A

APPENDIX A

Public Participation Materials



Onterra, LLC

- Founded in 2005
- Staff
  - Four full-time ecologists
  - One part-time ecologist
  - One field technician
- Services
  - Science and planning
- Philosophy
  - Promote realistic planning
  - Assist, not direct

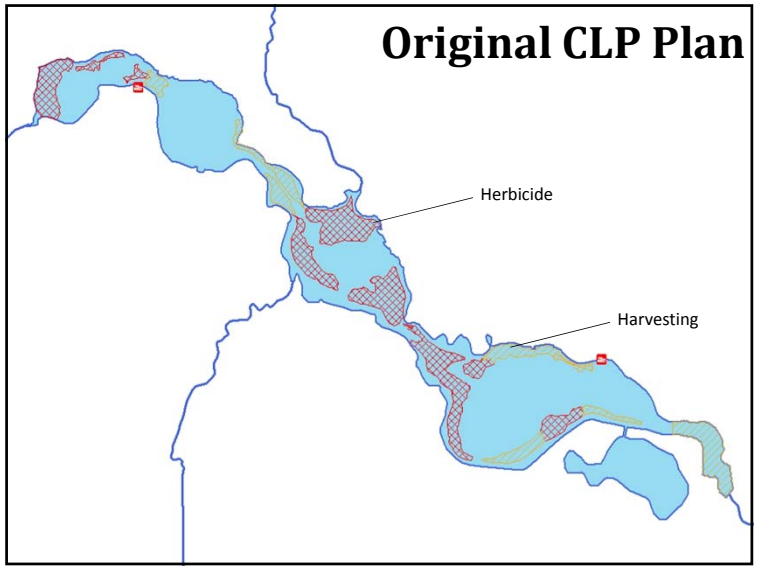


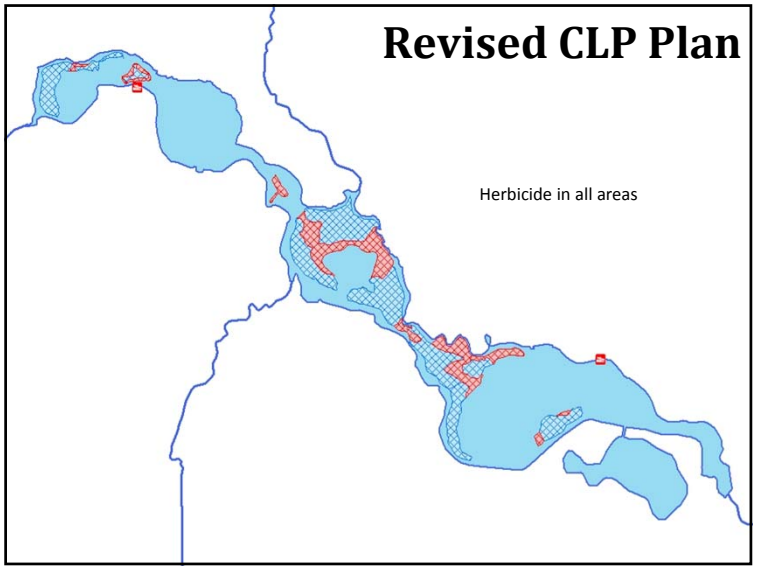
Onterra, LLC
Lake Management Planning

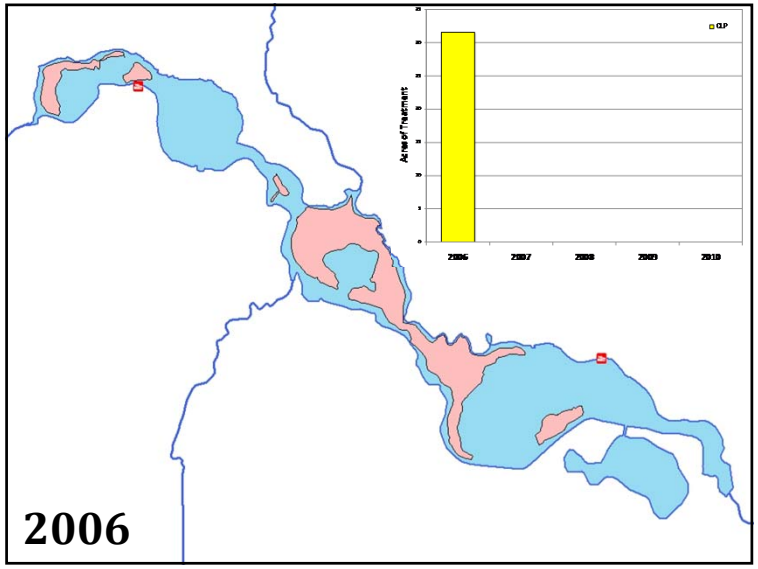
AIS Project Overview

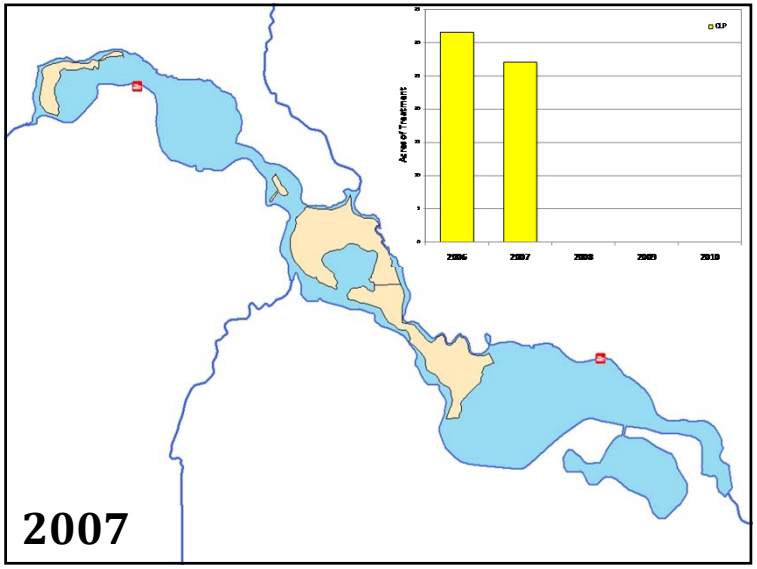
- Five-year, $120,000 project (cash costs)
  - $88,000 in herbicide
  - WDNR AIS Grant provided 50% project costs
- <u>Goals:</u>
  - Reduce CLP within lake and as a result, minimize its spread through harvesting
  - Control or possibly eradicate small amount of EWM that exists
  - Minimize additional AIS introductions
  - Prepare MMLMD to continue management & control efforts past five-year project

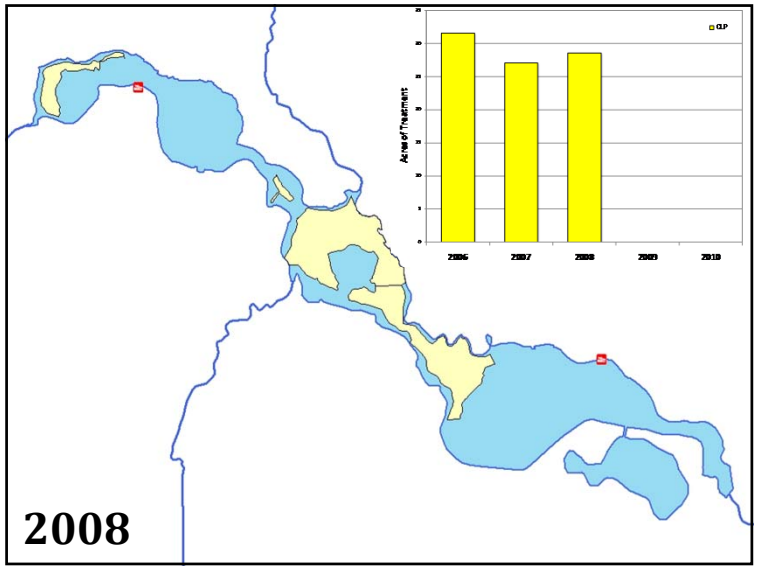


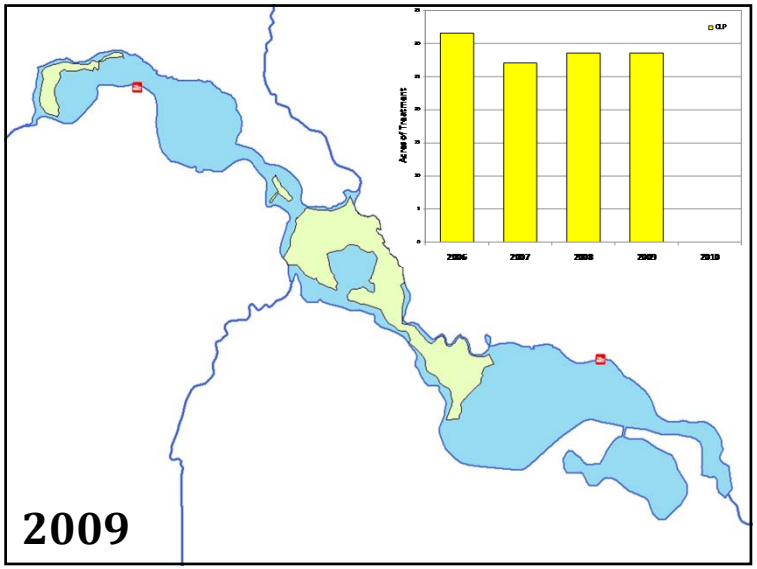

Original CLP Plan
Herbicide
Harvesting

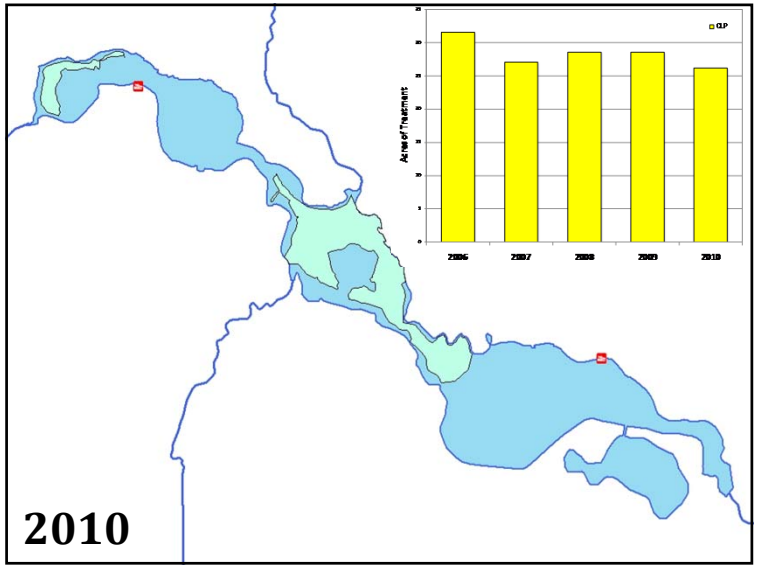

Revised CLP Plan
Herbicide in all areas


2006

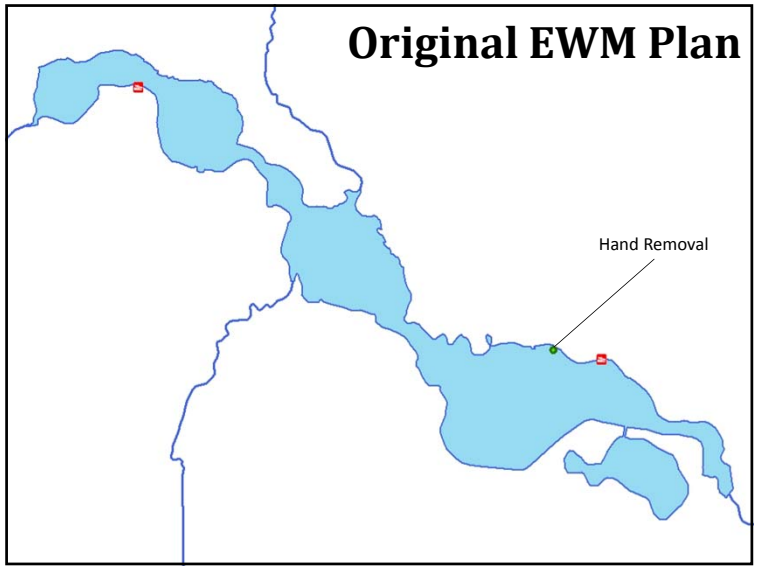

2007

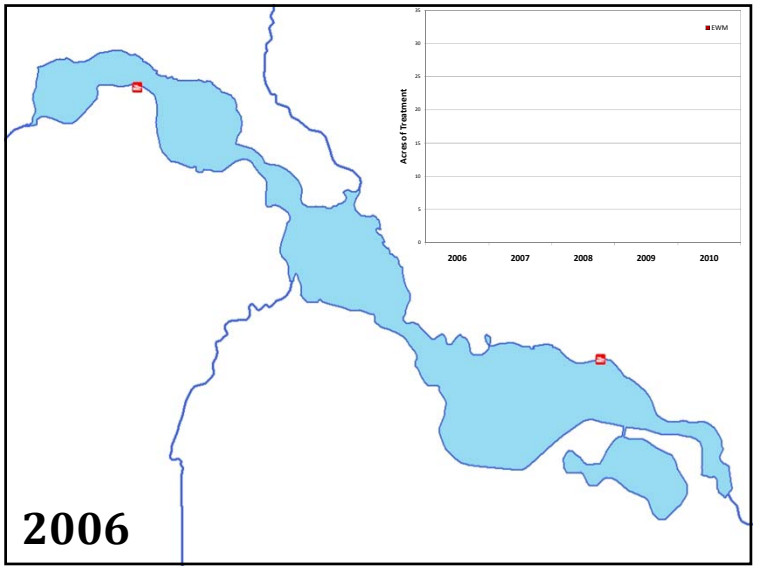

2008

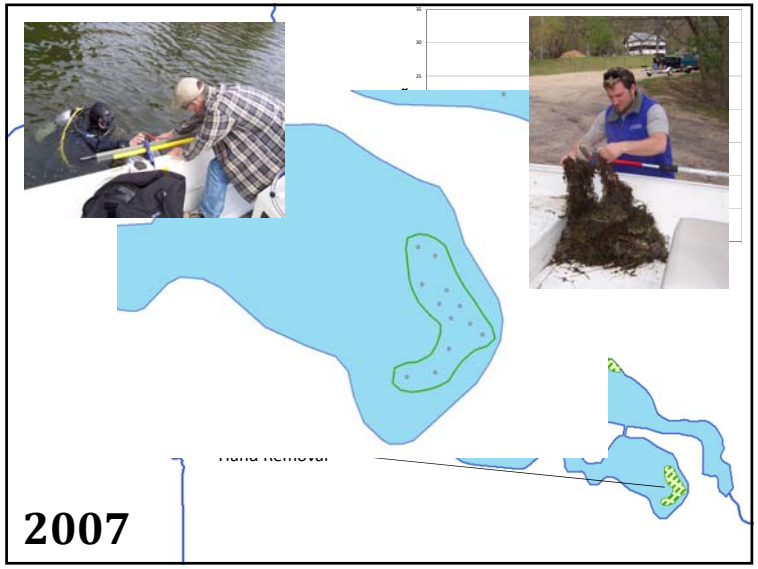

2009

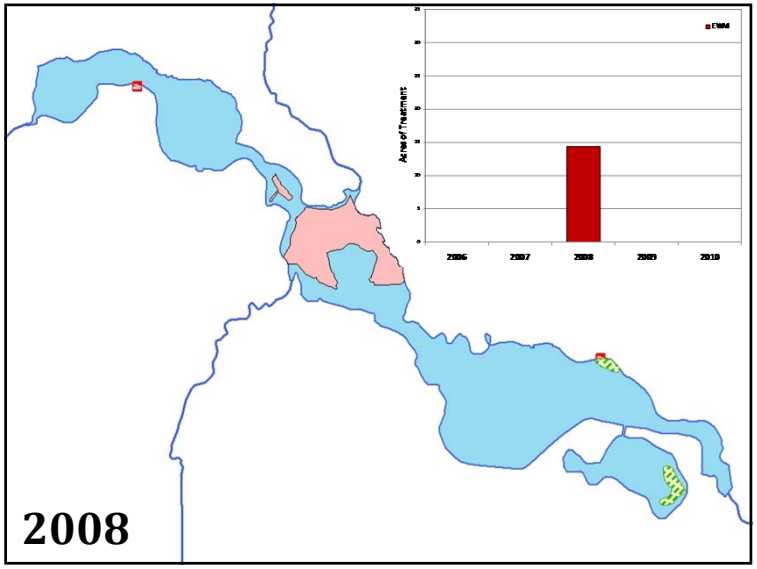

2010

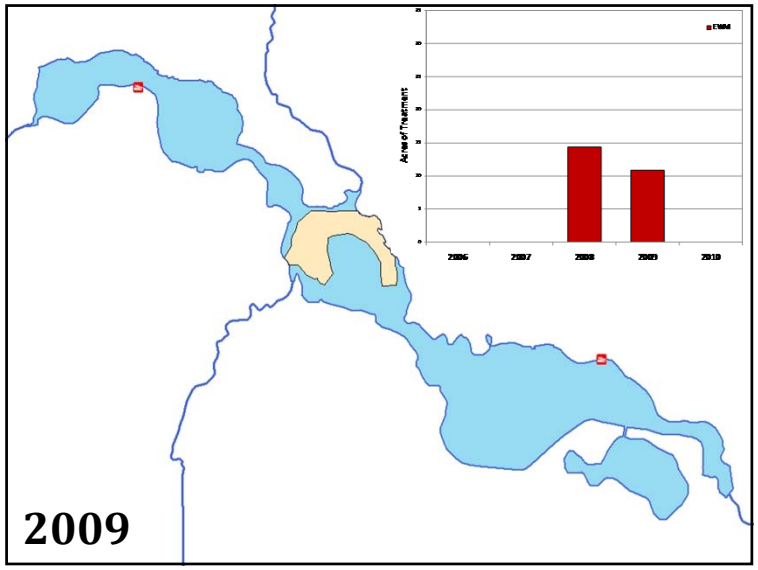

EWM

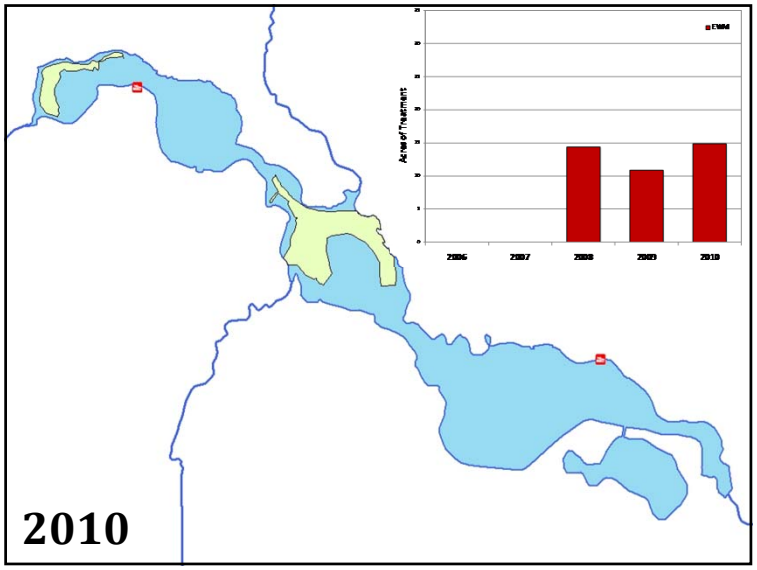

Original EWM Plan
Hand Removal

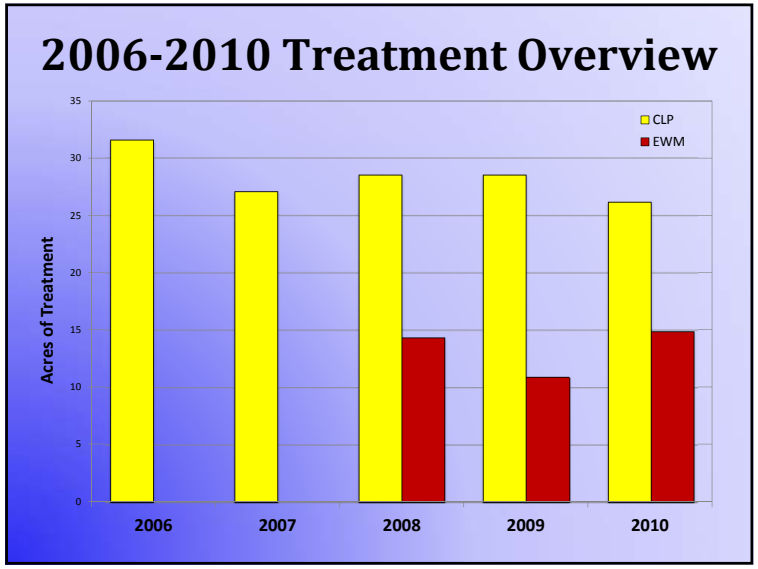

EWM
Acres of Treatment
2006
2007
2008
2009
2010
2006

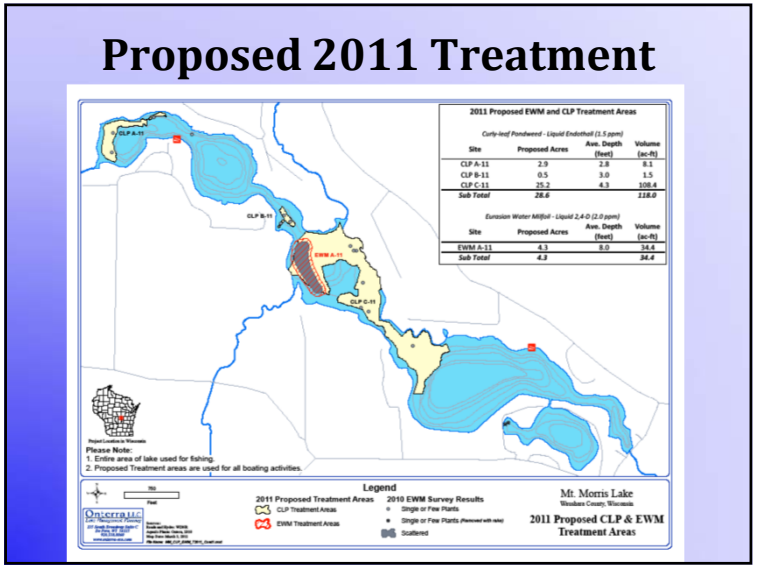

2007


EWM
Acres of Treatment
2008


2009


2010


2006-2010 Treatment Overview
Acres of Treatment
CLP
EWM
0
5
10
15
20
25
30
35
2006
2007
2008
2009
2010


Proposed 2011 Treatment
2011 Proposed EWM and CLP Treatment Areas
Curly-leaf Pondweed - Liquid Endothall (1.5 ppm)
Site
Proposed Acres
Ave. Depth (feet)
Volume (ac-ft)
CLP A-11 2.9 2.8 8.1
CLP B-11 0.5 3.0 1.5
CLP C-11 25.2 4.3 108.4
Sub Total 28.6 118.0
Eurasian Water Milfoil - Liquid 2,4-D (2.0 ppm)
Site
Proposed Acres
Ave. Depth (feet)
Volume (ac-ft)
EWM A-11 4.3 8.0 34.4
Sub Total 4.3 34.4
Please Note:
1. Entire area of lake used for fishing.
2. Proposed Treatment areas are used for all boating activities.
Legend
2011 Proposed Treatment Areas
CLP Treatment Areas
EWM Treatment Areas
2010 EWM Survey Results
Single or Few Plants
Single or Few Plants (Removed with rake)
Scattered
Mt. Morris Lake
Wyoming County, Wisconsin
2011 Proposed CLP & EWM Treatment Areas

Treatment Monitoring

- Water Quality (Phosphorus)
- Turion Dredge
- CLP Frequency of Occurrence



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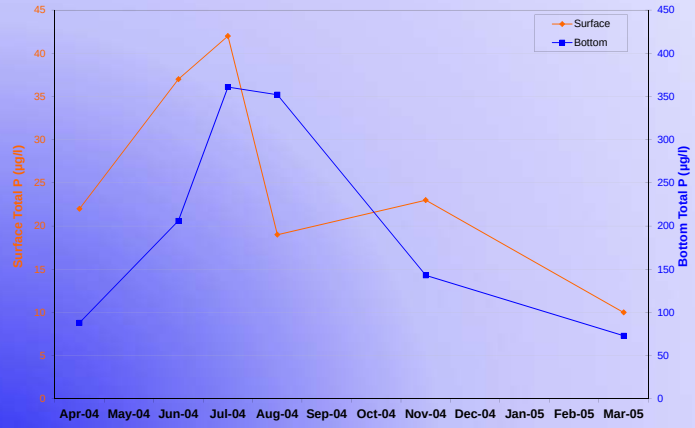
Water Quality



