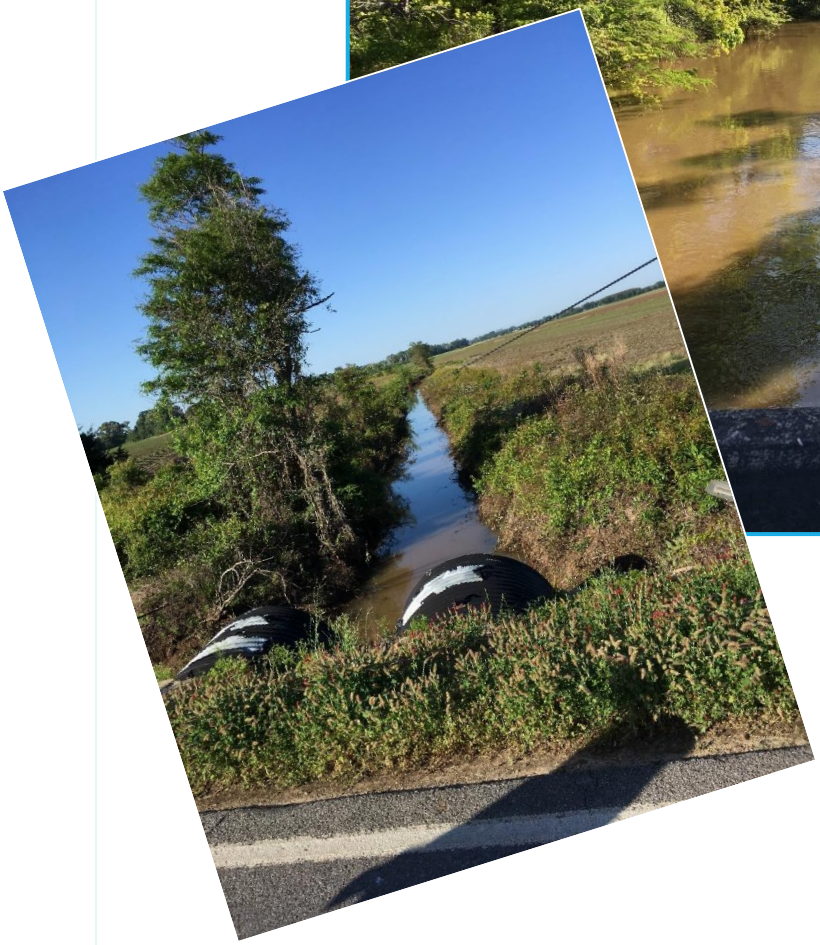
2025



BAYOU BARTHOLOMEW

Subsegment 080401

Watershed Implementation Plan

Water Quality Impairment: Turbidity

DEQ LOUISIANA

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Introduction

Bayou Bartholomew is the longest bayou in the world, meandering approximately 364 miles between northeastern Louisiana and southeastern Arkansas. Through Louisiana, the river flows for approximately 72.5 miles, in Morehouse Parish. Until construction of railroad lines in the area in the late 19th century, it was the most important stream for transportation in the interior Mississippi Delta. It allowed the development of one of the richest timber and agricultural industries in the Delta area. Once a pristine stream, it is now polluted, log-jammed, and over-sedimented in certain sections.

Louisiana Department of Environmental Quality (LDEQ) conducts a statewide water quality assessment centered on basin subsegments, these results are reported in the Louisiana Integrated Report (IR). LDEQ's 2022 IR currently indicates the waterbody is meeting its uses for primary contact recreation (PCR) and secondary contact recreation (SCR); however, it is not fully supporting its fish and wildlife propagation (FWP) and outstanding natural resource (ONR) uses. Currently, the Nonpoint Source (NPS) suspected cause of impairment is turbidity, due to agriculture. The watershed is approximately 29 percent evergreen forest; 29 percent woody wetlands; 18 percent soybeans, corn, cotton, and other cropland; 8 percent developed, 7 percent pasture, and the remaining are small percentages of other land use/land cover types. According to the Arkansas Soil and Water Conservation Commission, Bayou Bartholomew and its tributaries carry their highest flows during the months of January through May, due to higher rainfall events during those times. Minimum flows usually occur during the period from August to October. LDEQ's Total Maximum Daily Load (TMDL) for Bayou Bartholomew states that the water entering Subsegment 080401 from Arkansas is listed as impaired in Arkansas for siltation/turbidity. The implementation plans for the Arkansas TMDLs aim to reduce the amount of sediment entering Louisiana, lowering the load reduction required within Louisiana. LDEQ's TMDL suggests a 54 percent reduction in turbidity from January to June, and a three percent reduction from July to December, to meet its 25 NTU water quality standard.

T LDEQ partners with The Louisiana Department of Agriculture and Forestry (LDAF) to implement best management practices (BMPs) in watersheds of concern. As a result, the 2023-2027 LDEQ NPS Management Plan listed Bayou Bartholomew as a priority watershed for restoration. The United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) has also identified Bayou Bartholomew as a National Water Quality Initiative (NWQI) watershed for targeted outreach and conservation practice implementation.

This watershed implementation plan (WIP) will identify and address sources and causes of pollutant loading, practices to address those loadings, and the restoration of use support. The plan will follow the Environmental Protection Agency (EPA) nine-element watershed plan format. It is intended to be a living document with adaptive management revisions reflecting new stakeholder input, additional partnerships and opportunities expected in coming years, and improved technical approaches as necessary. This plan is not meant to limit activity in the watershed but to serve as a framework for planning measures to address pollutant loadings and to inform strategies for watershed managers in the future.

Mission Statement

This WIP will employ individual engagement and organizational commitment to address water quality issues identified by watershed assessment and stakeholders in Bayou Bartholomew, through promoting pollution reduction activities that will restore water quality.

Element A. Causes and Sources of Pollution

This section will describe the water quality impairments in Bayou Bartholomew, summarize both baseline and ambient water quality monitoring data, describe the geography of the watershed, and characterize the region in terms of known and potential sources of pollution.

LDEQ water quality sampling data has identified increased concentrations of turbidity as the primary cause of water quality impairment in Bayou Bartholomew, due to agriculture. Natural factors that may increase turbidity include: runoff caused by precipitation and/or severe weather; disruption of bottom sediments (resuspension) due to water turbulence from windstorms or rain events; bottom-feeding animals moving sediments around; dead organic matter in the water column; and summer algal growth in lakes and slower moving rivers. Human induced factors that may increase turbidity include: stream bank erosion contributing soil to water; and, erosion in other areas of the watershed caused by changes in land use (construction, farming, forestry, and urban development) that cause soil to be carried in runoff to surface water. Changes in turbidity can also affect other water quality parameters; increased turbidity is likely to be accompanied by higher temperature and reduced dissolved oxygen (DO), due to increased heat absorption of the water; and reduced DO due to decreased light penetration into the water. This section will discuss in detail the causes and sources of pollution in Bayou Bartholomew.

Bayou Bartholomew Water Quality Assessment

Louisiana's 2022 IR (Table 1) currently indicates the waterbody is meeting its uses for PCR and SCR; however, it continues to not fully support its FWP and ONR uses. The LDEQ conducts a statewide water quality assessment centered on basin subsegments, these results are reported in the Louisiana IR. Numeric turbidity criteria have been adopted in the State's Water Quality Standards, and the turbidity criteria for Bayou Bartholomew as a designated outstanding natural resource (ONR) is 25 NTU. For ONRs, 10 percent exceedances are allowed.

Upstream waterways regulated by the State of Arkansas are subject to less restrictive standards, including a turbidity standard of 45 NTU (FTN Associates, Ltd, 2002). Planners suggest that adjustment of the standard be reviewed as a potential means of making the sediment load reduction goals for Bayou Bartholomew more attainable (Lyles 2023).

TABLE 1. BAYOU BARTHOLOMEW, SUBSEGMENT 080401, 2022 INTEGRATED REPORT- APPENDIX A

Subsegment Number	Description	Type	Size (Miles)	Designated Uses				Use for Suspected Cause	Suspected Causes of Impairment	Category for Suspected Causes	Suspected Sources of Impairment
				PCR	SCR	FWP	ONR				
LA080401_00	Bayou Bartholomew- From Arkansas state line to Ouachita River (Scenic to Dead Bayou)	River	72.5	F	F	N	N	FWP	Turbidity	IRC 4a	Agriculture
LA080401_00	Bayou Bartholomew- From Arkansas state line to Ouachita River (Scenic to Dead Bayou)	River	72.5	F	F	N	N	ONR	Turbidity	IRC 4a	Agriculture

PCR = Primary Contact Recreation
SCR = Secondary Contact Recreation
FWP = Fish and Wildlife Propagation
ONR= Outstanding Natural Resource

N = Not supporting designated use
F= Full supporting designated use
IRC 4a= Total Maximum Daily Load (TMDL) completed

Ambient Water Quality Data

Ambient water quality monitoring was completed in 2017/2018 at ambient water quality network site (AWQN) 0074, in which 7 of 11 samples exceeded the criteria (Table 2 and Figure 1). Water quality data shown in red exceeds the 25 NTU standard. This data was used in the 2022 assessment. The waterbody was monitored in 2021/2022, and will be monitored again in 2025/2026. The waterbody is also listed for Mercury in Fish Tissue; however, only NPS impairments will be addressed in this WIP.

TABLE 2. TURBIDITY AMBIENT DATA, 2017/2018, WATER QUALITY NETWORK SITE 0074, WATER QUALITY DATA SHOWN IN RED EXCEEDS THE 25 NTU STANDARD

2017/2018 AMBIENT DATA	NTU
2017-11-14	8.9
2017-12-05	17
2018-01-09	3.1
2018-02-06	140
2018-03-06	42
2018-04-03	24
2018-05-01	59
2018-06-05	31
2018-07-10	31
2018-08-07	35
2018-09-11	32

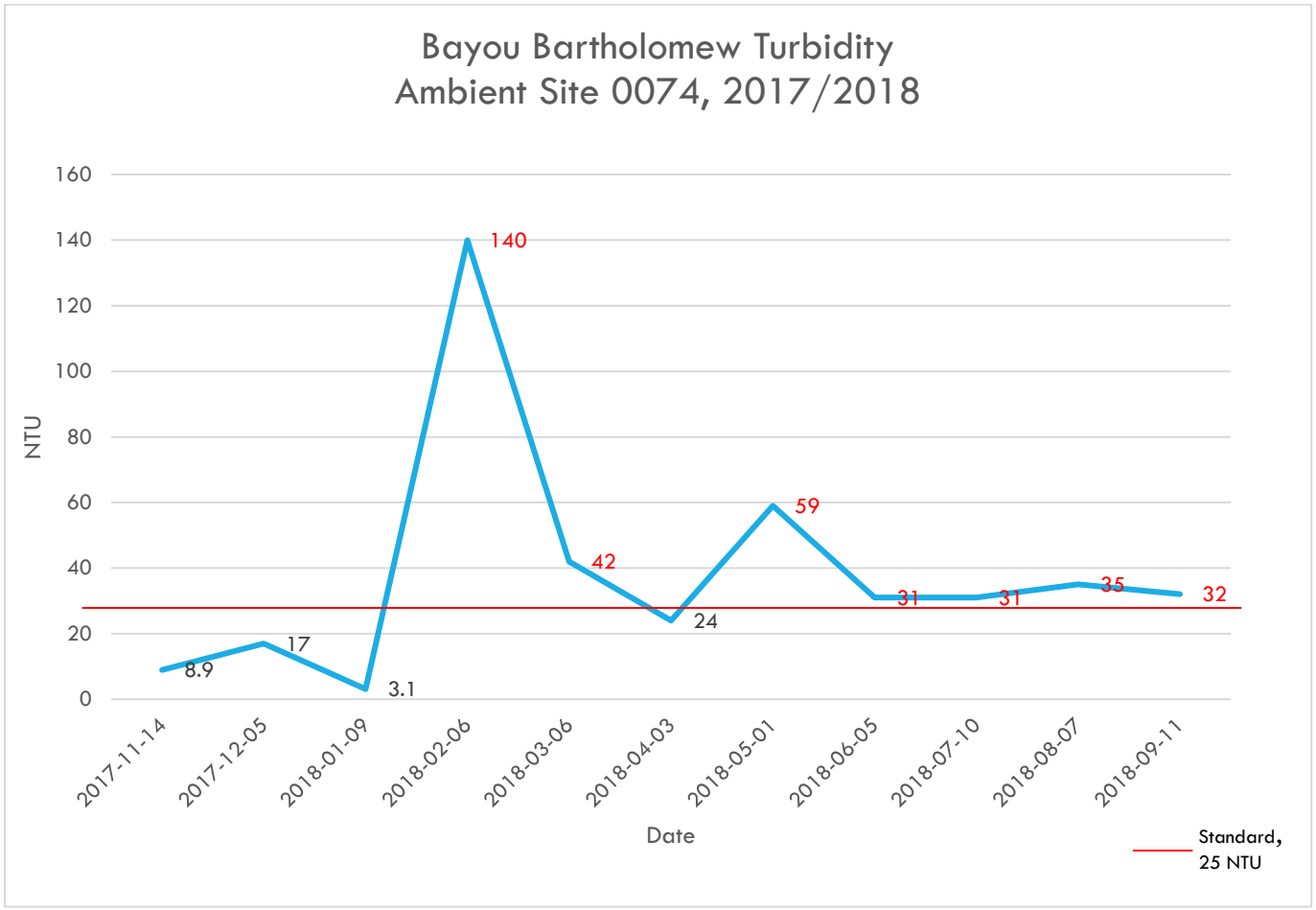

FIGURE 1. TURBIDITY AMBIENT DATA, 2017/2018, WQN SITE 0074

Baseline Water Quality Monitoring Data

Section 319(h) funds provides support for water quality monitoring at 18 sites in the Bayou Bartholomew Watershed (Subsegment 080401). These sites include the active ambient monitoring station, 0074, and 17 additional sites.

Baseline monitoring in Bayou Bartholomew began in January 2023 and is ongoing. The goal of baseline monitoring is to establish current water quality conditions, identify geographic areas for targeting BMP locations, track changes in water quality over time, and prioritize areas for education and outreach.

Sampling sites were selected based on land use data, safety of sampling locations, visual assessments, accessibility, proximity to the ambient station, drainage of potential sources of cropland runoff, and areas draining pasture land. In addition, major tributaries, elevation data, and infrastructure were mapped and evaluated to identify potential sites. LDEQ Water Surveys performed field reconnaissance to identify issues with flow or access. LDEQ Nonpoint Source (NPS) and LDAF reviewed the sites to confirm locations that would capture BMP implementation and runoff areas, and be applicable to future BMP targeting.

Water quality monitoring was conducted twice a month. In addition to in-situ parameters (pH, temperature, DO, DO percent saturation, specific conductance, and salinity) turbidity was sampled. In situ parameters will aid in watershed characterization and provide an indication of the water quality at the time the sample is collected. In situ data also provides an economical source of reference data for other possible anomalies occurring in the watershed. Flow is available through USGS gauge stations near sites 0911 and 5226. Long term sampling will begin approximately January 2025.

From January 2023 to December 2023, the ambient water quality network site, 0074, had a 65 percent exceedance for turbidity, in which 15 of 23 samples did not meet the 25 NTU criteria.

Percent exceedances at each water quality monitoring site, during the baseline water quality monitoring period, January 2023 to December 2023, are shown in Table 3. Percent exceedances in red, exceed the 10 percent allowance for ONR waterbodies. At this time, two sites, 5228 and 5238 are below the 10 percent allowance, at five and nine percent, respectively. During this time period, there should have been 24 total samples for each sampling site; however, the number of samples collected at each site varied, due to the lack of rain around June, causing severe drought situations, or other areas where water was being pooled. There were only a few instances where construction or lack of accessibility were an issue. Baseline turbidity data for each site is depicted in Figures 2 through 19. Data shows turbidity levels in the subsegment increase between March and June of each year and decrease around July to December. This may be due to the wet season occurring from January through June and the dry season is from July through December. Water quality sampling sites are depicted in Figure 21. In the future, LDEQ and LDAF may try to identify additional possible sources and processes to explain why turbidity spikes are occurring.

TABLE 3. PERCENT EXCEEDANCES AT PROJECT WATER QUALITY MONITORING SITES DURING BASELINE SAMPLING

WATER QUALITY MONITORING SITE	PERCENT EXCEEDANCE (%)	SAMPLES NOT MEETING CRITERIA
0457	14	3/22
0458	74	17/23
0074 AWQN	65	15/23
0911	61	14/23
5223	65	15/23
5224	65	15/23
5225	65	15/23
5226	78	18/23
5227	100	9/9
5228	5	1/22
5229	78	14/18
5230	87	13/15
5231	88	14/16
5232	47	9/19
5233	87	13/15
5234	17	4/23
5237	47	7/15
5238	9	2/23

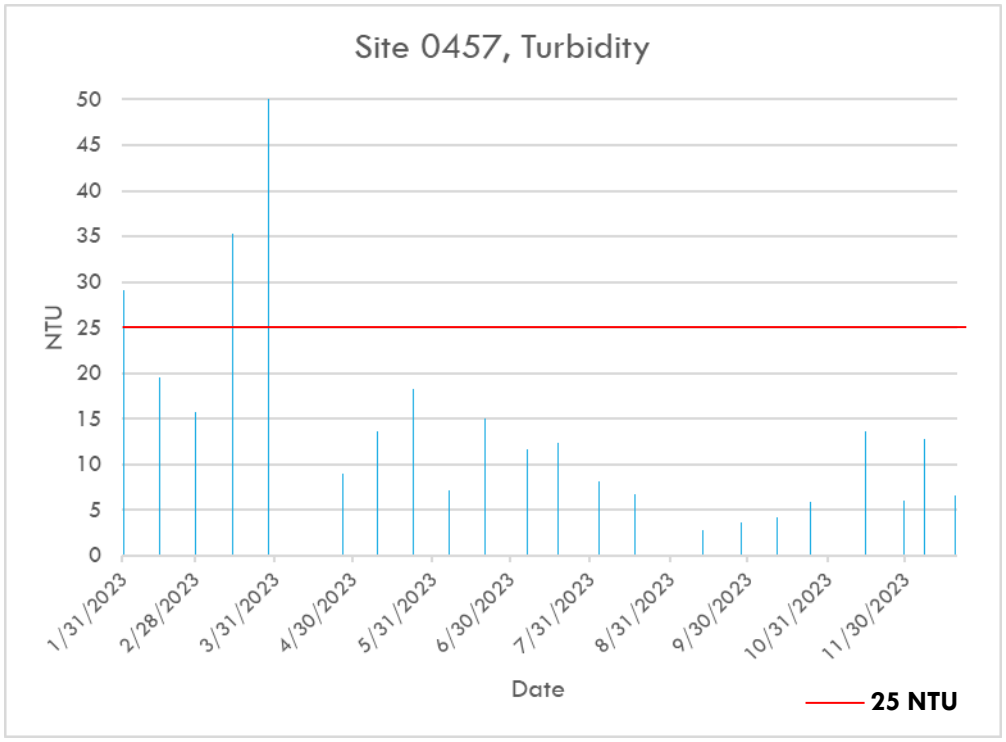

FIGURE 2. TURBIDITY AT SITE 0457, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 14%

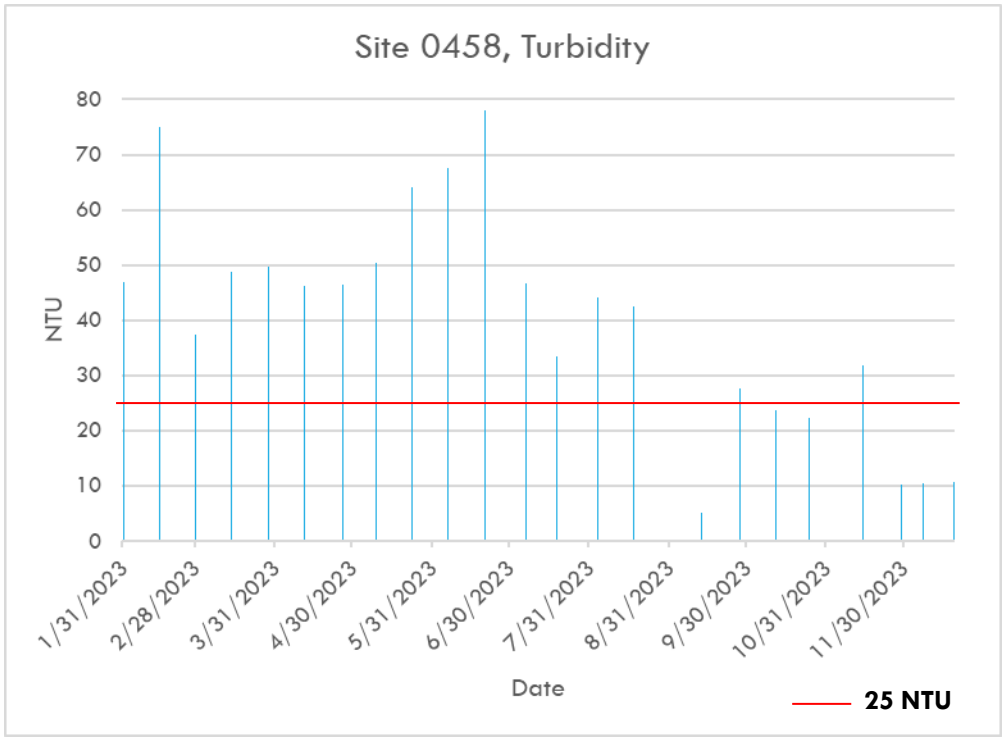

FIGURE 3. TURBIDITY AT SITE 0457, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 74%

