Lake Lucerne Management Plan

The Lucerne Lake Association adopted the lake management plan on _______________ after obtaining input from residents and lake users at a series of four public planning sessions held at the Waushara County Courthouse in Wautoma, Wisconsin in January through May, 2014. The inclusive community sessions were designed to identify key community concerns, assets, opportunities, and priorities. Representatives of state and local agencies, as well as nonprofit organizations, also attended the planning sessions to offer their assistance to the group in developing a strategic lake management plan (LMP).

The plan was adopted by the Town of Marion on: ________________________________
A special thanks to all who helped to create the Lake Lucerne Lake Management Plan and provided guidance during the plan’s development.

Lake Lucerne Management Planning Committee Members and Resources

Planning Committee
County to develop list of attendees

Waushara County
County Conservationist – Ed Hernandez
Land Conservation Department
Community, Natural Resources and Economic Development Agent –
Patrick Nehring
University of Wisconsin-Extension

UW – Stevens Point
Center for Watershed Science and Education
Water Resource Specialists – Ryan Haney and Danielle Rupp
Water Resource Scientist – Nancy Turyk

Wisconsin Department of Natural Resources
Water Resources Management Specialist – Ted Johnson
Fisheries Biologists – Dave Bartz and Scott Bunde

Golden Sands RC&D
Regional Aquatic Invasive Species Education Specialist – Paul Skawinski
Regional Aquatic Invasive Species Specialist – Kaycie Stushek

We are grateful to many for providing funding, support, and insight:
Waushara County Watershed Lakes Council
Waushara County Staff and Citizens
Wisconsin Department of Natural Resources Professionals,
Mark Sessing and Ted Johnson
Wisconsin Department of Natural Resources Lake Protection Grant
UW-Extension
Drs. Samantha Kaplan and Paul McGinley

Lake Lucerne photos courtesy of Mark McNiel. Thank you!
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Lake Lucerne is located amidst the morainal hills and marshes of central Waushara County, Wisconsin. The 42 acre lake is relatively undeveloped and provides quiet respite from the larger, more active lakes just outside of the City of Wautoma where residents and visitors can relax. The lake is also a beautiful setting for Lake Lucerne Camp, a youth camp which includes much of the land around the lake. Lake Lucerne residents strongly value the wildlife that inhabits the lake and the quality of water it contains. In 2014, these values inspired community members of Lake Lucerne to come together in partnership with local professionals to learn about Lake Lucerne and to create a lake management plan to protect and improve their lake for generations to come.

The purpose of this plan is to learn about Lake Lucerne and identify features important to the Lake Lucerne community in order to provide a framework for the protection and improvement of the lake. This framework, or lake management plan, will enable citizens and other supporters to achieve the vision for Lake Lucerne now and in the years to come. A series of four planning sessions were held at the Waushara County Courthouse to assist area residents, lake users, and representatives of local municipalities with the development of the lake management plan. Four meetings took place.

**Overarching Vision for Lake Lucerne**

*Lake Lucerne will retain its pristine nature with maintained and preserved shorelands. Community appreciation for the preservation of the lake will grow with educational opportunities, citizen action, mindful decision-making within the watershed, and balanced use of the lake. Lake Lucerne will boast quality native habitat in and around the lake.*
between January and May 2014 which enabled participants to learn about and discuss the topics of the fishery and recreation, the algal and aquatic plant community, water quality and land use, shoreland health, and communication.

Participation in the planning process was encouraged by letters sent directly to Lake Lucerne waterfront property owners, and press releases to local newspapers. To provide everyone the opportunity for input, topic-specific surveys were made available prior to each planning session. Property owners and interested lake users were notified about the surveys and how to access them via postcards (mailed to waterfront property owners) and press releases to local newspapers. The surveys could be filled out anonymously on-line or on paper (upon request). Survey questions and responses were shared at the planning sessions. Response rates were very low for Lake Lucerne; therefore, raw results have not been included in this plan though responses were considered when forming goals and action items.

Guest experts and professionals from various organizations (listed below) were invited to attend the planning sessions, present information, and respond to questions from participants. In addition to environmental and regulatory considerations, experts were able to provide context, insight and recommendations for planning participants to consider in their lake management plan. This information was incorporated, along with the survey results, into planning session discussion topics, which included the fishery and recreation, the algal and aquatic plant community, water quality and land use, shoreland health, and communication. After learning about the current conditions of each topic, participants identified goals, objectives, and actions for the lake management plan. Planning session notes and presentations were posted to the Waushara County website.

The Lake Lucerne Planning Committee consisted of property owners, Lake Lucerne camp directors, and recreational users of the lake. Technical assistance during the planning process was provided by the Waushara County Conservationist, the Waushara County Community, the Natural Resources and Economic Development Extension Agent, and professionals from the Wisconsin Department of Natural Resources (WDNR), Golden Sands RC&D, Inc. (RC&D), University of Wisconsin-Extension (UWEX), and the University of Wisconsin-Stevens Point Center for Watershed Science and Education (CWSE).
A lake management plan and the planning process allow a community to control the fate of its lake. It is a dynamic document that identifies goals and action items for the purpose of maintaining, protecting and/or creating desired conditions in a lake for a given period of time. It can correct past problems, improve on current conditions, and provide guidance for future boards, lake users, and technical experts by identifying which issues have been addressed and how successful previous efforts were. Each plan is unique, dependent upon the conditions of the lake (watershed) and the interests of the stakeholders involved. The actions identified in this lake management plan serve as a gateway for obtaining grant funding and other resources to help implement activities outlined in the plan. Because many entities are involved in lake and land management, it can be challenging to navigate the roles, partnerships, and resources that are available. The planning process and content of this plan have been designed to identify where some of the key assistance exists.

Who can use the Lake Lucerne Management Plan, and how can it be used?

- **Individuals**: Can use this plan to learn about the lake they love and their connection to it. People living near Lake Lucerne can have the greatest influence on Lake Lucerne by understanding and choosing lake-friendly options to manage their land and the lake.
- **Lucerne Lake Association**: This plan provides the Association with a list of options that can easily be prioritized. Annual review of the plan will also help the Association to realize its accomplishments. Resources and funding opportunities for Association management activities are made more available by placement of goals into the lake management plan, and the Association can identify partners to help achieve their goals for Lake Lucerne.
- **Neighboring lake groups, conservation clubs, and sporting clubs**: Neighboring groups with similar goals for lake stewardship can combine their efforts and provide each other with support, improve competitiveness for funding opportunities, and make efforts more fun.
- **The Town of Marion**: The Town can utilize the visions, wishes, and goals documented in this lake management plan when considering town-level management planning or decisions within the watershed that may affect the lake. The Town can work with requests by individuals or developers to best represent the documented wishes of the lake community.
- **Waushara County**: County professionals can identify needs, provide support, base decisions, and allocate resources to assist with some of the lake-related actions documented in this plan. This plan can also inform county board supervisors in decisions related to Waushara County lakes, streams, wetlands, and groundwater.
- **Wisconsin Department of Natural Resources**: Professionals working with lakes in Waushara County can use this plan as guidance for management activities and decisions related to the management of the resource, the fishery, and invasive species. Lake management plans help the WDNR identify and prioritize needs within Wisconsin’s lake community, and decide where to best apply resources and funding. A lake
management plan (LMP) increases an application’s competitiveness for funding from the State – if multiple Waushara County lakes have similar goals in their lake management plans, they can join together when seeking grant support to increase competitiveness for statewide resources.

