

**Abstract:**

One of the goals in Iron County's Land and Water Resource Management Plan is to develop a long-term strategy to improve the quality of Iron County lakes and streams. Within this goal, there are multiple objectives and activities related to assessing shoreland health, correcting erosion and habitat degradation both in the littoral and riparian areas along lakes and rivers. Currently, Iron County shorelines are in good condition, however the real estate market is picking up and with new shoreland owners buying property, the county is seeing an increase in shoreland violations. The Iron County Zoning Department has finished the Shoreland Zoning Ordinance and it is anticipated with its adoption there will be a large increase in shoreland mitigation. By conducting shoreland and shallow habitat monitoring on lakes within the county, the Land and Water Conservation Department (LWCD) will be able to have better record of the condition of the littoral and riparian habitat on the lakes. This will benefit both the Zoning Department, the LWCD as well as shoreland property owners. The LWCD will be able to use this information to better assist property owners to address habitat and erosion concerns. Over the last couple of years, the LWCD started working with the WDNR Fisheries staff to do some assessment on walleye spawning areas. This included visiting spawning areas and noting areas of degraded shoreland in need of erosion control measures. In the future, the WDNR Fisheries staff would like to work to address these areas through restoration efforts on public and private lands protecting spawning areas from being silted over. Many lake groups each year want to do fish habitat projects and with this partnership and the data collected along shoreland and shallow water habitats, we will now have quantified data to help guide us to habitat improvement recommendations, while protecting water quality and spawning habitats. Data collected throughout this project will also provide important and useful information to local and regional resource managers, community stakeholders, and others who are interested in protecting and enhancing Wisconsin's lakes. We anticipate that the data generated from this protocol will be used for:

- Teaching and outreach
- Identifying areas for protection or restoration
- Targeting future Critical Habitat Designations within lakes
- Creating lake management plans
- Creating county comprehensive plans
- Aiding management at the county level
- Planning Aquatic Plant Management
- Evaluating trends in lakeshore habitat over time (repeat survey every ~5 years)
- Understanding trends in lake ecology (e.g., fish, wildlife, invasive species)

## **Methodology:**

During the field seasons of 2017 and 2018, field data collectors used the Lake Shoreland & Shallows Habitat Monitoring Field Protocol, developed by the WDNR, to collect data on 7 of the 10 lakes planned for the project. During the spring months LWCD staff worked with the Iron County GIS department to prepare each of the lake maps with parcel information. This process proved more difficult than expected, mainly due to projections for mapping and the building of centroids into a GPS device. After some deliberation, the tasks were completed and staff could continue with the shoreland and shallows habitat monitoring surveys. To reduce data entry time and improve field data collecting methods, LWCD staff explored the use of a data collecting application to help assist in both field data collection and data entry. An app called Kobo Collect was used and a Samsung galaxy S-pen tablet was purchased for collecting data in the field. In the Kobo collect app, a data sheet was created matching the DNR Lake Shoreland & Habitat monitoring data sheets. This app not only collects data in the field via tablet but it also allows the user to collect GPS locations and attach 3 photos to the assessment data collected. Cell phone reception is not required, however, when the device is near WIFI the data is uploaded to a web based program. The user, through the web based program, can download the data to an excel spreadsheet which can be backed up and stored on a desktop computer or shared with other partners via the web based platform. While the exploration and set up of the app based tool was a bit time consuming during the 2017 field season, LWCD staff made up the time during 2018 and in what would have been used entering the paper based data into an excel spreadsheet. Now that the data collection process has been set up and proven to be effective, there will be much less prep time in future surveys of this nature.

Collecting data on shoreland and shallow habitat resulted in two data collecting sessions or loops around the lake with two people being present in a small sized boat. The first loop looked at coarse woody habitat (CWH) mapping large woody habitat. This protocol only enumerates “large wood,” defined as greater than 4 inches in diameter somewhere along its length and at least 5 feet long. A series of categories were assigned to the “Large Wood” which was then entered in the Kobo collect data application. Each CWH was marked with a GPS waypoint within the Kobo collect data unit. Accuracy reading of 3 meters were excepted. Woody habitat surveys were done in late May – early June. In addition to collecting CWH data, a second category was added to record the lakes substrate. Substrate categories were assigned as sand, rock, cobble, or silt. At all “large wood” locations a substrate reading was recorded and in areas, that were lacking in “large wood” a reading of just the substrate was recorded. This was done approximately every 100 meters. This additional data was requested by the DNR Fisheries Biologist to contribute to their work.

