Lake Providence Watershed Council

MANAGING LAKE PROVIDENCE WATERSHED RESOURCES

First Revision

An Interim Report to the Louisiana Legislature

April 2020

To the Distinguished Members of the La. House Committee on Natural Resources and Environment and Senate Committee on Environmental Quality of the Louisiana Legislature and the People of the Great State of Louisiana

April 2020

Dear Senators and Representatives:

We, the members of the Lake Providence Watershed Council, have completed this timely report in accordance with Senate Concurrent Resolution No. 10 of the Regular Session 2019.

Specifically, the Lake Providence Watershed Council has revised and updated the watershed management plan submitted to the legislature in May 2016. It is the intent of this Council, interested stakeholders, and all those involved in the project to preserve, protect, and enhance the quality of Lake Providence located in East Carroll Parish - now and for generations to come.

The citizens of Louisiana deserve to have a restored and viable Lake Providence. The lake restoration and revitalization can be accomplished through engineering, education, enticement, as well as, enforcement of existing and new regulations focused on best management practices.

This revised report describes the on-going activities and efforts by the Lake Providence Watershed Council, East Carroll Parish and local stakeholders, and offers background information, an executive summary, graphs, charts and maps, and further recommendations for your review. We look forward to any further guidance or feedback as we press forward with managing the Lake Providence Watershed Resources Project.

We appreciate the support of the Louisiana Legislature as we move forward with this plan of action.

Sincerely yours,

The Members of the Lake Providence Watershed Council

Lake Providence Watershed Fact Sheet

Lake Providence Watershed:

- East Carroll Parish
- Total area: ~17,000 acres
- Cultivated area: ~11,000 acres (64%)
- Developed area: ~1,600 acres (14%)
- Forested/Other Use area: ~2,700 acres (12%)
- Open water: ~1,700 acres (10%)
- Average Annual Precipitation: ~57 inches

Lake Providence

- Owned by the State of Louisiana
- Oxbow/horseshoe lake – abandoned meander of the Mississippi River
- Area: ~1,380 acres (3,200 acres with associated wetlands)
- Shoreline (including the Chute): ~74,000 feet (14 miles)
- Developed shoreline: ~46,000 feet (9 miles)
- Pool stage: ~90 feet above mean sea level (NGVD)
- Maximum depth: ~37 feet
- Average depth: ~12 feet
- Primary Outfall - Tensas Bayou spillway
- Secondary Outfall - Baxter Bayou Structure

Sources: LDWF, LDNR, LDOTD, NRCS

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EXECUTIVE SUMMARY

This report to the legislature has been prepared by the Lake Providence Watershed Council (LPWC) in response to Senate Concurrent Resolution No. 10 of the 2019 Louisiana Regular Session (SCR 10). SCR 10 renewed and mandated the LPWC to "*meet as often as necessary to deliberate and produce a report that will identify, review, and evaluate management strategies to facilitate the goal of improving the aquatic habitat of Lake Providence; to provide recommendations for the optimal management and protection of the resources within the Lake Providence watershed, including but not limited to the following (1) The study of impacts and potential impacts to water quality, excess nutrient, and sediment run-off management, shoreline modification management, watershed conservation measures, and innovative habitat restoration methodology. (2) Coordination of federal, state, and local efforts to improve and protect water quality; surface water resource management and protection policies; recommendations for the optimal management and protection of the natural resources in the Lake Providence watershed. (3) Recommended changes to current procedures and practices to make the management and protection of the natural resources in the Lake Providence watershed more efficient, comprehensive, and sustainable.*" The report is due no later than May 1, 2020.

Lake Providence is an oxbow lake which is an abandoned meander of the Mississippi River located in East Carroll Parish. On-going alterations and development along this oxbow lake and within this oxbow lake's watershed have resulted in excessive sedimentation, and deterioration of the water quality, aquatic vegetation and fisheries.

The LPWC first prepared a Watershed Management Plan in 2016. This revised Lake Providence Watershed Management Plan (WMP) describes the activities and efforts having taken place in the last 4 years and further addresses the on-going changes that came about from a thriving farming industry, as well as changes resulting from land development along the lake shore. Furthermore, the WMP identifies potential changes that may occur in the future through land development within the watershed and addresses those as well. This is a living document that should be periodically updated to address changes in conditions and to take advantage of scientific discoveries.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

TABLE OF APPENDIX

ACRONYMS

ac	Acre
BMP	Best Management Practice
CCPI	Cooperative Conservation Partnership Initiative
CPUE	Catch-per-unit-effort
CSP	Conservation Stewardship Program
CWA	Clean Water Act
ECPJ	East Carroll Police Jury
EQIP	Environmental Quality Incentives Program
FEMA	Federal Emergency Management Agency
LDAF	Louisiana Department of Agriculture and Forestry
LDEQ	Louisiana Department of Environmental Quality
LDH	Louisiana Department of Health
LDNR	Louisiana Department of Natural Resources
LDOTD	Louisiana Department of Transportation and Development
LDWF	Louisiana Department of Wildlife and Fisheries
LGS	Louisiana Geological Survey
LPWC	Lake Providence Watershed Council
MRBI	Mississippi River Basin Healthy Watersheds Initiative
MSL	Mean sea level
NAIP	National Agriculture Imagery Program
NAVD	North American Vertical Datum of 1988
NGVD	National Geodetic Vertical Datum of 1929
NRCS	Natural Resources Conservation Service
NTU	Nephelometric turbidity units
NPS	Nonpoint Source Program
SCR	Senate Concurrent Resolution
SCS	Soil Conservation Service
SWCD	Soil and Water Conservation Districts
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
USDA	United States Department of Agriculture
WRDA	Water Resources Development Act
WRP	Wetland Reserve Program

1 Introduction

This report to the legislature has been prepared by the Lake Providence Watershed Council (LPWC) in response to Senate Concurrent Resolution No. 10 of the 2019 Louisiana Regular Session (SCR 10). SCR 10 extended the LPWC and mandated that the LPWC

> *". . . produce a report that will identify, review, and evaluate management strategies to facilitate the goal of improving the aquatic habitat of Lake Providence; to provide recommendations for the optimal management and protection of the resources within the Lake Providence watershed, including but not limited to the following: (1) The study of impacts and potential impacts to water quality, excess nutrient and sediment run-off management, shoreline modification management, watershed conservation measures, and innovative habitat restoration methodology. (2) Coordination of federal, state, and local efforts to improve and protect water quality; surface water resource management and protection policies; recommendations for the optimal management and protection of the natural resources in the Lake Providence watershed. (3) Recommended changes to current procedures and practices to make the management and protection of the natural resources in the Lake Providence watershed more efficient, comprehensive, and sustainable."*

The report is to be submitted to the House Committee on Natural Resources and Environment and the Senate Committee on Environmental Quality no later than May 1, 2020.

Lake Providence is an oxbow lake which is an abandoned meander of the Mississippi River located in East Carroll Parish (Figure 1). This bald cypress-lined picturesque waterbody is an economic asset to the town of Lake Providence, East Carroll Parish and northeastern Louisiana. It is a regional draw for sport fishermen, vacationers and boaters.

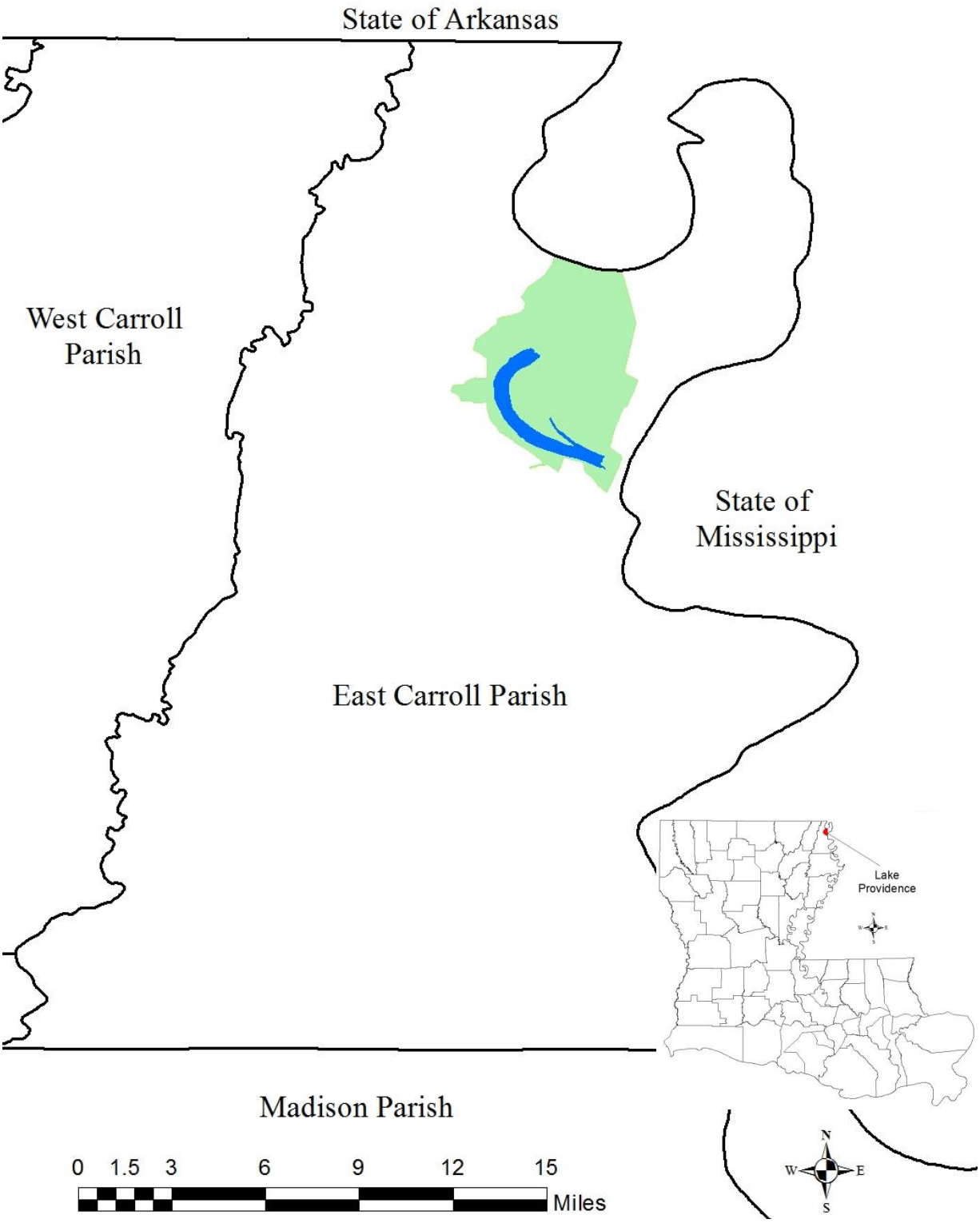

Figure 1: Lake Providence Watershed location map.

1.1 Public Access, Boat Launches and Parkland

There are two public boat launches on Lake Providence (Figure 2). The public boat launch on the Chute is locally referred to as the 'Airport boat landing.' The pier at this location was not designed to be a fishing pier but instead used for handling of watercraft. The second public boat launch is located south of US Highway 65 on Tensas Bayou. It is locally referred to as 'Tensas boat landing.' Both public boat landings have parking, covered tables and benches for public use. Beyond the two public boat launches, there is no other public access or associated public parkland on the shore of Lake Providence. A third privately owned boat launch is located at the Lakeview Inn Hotel (Figure 2).

Figure 2: Lake Providence public access.