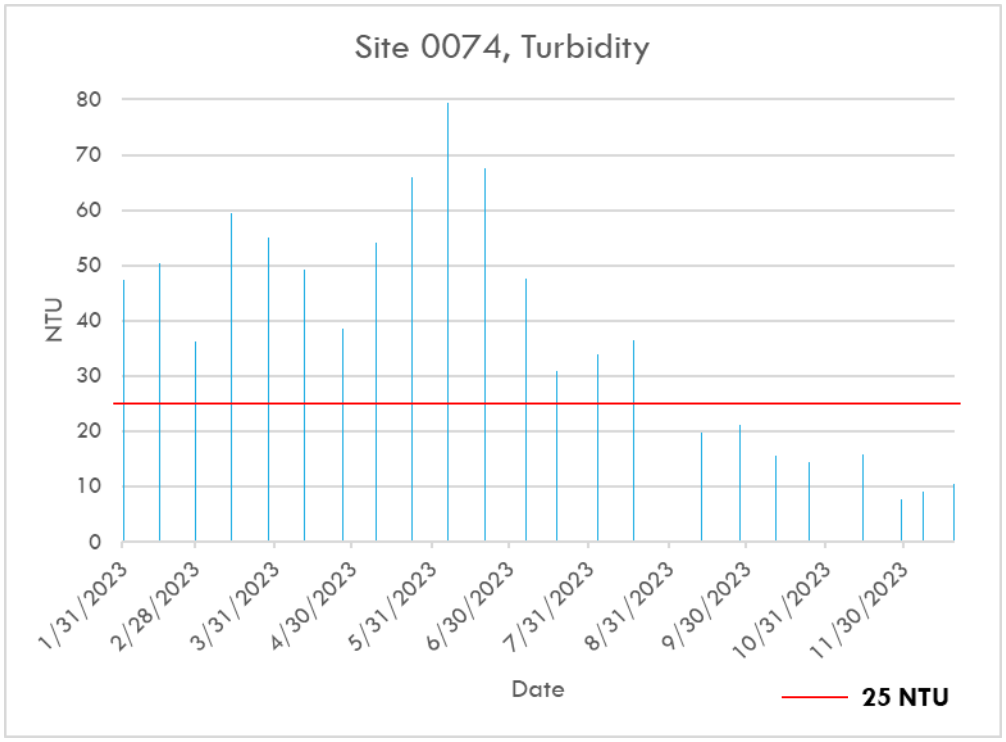

FIGURE 4. TURBIDITY AT SITE 0074, JANUARY 2023 TO DECEMBER 2023 EXCEEDANCE RATE 65%

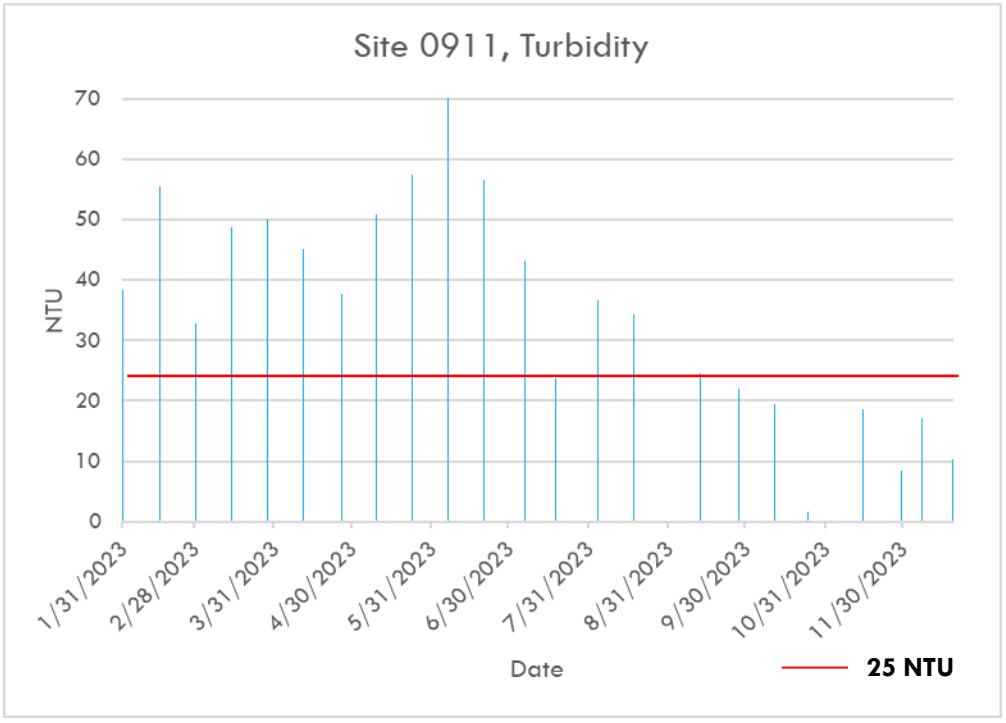

FIGURE 5. TURBIDITY AT SITE 0911, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 61%

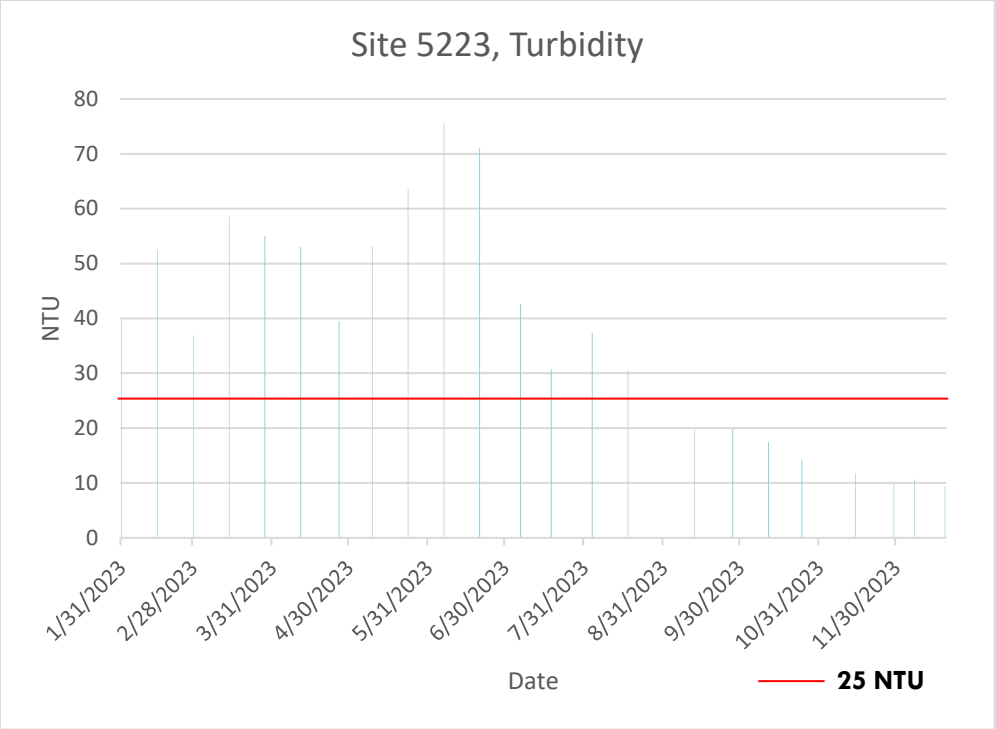

FIGURE 7. TURBIDITY AT SITE 5223, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 65%

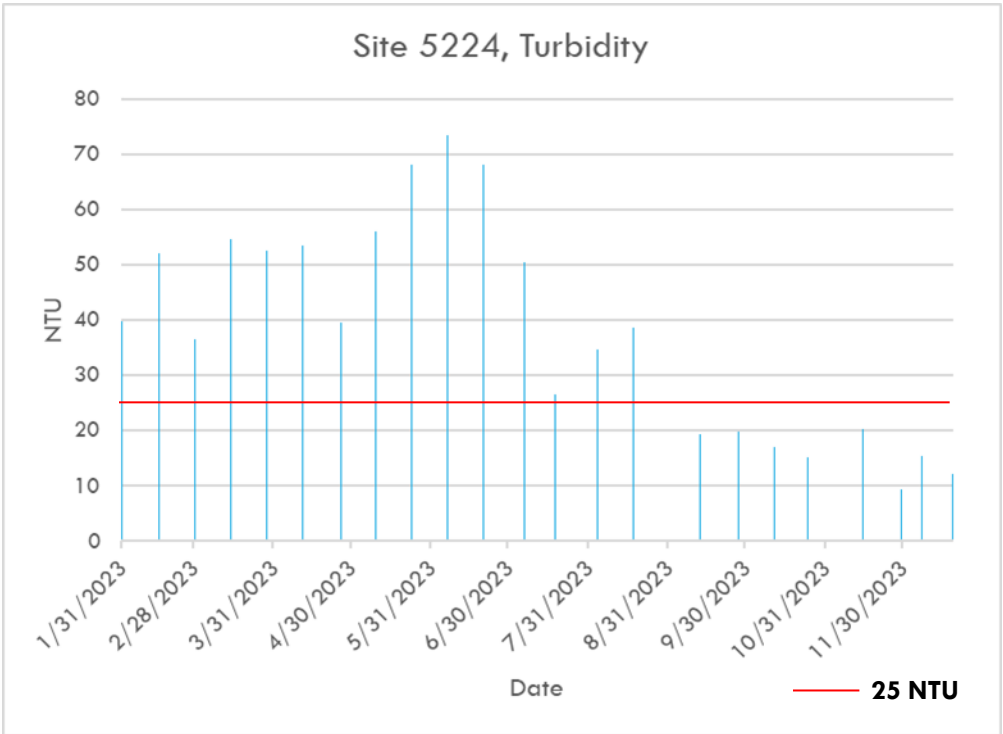

FIGURE 6. TURBIDITY AT SITE 5224, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 65%

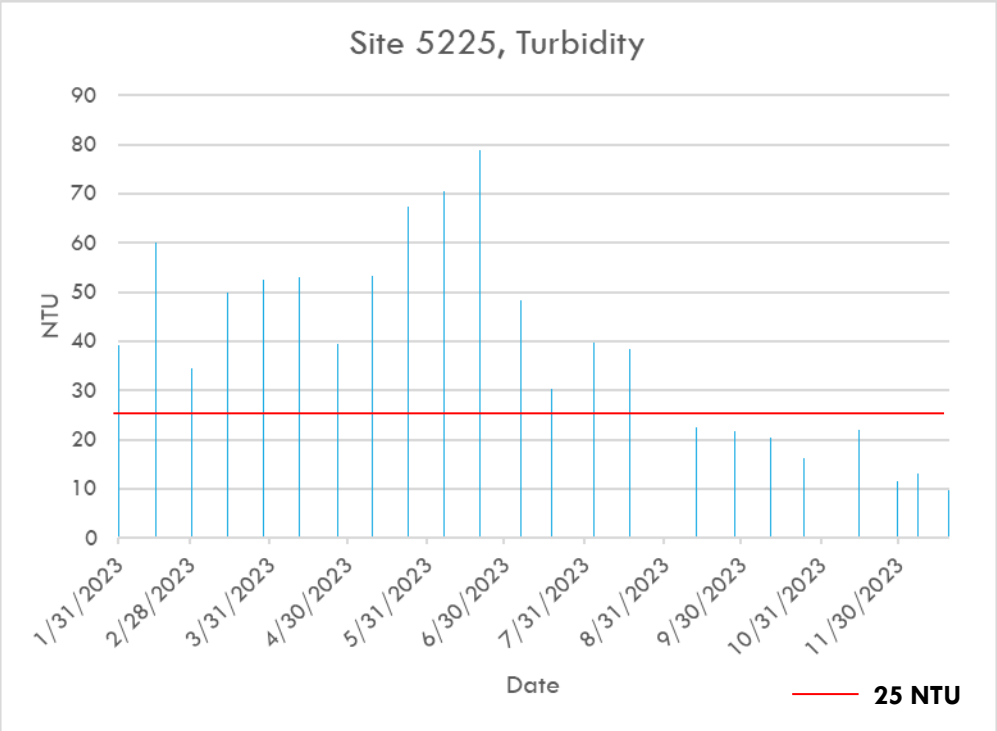

FIGURE 8. TURBIDITY AT SITE 5225, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 65%

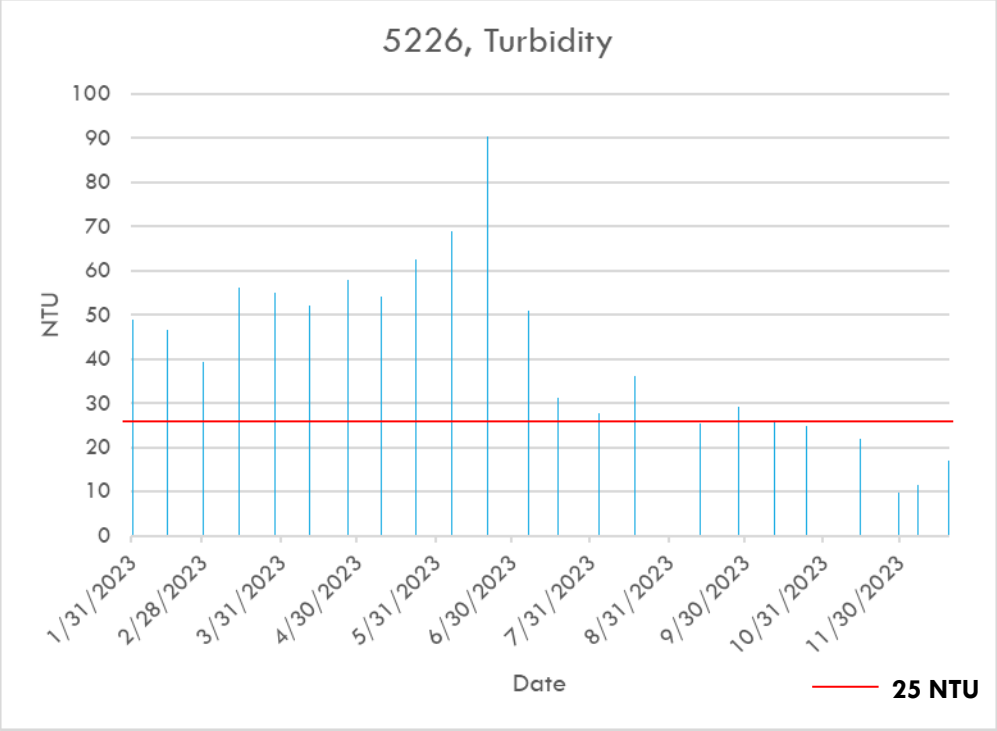

FIGURE 9. TURBIDITY AT SITE 5226, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 78%

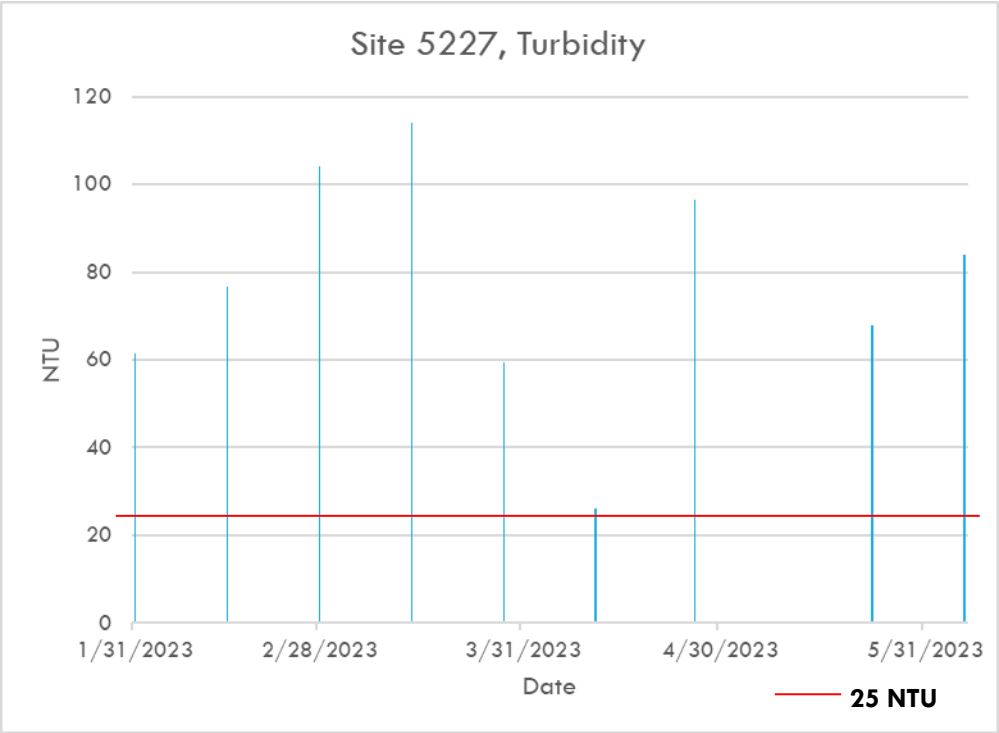

FIGURE 10. TURBIDITY AT SITE 5227, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 100%

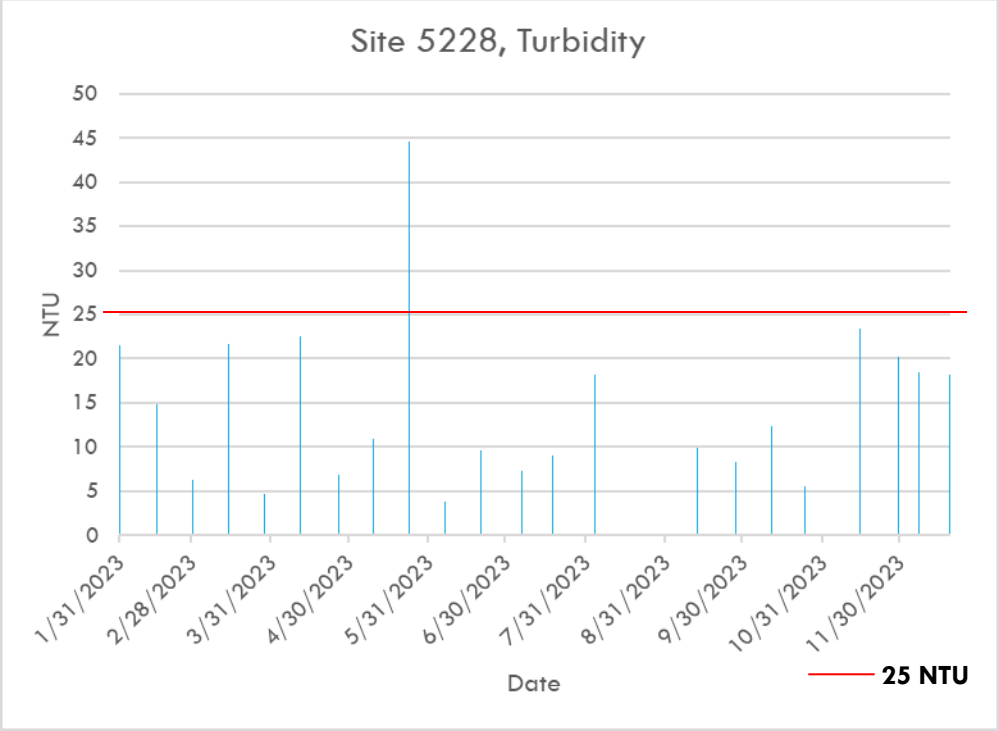

FIGURE 11. TURBIDITY AT SITE 5228, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 5%

