

Appendix K of Lake Monroe Watershed Management Plan

Definitions of Selected Best Management Practices

Boating Restrictions

Lake Monroe has designated several areas of the lake to be no wake zones including any area 200 feet or less away from the shoreline, embayments which are less than 1,500 feet wide at the mouth, and the entire section of lake east of State Road 446. These restrictions help minimize wave action on the Lake Monroe shoreline. Education and enforcement are key strategies to ensuring that the restrictions are followed by boaters.

Cover Crops

Crops which can include grasses, legumes, and forbs are planted after harvest of the main crop for seasonal cover through the winter. Their purpose is to reduce erosion from wind and water while improving soil health. Cover crops increase soil organic matter content, suppress weeds, manage soil moisture, and counter soil compaction. Some cover crops generate or redistribute nutrients in the soil, for example legumes acting as nitrogen fixers. Cover crops are increasingly popular and there are many incentives available for farmers interested in trying them, including reduced premiums for crop insurance in some cases when cover crops are used.

Critical Area Planting

Critical area planting involves establishing permanent vegetation on sites that have, or are expected to have, high erosion rates, and on sites that have physical, chemical or biological conditions that prevent the establishment of vegetation with normal practices. The purpose is to revegetate degraded sites that cannot be stabilized using normal establishment techniques and to stabilize areas with existing or expected high rates of soil erosion by wind or water.

Education

Education is key to achieving behavior change, which is a huge part of watershed management. Different stakeholders will require different forms of education. This could include field days for agricultural producers that showcase agricultural BMPs, forestry field days for foresters and loggers that showcase forestry BMPs, septic education workshops for residents who have septic systems, and general education of the public to increase awareness of water quality issues and result in behavior change to protect water quality.

Exclusion Fencing

Exclusion fencing is constructed to exclude livestock from streams and other critical areas to improve water quality and soil health. Benefits include reduced soil erosion, sedimentation, pathogen (E. coli) contamination and pollution from attached substances.

Field Border

Field borders are small areas or strips of land in permanent ideally native vegetation along the edge of crop fields. Like all conservation buffers, they are designed to intercept soil, fertilizer, and other pollutants before it is washed off-site. Field borders have the advantage of being designed to allow equipment access for turning around at the edge of the field. Field borders are typically a minimum of 15 feet wide.

Flocculation

Flocculation is an in-lake management tool to reduce phosphorus concentrations. One common flocculant is aluminum sulfate, also known as alum. When alum is added to water, it forms aluminum hydroxide, a fluffy precipitate also known as floc. This compound binds with phosphorus and settles to the bottom, effectively trapping the phosphorus. This lowers phosphorus concentrations in the water, decreasing the likelihood of harmful algal blooms. Flocculants are typically most effective in small bodies of water.

Forage and Biomass Planting

Forage and biomass planting are the establishment of adapted and/or compatible species, varieties, or cultivars of herbaceous species suitable for pasture, hay, or biomass production. Its purpose is to improve or maintain livestock nutrition and/or health, provide or increase forage supply during periods of low forage production, reduce soil erosion, improve soil and water quality, produce feedstock for biofuel or energy production.

Heavy Use Area Protection (HUAP)

Heavy Use Area Protection (HUAP) is the stabilization of areas frequently and intensively used by livestock by surfacing with suitable materials, establishing vegetative cover, and/or installing needed structures. Most HUAP practices in the region involve the installation of a stable, non-eroding surface such as a gravel or concrete pad in places like feeding areas that are heavily used in order to avoid soil erosion and simplify manure management.

