

CONSERVATION PRACTICES IN THE LAKE MONROE WATERSHED

Hundreds of people work in the Lake Monroe Watershed to prevent soil loss, protect water quality, maintain forests, and improve habitats for wildlife. This report documents conversations with practitioners who practice conservation of natural resources as part of their everyday work and life and identifies key conservation practices used in the watershed.

A Survey of Practitioners

Final Summary

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1.0 Supporting Development of the Watershed Plan for Lake Monroe

The mission of The Nature Conservancy (TNC) is to conserve the lands and waters on which all life depends. Since 1959, The Nature Conservancy in Indiana has helped to protect nearly 100,000 acres of forests, wetlands, prairies, lakes and streams for current and future generations to enjoy.

Friends of Lake Monroe (FLM) is a citizens group dedicated to finding solutions to improve the water quality of Lake Monroe by enhancing its use as a drinking water, recreational, and ecological resource for all who use it. In 2018, FLM proposed to develop a watershed management plan in accordance with state and federal section 319 requirements and in 2019 was awarded the 319 grant to complete the watershed plan. Working with IU SPEA Limnology Lab, a watershed coordinator and other partners, FLM engaged stakeholders to identify community concerns, conducted a watershed inventory including measurement of discharge, nutrients, total suspended sediments and basic chemical parameters to calculate sediment and nutrient loading. This information was used to identify key sources of sediment and nutrients in the watershed and lake, which allowed FLM to prioritize recommendations to reduce sediment and nutrient loading. FLM has developed this watershed management plan with expected outcomes, interim measures and an implementation schedule.

1.1 Scope of this In-Kind Effort

TNC provided in-kind support of the FLM 319 project by gathering input from conservationists on the best practices being implemented in the watershed for inclusion in the 319 watershed plan. Per our scope, TNC organized meetings with soil and water conservation districts (at least three), federal and state property owners and managers (at least two), and private landowners or managers (at least two). The purpose of these meetings was to:

1. Understand the best practices that are working well in their district or on their land,
2. Define the current level of investment in conservation implementation in their work,
3. Discuss the work that they would most like to implement to better protect Lake Monroe from nutrients and sediments in runoff, and
4. Establish a range of potential investments that might help their organization to implement the desired, yet currently unfunded, best practices.

The information gathered from these meetings and conversations provides the basis for this report.

1.2 Location of the Lake Monroe Watershed

Watershed boundaries are demarcated purely by natural and geophysical features of a land area, rather than governmental or political boundaries. Watersheds are defined by streams and rivers that drain into a single, larger body of water. The Lake Monroe watershed (Figure 1) encompasses portions of 5 counties (Bartholomew, Brown, Jackson, Lawrence, and Monroe). However, 98% of the 441 square mile watershed lies within three counties: Brown County (56%), Jackson County (21%), and Monroe County (21%). Therefore, the conservation programs based in those counties served as the focus for this information gathering process.



2.0 Soil, Water, and Natural Resource Conservation Organizations

To understand local organizations helping to apply conservation practices in the Monroe Watershed, TNC contacted the two programs that lead soil, water, and natural resource best management practices in the counties of focus: the Soil and Water Conservation Districts (SWCD) and US Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS). The SWCD's and NRCS both contribute funding and assist with implementation of a wide variety of conservation practices within their respective county-based jurisdictions. As described in their mission statements, both organizations prioritize conservation of natural resources by working directly with individual landowners and operators within their districts.

For example, the mission statement for Brown County SWCD states that they *provide leadership and partner with residents and interested environmental groups on management of the land and water resource*. They also conduct outreach and education as well as provide options for stewardship/conservation to private landowners.

The Jackson County SWCD *promotes the protection and improvement of the natural resources of Jackson County through leadership, education, and technical assistance to both the rural and urban communities*.

The Monroe County SWCD mission statement states: *Our mission is to identify and prioritize local soil and water resource concerns, provide information on soil, water, and related natural resource conservation, and to connect land users to sources of education and technical and financial assistance to implement conservation practices and technologies*.

The NRCS is an agency committed to *helping people help the land*. Their mission is *to provide resources to farmers and landowners to aid them with conservation in order to ensure productive lands and protect the environment*.

To begin the information gathering process, TNC created and shared a survey, then scheduled a virtual meeting via Zoom with the representative of each organization. The detailed responses to the surveys and conversations are included in Appendices A-F, organized by county and organization. This section describes the practices being implemented, documents funding sources for this soil, water, and natural resource conservation, and notes challenges and opportunities for protecting the water quality in Lake Monroe.

2.1 Most Commonly Used Best Management Practices

The SWCD's and NRCS's within the watershed shared which practices were most effective within their region. Generally, the most implemented soil and water conservation practices within the three counties are described below (Table 1).

Table 1 Types of Conservation Practices Used in Lake Monroe Watershed Grouped by NRCS in Indiana Conservation Practices Physical Effects ¹	
Practice Group	Practices
Agronomy	Cover Crops, Nutrient Management, High Tunnel System, Residue & Tillage Management
Invasive Species	Brush Management, Herbaceous Weed Control
Livestock – Grazing/Confined	Access Control, Fence, Prescribed Grazing, Livestock Pipeline, Watering Facility, Heavy Use Area Protection, Roof Runoff Structure
Biology – Wildlife	Upland Wildlife Habitat Management, Wildlife Habitat Planting
Forest Management	Forest Stand Improvement, Grapevine Control, Forest Trails and Landings, Brush Management
Buffer – Grass	Critical Area Plantings, Filter Strips, Riparian Buffer
Agronomy – Erosion	Grassed Waterway, Cover Crops, Residue & Tillage Management

At the same time, each county has different landscapes and the various NRCS and SWCD offices work with different types of landowners:

- Within Brown County, the land is hilly and forested. Farms tend to be smaller (less than 200 acres) and focus more on livestock than crops.
- In Jackson County, the land is flatter and consists of larger farms (more than 1,000 acres) compared to Brown County. There are a smaller number of farmers within Jackson County because farms tend to be larger.
- Monroe County has more urban areas incorporated into the county’s landscape compared to the other counties. Since there are more densely populated areas within the county, projects tend to be smaller scale and applied within smaller areas.

Given the different landscapes and landowner types, the application of soil and water conservation practices has different emphasis in each of the three counties.

¹ The Field Office Technical Guides describe the national conservation practices standards, and are available at <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/cp/ncps/>

- Due to the large amount of forests and prevalence of small livestock farms in Brown County, NRCS and SWCD support a blend of project types to promote soil and water conservation, including heavy-use area protection (HUAP), roof runoff structures, brush management, forest management, cover crops, and herbaceous weed control.
- Given the larger row crop farming operations in Jackson County, cover crops tend to make the largest difference in improving soil and water health. Therefore, the SWCD in Jackson County focuses their funding entirely on implementing cover crops. NRCS also supports cover crop adoption in Jackson County, in addition to measures related to brush management, access control (for livestock), prescribed grazing, and livestock watering areas.
- With a combination of rural and urban landscapes, Monroe County finds success in working on a variety of projects. Generally, smaller projects can be implemented more quickly by the SWCD, and their top practices include brush management, herbaceous weed control, pollinator habitat, cover crops, row crop practices, and critical area plantings. The NRCS supports more cover crops, brush management, nutrient management, access control, livestock watering, and high tunnel projects.

NRCS records conservation practices that have been implemented with the support of their programs and funding. For the five-year period including 2015 through 2019, the three counties benefited from the implementation of the practices presented below (Table 2).

Table 2 Practices Implemented through NRCS Funding Five Year Period from 2015 to 2019 ²				
Conservation Practice	Brown County	Jackson County	Monroe County	
Access Control (acres)	---	---	328	
Access Road (ft)	1,400	541	400	
Brush Management (acres)	1,730	90	1,200	
Comprehensive Nutrient Management Plan	1	2	2	
Conservation Cover (acres)	15	---	6.5	
Conservation Plan Supporting Organic Transition	1	---	2	
Cover Crop (acres)	1,550	7,845.3	1,500	
Critical Area Planting (acres)	1	1.8	2	
Diversion (ft)	---	26.3	---	
Fence (ft)	---	25,093	33,500	
Field Border (acres)	1.4	---	---	
Firebreak (ft)	3,370	---	---	
Forage and Biomass Planting (acres)	---	---	175	

² Practices implemented data are for the entire county, not just the portion of each county that falls within the Lake Monroe watershed.

Table 2 Practices Implemented through NRCS Funding Five Year Period from 2015 to 2019 ²			
Conservation Practice	Brown County	Jackson County	Monroe County
Forest Management Plans	6	2	2
Forest Stand Improvement (acres)	600	579.2	210
Grassed Waterways	---	4.4	2
Hedgerow Planting (ft)	---	---	400
Herbaceous Weed Control (acres)	300	---	145
Heavy Use Area Pads	48	25	48
High Tunnels for Season Extension	8	1	16
Integrated Pest Management (acres)	1	---	100
Lined Waterway/Outlet (ft)	---	145	---
Livestock Pipeline (ft)	---	---	26,200
Mulching (acres)	0.5	4.5	1.5
Nutrient Management Plan (acres)	1	1,335.3	2,350
Pasture and Hay Planting (acres)	---	53.9	---
Pipeline	---	2,650	---
Prescribed Burning (acres)	---	---	2
Prescribed Grazing (acres)	---	216.9	530
Pumping Plant	1	---	1
Roof Runoff Structure	4	5	4
Roof of Cover	---	---	1
Spring Development	---	---	2
Stream Crossing	---	1	1
Subsurface Drain (ft)	---	7,295	1,100
Tree/Shrub Planting (acres)	3	---	---
Underground Outlet (ft)	1,265	391	1,200
Use Exclusion	---	2.8	---
Waste Storage Facilities	---	---	2
Watering Facilities	---	16	47
Windbreak (ft)	---	---	870

Observations from the practices implemented (Table 2):

- All three counties used: access roads, brush management, comprehensive nutrient management plans, cover crops, critical area plantings, forest management plans, forest stand improvement, heavy use area pads, high tunnels, mulching, nutrient management plans, and underground outlets. So, they share a lot of similar practices.

- In addition to Jackson County leading in the implementation of cover crops with more than 7,800 acres covered, they also implemented more subsurface drains. This makes sense given the prevalence of larger crop-producing farms in the county.
- Brown County led implementation of herbaceous weed control, brush management, firebreak, and access road conservation measures. Leading in these areas is logical considering the terrain is more forested and hillier in this county.
- Monroe County uses the greatest variety of practices and leads in assisting with the implementation of prescribed grazing, livestock pipeline, and fencing practices. This reflects the large number of smaller projects completed in this urban county.

2.2 Common Themes from Soil and Water Conservation Practitioners

Some experiences were universal among the soil and water conservation professionals in the watershed.

- The conservation practices promoted by NRCS and the SWCDs are all known to work effectively for the intended purpose when they are implemented correctly and maintained appropriately. If there is a failure of a conservation practice, it occurs mainly through mismanagement of the practice.
- Cover crops were mentioned by all the organizations contacted as being an important and effective practice to improve soil health and water quality.
- The most important part of each funded project, no matter the scale or type of practice, is the maintenance that follows initial implementation. Without the continued diligence of landowners, the implemented projects may not result in a lasting improved health of the landscape. NRCS and the SWCDs provide continued support to landowners after practices are implemented to maximize the probability that the practice will be effectively maintained.
- Project success is measured by completion of the installation per program standards; water quality monitoring is not done by NRCS or SWCDs currently in these counties.
- Education of landowners on the wide variety of available conservation measures for their land uses is believed to be among the most important efforts to protect the watershed. The SWCD and NRCS program leaders work with landowners over long periods of time to continue to achieve buy-in for practices.
- Information about conservation or grant programs offered is typically shared via social media, websites, newsletters, outreach events and occasional news media coverage. Word of mouth is also an important way for people to learn of SWCD and NRCS.

2.3 Partner Groups for Implementing Conservation Practices

Both NRCS and the SWCDs partner with other organizations to promote soil and water conservation and collaborate to achieve additional ecological conservation goals. Examples of the types of work completed and/or funded by other organizations working in the watershed include:

- The NRCS partners with National Wild Turkey Fund Federation to employ a forester to assist with forestry related practices and education in a 10-county area that includes Brown and Monroe Counties.
- NRCS also partners with Pheasants Forever to employ a wildlife biologist to assist with wildlife related practices and education in about a 12-county region that includes Brown and Monroe Counties.
- U.S. Fish and Wildlife Service funds wildlife projects including pollinator habitats and wildlife focused conservation work.
- Indiana DNR offers a tax incentive program for conservation practices through the Classified Forests and Wildlands Program and funding through LARE (Lake and River Enhancement).
- South Central REMC has small, private funding sources. A recent example was for an invasive species removal and educational signage project on a Brown County property; the project was organized by the Brown County Native Woodlands Project.
- In Monroe County, MCIRIS (Monroe County Identify and Reduce Invasive Species) implements invasive control projects.
- The Nature Conservancy (TNC) manages forest lands and the Sycamore Land Trust manages forests, wildlands, and wetlands to achieve diverse and healthy forests
- Purdue Extension educates landowners in all three counties about conservation practices.
- In the urban areas of Monroe County, the Neighborhood Tree Planting Project does urban conservation, the City of Bloomington Parks and Recreation Department created the Bloomington Community orchard, hosts educational events, and manages two community gardens, and an IU campus farm promotes small farm conservation practices implementation and education.
- Southern Indiana Cooperative Invasive Management (SICIM) does invasive species control, identification and replacement. Local Cooperative Invasive Species Management Areas (CISMAs) are established in each of the three counties that cooperate with SICIM: the Brown County Native Woodlands Project, the Jackson County Invasive Partnership, and MCIRIS (Monroe County Identify and Reduce Invasive Species).

2.4 Current Investments in Soil & Water Conservation

The funding available to each of the soil and water conservation organizations that works in the Lake Monroe Watershed remains fairly consistent through federal and state programs. For the NRCS, the US Department of Agriculture directly funds the staff and conservation programs. The goal of NRCS's primary program, EQIP (environmental quality incentives program), is for the NRCS to provide 75% funding for a conservation practice and the customer to provide 25%.

For the SWCDs, the Clean Water Indiana program is the primary source of funding for the staff and conservation measure implementation. Monroe and Brown Counties also have mini grants that are administered at a local level. Funding available for soil and water conservation practice implementation in Brown, Jackson, and Monroe Counties is presented in Table 3.

Table 3 Soil and Water Related Conservation Annual Funding in Counties Included within Lake Monroe Watershed					
	2015	2016	2017	2018	2019
USDA Natural Resources Conservation Service (obligated for conservation program contracts)					
Brown	\$101,000	\$62,100	\$252,800	\$204,900	\$130,100
Jackson	\$135,956	\$114,001	\$76,964	\$4,625	\$151,325
Monroe	\$122,635	\$81,811	\$301,339	\$141,444	\$445,523
ISDA Soil & Water Conservation Districts					
Brown³					\$10,000
Jackson⁴					\$10,000
Monroe⁵					\$10,000

The average funding per year for each NRCS program varies by county, with Brown County averaging about \$150,000/year, Jackson County averaging about \$97,000/year, and Monroe County averaging about \$219,000/year. Each SWCD in the state of Indiana receives \$10,000 from CWI funds for basic operational expenses, if they have a way to match that funding locally. Usually a county SWCD employee is considered match. In addition, each SWCD can apply for additional CWI grants for various amounts annually, though those funds are not consistent. Some SWCDs, including Monroe County, receive funds locally from their county for support. In recent years, an additional \$10,000 to \$30,000 per year has been available for mini grant programs in these three counties.

Note that the NRCS and SWCD funding is not exclusively applied to practices within the watershed because it is available to any landowner within the county, and some landowners receiving funding are outside of the boundaries of the watershed.

The education and outreach for promoting the conservation programs plus the follow-up with landowners over many years is accomplished with a dedicated team of conservation staff (Table 4). In the counties comprising most of the Lake Monroe watershed, the SWCD and NRCS staff work closely together to achieve their shared missions. The staff share offices in Monroe and Jackson counties. One NRCS staff member is dedicated to Brown County, Jackson County, and Monroe County, respectively. These NRCS staff members are in addition to the SWCD employees in each county, so there are two full time staff focused on soil and

³ During this period, Brown County SWCD’s Mini Grant program invested an additional \$2,000 to \$6,000 in conservation practices each year. From 2017 to 2019 they were part of a CWI grant, with Monroe Co. handling the funds. In 2016, Brown County SWCD also received a larger LARE grant to pay for one big log jam removal; the funds did not go to individual landowners.

⁴ Jackson County SWCD currently has a CWI grant for a cost-share program to incentivize cover crops and forage and biomass plantings. The \$40,000 grant is for a 3-year period and is shared with the Lawrence County SWCD. Jackson County SWCD also has a grant to remove log jams.

⁵ Monroe County SWCD usually receives \$35,000 a year from the County for their Mini Grant program. Monroe and Brown Counties are both part of a CWI grant with the Southwestern Counties for Cover Crop Promotions for the next 2 years.

water conservation practice implementation within these counties (and an additional part-time staff member in Brown County).

Table 4 Soil and Water Related Staff Assigned to Counties within Lake Monroe Watershed			
Agency/County	NRCS	SWCD	Combined
Brown	1.0	1.25	2.25
Jackson	1.0	1.0	2.0
Monroe	1.0	1.0	2.0

2.5 Potential Opportunities to Expand Implementation of Conservation Practices

NRCS and the SWCDs have a long and successful history of working with private landowners to support and fund implementation of soil and water conservation practices. For this survey, each practitioner was asked “*What kind of work would you like to implement to better protect Lake Monroe from nutrients and sediments in runoff?*” Opportunities to do more included:

2.5.1 Increase Outreach and Education

Awareness of the conservation practices that improve soil and water quality while reducing soil erosion vary widely. Helping people understand the connection between healthy soil and the quality of our water is important. An increase in understanding the purpose of these soil and water conservation practices and how to maintain them would be an excellent way to help keep the water quality clean in the watershed.

Word of mouth is how most people find out about the programs. Landowners learn about the conservation practices from other landowners, extension offices, or crop or forestry consultants, who then refer landowners to NRCS and the SWCDs. New people may learn about conservation practices and funding opportunities through workshops, newsletters, and landowner site visits where NRCS and the SWCDs make them aware of funding available.

Both the NRCS and the SWCDs see more opportunities to make people aware of conservation practices, especially if partners and others working in the watershed can help spread the word.

2.5.2 Promote Underutilized Practices to Target Audiences

Some soil and water conservation practices are very effective and could be implemented more frequently or more effectively in the counties and the Lake Monroe Watershed, but due to lack of familiarity with the practices, landowners do not apply for support. Examples cited include:

- Lack of demand from livestock owners wanting to implement best management practices. Promoting the benefits of Heavy Area Use Protection (HUAP), Watering Facility and Pipeline, Access Control Fence and Prescribed Grazing to livestock owners would improve soil and water health.

