



Appendix 1A: Summary of Informational Meetings

Informational meetings regarding the Greater Bear Watershed Management Plan were held on August 19, 2011 and September 20, 2011, and were attended by a total of 54 members of the public.

Tim Ervin, of the Alliance for Economic Success, Jim Drazo, Chair of the Greater Bear Watershed Steering Committee, and Laura Heintzelman, Executive Director of the Manistee County Community Foundation, kicked off both the evenings by welcoming community members to the event.

At each meeting, the leadership team discussed the importance of watershed planning and how the steering committee came together to develop a watershed plan that will in turn help to create an action plan that the community can use to achieve its vision, goals, and priorities for the future.

Jack Bails and Jon Beard of Public Sector Consultants, the primary consulting firm involved with plan development, were introduced and provided information about the planning process and work that has already been done. They reviewed information that has been collected from other studies and provided information about the Greater Bear Watershed, which encompasses about 220 square miles, mostly in the northern portion of Manistee County.

Attendees were asked to provide their input into the Greater Bear Watershed planning process. They formed small groups and were asked three questions:

- What are some of the things that you do in the watershed?
- What concerns do you have about the watershed?
- What do you want the watershed to look like in 50 years?

A summary of those responses is given below. Detailed responses, as provided by participants, can be found in the Appendix 1B.

What are some of the things that you do in the watershed?

Participants gave many examples of activities in which they partake in the watershed including those that relate to recreation, residential uses, and economic activity. Recreational activities included both water- and land-based activities such as fishing, swimming, boating, hiking, biking, and snowmobiling, for example.

Many participants indicated that they reside in the watershed and that the natural resources enhance a way of life for them, their family, and their friends.

Attendees also indicated that they engage in commerce in the watershed, which is enhanced by the natural resources. Some of the commercial activities are tied directly to natural resources

through farming, forestry, and sport fishing; others indicated that natural-resource-based tourism supports other commercial interests in the region such as restaurants and shops.

What concerns do you have about the watershed?

Many participants expressed concern regarding degradation of environmental quality, specifically about nutrients and chemicals entering waterbodies from multiple sources including households, businesses, farms, and other sources.

Other concerns identified by participants included stream bank erosion, sedimentation, invasive species, and the health of the fishery. Participants also discussed concerns related to public access to waterbodies and waterways, in conjunction with private property rights.

The group also expressed concern about the lack of financial resources to implement and achieve goals, as well as the long-term economic vitality of communities within the watershed. Members of the group expressed the opinion that strengthening the coordination and collaboration between and among local, state, and federal government, businesses, and the nonprofit community could help address these concerns.

What do you want the watershed to look like in 50 years?

Participants expressed a multigenerational vision for the Greater Bear Watershed in terms of how they would like it to look in 50 years. Attendees said that they want to see planned growth and management that maintains and enhances the natural resources of the watershed and the sense of place of the communities within the Greater Bear Watershed. Attendees said that this could be achieved through active partnerships among and between government, business, and nonprofit organizations to realize shared goals, to enhance natural resource assets of the watershed, to help the community retain and attract residents and visitors of all ages, and to support a vibrant economy.

Appendix 1B: Responses from Participants

Following are individual responses from small group breakout discussions **as identified by participants**. While many of the responses touch on multiple themes, responses were categorized into relevant topics to help identify how people use the resources of the watershed, priority concerns, and goals for the future. Many items identified by participants extend beyond the bounds of watershed planning but are still relevant to resource management.

What are some of the things that you do in the watershed?

Water-based Activities

- | | |
|---------------|-------------|
| ■ Fish | ■ Boat |
| ■ Ice fishing | ■ Tube |
| ■ Swim | ■ Water ski |
| ■ Wade | ■ Sail |
| ■ Kayak | ■ Jet ski |
| ■ Canoe | ■ Windsurf |

Land-based Activities

- | | |
|--|--------------------------|
| ■ Picnic | ■ Cross country ski |
| ■ Garden | ■ Mushroom hunting |
| ■ Fertilize land | ■ Use scenic trails |
| ■ Walk/hike | ■ Horseback riding |
| ■ Camp | ■ Bicycle |
| ■ Hunt/trap | ■ Golf |
| ■ Off-road vehicles (snowmobile, ATVs, golf carts) | ■ Landscape the property |
| ■ Snowshoe | ■ Irrigate land |

Other Activities

- | | |
|---------------------------------|-------------------------------|
| ■ Entertain friends and family | ■ Campfires |
| ■ Reside | ■ Enjoy scenery |
| ■ Take photographs | ■ Educate children and adults |
| ■ Own businesses | ■ Wash cars/vehicles |
| ■ View wildlife (bird watching) | |

Resource-based Commercial Activities

- | | |
|-----------------|------------------------------|
| ■ Logging | ■ Charter (fishing) activity |
| ■ Tourism | ■ Gravel/sand mining |
| ■ Oil/gas wells | ■ Farm & Cultivate crops |

Community-based Activities

- Go to school
- Meet as local clubs

What concerns do you have about the watershed?