2 Identification of Historical, Current and Future Watershed Issues/Concerns

Alterations along this oxbow lake, and past and on-going activities within this oxbow lake's watershed have resulted in deterioration of the water quality, aquatic vegetation and fisheries. The approximate extent of the Lake Providence watershed is shown on Figure 3.

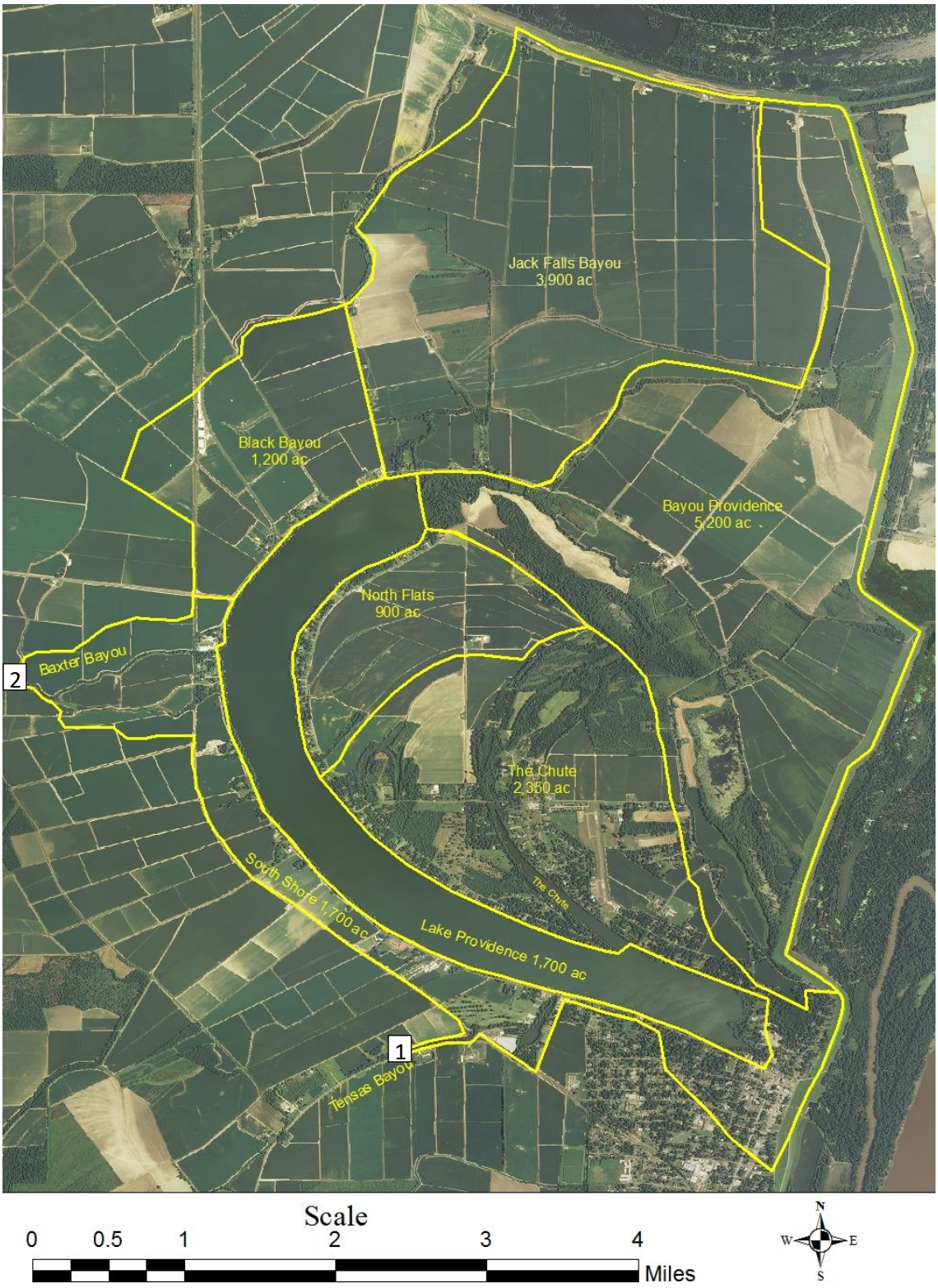

Figure 3: Lake Providence Watershed.

Notes: The yellow lines represent the sub-basin draining into Lake Providence. Box #1 locates the Tensas Bayou structure and box #2 the Baxter Bayou structure.

Primarily, water enters the lake from the north and east. Sub-basins are depicted on Figure 3 and the land use listed in Table 1. Lake Providence (including The Chute, which is the bay/channel located on the north side of the lake's south end – see Figure 3) represents approximately 10% of the watershed area. The two largest contributing sub-basins to the lake are Jack Falls Bayou (3,200 ac.) and Bayou Providence (5,200 ac.). The discharges of both of these sub-basins converge into the North Flats of the lake and are the primary contributors of sediment to the lake. The May 1, 2015 National Agriculture Imagery Program (NAIP) aerial imagery (Figure 4) distinctly shows the turbidity (discoloration) emanating from discharge of the sub-basin into the lake on that day. Based on a visual evaluation of the 2013 NAIP imagery (Figure 3), approximately 64% (71% of the land area) of the watershed is used for agriculture, primarily crop. Surface drainage into the lake has been modified to enhance efficiency and to facilitate cultivation (Figures 5 and 6). Cotton was the dominant crop in 2006, corn in 2007, and soybeans currently dominate the local industry.

The local topography (Figure 6) is relatively flat. In 1908, most of the watershed was too poorly drained to be farmed and the natural levees along the lakeshore limited flow into the lake (Worthen and Belden, 1908). In the mid-1940s, the primary water supply for the lake was reportedly underground seepage from the Mississippi River (Moore, 1950). Over the following 40 years, levee construction, laser leveling of fields and drainage canal construction changed the watershed's hydrology to what can be observed today, increased inward flow from surface runoff and limited outfall capability resulting in a lake behaving as a sediment trap.

Table 1: Sub-Basins Land Use

Sub-Basin	App. Area (ac)	Ag	Non-Ag	Open Water
Jack Falls Bayou	3,900	97%	3%	0%
Bayou Providence	5,200	69%	31%	0%
South Shore	1,700	59%	41%	0%
Black Bayou	1,200	92%	8%	0%
North Flats	900	78%	22%	0%
The Chute	2,350	28%	72%	0%
Lake Providence	1,700	0%	0%	100%
Total	16,950	64%	26%	10%

Figure 4: Suspended solids discharging into Lake Providence's North Flat on 05/01/2015.
Source: May 1, 2015 NAIP aerial imagery.

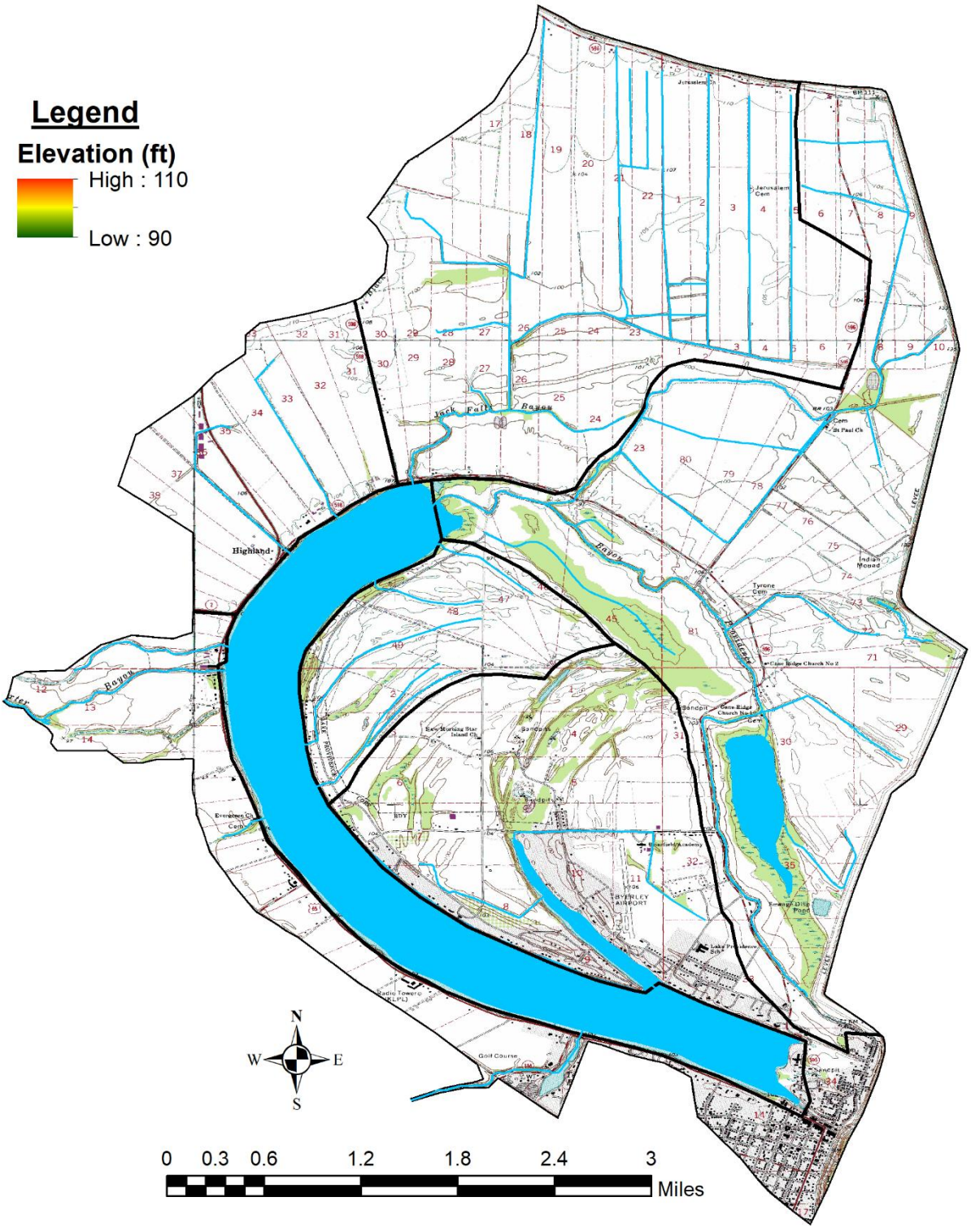

Figure 5: Lake Providence's drainage network.
Source: USGS 24K Quadrangle.