A second loop around the lake was then conducted, collecting data on both riparian and littoral zones outlined in the Shoreland & Shallows Habitat Monitoring Protocol. The Kobo collect data app was used to enter data on all parcels on the lake along with the three photos georeferenced to the data and parcel.

Examples of information that was gathered lake-wide include:

- percent impervious surface
- riparian buffer inventory
- erosion concerns
- length of modified shoreland (rip rap/seawall)
- human structures within the buffer (piers, buildings, etc.)
- presence of aquatic plants (floating, submerged, or emerged)
- aquatic plant abundance or rake fullness
- density of coarse woody habitat.

Separately, from the shoreland habitat survey being conducted by LWCD staff, the WDNR fisheries staff will be conducting fish surveys on the lakes included in this project. The data collected by fisheries will be analyzed with the data collected by the LWCD staff to attempt to see any correlation between habitat loss and fish populations on the lakes. To gather important fisheries data for the study additional survey data was collected for fisheries biologist. Some of these parameters include substrate and aquatic plant density. The substrate data was an important measurement for this study to understand current substrate make up across the lake. Many folks, lake residents, and natural resource professionals, have commented on increased density of aquatic vegetation on many Iron County lakes, however, in most lakes there is no data to back those claims up. The decision to include a basic rake throw and document basic rake fullness was included as a parameter in the survey methods. This was decided at the end of the 2017 and included in 2018 surveyed lakes.

### **Goal/Job Objective 1:**

*Obtain baseline data for Iron County Zoning, LWCD, and WDNR on current littoral and riparian habitat within Iron County to assist in future management decisions and evaluate habitat across the lake region of the county.*

**Activity 1a:** *Conduct whole lake surveys to document riparian and littoral habitat in order for the county to have a better understanding of the whole lake health. This information will be beneficial to all the partners involved in the project to protect and to promote habitat. WDNR Shoreland and Shallow's Habitat Monitoring Field Protocol will be followed to obtain the information needed.*

**Field Season 2017-18:** LWCD staff conducted 8 whole lake surveys on Echo, Pine, Randall, Cedar, Catherine, Spider, Trude, and Wilson Lakes. In total, 1,095 coarse woody habitat points were documented in 2017 and 3,407 in 2018. The total number of parcels evaluated in 2017 was 287 and 296 parcels in 2018. All data was collected based on the WDNR Shoreland and Shallow's Habitat Monitoring protocols. The information was then uploaded to the Kobo collect online account where data can be viewed through various web based mapping software or shared

with partners. The information collected will be beneficial to all the partners involved in the project.

A master lake list has been created for 2017 and 2018 lake surveys, the lakes include Spider, Wilson, Catherine, Trude, Echo, Pine, Randall, and Cedar. In total, 8 out of the projected 10 lakes were surveyed. In the original grant application, there was a goal of 10 lakes to be surveyed over the two-year grant, however, larger, more developed lakes were chosen and 4 lakes per season was what the LWCD staff could accomplish.

### **Deliverable / Outcomes:**

**Field Season 2017:** The lakes chosen for this project were chosen by the WDNR Fisheries Biologist who was focusing on lakes where walleye populations were declining, further refinement by the County Conservationist based on lakes that restoration projects would be well received and successful. This study was set up to include lakes with development and lakes with minimal development to be used as control lakes for the fisheries component. Fish densities will be analyzed across the studied lakes looking at each habitat metric. In total three of the lakes surveyed were ORW waterbodies, these include Catherine, Cedar and Trude Lakes. As a precursor to this project the WDNR Fisheries biologist and LWCD staff conducted a snapshot survey of the Turtle Flambeau Flowage, also an ORW waterbody in 2016. The surveys were done along shoreline with historically significant spawning areas. In 2017, the partners returned to install some live fascines and live stakes along the toe of the banks just above the OHWM as an attempt to stabilize the bank to protect the critical walleye spawning habitats from becoming silted in from the erosion. These sites were revisited in 2018 and found to have done fairly well considering there was no watering of the fascines and live stakes. Staff from WDNR and LWCD did a fair amount of habitat work to further stabilize the bank in the area the fascines and live stakes were installed. In 2019 the LWCD was awarded an additional grant to conduct more habitat restoration in this area as a study site to compare different restoration practices to better understand what is the most effective restoration technique on some of these difficult sites.

