

# Flood Risk Report

## Whisky Chitto Watershed

HUC-8 08080204

FEMA CASE NUMBER: 22-06-0014S

*July 2023*



# FEMA

Project Area Community List in Scope

<b>Community Name</b>
Allen Parish (Unincorporated Areas)
Beauregard Parish (Unincorporated Areas)
Rapides Parish (Unincorporated Areas)
Vernon Parish (Unincorporated Areas)
City of DeRidder
Town of Rosepine

# Flood Risk Report History

Version Number	Version Date	Summary
v1.0	7/10/2023	Discovery and Flood Risk Report

## Preface

The Department of Homeland Security, Federal Emergency Management Agency's (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) program provides states and local communities with flood risk information, datasets, risk assessments, and tools that they can use to increase their resilience to flooding and better protect their residents. By pairing accurate floodplain maps with risk assessment tools and planning and outreach support, Risk MAP transforms the traditional flood mapping efforts into an integrated process of identifying, assessing, communicating, planning for, and mitigating flood-related risks.

The Flood Risk Report (FRR) is one of the tools created through the Risk MAP program. An FRR provides non-regulatory information to help local officials, floodplain managers, planners, emergency managers, and others. Local, federal, and state officials can use the information in the FRR to establish a better understanding of their flood risk, take steps to mitigate those risks, and communicate those risks to residents and local businesses.

The FRR serves as a guide when communities update local hazard mitigation plans, community comprehensive plans, and emergency operations and response plans. It is meant to communicate risk to officials and inform them of the modification of development standards, as well as assist in identifying necessary or potential mitigation projects. The FRR extends beyond community limits to provide flood risk data for the Whiskey Chitto watershed.

Flood risk is always changing, and studies, reports, or other sources may be available that provide more comprehensive information. This report is not intended to be the regulatory nor the final authoritative source of all flood risk data in the watershed. Rather, it should be used in conjunction with other data sources to provide a comprehensive picture of flood risk within the project area.

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## Executive Summary

The Federal Emergency Management Agency's (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) program provides communities with flood information to help them understand their current flood risk and make informed decisions about taking action to become stronger and more resilient in the face of future risk. The Risk MAP process provides communities with new or improved information about their flood risk based on watershed models that use information from local, regional, state, and federal sources. Communities can use the resulting tools and data to enhance mitigation plans and better protect their residents.

This report is one such tool for communities impacted by an updated flood hazard analysis of the Whisky Chitto Hydraulic Unit Code 8 (HUC-8) watershed. The FRR has two goals: (1) **inform communities of their risks** related to certain natural hazards, and (2) **enable communities to act** to reduce their risk. It is intended to assist federal, state, and local officials with the following:

- Updating local Hazard Mitigation Plans (HMPs) and community comprehensive plans
- Updating emergency operations and response plans
- Communicating risk
- Informing the modification of development standards
- Identifying mitigation projects

**Most importantly, during this phase of the process, communities are encouraged to review the flood hazard changes closely and provide feedback to FEMA Region 6 based on their local knowledge and any additional data available.**

### About the FEMA Risk Mapping, Assessment, and Planning (Risk MAP) Program

Flood risk is continually changing over time due to factors such as new building and development and weather patterns. The goal of FEMA's Risk MAP program is to work with federal, state, tribal, and local partners to identify and reduce flood risk across communities. These projects are conducted using watershed boundaries and bring together multiple communities to identify broader mitigation actions and create consistency across the watershed. The program provides resources and support that are tailored to each community to help mitigate their risk and work towards a reduction in risk and future loss.

Through coordination and data sharing, the communities in the watershed work as partners in the mapping process. In addition to providing data, the communities can also provide insight into flooding issues and flood prevention within their areas. To prepare for a future study and assist in mitigation, FEMA provides several data sources, including information from the community, such as the following:

- Areas of repeated flooding and insurance claims
- Future development plans
- Areas of low water crossings
- High water marks from recent flooding events
- Areas of evacuation during high water
- Master drainage plans, flood risk reduction projects, and large areas of fill placement
- Local flood studies
- Other flood risk information

For more information about ways communities can act or take advantage of available resources, please review the attached appendices.

FEMA provides communities with Base Level Engineering (BLE) data for select watersheds during the Risk MAP process. BLE is a form of automated hydrologic and hydraulic modeling which, when completed, can provide modeled flood hazard data for all flooding sources within the HUC-8 watershed. Knowing the extent of flooding during the 1-percent-annual-chance flooding event supports both risk reduction efforts and more resilient community planning. Completed BLE data is provided to watershed communities for planning, risk communication, floodplain management, and permitting activities, and to inform future flood study needs. BLE is large scale watershed-based modeling that lacks the detail of Zone AE modeling such as road crossings and the effects of routing storage. BLE does not replace Zone AE data and should be used for comparison purposes only in these areas.

For the Whisky Chitto watershed BLE datasets and products, see Mapping Information Platform (MIP) case number 20-06-0046S, or visit the Interagency Flood Risk Management (InFRM) estimated [Base Flood Elevation \(BFE\) Viewer](#). For a review of these BLE products, see [Appendix III](#).

## About the Whisky Chitto Watershed

The Louisiana Department of Transportation and Development (LADOTD) became a FEMA Cooperating Technical Partner (CTP) in Fiscal Year 2015 (FY15). In FY21, LADOTD contracted with FEMA to provide Risk MAP Discovery for the Whisky Chitto HUC-8 watershed located in Louisiana. The project area covers the portions of the parishes included within the Whisky Chitto HUC-8 watershed: Allen, Beauregard, Rapides, and Vernon Parishes. Location maps covering the study area can be found in [Appendix I](#).

The oldest effective FEMA flood hazard mapping within the Whisky Chitto watershed were released in the 1980's in Rapides Parish. Most of the parishes received modernized parish-wide Digital Flood Insurance Rate Maps (DFIRMS) as part FEMA's Map Modernization program in the 2010's. However, Rapides Parish still has paper maps with flood hazard data developed during the 1980's and 1990's.

According to the 2019 National Land Cover Data, approximately 93 percent of the area in the Whisky Chitto watershed is undeveloped, including cropland, wetland, evergreen forest, and deciduous forest. Roughly seven percent of the area is developed, and less than half of a percent is open water.

Additional background information for the watershed is depicted in [Appendix I](#).

In 2021, FEMA authorized LADOTD to leverage the previously completed BLE data to perform Discovery in the Whisky Chitto watershed. The goal of the Discovery project was to work closely with communities to better understand local flood risks, mitigation efforts, and other topics to spark watershed-wide discussions about increasing resilience to flooding.

## Introduction

### Flood Risk

Floods are naturally occurring phenomena that can and do happen almost anywhere. In its most basic form, a flood is an accumulation of water over a normally dry area. Floods become hazardous to people and property when they inundate an area where development has occurred, causing losses. Mild flood losses may have little impact on people or property, such as damage to landscaping or the accumulation of unwanted debris. Severe flood losses can destroy buildings and crops and cause severe injuries or death.

### Calculating Flood Risk

It is not enough to simply identify where flooding may occur. Even if people know where a flood might occur, they may not know the level of flood risk in that area. The most common method for determining flood risk, also referred to as vulnerability, is to identify both the probability and the consequences of flooding:

**Flood Risk** (or Vulnerability) = **Probability x Consequences**; where

**Probability** = the likelihood of occurrence

**Consequences** = the **estimated** impacts associated with the occurrence on life, property, and infrastructure

The probability of a flood is the likelihood that it will occur. The probability of flooding can change based on physical, environmental, and/or engineering factors. Factors affecting the probability that a flood will have an impact on an area range from changing weather patterns to the existence of mitigation projects. The ability to assess the probability of a flood, and the level of accuracy for that assessment, are also influenced by modeling methodology advancements, better knowledge, and longer periods of record for the body of water in question.

The consequences of a flood are the estimated impacts associated with its occurrence. Consequences relate to human activities within an area and how a flood affects the natural and built environment.

The FRR has two goals: (1) inform communities of their risks related to certain natural hazards, and (2) enable communities to act to reduce their risk. The information within this Risk Report is intended to assist federal, state and local officials to:

- **Communicate risk** – Local officials can use the information in this report to communicate with property owners, business owners, and other residents about risks and areas of mitigation interest.
- **Update local hazard mitigation plans and community comprehensive plans** – Planners can use risk information to develop and/or update hazard mitigation plans, comprehensive plans, future land use maps, and zoning regulations. For example, zoning codes can be changed to provide for more appropriate land uses in high-hazard areas.
- **Update emergency operations and response plans** – Emergency managers can identify high-risk areas for potential evacuation and low-risk areas for sheltering. Risk assessment information may show vulnerable areas, facilities, and infrastructure for which continuity of operations plans, continuity of government plans, and emergency operations plans would be essential.

- **Inform the modification of development standards** – Planners and public works officials can use information in this report to support the adjustment of development standards for certain locations.
- **Identify mitigation projects** – Planners and emergency managers can use this risk assessment to determine specific mitigation projects of interest. For example, a floodplain manager may identify critical facilities that need to be elevated or removed from the floodplain.

This FRR focuses on the Risk MAP BLE and Discovery projects. It showcases risk assessments, which analyze how a flood hazard affects the built environment, population, and local economy to identify mitigation actions and develop mitigation strategies.

The information in this report should be used to identify areas for mitigation projects as well as for additional efforts to educate residents on the hazards that may affect them. The areas of greatest hazard impact are identified in the Areas of Mitigation Interest section of this report, which can serve as a starting point for identifying and prioritizing actions a community can take to reduce its risks.

## Watershed Basics

### Background

The Whisky Chitto watershed is in western Louisiana and covers portions of Vernon, Beauregard, Allen, and Rapides Parishes. See Figure 1 an overview map of the Whisky Chitto watershed. The watershed impacts six communities which include approximately 33,000 people. The total watershed size is approximately 1,881 square miles (sq. mi.) of which approximately 175 sq. mi. is mapped floodplain. See [Appendix I](#) for figures showing effective floodplain locations in the Whisky Chitto watershed.

All streams in the watershed are either direct or indirect tributaries to the Whisky Chitto Creek. There are approximately 958 stream miles in the Whisky Chitto watershed. These streams drain all the 26 HUC-12 watersheds within the study area. Flooding is highly dependent on rainfall and often follows tropical thunderstorm events hitting the watershed. Beauregard, Allen, Vernon, and Rapides Parishes receive between 59 to 63 inches of rainfall annually, per USClimateData.com.

The Whisky Chitto watershed is located within the South Central Plains ecoregion of Louisiana, primarily the Southern Tertiary Uplands subregion. This region consists of Ultisol and Alfisol soils with silt loam to loamy sand textures and are poorly to moderately drained. Bands of the Floodplains and Low Terraces subregion also run in the southern part of the Whisky Chitto watershed, which floods more often and more significantly than the South Central Plains ecoregion. The region's clayey and loamy Alfisol, Entisol, and Entisol soils are poorly drained.

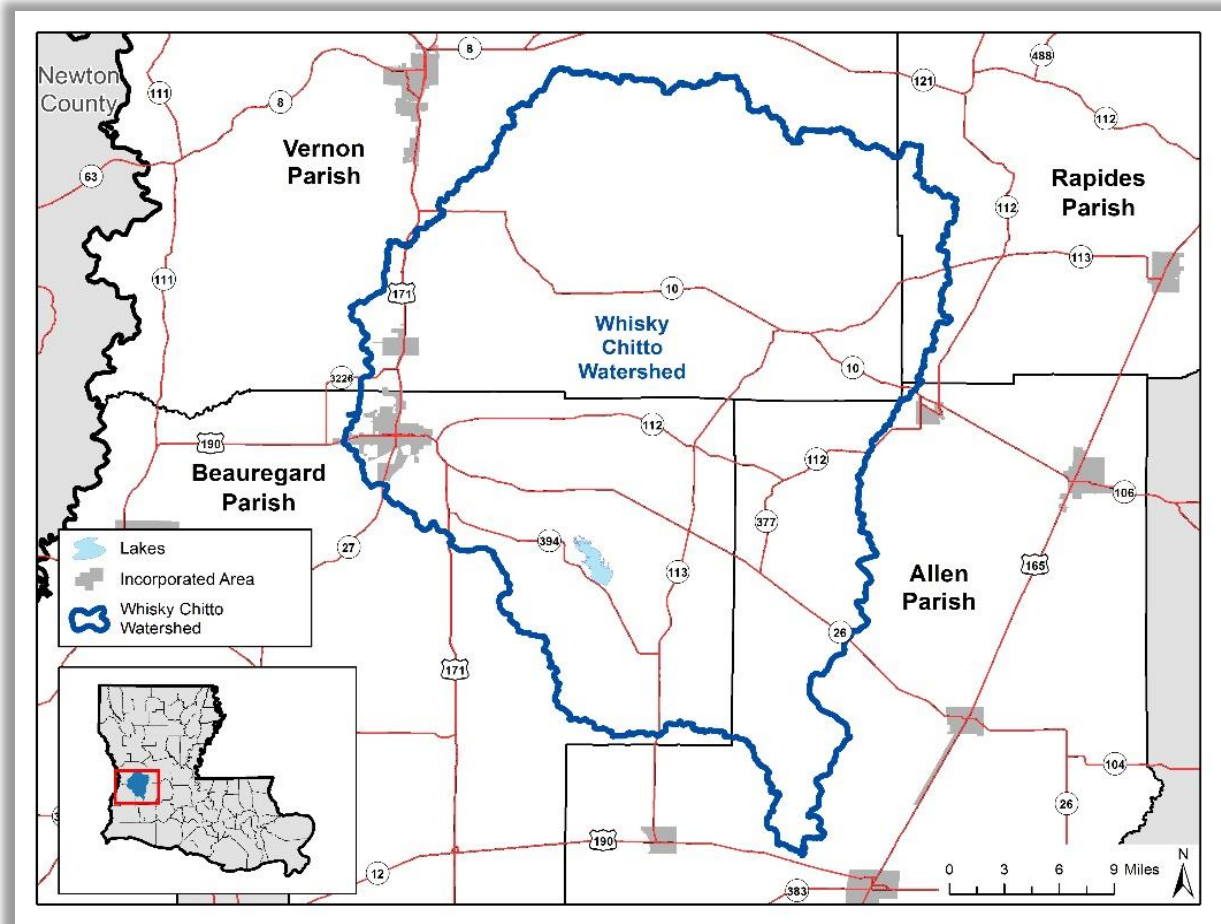


Figure 1: Overview map of the Whisky Chitto watershed

Intense, localized thunderstorms and frontal-type storms in spring cause most of the flooding issues in the Whisky Chitto watershed. The areas within the watershed experienced up to 30 flash floods from 1996 to 2020, often eroding the sandy soils during large rain events. Figure 2 shows the number of flash floods per parish in the study watershed. In Beauregard Parish, most flooding occurs on the roads of the City of DeRidder and along the banks of Bundick Lake. All the parishes have been impacted by hurricane activity, most recently from Hurricane Laura in August 2020.

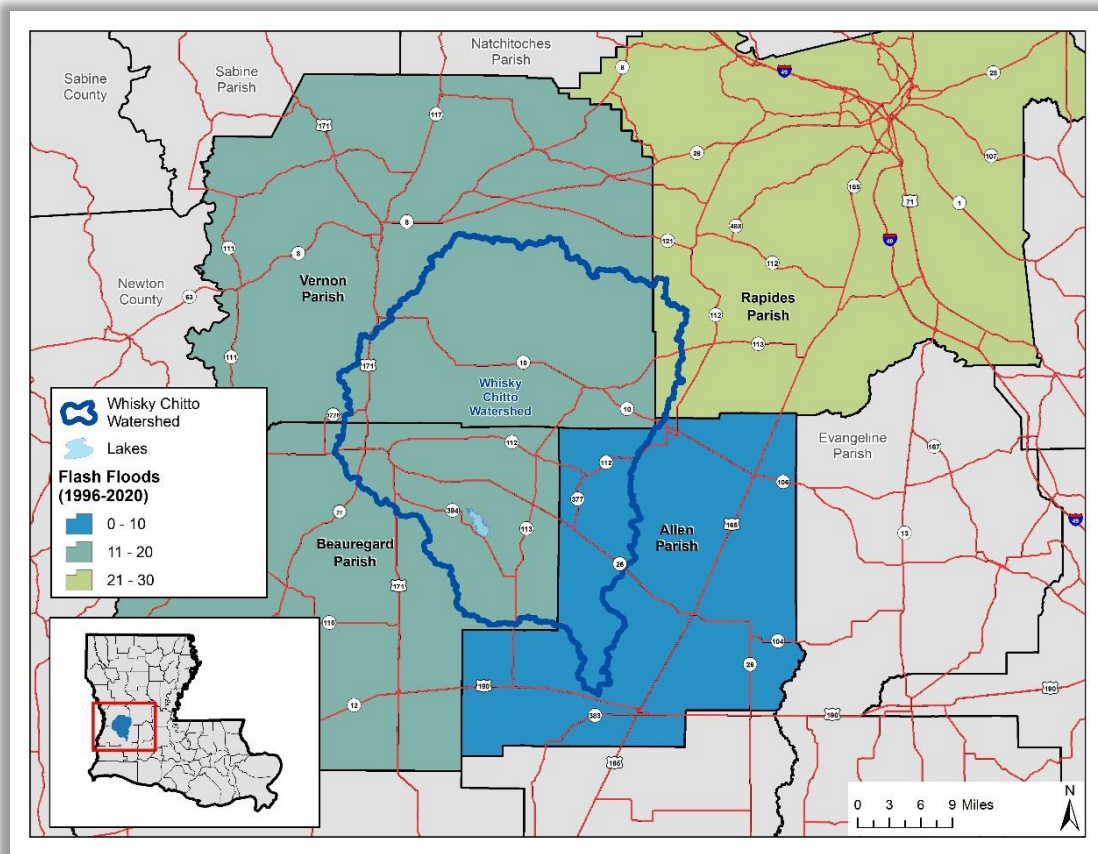


Figure 2: Flash Flood Incidents

### Population

A review of land cover changes and population growth patterns in the watershed revealed that minimal development and a steady decrease in population occurred from 2010 to 2020 in most of the Whisky Chitto watershed. The study watershed’s population dropped from 34,262 to 32,934, a difference of approximately four percent. By comparison, the total population of Louisiana increased by 2.7 percent in the same timeframe.

Since 2010, two communities within the study watershed have experienced population growth: Rapides Parish’s population increased over two percent, and Beauregard Parish’s population increased over seven percent. All other communities have declined in population since 2010, with Allen Parish serving approximately eight percent fewer people and Vernon Parish serving approximately five percent fewer people. Assuming the average decrease rate experienced between 2010 and 2020, it is possible that the region population may decrease by another two percent between 2020 and 2025. See Figure 5 and Figure 7 **Error! Reference source not found.** in [Appendix I](#) for a watershed population density map and a population change map, respectively.

### Watershed Land Use

The majority of the Whisky Chitto watershed is undeveloped, rural areas. The urban areas within this watershed are along the northern and western border. Half of the land is evergreen forest, while the other half consists of shrubs and scrub, herbaceous land, and bands of woody wetlands. Pasture area is plentiful, mostly concentrated on the west half of the watershed. Excluding the combined areas of previously developed land and open water, roughly 816 sq. mi. of the Whisky Chitto watershed still has the potential for new development. Table 1 shows both population and land use within the Whisky Chitto watershed. See Figure 6 in [Appendix I](#) for a land cover map.

Table 1: Population and Area Characteristics <sup>1</sup>

Risk MAP Project	Total Population in Watershed (2020)	Average % Population Growth Yearly (2010-2020)	Predicted Population (2025)	Land Area (sq. mi.)	Developed Area (sq. mi)	Open Water (sq. mi.)
Whisky Chitto Watershed (HUC-8 08080204)	32,934	-0.4	32,280	880*	60	4

\*Total Land Area includes land and water.

### National Flood Insurance Program (NFIP) Status and Regulation

To be a participant of the NFIP, all interested communities must adopt and submit floodplain management ordinances that meet or exceed the minimum NFIP regulations. These regulations can be found in the Code of Federal Regulations and most of the community ordinance requirements are in Title 44 parts 59 and 60. The level of regulation depends on the level of information available and the flood hazards in the area. The levels are as follows:

- A: The Federal Emergency Management Agency (FEMA) has not provided any maps or data – 60.3(a)
- B: Community has maps with approximate A Zones – 60.3(b)
- C: Community has a Flood Insurance Rate Map (FIRM) with Base Flood Elevations (BFE) – 60.3(c)
- D: Community has a FIRM with BFEs and floodways – 60.3(d)
- E: Community has a FIRM that shows coastal high hazard areas (V Zones) – 60.3(e)

To help mitigate the risk to areas where increased population and development are expected, communities can adopt (or exceed) the minimum standards of the NFIP. This is recommended as a proactive strategy to manage construction within the floodplain and avoid negative impacts to existing and future development. The Association of State Floodplain Managers (ASFPM) No Adverse Impact Floodplain Management is a good example.

To increase mitigation efforts and community flood awareness through potentially discounted premium rates, an NFIP community that has adopted more stringent ordinances or is actively completing mitigation and outreach activities is encouraged to consider joining the Community Rating System (CRS). The CRS is a voluntary incentive-based program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions.

Communities can review their current ordinances and reflect potential flood hazard changes by adopting updated ordinances early. This action can reduce future flood losses by affecting how substantial improvements or new construction are regulated. Figure 10 in [Appendix I](#) illustrates the NFIP flood losses within the project scope.

<sup>1</sup> Data obtained from the U.S. Census Bureau; ESRI Demographic 5-year Projections; and National Land Cover Database

### Hazard Mitigation Plan (HMP)

State and local governments must develop and adopt HMP's to be eligible for certain types of funding. To remain eligible, communities need to update and resubmit their plans every five years for FEMA approval. HMP's are created to increase education and awareness, identify strategies for risk reduction, and identify other ways to develop long-term strategies to reduce risk and protect people and property.

As of March 2023, Vernon Parish and the Town of Rosepine follow the Vernon Parish HMP, which has expired. Allen Parish expired in January 2023 but has a new plan in development. Beauregard and the City of DeRidder follow the Beauregard Parish HMP which is set to expire in May 2026. Rapides Parish is set to expire in November 2026.

HMP's effectively allow for FEMA to assess hazards identified through local, state, and federal partnerships and mitigation action items that communities have identified. These HMP's were used in the compilation and preparation of this report.

### Community Rating System (CRS)

CRS is a voluntary incentive-based program that recognizes and encourages community floodplain management activities that communities undertake in addition to the minimum requirements they must meet when joining the NFIP. Individuals that carry flood insurance in a community that participates in the CRS program can receive a discount on their flood insurance premium. Discounts can range from 5 to 45 percent. As of March 2023, there are no CRS participating communities in the Whisky Chitto watershed. Table 2 depicts NFIP and CRS participation status and provides an overview of the effective flood data availability.

Table 2: NFIP and CRS Participation <sup>2</sup>

Risk MAP Project	Participating NFIP Communities/ Total Communities	Number of CRS Communities	CRS Rating Class Range	Average Years since FIRM Update	Level of Regulations (44 CFR 60.3)
Whisky Chitto Watershed (HUC-8 08080204)	6/6	0	N/A	12	60.3 (b) 60.3 (c)

### Flood Insurance Rate Maps (FIRMs)

The average age of the oldest effective FIRMs within the study watershed is 20 years. The oldest effective map is in Rapides Parish; it is 42 years old and has an effective date of March 2, 1981. The newest effective maps in Vernon Parish are 5 years old and have an effective date of March 20, 2018. As of 2023, all communities except Rapides Parish have modernized digital parish-wide effective DFIRMs.

### Dams and Levees

As recorded by the United States Army Corps of Engineers (USACE) National Inventory of Dams (NID) datasets and the FEMA DFIRM databases, there are approximately 15 dams within the study watershed, with two classified as high-hazard dams. For these high-hazard dams, the owners and operators are

<sup>2</sup> Data obtained from FEMA Community Information Systems.

required to develop and maintain Emergency Action Plans (EAP) to reduce the risk of loss of life and property if the dam fails. Figure 3 shows locations of dams in the study watershed.

The 15 dams within the Whisky Chitto watershed are used for various reasons, including recreation, fish and wildlife, and water supply. Most dams are privately owned; one is owned by the state government, and three are federally owned. Eighty-seven percent of the dams are classified as low hazard dams. The Natural Resources Conservation Service (NRCS) has designed one dam in the study watershed. This NRCS dam is mainly used for flood control, to prevent erosion damage, to improve water supply and irrigation, and to create a habitat for wildlife. The largest dam is the Bundick Creek Dam storing 57,500 acre-feet of water, completed in 1963, and is used for recreation. There are no levees within the Whisky Chitto watershed. Table 3 provides the characteristics of the dams identified in the entire HUC-8 watershed.

Risk MAP Project	Total Number of Identified Dams	Number of Dams Requiring EAP	Percentage of Dams without EAP	Average Years since Inspection	Average Storage (acre-feet)
Whisky Chitto Watershed (HUC-8 08080204)	14	2	0	5*	4,223

Table 3: Risk MAP Project Dam Characteristics<sup>3</sup>

\*Date of last inspection not provided for all records as of March 2023

<sup>3</sup> Data obtained from USACE National Inventory of Dams

## Project Phases and Map Maintenance

### Background

FEMA manages several risk analysis programs, including Flood Hazard Mapping, National Dam Safety, the Earthquake Safety Program, Multi-Hazard Mitigation Planning, and the Risk Assessment Program, all of which assess the impact of natural hazards and lead to effective strategies for reducing risk. These programs support the Department of Homeland Security’s objective to “strengthen nationwide preparedness and mitigation against natural disasters.”

FEMA manages the NFIP, which is the cornerstone of the national strategy for preparing American

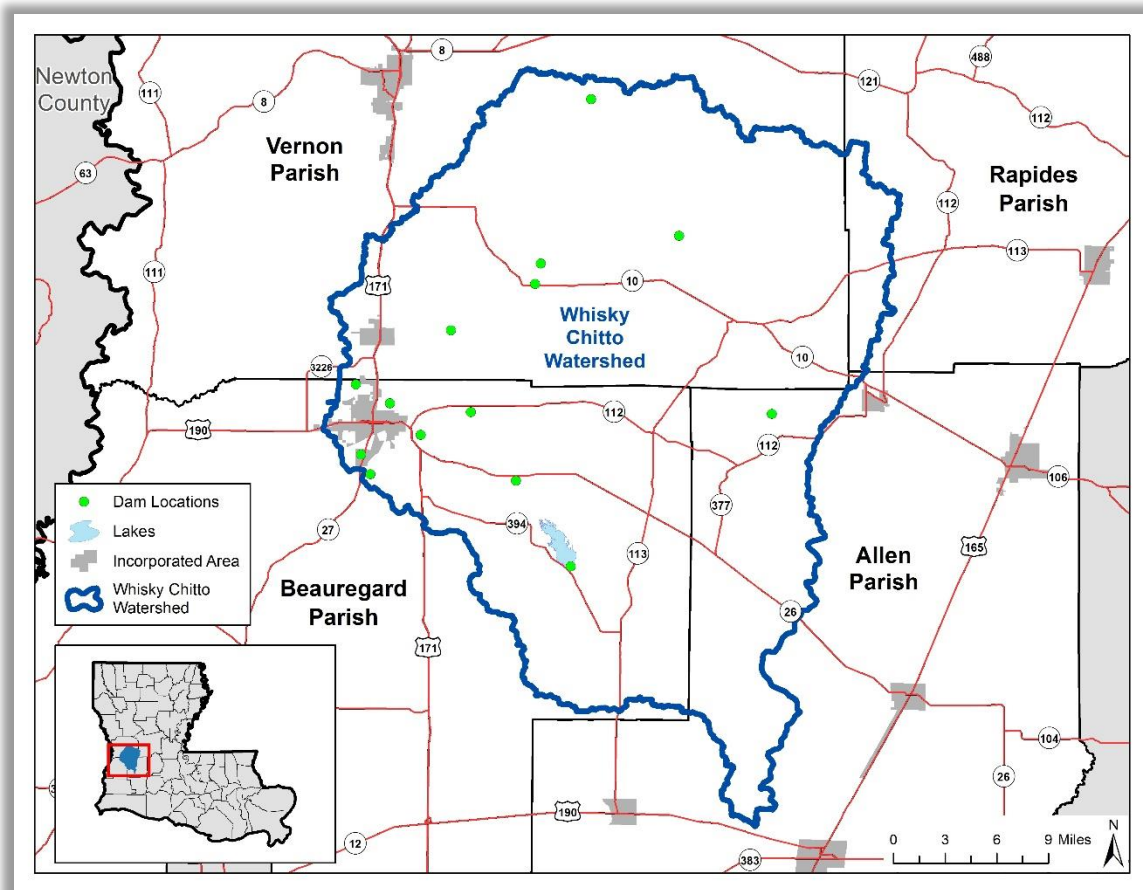


Figure 3: Dam Location Map for Whisky Chitto watershed

communities for flood hazards. In the nation’s comprehensive emergency management framework, the analysis and awareness of natural hazard risk remains challenging. A consistent risk-based assessment approach and a robust communication system are critical tools to ensure a community’s ability to make informed risk management decisions and take mitigation actions. Flood hazard mapping is a basic and vital component for a prepared and resilient nation.

In Fiscal Year 2009, FEMA’s Risk MAP program began to synergize the efforts of federal, state, and local partners to create timely, viable, and credible information identifying natural hazard risks. The intent of the Risk MAP program is to share resources to identify the natural hazard risks a community faces and ascertain possible approaches to minimizing them. Risk MAP aims to provide technically sound flood hazard information to be used in the following ways:

- To update the regulatory flood hazard inventory depicted on FIRMs and the National Flood Hazard Layer
- To provide broad releases of data to expand the identification of flood risk (flood depth grids, water-surface elevation grids, etc.)
- To support sound local floodplain management decisions
- To identify opportunities to mitigate long-term risk across the nation’s watersheds

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*Flood-related damage between 1980 and 2013 totaled \$260 billion [dollars], but the total impact to our Nation was far greater—more people lose their lives annually from flooding than any other natural hazard.*

*FEMA, “Federal Flood Risk Management Standard (FFRMS)” (2015)*

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### How are FEMA’s Flood Hazard Maps Maintained?

FEMA’s flood hazard inventory is updated through several types of revisions.

#### **Community-submitted Letters of Map Change (LOMCs)**

First and foremost, FEMA relies heavily on the local communities that participate in the NFIP to carry out the program’s minimum requirements. These requirements include the obligation for communities to notify FEMA of changing flood hazard information and to submit the technical supporting data needed to update the FIRMs.

Although revisions may be requested at any time to change information on a FIRM, FEMA generally will not revise an effective map unless the changes involve modifications to Special Flood Hazard Areas (SFHAs). Be aware that the best floodplain management practices and proper assessments of risk result when the flood hazard maps present information that accurately reflects current conditions.

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*Under the current minimum NFIP regulations, a participating community commits to notifying FEMA if changes take place that will affect an effective FIRM no later than 6 months after project completion.*

*Section 65.3, Code of Federal Regulations*

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#### **Letters of Map Amendment (LOMAs)**

The scale of an effective FIRM does not always provide the information required for a site-specific analysis of a property’s flood risk. FEMA’s LOMA process provides homeowners with an official determination on the relation of their lot or structure to the SFHA. Requesting a LOMA may require a homeowner to work with a surveyor or engineering professional to collect site-specific information related to the structure’s elevation; it may also require the determination of a site-specific BFE. Fees are associated with collecting the survey data and developing a site-specific BFE. Local surveying and engineering professionals usually

provide an Elevation Certificate to the homeowner, who can use it to request a LOMA. A successful LOMA may remove the federal mandatory purchase requirement for flood insurance, but lending companies may still require flood insurance if they believe the structure is at risk.

### **FEMA-Initiated Flood Risk Project**

Each year, FEMA initiates several Flood Risk Projects to create or revise flood hazard maps. Because of funding constraints, FEMA can study or restudy only a limited number of communities, parishes, or watersheds each year. As a result, FEMA prioritizes study needs based on a cost-benefit approach whereby the highest priority is given to studies of areas where development has increased, and the existing flood hazard data has been superseded by information based on newer technology or changes to the flooding extent. FEMA understands communities require products that reflect current flood hazard conditions to best communicate risk and implement effective floodplain management.

Flood Risk Projects may be delivered by FEMA or one of its Cooperating Technical Partners (CTPs). The CTP initiative is an innovative program created to foster partnerships between FEMA and participating NFIP communities, as well as regional and state agencies. Qualified partners collaborate in maintaining up-to-date flood maps. In FEMA Region 6, which includes the State of Louisiana, CTPs are generally statewide agencies that house the State Floodplain Administrator. However, some Region 6 CTPs are also large river authorities, flood control districts, regional planning agencies, or cities. They provide enhanced coordination with local, state, and federal entities, engage community officials and technical staff, and provide updated technical information that informs the national flood hazard inventory.

Risk MAP has modified FEMA's project investment strategy from a single investment by fiscal year to a multi-year phased investment, which allows FEMA to be more flexible and responsive to the findings of the project as it moves through the project lifecycle. Flood Risk Projects are funded and completed in phases.

## **General Flood Risk Project Phases**

Each phase of the Flood Risk Project provides both FEMA and its partner communities with an opportunity to discuss the data that has been collected and to determine a path forward. Local engagement throughout each phase enhances the opportunities for partnership, furthers the discussion on current and future risk, and helps identify local projects and activities to reduce long-term natural hazard risk.

Flood Risk Projects may be funded for one or more of the following phases:

- Phase Zero – Investment
- Phase One – Discovery
- Phase Two – Risk Identification and Assessment
- Phase Three – Regulatory Product Update

Local input is critical throughout each phase of a Flood Risk Project. More details about the tasks and objectives of each phase are included below.

### **Phase Zero: Investment**

Phase Zero of a Flood Risk Project initiates FEMA's review and assessment of the inventories of flood hazards and other natural hazards within a watershed area. During the Investment Phase, FEMA reviews the availability of information to assess the current floodplain inventory. FEMA maintains several data

systems to perform watershed assessments and selects watersheds for a deeper review of available data and potential investment tasks based on the following factors:

#### **Availability of High-Quality Ground Elevation Data**

FEMA reviews readily available and recently acquired ground elevation data. This information helps identify development and earth-moving activities near streams and rivers. Where necessary, FEMA may partner with local, state, and other federal entities to collect necessary ground elevation information within a watershed.



*If [The National Map - Advanced Viewer](#) can provide high-quality ground elevation data that is both available for a watershed area and compliant with FEMA's quality requirements, FEMA and its mapping partners may prepare engineering data to assess, revise, replace, or add to the current flood hazard inventory.*

#### **Mile Validation Status within Coordinated Needs Management Strategy (CNMS)**

FEMA uses the CNMS database to track the validity of the flood hazard information prepared for the NFIP. The CNMS database reviews 17 criteria to determine whether the flood hazard information shown on the current FIRM is still valid.



*Communities may also inform and request a review or update of the inventory through the CNMS website at <https://msc.fema.gov/cnms/>. The [Coordinated Needs Management Strategy \(CNMS\) Technical Reference \(fema.gov\)](#) provides an overview of the online tool. Requests should be directed to the appropriate [FEMA Regional Offices](#) for review.*

#### **Local Hazard Mitigation Plans**

Reviewing current and historic hazard mitigation plans provides an understanding of a community's comprehension of its flood risk and other natural hazard risks. The mitigation strategies within a local hazard mitigation plan provide a lens to local opportunities and underscore a potential for local adoption of higher standards related to development or other actions to reduce long-term risk.

#### **Cooperating Technical Partner (CTP) State Business Plans**

In some states, a CTP generates an annual state business plan that identifies future Flood Risk Project areas that are of interest to the state. The Louisiana Department of Transportation and Development (LADOTD) works to develop user-friendly data. In this project area, FEMA has worked closely with LADOTD to develop the project scope and determine the necessary project tasks.



*Communities that have identified local issues are encouraged to indicate their data needs and revision requests to the State CTP so that they can be prioritized and included in the State Business Plans.*

#### **Possible Investment Tasks**

After a review of the data available within a watershed, FEMA may choose to (1) purchase ground elevation data and/or (2) create some initial engineering modeling against which to compare the current inventory, also known as BLE modeling.

#### **Phase One: Discovery**

Phase One, the Discovery Phase, provides opportunities both internally (between the state and FEMA) and externally (with communities and other partners interested in flood potential) to discuss local issues

with flooding and examine possibilities for mitigation action. This effort is made to determine where communities currently are with their examination of natural hazard risk throughout their community and to identify how state and federal support can assist communities in achieving their goals.



*The Discovery process includes an opportunity for local communities to provide information about their concerns related to natural hazard risks. Communities may continue to inform the project identification effort by providing previously prepared survey data, as-built stream crossing information, and engineering information.*

For a holistic community approach to risk identification and mapping, FEMA relies heavily on the information and data provided at the local level. Flood Risk Projects are focused on identifying (1) areas where the current flood hazard inventory does not provide adequate detail to support local floodplain management activities, (2) areas of mitigation interest that may require more detailed engineering information than is currently available, and (3) community intent to reduce the risk throughout the watershed to assist FEMA's future investment in these project areas. Watersheds are selected for Discovery based on these evaluations of flood risk, data needs, availability of elevation data, regional knowledge of technical issues, identification of a community-supported mitigation project, and input from federal, state, and local partners.

#### **Possible Discovery Tasks**

Discovery may include a mix of interactive webinar sessions, conference calls, informational tutorials, and in-person meetings to reach out to and engage with communities for input. Data collection, interviews, and interaction with community staff and data-mining activities provide the basis for watershed-, community-, and stream-level reviews to determine potential projects that may benefit the communities. A range of analysis approaches are available to determine the extent of flood risk along streams of concern. FEMA and its mapping partners will work closely with communities to determine the appropriate analysis approach, based on the data needs throughout the community.

These potential projects may include local training sessions, data development activities, outreach support to local communities wanting to step up their efforts, or the development of flood risk datasets within areas of concern to allow a more in-depth discussion of risk.

#### **Phase Two: Risk Identification and Assessment**

Phase Two (Risk Identification and Assessment) continues the risk awareness discussion with communities through watershed analysis and assessment. Analyses are prepared to review the effects of physical and meteorological changes within the project watershed. The new or updated analysis provides an opportunity to identify how development has affected the amount of stormwater generated during a range of storm probabilities and shows how effectively stormwater is transported through communities in the watershed.



*Coordination with a community's technical staff during engineering and model development allows FEMA and its mapping partners to include local knowledge, based on actual on-the-ground experience, when selecting modeling parameters.*

The information prepared and released during Phase Two is intended to promote better local understanding of the existing flood risk by allowing community officials to review the variability of the risk throughout their community. As FEMA strives to support community-identified mitigation actions, it also

looks to increase the effectiveness of community floodplain management and planning practices, including local hazard mitigation planning, participation in the NFIP, use of actions identified in the CRS Manual, risk reduction strategies for repetitive loss and severe repetitive loss properties, and the adoption of stricter standards and building codes.



*FEMA is eager to work closely with communities and technical staff to determine the current flood risk in the watershed. During the Risk Identification and Assessment phase, FEMA would like to be alerted to any community concerns related to the floodplain mapping and analysis approaches being taken. During this phase, FEMA can engage with communities and review the analysis and results in depth.*

### **Possible Risk Identification and Assessment Tasks**

Phase Two may include a mixture of interactive webinars, conference calls, informational tutorials, and in-person meetings to reach out to and engage with communities for input. Flood Risk Project tasks may include hydrologic or hydraulic engineering analysis and modeling, floodplain mapping, risk assessments using Hazus-Multi Hazard software, and preparation of flood risk datasets (water-surface elevation, flood depth, or other analysis grids). Additionally, projects may include local training sessions, data development activities, outreach support to local communities that want to step up their efforts, or the development of flood risk datasets within areas of concern to allow a more in-depth discussion of risk.

### **Phase Three: Regulatory Products Update**

If the analysis prepared in the previous Flood Risk Project phases indicates that physical or meteorological changes in the watershed have significantly changed the flood risk since the last FIRM was printed, FEMA will initiate the update of the regulatory products that communities use for local floodplain management and NFIP activities.

Delivery of the preliminary FIRM and Flood Insurance Study (FIS) report begins another period of coordination between community officials and FEMA to discuss the required statutory and regulatory steps both parties will perform before the preliminary FIRM and FIS report can become effective. As in the previous phases, FEMA and its mapping partners will engage with communities through a variety of conference calls, webinars, and in-person meetings.



*Once the preliminary FIRMs are prepared and released to communities, FEMA will initiate the statutory portions of the regulatory product update. FEMA will coordinate a Consultation Coordination Officer meeting and initiate a 90-day comment and appeal period. During this appeal period, local developers and residents may coordinate the submittal of their comments and appeals through their community officials to FEMA for review and consideration.*

FEMA welcomes this information because additional proven scientific and technical information increases the accuracy of the mapping products and better reflects the community's flood hazards identified on the FIRMs.



*Communities may host or hold Open House meetings for the public. The Open House layout allows attendees to move at their own pace through several stations, collecting information in their own time. This format allows residents to receive one-on-one assistance and ask questions pertinent to their situations or their interests in risk or flood insurance information.*

All appeals and comments received during the statutory 90-day appeal period, including the community's written opinion, will be reviewed by FEMA to determine the validity of the appeal. Once FEMA issues the appeal resolution, the associated community and all appellants will receive an appeal resolution letter and FEMA will revise the preliminary FIRM, if warranted. A 30-day period is provided for review and comment on successful appeals. Once all appeals and comments are resolved, the flood map is ready to be finalized.



*After the appeal period, FEMA will send community leaders a Letter of Final Determination stating that the preliminary FIRM will become effective in six months. The letter also discusses the actions each affected community participating in the NFIP must take to remain in good standing in the NFIP.*

After the preceding steps are complete and the six month compliance period ends, the FIRMs are considered effective maps and new building and flood insurance requirements become effective.

The following sections describe FEMA's Risk MAP investment in the Whisky Chitto watershed to date.

# Whisky Chitto Watershed Risk MAP Project

## Watershed Selection Factors

FEMA Risk MAP Project life cycles begins with Phase Zero (Investment) and Phase One (Discovery). The investment in these two phases in the Whisky Chitto watershed paves the way for the local communities to move towards flooding resilience. FEMA selected and prioritized the watershed for BLE Investment and Discovery with the overall goal of assisting the local governments in identifying flood risks and strengthening their ability to make informed decisions about reducing these risks. Figure 4 shows communities within the Whisky Chitto watershed.

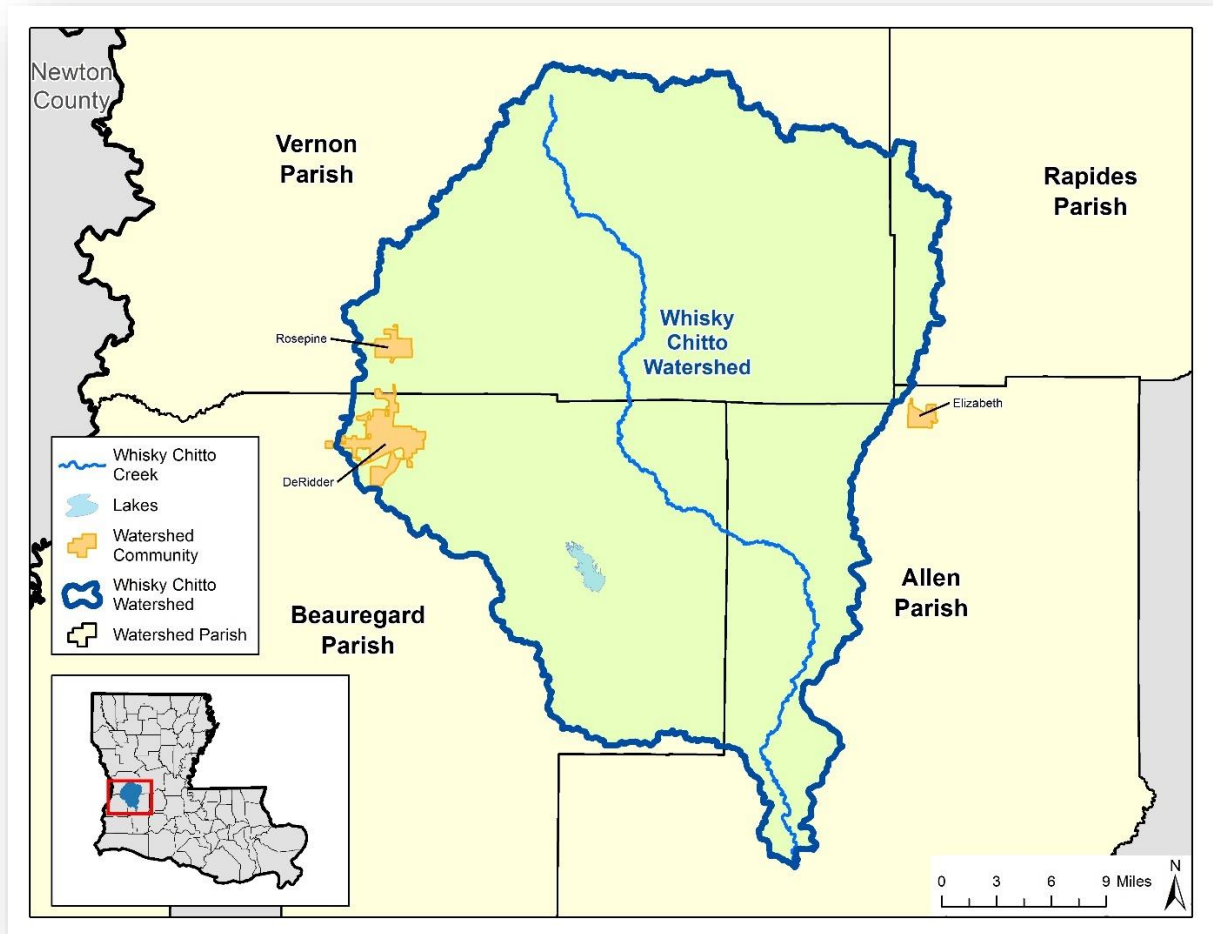


Figure 4: Overview of communities located within the Whisky Chitto watershed

Many factors and criteria are reviewed for watershed selection: flood risk, the age of the current flood hazard data, population growth trends and potential for growth, recent flood claims, and disaster declaration history. The availability of local data and high-quality ground elevation data is reviewed for use in preparing flood hazard data. The CNMS database is reviewed to identify large areas of unknown or unverified data for streams. FEMA consults the State of Louisiana CTP, the State NFIP Coordinator, and the State Hazard Mitigation Office when watersheds are identified for study.