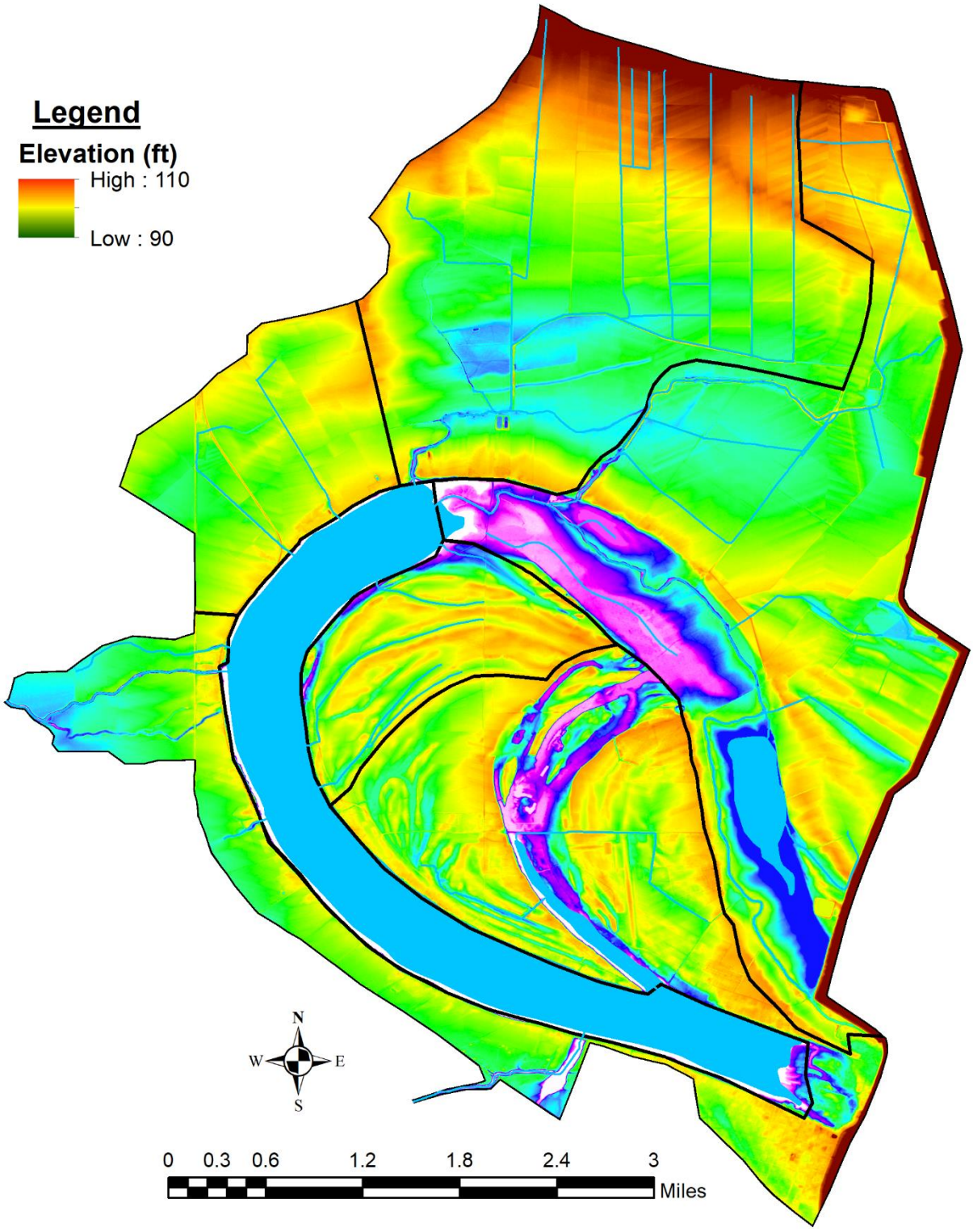

Figure 6: Lake Providence's topography.
Source: USGS 24K Quadrangle.

The lake has two outlets equipped with structures, Tensas Bayou and Baxter Bayou. Anecdotal information by local stakeholders suggests that the structure on Baxter Bayou only allows water to flow out of the lake at high stage, otherwise reverse flow can occur at time of unevenly distributed precipitation. Prior to 1923, Baxter Bayou discharged into the lake. In 1923, Baxter Bayou was dredged to reverse the flow direction; it now is supposed to flow toward Caney Bayou. The U.S. Geological Survey (USGS) data collected at Baxter Bayou shows that during their one-and-a-half-year study, flow reversed direction (negative discharge) approximately eleven times. The structure on Tensas Bayou is a weir that had been redesigned in 1975, but never replaced. Currently, neither structure allows for lake level manipulation, both are in disrepair and both are being bypassed at higher flow. The LPWC submitted on behalf of the ECPJ a pre-application to the LDOTD's Statewide Flood Control Program in May 2016 to seek funds to replace both structures. The Pre-Application was approved by the DOTD. A formal Application with engineering designs needs to be submitted to the by October 1, 2020.

2.1 Flooding

Water level data has been collected continuously as part of this project since 12/15/15 (Figure 7). The lake's pool stage is approximately 90 ft (NGVD 29) based on the weir height at the Baxter Bayou structure. The elevation of the Tensas Bayou weir is not known. The 2016 WMP documented the 2008 flood associated with Hurricanes Gustav and Ike, and that of March 2016 (Figure 8). Since the fall of 2018, the region has experienced a very wet weather pattern. Continued rainfall during the fall of 2018 affected the fall harvest. There was very little field work after harvest due to persistent rainfall. As a result, there was a lot of cover crops that were not able to get planted. Even though the cover crops did not get planted, there seem to be a smaller than usual amount of turbidity throughout the lake, which could be attributed to the lack fall tillage. The rains continued into early 2019 and lake levels stayed high (Figure 7). Even with rains of 3 and 4 inches, the water seemed to stay fairly clear and filtered out quickly. The Mississippi River was high through these times and resulted in poor planting conditions for the farmer during spring of 2019. There was a small window during the 3rd week of March that allowed growers to plant corn on the acreage where the Mississippi River was not causing seepage. Both cotton and soybeans were planted later that normal due to excessive rainfall.

August and September exhibited below normal rainfall, but October brought beneficial rain. During this period, the Mississippi River never was able to reach its seasonal low water stage.

During the second week of January 2020, a storm event brought in excess of 10 inches within a 3-day span. This caused Lake Providence to exceed flood stage and resulted in high lake water turbidity. Concurrently, the Mississippi River was rising beyond flood stage and has remained high since. The lake's stage was above normal when, on 2/11/20, another storm event delivered approximately 12 inches of precipitation during a 24-hour span. This resulted in the lake reaching flooding conditions again. The normal rainfall for Lake Providence is approximately 55 inches; in comparison, during first 6 weeks of 2020, the region experienced over 23 inches of rainfall. Local and regional flooding occurred throughout February 2020 (Appendix A).

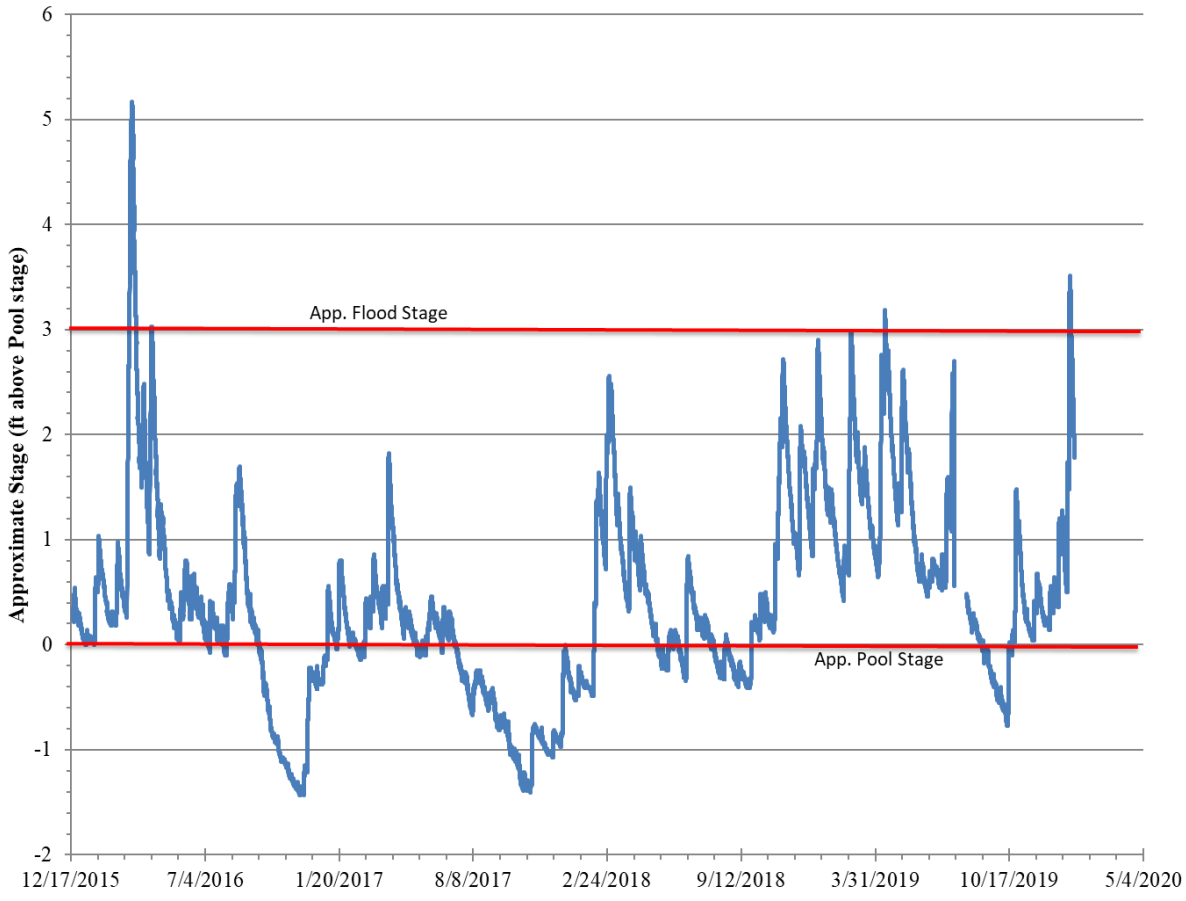

Figure 7: Lake Providence measured stage (2015-present)
Source: Lake Providence LGS gage, pool stage is approximately 90 ft.NGVD.