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Lake Management Planning

Water Quality



Onterra, LLC
Lake Management Planning

Turion Dredge



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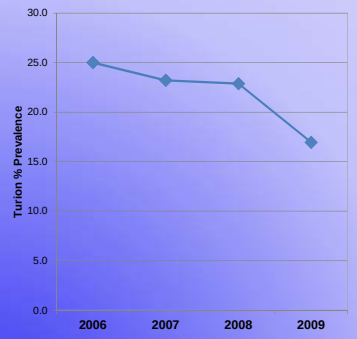
Lake Management Planning

Turion Dredge



Year	Total	% Prevalence	Average	Range
2006	102	25.0	0.9	1-14
2007	135	23.2	1.2	1-23
2008	116	22.9	1.0	1-21
2009	66	16.9	0.6	1-18

- Reductions Observed
- Limitations of method
  - Muskgrass carpet
  - "Hot spots"
  - Sample size

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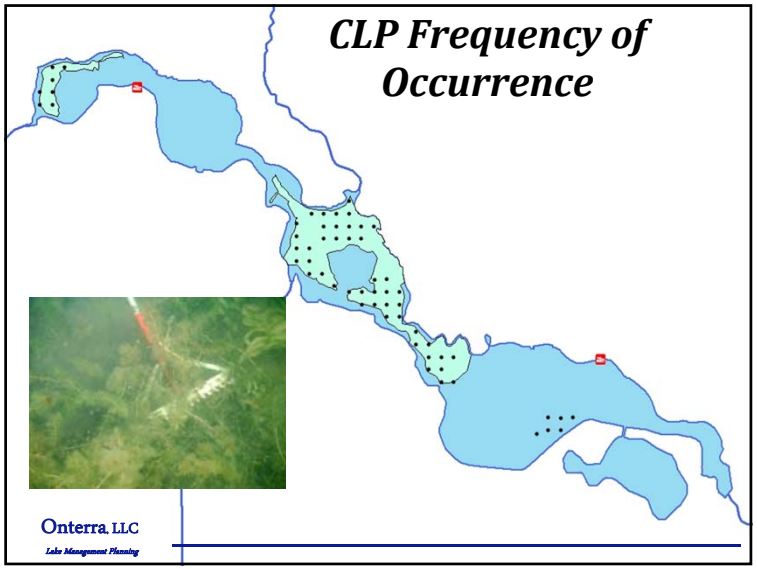
CLP Frequency of Occurrence



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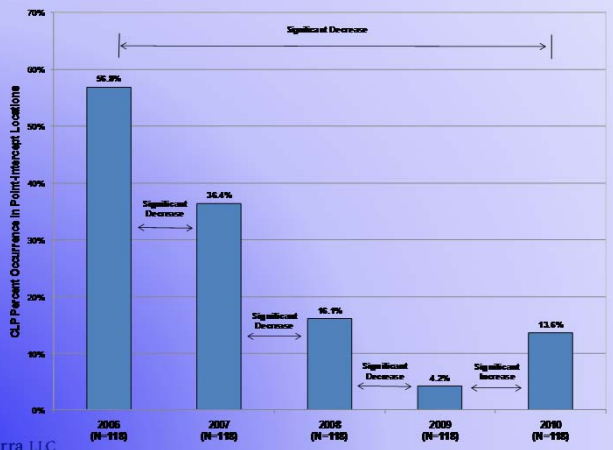
CLP Frequency of Occurrence



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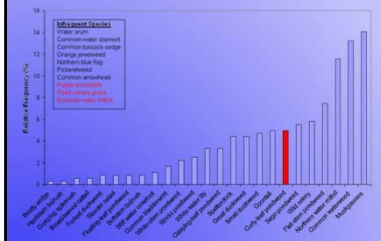
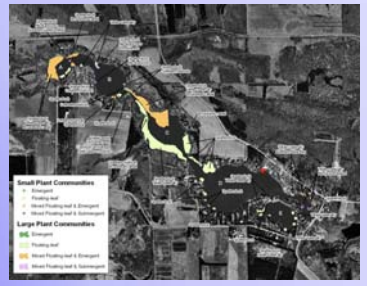
Additional Components

- Used within Lake Management Plan Update
  - Point-intercept Survey
  - Community Mapping Survey





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Lake Management Planning

AIS Project Results

- Reduce CLP within lake and as a result, minimize its spread through harvesting
- Control or possibly eradicate small amount of EWM that exists
- Minimize additional AIS introductions
- Prepare MMLMD to continue management & control efforts past five-year project

CLP control has been successful

Hand removal effective in Emerald
Continued efforts required

Signage at boat landings

Volunteerism is low
District likely will need to rely on professionals
Management planning project

Lake Management Plan Update



Why create a lake management plan?

- To create a better understanding of lake's positive and negative attributes.
- To discover ways to minimize the negative attributes and maximize the positive attributes.
- To foster realistic expectations and dispel myths.
- To create a snapshot of the lake for future reference and planning.

A goal without a plan is just a wish!



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Elements of an Effective Lake Management Planning Project

Data and Information Gathering

Environmental & Sociological

Planning Process

Brings it all together



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Data and information gathering

- Aquatic Plant Surveys
  - AIS (CLP & EWM) — *Re-survey & compare*
  - Comprehensive
- Water Quality Analysis — *Update & compare*
- Watershed Assessment — *Review (changes not likely)*
- Shoreline Assessment — *Evaluate shoreline condition*
- Fisheries Data Integration — *Included if available data*
- Stakeholder Survey — *Official WDNR-approved survey*
- Sediment Survey — *Attempt to understand depth of soft sediments*

Additional Tasks Not Included in Original Plan

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Shoreland Assessment

- Shoreland area is important for buffering runoff and provides valuable habitat for aquatic and terrestrial wildlife.
- It does not look at lake shoreline on a property-by-property basis.
- Assessment ranks shoreland area from shoreline back 35 feet

Urbanized — Range — **Natural**





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Fisheries Data Integration

- No fish sampling completed
- Assemble data from WDNR, USGS, & USFWS
- Fish survey results summaries (if available)
- Use information in planning as applicable



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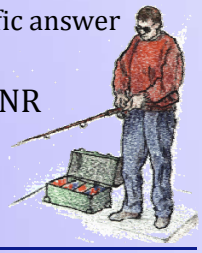
Stakeholder Survey

- Standard survey used as base
  - Planning committee develops additional questions and options
  - Must not lead respondent to specific answer through a "loaded" question
- Survey must be approved by WDNR



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Sediment Survey



Sediment build-up is a concern among lake residents

Depth of Soft Sediment
- Point-intercept Locations
- Water depths 6 feet or less
- Limitations of methodology

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Planning Process

Planning Committee Meetings

Study Results (including a stakeholder survey)
Conclusions & Initial Recommendations
Management Goals
Management Actions
Timeframe
Facilitator(s)

Implementation Plan



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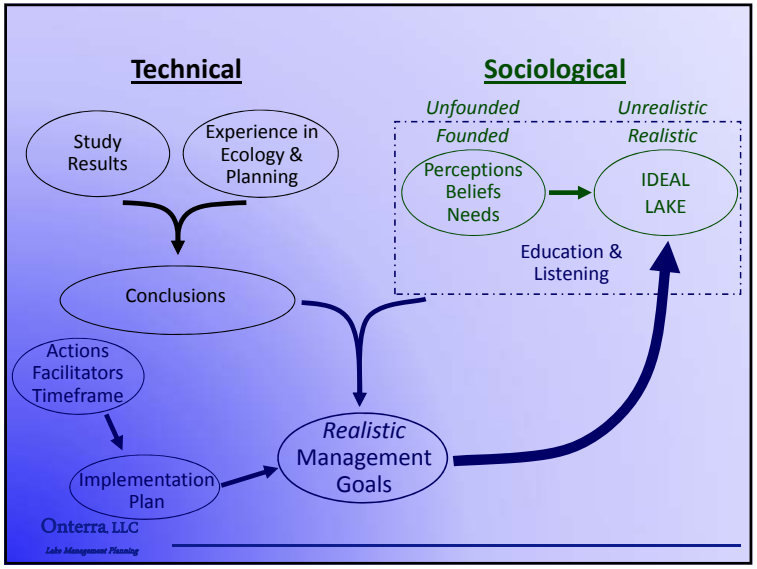
The Planning Process

…it's not as easy as you may think.







Presentation Outline

- Lake Management Planning Project Overview
- Study Results
  - Water Quality
  - Watershed
  - Aquatic Plants
  - Fishery
- "Big Picture"
- Stakeholder Survey
- Mission Statement



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Study and Plan Goals

- Collect & Analyze Data
- Construct Long-Term & Useable Plan



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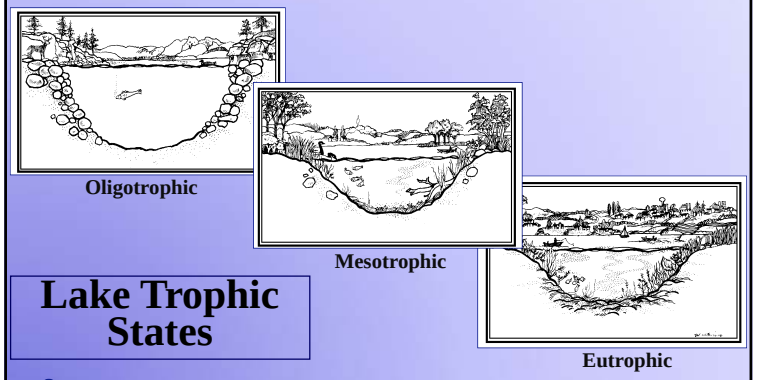
Eutrophication
-Lake Aging



Lake Trophic States

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Water Quality

- ↑ Phosphorus (Limiting Plant Nutrient)
- ↑ Chlorophyll-*a* (Algal Abundance)
- ↓ Water Clarity (Secchi Disk)



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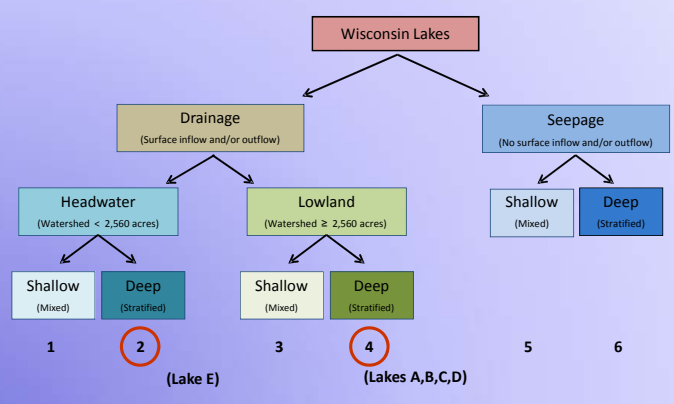
Wisconsin Lakes Classification



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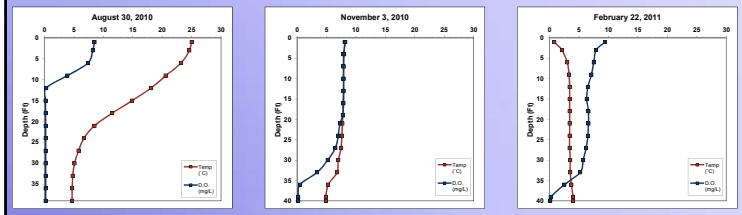
Dissolved Oxygen and Temperature Profiles

- **Dissolved Oxygen and Temperature Profiles**
  - Lakes are stratified during winter and summer months
  - Mixing occurs in spring and fall (dimictic)
    - In the end, there is little concern for winter or summer fishkill



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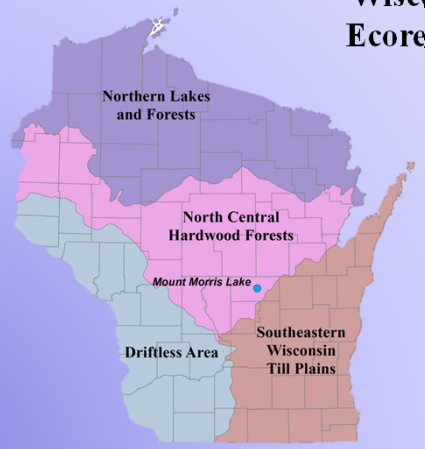
Wisconsin Ecoregions



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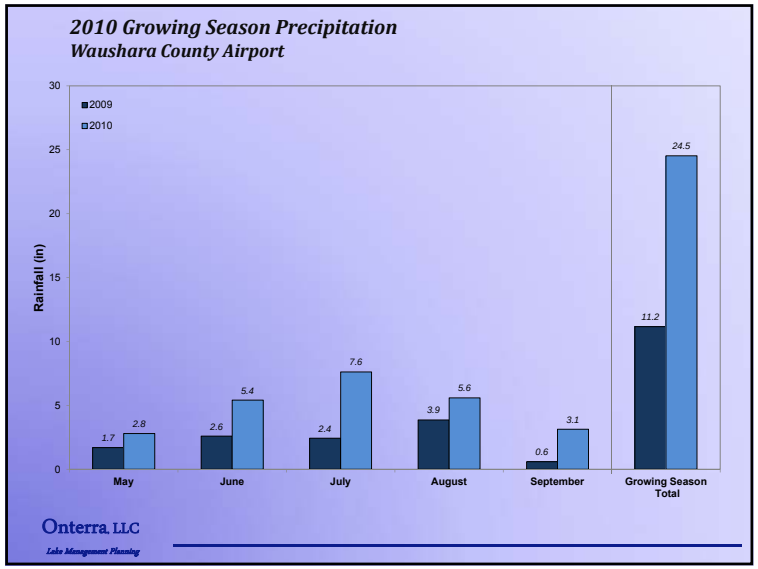
2010 Growing Season Precipitation
Waushara County Airport
2009
2010
Rainfall (in)
May
June
July
August
September
Growing Season Total
1.7
2.8
2.6
5.4
2.4
7.6
3.9
5.6
0.6
3.1
11.2
24.5
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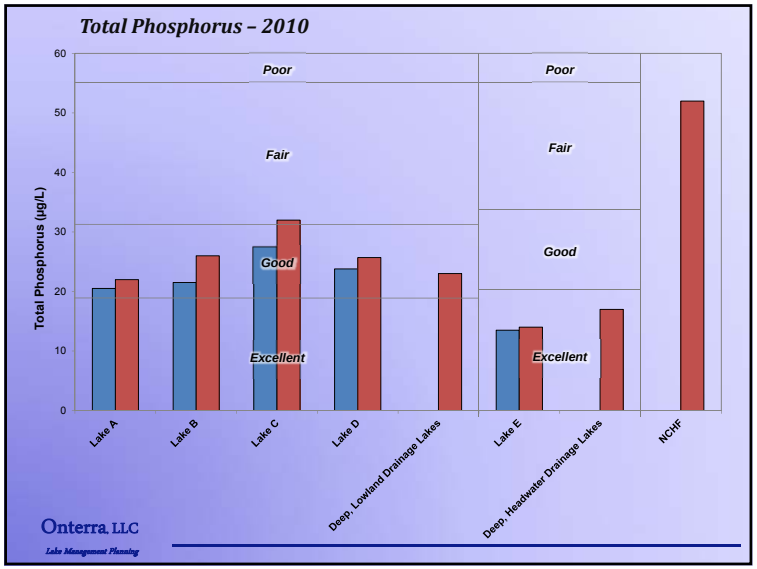
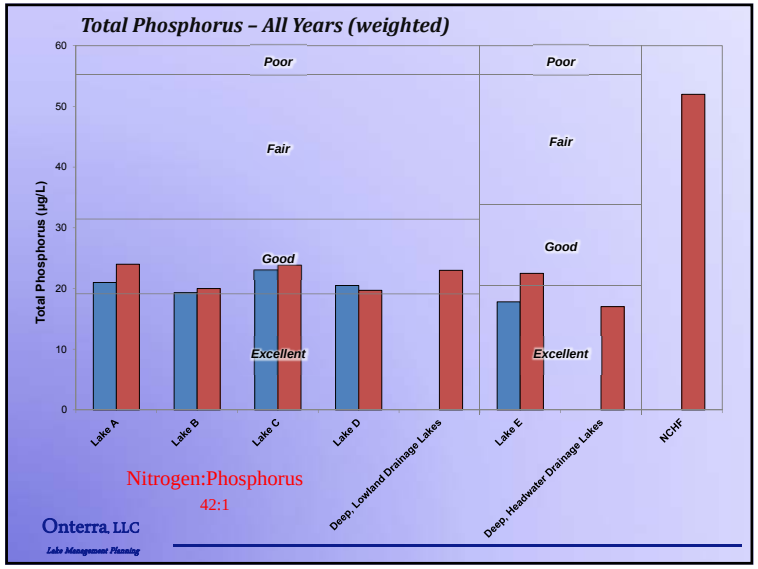
Lake Management Planning


Total Phosphorus – 2010
Total Phosphorus (µg/L)
Poor
Fair
Good
Excellent
Lake A
Lake B
Lake C
Lake D
Deep, Lowland Drainage Lakes
Lake E
Deep, Headwater Drainage Lakes
NCHF
Onterra, LLC
Lake Management Planning


Total Phosphorus – All Years (weighted)
Total Phosphorus (µg/L)
Poor
Fair
Good
Excellent
Lake A
Lake B
Lake C
Lake D
Deep, Lowland Drainage Lakes
Lake E
Deep, Headwater Drainage Lakes
NCHF
Nitrogen:Phosphorus
42:1
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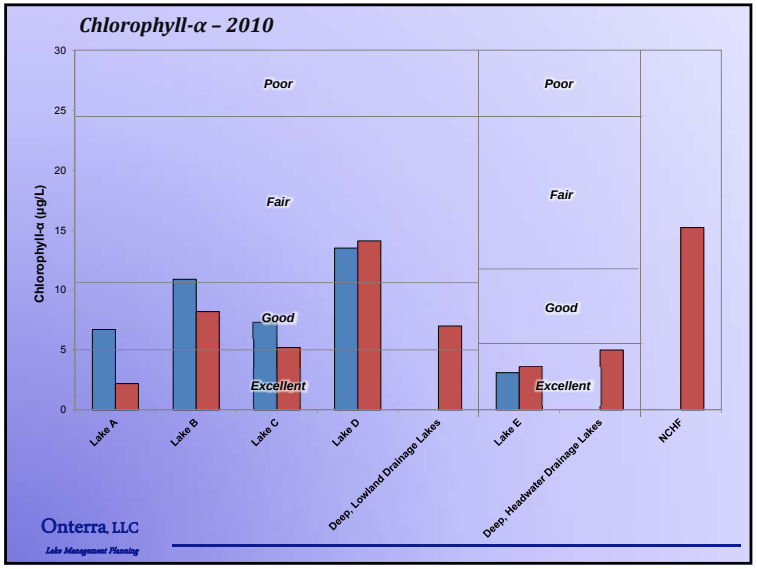
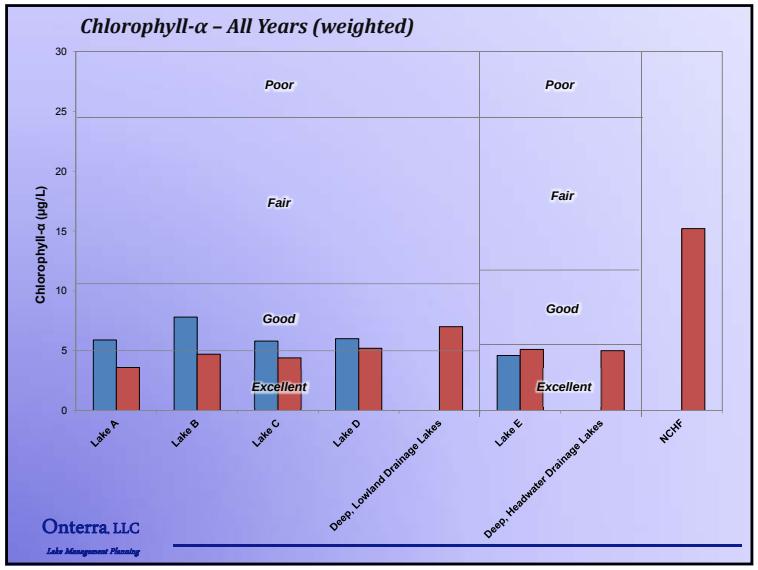
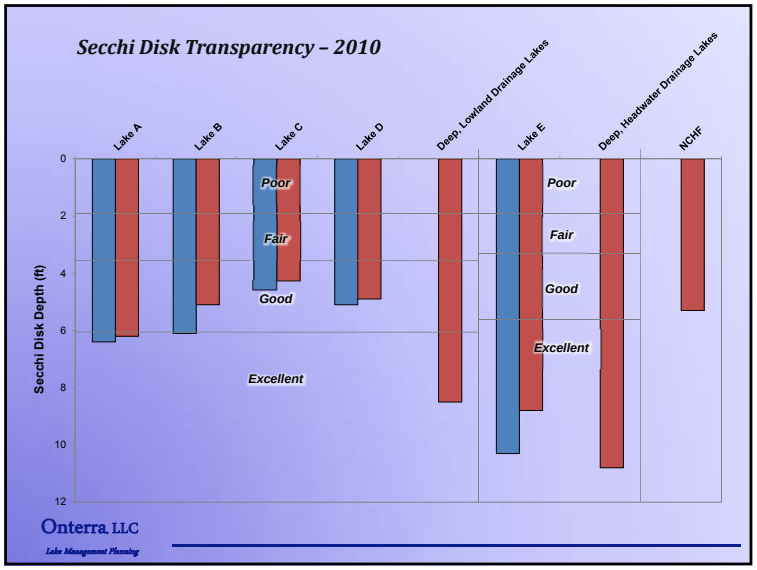
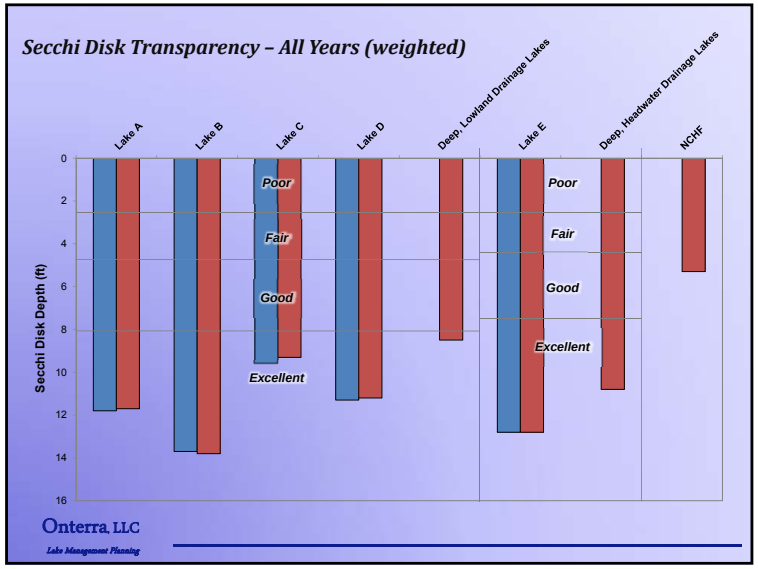
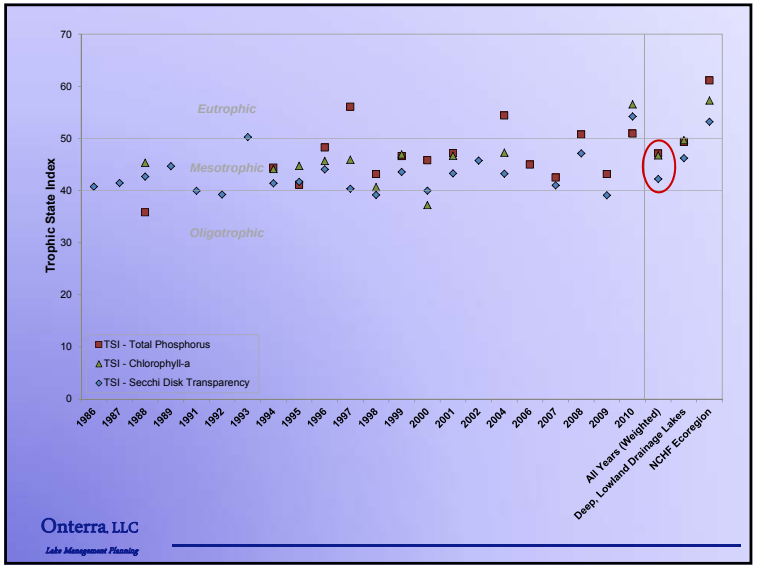

Chlorophyll-α – 2010
Chlorophyll-α (µg/L)
Poor
Fair
Good
Excellent
Lake A
Lake B
Lake C
Lake D
Deep, Lowland Drainage Lakes
Lake E
Deep, Headwater Drainage Lakes
NCHF
Onterra, LLC
Lake Management Planning


Chlorophyll-α – All Years (weighted)
Chlorophyll-α (µg/L)
Poor
Fair
Good
Excellent
Lake A
Lake B
Lake C
Lake D
Deep, Lowland Drainage Lakes
Lake E
Deep, Headwater Drainage Lakes
NCHF
Onterra, LLC
Lake Management Planning


Secchi Disk Transparency – 2010
Secchi Disk Depth (ft)
Lake A
Lake B
Lake C
Lake D
Deep, Lowland Drainage Lakes
Lake E
Deep, Headwater Drainage Lakes
NCHF
Poor
Fair
Good
Excellent
Onterra, LLC
Lake Management Planning


Secchi Disk Transparency – All Years (weighted)
Secchi Disk Depth (ft)
Lake A
Lake B
Lake C
Lake D
Deep, Lowland Drainage Lakes
Lake E
Deep, Headwater Drainage Lakes
NCHF
Poor
Fair
Good
Excellent
Onterra, LLC
Lake Management Planning


Trophic State Index
Eutrophic
Mesotrophic
Oligotrophic
TSI - Total Phosphorus
TSI - Chlorophyll-a
TSI - Secchi Disk Transparency
All Years (Weighted)
Deep, Lowland Drainage Lakes
NCHF Ecoregion
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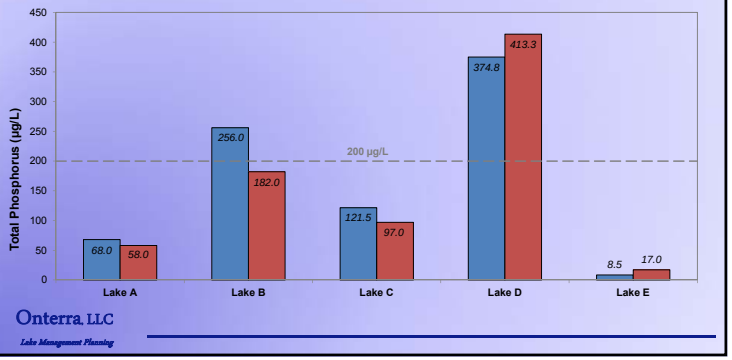
Internal Nutrient Loading

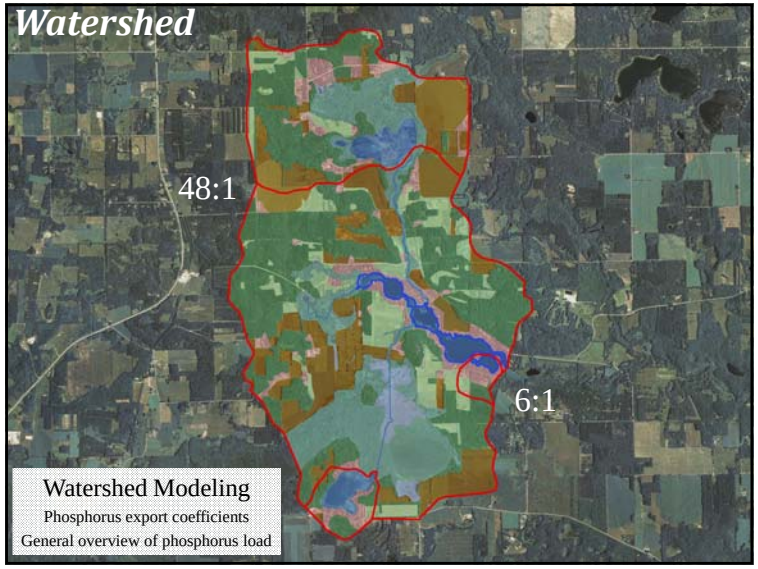
- **Hypolimnetic phosphorus values in Lakes A, B, C, and E are not a concern.**
  - Likely not a significant source of phosphorus at this time given 1) the size of the lake's watershed, and 2) lakes are *dimictic*.