Potential Sources of Pollution/Degradation of Resources

- Fertilizers and septic systems—harming the environment vs. practical need for farming and green spaces
- Oil/gas development
- Storm water runoff
- Oil well fracking
- Disaster from traffic on U.S. 31 that could result in a hazardous spill
- Old dump on Maidens Rd.
- Boat contamination
- Sludge dumping - PCA
- Animal waste
- Waste water dumps into the lake through storm sewers
- Septic or holding tanks
- Phosphate containing products
- Storm drains & runoff
- Waste disposal
- Oil well drilling
- Brine dumped – Fruit production
- Water/air pollution from motors
- Contracts with land owners for sludge dumping
- Runoff from golf course, farm lands, chemicals from businesses
- Three old township dumps

Other Environmental and Natural Resources Concerns

- (Degradation of) water quality
- Weed overgrowth
- Water levels
- Tree removal
- Pollution
- Water temperatures
- Erosion
- Litter
- Air pollution
- Sand load in creek
- Water table levels
- Irrigation from the lake
- Adequate water testing
- Drinking water quality
- Crust on bottom of lake
- Overuse (of resources)
- Fires not properly attended
- Landscaping
- Lake outlet maintenance
- Damage to small streams
- Swimming rafts
- Added population putting pressure on streams
- Decrease of resources

Landowner/ Public Issues

- Lack of public access to waterways
- Too much public access – like the 9-mile public access site
- (Protecting) Property owner’s rights
- ATVs, snowmobiles, etc. in prohibited areas
- People crossing private property to get access
- Misuse of creek by individuals

- Foot traffic
- Public information about state sites on creeks
- Guiding (fishing)

Riparian Land Uses

- Development
- Stabilizing banks
- Proper upland management
- Lack of zoning laws
- Mistreatment of creeks and banks
- Erosion concerns
- Shoreline Best Management Practices (BMPs)
- Keeping banks clean
- Bank erosion, hardening of shoreline
- Building too close to stream
- Blocking stream with illegal dams to create pond
- Boat hoists farther into lake

Construction of Road Crossings

- Road crossing Best Management Practices (BMPs)
- Road Commission practices related to bridge building and repairs
- Sand load – covers gravel
- Installation of culverts has changed nature of creek

Aesthetics

- Wind energy
- Wind power – potential turbines
- Improper disposal of trash, junk, etc.

Community & Economic Development

- No monetary resources
- Opposition to change
- Youth exodus
- Lack of public input before actions and decisions
- Lack of ownership/apathy
- Communication
- Need to identify those who can start and finish
- Local economy
- Blight
- Local government cooperation
- Preserving watershed with collaboration and public input
- Need to get Bear Lake Village and Pleasanton Township involved
- Restrictions – too many and not enough

Fisheries & Wildlife

- Fishing violations
- Fish spawn grounds
- Wildlife habitat
- Fisheries
- Continue to manage weeds (along creeks)
- Jet skis near spawning areas
- Aquatic insect populations
- Sea lamprey
- Non-native invasive species
- Quality of fish and game
- Health of fish
- Invasive aquatic and terrestrial animals
- (Declining) Fish populations
- Improper/illegal usage—snagging

What do you want the watershed to look like in 50 years?

Environmental & Natural Resources

- Cooler water temperatures
- Clean water and air
- Sediment/erosion issues addressed
- Eliminate sand load
- No detrimental species
- Return to natural environment
- Mixed, compatible use of Bear Lake
- Pristine (great fishing, hunting, clean water, clean air)
- Ample flora and fauna
- Limitations on oil and gas wells
- Eliminate dumping
- Everyone understands how to protect watershed
- Pristine woodland and water for entire area with good fishing and hunting
- Beautiful clean lakes and streams
- Educated public and government on conservation issues
- Parks near rivers and lakes
- Water and air quality as good or better than it presently is
- Like it did 50 years ago
- Solid/sustainable businesses
- Like it looks today or better
- Control over invasive species – no new areas or species

Water-based

- High water quality and safe wells
- Higher water levels
- More wood/habitat
- Safeguarded water source
- Excellent water quality
- Good water levels
- All the creeks still there
- Viable fishery

Land-based

- Preserved farm lands
- Land use issues resolved
- Bike/walking path around the lake
- More public trails
- Acres of morel mushrooms

Fisheries & Wildlife

- Larger population of fish
- Invasive species controlled
- Lots of big, healthy fish
- Control over invasive species – no new areas or species
- Abundant fish and wildlife

Waste and Pollution Management

- Non-polluting waste management system
- Sewer system/waste water management plans
- Safe disposal of human and household wastes

Community & Economic Development

- Spirit of cooperation among and between governmental entities
- Improved communities – Kaleva and Bear Lake – without blighted conditions
- Improved economies
- We are communities of choice for people to live, work, and play
- Collaboration among and between governments, communities and agencies
- Active participation in schools and churches
- Economically viable community
- Village plan
- More shared knowledge about the watershed and its care
- Regular and dependable communications among and between community members
- Community collaboration
- Local governments cooperating
- Balance development and public opinion and environmental issues
- Diversity of age and employment in community and in businesses
- Viable economy and halt of “brain drain”
- Population growth
- Population growth while maintaining a rural setting
- A master plan that we are following as a blueprint
- Listed concerns resolved
- Habitable buildings/no blight
- Greatly increased tourism and recreational activity
- Water drainage from all sources is properly and safely managed
- Recreation plan implemented
- An active and attractive village
- Updated commerce and business
- Stop practices that are harmful
- Involved and concerned citizens

Other

- Very few lights at night
- Great grandchildren enjoying clean waters of the watershed
- Remain a special place for family
- Need for oil diminished so oil production is no longer a threat
- Respect for resource/owners
- Better educations on BMPs for our area and for future generations
- Share the resources
- Acquire more public access
- Wonderful media coverage

Appendix 2A: Greater Bear Watershed Survey Introduction

In conjunction with the development of the Greater Bear Watershed Management Plan, a survey was developed in the spring of 2011 and administered by Drazo Consulting between August and December 2011. The survey was constructed using the U.S. Environmental Protection Agency's survey tool and item bank, and was approved by the Michigan Department of Environmental Quality in July 2011.

The survey asked residents and others who use watershed resources a number of questions that are intended to provide the steering committee and project consultants with information about how people use watershed resources, their knowledge of various natural resource management practices, their priorities for and concerns about the watershed, as well as other information.

