

A

APPENDIX A

Public Participation Materials

- Kick-off Meeting Announcement
- Kick-off Meeting Presentation
- Planning Meeting Presentation
- Wrap-up Meeting Presentation

Loon Lake

Management Planning Project

Kick-Off Meeting

July 23, 2016– 9:00 AM

Camp Tekakwitha

W5248 Lake Dr, Shawano, WI 54166

The Loon Lake Wescott Management District has received a grant totaling almost \$20,000 from the Wisconsin Department of Natural Resources to partially fund the completion of a comprehensive management plan for Loon Lake. The design for the planning project has been finalized and approved by the WDNR and includes two primary objectives: 1) the completion of in-depth studies including multiple plant surveys, water quality sampling, and watershed investigations; and 2) the completion of a realistic management plan for the lake and its watershed. Most of the studies will be completed during the spring, summer, and fall of 2016. The tasks associated with the analysis of the data will be completed during the fall and winter of 2016-17. The project will also incorporate opportunities for stakeholder education and input, which are both very important components of all lake management planning efforts. The first opportunity for your participation in the process will be at the Project Kick-off Meeting to be held on Saturday, July 23rd at 9:00 am at Camp Tekakwitha. In addition to this meeting another opportunity for your input will be through a written stakeholder survey that will be distributed during the project.



Onterra ecologist Eddie Heath speaks to a lake group in Fond du Lac County about their lake management plan. Public participation will be an integral part of the Loon Lake project.

Onterra, LLC, a lake management planning firm out of De Pere, has been hired to lead the project. During the meeting, Eddie Heath, an aquatic ecologist with Onterra, LLC, will describe the project and its importance. The presentation will include a description of the project's components, a quick course on general lake ecology, and a breakdown of how the District's Planning Committee will be involved in the plan's completion.

Please plan on attending this important meeting and do not hesitate to ask questions or make comments.



Presentation Outline

- Onterra, LLC
- Why Create a Management Plan?
- Elements of a Lake Management Planning Project
 - Data & Information
 - Planning Process

Onterra, LLC _____
Lake Management Planning

Onterra, LLC

- Founded in 2005
- Staff
 - Four lead ecologists
 - Three field technicians
 - Five summer interns
- Services
 - Science and planning
- Philosophy
 - Promote realistic planning
 - Assist, not direct

Onterra, LLC _____
Lake Management Planning

Why create a lake management plan?

- To create a better understanding of the 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.

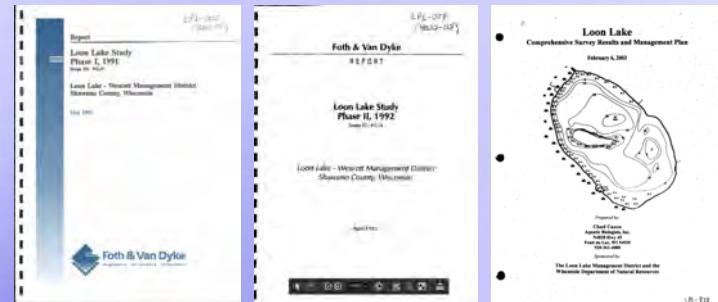
Onterra, LLC _____
Lake Management Planning

Why create a lake management plan?

- WDNR recommends lakes conducting active management update aspects of the plan every 5 years.
- Having a current and approved plan makes the sponsor eligible for WDNR grants that implement an action.
- Conducting large-scale management requires a current and approved plan.

Onterra LLC
Lake Management Planning

Past Planning Efforts



Onterra LLC
Lake Management Planning

Elements of an Effective Lake Management Planning Project

Data and Information Gathering

Environmental & Sociological

Planning Process

Brings it all together



Onterra LLC
Lake Management Planning

Data and information gathering

- Study Components
 - Water Quality Analysis
 - Watershed Assessment
 - Aquatic Plant Surveys
 - Fisheries Data Integration
 - Shoreline Assessment
 - Stakeholder Survey

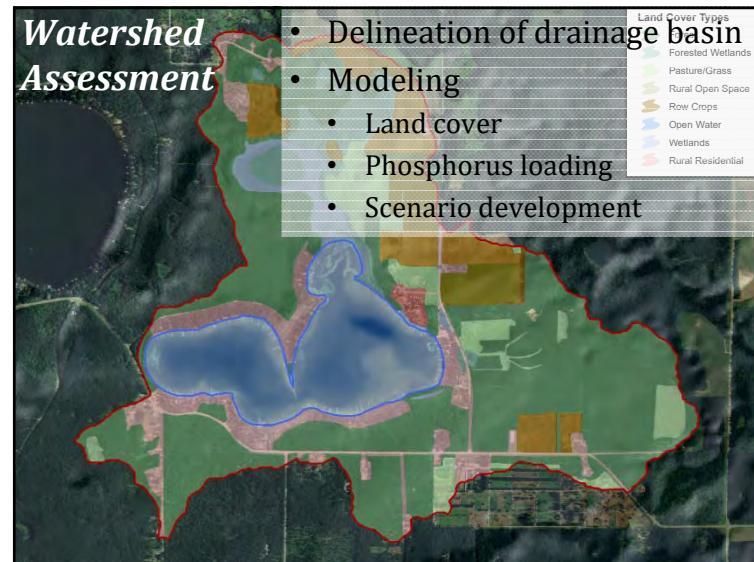
Onterra LLC
Lake Management Planning

Water Quality Analysis

- General water chemistry (current & historic)
- Nutrient analysis
 - Lake trophic state (Eutrophication)
 - Limiting plant nutrient
- Supporting data for watershed modeling



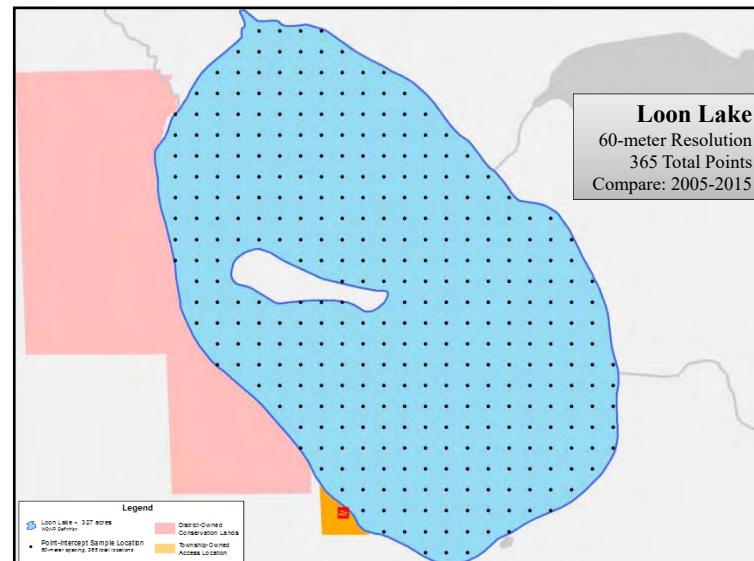
Onterra LLC
Lake Management Planning



Aquatic Plant Surveys

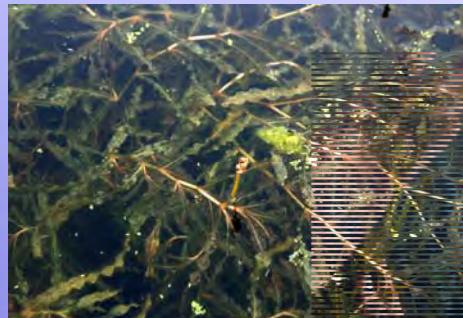
- Concerned with both native and non-native plants
- Multiple surveys used in assessment
 - Early Season AIS Survey
 - Point-intercept Survey
 - Late-Summer EWM Survey
 - Floating-leaf and Emergent Community Mapping Survey

Onterra LLC
Lake Management Planning



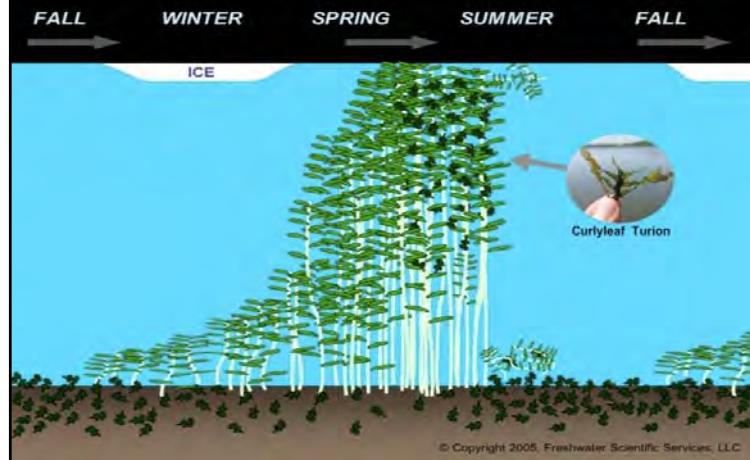
Non-native Aquatic Plants

Curly-leaf Pondweed



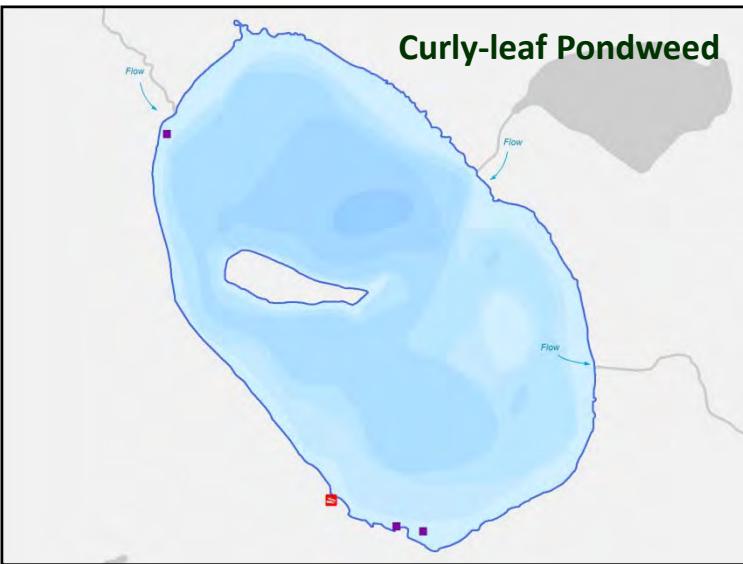
Onterra, LLC
Lake Management Planning

Curly-leaf Pondweed



Onterra, LLC
Lake Management Planning

Curly-leaf Pondweed

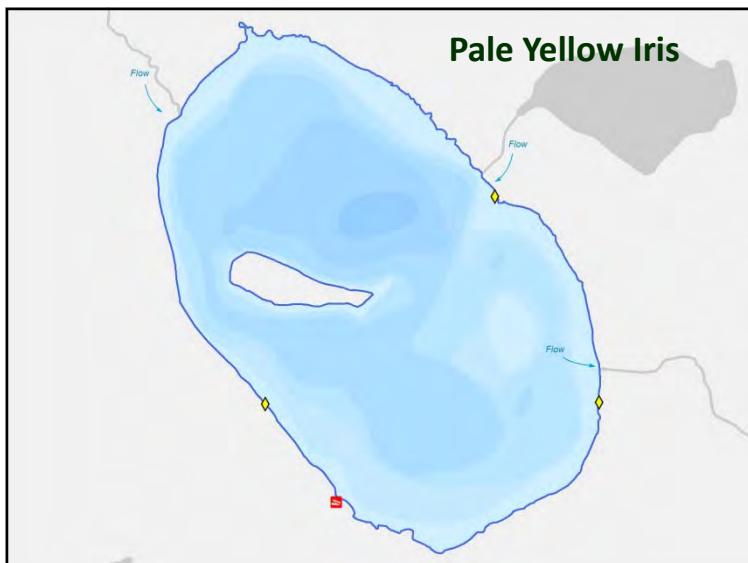


Non-native Aquatic Plants

Pale Yellow Iris



Onterra, LLC
Lake Management Planning

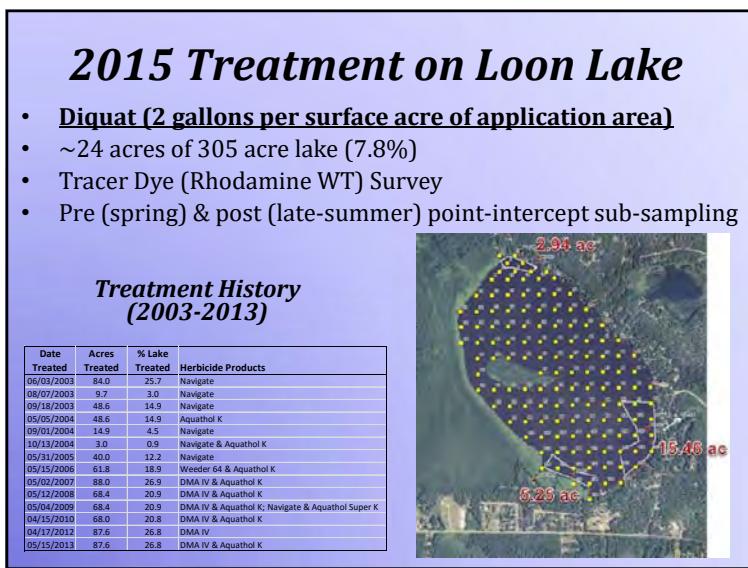


Non-native Aquatic Plants

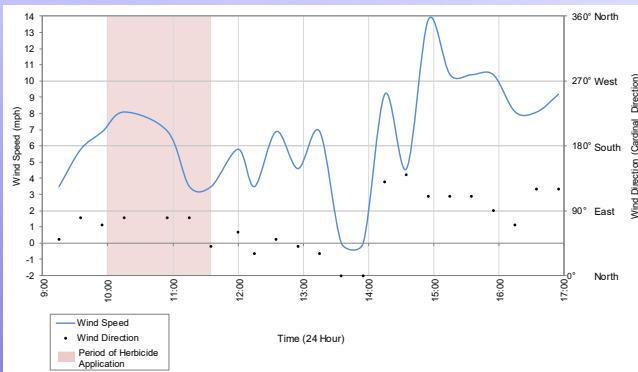
Eurasian Water Milfoil

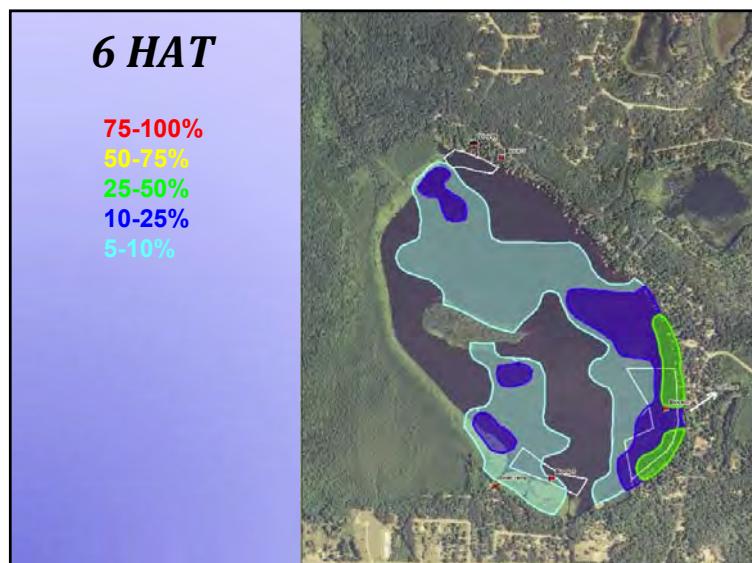
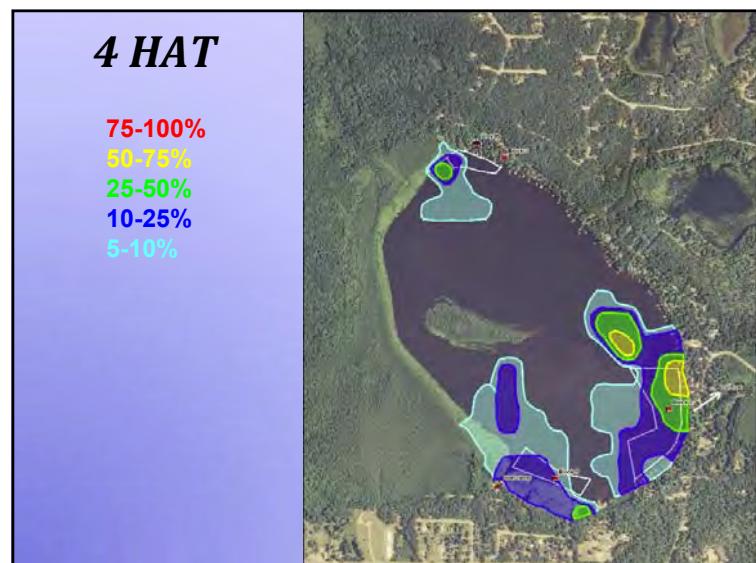
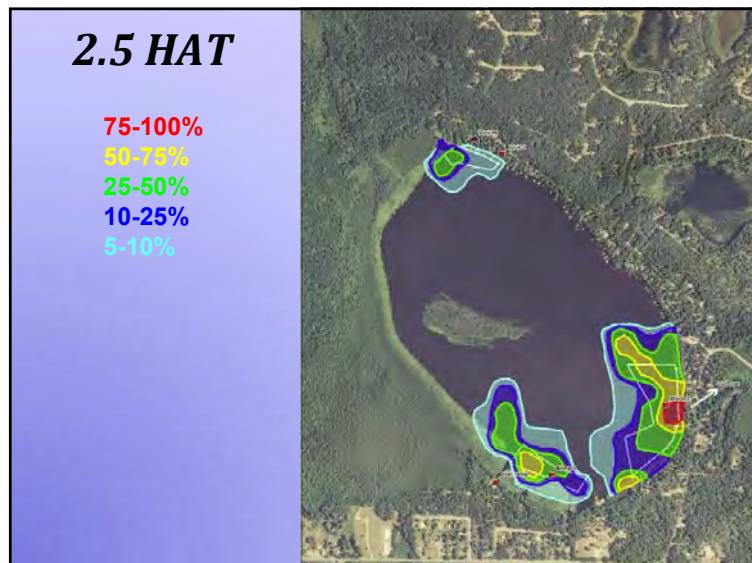
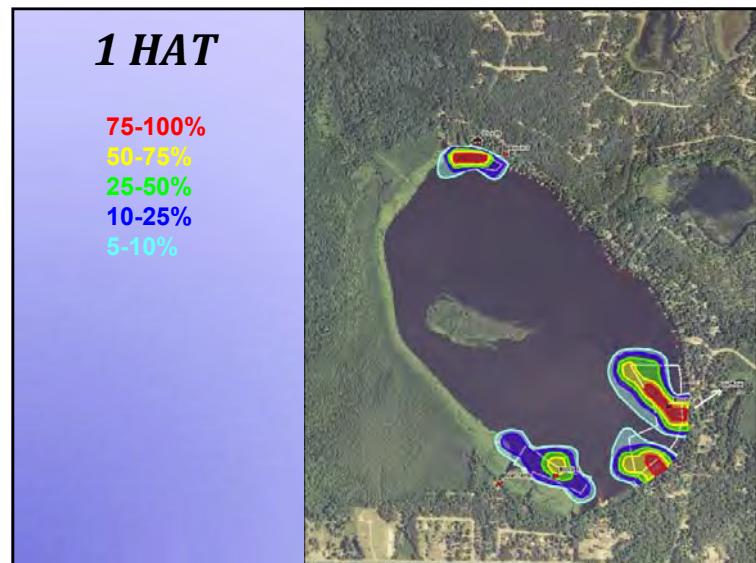