### **Goal/Job Objective 2:**

*The data collected and compiled will be used by partners to protect water quality and habitat.*

**Activity 2a:** *The partners will educate and encourage property owners to install best management practices on their properties for habitat and water quality.*

**Field Season 2017:** On August 16, 2017, LWCD staff along with WDNR fish biologists hosted a shoreland habitat workshop for the Fe University (a program started by the Iron County Aging and UWEX-Friendly Communities Coalition to give older adults the opportunity to keep their minds active and stay connected to the community and the environment). 18 participants attended the workshop. The focus was around Echo Lake, one of the study lakes. The class started in a classroom setting with the DNR Fisheries Biologist giving a brief presentation on fish reproduction needs and habitat requirements. The Shoreland and Shallows Habitat Monitoring Field Protocol was shared with the group and an overview of this project was

provided. From there participants toured Echo lake via boat stopping at various locations throughout the lake where healthy riparian and littoral habitat was shown. As this tour was done in mid field season the LWCD had not compiled all the data, but the attendees were given a brief synopsis of what was collected. The tour concluded with a stop at a riparian owner's property who had installed a rain garden and completed a shoreland habitat restoration through the LWCD's cost share program in 2015, participants were able to see how effective the practices were. The workshop highlighted the connection of good shoreland stewardship and healthy fisheries.

**Field Season 2018:** In 2018, a two-day workshop through Fe University educated 25 attendees on Lake Ecology, there were four speakers who presented on various topics. Susan Knight, Center for Limnology, educated attendees on waters of Wisconsin, giving students a Limnology 101 course. Carol Warden, Center for Limnology, spoke to the group on life in the water, from wildlife to macro invertebrates to aquatic plants and the delicate balance in our lakes. Pat Goggin, UWEX Lakes spoke on the importance of the riparian area and what a healthy riparian area looks like. Heather Palmquist, Iron Co LWCD, discussed where we go from here, practices attendees can implement on their properties to ensure water quality. She also went through different funding sources for landowners to access for projects including the cost-share programs county LWCD's have and the Healthy Lakes Program through the WDNR. Participants from this program gave this workshop rave reviews.

### **Activity 2b:**

*Develop a database to house collected data to have a reference tool to use in the future by all partners.*

**Field Season 2017-18:** Through the Kobo collect program, the data collected in 2017 and 2018 has already been uploaded and stored in a personalized web-based program. The collected data is housed in the program which provides several features; quick photo gallery of parcels, mapping software that shows not only the Aerial photo, but each waypoint, and the data collected within the waypoint, basic graphs and charts, and data analysis ie: mean number of boats on shore, etc. As a back up to the web based program all data has also been downloaded and stored in excel files which also has each photo georeferenced to the parcel and data collected. This will be useful for the Zoning Department to have pictures and extensive information on riparian condition (as of 2017-18) to reference when violations are reported within the shoreland area. The Zoning Department is a critical partner in providing staff time in the field, database management and enforcing the shoreland violations. The LWCD will be able to use the same information to develop whole lake presentations that give landowners detailed information on riparian and littoral habitat and areas that the groups can target to improve lake health.

**Goal/Job Objective 3:**

*The final goal of this project will be to work with partners and with property owners to implement restorations or mitigations in order to project water quality and habitat.*

**Activity 3a:**

*The Iron County LWCD will include a social attitude assessment component to this project.*

**Deliverable/Outcomes**

After conversations with DNR on these social attitude assessments it was decided not to conduct this survey. The assessment was delayed making it difficult to implement. In addition, the added programming on shoreland health and fisheries has accomplished awareness throughout the county, making the social attitude assessment unnecessary.

**Activity 3b:**

*Provide technical assistance and cost sharing to voluntary landowners who wish to implement best management practices on their properties to protect water quality and improve habitat.*

**Method and Data Collected**

Once the survey work has been done and compiled the LWCD will work with the WDNR Fisheries staff to prioritize habitat work to first address fish habitat and spawning areas. The LWCD and DNR Fisheries Biologist will work with lake groups to educate and make the landowners aware of important parcels that need to be addressed. From there the LWCD will work with the landowners to design and implement projects to improve habitat, address storm water and control erosion resulting in water quality protection. The LWCD will offer the technical design expertise for implementing projects according to NRCS specifications and will offer cost share assistance to offset the financial burden to landowners and making project installation more achievable. If there is more financial need than Iron County's cost share program can provide the LWCD staff will assist lake groups in other options specifically the Healthy Lakes program as many of the practices may be applicable to the DNR program.