The survey was available online and hard copies were made available to individuals without online access. Hard copies were available at the public libraries, the schools, and the Bear Lake and Maple Grove Township Halls. Since respondents were self-selected (not a random sample), survey results are not statistically significant. In other words, the results of the survey provide information about respondents' preferences and the way they use the watershed, but survey results cannot be extrapolated to provide information about all users in the watershed. It is also likely that people who are generally more aware of watershed issues and engaged in the plan process responded to the survey in greater numbers, which likely affected the results.

The results of the survey are still informative because they provide information about how respondents use the watershed, their knowledge of watershed management practices, and their priorities and concerns for natural resources in the region. This information is being used to inform the development of the Greater Bear Watershed Management Plan.

Appendix 2B: 2011 Survey of Residents in the Greater Bear Watershed

*All percentages reported in tables are the percentage of all respondents who answered that particular question (including those who answered “don’t know.”)

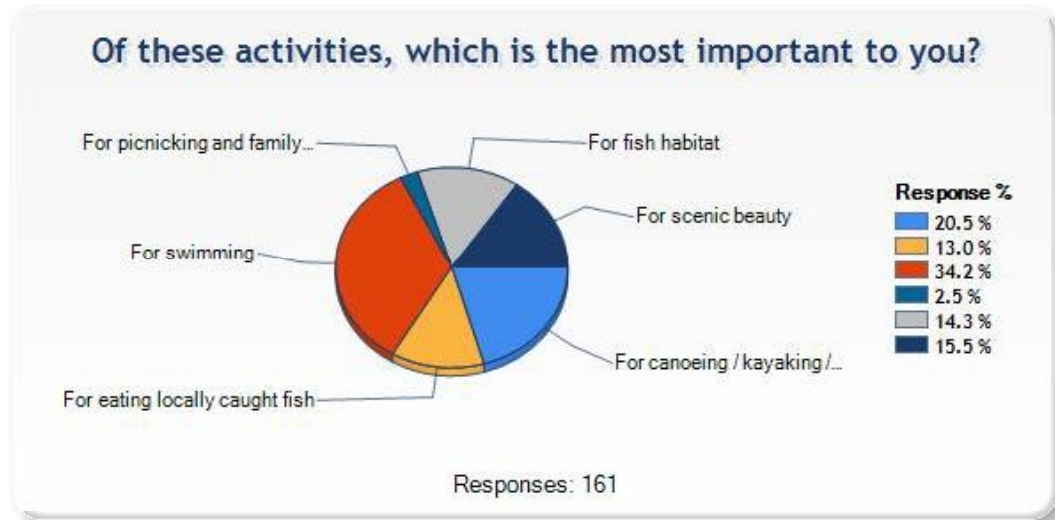
Ratings of Water Quality

	Poor	OK	Good	Don't Know	Total Responses
1. For canoeing / kayaking / other boating	1.9%	9.9%	83.9%	4.3%	161
2. For eating locally caught fish	3.1%	21.0%	64.8%	11.1%	162
3. For swimming	4.3%	19.3%	70.2%	6.2%	161
4. For picnicking and family activities	3.1%	14.2%	79.0%	3.7%	162
5. For fish habitat	6.2%	29.8%	49.1%	14.9%	161
6. For scenic beauty	1.2%	8.7%	90.1%	0.0%	161

How has the fishing changed in the past five years?

	Worse	Stayed the same	Improved	Don't Know	Total Responses
1. In Bear Lake?	18.5%	21.6%	17.3%	42.6%	162
2. In Bear Creek or tributary streams?	5.1%	12.7%	5.7%	76.4%	157

Water Resources



Greater Bear Watershed Management Plan

68.9% of respondents indicated they knew where the rain water goes when it runs off of their property. (161 respondents)

Where does your rain water drain to? (100 respondents)

- 43% into Bear Lake
- 26% into the ground (including swamps, ponds, woods, wetlands, fields, etc.)
- 16% into Bear Creek or tributaries
- 5% watershed or water table
- 4% into other Lakes (Glovers Lake, Lake Michigan, Manistee Lake)
- 3% flows down roads or streets
- 3% into a retention pond or sewer system

Water Access

How do you typically access Bear Lake & Bear Creek and tributaries?	Bear Lake (156 responses)	Bear Creek & tributaries
Public access site	32.1%	27.0%
Dock, mooring or launching from your own property or friends' property	48.1%	13.8%
Road end or dedicated easement	2.6%	
Road crossing		11.3%
Village Park boating access site	3.8%	
My household does not access	13.5%	47.8%

How would you rate the quality of the access?	Bear Lake (160 responses)	Bear Creek & tributaries
Poor	3.8%	5.6%
Fair	16.9%	22.5%
Good	41.2%	18.8%
Excellent	30.6%	5.0%
Do not know	7.5%	48.1%

Opinions

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Total responses
1. The way that I care for my lawn and yard can influence water quality in local streams and lakes.	5.6%	4.4%	7.5%	35.0%	47.5%	160
2. It is my personal responsibility to help protect water quality.	0.6%	1.2%	9.4%	35.6%	53.1%	160
3. It is important to protect water quality even if it slows economic development.	1.9%	3.2%	19.2%	37.8%	37.8%	156
4. My actions have an impact on water quality.	3.2%	0.6%	11.0%	34.8%	50.3%	155
5. I would be willing to pay more to improve water quality (for example: through local taxes or fees).	15%	13.1%	22.5%	29.4%	20.0%	160
6. I would be willing to change the way I care for my lawn and yard to improve water quality.	2.5%	5.6%	18.0%	39.8%	34.2%	161
7. The quality of life in my community depends on good water quality in local streams, rivers and lakes.	0.6%	3.1%	8.8%	40.6%	46.9%	160

