

Agenda

- Project progress
- Data update
 - Septic Inventory - Health Department
 - Water quality - Conservation District
- Swan Lake Watershed Management Plan
 - Findings
 - Critical areas
 - Recommendations
 - Possible funding sources
- Open discussion

Project Progress

- **Agriculture inventory**
 - Completed: Animal feeding operation survey, field prioritization scoring
- **Water quality inventory**
 - Completed: final tributary and lake samples, *E. coli* MST,
 - Next: septic analysis
- **Watershed management plan**
 - Completed: Final loading estimations, draft water quality objectives and recommendations
 - Next: EGLE review, final revisions

2024 Confirmed Bloom Events

Muskrat Lake

- 8/4/24*

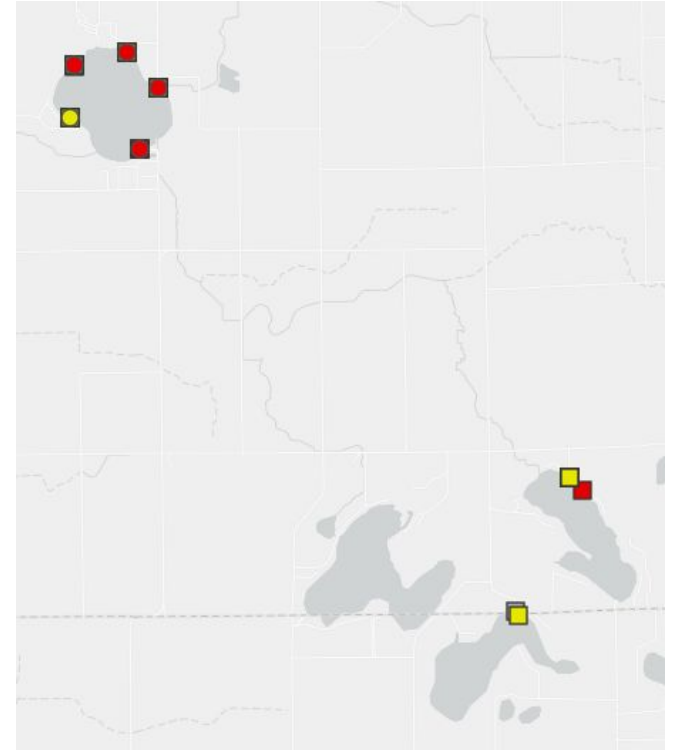
Duck Lake

- 4/25/24
- 5/8/24
- 6/4/24*
