

Sulphur Creek Watershed Implementation Plan Supplement and TMDL Alternative Plan



August 2023

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and TMDL Alternative Plan**

August 2023

**Kentucky Department for Environmental Protection
Division of Water
Frankfort, Kentucky**

This report is approved for release

A handwritten signature in black ink, appearing to read 'C. Johnson', is written over a horizontal line.

**Carey Johnson, Director
Division of Water**

August 14, 2023



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1.0 SUMMARY

This document has been prepared to supplement the 2015 [Sulphur Creek Watershed Implementation Plan \(SCWIP\)](#) and to formalize a Total Maximum Daily Load (TMDL) Alternative Plan for addressing the impairments in the Sulphur Creek watershed. A TMDL Alternative Plan is a near-term water quality restoration plan with a schedule of actions and milestones that are more immediately beneficial or practicable to achieving water quality standards than a TMDL. The [SCWIP](#) contains a detailed description of the watershed and its setting, the location and nature of 303(d) listed waters, an inventory of pollutant sources, a detailed summary of monitoring data results, and a schedule of implementation activities designed to address the impairments in the watershed. This TMDL Alternative Plan document summarizes key information in that earlier plan and supplements it with the following:

- Background information of the watershed and the development of the implementation plan (Section 1.1)
- Current status of 303(d) listings in the watershed (Section 2)
- Updated implementation information (Section 3 and Appendix A)
 - updated schedule for implementation
 - summary of implementation completed to date
 - discussion of future implementation priorities
 - detailed information on completed Implementation
- An updated plan for success monitoring and progress tracking/reporting (Section 4)

1.1 BACKGROUND

Located within central Kentucky in parts of Anderson, Mercer, and Washington counties, the Sulphur Creek watershed drains approximately 23 square miles. The watershed, which is a tributary to the Chaplin River, lies within the Salt River Basin and is identified as Hydrologic Unit Code 051401030105. The Sulphur Creek watershed is further divided into four subwatersheds: Brush Creek, Log Lick, Cheese Lick and Sulphur Creek. A portion of the mainstem of Sulphur Creek is designated as an Outstanding State Resource Water (OSRW), an Exceptional Water, and a Reference Reach. Land use in the Sulphur Creek Watershed consists of 70.8% forest, 13.9% farmland (mostly pasture), and 4.2% developed land. There are no active point sources of pollutants in the watershed. The watershed contains several waterbodies that do not fully support their designated uses. A detailed list of the impaired waterbodies is included in Section 2 of this document.

The initial impaired waterbody identified in the Sulphur Creek watershed was a segment of Cheese Lick, first listed on the 2006 303(d) list as being impaired for Nutrient/Eutrophication Biological Indicators and Sedimentation/Siltation, with suspected sources pointing to grazing, loss or riparian habitat, and streambank destabilization. The mainstem of Sulphur Creek was listed on the 2010 303(d) list, for fecal coliform, with no suspected source being identified.

During the preparation of the 2012 Integrated Report (IR) and review of TMDL priorities, the Sulphur Creek watershed was identified as a high priority for follow-up monitoring to identify additional impaired waters and to collect data to potentially develop TMDLs. Monitoring was conducted throughout the watershed in 2012 and 2013, which identified several additional impaired waterbody

segments within the watershed. A full account of the data results and analysis can be found in Sections 3 & 4 within the [SCWIP](#).

Following the 2012-13 monitoring effort, Sulphur Creek was selected for development of a “straight to implementation plan” due to high potential for recoverability, the presence of an OSRW, good baseline data, and a high level of local engagement. A [Watershed Health Report](#) was produced to aid in engaging with the community and potential partners. An implementation plan was developed and designed to meet the nine watershed planning elements required by the Environmental Protection Agency (EPA) to be eligible to apply for 319 implementation grants. The SCWIP was completed in 2015 and accepted by the EPA as meeting the required nine watershed plan elements (see the [SCWIP 3.0](#)).

The SCWIP contains a detailed catalog of sources and a strategy of prioritizing implementation activities in each of four subwatersheds. Since the completion of the plan, several 319 implementation grant projects have been executed in the watershed. There is currently one ongoing project, and continued engagement that makes additional work likely. The Kentucky Division of Water (DOW) continues to consider the Sulphur Creek watershed as an important recovery project because of its designation as an OSRW, Exceptional Water, and Reference Reach. Due to the level of community engagement and the lack of point sources, this TMDL Alternative Plan is an appropriate avenue for water quality restoration to be pursued in advance of TMDL development. It is anticipated that water quality standards will be met in these waters by the 2032 IR cycle for all impairments.

2.0 IMPAIRED WATERS UPDATE

The monitoring conducted in 2012-13 provided a greater understanding of the impairments within the Sulphur Creek watershed and helped to direct implementation priorities. At the time of the [SCWIP](#) development, only the original two segments were on an approved 303(d) list. The new data resulted in the listing of several additional waterbody segments on the 2016 303(d) list for impaired Primary Contact Recreation (PCR) and Warm Water Aquatic Habitat (WAH) designated uses. These segments remain on the most recent approved list (2022) (Table 2.1). Also in the 2016 cycle, the Cheese Lick WAH impairments were delisted (Table 2.2). There has been no new data or listing changes since the 2016 303(d) list, other than changes to river miles due to National Hydrography Dataset (NHD) updates.