Water Impairments

	Not a Problem	Slight Problem	Moderate Problem	Severe Problem	Don't Know	Total responses
1. Sedimentation (dirt and soil) in the water	21.9%	26.2%	26.9%	5.6%	19.4%	160
2. Bacteria and viruses in the water (such as <i>E.coli</i> /coliform)	25.3%	26.5%	15.4%	6.2%	26.5%	162
3. Trash or debris in the water	24.2%	41.6%	15.5%	7.5%	11.2%	161
4. Oil and grease	32.7%	29.0%	11.1%	6.2%	21.0%	162
5. Algae in the water	16.8%	31.7%	29.2%	5.6%	16.8%	161
6. Invasive aquatic plants and animals	7.5%	13.7%	40.4%	22.4%	16.1%	161
7. Habitat alteration harming local fish	13.0%	21.7%	24.2%	13.0%	28%	161
8. High water temperature	28.0%	21.7%	16.1%	3.7%	30.4%	161
9. Excessive nutrients	13.8%	20.8%	18.2%	7.5%	39.6%	159
10. Hazardous chemicals	30.6%	16.2%	5.0%	8.8%	39.4%	160
11. Dams and water withdrawals	38.5%	13.7%	9.3%	3.1%	35.4%	161

Sources of Water Pollution

	Not a Problem	Slight Problem	Moderate Problem	Severe Problem	Don't Know	Total responses
1. Soil erosion from shorelines and/or streambanks	20.0%	32.5%	30.0%	7.5%	10.0%	160
2. Excessive use of lawn fertilizers and/or pesticides	10.1%	18.9%	30.2%	18.2%	22.6%	159
3. Grass clippings and leaves entering lakes and streams	20.6%	19.4%	26.2%	6.9%	26.9%	160
4. Improper disposal of household wastes (chemicals, batteries florescent light bulbs, etc.)	26.5%	21.6%	11.1%	10.5%	30.2%	162
5. Improperly maintained septic systems	9.3%	16.0%	25.3%	23.5%	25.9%	162
6. Manure from farm animals	26.6%	21.5%	16.5%	5.7%	29.7%	158
7. Excessive use of fertilizers for crop production	18.0%	21.7%	21.7%	8.7%	29.8%	161
8. Timber harvesting/residue management	27.7%	20.6%	12.9%	7.1%	31.6%	155
9. Highway/road/bridge runoff	9.3%	16.7%	32.7%	16.0%	25.3%	162
10. Removal of riparian vegetation	10.6%	26.1%	16.1%	8.7%	38.5%	161
11. Streambank or shoreline modification/destabilization	13.7%	23.0%	21.7%	7.5%	34.2%	161
12. Drainage/filling of wetlands	18.9%	23.3%	18.9%	7.5%	31.4%	159
13. Spills	24.1%	25.3%	8.2%	6.3%	36.1%	158
14. Removal of vegetation bordering the water by property owners	12.4%	31.1%	17.4%	8.7%	30.4%	161
15. Oil and grease from cars, ATVs, boats or snowmobiles	14.1%	30.8%	25.6%	8.3%	21.2%	156

Consequences of Poor Water Quality

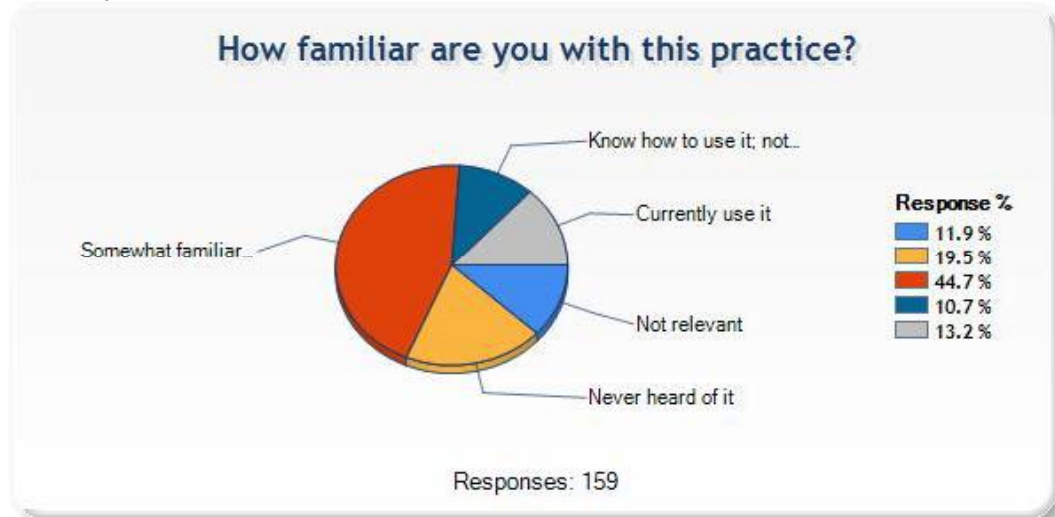
	Not a Problem	Slight Problem	Moderate Problem	Severe Problem	Don't Know	Total responses
1. Contaminated drinking water	44.0%	27.7%	13.8%	3.1%	11.3%	159
2. Polluted swimming areas	35.8%	36.5%	16.4%	3.1%	8.2%	159
3. Contaminated fish	37.7%	21.4%	13.2%	7.5%	20.1%	159
4. Loss of desirable fish species	16.4%	17.6%	28.3%	15.1%	22.6%	159
5. Reduced opportunities for water recreation	47.2%	20.1%	13.8%	6.3%	12.6%	159
6. Excessive aquatic plants or algae	10.1%	28.5%	38.0%	8.2%	15.2%	158
7. Lower property values	27.4%	24.8%	17.2%	7.6%	22.9%	157