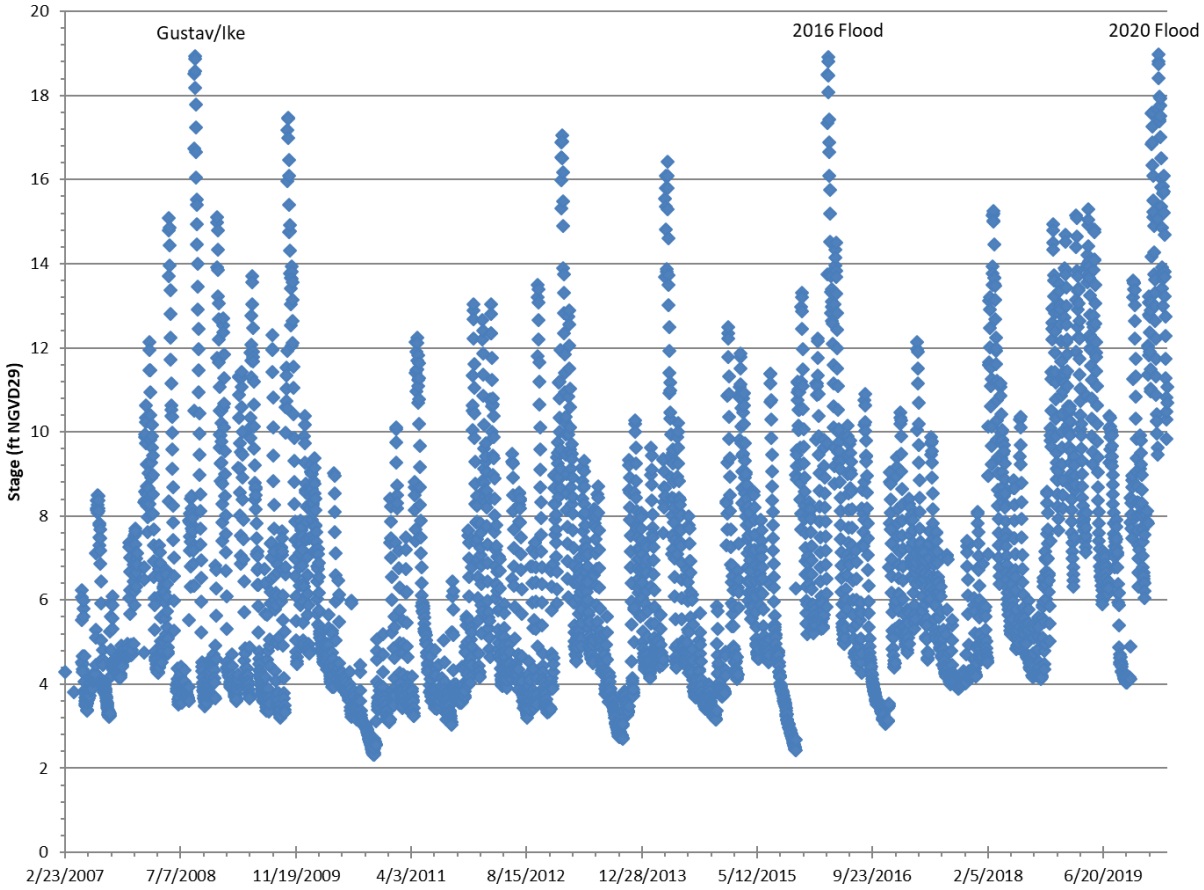

Figure 8: Tensas Bayou stage at Transylvania, LA (2007-present)
Source: USACE

2.2 Water Quality

LDEQ identified Lake Providence as impaired for fish and wildlife propagation due to total dissolved solids (TDS) in its 2016 Integrated Report. Ambient water quality monitoring in 2013-2014 showed high concentrations of TDS in the waterbody, in excess of the water quality standard. More recent monitoring shows that sediment and nutrient concentrations have improved since USDA-NRCS began implementing its Mississippi River Basin Initiative (MRBI) conservation practices with agricultural producers. LDEQ has sampled at 11 sites throughout the subsegment, primarily at tributary outlets. Figure 9 shows the project sampling locations. Recent water quality data is summarized below.

2.2.1 Sediment

The water quality standard for TDS in Lake Providence is 150 mg/L. Water quality assessment holds that no more than 30% of the samples may exceed the 150 mg/L TDS concentration in order to support fish and wildlife propagation. Current LDEQ Nonpoint Source (NPS) Program sampling in the lake, which occurs twice monthly, shows TDS concentrations at all sites meet the water quality standard. Table 2 shows summary statistics for all sites. This aligns with LDEQ 2017-2018 ambient monitoring data at Site 0132 on Lake Providence at mouth of Tensas Bayou (Figure 9), which also shows the concentrations meeting the standard (Figure 10).

Project data shows turbidity in the lake is increasing though mean values at all sites remain below 30 NTUs. Table 3 shows summary statistics at project monitoring sites.

Table 2. NPS Project Data: Total Dissolved Solids (mg/L) April 2018-July 2019

Site ID	%>150	Mean	Median	Min	Max
0132	14%	106	105	10	230
4776	14%	103	100	20	200
4777	17%	108	96	15	205
4778	10%	107	110	45	220
4779	17%	108	105	20	190
4780	10%	98	110	35	210
4781	7%	91	91	20	165
4782	14%	127	110	10	510
4783	7%	98	95	50	195
4784	10%	116	105	30	485
4785	18%	117	113	15	365

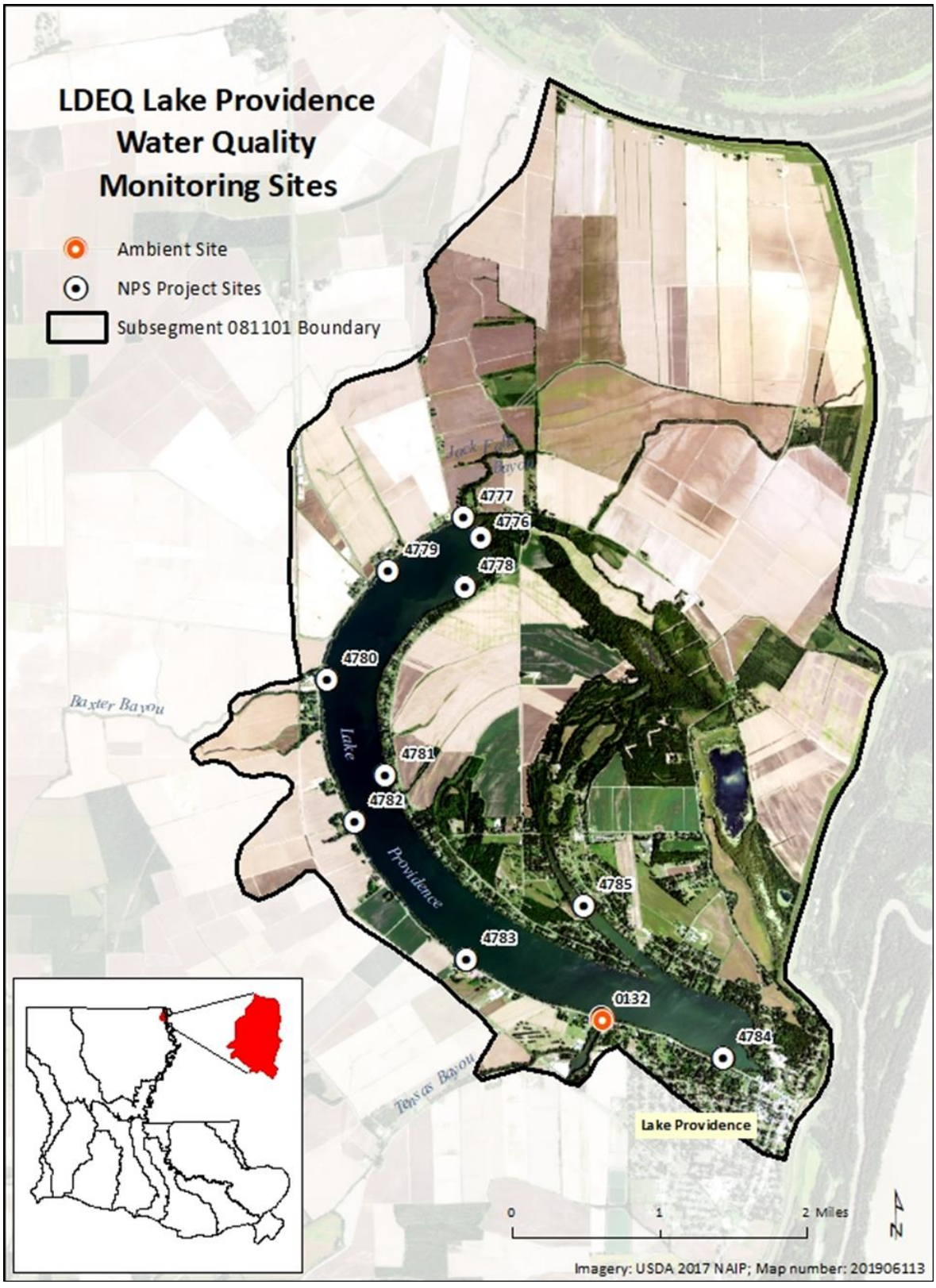

Figure 9: LDEQ Lake Providence monitoring locations

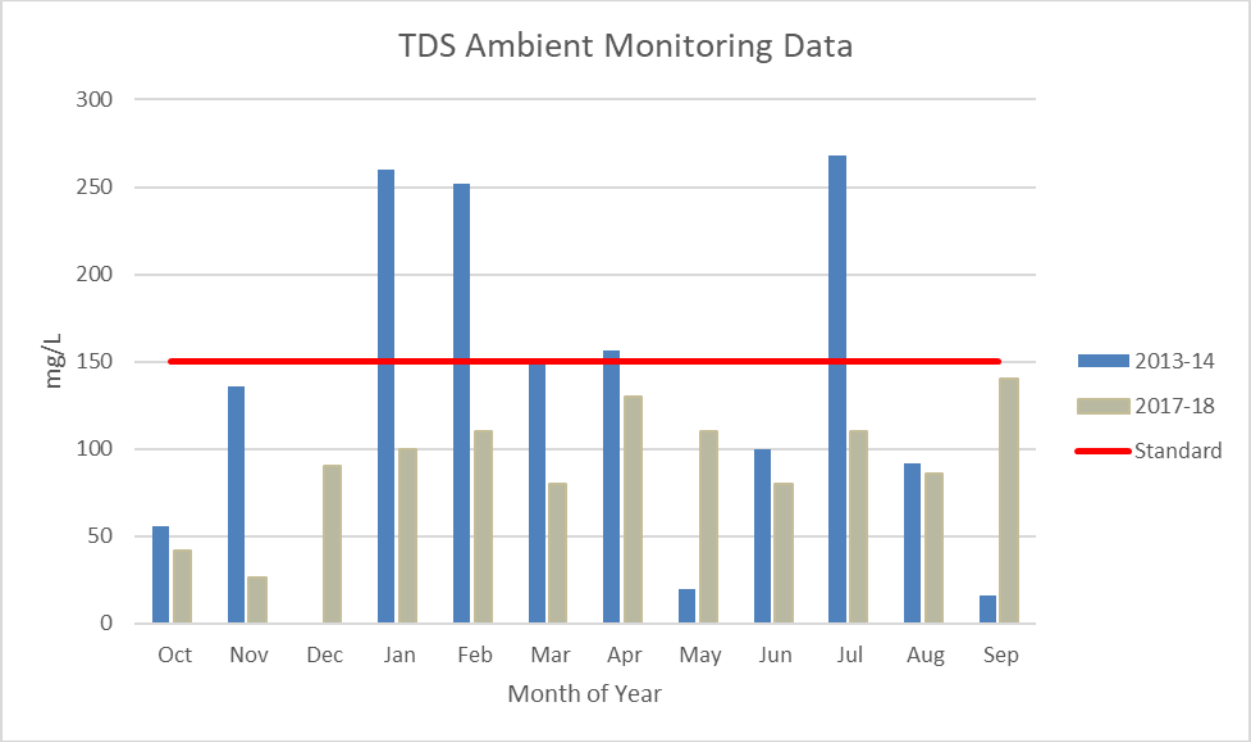

Figure 10: LDEQ Lake Providence TDS data through ambient monitoring

Table 3. NPS Project Data: Turbidity (NTUs) May 2017-July 2019

Site ID	Mean	Median	Min	Max
0132	15.2	9.3	1.0	198
4776	22.2	13.0	3.4	273
4777	25.3	14.3	3.0	272
4778	20.1	13.0	0.9	218
4779	17.6	11.6	1.9	174
4780	16.8	9.8	1.8	188
4781	12.6	8.6	2.9	85
4782	14.8	8.9	2.0	138
4783	12.6	8.0	0.4	102
4784	12.8	10.4	2.5	35
4785	15.5	14.9	3.4	48

2.2.2 Nutrients

Total phosphorous concentrations at all sites have trended downward since sampling began. All sites except 4778 show a slow downward trend in nitrate-nitrite. Many of the nutrient spikes seen in the spring of 2018 were not seen in spring of 2019. Summary statistics for nutrients are shown in Table 4 and Table 5, below.