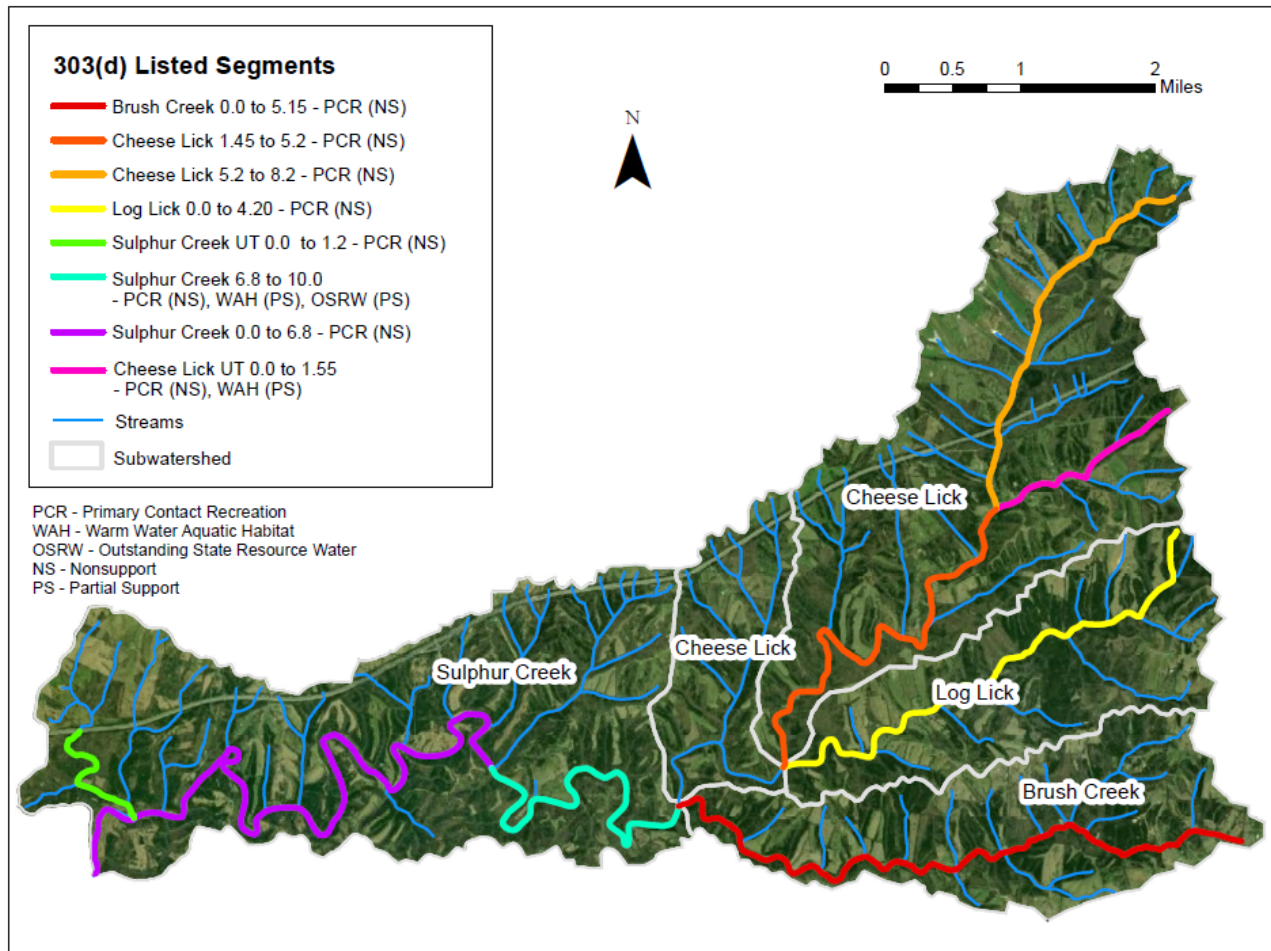


Figure 2.1 Sulphur Creek Watershed and Subwatersheds with 303(d)-Listed Segments

Table 2.1 303(d)-Listed Streams in Sulphur Creek Watershed as of 2022 Cycle

Waterbody & Segment ¹	Assessment Unit ID	Category ²	Impaired Use ³	Listed Parameter	Cycle First Listed	Suspected Sources
Brush Creek 0.0 to 5.15	KY-335	5-NS	PCR	<i>E.coli</i>	2016	Grazing in Riparian or Shoreline Zones, Livestock (Grazing or Feeding Operations), Non-Point Source, On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)
Cheese Lick 1.45 to 5.2	KY-467	5-NS	PCR	<i>E.coli</i>	2016	Livestock (Grazing or Feeding Operations), Non-Point Source, On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)
Cheese Lick 5.2 to 8.2	KY-468	5-NS	PCR	<i>E.coli</i>	2012	Grazing in Riparian or Shoreline Zones, Livestock (Grazing or Feeding Operations), Non-Point Source, On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)
Cheese Lick UT 0.0 to 1.55	KY-469	5-NS	PCR	<i>E.coli</i>	2016	Grazing in Riparian or Shoreline Zones, Livestock (Grazing or Feeding Operations), Non-Point Source, On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)
Cheese Lick UT 0.0 to 1.55	KY-469	5-PS	WAH	Nutrient/Eutrophication Biological Indicators	2016	Grazing in Riparian or Shoreline Zones, Livestock (Grazing or Feeding Operations), Non-Point Source
Cheese Lick UT 0.0 to 1.55	KY-469	5-PS	WAH	Sedimentation/Siltation	2016	Grazing in Riparian or Shoreline Zones, Loss of Riparian Habitat, Non-Point Source, Streambank Modifications/destabilization
Log Lick 0.0 to 4.20	KY-1177	5-NS	PCR	<i>E.coli</i>	2016	Grazing in Riparian or Shoreline Zones, Livestock (Grazing or Feeding Operations), Non-Point Source, On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)
Sulphur Creek 0.0 to 6.8	KY-1856	5-NS	PCR	<i>E.coli</i>	2012	Livestock (Grazing or Feeding Operations), Non-Point Source, On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)
Sulphur Creek 6.8 to 10.0	KY-1857	5-NS	PCR	<i>E.coli</i>	2016	Livestock (Grazing or Feeding Operations), Non-Point Source, On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)
Sulphur Creek 6.8 to 10.0	KY-1857	5-PS, 5-PS	WAH, OSRW	Nutrient/Eutrophication Biological Indicators	2016; 2010	Livestock (Grazing or Feeding Operations), Non-Point Source
Sulphur Creek 6.8 to 10.0	KY-1857	5-PS, 5-PS	WAH, OSRW	Sedimentation/Siltation	2016; 2010	Loss of Riparian Habitat, Non-Point Source, Streambank Modifications/destabilization
Sulphur Creek UT 0.0 to 1.2	KY-1859	5-NS	PCR	<i>E.coli</i>	2016	Livestock (Grazing or Feeding Operations), Non-Point Source, On-site Treatment Systems (Septic Systems and Similar Decentralized Systems)

(¹) River mile information for stream segments aligns with the 2022 303(d) list.