**Deliverable/Outcomes**

This project will provide a targeted approach to habitat restoration and water quality protection. Currently, the LWCD receives inquiries to the cost share program through past grant recipients, education programs, etc. This has been fairly successful, however to have the ability to focus efforts on a lake by lake basis would prove highly successful. If the LWCD could work with WDNR and landowners to have multiple restorations on one lake it would be more likely that multiple landowners would participate if they see a number of others and the lake would receive a greater positive effect. The opportunity to work directly with the WDNR Fisheries staff to ensure the restoration work is beneficial to fish as well as wildlife and water quality will make this project a great success. Furthermore, the partnership will try to bring multiple landowners together to do BMP projects on their properties that will collaboratively have a greater positive impact on water quality & habitat.

**Field Season 2017-18:** As the data that was collected and compiled in 2017 and 2018 a plan for targeted education will be put in place. The data collected by the LWCD has been compiled and is attached in the appendix. The data is illustrated in graphs with a brief explanation as well as a sample of the maps that have been developed for each lake based upon the data. Once the lake data is compared to fisheries data collected by the WDNR, the partners can provide recommendations to the lake associations for potential projects or areas to improve upon. The goal is to meet with associations in the summer of 2019 and any landowners interested in participating in a habitat project would apply for a project in the fall of 2019, with project implementation in 2020.

In the summer of 2018 staff presented to the Spider Lake association discussing the preliminary habitat assessment results, landowners were very interested in this project. The visit resulted in one landowner who contacted the LWCD about a stormwater and habitat restoration which LWCD designed for the homeowner. In addition, Trude Lake residents were also informed of this project and the assistance in shoreland habitat and stabilization assistance and had four landowners seek assistance through the LWCD cost-share program. These four projects were unable to be funded in 2019 as the county cost-share program was oversubscribed. The LWCD intends to apply for a Lake Protection Grant to assist these landowners with their shoreland restorations and stabilization projects.

#### **D. Role of Project in Planning/Management of Water Body**

As stated before, lakes, rivers and wetlands are an important economic factor in Iron County. It is critical that the county takes an active role in shoreland protection to preserve the pristine waters of Iron County. The data collected and created database will be a useful tool in permitting and in enforcement for the Zoning Department. The LWCD will benefit greatly with collected data in having good data on lake health and planning for restoration work. Staff will be able to target a larger number of projects in a more collective approach to increase the impact on water bodies. The WDNR Fisheries Staff will be able to obtain important woody habitat information as well as shoreland health information along critical spawning areas. Together the LWCD and WDNR Fisheries staff will be able to look at a water body and prioritize restoration work in a way that will be most beneficial to the water body and its fishery. The LWCD staff will also encourage the lake residents to start collecting water clarity data using a secchi disk, monitoring water quality long term. This will help promote the Citizen Lake Monitoring program and will engage residents in water quality long term.

**Field Season 2017-18:** Through data collection there were some shoreland violations that were documented and reported to the Iron County Zoning Department and Wisconsin DNR Water Regulations. Both the Zoning Administrator and area WDNR Water Management Specialist will be responsible for following up on violations. There were also some areas that were documented as having substantial erosion, these were noted and were followed up with a letter from the Iron County Conservationist who offered technical assistance to address the erosion issues. Further work will be done to analyze data and plan a collaborative message to take to lake associations,

prioritizing habitat work to be done. In 2017 and 2018 the Conservation Specialist worked with DNR staff to expand water quality monitoring on lakes included in this project. Through that effort Pike, Echo, and Pine were added to the volunteer water quality testing list. Pike Lake is a part of this study and will be surveyed in 2018-2020. In addition, purple loosestrife was identified on Spider Lake which was reported to the lake association in late summer 2018. A rapid response team was assembled, and the first phase of plant removal was implemented. Thanks to the lake surveys conducted through this grant, the lake association now has a multi-year plan to monitor and remove plants.