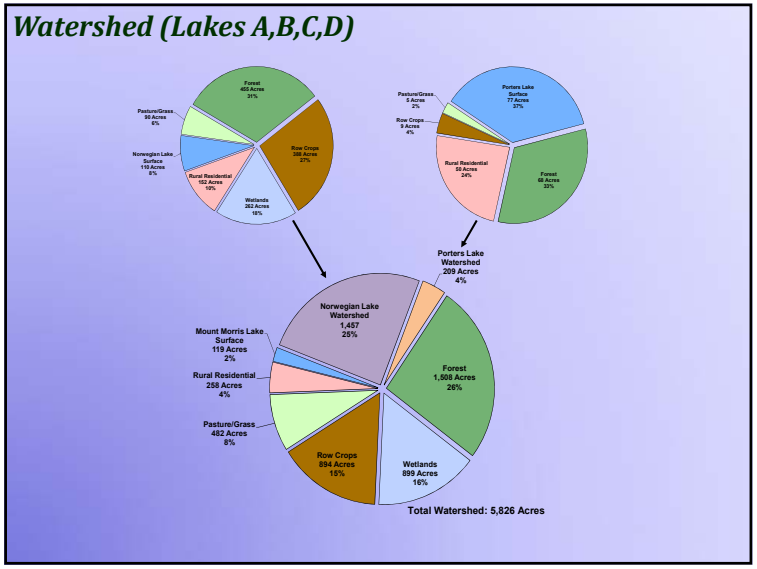
Watershed



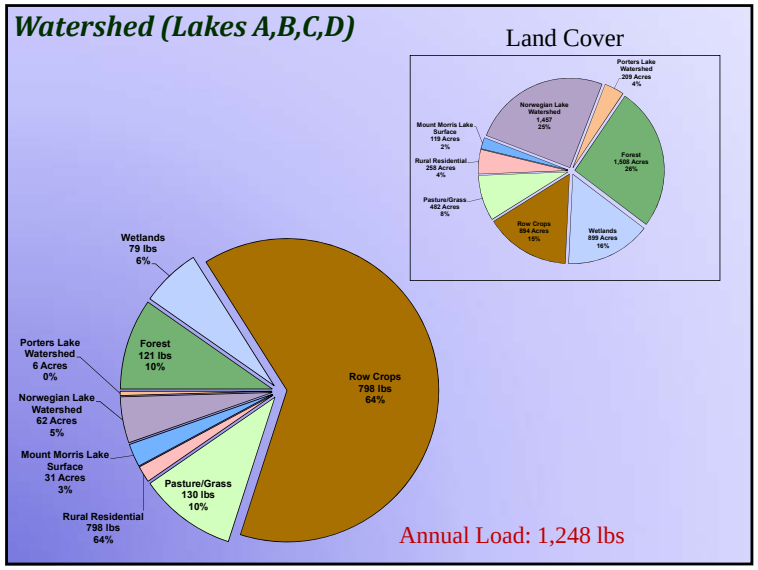
Watershed



Watershed (Lakes A,B,C,D)



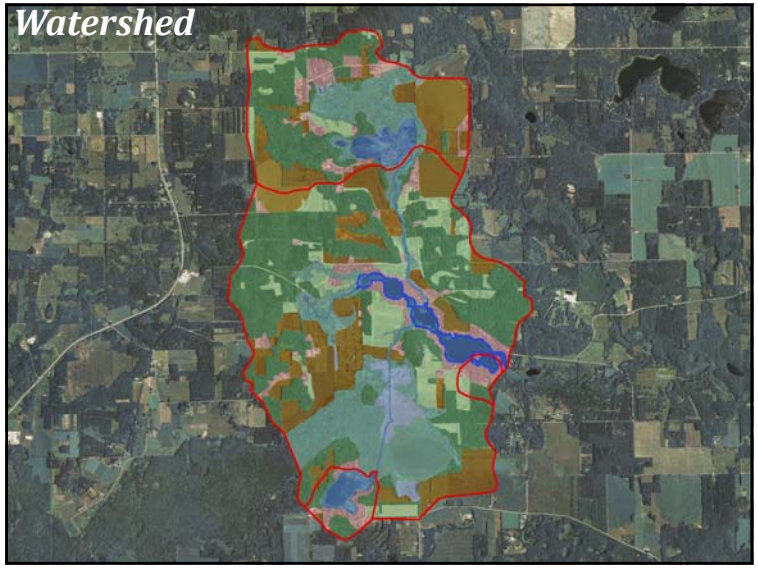
Watershed (Lakes A,B,C,D)



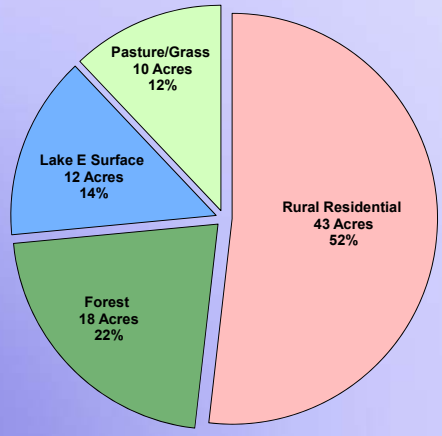
Watershed (Lakes A,B,C,D)

- WiLMS modeling significantly overestimated the annual phosphorus load
  - Majority of the croplands within the watershed are practicing *high residue management* techniques
  - Most of the croplands are surrounded by forests and wetlands, increasing runoff through filtering and soil percolation

Watershed

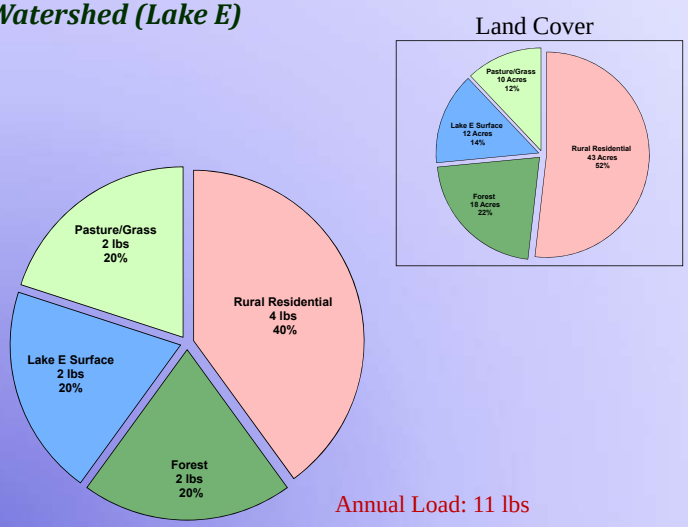


Watershed (Lake E)



Total Watershed: 83 Acres

Watershed (Lake E)



Annual Load: 11 lbs

Watershed (Lake E)

- Again, WiLMS modeling significantly overestimated the annual phosphorus load
  - Rural residential areas contain wooded lots
  - Pasture/grassland areas surrounded by forests

Shoreland Assessment

- Shoreland area is important for buffering runoff and provides valuable habitat for aquatic and terrestrial wildlife.
- It does not look at lake shoreline on a property-by-property basis.
- Assessment ranks shoreland area from shoreline back 35 feet

Urbanized Range **Natural**





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Shoreline Assessment Category Descriptions

More Natural Habitat



Urbanized | Developed-Unnatural | Developed-Semi-Natural | Developed-Natural | Natural/Undeveloped

Greater Need for Restoration

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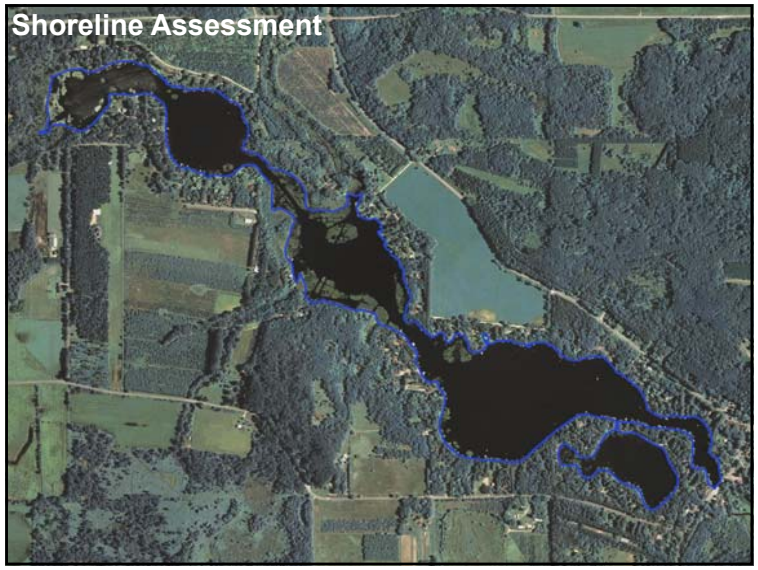
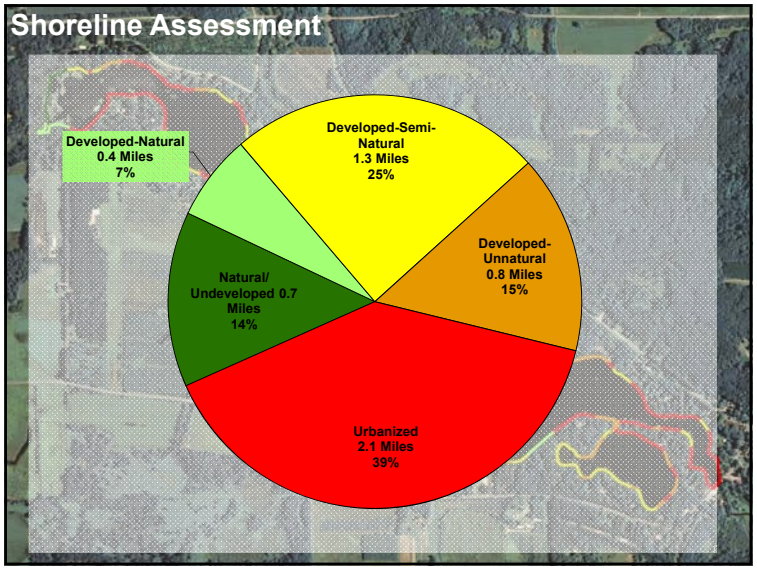
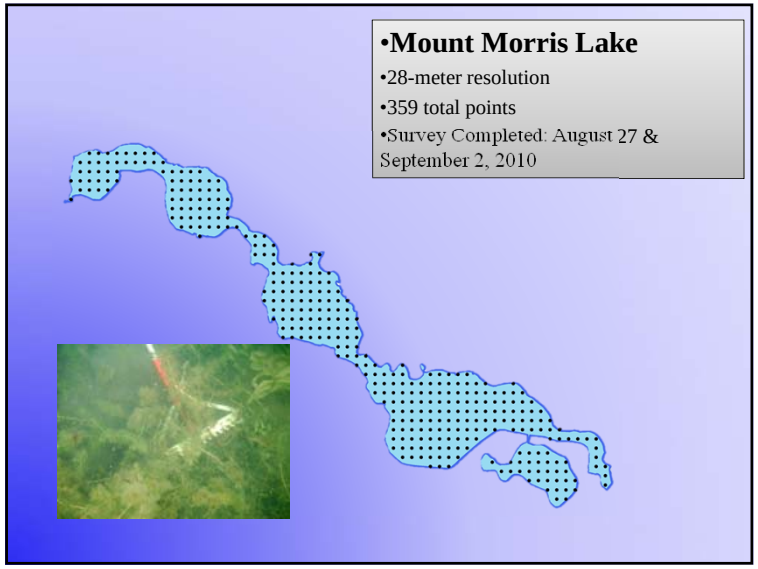
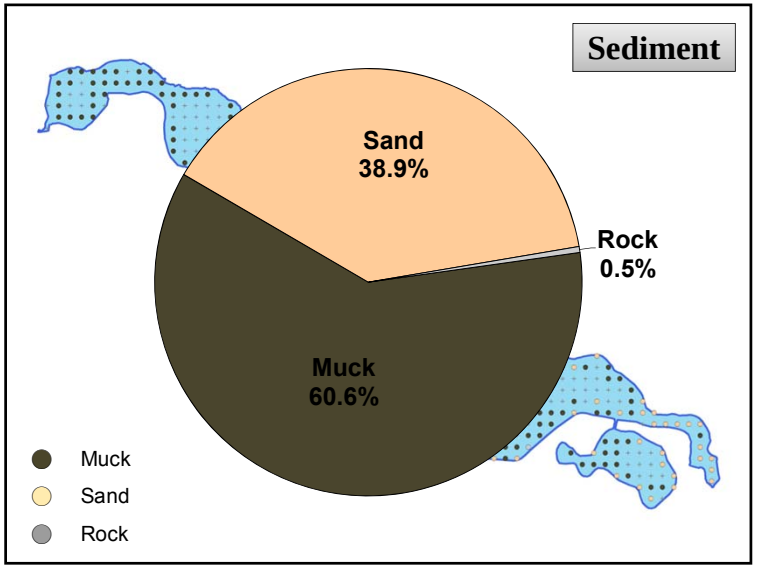
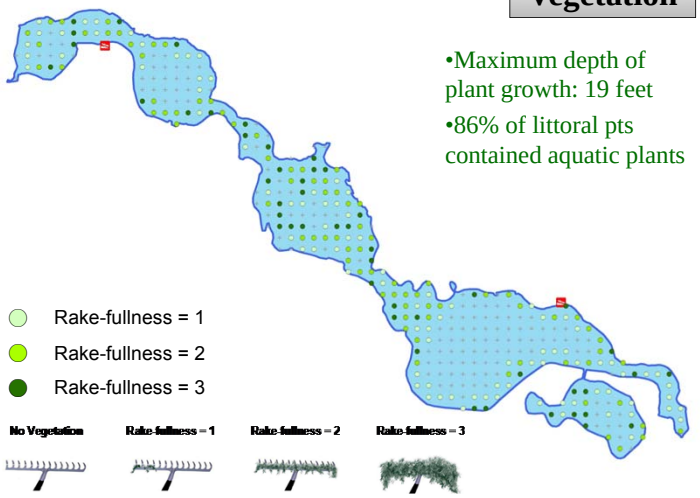

Shoreline Assessment


Shoreline Assessment
Developed-Natural
0.4 Miles
7%
Developed-Semi-
Natural
1.3 Miles
25%
Developed-
Unnatural
0.8 Miles
15%
Natural/
Undeveloped 0.7
Miles
14%
Urbanized
2.1 Miles
39%


•Mount Morris Lake
•28-meter resolution
•359 total points
•Survey Completed: August 27 &
September 2, 2010


Sediment
Sand
38.9%
Rock
0.5%
Muck
60.6%
Muck
Sand
Rock

Vegetation



- Maximum depth of plant growth: 19 feet
- 86% of littoral pts contained aquatic plants

Species List

- **34 Native Species**
- **4 (5?) Non-native Species**
  - Curly-leaf pondweed
  - Eurasian water milfoil
  - Eurasian water milfoil hybrid
  - Purple loosestrife
  - Pale-yellow iris
- **Avg. Conservatism:**
  - **2004: 5.3**
  - **2010: 5.5**

Life Form	Scientific Name	Common Name	Coefficient of Conservatism (C)	Mt. Morris 2004	Mt. Morris 2010
Emergent	*Bolboschoenus fluviatilis*	River bulrush	5		I
	Calla palustris	Water arum	9	I	I
	Carex comosa	Bristly sedge	5	X	I
	Carex stricta	Tussock Sedge	7	I	
	Eleocharis erythropoda	Bald spike-rush	3		X
	Eleocharis palustris	Creeping spikerush	6	X	
	Iris pseudacorus	Pale-yellow iris	Exotic		I
	Iris versicolor	Northern blue flag	5	I	
	Iris virginica	Southern blue flag	5		I
	Juncus effusus	Soft rush	4		I
	Lythrum salicaria	Purple loosestrife	Exotic	I	I
	Phalaris arundinacea	Reed canary grass	Exotic	I	
	Pontederia cordata	Pickerelweed	9	I	I
	Sagittaria latifolia	Common arrow-head	3	I	I
	Schoenoplectus acutus	Hardstem bulrush	5	X	X
	Schoenoplectus tabernaemontani	Softstem bulrush	4	X	I
	Typha spp.	Cattail spp.	1	X	I
FL	*Nuphar variegata*	Spatterdock	6	X	X
	Nymphaea odorata	White water lily	6	X	X
FF	*Lemna minor*	Lesser duckweed	5	X	
	Lemna trisulca	Forked duckweed	6	X	X
	Lemna turionifera	Turion duckweed	2		X
	Spirodela polyrhiza	Greater duckweed	5	X	X
FL/E	*Sparganium eurycarpum*	Common bur-reed	5		I
Submergent	*Callitriche palustris*	Common water starwort	8	I	
	Ceratophyllum demersum	Coontail	3	X	X
	Chara spp.	Muskgrasses	7	X	X
	Elodea canadensis	Common waterweed	3	X	X
	Heteranthera dubia	Water stargrass	6		X
	Myriophyllum sibiricum	Northern water milfoil	7	X	X
	*Myriophyllum sibiricum X M. spicatum**	Northern X Eurasian water milfoil	Exotic		I
	Myriophyllum spicatum	Eurasian water milfoil	Exotic	I	X
	Myriophyllum verticillatum	Whorled water milfoil	8		X
	Najas flexilis	Slender naiad	6	X	X
	Nitella spp.	Stonewarts	7		X
	Potamogeton crispus	Curly-leaf pondweed	Exotic	X	X
	Potamogeton illinoensis	Illinois pondweed	6	X	X
	Potamogeton natans	Floating-leaf pondweed	5	X	
	Potamogeton praelongus	White-stem pondweed	8	X	X
	Potamogeton richardsonii	Clasping-leaf pondweed	5	X	X
	Potamogeton zosteriformis	Flat-stem pondweed	6	X	
	Ranunculus aquatilis	White water-crowfoot	8	X	
	Stuckenia pectinata	Sago pondweed	3	X	X
	Utricularia vulgaris	Common bladderwort	7	X	X
	Vallisneria americana	Wild celery	6	X	X
	Zannichellia palustris	Horned pondweed	7		I
S/E	*Sagittaria cuneata*	Arum-leaved arrow-head	7		I

FL = Floating-leaf; FF = Free-floating; FL/E = Floating-leaf and Emergent; S/E = Submergent and Emergent
*X = Located on the rake during point-intercept survey; I = Incidental species; * Located during 2011 survey*

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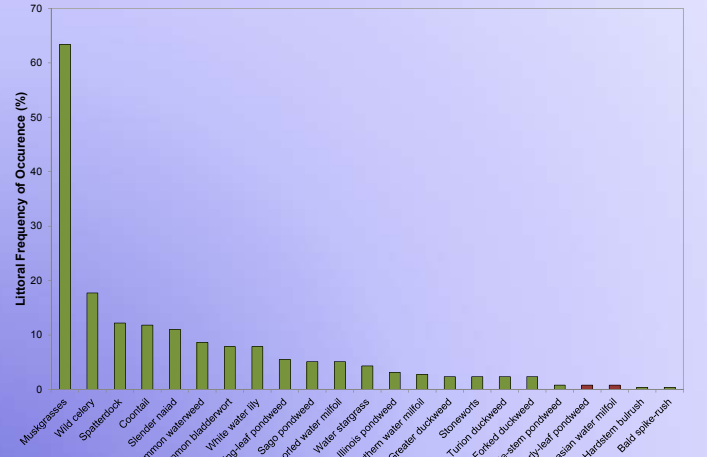
Littoral Frequency of Occurrence



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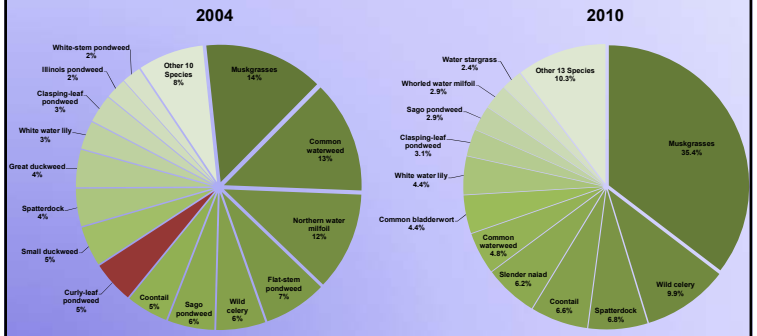
Relative Frequency



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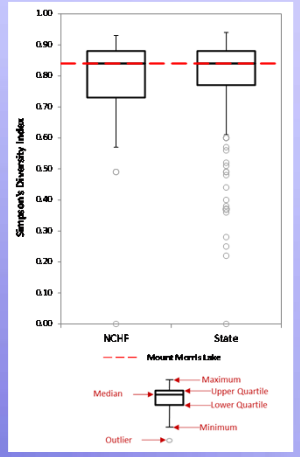
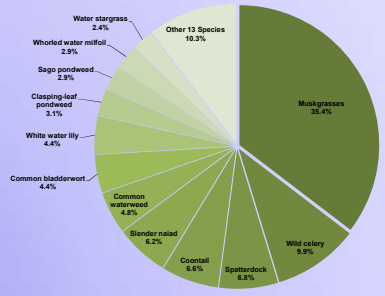
Simpson's Diversity Index