**Background**

One of the first steps in creating the plan was to gather and compile data about the lake and its ecosystem to understand past and current lake conditions. This was done alongside 32 other lakes as part of the Waushara County Lakes Project. The Waushara County Lakes Project was initiated by citizens in the Waushara Lakes Council who encouraged the County to work in partnership with personnel from UW-Stevens Point to assess 33 lakes in the county. This effort received funding from the WDNR Lake Protection Grant Program. Many of the lakes had insufficient data available to help evaluate current water quality, aquatic plant communities, invasive species, and shorelands, or had data obtained at differing frequencies or periods of time, making it impossible to compare lake conditions. Professionals and students from UW-Stevens Point and the Waushara County Land Conservation Department conducted the Waushara County Lakes Study and interpreted data for use in the development of lake management plans. Data collected by citizens, consultants, and professionals at the WDNR were also incorporated into the planning process to provide a robust set of information from which informed decisions.

Sources of information used in the planning process are listed at the end of this document for future reference. The results of this project, including this plan, will assist citizens, municipalities, Waushara County, and State staff to efficiently manage their water resources and help make informed decisions and policies that will affect their lakes now and for future generations.

Several reports from the <Lake Name> Study and the materials associated with the planning process and reports can be found on the Waushara County website:

Goals, Objectives and Actions

The following goals, objectives, and associated actions were derived from the values and concerns of citizens interested in Lake Lucerne and members of the Lake Lucerne Management Planning Committee, and the known science about Lake Lucerne, its ecosystem and the landscape within its watershed. Implementing and regularly updating the goals and actions in the Lake Lucerne Management Plan will ensure that the vision is supported and that changes or new challenges are incorporated into the plan.

Although each lake is different, the WDNR requires that a comprehensive lake management plan address, at a minimum, a list of topics that affect the character of a lake, whether each topic has been identified as a priority or as simply something to preserve. These topics comprise the chapters in this plan. For the purposes of this plan, the chapters have been grouped as follows:

**In-Lake Habitat and a Healthy Lake**
- Fish Community—fish species, abundance, size, important habitat and other needs
- Aquatic Plant Community—habitat, food, health, native species, and invasive species
- Critical Habitat—areas of special importance to the wildlife, fish, water quality, and aesthetics of the lake

**Landscapes and the Lake**
- Water Quality and Quantity—water chemistry, clarity, contaminants, lake levels
- Shorelands—habitat, erosion, contaminant filtering, water quality, vegetation, access
- Watershed Land Use—land use, management practices, conservation programs

**People and the Lake**
- Recreation—access, sharing the lake, informing lake users, rules
- Communication and Organization—maintaining connections for partnerships, implementation, community involvement
- Updates and Revisions—continuing the process
- Governance—protection of the lake, constitution, state, county, local municipalities, Lake Association

Resources listed within the plan identify the primary organizations or individuals that are able to provide information, suggestions, or services to accomplish the goals and objectives. This list should not be considered all-inclusive – assistance may also be provided by other entities, consultants, and/or organizations. Listed below are common acronyms for the resources mentioned in the following pages.
A management plan is a living document that changes over time to meet the current needs, challenges and desires of the lake and its community. The goals, objectives and actions listed in this plan should be reviewed annually and updated with any necessary changes.

In-Lake Habitat and a Healthy Lake
Many lake users value Lake Lucerne for its wildlife and good water quality. These attributes are all interrelated; the health of one part of the lake system affects the health of the rest of the plant and animal community, the experiences of the people seeking pleasure at the lake, and the quality and quantity of water in the lake. Habitat is the structure for a healthy fishery and wildlife community. It can provide shelter for some animals and food for others.

Lake habitat occurs within the lake, along all of its shorelands, and even extends into its watershed for some species. Many animals that live in and near the lake are only successful if they have a place to hide from predators. Wetlands along the shoreline and adjacent to the lake provide habitat for safety, reproduction, food, and can improve water quality and balance water quantity. Some lake visitors such as birds, frogs, and turtles use limbs from trees that are sticking out of the water for perches or to warm themselves in the sun. Aquatic plants infuse oxygen into the water and provide food for waterfowl, small mammals, and people. The types and abundance of plants and animals that comprise the lake community also vary based on the water quality, shoreland health, and characteristics of the watershed. Healthy habitat in Lake Lucerne includes the aquatic plants, branches, and tree limbs above and below the water.

The Fish Community
A balanced fish community has a mix of predator and prey species, each of which has different needs to flourish including sufficient food, habitat, appropriate nesting substrate, and water quality. A sustainable fishery is one that seeks to be in balance with the lake’s natural ability to support the fish community, and in which populations do not noticeably decline over time because of fishing practices or other human activity. Ultimately, the fish community would adapt to fishing without additional stocking or input because its reproductive and growth needs are met within the lake.
Activities in and around a lake that can affect a fishery may come from disturbance of aquatic plants or substrate, additions of harmful chemicals, removal of woody habitat, and shoreline alterations. Shoreland erosion can cause sediment to settle onto the substrate, causing the deterioration of spawning habitat. Ways in which habitat can be improved include allowing shoreland vegetation to grow, minimizing the removal of aquatic plants, providing fallen trees or limbs in suitable areas, and protecting wetlands and other areas of critical habitat.

People are an important part of a sustainable fish community; their actions on the landscape and the numbers and sizes of fish taken out of the lake can influence the entire lake ecosystem. Putting appropriate fishing regulations in place and adhering to them can help to balance the fishery with healthy prey and predatory species, can be adjusted as the fish community changes, and can provide for excellent fishing.

Managing a fishery in a sustainable fashion results in fewer expenses to lake stewards and the public. While some efforts may be needed to provide a more suitable environment to meet the needs of the fish, they do not have to be repeated on a frequent basis. Protecting existing habitat such as emergent, aquatic, and shoreland vegetation, or just allowing trees that naturally fall into the lake remain is free of cost. Alternatively, restoring habitat in and around a lake can have an up-front cost, but the effects will last for decades. Costs in time, travel, and other expenses are associated with routine efforts such as fish stocking and aeration. Ideally, a lake contains the habitat, water quality, and food necessary to support the fish communities that are present within the lake and provide fishing opportunities for people without supplemental efforts and associated expenses to maintain these conditions.

In the spring of 2011, the Wisconsin Department of Natural Resources (WDNR) conducted an electrofishing survey of Lake Lucerne. The results of this survey showed a fairly high abundance of largemouth bass with below average size structure and a good abundance of bluegill with good size structure. Recommendations given by the WDNR Fisheries Biologist included the protection of the high quality in-lake and shoreland habitat presently available; Lake Lucerne was ranked as having high quality, intact shoreland, which is excellent for fish and wildlife. Leaving woody habitat such as logs, sticks, and stumps in the water as fish habitat is important, as well as the continued monitoring for invasive species, as further recommended by the Fisheries Biologist.
Guiding Vision for the Fish Community

Lake Lucerne will have a healthy, well-balanced fish community.

Goal 1. Improve largemouth bass size structure and maintain bluegill abundance.

Objective 1.1. Educate visitors about the fish community in Lake Lucerne.

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<td>Create and maintain boat landing signage with information about the fish community.</td>
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Objective 1.2. Improve fish habitat

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<td>Leave existing woody habitat (branches, logs, stumps) in the lake.</td>
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<td>Consider applying for a permit with the WDNR for tree drops and/or fish cribs.</td>
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Aquatic Plants

Aquatic plants provide the forested landscape within Lake Lucerne. They provide food and habitat for spawning, breeding, and survival for a wide range of inhabitants and lake visitors including fish, waterfowl, turtles, amphibians, as well as invertebrates and other animals. They improve water quality by releasing oxygen into the water and utilizing nutrients that would otherwise be used by algae. A healthy lake typically has a variety of aquatic plant species which creates diversity that makes the aquatic plant community more resilient and can help to prevent the establishment of non-native aquatic species.

