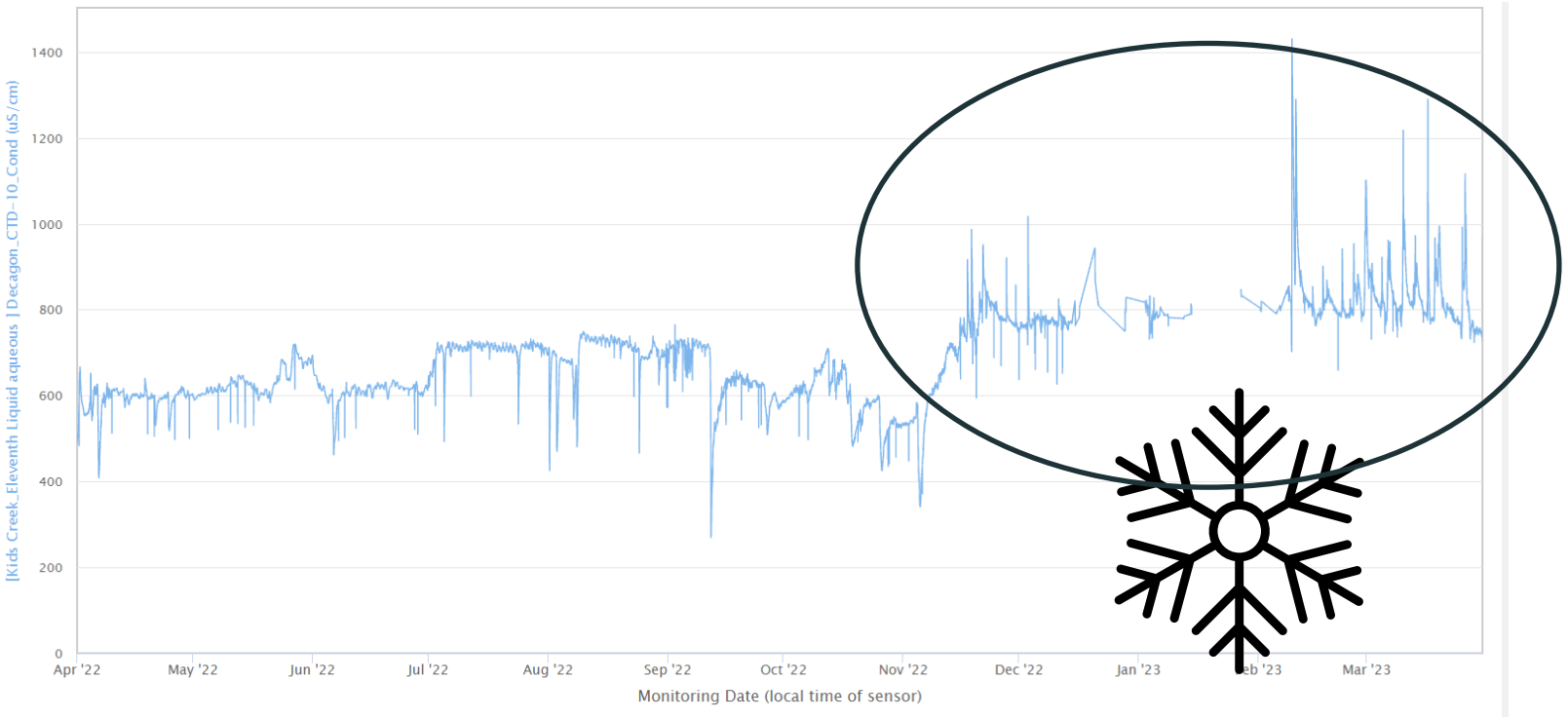
What are we missing?