Practices to Improve Water Quality

	Not relevant for my property	Never heard of it	Somewhat familiar with it	Know how to use it; not using it	Currently use it	Total responses
1. Following the manufacturer’s instructions when fertilizing lawn or garden	21.9%	0.6%	10.0%	20.0%	47.5%	160
2. Use a mulching lawn mower	19.0%	1.3%	9.5%	19.0%	51.3%	158
3. Keep grass clippings and leaves out of the roads, ditches, and gutters	20.0%	2.5%	8.1%	8.8%	60.6%	160
4. Use phosphate free fertilizer	25.6%	4.4%	7.5%	21.2%	41.2%	160
5. Regular servicing of septic system	8.8%	1.3%	7.5%	8.2%	74.2%	159
6. Use rain barrels	24.1%	9.5%	19.6%	39.9%	7.0%	158
7. Restore native plant communities	27.6%	10.9%	25.6%	22.4%	13.5%	156
8. Restore/enhance wetland	35.2%	7.5%	28.9%	18.9%	9.4%	159

Specific Constraints of Practices

Forest Management Plan: A plan describing methods for timber management, harvest and culture that also protects wildlife habitat, watersheds, aesthetics and endangered and threatened plant and animal species. (Responses to questions 1-3 are below, and then the balance of the responses continue in the table that follows.



11% respondents explained this was not relevant to them because they lived in a village or had no woodlands on their property.

Of the 150 individuals who responded to the question “are you willing to try this practice?”,

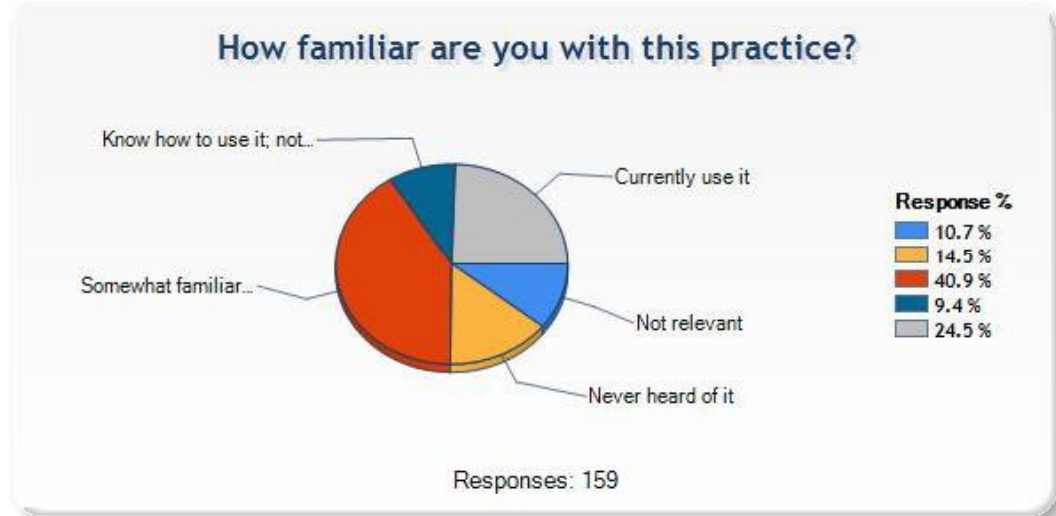
- 42% indicated “Yes or already do”
- 46.7% indicated “Maybe”

- 11.3% indicated “No.”

Limitations to Implementation of Forest Management Plans

	Not at all	A little	Some	A lot	Don't know	Total responses
4. Don't know how to do it	29.6%	16.9%	21.8%	12.7%	19.0%	142
5. Time involved	27.8%	17.4%	18.8%	13.2%	22.9%	144
6. Cost	21.0%	13.3%	20.3%	16.1%	29.4%	143
7. The features of my property make it difficult	26.0%	11.6%	18.5%	17.1%	26.7%	146
8. Insufficient proof of water quality benefit	38.9%	8.3%	13.2%	6.2%	33.3%	144
9. Desire to keep things the way they are	28.9%	16.2%	21.1%	12%	21.8%	142
10. Physical or health limitations	49.6%	13.5%	10.6%	2.8%	23.4%	141
11. Hard to use with my farm system	51.0%	4.2%	8.4%	1.4%	35.0%	143
12. Lack of equipment	36.1%	4.9%	13.9%	14.6%	30.6%	144

Vegetated Steambank/Shoreline Protection: Maintaining vegetation that grows along streams, rivers or lakes acts as a protective buffer between the land and the water to reduce runoff and sediments flowing into the water. (Responses to questions 13-15 are below, and then the balance of the responses continue in the table that follows.)



7.5% respondents explained this was not relevant to them because they lived in a village or had their property had no water frontage. 5% of the respondents believed this item was not relevant to them for other reasons (property slopes away from water, no time to implement practices, nature made plans are used, have seen no changes in 28 years).

Of the 145 individuals who responded to the question “are you willing to try this practice?”,

- 51% indicated “Yes or already do”
- 37.2% indicated “Maybe”

- 11.7% indicated “No”

Limitations to Implementation of Practices to Protect Vegetated Streambanks and Shorelines

	Not at all	A little	Some	A lot	Don't know	Total responses
16. Don't know how to do it	43.3%	10.6%	21.3%	8.5%	16.3%	141
17. Time involved	39.3%	14.3%	18.6%	10.7%	17.1%	140
18. Cost	38.4%	5.8%	19.6%	15.2%	21.0%	138
19. The features of my property make it difficult	33.3%	14.9%	11.3%	22.0%	18.4%	141
20. Insufficient proof of water quality benefit	46.0%	12.2%	12.2%	5.0%	24.5%	139
21. Desire to keep things the way they are	42.1%	11.4%	18.6%	10.7%	17.1%	140
22. Physical or health limitations	54.0%	12.2%	12.2%	5.0%	16.5%	139
23. Hard to use with my farm system	50.4%	5.0%	6.5%	5.0%	33.1%	139
24. Lack of equipment	37.2%	8%	13.9%	13.1%	27.7%	137