### **Flood Risk**

Numerous flooding events are listed in the historical record. Most of the flooding is caused by frontal type storms, and the watershed has also experienced several hurricanes since 2002. As recently as May 2019, the City of DeRidder experienced a flash flood that made roads impassable. In March of 2018, another flash flood caused \$100,000 dollars in property damage. In 2020, Hurricane Laura struck the watershed and caused \$2.8 billion dollars in damages.

Many additional flood related damages have been recorded in the various communities in the watershed. These flood events cause extensive damage to local infrastructure and illustrate the ongoing threat in the Whisky Chitto watershed.

### **Growth Potential**

The Whisky Chitto watershed is predominantly rural, with its urban areas on the western border. All the towns and cities within the watershed are lightly to moderately developed. Because of a steady decline in population, future development is likely to happen gradually over time.

### **Age of Current Flood Information**

Beauregard and Vernon Parishes have been updated to modernized parish wide DFIRMs and FIS reports as part of FEMA's MAP MOD program that began in 2004. Most FIRMs in the watershed are 11 to 13 years old, though some of the studies for Beauregard and Vernon Parishes were updated in 2018. However, the study for Rapides Parish went effective in 1980s and has not been updated since 1999. Over a third of the mapping shown on these FIRMs is also Zone A floodplains with no readily available Base Flood Elevations (BFEs).

The combination of related severe floods and outdated flood information and slightly increasing development indicate that this watershed needs updated flood hazard information to support floodplain management activities throughout the entire watershed.

### **Availability of High-Quality Ground Elevation Data**

FEMA's data availability review indicated that high-quality ground elevation data was available for all the Whisky Chitto watershed in the form of Light Detection and Ranging (LiDAR) data. This data provides a great basis for preparing hydrologic and hydraulic modeling and help identify development and earth-moving activities near the streams and creeks. The available LiDAR data was collected by USGS between 2000 and 2007. The source and date of the LiDAR topographic data coverage used in the Discovery and BLE projects for the Whisky Chitto watershed is shown in Figure 5. See Figure 9 in [Appendix I](#) for topographic data sources for the whole watershed.

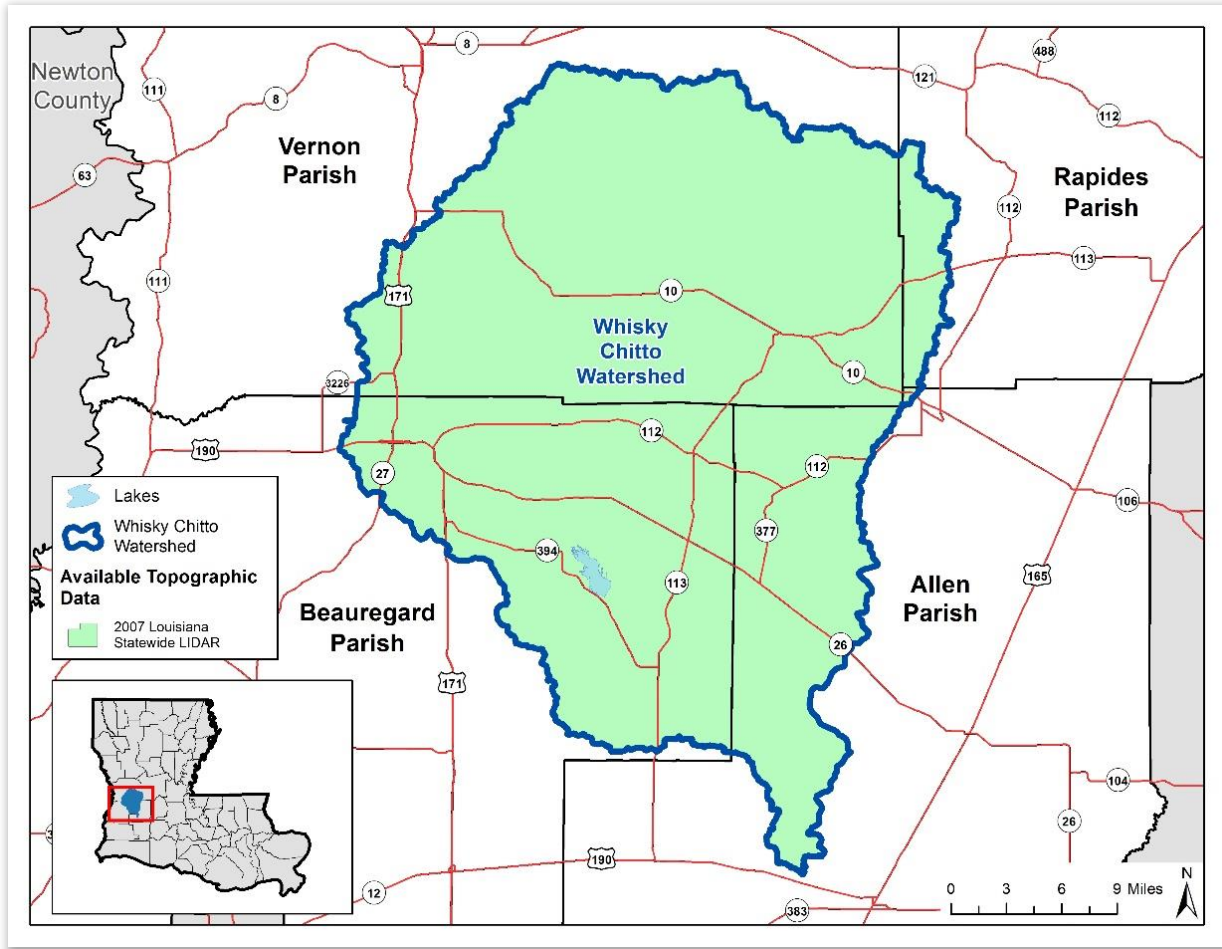


Figure 5: Availability of LiDAR data

### Coordinated Needs Management Strategy (CNMS) Database Review

The CNMS database indicates the validity of FEMA’s flood hazard inventory. CNMS reviews 17 criteria to determine whether flood hazard information shown on the current FIRMs is still valid. Streams that are indicated as **Unverified** or **Unknown** in the database indicate that the information used to map the floodplains currently shown on the FIRM is inaccessible or that a complete evaluation of the critical and secondary CNMS elements could not be performed. Figure 6 shows the CNMS-based attributed streams for the study watershed.

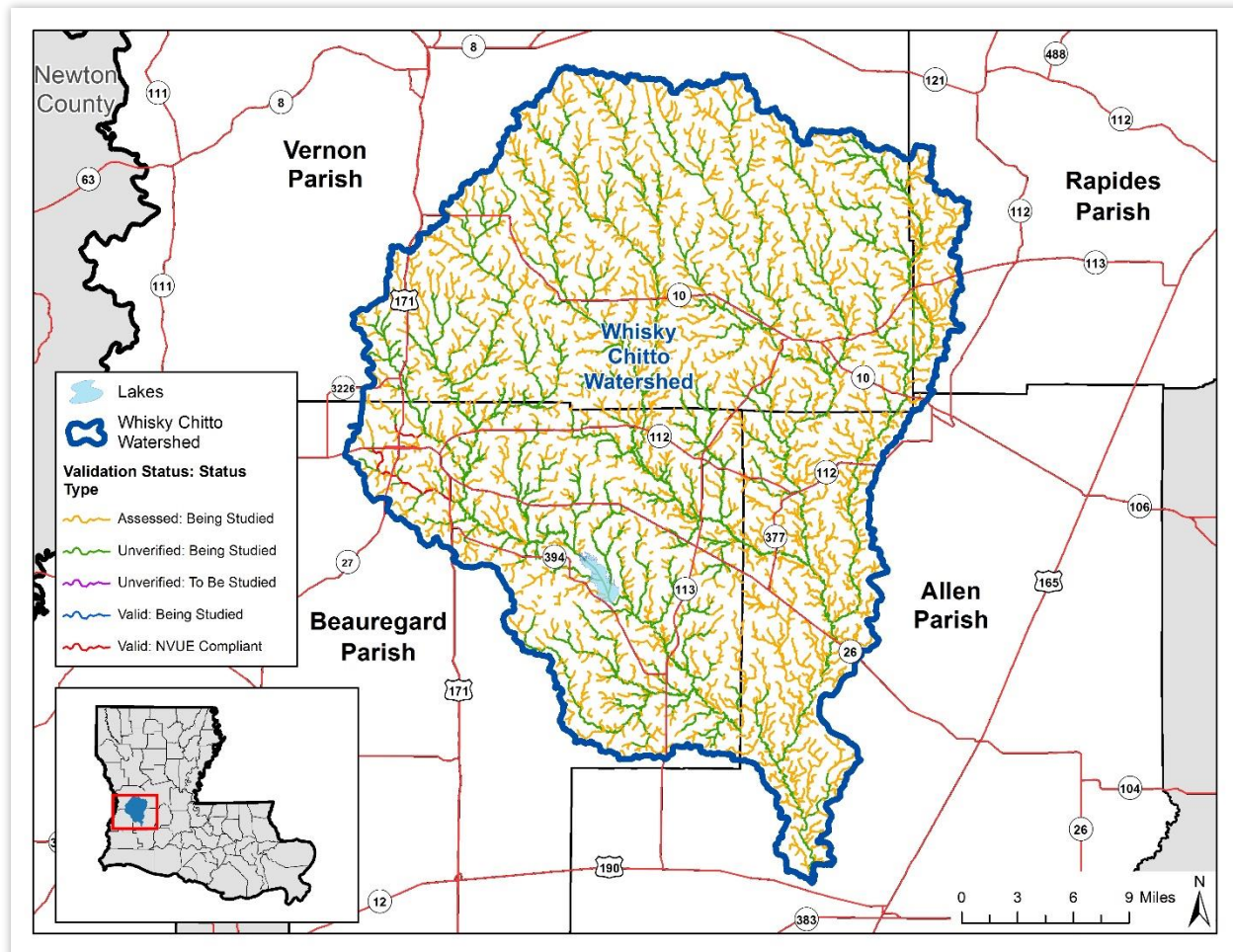


Figure 6: Overview of CNMS streams

### Unmapped Stream Coverage

FEMA also reviewed the current stream coverage and reviewed the areas against the [National Hydrography Dataset \(NHD\)](#). The NHD medium-resolution data inventoried by the USGS maps created at a 1:100,000 scale was used to review the watercourses within the Whisky Chitto watershed. Population centers of 1,000 or more were reviewed for additional mileage against the high-resolution data inventoried by the USGS Quadrangle maps created at a 1:24,000 scale. CNMS was completed as part of the BLE project in November 2020 and was updated as part of the Discovery process. The intent of this review was to identify streams and watercourses and create a complete stream network for preparing BLE data.

## Phase Zero – Base Level Engineering (BLE) – Whisky Chitto Watershed (2020)

In 2020, FEMA began investing in BLE data development for the Whisky Chitto watershed in Louisiana. This 2D approach prepares multi-profile hydrologic (how much water) and hydraulic (how is water conveyed in existing drainage) data for a large stream network or river basin to generate floodplain and other flood risk information for the basin area. BLE utilizes a gridded surface and precipitation model in conjunction with breaklines at significant hydraulic features and structures (streams, roads, dams, etc.) to develop a pluvial and fluvial flooding model that is calibrated to reflect data collected with USGS stream gages. The BLE project was published in November 2020 as MIP case number 20-06-0046S for the Whisky

Chitto watershed. The BLE report are included in Appendix III: [Base Level Engineering Report](#)

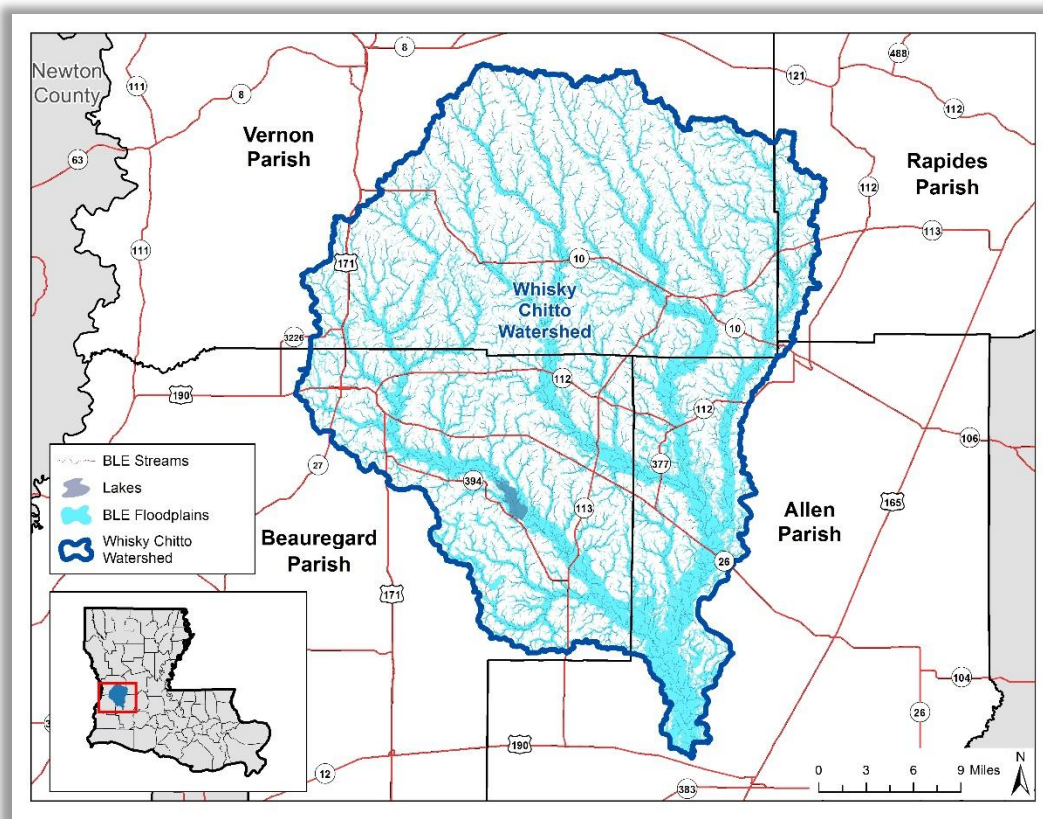


Figure 7: Overview of BLE streams and BLE floodplain

BLE provides an opportunity for FEMA to produce and provide non-regulatory flood risk information for a large watershed area in a much shorter time. The data prepared through BLE provides planning-level data that is prepared to meet FEMA’s Standards for Floodplain Mapping. BLE is scalable and can be updated for use as regulatory and non-regulatory products. Communities can choose to adopt the BLE as approximate, model-backed mapping in locations without model-backed Zone A mapping. Detailed studies can add structures to the BLE modeling for further refinement into Limited Detail studies or

Detailed studies with or without floodway. *Figure 7* shows the network of streams analyzed using the BLE approach. The results of this BLE study have been incorporated into the Discovery process to support the engagement and communication activities that take place during the Discovery phase.

### **FEMA Base Level Engineering (BLE) Deliverables**

The BLE provided the following items for use in the Whisky Chitto watershed:

- Hydrologic modeling (regression) flow values for the 10%, 4%, 2%, 1%, 1%+ and 0.2%, and 1%-frequencies
- Hydraulic (HEC-RAS) modeling for all study streams (for the same frequencies listed above)
- 10-, 1-, and 0.2-percent-annual-chance floodplain boundaries
- 1- and 0.2-percent-annual-chance Water Surface Elevation Grids
- 1- and 0.2-percent-annual-chance Flood Depth Grids
- HAZUS flood analysis for the watershed
- Point file indicating the location of culverts and inline structures that may be informed by local as-built information
- Flood Risk Map (See [Appendix I](#))

The BLE information is available on [FEMA's Estimated BFE viewer](#) to allow communities to use for planning, risk communication, floodplain management and permitting activities.

### **CNMS Validation and Assessment**

Per the Whisky Chitto BLE Report, “[as] described in Title 42 of the Code of Federal Regulations, Chapter III, Section 4101(e), once every five years, FEMA must evaluate whether the information on Flood Insurance Rate Maps (FIRMs) reflects the current risks in flood prone areas. FEMA makes this determination of flood hazard data validity by examining flood study attributes and change characteristics, as specified in the Validation Checklist of the Coordinated Needs Management Strategy (CNMS) Technical Reference. The CNMS Validation Checklist provides a series of critical and secondary checks to determine the validity of flood hazard areas studied by detailed methods (e.g., Zone AE, AH, or AO).”

The Regional CNMS database, National Flood Hazard Layer, and paper inventory were used as reference data to ensure extent of the BLE results represents appropriate flooding extent. The BLE CNMS database was revised for the study watershed during Discovery and the report tables are available in [Appendix I](#).

## Phase One – Discovery: Whisky Chitto Watershed

The LADOTD-led Discovery project focused on the "Discovery" of flood hazards and risks throughout the Whisky Chitto watershed. Through the Discovery process, flood risks are identified and local communities have an opportunity to collaborate with the State CTP to identify specific regions within the watershed that may benefit from future FEMA funded studies and assessments. Discovery initiates open lines of communication and relies on local involvement for productive discussions about flood risk. The process provides a forum for a watershed-wide effort to understand the interrelationships between upstream and downstream community flood risk throughout the watershed. At the conclusion of the Discovery process, the identified needs of the watershed will be considered for future investment in the Risk MAP process.

The Whisky Chitto watershed Discovery project was completed through the following activities:

- Data Gathering
- Pre-Discovery Engagement Efforts
- Discovery Meeting
- Watershed Findings and Prioritizations

All possible efforts were made to ensure that stakeholders understood Discovery and the Risk MAP process through emails, phone calls, newsletters, and a developed website created for this Discovery project.

### Data Gathering

Federal and state databases were downloaded and reviewed during the Pre-Discovery phase to highlight areas of concern where additional information from stakeholders would be most beneficial to fully understand the flood risk and damages in the area. Dams, levees, soils classification, recent developments, various population metrics, collections of high-water marks and low water crossings, historical flooding information, and more were reviewed to best prepare for in-depth conversations surrounding local action and impact. Additionally, the BLE water surface elevation rasters were compared to the effective flood extents and base flood elevations to check for any differences that might have been the result of changes in terrain or modeling considerations used in the non-regulatory model development. The final BLE Report is available in [Appendix III](#). Table 4 summarizes the geospatial data collected.

Table 4: Geospatial Data Collection

Data Type	Data Source	Data Description
HUC Watershed Boundaries	USGS	HUC boundary for the Whisky Chitto HUC-8. Also includes HUC-10 and HUC-12.
Roadways	US Census Bureau	2021 TIGER Line Roads
Jurisdictional Boundaries - Louisiana	LADOTD	Data includes city and parish boundaries
Current Effective Floodplain Information	FEMA DFIRMs	Data includes Floodplains, BFEs, and Cross Sections
Stream Lines	FEMA DFIRMs	Stream Centerlines and Profile Baselines from DFIRM
BLE Floodplains and Stream	FEMA	Base Level Engineering Study for the Whisky Chitto Watershed
Locations of Letters of Map Revision (LOMRs)	FEMA	LOMRs incorporated into Effective DFIRM databases and LOMRs filed after Effective DFIRM dates for watershed parishes
Coordinated Needs Management Strategy	FEMA	CNMS database dated December 31, 2021
Topography - Louisiana	LADOTD	2007 & 2008 Statewide LiDAR
HAZUS-based Loss Estimates	FEMA	HAZUS 5.0 (2021) building exposure and flood lost estimates per Census Tract
Location of Dams	National Inventory of Dams	Dam locations with Emergency Action Plan (EAP) status
Stream Gauges	USGS	Stream Gauge locations
Flood Claims	FEMA NFIP	Total number and value of claims by community for Louisiana
Land Cover	USGS	National Land Cover Dataset for 2011 and 2019
Land Use	USGS	Derived from National Land Cover Dataset 2019
Population	US Census Bureau	2020 U.S. Census
Population Growth	US Census Bureau	Calculated change between the 2010 and 2020 U.S. Census
U.S. Congressional Districts - Louisiana	LADOTD	Congressional District Boundaries
State House & Senate Districts - Louisiana	LADOTD	State House and Senate District Boundaries
National Risk Index	FEMA	NRI Rating data at the census tract level

The Discovery engagement process also included the development of a user-friendly website for data collection, verification, and coordination. The website was developed to become a repository to collect project information such as community background data; newsletters; planned meeting dates, times, and locations; project data deliverables; and reports. Figure 8 and Figure 9 show the website splash screen and progress tracking page, respectively.

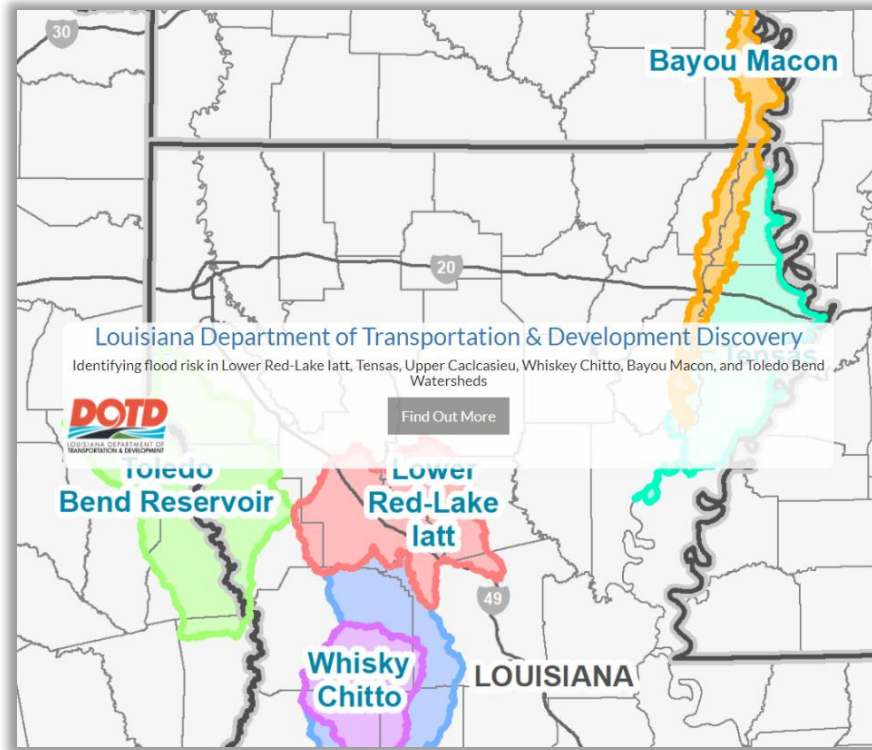


Figure 8: Website Splash Screen

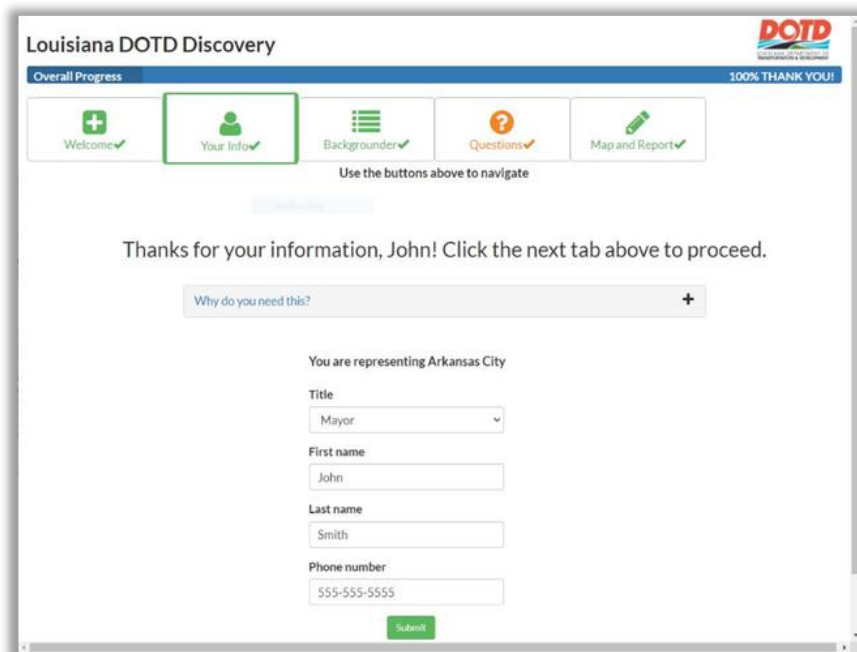


Figure 9: Website Progress Tracking Page

For the FEMA LADOTD Discovery project, the Discovery website allowed participating stakeholders to view basemap layers pertinent to the study area, including BLE rasters and polygons, effective FIRM layers, and satellite and street view imagery. Users were then able to update flood-related information about their community, including local flood risks, flood hazards, mitigation plans, mitigation activities, flooding history, development plans, and floodplain management activities. It also allowed stakeholders to input Areas of Mitigation Interest (AOMI) such as mitigation concerns, mapping needs, and requests on a web map. The website tracked community participation and helped accelerate the Discovery process by creating easy-to-use GIS shapefiles with attribute tables relevant to flood sources and community comments. Figure 10 shows the webmap interface.

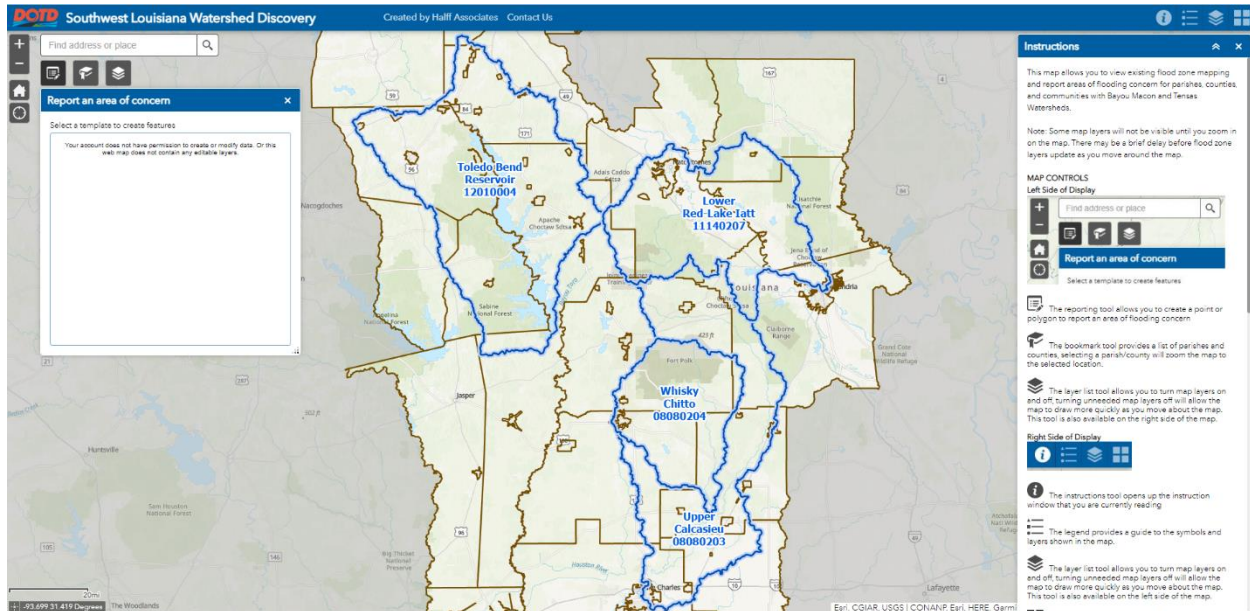


Figure 10: Webmap Interface

## Pre-Discovery Engagement Efforts

A Discovery flyer was emailed out to the communities on file two weeks prior to the Pre-Discovery Meeting. A Discovery newsletter was also developed and distributed to all stakeholders to gain public awareness of the Whisky Chitto Discovery process. The newsletter contained information about FEMA’s Risk MAP program, the Discovery process, details of the upcoming Pre-Discovery Meeting, the data collection process, and the Risk MAP process beyond Discovery. A copy of the flyer and the newsletter is included in [Appendix I](#).

LADOTD held a virtual informational Pre-Discovery Meeting on January 19, 2022, for stakeholders in the study watershed. A copy of the presentation is available in [Appendix I](#). The Pre-Discovery informational meeting was held to increase awareness of the Discovery process prior to the Discovery Meeting so the stakeholders would be prepared to fully participate in the Discovery process. Seven stakeholders participated in the meeting. The goals of the Pre-Discovery Meeting were to:

- Explain the Discovery process
- Explain why the LADOTD was conducting Discovery in the Whisky Chitto watershed
- Explain FEMA’s Risk MAP program and benefits
- Introduce the website with a tutorial and open website enrollment
- Obtain information for Discovery in the watershed

## Discovery Meeting

An in-person Discovery Meeting was held in the watershed with the goals of gathering additional flood risk data, discussing the communities' flooding history, development plans, flood mapping needs, and flood risk concerns, and discussing the vision for the watershed's future and the importance of mitigation planning and community outreach. The Discovery Meeting occurred on March 10, 2022, from 12:00 pm - 4:00 pm at the Beauregard Parish Library in DeRidder, Louisiana. In addition, an in-person Discovery Meeting was held in the Lower Red – Lake Iatt watershed on March 8, 2022 at the Natchitoches Parish Library from 12:00 pm - 4:00 pm in Natchitoches; Louisiana, and an in-person Discovery Meeting was held in the Toledo Bend Reservoir watershed on March 9, 2022 at the Cypress Bend Golf Resort, Spa and Conference Center from 12:00 pm - 4:00 pm in Many, Louisiana. Local stakeholders were invited to join for any of these meetings to offer flexibility in schedules and ideally collect more data.

Community stakeholders were able to participate in the meeting when most convenient to them. Discovery Ambassadors assisted stakeholder attendees through various stations in a “come and go” format. The stations included:

- *Laptops* – stakeholders were able to review, edit, or add information entered on the Discovery website.
- *Discovery Maps* – data collection process to capture information on identifying flood risk locations and problems, areas of growth or planned development, answering floodplain questions, and identifying map need locations.

Following the Discovery Meeting, stakeholders were contacted through email and phone calls to discuss their concerns and comments in detail. Often, in-person meetings were scheduled to offer a more in-depth webmap training and fuller conversations surrounding the identified areas of mitigation interest. Through these efforts, 100% community participation and representation were achieved via either phone/email coordination, in person meetings, or webmap usage.

The Whisky Chitto Discovery project gathered 11 comments, including one from phone calls, and 10 from the online web map. Of these 11 comments, no new mapping requests were made.

## Watershed Findings and Prioritizations

### Watershed Findings

Following the Discovery meeting, the gathered community comments were placed into categories by comment type and summarized by parish, as shown in Table 5.

Table 5: Whisky Chitto Comment Distribution by Parish

Parish Names	Stakeholder Comments					Other (As Reported)	Total Number of Comments
	Areas of Mitigation Success	Past Claim Hot Spot	Repetitive Loss	Streamflow Constrictions	Flooding Hot Spot		
Allen	No Comments Received						0
Beauregard			1		4	1. Suggest helping with resiliency and mitigation plan for the city	6
Rapides	No Comments Received						0
Vernon			1	1	3		5

\*Some comments were general to watershed naming, do not provide flooding or pertinent information, or are conversations had and are not represented in this table.

Figure 11 shows a sample of the comments submitted by communities. Beauregard Parish had the highest number of comments with six comments submitted. This parish expressed concerns about flooding hot spots and repetitive loss. There were seven comments about flooding hot spots, two were about repetitive loss, one was about streamflow constrictions, and one suggested help for a city resiliency plan. All stakeholder comments were submitted to FEMA in the digital supplemental data deliverable associated with this project.

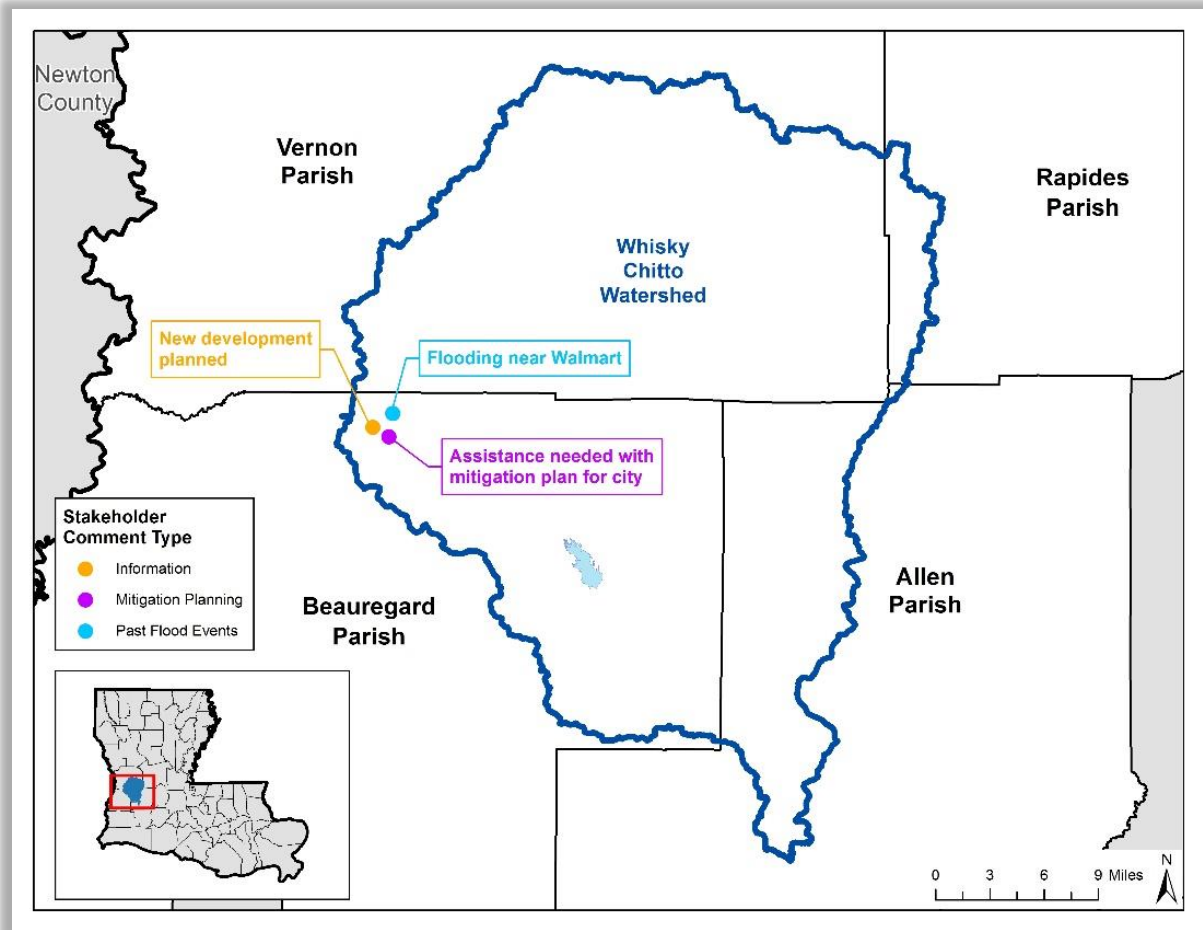


Figure 11: Stakeholder Comment Example

Figure 12 demonstrates the differences in numbers per comment type. There were nine comments regarding flooding and repetitive loss concerns, including flooding near buildings and overtopping bridges. One comment stated new development in the area, and one pertained to a resiliency and mitigation plan for the City of DeRidder.

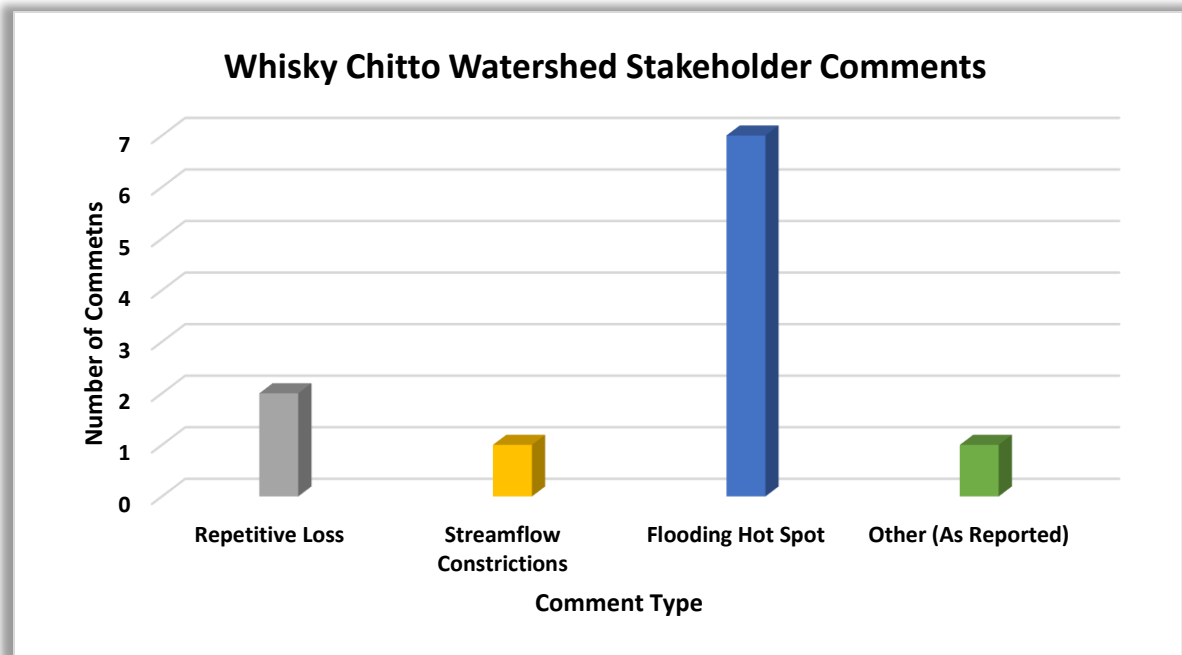


Figure 12: Stakeholder Comment Totals

### Project Selection and Prioritization

Because of the presence of almost 780 unverified CNMS stream miles in either Zone A or AE in the rural communities of this HUC-8 watershed, it is recommended that mapping updates be performed at a parish-wide level, rather than at the level of the individual flooding sources. This recommended mapping change would bring the number of modernized parishes from three to four [Rapides Parish is not yet modernized]. Table 6 below gives a more in-depth review of the parish CNMS data for all four parishes that intersect the Whisky Chitto watershed.

Table 6: CNMS Data by Parish

CNMS Data by Parish							
Parish	Total Area (mi <sup>2</sup> )	Oldest Effective FIRM Date	Total Stream Miles	Total Streams Unverified			A/AE Unverified of Total Mileage
				Zone	Segment Count	Miles	
Allen	747	3/17/2011	1,498	A	54	129	13%
				AE	2	64	
Beauregard	1,157	11/26/2010	1,804	A	285	745	44%
				AE	15	48	
Rapides	1,319	3/2/1981	2,268	A	194	392	22%
				AE	24	102	
Vernon	1,320	11/26/2010	2,678	A	90	404	16%
				AE	15	30	

Using the age of the oldest effective FIRM in the parish in conjunction with the percentage of unverified CNMS stream mileage, these parishes were prioritized from a low to moderate to high ranking with Rapides Parish rated as the highest priority. In addition to the CNMS data listed above, additional information such as partial update coverage and dates, DFIRM status, and stakeholder comments and requests were considered for this ranking. The outcome of this exercise can be seen below in Table 7.

Table 7: Mapping Needs Prioritization by Parish

Mapping Needs Prioritization by Parish		
Parish	Priority	Reason
<b>Rapides</b>	Highest	More than 20% of the stream miles are unverified, and the oldest effective date exceeds the last 40 years. No DFIRM.
<b>Beauregard</b>	Moderate	More than 40% of the stream miles are unverified, but the oldest effective date is within the last 15 years. DFIRM available.
<b>Allen</b>	Low	Less than 15% of the stream miles are unverified, and the oldest effective date is within the last 15 years. DFIRM available.
<b>Vernon</b>	Low	Less than 20% of the stream miles are unverified, and the oldest effective date is within the last 15 years. DFIRM available.

Allen and Vernon Parishes received a “Low” ranking due to relatively new FIRM data, DFIRM availability, a lower percentage of unverified stream miles. A total of six mapping comments from stakeholders in Beauregard Parish show the community’s desire for widespread flooding to be addressed with key attention to Repetitive Loss properties. Available data for these mitigation measures has been recently updated as the parish received a partial update on January 5, 2018. Still, with over 40% of the stream miles being unverified Zone A or AE streams and the oldest FIRM exceeding 10-years, this parish receives “Moderate” ranking for mapping needs. The lack of DFIRM availability, oldest FIRM dates in the watershed (dating back to 1981), and over 20% of CNMS mileage being unverified Zone A or AE all support Rapides Parish in receiving the “Highest” ranking for CNMS needs prioritization. A heatmap outlining each parish’s rank and unverified CNMS Zone A and AE streams can be seen in Figure 13.

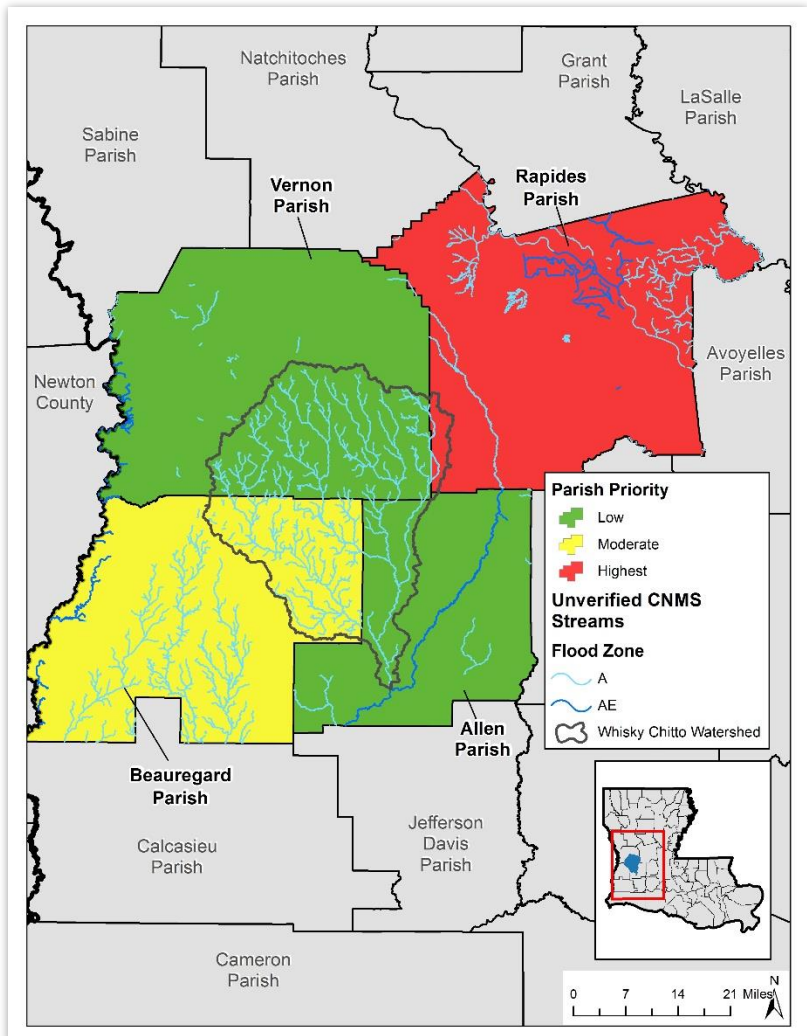


Figure 13: Parish Prioritization with Unverified CNMS Zone A and AE

When considering these projects, effort and cost associated with that effort must be weighed. The bulk of stream miles in need of update for all four of these parishes fall under Zone A. Given the BLE availability and recent practices of adopting BLE for FIRM map creation, it is expected that these miles will incur a reduced cost from previous Zone A modeling and mapping tasks. All four parishes do have unverified Zone AE streams as well. These will require enhancement of the BLE models with structure survey and further refinement before being used for any FIRM production. Additionally, the presence of a floodway in these streams would require a more advanced 2D modeling enhancement approach to produce accurate floodway coverage. The additional confidence in the BLE results after refinement and updated survey data in the Zone AE flood zones will provide communities with better models for mitigation considerations such as channel widening or hardening, pump resizing, and other approaches that might be considered to address the concerns given through the Discovery process. This parish-wide mapping approach will maximize the value received from the improved models and mapping updates.

Data availability for enhancement and limiting factors, such as lack of levee accreditation, must also be weighed when considering parishes for updates and modernization. For parishes with non-accredited levee systems, further discussions on the status and schedule of accreditation should happen before the investment in the enhancement of BLE. Table 8 and Table 9 outline the data availability and limitations as described.

Table 8: Parish Levee Accreditation Status\*

Parish	Modernized	Levee Accreditation	
		Levee	Accreditation
Allen	Y	Allen Parish Agricultural and Oil and Gas Levees	Non-Accredited
Beauregard	Y	-	-
Rapides	N	Aloha-Rigolette LA	Accredited
		Philip Bayou Levee	Accredited
		Pineville LA	Accredited
		Red River-South Bank Systems	Accredited
		West of Atchafalya Basin	Accredited
Vernon	Y	-	-

\*Includes all levees in the parishes affected by the watershed

Table 9: Parish BLE Status

Parish	Additional Intersecting BLE Models		
	Watershed Name	Status	Level of Study
Allen	Bayou Teche	Published	2D
	Mermentau Headwaters	Published	2D
	Upper Calcasieu	Published	2D
Beauregard	Lower Sabine	Published	1D
	Upper Calcasieu	Published	2D
	West Fork Calcasieu	In Progress	-
Rapides	Bayou Teche	Published	2D
	Little	Published	2D
	Lower Red	Published	2D
	Lower Red-Lake latt	Published	2D
	Upper Calcasieu	Published	2D
Vernon	Lower Red-Lake latt	Published	2D
	Lower Sabine	Published	1D
	Upper Calcasieu	Published	2D

### Flood Risk Assessments Results

HAZUS is a risk assessment software program for analyzing potential losses in dollars from floods, hurricane winds, and earthquakes. The BLE flood data developed for this project was used as input data for the HAZUS-based flood risk assessment. The Whisky Chitto watershed has an estimated \$3.2 billion dollars worth of vulnerable assets, including residential, commercial, and other asset types. If a 100-year storm event were to occur throughout the watershed, HAZUS estimated nearly three percent of the assets will be damaged, with losses estimated at over \$95 million dollars to physical assets. There will also be economic losses, including lost wages, inventory losses, losses in production, and economic opportunity losses, valued at \$78 million dollars. Figure 14 and Figure 15 show the capital stock inventory within the study watershed and the corresponding 100-year event losses. Figure 11 in [Appendix I](#) shows a more detailed potential loss risk map for the watershed.

