EAST FORK CREEK WATERSHED RESOURCE INVENTORY AND PLAN EXECUTIVE SUMMARY

Written by Rebecca Olson

The East Fork Creek Watershed Resource Inventory and Plan Executive Summary was created to summarize the findings and recommendations of the East Fork Watershed Resource Inventory and Watershed-Based Plan which can be used to inform the community, watershed stakeholders, and local decision makers about the East Fork Creek Watershed Plan. The East Fork Creek Watershed Resource Inventory is detailed in Section 1. Section 2 consists of the East Fork Creek Watershed Plan. The East Fork Creek Watershed Plan provides direction and recommendations to improve the quality of these waters. These efforts were initiated by the Lake Carroll Association and supported by the Illinois Environmental Protection Agency, funded in part through Section 319 of the Clean Water Act.

What is a Watershed?

When a raindrop falls to the ground, it takes the path of least resistance to the nearest stream or lake. It may travel over the land, infiltrate through the soil into the groundwater, or get routed through a drainageway or storm sewer to get there. The entire area that leads to the waterway is a basin called a watershed.

The watershed addressed by this inventory and plan is the East Fork Creek Watershed. Any rain that falls within the East Fork Creek Watershed runs into the East Fork of the Plum River, through Lake Carroll, and then eventually into the Plum River and Mississippi River before it dumps into the Gulf of Mexico.

The black dotted line represents the watershed divide in this illustration. All precipitation that falls within the watershed divide eventually runs to the same stream.

Why are residents concerned about the East Fork Creek Watershed?

Typical of the Midwest, rainfall that hits the East Fork Creek Watershed and runs into East Fork Creek and Lake Carroll picks up pollutants and debris from various land uses, carrying excess nutrients,

sediment, and other pollutants from agricultural production, lawn care, and hard surfaces such as roads and rooftops to the streams and lake. Excess nutrients can cause algae blooms and fish kills, sediment can decrease water clarity and reduce lake depths, and pathogens such as E. coli can cause health risks to swimmers and pets. These factors often lead to restricting contact with the water, decreased scenic enjoyment, and diminished quality of wildlife habitat, among other issues.

In order to determine the issues facing the East Fork Creek Watershed and identify opportunities to improve it, the community worked together with consultants and technical advisers. Stakeholders expressed concerns, technical advisers provided local knowledge, and consultants inventoried the resources of the watershed. Stakeholders were brought together on several occasions to identify and prioritize the community's interests, with excess nutrients and sediment in the water as main concerns. During these discussions, they recognized issues directly and indirectly affecting water quality.

- Issues directly affecting water quality included: algae blooms, blue-green algae, excessive milfoil and other non-native aquatic plants, favorable habitat for nuisance geese, excessive pollutants, litter in the lake and along trails, and the storms that seemingly were more frequent and intense, bringing an increased amount of rain and runoff.
- Other concerns indirectly affecting water quality included apathy of community members, lack of funds, and circulation of misinformation.

A watershed resource inventory provided the framework to understand these concerns and their potential causes and sources, identifying the natural resources and opportunities to improve the quality of the streams, ponds, and lake within the East Fork Creek Watershed.

What are the natural resources of the East Fork Creek Watershed?

Steep hills and ravines of the 14,426-acre East Fork Creek Watershed provided a beautiful setting for a 5,000-acre residential community and golf course surrounding the 640-acre Lake Carroll. It was surrounded by cropland with a few pastures and livestock operations at the headwaters. Most of the streams within the watershed were intermittent, carrying only stormwater after rain events and snow melt. At lower elevations close to Lake Carroll, streams became perennial, carrying water year-round and supporting fish and other wildlife.

-Watershed landscape, photo by Joe Rush

To understand the issues of this charming area related to water quality, we looked at landscape features that most directly influenced water runoff: topography, soils, water flow connectivity, geology, floodplains, wetlands, and natural areas. Due to the stark topography of the area, there were few floodplains and wetlands that normally provide natural water detention and filtration services. Even hydric soils, the leftover relicts of areas that were once wetlands, were scarce, suggesting that wetlands were naturally never a significant part of the landscape. Small areas with a 1% chance of flooding, also known as 100-year floodzones, surrounded Lake Carroll and some of its inlets. There were no floodzones with a 0.2% chance of flooding, also known as 500-year floodzones. One large wetland sat at the base of Lake Carroll below the dam surrounded by floodplain, otherwise only a scattering of small wetlands dotted the river corridors upstream of the lake, mostly near lake inlets. Soils of the watershed were mainly silt loams developed shallowly over bedrock. Soils were ranked as roughly 20% prime farmland mostly located at the highest elevations and on ridgetops between ravines, 34% not prime farmland on slopes greater than 5%, and 46% farmland of statewide importance located in between. Streams and ravines in the watershed were about 90% intermittent (65.88 miles), only carrying water during wetter times of the year like spring and after storm events and 10% perennial (6.88 miles), carrying water year-round. There were 19.76 miles of shoreline surrounding the lake, ponds, and basins in the watershed.