Aquatic plants near shore provide food, shelter and nesting material for shoreland mammals, shorebirds and waterfowl. It is not unusual for otters, beavers, muskrats, weasels, and deer to be seen along a shoreline in their search for food, water, or nesting material. The aquatic plants that attract the animals to these areas contribute to the beauty of the shoreline and lake.

Eleven species of aquatic plants were found in Lake Lucerne during the 2011 survey. The greatest plant diversity was found on the northern and southern sides of the lake in the shallows.
The dominant plant species in the survey was muskgrass (*Chara* spp.), followed by slender naiad (*Najas flexilis*) and Fries’ pondweed (*Potamogeton friesii*). Muskgrass is a favorite food source for a wide variety of waterfowl, and muskgrass beds offer cover and food to fish, especially young trout, largemouth bass, and smallmouth bass. The stems, leaves, and seeds of slender naiad provide food for waterfowl and marsh birds, and this common aquatic plant species also provides habitat for fish. Fries’ pondweed is also an important food source for a variety of waterfowl, and this submersed plant species offers shade and cover for fish, and habitat for invertebrates (Borman et al., 2001).

Overall, the aquatic plant community in Lake Lucerne can be characterized as having below average diversity when compared to all of the other lakes in the Waushara County Lakes Study, with several species that are typically found in relatively undisturbed systems. The identification of CLP within the lake is cause for concern and the lake should be routinely monitored for CLP in early June.

### Guiding Vision for Aquatic Plants in Lake Lucerne

*Lake Lucerne will have a healthy native plant community with minimal disturbance by invasive species.*

**Goal 2. Preserve the native plant community in Lake Lucerne.**

**Objective 2.1. Keep the disturbance of native plants to a minimum.**

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<tr>
<td>Protect the native aquatic plant community and refrain from removing native vegetation in and around the lake.</td>
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**Aquatic Invasive Species (AIS)**

Aquatic invasives species are non-native aquatic plants and animals that are most often unintentionally introduced into a lake via lake users. This most commonly occurs on trailers, boats, equipment, and from the release of bait.

Eurasian watermilfoil (EWM) was identified in Lake Lucerne in 2009. Golden Sands RC&D conducted a survey in 2013 and again encountered EWM in small patches on the west side of the lake (see Figure 2 in Appendix). In some lakes, EWM can exist as a part of the plant community, while in others EWM can create dense beds that can damage boat
motors, make areas non-navigable, and inhibit activities like swimming and fishing. This plant can produce viable seed; however, it often spreads by fragmentation. Just a small fragment of the stem is enough to start a new plant, so spread can occur quickly if plants are located near points of activity such as beaches and boat launches.

Because Lake Lucerne was identified by the Wisconsin DNR as having curly-leaf pondweed (CLP), a special survey was conducted in the summer of 2012. Curly-leaf pondweed, a non-native species, can have an impact on a lake’s ecosystem because of its life cycle. This plant can live in harmony with the rest of the aquatic plant community but may become invasive. The die-off of large beds of CLP in June can contribute to nuisance algae blooms throughout the summer. CLP grows under the ice during late winter/early spring and starts to die back in late June to early July. This die back causes the release of phosphorus into the water just as new plants and algae are beginning to grow, helping to fuel algae blooms and excessive plant growth. CLP was not found in Lake Lucerne during the 2012 survey, but the lake should continue to be monitored for signs of curly-leaf pondweed in the future.

Summary of Aquatic Plant Management Planning Session Discussion – April 17, 2014

Various aquatic plant management options involving the control of invasive species (EWM) were discussed at the April 17, 2014 lake management planning meeting. Attendees of this meeting included community members and lake residents, the WDNR Water Resources Management Specialist, and professionals from CWSE, Waushara County, and UW-Extension. All of the management options discussed can be found in the Appendix: Aquatic Plant Management Strategies.

Hand Pulling or Hand Pulling using Suction: Hand pulling is preferable in areas where there are small populations of invasive species. Divers and hand-pullers can more easily target specific plants without causing damage to native species. Hand pulling also removes the plants from the water, lessening the amount of nutrients released by decaying plants.

No Action: Waiting and seeing how EWM and CLP populations respond to no action over time is an option. In some cases, EWM and CLP have been observed to establish as a small population that remain small and become a nondestructive component of the ecosystem.

Goal 3. Diminish populations of invasive plants in and around Lake Lucerne.

Objective 3.1. Monitor and diminish populations of EWM in Lake Lucerne.

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<td>Coordinate field training for residents with Golden Sands RC&amp;D.</td>
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<td>Continue hand-pulling of EWM.</td>
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<td>Work with nearby lakes to apply for a grant (held</td>
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by Golden Sands RC&D) to hire divers to confirm no deep populations of EWM, hand pull deep EWM if found.

Consider no action if EWM is not degrading aquatic plant community.

Test existing milfoil for hybrid Water-Milfoil.

**Objective 3.2.** Educate visitors to Lake Lucerne about invasive species.

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<td>Work with Golden Sands RC&amp;D to explore Clean Boats, Clean Waters (CBCW) volunteer monitoring program.</td>
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**Objective 3.3.** Eliminate invasive terrestrial plants (*Phragmites* and Japanese knotweed) around Lake Lucerne.

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<tr>
<td>Work with Golden Sands RC&amp;D to learn how to remove <em>Phragmites</em> from west end of the lake.</td>
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<tr>
<td>Work with Golden Sands RC&amp;D to eliminate Japanese knotweed near the camp on Lake Lucerne.</td>
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**Critical Habitat**

Critical habitat areas are designated by the WDNR to protect features in a lake that are important to the overall health of the aquatic plants, animals, and lake itself. Every lake contains important natural features, but not all lakes have official critical habitat designations. Designating areas of the lake in this way results in special protections for these areas, and recognizes these areas by mapping and sharing information about them so many can know the locations and importance of areas that could be vulnerable to damage by human activity. Having a critical habitat designation on a lake can help lake groups and landowners plan waterfront projects to avoid and protect habitat and help ensure long-term health of the lake. Lake Lucerne does not currently have any officially designated critical habitat areas.
Guiding Vision for Lake Lucerne’s Critical Habitat

Sensitive areas in Lake Lucerne will be enhanced and protected from degradation.

Goal 4. Preserve high quality habitat for fish and wildlife.

Objective 4.1. Identify potentially critical habitat on Lake Lucerne.

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<td>Request critical habitat designation from WDNR?</td>
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Landscapes and the Lake

Land use and land management practices within a lake’s watershed can affect both its water quantity and quality. While forests, grasslands, and wetlands allow a fair amount of precipitation to soak into the ground, resulting in more groundwater and good water quality, other types of land uses may result in increased runoff and less groundwater recharge, and may also be sources of pollutants that can impact the lake and its inhabitants. Areas of land with exposed soil can produce soil erosion. Soil entering the lake can make the water cloudy and cover fish spawning beds. Soil also contains nutrients that increase the growth of algae and aquatic plants. Development on the land may result in changes to natural drainage patterns and alterations to vegetation on the landscape, and may be a source of pollutants. Impervious (hard) surfaces such as roads, rooftops, and compacted soil prevent rainfall from soaking into the ground, which may result in more runoff that carries pollutants to the lake. Wastewater, animal waste, and fertilizers used on lawns, gardens and crops can contribute nutrients that enhance the growth of algae and aquatic plants in our lakes. Land management practices can be put into place that better mimic some of the natural processes, and reduction or elimination of nutrients added to the landscape will help prevent the nutrients from reaching the water. In general, the land nearest the lake has the greatest impact on the lake water quality and habitat.
Shoreland vegetation is critical to a healthy lake’s ecosystem. It helps improve the quality of the runoff that is flowing across the landscape towards the lake. It also provides habitat for many aquatic and terrestrial animals including birds, frogs, turtles, and many small and large mammals. Healthy shoreland vegetation includes a mix of tall grasses/flowers, shrubs, and trees which extend at least 35 feet landward from the water’s edge. Shorelands can also encompass adjacent wetlands, which serve the lake by filtering contaminants, providing shelter for fish and wildlife, and decreasing the hazard of shoreline erosion by providing a shoreland barrier from waves and wind.