- Growth of hobby farms and agritourism as an increasing concern for water quality. Livestock are more likely to be living in high density conditions on poorer soil, and the hobby farm owners are less likely to be aware of erosion issues and conservation programs as traditional farmers.
- In Brown, Monroe, and Jackson Counties, more cover crops within the Lake Monroe Watershed would be beneficial; fewer farmers from within the Lake Monroe watershed apply for SWCD and NRCS programs to implement cover crops. In Jackson County, the farmers who most stand out as cover crop champions are in the east, outside of the Lake Monroe watershed. The SWCDs would need to find out from farmers what it would take to implement more cover crops in those areas.
- More cover crop seeding techniques are needed for farm fields surrounded by woodlands; the trees limit successful cover crop application by airplane.
- Belated recognition of the need for forest management practices. For forest harvesting, the landowner often discovers the need for conservation practices after the contractor is hired and the harvest begins, when it is too late. With forestry, practices such as soil stabilizing on skid trails, seeding after timber harvest, stream protection, stone cover for crossings can be encouraged more so that landowners are aware of them and are prepared to implement them ahead of a harvest.

2.5.3 Practices Without Funding Support

For various reasons, some conservation practices do not have a dedicated funding source. The practitioners noted these practices or needs:

- Stream bank stabilization is one practice that used to be funded by NRCS but is no longer supported due to the high cost of implementation and difficulty in achieving a successful outcome. In Jackson County, more programs that assist in preventing or slowing stream bank erosion issues are needed. It is a high demand and important issue, but NRCS doesn't have practices available that include financial assistance for landowners.
- Jackson County SWCD currently funds only cover crop implementation. An increase in funding would allow them to implement additional practices such as filter strips and grassed waterways along creek banks to help capture sediment, which would help protect water quality.
- Septic tank improvements are not funded through the State of Indiana's 319 non-point source program, nor through the soil and water focused agencies. If a need is identified for septic system upgrades as part of the Lake Monroe 319 Watershed Plan, a funding source may need to be explored.

2.5.4 Ideas to Expand Soil & Water Conservation Practice Implementation

Each of the practitioners was asked to identify potential investments or resources that could help their organizations implement more best practices. The following ideas were generated:

- A dedicated NRCS staff member for Brown County so there is a physical presence in the county; there is currently one NCS staff member serving both Brown and Monroe Counties. With the staff that are available, NRCS is leveraging all the federal resources that are available. Potentially, there could be

more NRCS funding invested in Monroe County or the Lake Monroe watershed if additional NRCS staff were available to assist customers in the application and implementation process. Across NRCS' Southwest Indiana 23-county region that includes both Brown and Monroe Counties, however, the interest in the NRCS programs exceeds the capacity. Alternatively, the local SWCDs could train another technician to support NRCS and to follow-up with projects, as another way to approach the staff need.

- A mini grants program for driveway construction and maintenance. Often, projects don't have drainage or culverts in their driveways, causing gravel and sediment to enter roads and streams. This could be a potential opportunity for SWCDs to help with water quality. Research is needed to determine whether the practice would be defined as a water quality improvement as opposed to a personal property improvement.
- Survey of farmers and agricultural landowners in Jackson County who are within the watershed to assess interest in implementing best management practices; most program applicants in Jackson County are outside of the Lake Monroe Watershed. The survey would establish landowner needs for conservation on their land.
- Livestock owner programs will benefit from more funding and more education for Heavy Use Area Protection and other livestock practices, including exclusion of livestock from streams. Funding for fencing and stream crossings is needed because in Brown County animals are often confined to a small pasture and not rotationally grazed.
- Survey of Brown County farmers to determine what it would take to implement more cover crops.
- A stream bank erosion assistance program promoting grassed waterways or filter strips to assist in preventing or slowing stream bank erosion.
- Forest timber sale protection measures. If a landowner doesn't require a logger to implement best management practices, then SWCDs can make funding available after-the-fact to the landowner to help protect the areas where forests have been cut from runoff. With the Federal programs, there can be up to a 1.5-year timeframe before funds can be obtained.
- An additional \$20,000/year/county would go a long way to help each county SWCD implement more livestock, forestry, and agronomy practices to address soil and water resource concerns.
- A technician hired by SWCD, trained to support the NRCS programs could be one way to approach the staff need. This may be the approach that Lawrence County has taken.

3.0 Public Lands & Best Management Practices

Several organizations manage public lands that lie within the Lake Monroe Watershed. The purposes for which the land is managed vary according to the organization. Each organization that was contacted to participate in this survey is listed below along with its mission statement.

Table 5 Public Land Managers in the Lake Monroe Watershed: Participants in the Practitioner Survey and Organization Mission Statement	
<p><u>National Guard Indiana, Camp Atterbury, Department of Defense</u></p>	<p><i>Atterbury-Muscatatuck Training Center serves as a major training site for individual, collective, and joint operations providing realistic venues for live, virtual and constructive training and testing events in order to increase training readiness, attract commercial defense industry participation and build strategic partnerships. On order, activate as a Mobilization Force Generation Installation in support of Forces Command and Combatant Commander requirements.</i></p> <p><i>Atterbury-Muscatatuck has three primary mission areas: (1) provide traditional training and testing support to ARNG, Active, Reserve and Joint Forces as a proposed Regional Collective Training Capability (RCTC) installation; (2) provide users with state-of-the-art multi-domain training opportunities; (3) on order, serve as a Primary Mobilization Force Generation Installation (pMFGI) as identified by Forces Command.</i></p>
<p><u>Hoosier National Forest</u></p>	<p><i>The mission of the Forest Service is to sustain the health, diversity, and productivity of the nation's forests and grasslands to meet the needs of present and future generations.</i></p>
<p><u>Indiana Department of Natural Resources (DNR), Brown County State Park</u></p>	<p><i>The mission of Indiana State Parks is to conserve, manage, and interpret our resources while creating memorable experiences for everyone.</i></p>
<p><u>Indiana DNR Division of Forestry, Morgan-Monroe & Yellowwood State Forest</u></p>	<p><i>The Indiana Department of Natural Resources' Division of Forestry promotes and practices good stewardship of natural, recreational and cultural resources on Indiana's public and private forest lands. This stewardship produces continuing benefits, both tangible and intangible, for present and future generations.</i></p>
<p><u>Indiana DNR Division of State Parks, Monroe Lake</u></p>	<p><i>The mission of Indiana State Parks is to conserve, manage, and interpret our resources while creating memorable experiences for everyone.</i></p>
<p><u>US Army Corps of Engineers - Louisville District</u></p>	<p><i>Deliver solutions and manage resources supporting regional and national requirements through an expert team of multidisciplinary professionals utilizing best engineering practices and strategic partnerships to reduce disaster risk, strengthen the economy and support national security.</i></p>

To initiate the survey process, TNC drafted and shared a list of questions, then scheduled a virtual meeting via Zoom with the representative(s) of each organization. Summaries of the responses to the survey questions, including notes from the conversation with each organization, are included in Appendices G-L.

In the following sections, common themes that emerged from the individual discussions with the public land managers are summarized. Challenges and opportunities for protecting the watershed and the water quality in Lake Monroe are noted.

3.1 Sustainable timber harvesting

The Hoosier National Forest (HNF) and the Indiana Department of Natural Resources' (IDNR) Division of Forestry implement best management practices during timber harvests. The programs that guide timber harvests on their properties are described below. Unless a tree poses danger to visitors, timber is not actively harvested at IDNR's Brown County State Park

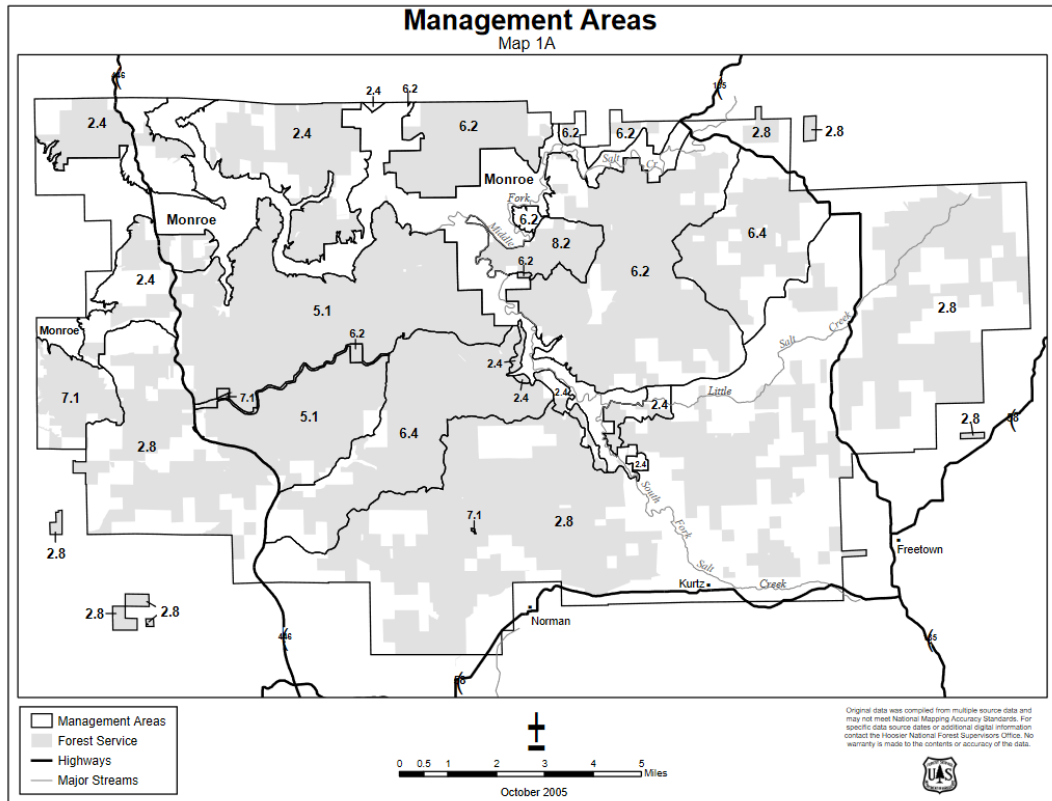
3.1.1 US Forest Service Hoosier National Forest

Management of the Hoosier National Forest (HNF) is guided by the Forest's [Land and Resource Management Plan \(Forest Plan\)](#). The Forest Plan identifies Management Areas in which different priorities are set and appropriate, or inappropriate, management actions are identified to achieve the desired future conditions of each Management Area (MA).

Within those HNF lands located within the Lake Monroe watershed, commercial timber harvest is identified as an appropriate tool in only MA 2.8 to achieve desired conditions for plant and animal habitat diversity. MA 2.8 makes up about 32% of the HNF acres in the watershed (or about 6% of the watershed acres). This does not mean that 32% of the HNF acres will have commercial harvests; rather, those lands are where it is possible to implement a harvest as a management tool. Timber harvests occur on a very small percentage of this land in any given year. In addition, per the management planning, unharvested areas are left between harvest sites, so that there is a mosaic of conditions on the landscape when timber harvest occurs. With these practices, far less than the entire management area would have a harvest occurring there.

Nearly all commercial timber harvest in the HNF occurs in MA 2.8 and MA 3.3 (no 3.3 lands are in the Lake Monroe watershed), which means that commercial timber harvests are limited to only the MA 2.8 acres. There are, however, somewhat narrow conditions that can allow for use of timber harvests in some of the other MAs to address specific needs, though those are situation dependent and rare.

Specifically, the Forest Plan states that in MA 2.4 *"Limited vegetation management is appropriate to create and improve habitat for wildlife and plant species within riparian corridors. Limited vegetation management includes maintenance of forest openings, wildlife habitat improvement for riparian dependent species, prescribed fire, or salvage and sanitation harvest when it is compatible with overall objectives."* For MA 6.2 and 6.4, the plans say *"Removal of commercial vegetation is not appropriate, other than salvage or sanitation harvest when it is compatible with overall objectives."*



6

Approval of timber harvest is subject to comprehensive environmental analyses and public comment prior to approval, consistent with the National Environmental Policy Act (NEPA).

The Hoosier National Forest writes all logging contracts by tiering to (i.e., directly referencing and requiring implementation of) the “Indiana Logging and Forest Best Management Practices: BMP Field Guide” and HNF’s “Forest Land and Resource Management Plan”. Both documents are also intended to serve as a model for other land users to encourage similar approaches to limiting soil erosion and non-point source pollution. Several positions on forest are dedicated to administrating contracts, doing harvest inspections and monitoring for effective BMP’s during and after harvest activity. If any extra mitigations are needed, timber purchasers must pay to have them done. Sale contracts are not closed without an acceptable performance rating based on BMP implementation and effectiveness. Contracts are inspected by a certified Harvest Inspector routinely during sale activity. Soil disturbance monitoring is also done throughout random or specific areas of sale activity usually no sooner than 6 months from sale closure to assess and ensure no detrimental impacts occurred and if so what kind of extra mitigations need to be conducted.

The [National Best Management Practices \(BMP\) Program](#), followed by the HNF, was developed to improve management of water quality consistent with the Federal Clean Water Act (CWA) and State water quality programs. BMPs are specific practices or actions used to reduce or control impacts to water bodies from nonpoint sources of pollution, most commonly by reducing the loading of pollutants from such sources into

⁶ USDA Forest Service Land and Resource Management Plan (2006), Appendix J.

storm water and waterways. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants to receiving waters. A section of the National BMP program and its monitoring focuses on vegetation management regarding harvesting and ground-based skidding within aquatic management zones (AMZ). An AMZ is an area within or nearby a body of water such as: lake, pond, wetland, ephemeral stream, intermittent stream or perennial stream. This information confirms that the harvesting mitigations and monitoring are effective or dictates a need for more adaptive management strategies in the future.

When it comes to USFS forests, there are many uses of the land, and the required BMPs are defined according to the activity. Practices related to vegetation management or timber harvest are certainly a part of the USFS National BMP Program (such as water bars or reseeded after a harvest), but there are many other activities where BMPs are implemented. For example, BMPs are also defined for aquatic ecosystems, chemical use, facilities and nonrecreational special uses (e.g., utility rights-of-way, research equipment or structures), recreation (e.g., camping, trails, motorized vehicle use) and road management.

As an example, the HNF lands are highly fragmented, and private land is interspersed between forest properties such that the USFS must provide access to the property owner through the national forest. In this case, the USFS uses BMPs for road location and design, road construction, stream crossings, snow removal, and storm damage to manage such an access road. There are also BMPs for decommissioning roads and redirecting traffic when a road is not accessible.

Similar BMPs apply to trail design, installation, and maintenance, and to repairing levees on a pond. The objective is always to stabilize an area disturbed by management activities as soon as is practical. To properly apply the BMPs in each location, a site assessment is needed, and the USFS team regularly conducts site assessments when work is happening on the HNF.

The top BMPs applied in the Hoosier National Forest (HNF) include revegetation by seeding & mulching, silt fencing, armoring stream banks and slopes, drainage restoration so that natural drainage flow is not interrupted, repairs where erosion is already happening. Keeping natural waterways open is important to minimize channel erosion. BMPs are listed in the Hoosier National Forest's [Forest Land and Resource Management Plan](#).

3.1.2 Indiana Department of Natural Resources

IDNR Division of Forestry requires all logging contracts to follow the Logging and Forest Best Management Practices: BMP Field Guide. The BMP Field Guide guides IDNR's work and is also intended to serve as a model for other land users to encourage similar approaches to limiting soil erosion and non-point source pollution. One member of each logging crew is required to have completed IDNR's Logger Training, and a Trained Logger must always be on site during an active logging project. Contracts are inspected by an IDNR forester throughout the timber sale process, daily for large harvests, and every other day for smaller harvests. Six months after the harvest, a follow up site assessment is conducted. Contractors must also make a damage deposit that is withheld or partially withheld if the BMPs in the BMP Field Guide are not followed. IDNR uses any money withheld from the damage deposit to make repairs protecting soil and water quality. IDNR intends

these contract and training requirements to teach contractors about and encourage them to adopt best practices so that they will still apply BMPs when contracting on private property.

Indiana's [Logging and Forestry Best Management Practices: 2005 BMP Field Guide](#) (BMP Field Guide) is what the Indiana Department of Natural Resources (IDNR) follows for BMP implementation in their forestry work. The document not only guides IDNR's work, it also is intended to serve as a model for other land uses. It is hoped that others will undertake similar approaches to control soil erosion and non-point source pollution.

For logging done on IDNR property, this is the guidance used, whether the work is completed by IDNR or others. Some logging for pine removal is done with IDNR crews. It is required that someone on the logger's crew must have completed the logger training that IDNR gives. Loggers that have completed various levels of the IDNR Logger Training are identified on the [IDNR website](#). A Trained Logger must be onsite all the time during an active logging project.

IDNR contracts require that loggers working on IDNR properties follow the BMP Field Guide. Throughout timber sale process, an IDNR forester goes out to inspect. Visits are daily for larger harvests, or approximately every-other-day for smaller harvests. Contractors are required to make a damage deposit payment that can be withheld or partially withheld if the BMPs in the BMP Field Guide are not followed. Any withheld portion of the damage deposit will be used by IDNR to make the repairs that protect from soil erosion and water quality degradation. The IDNR contracts and training requirements are intended to help contractors learn about and adopt best practices so that when the same contractors do work on private property, the same BMPs will be applied.

As of the time of this report writing, the IDNR Division of Forestry no longer has funds available for cost sharing on forest BMPs. Until recently, the logger training has remained free and has had some donors to help offer training at low-to-no cost; however, this low-to-no cost training will likely not continue.

3.1.3 Indiana Army National Guard

The Indiana Army National Guard's (INARNG) Camp Atterbury is in the northeastern most part of the Lake Monroe watershed. At about 35,000 acres in size, only the southwest corner of the property is within the Lake Monroe watershed. The southwest portion of the property is also near Whippoorwill Woods, a nature preserve owned and managed by The Nature Conservancy. This area in the southwest portion of the property drains to the North Fork of Salt Creek.

Camp Atterbury, together with Muscatatuck, serves as a major training site for the US military "providing realistic venues for live, virtual and constructive training and testing events in order to increase training readiness, attract commercial defense industry participation and build strategic partnerships." Training is the first mission of Atterbury-Muscatatuck. In addition, the Department of Defense (DoD) places high value on protecting the threatened and endangered species on Camp Atterbury. The US Fish & Wildlife Service (USFWS) regularly partners with Atterbury-Muscatatuck to assist with the protection of habitat and species that live on their properties.

A significant portion of the property is forested. For forest management, the INARNG follows Indiana Department of Natural Resources (DNR) and USFWS BMPs. The Indiana bat, a state and federally listed

endangered species, lives at Camp Atterbury and the INARNG must manage the property and its activity to protect Indiana bat habitat. INARNG follows the USFWS Bloomington Field Office guidelines for forest management to protect the Indiana bat, and implements BMPs to protect storm water from pollutants. Prescribed burning is used in some areas of the property, generally on open grasslands and ranges. For example, to reduce risk of fires starting and spreading out of control due to a training activity on the fire range, INARNG conducts prescribed burns to minimize available fuel on or near the firing range.

3.2 Trail maintenance

Multiple organizations, including the HNF, IDNR Brown County State Park and IDNR Division of Forestry, have hiking, mountain biking, and horseback riding trails within their properties.

3.2.1 US Forest Service Hoosier National Forest

For trails on HNF properties, the HNF Recreation staff uses the [Forest Service Trails Management Handbook](#) and [Hoosier National Forest Land and Resource Management Plan](#) to implement best management practices for constructing and maintaining trails. Recreation staff oversee the implementation of BMPs for those trails, with advice from a Forest Hydrologist as needed. Authorized trail uses include horseback riding, hiking, and mountain biking. Periodically, trails are impacted by weather disturbances and the USFS will identify problem areas for relocation of the trail or other improvements. During rainy periods, trails become muddy and maintaining these trails is difficult, especially when it is overused. When excessively saturated, trails may occasionally be closed to reduce soil and water quality impairments due to higher risk of accelerated compaction, erosion and sedimentation.