Table 4. NPS Project Data: Nitrate-Nitrite (mg/L) August 2017-July 2019

Site ID	Mean	Median	Min	Max
0132	0.21	0.05	0.03	1.21
4776	0.19	0.08	0.03	1.24
4777	0.20	0.10	0.04	1.23
4778	0.19	0.05	0.03	1.22
4779	0.22	0.05	0.03	1.24
4780	0.22	0.07	0.03	1.26
4781	0.20	0.05	0.03	1.26
4782	0.22	0.05	0.03	1.26
4783	0.21	0.05	0.03	1.24
4784	0.21	0.05	0.05	1.19
4785	0.12	0.05	0.01	0.90

Table 5. NPS Project Data: Total Phosphorous (mg/L) May 2017 - July 2019

Site ID	Mean	Median	Min	Max
0132	0.13	0.10	0.04	0.44
4776	0.14	0.11	0.04	0.41
4777	0.17	0.13	0.05	0.97
4778	0.13	0.10	0.02	0.32
4779	0.13	0.10	0.05	0.42
4780	0.13	0.10	0.04	0.61
4781	0.13	0.10	0.04	0.60
4782	0.12	0.10	0.04	0.56
4783	0.14	0.10	0.04	0.53
4784	0.14	0.10	0.05	0.63
4785	0.16	0.15	0.05	0.37

2.3 Data Gap

2.3.1 Lake Level Monitoring

Water level (i.e. stage) monitoring of the lake began in December 2015. This data has been collected by LDNR beyond the contract between the LDNR and the LGS which expired on June 30, 2016. It is necessary for this data to continue being collected in order to evaluate the lake's response to various rain/storm events, seasonal variability and begin to determine an appropriate lake level management schedule for the resource.

2.3.2 Sedimentation and Nutrients Transport Study

Similarly, to the need to evaluate storm event response within the watershed, the hydrologic response will directly impact the transport and loading of nutrients and sediments into the lake. This information is necessary to evaluate potential hydromodifications of the drainage network.

2.4 Fisheries

2.4.1 Non-native fish

Silver carp (*Hypopthalmychthys molitrix*) were collected during fisheries samples in 2012 but have not been collected in recent samples. They are believed to still be present in the lake.

2.4.2 Declining Stock

The mean total catch of largemouth bass has shown an overall downward trend since 2001 (Figure 11). The catch per unit effort (CPUE) is measured in catch per hour (CPH). The mean total catch for various size classes of bass is shown below in Figure 12. There is a slight declining trend for both quality (12 – 15 in.) and preferred (15 – 20 in.) size bass. An electrofishing sample conducted in fall 2014 revealed overall low abundance and an absence of bass less than 11 inches (Figure 13). This could potentially indicate multiple missing year classes of bass, likely due to poor water quality during the spawning season. It should be noted that sampling could not be achieved during spring 2014 due to excessive turbidity in the lake. The spring and fall electrofishing samples conducted in 2017 reveal a more evenly distributed population (Figure 14).

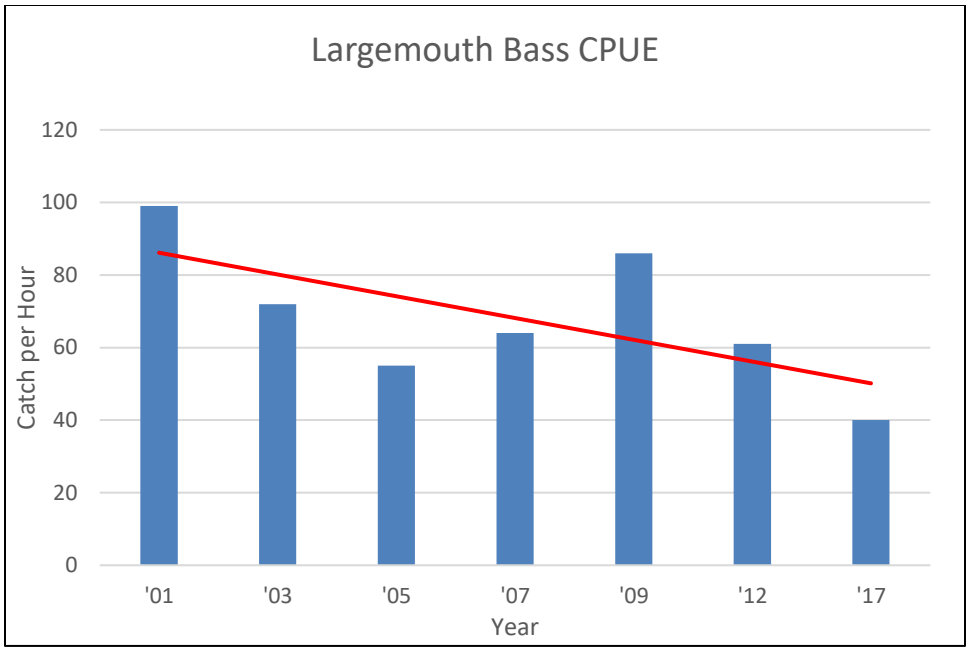

Figure 11: Catch per unit effort of largemouth bass from electrofishing samples conducted on Lake Providence since 2001

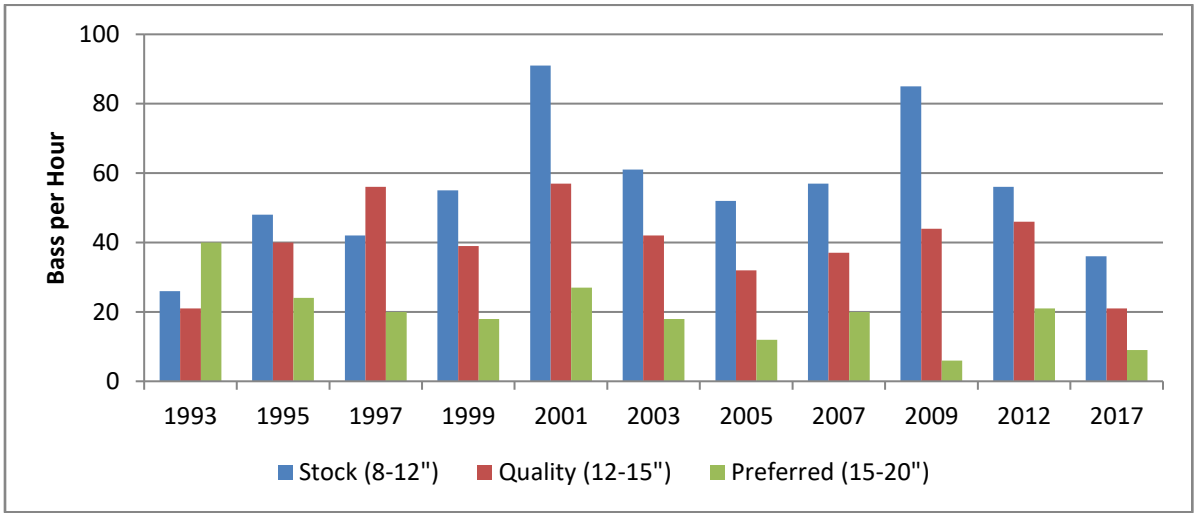

Figure 12: Mean catch-per-unit-effort (bass per hour) for stock-, quality-, and preferred-size largemouth bass collected in spring electrofishing samples on Lake Providence, LA from 1993 – 2017.

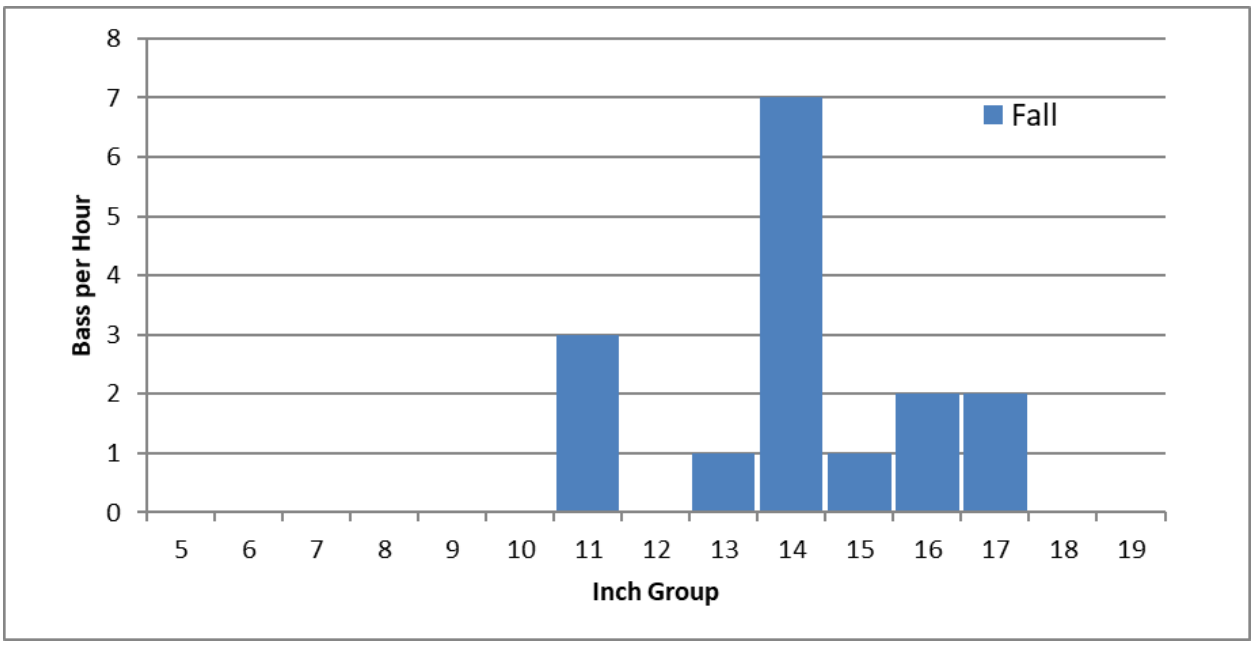

Figure 13: Largemouth bass size distribution by length group (bass per hour) from electrofishing samples in fall 2014 on Lake Providence.

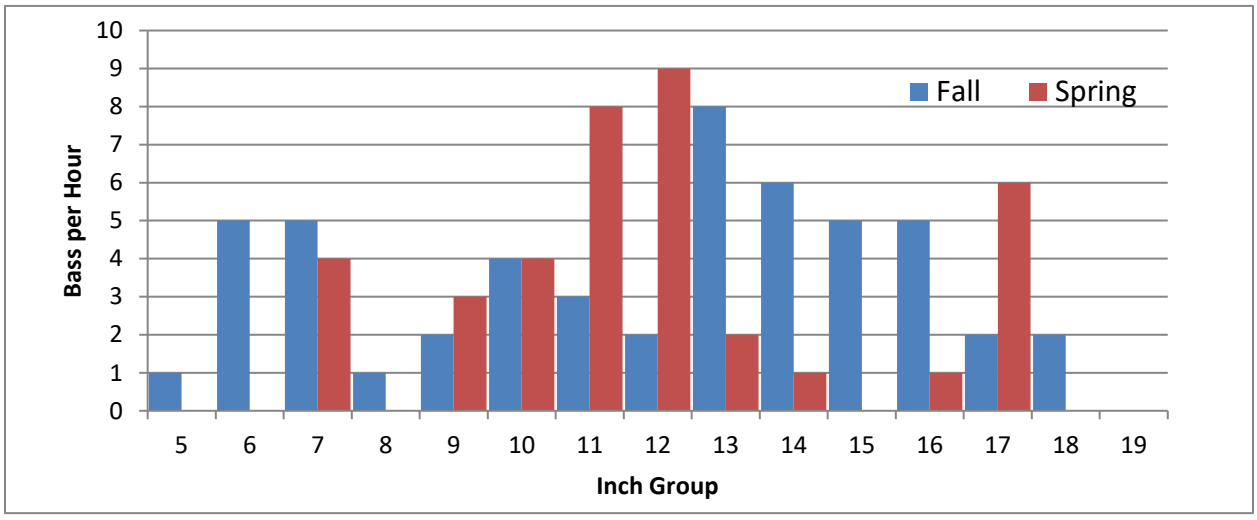

Figure 14: Largemouth bass size distribution from spring and fall electrofishing samples conducted during 2017 on Lake Providence.