Because the parishes in the Whisky Chitto watershed have land in other watersheds, these HAZUS-based 100-year flood loss estimates are not indicative of their total potential loss estimates. Hence, the losses shown in this report do not necessarily represent community-wide totals.

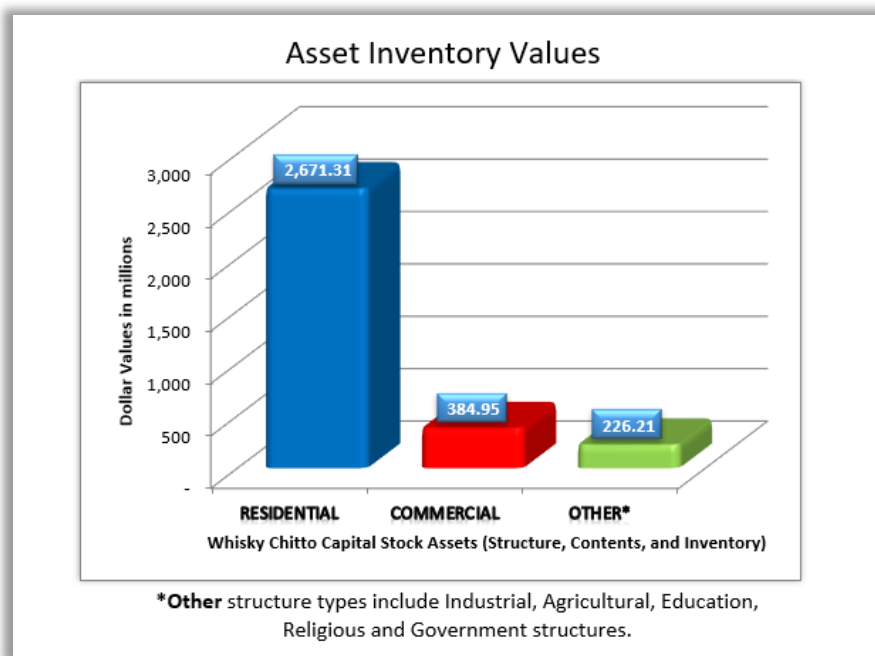
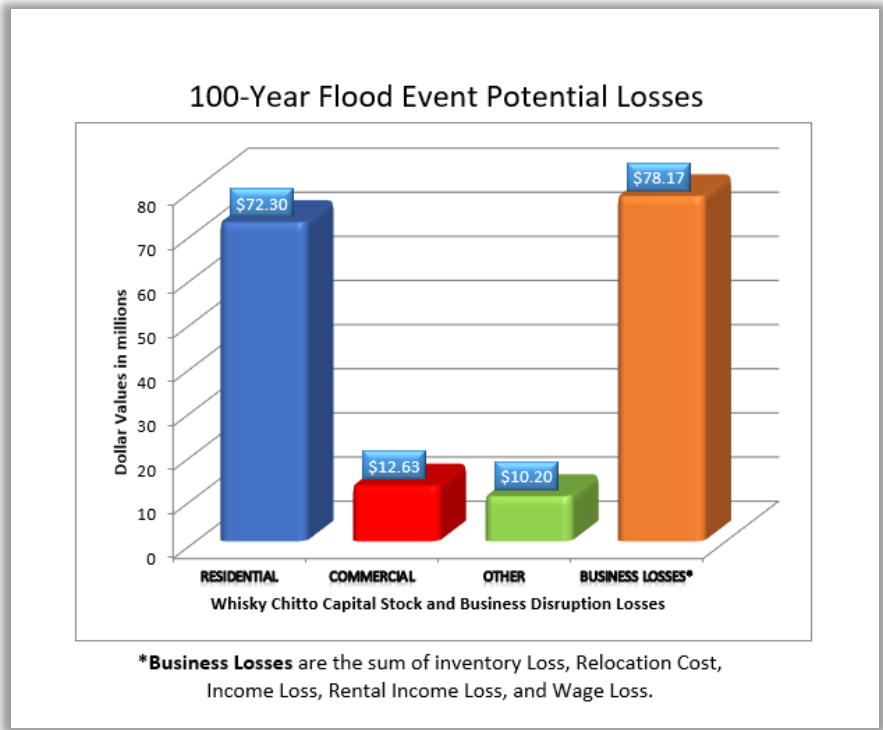


Figure 14: Asset Inventory Value Totals



*Figure 15: 100-Year Flood Potential Loss Totals*

Aggregating the HAZUS-based 100-year flood loss estimates to parishes provides another method to prioritize new studies and hazard mitigation projects in the watershed. Figure 16 ranks the HUC-12s by estimated flood losses. Most of the watershed is at risk for \$1 million dollars to \$84 million dollars in potential loss if there is a 100-year flood event. The northeast section is at risk for \$500,000 dollars to \$1 million dollars in losses, and the northern section is at risk for less than \$500,000 dollars in damages.

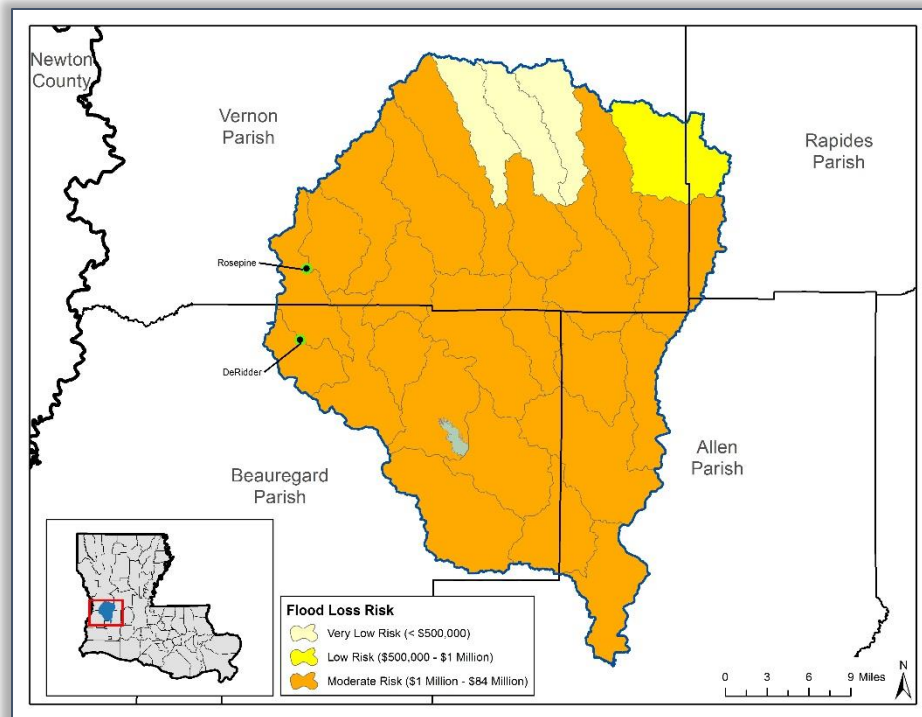


Figure 16: HAZUS-based 1% Annual Chance Loss Estimates by HUC-12s

### Project Recommendation

Based on the needs of the communities, the availability of the data, and the current FEMA investment process, the proposed projects were prioritized for FEMA investment based on the following criteria. First, non-digital parishes with no levees are recommended as primary considerations for immediate investment. The projects would enhance the BLE data in areas with effective Zone AE streams and advance BLE data to FIRMs. The next tier is the non-digital parishes with accredited levees. These projects would enhance and advance BLE while incorporating the results of the levee accreditation. The next tier is the non-digital parishes with non-accredited levees. These projects require additional coordination with the levee owners to determine accreditation status and schedule before BLE enhancement and advancement can occur. The readiness of the community to provide support can also be considered in the project prioritization.

From the outlined criteria for consideration and available data for reference, the following projects are recommended.

- Rapides Parish BLE Enhancement and Regulatory Update** – Rapides Parish is non-digital with 804 miles of a combination of model backed and non-model backed effective Zone A and 207 miles of Zone AE streams. The study would leverage the six BLE datasets and enhance the 207 miles through the effective Zone AE. The enhanced data would be combined with the BLE data to update the parish regulatory data. Prior to funding the study, the levee accreditation status of the five systems would be confirmed. If there are any proposed changes to the accreditation status, then the levee information would be confirmed prior to initiating the regulatory process. The Parish Social Vulnerability Index Score is 0.9198.

- **Vernon Parish BLE Enhancement and Regulatory Update** –Vernon Parish FIRMs are digital and were updated as recently as 2010, 2011, and 2018. There are 1,256 miles of a combination of model-backed and non-model-backed effective Zone A and 38 miles of Zone AE streams in the parish. The study would leverage the Whisky Chitto, Lower Red-Lake latt, Lower Sabine, and Upper Calcasieu BLE datasets and enhance the 38 miles through the effective Zone AE. The enhanced data would be combined with the BLE data to update the parish regulatory data. The Parish Social Vulnerability Index Score is 0.7801.
- **Allen Parish BLE Enhancement and Regulatory Update** – Allen Parish FIRMs are digital and were updated in 2011. There are 310 miles of a combination of model-backed and non-model-backed effective Zone A and 67 miles of Zone AE streams in the parish. The study would leverage the Whisky Chitto, Bayou Teche, Mermentau Headwaters, and Upper Calcasieu BLE datasets and enhance the 67 miles through the effective Zone AE. The enhanced data would be combined with the BLE data to update the parish regulatory data. Prior to funding the study, the levee accreditation status of the Allen Parish Agricultural and Oil and Gas Levees would be confirmed. If there are any proposed changes to the accreditation status, then the levee information would be confirmed prior to initiating the regulatory process. The Parish Social Vulnerability Index Score is 0.768.
- **Beauregard Parish BLE Enhancement and Regulatory Update** - Beauregard Parish FIRMs are digital and were updated in 2010 and 2018. There are 1,037 miles of a combination of model backed and non-model backed effective Zone A and 77 miles of Zone AE streams in the parish. The study would leverage the Whisky Chitto, Lower Sabine, Upper Calcasieu, and West Fork Calcasieu BLE datasets and enhance the 77 miles through the effective Zone AE. The enhanced data would be combined with the BLE data to update the parish regulatory data. The Parish Social Vulnerability Index Score is 0.5942.

#### **Follow-Up On Phase Project Decisions**

The BLE results and the effective DFIRM floodplains were compared to identify any areas of significant change. If the results show large areas of change (expansions and contractions of the floodplain, increases and decreases of the computed BFEs, and increases in expected flow values) FEMA will continue to coordinate with the communities to identify the streams that should be considered for FIRM updates. These updates could be Letter of Map Revisions for small project areas, or a Physical Map Revision for large areas with mapping changes.

To identify other streams for future refinement, community growth patterns and potential growth corridors should be discussed with FEMA. These areas of expected community growth and development may benefit from updated flood hazard information. BLE can be further refined to provide detailed study information for a Flood Risk Identification Study and a FIRM update.

Areas of communities that were developed prior to 1970 (pre-FIRM areas) may include repetitive and severe repetitive loss properties. They may also be areas where re-development is likely to occur. Having updated flood hazard information before re-development and reconstruction activities take place may benefit communities by providing guidance to mitigate future risk.



*The Discovery process aims to identify a subset of the BLE stream studies to be updated and included on the FIRMs. Communities may wish to review these possible areas and provide feedback once the BLE data has been received. Local communities can also refine BLE information and submit it through the Letter of Map Revision (LOMR) process to revise the existing flood hazard information and maintain the FIRMs throughout their community.*

### Post-Discovery Findings Meeting

LADOTD held one virtual Post-Discovery Meeting on March 17, 2023, for stakeholders in the watershed. A copy of the presentation is available in [Appendix I](#).

The Post-Discovery informational webinar was held to discuss the results of the Discovery process and findings, including a review of comments received, preliminary HAZUS results, and BLE data. The [FEMA Estimated BFE viewer](#), which can be used for reporting and downloading data, was presented and demonstrated to community stakeholders. The goals of the Post-Discovery Meeting were to:

- Recap FEMA’s Risk MAP program’s benefits and the Discovery process
- Discuss comments received by stakeholders
- Explain watershed prioritization and stream study requests
- Review HAZUS results
- Demonstrate the permanent FEMA BFE viewer
- Release a draft report to the communities prior to the release of the final report

### Future Investments Decisions

FEMA will work closely with communities to identify additional areas for model refinement and FIRM panel updates. Communities will be provided information and training to support the use of BLE for planning, floodplain management, permitting, and risk communication activities. FEMA will work with communities to review, interpret, and incorporate the BLE information into their daily and future community management and planning activities.

### Next Steps

Once the Discovery process is completed, FEMA will review project recommendations and determine if a project will move forward to update the regulatory products (FIS report, FIRM, and DFIRM database). A cursory review of the modeling results indicates that this study area has significant changes in floodplain width and depth.

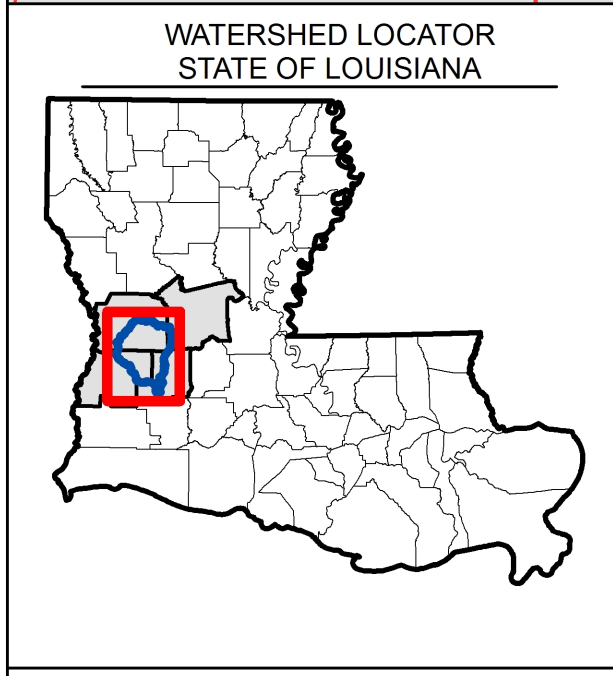
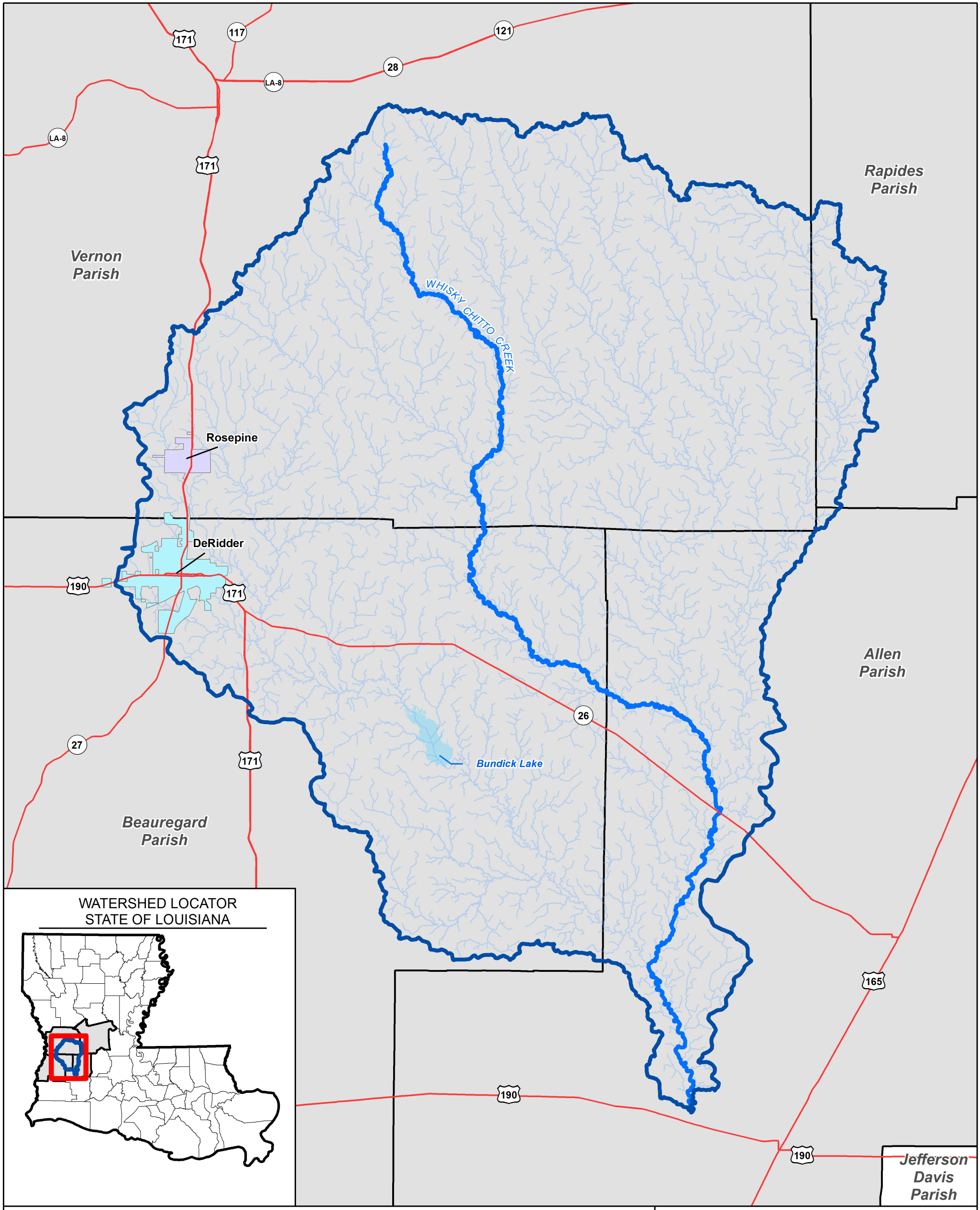


*FEMA will work with communities to collect any outstanding technical inquiries within the study area after delivering the hydrologic and hydraulic analysis and floodplain work maps. After coordinating with communities, FEMA will likely initiate the Phase Three effort to update the regulatory products.*

## Appendix I: Additional Data

# Appendix Figures

- Figure 01: Watershed (HUC-8) Location
- Figure 02: U.S. Congressional Districts
- Figure 03: Louisiana State House Districts
- Figure 04: Louisiana State Senate Districts
- Figure 05: Population Density
- Figure 06: Land Cover
- Figure 07: Population Change
- Figure 08: Effective Floodplains
- Figure 09: Topographic Data Source
- Figure 10: NFIP Flood Losses
- Figure 11: Flood Risk – Potential Losses
- Figure 12: Social Vulnerability Index
- Figure 13: Resilience Rating
- Figure 14: Flood Risk Rating
- Figure 15: Flood Risk Population Exposure
- Figure 16: Community Rating System (CRS) Participating Communities



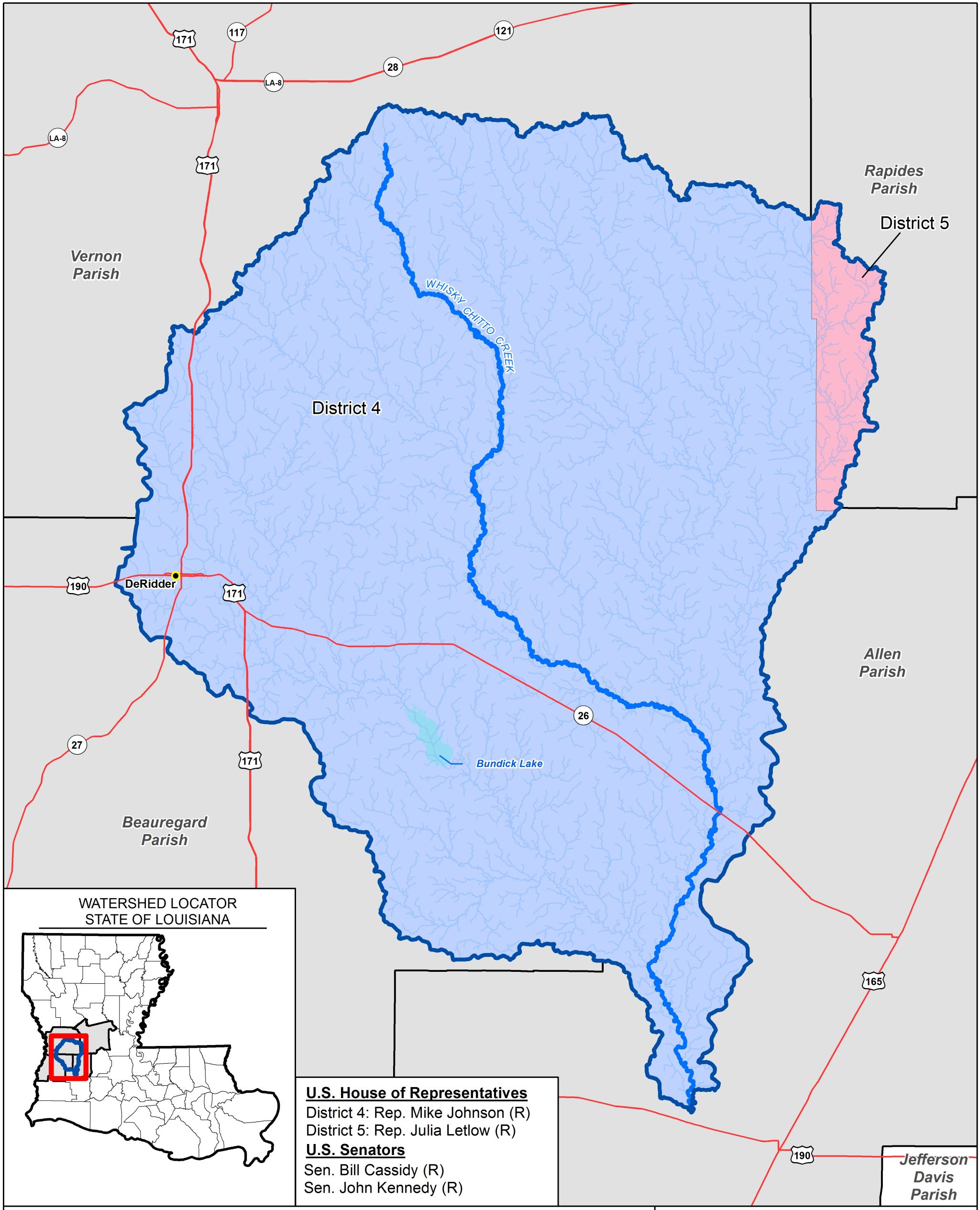
**Map Symbology**

- Whisky Chitto Creek
  - Other Streams
  - Major Highways
  - Watershed Boundary: HUC-8
  - Lake
  - Discovery Parish Boundary
  - Other Parish Boundary
- Municipalities**
- DeRidder
  - Rosepine

**Figure 1:  
Watershed (HUC-8) Location**

WHISKY CHITTO WATERSHED  
September 16, 2022





**WATERSHED LOCATOR STATE OF LOUISIANA**

**U.S. House of Representatives**  
 District 4: Rep. Mike Johnson (R)  
 District 5: Rep. Julia Letlow (R)

**U.S. Senators**  
 Sen. Bill Cassidy (R)  
 Sen. John Kennedy (R)

**Map Symbology**

- Parish Seat
- ~ Whisky Chitto Creek
- ~ Other Streams
- Major Highways
- Watershed Boundary: HUC-8
- Lake
- Discovery Parish Boundary
- Other Parish Boundary

**U.S. Congressional Districts**

- 4
- 5

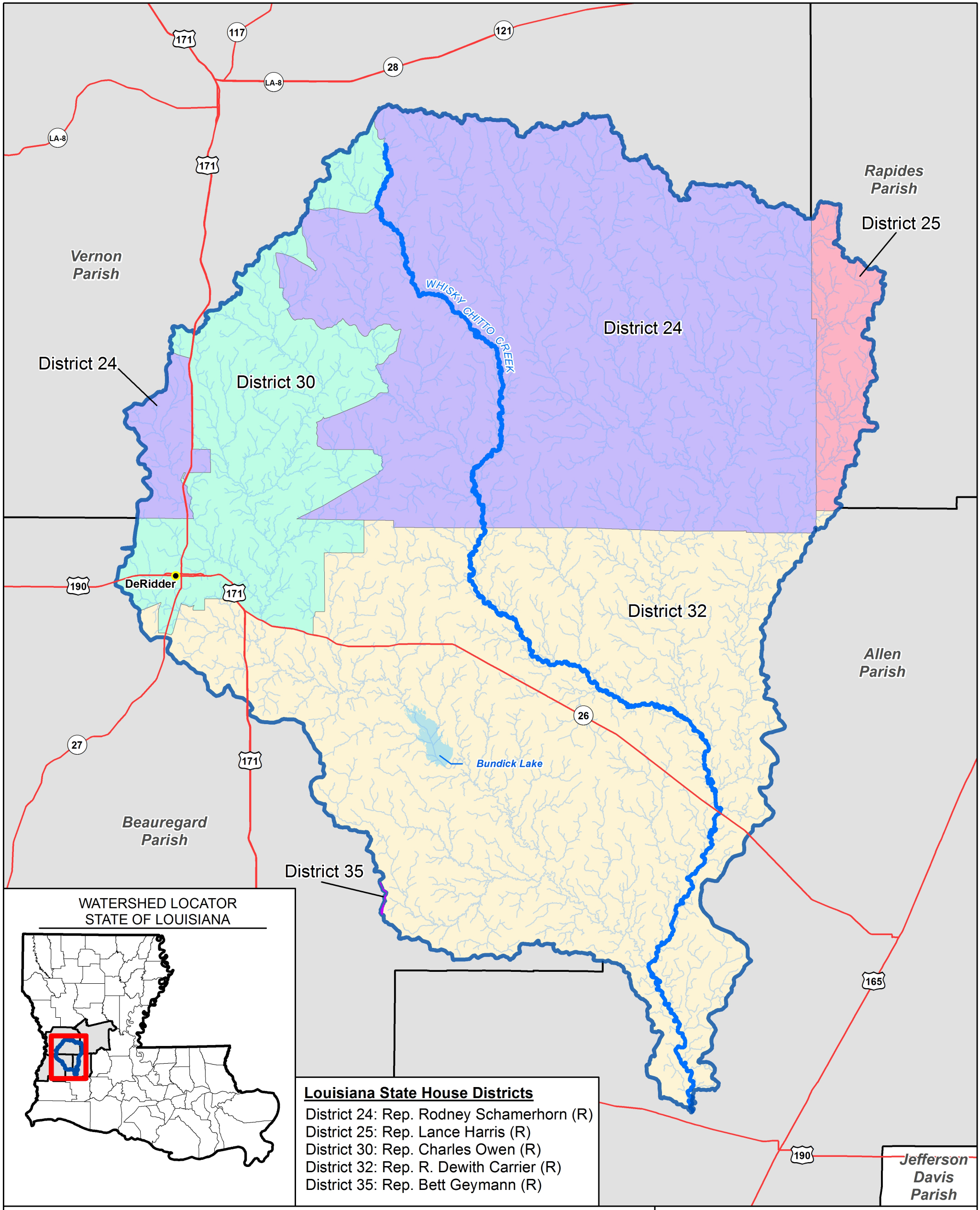
**Figure 2:**

**U.S. Congressional Districts**

WHISKY CHITTO WATERSHED

September 16, 2022

0 4 8 Miles



**Louisiana State House Districts**  
 District 24: Rep. Rodney Schamerhorn (R)  
 District 25: Rep. Lance Harris (R)  
 District 30: Rep. Charles Owen (R)  
 District 32: Rep. R. Dewith Carrier (R)  
 District 35: Rep. Bett Geymann (R)

**Map Symbology**

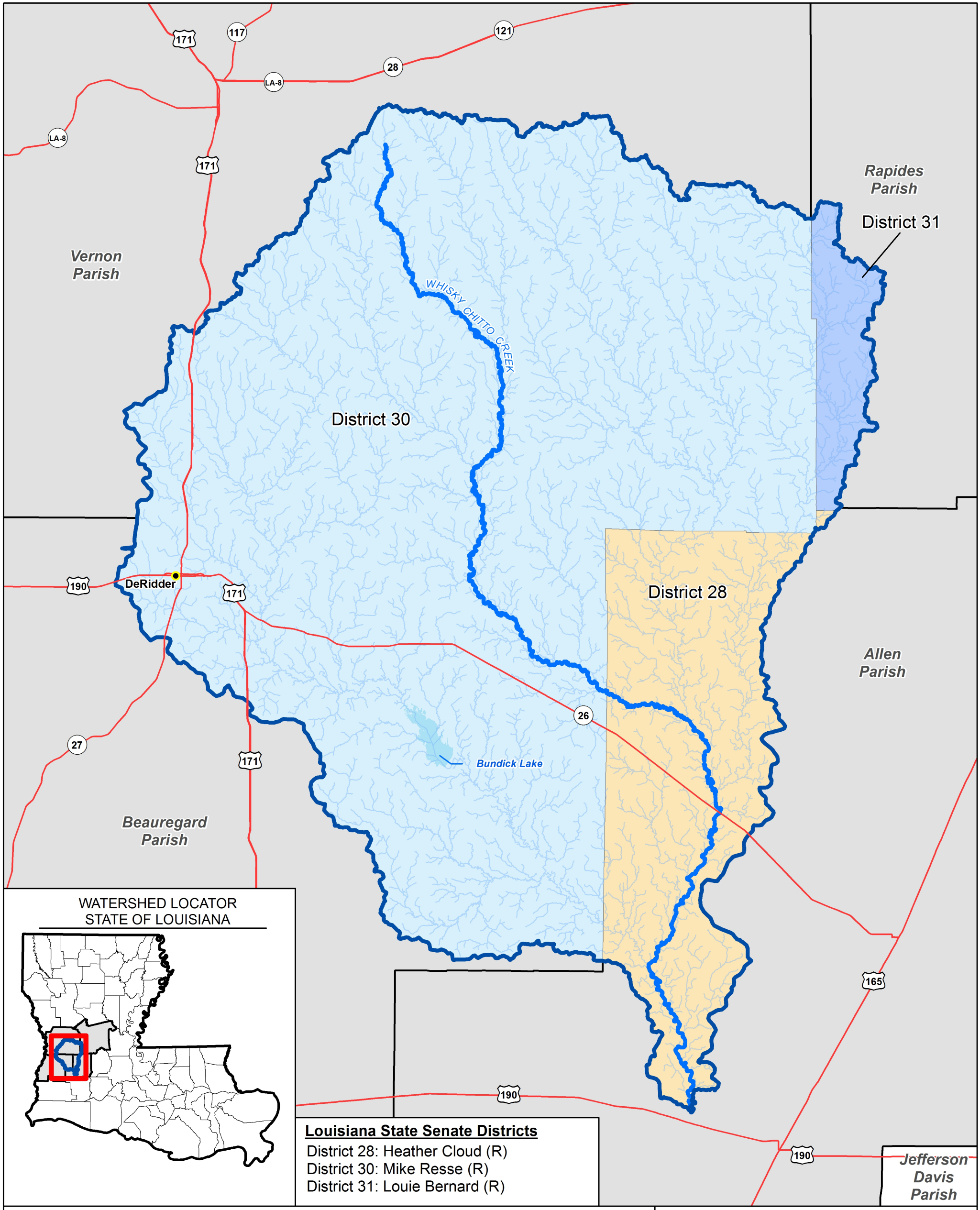
- Parish Seat
- Whisky Chitto Creek
- Other Streams
- Major Highways
- Watershed Boundary: HUC-8
- Lake
- Discovery Parish Boundary
- Other Parish Boundary

- Louisiana State House Districts (2020)**
- House District 24
  - House District 25
  - House District 30
  - House District 32
  - House District 35

**Figure 3:**  
**Louisiana State House Districts**  
 WHISKY CHITTO WATERSHED

September 16, 2022





Rapides Parish  
District 31

District 30

District 28

Allen Parish

Beauregard Parish

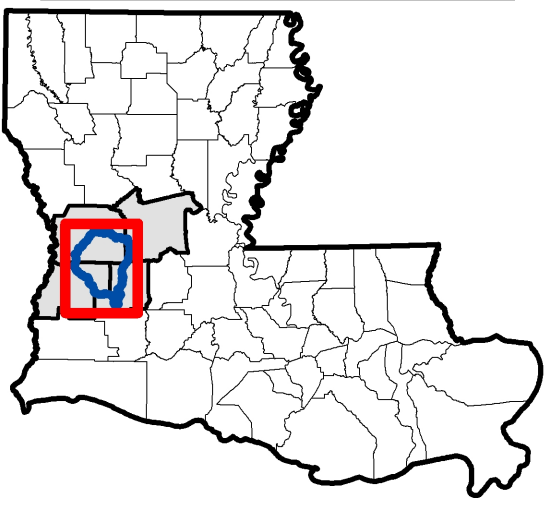
Jefferson Davis Parish

DeRidder

WHISKY CHITTO CREEK

Bundick Lake

**WATERSHED LOCATOR  
STATE OF LOUISIANA**



**Louisiana State Senate Districts**

- District 28: Heather Cloud (R)
- District 30: Mike Resse (R)
- District 31: Louie Bernard (R)

**Map Symbology**

- Parish Seat
- Whisky Chitto Creek
- Other Streams
- Major Highways
- Watershed Boundary: HUC-8
- Lake
- Discovery Parish Boundary
- Other Parish Boundary

**Louisiana State Senate Districts (2020)**

- Senate District 28
- Senate District 30
- Senate District 31

**Figure 4:**

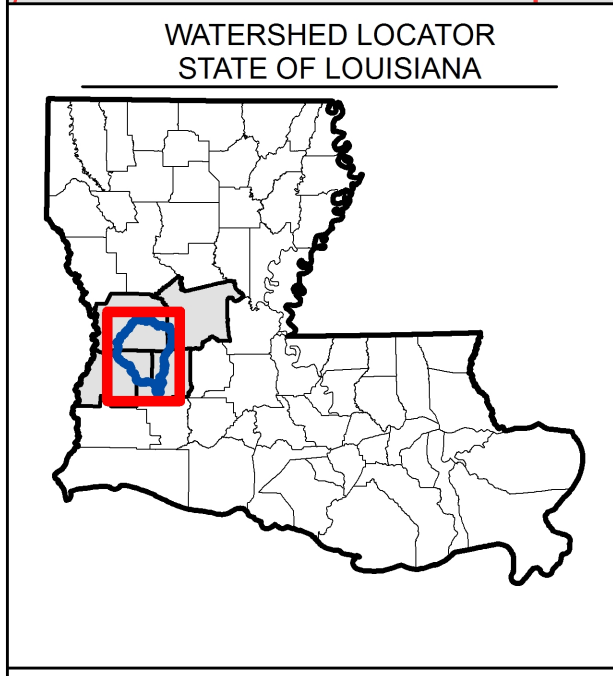
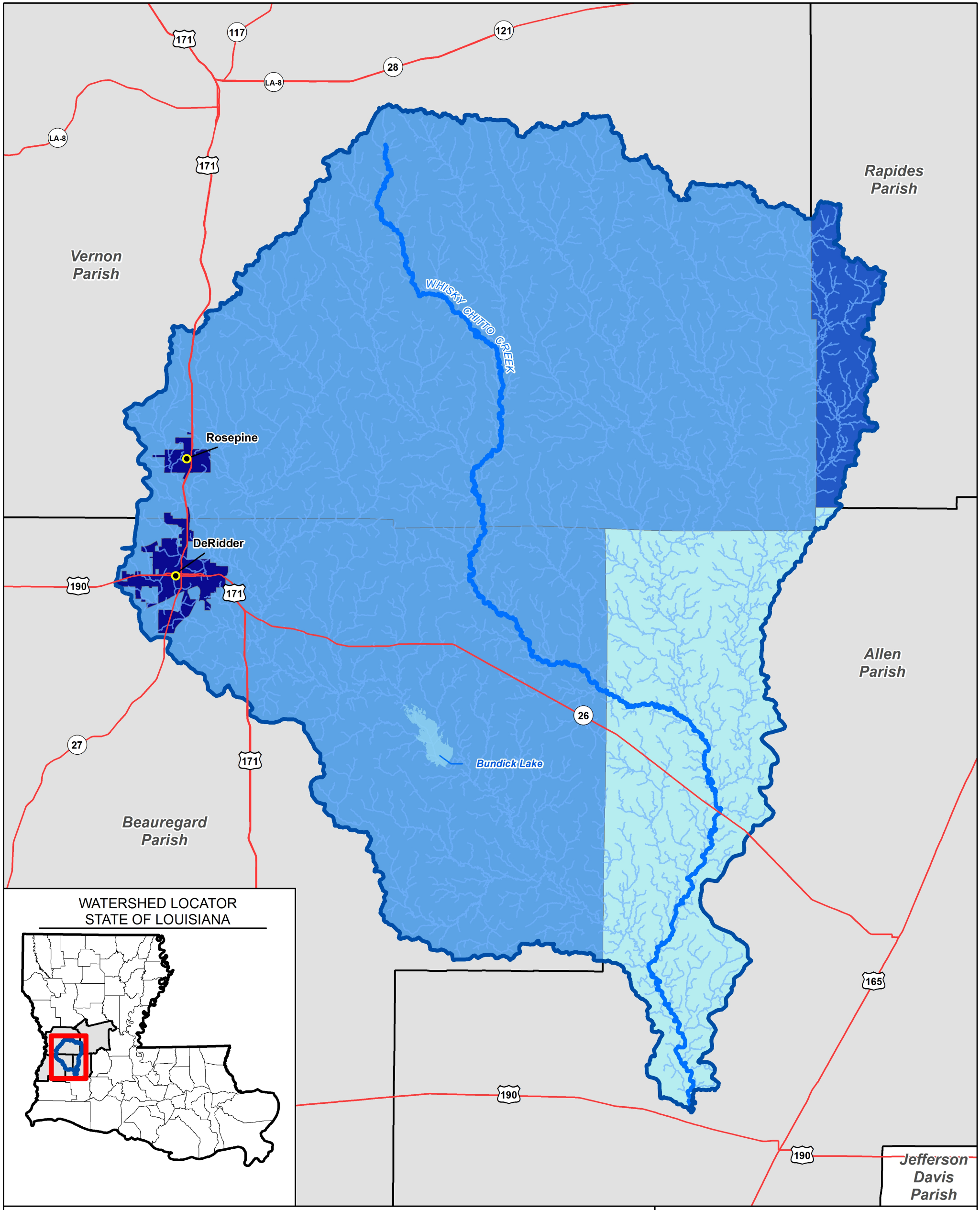
**Louisiana State Senate Districts**

WHISKY CHITTO WATERSHED  
September 16, 2022



FEMA





**Map Symbology**

- Cities
- Whisky Chitto Creek
- Other Streams
- Major Highways
- Watershed Boundary: HUC-8
- Lake
- Discovery Parish Boundary
- Other Parish Boundary

**Population Density (2020\*)**

- Very Low
- Low
- Medium
- High

**Figure 5:**

**Population Density**

WHISKY CHITTO WATERSHED

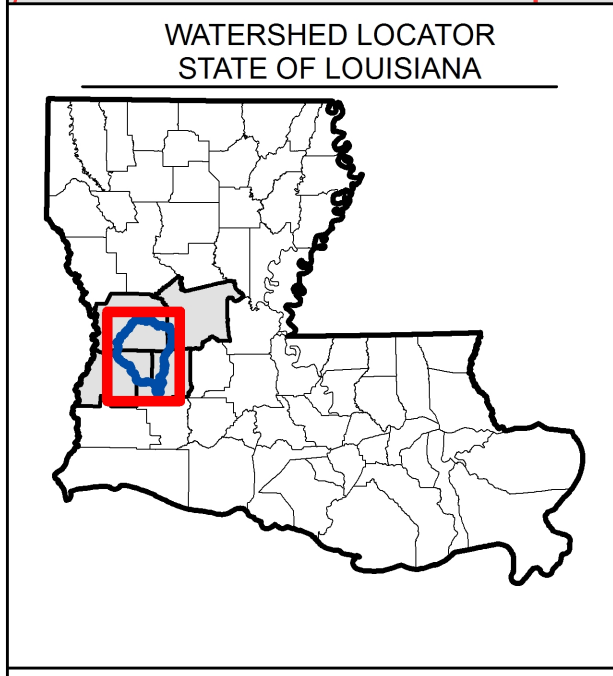
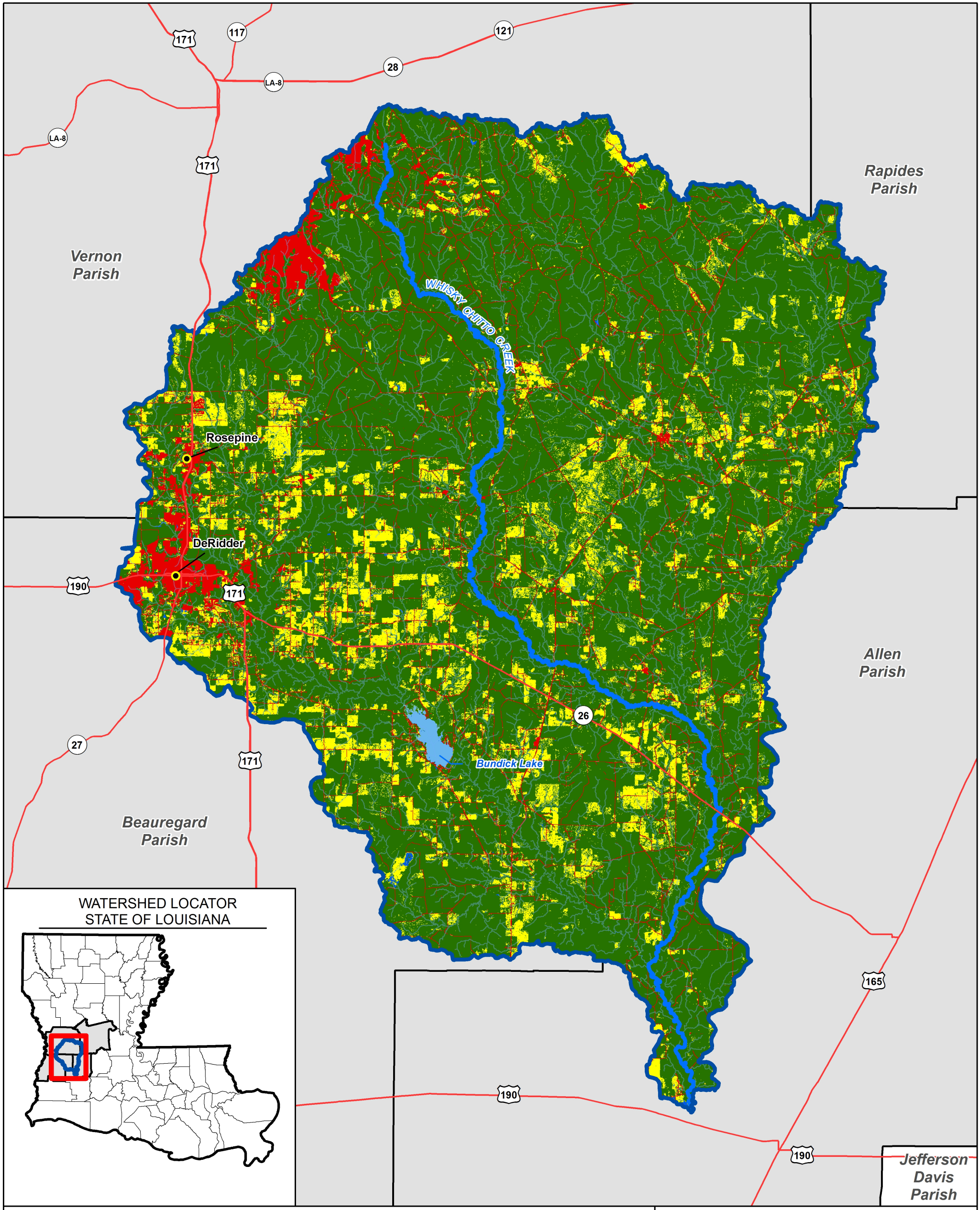
September 16, 2022



FEMA



\*Source: 2020 U.S. Census



**Map Symbology**

- Cities
- Whisky Chitto Creek
- Other Streams
- Major Highways
- Watershed Boundary: HUC-8
- Lake
- Discovery Parish Boundary
- Other Parish Boundary

- Land Cover (USDA 2021\*)**
- Farming
  - Forestry
  - Open Water
  - Urban Development