(²) NS – Nonsupport; PS – Partial Support

(³) PCR – Primary Contact Recreation; WAH – Warm Water Aquatic Habitat; OSRW – Outstanding State Resource Water

Table 2.2 Segments Delisted during the 2016 Cycle

Waterbody & Segment¹	Assessment Unit ID	Category²	Impaired Use³	Parameter	Cycle Delisted	Suspected Sources
Cheese Lick 1.45 to 5.2	KY-467	5-PS	WAH	Nutrient/Eutrophication Biological Indicators	2016	Grazing in Riparian or Shoreline Zones
Cheese Lick 1.45 to 5.2	KY-467	5-PS	WAH	Sedimentation/Siltation	2016	Grazing in Riparian or Shoreline Zones, Loss of Riparian Habitat, Streambank Modifications/destabilization
(1) River mile information for stream segments aligns with the 2022 303(d) list. (2) PS – Partial Support (3) WAH – Warm Water Aquatic Habitat						

3.0 IMPLEMENTATION

The watershed projects outlined in the [SCWIP](#) address Nonpoint Source (NPS) pollution. Two main categories of Best Management Practices (BMPs) were chosen to address the impairments of the Sulphur Creek watershed: agricultural, and onsite wastewater improvement and maintenance. Specific action items within these categories were selected according to the needs of each subwatershed.

To date, funding for the watershed projects has been secured largely through the Kentucky NPS Control Program which distributes monies from the US EPA Section 319 (h) grant of the Clean Water Act. These funds have been matched at the state level by the Division of Conservation State Cost Share program as well as by local landowners. DOW has been working closely with partners such as the Mercer County Health Department, Mercer and Anderson County Conservation Districts, Kentucky Division of Conservation, and the Natural Resources Conservation Service to engage with residents to address the sources of the impairments and to implement the SCWIP.

The following subwatershed implementation schedule provides an update to the implementation schedule outlined in Section 8.0 of the [SCWIP](#). The updated schedule identifies the committed partners, funding mechanisms, and timelines for implementing projects in each subwatershed.

3.1 Updated Sulphur Creek Watershed Implementation Schedule

Table 3.1 Sulphur Creek Watershed Implementation Projects								
Project	Project Number	Start Date	End Date	Subwatershed(s)	Pollutants Addressed	BMP Category	Key Partners	Funding
Sulphur Creek Watershed Agricultural Best Management Practices (BMP) Implementation Plan	15-10	03/2016	03/2018	Brush Creek, Log Lick	<i>E.coli</i> , Sediments, Nutrients	Agricultural Improvement	Mercer County Conservation District (MCCD), Sulphur Creek Watershed Oversight Committee, Division of Water (DOW)	2015 Section 319(h) Nonpoint Source (NPS) Implementation Grant
Septic System Reclamation Project for the Sulphur Creek Watershed in Northwestern Mercer County	15-09	03/2016	09/2018	Brush Creek, Log Lick	<i>E.coli</i>	Onsite Wastewater Improvement and Maintenance	MCCD, Mercer County Health Department (MCHD), Natural Resources Conservation Service (NRCS), DOW	2015 & 2017 Section 319(h) NPS Implementation Grant
Cheese Lick Watershed Agricultural BMP Implementation Project	17-17	01/2018	12/2020	Cheese Lick	<i>E.coli</i> , Sediments, Nutrients	Agricultural Improvement	Anderson County Conservation District, NRCS, DOW	2017 Section 319(h) NPS Implementation Grant
Sulphur Creek Watershed Agricultural BMP Implementation Plan	18-06	05/2019	04/2021	Brush Creek, Log Lick	<i>E.coli</i> , Sediments, Nutrients	Agricultural Improvement	MCCD, Sulphur Creek Watershed Oversight Committee, DOW	2018 Section 319(h) NPS Implementation Grant
Sulphur Creek Watershed Agricultural BMP Implementation Plan	22-09	11/2022	9/2026	Cheese Lick Sulphur Creek	<i>E.coli</i> , Sediments, Nutrients	Agricultural Improvement	MCCD, Anderson County Conservation District, Kentucky Division of Conservation, NRCS, Sulphur Creek Watershed Oversight Committee, DOW	2022 Section 319(h) NPS Implementation Grant

3.1 Implementation to Date

Implementation of onsite wastewater improvement and maintenance BMPs, as well as agricultural BMPs, have been ongoing since 2016 within the Brush Creek, Log Lick, and Cheese Lick subwatersheds. These efforts have resulted in the installation of 11 new septic systems, the repair of one septic system, and the pump out of an additional septic system. Completed agricultural BMPs include the installation of 14 winter feeding areas, 32,620 linear feet of fencing, 25,689 square feet of animal trails, 20 alternative waterers, 7,118 linear feet of water pipelines, and 349 acres of pasture renovation. The development and distribution of educational materials, as well as field farm demonstration events, have played a key role in recruiting landowner participation. The progress report in Appendix A can be consulted for a detailed account of completed implementation action items and accomplishments through September 2022.

3.2 Upcoming Implementation Projects

Implementation of further agricultural BMPs is currently ongoing within the Sulphur Creek and Cheese Lick subwatersheds. Appendix A contains a detailed list of planned action items for the current watershed project, which will be concluded by October 2026. Additional watershed projects will be considered if success monitoring indicates a continued need.

4.0 SUCCESS MONITORING AND REPORTING

Initial success monitoring in the Sulphur Creek watershed for *Escherichia coli* (E. coli) is projected to begin in 2024. Monitoring will primarily focus on the upper watershed, where several watershed projects have been completed within the Cheese Lick, Log Lick, and Brush Creek subwatersheds. As implementation projects are still ongoing within the lower watershed, further success monitoring for E. coli is anticipated in 2028 (Table 4.1). Success monitoring for Nutrient/Eutrophication Biological Indicators and Sedimentation/Siltation is projected to begin in 2030 (Table 4.2), to allow 4 years post-implementation for recovery of biological communities.

Impaired segments will be evaluated for delisting from the 303(d) list after monitoring results are obtained. The impaired segments in the watershed are anticipated to achieve water quality standards by the 2032 IR cycle. However, if delisting is not indicated, adaptive management will be employed to conduct additional monitoring or BMPs as appropriate. A progress report will be assembled for each IR cycle. These progress reports will summarize monitoring data collected, assessment updates, completed implementation, and upcoming implementation plans.