The water quality in Lake Lucerne is the result of many factors, including the underlying geology, the climate, and land management practices. Since we have little control over the climate and cannot change the geology, changes to land management practices are the primary actions that can have positive impacts on the lake’s water quality. The water quality in Lake Lucerne was assessed by measuring different characteristics including temperature, dissolved oxygen, water clarity, water chemistry, and algae. All of these factors were taken into consideration when management planning decisions were made.

**Water Quality**

Water quality was assessed during the 2010-2012 lake study and involved a number of measures including temperature, dissolved oxygen, water chemistry, and phosphorus. Each of these interrelated measures plays a part in the lake’s overall water quality. Citizen survey respondents indicated that water quality in Lake Lucerne has a major impact on their personal enjoyment of the lake. [Lake specific information on citizen perception of water quality over time.]

Dissolved oxygen is an important measure in Lake Lucerne because a majority of organisms in the water depend on oxygen to survive. Oxygen is dissolved into the water from contact with air, which is increased by wind and wave action. Algae and aquatic plants also produce oxygen when sunlight enters the water, but the decomposition of dead plants and algae reduces oxygen in the lake. Temperature and dissolved oxygen profiles indicate very typical thermal stratification in Lake Lucerne that is developed by June each year, limiting mixing of shallower and deeper water. Due to its depth and seasonal overturn mixing, oxygen depletion is not typically a problem in Lake Lucerne over the winter.

The water clarity measured in Lake Lucerne was considered good. For Lake Lucerne, the average water clarity was best during August and poorest during September. The measurements ranged from depths of 7 feet to 24 feet over the two-year monitoring period.

Chloride, sodium and potassium concentrations are commonly used as indicators of how a lake
is being impacted by human activity. Lake Lucerne had low average chloride, potassium, and sodium concentrations over the monitoring period.

Phosphorus is an element that is essential in trace amounts to most living organisms, including aquatic plants and algae. Sources of phosphorus can include naturally-occurring phosphorus in soils and wetlands, and in groundwater. Common sources from human activities include soil erosion, animal waste, fertilizers, and septic systems. Although a variety of compounds are important to biological growth, phosphorus gets so much attention because it is commonly the “limiting nutrient” in many Wisconsin lakes. Due to its relatively short supply compared to other substances necessary for growth, relatively small increases in phosphorus result in significant increases in aquatic plants and algae.

Total phosphorus concentrations in Lake Lucerne ranged from a high of 22 μg/L in June 2012 to a low of 3 μg/L in August 2012, with median growing season concentrations of 15 μg/L and 12 μg/L in 2011 and 2012, respectively. This is below Wisconsin’s phosphorus standard of 20 μg/L for deep seepage lakes and is down from measurements taken in the early 1980s, which averaged 20 μg/L. The median concentration measured in 2011 is at the flag value of 15 μg/L proposed by the WDNR for deep seepage lakes.

Managing nitrogen, phosphorus and soil erosion throughout the <Lake Name> watershed is one of the keys to protecting the lake itself. Near shore activities that may increase the input of phosphorus to the lake include applying fertilizer, removing native vegetation (trees, bushes and grasses), mowing vegetation, and increasing the amount of exposed soil. Nitrogen inputs to <Lake Name> can be controlled by using lake-friendly land management decisions, such as the restoration of shoreland vegetation, elimination/reduction of fertilizers, proper management of animal waste and septic systems, and the use of water quality-based management practices.

### Guiding Vision for Water Quality in Lake Lucerne

*Lake Lucerne will continue to hold water that is measureabley clear and clean for generations to come.*

**Goal 5.** Maintain current water quality conditions and record changes over time.

**Objective 5.1.** Build an ongoing, continuous dataset of water quality measurements to track changes/improvements/declines over time.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Lead person/group</th>
<th>Resources</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begin Ice on/off monitoring.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Begin water clarity monitoring during open water season.</td>
<td>Regional CLMN Coordinator</td>
<td></td>
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</tr>
</tbody>
</table>
Begin periodic collection of water samples for analysis to track changes over time.

| Objective 5.2. Maintain current median summer phosphorus concentrations (around 13.5 ppb) and reduce inorganic nitrogen concentrations (0.17 ppm during 2010-2012 study period) |
|---|---|---|---|
| **Actions** | **Lead person/group** | **Resources** | **Timeline** |
| Support county in any efforts to reduce fertilizer applications in the groundwater watershed. | | | |

**Shorelands**

Shoreland vegetation is critical to a healthy lake ecosystem. It provides habitat for many aquatic and terrestrial animals including birds, frogs, turtles, and small and large mammals. It also helps to improve the quality of the runoff that is flowing across the landscape towards the lake. Healthy shoreland vegetation includes a mix of unmowed grasses/flowers, shrubs, trees, and wetlands which extends at least 35 feet landward from the water’s edge.

To better understand the health of the Waushara County lakes, shorelands were evaluated. The survey inventoried the type and extent of shoreland vegetation. Areas with erosion, rip-rap, barren ground, sea walls, structures and docks were also inventoried. A scoring system was developed for the collected data to provide a more holistic assessment. Areas that are healthy will need strategies to keep them healthy, and areas with potential problem areas and where management and conservation may be warranted may need strategies for improvement. The scoring system is based on the presence/absence and abundance of shoreline features, as well as their proximity to the water’s edge. Values were tallied for each shoreline category and then summed to produce an overall score. Higher scores denote a healthier shoreline with good land management practices. These are areas where protection and/or conservation should be targeted. On the other hand, lower scores signify an ecologically unhealthy shoreline. These are areas where management and/or mitigation practices may be desirable for improving water quality and habitat.

The summary of scores for shorelands around Lake Lucerne is displayed on the map in the Appendix. The majority of Lake Lucerne’s shorelands are in good shape; only three short segments indicate areas that could benefit from improvement/restoration for lake health. There were no stretches of Lake Lucerne shoreland that ranked as poor.
Shoreland ordinances were enacted to improve water quality and habitat, and to protect our lakes. County and State (NR 115) shoreland ordinances state that vegetation should extend at least 35 feet inland from the water’s edge, with the exception of an optional 30 foot viewing corridor for each shoreland lot. Although some properties were grandfathered in when the ordinance was initiated in 1966, following this guidance will benefit the health of the lake and its inhabitants.