### **E. Existing and Proposed Partnership**

For years the LWCD has had a strong partnership with lake groups across the county. They have served as an important resource for education, resources and technical expertise. It is anticipated that this project will further strengthen that relationship and make even more residents aware of the department's cost share program and technical expertise. By partnering with the WDNR Fisheries staff this program will not only get the attention of those with more of a land ethic to consider conservation practices, but will garner the attention of those who focus on fisheries. The partnership will create a stronger conservation based approach by having multiple disciplines work together to bring new ideas and a more ecological approach. This partnership will also bring together science, education and enforcement by incorporating the three natural resource agencies to improve the water quality of the lakes and streams in Iron County. County staff will assist with this grant and provide as much of a contribution as the grant award from Zoning providing GIS assistance to build the database, to LWCD staff providing outreach, technical design, survey assistance to WDNR providing project design ideas with fish in mind. This collaboration of expertise will provide a solid grant project that help the County address goals and objectives in their Land & Water Resource Management Plan that they have not had the resources available to fulfill.

**Field Season 2017-18:** The partnership between the LWCD and WDNR Fisheries staff has always been solid. However, through the snapshot version of the shoreland and shallows habitat survey done on the Turtle Flambeau Flowage with both fisheries and LWCD staff and with some practices being installed as a follow up, this partnership has grown stronger. This project has created an even closer working relationship as both agencies meet to share information and collaborate on recommendations for habitat work.

Similarly, the cooperation between Iron County Zoning and LWCD has always been positive, but through this project the two departments have collected and shared data together. Zoning has been a critical asset to the LWCD with their staff's expertise on GIS mapping. The Zoning department has benefited by the ability to get out on the water and see shoreland violations from the lake first hand. Their department generally doesn't get the chance to do this as they don't have a boat. During the 2017-18 field season, they not only assisted in data collection and found shoreland violations they also solicited assistance from the LWCD to go out on other lakes at the beginning or end of a field day to follow up on shoreland violations that were reported by lake residents. These are examples of how through this grant project good relationships have become even stronger and have allowed for partners to work collaboratively in new or different ways.

## **F. Plan for Sharing Results**

The data collected in this project will be shared with each contributing agency, there will be a database created with parcels, pictures and information on each lake that all partners will have access to. To preserve the positive social attitude of the water front property owners the education component will not include the parcel information. Rather, the LWCD and Fisheries staff will use a positive approach to gain participation. LWCD staff anticipate by conducting the lake study and working with fisheries to concentrate on areas of special interest of fisheries on each water body the two agencies can work with landowners to focus their fish habitat interest away from building fish cribs, to more beneficial practices including controlling shoreline erosion through natural buffers, installing rain gardens or water diversions to control storm water, or where appropriate installing fish sticks. As this project progresses the LWCD will plan on scheduling a Conservation on Tap program on the project focusing on one lake that had a good participation and will include landowners in the presentation to educate the public on how the program worked well on their lake. The Conservation on Tap program was started 4 years ago by the LWCD to educate the public on different conservation topics during the summer months, it is a lecture series that is held monthly June-September at an outdoor venue. The program has been wildly popular with occasionally over 100 participants attending the lecture. This would be a great outreach opportunity to share the results and garner more interest in the Shoreland Program. The LWCD will also provide updates on the project on their Facebook page which has been another great tool to reach a new population. At the end of each year there will be a written report that will be submitted to WDNR along with the grant reimbursement request which will detail the year's progress on the project.

**Field Season 2017-18:** Data was collected and will be analyzed to prepare presentations to lake groups. WDNR Fisheries staff is still in the process of surveying some of the study lakes and others still have to be analyzed. Once that is done, a complete list of recommendations can be made for each lake. Until then, the LWCD will work on education and outreach as well as making recommendations to landowners who have erosion that was found on their lake front. Facebook has been used and will continue to be used to get information out to landowners about healthy lakes and resources to promote water quality.

## **G. Other**

There are many plans that have goals and objectives that this grant project will accomplish. The Iron County Comprehensive Plan 2025 has a natural resource section with the goal of: "Protect, conserve, and encourage the efficient and responsible management of the unique forest, water, land and other natural resources of Iron County." Under that goal there are numerous objectives including one that states, "Promote and encourage shoreland and management efforts throughout the county." Actions to accomplish this include, "offer shoreland restoration incentives to property owners who properly manage and/or restore native shoreland buffers" and "provide leadership and technical support to property owners to improve shorelands". There are goals and objectives in the Iron County Land & Water Resource Management Plan that this project will accomplish as well. This grant award imperative to accomplishing these plans.

**Results: See Appendix's**