How have people shaped the landscape?

To identify opportunities for water quality improvement, we studied past, present, and future predicted land uses; erodibility of soils, streambanks, and shorelines; channelization of streams; conditions within 50 feet of streams, ponds, and the lake; water quality information for Lake Carroll and the larger region surrounding the watershed; and estimated amounts of pollutants coming from the various current land uses of the watershed.

Historically, forest covered two-thirds of the watershed and prairie made up the other one-third. The stream ran where Lake Carroll now sits. Now forest and other natural lands cover about 15% of the watershed, while agricultural production covers 57% and the residential community of Lake Carroll with its golf course and turf open spaces makes up the other 28%. All of the row crop production is currently on a rotation of no-till and conservation tillage practices. About 3% of the watershed is covered with an impervious surface like rooftops, roads, driveways, and parking lots. None of the current land uses are expected to change, as population of the area is predicted to decrease according to the Carroll County Comprehensive Plan. Scheduled road projects were repairs and improvements only, and a future trail system shown by the Greenways and Trails Plan seemed incorporated into existing roads. Although the aforementioned plan acknowledged the need for expansion of rail and water transportation, anticipated changes didn't seem to have a direct effect on the watershed. Within the Lake Carroll community, there were 971 homes and 2,550 lots surrounding the man-made lake. Therefore, there was a possibility of home construction with a slow predicted pace based on past construction rates.

What is the condition of the watershed's streams, ponds, and lake?

Water samples within Lake Carroll over multiple years provided us with snapshots of the pollutants within the water, including a few instances when phosphorus and nitrogen were four and ten times in excess of suggested limits, respectively (ILM, 2016). Sediment depth surveys suggested inlets within the lake most in need of sediment removal (LCA, 2018). Downstream of this watershed there were areas of the Plum River that did not properly support aquatic life and had problems with aesthetic quality caused by alterations of stream and lakeside vegetation, sedimentation, suspended solids, and fecal coliform occurring due to channelization and irrigated crop production (Illinois EPA, 2018). Some of the activities causing the problems occurred within our watershed.

From surrounding lands, streams receive sediment, excess nutrients, and pathogens via stormwater runoff. Although this occurs naturally, the rate at which it occurs increases exponentially by intensive human land uses like agricultural production and residential development. We used computer models to predict the rate at which pollutant loading occurs within the East Fork Creek Watershed. We estimated 602 tons of sediment, 4,273 pounds of phosphorus, and 44,275 pounds of nitrogen enter East Fork Creek and Lake Carroll every year from the watershed's agricultural and residential land uses. Generally speaking, agricultural production contributed the most nitrogen per acre while residential land uses contributed the most phosphorus, suspended solids, and pathogens per acre. Because agricultural production is practiced on 2/3rds of the watershed, it is also a major contributor of phosphorus, suspended solids, and pathogens even though the amount per acre is slightly less compared to residential land uses.

-Lake Carroll, photo by Joe Rush

Natural vegetation cover between land uses and waterbodies can filter pollutants from stowmwater before it enters the water. Along the streambanks, ravines, and shorelines, we inventoried a 50-foot width for protective vegetative cover. We found that 37% of the stream and ravine buffer areas had good vegetative cover providing filtration of water runoff prior to it entering the stream. Another 40% had fair vegetative cover, and 23% were in poor condition.

Erosion concern within the watershed came from soil types and bank erosion and channelization of streams and ravines. The well-drained soils of the watershed tended to have moderate runoff potential and were highly to moderately susceptible to detachment with water. They were not particularly susceptible to wind erosion. Alarmingly, about half (51%) of the banks of streams and ravines were severely eroded. The remaining half of banks were split almost evenly between moderately eroded (23%) and slightly eroded (26%). There was no significant difference between streams and ravines. About one-fifth of streams and ravines were highly channelized (22%), while moderate channelization characterized almost half of the streams and ravines (44%) and little to no channelization was found on another third (34%). These conditions were likely exacerbated by the steep topography of the area, combined with invasion of non-native buckthorn shading out forest floors of their stabilizing vegetation. There was little erosion along the shorelines of small ponds and basins throughout the watershed, and the shorelines of Lake Carroll were completely protected by rip rap in various stages of repair, all with only slight erosion.