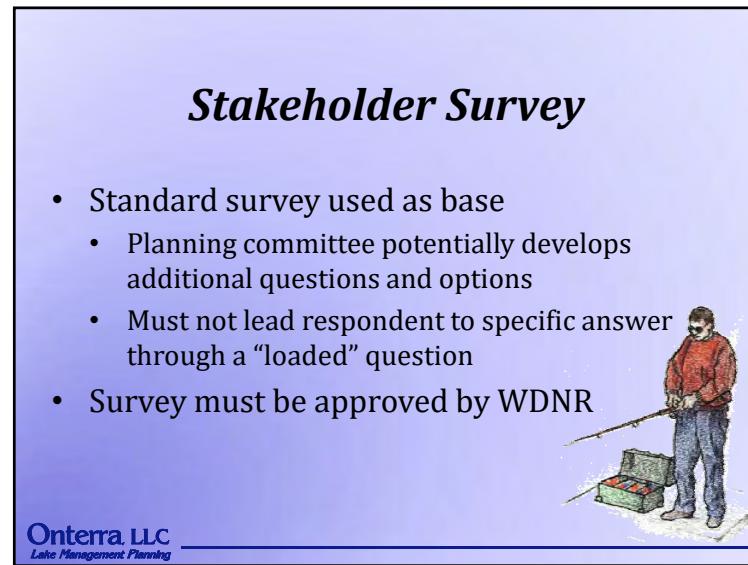
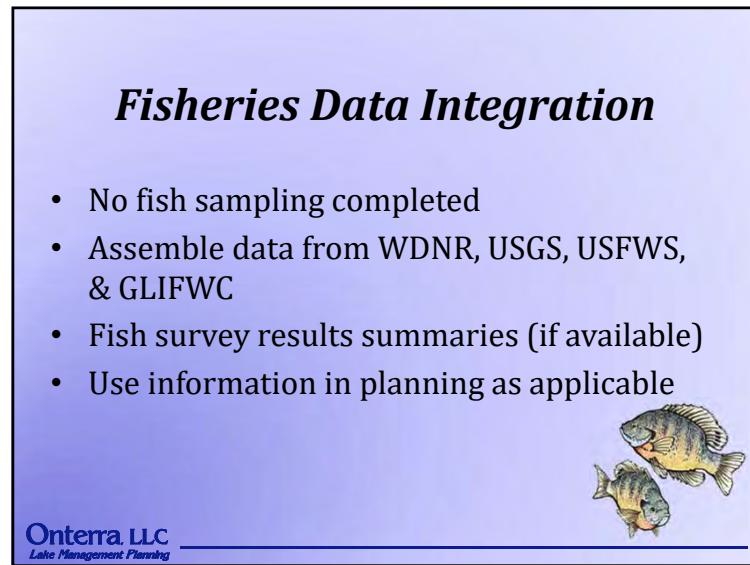
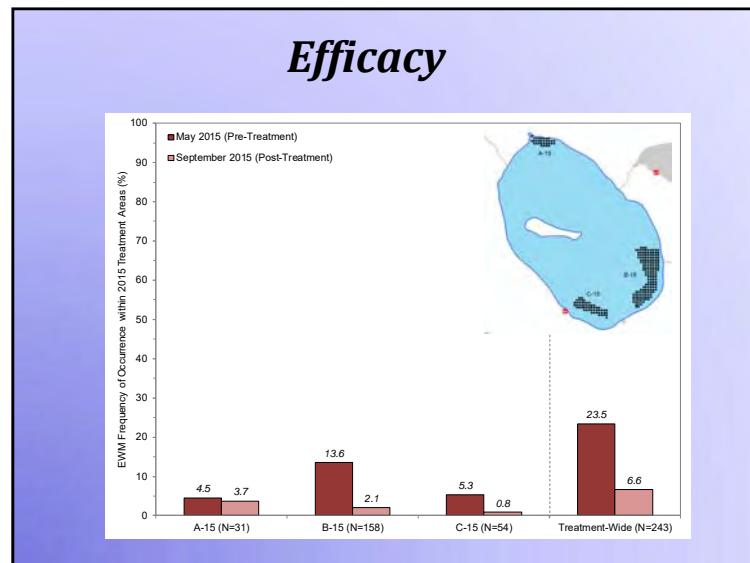
Onterra, LLC
Lake Management Planning



Wind Data

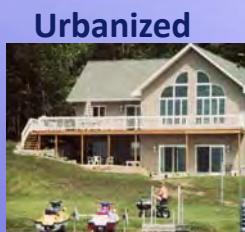






Shoreland Assessment

- Shoreland area is important for buffering runoff and provides valuable habitat for aquatic and terrestrial wildlife.
 - Assessment ranks shoreland area from shoreline back 35 feet
 - Assess shoreland development and habitat
 - Coarse woody habitat



Onterra, LLC
Land Management Planning



Natural

Planning Process

Planning Committee Meetings

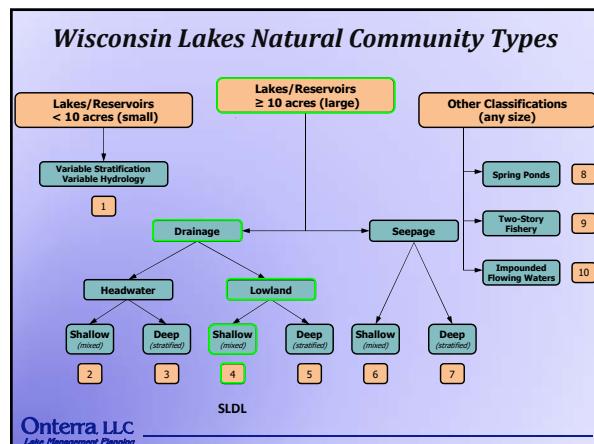
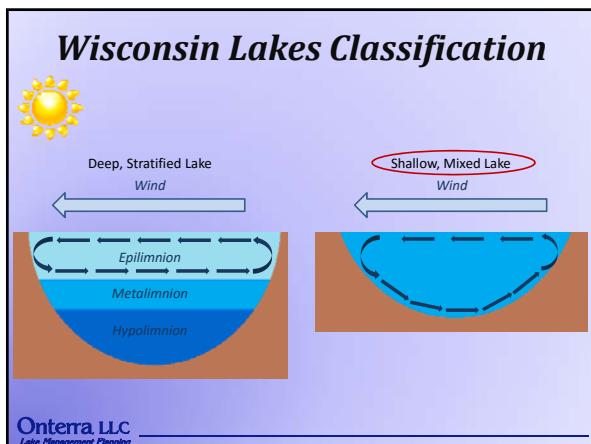
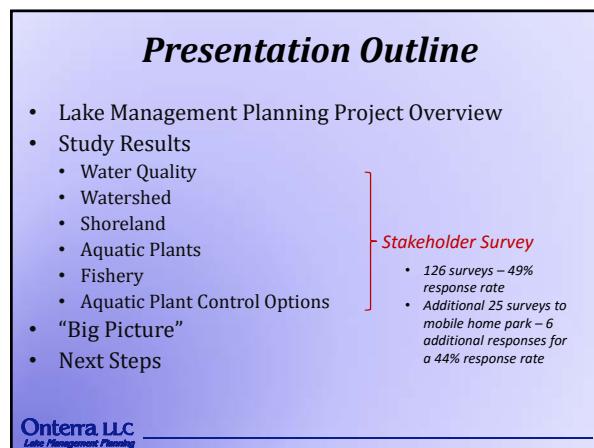
Study Results (including a stakeholder survey) Conclusions & Initial Recommendations

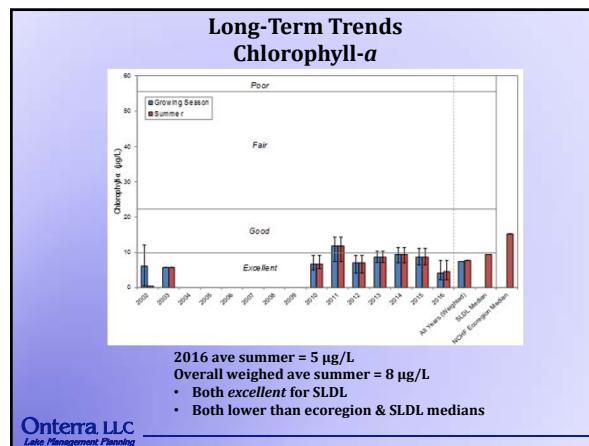
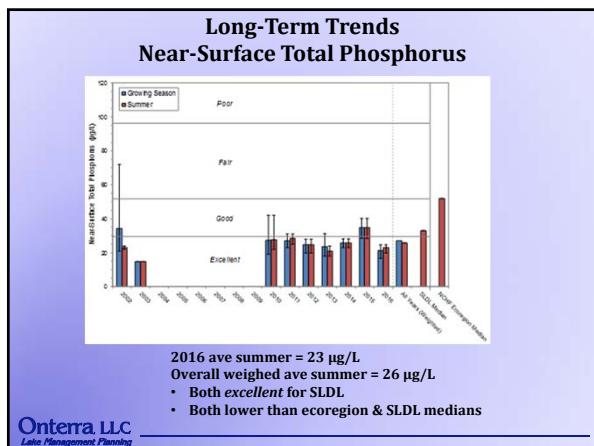
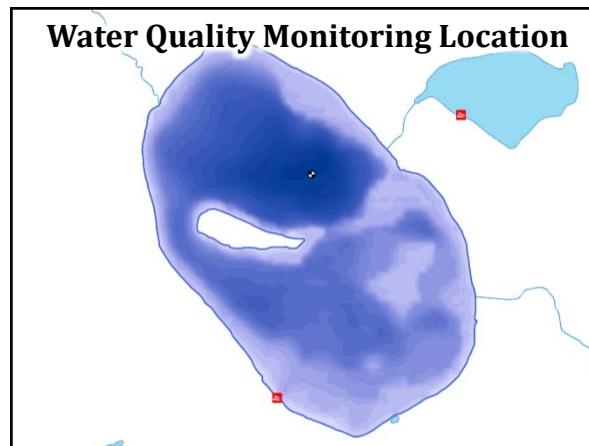
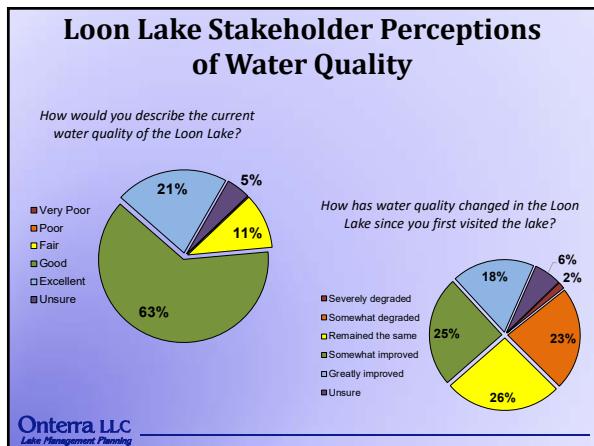
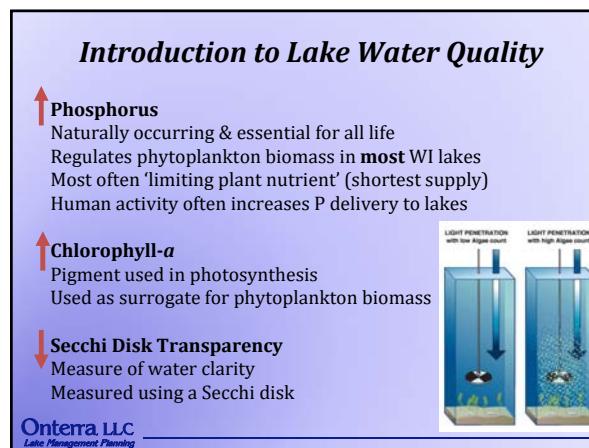
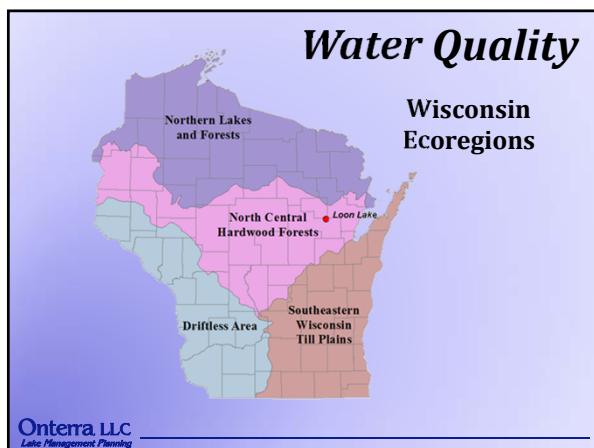
Management Goals
Management Actions
Timeframe
Facilitator(s)

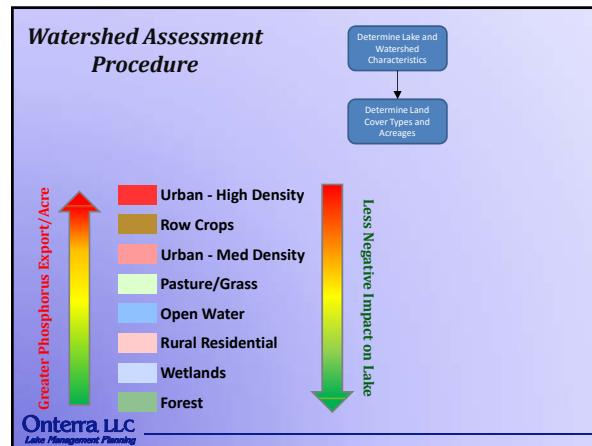
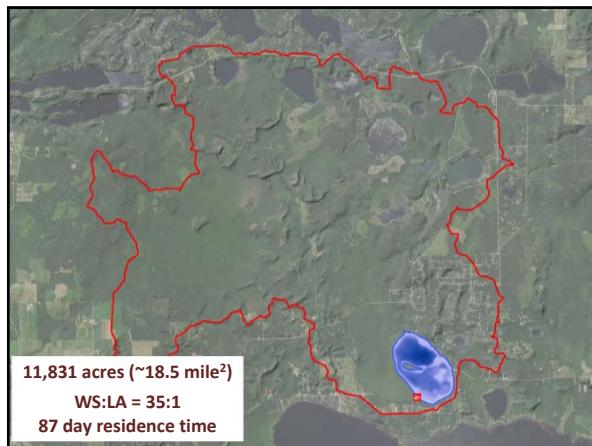
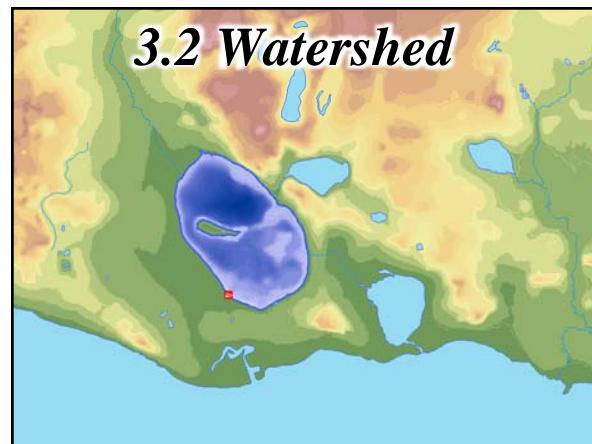
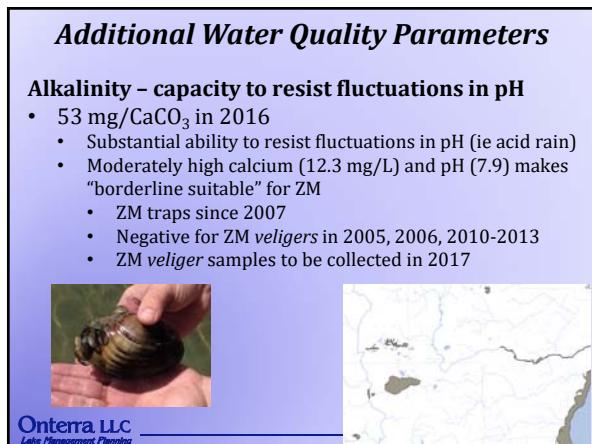
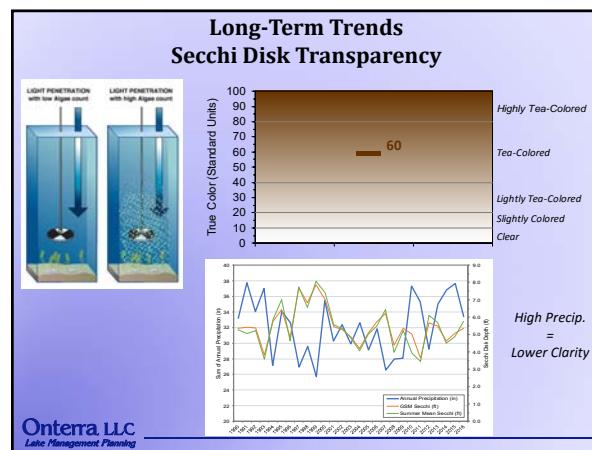
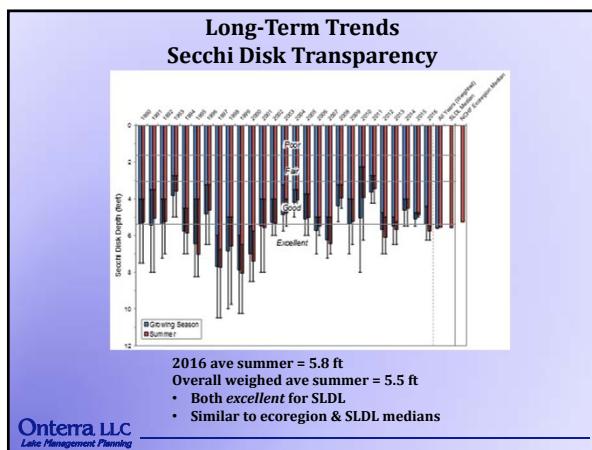
Implementation Plan

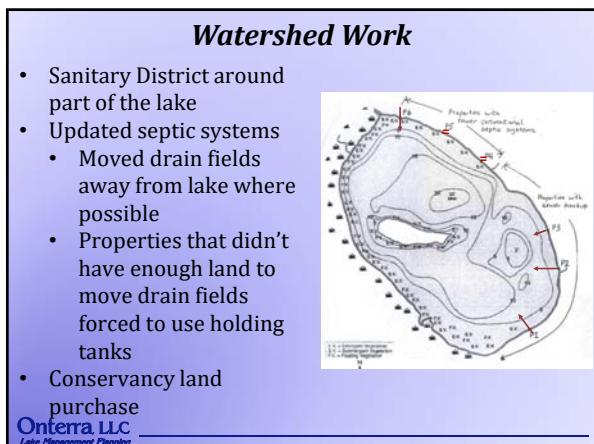
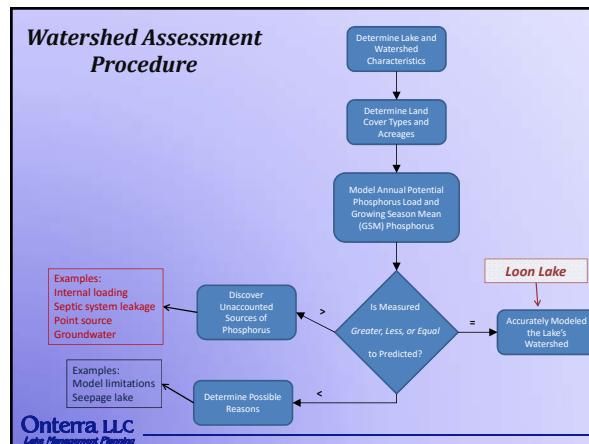
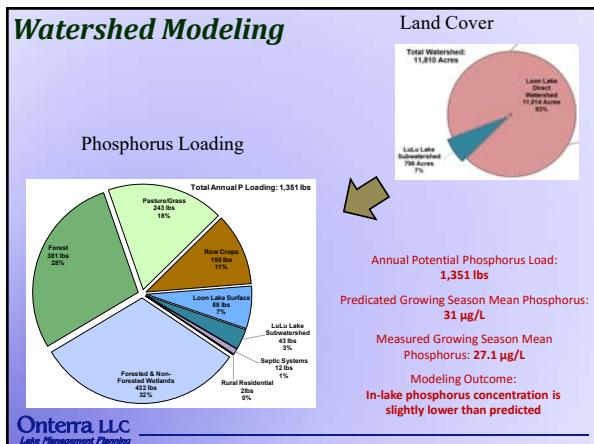
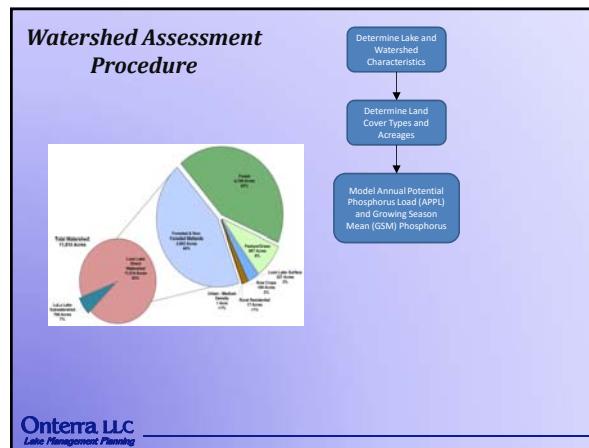
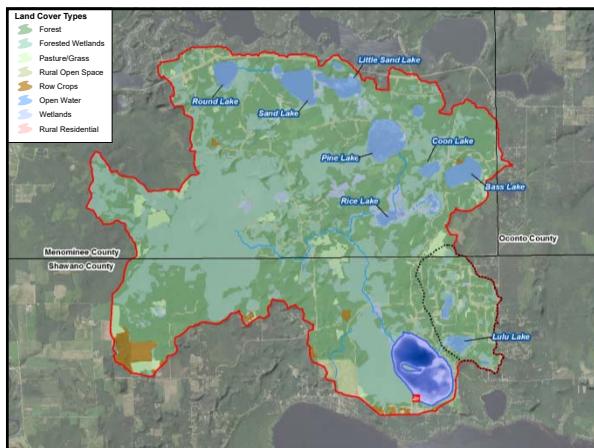