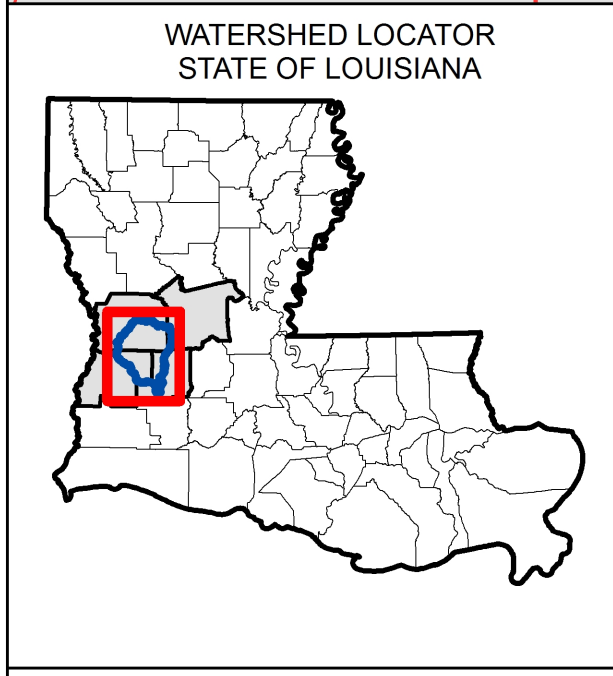
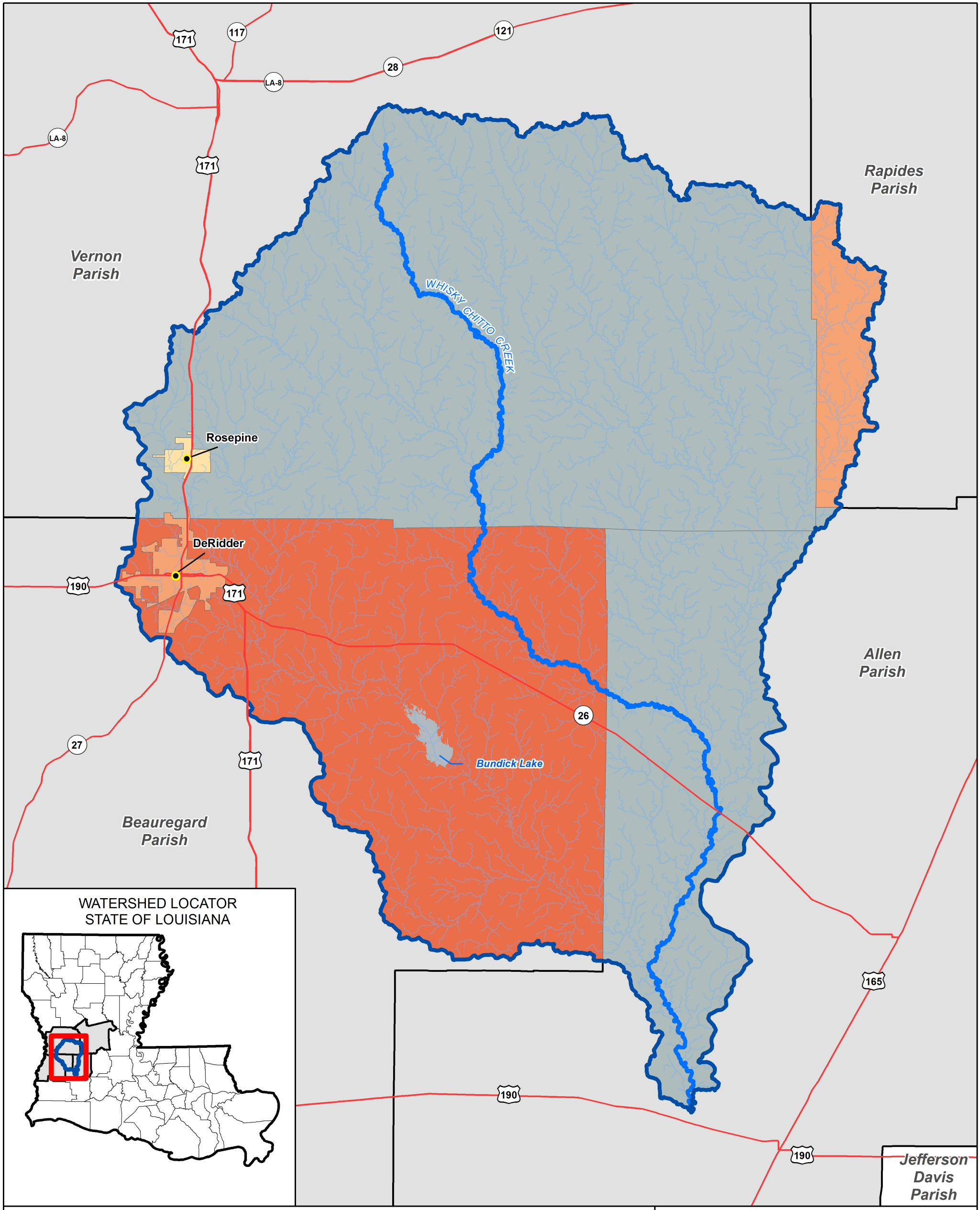
**Figure 6:**

**Land Cover**

WHISKY CHITTO WATERSHED  
September 16, 2022



\*United States Department of Agriculture (USDA) Cropland Data Layer



**Map Symbolology**

- Parish Seat
- Whisky Chitto Creek
- Other Streams
- Major Highways
- Watershed Boundary: HUC-8
- Lake
- Other Parish Boundary
- Other Parish Boundary selection

**Percent Population Change 2010-2020\***

- Less than -20%
- 10% to -20%
- 5% to -10%
- 0 to -5%
- No Change
- 0 to 5%
- 5% to 10%

\*Source: 2010, 2020 U.S. Census

**Figure 7:**

**Urban Land Use**

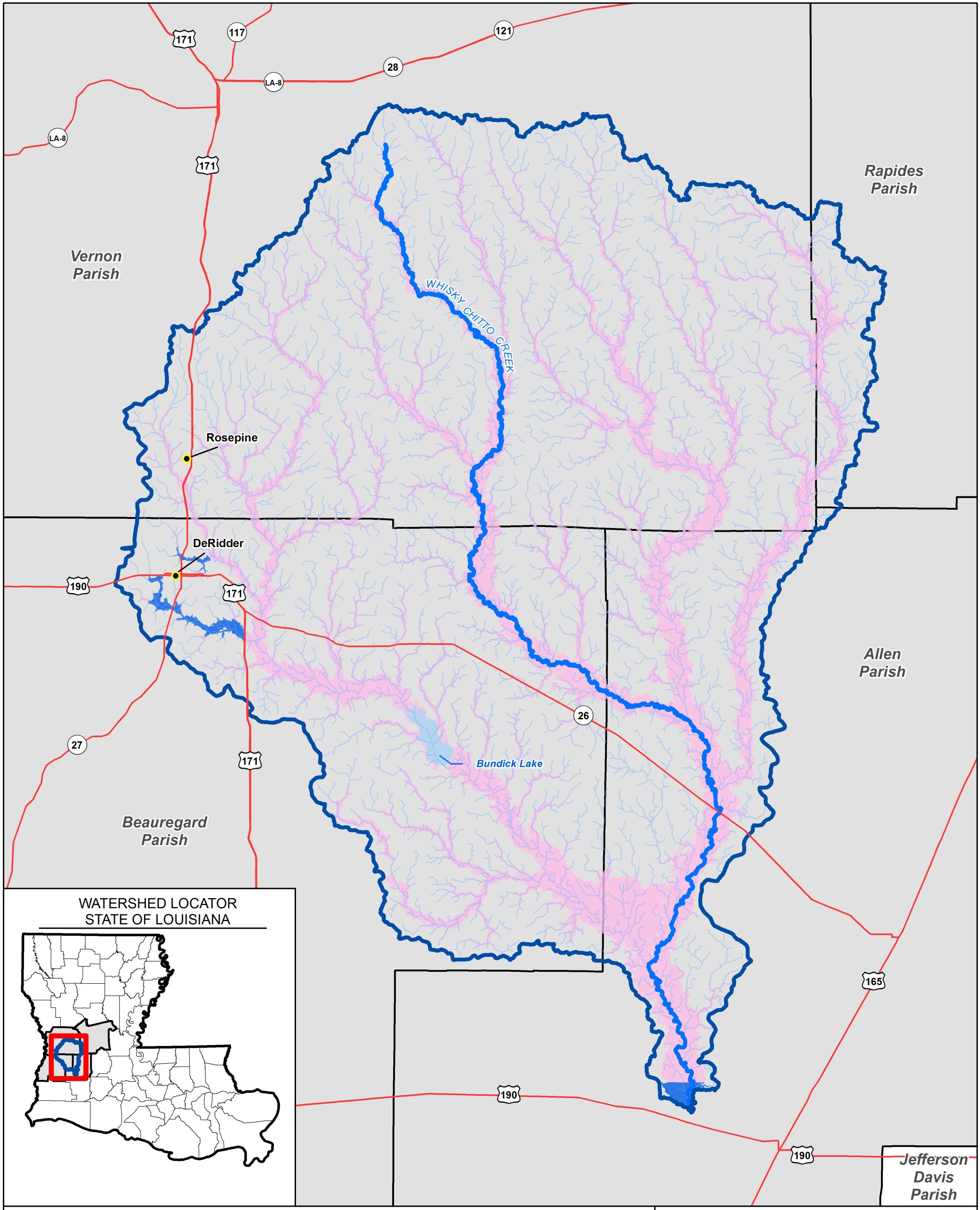
WHISKY CHITTO WATERSHED

September 16, 2022



**FEMA**





**Map Symbology**

- Cities
- ~ Whisky Chitto Creek
- ~ Other Streams
- Major Highways
- Watershed Boundary: HUC-8
- Lake
- Discovery Parish Boundary
- Other Parish Boundary

- Effective FEMA Floodplains (2021)**
- Zone AE, Floodway (100-Year, Detailed)
  - Zone AE, AO (100-Year, Detailed)
  - Zone A (100-Year, Approximate)
  - Zone X (500-Year or Depth <1 foot)
  - Zone X Reduced Flood Risk Due to Levee

**Figure 8:**

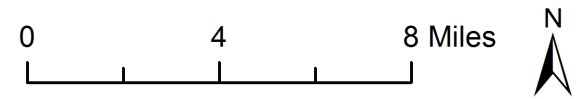
**Effective Floodplains**

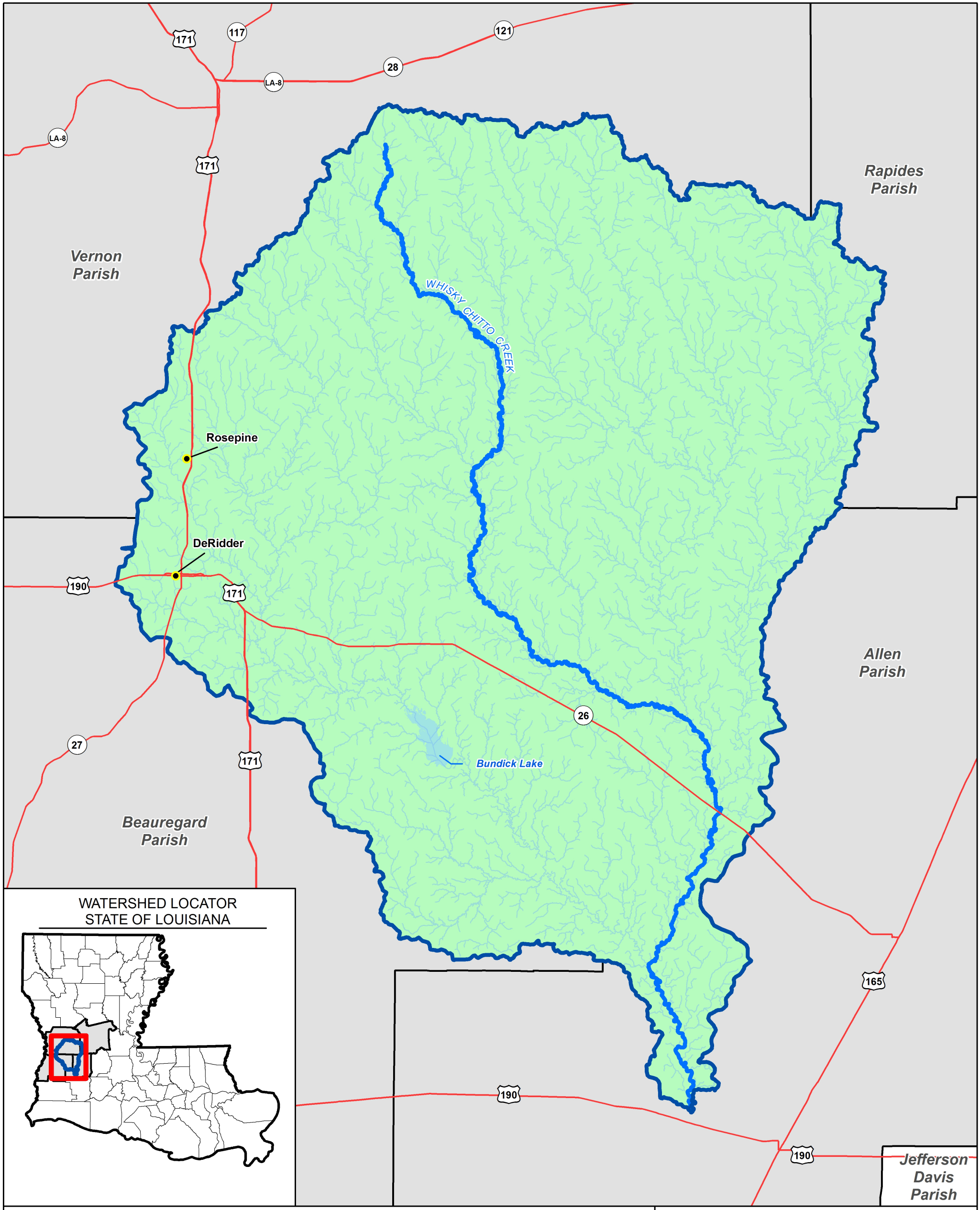
WHISKY CHITTO WATERSHED

September 16, 2022



FEMA





**Map Symbology**

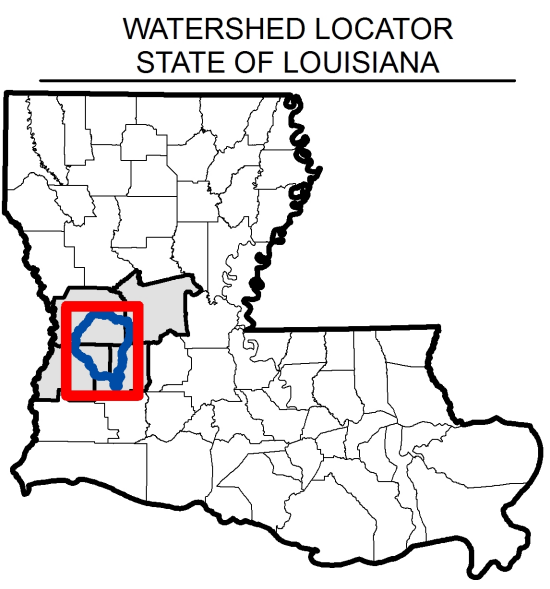
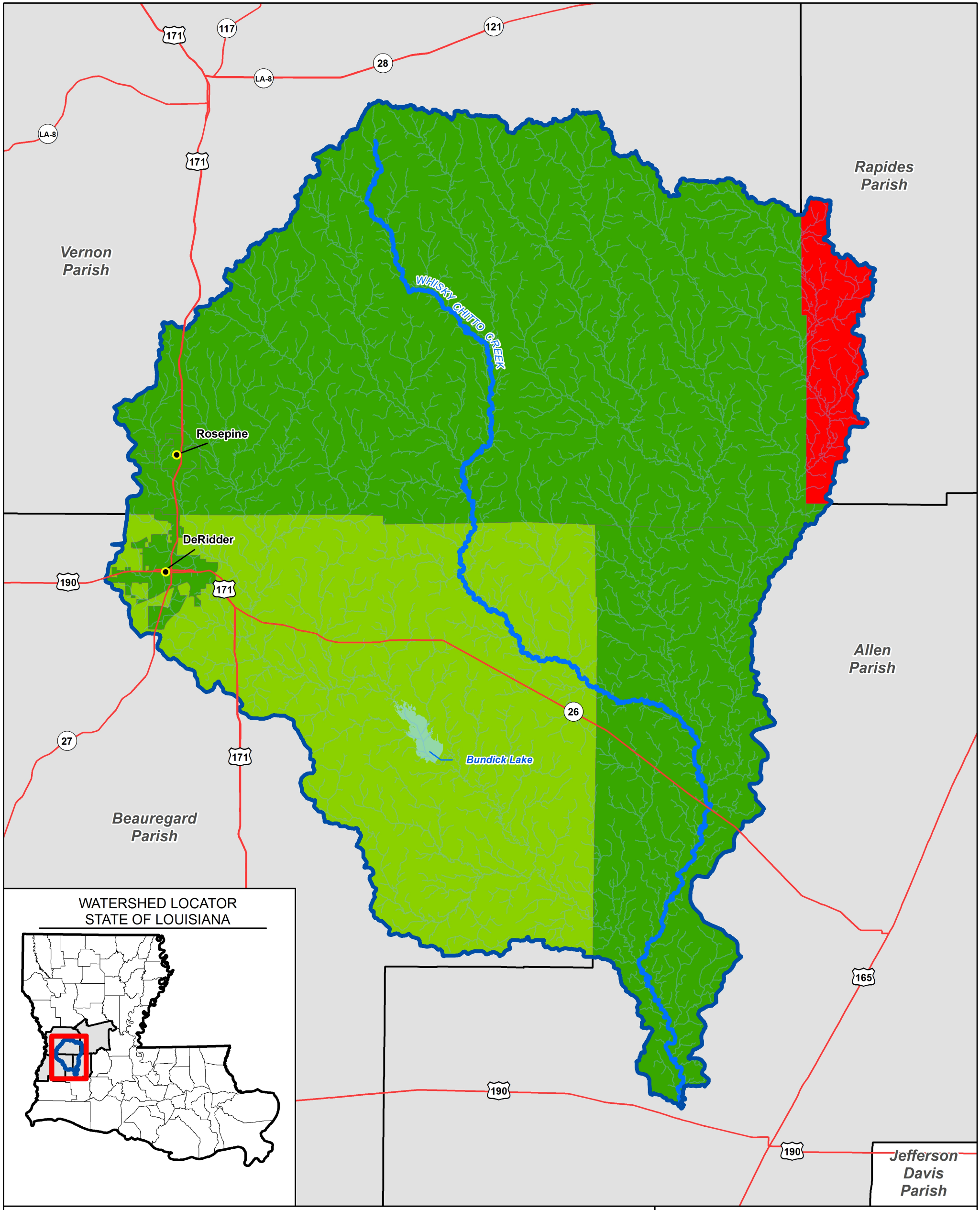
- Cities
- Whisky Chitto Creek
- Other Streams
- Major Highways
- Watershed Boundary: HUC-8
- Lake
- Discovery Parish Boundary
- Other Parish Boundary

**Available Topographic Data**  
 2007 Louisiana Statewide LIDAR

**Figure 9:  
 Topographic Data Source**

WHISKY CHITTO WATERSHED  
 September 16, 2022





**Map Symbolology**

- Whisky Chitto Creek
- Other Streams
- Major Highways
- Watershed Boundary: HUC-8
- Lake
- Discovery Parish Boundary
- Other Parish Boundary

**Community Total NFIP Losses**

- 2 - 292
- 293 - 582
- 583 - 871
- 872 - 1161
- 1162 - 1451

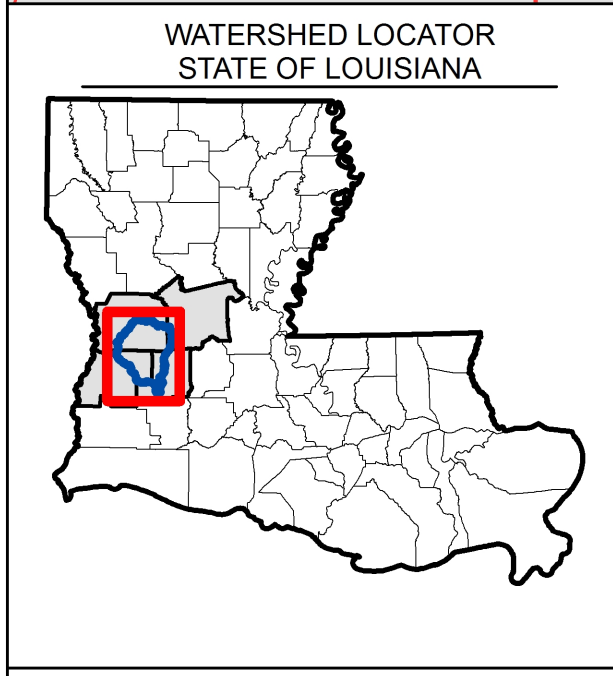
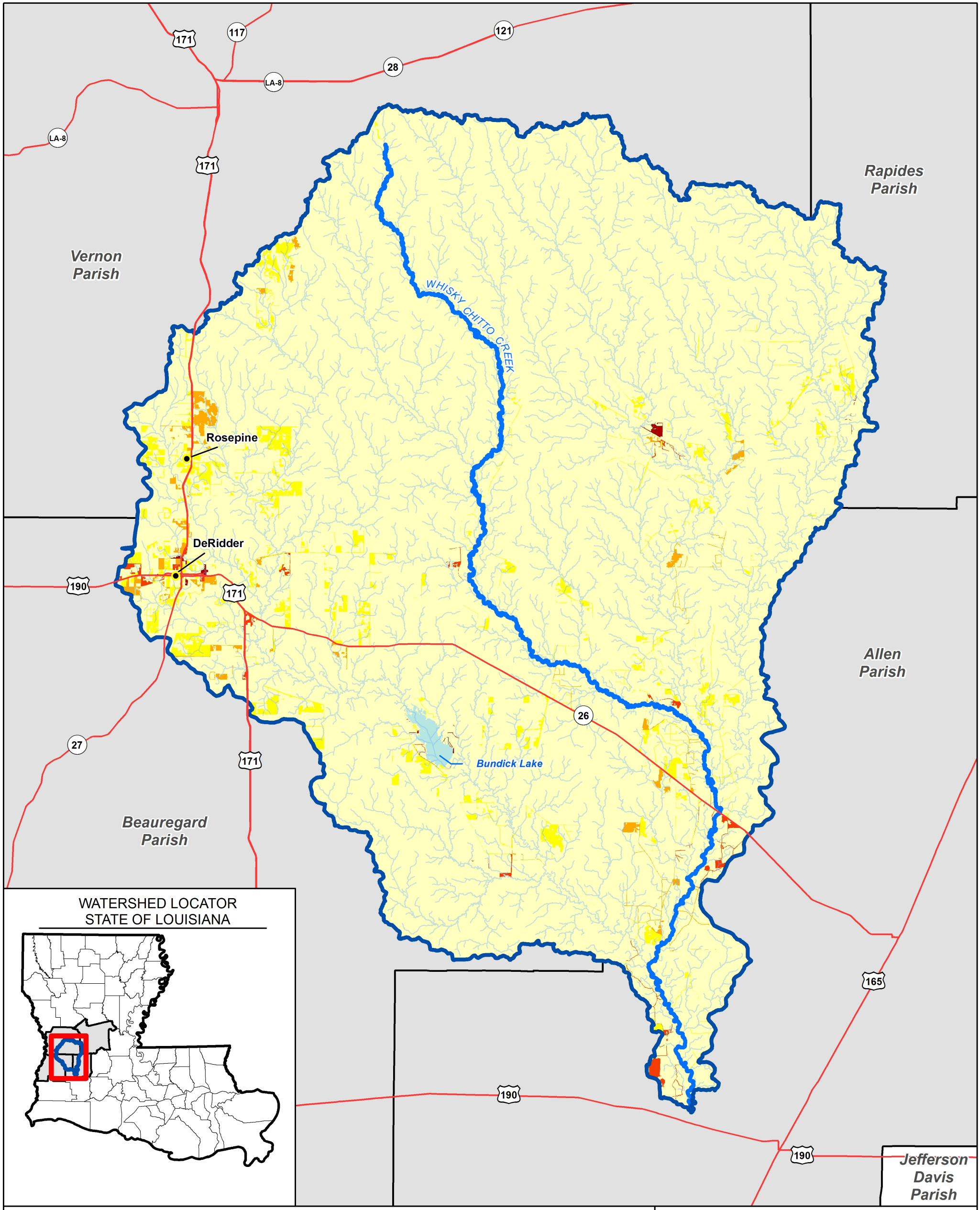
**Figure 10:**

**NFIP Flood Losses**

WHISKY CHITTO WATERSHED

September 16, 2022





**Map Symbolology**

- Cities
- Whisky Chitto Creek
- Other Streams
- Major Highways
- Watershed Boundary: HUC-8
- Lake
- Discovery Parish Boundary
- Other Parish Boundary

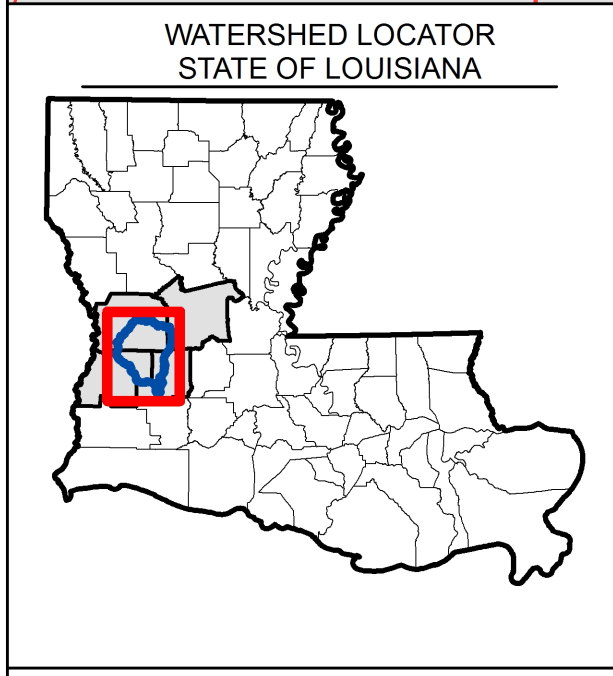
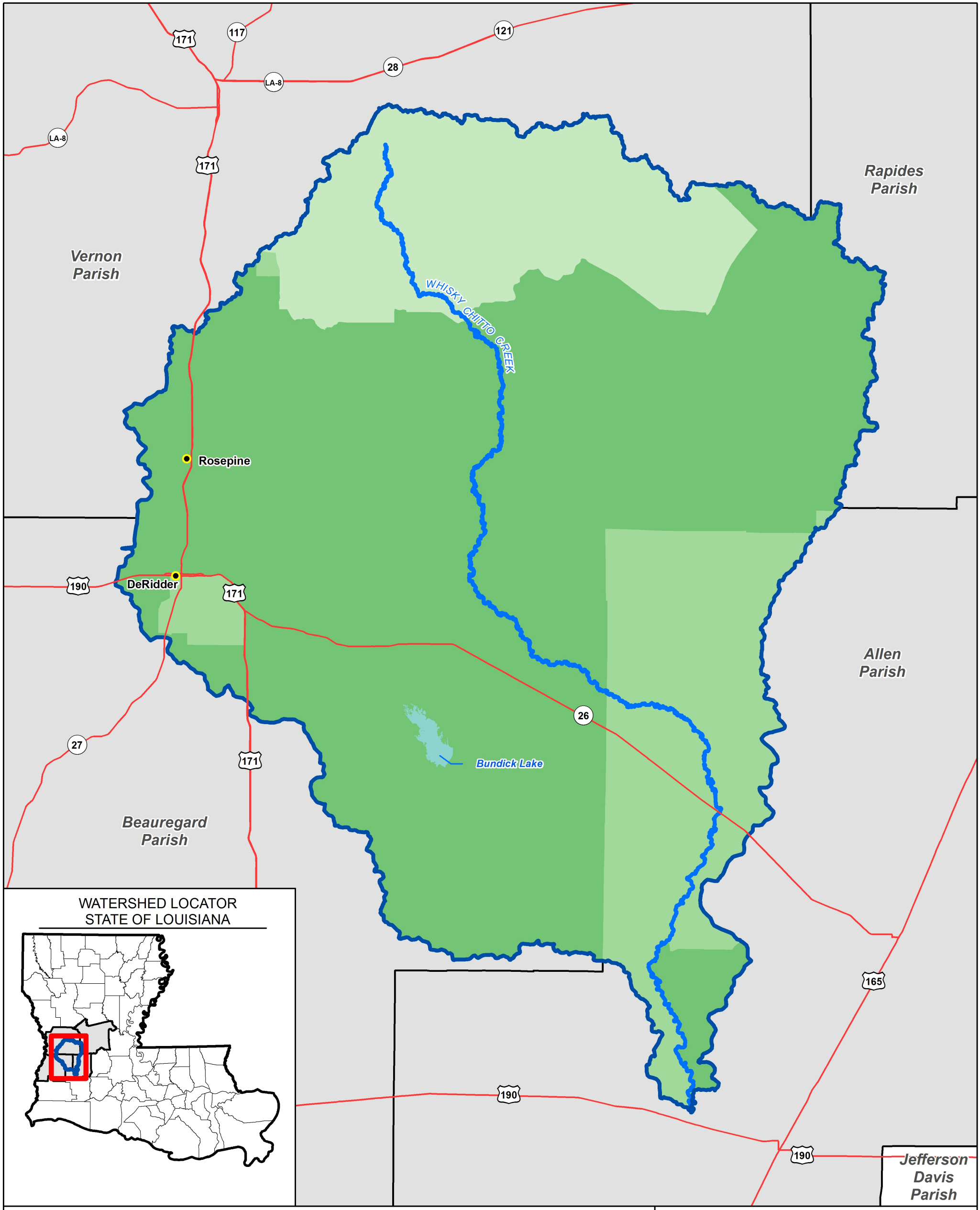
- Hazus 1%-Annual-Chance Loss Study\***
- Very Low
  - Low
  - Medium
  - High
  - Very High

\*Flood risk data obtained from the FEMA Base Level Engineering study

**Figure 11:  
Flood Risk -  
Potential Losses**

WHISKY CHITTO WATERSHED  
September 16, 2022





**Map Symbology**

- Whisky Chitto Creek
- Major Highways
- Watershed Boundary: HUC-8
- Lake
- Discovery Parish Boundary
- Other Parish Boundary

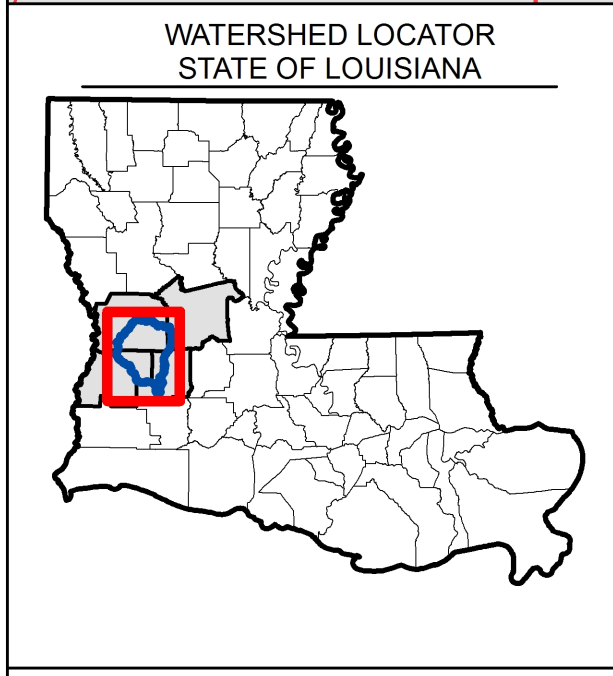
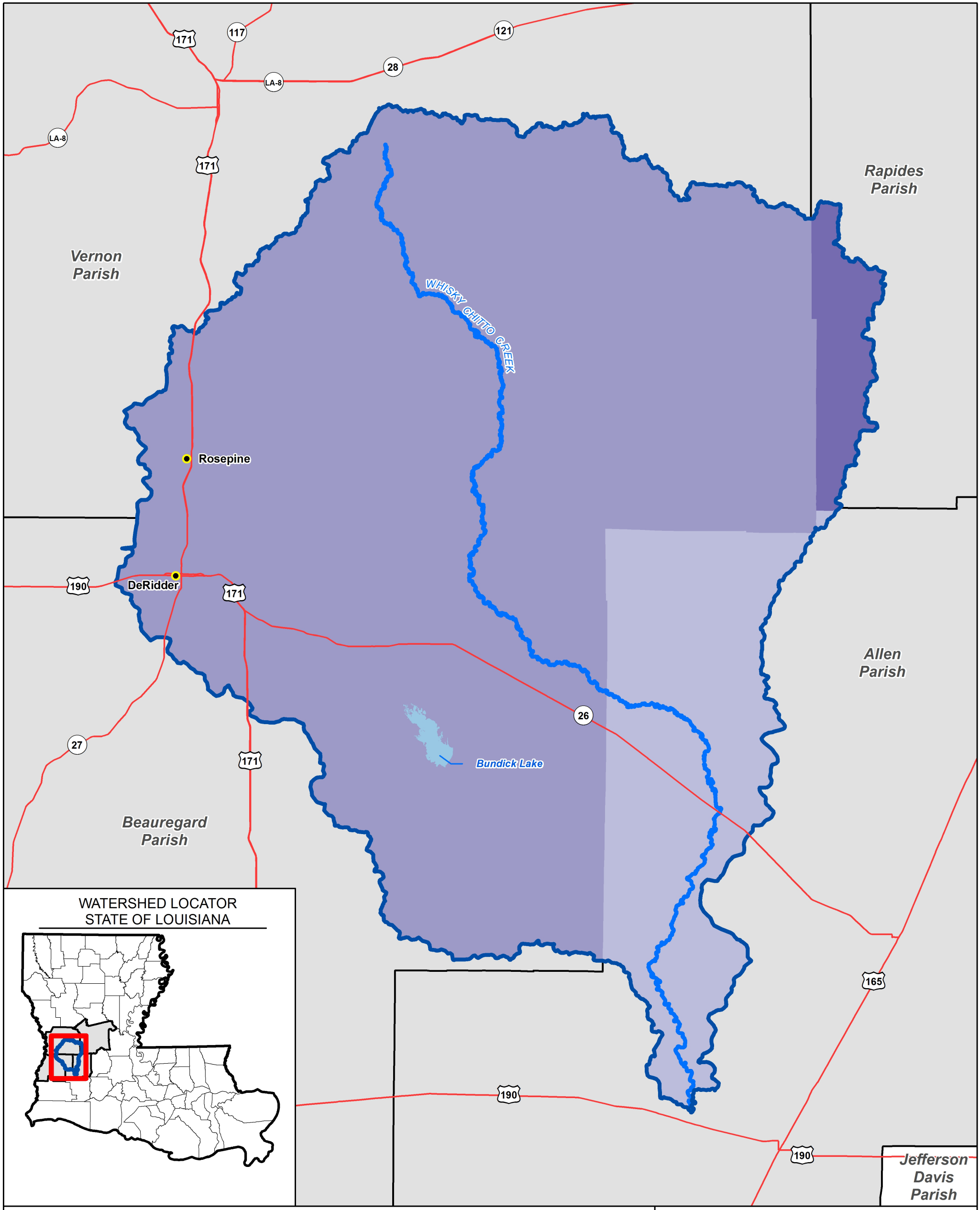
- Social Vulnerability Index (NRI 2021\*)**
- Very High
  - Relatively High
  - Relatively Moderate
  - Relatively Low
  - Very Low

**Figure 12:  
Social Vulnerability Index**

WHISKY CHITTO WATERSHED  
September 16, 2022



\*NRI is the National Risk Index, created by the Federal Emergency Management Agency



**Map Symbology**

- |                           |                                      |
|---------------------------|--------------------------------------|
| Whisky Chitto Creek       | <b>Resilience Rating (NRI 2021*)</b> |
| Major Highways            | Very High                            |
| Watershed Boundary: HUC-8 | Relatively High                      |
| Lake                      | Relatively Moderate                  |
| Discovery Parish Boundary | Relatively Low                       |
| Other Parish Boundary     | Very Low                             |

**Figure 13:**

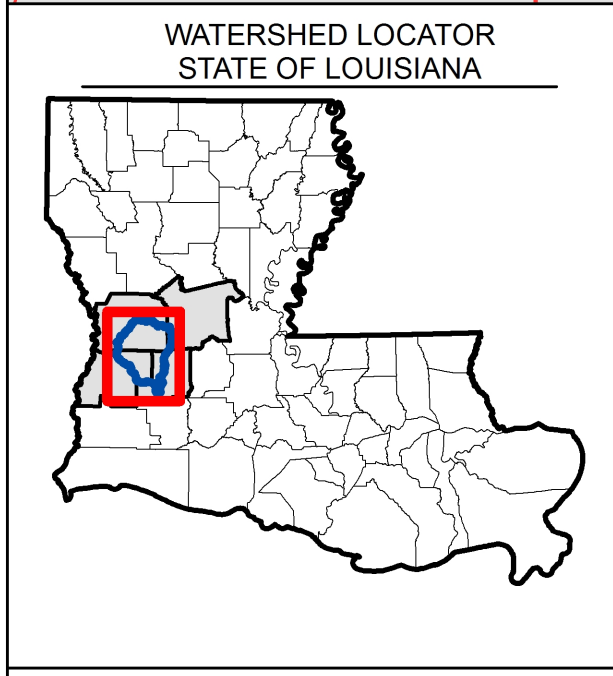
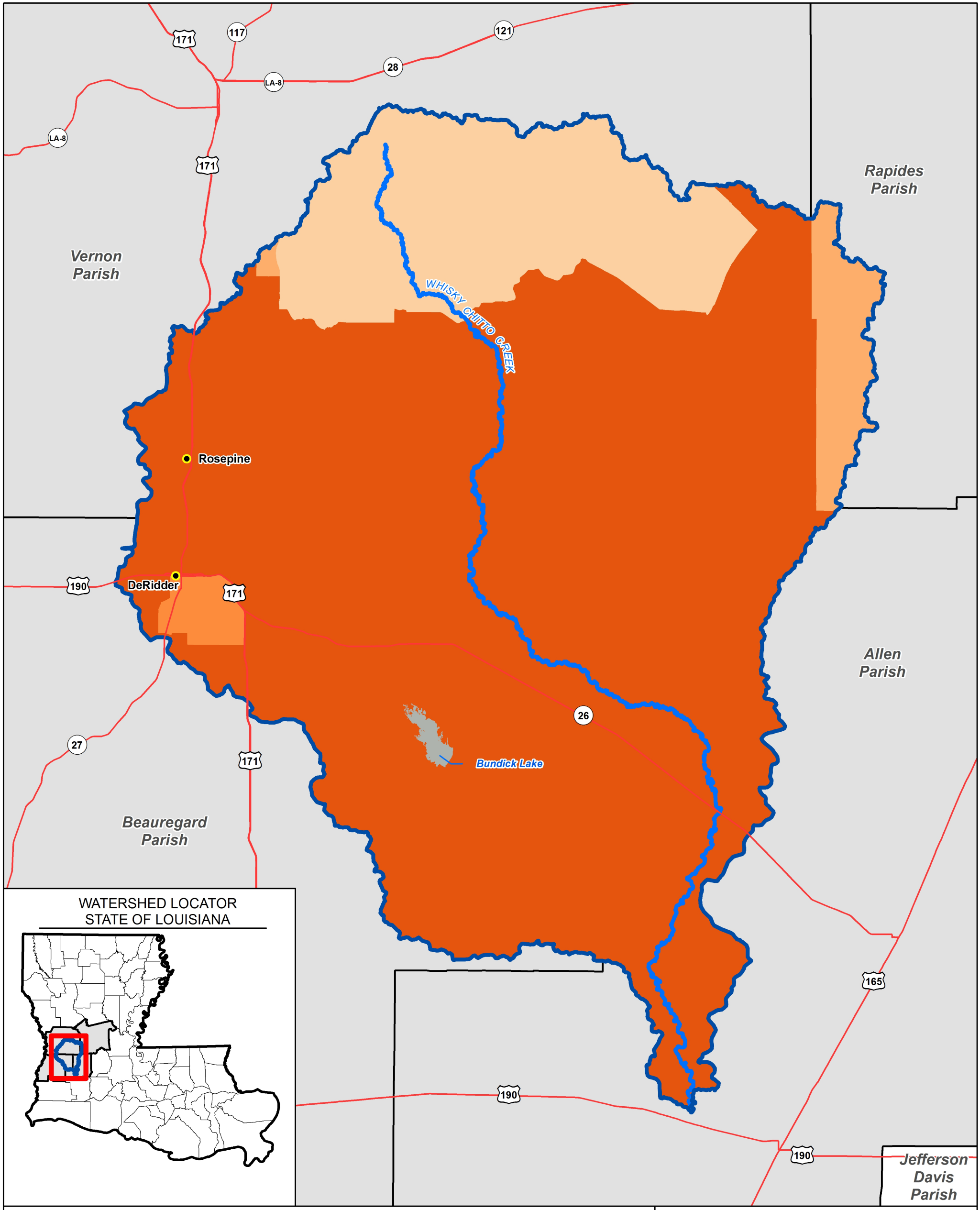
**Resilience Rating**

WHISKY CHITTO WATERSHED

September 16, 2022



\*NRI is the National Risk Index, created by the Federal Emergency Management Agency



**Map Symbology**

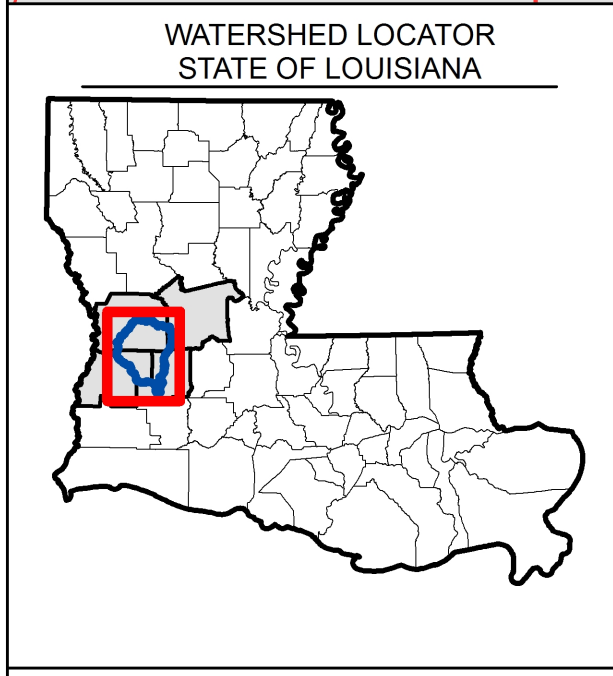
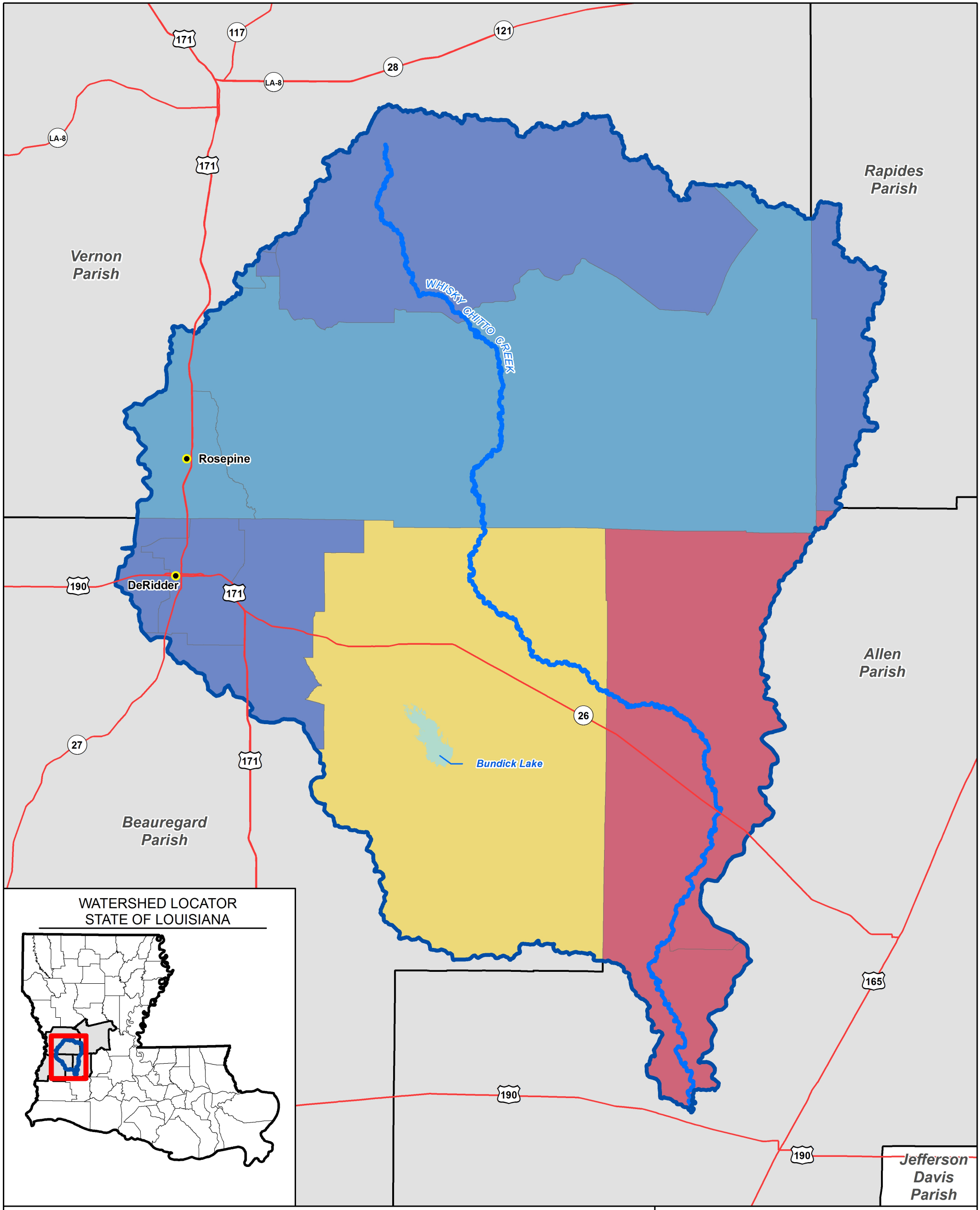
- |                           |  |
|---------------------------|--|
| Whisky Chitto Creek       | <b>Riverine Flooding Risk Rating (NRI 2021*)</b> |
| Major Highways            | Very High  |
| Watershed Boundary: HUC-8 | Relatively High                                  |
| Lake                      | Relatively Moderate                              |
| Discovery Parish Boundary | Relatively Low                                   |
| Other Parish Boundary     | Very Low   |

**Figure 14:  
Riverine Flood Risk Rating**

WHISKY CHITTO WATERSHED  
September 16, 2022



\*NRI is the National Risk Index, created by the Federal Emergency Management Agency