0.84



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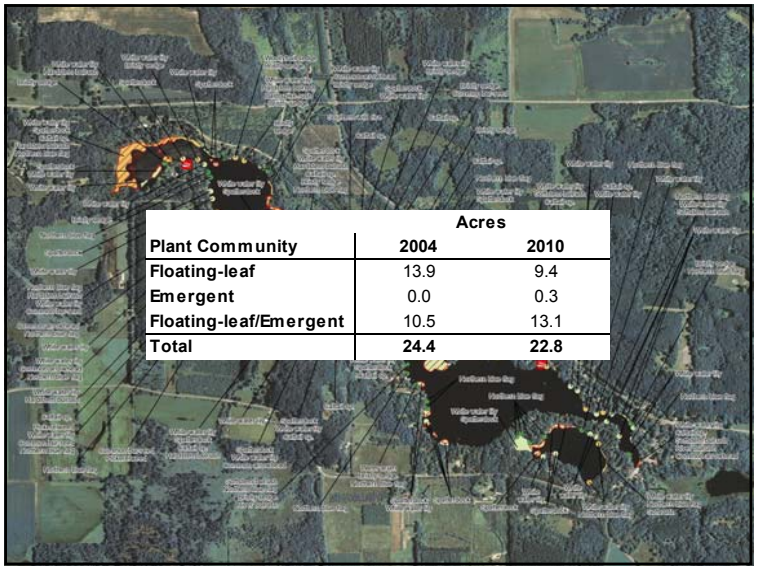
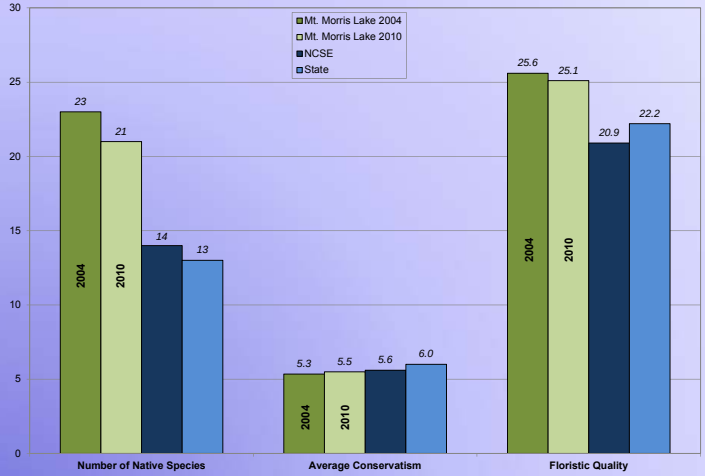


Plant Community	Acres 2004	2010
Floating-leaf	13.9	9.4
Emergent	0.0	0.3
Floating-leaf/Emergent	10.5	13.1
Total	**24.4**	**22.8**

Floristic Quality Analysis



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Lake Management Planning

Aquatic Invasive Species : Curly-leaf pondweed & Eurasian water milfoil

CLP & EWM Treatment Acreage

	2006	2007	2008	2009	2010	2011
CLP	31.6	27.1	28.6	28.6	26.2	23.9
EWM	0.0	0.0	14.4	10.9	14.9	2.1

Onterra, LLC
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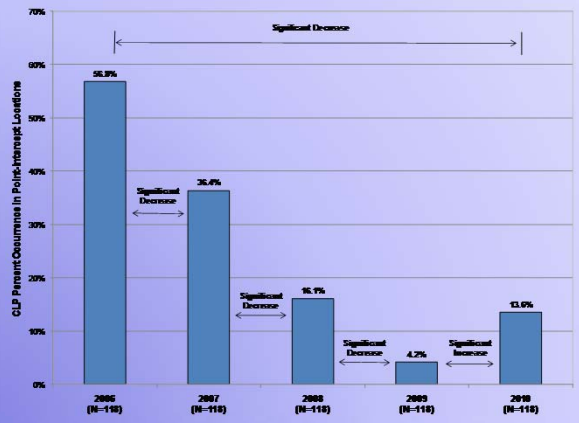
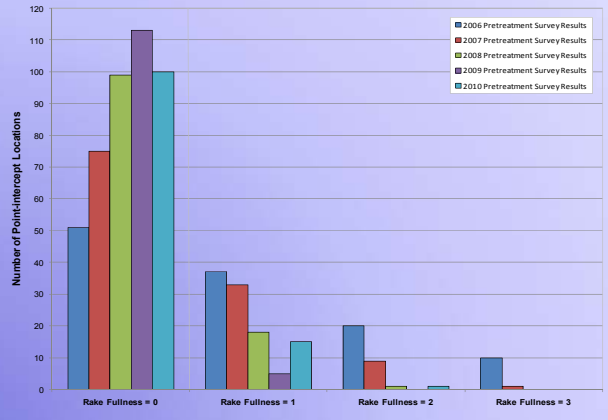
Aquatic Invasive Species : Curly-leaf pondweed & Eurasian water milfoil



Onterra, LLC
Lake Management Planning

Aquatic Invasive Species : Curly-leaf pondweed & Eurasian water milfoil



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Aquatic Invasive Species : Curly-leaf pondweed & Eurasian water milfoil

CLP turion data

Year	Total	% Prevalence	Average	Range
2006	102	25.0	0.9	1-14
2007	135	23.2	1.2	1-23
2008	116	22.9	1.0	1-21
2009	66	16.9	0.6	1-18

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Lake Management Planning

Aquatic Invasive Species : Curly-leaf pondweed & Eurasian water milfoil

- 2012 AIS Strategy
  - CLP
    - No treatment in 2012; allow plants to reach peak-biomass to assess population and formulate more effective strategy
  - EWM
    - 4.5 acres of EWM are proposed to be treated in 2012

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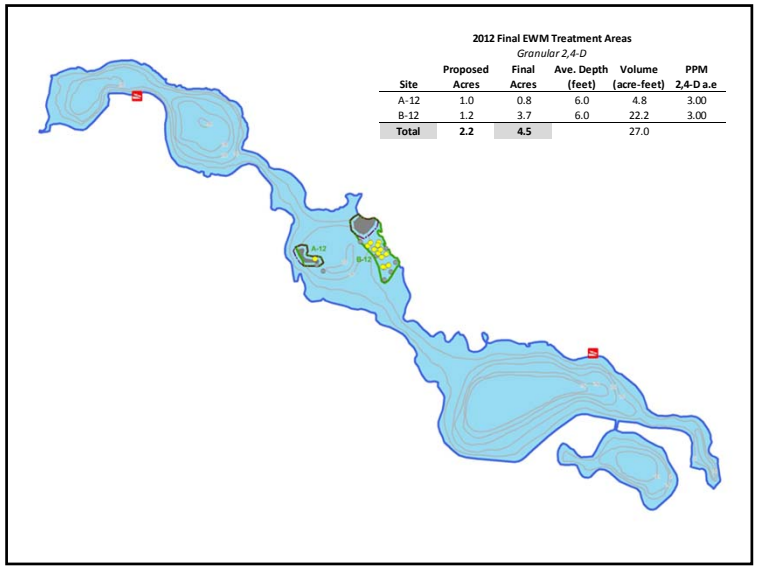
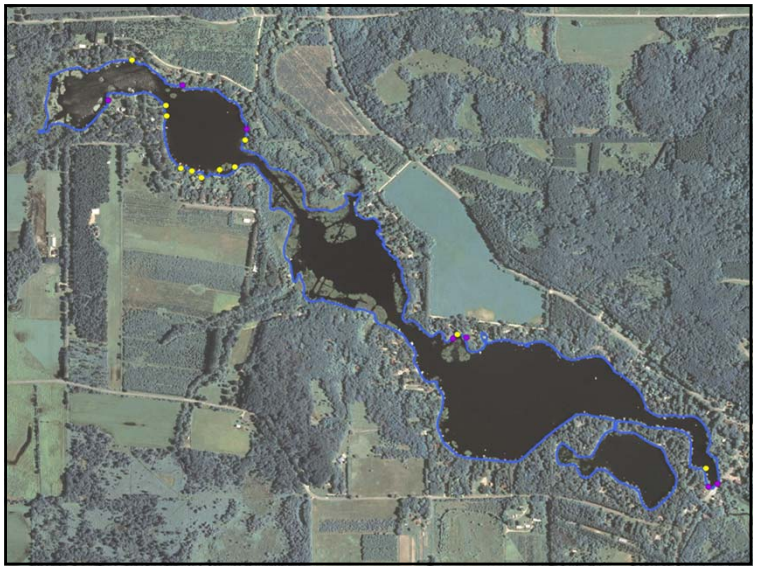
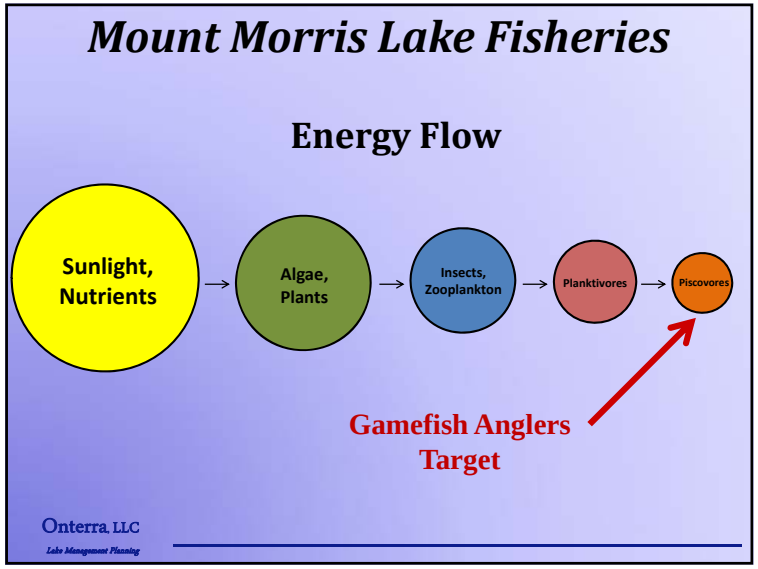
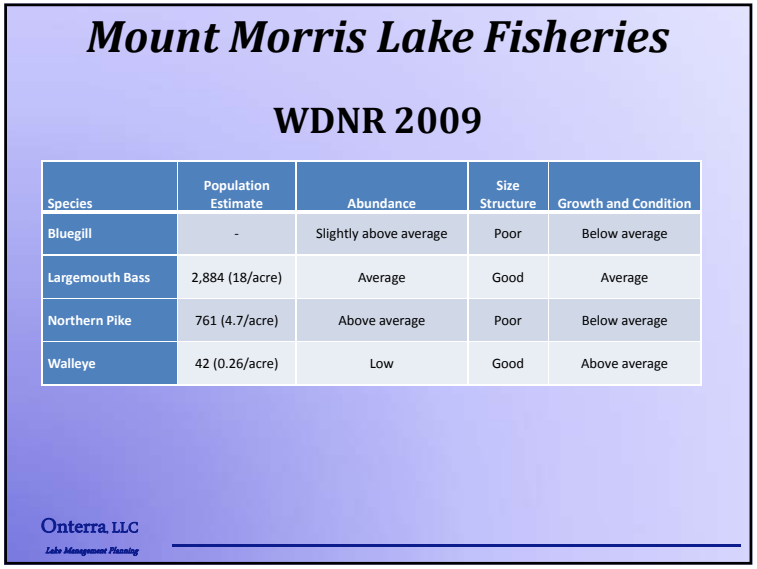

2012 Final EWM Treatment Areas
Granular 2,4-D
Site | Proposed Acres | Final Acres | Ave. Depth (feet) | Volume (acre-feet) | PPM 2,4-D a.e
A-12 | 1.0 | 0.8 | 6.0 | 4.8 | 3.00
B-12 | 1.2 | 3.7 | 6.0 | 22.2 | 3.00
Total | 2.2 | 4.5 | | 27.0 |
A-12
B-12




Mount Morris Lake Fisheries
Energy Flow
Sunlight, Nutrients
Algae, Plants
Insects, Zooplankton
Planktivores
Piscovores
Gamefish Anglers Target
Onterra LLC
Lake Management Planning


Mount Morris Lake Fisheries
WDNR 2009
Species | Population Estimate | Abundance | Size Structure | Growth and Condition
Bluegill | - | Slightly above average | Poor | Below average
Largemouth Bass | 2,884 (18/acre) | Average | Good | Average
Northern Pike | 761 (4.7/acre) | Above average | Poor | Below average
Walleye | 42 (0.26/acre) | Low | Good | Above average
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Lake Management Planning

Conclusions

- Water quality overall is very good.
  - Water quality is much better than most lakes in Central Wisconsin.
  - No positive or negative trends detected over time.
  - Increased nutrient levels and lower water clarity in 2010 likely a result of increased precipitation.
- Watershed is in good condition.
  - Half of watershed is comprised of intact forests and wetlands.
  - Modeling indicates efforts to reduce runoff from agricultural lands are working.
- Aquatic plant community
  - Based upon standard analysis, native community is of high quality.
  - Changes in species composition since 2004 may be a result of annual herbicide treatments.

Conclusions continued

- CLP
  - No treatment in 2012.
- EWM
  - Hybrid milfoil discovered in 2011.
  - 4.5-acre treatment proposed for 2012.
- Fisheries
  - Lake's high productivity likely translates to high fish biomass
  - High plant abundance beneficial to fishery as they provide valuable structural habitat

B

APPENDIX B

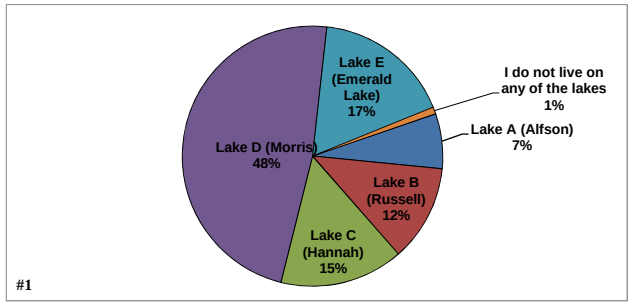
Stakeholder Survey Response Charts and Comments

Returned Surveys	117
Sent Surveys	185
Response Rate (%)	63.2

Mount Morris Lake Property

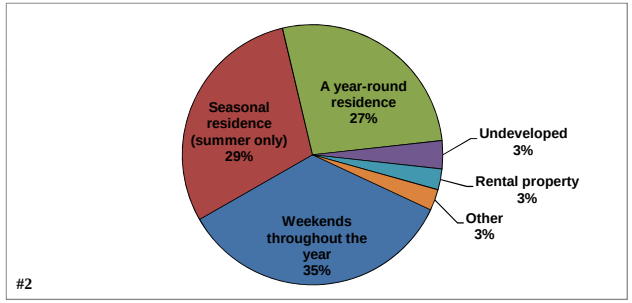
#1 On which basin is your property located?

	Total	%
Lake A (Alfson)	8	*6.8*
Lake B (Russell)	14	*12.0*
Lake C (Hannah)	18	*15.4*
Lake D (Morris)	56	*47.9*
Lake E (Emerald Lake)	20	*17.1*
I do not live on any of the lakes	1	*0.9*
	117	*100.0*



#2 What is the primary use of your property on Mount Morris Lake?

	Total	%
Weekends throughout the year	40	*34.8*
Seasonal residence (summer only)	34	*29.6*
A year-round residence	31	*27.0*
Undeveloped	4	*3.5*
Rental property	3	*2.6*
Other	3	*2.6*
	115	*100.0*

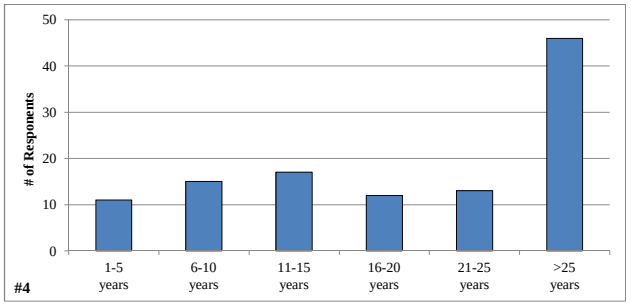


#3 How many days each year is your property used by you or others?

Answered Question	112
Average (Days)	137.5
Standard deviation (Days)	125.4

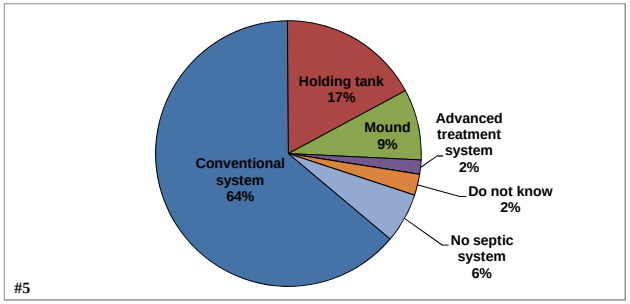
#4 How long have you owned your property on the lake?

	Total	%
1-5 years	11	*9.6*
6-10 years	15	*13.2*
11-15 years	17	*14.9*
16-20 years	12	*10.5*
21-25 years	13	*11.4*
>25 years	46	*40.4*
	114	*100.0*



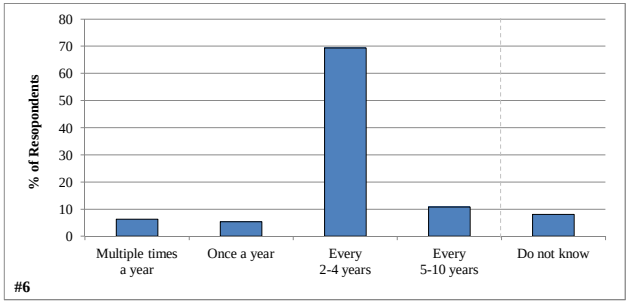
#5 What type of septic system does your property utilize?

	Total	%
Conventional system	74	*63.8*
Holding tank	20	*17.2*
Mound	10	*8.6*
Advanced treatment system	2	*1.7*
Municipal sewer	0	*0.0*
Do not know	3	*2.6*
No septic system	7	*6.0*
	116	*100.0*



#6 How often is the septic tank on your property pumped?

	Total	%
Multiple times a year	7	*6.3*
Once a year	6	*5.4*
Every 2-4 years	77	*69.4*
Every 5-10 years	12	*10.8*
Do not know	9	*8.1*
	111	*100.0*



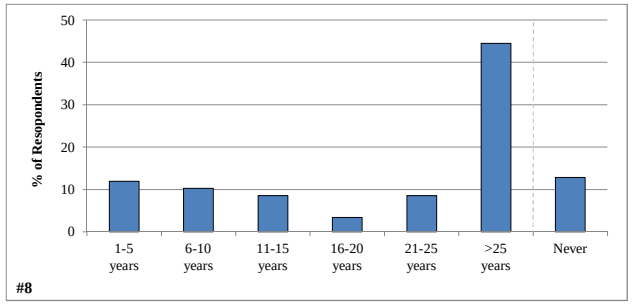
Recreational Use on Mount Morris Lake

#7 How many years ago did you first visit Mount Morris Lake?

Answered Question	117
Average (years)	36.1
Standard deviation (years)	20.7

#8 For how many years have you fished Mount Morris Lake?

	Total	%
1-5 years	14	*12.0*
6-10 years	12	*10.3*
11-15 years	10	*8.5*
16-20 years	4	*3.4*
21-25 years	10	*8.5*
>25 years	52	*44.4*
Never	15	*12.8*
	117	*100.0*

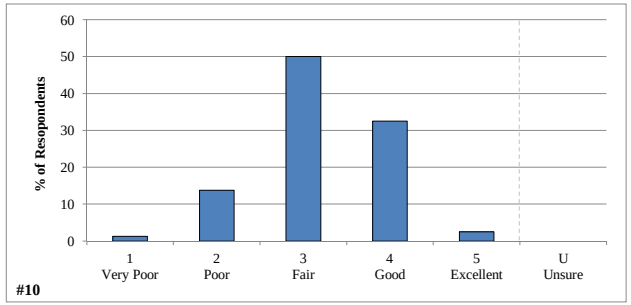


#9 Have you personally fished on Mount Morris Lake in the past 3 years?

	Total	%
Yes	82	*73.9*
No	29	*26.1*
	111	*100.0*

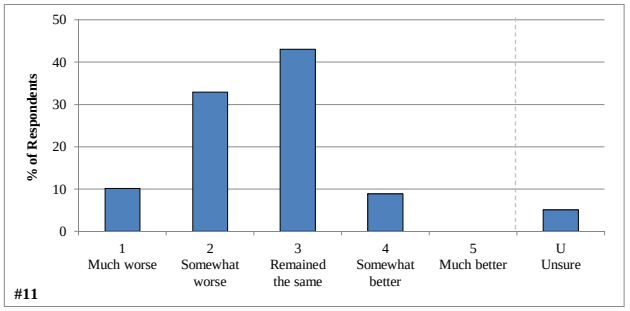
#10 How would you describe the current quality of fishing on Mount Morris Lake?

	Total	%
1 - Very Poor	1	*1.3*
2 - Poor	11	*13.8*
3 - Fair	40	*50.0*
4 - Good	26	*32.5*
5 - Excellent	2	*2.5*
U - Unsure	0	*0.0*
	80	*100.0*



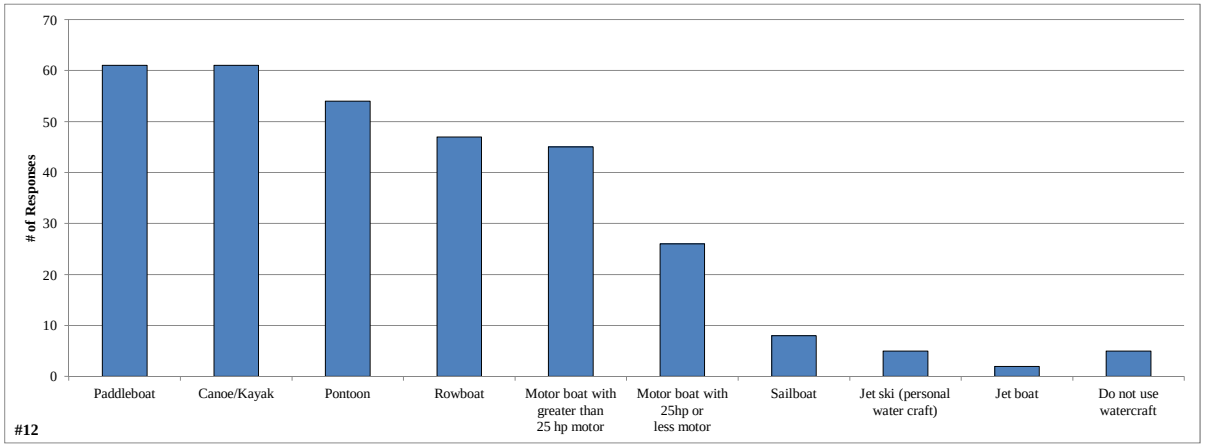
#11 How has the quality of fishing changed since you started fishing on the lake?

	Total	%
1 - Much worse	8	*10.1*
2 - Somewhat worse	26	*32.9*
3 - Remained the Same	34	*43.0*
4 - Somewhat better	7	*8.9*
5 - Much better	0	*0.0*
U - Unsure	4	*5.1*
	79	*100.0*



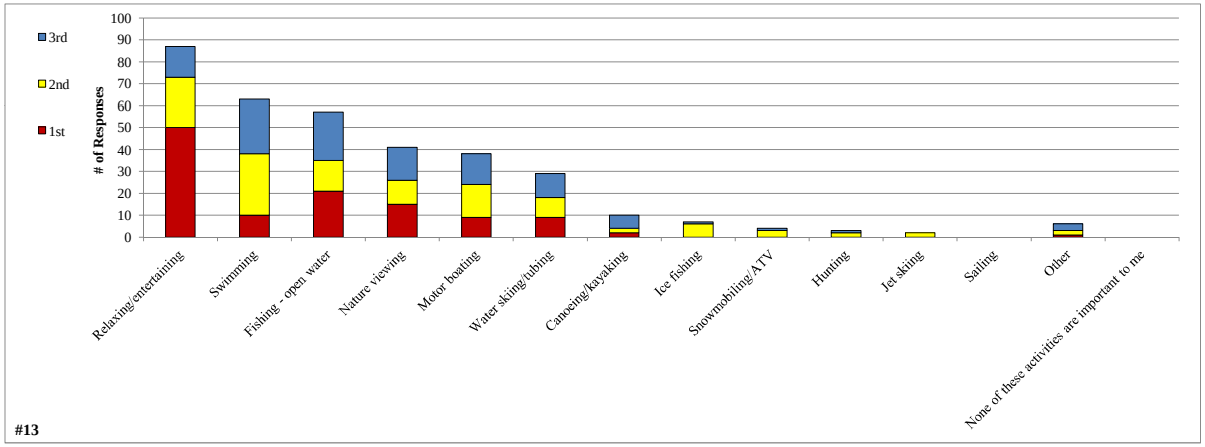
#12 What types of watercraft do you currently use on Mount Morris Lake?

	Total
Paddleboat	61
Canoe/Kayak	61
Pontoon	54
Rowboat	47
Motor boat with greater than 25 hp motor	45
Motor boat with 25hp or less motor	26
Sailboat	8
Jet ski (personal water craft)	5
Jet boat	2
Do not use watercraft	5



#13 Please rank up to three activities that are important reasons for owning your property on or near Mount Morris Lake.