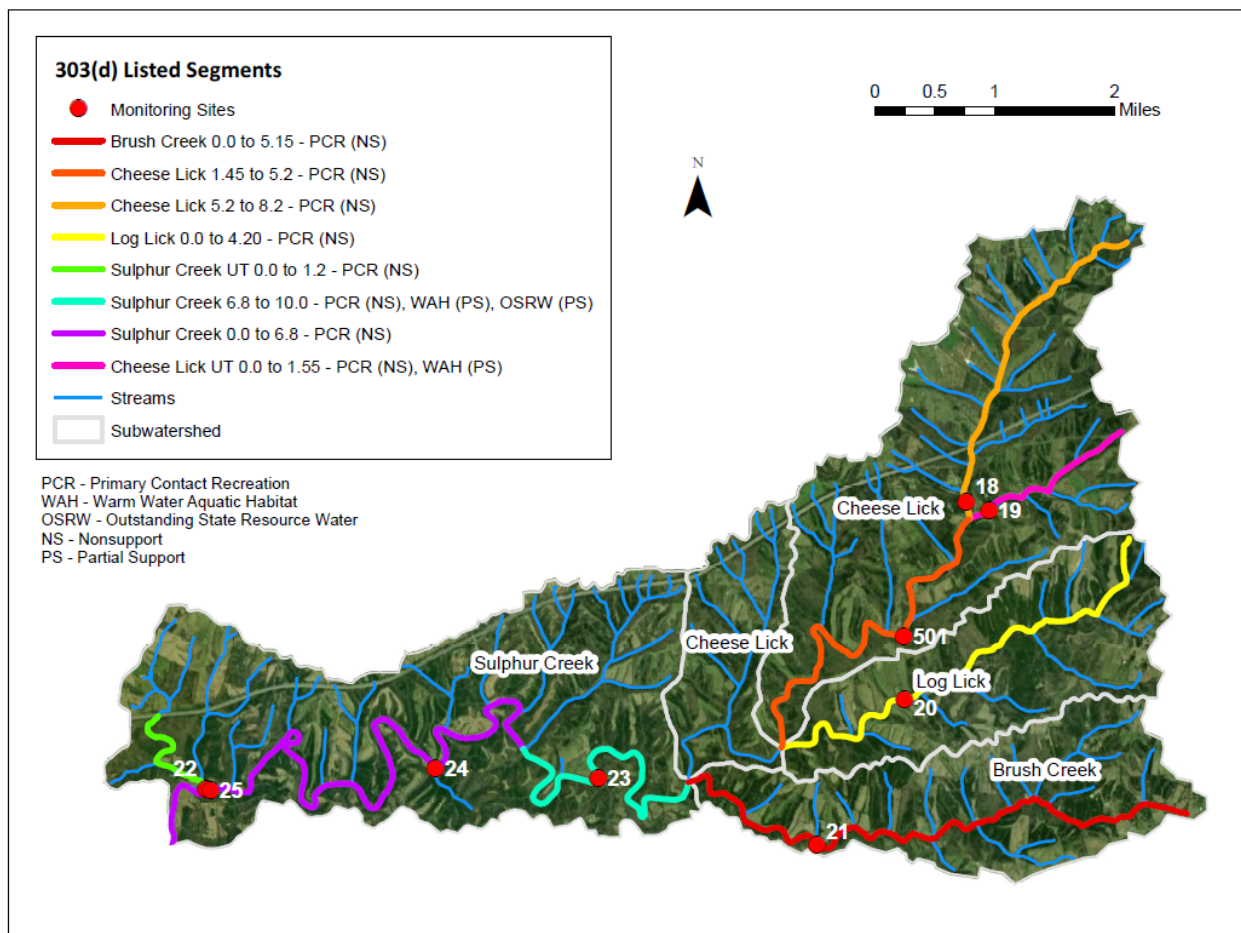


Figure 4.1 Sulphur Creek Watershed Monitoring Locations

Table 4.1 Success Monitoring for PCR - E.coli

Focus Subwatershed	Activity	Action Items	Key Partners	Funding Mechanism	Timeframe
Brush Creek	Success Monitoring	1. Collect <i>E.coli</i> samples from established site (21).	DOW	319	2024
		2. Review and submit data results for assessment.			2025
	Evaluate impaired segment for possible delisting from the 303(d) list	1. Delist Brush Creek river miles 0.0 to 5.15	DOW	319	2026 cycle
		2. If delisting not indicated, evaluate for additional monitoring and/or additional BMPs in watershed			2026
Log Lick	Success Monitoring	1. Collect <i>E.coli</i> samples from established site (20).	DOW	319	2024
		2. Review and submit data results for assessment.			2025
	Evaluate impaired segment for possible delisting from the 303(d) list	1. Delist Log Lick river miles 0.0 - 4.2	DOW	319	2026 cycle
		2. If delisting not indicated, evaluate for additional monitoring and/or additional BMPs in watershed			2026
Cheese Lick	Success Monitoring	1. Collect <i>E.coli</i> samples from established sites (18,19,501).	DOW	319	2024
		2. Review and submit data results for assessment.			2025
	Evaluate impaired segment for possible delisting from the 303(d) list	1. Delist Cheese Lick river miles 1.45 - 5.2; Cheese Lick 5.2 - 8.2; Cheese Lick UT 0.0 - 1.55	DOW	319	2026 cycle
		2. If delisting not indicated, evaluate for additional monitoring and/or additional BMPs in watershed			2026
Sulphur Creek	Success Monitoring	1. Collect <i>E.coli</i> samples from established sites (22, 23, 24, 25).	DOW	319	2028
		2. Review and submit data results for assessment.			2029
	Evaluate impaired segment for possible delisting from 303(d) list	1. 1. Delist Sulphur Creek river miles 0.0 - 6.8; 6.8 - 10.0; Sulphur UT 0.0 - 1.2	DOW	319	2030 cycle
		2. 2. If delisting not indicated, evaluate for additional monitoring and/or additional BMPs in watershed			2030

Table 4.2 Success Monitoring WAH - Nutrient/Eutrophication Biological Indicators and Sedimentation/Siltation

Focus Subwatershed	Activity	Action Items	Key Partners	Funding Mechanism	Timeframe
Cheese Lick	Success Monitoring	3. Biological/chemical monitoring at established sites (19).	DOW	319	2030
		4. Review and submit data results for assessment.			2031
	Evaluate impaired segment for possible delisting from the 303(d) list	3. Delist Cheese Lick UT river miles 0.0 - 1.55	DOW	319	2032 cycle
		4. If delisting not indicated, evaluate for additional monitoring and/or additional BMPs in watershed			2032
Sulphur Creek	Success Monitoring	3. Biological/chemical monitoring from established sites (23).	DOW	319	2030
		4. Review and submit data results for assessment.			2031
	Evaluate impaired segment for possible delisting from 303(d) list	3. 1. Delist Sulphur Creek river miles 6.8 - 10.0	DOW	319	2032 cycle
		4. 2. If delisting not indicated, evaluate for additional monitoring and/or additional BMPs in watershed			2032