Land Retirement

Land retirement generally refers to taking agricultural land out of production. It is used most often for marginal farmland that is too wet, too steep, or otherwise difficult to farm consistently. In many cases, the farmer can recover most or all of the loss of production by enrolling the land in the Conservation Reserve Program, which pays a regular stipend for taking sensitive land out of production. Floodplain fields in particular have a high chance of contributing sediment to streams and therefore taking them out of production has a positive impact on water quality. In some watersheds there are similar programs that target owners of non-agricultural land. These programs actively purchase and demolish structures (houses, commercial buildings) that were constructed in a floodplain and flood regularly. The idea is to provide a more natural floodplain (without structures that interrupt flow) and to avoid the hassle and expense of repeatedly repairing flood-damaged buildings. While this sort of program does not yet exist in the Lake Monroe watershed, there may be opportunities to

incentivize landowners to protect floodplain land with a conservation easement or other arrangement.

Lake aeration

Aeration is an in-lake management tool to increase the availability of dissolved oxygen, which can counteract eutrophication and reduce the likelihood of harmful algal blooms. The goal is to prevent oxygen depletion in the hypolimnion (the deepest part of the lake) to prevent the release of phosphorus from sediments. This will decrease the likelihood of cyanobacteria blooms. However, aeration does not address the underlying causes of eutrophication and should be viewed as a short-term tool while watershed work addresses the source of excess nutrients.

Lakeshore Stabilization

Lakeshores can erode for a variety of reasons. Fluctuations in water level, heavy usage destroying vegetation, waves caused by wind, waves caused by boats, and soil sloughing due to extreme periods of saturation are all potential causes at Lake Monroe. Lakeshore can be stabilized and protected using a variety of techniques. In the past, “hard” armoring such as riprap and retaining walls were considered the most effective. However, they are expensive, difficult to maintain, and often enhance erosion of the shoreline at the base and sides while providing minimal benefits to wildlife. Current recommendations focus on “soft” armoring (also known as bio-engineering) which involves creating a natural and gentle slope with a combination of natural elements including rocks and vegetation. This armoring is designed to absorb the energy of waves along the shoreline while also preventing erosion, enhancing natural habitats, and filtering nutrients. Lakeshore stabilization can be challenging in reservoirs like Lake Monroe that experience dramatic fluctuations in water level.

Livestock Watering Systems

Livestock watering systems ensure that livestock have clean drinking water from natural sources such streams, ponds, springs or wells. Livestock watering systems are especially important in riparian areas where they provide an alternative to giving livestock access to streams. This reduces sediment and nutrient loading in streams and lakes by preventing bank and shore erosion and limiting the amount of livestock urine and feces deposited directly in the water. Multiple access points can improve water quality and soil health by more evenly spreading manure and urine across a pasture, enhancing grass growth and avoiding runoff of nutrients into surface waters. Multiple watering points also keep livestock from overgrazing the area around any one tank and prevent soil erosion caused by livestock trailing habitually to and from the same spot. Similar conservation benefits are achieved with portable watering systems, which move water to the paddocks where livestock are currently grazing.

Logjam Removal

Logjams occur naturally anywhere there are streams and trees. In the past, woody debris was regularly removed from streams to allow unimpeded streamflow. Current guidance recognizes that woody debris can offer benefits such as cover for fish, redirection of flow to create scour pools, and an increase in groundwater levels. However, woody debris can collect and create hazardous logjams that should be removed. This is generally the case when the logjam threatens to flood a building or road, is likely to cause extreme erosion, or is making a commonly used stream unsafe for recreation. Logjams can be addressed by removing or shifting the material to restore an open channel. Removal permits from DNR are required in many cases.

Modifying Dam Operations

One of the biggest impacts on lakeshore erosion is the change in water levels due to flood control activities at Lake Monroe. The lake is designed with flood capacity above the normal pool level, meaning that the lake level rises above normal pool when there is a large storm event that is held back to prevent downstream flooding. This is different than most other reservoirs in the region, where lakes are drawn down to a lower “winter pool” elevation in the fall and slowly return to “normal pool” during winter and spring rain events. While the U.S. Army Corps of Engineers is charged with utilizing Lake Monroe for flood control, there may be opportunities to modify operations somewhat to reduce the drastic and sometimes prolonged changes in water level that can exacerbate shoreline erosion.