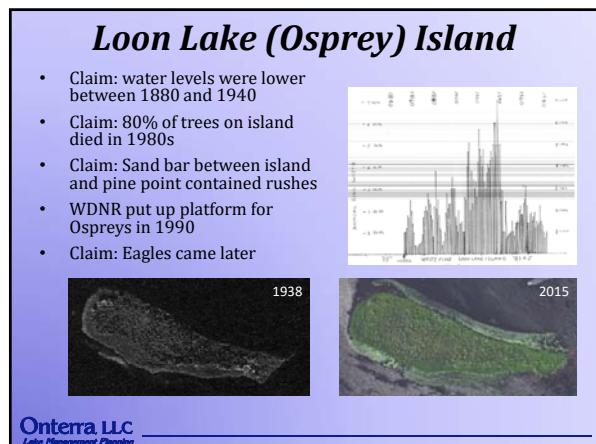
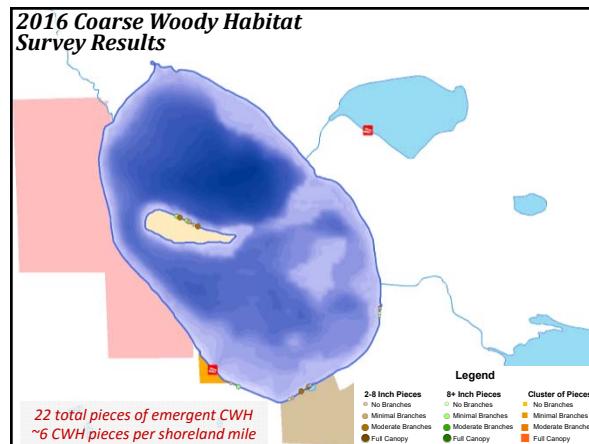
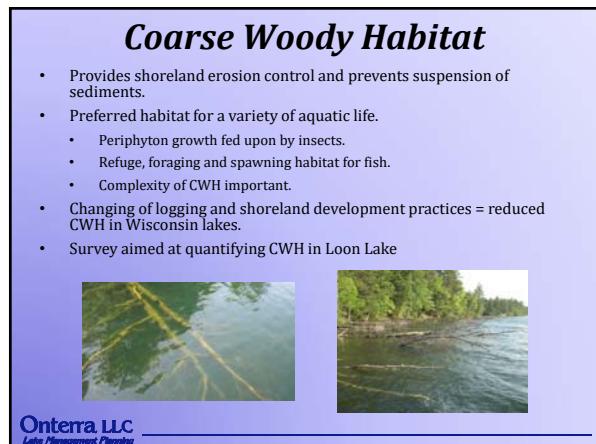
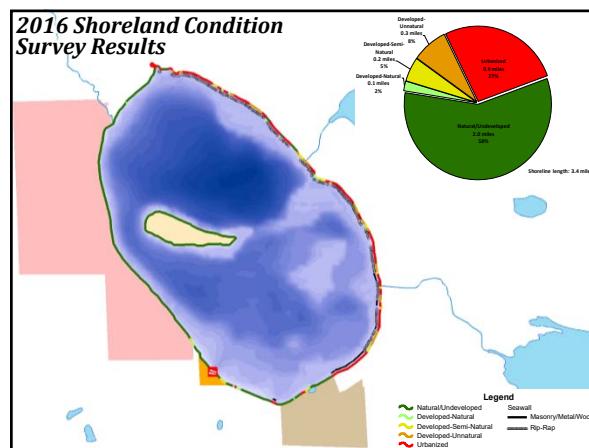
Onterra LLC
Lake Management Planning







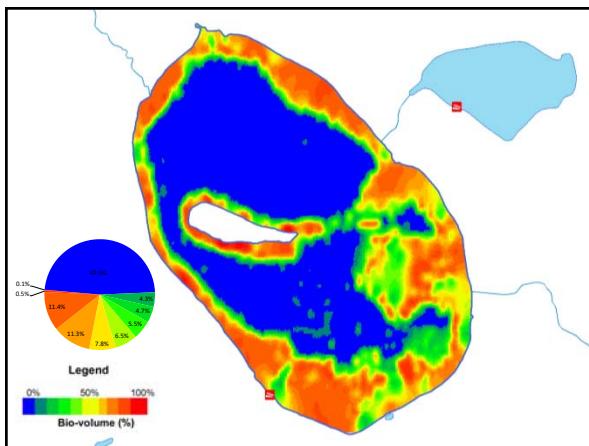
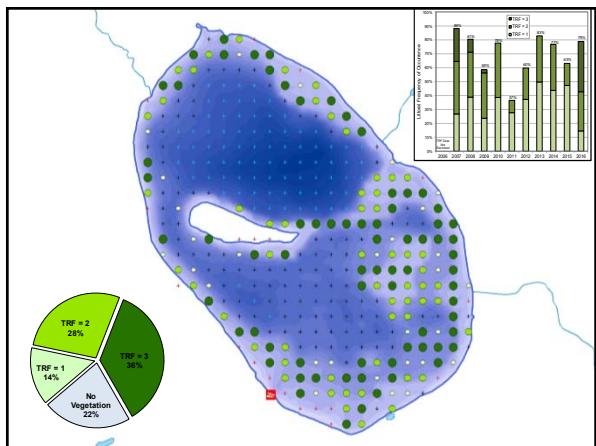
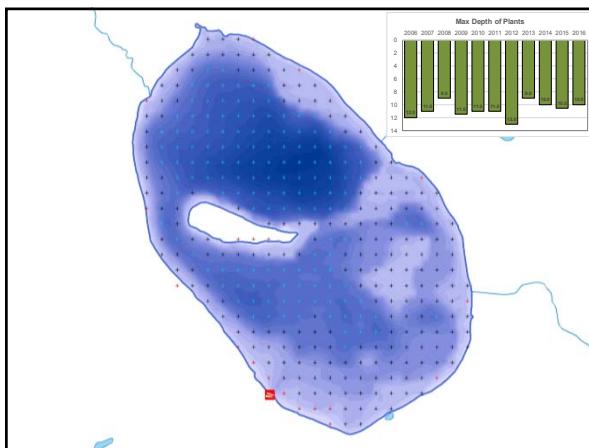




Aquatic Plant Surveys

- Determine changes in plant community from past surveys
 - Assess both native and non-native populations
 - Numerous surveys completed in 2016
 - Early-Season AIS Survey
 - Whole-Lake Point-Intercept Survey
 - Emergent/Floating-Leaf Community Mapping Survey
 - EWM Peak-Biomass Survey

Onterra LLC
Site Management Pending



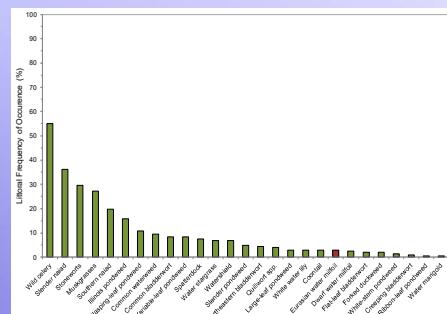
Aquatic Plant Species List

~40 Native Species

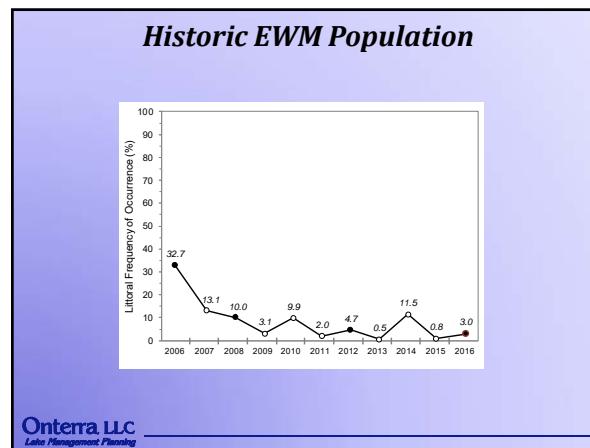
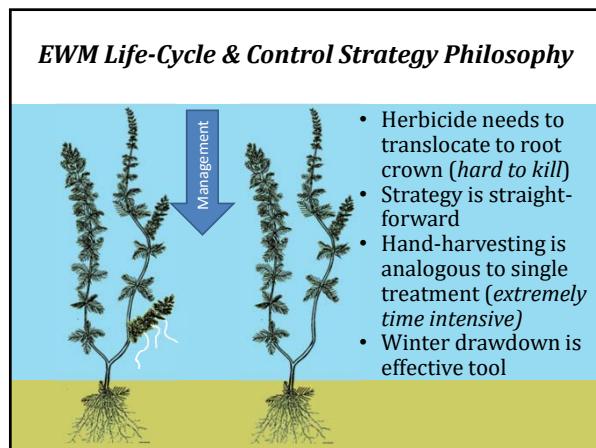
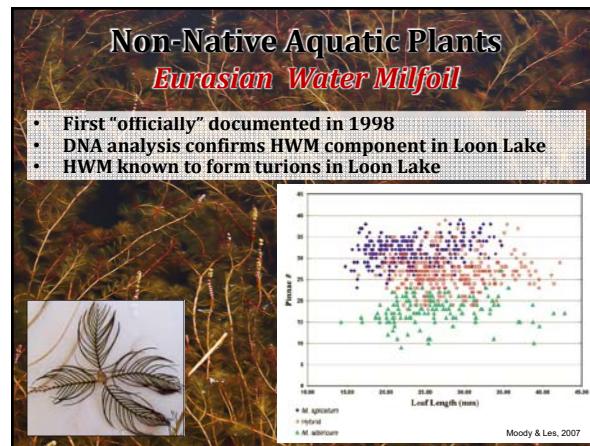
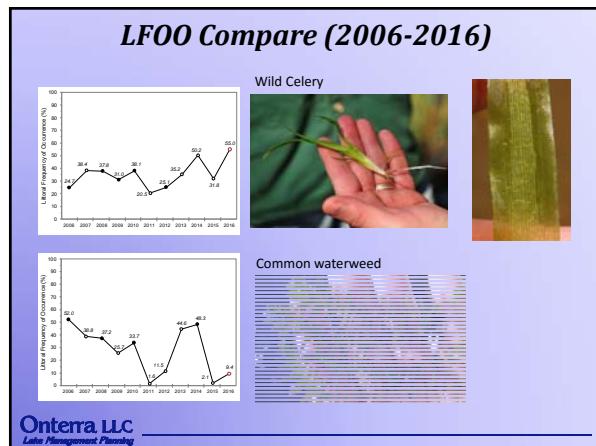
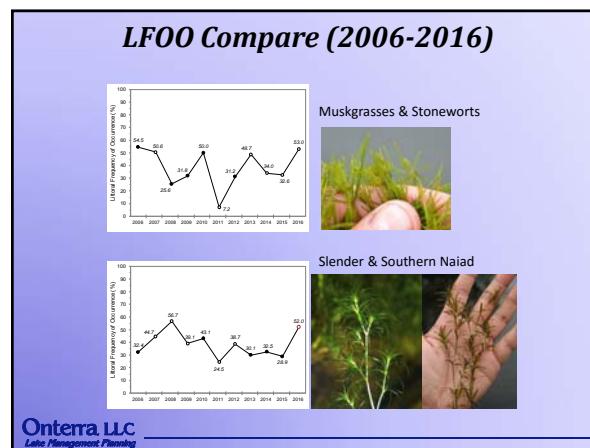
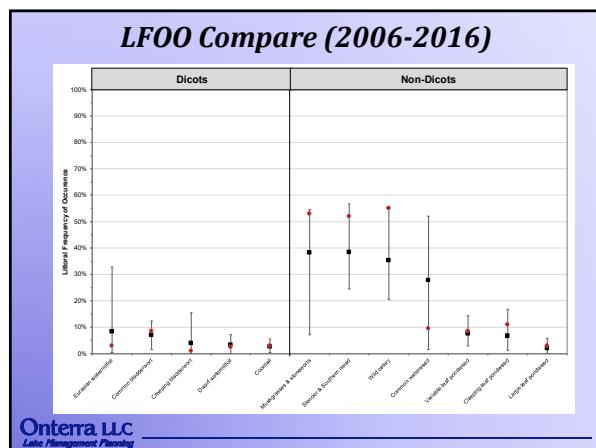
3 Non-Native Species

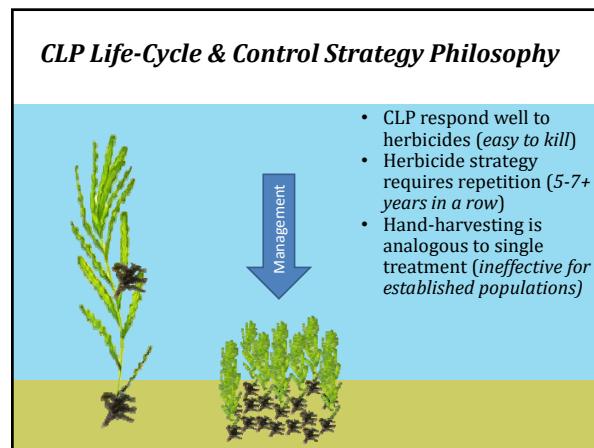
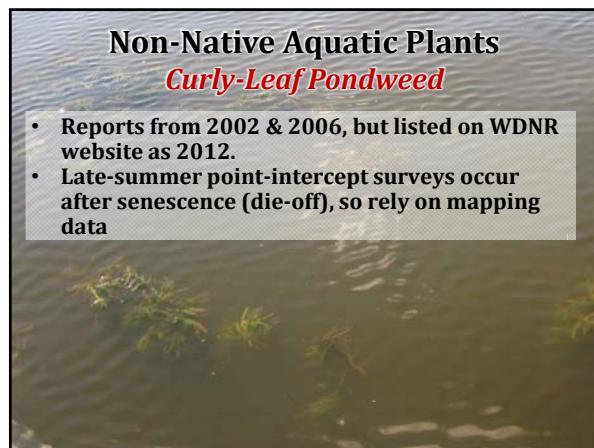
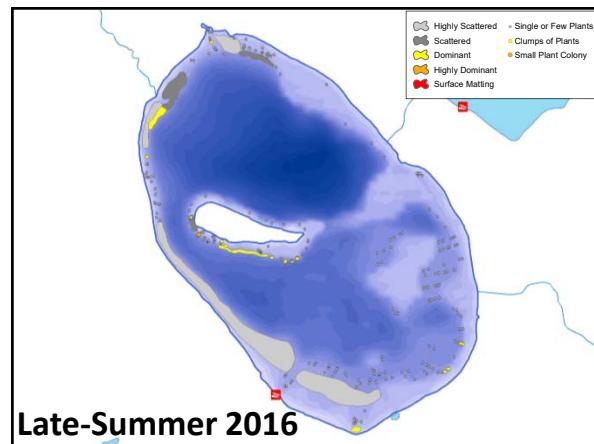
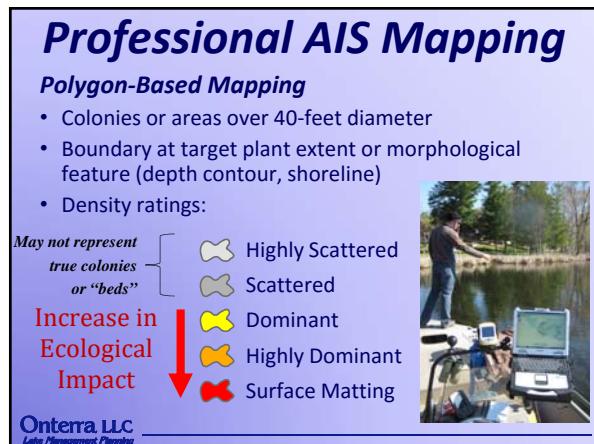
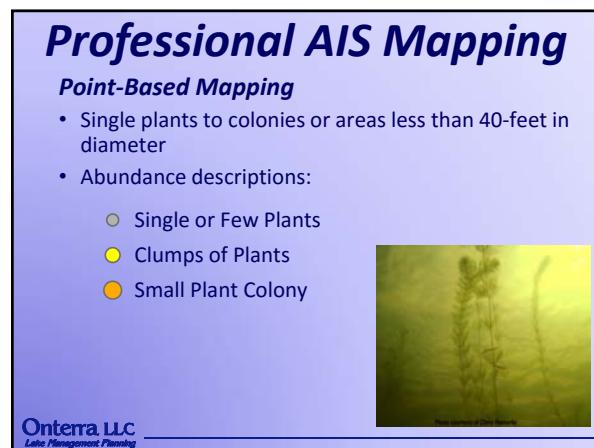
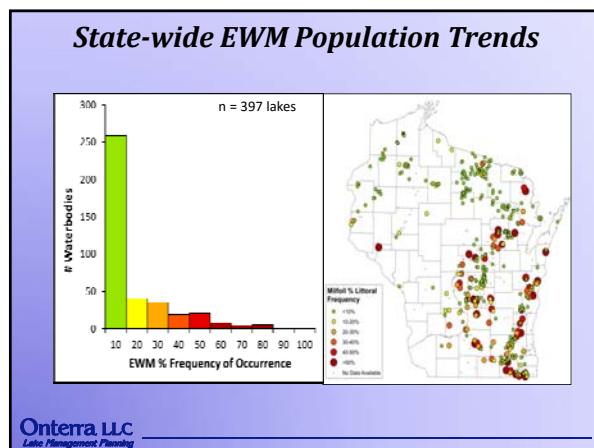
Non-Native Spec
Eurasian watermilfoil
Curly-leaf pondweed

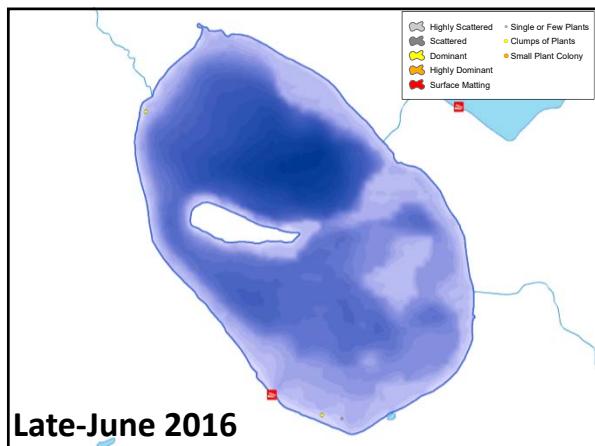
Onterra, LLC
Lake Management Planning



Onterra LLC
Lake Management Planning





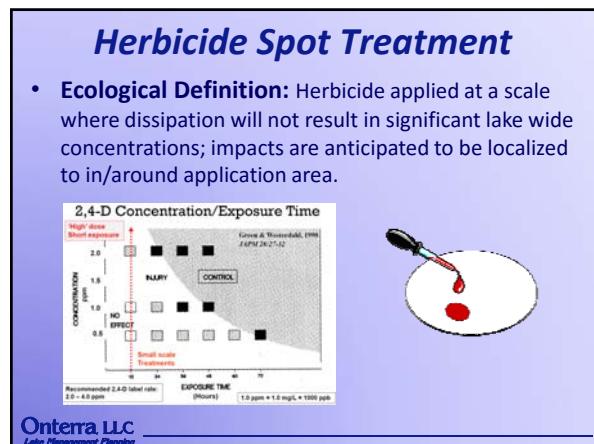
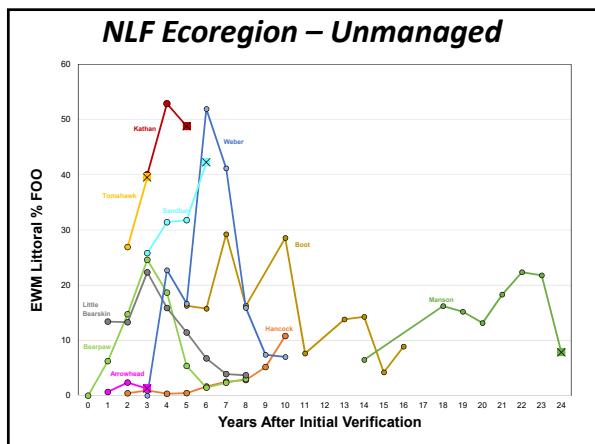
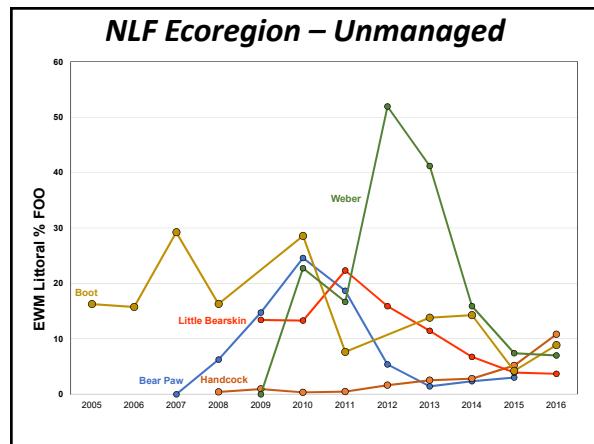
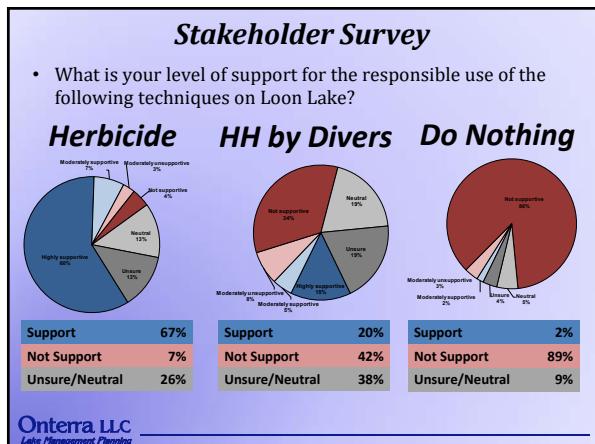