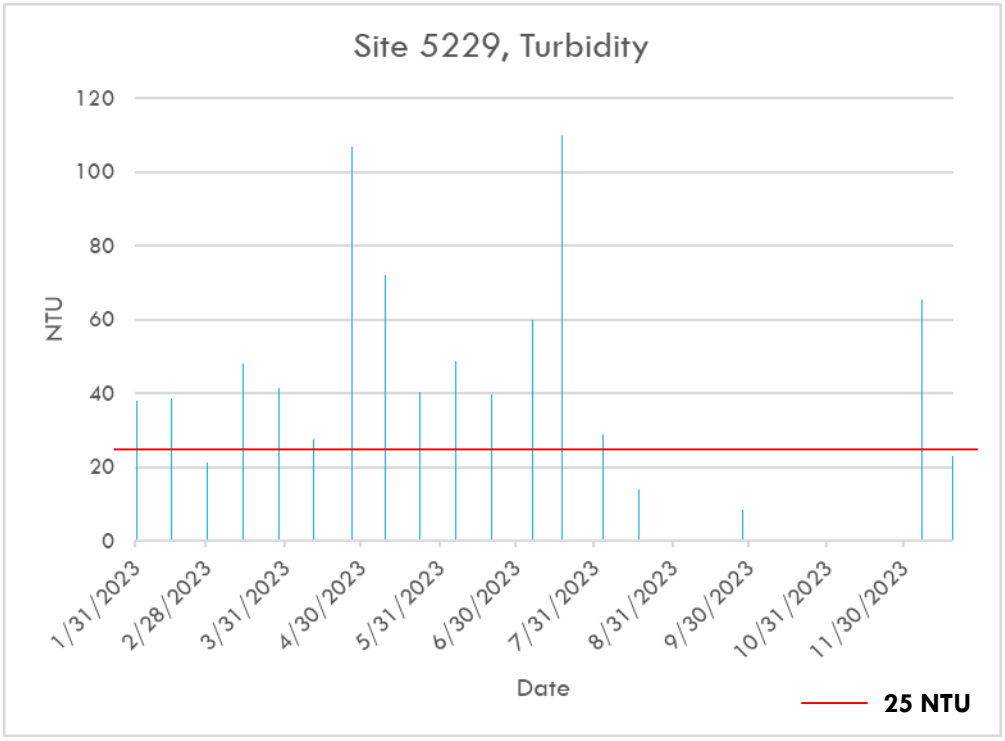

FIGURE 12. TURBIDITY AT SITE 5229, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 78%

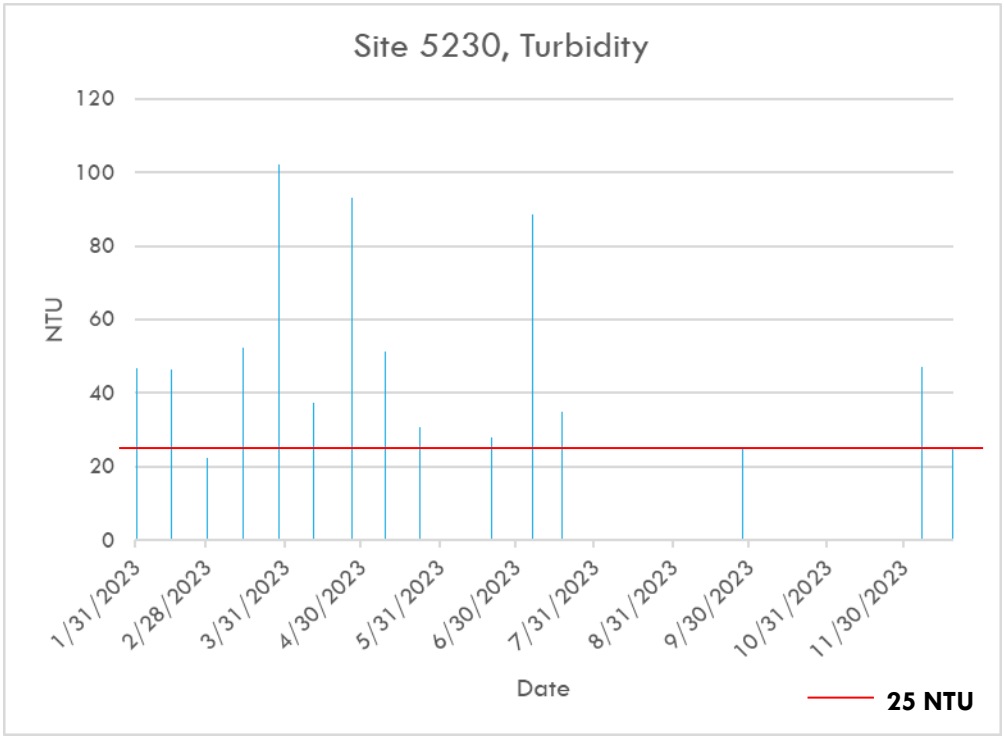

FIGURE 13. TURBIDITY AT SITE 5230, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 87%

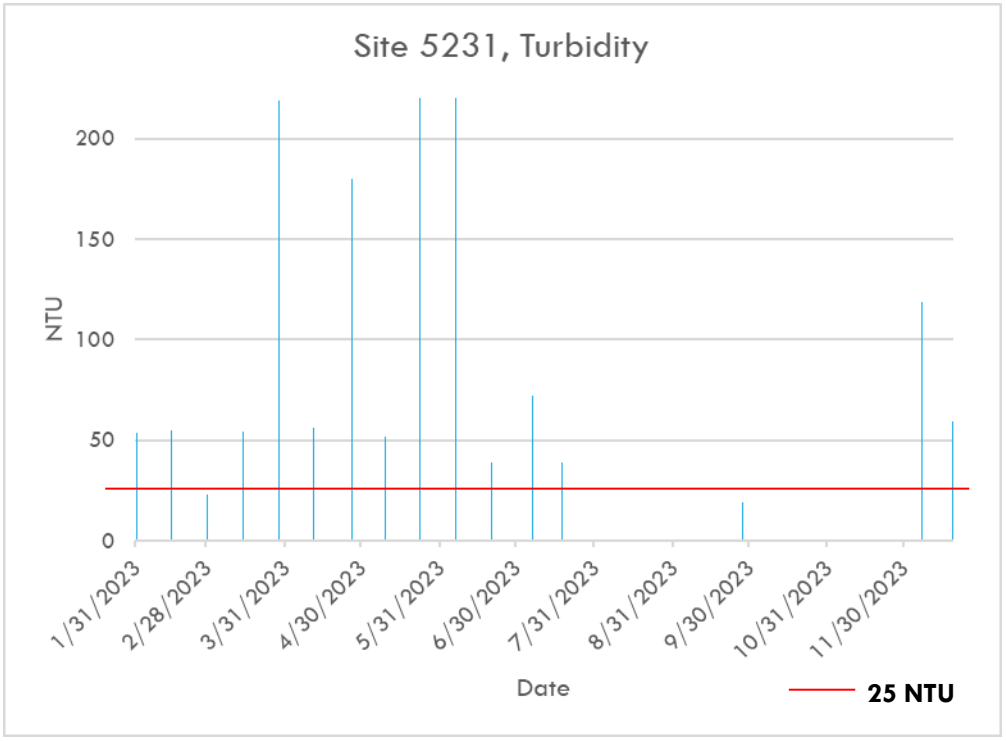

FIGURE 14. TURBIDITY AT SITE 5231, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 88%

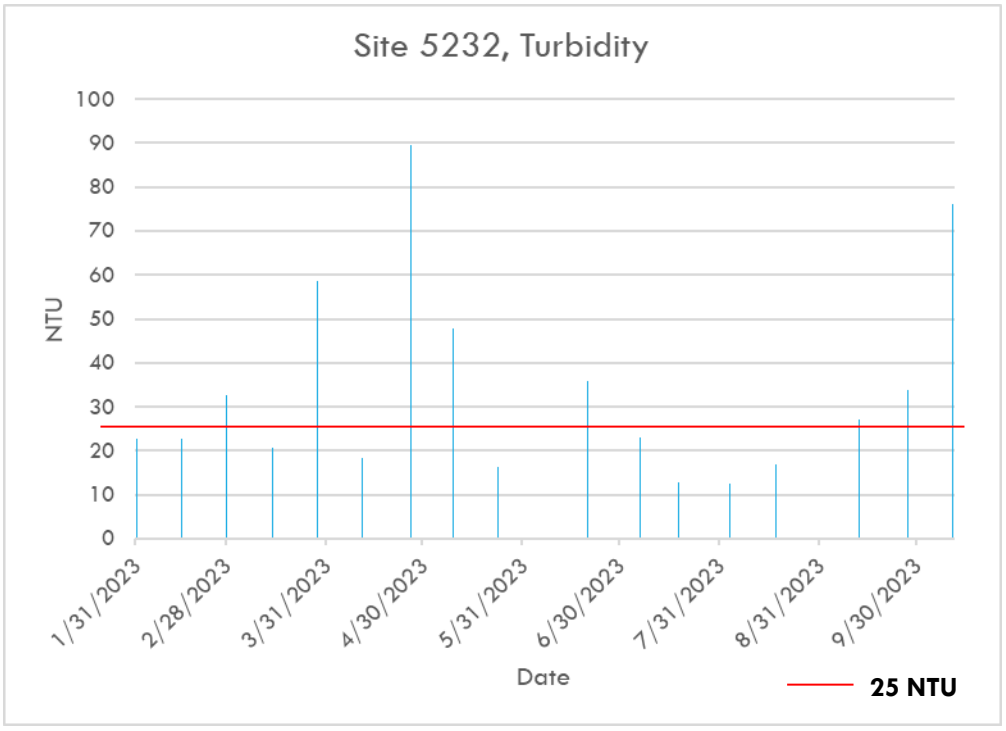

FIGURE 15. TURBIDITY AT SITE 5232, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 47%

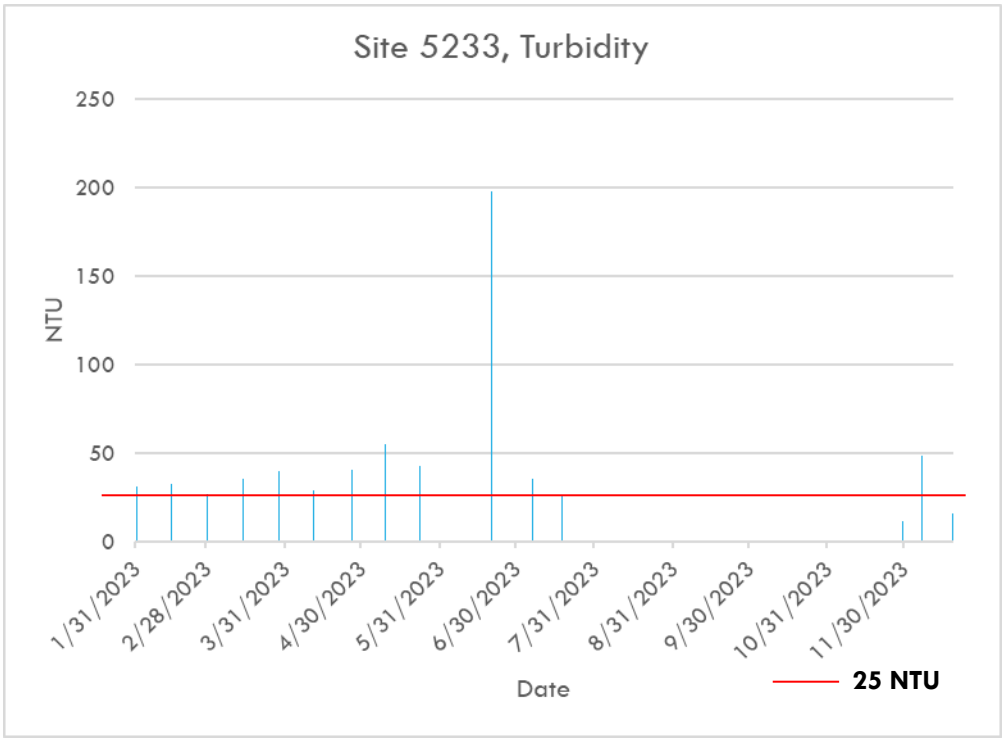

FIGURE 16. TURBIDITY AT SITE 5233, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 87%

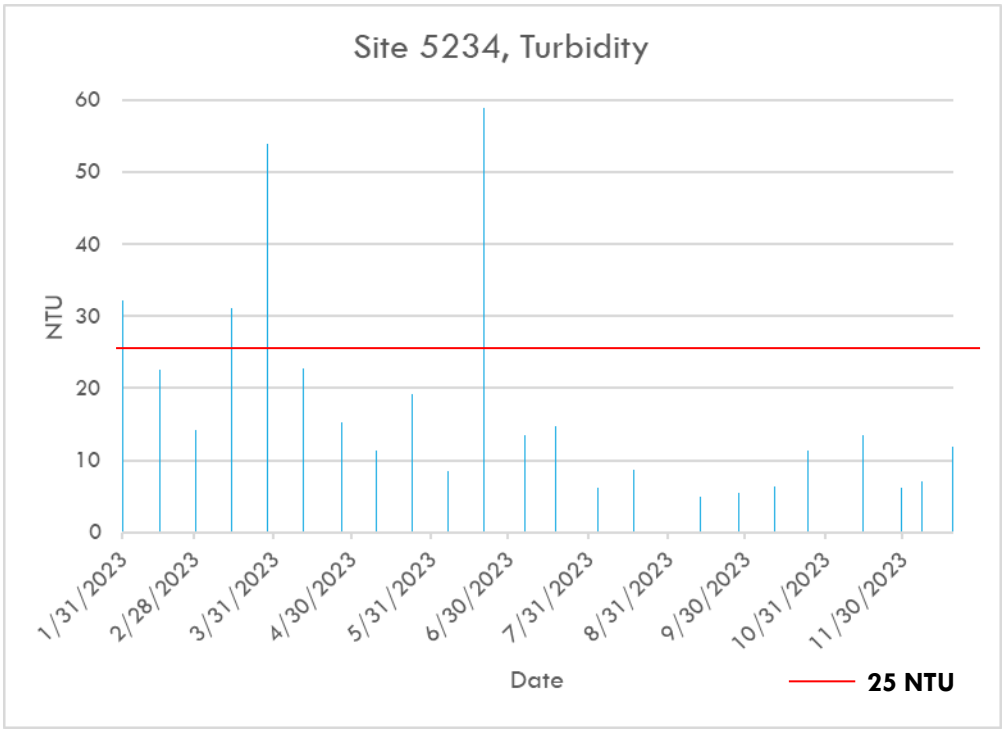

FIGURE 17. TURBIDITY AT SITE 5234, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 17%

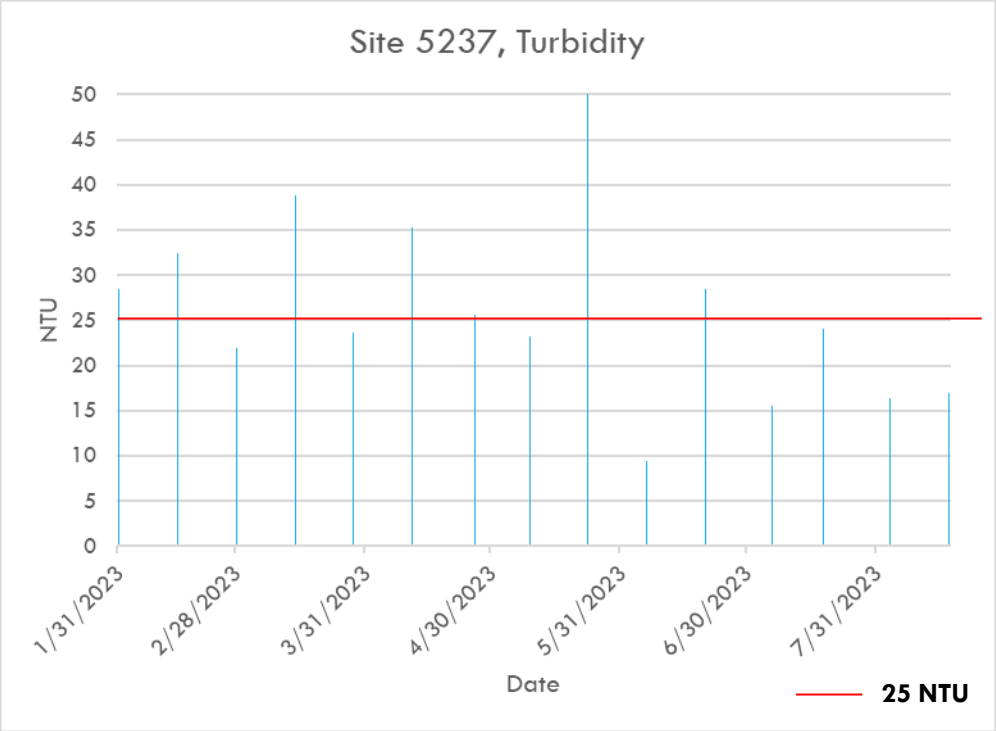

FIGURE 18. TURBIDITY AT SITE 5237, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 47%

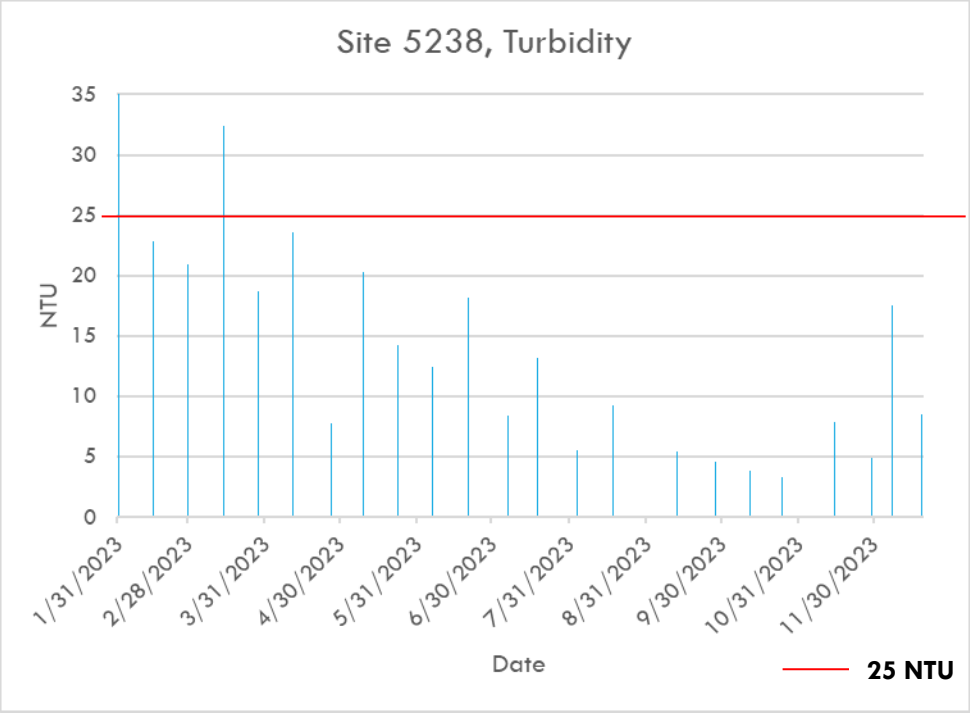

FIGURE 19. TURBIDITY AT SITE 5238, JANUARY 2023 TO DECEMBER 2023, EXCEEDANCE RATE 9%

Land Use/Land Cover

The Bayou Bartholomew watershed's headwaters begin near Pine Bluff, Arkansas and ends near the streams confluence with the Ouachita River just north of Sterlington, Louisiana. The watershed is approximately 80,260 acres and is comprised of approximately 31 percent evergreen forest, 17 percent woody wetlands, 12 percent soybean cropland, 11 percent mixed forest, 8 percent developed area, and the remaining percentage, agriculture.

Evergreen forests are concentrated in the northern portion of the subsegment and are also scattered throughout the southern portion, along a smaller percentage of mixed forest use. The anthropogenic effects on the various forest land uses are related to the harvesting of forest products. The reduction of cover in the cleared areas lasts for two years. These disturbed areas are the source of most of the contribution to sediment in the forest land uses. Access roads and stream crossings are another source of sediment in the forest areas. In general the BMPs where the largest gains often can be made are streamside management zone items and timber harvesting items. (LDEQ, 2002). The Recommended Forestry Best Management Practices for Louisiana BMP manual was updated in 2023 and was developed through a combined effort of foresters, soil scientists and engineers from LDEQ NPS, LDAF, Louisiana Forestry Association (LFA), and others. The manual can be found at, https://www.laforestry.com/single-post/bmp-manual-revision-completed-out-in-2023. LDAF survey reports a 97 percent BMP adherence rate for forestry BMPs in Louisiana (Louisiana Department of Agriculture and Forestry, 2019).

The two most significant factors affecting TSS and sediment in the Ouachita Basin are suspended solids in wet weather runoff and land use. The wet season, January through June, has 83 percent of the runoff. Much of the sediment load comes from areas of the basin that have developed more intensive agricultural uses. The dominant crop type in the Bayou Bartholomew watershed is soybean, approximately 12 percent, followed by corn, four percent, and grass/pasture, four percent. Agriculture contributes both sediment and nutrients to streams. Planting and harvesting of crops contributes to sedimentation of agricultural soils in rivers, streams, and lakes. Disruption of soil through tillage and cultivation increases the susceptibility of the disrupted soil particles to be carried via overland flow into nearby surface waters (USEPA, 2005). Pastureland areas can also contribute to sediment runoff, as well as nutrient and bacteria loading particularly where cattle can directly access streams. High rates of erosion occur in areas where precipitation is high, slopes are steep and vegetation cover is poor. Erosion is aggravated by overgrazing in pasturelands, by inappropriate ploughing on steep slopes and, more broadly, by deforestation, land clearing and the degradation of riverine vegetation.