Limitations on Making Decisions for Property

	Not at all	A little	Some	A lot	Don't know	Total responses
1. Personal out-of-pocket expense	23.7%	13.7%	24.5%	25.9%	12.2%	139
2. My own physical abilities	50.7%	16.7%	14.5%	8.7%	9.4%	138
3. Not having access to the equipment I need	26.1%	13.8%	29.0%	16.7%	14.5%	138
4. Lack of available information about a practice	29.0%	15.9%	26.1%	14.5%	14.5%	138
5. No one else I know is implementing the practice	40.6%	10.1%	17.4%	10.1%	21.7%	138
6. Approval of my neighbors	59.1%	10.2%	10.2%	3.6%	16.8%	137
7. Don't know where to get information or instructions about those practices	40.3%	14.4%	21.6%	10.8%	12.9%	139
8. Environmental damage caused by the practice	46.0%	11.7%	11.7%	5.8%	24.8%	137
9. Legal restrictions on my property	48.5%	6.6%	13.2%	6.6%	25.0%	136
10. Concerns about resale value	49.3%	8.0%	14.5%	8.7%	19.6%	138
11. Not being able to see a demonstration of the practice.	43.0%	7.4%	15.6%	15.6%	18.5%	135
12. The need to learn new skills or techniques	40.1%	10.9%	20.4%	11.7%	16.8%	137

Support and Opposition to Practices to Protect the Water Quality

	Strongly oppose	Some-what oppose	No opinion	Some-what support	Strongly support	Total responses
1. Involving students in watershed protection activities	0.6%	1.9%	9.7%	22.1%	65.6%	154
2. Better planning for future growth	0.7%	2.0%	9.2%	22.2%	66.0%	153
3. Improving bridge and stream crossings to reduce erosion and sedimentation	0.7%	0.7%	11.8%	25.0%	61.8%	152
4. Addressing unplugged and abandoned oil, gas and mineral wells to prevent groundwater pollution	1.9%	0.6%	11.7%	13.0%	72.7%	154
5. Expanding use of storm water detention basins, rain gardens and other methods to reduce surface runoff pollution	1.3%	1.3%	13.0%	22.1%	62.3%	154
6. Protecting and expanding the natural vegetative strips along shoreline areas of lakes, rivers, and streams	0.7%	3.4%	12.1%	27.5%	56.4%	149

Priorities for Protecting and Enhancing the following sites and resources:

	Not a priority	Low priority	Medium priority	Highest priority	Don't know	Total responses
1. Centennial farms, orchards, and other productive agricultural lands	4.5%	11.7%	40.9%	32.5%	10.4%	154
2. Scenic vistas	2.0%	11.8%	35.9%	46.4%	3.9%	153
3. Public access to lakes and streams	5.2%	9.2%	30.7%	53.6%	1.3%	153
4. Natural features such as wetlands and natural vegetation along lakes	1.9%	6.5%	33.1%	56.5%	1.9%	154
5. Unique lands identified or owned by local land conservancies	5.9%	7.8%	33.3%	44.4%	8.5%	153
6. Native American cultural sites	15.0%	23.5%	31.4%	22.9%	7.2%	153
7. Lake and stream fishing opportunities	1.3%	5.9%	25.5%	66.0%	1.3%	153
8. Other	15.9%	4.9%	3.7%	19.5%	56.1%	82

About respondents:

- 84.2% make the home and lawn care decisions in your household.
- 64.3% male, 35.7% female
- Median age:** 56
- Education level** (151 respondents)
 - 4.6% Some formal schooling
 - 11.3% High school diploma/GED
 - 19.9% Some college
 - 11.3% 2 year college degree
 - 29.1% 4 year college degree
 - 23.8% Post-graduate degree

5. **Approximate size of residential lots** (153 respondents)

- 20.3% ¼ acre or less
- 28.1% More than ¼ acre but less than 1 acre
- 25.5% 1 acre to less than 5 acres
- 26.1% 5 acres or more

6. 92% own their residence (150 respondents)

7. Mean number of years respondents have lived in their home: 17.42 (144 respondents)

8. **Description of property** where respondents live. (153 respondents)

- 36.6% In a town, village, or city
- 31.4% In an isolated, rural, non-farm residence
- 22.9% Rural subdivision or development
- 9.2% On a farm

9. In addition to residences, other property that is owned or managed: (152 respondents)

- 8.6% An agricultural operation
- 17.8% Forested land
- 9.9% Rural recreation property
- 74.3% None of these

10. **Professional lawn care service** (152 respondents)

- 5.9% Yes, just for mowing
- 3.9% Yes for mowing and fertilizing
- 6.6% Yes, just for fertilizing and pest control
- 2.0% Yes, for mowing, fertilizing, and pest control
- 81.6% No**

11. Average number of people live in households: 2.01 (154 respondents)

Property description: (percentage calculated on total # of surveys-164)

Street addresses were requested to determine whether there was broad representation across the watershed. Using Google earth to determine location of all addresses, the following describes the respondents.