APPENDIX A – Sulphur Creek Watershed Implementation Progress 2016-2022

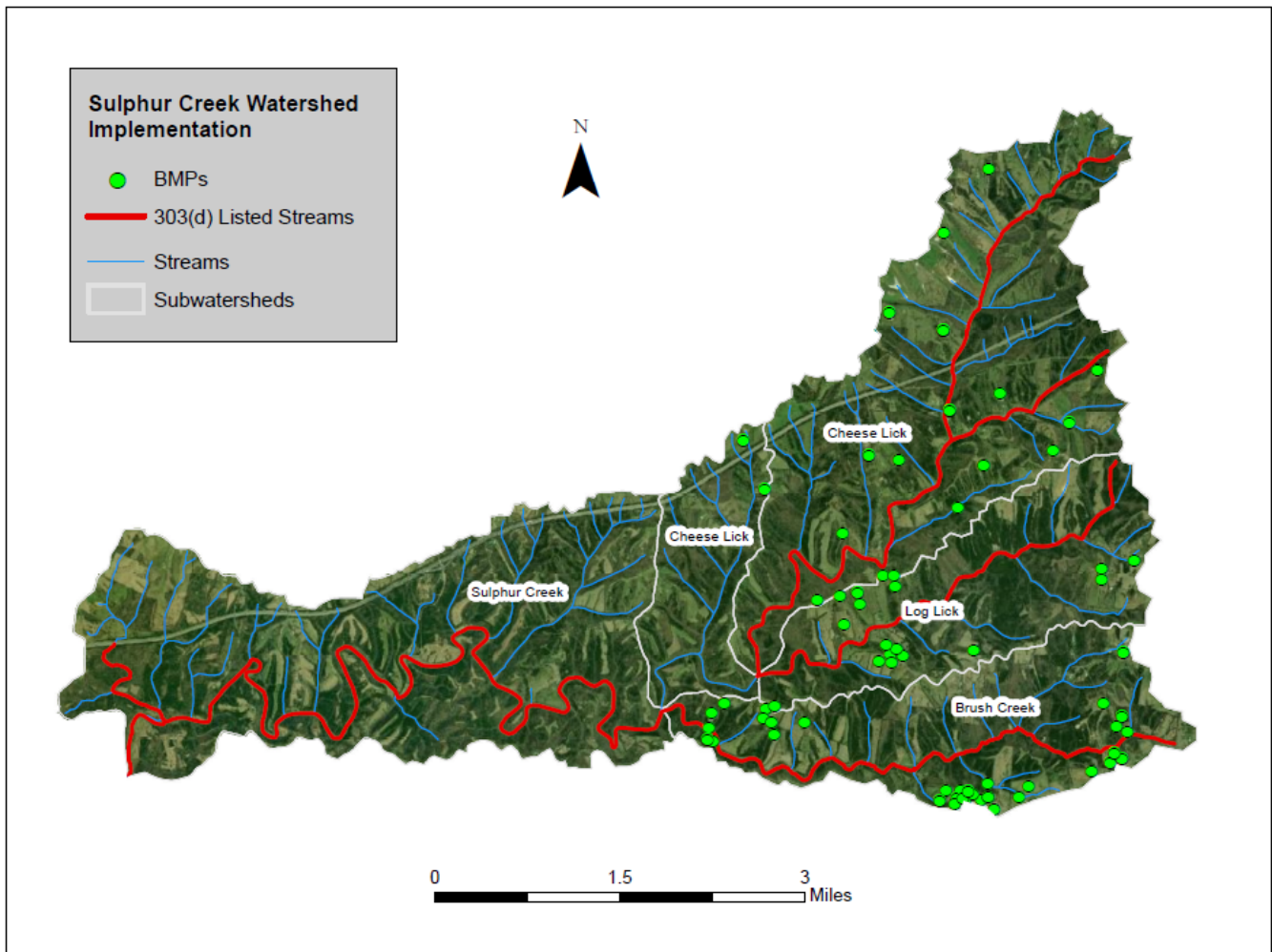
Sulphur Creek Watershed Implementation Progress

Period: March 2016 – September 2022

1.0 Summary

Implementation of the [Sulphur Creek Watershed Implementation Plan](#) began in 2016. The following section provides an overview of the implementation that has occurred in the subwatersheds of Sulphur Creek for the period of March 2016 through September 2022, as well as the ongoing implementation plans through 2026. The Kentucky Division of Water (DOW) Nonpoint Source program estimates the completed projects have resulted in a yearly reduction of 17,768 lbs of Nitrogen, 4,209 lbs of Phosphorus, and 2,907 lbs of Sediment. DOW has been working closely with partners such as the Mercer County Health Department, Mercer and Anderson County Conservation Districts, and the Natural Resources Conservation Service to engage with residents to address the sources of the impairments.

Figure 1.0 Locations of Best Management Practices (BMPs) Implemented Within Sulphur Creek Watershed (as of September



2022)