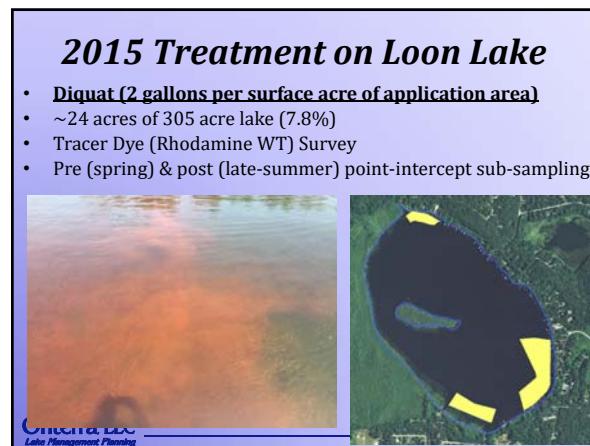
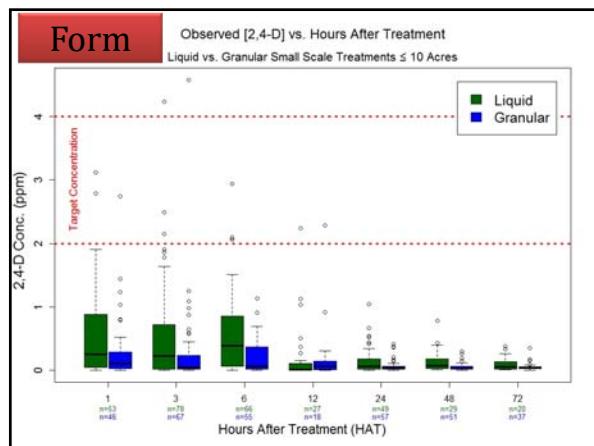
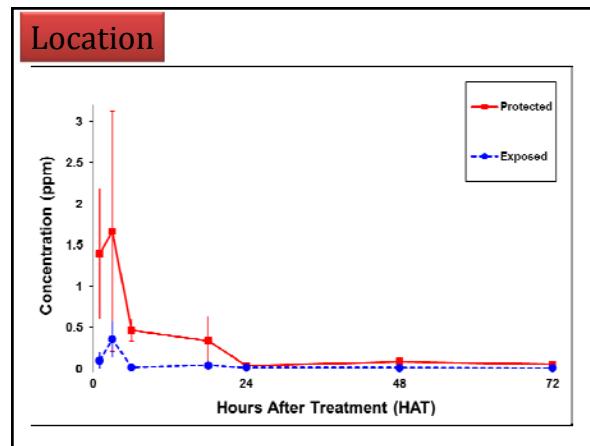
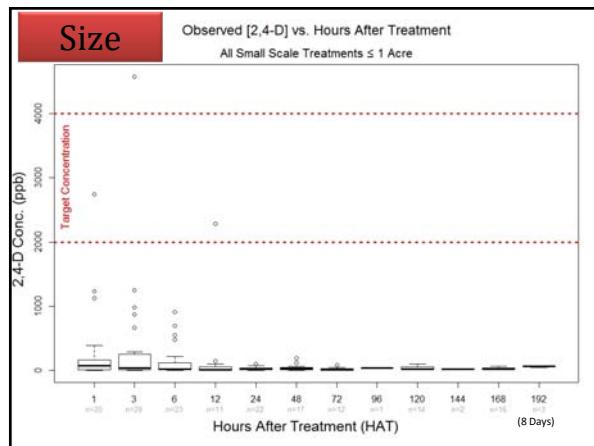
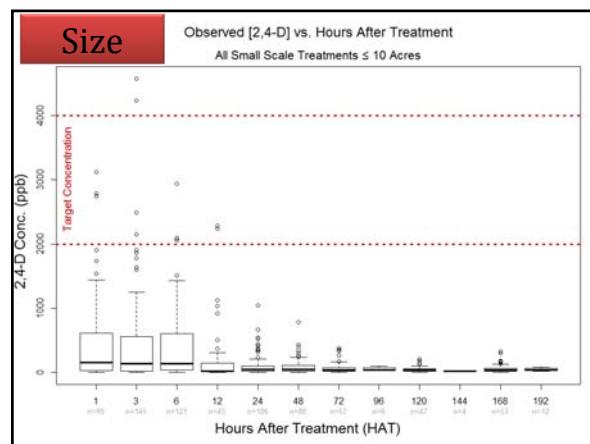
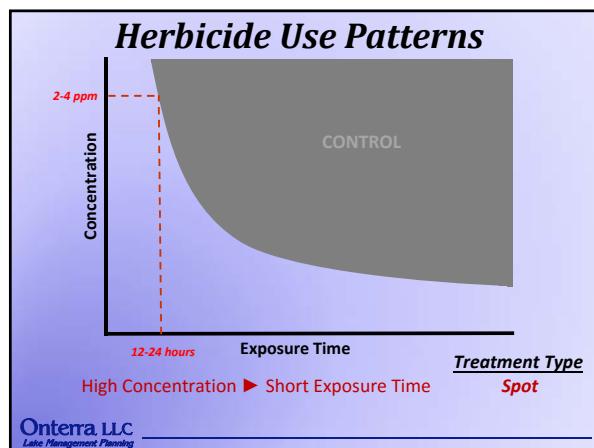
AIS Control Strategies

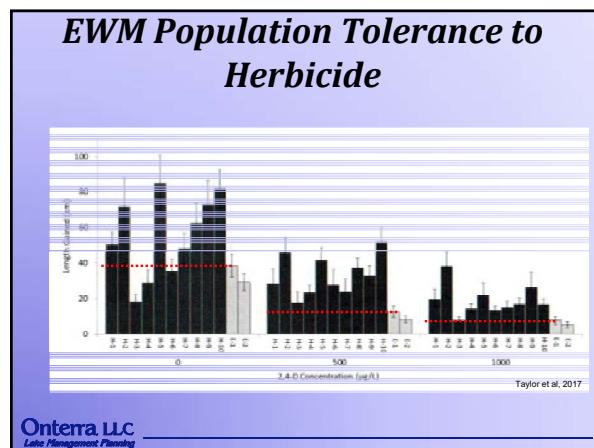
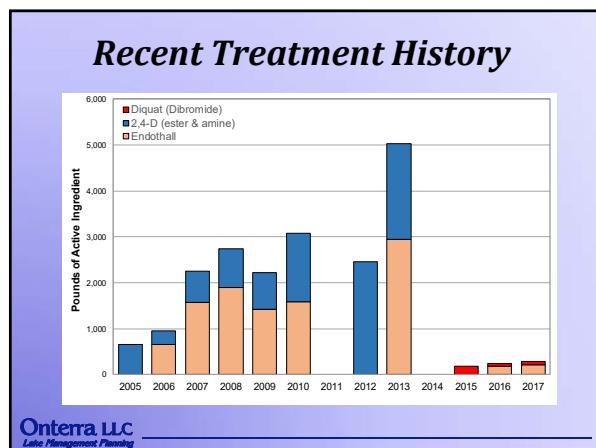
- Do nothing (monitor)
- Management
 - ~~Biocontrol (weevils)~~
 - Herbicide treatment
 - Hand removal (includes DASH)
 - ~~Winter drawdown~~
 - Mechanical harvesting



Onterra, LLC
Lake Management Planning







AIS Active Management Discussion

Pros	Cons
<ul style="list-style-type: none"> Keep AIS population low so native ecosystem can function as it did prior to AIS (ecosystem restoration) Keep AIS population low so it does not cause recreation, navigation, or aesthetic issues (improve cultural ecosystem services) Keep AIS population low so the lake is not a source population for other nearby lakes (stewardship) 	<ul style="list-style-type: none"> Management action itself may be damaging to the lake, so acknowledging potential known/unknown secondary impacts is important within the risk assessment. Management action may not be fully supported by public Unmanaged AIS population may be low enough to not cause measurable ecosystem impacts or reduce cultural ecosystem services

Onterra LLC
Lake Management Planning

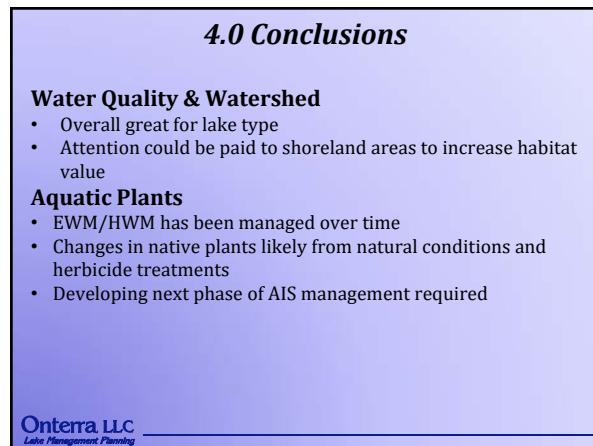
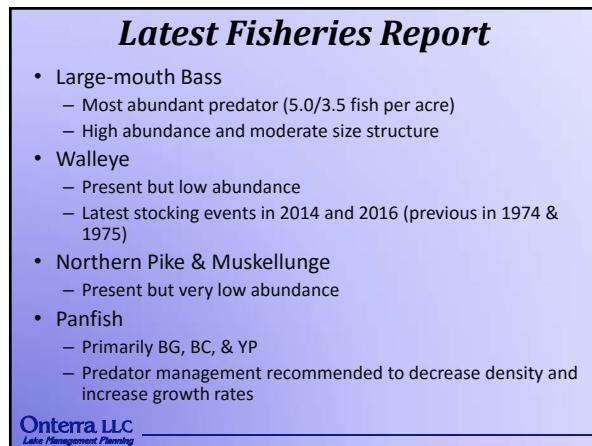
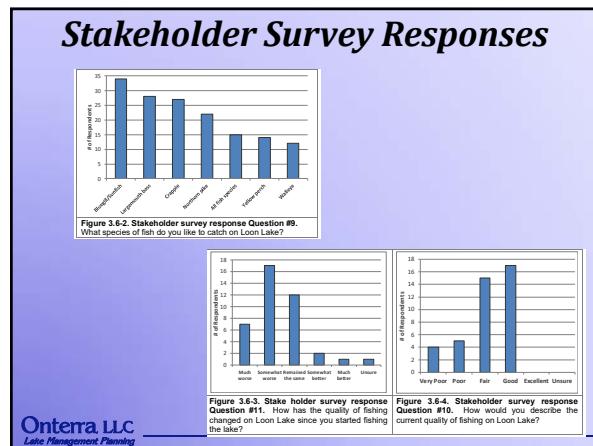
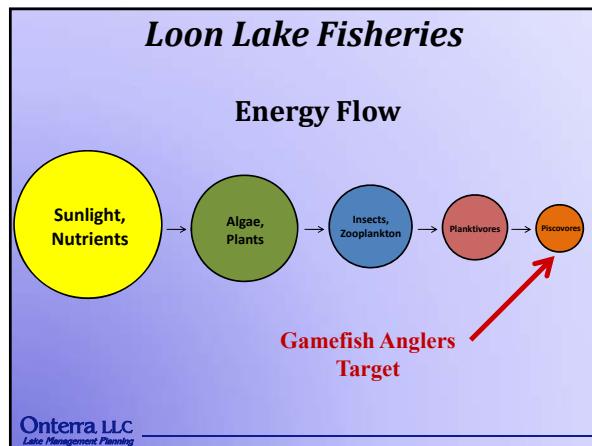


3.5 Aquatic Invasive Species

Type	Common name	Scientific name
Plants	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
	Curly-leaf pondweed	<i>Potamogeton crispus</i>
	Pale-yellow iris	<i>Iris pseudacorus</i>
Invertebrates	Banded mystery snail	<i>Viviparus georgianus</i>
	Chinese mystery snail	<i>Cipangopaludina chinensis</i>

Onterra LLC
Lake Management Planning



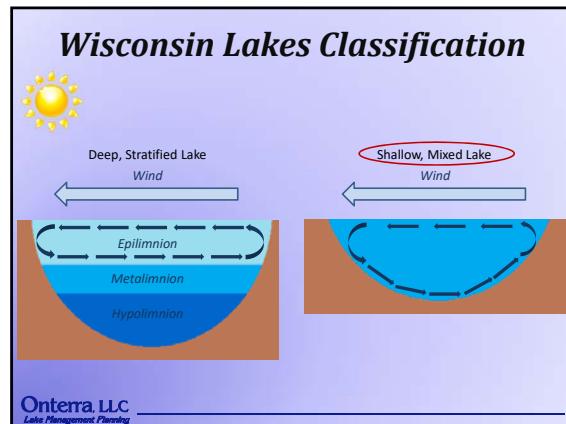




Presentation Outline

- Project Goals
- Overall Study Conclusions
- Key Study Results
- Management Goals and Actions
- Questions

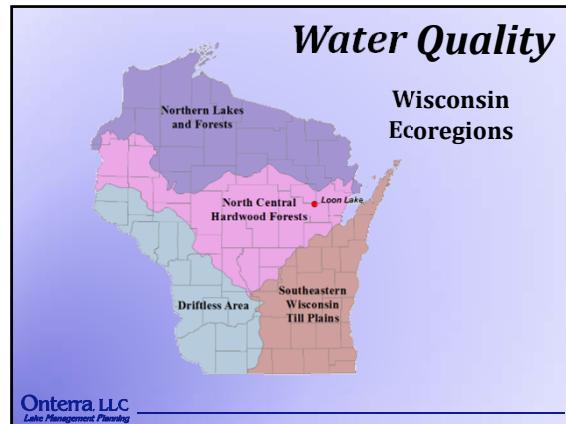
Onterra, LLC
Lake Management Planning

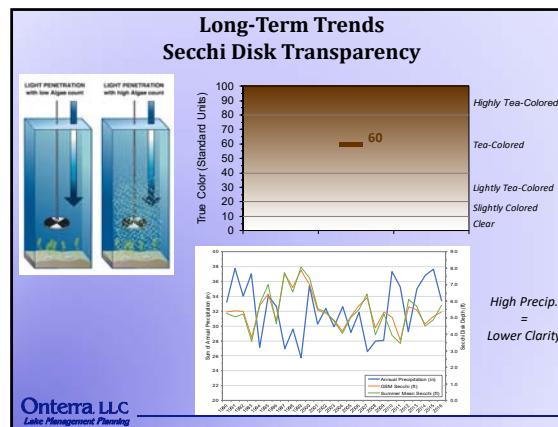
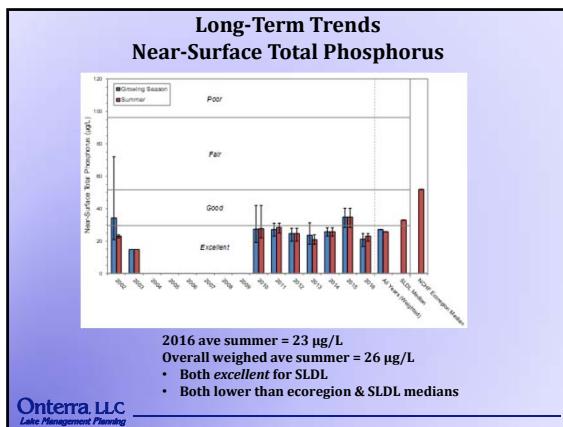
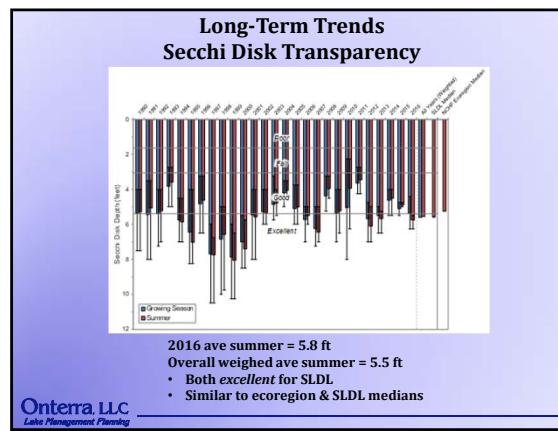
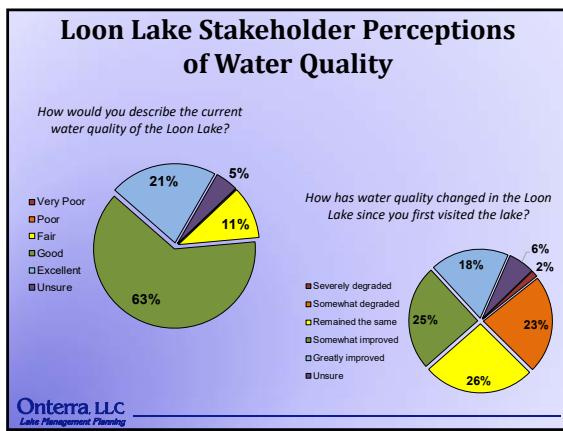
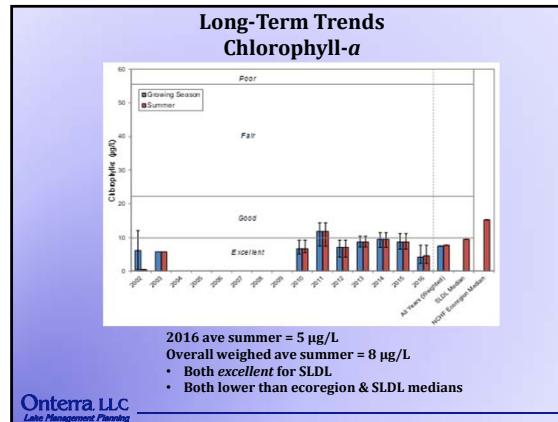
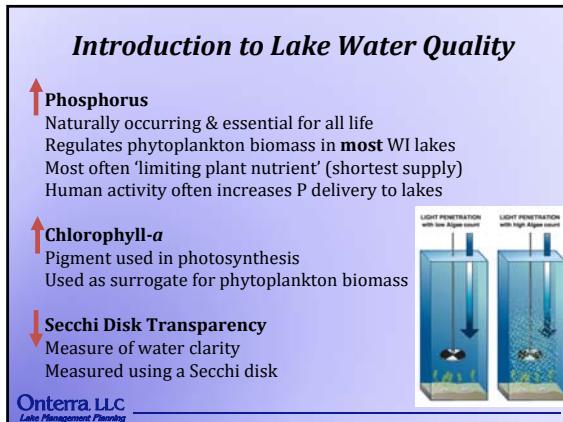


Study and Plan Goals

- Collect & Analyze Data
 - 2016/2017
- Aggregate Available Historic Data
- Construct Long-Term & Useable Plan
 - Planning Meetings 2017 (Damian Drewke, Lloyd Knope, Randy Perra, Mary Claire Luck, Larry Philbrick, Dick Koeller)
 - Plan currently in Review Stage (sent to agencies & currently posted on district website)

Onterra, LLC
Lake Management Planning



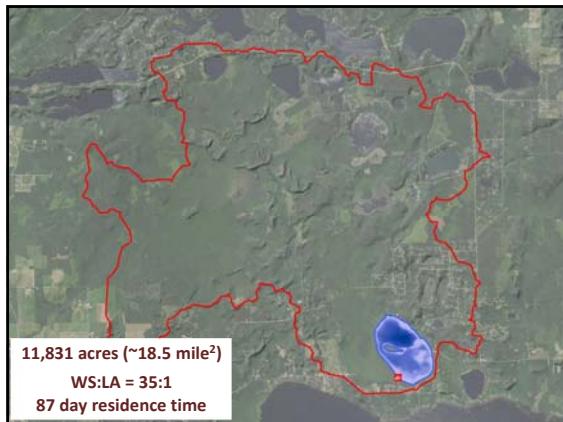
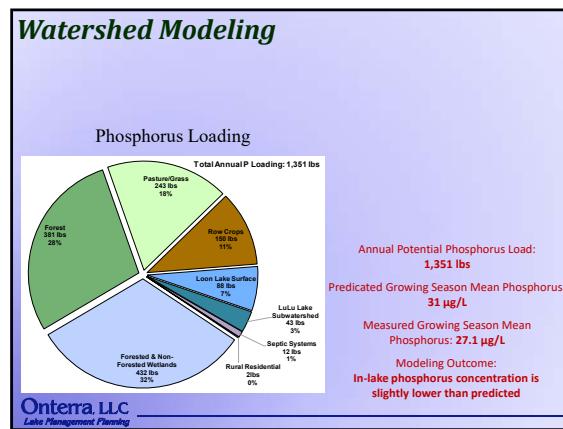
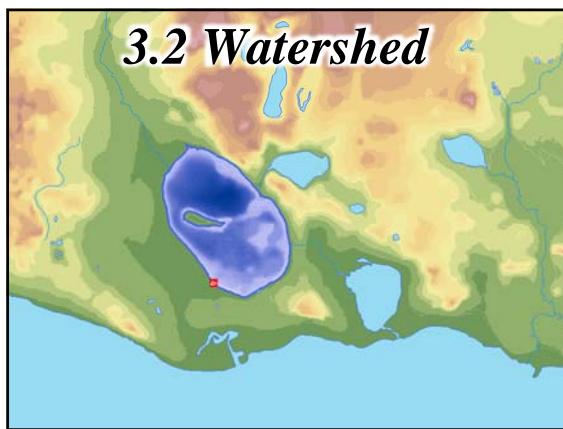
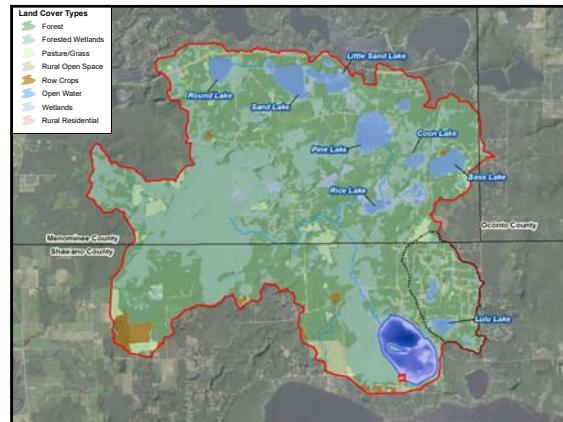