- 56.1% live in Bear Lake/Pleasanton Twp. area
- 23.8% live in the Bear Creek and tributary area
- 1.8% live in Manistee or Traverse City but have recreational property in watershed
- 18.3% refused to give address

Property locations (154 respondents)

- 45.5% on Bear Lake
- 4.5% on Bear Creek or tributary stream
- 5.2% on another waterbody
- 10.4% agricultural land
- 34.4% property not located on water body or farm property

91.5% maintain a **grass lawn** at your residence (153 respondents)

24.8% have a **seawall** or similar constructed retention structure on the lake-streamside of their property (153 respondents)

48.4% **fertilize their lawn** (155 respondents)

90.3% have a **washing machine** (154 respondents)

37% have a **garbage disposal** (154 respondents)

65.2% have a **dishwasher** (155 respondents)

Average number of **bathrooms**: 2 (154 respondents)

Average age of **septic systems**: 18.4 years—83.6% indicated their system has been pumped out in the last 5 years. (152 respondents)

What is your opinion of **hydraulic fracturing** (sometimes called “fracking” or “hydrofracking” for oil and gas exploration or production? (153 respondents)

- 19% Strongly oppose
- 13.7% Somewhat oppose
- 28.1% No opinion
- 7.2% Somewhat support
- 7.8% Strongly support
- 24.2% I have no knowledge of this process

Agricultural Operations

Management decisions are made by: (26 respondents)

- 61.5% Respondent and spouse
- 11.5% Respondent and family partners (siblings, parents, etc.)
- 7.7% Respondent and landowner
- 0% Respondent and tenant (s)
- 7.7% Respondent and business partners
- 15.4% Someone else makes the decisions for the operation
- Other

Property use: (24 respondents)

- 54.2% Tillable acreage
- 20.8% An orchard
- 25.0% Rangeland or grazing acreage
- 25.0% Tree farm
- 79.2% Woodlot

Tillable acreage (owned and/or rented) of your farming operation this year. (28 respondents)

- 35.7% — 0 acres
- 57.1%— 1-99 acres
- 0%— 100-400 acres
- 3.6%— 500-999 acres
- 3.6%—1,000 or more acres

Few agricultural operations included livestock. The total number of livestock reported was 1 beef cattle, 32 chickens, 18 horses, and 8 sheep, goats or alpaca. (25 respondents)

Of the 7 respondents who raised livestock, only 1 person managed manure according to an approved nutrient management plan. None of these 7 respondents had a grazing management plan.

17.6% use fencing to exclude animals from critical areas? (35 respondents). 79.4% indicated they did not have animals.

33.3% manage the harvest of trees on your land under a timber management plan. (36 respondents).

36.1% indicated they did not have woodlands.

Sources of Information:

People get information about water quality from a number of different sources. To what extent do you trust those listed below as a source of information about soil and water?

	Level of Trust					Total respondents
	Not at all	Slightly	Moderately	Very much	Am not familiar	
1. U.S. Environmental Protection Agency	8.5%	19.0%	38%	28.2%	6.3%	142
2. Local garden center	14.8%	31.9%	37.0%	11.1%	5.2%	135
3. Lawn care company	30%	29.3%	24.3%	10.0%	6.4%	140
4. Local community leader	11.5%	27.3%	39.6%	15.8%	5.8%	139
5. Neighbors/friends	10%	29.3%	42.1%	15.0%	3.6%	140
6. Little River Band of Ottawa Indians	36.0%	21.3%	25.0%	7.4%	10.3%	136
7. Manistee Conservation District	14.1%	12.7%	34.5%	28.2%	10.6%	142
8. U.S. Forest Service	14.9%	10.6%	34.0%	30.5%	9.9%	141
9. Regional Land Conservancy	14.1%	12.7%	27.5%	30.3%	15.5%	142
10. Michigan Land Use Institute	16.7%	12.3%	23.9%	22.5%	24.6%	138
11. Bear Creek Watershed Council	9.9%	11.3%	29.6%	31.7%	17.6%	142
12. Bear Lake Watershed Alliance	7.0%	16.9%	28.9%	33.8%	13.4%	142
13. Bear Lake Property Association	8.3%	18.1%	36.8%	25%	11.8%	144
14. Michigan Dept. of Natural Resources	10.5%	12.6%	37.8%	33.6%	5.6%	143
15. Michigan Dept of Agriculture	12.5%	16.9%	33.8%	27.9%	8.8%	136
16. Michigan Dept. of Environmental Quality	15.4%	14.0%	37.1%	28.0%	5.6%	143
17. Manistee County Health Dept.	11.1%	19.4%	40.3%	25%	4.2%	144
18. Michigan State University Extension Services	10%	8.6%	35.7%	36.4%	9.3%	140
19. Spirit of the Woods Conservation Club	14.6%	9.5%	35.8%	14.6%	25.5%	137

Information sources used to learn about water quality (146 respondents)

- 47.7% Local newspapers
- 14.4% Local cable access television
- 34.2% Newsletters delivered through mail
- 33.6% Bear Creek Watershed Council
- 8.9% Information bulletin boards
- 42.5% Internet sources
- 6.8% Other
- 34.2% Local television news
- 29.5% Public meetings
- 8.9% Radio public service announcements
- 32.2% Bear Lake Property Owners Association
- 11% Hand-outs at public library
- 37% Bear Lake Watershed Alliance

Concerns about the watershed:

- The most important problem at the present time are the drains used for runoff water that empty into Bear Lake.
- Survey is a little long, which may discourage participation. The purpose isn't clear because the questions are so far ranging.
- DEQ is to be complimented for a totally goofy set of question in the middle as well as sets of responses that are totally irrelevant! Otherwise, thanks for opportunity to be heard. NOTE - additional info should be available from a previous attempt at a comprehensive joint master plan as well as from MSU Small Town Design Initiative public hearings.
- In the 28 years we have owned this property, it has been a week-end or summer home. I found many of the questions not very easy to give a meaningful answer. However I feel it is very important to do everything I can to preserve quality and prevent threats to this watershed. One of our biggest problems is to work together with all local {rich and poor} and the non-voting temporary residents like our household.
- I would like to see this community get the state more involved with money – grants. Bear lake is a mess- the swimming is poor - the temp rises quickly and the aqua herbicide applications that happen over the summer deter me from even wanting to swim in bear lake. I was not aware of the practice until I lived in the area for a few years.
- I live on Glovers Lake and would appreciate you including GL in your watershed.
- I don't believe the average person knows much about phosphates and how they destroy water quality. Use of fertilizers, septic improvement and shoreline vegetation and trash are all things that cost nothing but not enough info is presented to the public to raise awareness.
- Thank you very much for compiling this data. I hope it's beneficial.
- Caution. Looking out for water quality is a much needed and desirable objective, but if the process trumps property rights to an unreasonable degree, failure is inevitable.
- Our Bear Lake Property is a second home. We however there all 4 seasons of the year and most of the summer. Thank you.
- Need to continue to limit access to Bear Creek to ensure no further damages to banks and property. Adding boat launches along Bear Creek will have a detrimental effect on fishing, bank management and stopping litter.
- I do not live in the watershed but use it frequently. I responded as a citizen living in Manistee but using the Bear Creek seasonally
- I do not want my local, Michigan or Federal taxes to go up. I do not want new laws that will force me or others to spend money and time, when there are laws already in the books.
- Very pleased and thankful we have the Bear Lake Property Owners Assoc., BL Watershed Alliance and the volunteers who give so much time to these organizations. Look forward to the day I'm retired and can participate more.
- Wind turbines--_why are they trying to stop something that will be good for all who are involved?
- Will there be enough funds to correct our concerns and watershed problems?

Appendix 3:

Estimates for Phosphorus Loading in Bear Lake

Some assumptions were necessary in preparing the high and low P loading estimates. The following is a summary of those assumptions. While some of the properties within the Special Assessment District (SAD) are businesses, the majority are residential properties. And because it was impossible to use a single estimate for water use due to the varying nature of businesses, the water use rate for residential properties was used for all parcels.

- Using the best demographic estimates for the watershed (see Exhibit 61 in the Description of the Greater Bear Watershed section), it was assumed that 26 percent of the parcels were seasonal housing units and 74 percent were permanent housing units.
- The estimate assumes that permanent housing units are occupied 365 days per year. Seasonal residents were assumed to occupy the housing units 50 percent of the year. This figure may represent a longer stay for some seasonal residents but it was noted that many seasonal occupants regularly entertain friends and family during the summer recreation season. Assuming a 50 percent occupancy rate may offset the lower estimate of 2.35 people per parcel for seasonal residents.
- The U.S. Environmental Protection Agency (USEPA) estimates average daily wastewater flows of approximately 50 to 70 gallons per person per day (USEPA 2002). To estimate mean wastewater flows the mean of the high and low values was used (60 gallons or 227 liters per person per day).
- The USEPA approximates the P concentration of residential effluent to be 6-12 mg/L (UESPA 2002). For the purposes of the Bear Lake loading, the mean of the high and the low was used (9mg/L) to approximate residential phosphorus (P) concentrations.

The USEPA estimates that well designed and maintained onsite wastewater treatment systems (OWTS) are between 85 and 95 percent effective in capturing P (USEPA 2002). For the Greater Bear Watershed, higher functioning OWTS were considered to be 85 percent effective in capturing P. High and low estimates were also generated by calculating different P capture rates for lower functioning OWTS (those that were not updated between 1973 and 2005). To generate the low estimate it was assumed lower functioning OWTS were 50 percent effective in capturing P. To generate the high estimate it was assumed lower functioning OWTS were 15 percent effective in capturing P.

Low Estimate

	Parcels	People Per Parcel	Effluent Per Person (Liters/Day)	Days Per Year	Effluent Residential Phosphorus (P) Concentration (mg/L)	Total Effluent (Liters/year)	Total P in Effluent (mg/year)	P Loss Rate	Max Estimated Pollutant Load (mg/yr)	Kg/yr
Lower Functioning										
Potentially lower functioning onsite wastewater treatment systems (OWTS) permanent residents	228	2.35	227.00	365.00	9	44,378,132	399,403,190	0.50	199,701,595	200
Likely low functioning OWTS seasonal residents	80	2.35	227.00	183.00	9	7,817,518	70,357,659	0.50	35,178,830	35
Total	308	2.35	227.00	NA	9	52,195,650	469,760,850	0.50	234,880,425	235
Higher Functioning										
Potentially higher functioning OWTS permanent residents	147	2.35	227.00	365.00	9	28,622,260	257,600,338	0.15	38,640,051	39
Potentially higher functioning OWTS seasonal residents	52	2.35	227.00	183.00	9	5,076,310	45,686,792	0.15	6,853,019	7
Total	199	2.35	227.00	NA	9	33,698,570	303,287,130	0.15	45,493,069	45
Total P Load	507	2.35	227.00	NA	9	85,894,220	773,047,979	0.15	280,373,494	280

High Estimate

	Parcels	People Per Parcel	Effluent Per Person (Liters/Day)	Days Per Year	Effluent P Concentration (mg/L)	Total Effluent (Liters/year)	Total P in Effluent (mg/year)	P Loss Rate	Max Estimated Pollutant Load (mg/yr)	Kg/yr
Lower Functioning										
Potentially lower functioning OWTS permanent residents	228	2.35	227.00	365.00	9	44,378,132	399,403,190	0.85	339,492,712	339
Likely low functioning OWTS seasonal residents	80	2.35	227.00	183.00	9	7,817,518	70,357,659	0.85	59,804,010	60
Total	308	2.35	227.00	NA	9	52,195,650	469,760,850	0.85	399,296,722	399
Higher Functioning										
Potentially higher functioning OWTS permanent residents	147	2.35	227.00	365.00	9	28,622,260	257,600,338	0.15	38,640,051	39
Potentially higher functioning OWTS seasonal residents	52	2.35	227.00	183.00	9	5,076,310	45,686,792	0.15	6,853,019	7
Total	199	2.35	227.00	NA	9	33,698,570	303,287,130	0.15	45,493,069	45
Total P Load	507	2.35	227.00	NA	9	85,894,220	773,047,979	NA	444,789,792	445