**Guiding Vision for Lake Lucerne’s Shorelands**

*Lake Lucerne will have a healthy, vegetated shoreland around the entire lake.*

**Goal 6. Restore areas negatively impacted by erosion and poor shoreland vegetation**

**Objective 6.1. Restore the degraded area around Lake Lucerne’s boat launch.**

<table>
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<tr>
<th>Actions</th>
<th>Lead person/group</th>
<th>Resources</th>
<th>Timeline</th>
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<tbody>
<tr>
<td>Work with the town and/or County to restore the shoreland near the boat launch and correct erosion issues.</td>
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</tbody>
</table>

**Watershed Land Use**

It is important to understand where Lake Lucerne’s water originates in order to understand the lake’s health. During snowmelt or rainstorms, water moves across the surface of the landscape (runoff) towards lower elevations such as lakes, streams, and wetlands. The land area that contributes runoff to a lake is called the surface watershed. Groundwater also feeds Lake Lucerne; its land area may be slightly different than the surface watershed.

The capacity of the landscape to shed or hold water and contribute or filter particles determines the amount of erosion that may occur, the amount of groundwater feeding a lake, and ultimately, the lake’s water quality and quantity. Essentially, landscapes with greater capacities to hold water during rain events and snowmelt slow the delivery of the water to the lake. Less runoff is desirable because it allows more water to recharge the groundwater, which feeds the lake year-round - even during dry periods or when the lake is covered with ice.

A variety of land management practices can be put in place to help reduce impacts to our lakes. Some practices are designed to reduce runoff. These include protecting/restoring wetlands, installing rain gardens, swales, rain barrels, and routing drainage from pavement and roofs away from the lake. Some practices are used to help reduce nutrients from moving across the landscape towards the lake. Examples include manure management practices, eliminating/reducing the use of fertilizers, increasing the distance between the lake and a septic drainfield, protecting/restoring wetlands and native vegetation in the shoreland, and using erosion control practices.
The surface watershed of Lake Lucerne is 232 acres. Primary land use is forested land with development and agriculture mixed throughout (Figure 1). The lake’s shoreland is comprised primarily of forest and wetlands. In general, the land closest to the lake has the greatest immediate impact on water quality.

Guiding Vision for Lake Lucerne’s Watershed
Lake Lucerne will continue to be situated in a pristine setting with minimal a minimally developed watershed.

Goal 7. Support local land management practices that can protect lake health.

Objective 7.1. Encourage involvement in local decision making activities that affect the lake.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Lead person/group</th>
<th>Resources</th>
<th>Timeline</th>
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</thead>
<tbody>
<tr>
<td>Encourage the County to work with landowners to install and maintain Best Management Practices (BMPs) for water quality.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Inform residents of the watershed about land practices to support a healthy lake?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research local zoning ordinances and</td>
<td></td>
<td></td>
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</tbody>
</table>
participate in comprehensive planning activities to better support lake health.
Support property owners interested in conservation programs such as Conservation Easements.

People and the Lake
The people that interact with the lake are a key component of the lake and its management. In essence, a lake management plan is a venue by which people decide how they would like people to positively impact the lake. The plan summarizes the decisions of the people to take proactive steps to improve their lake and their community. Individual decisions by lake residents and visitors can have a positive impact on the lake and on those who enjoy this common resource. Collaborative efforts may have a bigger positive impact; therefore, communication and cooperation between a lake district, community, and suite of lake users are essential to maximize the effects of plan implementation.

Boating hours, regulations, and fishing limits are examples of principles that are put into place to minimize conflicts between lake users and balance human activities with environmental considerations for the lake.

Recreation
Lake Lucerne has one public boat landing with 1-5 parking stalls on the west side. Lake Lucerne is a NO WAKE lake and no gas or electric motors are allowed. The lake is enjoyed by people who swim, boat, fish, and appreciate its beauty.

Guiding Vision for Recreation

Lake Lucerne will be a peaceful place for quiet recreation and relaxation.

Goal 8. Maintain secluded, quiet nature of recreation on the lake
Objective 8.1. Work with local municipality to protect the lake.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Lead person/group</th>
<th>Resources</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install a descriptive sign at the boat launch highlighting the beauty and value of the lake and asking visitors to respect it and recreate responsibly.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explore banning snowmobiles and other motors.</td>
<td></td>
<td></td>
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</tbody>
</table>

Communication and Organization

Many of the goals outlined in this plan focus on distributing information to lake and watershed residents and lake users in order to help them make informed decisions that will result in a healthy ecosystem in Lake Lucerne enjoyed by many people. Working together on common values will help to achieve the goals that are outlined in this plan.

Guiding Vision for Communication

Lake Lucerne will host respectful, informed and appreciative visitors and community members.

Goal 9. Build community appreciation for the beauty and protection of Lake Lucerne.

Objective 9.1. Inform new property owners and association members about important lake information and healthy land and lake management practices.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Lead person/group</th>
<th>Resources</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide welcome packets to new property owners containing important information about the lake and its watershed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attend the annual Lucerne Lake Association</td>
<td></td>
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</tbody>
</table>
**Objective 9.2.** Inform visitors about the importance of Lake Lucerne and responsible recreation.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Lead person/group</th>
<th>Resources</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install a descriptive sign at the boat launch highlighting the beauty and value of the lake and asking visitors to respect it and recreate responsibly. “The lake is the gift of a glacier...” Explore working with UWSP professor on design of a sign.</td>
<td>Kristin Floress, Assistant Professor of Human Dimensions.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Updates and Revisions**

A management plan is a living document that changes over time to meet the current needs, challenges and desires of the lake and its community. The goals, objectives and actions listed in this plan should be reviewed annually and updated with any necessary changes.

**Guiding Vision for Updates and Revisions**

*Lake Lucerne’s lake management plan will be a living document, updated and revisited as necessary so that proactive actions are taken to protect the lake.*

**Goal 10.** Review plan annually and update as needed.

**Objective 10.1.** Communicate updates with community members.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Lead person/group</th>
<th>Resources</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>How will the group organize to review the plan?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicate any important updates or changes to the lake management plan with the Lucerne Lake Association at the annual meeting.</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Governance
This section will identify plans, ordinances, regulations that affect the lake, and responsible authorities including the District (can/should be provided by the District), local municipalities, state, and federal. Waushara County staff will provide most of the content for this section.
References


Lake Lucerne 2010-2012 Study Report. Center for Watershed Science and Education. UW-Stevens Point.

Lake Lucerne 2010-2012 Study Mini-Report. Center for Watershed Science and Education. UW-Stevens Point


UW-Stevens Point Center for Watershed Science and Education, 2014. Waushara County Lake Study - Lake Lucerne 2010-2012. Final Report to Waushara County and Wisconsin Department of Natural Resources.
UW-Stevens Point Center for Watershed Science and Education, 2013. Waushara County Lake Study - Lake Lucerne 2010-2012 Mini-Report. Report to Waushara County and Wisconsin Department of Natural Resources. Planning Meeting Presentations


Appendix

Appendix A: Waushara County Lake Information Directory

Algae - Blue-Green
Contact: Ted Johnson, Wisconsin Department of Natural Resources
Phone: 920-787-3048
Address: WDNR 427 E Tower Drive, Wautoma, WI 54982
E-mail: TedM.Johnson@wisconsin.gov
Website: http://dnr.wi.gov/lakes/bluegreenalgae/

Contact: Wisconsin Department of Health Services
Phone: 608-267-3242
Address: 1 West Wilson Street, Madison, WI 53703
Website: http://www.dhs.wisconsin.gov/eh/bluegreenalgae/contactus.htm

Aquatic Invasive Species /Clean Boats Clean Water
Contact: Golden Sands RC&D
Phone: 715-343-6215
Websites: www.goldensandsrcd.org
http://dnr.wi.gov/invasives/