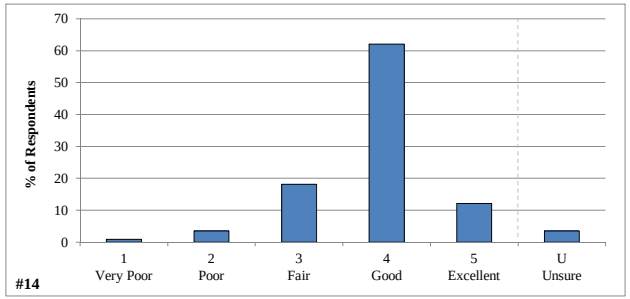
	1st	2nd	3rd	*% ranked*
Relaxing/entertaining	50	23	14	*25.1*
Swimming	10	28	25	*18.2*
Fishing - open water	21	14	22	*16.4*
Nature viewing	15	11	15	*11.8*
Motor boating	9	15	14	*11.0*
Water skiing/tubing	9	9	11	*8.4*
Canoeing/kayaking	2	2	6	*2.9*
Ice fishing	0	6	1	*2.0*
Snowmobiling/ATV	0	3	1	*1.2*
Hunting	0	2	1	*0.9*
Jet skiing	0	2	0	*0.6*
Sailing	0	0	0	*0.0*
Other	1	2	3	*1.7*
None of these activities are important to me	0	0	0	*0.0*
	117	117	113	*100.0*



Mount Morris Lake Current and Historic Condition, Health and Management

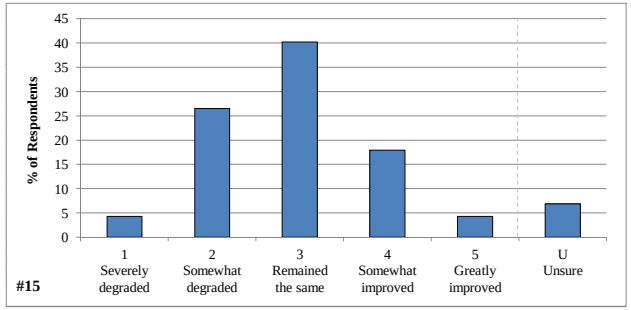
#14 How would you describe the current water quality of Mount Morris Lake?

	Total	%
1 - Very Poor	1	*0.9*
2 - Poor	4	*3.4*
3 - Fair	21	*18.1*
4 - Good	72	*62.1*
5 - Excellent	14	*12.1*
U - Unsure	4	*3.4*
	116	100.0



#15 How has the water quality changed in Mount Morris Lake since you visited the lake?

	Total	%
1 - Severely degraded	5	*4.3*
2 - Somewhat degraded	31	*26.5*
3 - Remained the same	47	*40.2*
4 - Somewhat improved	21	*17.9*
5 - Greatly improved	5	*4.3*
U - Unsure	8	*6.8*
	117	*100.0*



#16 Have you ever heard of aquatic invasive species?

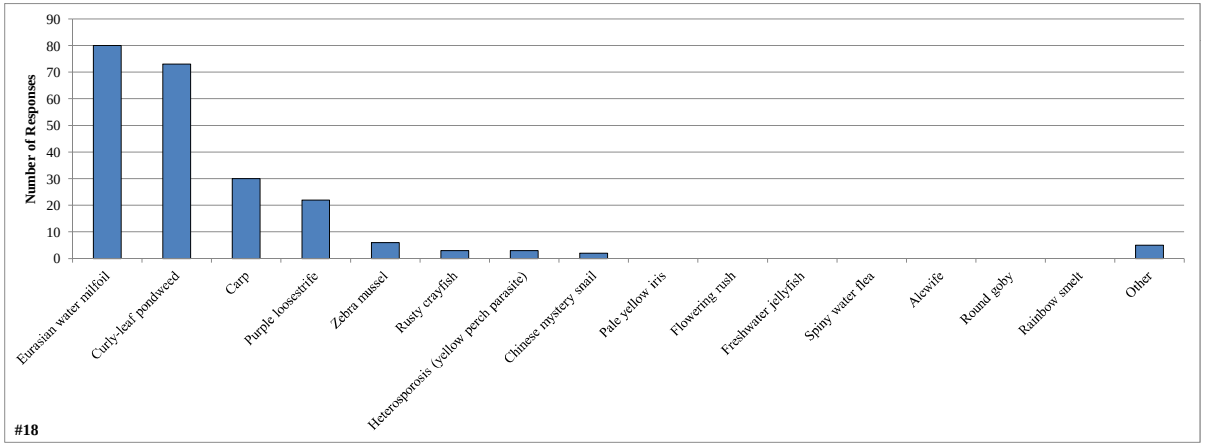
	Total	%
Yes	110	*94.8*
No	6	*5.2*
	116	*100.0*

#17 Are you aware of aquatic invasive species in the lake?

	Total	%
Yes	95	*86.4*
No	15	*13.6*
	110	*100.0*

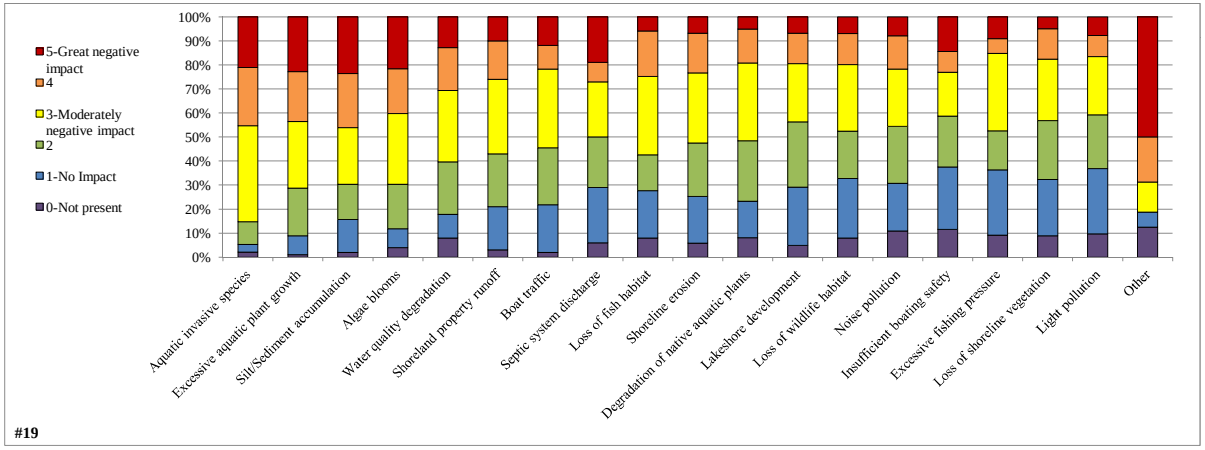
#18 Which aquatic invasive species are you aware of in Mount Morris Lake?

	Total
Eurasian water milfoil	80
Curly-leaf pondweed	73
Carp	30
Purple loosestrife	22
Zebra mussel	6
Rusty crayfish	3
Heterosporosis (yellow perch parasite)	3
Chinese mystery snail	2
Pale yellow iris	0
Flowering rush	0
Freshwater jellyfish	0
Spiny water flea	0
Alewife	0
Round goby	0
Rainbow smelt	0
Other	5



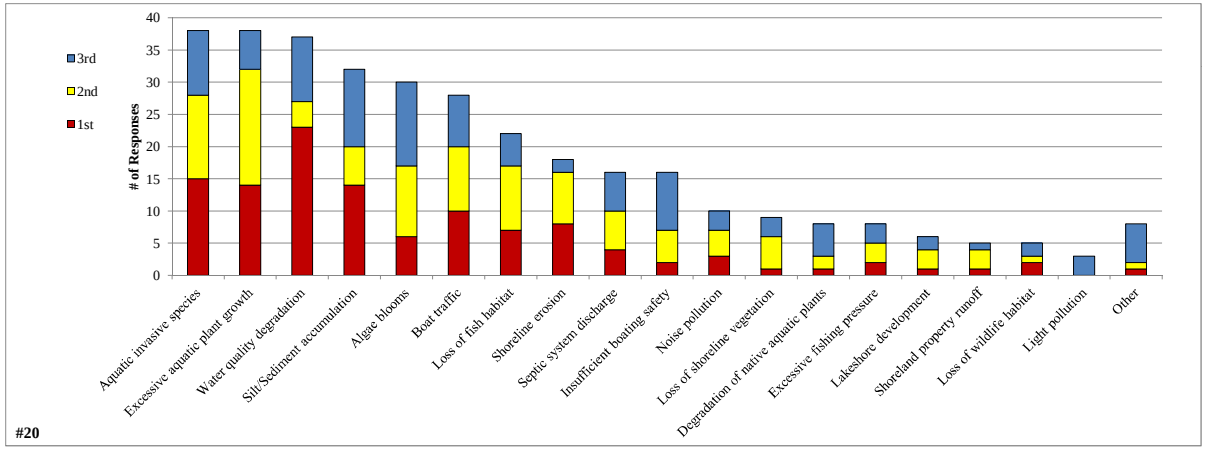
#19 To what level do you believe each of the following factors may be negatively impacting Mount Morris Lake?

	0-Not present	1-No Impact	2	3-Moderately negative impact	4	5-Great negative impact	*Total*	*Average*
Aquatic invasive species	2	3	9	38	23	20	*93*	*3.4*
Excessive aquatic plant growth	1	8	20	28	21	23	*100*	*3.3*
Silt/Sediment accumulation	2	14	15	24	23	24	*100*	*3.2*
Algae blooms	4	8	19	30	19	22	*98*	*3.2*
Water quality degradation	8	10	22	30	18	13	*93*	*2.8*
Shoreland property runoff	3	18	22	31	16	10	*97*	*2.7*
Boat traffic	2	20	24	33	10	12	*99*	*2.6*
Septic system discharge	6	23	21	23	8	19	*94*	*2.6*
Loss of fish habitat	8	20	15	33	19	6	*93*	*2.5*
Shoreline erosion	6	20	23	30	17	7	*97*	*2.5*
Degradation of native aquatic plants	8	15	25	32	14	5	*91*	*2.4*
Lakeshore development	5	25	28	25	13	7	*98*	*2.4*
Loss of wildlife habitat	8	25	20	28	13	7	*93*	*2.3*
Noise pollution	11	20	24	24	14	8	*90*	*2.3*
Insufficient boating safety	12	27	22	19	9	15	*92*	*2.3*
Excessive fishing pressure	9	27	16	32	6	9	*90*	*2.3*
Loss of shoreline vegetation	9	24	25	26	13	5	*93*	*2.2*
Light pollution	10	28	23	25	9	8	*93*	*2.2*
Other	2	1	0	2	3	8	*14*	*3.7*



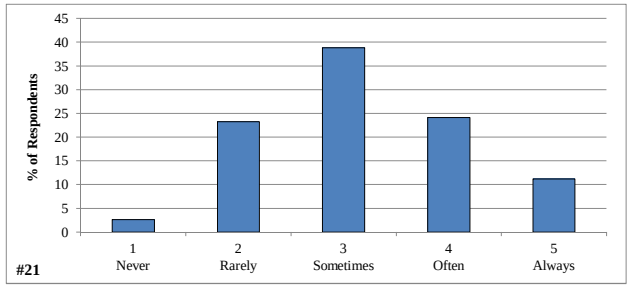
#20 From the list below, please rank your top three concerns regarding the lake.

	1st	2nd	3rd	*% Ranked*
Aquatic invasive species	15	13	10	*11.3*
Excessive aquatic plant growth	14	18	6	*11.3*
Water quality degradation	23	4	10	*11.0*
Silt/Sediment accumulation	14	6	12	*9.5*
Algae blooms	6	11	13	*8.9*
Boat traffic	10	10	8	*8.3*
Loss of fish habitat	7	10	5	*6.5*
Shoreline erosion	8	8	2	*5.3*
Septic system discharge	4	6	6	*4.7*
Insufficient boating safety	2	5	9	*4.7*
Noise pollution	3	4	3	*3.0*
Loss of shoreline vegetation	1	5	3	*2.7*
Degradation of native aquatic plants	1	2	5	*2.4*
Excessive fishing pressure	2	3	3	*2.4*
Lakeshore development	1	3	2	*1.8*
Shoreland property runoff	1	3	1	*1.5*
Loss of wildlife habitat	2	1	2	*1.5*
Light pollution	0	0	3	*0.9*
Other	1	1	6	*2.4*
	115	113	109	*100.0*



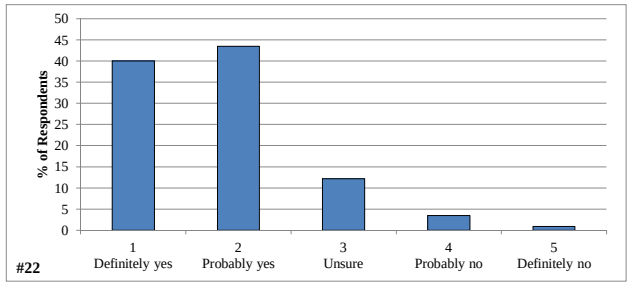
#21 During open water season how often does aquatic plant growth, including algae, negatively impact your enjoyment of Mount Morris Lake?

	Total	%
1 - Never	3	*2.6*
2 - Rarely	27	*23.3*
3 - Sometimes	45	*38.8*
4 - Often	28	*24.1*
5 - Always	13	*11.2*
	116	*100.0*



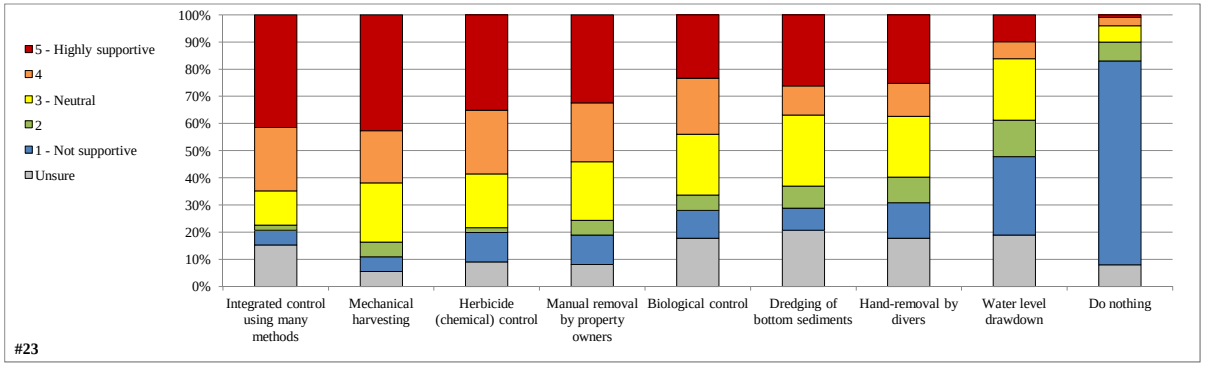
#22 Considering your answer to the question above, do you believe aquatic plant control is needed on Mount Morris Lake?

	Total	%
1 - Definitely yes	46	*40.0*
2 - Probably yes	50	*43.5*
3 - Unsure	14	*12.2*
4 - Probably no	4	*3.5*
5 - Definitely no	1	*0.9*
	115	*100.0*



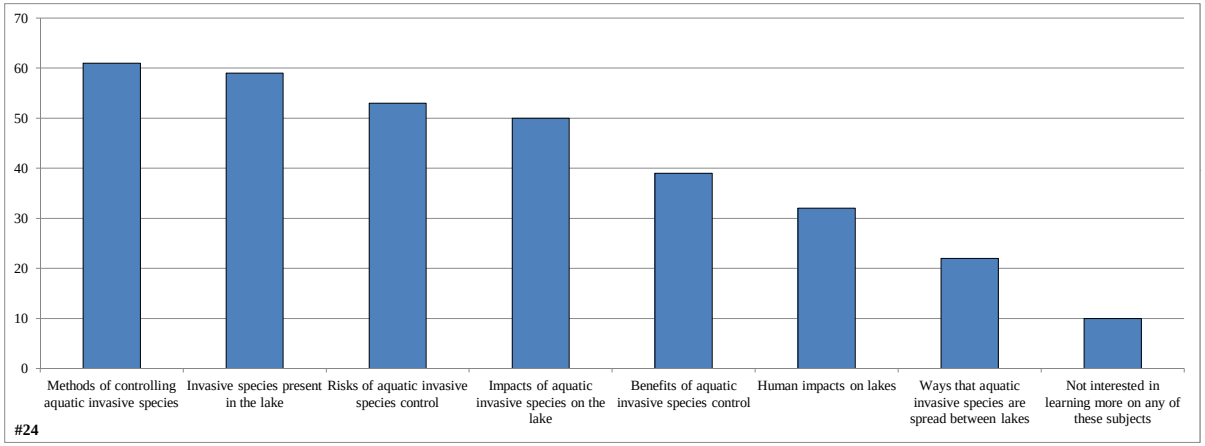
#23 What is your level of support for the responsible use of the following techniques on Mount Morris Lake?

	1 - Not supportive	2	3 - Neutral	4	5 - Highly supportive	Unsure	Total	Average
Integrated control using many methods	6	2	14	26	46	17	*94*	*4.1*
Mechanical harvesting	6	6	24	21	47	6	*104*	*3.9*
Herbicide (chemical) control	12	2	22	26	39	10	*101*	*3.8*
Manual removal by property owners	12	6	24	24	36	9	*102*	*3.6*
Biological control	11	6	24	22	25	19	*88*	*3.5*
Dredging of bottom sediments	9	9	29	12	29	23	*88*	*3.5*
Hand-removal by divers	14	10	24	13	27	19	*88*	*3.3*
Water level drawdown	32	15	25	7	11	21	*90*	*2.4*
Do nothing	75	7	6	3	1	8	*92*	*1.3*



#24 Which of these subjects would you like to learn more about?

	Total
Methods of controlling aquatic invasive species	61
Invasive species present in the lake	59
Risks of aquatic invasive species control	53
Impacts of aquatic invasive species on the lake	50
Benefits of aquatic invasive species control	39
Human impacts on lakes	32
Ways that aquatic invasive species are spread between lakes	22
Not interested in learning more on any of these subjects	10



Mount Morris Lake Management District

#25 Before receiving this mailing, have you ever heard of the Mount Morris Lake Management District?

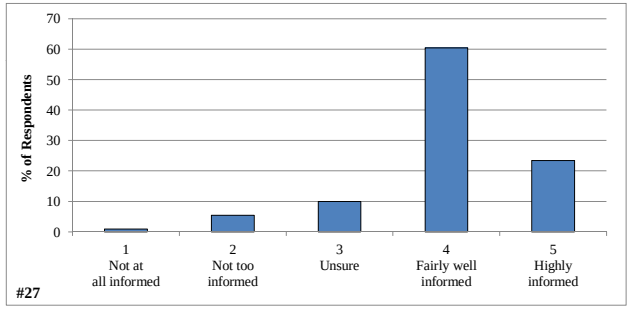
	Total	%
Yes	111	*98.2*
No	2	*1.8*
	113	*100.0*

#26 What is your membership status with the Mount Morris Lake Management District?

	Total	%
Current member	77	*71.3*
Former member	2	*1.9*
Never been a member	29	*26.9*
	108	*73.1*

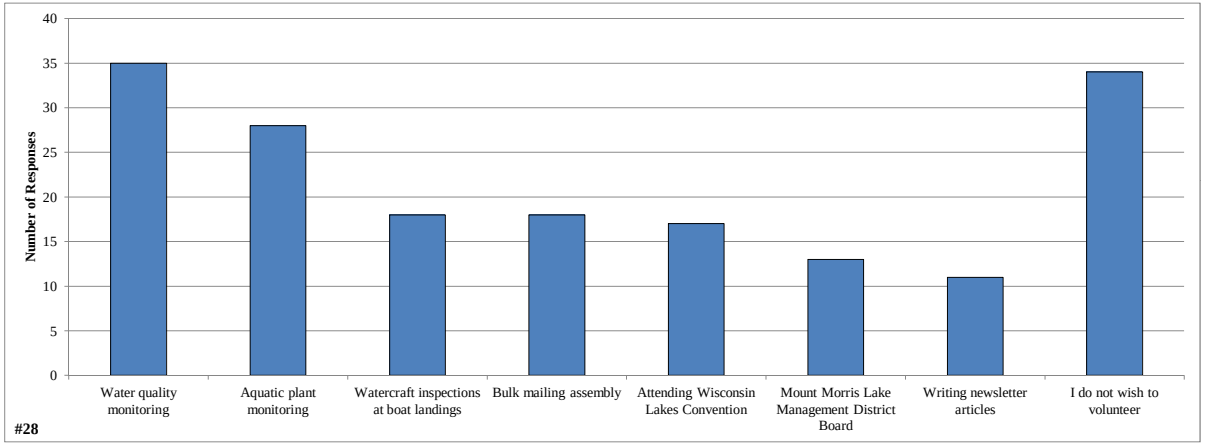
#27 How informed has the Mount Morris Lake Management District kept you regarding issues with the lake and its management?

	Total	%
1 - Not at all informed	1	*0.9*
2 - Not too informed	6	*5.4*
3 - Unsure	11	*9.9*
4 - Fairly well informed	67	*60.4*
5 - Highly informed	26	*23.4*
	111	*100.0*



#28 Please circle the activities you would be willing to participate in if the Mount Morris Lake Management District requires additional assistance.

	Total
Water quality monitoring	35
Aquatic plant monitoring	28
Watercraft inspections at boat landings	18
Bulk mailing assembly	18
Attending Wisconsin Lakes Convention	17
Mount Morris Lake Management District Board	13
Writing newsletter articles	11
I do not wish to volunteer	34



Survey Number	2f Comment	13m Comment	18p Comment	19s Comment	20s Comment	Other Comments (and Question 29)
1						
2						Morris Lakes are a unique resource in Waushara County, a clean clear water lake with enough undeveloped shoreline to have that special"up North" feel. The aesthetic condition of the water has deteriorated in recent years due to increased pressure of filamentous algae floating on the surface of the lake. It worsens with each successive year. The change in the last ten years has been significant. I fear that if the deterioration continues the special appeal of the lakes will be lost not too many years from now.
3		pontoon				
4						Thank you for all you do!
5						
6						Would like more information on the website.
7			Eared Sunfish			I feel the Present Board is doing an excellent job in monitoring the lake and educating the residents.
8						
9						
10						
11						Water skiers coming too close to shore and near beaches and going on other people's piers. Not following no wake rules.
12						How much pollution (fertilizer) comes from feeder creeks? We have a lot of muck at our lakeshore (primarily caused by decomposed leaves and branches from a huge willow tree). What can we do to reduce the muck accumulation? Thank you for this survey because we think water quality is an important issue. We rent the cottage for most of the summer - sometimes renters fish,others only bring their pontoon boat to swim and enjoy the lakes. Because we are not at the lake during June-August we are unable to help out as volunteers for the MMLMD because we are at the cottage for weekends intermittantly.
13						
14						1. Charge for daily lake usage: launching/parking (like Big Silver Lake). 2.Control tournament fishing. 3. Better marking of "no wake" statuws in Emerald Lake. 4. Any new equipment purchased by MMLMD hsould be able to be used on Emeral Lake. 5. Sewer system for the lakes. Question: Does urination in the lake affect water quality? On a weekend Emerald Lake can have 8-10 pontoons parked for hours ... enjoying the lake .. consuming beverages .. relieving themselves. Is there a way to test the water?
15						I believe the water quality is still very good but need to monitor aquatic plant growth. Having fished these lakes for many years I've noticed a big declin in the panfish species. I've seen groups of very large carp come in the shallows and root out or eat at the bluegill spawning areas. The bass population seems to be holding out fine. I'd be curious to find out what the water quality is compared to other regional lakes.
16						
17						
18						
19						
20						I would be happy to become more involved afer my children are grown. Thank you for the survey!
21						
22						
23						
24						
25						In the 10 years of property ownership we have observed a substantial upgrade in quality of property. I support this to continue. Monies from tax levies therefore should be rising and allocation to this effort as well. Let's spend it wisely on quality of environment.
26						
27						
28				Too restrictive times/places for speed		Over the 50 years I have been at Mount Morris Lakes I have seen water quality go from exceptionally clear to usually clouding and sometimes somewhat clear. Other lakes like Waupaca Chain and Big Silver have remained clear. How can we get back to clear water? I have sen no benefit to idle speed in channels exceptionally limited ski/speed times in big lake. Idle speed in Emerald Lake has been beneficial for swimming and paddle watercraft.
29						
30						
31						
32						
33						My concern is with the accumulation of algae and rotting plants that end up in front of our house on Lake Hannah. We constantly try to clean it out but wenever seem to be able to keep up. There is also a very deep accumulation of dead/rotting leaves near our shoreline that has a terrible smell. Thanks for all your hard work.
34						
35						Well put together survey. Keep moving forward!
36						
37						
38						
39				Lack of weed cutting	Lack of weed cutting. Government regulation	Thank you for your efforts. In short, we believe lake management is a balance. We could have a pristine lake if no one was allowed to use it or boats were banned (perhaps), but htat would be unacceptable. Lets find creative ways to address the lake's needs while preserving the things we love about the lake.
40						I "feed" bluegill from my pier 2-3Xs/day. In spring about 10-15 come. This growths to 50-60 by August. I began when we moved here full time in 2000. This year I had 10-15 in spring but never more than 20 all season. (I use bread and oatmeal occassionally).
41						When we take weeds our of lake please haul them away with weed cutter. People are getting old. They used to haul them away. I think the board is getting paid too much. They never used to get paid at all.
42						
43						

Survey Number	2f Comment	13m Comment	18p Comment	19s Comment	20s Comment	Other Comments (and Question 29)
44			Can't name them, know they're there			
45						My biggest concern is the neighboring farmland which is the source of surface water rushing through my property in the spring or after a heavy rain. This water floods my crawlspace and washes out my shoreline.
46						
47						I am currently dealing with brain/cancerous tumors and thus deal with it daily. I am aware of our lake(s) and how they are managed. I'd love to help but right now have desires in a different theater. I wish I could hunt/fish in the area; however, my redcent past has made it difficult and monies I have put into my cottage (upgrading) are mor important than anything. The overall fish population has changed but not looking for them is my problem. Our septic system is probably judged antiquated but we use such a small amount of water and deficate so infrequently it has a negligible effect on our use. Perhaps if we had company but we are a couple with little pressure at our property.
48						Fireworks throughout the summer months are quite disturbing, especially for young children and pets, not to mention that a peaceful relaxing atmosphere becomes nonexistent. There seems to be a conflict between people seeking the lake for R&R and those coming for their "spring break" parties.
49						My number one complaint is when weeds are cut they are not being picked up and they wash into my dock and frontage. I now have lilypads and those long tall weekds that grow in middle lake and everything else. This has been very much so in the last 3-4 years. My shoreline is loaded with thck weeks I never had before. I've been here since 1955. My husband wsa on lake managment from day one - so it is not anything that I just observed.
50						Very concerned about the well being of our lakes and ready to help in anyway we can to help sustain them. New to the community and want to learn more so that we do the right things.
51						The MMLMD board is doing an excellent job. The shoreland owners can be proud of the lake quality and the work done to preserve and enhance it. The AIS program of the past 5 years has proven very successful and should be continured to maintain the progress attained against AIS. A volunteer co-ordinator would be helpful to recruit helpers as needed and give property owners a point of contact. Geese control!! Don't know what, if anything, can be done but it sure is a mess.
52						
53						Please convince the DNR that the shorelines need to be protected and not with rolls of cocnut and plants. Example - channel between Morris Lake and Emerald Lake. It doesn't work. Bring back the walls! Please!!!
54						
55						
56						The MMLMD Board has to realize what it is in existence for. We pay taxes to insure that: 1) The lake is clean for swimming, boating, fishing and general aesthetic enjoyment. PRIORITY 2) The dam is maintained and in operational readiness to control water levels when needed. 3) A lake management plan is in effect to secure the future of the lake and control adverse environmental impacts. 4) Policies and regulations are in effect to ensure balanced and safe use of the lake by all. There is no concern what it costs to do these things. The Board exists to manage these 4 items, not to manage a budget!! We will let you know when it gets too expensive to do this but you must allocate the proper funds to get this done. We don't need a government beuracracy - we need action. Don't get too caught up on being a government agency - you do not need to respond to the DNR. You respond to the people on the lake, they are your customers. They set priorities, you facilitate the action needed. Overall ... really damn good work by all of you on the board. Glad to have competent, knowledgeable team managing our lake.
57						
58						
59		Keeping up the property	I know there are aquatic invasive species - just don't know their names			
60						The current MMLMD board is doing an outstanding job. Thank you for all you do!
61						We would like to see the boating/tubing time be extended to 6:00 or 6:30. The fishermen can fish any time on any of the lakes but the tubing boats have a very limited time window. Thank you.