- 7/19/24
- 7/26/24*

Swan Lake

- 8/12/24*
- 9/10/24
- 9/18/24
- 10/2/24
- 10/9/24

*Cyanobacteria confirmed, but cyanotoxins were not detected or not sampled

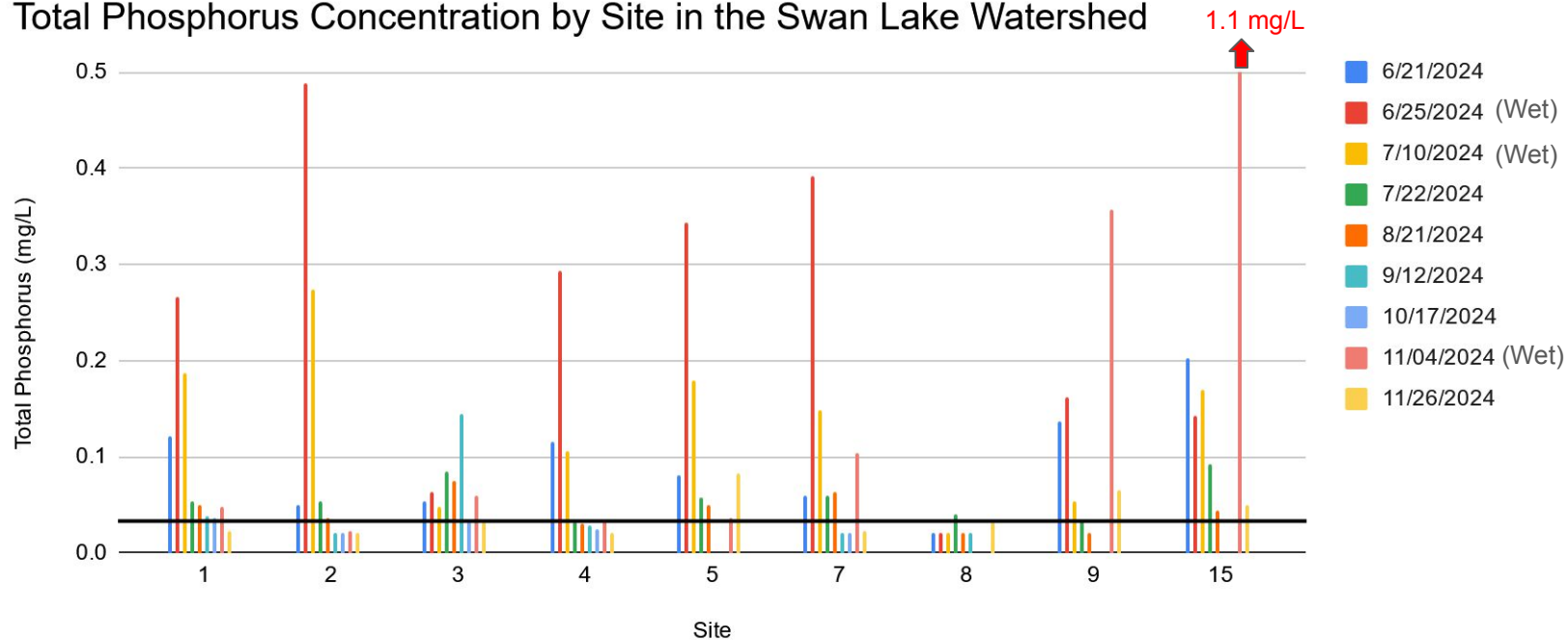


Water Quality Monitoring

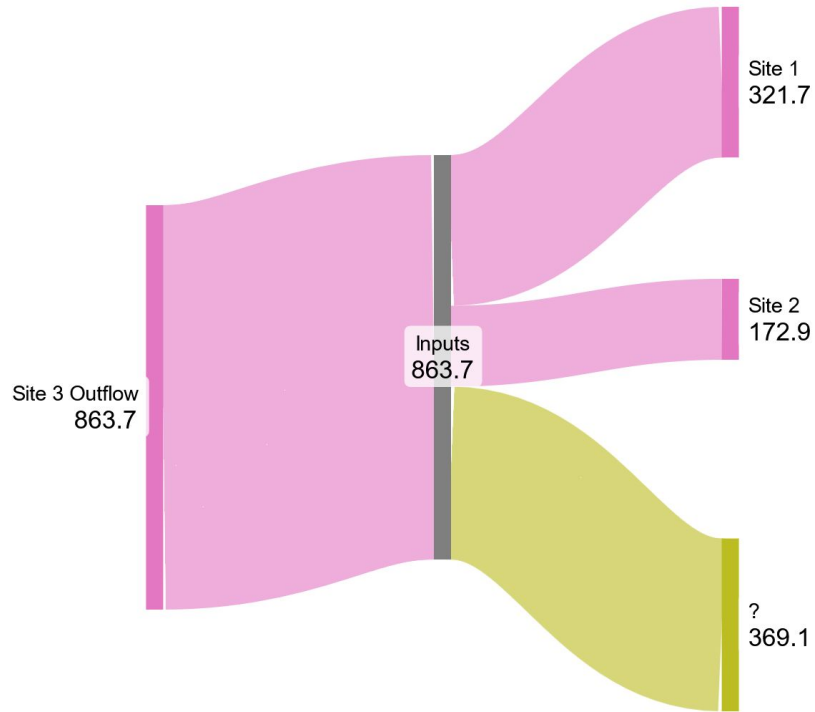


Total Phosphorus

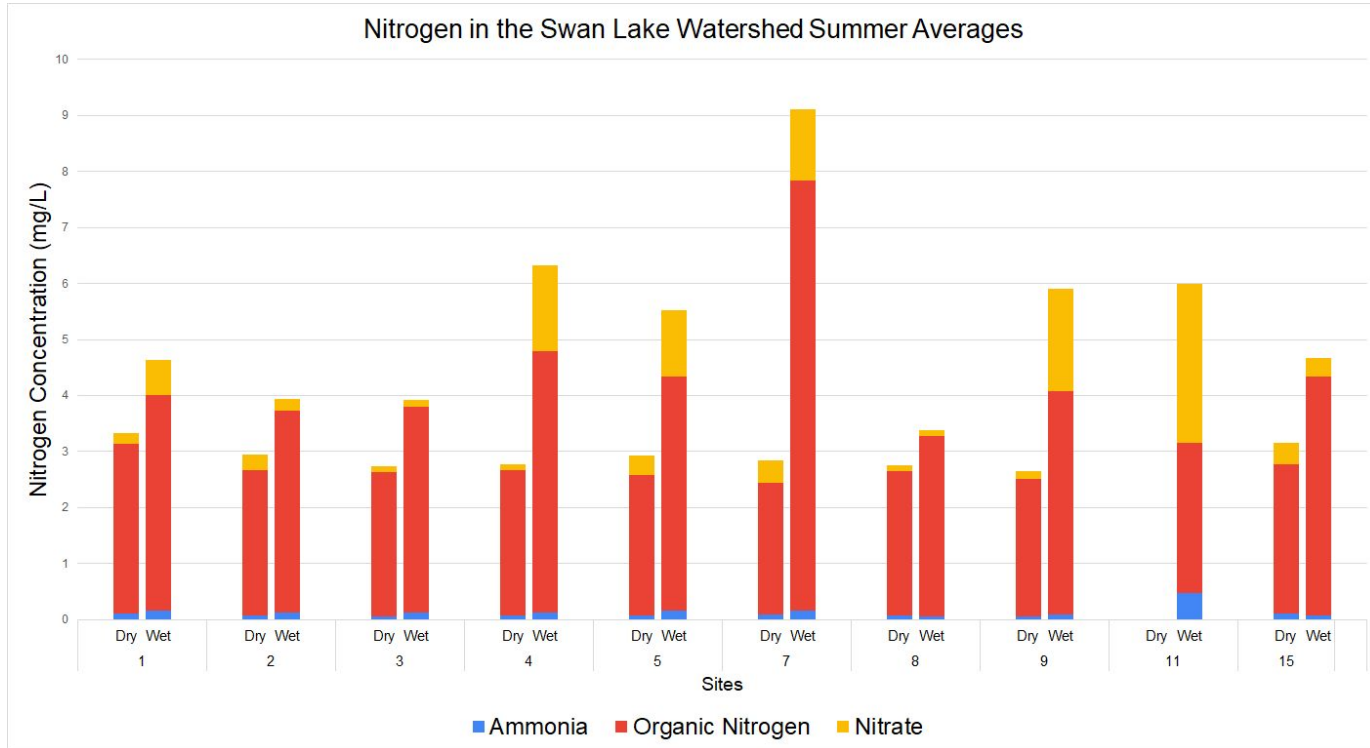
Total Phosphorus Concentration by Site in the Swan Lake Watershed