-Streambanks with varied levels of erosion, photo by Joe Rush

We compiled the information about community concerns, natural resources, and opportunities within the watershed to identify the most probable causes and sources of water quality impairments. Next we developed a course of action to address them in a watershed-based plan.

What is in the East Fork Creek watershed plan?

Watershed plans are valuable because they create a plan of action for the community to make improvements to their watershed. After inventorying the area for natural resources, concerns, and opportunities, stakeholders determined what needed to be accomplished to improve their waters. These desires were encompassed in a community driven, watershed plan as an important first step in improving water quality in East Fork Creek and Lake Carroll. These actions will have positive impacts on the local economy, property values, and recreational opportunities, and they preserve the local heritage for future generations. In addition, they provide benefits downstream for the greater good of the people and wildlife of the Mississippi River and Gulf of Mexico.

During a two-year planning process, stakeholders, consultants, and technical advisers came together to plan vision and direction toward better stewardship of the area's land and water. The resulting watershed plan used the group's feedback combined with the results of the watershed resource inventory to address concerns, put in place goals and objectives with measurable milestones, decide which best management practices would be most applicable to the watershed and acceptable to stakeholders, determine how the chosen projects and practices would positively affect the area's streams and lakes, decide how and when to implement the practices and educate stakeholders, weigh costs and benefits of chosen activities, and put in place monitoring efforts. It also provided guidance toward appropriate local financial and technical resources.

What do we want to see in our community?

The primary motive of stakeholders, as reflected by the East Fork Creek Watershed Plan, was to confront the causes of nonpoint pollution impairing the East Fork Creek and Lake Carroll, namely sediment and excessive nutrients. Goals and specific recommendations were created to make the community's vision a reality. The vision was to:

> "Maintain and improve the agricultural, residential, and recreational community through mutual cooperation by sustaining and improving all uses of the land and water within the watershed so that all obtain the maximum benefit."

~Vision of the East Fork Creek Planning Participants.

Five overarching goals to achieve this vision were:

1. Reduce sediment loading from all sources in the watershed.
2. Reduce nutrient loading from all sources in the watershed.
3. Utilize practices that protect and/or enhance wildlife habitat.
4. Address volume and velocity of water runoff.
5. Educate the watershed community about land and water conservation and this plan.

The community agreed upon meaningful targets in order to reduce the amount of orthophosphate and inorganic nitrogen causing nuisance algae blooms and relieve sedimentation of the streams and lake as follows:

We propose to decrease total phosphorus by 25%,
which will also result in reduction of orthophosphate.

We anticipate reasonable efforts to relieve 25% of the sediment loading
into Lake Carroll and East Fork Creek.

We expect to see a reduction of 15% total nitrogen
complimentary to phosphorus load reductions,
which will also result in reduction of inorganic nitrogen.

In order to meet these goals and targets, stakeholders chose projects and practices appropriate for their area that they were willing and excited to implement.

What conservation practices are already in place?

The community takes pride in their current conservation efforts. Lake homeowners and agricultural producers alike work toward sustainability of their land and water. Of the long list of activities, some highlights include:

Homeowner Efforts

- Lake Carroll's shoreline is entirely stabilized.
- Two sediment basins filter water entering the lake from two main tributaries.
- A dredging program is removing 94,000 cubic yards of sediment from Lake Carroll.
- The Prairie Club of Lake Carroll found a remnant prairie which they steward and monitor.
- Lake Carroll's goose population is being controlled.
- Vendors, including landscapers, must be registered prior to performing work within the Lake Carroll neighborhood.
- Private, improved lots greater than 1 total acre in size may install native plantings. These native planting areas may not exceed 1,000 square feet.
- Septic systems within the Lake Carroll community are monitored and maintained regularly.
- Water quality is monitored at Lake Carroll.

Agricultural Producer Efforts

- All agricultural fields are farmed using no-till and conservation tillage practices on the contour to reduce runoff.
- Producers are utilizing rotational grazing practices and other grazing plans.
- About 20% of the agricultural fields use cover crops.
- Most fields have functioning grassed waterways.
- Agricultural producers practice nutrient management, such as monitoring the timing and amount of fertilizer applied each year.
- Some farms have ponds and basins to slow and detain water during storms.
- Some farms have exemplary manure and leachate management systems.

What more can landowners and homeowners do?

Consultants and technical advisers recommended projects and practices that were adopted and prioritized by stakeholders. Projects to be implemented throughout the watershed receiving the highest priority were:

- Stabilize forested, highly erodible lands by removing invasive buckthorn and allowing the natural ground cover to regenerate (160 acres).
- Stabilize 25% of the watershed's severely eroded streambanks (69,400 feet).
- Stabilize 25% of ravine banks by removing invasive buckthorn to encourage self-healing of banks on highly erodible land (22,421 feet).
- Line stream corridors with 50-foot wide filter strips of native vegetation along 1/3 of the portion of streambanks where they are missing (185 acres).