1.1 Brush Creek Subwatershed Implementation

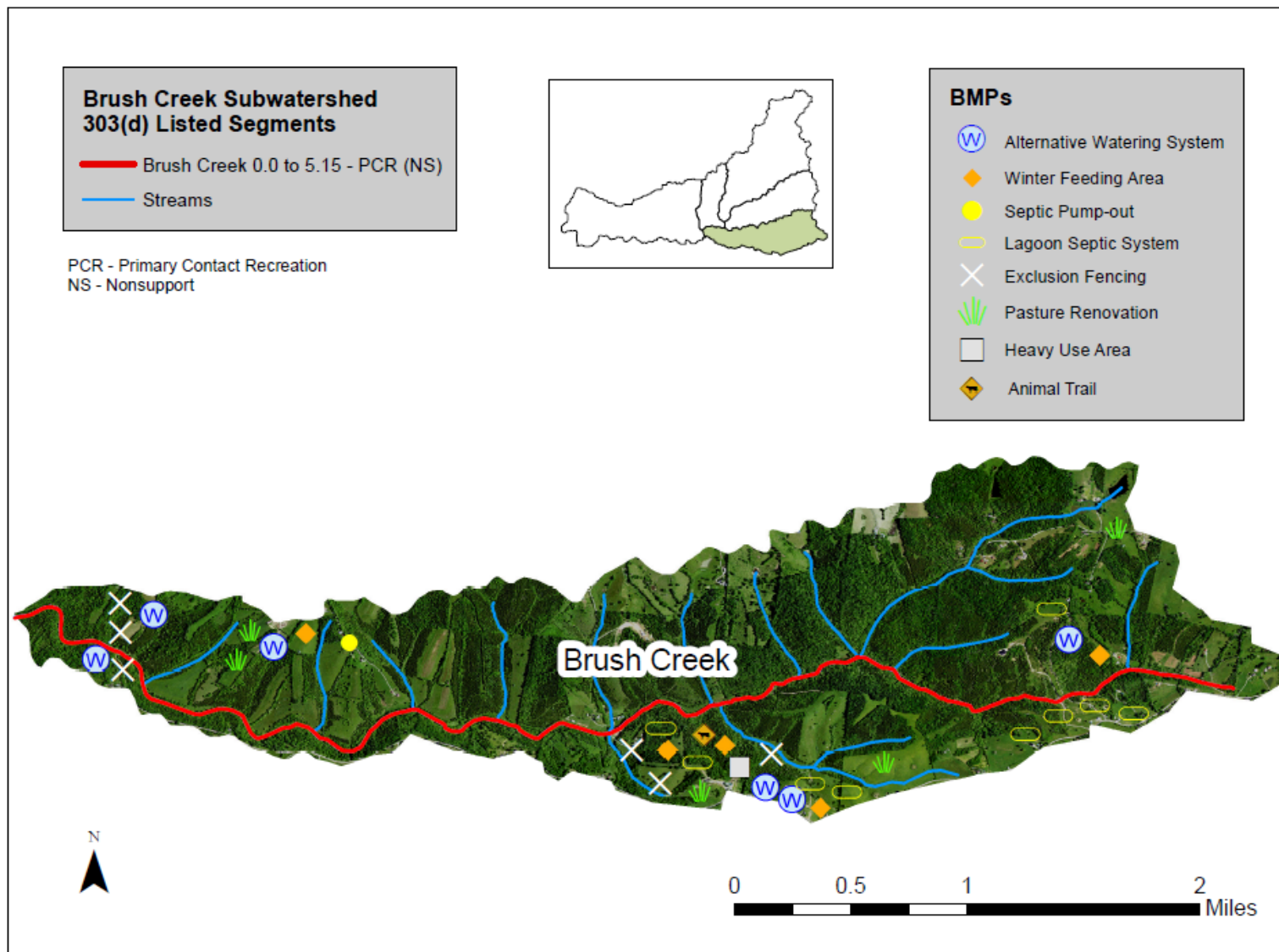


Figure 1.1 Brush Creek Subwatershed Implementation

Table 1.1 Brush Creek Subwatershed Implementation		
BMP Category	Action Items	Progress Report Updates (03/2016-09/2022)
Onsite Wastewater Improvement and Maintenance	1. Repair/Replace household septic systems	Installed 9 new lagoon household septic systems
	2. Complete septic pump-outs	Completed 1 septic pump-out
	3. Develop educational materials and hold workshops and field days	Developed educational materials on proper septic system maintenance, published an article in the newspaper, conducted a radio interview
		Held two workshops
		Held two farm field days to present information to the public about septic maintenance and watershed health, and to provide information about applying for septic system repair and replacement
4. Distribute and receive maintenance inspection applications from landowners	Distributed maintenance inspection applications to landowners	
Agricultural Improvement	1. Implement pasture re-seeding/renovation	Implemented pasture re-seeding resulting in 144.31 acres of renovated pasture
	2. Develop winter feeding areas	Developed 5 winter feeding areas
	3. Develop heavy use areas	Developed 1 heavy use area
	4. Install livestock exclusion fencing	Installed 17,952 linear feet of fence
	5. Install alternative watering systems	Installed 7,118 linear feet of water pipeline and 6 alternative watering systems
	6. Hold farm field days	Held two farm field days to showcase how multiple BMPs can work as a management system and helped raise awareness of water quality issues to landowners in the area. Approx. 200 people in attendance each year
	7. Develop animal trails and walkways	Developed 3,000 ft ² of animal trails and walkways