Aquatic Plant Management (Native and Invasive)
Contact: Ted Johnson, Wisconsin Department of Natural Resources
Phone: 920-787-3048
Address: WDNR 427 E Tower Drive, Wautoma, WI 54982
E-mail: TedM.Johnson@wisconsin.gov
Website: http://dnr.wi.gov/lakes/plants/

Aquatic Plant Identification
Contact: Golden Sands RC&D
Phone: 715-343-6215
Websites: www.goldensandsrcd.org

Contact: Dr. Emmet Judziewicz, UWSP Freckmann Herbarium
Phone: 715-346-4248
Address: 301 TNR UWSP 800 Reserve St.
Stevens Point, WI 54481
E-mail: ejudziew@uwsp.edu

Aquatic Plant Surveys/Management
Contact: Ted Johnson, Wisconsin Department of Natural Resources
Phone: 920-787-3048
Address: WDNR 427 E Tower Drive, Wautoma, WI 54982
E-mail: TedM.Johnson@wisconsin.gov
Website: http://dnr.wi.gov/lakes/plants/

Best Management Practices (Raingardens, shoreland buffers, agricultural practices, runoff controls)
Contact: Ed Hernandez, Waushara County Land Conservation Department
Phone: 920-787-0453
Address: PO Box 1109 Wautoma, WI 54982
E-mail: lcdzoning.courthouse@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/zoning.htm

Boat Landings, signage, permissions (County)
Contact: Scott Schuman, Waushara County Parks
Phone: 920-787-7037
Address: PO Box 300 Wautoma, WI 54982
E-mail: wcparks.parks@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/parks.htm

Boat Landings (State)
Contact: Dave Bartz, Wisconsin Department of Natural Resources
Phone: 608-635-4989  
Address: Hwy 22N Box 430, Montello, WI 53949  
E-mail: David.Bartz@wisconsin.gov  
Website: http://dnr.wi.gov/org/land/facilities/boataccess/

Boat Landings (Town)  
Contact the clerk for the specific town/village in which the boat landing is located.

Conservation Easements  
Contact: Gathering Waters Conservancy  
Phone: 608-251-9131  
Address: 211 S. Paterson St. Suite 270 Madison, WI 53703  
E-mail: info@gatheringwaters.org  
Website: http://gatheringwaters.org/

Contact: Ted Johnson, Wisconsin Department of Natural Resources  
Phone: 920-787-3048  
Address: WDNR 427 E Tower Drive, Wautoma, WI 54982  
E-mail: TedM.Johnson@wisconsin.gov

Contact: Patrick Sorge, Wisconsin Department of Natural Resources  
Phone: 715-839-3794  
Address: PO Box 4001, Eau Claire, WI 54702  
E-mail: Patrick.Sorge@wisconsin.gov

Contact: North Central Conservancy Trust  
Phone: 715-344-1910  
Address: P.O. Box 124 Stevens Point, WI 54481  
E-mail: info@ncctwi.org  
Website: http://www.ncctwi.org/

Contact: NRCS Stevens Point Service Center  
Phone: 715-346-1325  
Address: 1462 Strongs Ave. Stevens Point, WI 54481

Critical Habitat and Sensitive Areas  
Contact: Ted Johnson, Wisconsin Department of Natural Resources Lake Coordinator

Phone: 920-787-3048  
Address: 427 E. Tower Drive, Suite 100  
Wautoma, WI 54982  
E-mail: TedM.Johnson@wisconsin.gov  
Website: http://dnr.wi.gov/lakes/criticalhabitat/

Dams  
Contact: Joe Behlen, Wisconsin Department of Natural Resources  
Phone: 715-421-9940  
Address: 473 Griffith Ave. Wisconsin Rapids, WI 54494  
E-mail: joseph.behlen@wisconsin.gov  
Website: http://dnr.wi.gov/org/water/wm/dsfm/dams/

Fertilizers/Soil Testing  
Contact: Ken Williams, Waushara County UW-Extension  
Phone: 920-787-0416  
Address: 209 S St. Marie Street, PO Box 487, Wautoma, WI 54982  
E-mail: ken.williams@ces.uwex.edu  
Website: http://waushara.uwex.edu/agriculture/services

Fisheries Biologist (management, habitat)  
Contact: Dave Bartz, Wisconsin Department of Natural Resources  
Phone: 608-635-4989  
Address: Hwy 22N Box 430, Montello, WI 53949  
E-mail: David.Bartz@wisconsin.gov  
Website: http://dnr.wi.gov/fish/

Grants  
Contact: Ted Johnson, Wisconsin Department of Natural Resources Lake Coordinator  
Phone: 920-787-3048  
Address: 427 E. Tower Drive, Suite 100  
Wautoma, WI 54982  
E-mail: TedM.Johnson@wisconsin.gov  
Website: http://dnr.wi.gov/Aid/Grants.html#tabx8

Contact: Ed Hernandez, Waushara County Land Conservation Department
Groundwater Quality
Contact: Kevin Masarik, Center for Watershed Science and Education UWSP
Phone: 715-346-4276
Address: 224 TNR 800 Reserve St. Stevens Point, WI 54481
E-mail: kmasarik@uwsp.edu
Website: http://www.uwsp.edu/cnr/watersheds/

Groundwater Levels/Quantity
Contact: Ed Hernandez, Waushara County Land Conservation Department
Phone: 920-787-0453
Address: PO Box 1109 Wautoma, WI 54982
E-mail: lcdzoning.courthouse@co.waushara.wi.us

Contact: George Kraft
Phone: 715-346-2984
Address: TNR 224 800 Reserve Street, Stevens Point, WI 54481
E-mail: george.kraft@uwsp.edu

Contact: Scott Provost, Wisconsin Department of Natural Resources
Phone: 715-421-7881
Address: WDNR 473 Griffith Ave, Wisconsin Rapids, WI 54494
E-mail: scott.provost@wisconsin.gov
Website: http://prodoasext.dnr.wi.gov/inter1/hicap$start
tup

Informational Packets
Contact: Center for Watershed Science and Education UWSP
Phone: 715-346-2497
Address: 224 TNR UWSP 800 Reserve St. Stevens Point, WI 54481
E-mail: pclakes@uwsp.edu

Lake Groups – Friends, Associations, Districts
Contact: Patrick Nehring, UWEX Economic Resource Development Agent
Phone: 920-787-0416
Address: PO Box 487, Wautoma, WI 54982
E-mail: Patrick.nehring@ces.uwex.edu

Contact: Patrick Goggin, UWEX Lakes
Phone: 715-365-8943
Address: 203 TNR 800 Reserve St. Stevens Point, WI 54481
E-mail: pgoggin@uwsp.edu
Website: http://www.uwsp.edu/cnr/udwexlakes/organizations/

Contact: Eric Olson, UWEX Lakes
Phone: 715-346-2192
Address: 206 TNR 800 Reserve St. Stevens Point, WI 54481
E-mail: eolson@uwsp.edu
Website: http://www.uwsp.edu/cnr/udwexlakes/organizations/

Contact: Susan Tesarik, Wisconsin Lakes
Phone: 1-800-542-5253
Address: 4513 Vernon Blvd. Suite 101 Madison, WI 53705
E-mail: lakeinfo@wisconsinlakes.org
Website: http://wisconsinlakes.org/

Lake Levels
See: Groundwater

Lake Related Law Enforcement (No-wake, transporting invasives, etc.)
Contact: Ben Mott, Wisconsin Department of Natural Resources State Conservation Warden
Phone: 920-896-3383
Address: 427 E. Tower Drive, Suite 100 Wautoma, WI 54982
Website: http://www.wigamewarden.com/