> "Sediment in river systems is a complex mixture of minerals and organic matter, potentially including physical and chemical pollutants. Sediments can cover and destroy fish spawning beds, clog fish gills, and reduce useful storage volume in reservoirs. Sedimentation can damage watercourses, choke streams and make filtration necessary for municipal and irrigation water supplies. It can also affect delta formation and dynamics and limit the navigability of water bodies. Particles of clay and silt in sediment can adsorb many types of chemicals on their surfaces, including nutrients, heavy metals and persistent organic pollutants. Sediment, therefore, is a key means by which such pollutants are transported to waterbodies" (Gaurav Chaturvedi et al., 2020).

"Farmers and ranchers can reduce erosion and sedimentation by 20 to 90 percent by applying management practices that control the volume and flow rate of runoff water, keep the soil in place, and reduce soil transport" (USEPA, 2005).

Bayou Bartholomew consists primarily of seventeen Hydrologic Unit Codes (HUCs): 080402051003, 080402051002, 080402051001, 080402050905, 080402050802, 080402050805, 080402020701, 080402020704, 080402020705, 080402050903, 080402070201, 080500010601, 080500010702, 080500010705, 080500011101, 080500011103, and 080500011201. Spatial distribution of land use/land cover along with the water quality monitoring locations can be seen in Figures 20 and 21. Table 4 shows generalized landuse/land cover information at the HUC 12 level. Data includes only the portion of the HUC-12 within the subsegment boundary. Table 5 shows landuse percentages for Spreadsheet Tool for Estimating Pollutant Loads (STEP-L) classes in priority/monitored areas. For assigning BMP acreages, only the HUCs in the top six priority groups, were used, with the understanding that BMPs may be implemented in the other HUCs. However since LDEQ is not monitoring the other HUCs, that is a data gap and the impact of implementing in those unmonitored HUCs is to be determined. STEP-L estimated load reductions were distributed among the priority HUCs (priorities 1-6) based on percent landuse classes in each of those HUCs. Identifying landuse on a subwatershed scale is pertinent in an effort to identify and possibly investigate other sources that may be contributing to increased turbidity loadings that are not being reduced by agricultural BMPs. If there are future landuse changes or identification of additional significant sources, adaptive management measures allow LDEQ and LDAF to add more BMPs to this WIP and revisit the need for additional activities.

Data gaps include cause of turbidity spikes in the wet season, the role of forested lands, and how much timber may be harvested. The harvested areas could be a potential source of pollution in Bayou Bartholomew Should it be determined that forestry is a significant contributor, LDEQ and LDAF may establish additional partnerships in the forestry community, and seek to implement additional BMPs to address that loading.

Bayou Bartholomew Subsegment 080401
Land Use/Land Cover
Sampling Site Map

Legend	Land Use/Land Cover	Percent Land Use	Acres
	Evergreen Forest	29.3%	23,958
	Woody Wetlands	28.8%	23,494
	Developed	8.1%	6,640
	Soybeans	7.1%	5,819
	Grass/Pasture	6.6%	5,407
	Corn	5.9%	4,814
	Mixed Forest	4.0%	3,300
	Shrubland	3.9%	3,205
	Cotton	1.8%	1,478
	Open Water	1.1%	928
	Other Cropland	3.4%	2,794
	Other	0.7 %	650

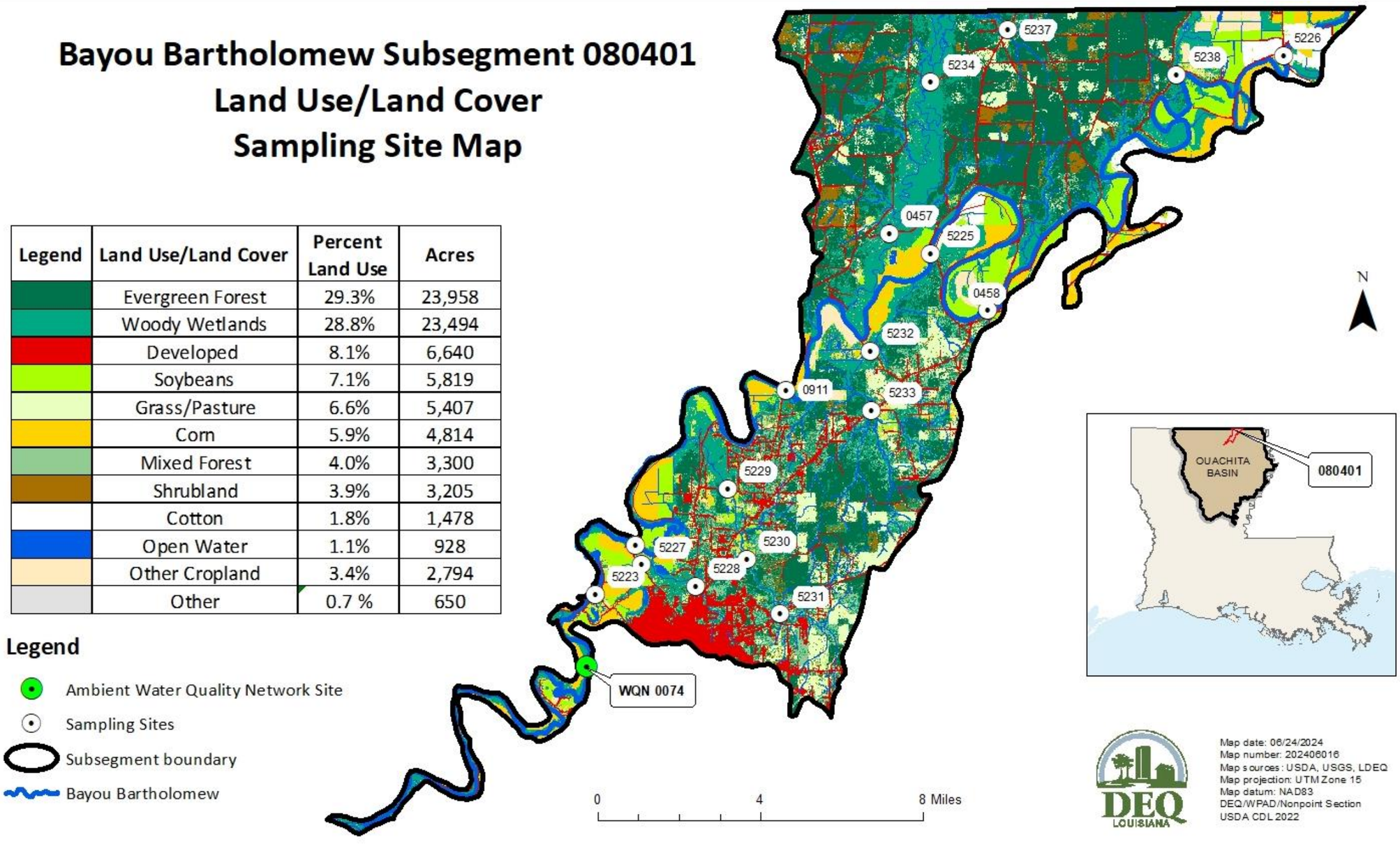

FIGURE 20. BAYOU BARTHOLOMEW, SUBSEGMENT 080401, LAND USE/LAND COVER/ SAMPLING SITE MAP

TABLE 4. GENERALIZED LANDUSE/LAND COVER BY HUC-12, IN ACRES

HUC-12	Cropland (Acres)	Grass-Pasture (Acres)	Water (Acres)	Developed (Acres)	Mixed Forest (Acres)	Evergreen Forest (Acres)	Shrubland (Acres)	Woody Wetlands (Acres)	TOTAL (Acres)
080402051003	3369	152	367	2381	358	481	198	3315	10621
080402051002	2237	3389	169	2140	2604	7338	1480	8298	27654
080402051001	3409	446	131	523	173	4400	359	4139	13581
080402050905	412	1266	40	1006	164	10331	1481	5941	20641
080402050802	1551	1	66	131	4	21	26	784	2586
080402050805	1106	8	31	60	10	83	20	642	1960
080402020701	138	25	0	41	4	482	36	32	757
080402020704	76	0	0	8	0	1	0	17	103
080402020705	0	0	0	7	1	0	0	39	48
080402050903	0	4	0	41	2	714	62	10	834
080402070201	21	0	0	16	0	0	0	1	38
080500010601	1182	0	112	84	0	2	3	90	1474
080500010702	4	0	0	1	0	0	0	0	5
080500010705	245	0	0	20	1	0	1	24	291
080500011101	331	76	10	98	72	50	39	134	809
080500011103	0	28	0	15	3	20	6	7	80
080500011201	10	7	0	64	5	26	4	10	126
TOTAL	14092	5404	927	6637	3401	23947	3716	23484	81608

Note: Data includes only portion of HUC-12 within the subsegment boundary

TABLE 5. LANDUSE PERCENTAGES FOR STEP-L CLASSES IN PRIORITY/MONITORED AREAS:

HUC-12	Cropland (%)	Pasture (%)	Developed (%)	Forest (%)
080402051003	27.9	2.9	38.1	8.5
080402051002	18.5	64.4	34.3	37.2
080402051001	28.2	8.5	8.4	17.7
080402050905	3.4	24.1	16.1	33.5
080402050802	12.8	0.0	2.1	1.6
080402050805	9.2	0.2	1.0	1.5
	100.0	100.0	100.0	100.0

Note: Percentages determined using priority area total, not subsegment total.

High Priority Areas for BMP Implementation

Water quality data was collected under the LDEQ-NPS section 319 "Water Quality Monitoring in Bayou Bartholomew" project. High priority areas for BMP implementation were determined by turbidity percent exceedances calculated from baseline water quality data (Table 4 and Table 5), land use/land cover data, and projected participation. The critical areas are provided to LDAF, and are used to develop ranking criteria for choosing applications for BMP implementation. BMP implementation in the subsegment will be focused on decreasing turbidity concentrations. Based on the exceedance rates, BMP implementation can be can be addressed in two ways: on a site by site basis or at the 12-digit HUC scale.

Priority areas indicate which areas will score higher in a ranking should there be competing applications. Outreach and signups occur simultaneously in all priority areas. Figure 21 illustrates the critical areas for 2025-2031 BMP implementation, based on turbidity exceedance rates calculated at each site, from January through December 2023 baseline data. The highest priority ranking for implementation, was assigned to the site with the highest exceedance rate, site 5227, with, 100 percent exceedance. See Table 6 for additional 2025-2031 LDAF BMP Priorities by water quality sampling site. The first approach, implementing BMPs on a site by site basis, suggests BMPs should be rigorously implemented closest to the water quality sampling sites with the highest turbidity percent exceedances first, in hopes of decreasing turbidity concentrations at these sites, thereby reducing turbidity concentrations at the ambient site.

TABLE 6. LDAF BMP PRIORITY AREAS FOR 2025-2031 BASED ON 2023 TURBIDITY PERCENT EXCEEDANCE RATES AT SAMPLING SITES

WATER QUALITY MONITORING SITE	2023 BASELINE TURBIDITY PERCENT EXCEEDANCE (%)	2025-2031 LDAF BMP PRIORITY
5227	100	1
5231	88	2
5230	87	3
5233	87	3
5229	78	5
5226	78	5
0458	74	7
5225	65	8
5224	65	8
5223	65	8
0074 (AWQN)	65	11
0911	61	12
5232	47	13
5237	47	13
5234	17	15
0457	14	16
5238	9	17
5228	5	18

Bayou Bartholomew Subsegment 080401 LDAF 2025-2031 BMP Implmentation Priorities Based on Sampling Site Turbidity Percent Exceedance

Water Quality Monitoring Site	2023 Baseline Turbidity Data Exceedance Rate (%)	2025-2029 LDAF BMP Priority
5227	100	1
5231	88	2
5230	87	3
5233	87	3
5229	78	5
5226	78	5
0458	74	7
5225	65	8
5224	65	8
5223	65	8
0074 (AWQN)	65	11
0911	61	12
5232	47	13
5237	47	13
5234	17	15
0457	14	16
5238	9	17
5228	5	18

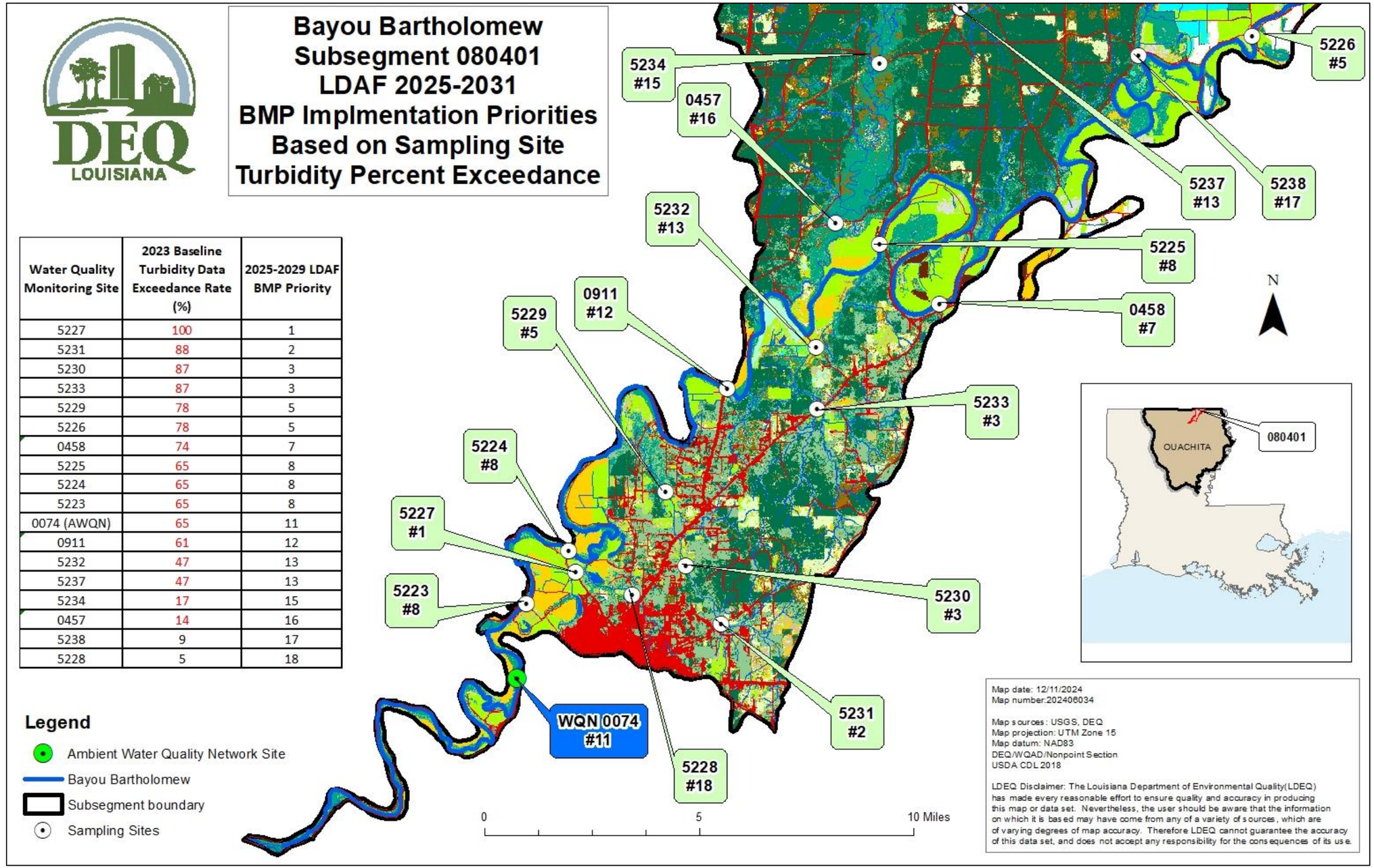

FIGURE 21. BAYOU BARTHOLOMEW, LDAF 2025-2031, BMP IMPLEMENTATION PRIORITIES BASED ON SAMPLING SITE TURBIDITY PERCENT EXCEEDANCE

BMP implementation at the 12-digit HUC scale suggests LDAF should begin implementing in the most critical 12-digit HUC first. Under this premise, implementation in HUC 080402051003 should be priority one. The HUC of focus was identified by LDEQ-NPS as containing the priority WQN site and having significantly larger coverage and total acreage of intense agricultural land uses known to cause the identified impairment, than in all other HUC-12s within the subsegment. In addition, site 5227 also lies in HUC 080402051003, and has a 100 percent exceedance rate, followed by sites 5224, 5223, WQN site 0074, with a 65 percent exceedance, and 5228 with a five percent exceedance. Each aforementioned water quality site is north of the WQN site and therefore drains directly to the ambient site. Although site 0074 is ranked as eleventh priority, the water quality ambient site is where subsegments are listed and restored; therefore, future implementation should also be a priority around the ambient site and above site 0074, in hopes of restoring the ambient site expeditiously.

BMP implementation in HUC 080402051002 is the second priority. Water quality sampling sites 5231, 5230, 5233, 5229, 0911, and 5232 are found in HUC 080402051002 and have percent exceedance rates of 88, 87, 87, 78, 61, and 47 percent, respectively.

BMP implementation in HUC 080402051001 is the third priority. Water quality sampling sites 0458 and 5225 are found in HUC 080402051001 and have percent exceedances of 74 and 65 percent, respectively.

BMP implementation in HUC 080402050905 is the fourth priority. Water quality sampling sites 5237, 5234, and 0457 are found in HUC 080402050905 and have percent exceedances of 47, 17, and 14 percent, respectively. These sites represent tributaries that flow from the Arkansas-Louisiana state line, but are not found on the main stem.

BMP implementation in HUC 080402050802 is the fifth priority. Water quality sampling sites 5226 and 5238 are found in HUC 080402050802 and have percent exceedances of 78 and 9 percent, respectively. This HUC is furthest from the ambient site and closest to the Arkansas-Louisiana border.

BMP implementation in HUC 080402050805 is the sixth priority. LDEQ is monitoring at sampling site 5238, which is the outlet of the HUC.

BMP Implementation in HUCs 080402020701, 080402020704, 080402020705, 080402050903, 080402070201, 080500010601, 080500010702, 080500010705, 080500011101, 080500011103, and 080500011201 are seventh priority. They are small portions of subsegment 080401 and do not include water quality sampling sites; however, they do consist of acres of cropland and/or or pasture, therefore, are relegated as lowest priority. Table 6 shows the 2025 LDAF BMP Priority areas based on 12-digit HUC areas. Figure 22 shows the 2025-2031 LDAF BMP Priority areas based on 12-digit HUC areas. Because these areas do not have sampling sites, their runoff contribution is a data gap.