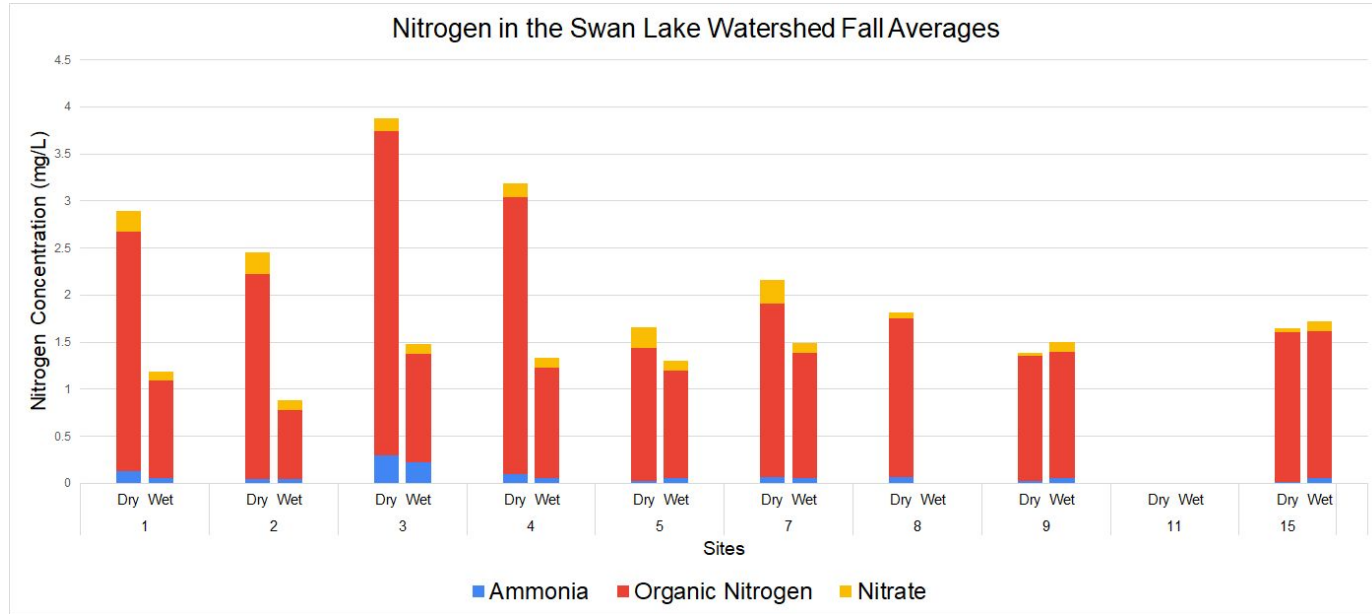
Dry Weather Phosphorus Loading to Swan Lake



Total Nitrogen Summer Averages



Total Nitrogen Fall Averages



Temperature

Site	6/21/2024	6/25/2024	7/10/2024	7/22/2024	8/21/2024	9/12/2024	10/17/2024	11/04/2024	11/26/2024
1	21.6	19	19.2	18.2	13.9	15.3	6.7	12.1	5.5
2	20.2	18.7	19.1	18.6	14	14.9	7.2	11.9	6.2
3	27.1	22.5	23.1	24.7	20.8	19.8	8.6	12.4	6.8
4	21.9	21.6	20.8	19.8	15.2	16.8	7.3	12.3	5
5	20.3	19.4	19.2	18.4	14.7			13	5.8
7	18.9	19.5	19.2	17.4	14.3		9	12.5	
8	30	21.7	25.8	27.5	26.1			0	10.3
9	25.6	24.8	23.8	25.6	21.9			13.9	5.5
11		20.2	20.3						
15	23.3	24.9	23.3	23.4	21.1			15.9	5.5

Measurements are in celsius. The Warmwater Fishery designated use standard is different for each month. Values above the standards are in red.

Dissolved Oxygen

Site	6/21/2024	6/25/2024	7/10/2024	7/22/2024	8/21/2024	9/12/2024	10/17/2024	11/04/2024	11/26/2024
1	5.38	6.38	6.25	7.2	7.88	7.43	9.88	8.63	9.7
2	7.55	6.93	7.13	8.17	9.4	9.43	11.45	8.51	10.82
3	2.3	4.01	4.28	5.57	4.78	2.01	3.01	3.14	7.58
4	6.87	5.53	5.92	8.17	9.85	10.4	11.55	7.62	10.89
5	6.36	7.1	7.26	8.52	10.08	0	0	5.55	10.08
7	6.49	5.84	5.53	7.08	4.27	0	9.3	3	0
8	10.8	10.01	9.67	9.98	8.94	0	0	0	8.81
9	5.7	5.93	6.48	6.21	7.48	0	0	4.14	10.16
11		6.56	5.01						
15	5.64	6.41	8.19	4.97	8.15	0	0	2.91	10.07

Designated Use of Warmwater Fishery Dissolved Oxygen standard is 5 mg/L. Values below the standard are red.