3.2.2 Indiana Department of Natural Resources: Brown County State Park

For IDNR State Parks, the funding for trail maintenance, which includes practices to minimize soil erosion, is from the State Parks budget. Occasionally, federal programs have organized youth to assist with park maintenance activities. The Young Hoosiers Conservation Corps was a program about ten years ago that engaged youth to work on hiking and horse trails at state parks around Indiana and the program was a boost to trail maintenance in Brown County State Park (Park).

The Hoosier Mountain Biking Association helped pursue funding to build a trail in the Park about 15 years ago. Volunteers have been consistently and effectively leading the maintenance on the mountain biking trails, which now include 13 trails covering over 37 miles. The bike trails are well-designed and are sustainable designs when well maintained.

The Indiana Trail Rider Association helps with horse trail maintenance at the Park. Horse trail maintenance and repair often requires heavy equipment, which means that individual volunteers using rakes, shovels, etc. have limited capability when working on horse trails. The existing horse trails are not as well laid out, and often follow old county roads, fire breaks, or other pre-existing path without being designed especially for horse traffic. The Park staff provides the heavy equipment for these repairs as resources allow.

Occasionally, the Park receives an allotment for supplies and materials that are needed for trail preventative maintenance work, though those allotments do not cover the hiring of staff to complete the repairs. When

major trail restoration is needed, IDNR is careful to consider the appropriate cultural resources and archeological permits needed before proceeding.

More funding for hiking trails and horse trail maintenance would be beneficial for minimizing soils loss from trails. The hills in the Park are steep, and erosion occurs, even in the heavily forested areas of the park, so care and maintenance of trails is an ongoing need.

3.2.3 Indiana Department of Natural Resources: Division of Forestry

The IDNR Division of Forestry budget covers horse and hiking trails, including inspections of the trails and stream crossings. IDNR sends a staff member out once per week to check on trails. The Hoosier Hikers Council also helps with trail maintenance on Division of Forestry properties to keep trails open. An additional seasonal staff member would help IDNR Division of Forestry be able to respond more quickly to needs and keep up with trail repairs during peak season.

3.3 Stream crossings

3.3.1 Indiana Army National Guard

Indiana Army National Guard (INARNG) has a vested interest in the water quality entering and leaving the Camp Atterbury property. Sustaining the land is a vital activity because the land is the only property for training. INARNG consistently uses buffered setbacks on streams, maintaining 100 feet of buffer on both sides of perennial streams as the primary strategy. On intermittent streams, a 50-foot buffer is applied. The training live fire range is a large tract of land cut into a contiguous tract of hardwood forest. The range is an intense use of training land, which is in the Lake Monroe watershed. The areas that drain to the Lake Monroe are mostly forested. INARNG monitors the water quality leaving the property and reports that the water quality leaving the property is better than the stream quality entering the property for several parameters.

During training exercises, soldiers are trained not to drive through streams for maneuvering except at designated, hardened crossings. Where stream crossings are made, INARNG seeks to construct each crossing with best management practices (BMPs), such as three-sided culverts, to minimize stream erosion and maintain natural stream bottoms. Also, the INARNG standard training procedures instruct the soldiers to not discharge pyrotechnics near or in surface waters.

INARNG controls the number of vehicle crossings, and uses a variety of practices in the design of those crossings. Cable-concrete crossings are good for vehicle crossings, but expensive and difficult to install correctly. Cable-concrete crossings are very heavy and cumbersome to work with, but very effective at protecting the bottom of the stream. Fish and water can flow through the crossing. The budget to implement this best practice is limited, which sometimes means that culverts or bridges must be made with other designs. Army Construction Engineering Research Lab researches and designs solutions similar to the cable-concrete stream crossings so that the Army will be able to implement best management practices that sustain the environment while achieving the military mission.

With the training that occurs at the range, there is intense use of the stream crossings, including daily military traffic. Being at the upper end of the watershed, INARNG seeks to replace some of the water crossings with three-sided culverts. As existing stream crossing designs reach the end of their life cycle, INARNG will replace

them with improved designs such as the three-sided culverts that stabilize the stream bed while allowing water and aquatic life to pass.

3.3.2 US Forest Service Hoosier National Forest

The Hoosier National Forest Land and Resource Management Plan is utilized for stream crossing mitigations. Stream crossings are addressed by many personnel on forest. Engineering addresses maintenance and construction of forest road and county road stream crossings within forest property. Recreation addresses trail crossings for maintenance and construction. The Fisheries Biologist and Hydrologist also address stream crossings based on aquatic organism passageways (AOP) needs and restored hydrologic function of streams.

The HNF uses BMPs for road location and design, road construction, stream crossings, snow removal, and storm damage as they manage access roads. Similar BMPs apply to trail design, installation, and maintenance; the objective is always to stabilize areas disturbed by management activities as soon as is practical.

AOP's are designed to restore natural hydrologic functions which allow a minimum of bank-full flows through bigger designed structures. This reduces channel incision and erosion/sedimentation. This restored hydrologic function allows for aquatic organisms to pass through non-perched structures at low flows. Keeping aquatic organisms healthy and established throughout waterways can indicate the water quality changes in the future.

Crossing construction and maintenance are designed to mitigate sedimentation and erosion. The HNF regularly conducts site assessments when work is conducted within the forest boundary.

A section of the National BMP program and its monitoring focuses on roads stream crossing maintenance or construction within aquatic management zones (AMZ). An AMZ is an area within or nearby a body of water such as: lake, pond, wetland, ephemeral stream, intermittent stream or perennial stream. Recent maintenance or construction will be evaluated. This information confirms that the stream crossing maintenance mitigations and monitoring are effective or dictates a need for more adaptive management strategies in the future.

HNF lands are highly fragmented by private land that is interspersed between forest properties, and it is necessary for the USFS to provide access to the property owner through the national forest. When this occurs, the USFS uses BMPs for road location and design, road construction, stream crossings, snow removal, and storm damage as they manage such an access road. Similar BMPs apply to trail design, installation, and maintenance; the objective is always to stabilize areas disturbed by management activities as soon as is practical. To properly apply the BMPs in each location, a site assessment is needed, and the USFS team regularly conducts site assessments when work is happening on their land.

3.3.3 Indiana Department of Natural Resources

As mentioned above, the IDNR Forestry budget covers inspections of horse and hiking trails, including stream crossings. On a weekly basis, an IDNR staff member checks on Forestry Division trails. An additional seasonal staff member would help IDNR be able to respond more quickly to needs and keep up with trail repairs during peak season.

The horse trails at Brown County State Park are heavily used. Horse crossings of creeks exist in numerous places and are especially challenging to maintain during the rainy seasons. The Park staff would like to have more resources available to monitor and maintain the horse trails.

3.4 Agricultural Lands Managed by DNR

IDNR Monroe Lake has five management areas that are leased to tenant farmers for four years at a time. The tenant farmers are required to maintain a 35-foot buffer along streams and intermittent streams, and the tenants follow a four-year rotation of two years of corn and/or beans, wheat, then fallow. Tenants can use fertilizers and work with IDNR to use herbicides, but manure application and most pesticides are not allowed. Cover crops (except after beans have been planted) and no till are not required. In the leases, there is an opportunity to encourage implementation of more conservation agriculture practices such as no till, as well as more consistent use of cover crops, etc.

Two of IDNR Monroe Lake's agricultural units have been fallow for several years and are returning to successional growth. IDNR seeks to maintain some of these fallow areas in wet hardwood oak-hickory plantings by managing the areas to reduce the amount of softwood maple, cottonwood, sassafras, and sycamore and work towards hardwood forest. Restoring portions of these two South Fork units, especially those in floodways, should be a priority for collaborating.

3.5 Horse manure

At Brown County State Park (Park), the horseman's camp is near Strahl Lake, which drains to Middle Fork Salt Creek, and includes more than 200 horseman's camp sites. During peak summer season, with an average of 3 horses per site, there can be as many as 600 horses in the area. In winter, there are significantly fewer horses.

The primary maintenance for the horseman's camp is mowing the campground for horses and cleaning up horse manure. Previously, the horse manure was stockpiled for spreading in a field within the Park. The manure stockpile was vulnerable to water ponding following heavy rain events, and the ponded water would eventually trickle out and make its way to nearby waterways. The Indiana Department of Environmental Management (IDEM) reviewed the stockpiling practice and cited concerns of potential bacterial contamination in the waterways. Following their review, IDEM asked the Park to undertake a contract to have the horse manure hauled away. This practice of hauling the horse manure away from the site began in 2019. Currently, the Park staff are exploring options to have farmers haul it away for use in their fields, as the contract for hauling the manure represents a large expense for the Park.

3.6 Shoreline erosion

Around Lake Monroe, a significant source of sediments is coming from shoreline. The first so many feet from the shoreline is very difficult to protect because wave action constantly erodes the shoreline.

3.6.1 US Forest Service Hoosier National Forest

The Hoosier National Forest observes shoreline erosion on their property that is adjacent to the lake. A specific example is the peninsula in the Charles C. Deam Wilderness area. It experiences heavy recreational use and the shoreline erosion is very difficult to stop. The Recreation staff within the Hoosier National Forest continues to seek new ideas to address this. One approach would be to consider a soft "hardening" of the

shoreline, in contrast to the hard rip rap that bounces waves from one shoreline to another, as opposed to softening the wave action altogether. This is an area where a solution is not readily apparent, and the Hoosier National Forest staff continue to pursue new ways to implement erosion control that are economically viable and consistent with managing the area for Wilderness values.

3.6.2 Indiana Department of Natural Resources

At the IDNR Division of State Parks, Monroe Lake location, riprap has been used regularly to minimize shoreline erosion along Lake Monroe for many years. However, there has been very limited funding for shoreline erosion since the last large allotment of \$400,000 in 1989. Increasing high water events due to spring rains and runoff over the last 40 years means that even places where shoreline erosion projects have been previously implemented are being compromised as water levels are rising above these formerly stabilized areas. IDNR also notes that, to complete any shoreline protection work, they must receive USACE's approval for work at or below 530-ft pool elevation.

3.7 Boater Pump-Out Facilities

IDNR has found that the boater pump-out facilities are effective at protecting water quality in Lake Monroe. For larger boats that have permanently installed toilets on board, the wastewater sanitation tanks must be emptied periodically. By providing a free place to empty wastewater at the boat launch site, DNR helps assure that wastewater is treatment and managed according to Indiana Department of Environmental Management (IDEM) requirements and does not end up in the lake.

In 2016 IDEM provided a grant to replace the pump out facility at Paynetown State Park. The Marina at the Cutright State Recreation Area, the Inn at Four Winds, and the Two Herons boat launches also have pump-out facilities. A fourth pump out, the Lake Monroe Sailing Association, recently received a grant from IDEM to have a pump-out system installed; this station is now installed and operational. Any organization receiving an IDEM grant is required to have a permit to operate the pump-out facility, and IDEM conducts an annual inspection. Facilities cannot charge to pump out if they have been built using IDEM grant dollars.

In the early 1990s, IDNR conducted on-boat inspections for boats with toilets and gave inspection stickers. In addition, boaters may bring reports to Conservation Officers, who then will follow-up and conduct an inspection on boats where concerns have been identified. Occasionally the Conservation Officers will walk the docks. During the tenure of the IDNR staff who participated in this survey, they have never found a boat that has dumped its wastewater in Lake Monroe. The boaters do a good job of self-policing.

3.8 Other practices

3.8.1 U.S. Forest Service Hoosier National Forest

The US Forest Service (USFS) also uses the National BMP Monitoring Program and Hoosier National Forest Land and Resource Management Plan as stated above to address mitigations for other management practices such as: chemical use for invasive species control, prescribed burning, and facilities maintenance and construction. . Prescribed burning assessment would evaluate revegetation, erosion, and mineral charring. Facilities example would be a utility right-away assessment of erosion/sedimentation and vegetation establishment during routine utility company maintenance. Random or selected sites are assessed to ensure no adaptive management strategies need to be implemented and current BMPs are effective.

3.8.2 Indiana Department of Natural Resources

IDNR Division of Forestry mentioned that prescribed burning is an important tool to control invasive species. While IDNR Division of Forestry has reasonable funding for prescribed burning, it can be expensive for private landowners.

IDNR Division of State Parks noted that trees and log jams will redirect flow into the banks. If not removed, a log jam grows bigger every year and erodes the stream bank. It is expensive and labor intensive to remove these jams. Recently IDNR has not had the staffing to remove these jams as they have in the past. IDNR would like to collaborate with soil and water conservation leaders to help local and small landowners with log jam removal.

3.9 Summary of Land Uses and Management Practices

From these conversations with the organizations that manage public land within the Lake Monroe watershed, a summary matrix of the most frequently mentioned practices and which organizations use them follows. Each organization maintains and follows internal guidance for the management practices, in addition to the local, state, or federal regulations that may apply the circumstance.

Table 6 Public Land Managers in the Lake Monroe Watershed ⁷ : Most Frequently Mentioned Management Practices					
Organization/Practice	Indiana DNR Division of Forestry	Indiana DNR Brown County State Park	Indiana DNR Monroe Reservoir	Indiana Army National Guard, Camp Atterbury	US Forest Service Hoosier National Forest
Forest Management & Timber Harvesting	●			●	●
Trail Maintenance	●	●			●
Stream Crossings		●		●	●
Agricultural Land Management			●		
Horse manure		●			
Shoreline erosion			●		●
Boater pump out			●		

⁷ The US Army Corps of Engineers was not included in this table because, although they own the land around the lake (as established by a specific water level designation), the Indiana Department of Natural Resources has been granted a long-term lease to manage the property as a state recreation area (Monroe Reservoir).

Table 6
 Public Land Managers in the Lake Monroe Watershed⁷:
 Most Frequently Mentioned Management Practices

Organization/Practice	Indiana DNR Division of Forestry	Indiana DNR Brown County State Park	Indiana DNR Monroe Reservoir	Indiana Army National Guard, Camp Atterbury	US Forest Service Hoosier National Forest
Other (e.g., log jams, invasives, prescribed burns, species of concern)	●		●	●	●

4.0 Private Lands & Best Management Practices

Private individuals own and manage an estimated 58% of the land in the Lake Monroe Watershed. For this survey, three private landowners were contacted to better understand how each applies conservation practices on their properties.

4.1 Private Landowner Management Practices

To initiate the process, TNC shared a list of questions, then scheduled a virtual meeting via Zoom with the landowner. Summaries of the responses to the survey questions, which include notes from the conversation with each landowner, are included in Appendices M-O.

Of the three landowners contacted, two have property in Brown County and another in Jackson County. Two raise livestock (one of these two is phasing out their livestock operation), and the third landowner purchased a farm so that he could replant the open land with trees and convert it to forest.

Management practices used on these three properties or referenced by the landowners include:

Table 7
Private Landowners in the Lake Monroe Watershed:
Management Practices Used

Agronomy

- Cover crops, especially in bottomland areas
- No till
- Soil scientist assistance, using a precise formula for fertilizer application

Supporting programs: NRCS and SWCD programs and funding. Conservation Reserve Program (CRP), administered by Farm Services Agency (FSA), farmers enrolled in the program agree to remove environmentally sensitive land from agricultural production and plant species that will improve environmental health and quality, in exchange for a yearly rental payment. Contracts for land enrolled in CRP are 10-15 years in length

Livestock & Grazing

- Feeding pads for cattle (heavy use area protection)
- Fencing
- Ponds for cattle watering and runoff control
- Hay production in place of raising cattle or crop production

Supporting programs: NRCS and SWCD programs and funding. Grassland reserve program (GRP), a voluntary conservation program that emphasizes support for working grazing operations, enhancement of plant and animal biodiversity, and protection of grassland under threat of conversion to other uses.

Forest Management

- Timber harvest with oversight to ensure BMPs such as grading and lining logging trails, water bars, grading and reseeding are implemented
- Reforestation
- Habitat restoration
- Invasive species removal: many invasive species are becoming endemic on private property

Table 7
Private Landowners in the Lake Monroe Watershed:
Management Practices Used

Supporting program: IDNR Classified Forest and Wildlands Program, where the land is managed for timber production, wildlife habitat, and the protection of watersheds, while conserving other natural resources. . NRCs and SWCD programs and funding.

Buffers & Streams

- Riparian corridor plantings (e.g., riparian buffer, filter strips)
- Streambank stabilization

Supporting programs: Conservation Reserve Program (CRP), which incorporates filter strips and grassed waterways. NRCs and SWCD Filter Strip, Riparian Forest Buffer and Riparian Herbaceous Cover practices.

Infrastructure & Human Access

- Horse trail improvements & maintenance
- Driveway maintenance
- Road maintenance

4.2 Private Landowner Experience, Observations and Ideas

The private landowners were asked for their observations about helpful practices being used on other properties, challenges that landowners face, and for their ideas on how to encourage more landowners to adopt land management practices that help protect Lake Monroe and its watershed. Collectively, these private landowners have had positive experiences and many successes with the practices they have implemented on their land.

One landowner has implemented feeding pads, cross fencing to prevent overgrazing, and ponds on his property. Pond construction was previously a higher priority with NRCs; since the time the pond was installed on the farm so the cattle could drink from it, the pond has been helpful for keeping water from the pastures from running directly into streams. Watering systems for the cattle, also called spring developments, have also been very helpful for keeping cattle out of the streams on this property.

Another landowner owns a lot of bottomland that has been reforested, which he did to 1) improve the forest, 2) to allow timber production in the long term, 3) provide wildlife habitat as the timber stand matures. This land is enrolled in the classified forest program with Indiana DNR. This means that, in exchange for developing a forest management plan by working with a District Forester and implementing BMPs, the enrolled land has low property taxes. The landowner appreciates the opportunity to get input from a professional to help manage the forest to achieve his goals for the forest. During a past timber harvest on his land, the work was planned for late summer or early fall to work in dry conditions and the Indiana DNR Division of Forestry District Forester observed the contractor’s work to ensure that Best Management Practices (BMPs) were followed. In another harvest, the landowner required the contractor to close-out the tree harvest work with proper water bars on slopes, followed by grading and reseeding afterwards. This landowner’s experience is that most loggers will do a good job of BMPs if they know it is important to the landowner to do so.

A third landowner reflected on his past and current management practices. In the past, fodder on his farm would be removed from the fields and put into silage, a practice which left the land bare. With assistance

from the Brown County NRCS, the landowner now applies cover crops, which has been helpful to stop washes over the farm fields. With only a thin layer of topsoil, cover crops help retain this valuable resource on his farm. On the cropland in the Lake Monroe watershed, the landowner had practiced minimum till for many years and now practices no-till, leaving corn fodder on the field and over-planting with cover crop. This landowner now also works with a soil scientist to develop a precise formula for fertilizer application to the crops so he can avoid investing in fertilizer that would be vulnerable to runoff.