TABLE 7. LDAF BMP PRIORITY AREAS FOR 2025-2031 BASED ON 12-DIGIT HUC IMPLEMENTATION

WATER QUALITY MONITORING SITE	2023 BASELINE TURBIDITY PERCENT EXCEEDANCE (%)	2025-2031 LDAF BMP PRIORITY BASED ON TURBIDITY EXCEEDANCE	12 DIGIT HUC	2025-2031 LDAF BMP PRIORITY BASED ON 12-DIGIT HUC
5227	100	1	080402051003	1
5224	65	8	080402051003	1
5223	65	8	080402051003	1
0074 (AWQN)	65	11	080402051003	1
5228	5	18	080402051003	1
5231	88	2	080402051002	2
5230	87	3	080402051002	2
5233	87	3	080402051002	2
5229	78	5	080402051002	2
0911	61	12	080402051002	2
5232	47	13	080402051002	2
0458	74	7	080402051001	3
5225	65	8	080402051001	3
5237	47	13	080402050905	4
5234	17	15	080402050905	4
0457	14	16	080402050905	4
5226	78	5	080402050802	5
5238	9	17	080402050802	5
N/A	N/A	N/A	080402050805	6
N/A	N/A	N/A	080402020701	7
N/A	N/A	N/A	080402020704	7
N/A	N/A	N/A	080402020705	7
N/A	N/A	N/A	080402050903	7
N/A	N/A	N/A	080402070201	7
N/A	N/A	N/A	080500010601	7
N/A	N/A	N/A	080500010702	7
N/A	N/A	N/A	080500010705	7
N/A	N/A	N/A	080500011101	7
N/A	N/A	N/A	080500011103	7
N/A	N/A	N/A	080500011201	7

Bayou Bartholomew Subsegment 080401 LDAF 2025-2031 BMP Implmentation Priority Based on 12-digit HUCS

Water Quality Monitoring Site	2023 Baseline Turbidity Percent Exceedance (%)	2025-2031 LDAF BMP Priority based on Turbidity Exceedance	12 digit HUC	2025-2031 LDAF BMP Priority based on 12-digit HUC
5227	100	1	80402051003	1
5224	65	8	80402051003	1
5223	65	8	80402051003	1
0074 (AWQN)	65	11	80402051003	1
5228	5	18	80402051003	1
5231	88	2	80402051002	2
5230	87	3	80402051002	2
5233	87	3	80402051002	2
5229	78	5	80402051002	2
0911	61	12	80402051002	2
5232	47	13	80402051002	2
0458	74	7	80402051001	3
5225	65	8	80402051001	3
5237	47	13	80402050905	4
5234	17	15	80402050905	4
0457	14	16	80402050905	4
5226	78	5	80402050802	5
5238	9	17	80402050802	5
N/A	N/A	N/A	80402050805	6
N/A	N/A	N/A	All other areas	7

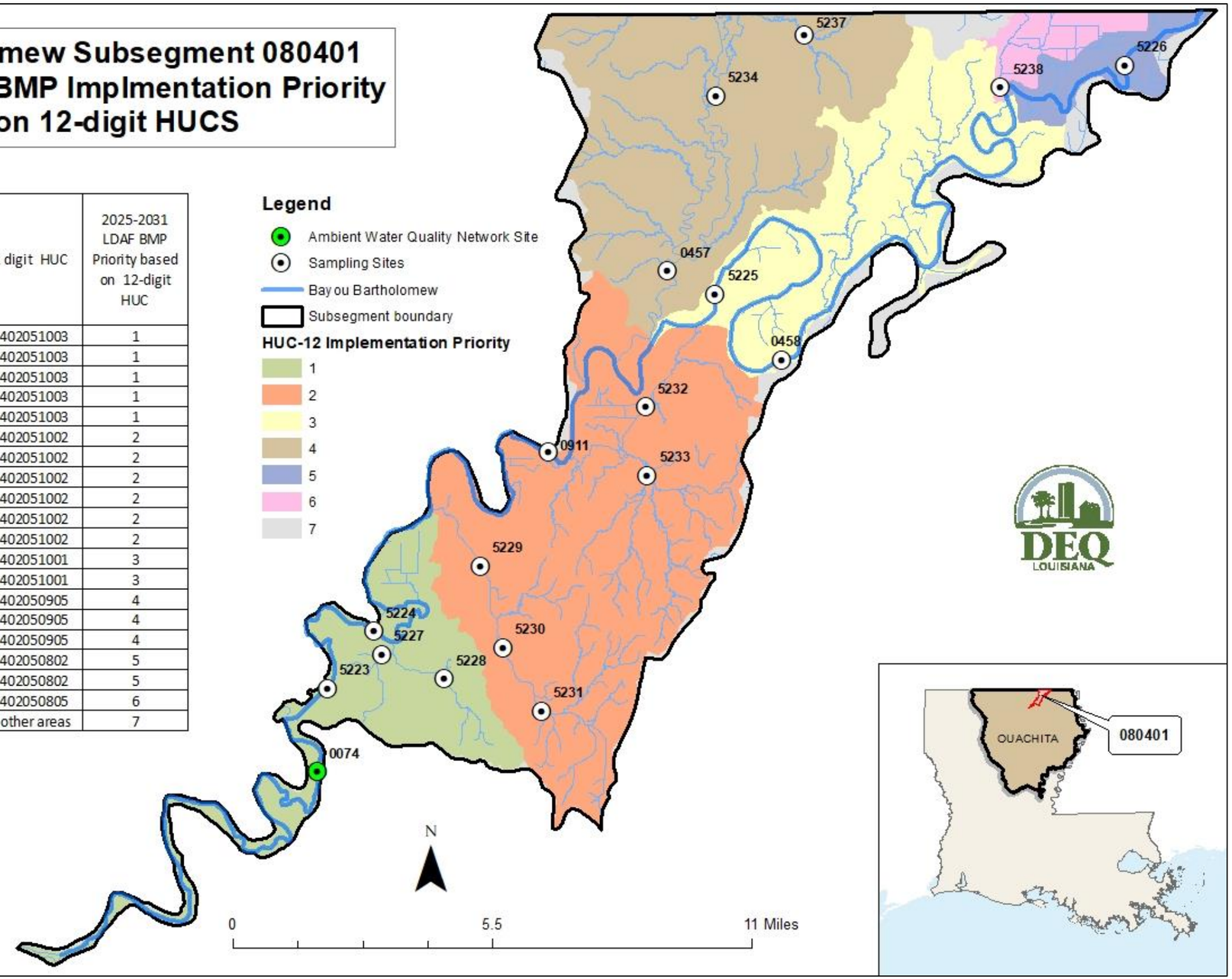

FIGURE 22. BAYOU BARTHOLOMEW, SUBSEGMENT 080401, LDAF 2025-2031, BMP IMPLEMENTATION PRIORITIES BASED ON 12-DIGIT HUCS

In 2002, EPA approved a TMDL for TSS, turbidity, and siltation for 13 subsegments in the Ouachita River Basin. The TMDL states a 54 percent reduction in turbidity from January to June, and a three percent reduction in turbidity from July to December, to meet the 25 NTU guideline and to achieve restoration of the FWP and ONR designated uses. For purposes of this plan, LDEQ will use a year-round 54 percent reduction as a conservative target to achieve the turbidity standard.

There is a moderate correlation between turbidity and TSS (total suspended solids) for the wet season and stronger relationship during the dry season. Point sources do not represent a significant source of TSS as defined in the TMDL. Wastewater treatment facilities discharge primarily organic TSS, which does not contribute to extensive habitat impairment resulting from sedimentation. The TMDL states that the organic TSS is a nonconservative constituent that would only be detected as a component in proximity to the discharge point. This TMDL only addresses geomorphic contributions of TSS/sediment. Some discharges classified as point sources, such as construction sites, permitted through general permits, can discharge erosional sediment loads. These sites are transient in nature, because they cover only the construction activities at the site; once construction is complete these permits expire. These permits require implementation of BMPs and other requirements designed to reduce sediment load as a result of the permitted activity. Large-scale construction activities are most often found in areas with urban development. Land use is dominated by agricultural or forest uses. Urban land use is only approximately eight percent of the watershed. Given this low percentage of urban use it is not expected that construction activities are a significant source of sediment (LDEQ, 2002).

Element B. Estimated Load Reductions

This section will attempt to quantify pollutant loading to Bayou Bartholomew as seen at the ambient monitoring site, and load reductions necessary to restore water quality.

Pollutant Load Estimates

Table 8 shows total nitrogen (N), phosphorus (P), and sediment loading estimates for Bayou Bartholomew, provided by the Spreadsheet Tool for Estimating Pollutant Loads (STEP-L) model. STEP-L is a scenario-based model, used to estimate reductions associated with specific BMPs Table 9 illustrates Bayou Bartholomew loading estimates from runoff by land use type, with no BMPs being implemented.

TABLE 8. TOTAL NITROGEN, PHOSPHORUS, BOD, AND SEDIMENT LOADING ESTIMATES FOR BAYOU BARTHOLOMEW

BAYOU BARTHOLOMEW 080401	*N LOAD (NO BMP) LB/YEAR*	P LOAD (NO BMP) LB/YEAR	SEDIMENT LOAD (NO BMP) TONS/YEAR
	393280.2	69971.4	7674.3

TABLE 9. BAYOU BARTHOLOMEW LOADING ESTIMATES FROM RUNOFF BY LAND USE TYPE, WITH NO BMPS IMPLEMENTED

LAND USE TYPE	N LOAD (LB/YEAR) (NO BMP)	P LOAD (LB/YEAR) (NO BMP)	SEDIMENT LOAD (TONS/YEAR) (NO BMP)
Urban	107929.42	17050.95	2445.33
Cropland	159222.37	28548.16	4689.17
Pastureland	91610.12	7192.43	324.26
Forest	34518.33	17179.85	215.54
Feedlots	0.00	0.00	0.00
User Defined	0.00	0.00	0.00
Septic	0.00	0.00	0.00
Gully	0.00	0.00	0.00
Streambank	0.00	0.00	0.00
Groundwater	0.00	0.00	0.00
Total	393280.24	69971.39	7674.30

Estimated Load Reductions

Louisiana Department of Agriculture and Forestry

Reduction strategies are based on BMPs as well as education and outreach for which success cannot be measured. Through previous research and project review, it has been shown that BMPs have been successful in reducing loads in watersheds and improving the overall health of waterbodies. When BMPs are implemented strategically based on site visits, data analysis, and knowledge of local stakeholders and landowners, results are significantly more effective.

To provide load reduction estimates for sediment, based on the BMPs that LDAF will implement, a STEPL model was run for the Bayou Bartholomew subsegment. The model addresses both sediment and nutrient loadings as a function of rainfall runoff, providing for soil and land use input taken from geospatial data. Sediment percent reductions ranged from 0.1 to 15.7 percent. The STEP-L model predicted the percent reductions for some of the BMPs LDAF proposes to implement, to reach the TMDL target of 54 percent (Table 10). In addition, Table 11 reflects load reductions for each HUC 12 in the watershed. LDEQ used the watershed scale reductions and proportionally assigned them to the HUC 12 scale based on percent cropland and percent pasture in each of the six top priority HUC 12s. LDEQ has identified data gaps as they relate to load reductions:

1. If future data does not reflect improvement, new sampling sites may be added.
2. If data does not reflect improvement, LDAF may contact other stakeholders in the watershed to participate in BMP implementation.
3. If data does not reflect improvement, LDEQ may run new scenarios through STEP-L.

TABLE 10. THE STEP-L MODEL PREDICTED THE PERCENT REDUCTIONS FOR SEVERAL BMPS LDAF PROPOSES TO IMPLEMENT

BMP	ACRES IN BMP	% SEDIMENT REDUCED
Conservation Crop Rotation	4,200	10
Field border	4,200	15.7
Reduced tillage	1,000	3.3
Grade Stabilization	4,200	5.5
Residue Management	3,000	3.9
Critical area planting	1,000	3.3
Cover crops	4,200	2.7
Streambank stabilization & fencing	2,800	9.1
Watering facility	1,000	0.1
Prescribed grazing	1,000	0.2
Heavy use area protection	1,000	0.4
Fence	1,000	0.2
TOTAL REDUCTION PERCENT		54.4

TABLE 11. PROJECTED LOAD REDUCTIONS BY HUC 12, BASED ON BEST MANAGEMENT PRACTICES

HUC **12**	**PROJECTED LOAD REDUCTIONS (TONS)**
080402051003	700.8
080402051002	810.9
080402051001	739.8
080402050905	216.8
080402050802	315.4
080402050805	225.6
TOTAL	3009.3

Turbidity concentrations were exceeded on 15 occasions during the 2023 baseline monitoring period, with the highest exceedance occurring on June 6, 2023 at 79.5 NTU (Table 12). To calculate the yearly percent reduction needed each year to reach the turbidity standard, an average of the 23 samples collected during the baseline monitoring period was calculated, which equaled 37.65 NTU. The LDEQ turbidity criteria of 25 NTU was subtracted from 37.65, to equal 12.65 NTU over the turbidity criteria. 12.65 NTU was then divided by seven (years of implementation). It is predicted that implementing the indicated cropland and pastureland related BMPs in the bayou, turbidity concentrations can be reduced by 1.80 NTU yearly, to meet the 25 NTU criteria. Reducing 37.65 NTU by 1.80 NTU each year, it is estimated that by 2031, turbidity concentrations should fall to approximately 23.25 NTU (Table 13) and by 2032, the FWP and ONR uses may be restored (25 NTU). It is predicted that Bayou Bartholomew should not be listed on the 2032 IR for not supporting its FWP and ONR use due to increased turbidity concentrations stemming from runoff from agriculture.

TABLE 12. JANUARY TO DECEMBER 2023 TURBIDITY BASELINE MONITORING DATA AT AMBIENT SITE, 0074

SAMPLING DATE	TURBIDITY (NTU)
1/31/2023	47.4
2/14/2023	50.5
2/28/2023	36.3
3/14/2023	59.5
3/28/2023	55
4/11/2023	49.2
4/26/2023	38.6
5/9/2023	54
5/23/2023	66
6/6/2023	79.5
6/20/2023	67.5
7/6/2023	47.6
7/18/2023	30.9
8/3/2023	33.9
8/17/2023	36.5
9/12/2023	19.7
9/27/2023	21.2
10/11/2023	15.6
10/24/2023	14.4
11/14/2023	15.7
11/29/2023	7.6
12/7/2023	9.1
12/19/2023	10.4

TABLE 13. BAYOU BARTHOLOMEW'S PROJECTED TURBIDITY YEARLY REDUCTIONS AT AMBIENT SITE 0074, 2023-2031

YEAR	2023	2024	2025	2026	2027	2028	2029	2030	2031
TURBIDITY (NTU)	37.65	35.85	34.05	32.25	30.45	28.65	26.85	25.05	23.25

Element C. Best Management Practices

This section will describe pollution reduction measures identified by key stakeholders (LDEQ, LDAF, and NRCS) that are selected to reduce runoff causing water quality impairments. It is understood that baseline monitoring data collected throughout the watershed will help guide geographic targeting of those measures.

BMPs have been identified for use within the project areas to address the resource management concerns. All practices will be implemented by the project participants as identified in the conservation plans and will provide for part of the project matching costs. The referenced lists will be used in the Bayou Bartholomew watershed; however, additional practices may be added on a case by case basis to achieve the optimum water quality improvements depending on site specific measures. The BMPs listed in Tables 14 and 15 will be implemented as part of a comprehensive conservation plan with the benefit of cost-share payments, incentive payments, and in-kind services. The cost of implementing these BMPs not covered by federal cost-share assistance will be borne by the individual project participants and will provide part of the non-federal in-kind match funds. BMP unit costs will follow the current NRCS statewide average cost list. Implementation of these practices will be used as interim indicators of improved water quality success. The LDAF Office of Soil and Water Conservation (LDAF-OSWC) in conjunction with the Morehouse SWCD will continue to focus its implementation efforts in Bayou Bartholomew, and foresee a decrease in turbidity. When properly implemented, BMPs can help improve water quality without placing unreasonable burdens on the agricultural industry of Louisiana. (USDA 2024).

Using Landuse/Land Cover Information in Table, 5, STEPL BMPs were assigned to each priority area, proportionally, Table 16, Best Management Practices by HUC 12 Priority Areas. Please note that acreages are based on a combination of BMPs that are typically used in Louisiana on common crops in the state. STEP-L, a scenario-based model, was used to estimate reductions associated with those BMPs. The voluntary nature of NPS programs suggests a data gap in implementation efforts, as future participation is unknown. Unmonitored HUC-12s within the subsegment that are not included in the model may see implementation. Those impacts are another data gap not accounted for in this model. For assigning BMP acreages, only the HUCs in the top six priority groups were used, with the understanding that BMPs may be implemented in the other HUCs. However since LDEQ is not monitoring in the other HUCs, that is a data gap and the impact of implementing in those unmonitored HUCs is to be determined. STEP-L estimated load reductions were distributed among the priority HUCs (priorities 1-6) based on percent landuse classes in each of those HUCs. For adaptive management purposes, identification of additional BMPs, listing the dominant land-use acreages will aid in identifying additional need, any possible sources to target in the future.

Since Bayou Bartholomew flows through Arkansas, then through Louisiana, BMP information for Arkansas has been included (Table 17). Louisiana and Arkansas have some BMPS in common, fencing, grade stabilization structures, prescribed grazing, and filter strips. BMP costs can be found in the United States Department of Agriculture/Natural Resources Conservation Service, Environmental Quality Incentives Program Manual, for fiscal year 2024, https://www.nrcs.usda.gov/sites/default/files/2023-12/fy24-louisiana-EQIP.pdf

Practices to Reduce Sediment Loading from Pasture Use

The NWQI Program allows the NRCS, in partnership with state and other federal agencies, to provide technical and financial assistance to farmers for implementation of conservation systems. Under the NWQI Program, the NRCS will implement BMPs to reduce sediment loading from cattle that access waterbodies directly, and to reduce runoff from pastureland. These BMPs are listed below (Table 14).

TABLE 14. PASTURELAND BEST MANAGEMENT PRACTICES

CODE	PRACTICE	PARAMETERS ADDRESSED	ROW CROP/ COMMODITY USE	PASTURELAND USE	COST PER UNIT*	UNIT
340	Cover Crop	Sediment, nutrients	X	X	$59.68 - $2,534.10	Acre
342	Critical Area Planting	Sediment, nutrients	X	X	$191.95 - $846.93	Acre
345	Residue and Tillage Management, Reduced Till	Sediment, nutrients	X		$15.05 - $18.46	Acre
382	Fence	Sediment, nutrients, bacteria		X	$1.48 - $3.62	Foot
410	Grade Stabilization Structure	Sediment, nutrients	X		$2,308.81- $33,927.36	Each
528	Prescribed Grazing	Sediment, nutrients		X	$16.88 - $208.75	Acre
561	Heavy Use Area Protection	Sediment, nutrients, bacteria		X	$1.75 - $6.14	Sq. Foot
590	Nutrient Management	Nutrients	X	X	$28.69- $165.16	Acre
595	Integrated Pest Management	Sediment, nutrients	X	X	$12.05 - $459.94	Acre
614	Watering Facility	Sediment, nutrients, bacteria		X	$0.75 - $5.46	Gallon

*Varies with practice specifics, for further details see FY 2024 EQIP cost table: https://www.nrcs.usda.gov/sites/default/files/2023-12/fy24-louisiana-EQIP.pdf

Practices to Reduce Runoff Loading from Row Crop/Commodity Crop Use

In addition to pastureland BMPs, as part of the NWQI Program, the NRCS will implement practices to reduce runoff from cropland. These are listed in Table 15 with the parameters of concern to be addressed.

TABLE 15. CROPLAND BEST MANAGEMENT PRACTICES

CODE	PRACTICE	PARAMETERS ADDRESSED	ROW CROP/ COMMODITY USE	PASTURELAND USE	COST PER UNIT*	UNIT
327	Conservation Cover	Sediment, nutrients	X		$114.86 - $837.37	Acre
328	Conservation Crop Rotation	Sediment, nutrients	X		$3.61- $127.31	Acre
340	Cover Crop	Sediment, nutrients	X	X	$59.68 - $2,534.10	Acre
342	Critical Area Planting	Sediment, nutrients	X	X	$191.95 - $846.93	Acre
345	Residue and Tillage Management, Reduced Till	Sediment, nutrients	X		$15.05 - $18.46	Acre
386	Field Border	Sediment, nutrients	X		$90.16 - $791.26	Acre
390	Riparian Herbaceous Cover	Sediment, nutrients			$219.20 - $280.21	Acre
393	Filter Strip	Sediment, nutrients	X		$165.37- $565.12	Acre
410	Grade Stabilization Structure	Sediment, nutrients	X	X	$2,308.81- $33,927.36	Each
462	Precision Land Forming	Sediment	X		$239.95- $432.98	Acre
580	Streambank and Shoreline Protection	Sediment, nutrients			$35.75- 422.03	Acre
590	Nutrient Management	Nutrients	X	X	$28.69- $165.16	Acre
595	Integrated Pest Management	Sediment, nutrients	X	X	$12.05 - $459.94	Acre

*Varies with practice specifics, for further details see FY 2024 EQIP cost table: https://www.nrcs.usda.gov/sites/default/files/2023-12/fy24-louisiana-EQIP.pdf

TABLE 16. BEST MANAGEMENT PRACTICES BY HUC 12 PRIORITY AREAS

HUC-12	080402051003	080402051002	080402051001	080402050905	080402050802	080402050805
Conservation Crop Rotation	1171	777	1185	143	539	384
Field border	1171	777	1185	143	539	384
Reduced tillage	279	185	282	34	128	92
Grade Stabilization	1171	777	1185	143	539	384
Residue Management	836	555	846	102	385	275
Critical area planting	279	185	282	34	128	92
Cover crops	1171	777	1185	143	539	384
Streambank stabilization & fencing	81	1803	237	674	1	4
Watering facility	29	644	85	241	0	2
Prescribed grazing	29	644	85	241	0	2
Heavy use area protection	29	644	85	241	0	2
Fence	29	644	85	241	0	2

Note that acreages are based on a combination of BMPs that are typically used in Louisiana on common crops in the state. STEP-L, a scenario-based model, was used to estimate reductions associated with those BMPs. The voluntary nature of NPS programs suggests a data gap in implementation efforts, as future participation is unknown. Unmonitored HUC-12s within the subsegment that are not included in the model may see implementation. Those impacts are another data gap not accounted for in this model.