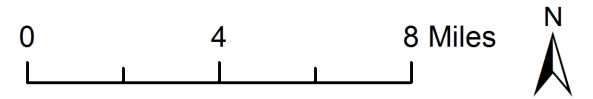


**Map Symbology**

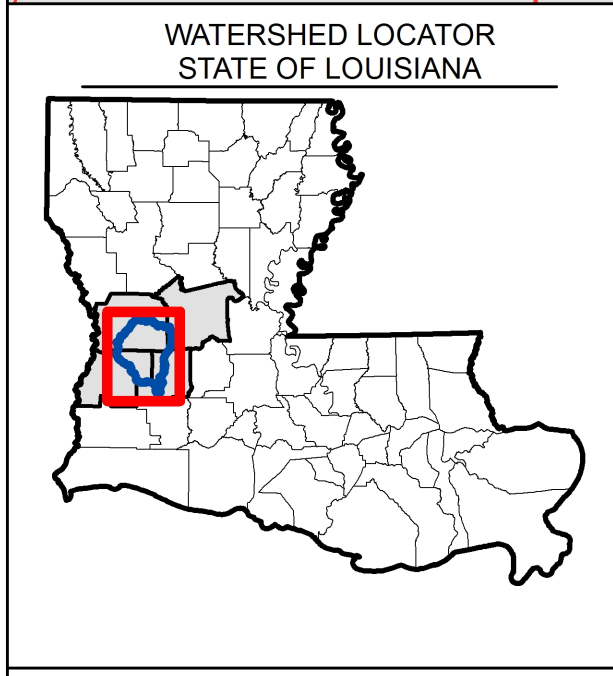
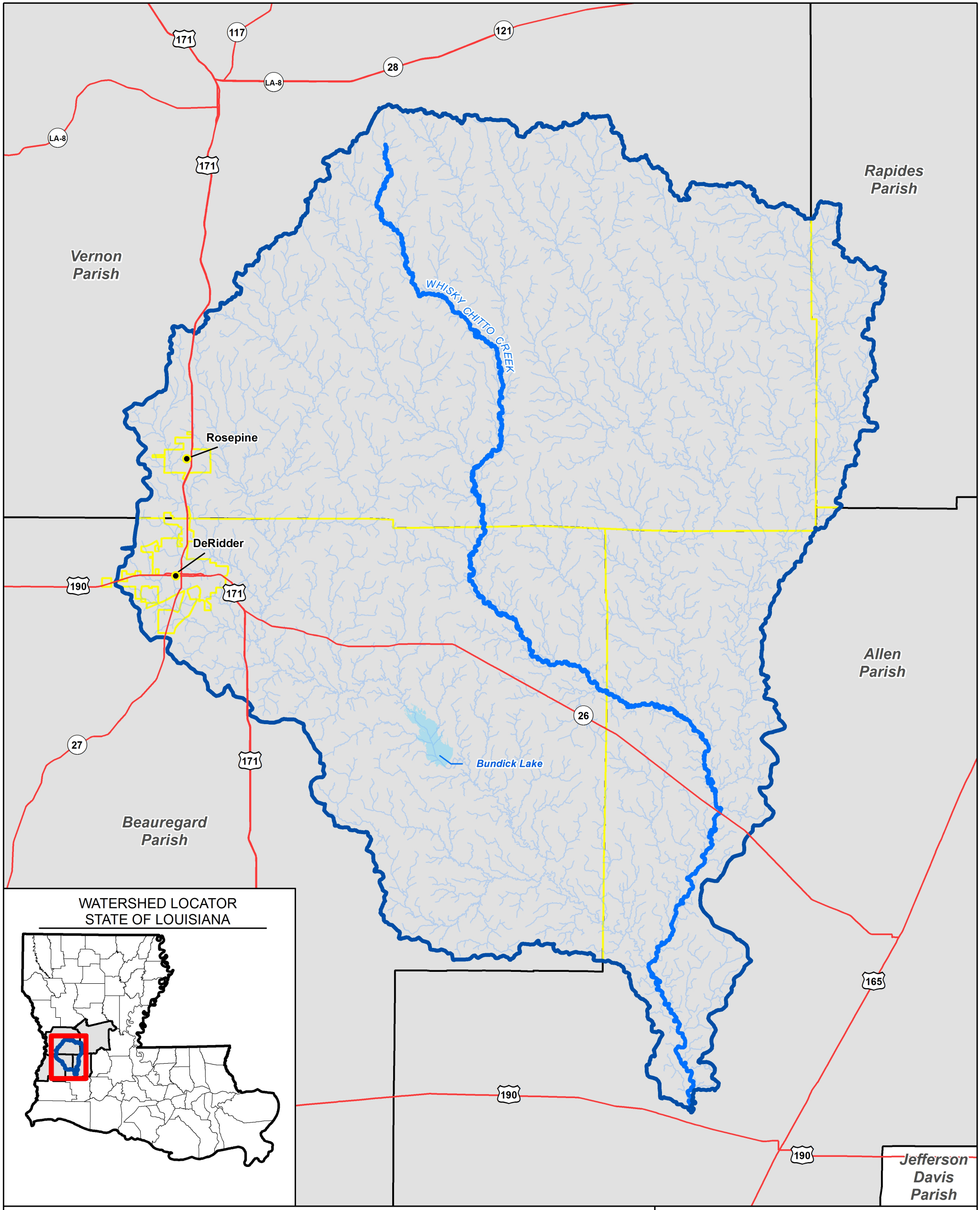
- Whisky Chitto Creek
  - Major Highways
  - Watershed Boundary: HUC-8
  - Lake
  - Discovery Parish Boundary
  - Other Parish Boundary
- | Population Exposed to Flooding (NRI 2021*) |             |
|--|-------------|
|  | 1 - 285     |
|  | 286 - 572   |
|  | 573 - 859   |
|  | 860 - 1145  |
|  | 1146 - 1432 |

**Figure 15:**  
**Flood Risk Population Exposure**

WHISKY CHITTO WATERSHED  
September 16, 2022



\*NRI is the National Risk Index, created by the Federal Emergency Management Agency



**Map Symbology**

- Cities
- Whisky Chitto Creek
- Other Streams
- Major Highways
- Watershed Boundary: HUC-8
- Lake
- Discovery Parish Boundary
- Other Parish Boundary

- CRS Class**
- Not Participating

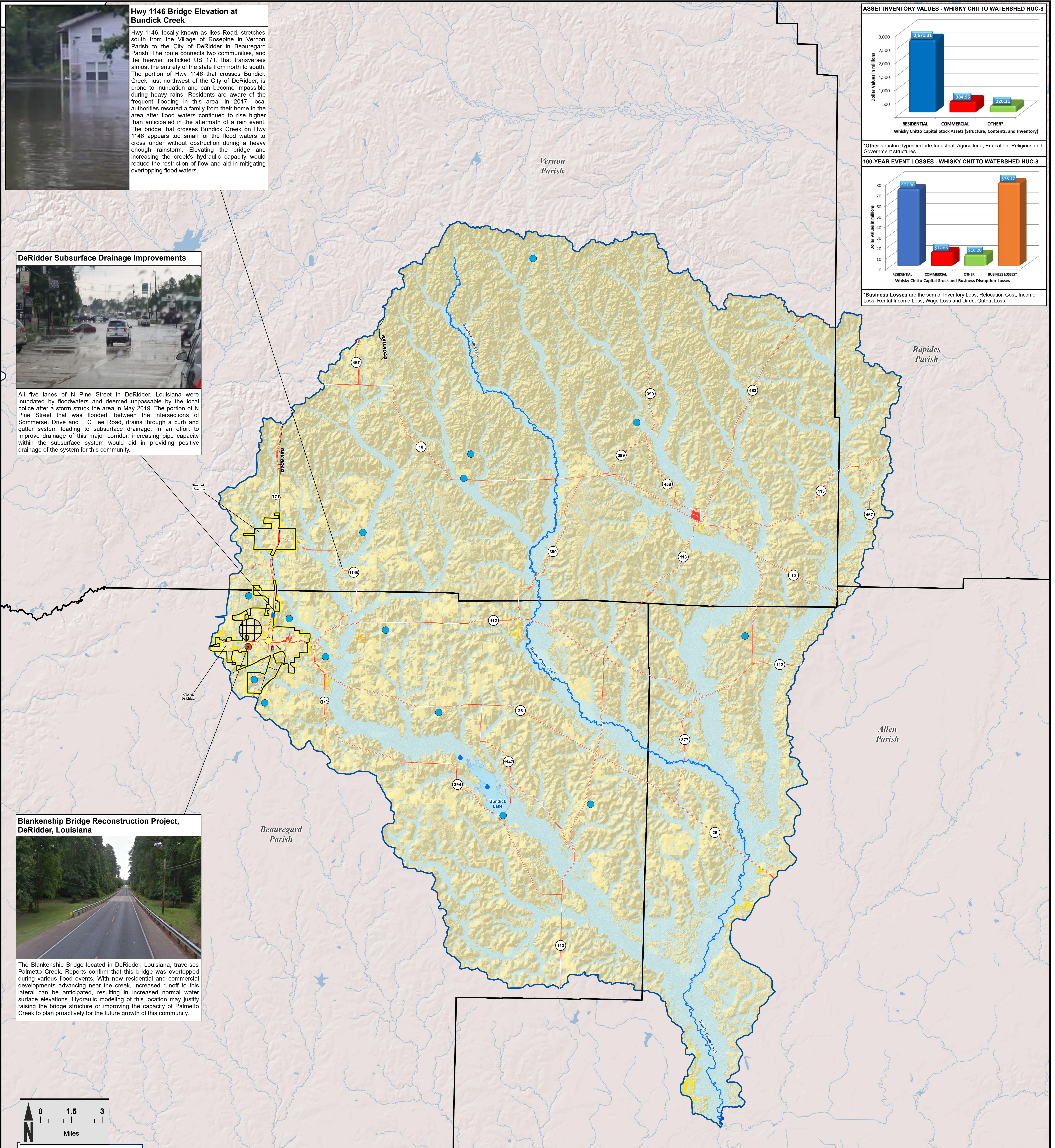
**Figure 16:  
Community Rating System (CRS)  
Participating Communities**

WHISKY CHITTO WATERSHED  
September 16, 2022



# Flood Risk Map

# Flood Risk Map: Whisky Chitto HUC 8 Watershed



**Hwy 1146 Bridge Elevation at Bundick Creek**

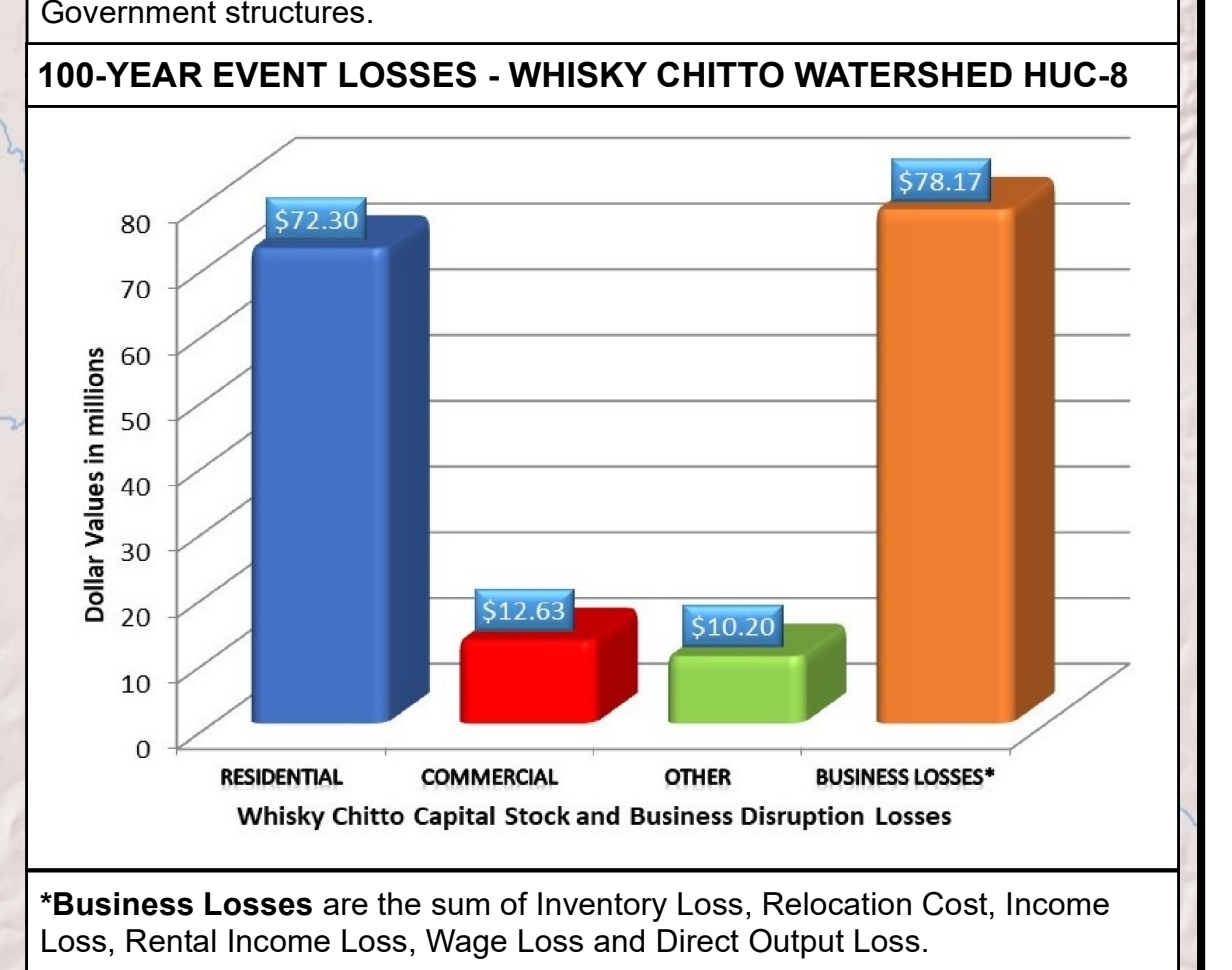
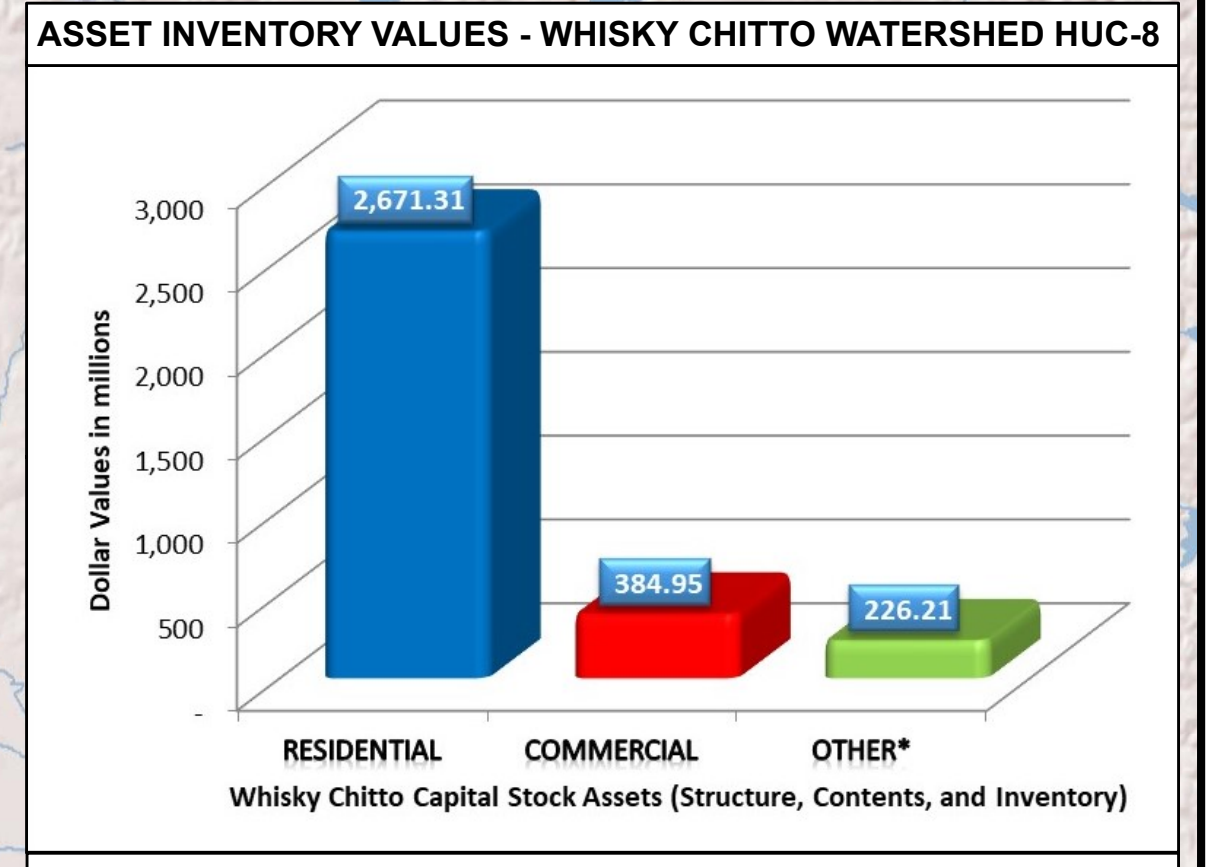
Hwy 1146, locally known as Ikes Road, stretches south from the Village of Rosepine in Vernon Parish to the City of DeRidder in Beauregard Parish. The route connects two communities, and the heavier trafficked US 171, that transverse almost the entirety of the state from north to south. The portion of Hwy 1146 that crosses Bundick Creek, just northwest of the City of DeRidder, is prone to inundation and can become impassible during heavy rains. Residents are aware of the frequent flooding in this area. In 2017, local authorities rescued a family from their home in the area after flood waters continued to rise higher than anticipated in the aftermath of a rain event. The bridge that crosses Bundick Creek on Hwy 1146 appears too small for the flood waters to cross under without obstruction during a heavy enough rainstorm. Elevating the bridge and increasing the creek's hydraulic capacity would reduce the restriction of flow and aid in mitigating overtopping flood waters.

**DeRidder Subsurface Drainage Improvements**

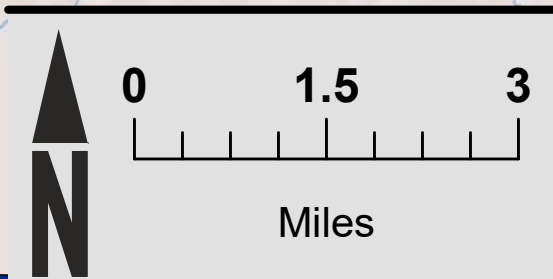
All five lanes of N Pine Street in DeRidder, Louisiana were inundated by floodwaters and deemed unpassable by the local police after a storm struck the area in May 2019. The portion of N Pine Street that was flooded, between the intersections of Somerset Drive and L C Lee Road, drains through a curb and gutter system leading to subsurface drainage. In an effort to improve drainage of this major corridor, increasing pipe capacity within the subsurface system would aid in providing positive drainage of the system for this community.

**Blankenship Bridge Reconstruction Project, DeRidder, Louisiana**

The Blankenship Bridge located in DeRidder, Louisiana, traverses Palmetto Creek. Reports confirm that this bridge was overtopped during various flood events. With new residential and commercial developments advancing near the creek, increased runoff to this lateral can be anticipated, resulting in increased normal water surface elevations. Hydraulic modeling of this location may justify raising the bridge structure or improving the capacity of Palmetto Creek to plan proactively for the future growth of this community.



\*Business Losses are the sum of Inventory Loss, Relocation Cost, Income Loss, Rental Income Loss, Wage Loss and Direct Output Loss.



**MAP SYMBOLOGY**

- |  |   |  |  |
|--|---|--|--|
| <p><b>Base Data</b></p> <ul style="list-style-type: none"> <li> Major Roads</li> <li> Railroads</li> <li> State Boundary</li> <li> Watershed Boundary</li> <li> Waterbodies</li> <li> City Boundary</li> <li> County Boundary</li> </ul> | <p><b>Flood Data</b></p> <ul style="list-style-type: none"> <li> Rivers and Streams</li> <li> New SFHA</li> </ul> | <p><b>Flood Risk*</b></p> <ul style="list-style-type: none"> <li> Very Low</li> <li> Low</li> <li> Medium</li> <li> High</li> <li> Very High</li> </ul> <p><b>*Flood Risk Data Source</b><br/>Base Level Engineering (BLE) data and HAZUS Level 1 Analysis</p> | <p><b>Areas of Mitigation Interest</b></p> <ul style="list-style-type: none"> <li> Dams</li> <li> Key Emergency Routes Overtopped During Frequent Flooding Events</li> <li> Individual Assistance (IA) &amp; Public Assistance (PA) Data</li> <li> Other Flood Risk Areas</li> <li> Significant Land Use Change</li> </ul> |
|--|---|--|--|

**WATERSHED LOCATOR**



**NATIONAL FLOOD INSURANCE PROGRAM**

**FRM FLOOD RISK MAP**

Whisky Chitto Watershed

HUC-8 Code  
**08080204**

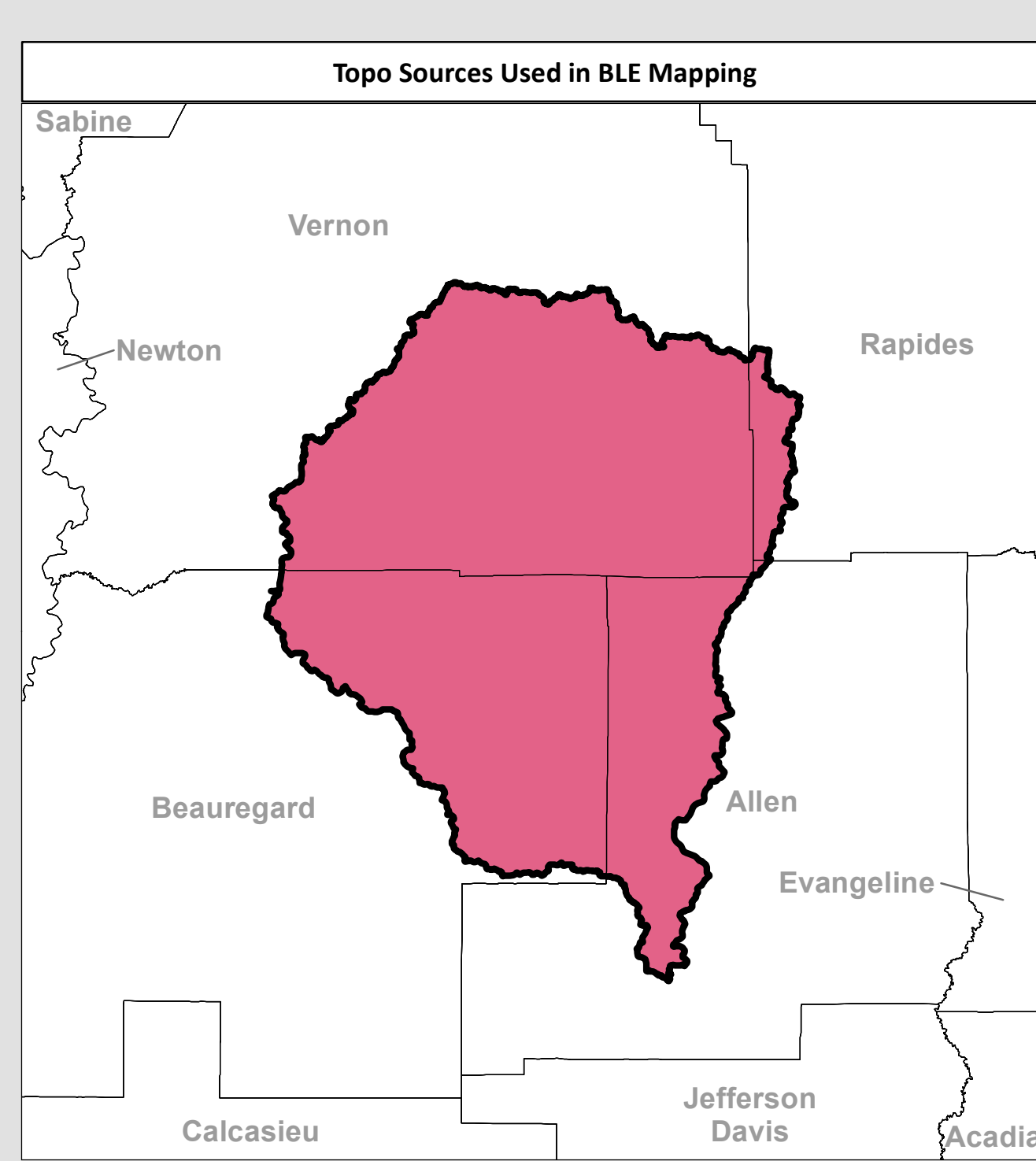
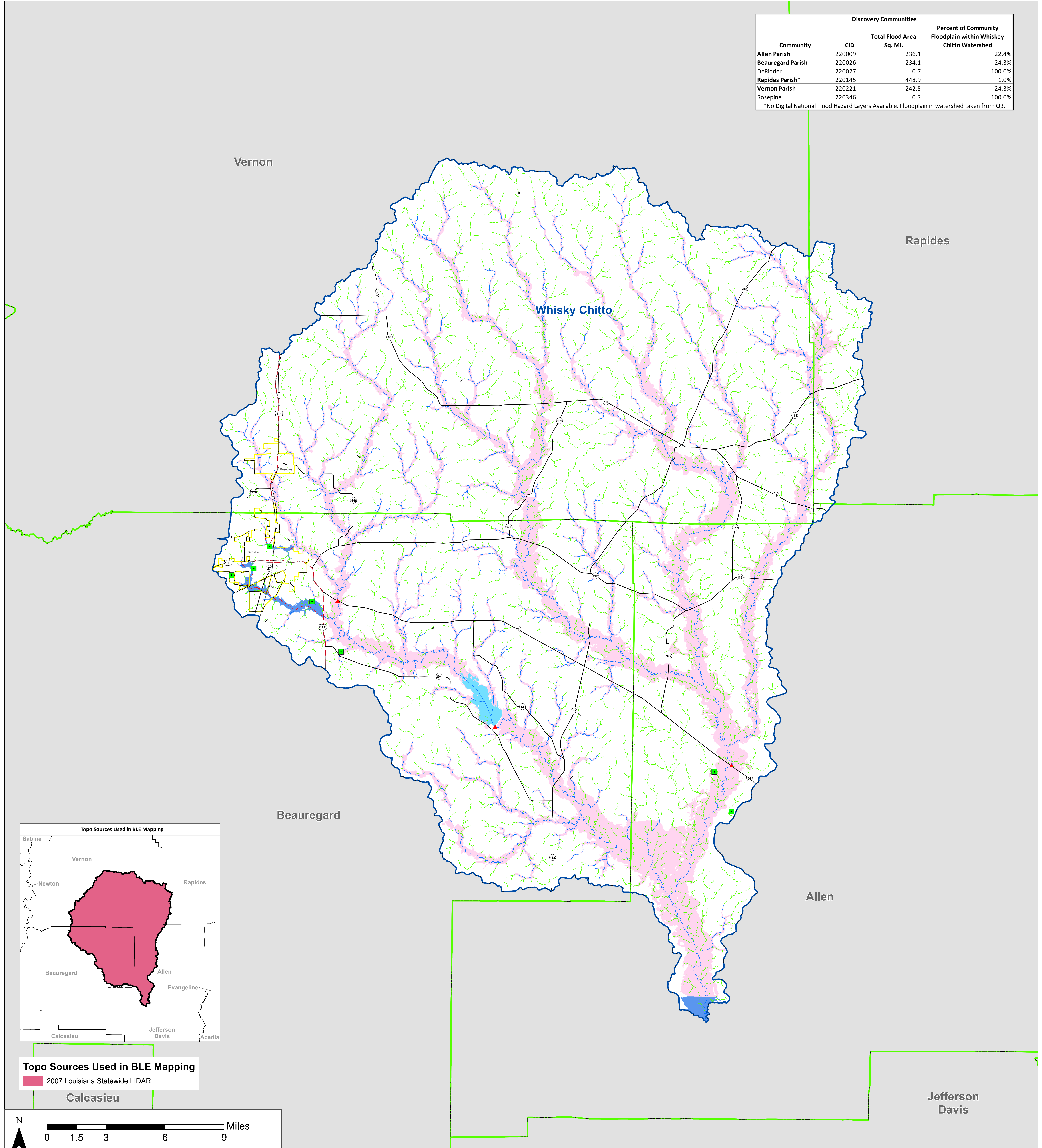
RELEASE DATE  
**03/29/2023**

For more information of data used for this map, please consult the Whisky Chitto Watershed Flood Risk Database and Flood Risk Report.

## Pre-Discovery Map

Discovery Communities			
Community	CID	Total Flood Area Sq. Mi.	Percent of Community Floodplain within Whiskey Chitto Watershed
Allen Parish	220009	236.1	22.4%
Beauregard Parish	220026	234.1	24.3%
DeRidder	220027	0.7	100.0%
Rapides Parish*	220145	448.9	1.0%
Vernon Parish	220221	242.5	24.3%
Rosepine	220346	0.3	100.0%

\*No Digital National Flood Hazard Layers Available. Floodplain in watershed taken from Q3.



**Topo Sources Used in BLE Mapping**  
 2007 Louisiana Statewide LIDAR

**Map Symbology**

- ▲ USGS Gage
  - LOMC
  - High Water Mark
  - Low Water Mark
  - × Dam
  - ☁ Lake
  - ⬜ City Boundary
  - ⬜ County Boundary
  - ⬜ Watershed Boundary
  - SHIELD**
  - ↗ Interstate Highway
  - ↘ US Highway
  - ↘ State Highway
  - ↘ Railroad
- Effective FEMA Floodplains\***
  - ☁ Floodway
  - ☁ Zone AE, VE, AO (100-Year, Detailed)
  - ☁ Zone A (100-Year, Approximate)
  - ☁ Zones AH, 100-Year Depth <1 Foot; X500 (500-Year, Detailed)
  - ☁ Zone X, Reduced Flood Risk Due to Levee
  - Effective Streams Study Type\***
  - ☁ Zone AE (100-Year, Detailed)
  - ☁ Zone A (100-Year, Approximate)
  - ☁ Zone X (Unshaded X, Areas of Minimal Flood Risk)

\*Data as of January 2022

**WATERSHEDS LOCATOR**



**NATIONAL FLOOD INSURANCE PROGRAM**  
**Pre-Discovery Map**

**WHISKEY CHITTO WATERSHED, LOUISIANA**

Stream Miles: 2,221  
 Zone AE Miles: 9  
 Zone A Miles: 775  
 Zone X Miles: 1,437  
 Population: 32,934

HUC-8 Codes  
**08080204**



**FEMA**

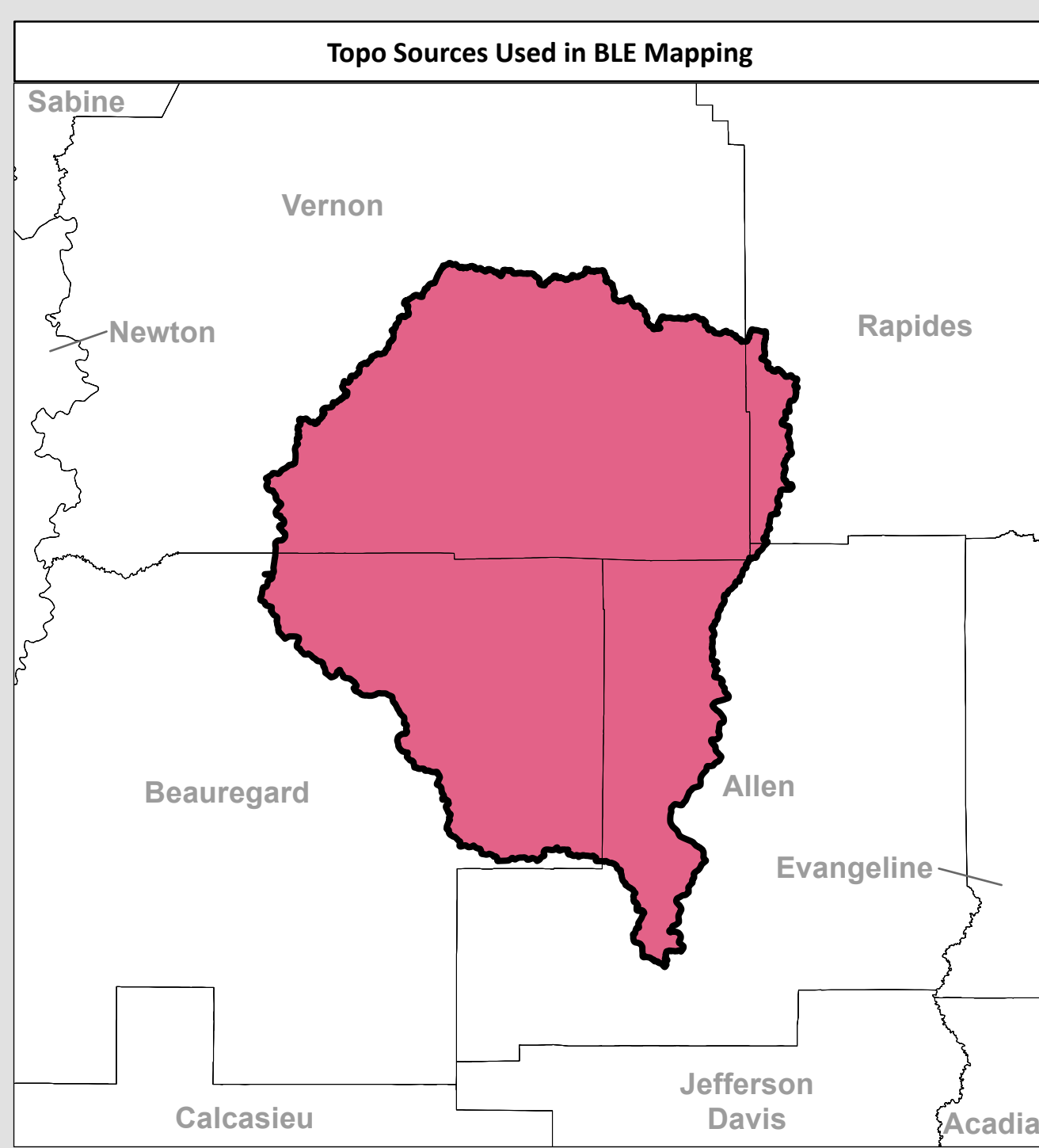
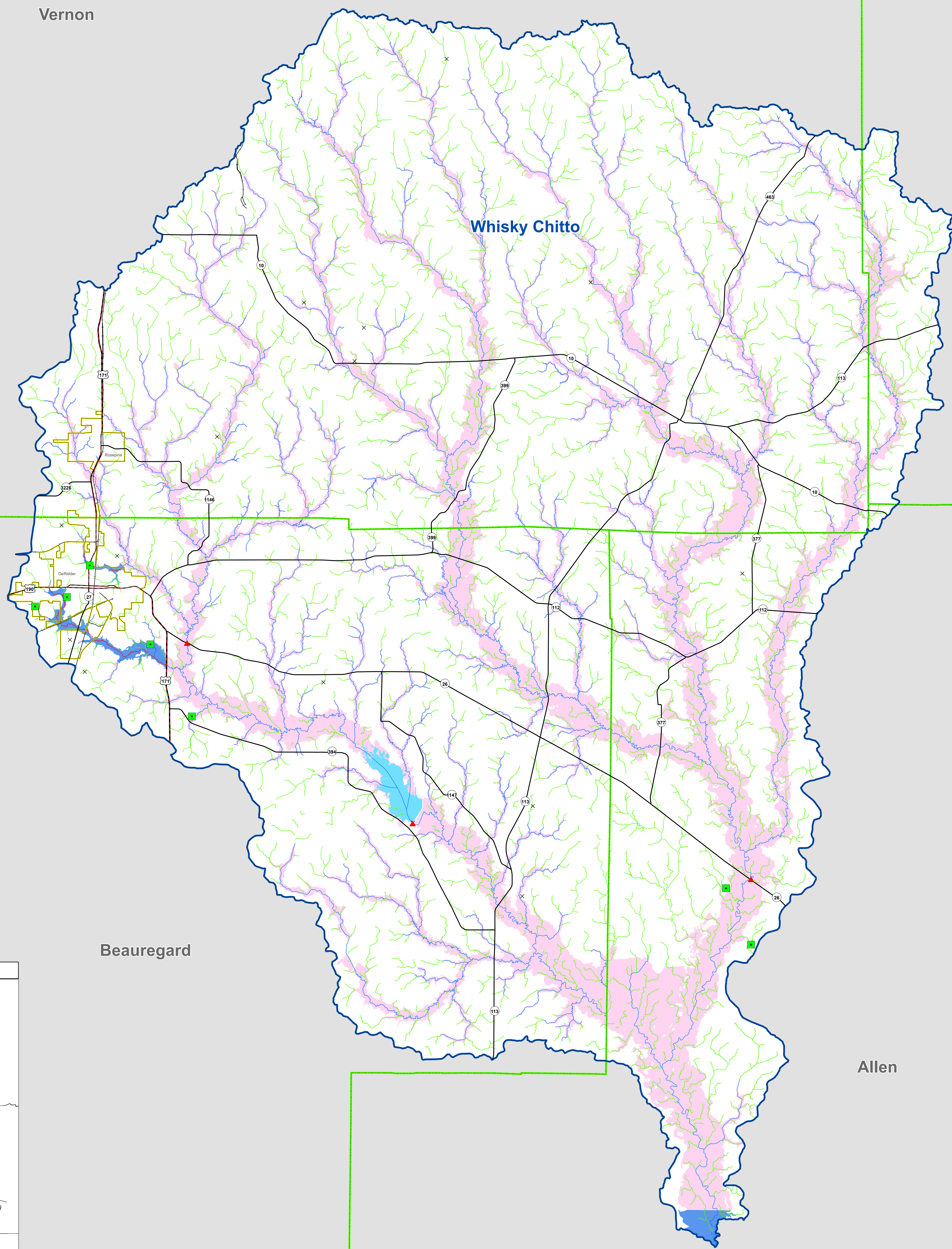
## Discovery Map

Parish	CID	Population <sup>1</sup>	Number of Policies	Total Coverage	Total Losses	Total Payments <sup>2</sup>	Current FEMA DFIRM Status	Oldest Effective Date
Allen Parish	220009	11,848	262	\$ 49,191,000.00	155	\$ 1,851,659.00	Modernized	3/17/2011
Beauregard Parish	220026	25,730	309	\$ 79,142,300.00	525	\$ 7,577,502.00	Modernized	11/26/2011
Rapides Parish	220145	60,547	1,455	\$ 336,610,400.00	1,577	\$ 24,295,616.00	Not Modernized	3/2/1988
Vernon Parish	220221	37,503	232	\$ 55,048,500.00	212	\$ 7,271,803.00	Modernized	11/26/2011

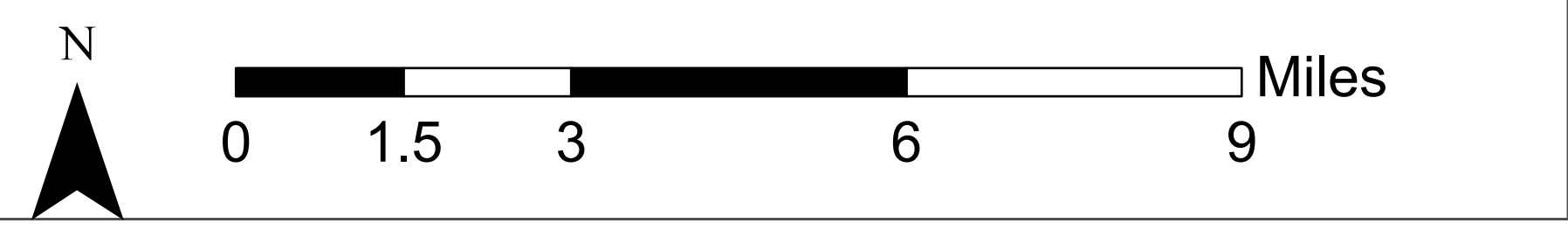
<sup>1</sup> Total community population based on 2020 Decennial Census data  
<sup>2</sup> Based on available NFIP claims data as of February 2022  
Total Losses - All losses submitted regardless of the status.  
Total Payments - Total amount paid on losses.

Discovery Communities			
Community	CID	Total Flood Area Sq. Mi.	Percent of Community Floodplain within Whiskey Chitto Watershed
Allen Parish	220009	236.1	22.4%
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\*No Digital National Flood Hazard Layers Available. Floodplain in watershed taken from Q3.



**Topo Sources Used in BLE Mapping**  
2007 Louisiana Statewide LIDAR



**Map Symbolology**

- ▲ USGS Gage
  - LOMC
  - × Dam
  - ☪ Lake
  - ▭ City Boundary
  - ▭ County Boundary
  - ▭ Watershed Boundary
  - Major Roads
  - Interstate Highway
  - US Highway
  - State Highway
  - Railroad
- Effective FEMA Floodplains\***
- ☪ Floodway
  - ☪ Zone AE, VE, AO (100-Year, Detailed)
  - ☪ Zone A (100-Year, Approximate)
  - ☪ Zones AH, 100-Year Depth <1 Foot; X500 (500-Year, Detailed)
  - ☪ Zone X, Reduced Flood Risk Due to Levee
- Effective Streams Study Type\***
- ☪ Zone AE (100-Year, Detailed)
  - ☪ Zone A (100-Year, Approximate)
  - ☪ Zone X (Unshaded X, Areas of Minimal Flood Risk)

\*Data as of January 2022

**WATERSHEDS LOCATOR**



**NATIONAL FLOOD INSURANCE PROGRAM**  
**Discovery Map**

**WHISKEY CHITTO WATERSHED, LOUISIANA**

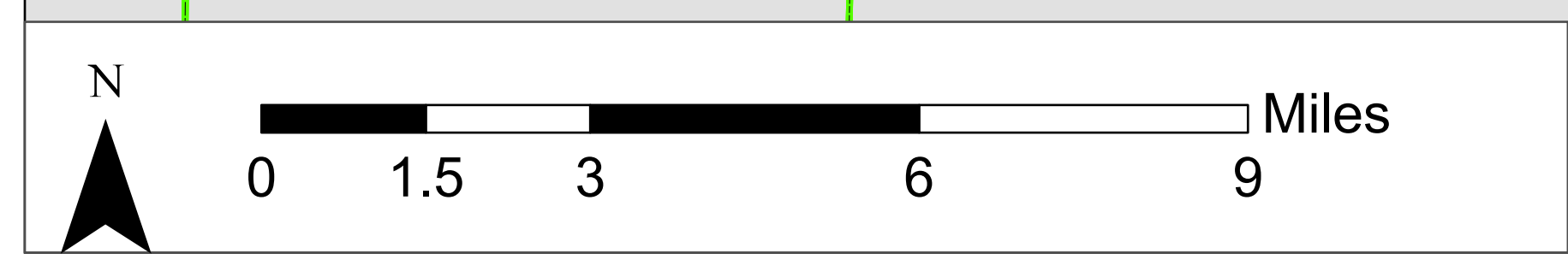
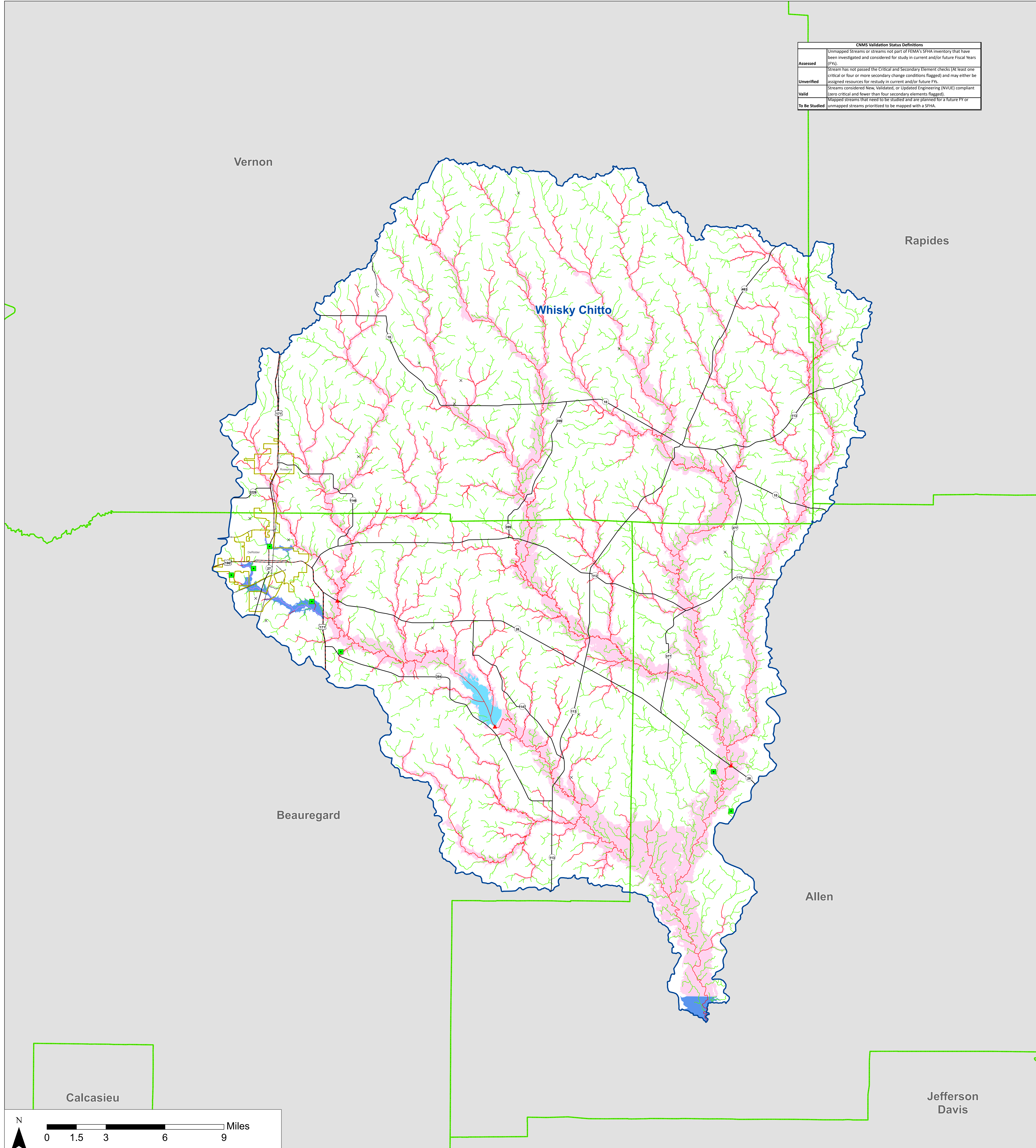
Stream Miles: 2,221  
Zone AE Miles: 9  
Zone A Miles: 775  
Zone X Miles: 1,437  
Population: 32,934

HUC-8 Codes  
**08080204**



## Post-Discovery Map

CNMS Validation Status Definitions	
Assessed	Unmapped Streams or streams not part of FEMA's SFHA inventory that have been investigated and considered for study in current and/or future Fiscal Years (FYs).
Unverified	Stream has not passed the Critical and Secondary Element checks (at least one critical or four or more secondary change conditions flagged) and may either be assigned resources for restudy in current and/or future FYs.
Valid	Streams considered New, Validated, or Updated Engineering (NVUE) compliant (zero critical and fewer than four secondary elements flagged).
To Be Studied	Mapped streams that need to be studied and are planned for a future FY or unmapped streams prioritized to be mapped with a SFHA.