Some additional observations provided by the private landowners included:

- Sharing about the importance of conservation practices (and implementing those practices) is more difficult if the landowner doesn't earn a living from the land (e.g., absentee landowners).
- When prices of corn and soybean crops increase, farmers like to plant. During these times, the incentives to use best management practices are not always enough to balance the higher value of the crops.
- A lot of land in the Lake Monroe watershed is in Brown and Jackson counties, though these counties do not benefit from Lake Monroe. Landowners in the rural areas of the watershed and the users of Lake Monroe are disconnected and connecting the dots for these different users' perspectives is important.
- The tax base in Brown and Jackson Counties is less than that in Monroe County. Investing in the Brown and Jackson County portions of the watershed would help demonstrate the importance of these lands and counties for watershed protection.
- Some gravel roads in rural areas wash out with each heavy rain or flood, then every car that passes through it generates more sediment. County road departments are not adequately funded to address roads in this condition.
- Log jams in the creeks create dams that the cause fields to flood. When this happens, large flows can wash away creek banks and increase soil loss from the fields. Large equipment is needed to remove log jams and property access can be difficult, either due to the terrain or in obtaining permission from property owners. Log jam removal is dangerous work.
- Stream bank stabilization is not as simple as putting stone along a stream bank and is expensive to do well.

4.3 Additional Options for Private Landowners

A few additional options are available to private landowners for protecting or restoring the legacy of the land that they own.

4.3.1 Land Management

In addition to the programs offered by the US Department of Agriculture's NRCS and FSA organizations, where landowners are supported in applying best management practices, the Forest Bank offers another approach for woodland owners in the hills of Brown County. The [Forest Bank](#) is a conservation alternative from The Nature Conservancy (TNC) in Indiana that is intended to conserve working woodlands while preserving opportunities for recreation, wildlife habitat, natural beauty and solitude.

Woodlands enrolled in the Forest Bank remain private property. Landowners can still hike, hunt, fish, cut firewood and use their woodland just as they normally would as long as the health and growth of timber is not

hampered. The Forest Bank program provides consistent, professional management for woodlands to protect biodiversity, wildlife habitat, and timber production; 10 and 30-year management agreement options are available. The Forest Bank is certified sustainable by the Forest Stewardship Council.

4.3.2 Conservation Alternatives

Some landowners are interested in preserving their land while maintaining ownership. In this circumstance, a conservation easement may be appropriate. With a conservation easement, a landowner voluntarily makes an agreement to permanently restrict the amount and type of development that can occur on their property. Conservation easements become part of the deed to the property; the recorded restrictions that limit the use of the land are permanent and remain with the land regardless of who owns the land in the future. Conservation easements can be held and enforced by the entity that holds them.

Some landowners may wish to preserve their land by donating it to a public agency or land trust to become part of a park, public land, or nature preserve. In the Lake Monroe watershed, the Indiana Department of Natural Resources, [Sycamore Land Trust](#) and [The Nature Conservancy](#) are among several organizations that hold conservation easements and own and maintain land for permanent wildlife habitat and conservation purposes.

5.0 Takeaways from the Practitioner Survey

Fifteen conversations were held to gather information for this survey. The following list summarizes points (in no particular order) offered by individual participants, repeated feedback about how best management practices come into practice, and some thoughtful notes about why this work is a challenge.

1. Many participants (8 of 15) mentioned awareness and education as the first step to engaging more landowners (or land users) in best management practices (BMPs). As one landowner said, “While incentive programs always help, the first and most important step is that the landowner wants to implement conservation practices on their land.”
2. On private land, the most common BMPs applied in the watershed result from the work and outreach of NRCS and the county soil and water conservation districts, who encourage adoption of NRCS conservation practices according to detailed implementation guidelines developed by the NRCS.
3. Landowners with personal ownership and economic ties to their land tend to be more vested in actively managing the land. Sharing information about conservation practices and implementing those practices is more difficult when the landowner doesn’t earn a living or income from the land.
4. For crop producers, when prices of corn and soybean crops increase, farmers will plant. During these times, the conservation practice incentives offered by the NRCS and SWCDs are not always enough to balance the higher value of the crops, and conservation practices may be reduced due to the higher crop value.
5. Most (77%) of the Lake Monroe watershed is in Brown and Jackson counties. Landowners in the rural areas of the watershed are disconnected from the users of Lake Monroe (e.g., in Bloomington or on

the lake). These rural counties do not benefit from Lake Monroe as much as Monroe County. Helping to connect the dots for these different users' perspectives is important work.

6. The tax base in Brown and Jackson Counties is less than that in Monroe County. Investing in the Brown and Jackson County portions of the watershed would help demonstrate the importance of lands in the rural counties for protection of Lake Monroe.
7. Federal and state-owned or managed properties apply internal standards for best management practices that are used for any work done on their land. These same standards apply to contractors who do work on their land.
8. Most participants (10 of 15) mentioned invasive species as a concern for the health of the lands and habitats in the watershed and are actively working to remove them.



Appendix A
Conservation Practitioner Survey
For Lake Monroe 319 Watershed Plan
 Cara Bergschneider, District Conservationist
 Brown County NRCS
 April 6, 2020

1. What are the most effective practices you have used?

Cover Crops, Brush Management, Forest Stand Improvement, Forest Management Plan

2. What practices have not worked?

Honestly, I would say that all of the conservation practices work effectively for the intended purpose when they are implemented correctly and maintained appropriately. The failure of conservation practices occurs mainly through mismanagement of the practice.

3. Are there successful conservation practices being implemented by other agencies or groups that are not coordinated through you?

I will defer to Dan Shaver's and Allison Shoaf's response here so as not to duplicate answers.

4. What current levels of investments in conservation are being implemented through your programs?

Below are the number of dollars obligated for conservation program contracts in Brown County for the last 5 years:

- 2015: \$101,000
- 2016: \$62,100
- 2017: \$ 252,800
- 2018: \$204,900
- 2019: \$130,100

5. What agencies are funding the current level of conservation in your programs?

NRCS: 100% of program funding
 NRCS partners with National Wild Turkey Federation to employ a Forester to assist with forestry related practices and education in a 10 county region (Monroe included).
 NRCS partners with Pheasants Forever to employ a Wildlife Biologist to assist with wildlife related practices and education in a 12 (??) county region (Monroe included).

6. Are investments in conservation mandatory if funding is provided, or are all practices voluntary regardless of whether funding is provided?

The goal of NRCS's primary program, EQIP, is for the NRCS to provide 75% funding for a conservation practice and the customer to provide 25%.
 All NRCS programs and practices are voluntary.

7. What kind of work would you like to implement to better protect Lake Monroe from nutrients and sediments in runoff?

EDUCATION!!! On all conservation practices that improve soil and water quality while reducing soil erosion but especially on livestock focused conservation practices.
It would also be helpful to have a NRCS staff member dedicated fully to Brown County so there is a physical presence in the county.

8. What range of potential investments would help you implement desirable, but currently underfunded, best practices?

9. Questions/Comments



Appendix B
Conservation Practitioner Survey
For Lake Monroe 319 Watershed Plan
 Charles Garrett, District Conservationist
 Jackson County NRCS
 May 4, 2020

1. What are the most effective practices you have used?	Cover Crops, Brush Management, Waterways, Access Control (which includes Fencing), Prescribed Grazing, Livestock Pipeline and Waterers,
2. What practices have not worked?	When done to the specification we provide the practices work. NRCS has been around long enough and made enough mistakes with enough failures that we've narrowed down our practices to those that get results.
3. Are there successful conservation practices being implemented by other agencies or groups that are not coordinated through you?	YES! Our Soil & Water Conservation District also implements seeding practices that serve our county quite well.
4. What current levels of investments in conservation are being implemented through your programs? (This was sent as a separate attachment)	
5. What agencies are funding the current level of conservation in your programs?	NRCS: Funds nearly 100% of program funding SWCD also has acreages in prevent planting after the flooding of 2019.
6. Are investments in conservation mandatory if funding is provided, or are all practices voluntary regardless of whether funding is provided?	The goal of NRCS's primary program, EQIP, is for the NRCS to provide 75% funding for a conservation practice and the customer to provide 25%. All NRCS programs and practices are voluntary.
7. What kind of work would you like to implement to better protect Lake Monroe from nutrients and sediments in runoff?	EDUCATION!!! On all conservation practices that improve soil and water quality while reducing soil erosion.
8. What range of potential investments would help you implement desirable, but currently underfunded, best practices?	Jackson County could use a lot more programs that assist in preventing or slowing stream bank erosion issues. It is a high demand issue that NRCS cares about but doesn't have practices offering financial assistance.
9. Questions/Comments	



Appendix C
Conservation Practitioner Survey
For Lake Monroe 319 Watershed Plan
 Cara Bergschneider, District Conservationist
 Monroe County NRCS
 April 6, 2020

	<p>1. What are the most effective practices you have used? Cover Crops, Brush Management, Nutrient Management, Access Control (which includes Fencing), Prescribed Grazing, Livestock Pipeline and Waterers, High Tunnels</p>
	<p>2. What practices have not worked? Honestly, I would say that all of the conservation practices work effectively for the intended purpose when they are implemented correctly and maintained appropriately. The failure of conservation practices occurs mainly through mismanagement of the practice.</p>
	<p>3. Are there successful conservation practices being implemented by other agencies or groups that are not coordinated through you? YES! Invasive species control through MCIRIS; wildlife-focused practices through USFWS; forest management through TNC; Forest, wildlands and wetland management through Sycamore Land Trust; Conservation practice education through Purdue Extension; Urban conservation through Neighborhood Tree Planting Project, City of Bloomington Parks and Rec and Bloomington Community Orchard; Small farm conservation practices implementation and education through IU Campus Farm; Classified Forest and Wildlands program through DNR; invasive species control, identification and replacement through Southern Indiana Cooperative Invasive Management (SICIM). I'm sure I am forgetting groups- these are just what come to mind immediately. Aren't we lucky in Monroe County!!!</p>
	<p>4. What current levels of investments in conservation are being implemented through your programs? Below are the number of dollars obligated for conservation program contracts in Monroe County for the last 5 years: 2015: \$122,635 2016: \$81,811 2017: \$ 301,339 2018: \$141,444 2019: \$445,523</p>
	<p>5. What agencies are funding the current level of conservation in your programs? NRCS: 100% of program funding NRCS partners with National Wild Turkey Federation to employ a Forester to assist with forestry related practices and education in a 10 county region (Monroe included). NRCS partners with Pheasants Forever to employ a Wildlife Biologist to assist with wildlife related practices and education in a 12 (??) county region (Monroe included).</p>
	<p>6. Are investments in conservation mandatory if funding is provided, or are all practices voluntary regardless of whether funding is provided?</p>

The goal of NRCS's primary program, EQIP, is for the NRCS to provide 75% funding for a conservation practice and the customer to provide 25%.
All NRCS programs and practices are voluntary.

7. What kind of work would you like to implement to better protect Lake Monroe from nutrients and sediments in runoff?
EDUCATION!!! On all conservation practices that improve soil and water quality while reducing soil erosion.

8. What range of potential investments would help you implement desirable, but currently underfunded, best practices?

9. Questions/Comments



Appendix D
**Conservation Practitioner Survey
For Lake Monroe 319 Watershed Plan**
Allison Shoaf, District Manager
Brown County SWCD
March 16, 2020

1. What are the most effective practices you have used?

The Brown County Soil and Water Conservation District (BCSWCD) works closely with the Natural Resources Conservation Service to implement BMPs because the NRCS has more funding. Since the farm community in Brown County is relatively small, the availability of services is spread by word of mouth. Newsletters and site visits are also used to communicate programs.

On a small-scale using a local grants program, the BCSWCD funds heavy-use area pads (HUAP) and rain catchment systems. If installed properly, these are effective for small scale. Heavy use area pads in areas where livestock congregates and waters – add a layer of gravel and limestone over the soil so that accumulated mud can be cleaned. Cover crops are better for broader scale projects.

Due to lack of funding, BCSWCD does not monitor water quality and there is no mandatory follow-up for farmers. BCSWCD measures projects by defining how the practice was installed (1st measure of success); designs are usually simple (e.g., pollinator garden) and the measure is to complete the installation per the design.

Each small grant program lasts one year, and there is no mandatory follow-up after that. BCSWCD would like to get more funds in this program and have had applications for grant money every year for many years.

There are more smaller farms in the area; farmers provide feedback that the HUAPs are helpful. BCSWCD does an 80/20 cost share. Projects typically cost ~\$2K but can be up to \$6K. BCSWCD also funds rain catchment systems for barns or outbuildings to help reduce runoff with HUAPs.

Process for cover crops: when seed is planted, BCSWCD goes out after 3 weeks to check that the seed has sprouted, and the farmer provides receipts for the seed. Cover crops have a different cost share program.

Brown County has a lot of land to implement practices on but needs more awareness and education. Due to much of the county being heavily forested, there are many forestry projects managed by the BCSWCD.

The Mini grant program supports any conservation practices, including projects for forest landowners. Mini grants of up to \$2000-\$5000 are available for BMPs, with a total of \$10,000 available.

2. What practices have not worked?

Some practices – like filter strips are not sought after by the landowner. Requires an area of land to be taken out of production so landowners do not request this often. Cost-share assistance is offered through other programs but has not caught on because BCSWCD doesn't see enough interest in filter strips in Brown County.

Best management practices (BMPs) for livestock are not implemented enough either. Owners are concerned that practices are really affecting their operations and therefore are not interested. There is also a general lack of awareness on the part of livestock farmers about the problems associated with improper farm practices.

For forest timber sales, if landowners don't require a logger to do BMPs, then (after a harvest) talk to the USDA Natural Resources Conservation Service (NRCS), there is an 18-month lag before NRCS can make funding available to the landowner. Often in these situations, water bars would help protect runoff from areas where forests have been cut. With the Federal programs, there is a 1.5-year timeframe before you can get funds. SWCDs can work more quickly.

Landowners often come to the SWCD after improper forestry practices have led to problems, and it would be cheaper and more effective if landowners came to the district for advice before logging. If SWCDs had more money, they could help applicants correct erosion immediately, instead of a year from the time of occurrence.

Stream bank stabilization- NRCS no longer funds these programs. They are expensive efforts, and there are a lot of failed projects.

Timber stand improvement and invasive species management are implemented but they are understudied in forested settings.

Proper stream crossings and water bars on forested properties are underutilized but should be implemented more. Farmers are unlikely to use these practices unless advised by their consultant. Farmers may not be educated in the need for these practices.

3. Are there successful conservation practices being implemented by other agencies or groups that are not coordinated through you?

SWCD is generally aware of the status of other programs and agencies (e.g., USFWS will fund wildlife projects such as pollinator habitat; IDNR also has funding). NRCS has been the most consistent funding agency on an annual basis. Projects from these other organizations may be implemented without the participation of the SWCD.

4. What current levels of investments in conservation are being implemented through your programs?

With the small grants program, BCSWCD had 2 applications in 2017 and 5 applications in 2019. Funding includes:

- \$10K for mini grant program, comes from the state of Indiana, and funding is fairly guaranteed each year

- Another grant funded through the Clean Water Indiana (CWI) grant program. For the past 3 years, BCSWCD has had an additional \$6K for invasive species removal.
- An additional \$2-3K is dedicated for cover crops from CWI funding.

So, on average, about ~\$15K in local funding available per year. This funds approximately 8-10 projects, with an average grant of about \$1K. The landowner will pay up front, and their work will count as match for the grant. SWCD pays 80% of a project, while the owner pays 20%.

5. What agencies are funding the current level of conservation in your programs?

From NRCS, funded projects were valued at \$90K in 2018 and \$144K in 2019.

Most funding is government sourced. South Central REMC does have some small funding sources but the only programs available to individual landowners are through the BCSWCD.

Private funding from the community foundation or REMC has been for invasive removal and educational signage. A recent example is for the Native Woodland Project and the project was implemented on school property.

6. Are investments in conservation mandatory if funding is provided, or are all practices voluntary regardless of whether funding is provided?

All programs are voluntary thru NRCS, SWCDs, and others. The only time that projects are mandatory is if there is mitigation required. SWCDs do not provide cost-share with mitigation projects.

A Rule 5 permit is required for construction in county. The business owner or contractor must be responsible for Rule 5 permit. Some contractors do a good job protecting water quality, but not all. BCSWCD tries to be eyes and ears on the ground, though does not always see the project in time.

It is important to get the best practices in place before it rains. The enforcement is up to the Indiana Department of Environmental Management (IDEM), but sometimes there is a lag in response time when concerns are raised.

County regulates drains and drainage ditches. Brown County does not have a drainage or ditch board. Jackson County might have a board.

7. What kind of work would you like to implement to better protect Lake Monroe from nutrients and sediments in runoff?

HUAPs could use more funding and more education for livestock owners. All have an impact in Brown County because animals are often confined to a small pasture. There needs to be more exclusion of livestock from streams, so funding for fencing and stream crossings is needed.

More cover crops are needed, although BCSWCD will need to find out from farmers what it would take to do more cover crops.

For forestry practices: soil stabilizing/water bars on skid trails, seeding after timber harvest (a really simple, low cost item!), stream protection, stone down near crossings would be good additional practices to encourage more of.

Best bang for the buck: education would be crucial in the beginning to raise awareness. Currently, there is not a demand from livestock owners wanting to implement BMPS. The BCSWCD could not identify anyone they consider to be model farmer for conservation practices. Only 5 farmers in the county have large production areas where the farmer grows and harvests crops. Hobby farms are also a big concern because they are not as likely to be aware of erosion issues as traditional farmers. Agritourism – hobby farms for people to visit can also be problematic because high density livestock live on poor soil and conservation is not currently a high priority in this business.

8. What range of potential investments would help you implement desirable, but currently underfunded, best practices?

Receiving \$20-30K/year above the \$10K that BCSWCD receives from the state would go a long way. However, receiving significantly more money would be difficult for their current staff to manage. For example, having \$100K available would require additional staffing to manage the projects.

9. Questions/Comments

How do people start BMPs? BCSWCD works closely with NRCS. NRCS programs are what BCSWCD promotes because funding is more consistent.

Word of mouth is how people find out about the programs. Crop or forestry consultants refer landowners to NRCS and BCSWCD. New people find out through workshops, newsletters, and landowner site visits where BCSWCD makes others aware of funding available.

NRCS has a list of BMPs that are possible. SWCD also funds a lot of pollinator projects. Depending on the location of the pollinator garden, it may or may not have a great impact on water quality as these are not necessarily along streams.

Driveway construction and maintenance and trails for logging or recreation are also concerns for water quality. Often, projects don't have drainage or culverts causing gravel and sediment to enter roads and streams. This would be a potential BCSWCD opportunity to help with water quality. Need to determine whether it is a water quality improvement versus personal property improvement. A driveway won't be funded through NRCS, so it might be more suited to a local mini grants program. NRCS programs can help with forest trails and recreation trails.



Appendix E
**Conservation Practitioner Survey
For Lake Monroe 319 Watershed Plan**
Terry Ault, District Manager
Jackson County SWCD
March 16, 2020

1. What are the most effective practices you have used?

The Jackson County SWCD (JCSWCD) focuses almost exclusively on cover crops. In 2019, JCSWCD provided cost share for about 1,000 acres of cover crops. In previous years, grants provided funding for cover crops on 500 to 1,000 acres. Grants for 2020 will (cut-likely) offer landowners cost-share of \$20/acre for cover crops up to 100 acres/person. The total grant amount is \$40,000, shared with Lawrence County. JCSWCD portion is for cover crops (3-year grant and hope to complete in 1 year). Asked for \$80K in funding and received half of the request.

Some farmers see value in cover crops and will stick with it even if they don't get into a cost share program. Multiple farmers keep coming back for funding.

Funding is a great resource in getting more cover crops on the ground. The JCSWCD is not aware of a need for other conservation practices because they don't survey landowners.

The JCSWCD has a grant to get log jams out of the river and is also active with the local Cooperative Invasive Species Management Area (CISMA) helping with invasive weed control.