TABLE 17. ARKANSAS BEST MANAGEMENT PRACTICES AND ASSOCIATED COSTS

CODE	PRACTICE	PARAMETERS ADDRESSED	ROW CROP/COMMODITY CROP USE	PASTURELAND USE	COST PER UNIT*	UNIT
329A	No Till/ Strip Till	Sediment, nutrients	X		$14.82-$17.78	Acre
382	Fence	Sediment, nutrients		X	$1.48-$3.62	Feet
391	Riparian Forest Buffer	Sediment, nutrients			$381.84- $ 662.08	Acre
410	Grade Stabilization Structure	Sediment, nutrients	X	X	$78.35-$94.02	Feet
512	Pasture and Hay Planting	Sediment, nutrients		X	$53.19-$443.64	Acre
528	Prescribed Grazing	Sediment, nutrients		X	$16.88- $ $208.75	Acre
587	Structure for Water Control	Sediment, nutrients	X		$1,775.04-$2,130.05	Feet
612	Tree/Shrub Establishment	Sediment, nutrients			$0.24- $ $22.31	No
393	Filter Strips	Sediment, nutrients	X		$165.37-$565.12	Acre

*Varies with practice specifics, for further details see FY 2024 EQIP cost table: https://www.nrcs.usda.gov/sites/default/files/2023-12/fy24-louisiana-EQIP.pdf

TABLE 18. BEST MANAGEMENT PRACTICES AND WATER QUALITY EFFECTS (NRCS)

NRCS CODE	PRACTICE	SELECTED IMPACTS	REDUCE NUTRIENTS	REDUCE BACTERIA	REDUCE SEDIMENT
102	Comprehensive Nutrient Management Plan	Reduce Nutrients			
104	Nutrient Management Plan	Reduce Nutrients			
216	Soil Testing	Reduce Nutrients			
315	Herbaceous Weed Treatment	Increase health and vigor of desirable plant species increases ground cover decreasing sheet and rill erosion.			
318	Short Term Storage of Animal Waste and Byproducts	Improved nutrient utilization and conservation, flexibility in rate, timing and location causes slight			
327	Conservation Cover	Reduce sheet, rill, and wind erosion and sedimentation, Reduce ground and surface water quality degradation by nutrients and surface water quality degradation by sediment, Improve soil health, and slight reduction in pathogens			
328	Conservation Crop Rotation	Reduce erosion, reduce water quality degradation due to excess nutrients, maintain or improve soil health, reduced runoff causes slight reduction in pathogens			
329	Residue and Tillage Management, No-Till/Strip Till/Direct Seed	Reduce erosion, prevent soil disturbance, and reduce nutrient and pathogen runoff			
340	Cover Crop	Increased vegetation reduces soil detachment and erosion, captures and recycles nutrients, increased organic matter promoting microbial activity and reduced erosion and runoff reduces pathogen delivery			
342	Critical Area Planting	Increased vegetation and cover stabilizes streambanks, reduces erosion, slightly increases microbial activity/competes with pathogens, and increases nutrient uptake			
345	Residue and Tillage Management, Reduced Till	Reduce erosion, improve soil health, less runoff reduces transport of nutrients and pathogens			
382	Fence	Reduce erosion and nutrient/pathogen runoff, and reduces access of animals/people to stream areas			
386	Field Border	Reduce erosion, compaction, and excess nutrients and pathogen transport			
410	Grade Stabilization Structure	Slightly reduce erosion			
430	Irrigation Pipeline	Reduces energy use and slightly reduces erosion, nutrient and pathogen transport as part of a complete irrigation system			
449	Irrigation Water Management	Minimize irrigation-induced soil erosion, reduces total runoff including nutrients and pathogens			
462	Precision Land Forming	Slightly reduces transport of nutrients and infiltration of pathogens,			
464	Irrigation Land Leveling	Reduce excess irrigation-induced runoff and transport of nutrients and pathogens			
472	Access Control	Reduce erosion and slightly reduces nutrient and pathogen transport			
512	Forage and Biomass Planting	Reduce erosion, and added vegetation increases nutrient and pathogen uptake reducing runoff transport			
516	Livestock Pipeline	Reduce bank erosion and nutrient loading by reducing access			
528	Prescribed Grazing	Reduces erosion by enhancing vegetative cover, increased vegetation increases nutrient uptake and reduces transport of pathogens and overall runoff			
561	Heavy Use Area Protection	Reduce erosion by increasing vegetative cover, allows collection of manure which reduces nutrient and pathogen runoff			
576	Livestock Shelter Structure	Provide protection for livestock from heat/cold. Reduces excess pathogens and nutrients in the water			
578	Stream Crossing	Reduces traffic on streambanks, sediment and nutrient loading, reduce streambank and streambed erosion but could increase pathogens by allowing animal access to the stream			
590	Nutrient Management	Amount, source, placement, and timing provides nutrients when plants need them most. Proper application of manure reduces pathogen transport to surface water.			
595	Integrated Pest Management	Prevent and mitigate pest suppression impacts and reduce risks to soil			
614	Watering Facility	Introducing alternate water source reduces animal traffic on streambanks therefore reducing erosion, manure deposition near the stream			
642	Water Well	increased vegetative cover increases water distribution and decreases erosion			
644	Wetland Wildlife Habitat Management	slight improvement due to pathogens/nutrients trapped in the wetland and reduces transport to water,			
646	Shallow Water Development and Management	Slight improvement in nutrient/pathogen transport by trapping them in the wetland			
748	Record Keeping				

Sources: LDAF personal communication, https://efotg.sc.egov.usda.gov/#/state/LA/documents/section=5&folder=5959

Best Management Practice Descriptions

Conservation Cover (NRCS Code 327) is used to establish and maintain permanent vegetative cover. Conservation cover reduces ground and surface water quality degradation by nutrients and surface water quality degradation by sediment.

Conservation Crop Rotation (NRCS Code 328) refers to growing crops in a recurring sequence on the same field. A conservation crop rotation may include crops planted for cover or nutrient enhancement. The crops selected should produce sufficient quantities of biomass at the appropriate time to reduce erosion by water or wind to within acceptable soil loss levels. Crops included in conservation crop rotation include high-residue producing crops such as corn or wheat in rotation with low-residue producing crops such as vegetables or soybeans. The rotation may also involve growing forage crops in rotation with other field crops. Crop rotations vary with soil type, crops produced, farming operations, and how the crop residue is managed. The most effective crops for soil improvement are fibrous-rooted high-residue producing crops such as grass and small grain. Perennial plants used for forage are very effective in crop rotations due to increases in organic matter and reduced soil erosion. In addition, crop rotations help break insect, disease, and weed cycles. Rotations add diversity to farm operations and often reduce economic and environmental risks.

Cover Crops (NRCS Code 340) are grasses, legumes, and forbs planted for seasonal vegetative cover. This practice is applied to support one or more of the following purposes: reduce erosion from wind and water, maintain or increase soil health and organic matter content, reduce water quality degradation by utilizing, excessive soil nutrients, suppress excessive weed pressures and break pest cycles, improve soil moisture use efficiency, and minimize soil compaction.

Critical Area Planting (NRCS Code 342) establishes permanent vegetation on sites that have, or are expected to have, high erosion rates, and on sites that have physical, chemical or biological conditions that prevent the establishment of vegetation with normal practices. Critical area plantings are used to stabilize stream and channel banks, and shorelines.

Residue and Tillage Management, Reduced Till (NRCS Code 345) involves managing the amount, orientation, and distribution of crop and other plant residue on the soil surface year round while limiting the soil-disturbing activities used to grow and harvest crops in systems where the field surface is tilled prior to planting.

Residue and Tillage Management, No Till/Strip Till (NRCS Code 329A) manages the amount, orientation, and distribution of crop and other plant residues on the soil surface year-round while growing crops in narrow slots or in tilled or residue free strips in soil previously untilled by full-width inversion implements.

- **No-Till**-Limiting soil disturbance to manage the amount, orientation and distribution of crop and plant residue on the soil surface year around. The purpose is to reduce sheet, rill and wind erosion and excessive sediment in surface waters. Reduce tillage-induced particulate emissions. Maintain or increase soil health and organic matter content. •Increase plant-available moisture. • Reduce energy use. Provide food and escape cover for wildlife.
- **Reduced Till**-Managing the amount, orientation, and distribution of crop and other plant residue on the soil surface year-round while limiting soil-disturbing activities used to grow and harvest crops in systems where the field surface is tilled prior to planting. The purpose

is to reduce sheet, rill, and wind erosion and excessive sediment in surface waters (soil erosion). Reduce tillage-induced particulate emissions (air quality impact). Improve soil health and maintain or increase organic matter content (soil quality degradation). Reduce energy use (inefficient energy use).

Fencing (NRCS Code 382) controls the movement of animals and people, including vehicles. This practice may be applied on any area where management of animal or human movement is needed. It's commonly applied with NRCS conservation practice standards (CPSs) such as prescribed grazing (Code 528) and use exclusion (Code 472). Helps to reduce soil erosion, sheet and rill erosion, excess pathogens and chemicals from manure, bio-so-undesirable plant productivity and health-emissions of greenhouse gases (GHGs).

Field Border (NRCS Code 386) are strips of permanent vegetation (grasses, legumes, forbs, or shrubs) established on one or more sides of a field.

Riparian Herbaceous Cover (NRCS Code 390) is establishment and maintenance of grasses, grass-like plants, and forbs that are tolerant of intermittent flooding or saturated soils and that are established or managed in the transitional zone between terrestrial and aquatic habitats.

Riparian Forest Buffer (NRCS Code 391) is an area predominantly covered by trees and/or shrubs located adjacent to and up-gradient from a watercourse or water body.

Filter Strip (NRCS Code 393) is an area of vegetation established for removing sediment, organic material, and other pollutants from runoff and wastewater.

Grade Stabilization Structures (NRCS Code 410) are used to control the grade and head cutting in natural or artificial channels. These structures are used to control erosion, prevent formation of gullies, improve water quality irrigation pipeline installation, and to enhance environmental quality and reduce pollution hazards.

Precision Land Forming (NRCS 462) is used on a field to remove surface irregularities. This practice is used to accomplish one or more of the following purposes: improve surface drainage, reduce erosion, and to improve equipment operation and efficiency.

Irrigation Land Leveling (NRCS 464) is to permit the uniform and efficient application of surface irrigation water without significant erosion, loss of water quality, soil damage, or crop damage due to prolonged saturation. Reshape a land surface according to the planned lines and grades for irrigation-Soil Erosion - Sheet and Rill Erosion-Soil Erosion - Ephemeral Gully Erosion-Pesticides in Surface Water-Pesticides in Groundwater-Nutrients in Surface water-Nutrients in Groundwater-Excessive Sediment in Surface Water-Excess Pathogens and Chemicals from Manure, and Bio-solid.

Pasture and Hay Planting (NRCS 512) is used in establishing adapted and compatible species, varieties, or cultivars of perennial herbaceous plants suitable for pasture or hay production.

Livestock Pipeline Installation (NRCS 516) is a pipeline and appurtenances installed to convey water for livestock or wildlife. The purpose is used to accomplish one or more of the following: convey water to points of use for livestock or wildlife, reduce energy use (component practice for well and watering facility).

Prescribed Grazing (NRCS Code528) is used to manage the harvest of vegetation with grazing and/or browsing animals to reduce accelerated soil erosion, maintain or improve soil condition, and to improve or maintain surface and/or subsurface water quality and quantity.

Heavy Use Area Protection (NRCS Code 561) provides for the stabilization of areas frequently and intensively used by people, animals or vehicles by establishing vegetative cover, surfacing with suitable materials, and/or installing needed structures. This practice is used to accomplish one or more of the following purposes reduce soil erosion, provide a stable, noneroding surface for areas frequently used by animals, people, or vehicles, and protect or improve water quality.

Streambank and Shoreline Protraction (NRCS Code 580) provides streambank and shoreline protection and consists of applying vegetative or structural measures to stabilize and protect banks of streams, lakes, estuaries, or excavated channels from scour or erosion.

Structure for Water Control (NRCS Code 587) is for water control is a structure in a water management system that conveys water, controls the direction or rate of flow, maintains a desired water surface elevation, or measures water.

Nutrient Management (NRCS Code 590) refers to balancing all sources of nutrient inputs with a crop's requirements for producing a realistic yield. Nutrients, like nitrogen and phosphorus are essential for crop production; overbalance of these nutrients can cause water quality problems. Manage rate, source, placement, and timing of plant nutrients and soil amendments while reducing environmental impacts-nutrients are managed based on the 4Rs of nutrient stewardship—apply the right nutrient source at the right rate at the right time in the right place—to improve nutrient use efficiency by the crop and to reduce nutrient losses to surface water and groundwater and to the atmosphere-nutrients in surface water and nutrients in groundwater.

Integrated Pest Management (NRCS Code 595) involves a site-specific combination of pest prevention, pest avoidance, pest monitoring, and pest suppression strategies to mitigate risks to water quality. A substantial improvement is expected if this BMP is implemented.

Tree/Shrub Establishment (NRCS Code 612) involves planting seedlings or cuttings, seeding, or creating conditions that promote natural regeneration.

Watering Facility (NRCS Code 614) provides livestock with drinking water at planned locations that will protect vegetative cover through proper distribution of grazing or other management techniques. The purpose is used to accomplish one or more of the following: supply daily water requirements, improve animal distribution, and provide a water source that is an alternative to a sensitive resource. Helps reduce streambank erosion, pathogens, sediments, and nutrients to surface waters. Improves water quality and aquatic habitats.

Water Well Installation (NRCS Code 642) is a hole drilled, dug, driven, bored, jetted, or otherwise constructed into an aquifer for agricultural water supply. The purpose of this practice is used to accomplish one or more of the following purposes: address the need for adequate livestock water quality and quantity. Provide water for terrestrial wildlife. Provide irrigation water and to prevent soil erosion, sheet and rill erosion, soil erosion, wind erosion, soil erosion, and ephemeral gully erosion.

The Louisiana Field Office Technical Guide gives descriptions of all BMPs and can be found at, https://efotg.sc.egov.usda.gov/#/state/LA/documents

Element D. Technical and Financial Assistance

This section will describe assistance provided by those partners that have committed to working in the watershed, and funding information (where available) for that assistance.

Implementing BMPs and conservation measures that reduce NPS pollution in Bayou Bartholomew relies on cooperation of watershed stakeholders and local governments. Involvement by watershed stakeholders is necessary to support watershed protection programs. Watershed stakeholders include LDEQ-NPS, LDAF, LDEQ Water Surveys, USDA-NRCS, The Morehouse SWCD, Lyles Land & Mineral Services (LL&MS), Arkansas Division of Environmental Quality, community members, local and state government, non-governmental organizations, and businesses.

Technical assistance for Bayou Bartholomew restoration is provided to agricultural producers by NRCS. Additional assistance is provided to the SWCD by LDAF, working with NRCS. LDAF will also provide a technician through a coastal conservation program to assist with the NWQI project. Tables 19-22, show both dedicated and undedicated funding for specific components of Bayou Bartholomew's water quality restoration.

In the Bayou Bartholomew watershed, approximately 8.1 percent or 6,640 acres is categorized as developed. Because of this, these areas may be a potential source of increased turbidity loadings. The unknown contribution of urban runoff to turbidity levels in the bayou is a data gap. Additional research may be needed to identify additional potential sources other than agricultural. In the event that additional sources are identified, technical and financial assistance may be needed to carry out general education and outreach in the area. In addition, a large portion of the watershed is forestry. In the future, if agricultural milestones are not being met, LDAF may provide additional technical assistance in these areas for forestry BMPs. There may also be a future need for agricultural technical assistance for farmers/producers who did not initially sign up for cost-share assistance but become interested, or those that were interested but initially were not selected. At this time, funding sources are limited. For this reason, additional grants/partners may be sought to contribute funding/their time for additional implementation, outreach, and activities.

Louisiana Department of Environmental Quality

The Louisiana Department of Environmental Quality NPS Program is the lead agency for the Section 319 program. Beginning in 2022, LDEQ-NPS was provided monetary assistance from EPA's Section 319 Program to work in Bayou Bartholomew. Funding goes towards LDEQ-NPS staff, water quality sampling coordinated by LDEQ Water Surveys, and lab analysis, performed by Pace Analytical-Gulf Coast. NPS worked closely with LDAF to identify the priority areas for BMP implementation, based on turbidity exceedance rates. In addition, all project partners collaborated to identify additional areas of interest in the project area, to address resource management problems, assess the project plan, implementation schedules, and to coordinate state Section 319(h) program components with LDAF.

The LDEQ Water Surveys Section collaborates with LDEQ's NPS Section to help plan and execute the Bayou Bartholomew water quality project through field data assessment and sample collection. Section 319 of the Clean Water Act required that the states develop a plan to reduce and control various types of NPS pollution, which comes in the form of agriculture and urban runoff, home sewage systems and many other sources. Water Surveys was tasked with reconnaissance of accessible and

representative sites for this water quality project, as well as adhering to bi-monthly water sample and flow measurement collection schedules. Their efforts provide a qualitative and quantitative assessment of Bayou Bartholomew and helped to identify potential "hotspots/critical areas" for NPS pollution. With the help of LDAF and the implementation of BMPs, LDEQ is hoping to educate local entities on how their land use practices can adversely affect local waterbodies. Table 19 illustrates all funding utilized by LDEQ-NPS from 2022 to approximately 2031.

TABLE 19. LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY FUNDING FOR BAYOU BARTHOLOMEW WATERSHED RESTORATION, 2022-2031

BAYOU BARTHOLOMEW RESTORATION COMPONENT	YEARS 2022 - 2024	YEARS 2025 - 2031	TOTAL DEDICATED FUNDS
LDEQ 319(h) Water Quality Sampling (LDEQ Water Surveys) (federal & match)*	$85,500	$99,750	$185,250
LDEQ NPS Staff (federal & match)*	$120,000	$210,000	$330,000
LDEQ 319(h) Analysis Pace Analytical-Gulf Coast	$15,840	$18,480	$34,320
TOTAL	$221,340	$328230	$549,570

Source: LDEQ *319(h) funding based on Oct – Sep cycle.

Louisiana Department of Agriculture & Forestry

The Louisiana Department of Agriculture & Forestry is the lead agency for BMP implementation. They will provide project management on a day-to-day basis, assist in developing and implementing BMPs, and provide reimbursement to project participants for cost-share. LDEQ-NPS will partner with LDAF to host one to two stakeholder meetings annually to discuss progress made in BMP implementation and water quality data collection. A summary of water quality data will be presented at these meetings. LDAF will forward the information to landowners and producers to show participants how their participation in the programs is affecting water quality in Bayou Bartholomew. The need to achieve water quality standards with continued implementation within the critical areas will be emphasized at each meeting. To promote stakeholder involvement in restoring water quality in Bayou Bartholomew, LDEQ will continue to share data and information with LDAF, and to solicit concerns, comments, and suggestions from stakeholders in the region. LDAF will continue to participate in local meetings and in public education opportunities when appropriate. Table 20 illustrates LDAF's estimated budget for BMP implementation in the watershed from 2024 to 2028. BMP implementation may be necessary beyond year 2028. Funding from 2029-2031 is to be determined.

TABLE 20. LOUISIANA DEPARTMENT OF AGRICULTURE AND FORESTRY ESTIMATED FUNDING FOR BAYOU BARTHOLOMEW WATERSHED RESTORATION, 2025-2031

BAYOU BARTHOLOMEW RESTORATION COMPONENT	2025	20 26	2027	2028	2029-2031	TOTAL DEDICATED FUNDS
LDAF 319(h) Federal*	$187,500	$187,500	$187,500	$187,500	TBD	$750,000
Match*	$312,500	$312,500	$312,500	$312,500	TBD	$1,250,000
TOTAL	$500,000	$500,000	$500,000	$500,000	TBD	$2,000,000

Source: LDAF *319(h) funding based on Oct – Sep cycle.

Lyles Land & Mineral Services

James Lyles, Sr. is a freelance Environmental Consultant with Lyles Land & Mineral Services with 48 plus years' experience. He is a licensed geoscientist, a certified professional soil scientist/soil classifier, and an agronomist with expertise in soils, storm water management, environmental permitting and regulatory compliance assistance, property management, and other areas related to water quality and runoff pollution. Under a contract in 2022 with the Morehouse SWCD he has assisted in development of a NWQI Workplan for Bayou Bartholomew (Table 21).

TABLE 21. LYLES LAND & MINERAL SERVICES FUNDING FOR BAYOU BARTHOLOMEW WATERSHED RESTORATION, 2022-2023

BAYOU BARTHOLOMEW RESTORATION COMPONENT	2022	2023	TOTAL DEDICATED FUNDS
Lyles Land & Mineral Services (LL&MS) Morehouse Soil Water Conservation District National Water Quality Incentive Plan	$22,450	$17,500	$39,950

Source: LL&MS, NRCS

United States Department of Agriculture-Natural Resources Conservation Service

The United States Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS) has selected Bayou Bartholomew as a NWQI watershed, targeted for multi-year agricultural BMP implementation for water quality improvement. "NWQI provides a way to accelerate voluntary, on-farm conservation investments and focused water quality monitoring and assessment resources where they can deliver the greatest benefits for clean water" (Lyles 2023). The USDA-NRCS staff will assist LDAF and LDEQ in collecting field information, meeting with local commodity groups, and identifying cropland in the Bayou Bartholomew watershed. Project ranking criteria will be developed by the USDA-NRCS, LDAF and the Morehouse SWCD. The Morehouse SWCD covers all

of Morehouse Parish, Louisiana of which the Bayou Bartholomew Watershed constitutes roughly 16 percent. The SWCD operates as the link between LDAF, the USDA-NRCS, and the agricultural producers of the parish. USDA-NRCS staff will assist LDAF and local SWCDs with outreach and education activities to ensure landowners and operators are aware of program opportunities. The USDA-NRCS staff will work closely with LDAF to ensure that resource management system (RMS) level conservation plans developed for this project meet NRCS planning standards. The field and area staff will assist in providing technical assistance for BMP plan designs, implementation, and certification. The NRCS staff will assist LDAF and LDEQ in developing semi-annual and annual reports for this project. At this time, USDA-NRCS does not have dedicated funds for Bayou Bartholomew.