**Map Symbology**

- ▲ USGS Gage
  - LOMC
  - × Dam
  - 🌊 Lake
  - 🏘️ City Boundary
  - 🗺️ County Boundary
  - 🌊 Watershed Boundary
- Effective FEMA Floodplains\***
- 🌊 Floodway
  - 🌊 Zone AE, VE, AO (100-Year, Detailed)
  - 🌊 Zone A (100-Year, Approximate)
  - 🌊 Zones AH, 100-Year Depth <1 Foot; X500 (500-Year, Detailed)
  - 🌊 Zone X, Reduced Flood Risk Due to Levee
- VALIDATION STATUS, STATUS TYPE\*\***
- 🌊 Unverified, Being Studied
  - 🌊 Unverified, To Be Studied
  - 🌊 Assessed, Being Studied
  - 🌊 Valid, Being Studied
  - 🌊 Valid, NVUE Compliant
- Transportation**
- 🛣️ Interstate Highway
  - 🛣️ US Highway
  - 🛣️ State Highway
  - 🚂 Railroad

\*Data as of January 2022

**WATERSHEDS LOCATOR**



**NATIONAL FLOOD INSURANCE PROGRAM**  
**Post-Discovery Map**

**WHISKEY CHITTO WATERSHED, LOUISIANA**

Stream Miles: 2,221  
 Zone AE Miles: 9  
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**HUC-8 Codes**  
**08080204**



## Pre-Discovery Newsletter

# Pre-Discovery Newsletter

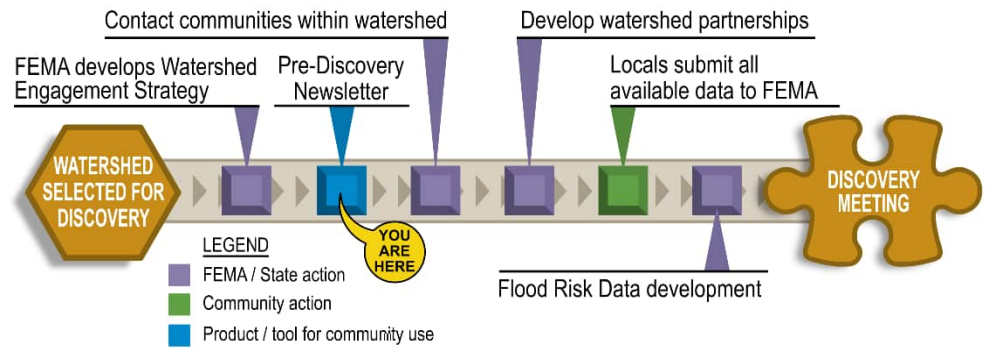


# Toledo Bend Reservoir, Lower Red-Lake latt, Whisky Chitto & Upper Calcasieu Watersheds

“Capturing a More Complete Picture of Your Community and Your Watershed” January 2022

## Risk MAP Process and Discovery

Risk Mapping, Assessment, and Planning (Risk MAP) is the Federal Emergency Management Agency (FEMA) Program that assists communities with flood information and tools they can use to enhance their mitigation plans and better protect their citizens. Discovery is the first phase of an overall process to achieve mitigation actions for reducing risks. The Louisiana Department of Transportation & Development (DOTD) has been awarded a FEMA grant to conduct Discovery in the Toledo Bend Reservoir, Lower Red-Lake latt, Whisky Chitto & Upper Calcasieu Watersheds in 2022.



**The Goal:** To work closely with communities to better understand local flood risk, mitigation efforts, and other topics to spark watershed-wide discussions about increasing resilience to flooding.

**Pre-Discovery Meeting**  
January 19<sup>th</sup>, 2022  
10:00 AM

**Online invitations for Webex Meeting to be sent out soon**

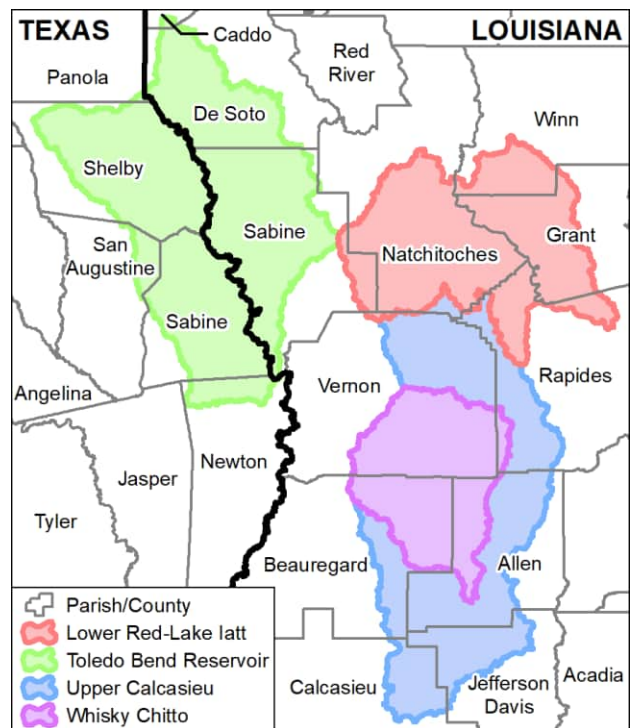
## Pre-Discovery Meeting

In preparation for the upcoming Discovery Meetings, DOTD will be hosting one Pre-Discovery meeting via Webex call. This meeting will introduce you to flood risk data being developed in the watershed, inform you about what to expect at the Discovery Meeting, describe who should attend, and communicate the data we need to collect from your community. Invitations to the meeting are currently being sent out. The meeting will be recorded and posted online should your community be unable to join the Webex call.

## Requested Data from Communities

- Areas of recurring flooding
- Historical local flooding locations
- High water marks or flood photos documented from historical flood events
- Infrastructure information, especially for levees and new bridges, dams, culverts and road improvements
- Mitigation activities and grant projects (ongoing or planned)
- Local development and floodplain management plans
- Stormwater management activities
- Regional watershed plans
- Flood study needs

Customize Discovery:  
After the meeting, enter your community's data at:  
<https://dotd.discovery.half.com>  
Password: DOTD\_FY20!



## Discovery Data Collection

The section to the left lists some of the types of data requested from each community within the watershed. We would greatly appreciate your participation in providing mapping needs and flood risk data for your community.

**DOTD requests communities share whatever data they have, to provide as complete a picture as possible.**

The Louisiana Department of Transportation & Development is a FEMA Cooperating Technical Partner (CTP), which allows them to collaborate with FEMA to help maintain current flood hazard information. The results from Base Level Engineering (BLE) studies served as a reference for the Mapping Activity Statement (MAS) of the FEMA CTP grant. FEMA awarded a CTP grant to DOTD to perform Discovery in these watersheds. The current MAS is included in the Risk MAP program. **Please contact Susan Veillon ([Susan.Veillon@la.gov](mailto:Susan.Veillon@la.gov)) if you have questions about Discovery.**

## Pre-Discovery Meeting Slides



# LOUISIANA DISCOVERY

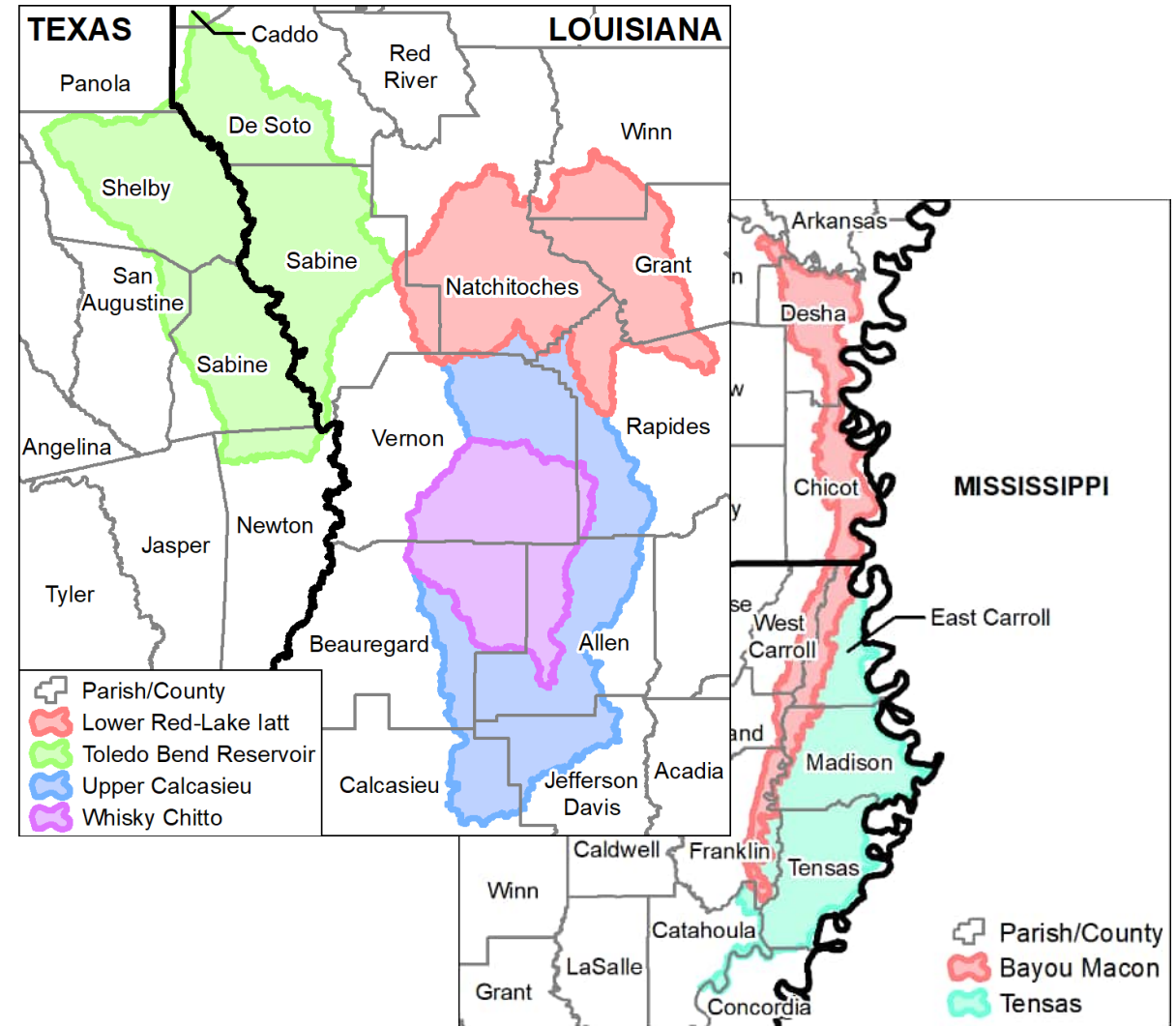
**“CAPTURING A MORE COMPLETE PICTURE OF  
YOUR WATERSHED”**

**PRE-DISCOVERY MEETING**

**JANUARY 19, 2022**

# AGENDA

- Overview of Risk MAP
- Discovery Overview
- LaDOTD Discovery Activities
  - Pre-Discovery Activities
  - Discovery Activities
  - Post-Discovery Activities
- 2022 LaDOTD Discovery Watersheds
  - Northeast Watersheds: Tensas & Bayou Macon
  - Southwest Watersheds: Toledo Bend Reservoir, Lower Red-Lake latt, Upper Calcasieu & Whisky Chitto
- Data Gathering Website and Walk-through



## DISCOVERY OVERVIEW

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Discovery is FEMA's process for identifying and accessing flood risk to better prepare a list of needs and projects to address those needs within communities.

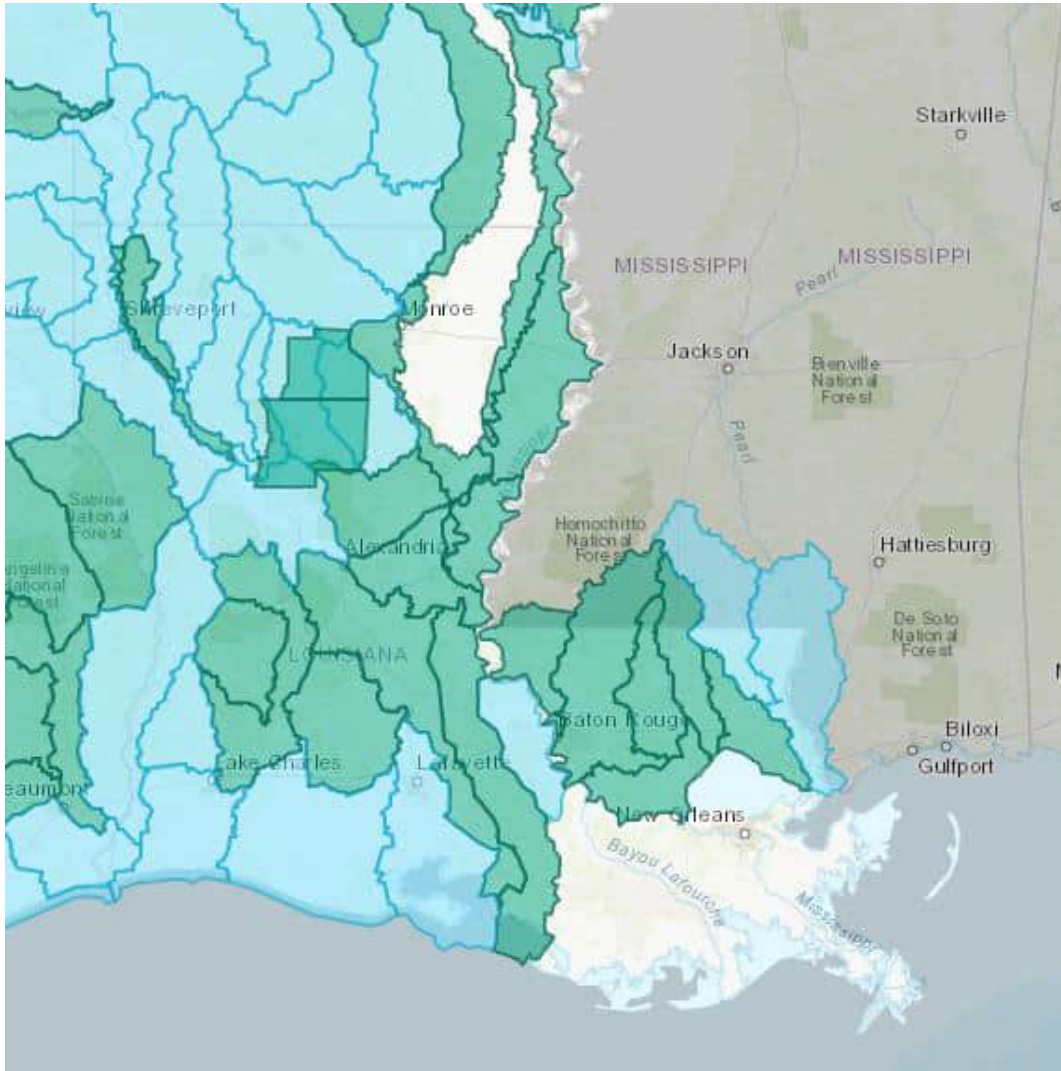
- Heighten community involvement and understanding
- Gather all flood-related information available
  - Knowledge of Flood Risks and Past Flooding in your community
  - Hazard Mitigation Projects – ongoing, planned or completed
  - Master Drainage Plans and floodplain studies – ongoing, planned or completed
  - Current flood risk communication process
  - GIS data

# DISCOVERY OVERVIEW

---

- Request needs in the community
  - Questions and concerns for DFIRM maps
  - All questions and concerns for dams and levees
  - Study request in areas of repetitive loss
  - Areas of new development or other causes of concern for the future
  - Funding needs for identified flood risk projects

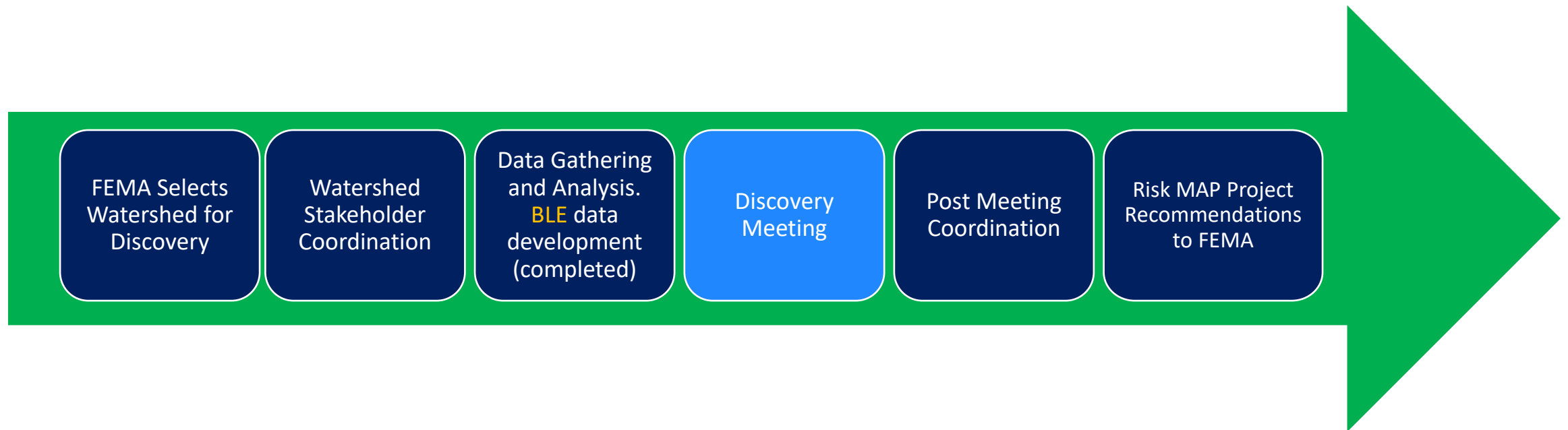
# FEMA'S RISK MAP PROGRAM



## DISCOVERY STEPS

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- *Capture a more complete picture of your watershed by working closely with local communities...*

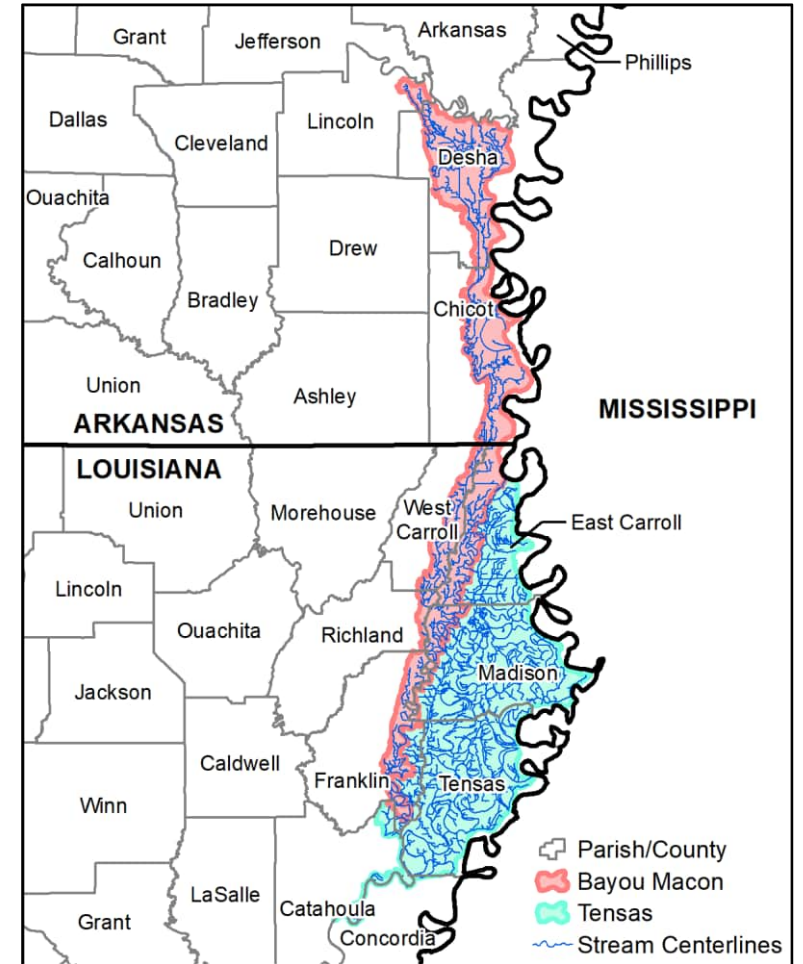
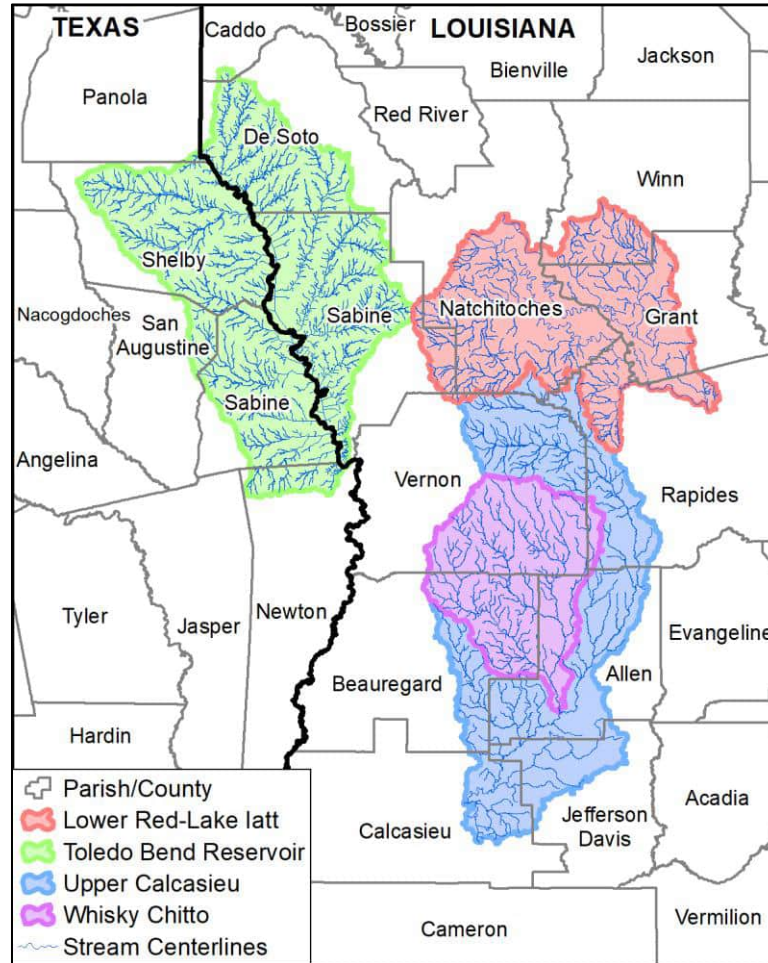


# LOUISIANA DOTD DISCOVERY GOALS

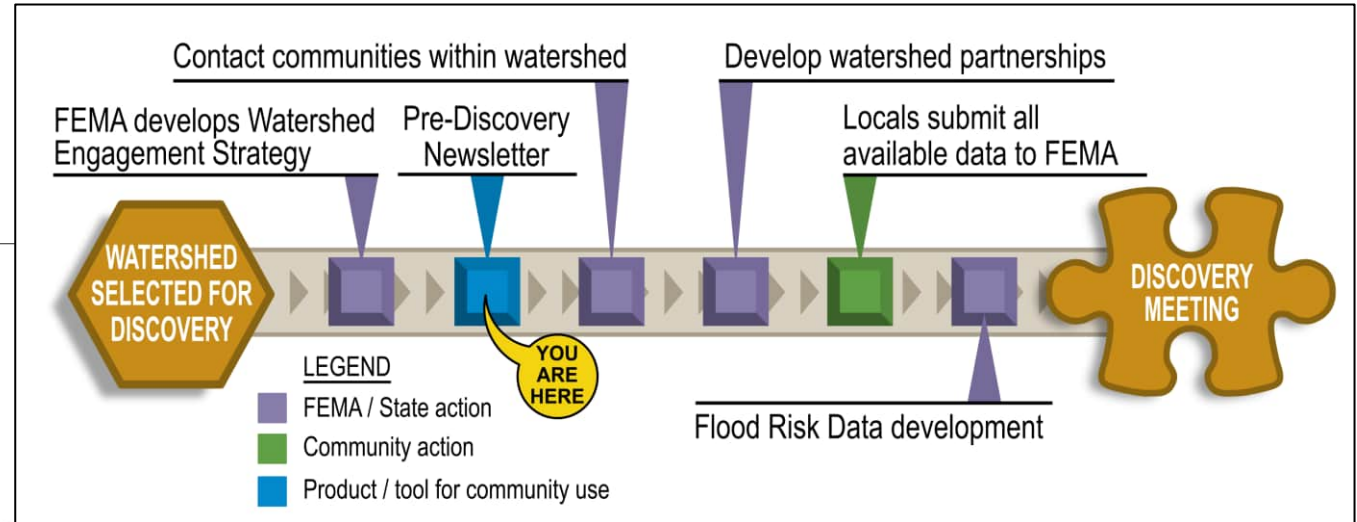
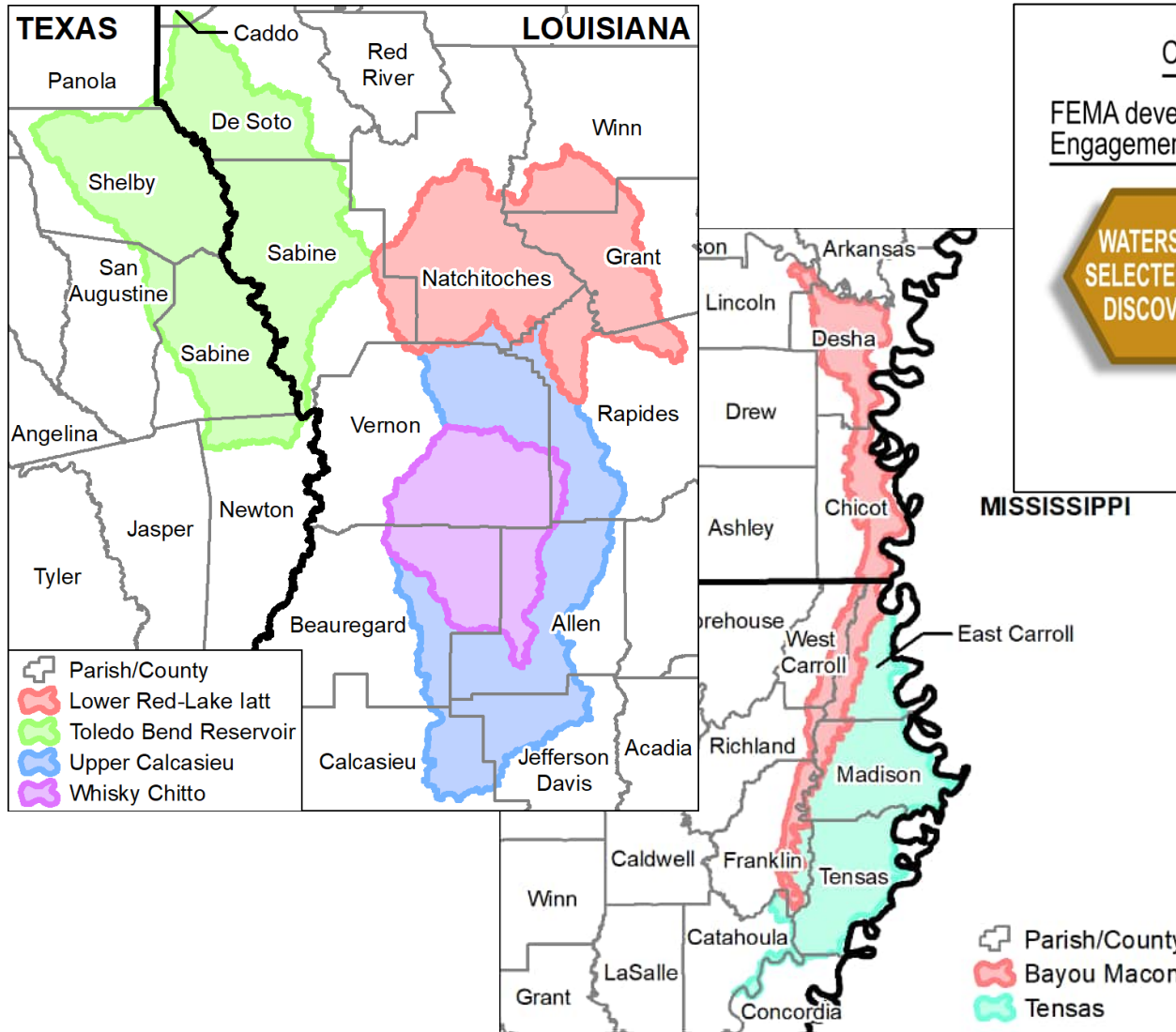
## Louisiana Watersheds Discovery

### Goals

- Inform Community of Present Flood Risk
- Gather local data to supplement National, Regional and State data
- Present FEMA with areas of highest concern and need for additional study



# DISCOVERY NEWSLETTER



**Pre-Discovery Meeting**  
**January 19<sup>th</sup>, 2022**  
**10:00 AM**

**Online invitations for Webex Meeting to be sent out soon**

# DISCOVERY COMMUNITY ENGAGEMENT

What information are we interested in?

## FEMA ENGAGEMENT WITH STAKEHOLDERS AND DATA COLLECTION

Review of all available data begins the process...

### Risk Identification and Communication

- Low water crossings?
- Large areas of fill placement?
- Future development areas?
- Capital improvement projects?
- Channelization projects?
- Large reservoirs? O&M plan?
- Flood risk reduction projects?
- Digital stream inventory?
- Digital building stock?
- High water marks from recent flooding event?
- Elevation data? LiDAR?
- Local flood studies?



### Mitigation Planning and Mitigation Actions

- Approved hazard mitigation plan?
- Local evacuation plans?
- Current land use plan?
- Future land use plan?
- Drainage master plan(s)?
- Flood reduction projects?
- Culvert enlargement projects?
- Areas of evacuation during high water?
- Local HAZUS runs?
- Digital parcel boundaries?



### Engage:

- U.S. Geological Service
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- State NFIP coordinator
- State Hazard Mitigation Officer
- State floodplain management associations
- State emergency management associations
- Local elected officials
- Regional authorities
- Local floodplain administrators
- Local emergency management officials
- Local levee districts
- Watershed groups
- Special interest groups
- Local business and commerce entities
- CTPs



### NFIP Community Actions

- Participating in the NFIP?
- Community assistance meetings?
- Community Rating System (CRS)?
- Repetitive loss properties?
- Areas of insurance claims?
- Community assistance visits?
- Community assistance calls?
- Active Letters of Map Change (LOMCs)?
- Recent disaster? Declared?
- Data from PDAs?



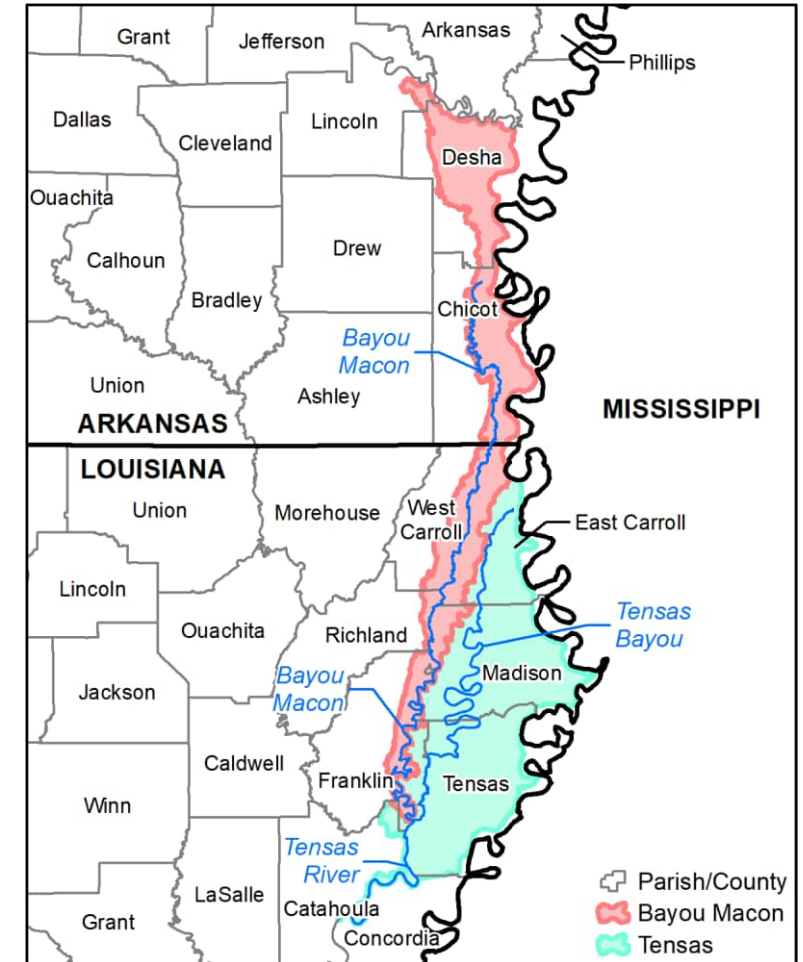
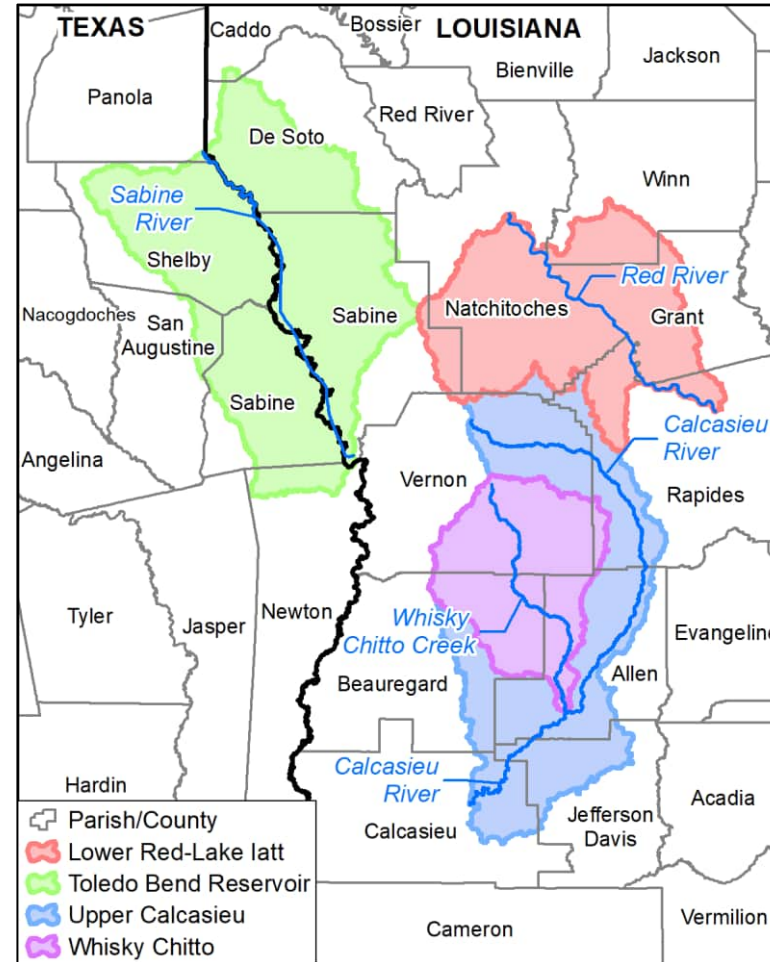
### Community Benefits and Grant Opportunities

- Grant administration plan?
- Ongoing grant projects?
- Hard projects? (infrastructure)
- Soft projects? (outreach/education)
- Targeted buy-out areas?
- Elevation projects planned?
- Pre-Disaster Mitigation (PDM) grants?
- Severe Repetitive Loss (SRL) grants?
- Grants in need of engineering info?
- Post-disaster 404 projects?
- Post-disaster 406 projects?

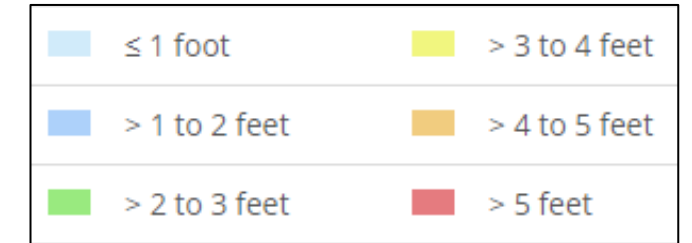
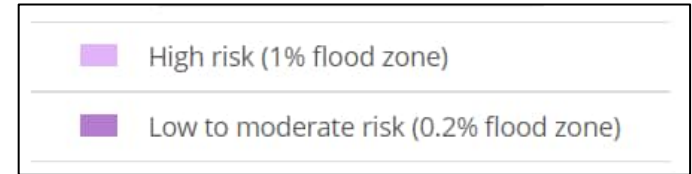
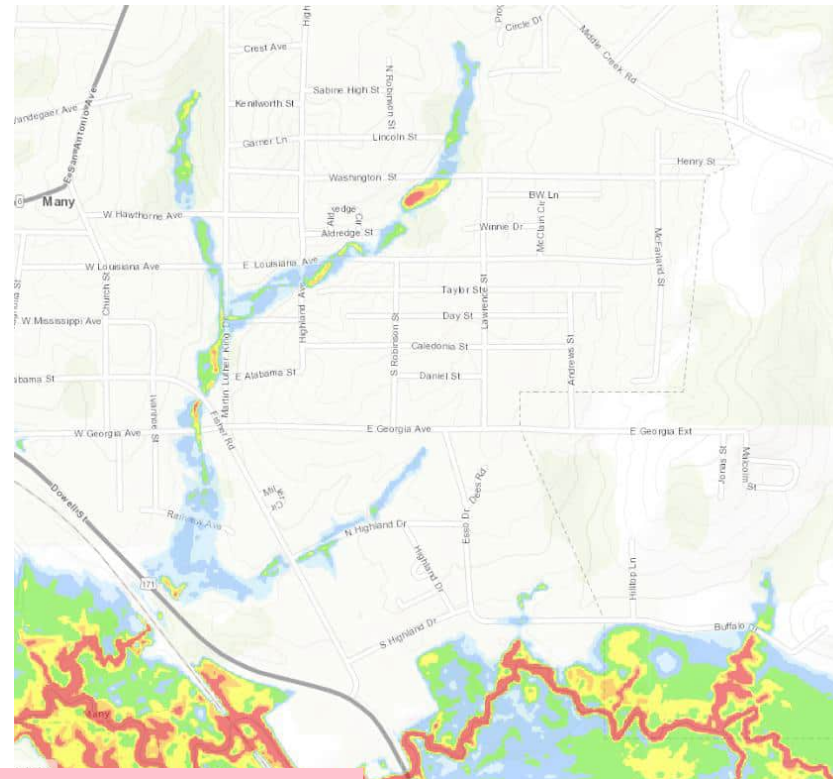
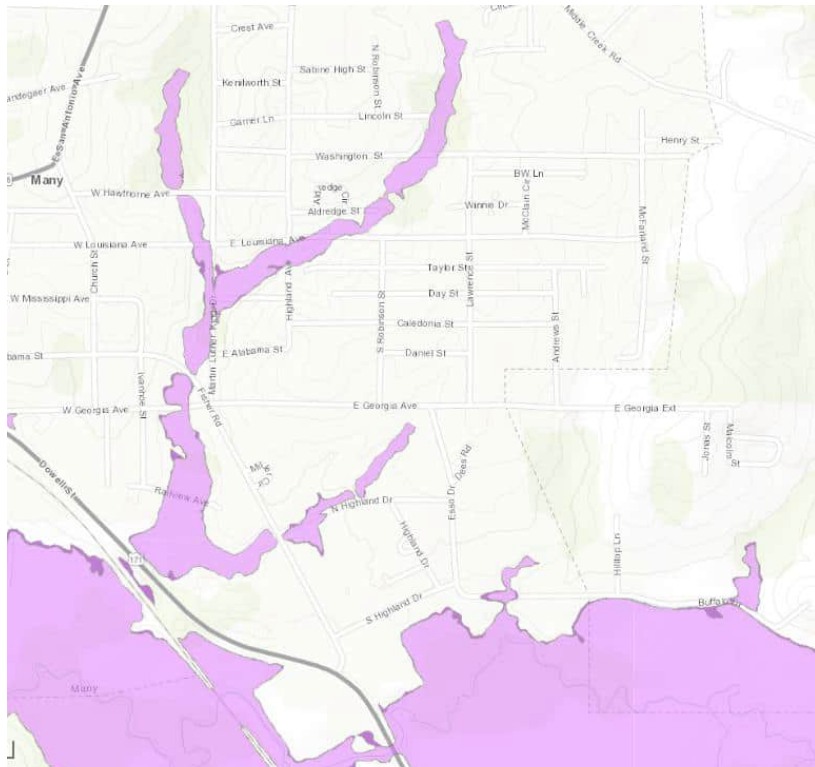


# BASE LEVEL ENGINEERING (BLE)

- BLE is developed at a larger scale (HUC8)
- LiDAR must be available
- Steps of Hydrology, Hydraulics & Terrain
- Model review and adjustments
- Gage review included in hydrology
- Used to assess flood risk



# BASE LEVEL ENGINEERING (BLE)



## OUTPUTS

- Hydrology modeling (Regression) flows w/gage analysis
- Hydraulic modeling (HEC-RAS) for 10%, 4%, 2%, 1% and 0.2% storm events
- 10%, 1% and 0.2% floodplain boundaries

## Non-Regulatory

- Areas of Expanded Flood Risk
- Depth and Analysis Grids
- Flood Risk Assessment

# DISCOVERY MEETINGS – PREPARATION

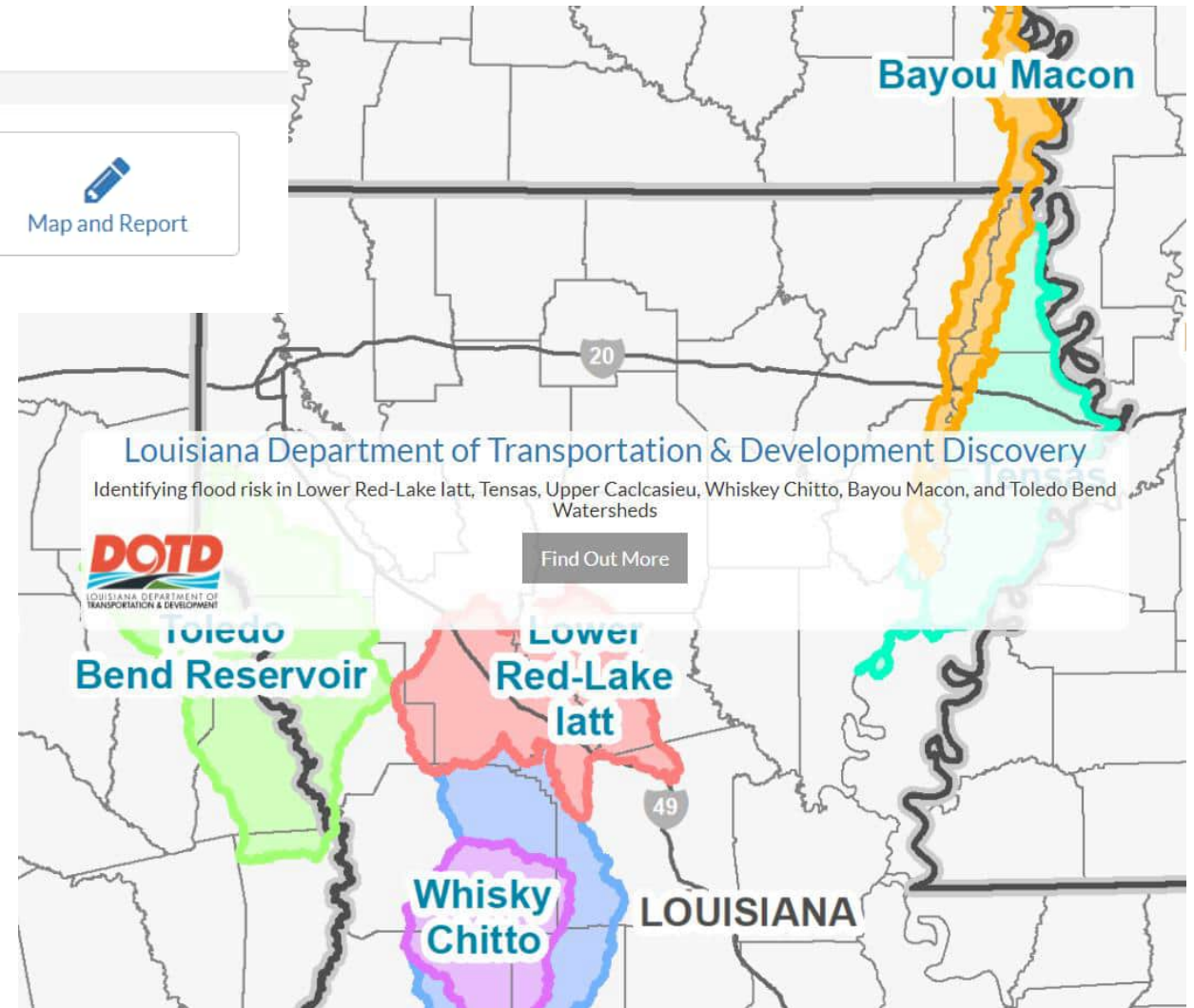
## Louisiana DOTD Discovery

Overall Progress



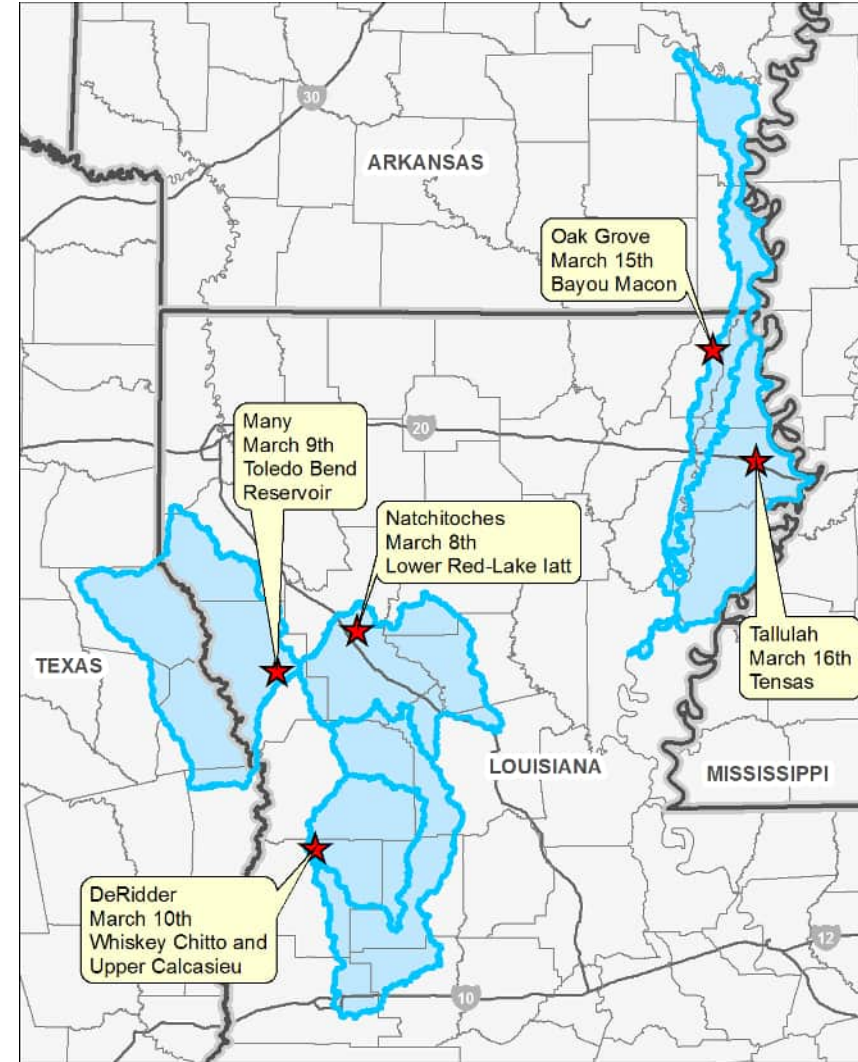
Use the buttons above to navigate

- Enter your data online before the meeting
- Discovery meetings in March
- All community stakeholders are encouraged to attend