Land Use Plans and Zoning Ordinances
Contact: Terri Dopp-Paukstat, Waushara County Planning and Zoning
Phone: 920-787-0453
Address: PO Box 1109 Wautoma, WI 54982
E-mail: lcdzoning.courthouse@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/zoning.htm

Contact: Center for Land Use Education, UWSP
Phone: 715-346-3783
Address: TNR 208 800 Reserve St. Stevens Point, WI 54481
E-mail: Center.for.Land.Use.Education@uwsp.edu
Website: http://www.uwsp.edu/cnr/landcenter/

Nutrient Management Plans
Contact: Ed Hernandez, Waushara County Land Conservation Department
Phone: 920-787-0453
Address: PO Box 1109 Wautoma, WI 54982
E-mail: lcdzoning.courthouse@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/zoning.htm

Contact: NRCS Stevens Point Service Center
Phone: 715-346-1325
Address: 1462 Strongs Ave. Stevens Point, WI 54481

Parks (County)
Contact: Scott Schuman, Portage County Parks
Phone: 920-787-7037
Address: PO Box 300 Wautoma, WI 54982
E-mail: wcparks.parks@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/parks.htm

Purchase of Development Rights
Contact: North Central Conservancy Trust
Phone: 715-341-7741
Address: P.O. Box 124 Stevens Point, WI 54481
E-mail: info@ncctwi.org
Website: http://www.ncctwi.org/

Purchase of Land
Contact: Ted Johnson, Wisconsin Department of Natural Resources Lake Coordinator
Phone: 920-787-3048

Address: 427 E. Tower Drive, Suite 100
Wautoma, WI 54982
E-mail: TedM.Johnson@wisconsin.gov
Website: http://dnr.wi.gov/topic/stewardship/

Rain Barrels – Order
Contact: Golden Sands RC&D
Phone: 715-343-6215
Address: 1100 Main Street, Suite #150, Stevens Point, WI 54481
Website: http://www.goldensandsrcd.org/store

Rain Gardens and Stormwater Runoff
Contact: Ed Hernandez, Waushara County Land Conservation Department
Phone: 920-787-0453
Address: PO Box 1109 Wautoma, WI 54982
E-mail: lcdzoning.courthouse@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/zoning.htm

Septic Systems/Onsite Waste
Contact: Terri Dopp-Paukstat, Waushara County Planning and Zoning
Phone: 920-787-0453
Address: PO Box 1109 Wautoma, WI 54982
E-mail: lcdzoning.courthouse@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/zoning.htm

Shoreland Management
Contact: Ed Hernandez, Waushara County Land Conservation Department
Phone: 920-787-0453
Address: PO Box 1109 Wautoma, WI 54982
E-mail: lcdzoning.courthouse@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/zoning.htm

Shoreland Vegetation
http://dnr.wi.gov/topic/ShorelandZoning/

Shoreland Zoning Ordinances
See: Zoning Ordinances
Soil Fertility Testing
Contact: Ken Williams, Waushara County UW-Extension
Phone: 920-787-0416
Address: 209 S St Marie PO Box 487, Wautoma, WI 54982
E-mail: Ken.williams@ces.uwex.edu
Website: http://waushara.uwex.edu/index.html

Water Quality Monitoring
Contact: Ted Johnson, Wisconsin Department of Natural Resources Lake Coordinator
Phone: 920-787-3048
Address: 427 E. Tower Drive, Suite 100
Wautoma, WI 54982
E-mail: TedM.Johnson@wisconsin.gov

Water Quality Problems
Contact: Ted Johnson, Wisconsin Department of Natural Resources Lake Coordinator
Phone: 920-787-3048
Address: 427 E. Tower Drive, Suite 100
Wautoma, WI 54982
E-mail: TedM.Johnson@wisconsin.gov

Contact: Nancy Turyk, Center for Watershed Science and Education UWSP
Phone: 715-346-4155
Address: 216 TNR 800 Reserve St. Stevens Point, WI 54481
E-mail: nturyk@uwsp.edu

Woody Habitat
Contact: Tom Meronek, Wisconsin Department of Natural Resources
Phone: 715-359-7582
Address: 5103 Rib Mt. Drive, Wausau, WI 54401
E-mail: Thomas.Meronek@wisconsin.gov

If you are looking for any information that is not listed in this directory please contact:
Ryan Haney or Danielle Rupp (wclakes@uwsp.edu)
UWSP Center for Watershed Science and Education
224 TNR UWSP 800 Reserve St. Stevens Point, WI 54481
Phone: 715-346-2497

Wetlands
Contact: Keith Patrick, Wisconsin Department of Natural Resources
Phone: 715-241-7502
Address: 5301 Rib Mt. Drive Wausau, WI 54401
E-mail: keith.patrick@wisconsin.gov
Website: http://dnr.wi.gov/wetlands/

Contact: Wisconsin Wetlands Association
Phone: 608-250-9971
Address: 214 N. Hamilton Street #201, Madison, WI 53703
Email: info@wisconsinwetlands.org

Wetland Inventory
Appendix B: Invasive Species Rapid Response Plan 2014
SURVEY/MONITOR

1. Learn how to survey/monitor the lake. Contacts:
Water Resource Management Specialist
Wisconsin Department of Natural Resources
Phone: 
E-Mail: 
Regional Aquatic Invasive Species (AIS) Coordinator
Golden Sands RC&D
1100 Main St., Suite #150
Stevens Point, WI 54481
Phone: 715-343-6278
E-Mail: info@goldensandsrcd.org

2. Survey/monitor the lake monthly/seasonally/annually.

If you find a suspected invasive species, report it as soon as possible using the procedure below.

REPORTING A SUSPECTED INVASIVE SPECIES

1. Collect specimens or take photos. Collect, press and dry a complete sample. This method is best because a plant expert can then examine the specimen.

-OR-

Collect a fresh sample. Enclose in a plastic bag with a moist paper towel and refrigerate.

-OR-

Take detailed photos (digital or film).

2. Note the location where the specimen
was found.
If possible, give the exact geographic location using a GPS (global positioning system) unit, topographic map, or the Wisconsin Gazetteer map book. If using a map, include a photocopy with a dot showing the plant's location. You can use TopoZone.com to find the precise location on a digital topographic map. Click the cursor on the exact collection site and note the coordinates (choose UTM or Latitude/Longitude).

Provide one or more of the following:
- Latitude & Longitude
- UTM (Universal Transverse Mercator) coordinates
- County, Township, Range, Section, Part-section
- Precise written site description, noting nearest city & road names, landmarks, local topography

3. Gather information to aid in positive species identification.

- Collection date and county
- Your name, address, phone, email
- Exact location (Latitude/Longitude or UTM preferred, or Township/Range/Section)
- Plant name (common or scientific)
- Land ownership (if known)
- Population description (estimated number of plants and area covered)
- Habitat type(s) where found (forest, field, prairie, wetland, open water)
4. **Mail or bring specimens and information to any of the following locations:**

   Digital photos may be emailed.