No Till / Conservation Tillage / Crop Residue Management / Equipment Modification

No Till is a conservation practice that leaves the crop residue undisturbed from harvest through planting except for narrow strips that cause minimal soil disturbance. Crop residues are materials left in an agricultural field after the crop has been harvested. These residues include stalks and stubble (stems), leaves and seed pods. Good management of field residues can minimize erosion. No-till can be used for almost any crop in almost any soil and can save producers labor costs and fuel. It also increases the organic matter in the soil, increases earthworm populations that improve soil quality, and increases water infiltration.

Riparian Herbaceous Buffer

Riparian herbaceous buffers are strips of land along a stream that are planted in permanent ideally native herbaceous vegetation (grasses, flowers, sedges, etc.). They are designed to stabilize the streambank and to intercept sediment, nutrients, and pesticides running off an agricultural field before they reach the stream. Riparian herbaceous buffers can also enhance wildlife habitat and protect biodiversity, particularly when planted with native plants that support pollinators and other desirable insects.

Riparian Forested Buffer

Riparian forested buffers are strips of land along a stream that are planted in permanent woody ideally native vegetation (trees and shrubs). They are designed to stabilize the streambank and to intercept sediment, nutrients, and pesticides before they reach the stream. Riparian forested buffers also improve water quality and in-stream habitat by providing shade, which lowers water temperatures and increases available dissolved oxygen. Tree roots provide excellent in-stream habitat and the trees and shrubs enhance terrestrial wildlife habitat, particularly when native species are used.

Sediment Trap

A sediment trap is a shallow basin designed to slow down incoming water and allow particles of sediment to settle out of suspension. Over time, the sediment trap accumulates sediment and needs to be cleaned in order to maintain effectiveness. Sediment traps are commonly used on large construction sites to minimize soil being released into nearby storm drains or waterways. They can also be installed where a stream enters a lake to capture incoming sediment before it reaches the main body of the lake.

Septic System Maintenance, Repairs, and Alternatives

Poorly maintained septic systems can be a major source of bacteria and nutrients entering surface water. Many residents are unaware that their septic systems require regular maintenance and periodic repair. More education is needed to increase the likelihood that septic systems are being maintained and inspected, which will identify systems in need of repairs. Septic system repairs can be expensive and in some cases infeasible, which raises the importance of identifying potential alternatives.

Streambank Stabilization

Streambanks can erode for a variety of reasons. Changes in stream flow, sediment load, and erosion or deposition on the streambanks will cause the stream to seek a new balance. While some streambank erosion is natural, extreme erosion may require bank stabilization. Common techniques include regrading to acquire a gentler slope, adding erosion control materials such as jute blankets or coir logs, re-establishment of thick vegetation, and/or restructuring the stream channel itself. Riprap can also be used to stabilize streambanks but it is generally less desirable as it is unsightly, it provides few habitat benefits, and it often simply pushes the erosion problem further downstream.

Tree/Shrub Establishment

A variety of desired tree species, either seedling or seeds, are planted mechanically or by hand in understocked woodlands or open fields. Tree species are matched with soil types and selected to prevent soil erosion, increase income, or boost productivity of existing woodlands. Trees also provide protection from rill and sheet erosion, protects water quality by filtering excess nutrients and chemicals from surface runoff, increases infiltration rates, and provides long-term wildlife habitat.

Wetland Restoration or Creation

Wetland restoration is the return of a wetland and its functions to a close approximation of its original condition as it existed prior to disturbance on a former or degraded wetland site.

Wetland creation is the creation of a wetland area where no wetland previously existed. Both provide the water quality benefit of trapping sediment and nutrients as well as providing storage capacity during flood events and habitat for wildlife. Wetland restoration or creation typically involves regrading an area so that it captures and retains water and adding appropriate water-tolerant vegetation.