1.2 Log Lick Subwatershed Implementation

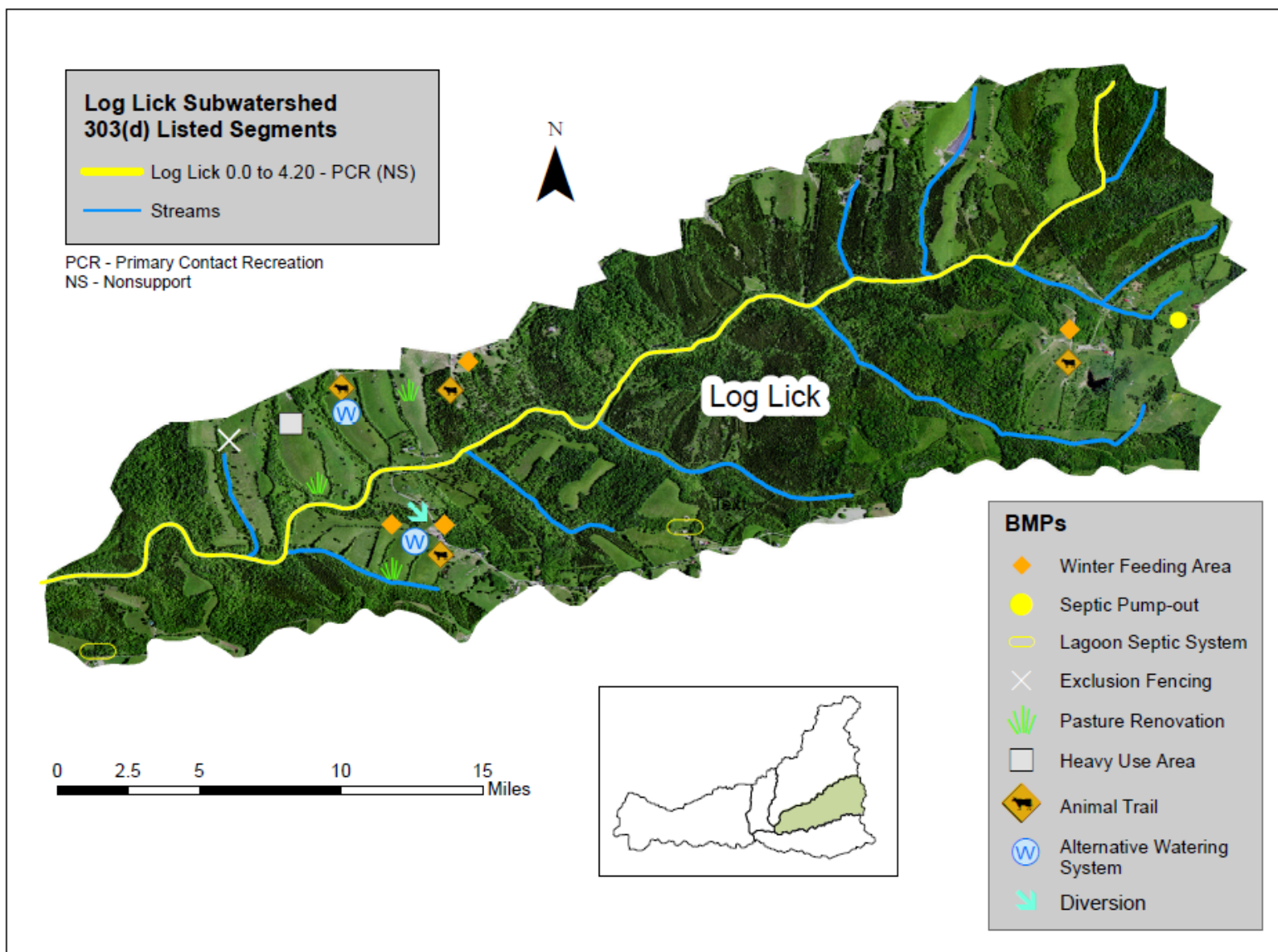


Figure 1.2 Log Lick Subwatershed Implementation

Table 1.2 Log Lick Subwatershed Implementation		
BMP Category	Action Items	Progress Report Updates (03/2016-09/2022)
Onsite Wastewater Improvement and Maintenance	1. Repair/Replace household septic systems	Installed 2 new lagoon household septic systems
	2. Complete septic pump-outs	1 septic pump-out
	3. Develop materials and hold workshops and field days	Developed educational materials on proper septic system care, published newspaper article, conducted a radio interview
		Held two workshops (see workshop flyer in <i>2.1 Completed Watershed Implementation Projects</i>).
		Held two farm field days to present information to the public about septic care & watershed health, and to provide information about applying for septic system repair and replacement.
4. Distribute maintenance inspection applications to landowners	Distributed maintenance inspection applications to landowners	
Agricultural Improvement	1. Implement pasture re-seeding/renovation	Implemented pasture re-seeding resulting in 205 acres of renovated pasture
	2. Develop winter feeding areas	Developed 4 winter feeding areas
	3. Install livestock exclusion fencing	Installed 5,684 linear feet of fencing
	4. Develop animal trails and walkways	Developed 22,689 ft ² animal trails and walkways
	5. Hold field farm days	Held two farm field days to showcase how multiple BMPs can work as a management system and helped raise awareness of water quality issues to landowners in the area. Approx. 200 people in attendance each year
	6. Develop heavy use area	Developed 1 heavy use area
	7. Install downspouts	Installed a diversion (6 downspouts)
	8. Install alternative watering systems	Installed 2 alternative watering systems