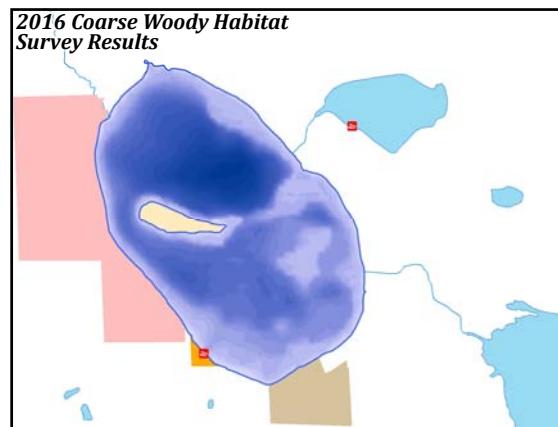
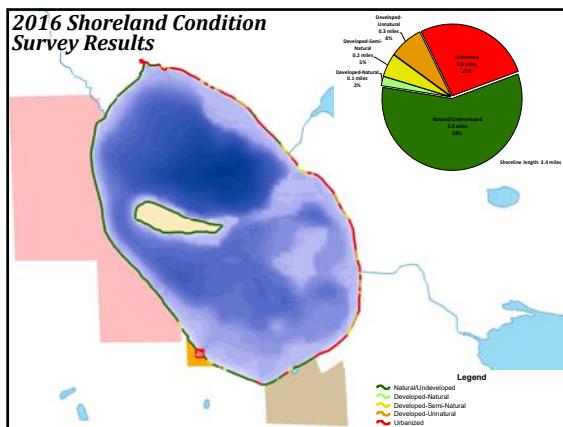
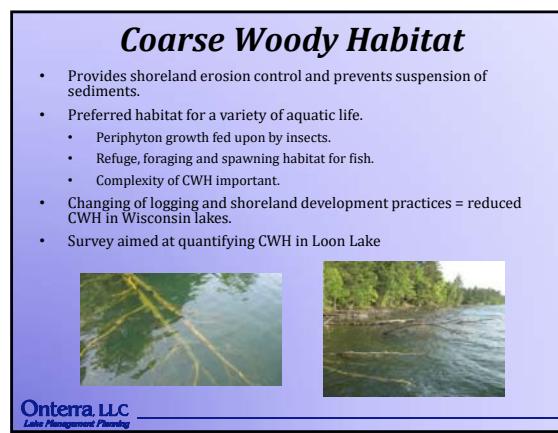
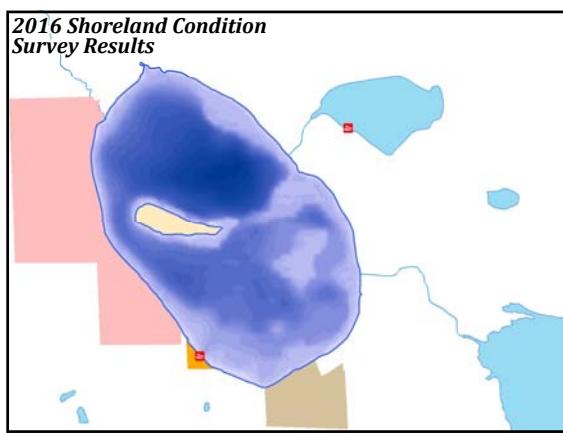
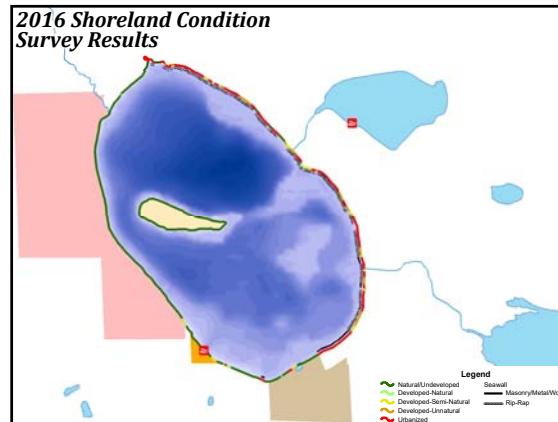
Management Goal:
Maintain Current Water Quality Conditions

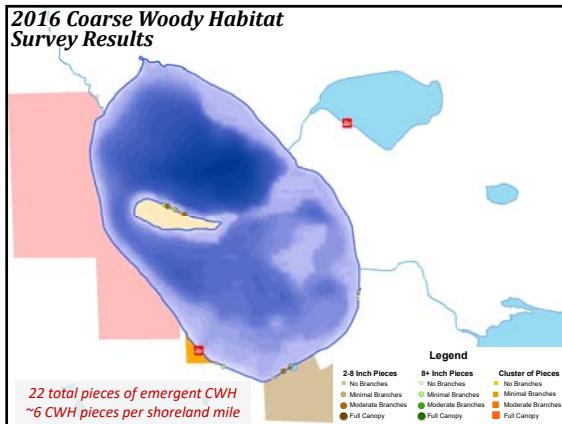
Management Actions

- Monitor water quality through WDNR Citizens Lake Monitoring Network.
*Continuation of current effort
Requires refreshed volunteer commitment*

Onterra, LLC
Lake Management Planning





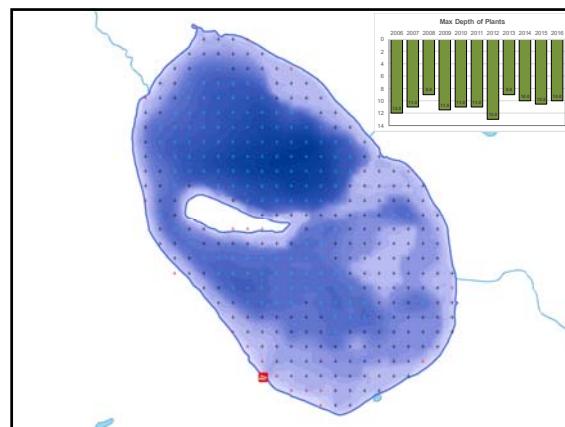
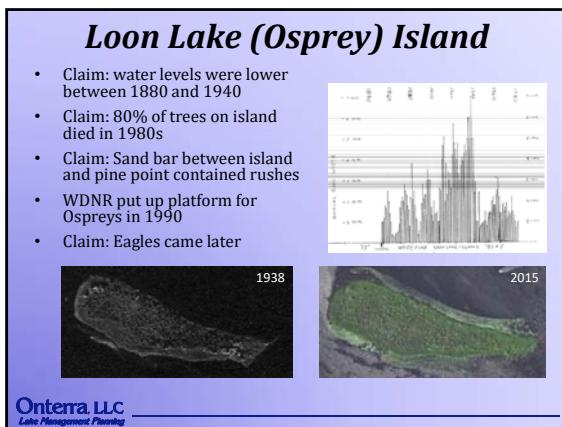
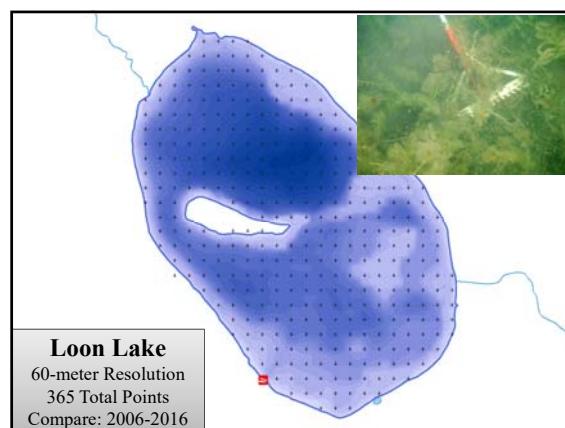


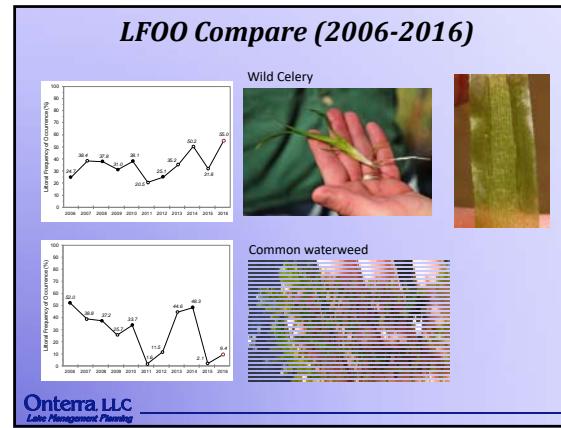
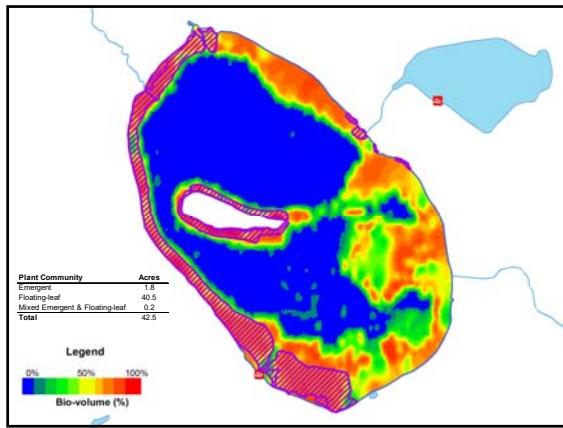
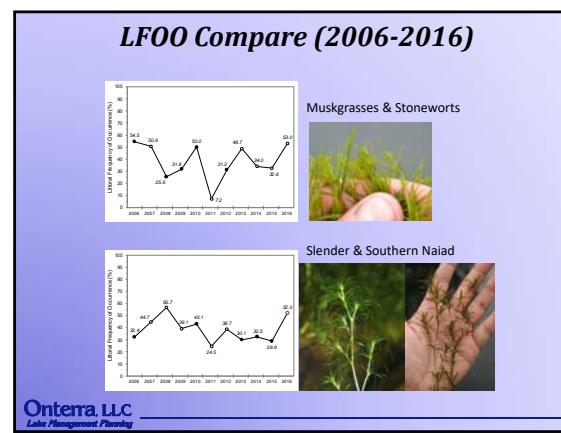
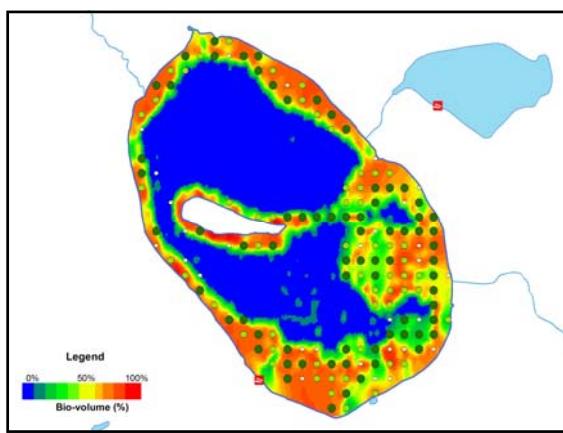
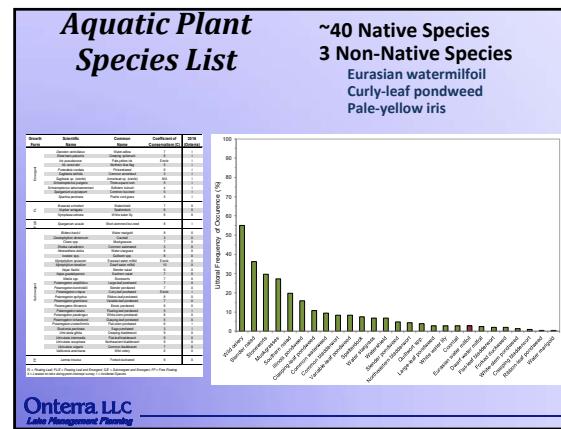
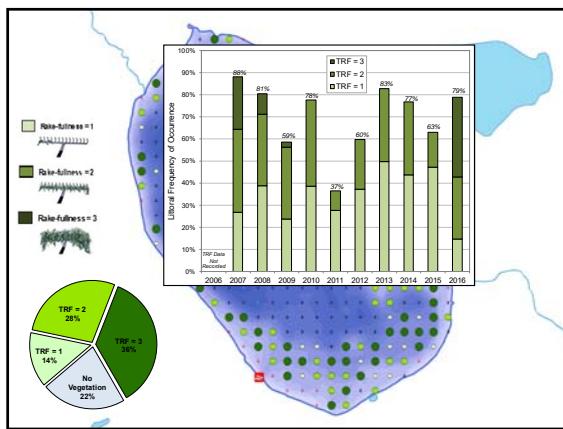
Management Goal:
Maintain and Improve Lake Resource of Loon Lake

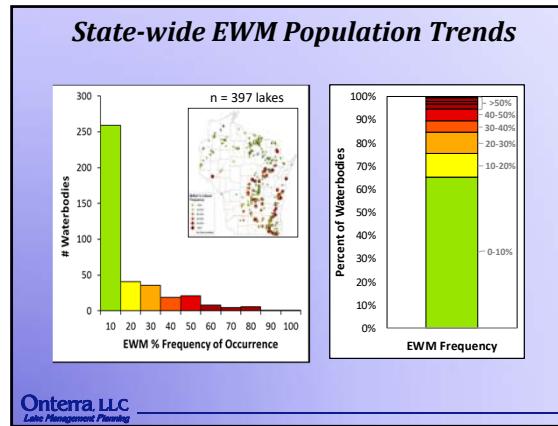
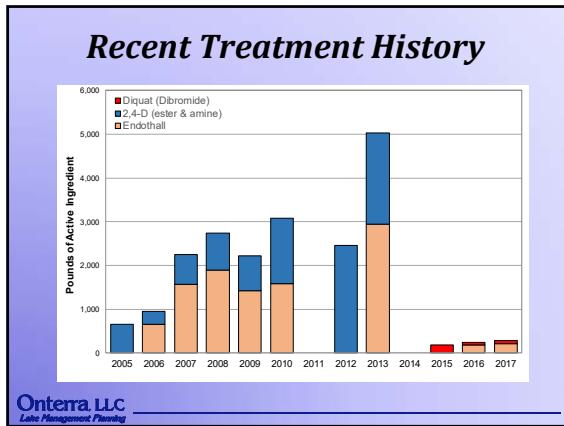
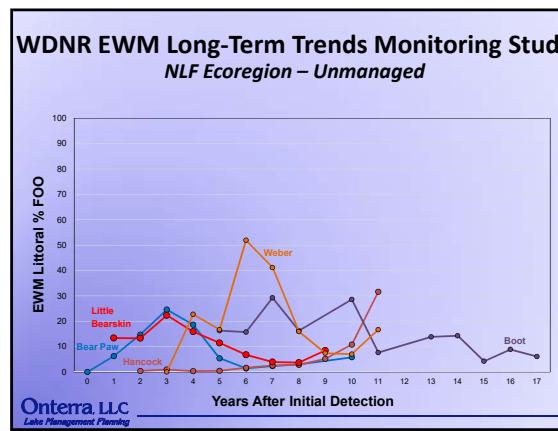
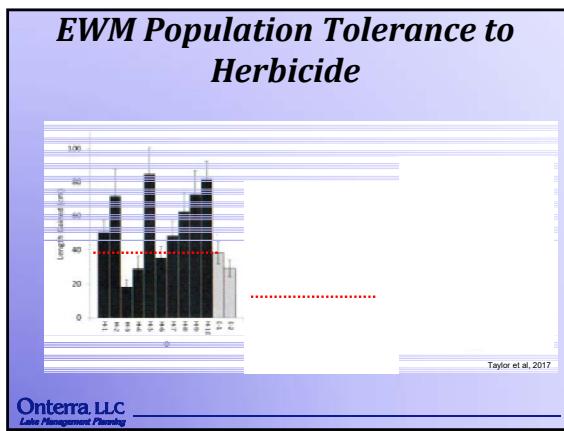
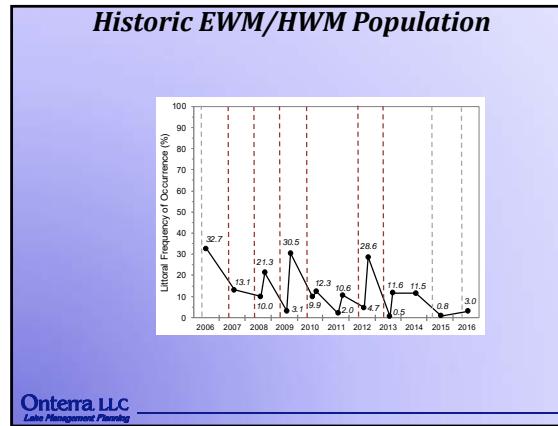
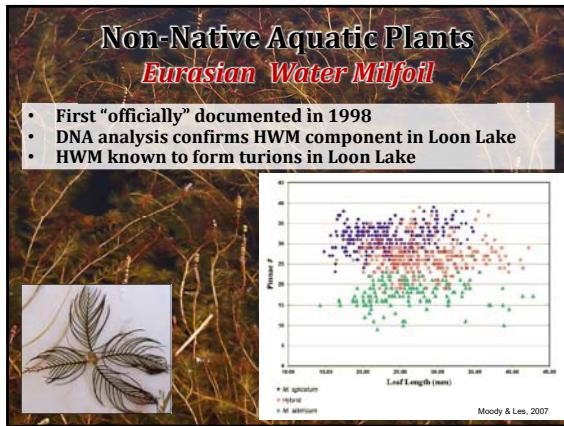
Management Actions

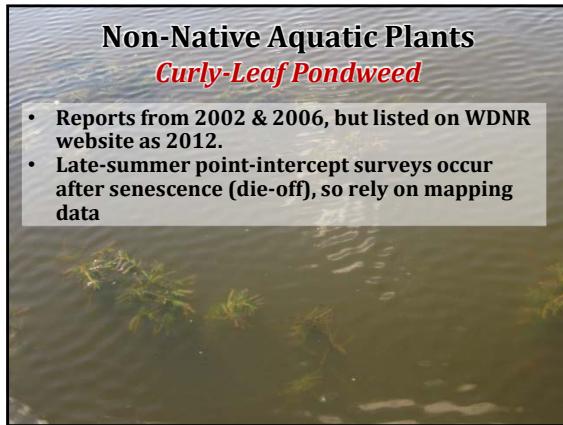
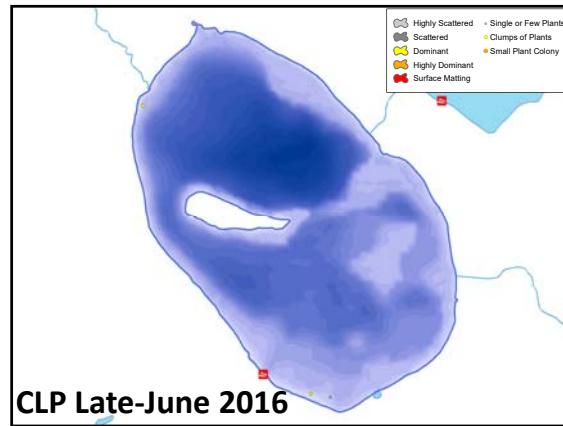
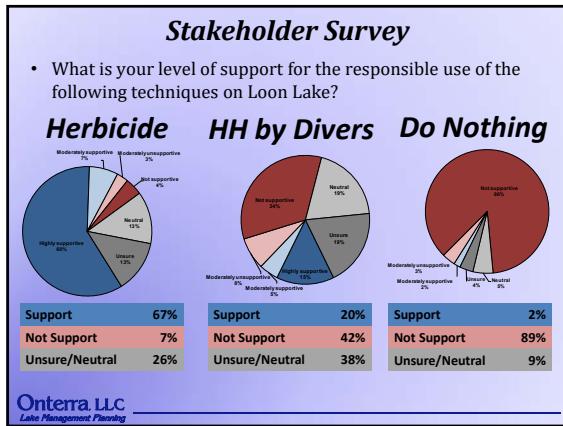
1. Educate Stakeholders on the Importance of Shoreland Condition, Shoreland Restoration, and Coarse Woody Habitat (Fish Sticks Program)
2. Protect natural shoreland zones
3. Continue the Loon Watch program
4. Control and discourage local Canada goose residents