# DISCOVERY MEETINGS – LOCATIONS

- Southwest Watersheds
  - March 8<sup>th</sup> – Natchitoches
  - March 9<sup>th</sup> – Many
  - March 10<sup>th</sup> – DeRidder
- Northeast Watersheds
  - March 15<sup>th</sup> – Oak Grove
  - March 16<sup>th</sup> – Tallulah



# DISCOVERY MEETINGS – WHAT TO EXPECT

- “Come and Go” format
- Open conversation
- Serves as additional meeting point beyond the webmap
- Groups present:
  - Federal, State, and Regional Agencies
  - Community Officials and other local stakeholders



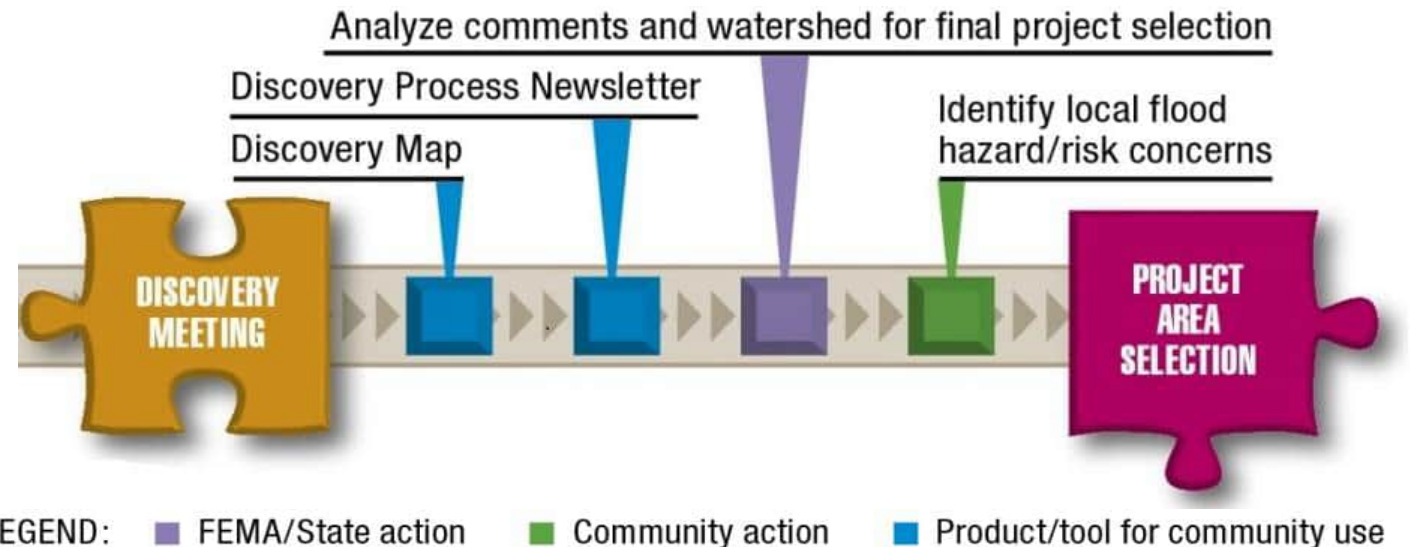
# DISCOVERY MEETINGS – WHAT YOU SHOULD BRING

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- Knowledge of Flood Risks and Past Flooding in your community
- Hazard Mitigation Projects – Identified, In Progress, or Complete?
- Master Drainage Plan(s), floodplain studies – completed or identified as needs
- Questions or Concerns regarding your current Digital Flood Insurance Rate Maps – Flood Study Needs
- Current Flood Risk Communication Process
- Dams and Levees – Questions or Concerns
- GIS data

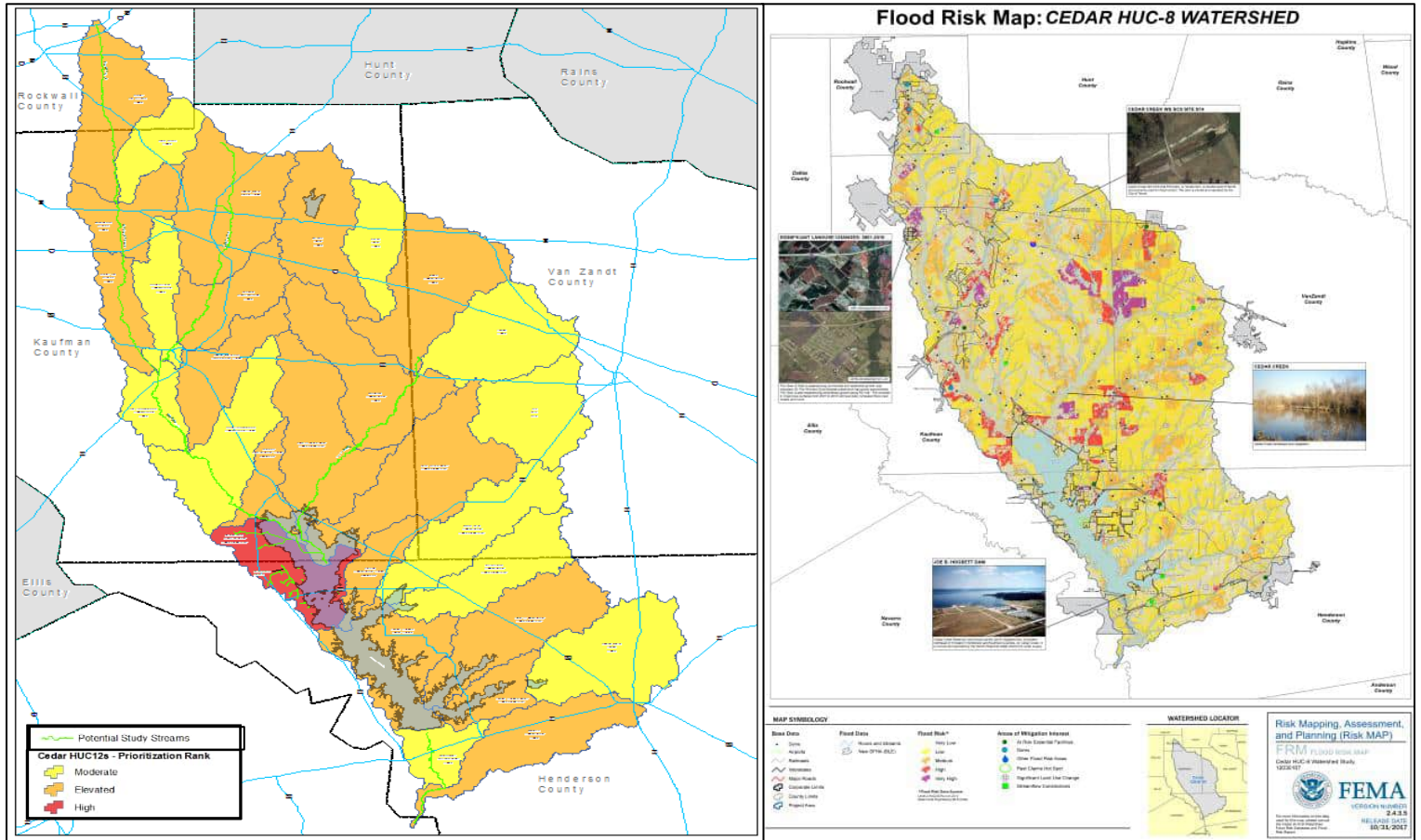
# POST-DISCOVERY ACTIONS

- Post-Discovery Actions
  - Analyze data collected
  - Review findings with LaDOTD
  - Preliminary project selections provided to communities
  - Evaluate community input
  - Discovery Report
- Findings Meetings – Fall 2022



# POST-DISCOVERY RESULTS

- Population density and change
- Predicted population growth
- Historical flood events and claims
- Number of Letters of Map Change (LOMR/LOMA)
- Available current topography
- Age of technical data – hydrology and hydraulics
- Ability to leverage current studies
- Potential for local funding and “work in kind”
- Previous contribution to FEMA studies
- Stakeholder mapping requests



**The primary result of Discovery is a list of projects to be considered for funding!**

## DISCOVERY SUMMARY

---

- Heighten community involvement and understanding
- Gather all flood-related information available
  - Knowledge of Flood Risks and Past Flooding in your community
  - Hazard Mitigation Projects – ongoing, planned or completed
  - Master Drainage Plans and floodplain studies – ongoing, planned or completed
  - Current flood risk communication process
  - GIS data
- Request needs in the community
  - Questions and concerns for DFIRM maps
  - All questions and concerns for dams and levees
  - Study request in areas of repetitive loss
  - Areas of new development or other causes of concern for the future
  - Funding needs for identified flood risk projects

# DISCOVERY SUMMARY

---

- Next steps
  - Involve other people in your office, team and community
  - Go to the website and add all information you gather
  - Call or email with questions
  - Join us in March for the Discovery meeting for any additional conversation
  - Get funding for your area!

# PLEASE ENTER YOUR INFORMATION ON THE WEBSITE – LIVE AFTER THIS MEETING

## Louisiana DOTD Discovery

Overall Progress



Welcome



Your Info



Backgrounder



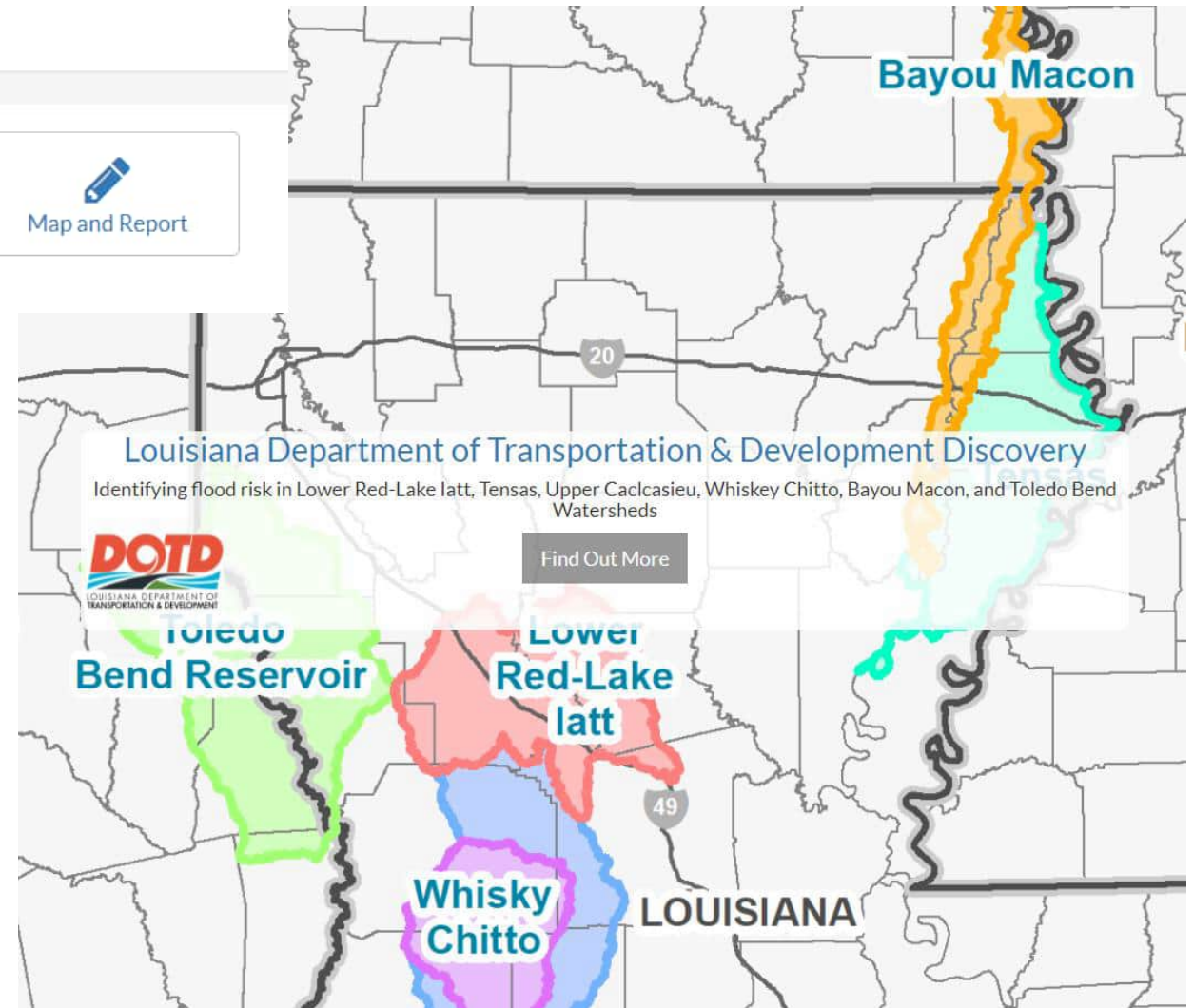
Questions



Map and Report

Use the buttons above to navigate

Customize Discovery:  
After the meeting, enter your  
community's data at:  
<https://dotd.discovery.halff.com>  
Password: DOTD\_FY20!



# WEBSITE OVERVIEW

Log in - Louisiana DOTD Discovery | Southwest Louisiana Watershed | Bayou Macon and Tensas Water

dotd-discovery.test.half.com/Account/Login

## Louisiana DOTD Discovery

Overall Progress 0%

Welcome Your Info Backgrounder Questions Map and Report

Use the buttons above to navigate

### We need your help!

The Louisiana Department of Transportation and Development (DOTD) has partnered with the Federal Emergency Management Agency (FEMA) to perform Discovery throughout six HUC-8 watersheds (Lower Red-Lake, Tensas, Upper Caclcasieu, Whiskey Chitto, Bayou Macon, and Toledo Bend). Discovery is a step in the Risk MAP process in which communities are able to share flood risk concerns, identify areas at risk for flooding, and discuss solutions to reduce risk. You can help by ensuring the data about your community is current and accurate.

The overall goal of Discovery is for FEMA to partner with local communities and identify stakeholders to review and validate gathered flood risk data as well as discuss the vision for the watershed's future.

By logging in with your email address and the password provided during the Pre-Discovery Meeting, you can help the DOTD refine the gathered regional flood risk data with local information regarding mapping needs and local flood risk data. Information such as flood-study needs, historical flooding locations, development plans, mitigation plans, floodplain management plans, etc. is needed. The contact information enables more local as well as watershed-wide follow-up conversations about flood-risk decision making activities.

[Click here to download a list of commonly used Discovery related acronyms.](#)

Partners in the Discovery process include:

- Community officials
- Federal, State, regional, local, and non-profit organizations
- Other identified stakeholders

A detailed description of the Discovery process is located [here](#).

FEMA, state, local, and tribal officials collect current and historic flood-related data including:

Contact Info - Louisiana DOTD Discovery | Southwest Louisiana Watershed | Bayou Macon and Tensas Water

dotd-discovery.test.half.com/Account/ContactInfo

## Louisiana DOTD Discovery

Overall Progress 100% THANK YOU!

Welcome Your Info Backgrounder Questions Map and Report

Use the buttons above to navigate

Thank you, John! Click the next tab above to proceed.

Why do you need this? +

You are representing Arkansas City

Title  
Mayor

First name  
John

Last name  
Smith

Phone number  
555-555-5555

Submit

# WEBSITE OVERVIEW

## Community Backgrounder

- Snapshot of existing data
- Open for review and verification
  - Key items for verification:
    - Number of NFIP claims
    - Financial cost of losses
    - Mitigation Plan standing (outdated, existing, proposed, etc.)
    - Number of high-water marks
    - Number of low-water crossings

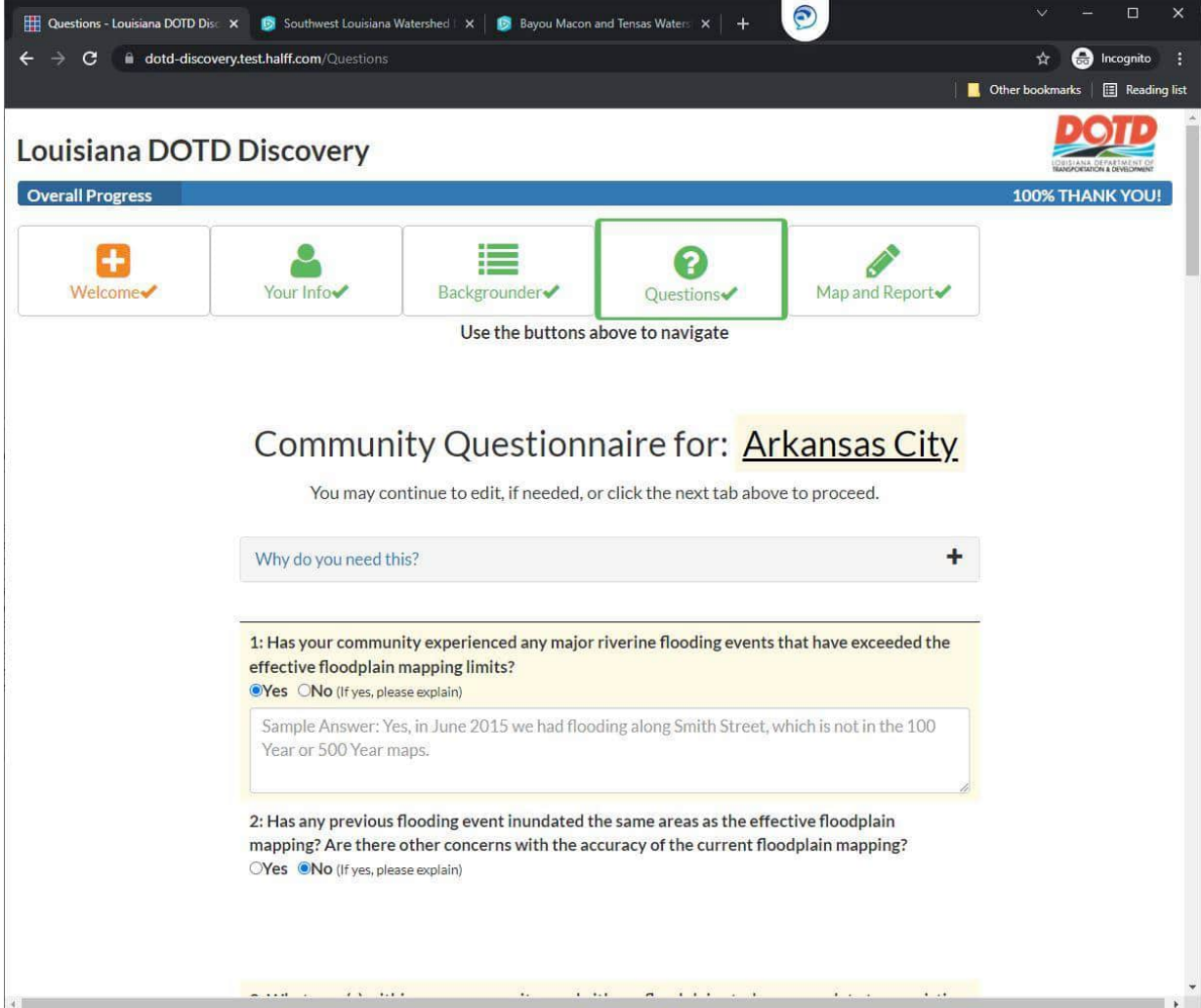
The screenshot shows a web browser window with the URL `dotd-discovery.test.halff.com/Backgrounder/Edit/1855C9FB-A75A-4E93-BB61-8F03F6A525C4`. The page title is "Louisiana DOTD Discovery" and it features a "100% THANK YOU!" banner. A navigation bar contains five buttons: "Welcome", "Your Info", "Backgrounder" (highlighted with a green box), "Questions", and "Map and Report". Below the navigation bar, the page displays "Community Backgrounder for: Arkansas City". A text input field contains "What is this? Why do you need this?". A table follows, showing fields and their values, with "Your Updated Info" columns for some fields.

Field	What We Found	Your Updated Info
Community ID: (Source: FEMA)	50066	
HUC8s:	• Bayou Macon	
Type:	City	
Parish:	Desha County	
State:	AR	
Population: (2019 American Community Survey)	376	<input type="text" value="376"/>
NFIP Participant: (Source: FEMA)	No	<input type="radio"/> Yes <input checked="" type="radio"/> No
CRS Rating: (Source: FEMA)		<input type="text" value="Usually 1 through 10,"/>
Mitigation Plan: (Source: Community Website)	Yes	<input checked="" type="radio"/> Yes <input type="radio"/> No

# WEBSITE OVERVIEW

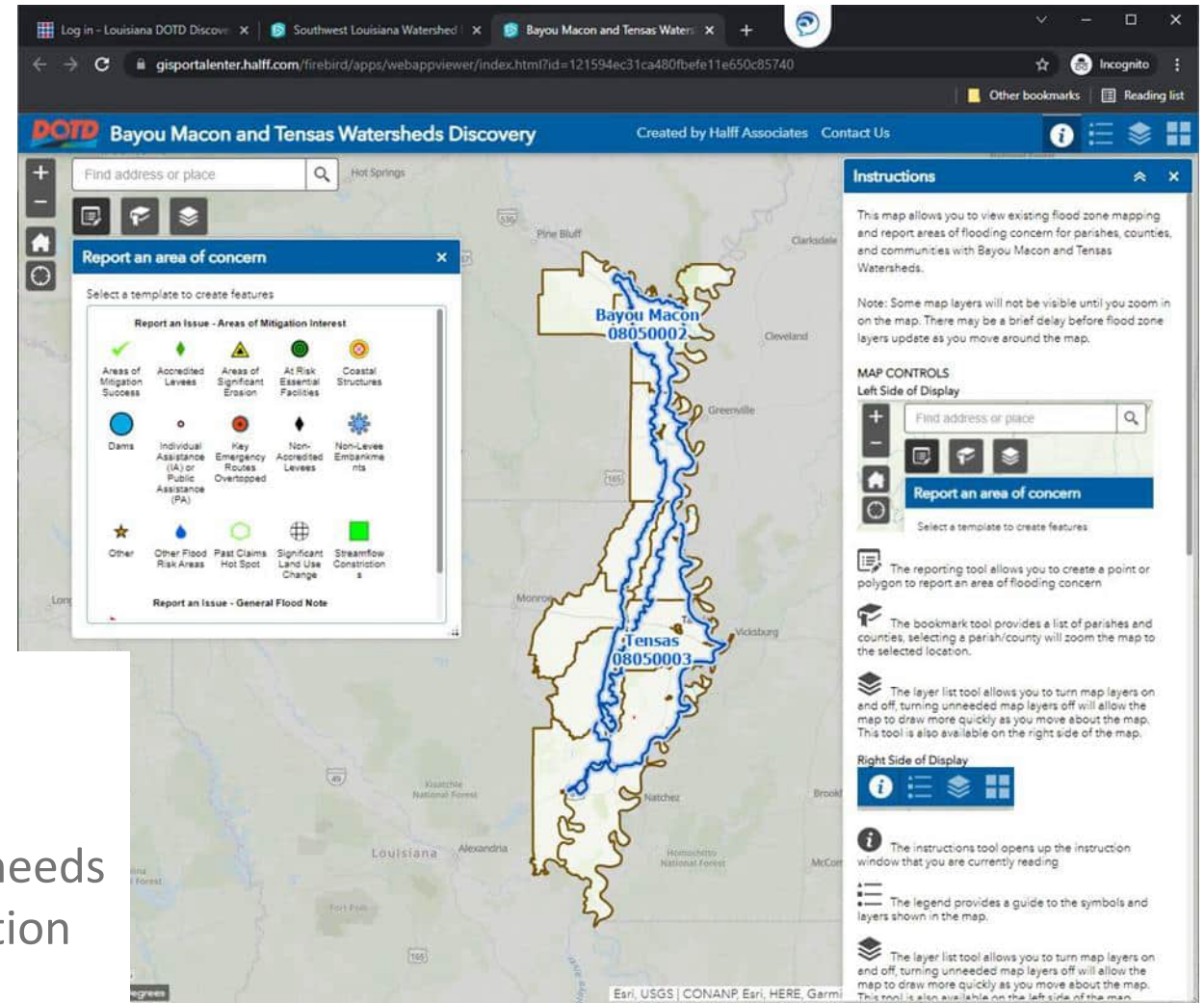
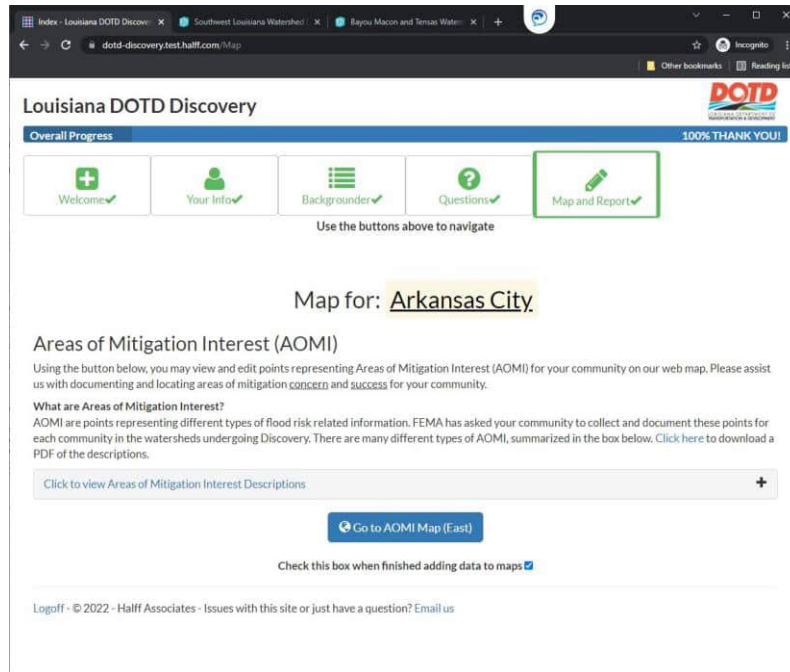
## Community Questionnaire

- 26 questions to guide flood risk conversation and data gathering/mapping
- Sample responses provided



The screenshot shows a web browser window displaying the Louisiana DOTD Discovery website. The browser's address bar shows the URL `dotd-discovery.test.halff.com/Questions`. The website header includes the Louisiana DOTD logo and the text "Louisiana DOTD Discovery". A progress bar at the top indicates "Overall Progress" and "100% THANK YOU!". Below the progress bar, there are five navigation buttons: "Welcome", "Your Info", "Backgrounder", "Questions", and "Map and Report". The "Questions" button is highlighted with a green border. Below the navigation buttons, the text "Use the buttons above to navigate" is displayed. The main content area features the title "Community Questionnaire for: Arkansas City". Below the title, there is a message: "You may continue to edit, if needed, or click the next tab above to proceed." A text input field contains the question "Why do you need this?". Below this, there are two numbered questions. Question 1 asks: "1: Has your community experienced any major riverine flooding events that have exceeded the effective floodplain mapping limits?" with radio buttons for "Yes" (selected) and "No (If yes, please explain)". A text box below contains a sample answer: "Sample Answer: Yes, in June 2015 we had flooding along Smith Street, which is not in the 100 Year or 500 Year maps." Question 2 asks: "2: Has any previous flooding event inundated the same areas as the effective floodplain mapping? Are there other concerns with the accuracy of the current floodplain mapping?" with radio buttons for "Yes" and "No (If yes, please explain)".

# WEBSITE OVERVIEW



## Interactive Webmap

- Areas of Mitigation Interest (AOMI)
- Gathering information on mitigation success and needs
- Place for all additional data and mapping risk location
- Tutorial available online

# QUESTIONS?



# QUESTIONS

---

**Susan Veillon**

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(225) 379-3005  
susan.veillon@la.gov

**Cindy O'Neal**

State NFIP Coordinator  
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Project Manager  
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Discovery Task Manager  
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vbivens@Halff.com

**Dennis Skultety**

Discovery GIS Lead  
(501) 801-2683  
dskultety@Halff.com

## Discovery Findings Webinar Slides



# LOUISIANA DISCOVERY

**“CAPTURING A MORE COMPLETE PICTURE OF  
YOUR WATERSHED”**

**POST-DISCOVERY MEETING**

# CONTACTS

---



**Susan Veillon**  
DOTD CTP Project Manager  
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susan.veillon@la.gov

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Floodplain Coordinator  
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jyoung@Halff.com

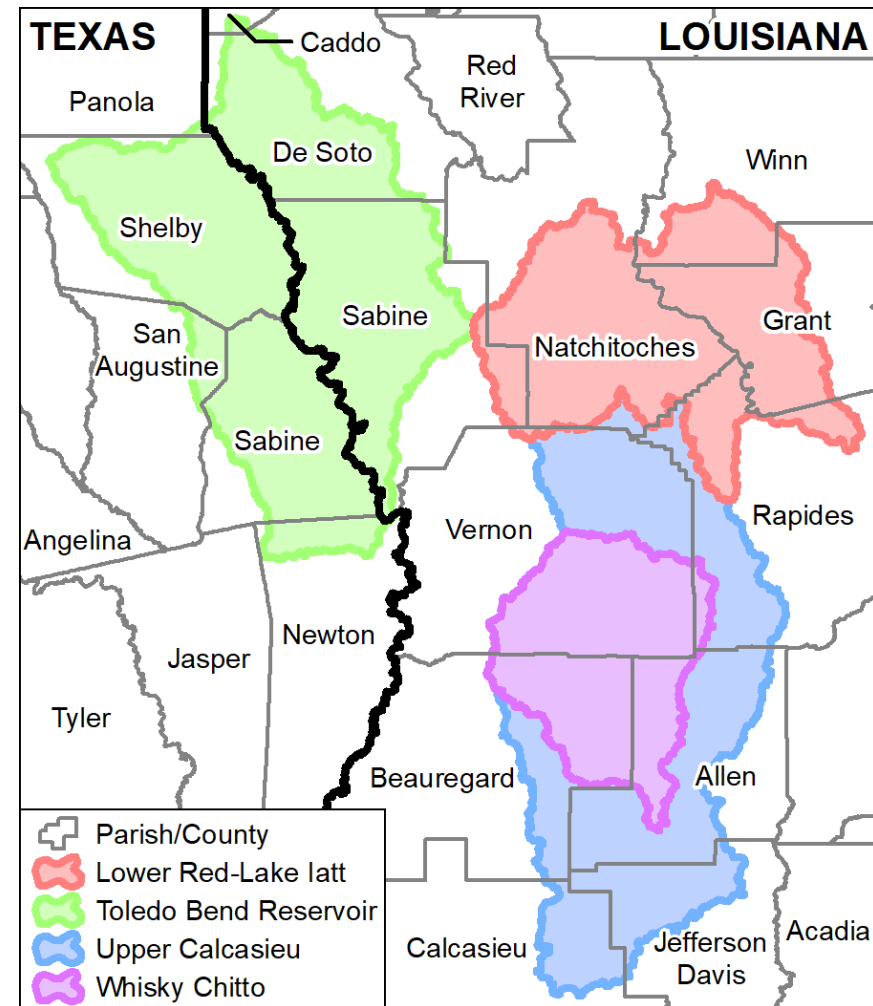
**Victor Bivens**  
Discovery Task Manager  
(318) 716-6134  
vbivens@Halff.com

**Dennis Skultety**  
Discovery GIS Lead  
(501) 801-2683  
dskultety@Halff.com



# AGENDA

- Discovery Overview
- Overview of Risk MAP
- LaDOTD Discovery Activities
  - Pre-Discovery Activities
  - Discovery Activities
    - Data Gathering Website and Walk-through
  - Post-Discovery Activities
  - Post-Discovery Results
    - Base Level Engineering
    - HAZUS Results
- Post Meeting Coordination
- BFE Overview
- Project Recommendations to FEMA



## DISCOVERY OVERVIEW

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Discovery is FEMA's process for identifying and accessing flood risk to better prepare a list of needs and projects to address those needs within communities.

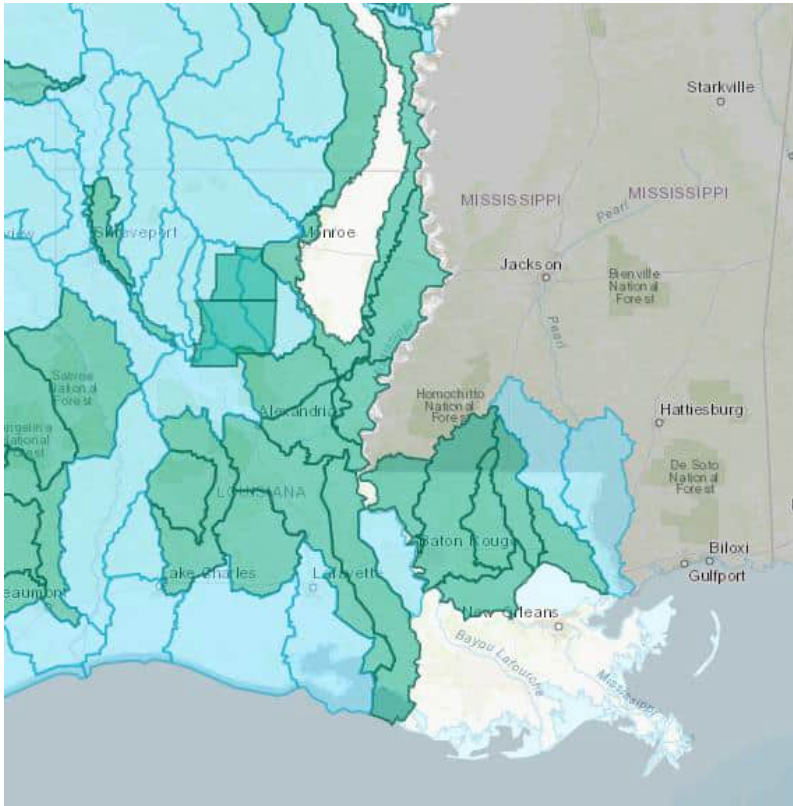
- Heighten community involvement and understanding
- Gather all flood-related information available
  - Knowledge of Flood Risks and Past Flooding in your community
  - Hazard Mitigation Projects – ongoing, planned or completed
  - Master Drainage Plans and floodplain studies – ongoing, planned or completed
  - Current flood risk communication process
  - GIS data

# DISCOVERY OVERVIEW

---

- Request needs in the community
  - Questions and concerns for DFIRM maps
  - All questions and concerns for dams and levees
  - Study request in areas of repetitive loss
  - Areas of new development or other causes of concern for the future
  - Funding needs for identified flood risk projects
- Present Projects for Consideration
  - Modeling and Mapping needs
  - Structural improvements listed in the Flood Risk Map

# FEMA'S RISK MAP PROGRAM



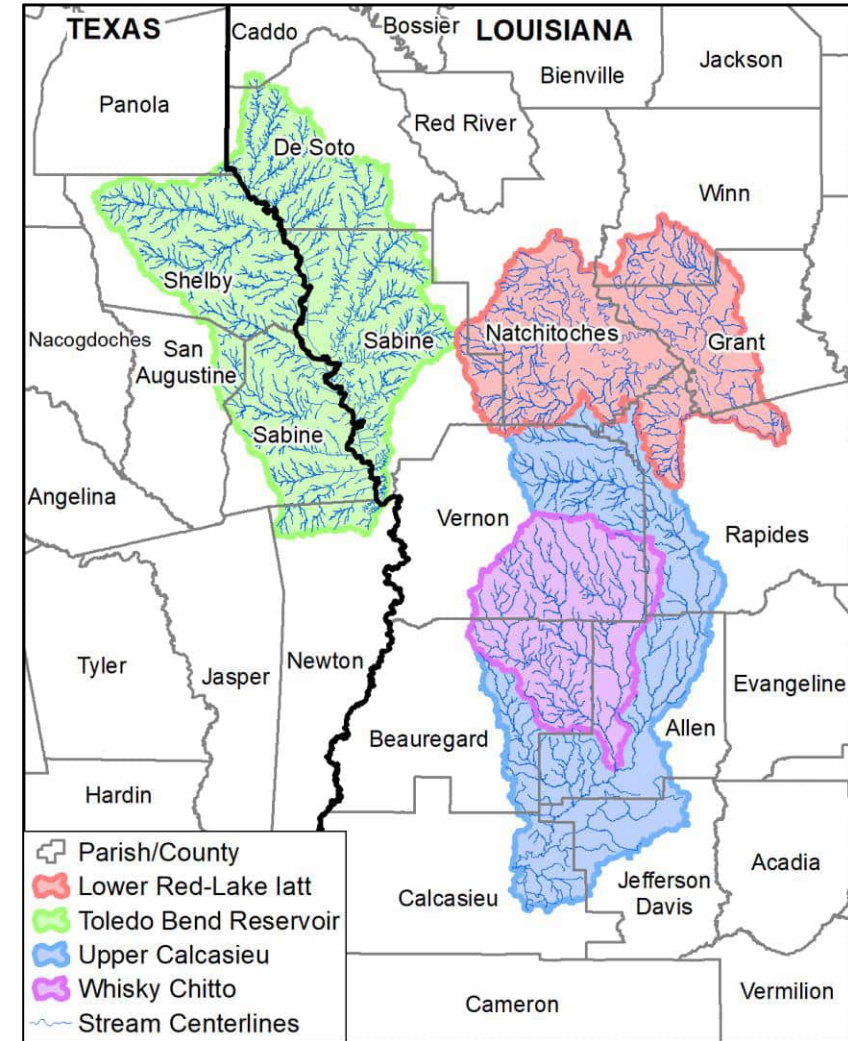
- Provide flood information and tools for better **protection**
- **Action-Driven** through local understanding and ownership of risk



# LOUISIANA DOTD DISCOVERY GOALS

## Louisiana Watersheds Discovery

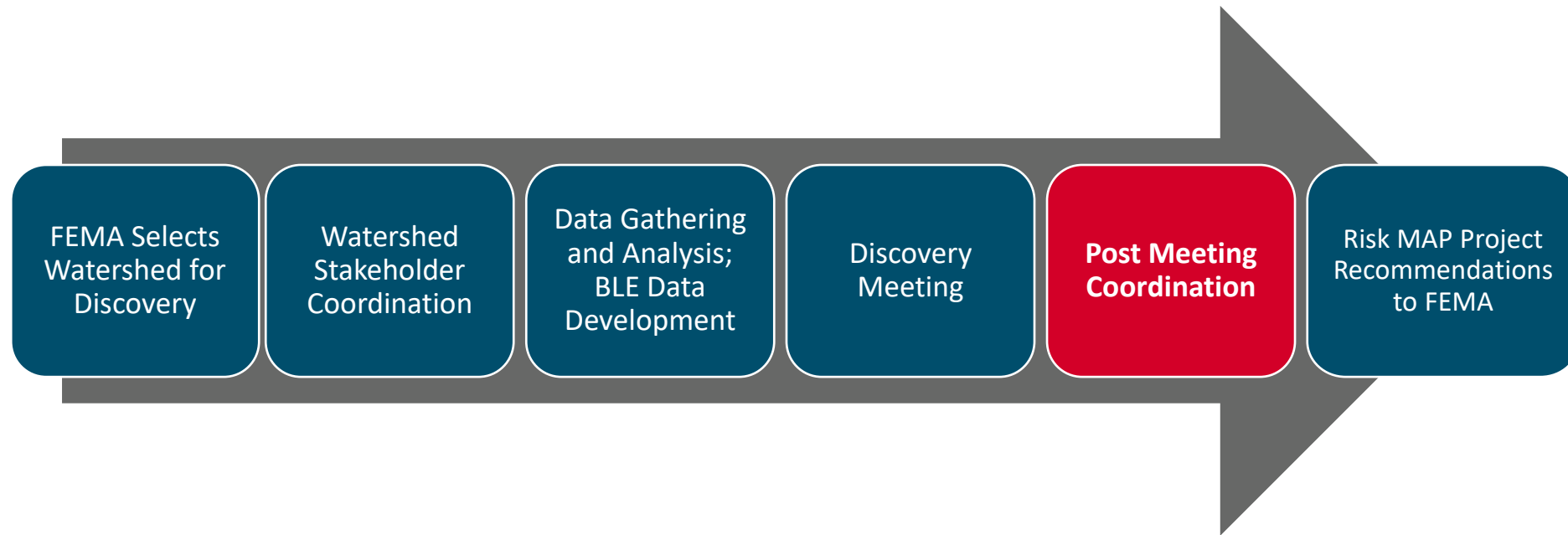
- Goals
  - Inform Community of Present Flood Risk
  - Gather local data to supplement National, Regional and State data
  - Present FEMA with areas of highest concern and need for additional study



## DISCOVERY STEPS

---

- *Capture a more complete picture of your watershed by working closely with local communities...*



## Pre-Discovery Newsletter

### Toledo Bend Reservoir, Lower Red-Lake latt, Whisky Chitto & Upper Calcasieu Watersheds

*"Capturing a More Complete Picture of Your Community and Your Watershed" January 2022*

**Risk MAP Process and Discovery**

Risk Mapping, Assessment, and Planning (Risk MAP) is the Federal Emergency Management Agency (FEMA) Program that assists communities with flood information and tools they can use to enhance their mitigation plans and better protect their citizens. Discovery is the first phase of an overall process to achieve mitigation actions for reducing risks. The Louisiana Department of Transportation & Development (DOTD) has been awarded a FEMA grant to conduct Discovery in the Toledo Bend Reservoir, Lower Red-Lake latt, Whisky Chitto & Upper Calcasieu Watersheds in 2022.

**The Goal:** To work closely with communities to better understand local flood risk, mitigation efforts, and other topics to spark watershed-wide discussions about increasing resilience to flooding.

**Pre-Discovery Meeting January 19<sup>th</sup>, 2022 10:00 AM**

**Online invitations for Webex Meeting to be sent out soon**

**Requested Data from Communities**

- Areas of recurring flooding
- Historical local flooding locations
- High water marks or flood photos documented from historical flood events
- Infrastructure information, especially for levees and new bridges, dams, culverts and road improvements
- Mitigation activities and grant projects (ongoing or planned)
- Local development and floodplain management plans
- Stormwater management activities
- Regional watershed plans
- Flood study needs

**Discovery Data Collection**

The section to the left lists some of the types of data requested from each community within the watershed. We would greatly appreciate your participation in providing mapping needs and flood risk data for your community.

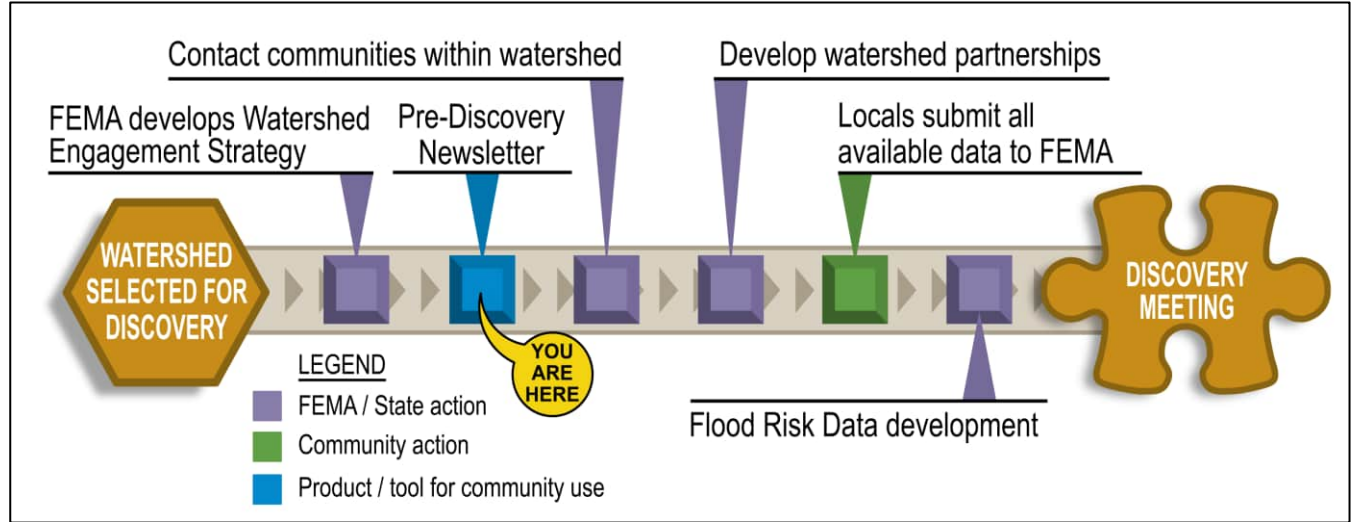
**LEGEND**

- FEMA / State action
- Community action
- Product / tool for community use

**Customize Discovery:**  
After the meeting, enter your community's data at:  
<https://dotd.discovery.half.com>  
Password: DOTD\_FY20!