E. coli

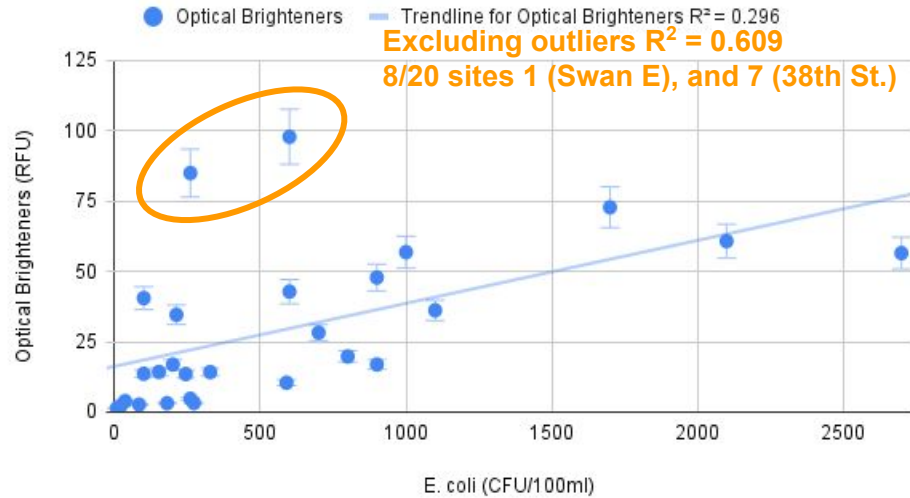
	Dry Weather	Dry Weather	Dry Weather	Dry Weather	Dry Weather		Wet Weather
Site	8/12/2024	8/20/2024	9/3/2024	9/5/2024	9/11/2024	30-Day Geometric Mean	11/04/2024
1 (Swan E)	1069.69	896.28	1925.56	1207.36	2243.09	1379.71	935.6
2 (Swan SE)	704.73	990.58	1076.64	476.22	479.14	702.83	788.37
7 (38th St)	292.25	263.58	340.16	266.62	199.33	268.38	1105.2
8 (Eagle d/s)	11.69	52.76	301.54	104.57	16.64	50.35	31.75
9 (Duck d/s)	260.23	161	241.01	594.99		278.4	3688.55
15 (Burke)	246.2	102.59	925.21			285.89	8000

E. coli MST

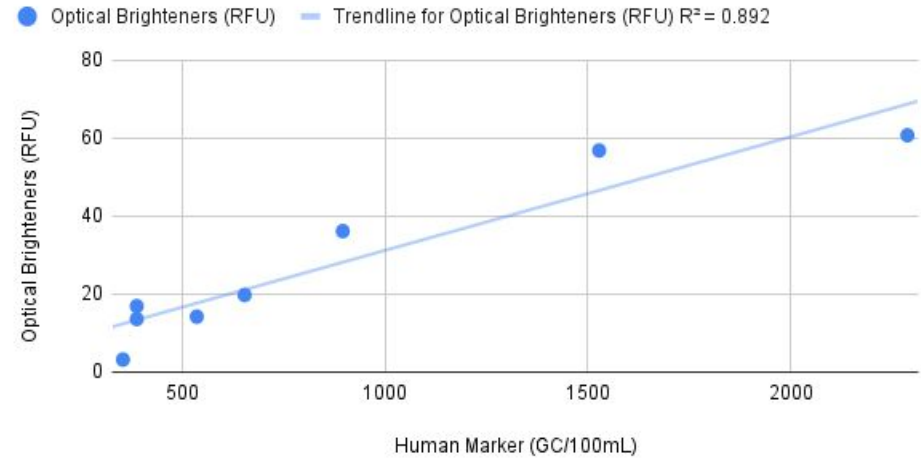
Collection Date	Site	<i>E Coli</i> Geomean CFU/100m L	Optical Brighteners (RFU)	HF183 (Human Marker) Average GC/100mL	CowM2 (Cow Marker) Average GC/100mL
9/3/2024	1	1926	60.72666667	2288	354
9/3/2024	2	1077	19.76	654	354
9/3/2024	7	340	14.2	536	354
9/3/2024	8	302	3.1925	354	354
9/3/2024	9	362	13.6	388	354
9/3/2024	15	925	36.15	896	354
9/3/2024	BLANK	NA		388	354
9/5/2024	1	1207	56.82666667	1528	354
9/5/2024	2	1072	16.9	388	354
9/5/2024	BLANK	NA		608	354
11/4/2024 (wet weather)	1	936		744	354
11/4/2024 (wet weather)	2	788		354	354
11/4/2024 (wet weather)	7	1105		354	354
11/4/2024 (wet weather)	9	3689		452	354
11/4/2024 (wet weather)	15	>8000		388	354
11/4/2024 (wet weather)	BLANK	NA		354	354