<table>
<thead>
<tr>
<th>Location</th>
<th>Address</th>
<th>Phone</th>
<th>E-Mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wisconsin Dept. Natural Resources</td>
<td>427 E. Tower Drive, Suite 100, Wautoma, WI 54982</td>
<td>(920) 787-4686</td>
<td></td>
</tr>
<tr>
<td>Regional AIS Coordinator</td>
<td>Golden Sands RC&amp;D, 1100 Main St., Suite #150, Stevens Point, WI 54481</td>
<td>715-343-6214</td>
<td><a href="mailto:info@goldensandsrcd.org">info@goldensandsrcd.org</a></td>
</tr>
<tr>
<td>UW-Stevens Point Herbarium</td>
<td>301 Trainer Natural Resources Building, 800 Reserve Street, Stevens Point, WI 54481</td>
<td>715-346-4248</td>
<td><a href="mailto:ejudziew@uwsp.edu">ejudziew@uwsp.edu</a></td>
</tr>
<tr>
<td>Wisconsin Invasive Plants Reporting &amp; Prevention Project</td>
<td>Herbarium-UW-Madison, 430 Lincoln Drive, Madison, WI 53706</td>
<td>(608) 267-7612</td>
<td><a href="mailto:invasiveplants@mailplus.wisc.edu">invasiveplants@mailplus.wisc.edu</a></td>
</tr>
</tbody>
</table>

5. **Once the specimen is dropped off or sent for positive identification, be sure to contact:**

   | Regional AIS Coordinator | Golden Sands RC&D, 1100 Main St., Suite #150, Stevens Point, WI 54481 | 715-343-6214 | info@goldensandsrcd.org |

If an invasive species is confirmed, the Regional AIS Coordinator will make the following public information contacts:
o Wisconsin Department of Natural Resources
  427 E. Tower Drive, Suite 100
  Wautoma, WI 54982
  Phone: (920) 787-4686

o Lucerne Lake Association

o The town in which the waterbody is located.
  Town of: Marion

o University of Wisconsin-Stevens Point
  Water Resource Scientist
  Nancy Turyk
  Trainer Natural Resources Building
  800 Reserve Street
  Stevens Point, WI 54481
  Telephone: 715-346-4155
  E-mail: nturyk@uwsp.edu

o Local Residents

  If an invasive species is confirmed, the County Conservationist will make the following public information contacts:

  o Newspapers: The Argus

  Contact the WDNR to post notice(s) at the access point(s) to the water body.
Appendix C: Aquatic Plant Management Strategies

Figure 2: Locations of Eurasian water milfoil in Lake Lucerne during Golden Sands RC&D 2013 survey.
**General recommendations:**

- Reduce nutrients traveling to the lake from the landscape.
- Avoid increasing algal blooms by maintaining a healthy amount of aquatic plants.
- Don’t denude the lakebed.
  - Increases potential for aquatic invasive species establishment.
  - Sediments can add phosphorus to the water which may lead to increased algal growth.
- Choose options that are appropriate for your lake’s situation.
- Monitor and adjust your strategies if you are not making headway!

**List of Aquatic Plant Management Options (selection of options varies with situation):**

The following options were selected as the most favorable aquatic plant/aquatic invasive species management options for Lake Lucerne to minimize disturbance and harm to the native plant community:

**No Action**

**ADVANTAGES**
- No associated cost.
- Least disruptive to lake ecosystem.

**LIMITATIONS**
- May not be effective in achieving aquatic plant management objectives.

**Hand Pulling**

**ADVANTAGES**
- Can be used for thinning aquatic plants around docks.
- Can target specific plants - with proper training.
- Can be effective in controlling small infestations of aquatic invasive species.
- No associated cost.

**LIMITATIONS**
- Removes near-shore wildlife and fish habitat.
- Opens up areas where invasives to become established.
If aquatic invasive species are not pulled properly, could worsen the problem.

**Hand Pulling Using Suction**

**ADVANTAGES**
- Can be used for thinning plants around docks.
- Can be used in deeper areas (with divers).
- Can target specific plants with proper training.
- Can be effective in controlling small infestations of aquatic invasive species.
- May be useful in helping to remove upper root mass of aquatic invasive species.

**LIMITATIONS**
- Costs associated with hiring a diver may be comparable to chemical treatment expenses.
- Currently an experimental treatment – not readily available.
- If aquatic invasive species are not pulled properly, could worsen the problem.

**Milfoil Weevils**

**ADVANTAGES**
- Natural, native maintenance of native and exotic milfoils.
- Prefers the aquatic invasive Eurasian Watermilfoil.
- Some lakes may already have a native population; need a professional stem count and assessment of shoreland health, structure of fishery, etc.
- Doesn’t harm lake ecosystem.

**LIMITATIONS**
- Require healthy shoreline habitat for overwintering.
- Cannot survive in areas of mechanical harvesting or herbicide application.
- Effectiveness highly variable between lakes (only works well for some lakes).
- Limited access to weevils for purchase in WI.
- Still considered experimental.

The following action items were discussed, but not selected during the planning process. Some of the following are not optional for Lake Lucerne due to lake size and/or structure.
**Mechanical Harvesting**

**ADVANTAGES**
* Removes plant material and nutrients.
* Can target specific locations.
* Used to manage larger areas for recreational access or fishery management.

**LIMITATIONS**
* Not used in water depths less than 3 feet.
* Some harm to aquatic organisms.
* Is a temporary control.
* Risk of introduction of new aquatic invasive species (on a hired harvester) or spread of some existing invasive species.
* Hired cost at least $150/hr.

**Water Level Manipulation**

**ADVANTAGES**
* Controls aquatic plants in shallower, near-shore areas.
* Can be low cost.

**LIMITATIONS**
* Requires a controlling structure on the lake.
* May cause undesired stress on ecosystem.
* Cannot be used frequently.
Chemical Treatment: Spot

ADVANTAGES
* May be less destructive to lake ecosystem than lake-wide treatment.

LIMITATIONS
* Only considered in lakes with aquatic invasive plants.
* Usually not fully effective in eradicating target species.
* Contaminants may remain in sediment.
* Effects on lake ecosystem not fully understood.
* Does not remove dead vegetation, which depletes oxygen and releases nutrients, adds to build-up of muck.
* Extra nutrients may spur additional aquatic plant and algae growth.

Chemical Treatment: Lake-wide

ADVANTAGES
* May reduce aquatic invasives for a time.
* Treatment not needed as frequently.

LIMITATIONS
* Only considered in lakes with aquatic invasive plants.
* Usually not fully effective in eradicating target species.
* Contaminants may remain in sediment.
* Does not remove dead vegetation, which depletes oxygen and releases nutrients, adds to build-up of muck.
* Extra nutrients may spur additional aquatic plant and algae growth.
* Negatively affects native vegetation.
* Effects on lake ecosystem not fully understood.
* Opens up space once taken up by natives for invasive species to colonize once again.
* ~$4000 per 5 acres.
Appendix D: Shoreland Survey – 2010
A scoring system was developed for the collected data to provide a more holistic assessment. Areas that are healthy will need strategies to keep them healthy, and areas with potential problem areas and where management and conservation may be warranted may need a different set of strategies for improvement. The scoring system is based on the presence/absence and abundance of shoreline features, as well as their proximity to the water’s edge. Values were tallied for each shoreline category and then summed to produce an overall score. Higher scores denote a healthier shoreline with good land management practices. These are areas where protection and/or conservation should be targeted. On the other hand, lower scores signify an ecologically unhealthy shoreline. These are areas where management and/or mitigation practices may be desirable for improving water quality.

The summary of scores for shorelands around Lake Lucerne is displayed in Figure 3. The shorelands were color-coded to show their overall health based on natural and physical characteristics. Blue shorelands identify healthy shorelands with sufficient vegetation and few human disturbances. The majority of Lake Lucerne’s shorelands are in good shape; only three short segments indicate areas that could benefit from improvement/restoration for lake health. There were no stretches of Lake Lucerne shoreline that ranked as poor.

Waushara County Lakes – Directory of Inform

Figure 3 Scoring for Lake Lucerne’s shoreland health, 2010 Shoreland Survey.