Crappie sampling with the use of lead nets has revealed widely variable size distributions and abundance. Samples in 2007 and 2014 showed a low abundance of crappies (Figure 15). Samples in 2017 and 2018 (Figures 16 and 17, respectively) showed a higher abundance and a fairly normal disribution. The variablity in the samples could be a result of highly variable water quality conditions during the spring.

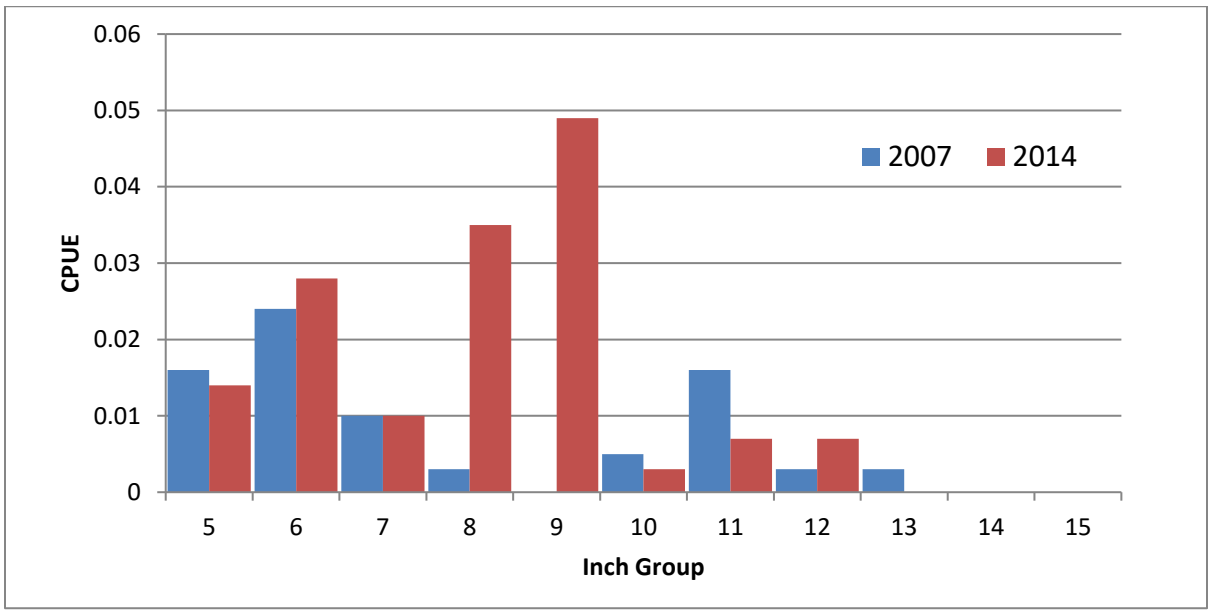

Figure 15: Catch per unit of effort by length group for crappies collected in fall lead net samples taken on Lake Providence in 2007 and 2014

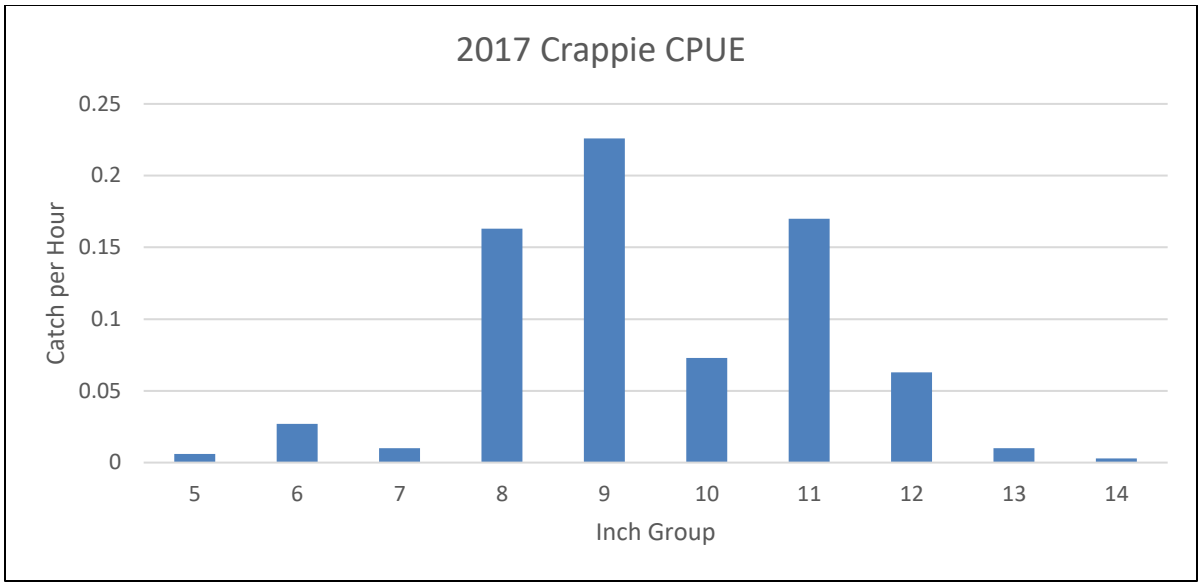

Figure 16: Catch per unit of effort by length group for crappies collected in fall lead net samples taken on Lake Providence in 2017

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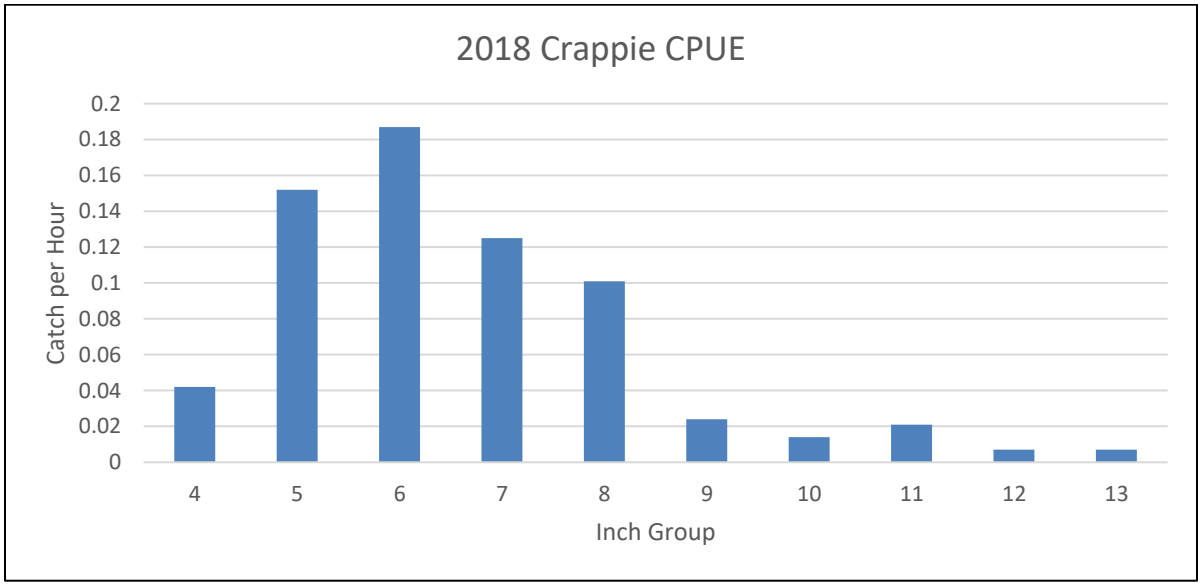

Figure 17: Catch per unit of effort by length group for crappies collected in fall lead net samples taken on Lake Providence in 2018

3 Management Strategies

3.1 Flooding

3.1.1 Lake Level Management

Flooding along Lake Providence's shore continues to worsen due to the improper drainage that currently exists. There are two drains on Lake Providence, namely Tensas Bayou and Baxter Bayou. Tensas Bayou is the main drain which allows roughly 70% of the water in Lake Providence to exit once the lake gets above the weir. The Tensas Bayou originates in Lake Providence as a ditch and becomes the Tensas River downstream, south of Tendal, LA. Due to lack of maintenance, Tensas Bayou has become overgrown and obstructed, therefore limiting the ability of Lake Providence to drain efficiently. Tensas Bayou is located on the lower end of the lake just west of the Town of Lake Providence (Figure 2). Baxter Bayou is located on the northwest side of the lake and it drains toward the Bayou Macon (Figure 2). The water that drains into Baxter Bayou will actually run backwards into the lake due to insufficient drainage below the weir. Baxter Bayou runs southwest across East Carroll Parish discharging into the Bayou Macon. Baxter Bayou's watershed cannot store excessive rainfall, causing it to flow backwards into the lake. It is not uncommon for Baxter Bayou to flow backwards multiple times in a given year. It is a rarity for Tensas Bayou to flow backwards, although it has been occurring more often in recent years.

In August of 2018, the ECPJ stacked bags of concrete mix in the eroded bypass along the Tensas weir in an effort to hold water levels during the low water season. These temporary repairs seemed to help retained water levels. In the summer of 2019, the ECPJ cleared and removed snags from the Tensas Bayou below the weir for approximately one mile. The lake discharge seemed to flow out of the lake at a much faster rate as a result of the clearing. The area experienced several big rains since the work on the Tensas Bayou, and recent observations suggest that this effort has helped the water recede faster. The water continues to reverse flow into the lake from Baxter Bayou. Even with the clearing, there is a tremendous amount of water that is continuing to back-up into the lake, causing flooding. The ECPJ will try to continue clearing Tensas Bayou in 2020 with its very limited funds.

3.1.1.1 Natural Cycle

Lake Providence is a cut-off oxbow of the Mississippi River. Current lake levels are stabilized at approximately 90 ft (NGVD) with limited seasonal fluctuations and no ability to manipulate the stage at the existing structures. To improve the health of the lake, consideration should be given to manage water levels to the extent practical to mimic more natural seasonal fluctuations. Fluctuating water levels are dependent on the capacity of the control structures. Typical annual Mississippi River fluctuations are low water levels in the late summer and winter months (July– January), and high-water levels in the spring and early summer months (February– June). In order to actively manage the lake's level, it is recommended that both the Baxter and Tensas Bayous structures be rehabilitated/modified or replaced.

3.1.1.2 Tropical Storm/Flooding Event

In order to increase the volume of water that Lake Providence can store during large rain events such as tropical storms and to actively manage the lake's level, it is recommended that both the Baxter and Tensas Bayous structures be upgraded or replaced, and regular maintenance made to Tensas Bayou. These recommendations are consistent with those proposed by the USACE after Hurricane Gustav.

3.1.1.3 Other Lake Level Management Issues

Lake level management can be a useful tool to improve water quality. Exposure of shallow water areas has the beneficial effect of hardening the lake substrate resulting in improvement in lake water quality from decreased turbidity, improvement in fish habitat, and helping to keep invasive plants from taking over. Similarly, periods of low water level can be used by camp and home owners to perform shoreline maintenance on piers and bulkheads.

3.2 Water quality

3.2.1 Nutrient Run-off Management

According to the latest testing data, nutrient levels in Lake Providence are at low levels and not considered a problem at this time. However, in the last decade corn has become a major crop

grown in the watershed replacing cotton. Corn requires far more nitrogen fertilizer than cotton so continued monitoring will be required. Nutrient run-off will be contained if proper sediment run-off management can be achieved.