JCSWCD rents no-till drills, straw crimpers, and other equipment to farmers to assist with conservation farming practices. This rental equipment is available for farmers to rent.

Charles Garrett, the new USDA Natural Resources Conservation Service (NRCS) representative, started in April.

2. What practices have not worked?

JCSWCD has only worked with cover crops. Farmers turn in invoices and their seed tags, then JCSWCD checks to see that the right amount of seed has been applied for cover crops before payment is made.

3. Are there successful conservation practices being implemented by other agencies or groups that are not coordinated through you?

Through NRCS, landowners can get support for timber stand improvement as well as for other agricultural best management practices (BMPs) beyond cover crops. NRCS has other programs and can provide better cost share rates for waterway improvements, filter strips, cattle watering systems, heavy-use pads, roof runoff, access roads.)

NRCS provides the SWCD office space where Terry works.

NRCS works with the Indiana Department of Natural Resources (DNR) forester and wildlife biologist to develop forestry plans and wildlife enhancements.

<p>Requests for funding and support for fencing installation go to NRCS.</p> <p>The JCSWCD doesn't have any way of knowing the dollar value of private funds invested in conservation practices for protecting water quality.</p>
<p>4. What current levels of investments in conservation are being implemented through your programs?</p> <p>State funds are provided for SWCD operating costs through the Clean Water Indiana (CWI) grant. JCSWCD uses the funding of about \$10K from the state of Indiana for office supplies, equipment repair, and cover crops.</p> <p>CWI grant funding of \$20K is dedicated for cover crop implementation, and forage and biomass plantings. Lawrence county landowners mostly request for forage and biomass plantings and Jackson County landowners request cover crops.</p>
<p>5. What agencies are funding the current level of conservation in your programs?</p> <p>Clean Water Indiana and JCSWCD are the primary funders of JCSWCD work.</p>
<p>6. Are investments in conservation mandatory if funding is provided, or are all practices voluntary regardless of whether funding is provided?</p> <p>All programs through the JCSWCD are voluntary. Email newsletter, Facebook, newspaper articles, are the primary ways that SWCD advertises in Jackson County.</p>
<p>7. What kind of work would you like to implement to better protect Lake Monroe from nutrients and sediments in runoff?</p> <p>JCSWCD believes cover crops, filter strips along the creek banks and grassed waterways would work best to capture sediment, which would help protect water quality. Not as many farmers come to SWCD from the Lake Monroe watershed area. Most participants in their programs are from the cropland areas outside of the Lake Monroe watershed.</p>
<p>8. What range of potential investments would help you implement desirable, but currently underfunded, best practices?</p> <p>Filter strips and grassed waterways would be beneficial. Keeping cattle out of streams by adding watering tank systems for farms and potentially heavy-use pads. JCSWCD would want to survey downstream farmers and agricultural landowners to assess interest in implementing other best management practices.</p>

9. Questions/Comments

The farmers who most stand out as cover crop champions are in the eastern part of the county, outside of the Lake Monroe watershed.

Previously, JCSWCD has been part of a field day with a farmer who has cattle. The owner installed an access road, roof runoff practice (rocks placed under the gutter on the ground to protect the soil), cattle watering system, and believes some fencing. All those practices help to protect streams. In addition, they rotate cattle from one pasture to another to minimize grazing impacts. All these best management practices were projects supported through NRCS.



Appendix F

Conservation Practitioner Survey For Lake Monroe 319 Watershed Plan

Martha Miller, District Manager Monroe County
SWCD and Cara Bergschneider, District
Conservationist Monroe County NRCS

1. What are the most effective practices you have used?

For Monroe county USDA Natural Resources Conservation Service (NRCS): Cover Crops, Brush Management (woody invasive species control that seeks 95% reduction after 3-year treatment period), Nutrient Management, Access Control (which includes Fencing), Prescribed Grazing, Livestock Pipeline and Waterers, High Tunnels (hoop houses for specialty crop production)

Soil and Water Conservation Districts (SWCD) and NRCS have the same customers, are co-housed in office spaces. Offer to support same practices, bigger practices are often deferred to NRCS. Locally, Monroe County SWCD (MCSWCD) has support and funding from Monroe County Stormwater. Smaller projects can be implemented more quickly with MCSWCD.

MCSWCD receives funding from grants, County stormwater, and the state of Indiana. In 2012-2015, the MCSWCD had a 319 grant. Conservation practices in the agricultural world can be brought to bear in urban spaces too.

Top practices for MCSWCD: Invasive species control impacts runoff and erosion, pollinator habitat, forest management, cover crops, row crop practices, critical area plantings. The practices are very specific to the different sections of watershed, meaning that effectiveness of the practice varies from region to region.

2. What practices have not worked?

Honestly, NRCS would say that *all of the conservation practices work effectively* for the intended purpose when they are implemented correctly and maintained appropriately. The failure of conservation practices occurs mainly through mismanagement of the practice.

Smaller crop fields with woodlands nearby makes aerial application of cover crop seed difficult; this can happen in the more wooded areas of Monroe and Brown Counties.

Maintaining the practice is the key part of achieving the conservation goal of the practice.

Cover cropping is relatively inexpensive but is a big management shift in how a landowner is managing their land. Addresses soil quality, soil erosion, wildlife habitat, soil compaction, air quality – there are many benefits from this practice. The education to help landowner continue with the practice is key to keep practice in place after funding is complete.

Grass waterway can be \$1,000-10,000 and is a one-time practice that has a more permanent long-term benefit. By comparison, cover crops can be applied for the same budget, but continued implementation after the cover crops are applied is what leads to success.

Programs with MCSWCD and NRCS are voluntary. Staff work with landowners over long periods of time to continue to work on buy-in for practices. Funding helps those who are most interested to implement.

3. Are there successful conservation practices being implemented by other agencies or groups that are not coordinated through you?

YES! Invasive species control through MCIRIS; wildlife-focused practices through US Fish and Wildlife Service (FWS); forest management through TNC; Forest, wildlands and wetland management through Sycamore Land Trust; Conservation practice education through Purdue Extension; Urban conservation through Neighborhood Tree Planting Project, City of Bloomington Parks and Rec and Bloomington Community Orchard; Small farm conservation practices implementation and education through IU Campus Farm; Classified Forest and Wildlands program through DNR; invasive species control, identification and replacement through Southern Indiana Cooperative Invasive Management (SICIM). I'm sure I am forgetting groups- these are just what come to mind immediately. Aren't we lucky in Monroe County!!!

MCSWCD also works to partner with other agencies to promote others' efforts and collaborate on conservation programs.

4. What current levels of investments in conservation are being implemented through your programs?

The NRCS dollars obligated (different than practices implemented) for conservation program contracts in Monroe County for the last 5 years:

2015: \$122,635

2016: \$81,811

2017: \$ 301,339

2018: \$141,444

2019: \$445,523 (includes 200-acre forest for invasive species control and forest stand improvement)

NRCS funding obligated varies with interest of application to participate in programs. It also varies with funding available to Indiana through the federal Farm Bill, and also depends on the relative ranking of proposals received by NRCS (e.g., forest applications compete w/other forestry applications in 23 county area; ranked projects receive funding until all funding in that category is gone). Other applications such as specialty crop applications compete with others from around the entire state. The best applications include producer practices that landowners are most excited to implement on their land. NRCS help applicants assemble strong applications.

Brown County almost always gets funding for forest stand improvement and invasive species removal due to its unique geographic location: it has 303d impaired waters, home of several endangered species, proximity to public lands (has greater impact). On the other hand, Monroe will rank more like other counties due having fewer unique geographic factors.

Smaller acreage farms are predominant in Monroe and Brown Counties. A farm of 200-300 acres is considered a larger farm for Brown or Monroe Counties, while a large farm in other counties would be over 1,000 acres.

<p>For MCSWCD, funding is from a variety of sources: grants, Marion County Stormwater, state of Indiana.</p>
<p>5. What agencies are funding the current level of conservation in your programs? NRCS: 100% of program funding</p> <p>NRCS partners with National Wild Turkey Federation to employ a Forester to assist with forestry related practices and education in a 10-county region (Monroe included).</p> <p>NRCS partners with Pheasants Forever to employ a Wildlife Biologist to assist with wildlife related practices and education in a 12 (??) county region (Monroe included).</p>
<p>6. Are investments in conservation mandatory if funding is provided, or are all practices voluntary regardless of whether funding is provided?</p> <p>The goal of NRCS’s primary program, EQIP (Environmental Quality Incentive Program), is for the NRCS to provide 75% of the funding for a conservation practice and the customer to provide 25% of the resources. All NRCS programs and practices are voluntary.</p> <p>MCSWCD practices are also all voluntary. 75-80% of the work is education, and the remaining 20-25% of the work provides funding to help the landowners implement practices. For a project to be successful in the long-term, it is Important for the landowner to have buy in, whether through their time or own investment.</p>
<p>7. What kind of work would you like to implement to better protect Lake Monroe from nutrients and sediments in runoff?</p> <p>EDUCATION!!! On all conservation practices that improve soil and water quality while reducing soil erosion. And not just NRCS doing the work - others can help too.</p> <p>NRCS has maximized their capacity with the current staff. Interest in and awareness of NRCS programs is very high. Monroe and Brown County NRCS applications are being rolled over into the next year. The local team has requested additional staff: Monroe and Brown County had the 2nd largest number of contracts 2 years ago, and the 3rd highest number of contracts last year. To be able to help more applicants with their applications for funding, more staff would be needed. Brown County customers are at a disadvantage because NRCS staff is not located in their county. People seem to be more comfortable being able to work directly with staff. The local SWCD very successfully refers customers to NRCS for their programs, and Cara spends one day every 2 weeks at the Brown County SWCD office to stay connected with Brown County SWCD and customers interested in programs. Monroe County customers text and email; Brown County customers seem to prefer to visit more in person. There is also more potential for more livestock work in Brown County.</p> <p>Regarding prescribed grazing, fencing to subdivide pastures allows grazing animals to rotate their grazing location (prescribed grazing) to keep root mass intact. External fencing for a livestock operation is not typically funded, so most of the NRCS work is with already established farmers to achieve prescribed grazing. EQIP funding can help if a landowner is converting highly erodible land to pasture. Rotational grazing is a valuable conservation practice, though it is more difficult to implement, because landowners often consider the practice to be adverse.</p>

Helping people understand the connection between healthy soil and the quality of our water. Soil health is so important for healthy water. Fixing water quality is a great goal, and helping soil be healthy is the first step.

8. What range of potential investments would help you implement desirable, but currently underfunded, best practices?

People know about the NRCS programs and are applying. NRCS needs help processing applications from those who are interested to implement the practices.

MCSWCD would appreciate help promoting their local programs. Would also like a technician locally to help with practices in both the urban community as well as to follow up on projects that are being implemented.

9. Questions/Comments

NRCS is leveraging all the federal resources that are available, with the resources that they have available. Potentially, there could be more NRCS funding invested in Monroe County or the Lake Monroe watershed if there was more NRCS staff to assist customers in the application and implementation process. The interest in the NRCS programs exceeds the capacity in NRCS' Southwest Indiana 23 counties that include both Brown and Monroe Counties.

If the local SWCDs were able to have another technician trained to support NRCS, this could be one way to approach the staff need. This may be the approach that Lawrence County has taken.

Lessons learned from Martha's experience with the Bean Blossom Creek 319 project process: a plan was created outside of the soils & water conservation expertise, and the report needed to get the right practices listed in order to qualify for implementation. Eventually Monroe County SWCD hired a watershed coordinator to write plan, a living document. The next phase of funding is 319 implementation dollars, and those are often are started through SWCDs in Indiana. To go after 319 implementation funding, it is important to include what you want to implement. No septic systems should be included; the 319 funding is not available to invest in septic system improvements. If there are MS4 (for cities >10K) that include specific practices in their plan, those same practices cannot be in the 319 plan.

Suggestion for the TNC/FLM team: Incorporate cropland and livestock producer perspectives? Cara can provide a recommendation.



Appendix G
**Conservation Practitioner Survey
For Lake Monroe 319 Watershed Plan**

Jerry Hartley, Chief
Environmental Branch, National Guard Indiana
Camp Atterbury, Department of Defense
June 2, 2020

1. What are the most effective practices you have used to manage your land to protect water quality?

Camp Atterbury is in the northeastern most part of the Lake Monroe watershed. At about 35,000 acres in size, only the southwest corner of the property is within the Lake Monroe watershed. The southwest portion of the property is also near Whippoorwill Woods, a nature preserve owned and managed by The Nature Conservancy. This area in the southwest portion of the property drains to the North Fork of Salt Creek.

Camp Atterbury, together with Muscatatuck, serves as a major training site for the US military “providing realistic venues for live, virtual and constructive training and testing events in order to increase training readiness, attract commercial defense industry participation and build strategic partnerships.”¹ Training is the first mission of Atterbury-Muscatatuck. In addition, the Department of Defense (DoD) places high value on protecting the threatened and endangered species on Camp Atterbury. The US Fish & Wildlife Service (USFWS) regularly partners with Atterbury-Muscatatuck to assist with the protection of habitat and species that live on their properties.

Indiana Army National Guard (INARNG) has a vested interest in the water quality entering and leaving the Camp Atterbury property. Sustaining the land is a vital activity because the land is the only property for training. INARNG consistently uses buffered setbacks on streams, maintaining 100 feet of buffer on both sides of perennial streams as the primary strategy. On intermittent streams, a 50-foot buffer is applied. The training live fire range is a large tract of land cut into a contiguous tract of hardwood forest. The range is an intense use of training land, which is in the Lake Monroe watershed. The areas that drain to the Lake Monroe are mostly forested. INARNG monitors the water quality leaving the property and reports that the water quality leaving the property is better than the stream quality entering the property for a number of parameters.

During training exercises, soldiers are trained not to drive through streams for maneuvering except at designated, hardened crossings. Where stream crossings are made, INARNG seeks to construct each crossing with best management practices (BMPs), such as three-sided culverts, to minimize stream erosion and maintain natural stream bottoms. Also, the INARNG standard training procedures instruct the soldiers to not discharge pyrotechnics near or in surface waters.

A significant portion of the property is forested. For forest management, the INARNG follows Indiana Department of Natural Resources (DNR) and USFWS BMPs. The Indiana bat, a state and federally listed endangered species, lives at Camp Atterbury and the INARNG must manage the property and its activity to protect Indiana bat habitat. INARNG follows the USFWS Bloomington Field Office

¹ <https://www.atterburymuscatatuck.in.ng.mil/>

guidelines for forest management to protect the Indiana bat, and implements BMPs to protect storm water from pollutants. Prescribed burning is used in some areas of the property, generally on open grasslands and ranges. For example, to reduce risk of fires starting and spreading out of control due to a training activity on the fire range, INARNG conducts prescribed burns to minimize available fuel on or near the firing range.

INARNG and the Army maintain a goal to continuously reduce the total pounds of pesticides applied to the property year-over-year. NGI accomplishes this through adaptive management and integrated pest management strategies.

2. What practices have not worked or do not seem efficient?

INARNG controls the number of vehicle crossings, and uses a variety of practices in the design of those crossings. Cable-concrete crossings (example [here](#)) are good for vehicle crossings, but very expensive and very difficult to install correctly. Cable-concrete crossings are very heavy and cumbersome to work with, but very effective at protecting the bottom of the stream. Fish and water can flow through the crossing. The budget to implement this best practice is limited, which sometimes means that culverts or bridges must be made with other designs. Army Construction Engineering Research Lab researches and designs solutions similar to the cable-concrete stream crossings so that the Army will be able to implement best management practices that sustain the environment while achieving the military mission.

3. What agencies are funding the current level of watershed conservation in your programs? What is the approximate annual investment from your programs in watershed conservation practices?

At Atterbury, the land is federally owned. The National Guard Bureau, through a cooperative agreement with the State of Indiana, funds all work performed at the site for both mission-driven training activity and land and water protection. The budget includes professional services, employees, goods & services or equipment for land management and environmental protection. The training program budget also covers Integrated Training Area Management (ITAM) to restore damage caused by training. Annually this budget is in the range of \$100,000 - \$300,000 per year across the entire Atterbury property. An estimated 1/6 or 1/7th of the property acreage lies within the Lake Monroe Watershed.

Jerry's staff in the Environmental Branch acts as an internal consultant to Atterbury-Muscatatuck assisting with both EPA and IDEM compliance. Generally, conservation work done on the property is completed in-house. One example of an ITAM project is the new helicopter landing zone. The staff used an adaptive management approach in the implementation of the helicopter landing zone, and in the process, removed invasive species from the entire area, then replanted with native seed mixes. In other projects for large fields, the staff have applied cover crops on a field to retain soils and improve soil health.

4. What kind of work would you like to implement to better protect the water quality of Lake Monroe?

With the training that occurs at the range, there is intense use of the stream crossings, including daily military traffic. Being at the upper end of the watershed, INARNG seeks to replace some of the water crossings with three-sided culverts. As existing stream crossing designs reach the end of their life cycle, INARNG wants to replace them with improved designs such as the three-sided culverts that stabilize the stream bed while allowing water and aquatic life to pass.

5. What additional investments would help you implement desirable, but currently underfunded, best practices?

As a branch of the US military, it is required that the Army pays for improvements in their property themselves; funds from outside the federal budget are generally not able to be invested. One example of a way that partners could collaborate at Atterbury would be by providing in-kind assistance with clearing of invasive species or land management practices.

6. Do you offer matching funding programs that could be leveraged to protect water quality in Lake Monroe on private land?

The DoD has a few programs that could be available.

The Army Compatible Use Buffer (ACUB) Program² is a tool to protect an installation's accessibility, availability, and capability for training, testing, and operations by sustaining natural habitats, open space, working lands, cultural resources, and communities. It forms an integral component of the Army's triple bottom line: mission, environment, and community. The ACUB program achieves conservation objectives and supports the Soldiers' combat readiness training through partnerships with public and private organizations and willing landowners. For example, a private landowner adjacent to Atterbury could receive a fee to do something besides a non-compatible use (e.g., not a mall or retirement home because that would not be compatible w/training mission). Wildlife habitat and forest conservation would be examples of ACUB buffers to help limit encroachment.

Readiness and Environmental Protection Integration (REPI) Program³ is intended to address encroachment that can limit or restrict military training, testing, and operations. The REPI Program protects military missions by helping remove or avoid land-use conflicts near installations and addressing regulatory restrictions that inhibit military activities. One program within REPI, the Sentinel Landscape Partnership, promotes natural resource sustainability in areas surrounding military installations. The Partnership identifies opportunities that benefit national defense, local economies and conservation of natural resources. With this program, Camp Atterbury could pay landowners to set up or implement practices.

Currently, the INARNG Environmental Program is understaffed to deliver on the work that they already have on-site. The Environmental Branch wishes to use these programs but anticipates needing some time to be prepared to use these programs.

² <https://aec.army.mil/application/files/8715/0170/0424/eoys-fy12.pdf>

³ <https://www.repi.mil/>

7. Questions/Comments

Jerry offered to host visitors for the 319 project if there is interest to see Camp Atterbury.