- Winter monitoring
  - Continuous sensor takes readings for conductivity and temperature every 15 minutes



https://monitormywatershed.org/browse/

Using Mayfly Monitors



- Less labor (view from a computer)
- No lab analyses
- Maintenance!
- Availability of technology

- Consider costs
  - $1,160 each for a Mayfly plus installation equipment
  - $20/month for cellular service

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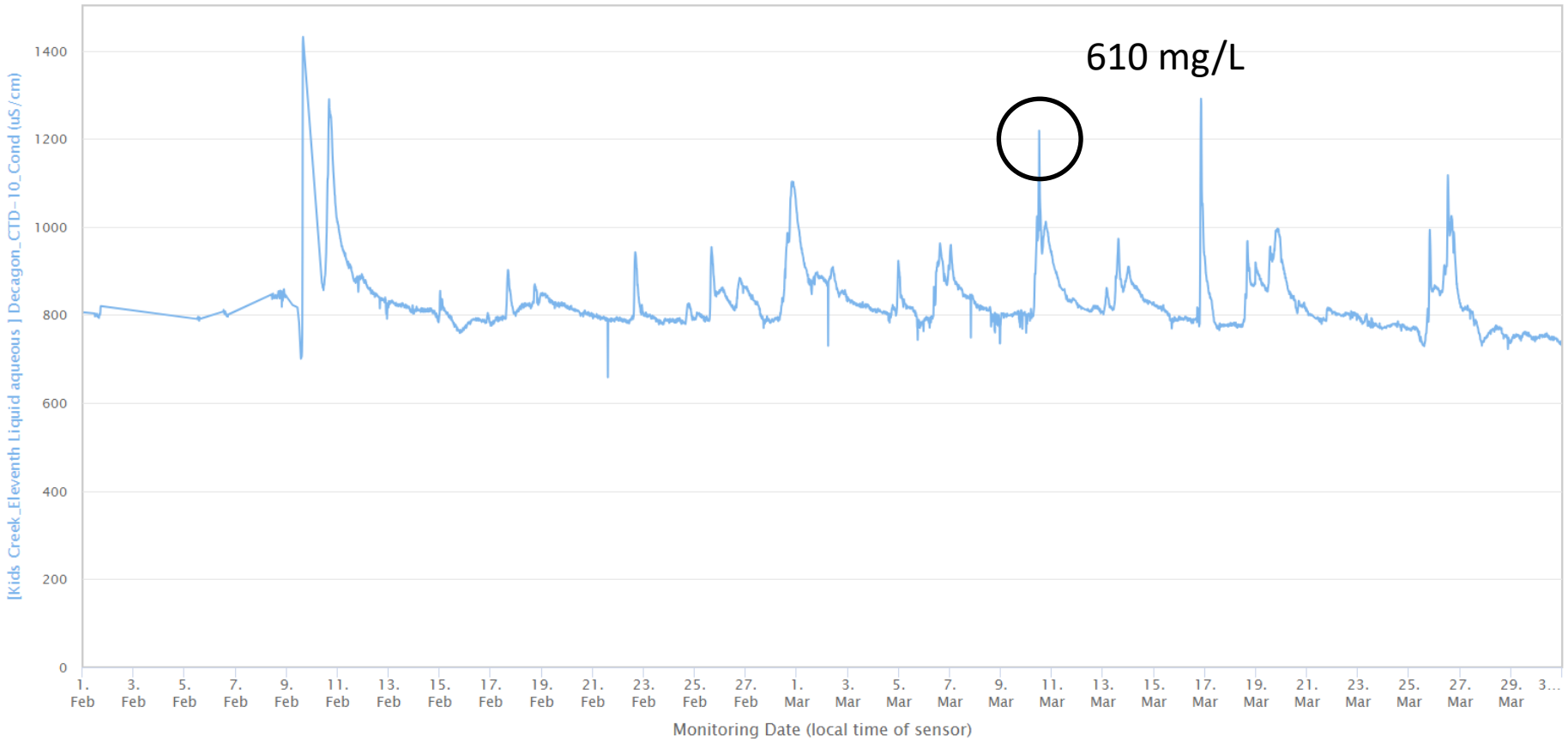
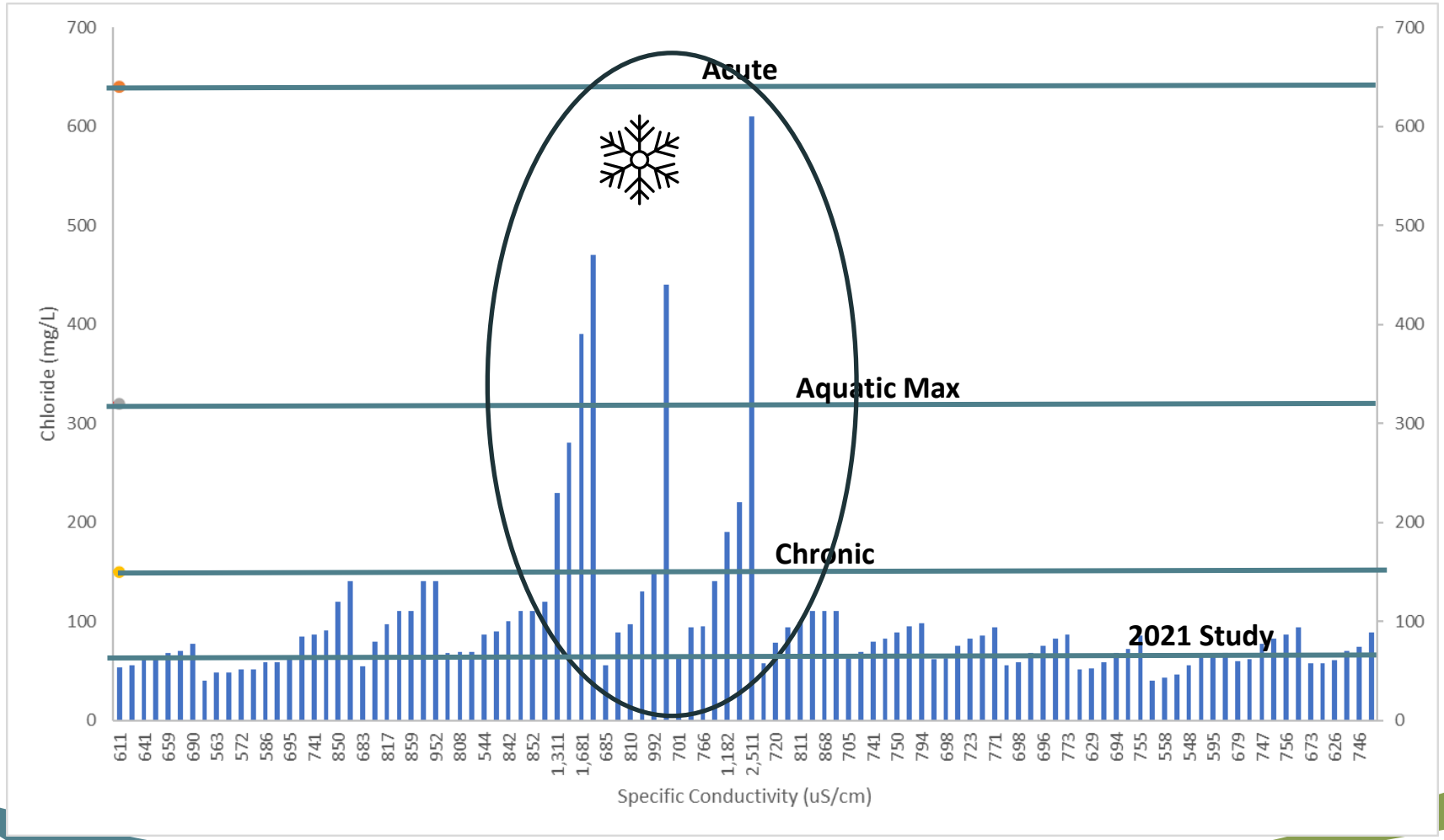
Winter 2023 Mayfly Data



Chloride: AMV: 320 mg/L FCV: 150 mg/L

October 2022-September 2023



Where do we go from here?

- Aquatic life is being harmed by chloride in Kids Creek in winter months
  - We can infer how long this is occurring using conductivity as a proxy
  - Storage vs. Spreading
  - More winter data
- Where else is this occurring?
  - Start small and cheap—conductivity sensors, test strips
  - Continue testing methods against each other
  - What data do we already have?
  - What partners do we already have?

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