The NRCS' Mississippi River Basin Healthy Watersheds Initiative (MRBI) and Environmental Quality Incentives Program (EQIP) help producers in the watersheds to voluntarily implement conservation practices that avoid, control, and trap nutrient runoff; improve wildlife habitat; and maintain agricultural productivity. The LPWC will through its education and outreach program disseminate and promote the benefits of these programs. In addition, LDEQ's Nonpoint Source Program (NPS) has developed a monitoring strategy to help NRCS target implementation as well as monitor water quality changes throughout the lake.

3.2.2 Sediment Run-off Management

The lake's watershed consists of 11,000 acres of intensively tilled cropland. Sediment run-off from farmland is the main contributor to the turbidity problem in Lake Providence. Agriculture is the largest industry in East Carroll Parish, and the economic success of parish is determined by the success of the area's farmers, so this must be considered when attempting to manage run-off from surrounding farms.

The most effective sediment run-off management tool will be to encourage farmers in the watershed to plant and maintain cover crops immediately after harvest until just prior to planting crops in the spring. Some farmers near the lake may have some reluctance to plant cover crops for the following reasons:

- cover crops can be expensive to plant;
- glyphosate resistant winter annual weeds and grasses are an increasing problem in the area and farmers have started applying pre-emergence herbicides in the fall to control this problem vegetation; and
- under certain conditions cover crops can harbor insects, snails and slugs that can destroy young crops planted into the stubble of the dead or dying cover crop.

There are several possible solutions to these issues. There are a few cost share programs administered by the NRCS, most commonly known as EQIP and Conservation Stewardship

Program (CSP) that offer farmers financial incentives to establish cover crops. However funding for these programs is normally insufficient to handle the demand.

Other sediment run-off management tools include filter strips which are strips of vegetation allowed to grow on the upland side of field drainage ditches. The vegetation filters sediment out of storm or irrigation run-off just prior to entering the drainage ditch. Establishing grassy field borders is also a sediment run-off practice that can be effective. Farmers simply let the borders around fields grow naturally occurring or planted vegetation that filters run-off as it drains from the field. Both of these practices can be somewhat effective in reducing sediment run-off and are cheaper to establish than cover crops planted over an entire field. These are common practices used to help in the reduction of soil erosion around field drainage ditches and culverts.

In addition, the NRCS' MRBI help producers in the watersheds to voluntarily implement conservation practices that avoid, control, and trap nutrient runoff; improve wildlife habitat; and maintain agricultural productivity. The MRBI contracts that were first awarded have almost all expired their 3-year term. There are still some contracts that were in place for 2019 and the cover crops seeded and sprouted well. Even with the cover crops this fall the lake is still very muddy. The NRCS has announced that there will be a Baxter Bayou MRBI signup for 2020. This will help will the sedimentation entering the lake in Baxter Bayou but the water has to be slowed down or diverted. The water entering the lake on the north flat continues to bring sedimentation at a high level causing that end of the lake to silt end at a high rate.

3.2.3 Private/Public Sanitary Effluent Management

LPWC recommends that an assessment of the private and public sanitary effluent systems within the watershed be effectuated to evaluate whether outdated systems need to be replaced by newer units or updated.

3.2.4 Storm Flow Management

The LPWC supports FEMA's recommended improvement to the drainage within the Town of Lake Providence. In addition, the LPWC has sought the expertise of the LDOTD to evaluate the conditions of the two control structures and is seeking funding to study the hydrology of the watershed. The LPWC recommends that ordinances as well as conservation and engineered

solutions be evaluated. Sediment control and servitude ordinances should be evaluated, as well as drainage channel Operation and Maintenance Plan and hydromodification where applicable. Conservation measures through NRCS' MRBI, Wetland Reserve Program (WRP) and EQIP would help producers in the watersheds to voluntarily implement conservation practices that avoid, control, and trap nutrient runoff; improve wildlife habitat; and maintain agricultural productivity.

3.2.5 Shoreline Modification Management

Shoreline modifications are common along private shoreline, in the form of shoreline hardening and bulkheads. The vertical profile of bulkheads causes erosion, turbidity and wave refraction.

Any shoreline treatment that mimics the lake's natural shoreline and prove edge habitat would be a huge advantage over vertical bulkheads. There are several methods to "harden" a shoreline while having it appear to be natural. This method uses gentle slopes and vegetation to dissipate wave energy.

LPWC and ECPJ plan on addressing the matter of ownership of water bottoms with the State Land Office. It is likely that debris fences and rip-rap placed in front of the bulkheads may be constructed on State-owned water bottoms. Once those issues are resolved, the shoreline policy should be implemented.

3.2.6 Watershed Conservation Measures

The NRCS' MRBI, CSP and EQIP help producers in the watersheds to voluntarily implement conservation practices that avoid, control, and trap nutrient runoff; improve wildlife habitat; and maintain agricultural productivity. The LPWC will through its education and outreach program disseminate and promote the benefits of these programs.

3.2.7 Habitat Restoration

LDWF will conduct a qualitative assessment of the fisheries habitat in Lake Providence, identifying deficiencies and problems. Plans to address will be constructed. See also the Lake Providence Management Plans provided by LDWF (LDWF, 2013 and 2015). http://www.wlf.louisiana.gov/fishing/waterbody-management-plans-inland

3.2.8 Fisheries Management

Current management strategies for all species will be re-evaluated. One particular issue of concern is the unreliable and widely inconsistent spawning success and recruitment of crappie, which are a very popular game fish in Lake Providence. The introduction of hybrid striped bass as an alternative recreational species should also become an option if anglers if it is determined that anglers would be in support. The current fisheries management strategies for Lake Providence may be found in the LDWF Management Plans.

3.2.9 Coordination of Federal, State, and Local Efforts to Improve and Protect Water Quality

LPWC through contacts with many of the local and regional stakeholders is currently seeking to assist coordinating many of the ongoing efforts to address the lake's water quality. LPWC will continue to seek ideas and help from Federal, State, and Local individuals interested in this effort. In addition, LPWC will through its education and outreach program continue to disseminate and promote the benefits of these programs.

3.2.10 Surface Water Resource Management and Protection Policies

LPWC will assist the ECPJ, as well as the Lake Providence Commission to develop management tools and policies consistent with this effort.

3.2.11 Education and Outreach

Documents and presentations are continuously uploaded onto the Lake Providence webpage on the LDNR web site along with the Council's agendas and minutes, news articles, etc. The website is updated with a list of actions completed and in progress. Press releases are issued as actions are taken. E-Mails, flyers and talks at various nonprofit meetings are held to keep communities informed. Information generated by agencies or obtained to date has been placed on the LDNR website at the following URL:
http://www.dnr.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=1316

4. Funding Strategies

4.1 Capital Outlay for Ecosystem Restoration

The ECPJ has made repeated requests for funds ($100,000) for a hydrologic study in HB 2 since the Regular Legislative Session 2016. This project funding is critical in order to keep the project moving forward.

4.2 Statewide Flood Control Program

The LDOTD's Statewide Flood Control Program is *"designed to help solve flood problems through an active, innovative approach. This Program uses state funds allocated each year by the Legislature to assist in the construction of flood control infrastructure. Eligible projects for consideration must reduce existing flood damages. Potential projects include measures to reduce or eliminate the incidence of flooding or damages.*" The program is designed to fund projects that do reduce existing flood damages, do not encourage additional development in flood-prone areas, and do not increase upstream or downstream flooding. The program provides up to 90% of the project construction costs for projects that have a total construction cost of $100,000 or more.

With the assistance of the LPWC, the ECPJ has submitted a Pre-Application in May 2016 ($2-$3 Million). The Pre-Application was approved by the DOTD. A formal Application with engineering designs needs to be submitted to the by October 1, 2020. This is dependent on getting funds from the DOTD from a Highway swap.

4.3 Louisiana Watershed Initiative

The Louisiana Watershed Initiative (LWI) was created in response to Gov. John Bel Edwards' executive order following historic flooding in 2016 (EO JBE18-16) and the federal government's 2018 allocation of $1.2 billion in CDBG funds for flood risk mitigation (FR 6109-N-02). The Council on Watershed Management was established to oversee and coordinate the creation of the LWI as a watershed-based floodplain management program that will establish a coordinated

approach to flood risk mitigation and include a process to synchronize local, regional and statewide watershed planning.

As already described in this report, the LPWC is a watershed-scale, multi-agency group that reports to the Louisiana legislature and has developed a watershed management plan to address water challenges resulting from changes in land use throughout the area. The watershed management plan, which is continually updated, identifies current problems, includes evaluations of management strategies, and offers recommendations for the use of current and future federal, state and local funding sources to accomplish the goals of 1) optimal resource management and 2) protection of the natural resources of the watershed.

As a first step to obtain potential LWI funding, The LPWC has engaged with Tracy Hilburn, the LWI region 3 point-of-contact from the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP). The LPWC is currently looking to participate in the region 3 Watershed Steering Committee and hopes to gain representation on this important committee in order to elevate the findings of this report and the future needs of the Lake Providence area in regard to flood mitigation.

The Louisiana Watershed Initiative was introduced throughout the state in the last quarter of 2019. Mr. Francis Lensing attended two meeting in Monroe along with members of the police jury (Roger Clement, Kendall Thompson and Randy Walters). It is not expected that this program will be a viable source of funding for the short term to fund the initial study of the lake. Phase I of the program is more targeted for urban area instead of the rural outlying communities. Reynold Minsky is working with Randy Denmon (engineer) in an effort to secure funding for the clearing of the Tensas River all the way below I-20 between Tallulah and Delhi. It is hopeful that this funding could be found in Phase II of the program which should happen within the next year.

On 2/13/20 Reynold Minsky surveyed with the USACE the length of the Tensas Bayou and Tensas River from Lake Providence to below I-20. The USACE believes that the culverts at the start of Tensas Bayou (next to Lake Providence County Club) and extending for 3 more culverts down to the Moose Lodge along Hwy 134 are not large enough. There was discussion to add a second culvert at each of the 4 locations to allow better water flow. The culvert on Hwy 134 is a state-owned road and would have to be worked on by the State of LA. The other 3 culverts are

accessing private properties and could be enhanced by local government. Reynold Minsky has reported that he will be going to Washington DC in March requesting funding for the clearing of the Tensas Bayou and Tensas River.

4.4 Water Resources Development Act

Under Section 1135 of the 1986 Water Resources Development Act (WRDA), the USACE can enter in a cost share agreement with the ECPJ to partially fund the restoration of Lake Providence (and associated bayous) degraded ecosystem. The funding would include a Feasibility Study (estimated at $600,000 - the first $100,000 at 100% federally funded then cost shared at 50%). The restoration project would have a maximum federal cost of $10,000,000 with a cost share of 75% federal and 25% non-federal.

4.5 Clean Water Act Section 319 Program

The LDEQ Nonpoint Source (NPS) Program is funded by U.S. Environmental Protection Agency's (USEPA) Clean Water Act (CWA) Section 319 Program funds. In a partnership between LDEQ and USDA-NRCS, both agencies came together in an effort to restore water quality in Lake Providence through the Section 319 Program and the USDA-NRCS Mississippi River Basin Initiative (MRBI), funded through the USDA Farm Bill.