Appendix H
**Conservation Practitioner Survey
For Lake Monroe 319 Watershed Plan**
Hoosier National Forest
Mike Chaveas and Chad Menke
May 29, 2020

1. What are the most effective practices you have used to manage your land to protect water quality?

The US Forest Service (USFS) uses a wide variety of best management practices. From the USFS website: *The [National Best Management Practices \(BMP\) Program](#) was developed to improve management of water quality consistently with the Federal Clean Water Act (CWA) and State water quality programs. BMPs are specific practices or actions used to reduce or control impacts to water bodies from nonpoint sources of pollution, most commonly by reducing the loading of pollutants from such sources into storm water and waterways. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants to receiving waters.*

When it comes to USFS forests, there are many uses of the land, and the required BMPs are defined according to the activity. Practices related to vegetation management or timber harvest are certainly a part of the USFS National BMP Program (such as water bars or reseeding after a harvest), but there are many other activities where BMPs are implemented. For example, BMPs are also defined for aquatic ecosystems, chemical use, facilities and nonrecreational special uses (e.g., utility rights-of-way, research equipment or structures), recreation (e.g., camping, trails, motorized vehicle use) and road management.

As an example, for some USFS forests, the land is fragmented, and private land is interspersed between forest properties such that the USFS must provide access to the property owner through the national forest. In this case, the USFS uses BMPs for road location and design, road construction, stream crossings, snow removal, and storm damage as they manage such an access road. There are also BMPs for decommissioning roads and redirecting traffic when a road is not accessible.

Similar BMPs apply to trail design, installation, and maintenance, and to repairing levees on a pond. The objective is always to stabilize areas disturbed by management activities as soon as is practical. To properly apply the BMPs in a given location, a site assessment is needed, and the USFS team regularly conducts site assessments when work is happening on their land.

Common soil and water mitigation BMPs from post-project disturbances that are applied in the Hoosier National Forest (HNF) include revegetation by seeding & mulching, silt fencing, armoring stream banks and slopes, drainage restoration so that natural drainage flow is not interrupted, repairs where erosion is already happening. Keeping natural waterways open is important to minimize channel erosion. BMPs are listed in the Hoosier National Forest's [Forest Land and Resource Management Plan](#).

Regarding trails, the HNF Recreation group oversees the implementation of BMPs for those trails, with advice from Forest Hydrologist as needed. Authorized trail uses include horseback riding, hiking and mountain biking. Often, the trails have disturbances and the USFS will identify problem areas for

relocation or improvements. In the Indiana climate where there is rain and trails become muddy maintaining these trails is difficult, especially when it is overused. HNF Staff in both the Tell City and Bedford offices address trail maintenance needs. When trails are too wet, the HNF will close trails to protect the forest's soils from compaction and rutting, which could contribute to accelerated erosion and sedimentation.

When contracting for project, the HNF prepares National Environmental Policy Act (NEPA) documentation. At the project start, HNF staff (often Chad, though many employees can conduct inspections and report any issues) will visit the site to verify that practices are in place. As a project progresses, HNF staff visit regularly, often daily, to observe that BMPs are in place. At the end of the project, a HNF staff member observes and monitors that BMPs are implemented and working effectively. Contractors that work with HNF know the requirements and realize the importance and take pride in the work. Many people on the ground to verify performance.

Per their agreements, contractors are required to meet BMP requirements. This may take the form of cleaning equipment, repairing damage from the activity, completing the project correctly. Timber sales contracts with the HNF include legally binding requirements to implement BMPs, and contractors can be held liable for damages or failure to complete the project. Although it happens rarely, a blatant error in failing to implement BMPs can lead to financial penalties or, in severe cases, a contractor being banned from future federal work. Most contractors who bid know the USFS rules and know how to complete the work following the necessary BMPs.

2. What practices have not worked or do not seem efficient?

Around Lake Monroe, a major source of sediments is coming from shoreline. The first so many feet from the shoreline is very difficult to protect because wave action constantly erodes the shoreline. The HNF sees shoreline erosion on their property that is adjacent to the lake.

A specific example is the peninsula in the Deam wilderness area. It experiences heavy recreational use and the shoreline erosion there is very difficult to stop. The Recreation (Rec) group within the HNF continues to seek new ideas to address this. One approach would be to consider a soft "hardening" of the shoreline, in contrast to the hard rip rap that bounces waves from one shoreline to another, as opposed to softening the wave action altogether. This is an area where HNF continues to look into economically viable new ways to implement erosion control.

Stream banks are also very difficult to maintain. The best approach is to maintain riparian area on the stream banks with trees. Once trees on either side of the stream are cut, the protection for the streams is gone. Native grass plantings don't hold the soil as well as the trees. A woody riparian area is vital for protection of the stream banks. The USFS has a set of BMPs for riparian management corridors.

3. What agencies are funding the current level of watershed conservation in your programs? What is the approximate annual investment from your programs in watershed conservation practices?

The most significant funding to the HNF is by congressional appropriations. One budget category is dedicated for watershed protection activities, but other funding categories also are directed toward watershed protection. For example, improving roads and access routes after timber harvests is a conservation measure that is in another funding bucket. In a timber contract, the contractor must meet BMPs as part of the work, though funding for the project is not specifically from the watershed protection budget.

Another smaller funding source is from stewardship contracting. In stewardship contracting, the contractor removes trees in exchange for conducting restoration or conservation actions, and if the value of the timber exceeds the services outlined in the contract, the Forest can retain the additional funds (known as “retained receipts”) and apply those to other restoration work, often associated with watershed improvements and erosion protection, elsewhere on the Forest. The work funded with retained receipts can even be for non-USFS land if the project also benefits a USFS property or resource. In Indiana, stewardship harvesting is not as common, so HNF doesn’t have as many retained receipts. HNF follows an internal process to decide on investments to be made with retained receipts. In Indiana, there is not a collaborative group work with HNF on these topics, though an attempt was made several years ago to form such a group.

Projects are also funded by USFS internal grants known as “joint chiefs projects”, where partners collaborate to fund specific projects. The HNF and IN NRCS were a recipient of such additional funding from 2016-18.

Other investments are made by others. If a utility right-of-way traverses USFS property, then the utility pays for the maintenance of property and required BMPs. For example, if the utility mows, then ATVs decide to ride on the mowed pathway, erosion can be induced and the utility will work to resolve the erosion problem.

Locally, the National Wild Turkey Federation has contributed to projects that aid in habitat restoration, working in collaboration with the USFS biologist. Nationally, many partner organizations fund water quality related projects on NFs.

4. What kind of work would you like to implement to better protect the water quality of Lake Monroe?

Habitat restoration. In other regions of the US (e.g., Oregon), groups help advise and make recommendations on use of USFS timber receipts. For example, Trout Unlimited and others provide funding and USFS staff can match contributions with their time to accomplish mutual goals. In Indiana, there are not as many fishing groups interested to support these projects.

Floodplain restoration. Channel incision is prevalent in Indiana, as streams are made to be straight and open for drainage purposes. In Indiana forests, riparian vegetation is crucial in stabilizing stream banks that connect the channel to its floodplain instead of allowing for barren channelized ditches. Wetland and floodplain restoration can keep the wetland and riparian areas functional, slowing the water and capturing excess nutrients and sediment.

USFS has a long list of projects that they would like to implement when funding becomes available: aquatic organism passageways (AOP), dam removal, re-routing of trails. Each can help protect water quality but only limited progress can be made each year with HNF's federal appropriation. HNF will gradually chip away at their project list with annual appropriations, sometimes supplemented with internal competitive grants, and partnership funding.

KV funds come from more traditional timber sales and can be available to do more reforestation and restoration work.

5. What additional investments would help you implement desirable, but currently underfunded, best practices?

Acquiring new land to add to the HNF ensures that the land remains forested for the long term. This is a more expensive investment and is funding dependent. HNF is continually acquiring land annually to add to the NF, on a willing seller basis. ~470 ac. have been added in the Lake Monroe watershed in last couple of years.

Another source of funding that HNF is trying to tap into is the State In-lieu Program for stream mitigation credits to get projects done on forest land. It is a newer program and HNF is working to establish a partnership with this program currently. Watershed projects are sometimes the most expensive in the forest which is why this may be a good potential source of funding for future projects. Basically, when other landowners do an activity within the watershed on private land that impacts the watershed, they then pay the state for mitigation credits. The State of Indiana then pursues needed watershed mitigation projects within the same watershed and funds them.

<https://www.in.gov/dnr/heritage/8340.htm>

6. Do you offer matching funding programs that could be leveraged to protect water quality in Lake Monroe on private land?

From the USFS State and Private branch:

The first is the Community Forest Program (<https://www.fs.usda.gov/managing-land/private-land/community-forest/program>). These are funds for targeted land acquisitions by non-federal entities. Can be tribal or county or municipal governments, or qualified conservation non-profits (which I think means land trusts) as long as land to be acquired will provide "community benefits", including provision of clean water. These require a 50:50 funding match and the land acquired must be at least 75% forested, under threat of conversion to non-forest uses, and once acquired needs to be open to the public. Parcels need to be at least 5 ac in size. There is not an upper acreage limit, but a cap of \$600,000 max for any one grant recipient. Last year the call for applications came in August.

The other is a Landscape Scale Restoration (LSR) Grants (<https://www.fs.usda.gov/naspf/working-with-us/grants/landscape-scale-restoration-grants>). These applications must come through the DNR Division of Forestry and must support goals of the State Forest Action Plan, but they often originate from community based organizations, local governments or universities who work with the state to ensure their objectives are supported and ultimately are sponsored by the State Forester. The purpose of these is to support collaborative, science-based restoration of forested landscapes, to help ensure forests continue to provide public benefits, including wildlife habitat, watershed protection,

timber and fuel wood, and support rural jobs. These also require a 50:50 cost share. Grants can range from \$25,000 and the max any one state can receive is 15% of the total appropriated by Congress for this program in a given year. This number will vary from year to year, but to give an idea of the ballpark, it appears the highest amount of funding received by any one project in this region this FY was about \$398K. The program has a lot of resources and application guidance and aides, as well as info on all the funded projects over the last several years. Examples of uses include actions to improve fish and wildlife habitats, improve watershed function, mitigate invasive species, and prescribed burning for forest restoration. The State Division of Forestry is a key partner for the above programs.

Also, retained receipts, described earlier, can be seen as a funding opportunity to support watershed protection efforts.

7. Questions/Comments

A USFS philosophy is for continual learning, adaptive management, and to modify and experiment with practices to learn how to do the work better. This philosophy provide staff an opportunity to pursue innovative solutions. For example, Chad has been involved in a project to create log landings that also provide pollinator habitat. A recent press release describes the making of a log landing with biochar to help revegetate an area; the soil stays on site, and it helps reduce erosion and runoff. The HNF was innovative, producing biochar onsite to apply on this site to stabilize the soil, retain nutrients, and reduce runoff. <http://www.wbiw.com/2020/05/22/hoosier-national-forest-contractor-tests-production-of-biochar-for-use-as-soil-amendment/>



Appendix I

**Conservation Practitioner Survey
For Lake Monroe 319 Watershed Plan**

Doug Baird, Property Manager and

Kevin Schneider, Assistant Manager

Indiana Department of Natural Resources (DNR)

Division of State Parks, Brown County State Park

June 18, 2020

1. What are the most effective practices you have used to manage your land to protect water quality?

Brown County State Park (Park) includes 15,815 acres, most of which is heavily forested. The North Fork of Salt Creek runs through the northernmost portion of the park, while the southern portion of the Park drains to the Middle Fork of Salt Creek.

Within the Park, the Upper Schooner Creek has been dammed to create Ogle Lake. Ogle Lake is the source of water for the Park's drinking water treatment plant. During heavy rain events, increasing amounts of sediment are carried into Ogle Lake, where they eventually settle out. In June of 2019, a downpour event carried excessive sediment to Ogle Lake, overcoming the ability of the Park's small water plant to treat to drinking water standards. On June 16, 2019, the water treatment plant had to close, which meant that the Park also needed to close.

Since the 1960s, the Park has maintained a sewage treatment plant that treats sewage and graywater from the campgrounds, park offices, on-site residences, and the nature center. The horseman's camp has a separate septic system for treating the wastewater generated there. The Abe Martin Lodge sends its wastewater to the Town of Nashville for treatment.

Timber is not actively harvested from the park, though dead trees that pose a hazard to visitors or property are removed. Forest openings for overlooks are maintained by IDNR staff; trees and brush are removed from these areas by hand or using controlled burns. There are vegetated fire trails within the Park, though erosion rarely occurs around these trails.

Contractors who work in the Park are required to adhere to IDNR best management practices to prevent soil loss and erosion on their work area from affecting the quality of the water leaving the site.

The main approach to protecting water quality is to keep the soil stabilized to prevent runoff and erosion. DNR staff visit hiking trails regularly to repair areas with erosion or soil loss problems so that the soil can be retained. For horse trails, however, staff are not able to visit the horse trails regularly. On the horsemen's trails, the soil is exposed and becomes compacted with the footsteps of all the horses. When this soil becomes worn down, it is vulnerable to soil migration during flooding periods, though most of the soil is believed to stay on the property given the buffer zones between the horseman's camp and the streams.

2. What practices have not worked or do not seem efficient?

The horseman's camp is near Strahl Lake, which drains to Middle Fork Salt Creek, and includes 204 horseman's camp sites. During peak summer season, with an average of 3 horses per site, there can be as many as 600 horses in the area; there are significantly fewer horses there in the winter.

The primary maintenance for the horseman's camp is mowing the campground for horses and cleaning up horse manure. Previously, the horse manure was stockpiled for spreading in a field within the Park. The manure stockpile was vulnerable to water ponding following heavy rain events, and the ponded water would eventually trickle out and make its way to nearby waterways. The Indiana Department of Environmental Management (IDEM) reviewed the stockpiling practice and cited concerns of causing bacterial contamination in the waterways. Following their review, IDEM asked the Park to undertake a contract to have the horse manure hauled away. This practice of hauling the horse manure away from the site began in 2019. Currently, the Park staff are exploring options to have farmers haul it away for use in their fields, as the contract for hauling the manure represents a large expense for the Park.

The horse trails at the Park are heavily used. Horse crossings of creeks exist in numerous places and are especially challenging to maintain during the rainy seasons. The Park staff would like to have more resources available to monitor and maintain the horse trails.

3. What agencies are funding the current level of watershed conservation in your programs? What is the approximate annual investment from your programs in watershed conservation practices?

All funding for trail maintenance, which includes practices to minimize soil erosion, is from the State Parks budget.

Occasionally, federal programs have organized youth to assist with park maintenance activities. Young Hoosiers Conservation Corps was a program about ten years ago that engaged youth to work on hiking and horse trails at state parks around Indiana and that was a boost to trail maintenance in the Park.

The Hoosier Mountain Biking Association helped pursue funding to build a trail about 15 years ago. Volunteers have so far done all of the maintenance on the mountain biking trails (we now have 13 trails covering over 37 miles.) and have been doing a good job. The bike trails are well-designed and are sustainable designs when well maintained.

The Indiana Trail Rider Association helps with horse trail maintenance. Horse trail maintenance and repair often requires heavy equipment, so individual volunteers using rakes, shovels, etc. have limited capability when working on horse trails. The horse trails are not as well laid out, often following old county roads, fire breaks, or other pre-existing path without being designed especially for horses. The Park staff provides the heavier equipment for these repairs as resources allow.

Occasionally, the Park receives an allotment for supplies and materials that are needed for trail preventative maintenance work, though those allotments do not cover the hiring of staff to complete the repairs. When major trail restoration is needed, IDNR is careful to consider the appropriate cultural resources and archeological permits needed before proceeding.

4. What kind of work would you like to implement to better protect the water quality of Lake Monroe?

In the past, Indiana State Parks has kept a heavy equipment crew that moves from property to property and can help with trail alignment, erosion, and repairs. The availability of this crew has been limited in recent years due to limited State Parks budgets. In some places, horse trails are getting rough and need maintenance that is lacking due to the absence of the heavy equipment crew.

O'Bannon Woods State Park has developed plans to realign their horse trails to be more sustainable and reduce erosion; this was cited as an example of some work that staff would like to undertake at Brown County State Park. While the plans have been developed, it is unclear whether the work to install the new horse trails has been completed. At O'Bannon Woods, some FEMA funds that became available following tornado damage allowed new stone to be put on their horse trails along with the realignment.

5. What additional investments would help you implement desirable, but currently underfunded, best practices?

More funding for hiking trails and horse trail maintenance would be beneficial for minimizing soils loss from trails. The hills in the Park are steep, and erosion occurs, even in the heavily forested areas of the park, so care and maintenance of trails is an ongoing need.

6. Do you offer matching funding programs that could be leveraged to protect water quality in Lake Monroe on private land?

The Park does not have any funding of its own available to leverage other funding. Friends of Brown County State Park have implemented projects over the years such as a handicapped accessible hiking trail, and purchase of specialized rescue equipment that staff have not been able to purchase themselves. The group's primary mission is to support the education efforts of the Park nature center. The makeup of the group has been changing, with one or two members of the founding group remaining active, plus some new members; the group has been smaller and less active in recent years.

7. Questions/Comments

The Park does not have any active agricultural lands on the property.

Kevin noted that he has observed greenway programs/conservation districts that have been effective to teach citizens about leaving buffers between disturbed soil areas and streams (Pulaski County experience).



Appendix J
**Conservation Practitioner Survey
For Lake Monroe 319 Watershed Plan**
Darren Bridges, Indiana DNR Division of Forestry,
Fire Coordinator, Morgan-Monroe &
Yellowwood State Forest
June 12, 2020

1. What are the most effective practices you have used to manage your land to protect water quality?

Indiana's [Logging and Forestry Best Management Practices: 2005 BMP Field Guide](#) (BMP Field Guide) is what the Indiana Department of Natural Resources (IDNR) follows the guide for BMP implementation in their forestry work. The document not only guides IDNR's work, it also is intended to *serve as a model for other land uses. It is hoped that others will undertake similar approaches to control soil erosion and non-point source pollution.*

For logging done on IDNR property, this is the guidance used, whether the work is completed by IDNR or others. Some logging for pine removal is done with IDNR crews. It is required that someone on the logger's crew must have completed the logger training that IDNR gives. Loggers that have completed various levels of the IDNR Logger Training are identified on the [IDNR website](#). A Trained Logger must be onsite all the time during an active logging project.

IDNR contracts require that loggers working on IDNR properties follow the BMP Field Guide. Throughout timber sale process, an IDNR forester goes out to inspect. Visits are daily for larger harvests, or approximately every-other-day for smaller harvests. Contractors are required to make a damage deposit payment that can be withheld or partially withheld if the BMPs in the BMP Field Guide are not followed. Any withheld portion of the damage deposit will be used by IDNR to make the repairs that protect from soil erosion and water quality degradation. The IDNR contracts and training requirements are intended to help contractors learn about and adopt best practices so that when the same contractors do work on private property, the same BMPs will be applied.

2. What practices have not worked or do not seem efficient?

The BMPs in the BMP Field Guide are effective for protecting water quality and for minimizing and controlling soil erosion. A critical aspect of the project during a harvest, however, is the oversight of a contractor's work to ensure that proper BMPs are in place at the onset and throughout the project. Contractor projects completed without oversight can lead to damage in the harvested area. For this reason, IDNR foresters regularly inspect contractor work during a harvest.

3. What agencies are funding the current level of watershed conservation in your programs? What is the approximate annual investment from your programs in watershed conservation practices?

IDNR employs two staff in Indianapolis who focus on watersheds and water quality. Their group generates reports related to forests and water quality, dedicating the equivalent of about an 0.25 full-time equivalent to watersheds and water quality in the areas where the IDNR Division of Forestry maintains properties.