- Plant filter strips of native vegetation along lake and pond shorelines currently in mowed turf (23 acres).
- Plant 35 swales with native vegetation along water courses that run through greenways (2.4 acres).
- Create rain gardens at 100 of the ¼-acre lots upstream of the ravines (15,000 square ft.).
- Widen existing grassed waterways to handle the larger, flashier, more frequent storms that have been occurring recently (53 acres).
- Fully repair grassed waterways that are currently bare (22 acres).
- Construct detention features, such as ponds, basins, dry detention, and scrapes to ease flashy hydrology to cover 1% of the drainage area (144 acres).

In addition to these watershed-wide recommendations, specific projects were located throughout the Lake Carroll community:

- Encourage self-healing of severely eroded banks along 16 ravines surrounding Lake Carroll by removing invasive buckthorn and other non-native vegetation to allow natural ground cover to regenerate (24,700 feet).
- Stabilize severely eroded banks along two sections of stream (15,000 feet).
- Preserve and plant long-rooted, native vegetation in 17 locations including vegetated swales, filter strips, preservation of a remnant prairie, restoration of wetlands, and other critical plantings (35 acres).
- Place floating island wetlands within 10 areas: coves of the lake with high levels of siltation and ponds (2,250 cubic feet of floating island material).
- Construct an interpretive trail through restored natural filtration areas (3 acres).

For each project and practice, stakeholders will consider the potential to incorporate habitat for wildlife.

How do we accomplish the recommended projects and practices?

To construct the recommended projects and practices throughout the watershed will take time, money, and expertise. The possibilities are greater than what can reasonably be expected by the community. Therefore, stakeholders decided what priority projects they would like to accomplish within a ten-year time frame, resulting in the amounts stated above for each project. There is help out there! The main sources of technical and financial support to implement this watershed plan are:

- Blackhawk Hills Regional Council will assist landowners with grant applications and administration.
- Illinois Environmental Protection Agency's Section 319 Program will accept grant applications for implementation projects.
- The Natural Resources Conservation Service in partnership with Trout Unlimited has funds set aside in the RCPP program for implementing streambank stabilization projects within the Driftless Area, including this watershed. These funds will be available for the next four years.
- The Natural Resources Conservation Service also has a selection of conservation programs available to agricultural producers.
- Americorps volunteers have worked in the watershed before removing invasive plants.

Several private foundations and public entities also exist with missions aligned with this watershed plan and a focus within the watershed's geographic location.

How do we educate our community?

Educating the community starts with the Lake Carroll Association Board of Directors, staff, community members, and surrounding agricultural producers. The watershed planning members wish to:

- Amend Lake Carroll Association covenants and plats to allow for conservation projects.
- Provide tours and demonstrations of successful, existing projects.
- Provide programs and free consultation to homeowners and landowners.
- Publish articles and "how to" guides in the Lake Carroll Association newsletter and local newspaper regarding conservation projects and this plan.

How do we know if we are successful?

Ongoing monitoring of Lake Carroll's water quality and shorelines will be a good way to measure if added conservation practices are helping, including annual water sample analysis, annual shoreline inspections, and sediment depth measurements every 10 years. It may take a while to see dramatic differences. In the meantime, a dedicated group of stakeholders will annually distribute and collect monitoring worksheets to document conservation activities in the watershed, record watershed improvements, update the plan accordingly, and inform the community of updates and new funding opportunities.

What should we do next?

Now that we have a watershed plan, we strive to implement it over the next ten years. Help us to keep the plan alive. Become involved. For more information, contact the Lake Carroll Association, Lake Carroll Prairie Club, Illinois Environmental Protection Agency's Bureau of Water, JadEco Natural Resources, Olson Ecological Solutions, or a friend or neighbor who was instrumental in the planning process.

Literature Cited

Illinois Environmental Protection Agency (Illinois EPA). 2018. *Illinois Integrated Water Quality and Section 303(d) List, 2018 – Clean Water Act Section 303(d), 305(b) and 304 - Water Resource Assessment Information and List of Impaired Waters – Draft (11/14/2018).* Retrieved from https://www2.illinois.gov/epa/topics/water-quality/watershed-management/tmdls/Pages/303d-list.aspx

Integrated Lakes Management. 2016. *Lake Carroll Water Quality Testing, June 21, 2016.* Unpublished.

Lake Carroll Association. 2018. Lake Improvement Project – December 2018 Update. Retrieved from http://www.golakecarroll.com/LCA/NewsDoc/NewsDoc40334.pdf