LDEQ's ambient water quality monitoring network site for Lake Providence, LDEQ subsegment LA-081101, showed elevated levels of total dissolved solids (TDS) for the sampling year 2014/2015. According to the 2016 Integrated Report, Lake Providence, was impaired for fish and wildlife propagation with a suspected cause of impairment being total dissolved solids (TDS). Beginning in May 2017, LDEQ sampled water quality bimonthly at 11 locations in the lake. The monitoring data allowed partners to characterize the geographic distribution of pollutant concentrations, and helped USDA-NRCS more effectively target best management practice (BMP) implementation in the subsegment. In addition, this data quantified how pollutant concentrations changed over time with BMP implementation. Project data shows TDS improving to meet the water quality standard. USDA-NRCS conservation practices in Lake

Providence will continue through October 2020, and LDEQ will continue to monitor water quality in support of that initiative.

4.6 LDEQ Supplemental Monitoring Study in Inland Lakes

During the summer of 2019 LDEQ began sampling for a study of nutrients and aquatic life in Louisiana's inland, freshwater lakes. This study is funded through a supplemental monitoring grant through USEPA. The study, which will continue sampling efforts at lakes during May – Oct. 2020 and 2021, will help the state measure the nutrients (particularly nitrogen and phosphorus) and aquatic life in inland, freshwater lakes. LDEQ field crews will sample a total of 48 lakes, ponds, and reservoirs across four of the state's inland ecoregions in central and northern Louisiana. Lakes to be sampled must be at least 1 meter deep and more than 10 acres in size and were selected based on how representative they are of their ecoregion and on the surrounding land use.

Lake Providence was selected for this study and two field crews sampled the lake Thursday, September 26, 2019. The following data parameters were collected:

- Temperature, dissolved oxygen, nutrients, chlorophyll-a, water clarity, turbidity, and other water quality parameters
- Habitat along the lake shoreline
- Zooplankton – microscopic animals and plants in the water that are an important part of the food chain
- Benthic macroinvertebrates – small animals such as insects and snails that are a source of food for fish and birds
- Fish – using electroshocking methods where the fish are counted and identified and then put back into the lake (fish which are difficult to identify may be preserved for later identification)
- Periphyton – algae and diatoms that grow on the lake bottom and on plants around the shallow, perimeter of the lake that can be indicative of nutrient enrichment or algal blooms

The majority of water quality data and biological data collected have been sent off to a contracted laboratory and results have yet to be received. However, at a deep-water site near the center of the

lake, a field crew collected data using a multi-parameter probe at 1-meter intervals. The site was 8.9 meters deep. Dissolved oxygen ranged from 0.00 mg/L at the bottom of the profile, to 5.61 mg/L at the top. Temperature ranged from 26.45 °C to 28.79 °C. The pH ranged from 6.77 to 8.21. Conductivity ranged from 189.7 to 296.2 µmhos/cm. Salinity ranged from 0.09 to 0.14 ppt. Additionally, a total of 18 species of fish were collected at Lake Providence and none appeared to be diseased or have other condition issues.

4.7 LDEQ Drinking Water Protection Program

The goal LDEQ's Drinking Water Protection Program (DWPP) is to protect the sources of water for public water systems. The DWPP is operated on a parish-wide basis with a previously set schedule and East Carroll and West Carroll parishes are scheduled for implementation during the current fiscal year (2020). LDEQ's DWPP staff met with all the public water systems in East Carroll and West Carroll parishes during the months of January and February in 2020 to explain the program and learn about local issues that may need to be addressed regarding their water sources. They also worked on completion of contingency plans with each system which will give them a plan of action in the event of a water supply interruption or similar emergency. At that time updates were made to the information previously collected for each water system as part of LDEQ's Source Water Assessment Program if warranted. Specifically, new wells were geographically surveyed and inactive wells were removed from LDEQ's source water assessment database. Each water system also received signs that read Drinking Water Protection Area to be put along major roads going into the protection area for each well. In addition to this DWPP staff introduced a model ordinance to officials from local governing bodies that would protect public water wells within their jurisdiction.

Due to social distancing requirements in response to the current corona-virus pandemic, all follow up work that involves travel to East Carroll and West Carroll has been indefinitely suspended. LDEQ is currently working remotely with water systems on completing contingency plans. Future work will include follow up with governing bodies on adoption of the model ordinance and holding a community meeting locally to teach people where their water comes from, why it is important to protect it and how they can protect it. Upon completion of the community meeting DWPP staff

will assess appropriate measures for further source water protection work. This further protection work will include education of significant potential sources of contamination identified within the protection areas for public water wells. It could also possibly include the formation of a local working group to assist DWPP staff with identification of local source water protection issues and implementation of source water protection measures.

4.8 Other Funding Opportunities

NRCS through the EQIP program provides for channel landowners to reduce erosion. In addition, as part of its Mississippi River Basin Healthy Watersheds Initiative (MRBI)-Cooperative Conservation Partnership Initiative (CCPI), NRCS is accepting applications by landowners for Special Projects in Bayou Boeuf and Lower Bayou Macon Watersheds. The funding is there to "help producers implement conservation practices to avoid excess application of nutrients and water on fields; control the amount of nutrient and water runoff from fields into the watershed, and trap nutrients before they leave the field."
http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/home/?cid=stelprdb1048200

5 Recommendations

This plan takes a multifaceted approach to address issues within the watershed, including engineered, education, enticement and enforcement solutions. The plan draws from the expertise of many parish, state and federal agencies, including LDNR, LDWF, LDEQ, LDH, LDAF, NRCS, as well as other local stakeholders.

6 References

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APPENDIX A

FEBRUARY 2019 FLOOD

Lake Providence woman looking to rebuild after flooding

By Nydja Hood | Posted: Tue 8:14 PM, Feb 11, 2020 | Updated: Wed 10:13 AM, Feb 12, 2020

LAKE PROVIDENCE, La. (KNOE)- A Lake Providence woman is calling on the town for flood relief.

Vera Newton has experienced ongoing problems with flooding for years and feels the Town of Lake Providence could be doing more to help.

"It's the same old thing over and over, and it just seems like nothing is getting done," Newton said.

She said she's experienced flooding several times since she first moved into her home during the 1980s. She has tried to get in contact with Lake Providence Mayor Bell. She said she has not been able to reach him.

She said she would like city council members to reach out to residents and offer them assurance that something will get done. She said action should be taken on a consistent basis, even before it starts to rain.

"Please, do better than what you're doing. Get the workers out there to do their job," Newton said.

Mayor Jerry Bell told KNOE that he is aware of the problem and is working on providing relief.

He said that the flooding has been affecting all of East Carroll Parish.

Bell has sent street crews out to the affected communities and is distributing sandbags to residents. He asked that residents remain patient during this process.

Photo taken Feb. 12, 2020 a residence located on Schneider Lane

Photo taken Feb. 12, 2020 - a residence located along Hwy 65N at mid lake

Photo taken Feb. 12, 2020 - a new boathouse on Hwy 65N

Photo taken Feb. 12, 2020 - on North Hood St by EC Parish Hospital

Photo taken Feb. 12, 2020 near the biodiesel plant

Photo taken Feb. 12, 2020 at the cemetery

Photo taken Feb. 12, 2020 near the Lake Providence Country Club

Photo taken Feb. 12, 2020 near the Moose Lodge

Photo taken Feb. 12, 2020 at the Tensas passage under HWY 65

PROVIDENCE JOU

The Pulse of East Carroll Parish

3rd year – No. 11 Lake Providence, LA (Official Journal for East Carroll Parish) Thursday, February 20, 2020 $1.00

Homes around parish flood as rain continues to be in the forecast

So far, 2020 has been the year of rain, rain , and more rain in East Carroll Parish.

There was more than 15 inches of rain last week to go along with 15 inches in January making this area saturated.

The flooding has been intense in low areas near the lake and around the parish.

The East Carroll Parish Police Jury President Kendall Thompson has declared a State of Emergency in the parish. The declaration is to ensure that the parish will be eligible for relief from the state and federal government, should resources be allocated for disaster relief.

Thompson says that the police jury and town have city and parish employees out and about checking on local residents as well as using resources and equipment to alleviate emergency evacuations and to address other dire circumstances.

"We are in touch with city hall and other government offices and we are doing our best during this difficult time. Our office at the police jury office in the courthouse will direct local citizens in need of emergency services to their respective officials if they need assistance during the flooding," states Thompson.

Vice-President Roger Clement says anyone who need assistance from the police jury can feel free to contact him at 318 - 282 - 4609, regardless of which district they live in. "We are one parish and if anyone needs the resources that the police jury have to offer, it shouldn't matter what district they are in, reach out to any of us on the police jury and we will do our best to assist," states Clement.

The forecast calls for rain until Thursdays afternoon.

The police jury does not currently have an OEP Director, but Thompson says the police jury is still addressing all aspects of mitigation as it relates to the purpose of the Office of Emergency Preparedness.

Officials are pleased with the newly renovated drainage system and how it is holding up.

The rain water is flowing as intended through the parish and as soon as the rain stops, the water quickly continues to its designated relief canal through most of the parish.

Officials are urging citizens to help making sure that the ditches near their homes are clear of debris.

Thompson says some canals are blocked because people throw wash machines and other heavy duty appliances and furniture in the new wide dug out ditches in the parish.

"We dug these ditches out to help drain water when it rains, but some people are dumping construction debris and sofas in there, then that defeats the purpose of what we are trying to do. There are weeks when the sheriff get the inmate crews to clean out ditches and before the week is over, these ditches are back full of debris," states Thompson .

FACTS Page 2

AROUND THE DELTA Page 5

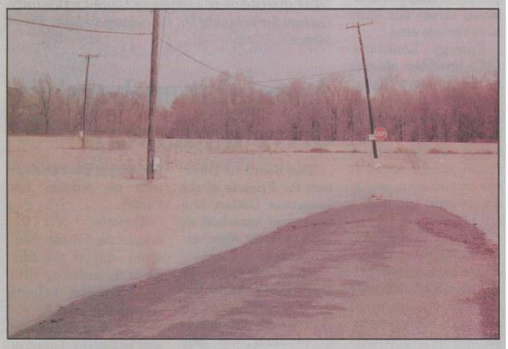
CHURCH Page 6

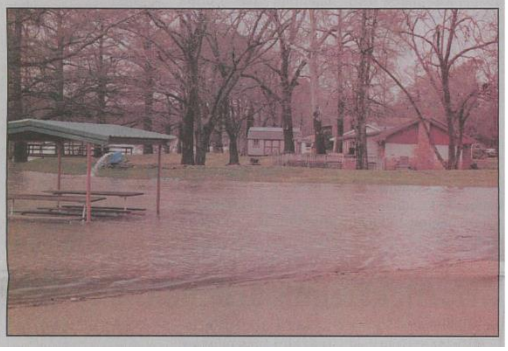
SPORTS Page 7

Flooding in Parish *has been an issue in 2020 due to constant rainfall in the parish. There has been more than 30 inches of rain so far this year with more rainfall expected this week. This property located on Schneider Lane was among many properties that saw water from the lake flood their yards.*

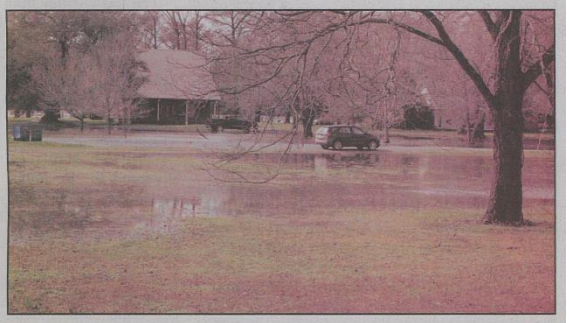
Heavy rains cause problems for area residents

Roads underwater





Boatlandings closed



Flooded yards