Onterra, LLC
Lake Management Planning





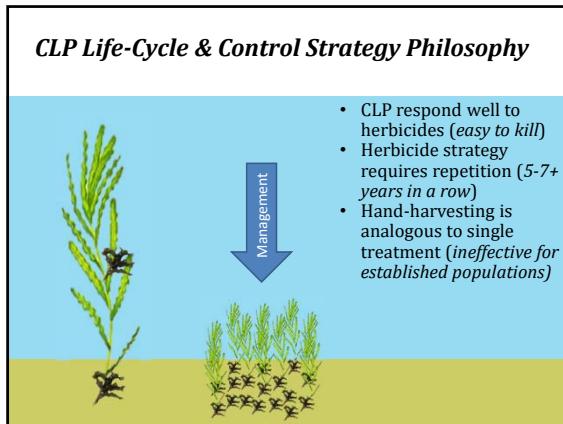


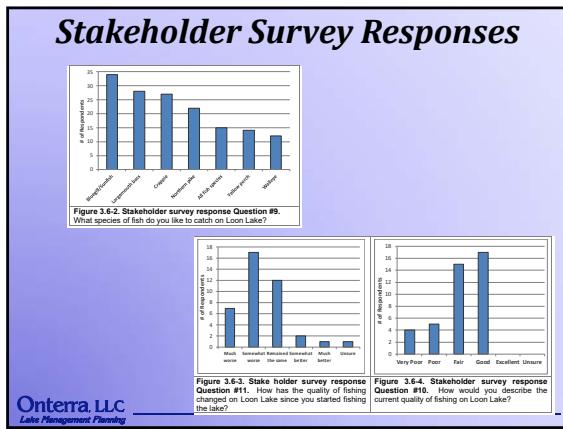
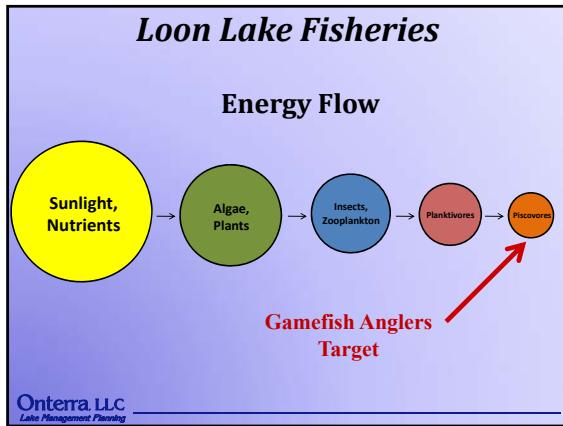


Management Goal:
Control Existing and Prevent Further Aquatic Invasive Species Infestations within Loon Lake

Management Actions

1. Clean Boats Clean Waters
2. Coordinate volunteer monitoring of CLP
3. Coordinate annual professional EWM/HWM Monitoring
 - Annual late-summer surveys
4. Conduct EWM/HWM Population Control Using Herbicide Spot Treatments
 - *Trigger:* Colonized EWM that are dominant or greater in density, with areas containing high use or riparian frontage would be prioritized.
5. Conduct EWM Population Control Using Large-Scale Herbicide Treatments
 - *Trigger:* When EWM population exceeds levels that can be controlled with spot-treatments
6. Coordinate Periodic Quantitative Vegetation Monitoring
 - PI Survey – every 3-5 years, Communities – every 7-8 years





Conclusions

Your lake is in great shape – Keep it up!

Onterra, LLC
Lake Management Planning

Latest Fisheries Report

- Large-mouth Bass
 - Most abundant predator (5.0/3.5 fish per acre)
 - High abundance and moderate size structure
- Walleye
 - Present but low abundance
 - Latest stocking events in 2014 and 2016 (previous in 1974 & 1975)
- Northern Pike & Muskellunge
 - Present but very low abundance
- Panfish
 - Primarily BG, BC, & YP
 - Predator management recommended to decrease density and increase growth rates

Onterra, LLC
Lake Management Planning



B

APPENDIX B

Stakeholder Survey Response Charts and Comments

Loon Lake - Anonymous Stakeholder Survey

Surveys Distributed: 151
Surveys Returned: 67
Response Rate: 44%

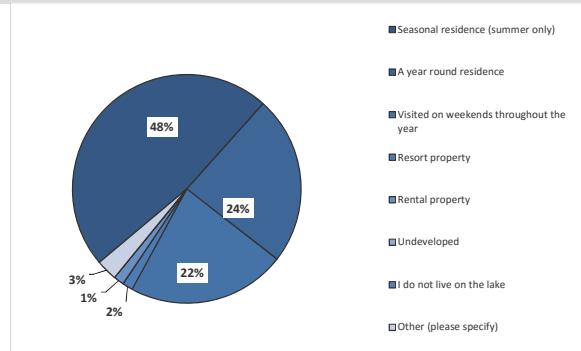
Loon Lake Property

1. How is your property on Loon Lake utilized?

Answer Options	Response Percent	Response Count
Seasonal residence (summer only)	47.8%	32
A year round residence	23.9%	16
Visited on weekends throughout the year	22.4%	15
Resort property	1.5%	1
Rental property	1.5%	1
Undeveloped	0.0%	0
I do not live on the lake	0.0%	0
Other (please specify)	3.0%	2
answered question	67	
skipped question	0	

Number Other (please specify)

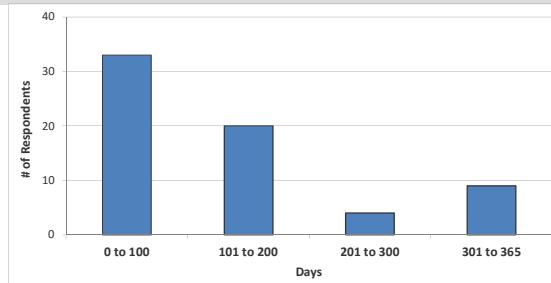
- 1 Visited throughout the year not just weekends
- 2 Year round home used year round no one's primary



2. How many days each year is your property used by you or others?

Answer Options	Response Count
answered question	66
skipped question	1

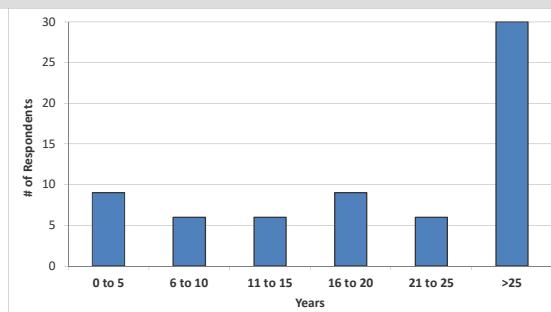
Category (# of days)	Responses
0 to 100	33 50%
101 to 200	20 30%
201 to 300	4 6%
301 to 365	9 14%



3. How long have you owned your property on Loon Lake?

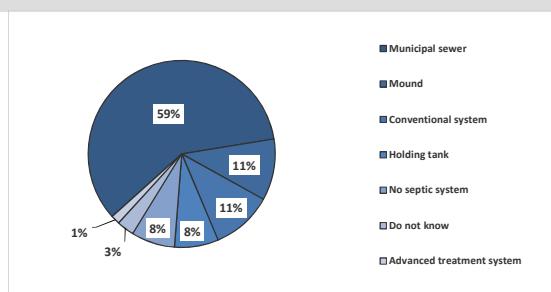
Answer Options	Response Count
answered question	66
skipped question	1

Category (# of years)	Responses	% Response
0 to 5	9	14%
6 to 10	6	9%
11 to 15	6	9%
16 to 20	9	14%
21 to 25	6	9%
>25	30	45%



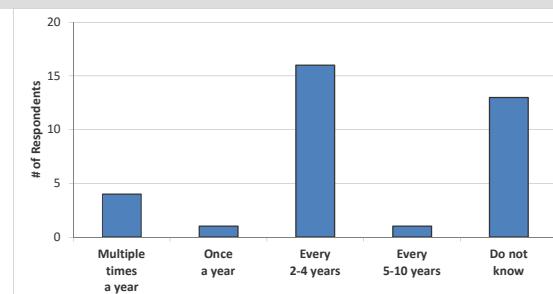
4. What type of septic system does your property utilize?

Answer Options	Response Percent	Response Count
Municipal sewer	59.1%	39
Mound	10.6%	7
Conventional system	10.6%	7
Holding tank	7.6%	5
No septic system	7.6%	5
Do not know	3.0%	2
Advanced treatment system	1.5%	1
answered question	66	
skipped question	1	



5. How often is the septic system on your property pumped?

Answer Options	Response Percent	Response Count
Multiple times a year	11.4%	4
Once a year	2.9%	1
Every 2-4 years	45.7%	16
Every 5-10 years	2.9%	1
Do not know	37.1%	13
answered question	35	
skipped question		32

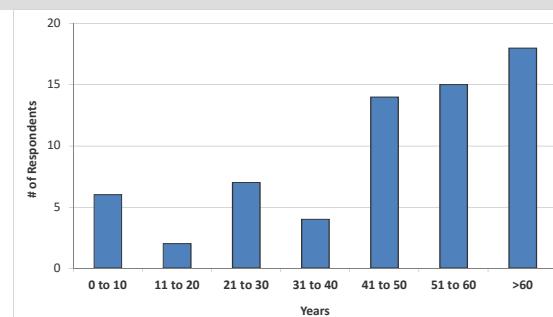


Recreational Activity on Loon Lake

6. How many years ago did you first visit Loon Lake?

Answer Options	Response Count
answered question	66
skipped question	1

Category (# of days)	Responses	% Response
0 to 10	6	9%
11 to 20	2	3%
21 to 30	7	11%
31 to 40	4	6%
41 to 50	14	21%
51 to 60	15	23%
>60	18	27%



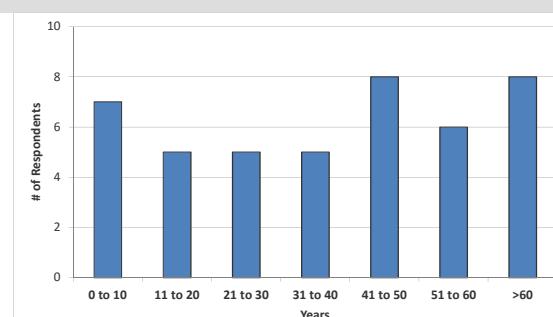
7. Have you personally fished on Loon Lake in the past three years?

Answer Options	Response Percent	Response Count
Yes	66.7%	44
No	33.3%	22
answered question	66	
skipped question		1

8. For how many years have you fished Loon Lake?

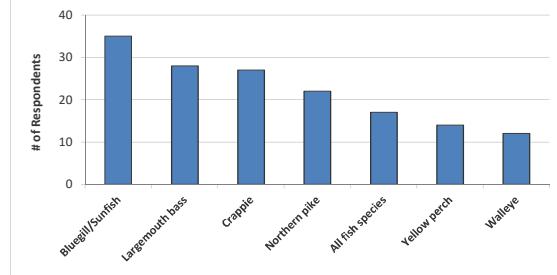
Answer Options	Response Count
answered question	44
skipped question	23

Category (# of years)	Responses	% Response
0 to 10	7	16%
11 to 20	5	11%
21 to 30	5	11%
31 to 40	5	11%
41 to 50	8	18%
51 to 60	6	14%
>60	8	18%



9. What species of fish do you like to catch on Loon Lake?

Answer Options	Response Percent	Response Count
Bluegill/Sunfish	79.6%	35
Largemouth bass	63.6%	28
Crappie	61.4%	27
Northern pike	50.0%	22
All fish species	38.6%	17
Yellow perch	31.8%	14
Walleye	27.3%	12
Other (please specify)	6.8%	3
<i>answered question</i>		44
<i>skipped question</i>		23

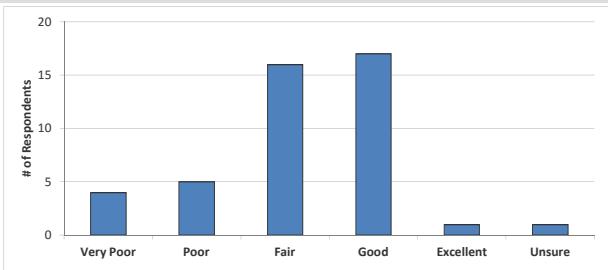


Number Other (please specify)

- 1 Ones that are large enough to keep
- 2 anything that is big enough.
- 3 Musky

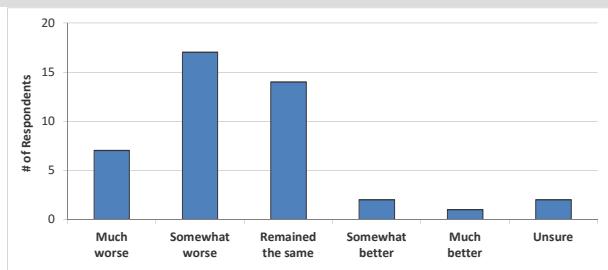
10. How would you describe the current quality of fishing on Loon Lake?

Answer Options	Very Poor	Poor	Fair	Good	Excellent	Unsure	Response Count
	4	5	16	17	1	1	44
<i>answered question</i>		<i>skipped question</i>					44
							23



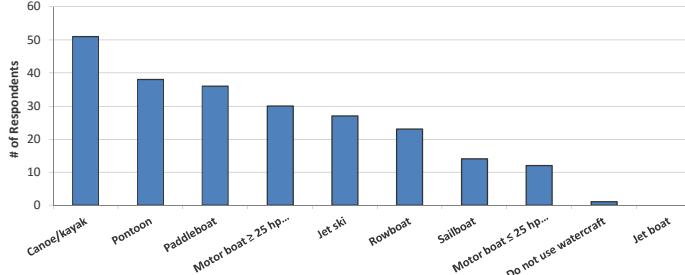
11. How has the quality of fishing changed on Loon Lake since you have started fishing the lake?

Answer Options	Much worse	Somewhat worse	Remained the same	Somewhat better	Much better	Unsure	Response Count
	7	17	14	2	1	2	43
<i>answered question</i>		<i>skipped question</i>					43
							24



12. What types of watercraft do you currently use on Loon Lake?

Answer Options	Response Percent	Response Count
Canoe/kayak	77.3%	51
Pontoon	57.6%	38
Paddleboat	54.6%	36
Motor boat with greater than 25 hp motor	45.5%	30
Jet ski (personal water craft)	40.9%	27
Rowboat	34.9%	23
Sailboat	21.2%	14
Motor boat with 25 hp or less motor	18.2%	12
Do not use watercraft	1.5%	1
Jet boat	0.0%	0
<i>answered question</i>	66	
<i>skipped question</i>	1	



13. Do you use your watercraft on waters other than Loon Lake?

Answer Options	Response Percent	Response Count
Yes	18.5%	12
No	81.5%	53
<i>answered question</i>	65	
<i>skipped question</i>	2	

14. What is your typical cleaning routine after using your watercraft on waters other than Loon Lake?

Answer Options	Response Percent	Response Count
Remove aquatic hitch-hikers (ex. - plant material, clams, mussels)	76.9%	10
Drain bilge	53.9%	7
Rinse boat	38.5%	5
Power wash boat	7.7%	1
Apply bleach	0.0%	0
Do not clean boat	0.0%	0
Other (please specify)	23.1%	3
<i>answered question</i>	13	
<i>skipped question</i>	54	

Number Other (please specify)

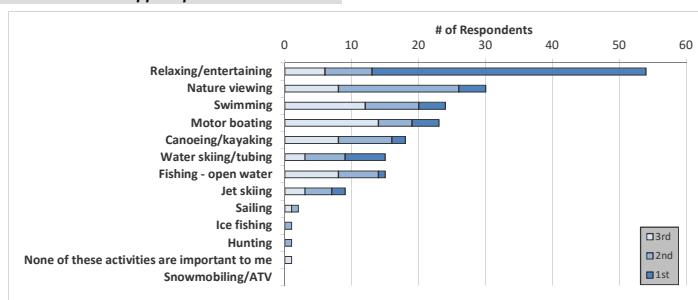
- 1 Wax
- 2 Only take boat out of Loon once a year to store for
- 3 kayaks don't get hitchhikers in my experience

15. For the list below, rank up to three activities that are important reasons for owning your property on Loon Lake, with 1 being the most important.

Answer Options	1st	2nd	3rd	Rating Average	Response Count
Relaxing/entertaining	41	7	6	1.35	54
Nature viewing	4	18	8	2.13	30
Swimming	4	8	12	2.33	24
Motor boating	4	5	14	2.43	23
Canoeing/kayaking	2	8	8	2.33	18
Water skiing/tubing	6	6	3	1.8	15
Fishing - open water	1	6	8	2.47	15
Jet skiing	2	4	3	2.11	9
Sailing	0	1	1	2.5	2
Ice fishing	0	1	0	2	1
Hunting	0	1	0	2	1
None of these activities are important to me	0	0	1	3	1
Snowmobiling/ATV	0	0	0	0	0
Other (please specify below)	2	0	0	1	2
Please specify "Other" response here					3

answered question 66
skipped question 1

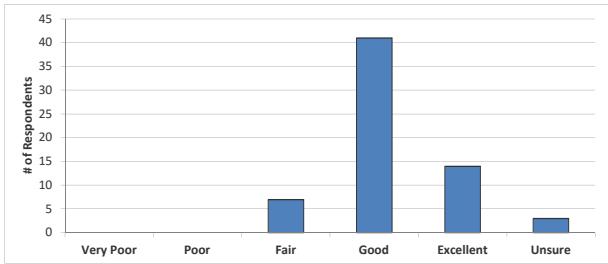
Number	"Other" responses
1	Family. Nature
2	It's been a family tradition for years to spend our Summers at Loon Lake.
3	Living next to a body of water.



Loon Lake Current and Historic Condition, Health and Management

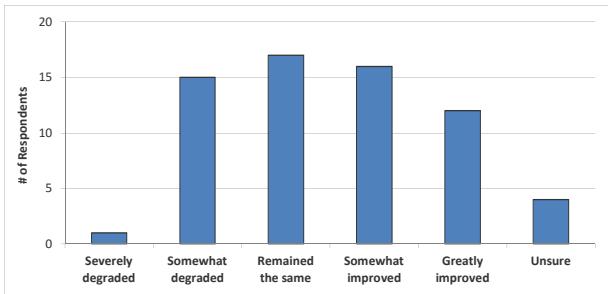
16. How would you describe the current water quality of Loon Lake?