1.3 Cheese Lick Subwatershed Implementation

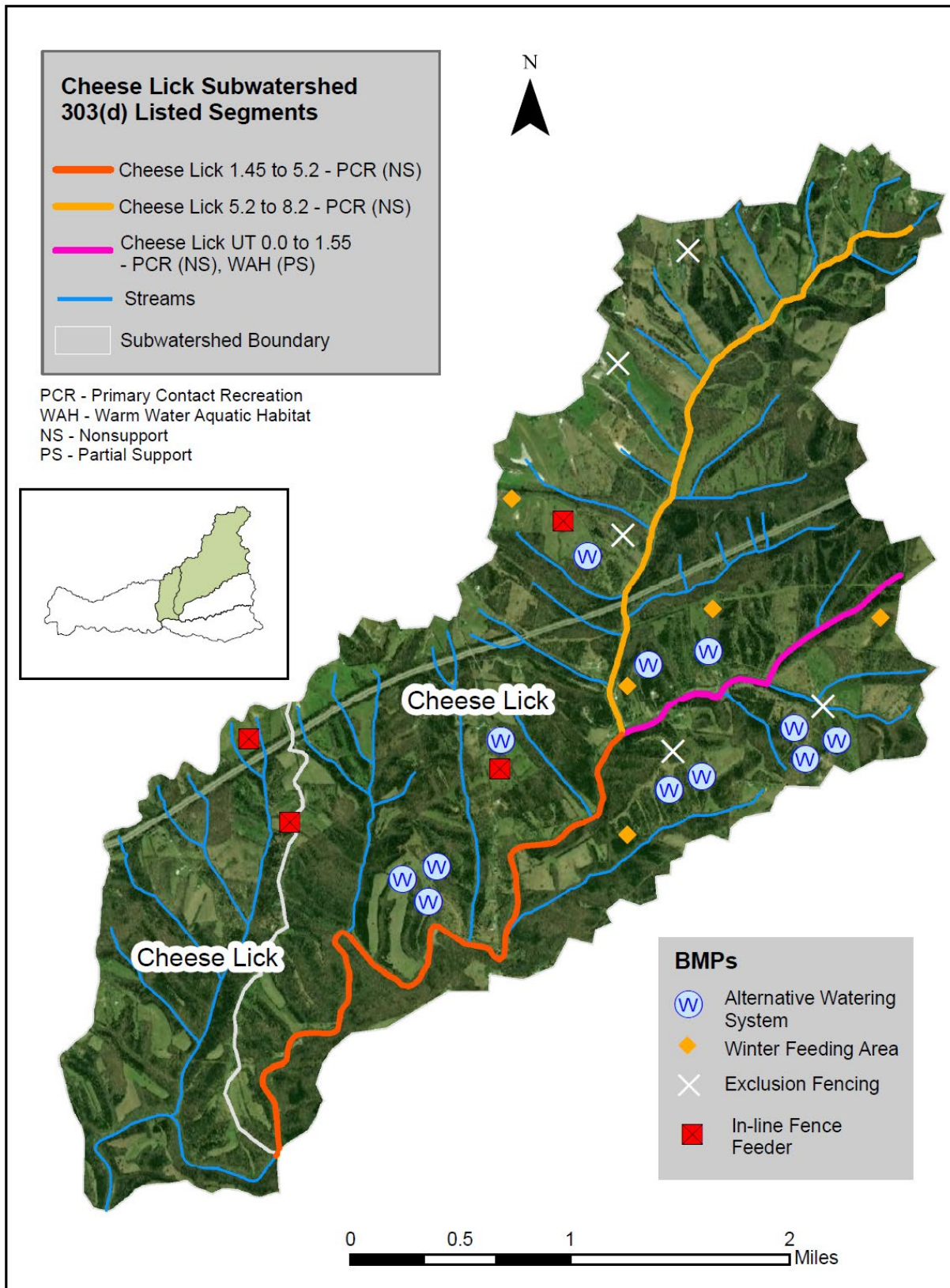


Figure 1.3 Cheese Lick Subwatershed Implementation

Table 1.3 Cheese Lick Subwatershed Implementation		
BMP Category	Action Items	Progress Report Updates (03/2016-09/2022)
Agricultural Improvement	1. Implement pasture re-seeding/renovation	No Information for this reporting period
	2. Develop winter feeding areas	Developed 5 winter feeding areas
	3. Install in-line fence feeders	Installed 4 in-line fence feeders
	4. Install livestock exclusion fencing	Installed 8,984 linear feet of fence
	5. Install alternative watering systems	Installed 12 alternative watering systems
	6. Develop springs as water source	No Information for this reporting period
	7. Fund/Plan farm field days & educational workshops	Held a farm field day to showcase how multiple BMPs can work as a management system and helped raise awareness of water quality issues to landowners in the area.

Table 1.3.1 Upcoming Cheese Lick Subwatershed Implementation		
BMP Category	Action Items	Planned Implementation (11/2022-09/2026)
Agricultural Improvement	1. Implement pasture renovation	No Information for this reporting period
	2. Implement prescribed grazing	No Information for this reporting period
	3. Develop winter feeding areas	No Information for this reporting period
	4. Install heavy use areas	No Information for this reporting period
	5. Install livestock exclusion fencing	No Information for this reporting period
	6. Install alternative watering systems	No Information for this reporting period
	7. Fund/Plan farm field days & educational workshops	No Information for this reporting period

1.4 Sulphur Creek Subwatershed Implementation

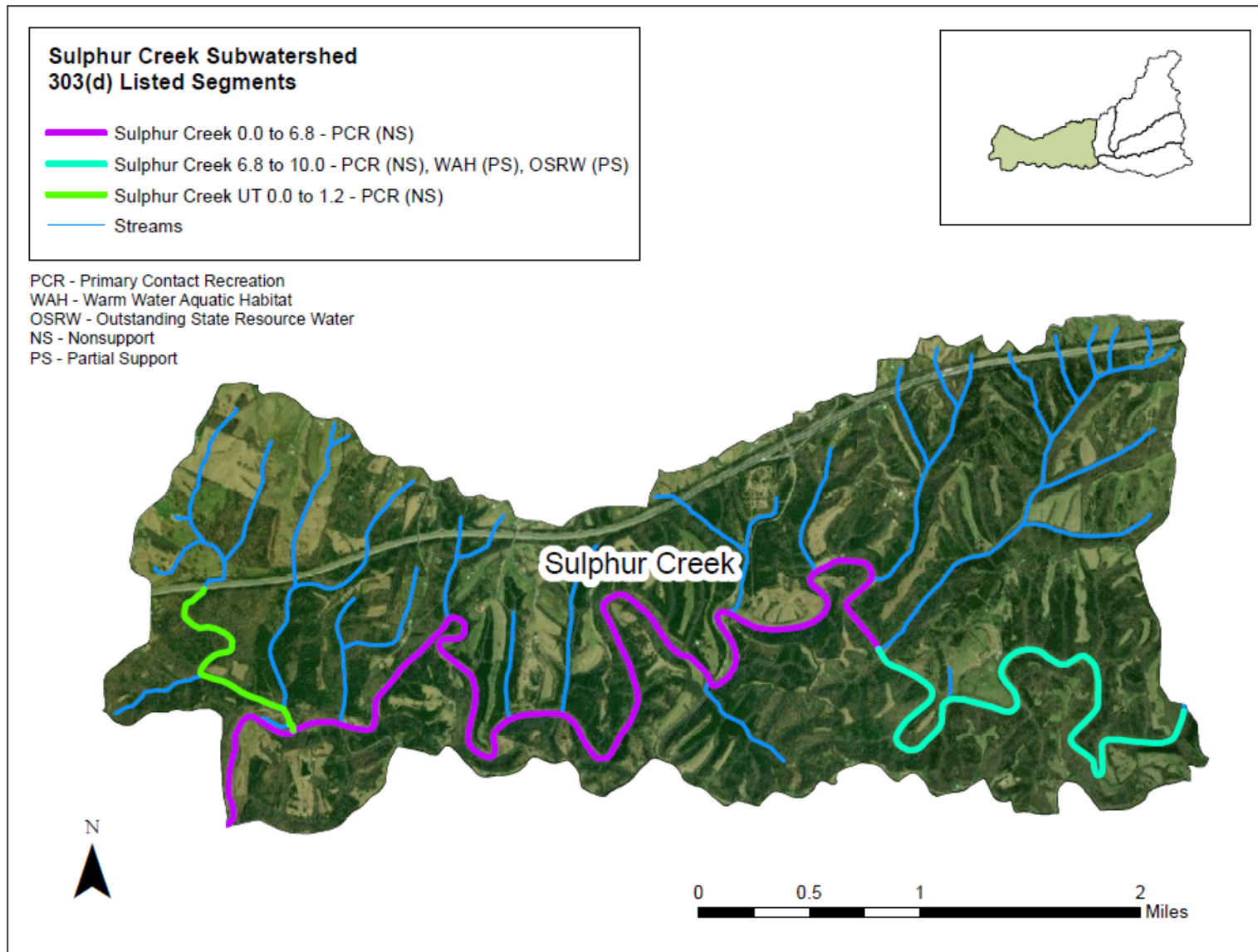


Figure 1.4 Sulphur Creek Subwatershed Implementation

Table 1.4 Upcoming Sulphur Creek Subwatershed Implementation		
BMP Category	Action Items	Planned Implementation (11/2022-09/2026)
Agricultural Improvement	1. Implement pasture renovation	No Information for this reporting period
	2. Implement prescribed grazing	No Information for this reporting period
	3. Develop winter feeding areas	No Information for this reporting period
	4. Install heavy use areas	No Information for this reporting period
	5. Install livestock exclusion fencing	No Information for this reporting period
	6. Install alternative watering systems	No Information for this reporting period
	7. Fund/Plan farm field days & educational workshops	No Information for this reporting period