Survey Number	2f Comment	13m Comment	18p Comment	19s Comment	20s Comment	Other Comments (and Question 29)
62						My belief is the MMLMD does a good job in balancing the use of our lakes. The top priority should be control of invasive species that destroy them. I don't fish but people who enjoy fishing should respect those who enjoy water sports like water skiing and refrain from fishing during high speed water ski hours. My son fishes evenings. I would support making rules or hours for fishing that do not conflict iwth water skiing. The same for pleasure boating. There is really no good safety reason to be out in your row boat, pontoon boat or fishing boat on a weekend during the water ski hours. The pontoon boat parade is fine but this should occur after water ski hours. Overall those of us with young families who like to tube and ski are looked at as a nuisance by manypeople on our lakes because of noise, etc. I don't think the pontoon parade should be held during weekend water ski hours. It should be afterward. The reality is if water skiing were not allowed, property values would fall. I support all uses of our lakes but feellike speed boats and water skiers are not welcome. Lastly septic systems are definitely adding to week growth. Not sure what to do about old septic systems but this should also be a top concern. This all runs into the lakes and fertilizes the weekds making the water quality poor. Thanks for all you're doing!! I wish I was there more oftetn to enjoy the lakes but I'm not able to be. My best!
63				Jet skis		The professionalism of the board is admirable, in sharp contrast with ten or more years ago. Keep it up! As you realize our lake's quality is vital to all of us.
64						
65						I feel the water skiing while confined to the big lake has the potential to become a safety problem in the future. I feel a horsepower limit is appropriate on the watercraft on Mt. Morris. Difficult to put in place and more difficult to enforce. I would like to see "no wake" enforced at all times on the upper lakes.
66						
67						STOP water skiing at beach at the public landing. Law is 100' from swim area.
68						
69						*note written but not legible*
70						
71						
72						
73						
74					Chemicals in lake to combat AIS do more harm than good.	Chemicals have not helped, dirty water, algae, fish death
75			The only reason I know about any is because of the information I have received from the Lake Association			
76				Too many DNR regulations	DNR regulations	Tuesday "catch and release" clubs seem to disregard property owners personal area. Coconut shell frontage is the only protection from "no wake" violators. Property owners have no say on their own land. Can only use 20% of first 35 feet. The dictators don't pay my taxes. No wake violators - too many.
77						
78						
79						MMLMD is doing a very fine job of informing and performing for members.
80	April 1 to December 1					As you can see I have been enjoying the Mt. Morris Lakes for years since I was a boy. I enjoy the peace and serenity that they provide. However, I do have some complaints that need to be addressed. Ice fisherman have been abusing our property (pier) for years. Emerald Lane is a PRIVATE DRIVE and people come down there with their trucks and 4X4s and think they own the place!! How can this be addressed? In addition the over fishing of the lake especially in winter has depleteed the stocks of good sized fish! Summer fishing very close to our pier is getting ridiculous!! These idiots cast their baits into my pier and boat cover and give you that "so what" attitude. I'm tired of pulling treble hooks out of the pier, trees and boat cover!! Isn't this against the law? I would like my grandchildren to be SAFE wlaking on the pier instead of worrying about fishing lures. A also detest the LARGE motors and boats that take over Mt. Morris Lake inthe summer (115 HP and larger). They use (abuse) the lake and then they're gone! Also pontoons that congregate on Emerald Lake are getting ridiculous!! We can't even manuever our boat to the pier. They anchor all over and swim around like they own the place! We can't even enjoy a nice swim anymore!! I see these new boaters as having no respect for people's PROPERTY and take no responsibility for things they abuse and destroy!! What can be done? I don't own the lakes but I would like to leave a legacy of a clean lake chain for my children and grandchildren! Let's address these problems NOW! They love these lakes as I do and we sure don't need further deterioration of what used to be an enjoyable area in Waushara County! Also, I noticed the very LARGE CARP that now congregate in Emeral Lake!! How can we eliminate them before they destroy the habitat? (A concerned citizen of the Mt. Morris Lakes Chain)

Survey Number	2f Comment	13m Comment	18p Comment	19s Comment	20s Comment	Other Comments (and Question 29)
81						We would like to see clearly marked "No Wake" zones on all lakes and channels with the exception of Lake D, and then, speed and horsepower may be unlimited during recreational hours from May to September. Currently very large speed boats, jet skis and very high horsepower pontoon boats are tearing up lakes A, B + C. Lake B is a very fragile ecosystem and cannot handle big boats going at full throttle. We have seen speed boats travel Lake B from channel to channel in 30 seconds. Outrageous! Make rules to protect the little lakes and enforce the rules. Fireworks blast the sky and ruin many weeken nights during the summer. Limit illegal fireworks to the 4th of July only! Pollution of our fragile lakes is now happening as a result of the Perchlorates (a by product of gunpowder in sky rockets). On the mornings after illegal sky busting fireworks there is a chemical scum on the water. It takes many days for this film of pollution to dissipate.
82	whenever I feel like it winter or summer					Having a Bass Tournament on the chain every other week by Hidaway Bar does affect the fishing quality.
83						Bottom sediments - especially on Lake C on and near Rattlesnake Creek mouth. Lots of silt muck is accumulating on creek and lake bottom severely limiting navigation - even with a canoe! Floating algae - especially Lake C is a major limitation to navigation and enjoyment. A educational topic I would find valuable: removing and managing silt and sediment accumulation (can that stuff be used in a garden?)
84						Some type of safety patrol. In favour of chemical treatment. Opposed to weed harvesting with mechanical means except where needed to to gain property access.
85						Get rid of all the geese.
86						
87		pontoon				
88						
89						
90						I do not want to lose the right to use jet skis or motor boats on Morris Lake. This would not only limit what we enjoy doing periodically but it would greatly reduce my property value! If we enforce existing boating laws I think we can limit the riff-raff boaters through a strong enforcement reputation. And at the same time satisfy property owners concerns of watercraft operating too close to shore or objects, excessive speeds, loud motors, etc. I really wish we could figure out a way to enforce the No Wake after five and before ten rule. But I understand it is now only a guideline or request, if you will. Thanks for taking thetime to do this. Good luck!
91						
92						
93						
94						The Mount Morris Lakes are a beautiful resource and I am thankful for you effors to maintain them. I attended the annual MMLMD meeting in May this past year and found it very informative. I do believe that during the sign-up for the attendence of that meeting the sheets asked for emails. I submitted mine but I don't believe I have ever received an email from the organization of any kind. It would be nice to receive updates about the lake and your efforts throughout the year. Perhaps monthly emails. I also was under the impression there was a newsletter as well. Again I haven't received anything via mail or email. I am new to the area so I might be mistaken. During the meeting there was thalk of a new type of boat skimmer to remove plants. I believe it was state the MMLMD was going to test this type of machine along with the established harvesting machine already in use. I did not see this new technique and again perhaps emails or a newletter article would be helpful to property owners. One final thought, although I marked the noise pollution level as "0" I am very disappointed with the amount of fireworkds that are used illegally around the lake. They scare young children and terrorize many pets. I would like to see the MMLMD make some sort of statement against the use of these other thatn on the 4th of July weekend. I come to Lake Morris to relax not to listen to annoying fireworkds all night and many times during the day. They are all illegal, we should not condone it. Individuals that rent their place should tell renters that fireworks are not allowed. Thank you.
95						My impression is that we have an excellent management district board of very dedicated individuals for which I am grateful. Prior to the chemical treatment of the lakes we learned hat plant aquatic environment is quite diverse. I think it is time to consider another survey. Has this biodiversity been degraded by treatment for the invasives? Since our last lakes plan the boat launch and parking area at the coutny park has been black topped. I may be wrong but it looks like the impervious surface is pitched such that all water from the lot and road runs down directly into the lake. I wonder if this needs to be redone to direct water run off to a rain garden or small retention pond. If possible I'd like to see the Lake District get involved in theremoval of brick walls along the shoreline. They might be grandfathered under current law but are unsightly and detract from nearby property value. I don't know when the last fish survey was carried out probably after the dam break but given time and aquatic palnt treatment in the interim, it may be time to request that again. My wife has concerns about the geese - adverse effects on lakeside property and potentially water quality. Thanks. P.S. Saw my first bald eagle on the lake this year.
96						12 years ago the lakes were better fishing. To many outside of the lake people launch boats to fish.
97						
98						
99						The constant build-up of sediment, harvested cut weeds and algae in front of our cottage has been an ongoing concern. Unless water flow is returned via the creek it will always be a concern. The silt build-ip is so deep that it is easy to get stuck in the muck. N3900 Primrose
100						

Survey Number	2f Comment	13m Comment	18p Comment	19s Comment	20s Comment	Other Comments (and Question 29)
101						Mt. Morris Lakes are in great condition and I strongly feel nearly all shoreline property owners do their very best to preserve them. We need to ensure we control the growth of aquatic palnts and weeds. Also I believe the single greatest threat to the lakes is the explosioin in the canadian geese population. The population has grown by leaps and bounds over the last 10 years. They pollute the water and shoreline. We need an abatement plan. Finally let's not over-regulate ourselves. Let's not go overboard on self-inflicted rules. Lastly I'm concerned with the growing snapper turtle population. Dangerous to kids and swimmers.
102	whenever I can		Do not know the names of anything I see in the lake			When we purchased our property in 1971 we had 100' of beautiful sand beach. Today, thanks mostly to fast boats towing water skiers, there is none. In addition, the present "shoreline" is deeply undercut. I cannto approach the water except by a stairway because the ground would collapse and I'd have to swim. I doubt if I could sell my property for any decent price because there is no place to launch even a canoe. I took my last canoe ride last year. The water was weedy, foamy and disgusting. No sane person would have swum in it. Also, we were nearly swamped by a passing boat with skier. Since it is now useless to me, I gave the canoe to my son. I won't be going out on the water any more. When weeds are cut on Lake D, the current carries many, if not most of them into my cove. I have to deal with other people's mess wich is almost impossible for me to do. Where can I stand? Not on shore and standing in the lake is a highly unstable undertaking. I do not care to lose my balance and fall into that dirty water, perhaps not able to find firm enough footing to get out again. My property is historic having the first dwelling on the south side of Rattlesnake Creek which was dammed to make the lake in the 1930s. My property (most of the south side of the creek then) became a resort. The house was built in 1879, shortly after one could take out a patent on his or her land; but by type of structure and local legend, the basement was once an underground house built in 1849. The land was in Indian Territory at that time, so the underground house was probably an "illegal" French fur trading post. The windows support that possibility. My neighbors all around the lake hav edestroyed both the lake and my beach for their "recreation". I find it difficult to remember the Biblical command to love them. I see no need to remain anonymous Joanne Alderson
103						We had a holding tank installed on our property. We have seen a slight improvement in water quality in our property area. Water seems clearer in some areas. (Would like to be able to clear the weeds in front of our property - as the weeds can be better controlled for our use of Lake D).
104						On the spot on Lake A where a stream flows into the southwest "corner", the silt buildup is extreme and makes docking our small boat virtually impossible. We'd love to get involved in any effort to remedy this. Kevin and Jeanne McCormick E7998 Wohlt Road Fremont WI 54940 920-667-4244 Would suggest looking into the Circul-O-Rater at http://www.tjtooley.com/2000/aerationlae_index.htm Restoring Lakes Using a Combination of Bacteria and Lake Aerator Technology such as Clean_Flo
105						Need to restrict boat launching statewide. Need water and hose at launch sites to wash boats. Need to restrict Bass Fishing Tournament. Periodically lower lake to allow property owners to clear along shore. Need better - mor obvious signage about wake hours. Need to increase mechanical harvesting of weeds.
106						
107						We want to be educated in ways to help our lakes stay as healthy as possible for future generations. Shoreline restoration is valuable. Do we have regulation to require land owners to keep a buffer area so lawn runoff is minimized? A boat ride reveals there are new lawns being allowed to run into the lake system.
108						With the enormous investment made in the weed cutter it would be nice to see it put more to use. If not to cut weeds to collect the floaters. Lake C has more of a problem than the other lakes because Porters Creek enters the lake flowing opposite to that of the lakes. This opposite flow causes anything floating down stram to be entangled in the natural vegetation. Mostly on the west side of the lake. When not retrieved this matter rots down and mixed with the silt that enters the lake from Porters Creek. This has happened every year since we arrived here and we have noticed that the lakes depth has decreased a great deal making it increasingly difficult to get our boat from our pier to navigable waters. Since the day the dam was lost during reconstruction this annual occurence has created a new land mass some one hundred plus feet long from the original mouth of Porters Creek to its' current position. I fear that if unchecked we will be unable to utilize our "over taxed" shoreline as well as seriously limit the amount of usable lake surface.
109						
110		ski hill				
111						
112						As an owner on Lake D, I believe the best/biggest step forward we took was chemical control of the weeds. If has made all the lakes more enjoyable and no doubt has helped property value. I do strongly support the use of a machine to help clean floating weeds off the lakes. If that required the purchase of a different machine, I would be all for that. Als, for what its worth, when I bought 14 years agoe I intended to be at Morris Lake for a brief period and move on to a bigger lake with more ski/tube hours. While I personally would like 10-6 instead of 10-5 dkiing/tubing hours, I think we have a great balance. I embrace and have come to love the combination of full wake hours and stillenjoy the quiet in the morning and late afternoon/early evening. Don't change a plan that works and may negatively impact property value. As long as we actively (let's face it chemically) control weeds and their pick up, the Morris chain will continue to be the best of all worlds.

Survey Number	2f Comment	13m Comment	18p Comment	19s Comment	20s Comment	Other Comments (and Question 29)
113						
114						I am so thankful that we have people like you Tim and others that care about the life of our lakes. Gob bless you.
115						
116						
117						
118						
119						
120						

C

APPENDIX C

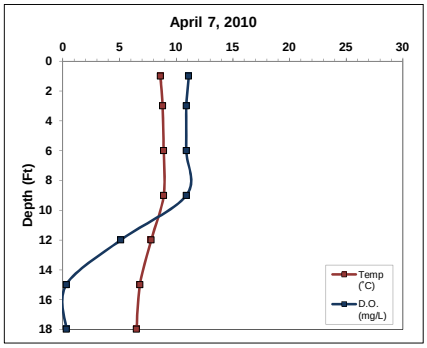
Water Quality Data

Mt. Morris - Lake A

Date: 4/7/2010
Time: 13:00
Weather: 100%clouds, windy, 35°F
Entry: TWH

Max Depth: 19.4
MMAS Depth (ft): 3.0
MMAB Depth (ft): 17.0
Secchi Depth (ft): 6.6

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	8.6	11.1		
3	8.8	10.9		
6	8.9	10.9		
9	8.9	10.9		
12	7.8	5.1		
15	6.8	0.3		
18	6.5	0.3		



Parameter	MMAS	MMAB
Total P (µg/L)	19.00	78.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	11.30	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

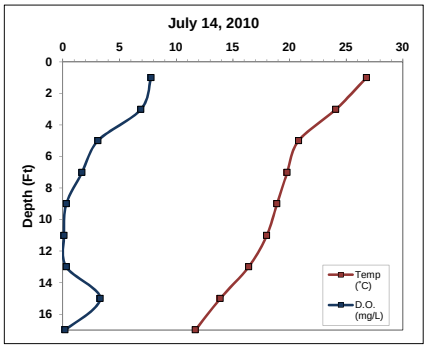
Data collected by BTB (Onterra)

Mt. Morris - Lake A

Date: 7/14/2010
Time: 12:02
Weather: 75% clouds, windy, 80°F+
Entry: TWH

Max Depth: 18.3
MMAS Depth (ft): 3.0
MMAB Depth (ft): 15.0
Secchi Depth (ft): 6.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	26.8	7.8		
3	24.1	6.9		
5	20.8	3.1		
7	19.8	1.7		
9	18.9	0.3		
11	18.0	0.1		
13	16.4	0.3		
15	13.9	3.3		
17	11.7	0.2		



Parameter	MMAS	MMAB
Total P (µg/L)	22.00	58.00
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	2.16	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

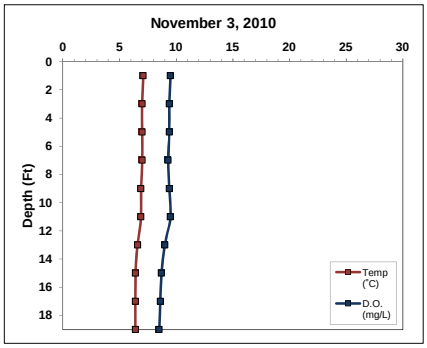
Data collected by TWH (Onterra)

Mt. Morris - Lake A

Date: 11/3/2010
Time: 12:10
Weather: 50% clouds, gentle breeze, 45°F
Entry: TWH

Max Depth: 20.2
MMAS Depth (ft): 3.0
MMAB Depth (ft): 17.0
Secchi Depth (ft): 12.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	7.1	9.5	8.0	354.0
3	7.0	9.4	8.1	355.0
5	7.0	9.4	8.1	354.0
7	7.0	9.3	8.1	355.0
9	6.9	9.4	8.1	353.0
11	6.9	9.5	8.1	353.0
13	6.6	9.0	8.1	352.0
15	6.4	8.7	8.0	351.0
17	6.4	8.6	8.0	352.0
19	6.4	8.5	8.0	353.0



Parameter	MMAS	MMAB
Total P (µg/L)	18.00	18.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	3.73	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

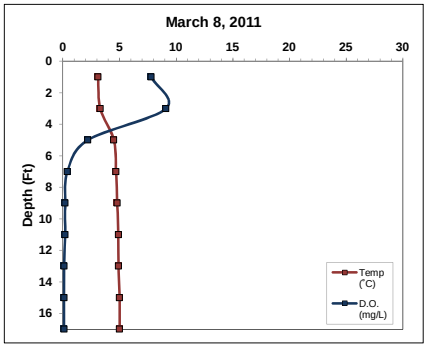
Data collected by DAC and TWH (Onterra)
Note: Water is pretty clear.

Mt. Morris - Lake A

Date: 03-08-11
Time: 10:15
Weather: 100% clouds, little breeze, 32°F
Entry: TWH

Max Depth: 17.5
MMAS Depth (ft): 3
MMAB Depth (ft): 15
Secchi Depth (ft): 6.1

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	3.1	7.8		
3	3.3	9.1		
5	4.5	2.2		
7	4.7	0.4		
9	4.8	0.2		
11	4.9	0.2		
13	4.9	0.1		
15	5	0.1		
17	5	0.1		



Parameter	MMAS	MMAB
Total P (µg/L)	15.00	76.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	NA	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

Data collected by TAH and TWH (Onterra)
Note: Ice depth 1.2'

Water Quality Data

2010	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	4	7.9	NA	NA
Total P (µg/L)	4	18.5	4	57.5
Dissolved P (µg/L)	0	NA	0	NA
Chl a (µg/L)	3	5.7	0	NA
TKN (µg/L	0	NA	0	NA
NO3+NO2-N (µg/L)	0	NA	0	NA
NH3-N (µg/L)	0	NA	0	NA
Total N (µg/L)	0	NA	0	NA
Lab Cond. (µS/cm)	0	NA	0	NA
Lab pH	0	NA	0	NA
Alkal (mg/l CaCO3)	0	NA	0	NA
Total Susp Sol (mg/l)	0	NA	0	NA
Calcium (µg/L)	0	NA	0	NA

Trophic State Index (WTSI)

Year	TP	Chl-a	Secchi
1986			43.5
1987			39.4
1988			41.5
1989			43.6
1991			42.0
1992			39.6
1993			43.9
1994			40.1
1995			41.4
1996			41.2
1997			42.2
1998			41.2
1999			43.2
2000			41.2
2001			40.4
2002			42.7
2004	51.1	46.3	39.4
2010	48.7	38.2	50.8
All Years (Weighted)	50.0	43.1	41.7
Deep, Lowland Drainage Lakes	49.4	49.7	46.2
NCHF Ecoregion	61.1	57.3	53.2

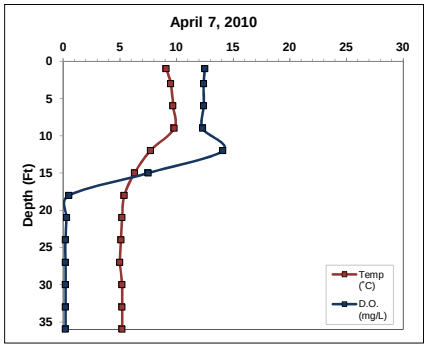
	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1986	10	10.9	6	10.3								
1987	7	12.7	4	13.8								
1988	20	11.8	13	11.8								
1989	12	11.1	9	10.2								
1991	11	11.6	10	11.4								
1992	11	13.3	9	13.5								
1993	13	10.7	10	10.0								
1994	14	13.2	11	13.1								
1995	12	11.9	12	11.9								
1996	8	11.8	7	12.1								
1997	9	11.3	9	11.3								
1998	11	12.1	11	12.1								
1999	10	10.5	9	10.5								
2000	11	12.4	9	12.1								
2001	8	13.2	7	12.8								
2002	7	10.9	4	10.9								
2004	2	11.7	1	13.7	2	5.1	1	5.0	2	21.5	1.0	26.0
2010	2	6.4	1	6.2	2	6.7	1	2.2	2	20.5	1.0	22.0
All Years (Weighted)		11.8		11.7		5.9		3.6		21.0		24.0
Deep, Lowland Drainage Lakes				8.5				7.0				23.0
NCHF Ecoregion				5.3				15.2				52.0

Mt. Morris - Lake B

Date: 4/7/2010
Time: 13:00
Weather: 100% clouds, windy, 35°F
Entry: TWH

Max Depth: 37.9
MMBS Depth (ft): 3.0
MMBB Depth (ft): 36.0
Secchi Depth (ft): 6.6

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	9.1	12.5		
3	9.5	12.4		
6	9.7	12.4		
9	9.8	12.3		
12	7.7	14.1		
15	6.3	7.5		
18	5.4	0.5		
21	5.2	0.3		
24	5.1	0.2		
27	5.0	0.2		
30	5.2	0.2		
33	5.2	0.2		
36	5.2	0.2		



Parameter	MMBS	MMBB
Total P (µg/L)	17.00	330.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	13.50	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

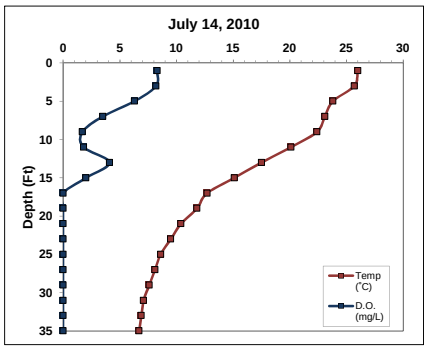
Data collected by BTB (Onterra)

Mt. Morris - Lake B

Date: 7/14/2010
Time: 11:30
Weather: 50% clouds, windy, 80°F+
Entry: TWH

Max Depth: 36.9
MMBS Depth (ft): 3.0
MMBB Depth (ft): 34.0
Secchi Depth (ft): 5.1

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	26.0	8.3		
3	25.7	8.2		
5	23.8	6.3		
7	23.1	3.5		
9	22.4	1.7		
11	20.1	1.8		
13	17.5	4.1		
15	15.1	2.0		
17	12.7	0.0		
19	11.8	0.0		
21	10.4	0.0		
23	9.5	0.0		
25	8.6	0.0		
27	8.1	0.0		
29	7.6	0.0		
31	7.1	0.0		
33	6.9	0.0		
35	6.7	0.0		



Parameter	MMBS	MMBB
Total P (µg/L)	26.00	182.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	8.23	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

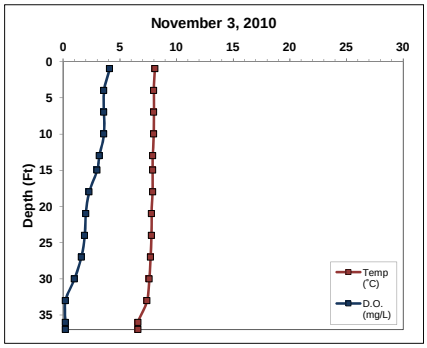
Data collected by TWH (Onterra)

Mt. Morris - Lake B

Date: 11/3/2010
Time: 12:10
Weather: 50% clouds, gentle breeze, 45°F
Entry: TWH

Max Depth: 38.0
MMBS Depth (ft): 3.0
MMBB Depth (ft): 35.0
Secchi Depth (ft): 7.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	8.1	4.1	7.8	374.0
4	8.0	3.6	7.8	374.0
7	8.0	3.6	7.7	374.0
10	8.0	3.6	7.7	374.0
13	7.9	3.2	7.7	374.0
15	7.9	3.0	7.7	374.0
18	7.9	2.3	7.7	374.0
21	7.8	2.0	7.7	375.0
24	7.8	1.9	7.7	375.0
27	7.7	1.6	7.6	377.0
30	7.6	1.0	7.6	381.0
33	7.4	0.2	7.4	399.0
36	6.6	0.2	7.1	471.0
37	6.6	0.2	7.0	475.0



Parameter	MMBS	MMBB
Total P (µg/L)	32.00	764.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	8.12	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

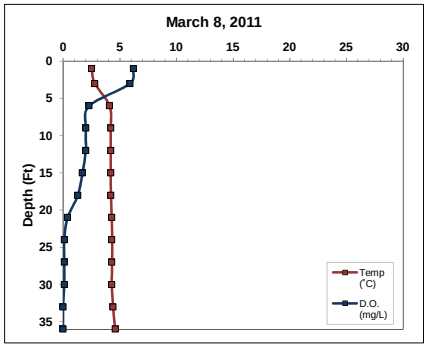
Data collected by DAC and TWH (Onterra)
Note: Water is pretty clear.