E. coli and Optical Brighteners

Optical Brighteners vs. *E. coli*



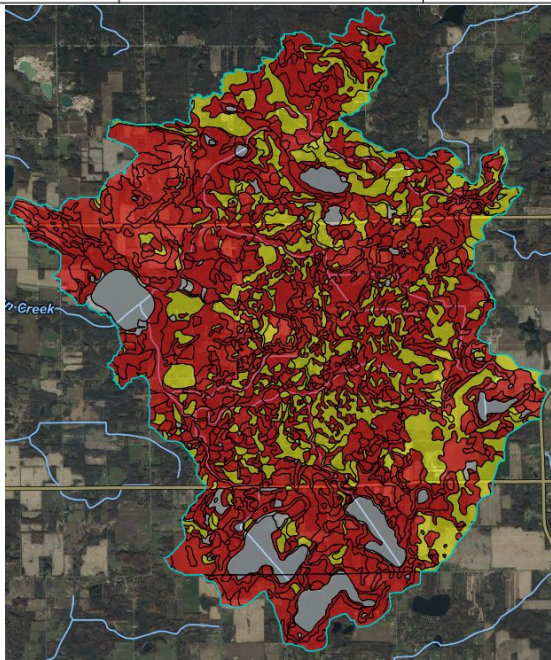
HF183 (Human Marker) Average GC/100mL vs. Optical Brighteners (RFU)



Soil Suitability

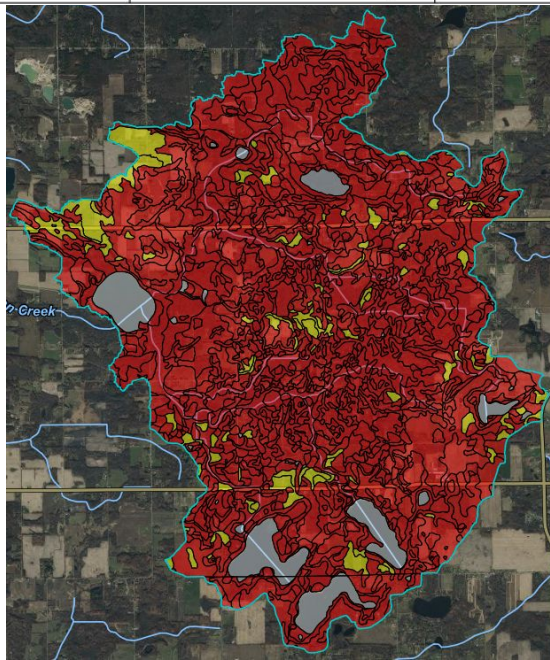
Manure application

Rating	Acres in AOI	Percent of AOI
Very limited	10,631.9	69.5%
Somewhat limited	3,526.3	23.0%
Null or Not Rated	1,145.6	7.5%
Totals for Area of Interest	15,303.8	100.0%