Arkansas Division of Environmental Quality and Partners in Arkansas

Lastly, The Arkansas Division of Environmental Quality has used assessment efforts conducted by others for a portion of Bayou Bartholomew in Arkansas. Lyles LL&MS planners included the Arkansas documents in their NWQI document (Lyles, James 2023). These documents indicate various Louisiana soil conservationists and environmental specialists contributed to the Arkansas assessments of record.

According to Arkansas' 2018-2023 NPS Management Plan, Bayou Bartholomew was listed as a Priority Watershed for 2017, section 11. An EPA nine key element plan has also been approved. The Management Plan can be found here: https://www.agriculture.arkansas.gov/wp-content/uploads/2020/05/Pages_from_2018-2023_NPS_Pollution_Management_Plan.compressed_1.pdf.

Excerpt from Arkansas 2024-2029 Nonpoint Source Pollution Management Plan:

The Arkansas Discovery Farm (ADF) program uses a unique approach based on agriculture producers, scientists, and natural resource managers working jointly to identify issues and potential solutions. It strives to collect economic and environmental data to better define sustainability issues and find solutions that promote agricultural profitability and natural resource protection. The University Of Arkansas System Division Of Agriculture provides leadership and expertise to ensure that data is collected in a scientifically rigorous and valid manner. The program is led by the ADF Stakeholder Committee. The committee consists of members of agricultural, nongovernmental and rural entities within Arkansas. It is supported by the Technical Advisory Committee, which is comprised of members of state and federal organizations and agencies involved with agriculture in Arkansas. More information about Discovery Farms can be found at http://discoveryfarms.uark.edu/index.htm . The Discovery Farm program uses extensive state-of-the-art water quality monitoring systems equipment and protocol installed on real, working farms to document environmental and natural resource impact and to investigate solutions to reduce off-farm impacts. The overall goal of the program is to document sustainable and viable farming systems that remain cost-effective and environmentally sound. The following objectives are applied to each farm:

- Assess the need for and effectiveness of adopting appropriate BMPs to reduce nutrient and sediment loss and conserve water for major agricultural systems.
- Provide on-farm verification of nutrient and sediment loss reductions and water conservation.
- Mitigate nutrient and sediment losses that may prevent state waters from attaining designated uses.
- Deliver outreach programs to producers in achieving production and environmental goals.
- Provide information in support of the Arkansas State Water Plan.

This program and its partnerships have the potential to affect millions of agricultural acres across the state. In 2016, the program consisted of 11 farms spread across the state targeting dominant farming systems. Two of the farms in Bayou Bartholomew (Arkansas) are included under this program.

1. Pine Bluff-Rice-Corn-Soybean With Cover Crop Rotation (Jefferson County)
   This row crop operation with rice, corn and soybeans will be implementing cover crops in the rotation on the farm in the Bayou Bartholomew Watershed to see what effect cover crops have on water quality. Three subwatersheds are in the National Water Quality Initiative project area. Two water monitoring stations have been set up on opposite sides of the field where the water drains off the field. This will allow the water leaving the field to be collected and analyzed for sediment and nutrient concentrations. Approximately 40 acres of the field will be planted in cover crops. The rest will serve as a control by not having any cover crops planted.

2. Pine Bluff-Rice-Corn-Soybean With Cover Crop Rotation (Jefferson County)
   This row crop operation in the Bayou Bartholomew Watershed concentrates on rice, corn and soybean rotations with cover crops. The farm is located within the National Water Quality Initiative project area. A 12-acre field will be treated with cover crops and the 18-acre field across the road will be used as a control without cover crops. Both of these fields have water monitoring stations where the water drains off the fields. The results will be used to evaluate the effect that cover crops have on water quality.

Arkansas' 2024-2029 Management Plan mentions the Arkansas Department of Agriculture's Natural Resources Division (NRD) listed Bayou Bartholomew as one of their 12 priority NPS watersheds. The management plan can be found here: https://www.agriculture.arkansas.gov/wp-content/uploads/FINAL-DRAFT-2024-2029-NPS-Plan.pdf

Currently, NRCS has three HUC12's for NWQI projects in Arkansas:

1. Ables Creek-Bayou Bartholomew, 080402050405
2. Fourmile Creek-Bayou Bartholomew, 080402050406,
3. Lake Wallace-Bayou Bartholomew, 080402050509

Arkansas has also funded an FY24 319(h) project for updated water quality monitoring data throughout Bayou Bartholomew.

Arkansas' EPA Approved WIP includes Table 22, which illustrated the estimated amount of funding needed for BMPs in the Bayou Bartholomew watershed in Arkansas, per EQUIP 2008 payments. Updated funding amounts were not available at the time of the writing of the WIP. The finances needed to complete the required reduction in sediment load go beyond the cost of BMP implementation. These amounts include public outreach and education, technical assistance, and additional water quality sampling. At the time of WIP drafting, the approximated costs spanned over a 5-year period. Due to the unforeseeable future, limiting implementation to 5 years may not be feasible or reasonable.

TABLE 22. ARKANSAS DIVISION OF ENVIRONMENTAL QUALITY ESTIMATES FOR BAYOU BARTHOLOMEW WATERSHED RESTORATION, 2009

ITEMS	AMOUNT
Additional Water Quality Monitoring	$1,200,000
BMP Implementation	$15,798,000
Public Outreach and Education	$522,000
Technical Assistance	$650,000
Estimated Costs for 5 years, 2009	$18,170,000

Element E. Education and Outreach

This section outlines current and planned education and outreach activities that will occur on a local level in the watershed.

Implementing BMPs and conservation measures that reduce NPS pollution in Bayou Bartholomew relies on cooperation of watershed stakeholders and local governments. Involvement by watershed stakeholders is necessary to support watershed protection programs. Watershed stakeholders include LDEQ-NPS, LDAF, LDEQ Water Surveys, USDA-NRCS, The Morehouse SWCD, Lyles LL&MS, Arkansas Division of Environmental Quality, community members, local and state government, non-governmental organizations, and businesses. Education and outreach in the Bayou Bartholomew subsegment is an important component of watershed restoration, as it is the initial step in understanding how to improve water quality in the bayou. When landowners/producers understand the objectives of watershed restoration and benefits to the community, they are more likely to implement and maintain BMPs. Understanding the problem often results in a greater concern and encourages the community to take actions without regulation. Educational program activities are crucial components of watershed protection and water quality improvement. These activities are initiated prior to BMP implementation and continue throughout the life of the project.

LDAF will be the lead in the education and outreach program in order to increase the awareness of NPS pollution problems and issues associated with agricultural activities within the Bayou Bartholomew watershed. In cooperation with the LDAF, Morehouse SWCD, USDA-NRCS, LSU Ag Center, and the LDEQ NPS section, the goal is to work together to conduct education and outreach through agricultural BMP workshops, field days within the watershed, the Soil and Water Stewardship Program, and through other related events and activities throughout communities. Project WET (Water Education for Teachers) education workshops will be conducted for formal and non-formal educators of students ages kindergarten through twelve. The outreach will also lead to a better community wide understanding of the effects and remediation of off-site NPS pollution impairments. One agricultural BMP field day will be held within the Bayou Bartholomew watershed to demonstrate the potential for reducing stream loading from agriculture activities, through the implementation of BMPs. Education and outreach will be conducted by the SWCD and NRCS in conjunction with a farm tour or rice field day. A special effort will be made to encourage landowners, operators, and educators from within the watershed to participate in the field day. Citizens will also be encouraged to become certified Master Farmers through the LSU Ag Center. USDA-NRCS and SWCD staff will make every effort to address local commodity groups at their annual meetings. NRCS Morehouse field office conducted education and outreach at the Soil Health Outreach and locally led meeting in January and February of 2023. The NWQI project was mentioned at the Area 1 meeting held in February 2024. NWQI education outreach for Bayou Bartholomew will occur on July 21, 2024 at the Morehouse Parish Farm Field Day Event.

Additionally, to engage producers in the project areas, project fliers are distributed locally to notify landowners of CWA Section 319 funds being available for conservation assistance to correct surface water impairments. These impairments are made known to the community during the SWCD's locally-led conservation meetings, whereby all community stakeholders present are encouraged to voice, and prioritize their natural resource concerns. Beyond the locally led meeting is the project specific SWCD led BMP workshop and project orientation. These workshops often include presentations by technical specialists from all agencies involved in the watershed effort, and include presentations on the extent of impairments, environmental/agricultural impacts resulting

from these impairments and methods of remediation. Maximizing public outreach and education is one of the annual goals of the Morehouse SWCD.

In addition to field days and educational flyers/materials provided through the LSU Ag Center, LDEQ will partner with USDA and LDAF to host one to two meetings annually to discuss progress made in BMP implementation and water quality data collection. A summary of water quality data will be presented at these meetings to allow landowners and producers an opportunity to see how their participation in the programs is affecting water quality in Bayou Bartholomew. The need to achieve ONR and FWP standards with continued implementation within the critical areas will be emphasized at each community meeting.

Element F. Implementation Schedule

This section provides a schedule of tasks and activities required for plan implementation.

LDEQ and LDAF will work together to ensure BMP implementation coincides with water quality sampling. Implementation placement in the seventeen 12-digit HUC areas will be a concerted effort between LDAF, Morehouse SWCD, LDWF, USDA-NRCS, and LDEQ-NPS. LDAF will begin developing and ranking criteria tentatively in October 2025, BMP implementation is scheduled for January 2025 through September 2031, and wrap up of the project is tentatively scheduled for September 2031. Depending on implementation, the project may be extended beyond 2031. Table 23 displays LDAF's anticipated implementation schedule for the watershed.

LDAF and the SWCD will work diligently with local producers to prepare RMS plans that address all resource concerns on each farm, and hopes to meet the desired level of pollution abatement on each tract of land that is ultimately selected for implementation. Table 24 displays the Morehouse SWCD project calendar.

Each RMS plan will be developed under a three year contract and tracked accordingly. The Morehouse SWCD employees will determine if the BMPs are being implemented on schedule. The SWCD is also responsible for ensuring landowners are knowledgeable in proper maintenance and operation of BMPs implemented on their land.

Priority areas indicate which areas will score higher in a ranking should there be competing applications. Outreach and signups occur simultaneously in all priority areas.

TABLE 23. LDAF BMP IMPLEMENTATION SCHEDULE FOR FFY 2023 WORKPLAN, IN HUCS 080402051003, 080402051002, 080402051001, 080402050905, 080402050802, 080402050805, 080402020701, 080402020704, 080402020705, 080402050903, 080402070201, 080500010601, 080500010702, 080500010705, 080500011101, 080500011103, AND 080500011201

	TASK	TIMEFRAME
BAYOU BARTHOLOMEW BMP IMPLEMENTATION	Develop Ranking Criteria	October 2025
	Selection of BMPs and Participants	October 2025- December 2025
	Meet with Potential Participants	October 2025- December 2025
	Prepare Individual Comprehensive BMP Plans	October 2025- September 2026
	Technical Assistance	October 2025- September 2028, *if possible extend to 2031*
	Cost Share Assistance	January 2026- September 2028, *if possible extend to 2031*
	Education Program	December 2025- September 2028 *if possible extend to 2031*
	BMP Implementation	January 2026- September 2028 *if possible extend to 2031*
	Wrap Up	September 2028, *if possible extend to 2031*

TABLE 24. MOREHOUSE SOIL AND WATER CONSERVATION DISTRICT PROJECT CALENDAR FOR NWQI

	TASK	TIMEFRAME
MOREHOUSE SWCD NWQI PROJECT CALENDAR	Draft Plan Submittal	November 2022
	Plan Approval	October 2023
	Public Outreach	October 2023-January 2024
	Producer Signup	November 2023-February 2024
	Public Outreach Renewal	October 2024-November 2024
	Public Outreach Renewal	October 2025-November 2025
	Public Outreach Renewal	October 2026-November 2026
	Public Outreach Renewal	October 2027-November 2027
	Project Wrap-Up & Level of Success Reporting	July 2028-October 2028
	FY 28 End	October 2028-November 2028

Element G. Interim Milestones

This section lists quantitative and qualitative indicators that will be used to gauge progress of implementing the plan and its effectiveness. Feedback on achieving these milestones will come in the form of water quality data, participation rates, and stakeholder input. This information will advise any adjustments to the plan elements: scheduling, locating practices, adding or removing specific practices, and education/outreach approach.

The short-term goal of this WIP is to identify areas contributing pollutant loading within the watershed, reduce cropland and pastureland runoff in the subsegment, and to monitor water quality to evaluate changes in the watershed. It is estimated that LDAF will begin implementation in Bayou Bartholomew in January 2025 and continue through September 2028. The Morehouse Conservation District conducted public outreach in the watershed from October 2023 through January 2024. The SWCD will recommence outreach activities from October 2024 through November 2024. The long-term goal is to improve water quality in the bayou by reducing turbidity concentrations; thereby, meeting the state's water quality standards and/or restoring beneficial uses in Bayou Bartholomew.

Progress toward achieving these goals will be determined using interim indicators and milestones as depicted in Table 25. Quantitative milestones are based on baseline monitoring data, water quality criteria, and STEP-L modeling. Other sources of information used in analysis include: agricultural statistics and land use data. Assumptions and calculations are available from LDEQ upon request. Limitations of this approach include:

- STEP-L does not represent geographic variability within the watershed,
- An additive approach to load reductions does not reflect complexities of turbidity in the natural environment,
- Benthic and streambank load / resuspension is not represented.

In light of these limitations, monitoring and tracking data will be key to measuring progress. In addition, because implementing BMPs on cropland and pasture relies on volunteers, acreages under implementation during a given year are difficult to predict. As implementation of this plan progresses, new information will be used to adjust activities as required. This adaptive management strategy will occur in the context of these milestones and plan adjustments will occur with continued stakeholder involvement.

Qualitative milestones include communicating water quality issues to stakeholders and compiling a team of interested and invested local individuals and organizations, ensuring education and outreach events are conducted, and plan adjustments as indicated by water quality monitoring data.

LDEQ's water quality monitoring project information and LDAF's implementation project information will be updated in the Grants Reporting and Tracking System (GRTS) semi-annually throughout the project period. Water quality data will be entered into LDEQ's and EPA's water quality databases. Annual progress made in implementing BMPs and activities associated with projects by LDAF will be utilized as interim indicators of success toward restoring water quality in the watershed. It is estimated Bayou Bartholomew could be restored for FWP and ONR due to increased concentrations of turbidity from agriculture by 2031 and possibly removed from LDEQ's 305(b) report in 2032. Water quality sampling will continue through at least 2031 to monitor water quality changes.

Figure 23 show Bayou Bartholomew's projected turbidity yearly reductions at ambient site 0074, 2023-2031. If BMPs implemented do not reduce turbidity by 1.80 NTUs annually, corrective action will be taken with partner and stakeholder input to adjust planned activities as indicated. For instance, more implementation may be carried out in other areas of the watershed and additional education and outreach will be executed.

TABLE 25. LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY, LOUISIANA DEPARTMENT OF AGRICULTURE AND FORESTRY, AND MOREHOUSE SOIL & WATER CONSERVATION DISTRICT MILESTONES FOR BAYOU BARTHOLOMEW MILESTONES FOR BAYOU BARTHOLOMEW

BAYOU BARTHOLOMEW, SUBSEGMENT 080401, MILESTONES

			2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
GOALS	1	**Project Term**																
	2	**Ambient Monitoring**																
	3	**IR Assessment**																
	4	**Waterbody possibly restored for turbidity (FWP)**																
	5	**Waterbody possibly restored for turbidity (ONR)**																
	6	**Waterbody possibly removed from The LDEQ's 2032 305(b) report**																
LDEQ	1	**Assessment, Recon, Site Selection**																
	2	**QAPP/Sampling Plan Drafting & Approval**																
	3	**Baseline Sampling & Assessment, two *times a month***																
	4	**WIP Development**																
	5	**GRTS Reporting, *two times a year***																
	6	**Long-term Monitoring / Data Analysis, *monthly***																
	7	**Plan Revision (if required), *yearly***																
	8	**Partner's Meeting, *quarterly***																
	9	**Post BMP Monitoring, *monthly***																
	10	**Final Report**																
	11	**Possible Success Story**																
LDAF	1	**Develop Ranking Criteria/Select BMPs, *October 2025***																
	2	**Selection of BMPs and Participants, *December October 2025-December 2025***																
	3	**Meet with Participants/Sign-Ups, *October 2025-December 2025***																
	4	**Prepare Individual Comprehensive BMP Plans, *October 2025-September 2026***																
	5	**Technical Assistance, *October 2025-September 2028, if possible extend to 2031***																
		1. **Semi-Annual and Annual Reports, *April 30 (USEPA), November 15 (LDEQ)***																
	6	**Cost Share Assistance, *post implementation & approval, January 2026-September 2028, if possible extend to 2031***																
		1. **Semi-Annual and Annual Reports, *April 30 (USEPA), November 15 (LDEQ)***																
	7	**Develop Quarterly Financial Reports, *January 2026-September 2028, quarterly, if possible, extend to 2031***																
	8	**Education Program, *December 2025- September 2028, if possible extend to 2031***																
	9	**BMP Implementation, *January 2026- September 2028, if possible extend to 2031***																
		a. **Goal for cropland/pastureland acreage completed**																
	10	**Wrap Up, *September 2028, if possible extend to 2031***																
	11	**Final Report**																
Morehouse SWCD	1	**Draft Plan Submittal**																
	2	**Plan Approval**																
	3	**Public Outreach**																
	4	**Producer Signup**																
	5	**Public Outreach Renewal**																
	6	**Public Outreach Renewal**																
	7	**Public Outreach Renewal**																
	8	**Public Outreach Renewal**																
	9	**Project Wrap-Up & Level of Success Reporting**																

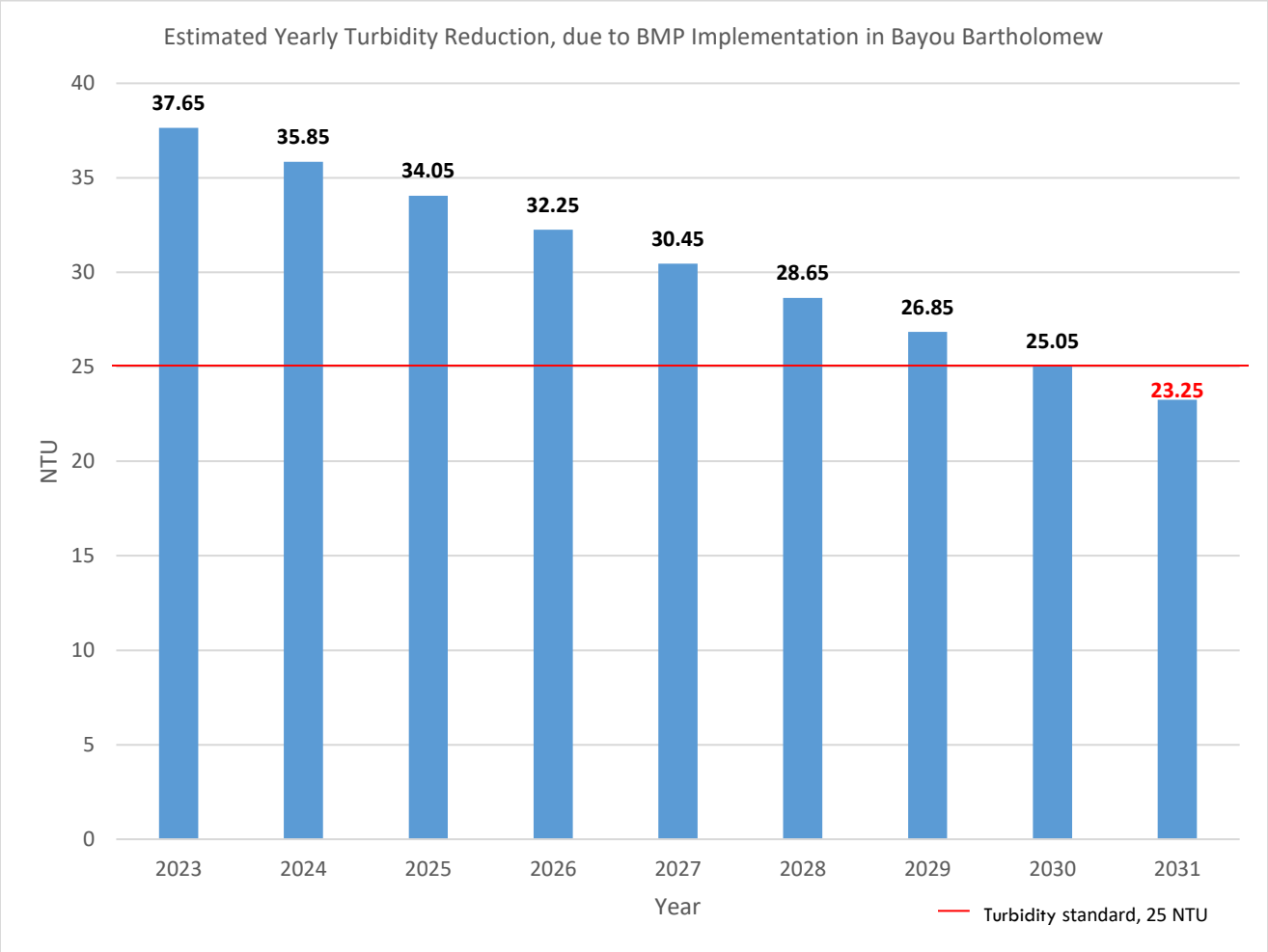

FIGURE 23. BAYOU BARTHOLOMEW'S ESTIMATED TURBIDITY YEARLY REDUCTION AT AMBIENT SITE 0074, DUE TO BMP IMPLEMENTATION. IT IS EXPECTED THAT THE BAYOU WILL BE RESTORED TO FULLY SUPPORTING ITS FWP AND ONR DESIGNATED USES BY 2031.