Darren's team conducts inspections after a harvest, then sign off on completion reports for the contractor's or internal team's work. Approximately 6 months after the completion reports are signed-off, the IDNR Division of Forestry team from Indianapolis conducts a follow-up inspection of the harvested property to check on quality of the harvest site and report on the effectiveness of the BMPs used. IDNR will make updates to further protect the site from soil erosion if something is missing, though such intervention is rarely needed because the oversight is provided during the logging period.

4. What kind of work would you like to implement to better protect the water quality of Lake Monroe?

Prescribed fire is a tool that is not used enough, and more invasive control is needed. Prescribed fire promotes the growth of new trees, and especially helps to promote oak and hickory growth. IDNR uses prescribed fire to remove tree species that are more shade tolerant and to remove invasive species of undergrowth. This type of prescribed fire helps create the conditions where the more slow-growing oak and hickory species can grow. Prescribed fires do not "burn hot" like a wildfire. Prescribed fires are conducted on days (usually in the springtime) that keep fires from exposing the soil or roots of trees and plants.

5. What additional investments would help you implement desirable, but currently underfunded, best practices?

Additional funding to do more prescribed fire. IDNR is reasonably well-funded, but on private land, prescribed fire could be beneficial for improved control of invasive species.

Some funds are available through the Natural Resources Conservation Service's Environmental Quality Incentive Program (EQIP) for landowners to burn old fields or old season grasses, but not much funding is available private landowners. It can be expensive for private landowners to conduct a prescribed fire burn on their land, even though it is less expensive for private landowners to hire tree removal with heavy equipment.

The IDNR Forestry budget also covers horse and hiking trails, including inspections of the trails and stream crossings. IDNR has a staff member out once per week to check on trails. Hoosier Hikers Council also helps with trail maintenance to keep trails open. An additional seasonal staff member would help IDNR be able to respond more quickly to needs and keep up with trail repairs during peak season.

6. Do you offer matching funding programs that could be leveraged to protect water quality in Lake Monroe on private land?

From the IDNR website:

Logging operations in the State of Indiana are eligible to apply for [cost-share dollars](#) that will help defray the expense of BMP installations on harvest sites, depending on the location and timing of the harvest. Limitations are based on specific grant parameters and available dollars. The available cost share on each harvest operation is 75% of the actual cost of implementing the BMP's on the operation, not to exceed \$650.

Cost share programs from other agencies are here: <https://www.in.gov/dnr/forestry/2861.htm>

7. Questions/Comments

A general idea or observation: It is important to keep forests whole to protect the watershed. Much of the watershed is privately owned, and private landowners do rely on timber income. When considering incentives to participate in watershed protection programs, it is Important to protect the private landowner's ability to draw income. Without the ability to draw income, there may be financial motivation to subdivide property and sell off into smaller parcels.



Appendix K
**Conservation Practitioner Survey
For Lake Monroe 319 Watershed Plan**

Jim Roach, Indiana DNR
Division of State Parks, Monroe Lake
June 25, 2020

1. What are the most effective practices you have used to manage your land to protect water quality?

Background

An estimated 155 miles of the Lake Monroe shoreline are managed by the Indiana Department of Natural Resources (DNR). The only area not managed by DNR are the segments that the US Forest Service (USFS) owns and manages, known as the Deam Wilderness. The US Army Corps of Engineers (ACOE) owns the entire shoreline up to elevation 556 feet.

Shoreline Protection

Shoreline protection to minimize erosion using riprap has been a regularly used and effective practice. A large investment in shoreline protection was made at Paynetown in 1989, with the implementation of a \$400,000 project to protect around the campground with riprap. When any equipment needs to work in the water or below the 530-foot pool elevation, the project requires a permit to comply with Clean Water Act Section 401; the DNR obtained this permit for the Paynetown shoreline stabilization project in 1989.

Since then, smaller projects have been completed around the recreation areas, such as the marina. The east side of the reservoir is more susceptible to erosion than the south side, because the east side experiences more wave action. In the 1990s, a private homeowner put in more than 800 cubic yards of riprap to protect a highly erodible bank below the property.

Since 1986, spring rains and runoff are increasing the frequency of high-water events. Even where major shoreline improvements have been made previously, the water level is now rising above those levels and compromising those formerly-stabilized areas. More recently, the ACOE has been advocating for the least disturbance to shorelines as a better approach to retaining soil and maintaining a shoreline.

Boater Pump-out Facilities

DNR also has found that the boater pump-out facilities are effective at protecting water quality in Lake Monroe. For larger boats that have permanently installed toilets on board, the wastewater sanitation tanks must be emptied periodically. By providing a free place to empty wastewater at the boat launch site, DNR helps assure that wastewater is treatment and managed according to Indiana Department of Environmental Management (IDEM) requirements and does not end up in the lake.

In 2016 IDEM provided a grant to replace the pump out facility at Paynetown SP. The Marina at the Cutright State Recreation Area, the Inn at Four Winds, and the Two Herons boat launches also have pump-out facilities. A fourth pump out, the Lake Monroe Sailing Association, just received a grant from IDEM to have a pump-out system installed. With any organization receiving an IDEM grant, a permit required to operate the pump-out facility, and IDEM conducts an annual inspection. Facilities cannot charge to pump out if they have been built using IDEM grant dollars.

In the early 1990s, the DNR conducted on-boat inspections on boats with toilets and gave inspection stickers. In addition, boaters may bring reports to Conservation Officers, who then will follow-up and conduct an inspection on boats where concerns have been identified. Occasionally the Conservation Officers will walk the docks. During Jim's time at Lake Monroe, they have never found a boat that has dumped its wastewater in the lake. The boaters do a good job of self-policing.

Activities on DNR-Managed Land

DNR has a management agreement to maintain and manage the entire land area around lake, except the immediate vicinity of the dam, which ACOE maintains. ACOE maintains control of access, trails, etc. within a certain elevation. For example, to build a driveway below elevation 538, ACOE requires a permit. Operation of the reservoir is determined by ACOE, which controls the water levels.

DNR has five management units in the property adjacent to the lake, where tenant farmers farm the land. Three units are in the North Fork sub watershed of about 600 acres (east of Bloomington to Nashville), and two units are in the South Fork that have been fallow for a few years. DNR works closely with the tenant farmers, especially in the North Fork region. The tenant farmers obtain a 4-year lease with DNR, and the farm using a DNR-specified rotation.

The leases require tenants to maintain fences, ditches, waterways. They must cultivate the property, and harvest crops in a timely manner. The four-year rotation is corn and/or beans for two years, then wheat in the third year, and the fourth year must remain idle.

The use of pesticides; if the farmer wants to use herbicides work with DNR, pesticides are much more restricted use. Manure application is not allowed, but the tenant can fertilize. The tenant must maintain a 35-foot buffer along streams or intermittent streams. DNR does not require complete no till and does not require cover crops except after beans have been planted. At least 10% of the farmed property must be left idle for wildlife, and DNR encourages that the wildlife-designated areas be maintained along streams. Livestock is not allowed on the management properties.

In two of the last four years, tenants in all units were not able to farm due to flooding. The two units in the South Fork have been fallow for several years and are currently returning to successional growth. DNR seeks to maintain some of these fallow areas in wet hardwood hickory-oak plantings, managing to reduce the amount of softwood maple, cottonwood, sassafras, sycamore and work towards hardwood forest.

There are no official horse trails on the DNR properties at Lake Monroe, though some illegal riding activity is suspected in the vicinity of Maumee and Houston.

2. What practices have not worked or do not seem efficient?

The projects implemented for shoreline protection, boater pump-out facilities, and the land management program for tenant farmers all have benefits that help protect water quality.

Trees or log jams in the streams will redirect flow into the banks. Removing these trees is labor intensive and sometimes requires special equipment, which also can disturb the soil. DNR does wish to remove the log jams, and has done so in the past, but more recently staffing has not been available to do log jam removals.

Notes on changing rainfall patterns and more intense rains:

Significant rain events in the past few years have particularly affected the north shore. Small stream stabilization projects that were installed previously and have been successful under less intense rainfall conditions have been overcome; the stream stabilization improvements have been washed away and can no longer be located.

In one example, the DNR planted willows along a 100-foot bank, 1 foot apart. The willow planting was installed side-by-side with an interlocking block structure. Both worked very well for many wet weather events. Then a heavy rainfall event came and brought the water level above both the willows and the block structures; both systems failed. Plus, the many beaver in the area liked cutting the willow.

3. What agencies are funding the current level of watershed conservation in your programs? What is the approximate annual investment from your programs in watershed conservation practices?

Funding for the operations of the Paynetown Recreation Area and management of other lands around Lake Monroe is from the Indiana General Fund. Some Pittman Robinson money for wildlife management comes through DNR Division of Fish & Wildlife. Mostly has been used to supplement salaries.

Occasionally, the Division of Parks, Monroe Lake will be included as a large line item in the state budget if there is a large capital project, such as for Paynetown shoreline protection. In the past four or five years, special allocations for projects dedicated to minimizing shoreline erosion have been included in the budget, providing about \$30,000 to \$40,000 per year. Those special allocations may be lost when the state budget is reduced, as is anticipated during this economic downturn following COVID-19.

The US Fish & Wildlife Service (FWS) provides financial assistance to DNR through the federal Pittman-Robertson and Dingell-Johnson Acts. These federal funds can be used to restore wildlife habitat or to acquire habitat that benefits Indiana Sportsmen. In Indiana, DNR uses Dingell-Johnson for fish restoration and related management plans or projects around the state, and occasionally (though rarely) some of the funding will be directed to Lake Monroe.

4. What kind of work would you like to implement to better protect the water quality of Lake Monroe?

A top priority for Division of State Parks, Monroe Lake is a program of reforestation in some of the smaller agricultural land units along the tributary streams that are leased to tenant farmers. Currently, the limitation to implementing this work is with staff resources. A recent retirement is leaving a gap in the staff, and with the state budget being reduced, the position is at risk of not being filled.

Jim observes that siltation is coming from stream bank erosion upstream, particularly when trees fall across streams and logs are not removed. The following year, the log jam increases in size, and the water begins to erode into the bank. It is labor intensive and expensive to remove log jams. DNR

would like to see a collaboration with soil and water conservation leaders to help local landowners and smaller landholders with log removal.

Additional shoreline protection at Paynetown is needed. There is another 2,000-foot section of shoreline that is highly erodible that Jim would like to see protected. The projects are complicated and expensive. Because heavy equipment must have access in and around lake, federal permits are needed to complete the work.

Horse trails around Lake Monroe follow old logging roads, county roads, and other access routes that were not intended to be permanent. Trails that are designed for horse traffic will help keep the horses on the trails and better protect water quality. By comparison, in Monroe County there are many hikers, and the trails are well-designed with water quality controls. They are also well maintained by volunteer groups like the Hoosier Hiking Council. Mountain biking clubs in the area have also developed trails in a thoughtful way that protects water quality. At Paynetown specifically, however, there are fewer hikers with most visitors being boaters.

5. What additional investments would help you implement desirable, but currently underfunded, best practices?

A different source of funding will be needed to implement the ideas mentioned in Question #4 above. Funding is expected to be limited with DNR budget cuts due to the economic downturn that has come with COVID-19. Wildlife management operations staff mow and reforest, and those positions are often the first place to be cut. Additional funding could help with equipment rental, personnel, hiring additional staff for maintenance. May need to use prescribed fire management approach with reduced mowing budgets.

To implement more shoreline protection, larger budgets are needed to complete the work.

6. Do you offer matching funding programs that could be leveraged to protect water quality in Lake Monroe on private land?

DNR Division of State Parks and Reservoirs does not have a matching fund program. Other DNR programs such as the Lake & River Enhancement (LARE) program. Ginger Murphy is recommended as a good contact for this program.

DNR applied for and received an ACOE Environmental Restoration Section 1135 grant, a funding source that supports freshwater wetland restoration, fish passage, and river restoration projects. DNR proposed the placement of sub-impoundments to slow siltation coming into the reservoir from the Crooked Creek tributary. By holding a few feet of water in shallow field impoundments, the design would have slowed flow following heavy rain events and sediments would be retained on the land. The seasonal flood plains around Crooked Creek would have been flooded; these areas are currently open and under water.

However, once the permitting process started, the project could not move forward. The ACOE permitting group had soil sampling concerns related to the Clean Water Act Section 401 (for water quality protection) and Section 404 permit (for dredging and fill material). The project was estimated to cost \$6,000,000, and DNR had identified the required match to complete the application. The project would also have improved access to the Crooked Creek Boat ramp.

7. Questions/Comments – No additional comments.



Appendix L
**Conservation Practitioner Survey
For Lake Monroe 319 Watershed Plan**
US Army Corps of Engineers - Louisville District
Zac Wolf, Limnologist, Water Quality Team
July 27, 2020

Background

The US Army Corps of Engineers (Corps) owns the land around the lake (as established by a specific water level designation) and leases it to the State of Indiana in a long-term lease. The Indiana Department of Natural Resources has been granted the lease to manage the recreation areas land.

The Corps Louisville District's [Monroe Lake Master Plan](#) (2016) gives these descriptions:

Excerpt from p. 1-9

Land for Monroe Lake was acquired according to land acquisition policies that called for fee acquisition to the five-year flood frequency line and flowage easement from the five-year line to an established contour four feet above the flood control pool. Then in 1961, a memorandum recommended fee acquisition to elevation 560 instead of elevation 551 because of terrain steepness in the river valley and its tributaries. Additional fee land was acquired where needed for recreation areas. Easements were acquired mostly for required road relocations. The total project area is 24,630 acres: 23,604 acres were acquired in fee, 11 acres are under flowage easement, and 1,014 acres are under use permit. There are 14,371 acres of fee land above the seasonal pool elevation.

Excerpt from p. 1-11

In 1967, Indiana Department of Natural Resources (IDNR) was granted use and occupancy of 22,663 acres of land and water areas for public park and recreational and fish and wildlife for 40 years. The lease was amended in 1989 to extend the lease term to 30 April 2032. Additionally, IDNR has agreements with various concessionaires for management of recreation areas throughout the project area.

Excerpt from p. 1-13

The lake has a recreational pool elevation of 538 above mean sea level (msl). At recreational pool elevation, the lake is designed for 182,000 acre feet of storage with 190 miles of shoreline. The lake is designed to provide flood storage from elevation 538 to 556 msl with a 258,000 acre feet capacity. The spillway crest elevation is 556 msl.

1. What are the most effective practices you have used to manage your land to protect water quality?

While Corps does not have specific criteria for managing the land that it owns around the lake for the protection of water quality in the lake, they do have operational criteria to minimize the impacts of the dams to downstream water quality (tailwater). The Corps also conducts monitoring of the water quality of streams flowing into the reservoir.

- Annually, Corps collects water quality samples from the reservoir, in the tributaries, and the tailwater.

- During thermal stratifications between about May and December, staff collect temperature and DO as close near the control tower (at various depths), as well as in the tailwater every two weeks.

Operationally, the Corps' priority of business is to mitigate flooding in downstream communities. The Water Management Section of the Corps was created to support management of the entire water system. The Corps uses models to analyze the system and strategize on the best ways to mitigate the effects of flooding in downstream communities, and a water control plan provides the Corps with a set of operating rules for the operation of the dam.

Water quality also plays a role in the operational plan; selective withdrawal capabilities can be used to meet downstream water quality criteria. The Corps maintains the tailwater temperature within a range specified in the lake's water control plan and operates to achieve dissolved oxygen (DO) above the state criteria for dissolved oxygen. Low flow restrictions do affect releases and can be a part of the operational objectives as well.

Relative to the land that the Corps owns around the lake, the authorized purpose of the lake (i.e., flood control) creates an understanding of what happens if there is flooding. No other specific requirements are in place for the DNR regarding land use on the land that Corps owns. In both Indiana and Ohio, the recreational facilities are leased to the state.

Examples of collaborative work to protect the watersheds where they work include the locks and dams on the Ohio river, the Corps has added more native vegetation along the river to add habitat for pollinators and reduce maintenance costs. In other areas, Corps has had partnerships to develop wetlands.

When it comes to bank stabilization projects, the Corps doesn't directly manage for shoreline erosion. The Corps gives permission via permits for others like IDNR or private landowners to construct bank stabilization projects, such as installing rip rap on shoreline. At Harden Lake (aka Raccoon Lake) there was a time where the Corps purchased the rock material and individual landowners did their own installation of the material. So historically, there have been examples of indirect support of mitigating shoreline erosion, but typically this work is not undertaken directly by the Corps.

Observations: Lake Monroe seems to have a better protected watershed with the higher level of forestation. However, in recent years samples collected from the tailwater have exceeded the acute aquatic criteria (IAC Article 2 – Water Quality Standards) for total copper (2018) and total iron (2019). These criteria are established by IDEM for water quality in point source discharges. The Corps tracks a few parameters relative those aquatic life toxicity-based water quality limits. Harmful algal blooms (HAB) are also a concern in Lake Monroe and the Corps is providing data collection support to Indiana state agencies.

USEPA maintains recommendations for nutrients in natural water bodies and streams, and the Corps references those when reporting on water quality. The [2018 Monroe Lake Water Quality report](#) provides an example of how this data is gathered and shared.

More frequent, large rainstorm events from climate change are making the Corps' job of flood mitigation more difficult. These climate change-related events are causing the operational plans to need to be updated.

2. What practices have not worked or do not seem efficient?

Question not applicable to the Corps' work.

3. What agencies are funding the current level of watershed conservation in your programs? What is the approximate annual investment from your programs in watershed conservation practices?

The Corps' work is funded by the federal government. The Indiana Department of Natural Resources (IDNR) submits an annual management plan to the Corps that describes how they plan to manage the land that they lease. Zac wasn't sure if that document is publicly available but encouraged us to inquire with IDNR about it.

4. What kind of work would you like to implement to better protect the water quality of Lake Monroe?

Collaboration with other groups in support of watershed plans is one way that the Corps can help with water quality protection. Most often this is accomplished with data collection and sharing from the Corps monitoring programs. One example of this type of collaboration is the Corps' work with the [Salamonie River Watershed Group](#), where conservation, soil and water, Indiana DNR and the Corps collaborated to address HABs.

5. What additional investments would help you implement desirable, but currently underfunded, best practices?

Question not applicable to the Corps' scope of work.

6. Do you offer matching funding programs that could be leveraged to protect water quality in Lake Monroe on private land?

In a separate program (apart from the Louisville office) the Corps does provide [planning assistance to states](#), local governments, other non-federal entities, and eligible Native American Indiana tribes for "the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources." Recently funded projects have included "the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources." In a Louisville example, the Corps provides matching funds to support a survey for a local watershed project.

In addition, the Corps' Louisville District has an [Outreach](#) cost sharing program that can "help resolve water resource problems and provide reliable technical assistance", responding to the needs of state and local communities. The Outreach Coordinator, Brandon Brummett, can be reached at 502-315-6883 or brandon.r.brummett@usace.army.mil

7. Questions/Comments

The Public Affairs Office within the Corps helps respond to questions about lake levels, water quality, and manages local websites and site-specific social media.



Appendix M
**Conservation Practitioner Survey
For Lake Monroe 319 Watershed Plan
Private Land Managers**
Jeff Fisher, Jackson County
Private Land Manager
March 2, 2021

1. What are the most effective best management practices you have used on your land?

Jeff works for the Department of Agriculture's Farm Service Agency (FSA) in Jackson County. He is a farmer, though his income comes from his FSA job. His farm is 120 acres, with 10-15 acres near Norman Hill in the Lake Monroe Watershed (along Tipton Creek near Kurtz that flows into Salt Creek). The rest of his farmland drains to a different watershed.