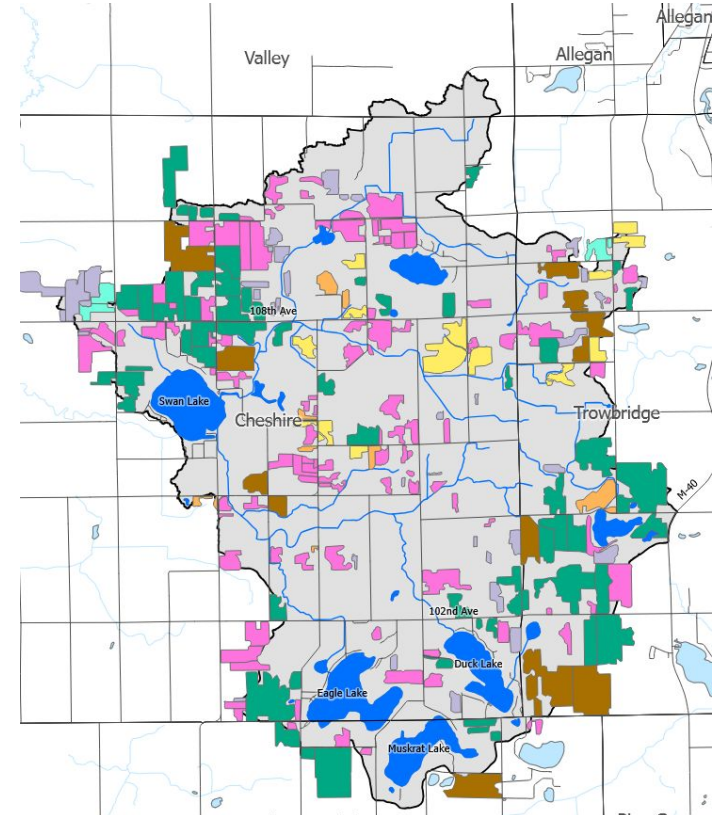
Septic Systems

Rating	Acres in AOI	Percent of AOI
Very limited	13,467.3	88.0%
Somewhat limited	933.7	6.1%
Null or Not Rated	902.7	5.9%
Totals for Area of Interest	15,303.8	100.0%

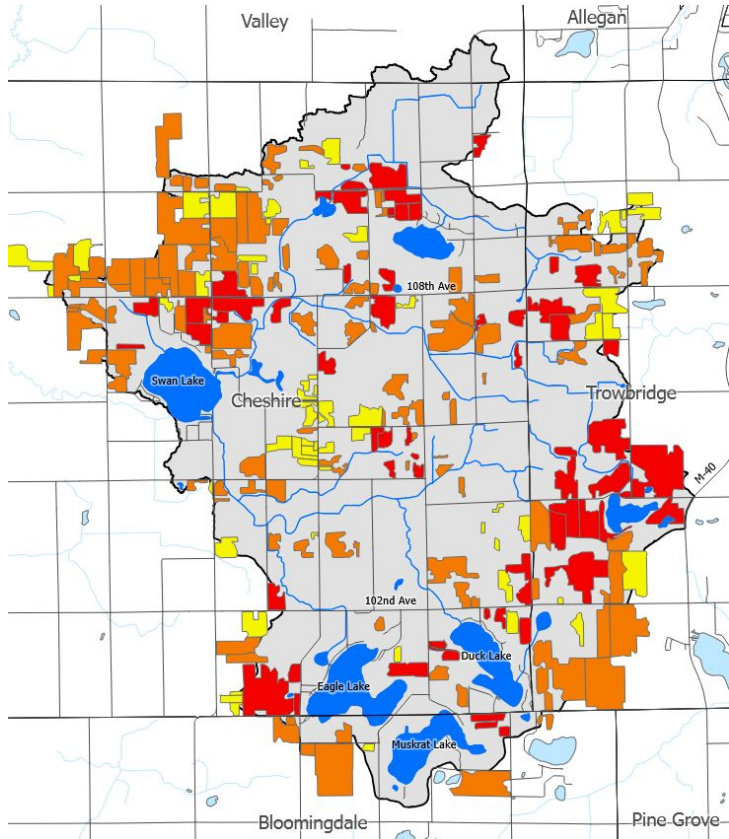


Agricultural Inventory

Spring Residue	Fields	Acreage	Percentage
Planted no-till	15	290	6%
Greater than 30%	3	70	1.5%
Less than 30%	13	664	14%
No residue	59	1,783	38.5%
N/A	105	1,345	29%
Not Planted	10	106	2%
Skipped	36	368	8%
Total	241	4,629	