Element H. Progress Determination Criteria

This section summarizes benchmarks used to determine progress and long-term success.

According to the article *Lag Time in Water Quality Response to Best Management Practices*, "NPS watershed projects often fail to meet expectations for water quality improvement because of lag time, the time elapsed between adoption of management changes [BMP implementation] and the detection of measurable improvement in water quality in the target waterbody. Even when management changes are well designed and fully implemented, water quality monitoring efforts may not show definitive results if the monitoring period, program design, and sampling frequency are not sufficient to address the lag between treatment and response, which may be years after implementation has been completed. The main components of lag time include the time required for an installed practice to produce an effect, the time required for the effect to be delivered to the water resource, the time required for the waterbody to respond to the effect, and the effectiveness of the monitoring program to measure the response" (Donald 2009). Important processes influencing lag time include hydrology, vegetation growth, transport rate and path, hydraulic residence time, pollutant sorption properties, and ecosystem linkages. The magnitude of lag time is highly site and pollutant specific, but may range from months to years for relatively short-lived contaminants such as indicator bacteria, years to decades for excessive phosphorus (P) levels in agricultural soils, and decades or more for sediment accumulated in river systems. Groundwater travel time is also an important contributor to lag time and may introduce a lag of decades between changes in agricultural practices and improvement in water quality. Approaches to deal with the inevitable lag between implementation of management practices and water quality response lie in appropriately characterizing the watershed, considering lag time in selection, siting, and monitoring of management measures, selection of appropriate indicators, and designing effective monitoring programs to detect water quality response (Donald 2009).

Watershed implementation plan success evaluation will be based on achievement of milestones in Table 25, achieving TMDL reductions, state water quality standards, and restoring use support. Data collected from water quality monitoring will be used to determine whether NPS loads are improving over time and progress is being made toward meeting water quality standards. Success will be determined using water quality data sampled at the ambient monitoring location measured against Louisiana's water quality criteria to assess the watershed's use support restoration. LDEQ formally assesses use support every two years and publishes this assessment in its biannual Integrated Report.

LDEQ water quality standards used to assess use support in this subsegment are found below and in Table 26:

- Designated Uses: Primary Contact Recreation, Secondary Contact Recreation, Fish and Wildlife Propagation, and Outstanding Natural Resource Waters
- DO: 5mg/L year-round (maximum 25% excursion rate)
- Turbidity: 25 NTU
- Fecal coliform limits for Primary Contact Recreation – 400 col/100ml May-Oct (maximum 10% exceedance rate)
- TDS: 420 mg/L
- Nutrients: no numeric criteria, tied to DO.

Continued sampling throughout the watershed will serve as a feedback mechanism and provide information needed for any plan adjustments in the future. Turbidity data will be analyzed and compared to milestones in Element G to assess progress. In addition, assessment of turbidity reduction progress will be determined yearly through annual analysis of acres participating in BMPs. Associated reductions can be estimated using STEP-L. Acreages and modeled reductions will be compared against milestones in Element G to determine progress. Refer to Figure 23, Bayou Bartholomew's estimated turbidity yearly reduction at ambient site 0074, due to BMP implementation. It is expected that the bayou will be restored to fully supporting its FWP and ONR designated uses by 2031. It is predicted that Bayou Bartholomew should not be listed on the 2032 IR for not supporting its FWP and ONR use due to increased turbidity concentrations stemming from runoff from agriculture. If BMPs implemented do not reduce turbidity by 1.80 NTUs annually, corrective action will be taken with partner and stakeholder input to adjust planned activities as indicated. For example, additional monitoring in other areas of the watershed to identify if other areas are contributing to increased concentrations of turbidity, or promotion of more impactful BMPs may be advised. More implementation may be needed across the watershed to reduce turbidity concentrations. More technical/financial assistance may be needed. Schedules may be adjusted as needed. Additional partners may be sought out locally as well as upstream in Arkansas.

TABLE 26. BAYOU BARTHOLOMEW NUMERICAL STANDARDS AND LDEQ'S 2022 INTEGRATED REPORT DATA

WATERBODY	NPS RELATED PARAMETERS FOR WHICH NUMERICAL STANDARDS HAVE BEEN DEVELOPED	STANDARD LDEQ ENVIRONMENTAL REGULATORY CODE	DOES WATERBODY MEET STANDARD? 2022 IR
BAYOU BARTHOLOMEW 080401	Primary Contact Recreation (Fecal coliform)	[1]	Fully
	Secondary Contact Recreation (Fecal coliform)	[2]	Fully
	Fish and Wildlife Propagation (Turbidity)	25 NTU	Not
	Outstanding Natural Resource Waters (Turbidity)	10% exceedance allowed	Not
	Turbidity	25 NTU	Not
	TDS	420 mg/L	Fully
	Dissolved Oxygen	5 mg/L year-round (maximum 25% excursion rate)	Fully

[1] Based on a minimum of not less than five samples taken over not more than a 30-day period. Fecal coliform count should be less than 200 /100ml over a 30-day period, and less than 10 % of samples during any 30-day period or 25 % of total samples collected annually can exceed 400/100ml. Applies only May 1 – Oct. 31, otherwise, criteria for secondary contact recreation applies.

[2] Based on a minimum of not less than five samples taken over not more than a 30-day period Fecal coliform count should be less than 1000 /100ml in at least 5 samples taken over a 30-day period, and less than 10 % of samples during any 30-day period or 25 % of total samples collected annually can exceed 2000/100ml.

Element I. Monitoring

This section describes the purpose, method, sites, parameters, and schedule of water quality monitoring that will support this plan.

LDEQ's Ambient Water Quality Monitoring

LDEQ's ambient water quality monitoring is one source of historical data to evaluate water quality before the implementation of BMPs in the Bayou Bartholomew watershed. The turbidity standard is 25 NTU and represents the maximum criterion designed to protect indigenous wildlife and aquatic life species associated with the aquatic environment. Louisiana's ambient water quality monitoring and assessment program follows a four-year rotating subsegment approach through which approximately one fourth of the state's subsegments are monitored during each one-year period of the rotation. LDEQ has one ambient WQN site, located at Point Pleasant Road (LA-592) bridge, where water quality data has been collected since 1958. LDEQ sampled the Bayou Bartholomew subsegment yearly from 1958 to 1999, 2003/2004, 2006, 2009/2010, 2013/2014, 2017/2018, and 2021/2022. The next monitoring round is 2025/2026.

Water Quality Monitoring in Bayou Bartholomew

A second avenue to gauge changes in water quality before, during and after BMP implementation is through targeted watershed monitoring. Section 319(h) funds provides support for water quality monitoring, by LDEQ Water Surveys, at 18 sites in the Bayou Bartholomew watershed, subsegment 080401. These sites include the active ambient monitoring station and 17 additional sites (Table 27). The goal of targeted watershed monitoring is to characterize water current quality conditions; identify geographic areas for targeting BMP locations; and track changes in water quality over time; and, prioritize areas for education and outreach.

Sampling sites were selected based on land use data, safety of sampling locations, visual assessments, accessibility, proximity to the ambient station, drainage of potential sources of cropland runoff, and areas draining pasture land. In addition, major tributaries, elevation data, and infrastructure were mapped and evaluated to identify potential sites. LDEQ Water Surveys performed field reconnaissance to identify issues with flow or access. LDEQ-NPS and LDAF reviewed the sites to confirm location that would capture BMP implementation and runoff areas, and be applicable to future BMP targeting.

Water quality monitoring is conducted twice a month during baseline sampling, and monthly subsequent to that. The laboratory water quality parameter collected is turbidity. The in situ parameters measured are pH, temperature, dissolved oxygen (DO), DO percent saturation, specific conductance, and salinity. In situ parameters aid in watershed characterization and provide an indication of the water quality at the time the sample is collected. In situ data also provides an economical source of reference data for other possible anomalies occurring in the watershed. A tapedown measurement and Secchi disk depth measurement are made at each sampling event, whenever possible. Flow will be accessed through USGS gauge stations near sites 0911 and 5226. Baseline monitoring in Bayou Bartholomew began in January 2023 and was completed in December 2023. Long term sampling will begin approximately January 2025 and is currently set to end in 2031. Post BMP sampling will commence once BMP implementation concludes.

Data Review and Analysis

All water quality data will be collected and analyzed according to approved quality assurance (QA) and quality control (QC) procedures. Baseline monitoring data will be analyzed to determine sites with highest NPS pollutant concentrations and thus drainage areas contributing more loading. Long-term monitoring data will be analyzed to identify changes in water quality post-implementation. LDEQ will analyze sampling results quarterly and share with partners, along with any maps generated using this data. It is expected that this data will be used by LDEQ and its partners to strategically target NPS loadings into the waterbody to improve overall watershed health and restore Bayou Bartholomew to fully meet its designated uses. This will be determined by the WQN site. Monitoring data and QC results will be analyzed to identify any issues with completeness, precision, and accuracy as per the QAPP document. Data collection and analysis occur under EPA-approved QAPP #3050 and the current EPA-approved sampling plan. All data for the project will be stored in LDEQ's database and up-loaded to United States Environmental Protection Agency's (USEPA) database (Water Quality Exchange (WQX)). Water quality data collected may be used for water quality assessment purposes.

TABLE 27. BAYOU BARTHOLOMEW WATERSHED (SUBSEGMENT #080401) SAMPLING SITES – PROJECT NUMBER NP2021001

LEAU SITE NO.	SITE NAME	SITE LOCATION	LATITUDE	LONGITUDE	PARISH	WATER QUALITY[1,2]		NPS SITE CHARACTERIZATION WITH PHOTOS[3]
						Lab	In Situ	Initially and as needed
0911	Bayou Bartholomew North of Log Cabin, Louisiana	at Crossett Road (US-425) bridge, 2.2 miles east of Wardville, 2.8 miles north of Lob Cabin, 5 miles southwest of Twin Oaks	-91.867847	32.873041	Morehouse Parish	X	X	X
0458	Bayou Bartholomew Northeast of Bastrop, Louisiana	at Knox Ferry Road bridge, off Old Bonita Road (LA-140), 11.3 miles northeast of Bastrop, 8.7 miles north of Mer Rouge, 6.5 miles west-southwest of Bonita	-91.782422	32.900778	Morehouse Parish	X	X	X
5224	Bayou Bartholomew North-Northwest of Bastrop, Louisiana	at Bonner Ferry Road (LA-593) bridge, 2.9 miles north-northwest of Bastrop, 8.6 miles west-northwest of Mer Rouge, 15.3 miles east of Linville	-91.932189	32.818552	Morehouse Parish	X	X	X
5226	Bayou Bartholomew North-Northwest of Jones, Louisiana	at Hopkins Hill Road (LA-834) bridge, 1.6 miles north-northwest of Jones	-91.655721	32.990155	Morehouse Parish	X	X	X
5223	Bayou Bartholomew Northwest of Bastrop, Louisiana	at Pleasant Drive (LA-830-1) bridge off LA-592, 2.5 miles northwest of Bastrop, 9.3 miles west-northwest of Mer Rouge, 11.3 miles east of Spencer	-91.94953	32.800993	Morehouse Parish	X	X	X
0074	Bayou Bartholomew West of Bastrop, Louisiana	at Point Pleasant Road (LA-592) bridge, 2.6 miles west of Bastrop, 9.5 miles northeast of Sterlington, 10.7 miles east of Spencer , Ambient Water Quality Network Site	-91.953403	32.775404	Morehouse Parish	X	X	X
5225	Bayou Bartholomew West of Bonita, Louisiana	at Old Berlin Road (LA-591) bridge, 7.8 miles west of Bonita, 10.1 miles north of Mer Rouge, 11.6 miles northeast of Bastrop	-91.806343	32.92115	Morehouse Parish	X	X	X
5233	Bayou de Glaize Northeast of Bastrop, Louisiana	at Old Bonita Road (LA-140) bridge, 7.5 miles northeast of Bastrop, 6.6 miles north-northwest of Mer Rouge, 10.0 miles southwest of Bonita	-91.831903	32.865576	Morehouse Parish	X	X	X
0457	Chemin-a-Haut Bayou North of Bastrop, Louisiana	at Chem Cutoff Road bridge, off Loop Park Road from US-425, 11.6 miles north-northeast of Bastrop, 8.8 miles west of Bonita, 10.6 miles west-southwest of Jones	-91.823613	32.928465	Morehouse Parish	X	X	X
5234	Chemin-A-Haut Bayou Northwest of Bonita, Louisiana	at Cain Road (LA-590) bridge, 8.7 miles northwest of Bonita, 9.3 miles west of Jones, 15.4 miles north-northeast of Bastrop	-91.805263	32.982204	Morehouse Parish	X	X	X
5231	Cypress Bayou East-Northeast of Bastrop, Louisiana	at Cooper Lake Road bridge off Cherry Ridge Road, 2.7 miles east-northeast of Bastrop, 4.7 miles west-northwest of Mer Rouge, 14.5 miles southwest of Bonita	-91.87147	32.793403	Morehouse Parish	X	X	X
5229	Cypress Bayou North of Bastrop, Louisiana	at Shelton Cutoff Road (culvert), 4.2 miles north of Bastrop, 7.3 miles northwest of Mer Rouge, 14.0 miles southwest of Bonita	-91.893135	32.83825	Morehouse Parish	X	X	X
5230	Cypress Bayou Northeast of Bastrop, Louisiana	at Three Copper Road bridge, 2.9 miles northeast of Bastrop, 5.9 miles northwest of Mer Rouge, 14.4 miles southwest of Bonita	-91.88533	32.813073	Morehouse Parish	X	X	X
5228	Horse Bayou North of Bastrop, Louisiana	at Shelton Road bridge off US-425, 1.7 miles north of Bastrop, 7.0 miles west-northwest of Mer Rouge, 13.8 miles east of Spencer	-91.906809	32.803555	Morehouse Parish	X	X	X
5232	Jelks Bayou West-Southwest of Bonita, Louisiana	at Carpenter Road, 9.6 miles west-southwest of Bonita, 8.8 miles northeast of Bastrop, 8.0 miles north of Mer Rouge	-91.832269	32.88661	Morehouse Parish	X	X	X
5238	Overflow Creek West-Northwest of Jones, Louisiana	at Hopkins Hill Road (LA-834) bridge, 3.4 miles west-northwest of Jones, 4.7 miles north-northwest of Bonita, 15.3 miles north-northeast of Mer Rouge	-91.701217	32.983841	Morehouse Parish	X	X	X
5227	Unnamed Canal (to Horse Bayou) North-Northwest of Bastrop, Louisiana	at Bonner Ferry Road (LA-593) (pipes), 2.4 miles north-northwest of Bastrop, 8.3 miles west-northwest of Mer Rouge, 13.0 miles east of Spencer	-91.929638	32.811387	Morehouse Parish	X	X	X
5237	Unnamed Tributary (to Chemin-A-Haut Bayou) Northwest of Jones, Louisiana	at Old Berlin Road (LA-591), 7.6 miles west-northwest of Jones, 7.9 miles northwest of Bonita, 17.3 miles northeast of Bonita	-91.772659	33.000669	Morehouse Parish	X	X	X

1) **The in situ parameters to be measured are pH, temperature, DO, DO percent saturation, specific conductance, salinity, depth, Secchi disk, and tapedown measurements. Discharge will be collected at the ambient monitoring site, or other representative site if required, with each sampling event when possible.**
2) **The water quality parameters to be collected for laboratory analysis is turbidity.**
3) **Field Data Sheets will be completed at each sampling event and a NPS Site Characterization Form will be conducted initially and as needed.**

One field equipment blank and one field duplicate will be taken per sampling event – per sampling team.

Tracking and Evaluation: Pathway to Improvement

LDEQ-NPS staff partners with LDAF through quarterly meetings to discuss progress made in watershed implementation. These quarterly meetings include progress made on BMP implementation in the Bayou Bartholomew watershed as well as current status of water quality data collected at the subwatershed scale. If water quality data indicates improvement in turbidity concentrations, due to implementation, LDEQ and LDAF will continue their current approach with respect to watershed implementation. If water quality data does not indicate improvement, LDEQ and LDAF will determine adaptive management strategies to be applied to the watershed implementation approach. If water quality data indicate water quality standards have been met, the waterbody will be listed as restored and a NPS success story will be developed and submitted to USEPA Region 6.

Next Steps:

1. Continue implementation of BMPs to improve turbidity concentrations;
2. Integrate additional turbidity BMPs into the WIP, as deemed necessary;
3. Increase promotion of implementation of proposed turbidity BMPs;
4. Expand or adapt monitoring surface water quality in Bayou Bartholomew, focusing on high priority areas;
5. Integrate efforts currently being implemented by project partners;
6. Increase implementation within the high priority areas in the watershed;
7. Maintain agricultural productivity and the local economy by providing financial incentives; and
8. Develop a more aggressive outreach component for Bayou Bartholomew, reaching all stakeholders in the watershed.

Data Gaps

1. STEP-L, a scenario-based model, was used to estimate reductions associated with BMPs. The voluntary nature of NPS programs suggests a data gap in implementation efforts, as future participation is unknown. Unmonitored HUC 12s within the subsegment that are not included in the model may see implementation. Those impacts are another data gap not accounted for in this model.
2. Table 5 shows landuse percentages for STEP-L classes in priority/monitored areas. For assigning BMP acreages only the HUCs in the top six priority groups, were used, with the understanding that BMPs may be implemented in the other HUCs. However since LDEQ is not monitoring the other HUCs, that is a data gap and the impact of implementing in those unmonitored HUCs is to be determined. STEP-L estimated load reductions were distributed among the priority HUCs (priorities 1-6) based on percent landuse classes in each of those HUCs.
3. BMP Implementation in HUCs 080402020701, 080402020704, 080402020705, 080402050903, 080402070201, 080500010601, 080500010702, 080500010705, 080500011101, 080500011103, and 080500011201 are seventh priority. They are small portions of subsegment 080401 and do not include water quality sampling sites; however, they do consist of acres of cropland and/or or pasture, therefore, are relegated

as lowest priority. Table 6 shows the 2025 LDAF BMP Priority areas based on 12-digit HUC areas. Figure 22 shows the 2025-2031 LDAF BMP Priority areas based on 12-digit HUC areas. Because these areas do not have sampling sites, their runoff contribution serves as a data gap.

4. Another identified data gap would be the difference in Arkansas and LDEQ's turbidity criteria.
5. Identifying landuse on a subwatershed scale is pertinent in an effort to identify and possibly investigate other sources that may be contributing to increased turbidity loadings that are not being reduced by agricultural BMPs. If there are future landuse changes, adaptive management measures allow LDEQ and LDAF to add more BMPs to this WIP.
6. If data does not reflect improvement, new sampling sites may be added.
7. If data does not reflect improvement, LDAF may contact other stakeholders in the watershed to participate in implementation.
8. If data does not reflect improvement, LDEQ may run new scenarios through STEP-L.
9. In the Bayou Bartholomew watershed, approximately 8.1 percent or 6,640 acres is categorized as developed. Because of this, these areas may be a potential source of increased turbidity loadings. Additional research may be needed to identify potential sources other than agricultural. In the event that additional sources are identified, technical and financial assistance may be needed to carry out general education and outreach in the area.
10. Large portions of the watershed is forestry. In the future, if agricultural milestones are not being met, LDAF may provide additional technical assistance in these area for forestry BMPs. There may also be a future need for agricultural technical assistance for farmers/producers who did not initially sign up for cost-share assistance but are now interested, or those that were interested but were not selected. At this time, funding sources are limited. For this reason, additional grants/partners may be sought to contribute funding/their time for additional implementation, outreach, and activities.
11. If BMPs implemented do not reduce turbidity by 1.80 NTUs annually, corrective action will be taken with partner and stakeholder input to adjust planned activities as indicated. For example, additional monitoring in other areas of the watershed to identify if other areas are contributing to increased concentrations of turbidity. More implementation may be needed across the watershed to reduce turbidity concentrations. More technical/financial assistance may be needed. Schedules may be adjusted as needed. Additional partners may be sought out.
12. Arkansas and the unmonitored areas near the state border can be considered data gaps.

More information on NPS can be found at LDEQ's NPS website at http://deq.louisiana.gov/page/nonpoint-source

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