Mt. Morris - Lake B

Date: 03-08-11
Time: 10:15
Weather: 100% clouds, little breeze, 32°F
Entry: TWH

Max Depth: 37
MMBS Depth (ft): 3
MMBB Depth (ft): 34
Secchi Depth (ft): 11

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	2.5	6.2		
3	2.8	5.9		
6	4.1	2.3		
9	4.2	2		
12	4.2	2		
15	4.2	1.7		
18	4.2	1.3		
21	4.3	0.4		
24	4.3	0.1		
27	4.3	0.1		
30	4.3	0.1		
33	4.4	0		
36	4.6	0		



Parameter	MMBS	MMBB
Total P (µg/L)	18.00	326.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	NA	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

Data collected by TAH and TWH (Onterra)
Note: Ice depth 1.2'

Water Quality Data

2010	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	4	7.5	NA	NA
Total P (µg/L)	4	23.3	4	400.5
Dissolved P (µg/L)	0	NA	0	NA
Chl a (µg/L)	3	10.0	0	NA
TKN (µg/L	0	NA	0	NA
NO3+NO2-N (µg/L)	0	NA	0	NA
NH3-N (µg/L)	0	NA	0	NA
Total N (µg/L)	0	NA	0	NA
Lab Cond. (µS/cm)	0	NA	0	NA
Lab pH	0	NA	0	NA
Alkal (mg/l CaCO3)	0	NA	0	NA
Total Susp Sol (mg/l)	0	NA	0	NA
Calcium (µg/L)	0	NA	0	NA

Trophic State Index (WTSI)

Year	TP	Chl-a	Secchi
1986			41.0
1987			39.4
1988			40.2
1989			43.9
1991			42.9
1992			36.6
1993			39.7
1994			39.4
1995			35.0
1996			39.7
1997			38.1
1998			37.1
1999			41.8
2000			38.9
2001			38.7
2002			42.1
2004	42.2	32.5	38.7
2010	51.1	51.3	53.6
All Years (Weighted)	47.3	45.8	39.3
Deep, Lowland Drainage Lakes	49.4	49.7	46.2
NCHF Ecoregion	61.1	57.3	53.2

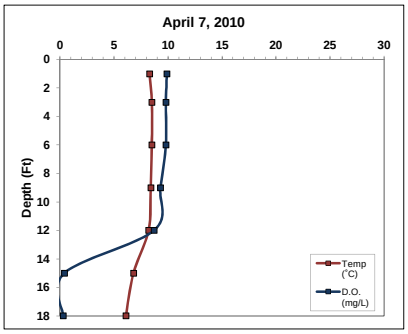
	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1986	10	12.9	6	12.3								
1987	7	15.0	3	13.8								
1988	20	12.8	13	13.0								
1989	12	11.5	9	10.1								
1991	12	11.0	11	10.8								
1992	11	16.0	9	16.6								
1993	13	13.9	10	13.4								
1994	14	14.4	11	13.8								
1995	12	18.5	12	18.5								
1996	8	13.0	7	13.4								
1997	9	15.0	9	15.0								
1998	11	16.0	11	16.0								
1999	10	11.5	9	11.6								
2000	11	13.9	9	14.2								
2001	8	14.5	7	14.4								
2002	7	11.6	4	11.4								
2004	2	12.3	1	14.4	2	4.7	1	1.2	2	17.0	1.0	14.0
2010	3	6.1	1	5.1	2	10.9	1	8.2	2	21.5	1.0	26.0
All Years (Weighted)		13.7		13.8		7.8		4.7		19.3		20.0
Deep, Lowland Drainage Lakes				8.5				7.0				23.0
NCHF Ecoregion				5.3				15.2				52.0

Mt. Morris - Lake C

Date: 4/7/2010
Time: 13:00
Weather: 100% clouds, windy, 35°F
Entry: TWH

Max Depth: 19.4
MMCS Depth (ft): 3.0
MMCB Depth (ft): 17.0
Secchi Depth (ft): 5.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1.0	8.3	9.9		
3.0	8.5	9.8		
6.0	8.5	9.8		
9.0	8.4	9.3		
12.0	8.2	8.7		
15.0	6.8	0.4		
18.0	6.1	0.3		



Parameter	MMCS	MMCB
Total P (µg/L)	23.00	146.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	9.43	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

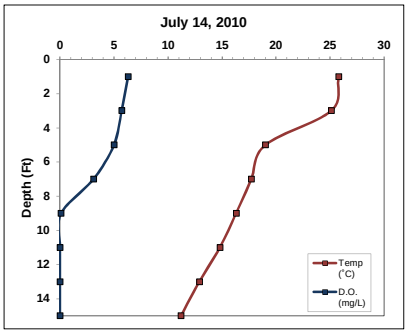
Data collected by BTB (Onterra)

Mt. Morris - Lake C

Date: 7/14/2010
Time: 11:30
Weather: 50% clouds, windy, 80°F+
Entry: TWH

Max Depth: 16.5
MMCS Depth (ft): 3.0
MMCB Depth (ft): 14.0
Secchi Depth (ft): 4.3

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	25.8	6.3		
3	25.1	5.7		
5	19.0	5.0		
7	17.7	3.1		
9	16.3	0.1		
11	14.8	0.0		
13	12.9	0.0		
15	11.2	0.0		



Parameter	MMCS	MMCB
Total P (µg/L)	32.00	97.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	5.20	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

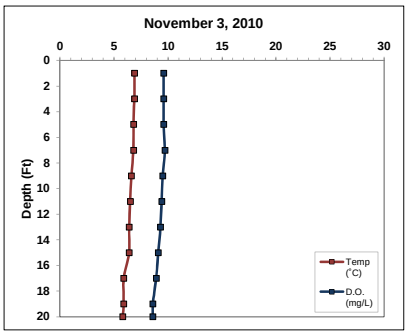
Data collected by TWH (Onterra)

Mt. Morris - Lake C

Date: 11/3/2010
Time: 12:10
Weather: 50% clouds, gentle breeze, 45°F
Entry: TWH

Max Depth: 20.6
MMCS Depth (ft): 3.0
MMCB Depth (ft): 17.0
Secchi Depth (ft): 9.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1.0	6.9	9.6	8.1	367
3.0	6.9	9.6	8.1	366
5.0	6.8	9.6	8.1	366
7.0	6.8	9.7	8.2	366
9.0	6.6	9.5	8.1	366
11.0	6.5	9.4	8.1	365
13.0	6.4	9.3	8.1	366
15.0	6.4	9.1	8.1	365
17.0	5.9	8.9	8.0	367
19.0	5.9	8.6	8.0	367
20.0	5.8	8.6	8.0	367



Parameter	MMCS	MMCB
Total P (µg/L)	16.00	26.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	2.81	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

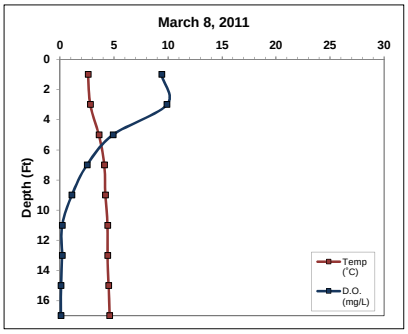
Data collected by DAC and TWH (Onterra)
Note: Water is pretty clear.

Mt. Morris - Lake C

Date: 03-08-11
Time: 10:15
Weather: 100% clouds, little breeze, 32°F
Entry: TWH

Max Depth: 18.5
MMCS Depth (ft): 3
MMCB Depth (ft): 16
Secchi Depth (ft): 9.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1.0	2.6	9.4		
3.0	2.8	9.9		
5.0	3.6	4.9		
7.0	4.1	2.5		
9.0	4.2	1.1		
11.0	4.4	0.2		
13.0	4.4	0.2		
15.0	4.5	0.1		
17.0	4.6	0.1		



Parameter	MMCS	MMCB
Total P (µg/L)	12.00	91.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	NA	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

Data collected by TAH and TWH (Onterra) Note: Ice depth 1.4'

Water Quality Data

2010	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	4	6.9	NA	NA
Total P (µg/L)	4	20.8	4	90.0
Dissolved P (µg/L)	0	NA	0	NA
Chl a (µg/L)	3	5.8	0	NA
TKN (µg/L	0	NA	0	NA
NO3+NO2-N (µg/L)	0	NA	0	NA
NH3-N (µg/L)	0	NA	0	NA
Total N (µg/L)	0	NA	0	NA
Lab Cond. (µS/cm)	0	NA	0	NA
Lab pH	0	NA	0	NA
Alkal (mg/l CaCO3)	0	NA	0	NA
Total Susp Sol (mg/l)	0	NA	0	NA
Calcium (µg/L)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1986			44.6
1987			41.5
1988			44.1
1989			45.0
1991			43.2
1992			42.6
1993			53.2
1994			41.9
1995			45.1
1996			45.3
1997			46.7
1998			42.0
1999			48.9
2000			44.6
2001			45.5
2002			45.4
2004	53.2	43.2	49.7
2006	48.3		42.1
2007	47.1		46.3
2008	55.1		49.1
2009	46.6		43.8
2010	54.1	46.8	56.1
All Years (Weighted)	49.9	45.2	44.9
Deep, Lowland Drainage Lakes	49.4	49.7	46.2
NCHF Ecoregion	61.1	57.3	53.2

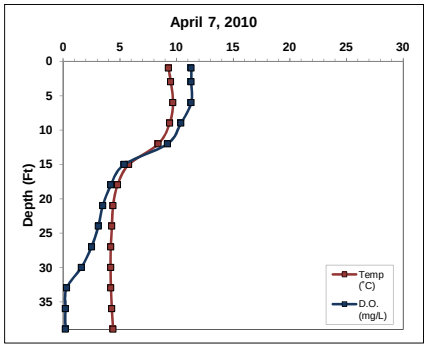
	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1986	10	8.9	6	9.5								
1987	7	11.4	4	11.8								
1988	18	10.2	12	9.9								
1989	12	9.7	9	9.3								
1991	12	10.3	11	10.5								
1992	11	11.3	9	11.0								
1993	13	6.6	10	5.3								
1994	14	11.7	11	11.5								
1995	12	9.2	12	9.2								
1996	8	9.2	7	9.1								
1997	9	8.3	9	8.3								
1998	11	11.5	11	11.5								
1999	10	7.2	9	7.1								
2000	11	10.4	9	9.5								
2001	8	9.9	7	9.0								
2002	7	9.4	4	9.1								
2004	9	11.0	1	6.7	2	4.2	1	3.6	2	23.0	1.0	30.0
2006	5	9.9	1	11.4					8	21.6	6.0	21.3
2007	8	8.6	6	8.5					8	20.0	6.0	19.7
2008	5	7.4	3	7.0					5	29.6	3.0	34.3
2009	1	10.1	1	10.1					1	19.0	1.0	19.0
2010	2	4.6	1	4.3	2	7.3	1	5.2	2	27.5	1.0	32.0
All Years (Weighted)		9.6		9.3		5.8		4.4		23.1		23.9
Deep, Lowland Drainage Lakes				8.5				7.0				23.0
NCHF Ecoregion				5.3				15.2				52.0

Mt. Morris - Lake D

Date: 4/7/2010
Time: 13:00
Weather: 100% clouds, windy, 35°F
Entry: TWH

Max Depth: 41.0
MMDS Depth (ft): 3.0
MMDB Depth (ft): 39.0
Secchi Depth (ft): 5.7

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1.0	9.3	11.3		
3.0	9.5	11.3		
6.0	9.7	11.3		
9.0	9.4	10.4		
12.0	8.4	9.2		
15.0	5.8	5.4		
18.0	4.8	4.2		
21.0	4.4	3.5		
24.0	4.3	3.1		
27.0	4.2	2.5		
30.0	4.2	1.6		
33.0	4.2	0.3		
36.0	4.3	0.2		
39.0	4.4	0.2		



Parameter	MMDS	MMDB
Total P (µg/L)	18.00	259.00
Dissolved P (µg/L)	ND	180.00
Chl-a (µg/L)	11.60	NA
TKN (µg/L)	500.00	2360.00
$NO_3 + NO_2$-N (µg/L)	616.00	39.00
NH_3-N (µg/L)	ND	1690.00
Total N (µg/L)	1116.00	2399.00
Lab Cond. (µS/cm)	336.00	414.00
Lab pH	8.33	7.63
Alkalinity (mg/L $CaCO_3$)	159.00	201.00
Total Susp. Solids (mg/L)	2.00	5.00
Calcium (mg/L)	40.50	NA

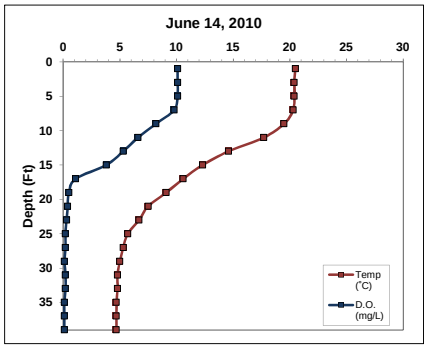
Data collected by BTB (Onterra)

Mt. Morris - Lake D

Date: 6/14/2010
Time: 12:15
Weather: 100% clouds, sprinkling, 65°F
Entry: TWH

Max Depth: 41.4
MMDS Depth (ft): 3.0
MMDB Depth (ft): 39.0
Secchi Depth (ft): 6.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1.0	20.5	10.1		
3.0	20.4	10.1		
5.0	20.4	10.1		
7.0	20.3	9.8		
9.0	19.5	8.2		
11.0	17.7	6.6		
13.0	14.6	5.3		
15.0	12.3	3.8		
17.0	10.6	1.1		
19.0	9.1	0.5		
21.0	7.5	0.4		
23.0	6.7	0.3		
25.0	5.7	0.2		
27.0	5.3	0.2		
29.0	5.0	0.1		
31.0	4.8	0.2		
33.0	4.8	0.2		
35.0	4.7	0.1		
37.0	4.7	0.1		
39.0	4.7	0.1		



Parameter	MMDS	MMDB
Total P (µg/L)	20.00	375.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	10.80	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	ND	5.00
Calcium (mg/L)	NA	NA

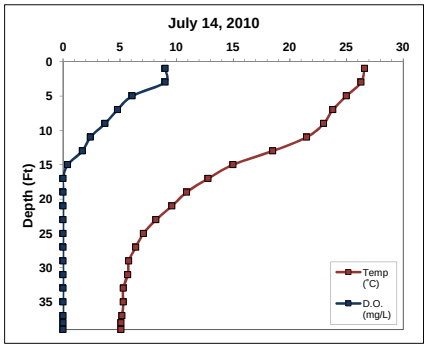
Data collected by TWH (Onterra)

Mt. Morris - Lake D

Date: 7/14/2010
Time: 10:00
Weather: sunny, breezy, 80°F
Entry: TWH

Max Depth: 41.2
MMDS Depth (ft): 3.0
MMDB Depth (ft): 38.0
Secchi Depth (ft): 4.3

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1.0	26.6	9.0		
3.0	26.3	9.0		
5.0	25.0	6.1		
7.0	23.8	4.8		
9.0	23.0	3.7		
11.0	21.5	2.4		
13.0	18.5	1.7		
15.0	15.0	0.4		
17.0	12.8	0.0		
19.0	10.9	0.0		
21.0	9.6	0.0		
23.0	8.2	0.0		
25.0	7.1	0.0		
27.0	6.4	0.0		
29.0	5.8	0.0		
31.0	5.7	0.0		
33.0	5.3	0.0		
35.0	5.3	0.0		
37.0	5.2	0.0		
38.0	5.1	0.0		
39.0	5.1	0.0		



Parameter	MMDS	MMDB
Total P (µg/L)	30.00	287.00
Dissolved P (µg/L)	ND	213.00
Chl-a (µg/L)	11.90	NA
TKN (µg/L)	840.00	2720.00
$NO_3 + NO_2$-N (µg/L)	239.00	26.00
NH_3-N (µg/L)	27.00	2340.00
Total N (µg/L)	1079.00	2746.00
Lab Cond. (µS/cm)	292.00	442.00
Lab pH	8.35	7.47
Alkalinity (mg/L $CaCO_3$)	139.00	220.00
Total Susp. Solids (mg/L)	3.00	3.00
Calcium (mg/L)	NA	NA

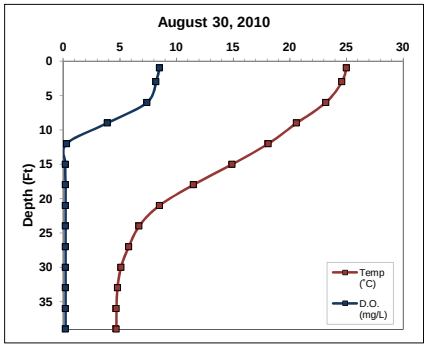
Data collected by TWH (Onterra)

Mt. Morris - Lake D

Date: 08-30-10
Time: 12:00
Weather: clear, light breeze, 83°F
Entry: TWH

Max Depth: 41.5
MMDS Depth (ft): 3
MMDB Depth (ft): 38
Secchi Depth (ft): 3.9

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1.0	25.0	8.5	8.2	342
3.0	24.6	8.2	8.2	342
6.0	23.2	7.4	8.0	344
9.0	20.6	3.9	7.6	347
12.0	18.1	0.3	7.4	338
15.0	14.9	0.2	7.4	350
18.0	11.5	0.2	7.4	365
21.0	8.5	0.2	7.4	382
24.0	6.7	0.2	7.3	386
27.0	5.8	0.2	7.3	386
30.0	5.1	0.2	7.3	386
33.0	4.8	0.2	7.3	389
36.0	4.7	0.2	7.3	400
39.0	4.7	0.2	7.1	427



Parameter	MMDS	MMDB
Total P (µg/L)	27.00	578.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	19.60	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	5.00	3.00
Calcium (mg/L)	NA	NA

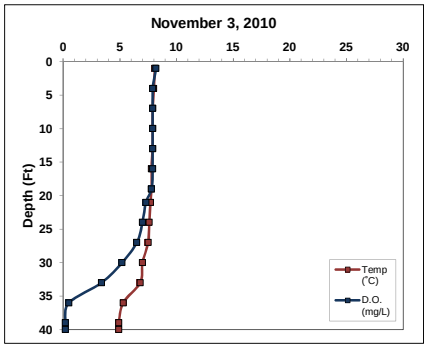
Data collected by TAH (Onterra)
Note: Lake D water stained

Mt. Morris - Lake D

Date: 11/3/2010
Time: 12:10
Weather: 50% clouds, gentle breeze, 45°F
Entry: TWH

Max Depth: 41.6
MMDS Depth (ft): 3
MMDB Depth (ft): 38
Secchi Depth (ft): 11

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1.0	8.1	8.2	8.8	366
4.0	8.0	7.9	8.1	366
7.0	7.9	7.9	8.1	366
10.0	7.9	7.9	8.1	367
13.0	7.9	7.9	8.1	366
16.0	7.8	7.9	8.1	366
19.0	7.8	7.8	8.0	366
21.0	7.7	7.3	8.0	367
24.0	7.6	7.0	8.0	368
27.0	7.5	6.5	7.9	370
30.0	7.0	5.2	7.8	376
33.0	6.8	3.4	7.7	379
36.0	5.3	0.5	7.5	406
39.0	4.9	0.2	7.3	425
40.0	4.9	0.2	7.3	429



Parameter	MMDS	MMDB
Total P (µg/L)	16.00	379.00
Dissolved P (µg/L)	3.00	NA
Chl-a (µg/L)	1.99	NA
TKN (µg/L)	520.00	NA
$NO_3 + NO_2$-N (µg/L)	569.00	NA
NH_3-N (µg/L)	208.00	NA
Total N (µg/L)	1089.00	NA
Lab Cond. (µS/cm)	373.00	NA
Lab pH	8.03	NA
Alkalinity (mg/L $CaCO_3$)	180.00	NA
Total Susp. Solids (mg/L)	ND	3.00
Calcium (mg/L)	43.00	NA

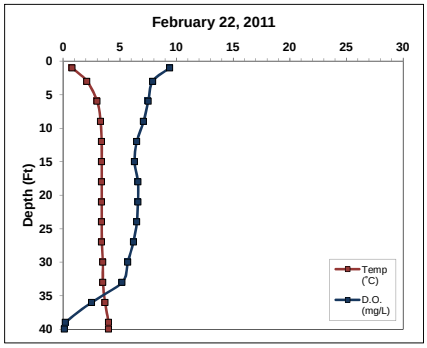
Data collected by DAC and TWH (Onterra)

Mt. Morris - Lake D

Date: 2/22/2011
Time:
Weather: 35°F, 12" snow on ice
Entry: TWH

Max Depth: 41
MMDS Depth (ft): 3
MMDB Depth (ft): 38
Secchi Depth (ft): 7.7

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1.0	0.8	9.4		
3.0	2.1	7.9		
6.0	3.0	7.5		
9.0	3.3	7.1		
12.0	3.4	6.5		
15.0	3.4	6.3		
18.0	3.4	6.6		
21.0	3.4	6.6		
24.0	3.4	6.5		
27.0	3.4	6.2		
30.0	3.5	5.7		
33.0	3.5	5.2		
36.0	3.7	2.5		
39.0	4.0	0.2		
40.0	4.0	0.1		



Parameter	MMDS	MMDB
Total P (µg/L)	13.00	83.00
Dissolved P (µg/L)	ND	60.00
Chl-a (µg/L)	NA	NA
TKN (µg/L)	300.00	1120.00
$NO_3 + NO_2$-N (µg/L)	1110.00	417.00
NH_3-N (µg/L)	139.00	861.00
Total N (µg/L)	1410.00	1537.00
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	ND	ND
Calcium (mg/L)	NA	NA

Data collected by TAH,DAC and BTB (Onterra) Notes: Last week, warm temps caused rapid snow and ice melt in WI. On 2-20 and 2-21, a snow storm dropped 13" of snow in this area. As a result, Mt Morris Lake was very flat and slick with 13" of snow on top. Difficult to get around on the lake. Decided not to attempt to sample other basins at this time.