Answer Options	Very Poor	Poor	Fair	Good	Excellent	Unsure	Response Count
	0	0	7	41	14	3	65
<i>answered question</i>							65
<i>skipped question</i>							2



17. How has the current water quality changed in Loon Lake since you first visited the lake?

Answer Options	Severely degraded	Somewhat degraded	Remained the same	Somewhat improved	Greatly improved	Unsure	Response Count
	1	15	17	16	12	4	65
<i>answered question</i>							65
<i>skipped question</i>							2



18. Before reading the statement above, had you ever heard of aquatic invasive species?

Answer Options	Response Percent	Response Count
Yes	98.5%	65
No	1.5%	1
<i>answered question</i>		66
<i>skipped question</i>		1

19. Do you believe aquatic invasive species are present within Loon Lake?

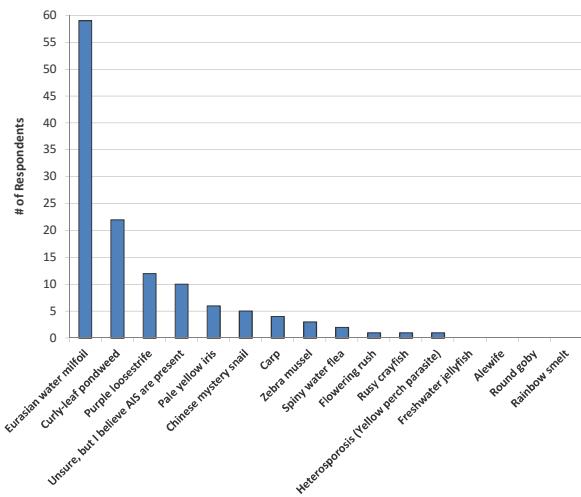
Answer Options	Response Percent	Response Count
Yes	96.8%	61
No	3.2%	2
<i>answered question</i>		63
<i>skipped question</i>		4

20. Which aquatic invasive species do you believe are in Loon Lake?

Answer Options	Response Percent	Response Count
Eurasian water milfoil	93.7%	59
Curly-leaf pondweed	34.9%	22
Purple loosestrife	19.1%	12
Unsure, but I believe AIS are present	15.9%	10
Pale yellow iris	9.5%	6
Chinese mystery snail	7.9%	5
Carp	6.4%	4
Zebra mussel	4.8%	3
Spiny water flea	3.2%	2
Flowering rush	1.6%	1
Rusy crayfish	1.6%	1
Heterosporosis (Yellow perch parasite)	1.6%	1
Freshwater jellyfish	0.0%	0
Alewife	0.0%	0
Round goby	0.0%	0
Rainbow smelt	0.0%	0
Other (please specify)	11.1%	7
<i>answered question</i>		63
<i>skipped question</i>		4

Number "Other" responses

- 1 muskie
- 2 Muskies. Are they eating all the fish?
- 3 FIBS
- 4 Muskee
- 5 celery weed?
- 6 Some species that burrows into your skin.
- 7 not sure what species are in our lake



21. To what level do you believe each of the following factors may currently be negatively impacting Loon Lake?

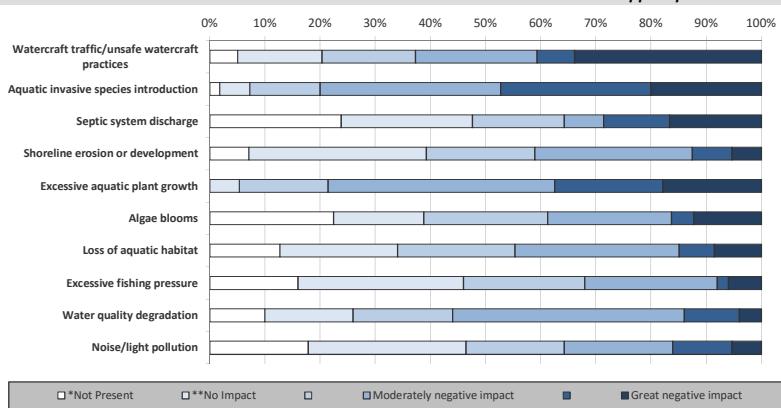
* Not Present means that you believe the issue does not exist on Loon Lake.

** No Impact means that the issue may exist on Loon Lake but it is not negatively impacting the lake.

Answer Options	*Not Present	**No Impact	Moderately negative impact	Great negative impact	Unsure: Need more information	Rating Average	Response Count
Watercraft traffic or unsafe watercraft practices	3	9	10	13	4	20	2.10
Aquatic invasive species introduction	1	3	7	18	15	11	2.20
Septic system discharge	10	10	7	3	5	7	0.93
Shoreline erosion or development	4	18	11	16	4	3	1.12
Excessive aquatic plant growth (excluding algae)	0	3	9	23	11	10	2.17
Algae blooms	11	8	11	11	2	6	1.07
Loss of aquatic habitat	6	10	10	14	3	4	1.07
Excessive fishing pressure	8	15	11	12	1	3	0.85
Water quality degradation	5	8	9	21	5	2	1.25
Noise/light pollution	10	16	10	11	6	3	1.07
Other (please specify)							8
						answered question	61
						skipped question	6

Number Other (please specify)

1. Water level is 1 foot higher than it was 20+ years ago. I think this is why all the trees on the island have drown. Why is the water level so high? For Boaters? From the Shawano Dam? From the Channel to Washington nearly closing? The channel used to be navigable with a fishing boat
- 1 with a 10 hp motor. It is now filled in and extremely shallow - even with the increased water levels. Water flows in on the north and out through the channel. We should be looking at the entire lake ecosystem, not just inflow. The lake assn seems to ignore this and prevent discussion. Why?
- 2 after hours speed. mostly by lake visitors
- 3 High Lake water levels
- 4 motors too fast and too big for lake. they cut off weeds
- 5 Seeing more dogs than we used to. Some not well behaved.
- 6 really don't know enough to qualify a intelligent answer
- 7 I've caught Northern Pike with "sores" on their sides
- 8 no-wake violations by pontoons in evening

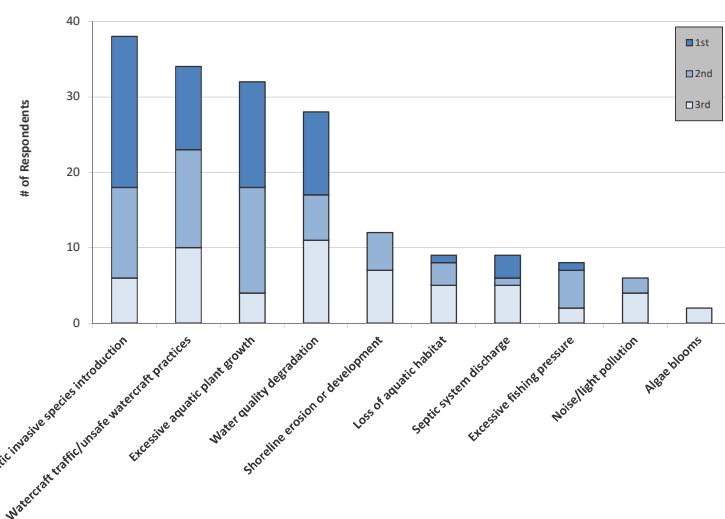


22. From the list below, please rank your top three concerns regarding Loon Lake, with 1 being your greatest concern.

Answer Options	1st	2nd	3rd	Response Count
Aquatic invasive species introduction	20	12	6	38
Watercraft traffic or unsafe watercraft practices	11	13	10	34
Excessive aquatic plant growth (excluding algae)	14	14	4	32
Water quality degradation	11	6	11	28
Shoreline erosion or development	0	5	7	12
Loss of aquatic habitat	1	3	5	9
Septic system discharge	3	1	5	9
Excessive fishing pressure	1	5	2	8
Noise/light pollution	0	2	4	6
Algae blooms	0	0	2	2
Other (please specify)	1	0	1	2
Please specify "Other" response here				5
	<i>answered question</i>		63	
	<i>skipped question</i>		4	

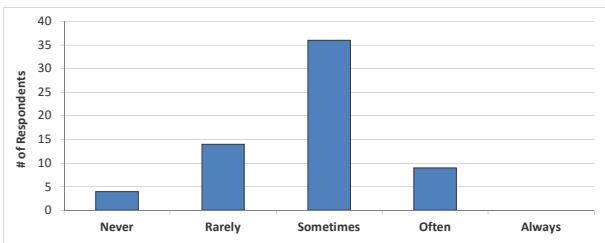
Number "Other" responses

1. Lake water level - too high. 2. Island Channel. The water level has risen so much the island trees have nearly all died. The water flows in and out. The channel has changed so much in the last 50 years. It should be studied and managed.
- 2 motors too large and fast for lake
- 3 light pollution is 4th
- 4 Poor fisheries management leading to stunting
- 5 Possible fish Virus observed in Northern Pike (sores on their sides)



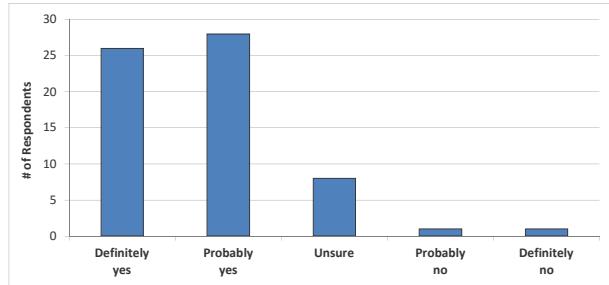
23. During open water season how often does aquatic plant growth, including algae, negatively impact your enjoyment of Loon Lake?

Answer Options	Never	Rarely	Sometimes	Often	Always	Response Count
	4	14	36	9	0	63
	<i>answered question</i>		63			
	<i>skipped question</i>		4			



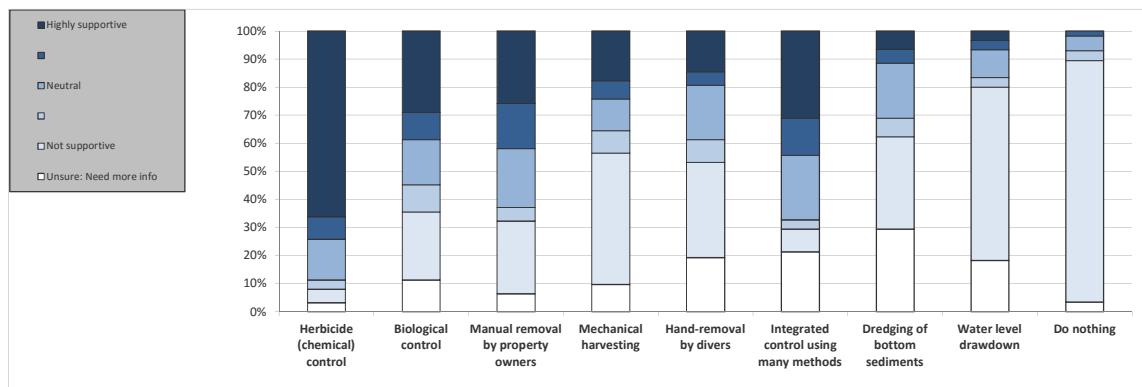
24. Considering your answer to the question above, do you believe aquatic plant control is needed on Loon Lake?

Answer Options	Definitely yes	Probably yes	Unsure	Probably no	Definitely no	Response Count
	26	28	8	1	1	64
<i>answered question</i>					64	
<i>skipped question</i>					3	



25. Aquatic plants can be managed using many techniques. What is your level of support for the responsible use of the following techniques on Loon Lake?

Answer Options	Not supportive	Neutral	Highly supportive	Unsure: Need more info	Rating Average	Response Count
Herbicide (chemical) control	3	2	9	5	41	3
Biological control (milfoil weevil, loosestrife beetle, etc)	15	6	10	6	18	7
Manual removal by property owners	16	3	13	10	16	4
Mechanical harvesting	29	5	7	4	11	6
Hand-removal by divers	21	5	12	3	9	12
Integrated control using many methods	5	2	14	8	19	13
Dredging of bottom sediments	20	4	12	3	4	18
Water level drawdown	37	2	6	2	2	11
Do nothing (do not manage plants)	49	2	3	1	0	2
<i>answered question</i>					63	
<i>skipped question</i>					4	



26. Did you know that aquatic herbicides were being applied in Loon Lake to help control Eurasian watermilfoil?

Answer Options	Response Perct	Response Count
Yes	92.2%	59
I think so but can't say for certain	6.3%	4
No	1.6%	1
<i>answered question</i>		64
<i>skipped question</i>		3

27. How do you feel about the past use of herbicides to treat Eurasian watermilfoil in previous years?

Answer Options	Completely support	Moderately support	Unsure	Moderately oppose	Completely oppose	Rating Average	Response Count
	48	7	7	1	1	1.11	64
<i>answered question</i>					64		
<i>skipped question</i>					3		

28. What is your level of support or opposition for future aquatic herbicide use to treat Eurasian watermilfoil in Loon Lake?

Answer Options	Completely support	Moderately support	Unsure	Moderately oppose	Completely oppose	Rating Average	Response Count
	47	9	5	1	1	1.17	63
<i>answered question</i>							63
<i>skipped question</i>							4

29. What is the reason(s) you oppose the future use of aquatic herbicides to target Eurasian watermilfoil in Loon Lake?

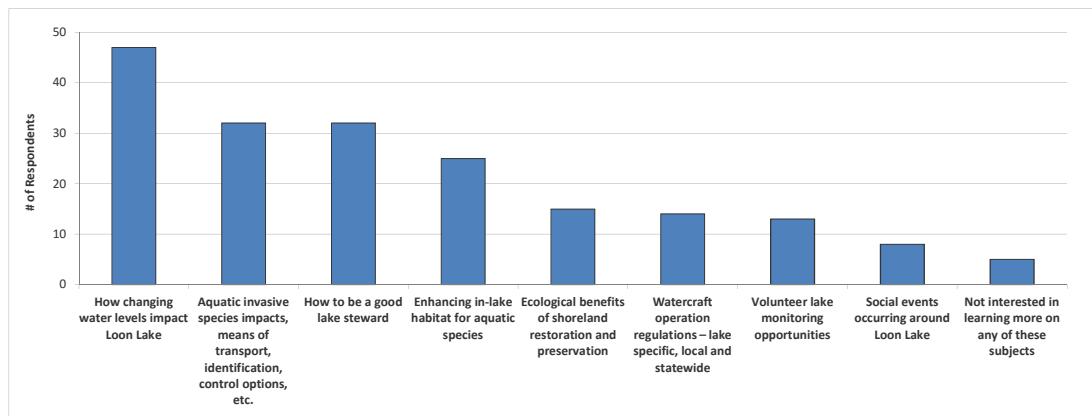
Answer Options	Response Perct	Response Count
Cost of treatment is too high	0.0%	0
Potential impacts to native aquatic plant species	50.0%	1
Potential impacts to native (non-plant) species such as fish, insects, etc.	50.0%	1
Potential impacts to human health	50.0%	1
<i>answered question</i>		2
<i>skipped question</i>		65

30. Stakeholder education is an important component of every lake management planning effort. Which of these subjects would you like to learn more about?

Answer Options	Response Percent	Response Count
How changing water levels impact Loon Lake	78.3%	47
Aquatic invasive species impacts, means of transport, identification, control options, etc.	53.3%	32
How to be a good lake steward	53.3%	32
Enhancing in-lake habitat (not shoreland or adjacent wetlands) for aquatic species	41.7%	25
Ecological benefits of shoreland restoration and preservation	25.0%	15
Watercraft operation regulations – lake specific, local and statewide	23.3%	14
Volunteer lake monitoring opportunities (Clean Boats Clean Waters, Citizens Lake Monitoring Network, Loon Watch, LLWMD programs, etc.)	21.7%	13
Social events occurring around Loon Lake	13.3%	8
Not interested in learning more on any of these subjects	8.3%	5
Other (please specify)	5.0%	3
<i>answered question</i>		60
<i>skipped question</i>		7

Number Other (please specify)

- 1 What to do to save the island. How to open the channel - how its current state has affected the water level and cleanliness in the lake and what will happen in the next 50 years.
- 2 Mandatory Flagpoles
- 3 do we qualify for on-going fish species planting in Loon Lake?



Loon Lake Wescott Management District (LLWMD)

31. Before receiving this mailing, have you ever heard of the LLWMD?

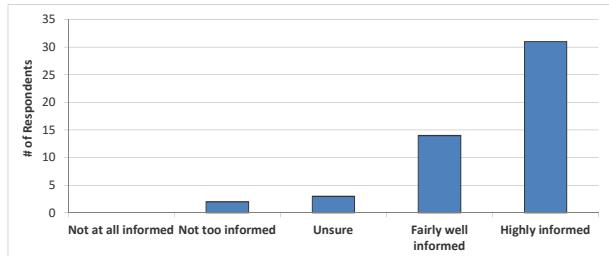
Answer Options	Response Percent	Response Count
Yes	96.8%	60
No	3.2%	2
	<i>answered question</i>	62
	<i>skipped question</i>	5

32. What is your membership status with the LLWMD?

Answer Options	Response Percent	Response Count
Current member	79.3%	46
Former member	1.7%	1
Never been a member	19.0%	11
	<i>answered question</i>	58
	<i>skipped question</i>	9

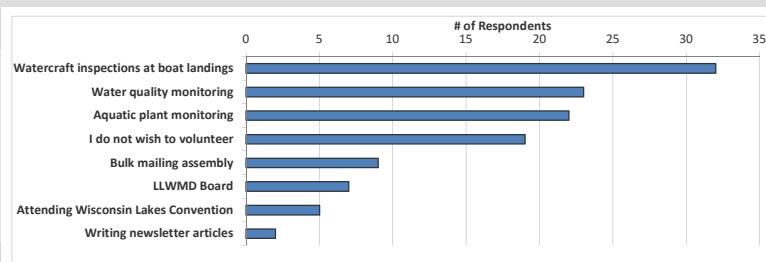
33. How informed has (or had) the LLWMD kept you regarding issues with Loon Lake and its management?

Answer Options	Not at all informed	Not too informed	Unsure	Fairly well informed	Highly informed	Response Count
	0	2	3	14	31	50
				<i>answered question</i>		50
				<i>skipped question</i>		17



34. The effective management of your lake will require the cooperative efforts of numerous volunteers. Please circle the activities you would be willing to participate in if the LLWMD requires additional assistance.

Answer Options	Response Percent	Response Count
Watercraft inspections at boat landings	53.3%	32
Water quality monitoring	38.3%	23
Aquatic plant monitoring	36.7%	22
I do not wish to volunteer	31.7%	19
Bulk mailing assembly	15.0%	9
LLWMD Board	11.7%	7
Attending Wisconsin Lakes Convention	8.3%	5
Writing newsletter articles	3.3%	2
	<i>answered question</i>	60
	<i>skipped question</i>	7



35. Please feel free to provide written comments concerning Loon Lake, its current and/or historic condition and its management.

Answer Options	Response Count
	33
<i>answered question</i>	33
<i>skipped question</i>	34

Number	Response Text
1	Would like to see wake time extended to 7pm
2	Extend skiing hours until 6:00pm
3	Investigate how to increase the number and size of pan fish and northern fishing on Loon Lake. It has not been good for the last 20 years. The 30 years before that, fish was plentiful and large. Why the change? What can be done to make recreational fishing good again for lake residents? What is up with the Fishing Tournaments? (I heard they are fishing Muskies and Muskie eat the smaller fish?) There used to be schools of minnows all over in the summer. There haven't been any minnows in years.
4	Love that Loons and Eagles have been back for the last 20 years. That means that the lake must be good for them.
5	The Trailer Park residents are heavy users of the lake. From pontoons, to ski boats to jet skis. They do not pay Lake Association dues and do not have a large vested interest in the lake. Yet many are 10-20 year residents as well. It is not a transient trailer park. Now since the ownership has just changed, it is time to openly discuss this.
6	The Labor Day meeting seemed rushed. It would have been nice to formally thank Camp T and Eric as he was leaving.
7	Every issue should be able to be heard.
8	What is going on that the newest board member is no longer on the board? What were the issues? This seems alarming.
9	I think that there is not enough concern over the danger of the reckless driving of boats and the personal watercraft on Loon Lake. There were times I was afraid to go out on the lake this past Summer due to the reckless, irresponsible driving I witnessed by some of the boats and jet skis. I really feel this needs to be addressed and is just as important, if not more so, than any aquatic plants in the lake.
10	What happened to the bullheads?
11	I commend all efforts of our board! I have been on the board before, and it is time consuming but gratifying to know Loon Lk. will be in good hands in the future
12	Water level has risen greatly in recent years and trees on the island have drowned. Need studies on reason for this. Need discussion on size of motors because of the weeds they cut off.
13	Boats and motors are getting too big and too fast for the lake
14	Water quality seems better than it was ten years ago and about the same as fifty years ago
15	Since we are relatively new to the lake, would be interested in historical information about the lake and specifically how it has changed. Is there one specific document that tells what is and isn't allowed on Loon Lake? Regarding landscaping, building, etc., not just no wake before 9 and after 5?
16	Loon Lake seems very healthy!
17	Our Loon Lake property has been in my family for 100 years. We currently live out of state but I fully intend to retire in Shawano (or move there before I retire). My commitment to the preservation of Loon Lake and its attributes is extremely important and meaningful to me. I'm sad to see all the new TREMENDOUS homes and believe there is too many personal watercraft creating a safety hazard as well as disturbing the lakes tranquility and other boaters.
18	In the past few years I have caught more walleyes off the dock than ever before
19	Even though I stated that water quality has slightly degraded since I first came to Loon Lake, it's much better than it was in early 2000's
20	I am very proud of the efforts put into management of the lake and remain a strong supporter of our association. My family lives 435 miles away and we always look forward to our periodic trips to Loon Lake during each summer.
21	Please don't add more regulations.
22	Loon Lake was different when I came here as a kid. The lake is looking better than it has 10 years ago. Sadly society is spiraling downward leaving us with less respectful lake neighbors. We have another home on a no-wake lake and actually prefer it there.
23	Great job. Keep it up!
24	I would like to know if there is anything that can be done to preserve the island on the lake, 50 years ago it was lush and green, now most of the trees are dead
25	Loon Lake remains a great lake due primarily to the efforts of our lake association board
26	Personally I feel that our board does a wonderful job. Job Well Done! Keep up the good work!
27	water quality and weed control are essential
28	We appreciate all that our Management team does to preserve the integrity of Loon Lake and will support them in doing so
29	The past management of invasive weeds has continued to improve our lake on a yearly basis. We are extremely thankful for those directly involved in numerous volunteer hours to continue the effort to contain the invasive weeds.
30	We are fortunate to have formed a Lake District in 1990!!! And for having purchased the shoreline frontage on the west side
31	The lake water use to be clear but the last 10 years is very brown and murky
32	The Loon Lake Board needs to find a way to encourage younger people to get involved, not someone my age.
33	I remember 80 years ago when the bottom was a solid light colored sand. Now it is getting mucky and soft.
34	I also remember clams being more of a problem in our swimming area.
35	I am pleased that we have a management district and an active board. Keep up the good work!
36	Keep up the good work!
37	Please do not interpret my lack of "interest" in speedboat water activities (jet ski, waterskiing, etc) as saying there is no place for them on the lake. We have had speed motor watercraft in the past and enjoyed them and wish well to people who want to responsibly use them. I am also not opposed to expanding the "busy time" on the lake til 7 pm or changing the hours from 11 am to 7 pm. While the lake is not big by lake standards, it is big enough to accommodate multiple uses as long as they are done courteously and safely.
38	I am pleased and appreciate the active water management and the improvements in action and communication. Also with the view toward improvement
39	I believe the lake to be in very good condition and I would be very opposed to drastic efforts to change usage rights of property owners. Weed control over the last 10 years has been very effective and should be a continued focus. Fishing quality for game fish has diminished a bit over the last 5 years (except that panfish, especially bluegill are still present in abundance). But, I've observed more residents fishing. I've got some theories regarding the decrease in numbers of game fish caught. First - I've observed weekday evening bass tournaments from outside fisherman (non lake-residents). I would be in favor of banning outside bass tournaments but would support resident only tournaments/jamborees. Next, the decrease in numbers for game fish caught seems to coincide with the very high waters of about 5 years ago. It has declined ever since. After these high waters, a population of Musky has emerged, so that might have something to do with it. (I do very much enjoy the presence of Musky in the lake for a new fishing opportunity, so, I would like to keep that opportunity). Continued stocking efforts for Northern/Bass/Walleye/even Musky would be appreciated.
40	I hope this survey does not manufacture conclusions basis the answers to very specific questions as has been done in past DNR style surveys
41	Why were no questions about cost contained in this survey?
42	Overall lake quality nosedived to poor in the 1980's. Since the LLWMD was formed GREAT progress has been made!