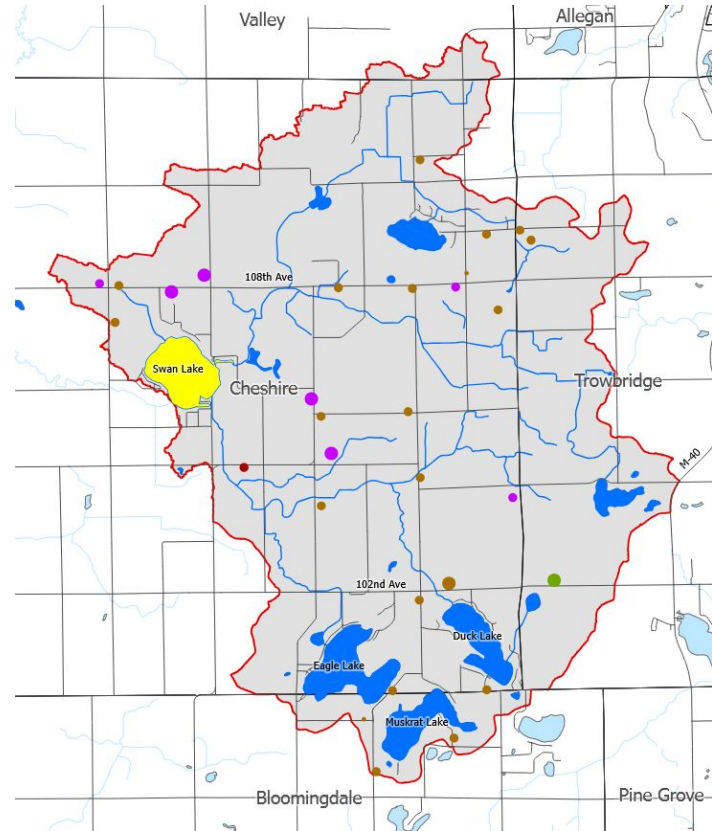
Agricultural Field Survey and Priority



Priority

- Slope
- Proximity to waterbody
- Current agricultural practices
- Noted direct drainage concerns

Animal Feeding Operation Survey and Priority



30 AFOs in the watershed

- Beef
- Dairy
- Hobby
- Swine

Priority

- Proximity to waterbody
- Noted runoff concern
- Noted manure concern

Primary Pollutants

E. coli - likely sources are septics, manure (seasonally)

- Consistent exceedance of water quality standard
- MST results indicated human waste is a significant contributing factor
- No evidence of manure contamination; does not rule out contributions

Phosphorus - likely sources are septics, field runoff, lawn runoff, erosion

- Consistent exceedance of recommendations
- Appears to be significantly impacted by drought/precipitation

Nitrogen

- Consistent exceedance of recommendations
- Appears to be significantly impacted by drought/precipitation
- Elevated nitrates in runoff

Recommendations

Agricultural Best Management Practices

- Grassed waterways
- No-till and cover crops
 - 2,868 acres of agricultural land can implement cover crops
 - 2,447 acres of agricultural land can implement conservation tillage practices
- Nutrient management
- Waste storage facilities
- Critical Area Planting

Recommendations

Residential Best Management Practices

- Natural shorelines
- Fertilizer reduction
- Native plantings
- Septic system repairs
- Centralized wastewater treatment

Education Topics and Resources

Agricultural BMPS

- Midwest Cover Crops Field Guide
- Nature Conservancy No-till Cover Crops Handbook
- MSU Extension

Septic Repair

- EPA SepticSmart Week
- Materials from State and County health department

Natural Shorelines

- Michigan Natural Shoreline Partnership

Possible Funding Sources

- EGLE, Nonpoint Source Watershed Implementation Grants
- EGLE, Watershed Council Support Grants
- Midwest Glacial Lakes Partnership, Lake Conservation Grants
- MSU, Clean Boats Clean Waters
- Great Lakes Commission, Great Lakes Sediment and Nutrient Reduction Program
- National Fish and Wildlife Foundation, Sustain Our Great Lakes
- USDA, National Water Quality Initiative

Questions and Open Discussion

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