Water Quality Data

2010	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	6.5	NA	NA
Total P (µg/L)	6	20.7	6	326.8
Dissolved P (µg/L)	4	3.0	3	151.0
Chl a (µg/L)	5	11.2	0	NA
TKN (µg/L	4	540.0	3	2066.7
NO3+NO2-N (µg/L)	4	633.5	3	160.7
NH3-N (µg/L)	4	124.7	3	1630.3
Total N (µg/L)	4	1173.5	3	2227.3
Lab Cond. (µS/cm)	3	333.7	2	428.0
Lab pH	3	8.2	2	7.6
Alkal (mg/l CaCO3)	3	159.3	2	210.5
Total Susp Sol (mg/l)	6	3.3	6	3.8
Calcium (µg/L)	2	41.8	0	NA

Trophic State Index (WTSI)

Year	TP	Chl-a	Secchi
1986			40.8
1987			41.5
1988	35.8	45.4	42.7
1989			44.7
1991			40.0
1992			39.3
1993			50.3
1994	44.4	44.2	41.4
1995	41.1	44.8	41.7
1996	48.3	45.7	44.1
1997	56.1	46.0	40.4
1998	43.2	40.7	39.2
1999	46.6	46.9	43.6
2000	45.8	37.2	40.0
2001	47.2	46.7	43.3
2002			45.8
2004	54.4	47.3	43.2
2006	45.0		
2007	42.5		41.0
2008	50.8		47.2
2009	43.2		39.1
2010	50.9	56.6	54.2
All Years (Weighted)	47.1	46.8	42.2
Deep, Lowland Drainage Lakes	49.4	49.7	46.2
NCHF Ecoregion	61.1	57.3	53.2

	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1986	10	11.3	6	12.5								
1987	7	12.2	4	11.9								
1988	25	12.4	18	10.9	2	4.5	2	4.5	2	9.0	2.0	9.0
1989	5	9.5	5	9.5								
1991	10	12.8	9	13.2								
1992	11	14.1	9	13.8								
1993	13	7.7	10	6.5								
1994	19	12.1	14	11.9	5	4.2	3	4.0	5	16.2	3.0	16.3
1995	16	11.6	15	11.7	4	3.7	3	4.2	4	15.0	3.0	13.0
1996	13	9.8	10	9.9	5	8.3	3	4.7	5	21.6	3.0	21.3
1997	14	12.6	12	12.8	4	5.5	3	4.8	5	36.8	3.0	36.7
1998	13	13.8	11	13.9	4	4.3	3	2.8	5	19.0	3.0	15.0
1999	13	10.5	10	10.3	4	5.5	3	5.3	5	18.8	3.0	19.0
2000	14	13.3	11	13.1	4	4.2	3	2.0	5	18.4	3.0	18.0
2001	15	10.9	12	10.5	5	5.3	4	5.2	6	19.0	4.0	19.8
2002	8	8.4	4	8.8					1	25.0	0.0	
2004	20	9.9	13	10.5	4	6.6	3	5.5	4	30.0	3.0	32.7
2006									8	16.8	6.0	17.0
2007	8	11.9	6	12.3					9	18.1	7.0	14.3
2008	5	8.2	3	8.0					5	24.0	3.0	25.3
2009	1	14.0	1	14.0					1	15.0	1.0	15.0
2010	4	5.1	3	4.9	4	13.5	3	14.1	4	23.8	3.0	25.7
All Years (Weighted)		11.3		11.2		6.0		5.2		20.5		19.7
Deep, Lowland Drainage Lakes				8.5				7.0				23.0
NCHF Ecoregion				5.3				15.2				52.0

Summer 2010 N: 1079.0
Summer 2010 P: 25.7

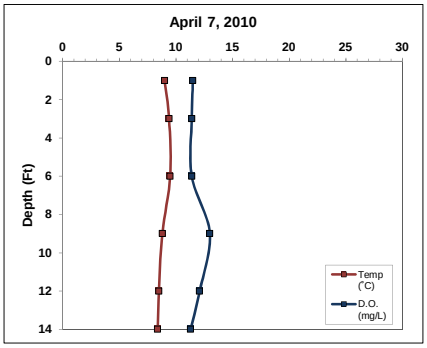
Summer 2011 N:P 42 :1

Mt. Morris - Lake E

Date: 4/7/2010
Time: 13:00
Weather: windy, 1005 clouds, 35°F
Entry: TWH

Max Depth: 15.6
MMES Depth (ft): 3.0
MMEB Depth (ft): 14.0
Secchi Depth (ft): 11.8

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1.0	9.0	11.5		
3.0	9.4	11.4		
6.0	9.5	11.4		
9.0	8.8	13.0		
12.0	8.5	12.1		
14.0	8.4	11.3		



Parameter	MMES	MMEB
Total P (µg/L)	13.00	ND
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	2.57	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

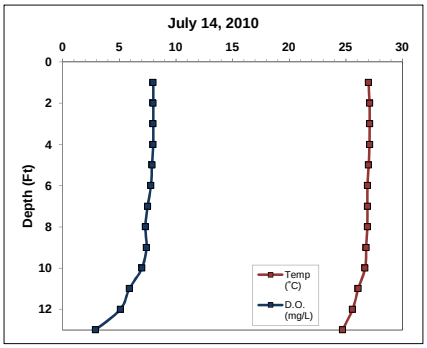
Data collected by BTB (Onterra)

Mt. Morris - Lake E

Date: 7/14/2010
Time: 10:35
Weather: sunny, breezy, 80°F
Entry: TWH

Max Depth: 14.3
MMES Depth (ft): 3.0
MMEB Depth (ft): 11.0
Secchi Depth (ft): 8.8

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1.0	27.0	8.0		
2.0	27.1	8.0		
3.0	27.1	8.0		
4.0	27.1	8.0		
5.0	27.0	7.9		
6.0	26.9	7.8		
7.0	26.9	7.5		
8.0	26.9	7.3		
9.0	26.8	7.4		
10.0	26.7	7.0		
11.0	26.1	5.9		
12.0	25.6	5.1		
13.0	24.7	2.9		



Parameter	MMES	MMEB
Total P (µg/L)	14.00	17.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	3.56	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

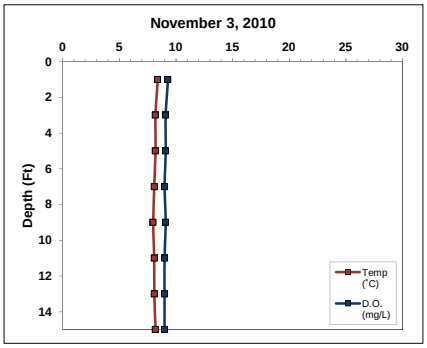
Data collected by TWH (Onterra)

Mt. Morris - Lake E

Date: 11/3/2010
Time: 12:10
Weather: 50% clouds, gentle breeze, 45°F
Entry: TWH

Max Depth: 16.3
MMES Depth (ft): 3.0
MMEB Depth (ft): 13.0
Secchi Depth (ft): 10.4

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1.0	8.4	9.3	8.4	325
3.0	8.2	9.1	8.4	325
5.0	8.2	9.1	8.4	325
7.0	8.1	9.0	8.4	325
9.0	8.0	9.1	8.4	324
11.0	8.1	9.0	8.4	323
13.0	8.1	9.0	8.4	324
15.0	8.2	9.0	8.2	339



Parameter	MMES	MMEB
Total P (µg/L)	16.00	29.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	3.55	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

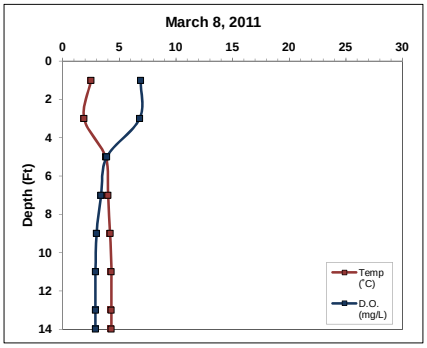
Data collected by DAC and TWH (Onterra)

Mt. Morris - Lake E

Date: 03-08-11
Time: 11:40
Weather: 100% clouds, little breeze, 32°F
Entry: TWH

Max Depth: 14.7
MMES Depth (ft): 3
MMEB Depth (ft): 12
Secchi Depth (ft): 11.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1.0	2.5	6.9		
3.0	1.9	6.8		
5.0	3.8	3.9		
7.0	4.0	3.4		
9.0	4.2	3.0		
11.0	4.3	2.9		
13.0	4.3	2.9		
14.0	4.3	2.9		



Parameter	MMES	MMEB
Total P (µg/L)	16.00	14.00
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	NA	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA

Data collected by TAH and TWH (Onterra) Note: Ice depth 1.5'

Water Quality Data

2010	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	4	10.6	NA	NA
Total P (µg/L)	4	14.8	4	20.0
Dissolved P (µg/L)	0	NA	0	NA
Chl a (µg/L)	3	3.2	0	NA
TKN (µg/L	0	NA	0	NA
NO3+NO2-N (µg/L)	0	NA	0	NA
NH3-N (µg/L)	0	NA	0	NA
Total N (µg/L)	0	NA	0	NA
Lab Cond. (µS/cm)	0	NA	0	NA
Lab pH	0	NA	0	NA
Alkal (mg/l CaCO3)	0	NA	0	NA
Total Susp Sol (mg/l)	0	NA	0	NA
Calcium (µg/L)	0	NA	0	NA

Trophic State Index (WTSI)

Year	TP	Chl-a	Secchi
1986			38.8
1987			42.9
1988			39.8
1991			39.8
1992			39.6
1993			42.4
1994			38.7
1995			39.8
1996			39.1
1997			39.8
1998			39.5
1999			44.8
2000			38.9
2001			39.1
2002			41.5
2004	53.7	49.1	45.0
2010	42.2	43.1	45.8
All Years (Weighted)	49.0	46.5	40.3
Deep, Seepage Lakes	43.2	43.2	42.4
NCHF Ecoregion	61.1	57.3	53.2

	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1986	10	14.4	6	14.3								
1987	7	11.8	4	10.8								
1988	19	13.6	12	13.3								
1991	11	13.1	10	13.3								
1992	11	13.6	9	13.5								
1993	13	11.5	10	11.1								
1994	14	14.4	11	14.3								
1995	12	13.3	12	13.3								
1996	8	14.0	7	14.0								
1997	9	13.3	9	13.3								
1998	11	13.6	11	13.6								
1999	10	9.4	9	9.4								
2000	11	14.1	9	14.2								
2001	7	14.0	6	14.0								
2002	7	12.4	4	11.8								
2004	10	8.4	5	9.3	2	5.6	1	6.6	2	22.0	1.0	31.0
2010	4	10.3	2	8.8	2	3.1	1	3.6	2	13.5	1.0	14.0
All Years (Weighted)		12.8		12.8		4.3		5.1		17.8		22.5
Deep, Seepage Lakes				11.2				3.6				15.0
NCHF Ecoregion				5.3				15.2				52.0

D

APPENDIX D

Watershed Analysis WiLMS Results

Date: 3/16/2012 Scenario: Mt Morris Watershed Current

Lake Id: MtMorris_Watershed_Current
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 4041.0 acre
Total Unit Runoff: 10.30 in.
Annual Runoff Volume: 3468.5 acre-ft
Lake Surface Area <As>: 119 acre
Lake Volume <V>: 1428 acre-ft
Lake Mean Depth <z>: 12.0 ft
Precipitation - Evaporation: 3.2 in.
Hydraulic Loading: 4817.7 acre-ft/year
Areal Water Load <qs>: 40.5 ft/year
Lake Flushing Rate <p>: 3.37 1/year
Water Residence Time: 0.30 year
Observed spring overturn total phosphorus (SPO): 22.1 mg/m^3
Observed growing season mean phosphorus (GSM): 20.5 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre	Low	Most Likely	High	Loading %	Low	Most Likely	High
	(ac)	Loading (kg/ha-year)				Loading (kg/year)		
Row Crop AG	894	0.50	1.00	3.00	63.8	181	362	1085
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	482	0.10	0.30	0.50	10.3	20	59	98
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	0.0	0.30	0.50	0.80	0.0	0	0	0
Rural Res (>1 Ac)	258	0.05	0.10	0.25	1.8	5	10	26
Wetlands	899	0.10	0.10	0.10	6.4	36	36	36
Forest	1508	0.05	0.09	0.18	9.7	31	55	110
Lake Surface	119.0	0.10	0.30	1.00	2.5	5	14	48

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %
Porters Lake	165000	0.0	2.5	0.0	0.4
Norwegian Lake	1460000	0.0	27.9	0.0	4.9

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	0.0				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	611.4	1249.8	3094.0	100.0
Total Loading (kg)	277.3	566.9	1403.4	100.0
Areal Loading (lb/ac-year)	5.14	10.50	26.00	
Areal Loading (mg/m^2-year)	575.90	1177.22	2914.25	
Total PS Loading (lb)	0.0	67.0	0.0	5.4
Total PS Loading (kg)	0.0	30.4	0.0	5.4
Total NPS Loading (lb)	600.8	1151.0	2987.8	94.6
Total NPS Loading (kg)	272.5	522.1	1355.3	94.6

Phosphorus Prediction and Uncertainty Analysis Module

Date: 3/16/2012 Scenario: 46
Observed spring overturn total phosphorus (SPO): 22.1 mg/m^3
Observed growing season mean phosphorus (GSM): 20.5 mg/m^3
Back calculation for SPO total phosphorus: 0.0 mg/m^3
Back calculation GSM phosphorus: 0.0 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 0 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir	22	45	112	25	122
Canfield-Bachmann, 1981 Natural Lake	31	57	117	37	180
Canfield-Bachmann, 1981 Artificial Lake	28	47	87	27	132
Rechow, 1979 General	22	45	110	25	122
Rechow, 1977 Anoxic	40	81	200	61	298
Rechow, 1977 water load<50m/year	29	59	147	39	190
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	32	65	160	43	195
Vollenweider, 1982 Combined OECD	25	46	96	25	117
Dillon-Rigler-Kirchner	22	45	112	23	104
Vollenweider, 1982 Shallow Lake/Res.	20	38	85	17	80
Larsen-Mercier, 1976	30	62	153	40	181
Nurnberg, 1984 Oxic	24	48	119	28	137

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir	26	89	FIT	0	GSM
Canfield-Bachmann, 1981 Natural Lake	18	164	FIT	1	GSM
Canfield-Bachmann, 1981 Artificial Lake	15	135	FIT	1	GSM
Rechow, 1979 General	25	89	FIT	0	GSM
Rechow, 1977 Anoxic	48	158	FIT	0	GSM
Rechow, 1977 water load<50m/year	34	117	FIT	0	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	32	134	FIT	0	SPO
Vollenweider, 1982 Combined OECD	22	90	FIT	0	ANN
Dillon-Rigler-Kirchner	27	89	P	0	SPO
Vollenweider, 1982 Shallow Lake/Res.	19	76	FIT	0	ANN
Larsen-Mercier, 1976	38	120	P Pin	0	SPO
Nurnberg, 1984 Oxic	25	98	FIT	0	ANN

E

APPENDIX E

Aquatic Plant Survey Data

Point Number	Depth (ft)	Sediment type (M=muck, S=Sand, R=Rock)	Rope (R); Pole (P); Visual (V)	Notes	Total Rake Fullness	*Myriophyllum spicatum*	*Potamogeton crispus*	*Ceratophyllum demersum*	*Chara spp.*	*Eleocharis erythropoda*	*Elodea canadensis*	*Heteranthera dubia*	*Lemna trisulca*	*Lemna turionifera*	*Myriophyllum sibiricum*	*Myriophyllum verticillatum*	*Najas flexilis*	*Nitella spp.*	*Nuphar variegata*	*Nymphaea odorata*	*Potamogeton illinoensis*	*Potamogeton praelongus*	*Potamogeton richardsonii*	*Schoenoplectus acutus*	*Spirodela polyrhiza*	*Stuckenia pectinata*	*Utricularia resupinata*	*Utricularia vulgaris*	*Vallisneria americana*	*Wolffia brasiliensis*	*Zizania aquatica*
1				UNREACHABLE																											
2				UNREACHABLE																											
3	2	M	P		2			2						1						1					1						
4	5	M	P		1															1											
5	5	M	P		1				1							1			1									1			
6	5	M	P		1		V	1	1																						
7	4	M	P		1			1	1										1									1			
8	9	M	P		1						1																				
9	15		R		2			2																							
10	14		R	NV																											
11	6	M	P		2											2			1									1			
12	4	M	P		2				2										1	1											
13	14		R	NV																											
14				TD																											
15	16		R	NV																											
16	5	M	P		3				3																						
17	3	M	P		2				2										1	1											
18	12	M	P		1											1															
19	14	M	P	NV																											
20	6	M	P		1			1								1			1							1		1			
21	2	M	P		2			1	1							1	1										1	2			
22	5	M	P		3				3																						
23	5	M	P		3			1	3																						
24	4	M	P		3				3																						
25				UNREACHABLE																											
26	10	M	P		1											1															
27	6	M	P		2				2																			1			
28	15		R		1				1																						
29	11	M	P		1																							1			
30	8	M	P		2				2																						
31	6	M	P		2				2																						
32	3	M	P		3				3										1	1											
33	6	M	P		2			1	1														2								
34	3	M	P		1				1																						
35	8	M	P		2				2																			1			
36	6	M	P		1				1			1			1				1										1		
37	8	M	P		2				1																			2			
38	14		R		1			1																							
39	10	M	P	NV																											

40	11	M	P																						1					
41	5	M	P		3				3																					
42	7	M	P		2				2																					
43				TD																										
44				TD																										
45				TD																										
46				TD																										
47	14		R		2			2																						
48	6	M	P		2				2						1															
49	5	M	P		2				3																					
50				TD																										
51				TD																										
52				TD																										
53				TD																										
54				TD																										
55	4	M	P		2			1	2																					
56	4	M	P		3				3																					
57	16		R		1			1	1																					
58				TD																										
59				TD																										
60				TD																										
61				TD																										
62	6	M	P		2				2																					
63	1	M	P		2			1	2														1	1						
64	14		R		1			1																						
65				TD																										
66				TD																										
67				TD																										
68	19		R	NV																										
69	6	M	P		3				3																1					
70	5	M	P		1				1																					
71	11	M	P	NV																										
72	12	M	P		1				1																					
73	7	M	P		1			1	1																					
74	6	M	P		2				2																			1		
75	4	M	P		1														1											
76	5	M	P		1				1														1				1	1		
77				UNREACHABLE																										
78	2	M	P		2				2																		1			
79	1	S	P		3				3																					
80	2	S	P		2				2																					
81	3	S	P		2				2																					
82	3	S	P		3				3										1											
83				UNREACHABLE																										
83	4	S	P		3				3						1			1												
84	5	S	P		1				1						1			1												
85				UNREACHABLE																										
86	4	S	P		2				2									1	1								1			

87	4	M	P	NV																										
91	2	S	P		3										3				1											
92	5	S	P		2				2							1														
93	5	M	P	NV																										
94	5	M	P		3				3						1															
95	5	M	P		1			1																						
96	2	M	P		2	2	1	1																						
97				UNREACHABLE																										
98				UNREACHABLE																										
99	5	M	P		3				3																		1			
100	9	M	P	NV																										
101	8	M	P	NV																										
102	5	M	P		3	1		2			2																			
103	3	M	P		3			3					1	1										1						
104	3	M	P		3			3					1	1										1						
105				UNREACHABLE																										
106				UNREACHABLE																										
107				UNREACHABLE																										
108	5	M	P		2				1		2				1				1											
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110	6	S	P	NV																										
111	8	M	P		1													1												
112				TD																										
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115				UNREACHABLE																										
116	2	M	P		2		1				2		1						1											
117	3	M	P		3				3																					
118	5	M	P		3				3		2					1														
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121	8	M	P		3				3																					
122	5	S	P		2				2		1																			
123	3	S	P		1				1										1	1										
124				UNREACHABLE																										
125	1	M	P		3			3	1		1																			V
126	2	M	P		3			1			2									1						1				
127	2	S	P		2				2										1											
128	5	S	P		1				1																	1				
129	19		R	NV																										
130	18		R	NV																										
131	19		R	NV																										
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136	2	M	P		2			1	1		2											2								
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139	18		R	NV																										
140	14		R		1			1																						
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142	2	S	P	NV																										
143	2	S	P		2			1			2																			
144	6	M	P		1										1															
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146	8	M	P		1											1														
147	16		R	NV																										
148	8	M	P		3				1									3												
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152	8	M	P		2				2													1								
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163	5	S	P		2				2																					
164	5	M	P	NV																										
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168	2	S	P		3				3			1	1	1					1		1				1			1	1	1	
169	2	S	P		3				3										1				1							
170	2	S	P		2				2								1													
171	2	S	P		3				1																		1	3		
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173	6	S	P		1				1																					
174	3	S	P		2							1															2			
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177	4	S	P		3				1																		3			
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186	6	S	P		1				1																					
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195	4	S	P		2				2																					
196	6	S	P		1							1																		
197	6	M	P		1						1																1			
198	14		R	NV																										
199				TD																										
200				TD																										
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202	6	M	P		1				1							1				1							1			
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204	4	S	P		1				1																					
205	19		R	NV																										
206				TD																										
207				TD																										
210				TD																										
211	8	M	P		1				1															1						
212	7	S	P		1				1															1						
213				TD																										
214				TD																										
219				TD																										
220	8	M	P		1				1																					
222	17		R	NV																										
223				TD																										
229				TD																										
230	18		R	NV																										
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232	5	S	P		3																						3			
240				TD																										
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242	4	M	P		3				1											1							3			
243	5	S	P		2				2																					
244				TD																										
251	24			TD																										
252	7	M	P		1				1															1						
253	2	S	P		3											3														
254	4	S	P	NV																										
255				TD																										
260				TD																										
261				TD																										
262	8	M	P		1				1															1			1			

263	2	R	P		1				1								1											1		
264	6	S	P		2															1								2		
270	12	M	P		1				1									1												
271	8	M	P		2				2																					
272	5	M	P		1				1								1													
273	7	M	P		2																							2		
274				TD																										
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279	5	M	P		3				3																					
280	1	S	P		1																							1		
281				TD																										
285	8	M	P		1				1																					
286	7	S	P		1				1																					
287				TD																										
288				TD																										
289	8	M	P		1				1																					
290	2	S	P		1																							1		
291	6	M	P		2				2																					
292				TD																										
293				TD																										
294	12		R		1				1								1													
295	2	S	P		3						1						1										1	3		
296	12		R		1				1																					
297	28			TD																										
298	30			TD																										
299	9	S	P		1				1																					
300	5	M	P		2				2		1	1																2		
301	6	M	P		2				2																					
302	9	M	P		1				1																					
304	20		R	NV																										
305	6	M	P		1				1								1											1		
306	7	M	P		2				2																					
307	15		R	NV																										
308	24			TD																										
309	5	S	P		2				2								1											1		
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311	6	M	P		2				2																					
312	6	M	P		1				1																			1		
313	2	S	P		3				3								1								1					
314	8	S	P		1				1																					
315				UNREACHABLE																										
316	3	S	P		2												2			1								1		
317	5	S	P		1				1																			1		
318	4	S	P		3				3								1													
319	8	S	P		1				1			1																		
320	9	S	P		1				1																					
321	5	S	P		3				1			1					2			1								1		
322	6	M	P		1				1																			1		

323	10	S	P		1				1																				
324	11	S	P		1				1																				
325	11	S	P		1				1																				
326	10	S	P		1				1																				
327	8	S	P		2															1					2			
401	5	M	P		1													1	1	1									
402	4	M	P		3				2													1							
403	4	S	P		1				1																				
404	5	M	P		1											1				1									
405	6	M	P		3				3																				
406	7	M	P		1				1																				
407	5	M	P		3				1							3												1	
408	6	M	P		3				3																				
409	12	M	P		2				2																				
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411	5	S	P		3											3													
412	9	M	P		1				1																				
413	14		R	NV																									
414	14		R	NV																									
415	12	M	P	NV																									
416	6	S	P		1				1																				
417	15		R	NV																									
418	15		R		1											1													
419	14		R	NV																									
420	6	S	P		2											1												2	
421	12		R		2				2																				
422	14		R	NV																									
423	14		R	NV																									
424	13	M	P	NV																									
425	6	S	P		2				1							2												1	
426	3	S	P		1				1						1		1			1								1	
427	8	S	P		1				1																				
428	13		R		3				3							1											1		
429	11	M	P		1				1							1													
430				UNREACHABLE																									
431	3	S	P		2				1							2			1	1		1						1	
432	3	S	P		2											1			1	2		1							