C

APPENDIX C

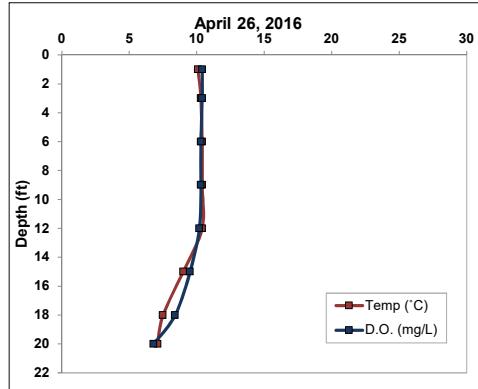
Water Quality Data

Loon Lake

Date: 4/26/2016
Time: 11:33
Weather: windy, 100% clouds, 41F
Entry: EEH

Max Depth: 20.8
LS Depth (ft): 3.0
LB Depth (ft): 18.0
Secchi Depth (ft): 4.4

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	10.1	10.4		
3	10.3	10.4	7.3	
6	10.4	10.3		
9	10.4	10.3		
12	10.4	10.2	7.4	
15	9.0	9.5		
18	7.5	8.4	7.4	
20	7.1	6.8		



Parameter	LS	LB
Total P (µg/L)	16.70	23.50
Dissolved P (µg/L)	ND	ND
Chl-a (µg/L)	3.38	NA
TKN (µg/L)	495.00	473.00
NO ₃ + NO ₂ -N (µg/L)	ND	58.90
NH ₃ -N (µg/L)	15.20	27.20
Total N (µg/L)	495.00	531.90
Lab Cond. (µS/cm)	114.00	115.00
Lab pH	7.71	7.35
Alkalinity (mg/L CaCO ₃)	44.90	44.50
Total Susp. Solids (mg/L)	2.75	4.60
Calcium (mg/L)	12.30	NA
Magnesium (mg/L)	5.65	NA
Hardness (mg/L)	53.90	NA
Color (SU)	60.00	NA
Turbidity (NTU)	NA	NA

Data collected by TWH and EJH (Onterra).

Loon Lake

Date: 6/24/2016
Time: 11:00
Weather: 0% clouds, 76F
Entry: EEH

Max Depth:
LS Depth (ft):
LB Depth (ft):
Secchi Depth (ft):

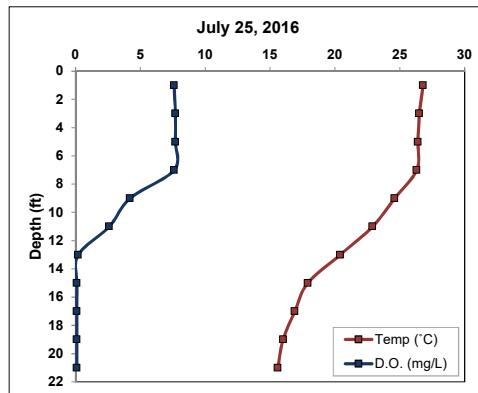
Parameter	LS	LB
Total P (µg/L)	24.60	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	7.67	NA
TKN (µg/L)	NA	NA
NO ₃ + NO ₂ -N (µg/L)	NA	NA
NH ₃ -N (µg/L)	NA	NA
Total N (µg/L)	670.00	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L CaCO ₃)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Loon Lake

Date: 7/25/2016
Time: 9:00
Weather: Clear, Breezy
Entry: JMB

Max Depth: 21.5
LS Depth (ft): 3.0
LB Depth (ft): 19.0
Secchi Depth (ft): 5.5

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	26.8	7.6		
3	26.5	7.7		
5	26.4	7.7		
7	26.3	7.6		
9	24.6	4.2		
11	22.9	2.6		
13	20.4	0.2		
15	17.9	0.1		
17	16.9	0.1		
19	16.0	0.1		
21	15.6	0.1		



Parameter	LS	LB
Total P (µg/L)	19.90	44.40
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	2.28	NA
TKN (µg/L)	654.00	NA
NO ₃ + NO ₂ -N (µg/L)	ND	NA
NH ₃ -N (µg/L)	ND	NA
Total N (µg/L)	654.00	NA
Lab Cond. (µS/cm)	140.00	156.00
Lab pH	7.90	7.04
Alkalinity (mg/L CaCO ₃)	61.10	73.50
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	60.00	NA
Turbidity (NTU)	NA	NA

Data collected by TAH (Onterra).

Loon Lake

Date: 8/10/2016
Time: 11:00
Weather: 27.7C, 50% clouds
Entry: EEH

Max Depth:
LS Depth (ft):
LB Depth (ft):
Secchi Depth (ft): 6.3

Parameter	LS	LB
Total P (µg/L)	24.80	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	3.70	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)	531.00	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
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

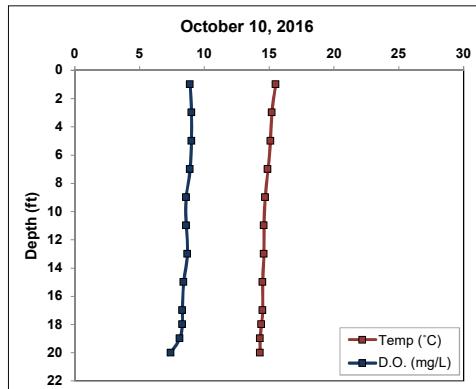
[Redacted]

Loon Lake

Date: 10/10/2016
Time: 10:30
Weather: 0% clouds, Light breeze, 57 °F
Entry: JMB

Max Depth: 20.4
LS Depth (ft): 3.0
LB Depth (ft): 18.0
Secchi Depth (ft): 5.1

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	15.5	8.9		
3	15.2	9.0		
5	15.1	9.0		
7	14.9	8.9		
9	14.7	8.6		
11	14.6	8.6		
13	14.6	8.7		
15	14.5	8.4		
17	14.5	8.3		
18	14.4	8.3		
19	14.3	8.1		
20	14.3	7.4		



Parameter	LS	LB
Total P (µg/L)	20.50	23.20
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	3.75	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	ND
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

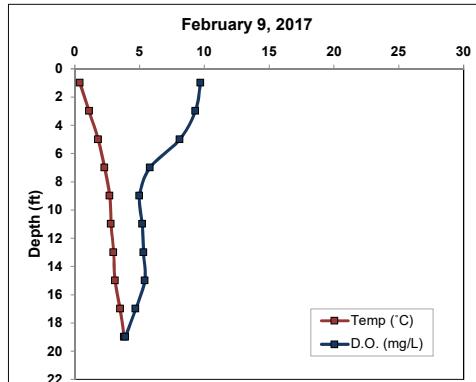
Data collected by LJS, JMB and TWH (Onterra).

Loon Lake

Date: 2/9/2017
Time: 9:30
Weather: 0% clouds 10mph wind 0F
Entry: JMB

Max Depth: 20.2
LS Depth (ft): 3.0
LB Depth (ft): 17.0
Secchi Depth (ft): 5.6

Depth (ft)	Temp (°C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0.4	9.7		
3	1.1	9.3		
5	1.8	8.1		
7	2.3	5.8		
9	2.7	5.0		
11	2.8	5.2		
13	3.0	5.3		
15	3.1	5.4		
17	3.5	4.7		
19	3.8	3.9		



Parameter	LS	LB
Total P (µg/L)	22.20	21.20
Dissolved P (µg/L)	2.80	5.90
Chl-a (µg/L)	NA	NA
TKN (µg/L)	629.00	468.00
NO ₃ + NO ₂ -N (µg/L)	138.00	454.00
NH ₃ -N (µg/L)	39.10	ND
Total N (µg/L)	767.00	922.00
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
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH & JMB (Onterra). Ice depth 1.2ft.

Water Quality Data

Parameter	Surface		Bottom	
	Count	Mean	Count	Mean
Secchi Depth (feet)	5	5.4	NA	NA
Total P (µg/L)	6	21.5	4	28.1
Dissolved P (µg/L)	2	2.8	2	5.9
Chl a (µg/L)	5	4.2	0	NA
TKN (µg/L)	3	592.7	2	470.5
NO ₃ +NO ₂ -N (µg/L)	3	138.0	2	256.5
NH ₃ -N (µg/L)	3	27.2	2	27.2
Total N (µg/L)	5	623.4	2	727.0
Lab Cond. (µS/cm)	2	127.0	2	135.5
Alkal (mg/l CaCO ₃)	2	53.0	2	59.0
Total Susp. Solids (mg/l)	2	2.8	2	4.6
Calcium (mg/L)	1	12.3	0	NA
Magnesium (mg/L)	1	5.7	0	NA
Hardness (mg/L)	1	53.9	0	NA
Color (SU)	2	60.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1990			53.2
1991			53.8
1992			53.3
1993			58.7
1994			51.6
1995			49.0
1996			55.1
1997			47.6
1998			50.0
1999			47.0
2000			48.3
2001			52.4
2002	49.4	22.5	53.0
2003	43.0	47.6	54.6
2004			56.9
2005			53.9
2006			52.6
2007			50.3
2008			57.3
2009			53.3
2010	52.0	49.1	57.4
2011	52.4	54.8	59.3
2012	50.4	49.8	51.1
2013	48.0	51.7	52.1
2014	51.0	52.6	55.4
2015	55.3	51.7	54.3
2016	49.4	45.5	51.9
All Years (Weighted)	51.0	50.6	52.4
SLDL Median	54.6	52.6	52.4
NCHF Ecoregion Median	61.1	57.3	53.2

Year	Secchi (feet)				Chlorophyll-a (µg/L)				Total Phosphorus (µg/L)				
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer		
	Count	Mean	Count	Mean		Count	Mean		Count	Mean		Count	Mean
1990	15	5.4	10	5.3									
1991	22	5.4	13	5.1									
1992	20	5.4	13	5.2									
1993	21	3.8	14	3.6									
1994	22	5.8	13	5.9									
1995	21	6.4	13	7.0									
1996	14	4.8	10	4.6									
1997	19	7.7	14	7.7									
1998	21	6.8	14	6.6									
1999	18	7.9	11	8.1									
2000	19	7.0	13	7.4									
2001	18	5.5	12	5.6									
2002	22	5.3	15	5.3	3	6.1	1	0.4	6	34.3	2.0	23.0	
2003	18	4.9	14	4.8	1	5.7	1	5.7	1	14.8	1.0	14.8	
2004	16	4.2	13	4.1	0		0		0		0.0		
2005	15	5.1	13	5.0	0		0		0		0.0		
2006	12	5.7	8	5.5	0		0		0		0.0		
2007	21	6.2	9	6.4	0		0		0		0.0		
2008	16	4.4	8	4.0	0		0		0		0.0		
2009	15	5.4	8	5.2	0		0		0		0.0		
2010	15	5.0	8	3.9	3	6.6	3	6.6	4	27.3	3.0	27.7	
2011	7	3.6	5	3.5	3	11.7	3	11.7	4	27.0	3.0	28.3	
2012	9	5.7	5	6.1	3	7.1	3	7.1	3	24.7	3.0	24.7	
2013	6	5.5	4	5.7	3	8.6	3	8.6	4	23.5	3.0	20.9	
2014	4	4.6	3	4.5	3	9.5	3	9.5	3	25.8	3.0	25.8	
2015	3	5.1	2	4.9	3	8.6	3	8.6	3	34.8	3.0	34.8	
2016	5	5.4	3	5.8	5	4.2	3	4.5	5	21.3	3.0	23.1	
All Years (Weighted)	5.6		5.5		7.5		7.7		27.1		25.7		
SLDL Median	5.6		5.6		9.4		15.2		33.0		52.0		
NCHF Ecoregion Median	5.3												

D

APPENDIX D

Watershed Analysis WiLMS Results

Date: 2/16/2017**Scenario: Loon Lake Current**

Lake Id: Loon Lake

Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 11503.0 acre

Total Unit Runoff: 10.80 in.

Annual Runoff Volume: 10352.7 acre-ft

Lake Surface Area <As>: 327.0 acre

Lake Volume <V>: 2663.0 acre-ft

Lake Mean Depth <z>: 8.1 ft

Precipitation - Evaporation: 4.6 in.

Hydraulic Loading: 11175.3 acre-ft/year

Areal Water Load <qs>: 34.2 ft/year

Lake Flushing Rate <p>: 4.20 1/year

Water Residence Time: 0.24 year

Observed spring overturn total phosphorus (SPO): 29.9 mg/m^3

Observed growing season mean phosphorus (GSM): 31.1 mg/m^3

% NPS Change: 0%

% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low	Most Likely	High	Loading %	Low	Most Likely	High	
		----- Loading (kg/ha-year) -----					----- Loading (kg/year) -----		
Row Crop AG	169.0	0.50	1.00	3.00	11.1	34	68	205	
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0	
Pasture/Grass	913.0	0.10	0.30	0.50	18.1	37	111	185	
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0	
MD Urban (1/4 Ac)	1.0	0.30	0.50	0.80	0.0	0	0	0	
Rural Res (>1 Ac)	17.0	0.05	0.10	0.25	0.1	0	1	2	
Wetlands	4858.0	0.10	0.10	0.10	32.0	197	197	197	
Forest	4749.0	0.05	0.09	0.18	28.2	96	173	346	
Lake Surface	327.0	0.10	0.30	1.00	6.5	13	40	132	

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %	=
LuLu Lake Watershed	860000.0	0.0	19.3	0.0	3.1	

SEPTIC TANK DATA

Description	Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)	0.30	0.50	0.80	
# capita-years	106.0			
% Phosphorus Retained by Soil	98.0	90.0	80.0	
Septic Tank Loading (kg/year)	0.64	5.30	16.96	0.9

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	833.7	1353.6	2389.4	100.0
Total Loading (kg)	378.2	614.0	1083.8	100.0
Areal Loading (lb/ac-year)	2.55	4.14	7.31	
Areal Loading (mg/m^2-year)	285.78	463.99	819.01	
Total PS Loading (lb)	0.0	42.5	0.0	3.1
Total PS Loading (kg)	0.0	19.3	0.0	3.1
Total NPS Loading (lb)	803.2	1211.9	2060.2	96.0
Total NPS Loading (kg)	364.3	549.7	934.5	96.0

Phosphorus Prediction and Uncertainty Analysis Module

Date: 2/16/2017 Scenario: 61

Observed spring overturn total phosphorus (SPO): 29.9 mg/m^3

Observed growing season mean phosphorus (GSM): 31.1 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	Most Likely	High	Predicted	% Dif.
	Total P (mg/m^3)	Total P (mg/m^3)	Total P (mg/m^3)	-Observed (mg/m^3)	
Walker, 1987 Reservoir	18	29	52	-2	-6
Canfield-Bachmann, 1981 Natural Lake	20	31	51	0	0
Canfield-Bachmann, 1981 Artificial Lake	19	28	43	-3	-10
Rechow, 1979 General	12	19	34	-12	-39
Rechow, 1977 Anoxic	23	38	67	7	23
Rechow, 1977 water load<50m/year	18	29	51	-2	-6
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	19	31	55	1	3
Vollenweider, 1982 Combined OECD	17	25	40	-6	-20
Dillon-Rigler-Kirchner	12	20	36	-10	-33
Vollenweider, 1982 Shallow Lake/Res.	13	20	33	-11	-36
Larsen-Mercier, 1976	18	30	53	0	0
Nurnberg, 1984 Oxic	13	21	37	-10	-32

Lake Phosphorus Model	Confidence	Confidence	Parameter	Back	Model
	Lower Bound	Upper Bound	Fit?	Calculation (kg/year)	Type
Walker, 1987 Reservoir	19	46	FIT	0	GSM
Canfield-Bachmann, 1981 Natural Lake	10	89	FIT	1	GSM
Canfield-Bachmann, 1981 Artificial Lake	9	81	FIT	1	GSM
Rechow, 1979 General	12	31	FIT	0	GSM
Rechow, 1977 Anoxic	25	60	FIT	0	GSM
Rechow, 1977 water load<50m/year	18	47	FIT	0	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	17	54	FIT	0	SPO
Vollenweider, 1982 Combined OECD	13	44	FIT	0	ANN
Dillon-Rigler-Kirchner	13	32	P	0	SPO
Vollenweider, 1982 Shallow Lake/Res.	11	35	FIT	0	ANN
Larsen-Mercier, 1976	20	47	P In	0	SPO
Nurnberg, 1984 Oxic	12	36	FIT	0	ANN

Water and Nutrient Outflow Module

Date: 2/16/2017 Scenario: 32

Average Annual Surface Total Phosphorus: 31.1mg/m^3

Annual Discharge: 1.12E+004 AF => 1.38E+007 m^3

Annual Outflow Loading: 904.5 LB => 410.3 kg

E

APPENDIX E

Official Comments on Draft Documents

Comments to Loon Lake Draft Comprehensive Management Plan – June 2018

Response Comments by Jo Barlament

Response comments by Eddie Heath

WDNR Comments from Brenda Nordin (WDNR Water Resources Management Specialist)

Hi All, I'd like to see a goal for the increase of woody habitat integrated into the plan. As of now there is not a lot of wood in Loon. Wood would certainly benefit the fish and wildlife habitat. We do have a grant program that pays for Fish sticks. Additionally, Emily Henrigillis the new watershed coordinator will be starting next week and she could assist with the logistics of this. **Discussion with the LLWMD following comments received on the first draft resulted in the modification of a management action into: Determine feasibility of coarse woody habitat additions (i.e. fish sticks projects) on Loon Lake.** This action discusses the WDNR's Healthy Lakes Initiative and how the FWWA can assist with this effort.

WDNR Comments from Jason Breeggemann (WDNR Fisheries Biologist)

I have a couple of comments/suggestions for the Loon Lake comprehensive management plan:

- 1.) I think the report does a great job explaining the many benefits of coarse woody habitat as it pertains to fish. I agree with Brenda that efforts should be made to increase the amount of coarse woody habitat in Loon Lake. **Additional discussions with the lake group occurred in regards to fish stick additions.**
- 2.) The current walleye regulation for Loon Lake is a daily bag limit of 5 and a minimum length limit of 15". However, the walleye regulation in the table states a daily bag limit of 3 and only one walleye over 14". **Change has been made**
- 3.) Both large fingerling walleye and northern pike were stocked in Loon Lake in 2017. Below is the 2017 stocking information to add to table 3.6-2. <table omitted> **Data provided was added to this table**
- 4.) Northern pike were stocked to enhance predator densities to hopefully decrease panfish densities and improve panfish growth rates. Loon Lake was not supposed to receive a walleye stocking in 2017. Walleyes are usually stocked in Loon Lake in even years as part of the Wisconsin Walleye Initiative. However, higher than expected survival in the hatcheries resulted in a surplus of walleyes in 2017. Loon Lake was chosen to receive additional walleyes to again enhance predator densities as well as increase future fishing opportunities for walleyes. **Information was added to this section.**

WDNR Comments from Brenda Nordin (WDNR Water Resources Management Specialist)

1. I agree with Brenda's comment that it would be nice to see more coarse woody habitat around the lake. I would be more than happy to help anyone interested in improving their shoreline get started. Please feel free to pass my contact information along. **Contact information was added to the table on page 94.**
2. Fish sticks may be the best way to go. Here is the links for the Healthy Lakes grants and the information about fish sticks <http://healthylakeswi.com/best-practices/#fish> **The Healthy Lakes Initiative is referenced on page 95 (shoreland) and 97 (fish sticks).**