Some of the most successful practices that Jeff has implemented on his farm include feeding pads, cross fencing to prevent overgrazing, and ponds. While NRCS has now made pond construction a lower priority, when the pond was installed on Jeff's farm for the cattle to drink it was helpful for keeping water from the pastures from running directly into streams. Watering systems for the cattle, also called spring developments, were also very helpful for keeping cattle out of the streams in Jeff's property.

2. What are the biggest threats to your land? What practices have not worked?

The biggest threat that Jeff reports on his farm is cocklebur, which is a problem for cattle because it takes over the grass. However, Jeff has observed that turkeys love cockle burs because he sees large numbers of turkeys where the cocklebur is most prevalent.

On other farms, Jeff has observed landowners installing drain tiles, which draw the water away too quickly and do not allow for slower adsorption of the water into the soil. When crops are profitable, more farmers add tiling to their land to drain the water away more quickly and carry that water directly to the streams.

An example of a practice that didn't work well on Jeff's farm was a particular spring development (i.e., watering system). For this project, Jeff ran electricity over a hill to reach the watering system, and it required a fair amount of maintenance. Springs that work by gravity are less work, requiring much less maintenance.

3. What other successful conservation practices are being implemented by other landowners, agencies or groups that are not applicable on your land? Or that you are not implementing?

The Conservation Reserve Program (CRP) has been used by many crop field owners. When in the program the period is 10 years, and landowners are required to use filter strips and grassed waterways with their crops. Many of those farmers who Jeff knew to previously have their land in the CRP program have brought their land out of CRP and now cash rent the land to others to farm. Most of the filter strips remain, but the large parcels of cropland have been brought out of CRP. Currently, the prices of corn & beans are high, so more farmers want to grow corn and beans.

Bringing land out of crop or cattle production and into hay production is another effective practice to protect water quality. In the winter months, cattle trample the soil and make a lot of mud that exposes the soil to runoff.

Cover crops are also a good practice. The Jackson County Soil and Water Conservation District (SWCD) has seen a lot of use with cover crops. In the Salt Creek area of Jackson County, there are more bottomlands in trees and pasture. The cropland areas would be helped by the cover crops. The other areas are not planted to a crop and cover crop isn't needed.

4. What investments do you make for the conservation or best management practices being implemented on your land?

Now, Jeff is getting out of the livestock business and only has a few remaining cattle. His farm is in the grassland reserve program with the Natural Resources Conservation Service (NRCS), which means that the land has an easement that only allows it to be used for pasture or hay. This easement program offers landowners an upfront payment; in exchange, the farmer cannot build on the land and it must remain in pasture or used to grow hay.

Jeff noted that growing hay is a better practice, because the areas where cattle stand become a muddy mess, and water runs off carrying the soil with it.

5. What sources of funding support implementation of the best management practices or conservation programs on your land?

Through the Environmental Quality Incentives Program (EQIP), NRCS provides agricultural producers with financial resources and one-on-one help to plan and implement conservation practices. Through EQIP, Jeff worked with NRCS to install a cattle waterer; Jeff cleaned out his pond as part of the cost share, which was more expensive than the cattle waterer. Some programs offer financial assistance at 75% NRCS -25% landowner. The programs used to offer a 90/10 cost share, though most have now dropped to 50/50.

Jeff also participates in the Grassland Reserve Program through NRCS as described above.

A third program is the Conservation Reserve Program offered by the Farm Services Agency (FSA). As the enrolled landowner, he receives a cost share for installing the practice, plus an annual rental payment.

6. Are the practices that you implement voluntary? Are any of the funding sources that you use contingent upon the best management practices that you are using?

Yes, while the practices that Jeff uses on his farm are voluntary, some of the programs have strings attached. The grassland easement program mentioned above gives landowners an upfront payment. In exchange, the landowner cannot build on the land and it must be used for pasture or to grow hay.

7. What kind of practices would you like to implement on your property to better protect Lake Monroe from nutrients and sediments in runoff?

As mentioned previously, Jeff is getting out of the livestock business, understanding that cattle make the soil prone to runoff. With his land enrolled in the grassland reserve program, he will only be using his farmland as pasture or for hay.

8. What resource concerns do you have related to implementing best management practices on your land? What support would help you or your neighbors implement desirable, yet unimplemented (if any), best practices on your property?

When prices of corn and soybean crops increase like they are now, farmers like to plant. During these times, the incentives are not always enough to balance the higher value of the crops.

9. Questions/Comments



Appendix N
**Conservation Practitioner Survey
For Lake Monroe 319 Watershed Plan**

Gerry Long,
Private Land Manager
December 14, 2020

1. What are the most effective best management practices you have used on your land?

Gerry Long's property is in western Brown County, on the North Fork of Salt Creek between Jackson Creek Road and Salt Creek. The property is situated only a few feet above the flood stage of the lake; when Lake Monroe is at flood level, the North Fork of Salt Creek is about half full. Gerry originally purchased the property to be near Yellowwood State Forest and have access to horse trails. Gerry bought the land as a farm and wanted to grow trees.

Most of Mr. Long's work is with forestry practices. He has a lot of bottomland that has been reforested, which was done to 1) improve the forest, 2) to allow timber production in the long term, 3) provide wildlife habitat as the timber stand matures. Gerry notes that managing creek or bottomland forest and flood plain is different than managing upland forest. Bottom ground is most of Gerry's land.

Gerry's land is enrolled in the classified forest program with Indiana DNR. In exchange for developing a forest management plan by working with a District Forester and implementing BMPs, the enrolled land has low property taxes. Gerry appreciates the opportunity to get input from a professional to help manage the forest for his landowner goals.

Gerry has had several timber harvests, the largest of which was a harvest of silver maple, taken from a flat floodplain. The work was planned to be completed in the late summer or early fall to be able to work in dry conditions. During the timber harvest, Zac Smith, the Indiana DNR Division of Forestry District Forester for Brown County, observed the contractor's work to ensure that Best Management Practices (BMPs) were followed. An important aspect of BMPs in this situation was keeping tree tops out of the creek.

Gerry conducted a smaller "mature harvest" in the upland portion of his property a few years ago. Before beginning the harvest, he lined out the skid trails and log yard with the logger. The contractor had to close-out the tree harvest work with proper water bars on slopes, followed by grading and reseeding afterwards. Gerry's experience is that most loggers will do a good job of BMPs if they know it is important to the land owner to do so..

To maintain these trails after they are installed (they are permanent trails), Gerry keeps working on them to keep them from eroding. On his property, this has included the installation of water deflections/water bars, laying rough mulch or wood chips on the trail to keep it intact.

2. What are the biggest threats to your land? What practices have not worked?

Late winter/early spring right after a freeze-thaw, the runoff conditions are at their worst and it doesn't take much to move the soil. The late winter/early spring floods in Salt Creek also carry a lot of mud (near where Jackson Creek comes into Salt Creek). In areas where Gerry has added tree plantings with small vegetation, including downed brush and small trees from thinning, the streams are successfully slowed in their path, and after a flood, Gerry gains soil.

Gerry also loses a lot of soil from the creek banks. It is a natural state for the creeks to lose soil during high water. Creeks get the most erosion when high flow is at upper limit of creek banks. Brown County Hills are formed by erosion with water, wearing down the sandstone and soil.

3. What other successful conservation practices are being implemented by other landowners, agencies or groups that are not applicable on your land? Or that you are not implementing?

Indiana Forestry and Woodland Owners Association (IFWOA) members advocate for best management practices. IFWOA members tend to do things the right way to protect the land; most often damage occurs on private lands where the owners are not aware of the effects of their activity. Unfortunately, only a small percentage of private woodland owners belong to IFWOA. This is because the management of the forest/woodland is low on their priority list of personal concerns.

IFWOA encourages landowners to work with professional foresters and woodland managers. Many landowners don't want regulations. Education is important to invite owners to participate on a voluntary basis; it is important that any incentives or programs are not too complicated. Organizations such as The Nature Conservancy are working on programs to give education and/or incentives to private landowners to better manage the woodlands.

Other opportunities for improvement that are not necessarily related to Gerry's properties: improving the roads, expanding the amount of Conservation Reserve Program (CRP) acres, more streambank stabilization, increase riparian corridor plantings. In Jackson County, Gerry has applied for cost-share to remove invasive species.

About the Conservation Reserve Program (CRP): In exchange for a yearly rental payment, farmers enrolled in the program agree to remove environmentally sensitive land from agricultural production and plant species that will improve environmental health and quality. Contracts for land enrolled in CRP are 10-15 years in length. The long-term goal of the program is to re-establish valuable land cover to help improve water quality, prevent soil erosion, and reduce loss of wildlife habitat.¹

4. What investments do you make for the conservation or best management practices being implemented on your land?

Gerry works to clean up his properties as best as possible by removing invasive species before new trees are planted in

Gerry puts management of the driveway up the hill to the house in this category. This is a steep gravel driveway that has to be routinely graded to divert the water off the side and prevent erosion.

¹ <https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/>

5. What sources of funding support implementation of the best management practices or conservation programs on your land?

Gerry's forest is enrolled in the classified forest program, which prohibits livestock, building of structures, and several other activities. Zac Smith, DNR District Forester, visits the enrolled property at least once every seven years to update the property management plan and to oversee the classified forest program. This reduces state taxes for the acres enrolled in the classified forest program.

Some of the eastern portions of the property are in the Conservation Reserve Program (CRP) with NRCS because Gerry took some agricultural land out of production and put in tree plantings. Has also used a USF&W cost-share program for reforestation, to remove silver maple and plant more hardwoods.

Gerry observes that a lot of the forestry cost-share programs are investing more toward invasive plant species control, which is part of timber stand improvement. Gerry is concerned that we are not able to get ahead of the invasives yet believes that the current approach is sporadic. On his land, he tries to control invasives so they don't strangle trees. The 'endemic' invasives on Gerry's property are Japanese honeysuckle and multiflora rose. Japanese stilt grass is becoming endemic, and is endemic in Yellowwood State Forest. A number of invasives appear on Gerry's property and he attempts to control them. This is a difficult process because many come in with the flood waters and some spread from adjacent properties, e.g. along the road.

6. Are the practices that you implement voluntary? Are any of the funding sources that you use contingent upon the best management practices that you are using?

Yes, the programs that Gerry participates in are voluntary. To receive the state tax credits from the classified forest program, he must comply with specified management practices for forestry and avoid certain activities on the land (e.g., cattle grazing, constrictions, growing Christmas trees).

7. What kind of practices would you like to implement on your property to better protect Lake Monroe from nutrients and sediments in runoff?

Another challenge that Gerry observes on his property is that there is floodplain in the North Branch of Salt Creek that drains the northern half of Brown County. His property is near the 'end' of the drainage, i.e. shortly before it reaches the floodplain of Lake Monroe. Most of the soil lost during flooding is from stream bank erosion. However, the nature of the floodplain in this area (mostly silt clay soil, deep creek banks with little stone), makes any work for stream bank stabilization a major undertaking. Trees and brush on his property helps to slow the flow and filter out sediments and trash. However, any major work to slow sediments and trash has to be done higher up in the drainage area of Salt Creek.

8. What resource concerns do you have related to implementing best management practices on your land? What support would help you or your neighbors implement desirable, yet unimplemented (if any), best practices on your property?

Incentives for establishing more wetlands like CRP land. More incentive programs are a positive, though many of the incentives are not enough unless you are going to do that practice anyway. Not much farmland exists in Brown County because of the terrain, and what is farmable is directly in the floodway.

The tax base in Brown County is not great. A lot of land in the Lake Monroe watershed is in Brown County, but Brown County does not get much benefit from Lake Monroe. How do we connect the dots for landowners?

Gerry has reported to the Brown County Highway Department that Jackson Creek Road is frequently flooded. Jackson Creek Road is a gravel road and is an example of a road that gets washed out each time there is a heavy rain or flood. Every car that runs through it generates more mud, but there are not enough funds in the Brown County Road Department to address this road and the many others that are in similar condition.

Gerry has been part of an effort at Yellowwood, to reroute horse trails to help prevent their erosion. A group of registered volunteers is working to add switchbacks instead of allowing the trail to run straight. The volunteers also clear downed limbs that block the trails. The IDNR Division of Forestry's budgets keep getting cut, and they are short on help. Many of the skid trails, access roads and horse trails in the state forest follow the original county roads and farm access roads which were wagon roads that were placed wherever people could get through. Some have been rerouted to be more 'manageable', but more work needs to be done.

9. Questions/Comments

Would be great if more could be done to plant in the floodway lands that are right along the lake. Such plantings could include shrubs or mature trees.

Stream bank stabilization is an expensive effort to do well; it's not as simple as putting stone along the stream bank.

In Brown County, Gerry has also wondered if small coffer dams in some of the upper drainages could be installed to hold back some of the sediment or filter out sediments instead of trying to stop the water entirely.



Appendix O
**Conservation Practitioner Survey
For Lake Monroe 319 Watershed Plan**

Kenny Wagler, Brown County

Private Land Manager

December 2, 2020; revised June 21, 2021

Introduction

Kenny Wagler’s property has been a family farm since his father arrived in Brown County area in the 1950s; Kenny joined his father in the farming business in the 1970s. The land is in agricultural production, with the primary goal of raising dairy cattle. Part of the property is in the Monroe/Salt Creek watershed within Brown County and is farmed for livestock feed. The crops raised include corn, alfalfa hay, and soybeans.

The 750 milking dairy cattle and 750 growing heifers that eat this feed also reside in Brown County but in the Lake Lemon watershed, outside of the Lake Monroe watershed. The dairy cattle operation has a permit from the Indiana Department of Environmental Management (IDEM) and is inspected regularly by IDEM as a dairy operation.

1. What are the most effective best management practices you have used on your land?

In the past, fodder would be removed from the fields and put into silage, a practice which left the land bare. With assistance from the Brown County NRCS, Mr. Wagler now applies cover crops, which has been helpful to stop washes over the farm fields. With only a thin layer of topsoil, cover crops help retain this valuable resource. On some of the cropland in the Lake Monroe watershed Kenny had practiced minimum till for many years and now practices no-till, leaving corn fodder on the field and over-planting with cover crop. Occasionally, the fields will be tilled if the soil becomes compacted, but he prefers not to till. Kenny also works with a soil scientist to develop a precise formula for fertilizer application to the crops to avoid investing in fertilizer that would be vulnerable to runoff.

Generally, Kenny plants cover crops on manure ground (where manure from the dairy is applied) and ground where the corn stalks are chopped back. In other words, where the fields are made bare, that’s where Kenny has applied cover crops to this point. There are a few fields in the Lake Monroe watershed where cover crops are not currently used, though Kenny is open to the possibility in the future; in these areas the corn is harvested by only removing the ear of corn, and the entire stalk is left in the field, making a corn stalk cover instead of a “live” cover crop.

In the Lake Lemon Watershed, the Watershed Plan was completed about 25 years ago. Kenny knows of a good example of a project implemented to protect a stream bank from erosion. In this example, downed trees and log jams were removed, then the creek banks were protected to better manage erosion.

2. What are the biggest threats to your land? What practices have not worked?

Some of the Wagler farm property is adjacent to Salt Creek. Log jams in the creeks are a threat, because they create dams that cause fields to flood. When this happens, large flows can wash away creek banks and increase soil loss from the fields. Large equipment is needed to remove log jams and property access can be difficult, either due to the terrain or in obtaining permission from adjacent property owners.

To remove a log jam or woody debris that is impeding the flow of water, the landowner must obtain a permit from the Indiana Department of Natural Resources (DNR). A landowner cannot add riprap, concrete, or other slope stabilizer to stop erosion without a permit.

In Kenny's experience, healthy trees along the creeks and buffer strips are important to keeping the creeks clear. Once trees are compromised and they fall into the creeks, there is a negative effect. In one successful example where a log jam was removed near Kenny's farm, the streambanks were grassed afterwards.

3. What other successful conservation practices are being implemented by other landowners, agencies or groups that are not applicable on your land? Or that you are not implementing?

In the surrounding areas, no other farmers have the same business goals that Kenny has with respect to livestock and dairy farming, so there is not an opportunity to compare to other nearby dairy operations.

In some areas of his farm, crops cannot be rotated between corn and beans, so Kenny grows corn only. To grow corn in the Lake Lemon watershed fields, Kenny must apply organic material to the soil and can also put cover crop in to fix nitrogen over the winter. To apply the organic material from the dairy farm in the Lake Monroe watershed would require hauling it from 10 miles away, and it is too expensive for Kenny to haul that far. Therefore, Kenny is not applying the organic material (manure) from the dairy in the Lake Monroe watershed.

4. What investments do you make for the conservation or best management practices being implemented on your land?

Investments in conservation include cover crops, which Kenny has grown to love, especially seeing green fields in the fall and winter. Radishes are a frequently used cover crop that take up nitrogen to fix it in the soil, allowing another crop to be planted in the spring. Another family member farms DNR-leased farmland in fields that stretch between Nashville and Bloomington; all are planted in row crop, and most of those fields are planted with cover crop following harvest.

While incentive programs always help, the first and most important step is that the landowner wants to implement conservation practices on their land. There's more to farming than the dollar; many landowners want to leave an inheritance for a future generation or another person.

On the dairy farm in the Lake Lemon watershed, Kenny's cattle operation includes about five heavy use area pads to protect the soil from washing away after being disturbed by cattle hooves.

5. What sources of funding support implementation of the best management practices or conservation programs on your land?

Kenny has applied for and received funding through NRCS. He notes that most farmers won't use buffer strips along streams because it requires leaving acreage out of production which reduces yields. Incentives for the implementation of buffer strips are available through NRCS, but this incentive might need to be a bit greater to encourage more farmers to adopt the practice.

Cara Bergschneider's work in outreach and education at NRCS has been very effective in helping Kenny implement best management practices. In the past he has used Water and Sediment Control Basins, or WASCObS (small grassy areas in low spots to slow water, carry it to a stable outlet and to help trap sediment/preserve topsoil) in hilly fields. Now buffer strips are used on his properties to protect the stream water quality.

6. Are the practices that you implement voluntary? Are any of the funding sources that you use contingent upon the best management practices that you are using?

All practices that Kenny uses on his farm are voluntary. The NRCS practices do have follow-up visits to verify implementation and discuss needs to carry the implementation forward into the future.

7. What kind of practices would you like to implement on your property to better protect Lake Monroe from nutrients and sediments in runoff?

Log jam removal is of great interest to Kenny, and he describes it as "a hot potato". Removing log jams is dangerous work; Kenny knows of someone who was trying to remove a jam and suffered a fatality. Support and resources are needed to do this work and do it safely.

8. What resource concerns do you have related to implementing best management practices on your land? What support would help you or your neighbors implement desirable, yet unimplemented (if any), best practices on your property?

On his own farm, Kenny has watched, lived and gained experience with different conservation practices. One thing that stands out is that information sharing and education for landowners is very important. Reaching out to share information about conservation practices is more difficult if the landowner is not financially connected to the management of the land (e.g., a landowner doesn't earn a living from the land). Working together with fellow landowners, partners, and informed agencies is also important.

Kenny knows someone who recently purchased a dairy. Then, a solar energy company rented that dairy land for \$800-1,000/acre with a 30-year lease. In the long term, this likely means that the land will not return to agricultural production since most farmers consider \$100/acre revenue to be a job well done. Agriculture cannot compete with the higher revenue that can be generated from green energy companies that have tax dollars supporting them.