**DOTD requests communities share whatever data they have, to provide as complete a picture as possible.**

The Louisiana Department of Transportation & Development is a FEMA Cooperating Technical Partner (CTP), which allows them to collaborate with FEMA to help maintain current flood hazard information. The results from Base Level Engineering (BLE) studies served as a reference for the Mapping Activity Statement (MAS) of the FEMA CTP grant. FEMA awarded a CTP grant to DOTD to perform Discovery in these watersheds. The current MAS is included in the Risk MAP program. **Please contact Susan Vellon ([Susan.Vellon@la.gov](mailto:Susan.Vellon@la.gov)) if you have questions about Discovery.**



**Pre-Discovery Meeting**  
**January 19<sup>th</sup>, 2022**  
**10:00 AM**

**Online invitations for**  
**Webex Meeting to be**  
**sent out soon**

# DISCOVERY MEETINGS – WEBSITE

## Louisiana DOTD Discovery

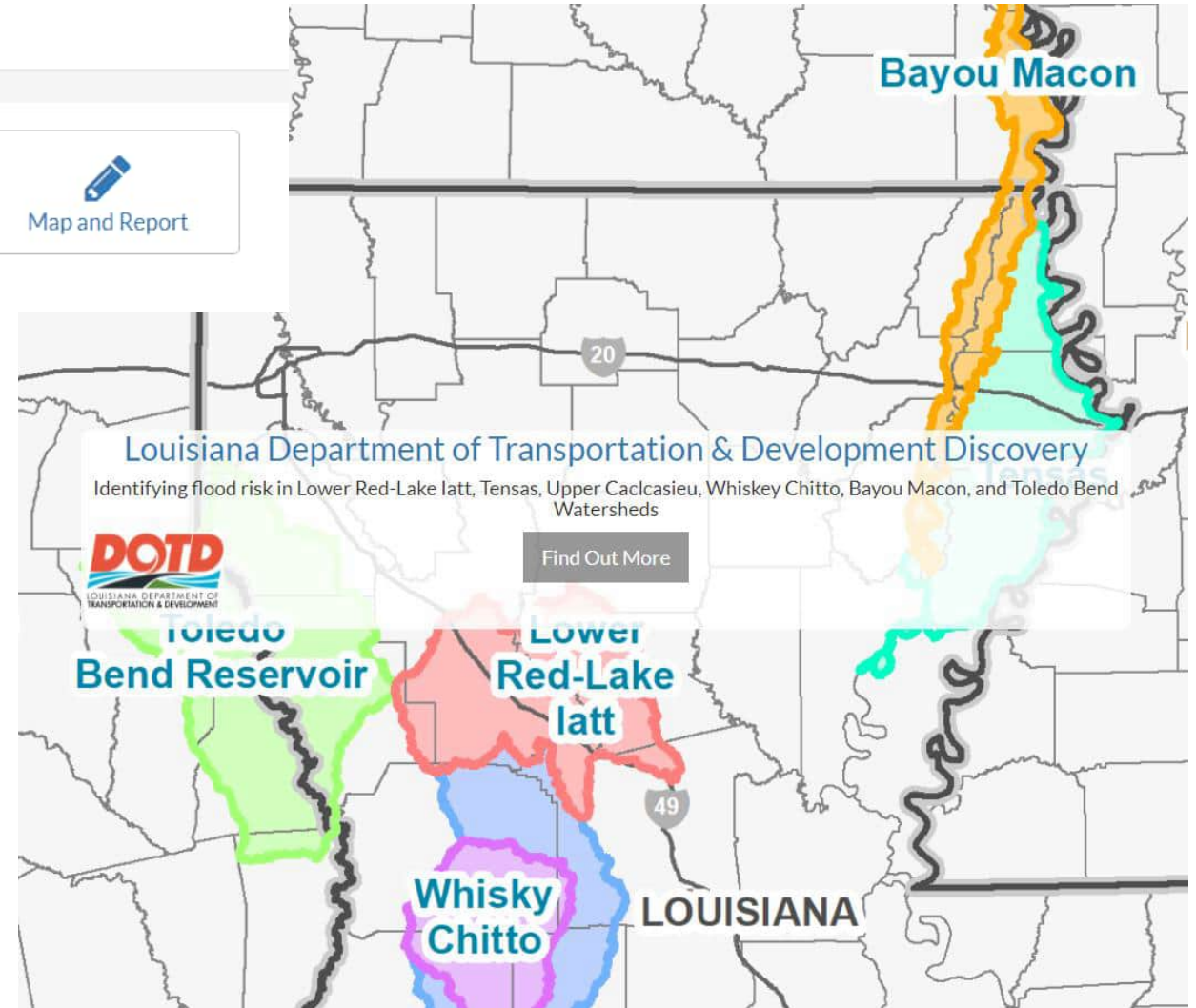
Overall Progress

Navigation buttons:

- Welcome (highlighted with a green border)
- Your Info
- Backgrounder
- Questions
- Map and Report

Use the buttons above to navigate

- Enter your communities' data online
- Discovery meetings were conducted in March
- All community stakeholders were encouraged to attend



## Community Backgrounder






- Key items for verification:
  - Number of NFIP claims
  - Financial cost of losses
  - Mitigation Plan standing (outdated, existing, proposed, etc.)
  - Number of high-water marks
  - Number of low-water crossings
  - Significant Land Use Changes
  - Issues with Effective Mapping

### Louisiana DOTD Discovery



Overall Progress

80%

 Welcome ✓	 Your Info ✓	 Backgrounder ✓	 Questions ✓	 Map and Report
--	--	---	--	---

Use the buttons above to navigate

Map for: Caddo Parish

### Areas of Mitigation Interest (AOMI)

Using the button below, you may view and edit points representing Areas of Mitigation Interest (AOMI) for your community on our web map. Please assist us with documenting and locating areas of mitigation concern and success for your community.

#### What are Areas of Mitigation Interest?

AOMI are points representing different types of flood risk related information. FEMA has asked your community to collect and document these points for each community in the watersheds undergoing Discovery. There are many different types of AOMI, summarized in the box below. [Click here](#) to download a PDF of the descriptions.

[Click to view Areas of Mitigation Interest Descriptions](#)



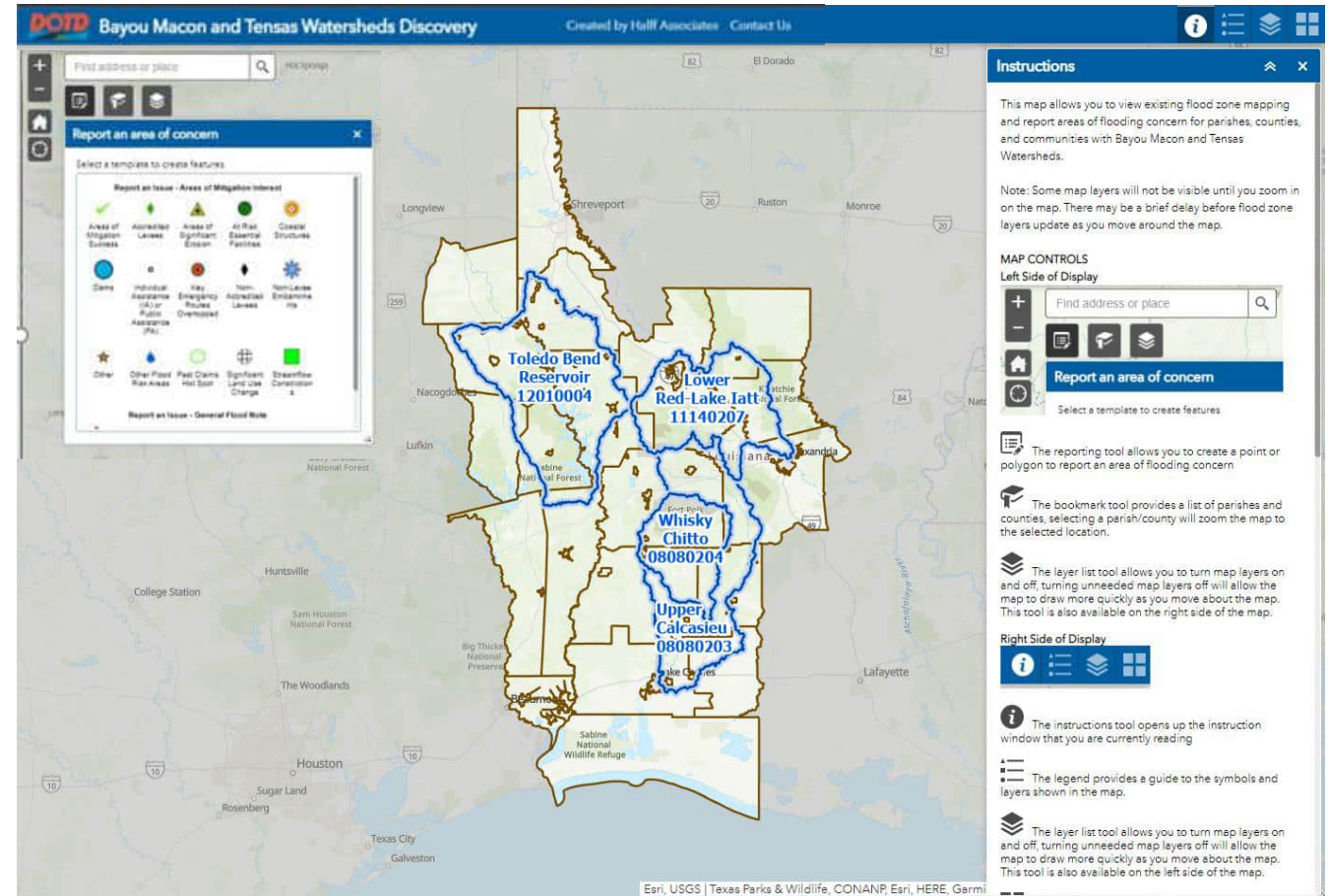
[Go to AOMI Map \(West\)](#)

Check this box when finished adding data to maps

Logoff - © 2022 - Halff Associates - Issues with this site or just have a question? [Email us](#)

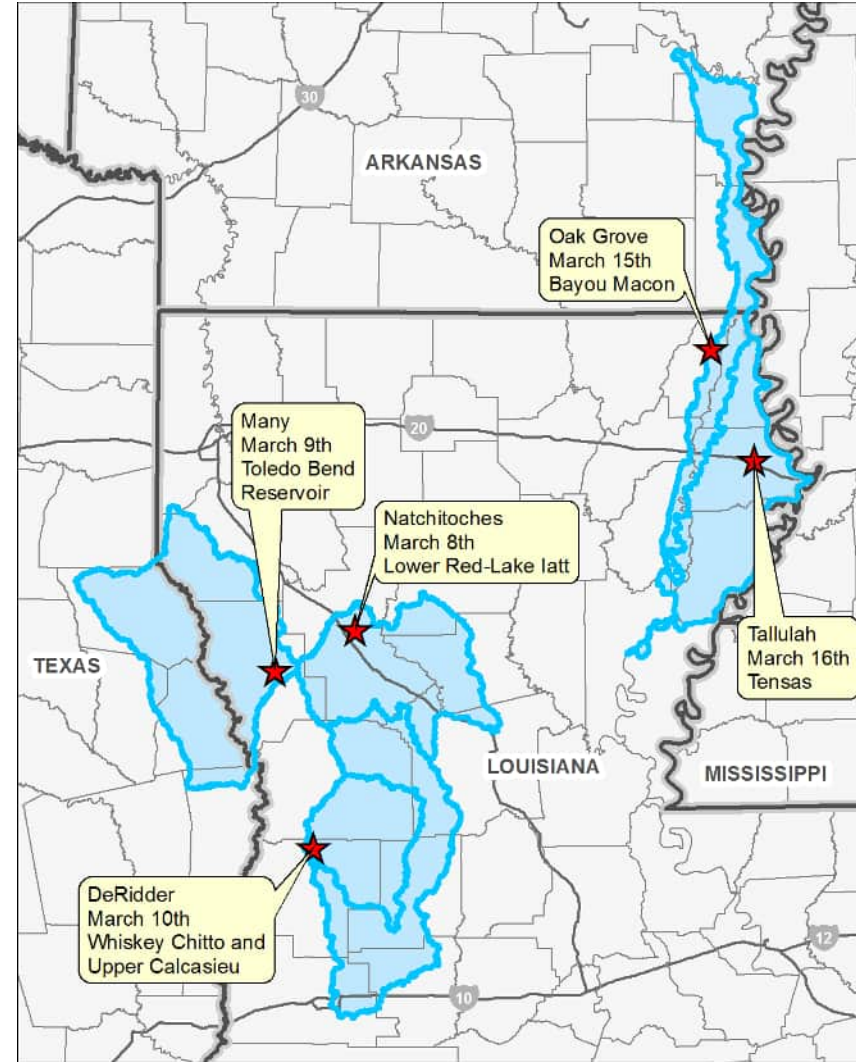
## Interactive Webmap

- Areas of Mitigation Interest (AOMI)
- Gathering information on at risk facilities, significant erosion areas, past claim hotspots, low water crossings, streamflow constrictions, and other flood risk areas
- Place for all additional data and mapping risk location



# DISCOVERY ACTIVITIES – MEETINGS

- Southwest Watersheds
  - March 8<sup>th</sup> – Natchitoches
  - March 9<sup>th</sup> – Many
  - March 10<sup>th</sup> – DeRidder
- Northeast Watersheds
  - March 15<sup>th</sup> – Oak Grove
  - March 16<sup>th</sup> – Tallulah



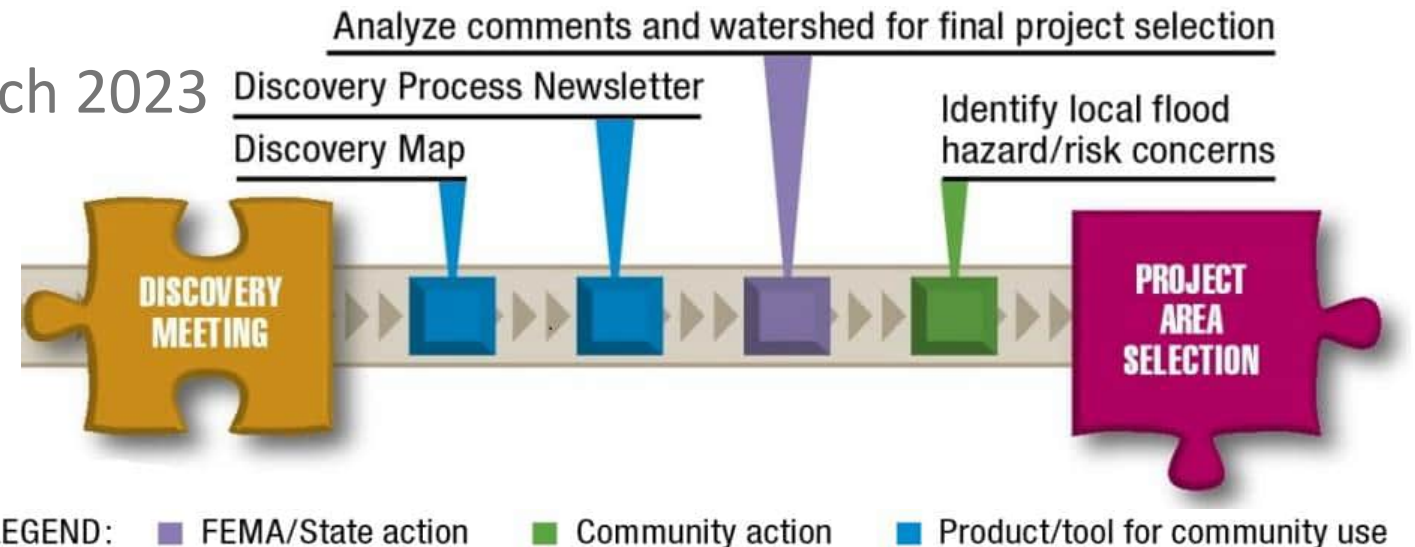
# DISCOVERY MEETINGS – WHAT TO EXPECT

- “Come and Go” format
- Open conversation
- Served as additional meeting point beyond the webmap
- Facilitated discussion among stakeholders
- Received flooding issues
- Groups present:
  - Federal, State, and Regional Agencies
  - Community Officials and other local stakeholders



# POST-DISCOVERY ACTIONS

- Post-Discovery Actions
  - Analyze data collected
  - Review findings with LaDOTD
  - Preliminary project selections provided to communities
  - Evaluate community input
  - Discovery Report
- Post Discovery Meeting – March 2023

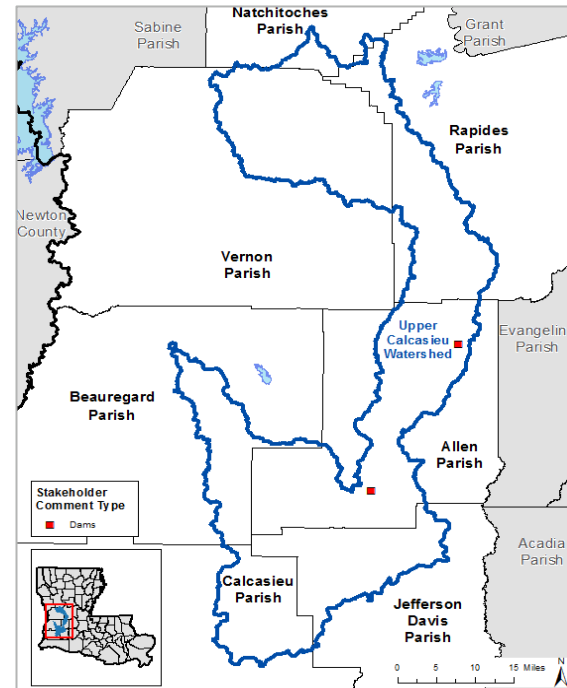


# FINDINGS

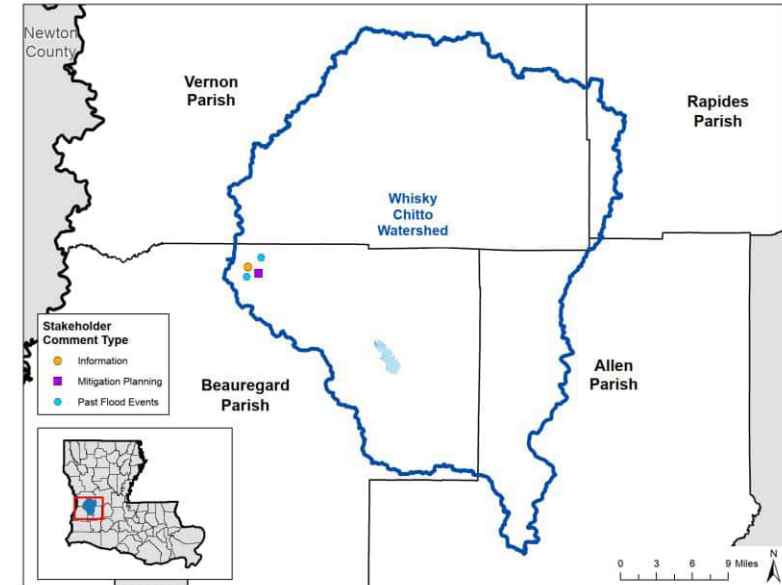
## 27 STAKEHOLDER MAP COMMENTS

Number of Comments	Community
5	Allen
6	Beauregard
6	Calcasieu
0	Jefferson Davis
0	Natchitoches
5	Rapides
5	Vernon

Upper Calcasieu Watershed



Whisky Chitto Watershed

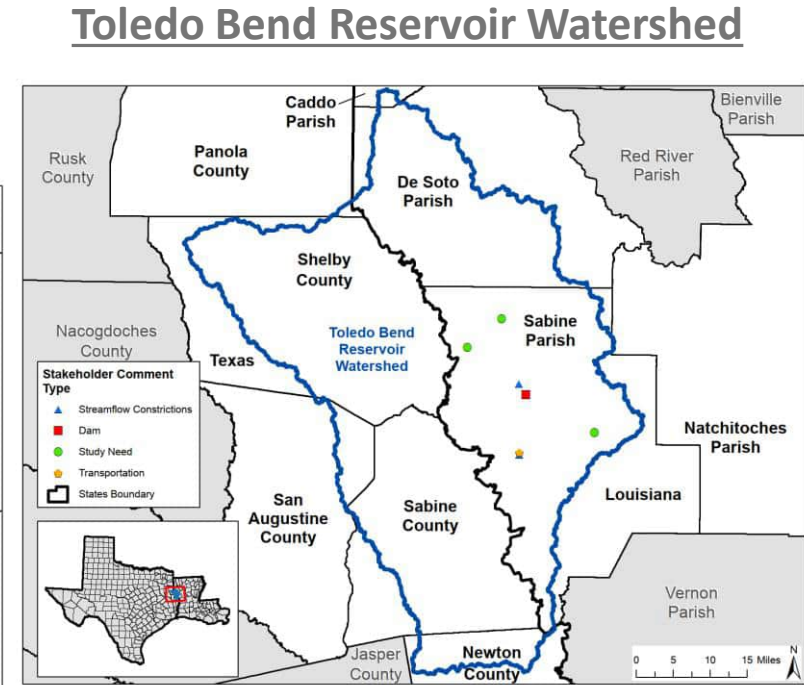
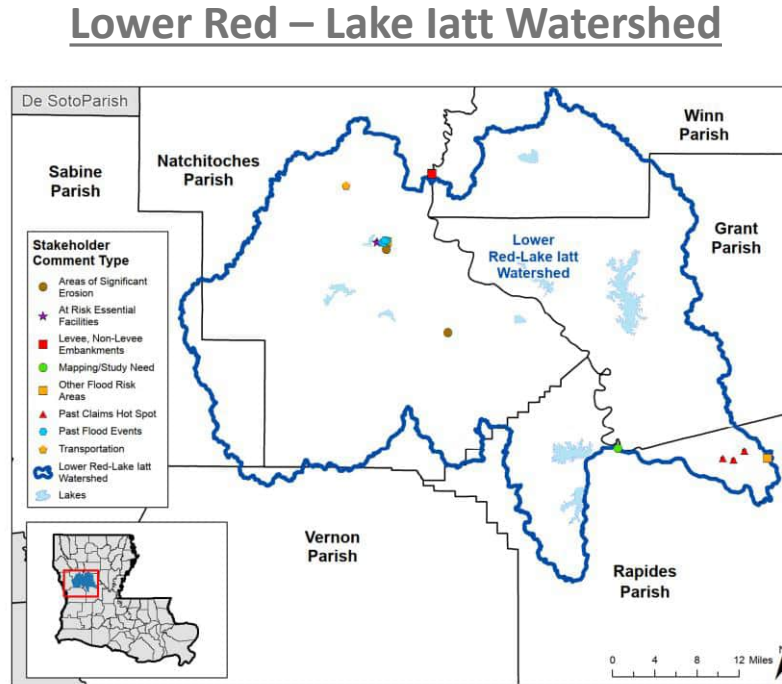


**The primary result of Discovery is a list of projects to be considered for funding!**

# FINDINGS

## STAKEHOLDER MAP COMMENTS

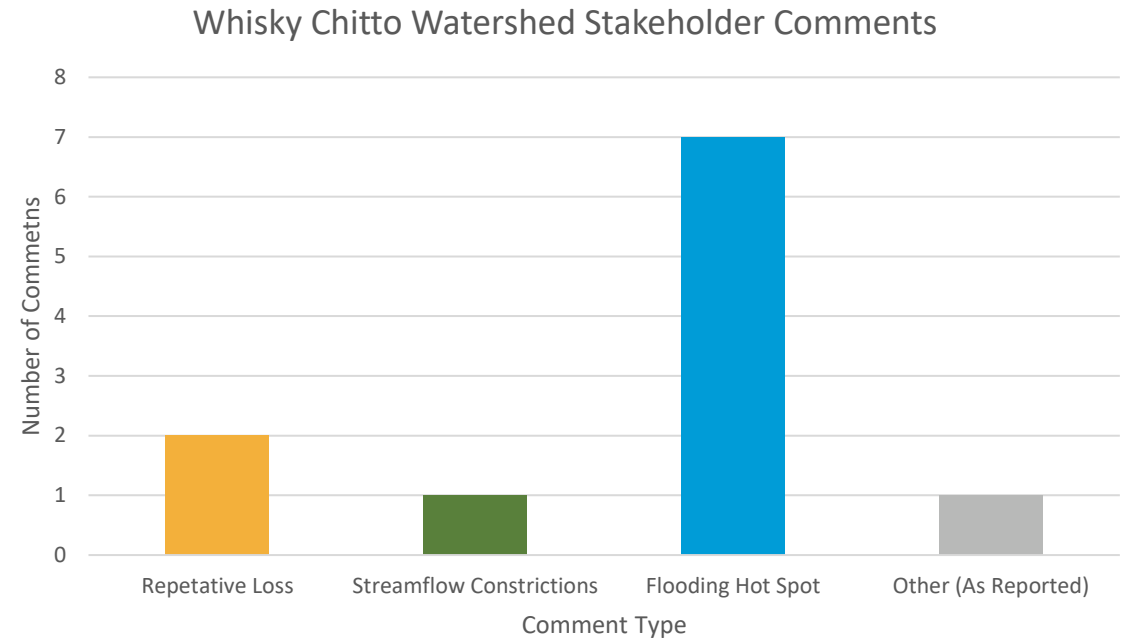
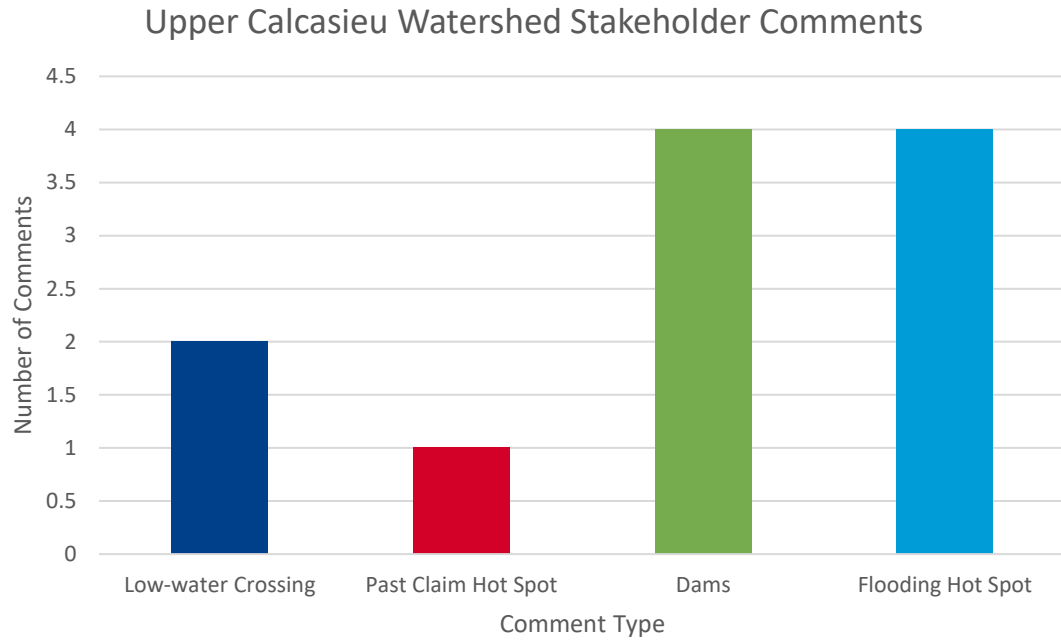
Number of Comments	Community
0	Caddo
1	DeSoto
3	Grant
10	Natchitoches
14	Rapides
13	Sabine
0	Vernon
1	Winn



**The primary result of Discovery is a list of projects to be considered for funding!**

# POST-DISCOVERY RESULTS

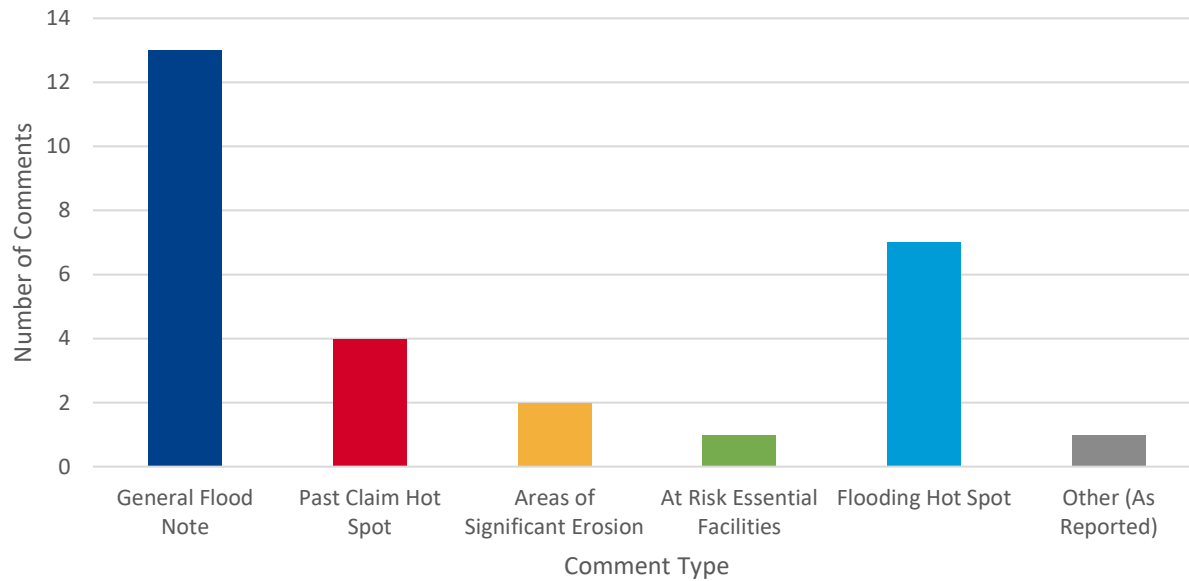
## STAKEHOLDER COMMENTS BY TYPE



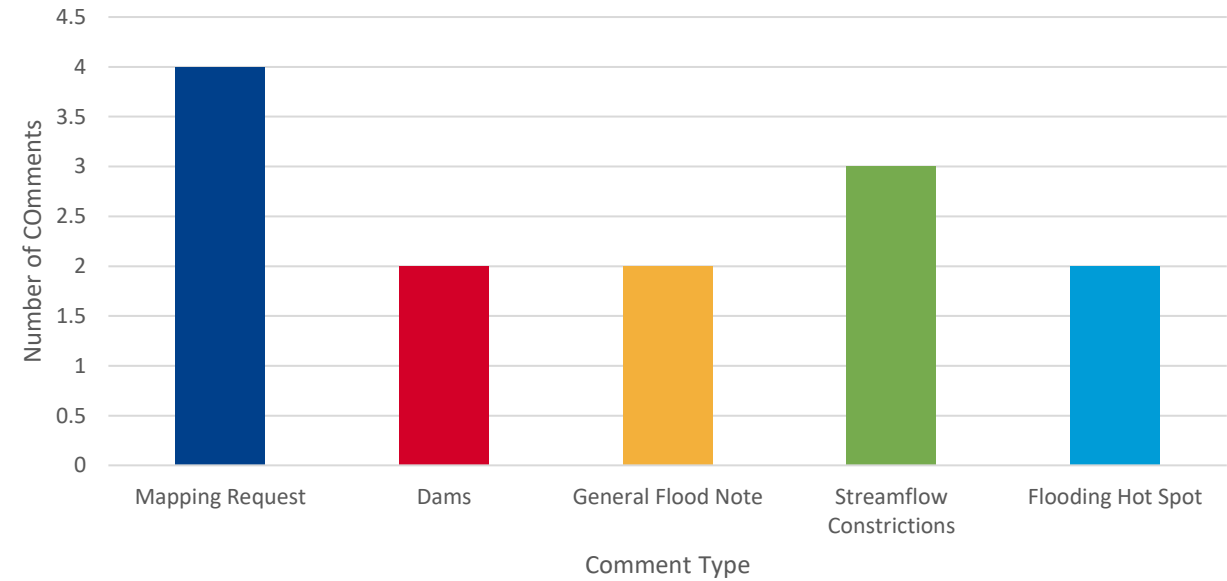
# POST-DISCOVERY RESULTS

## STAKEHOLDER COMMENTS BY TYPE

Lower Red - Lake Iatt Watershed Stakeholder Comments



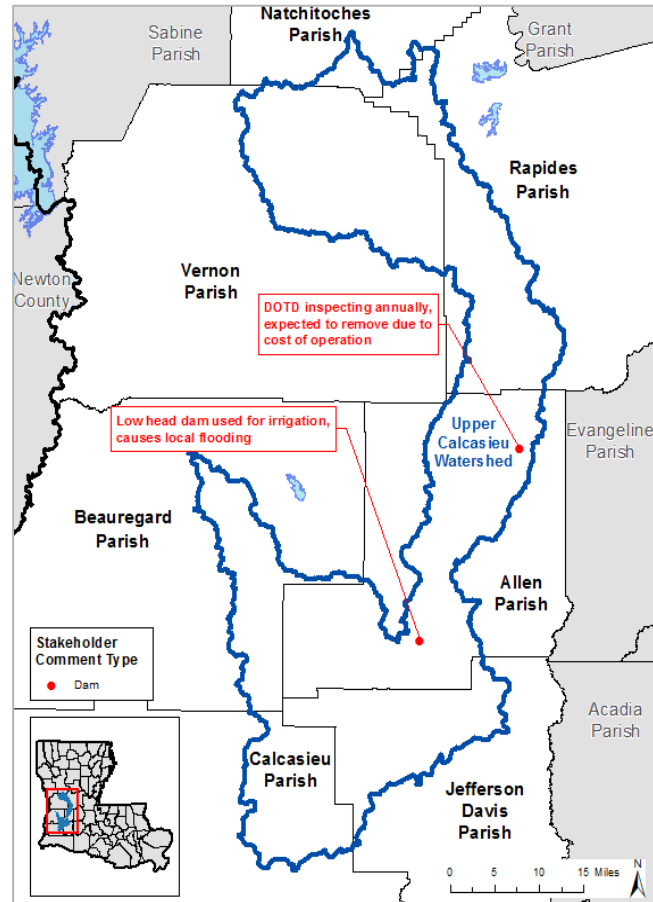
Toledo Bend Reservoir Watershed Stakeholder Comments



# POST-DISCOVERY RESULTS

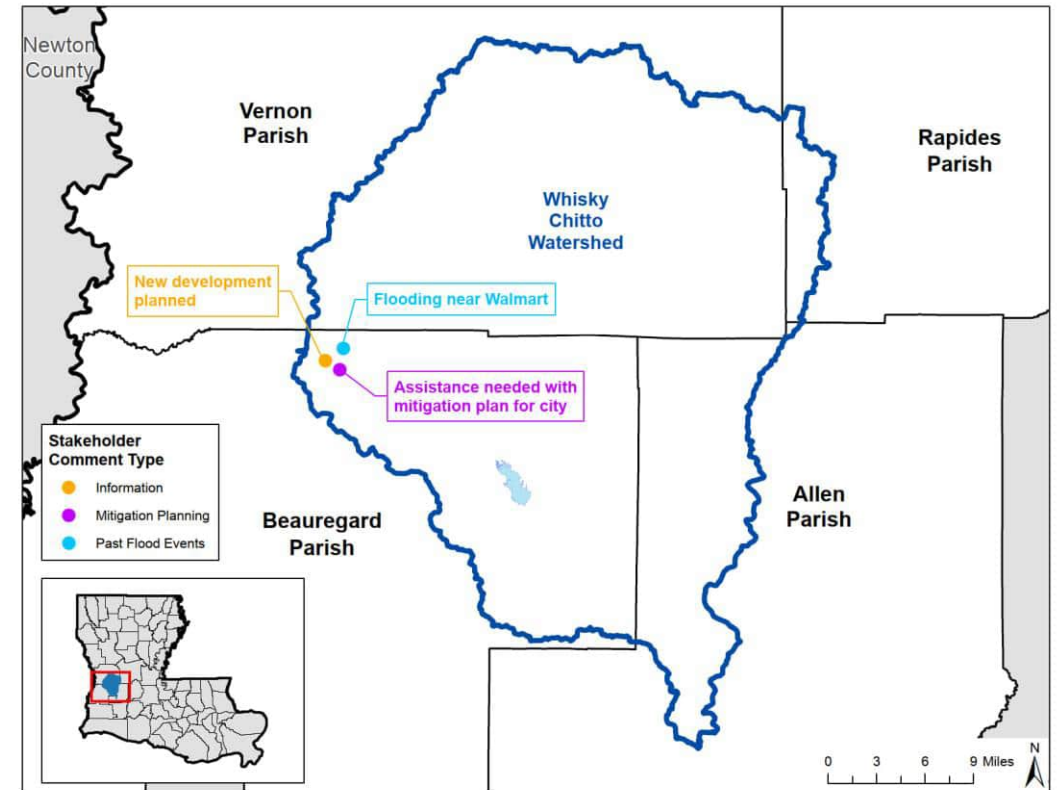
## SAMPLE COMMENTS SUBMITTED

### Upper Calcasieu Watershed



## SAMPLE COMMENTS SUBMITTED

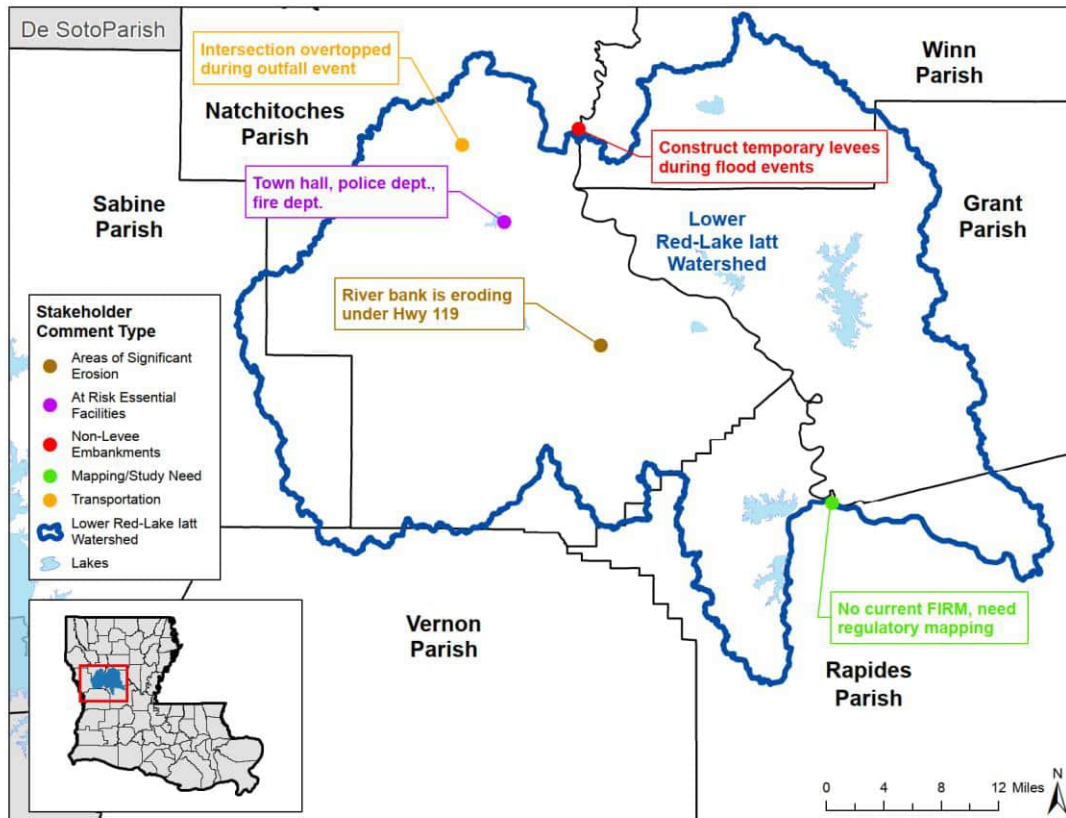
### Whiskey Chitto Watershed



# POST-DISCOVERY RESULTS

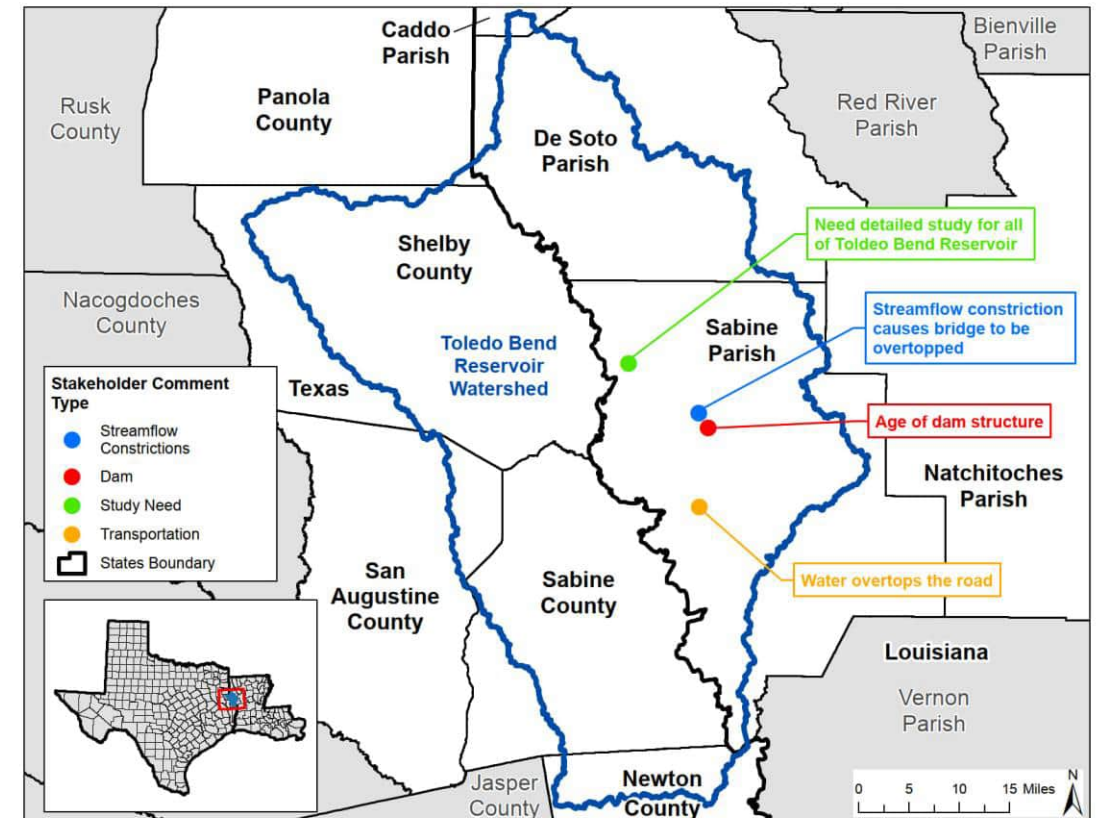
## SAMPLE COMMENTS SUBMITTED

### Lower Red – Lake Iatt Watershed



## SAMPLE COMMENTS SUBMITTED

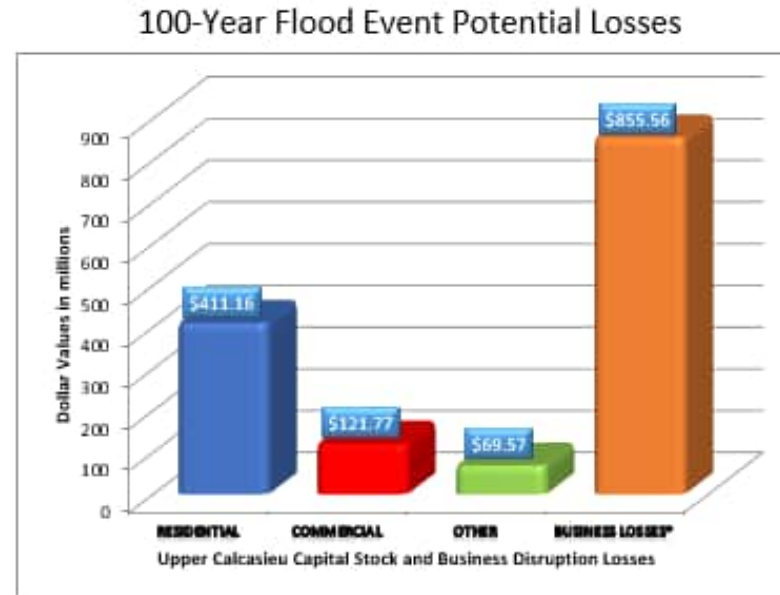
### Toledo Bend Reservoir Watershed



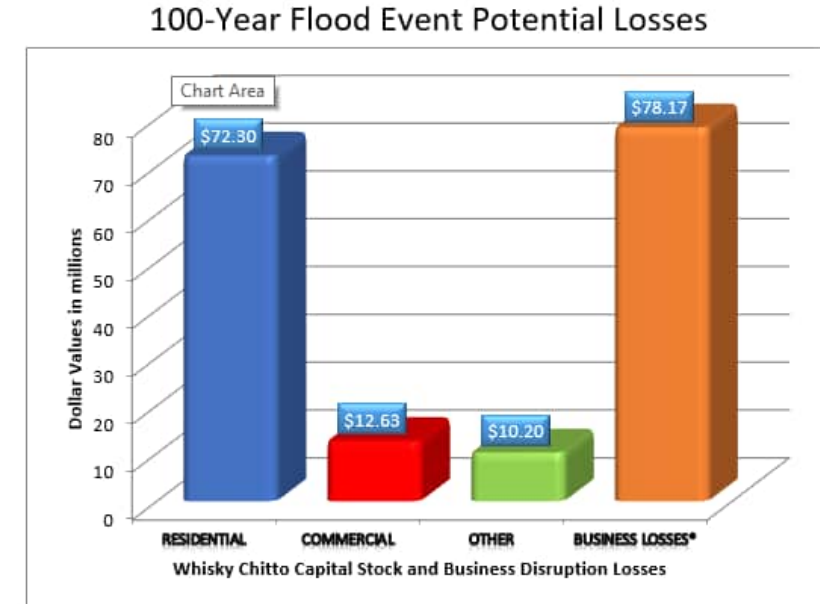
# POST-DISCOVERY RESULTS

## HAZUS-BASED 100-YEAR POTENTIAL LOSS ESTIMATES

- Identify flooding consequences in damages and other losses
- Based on 100 Year Depth Grids and at-risk assets
- Can be further refined



\*Business Losses are the sum of inventory Loss, Relocation Cost, Income Loss, Rental Income Loss, and Wage Loss.

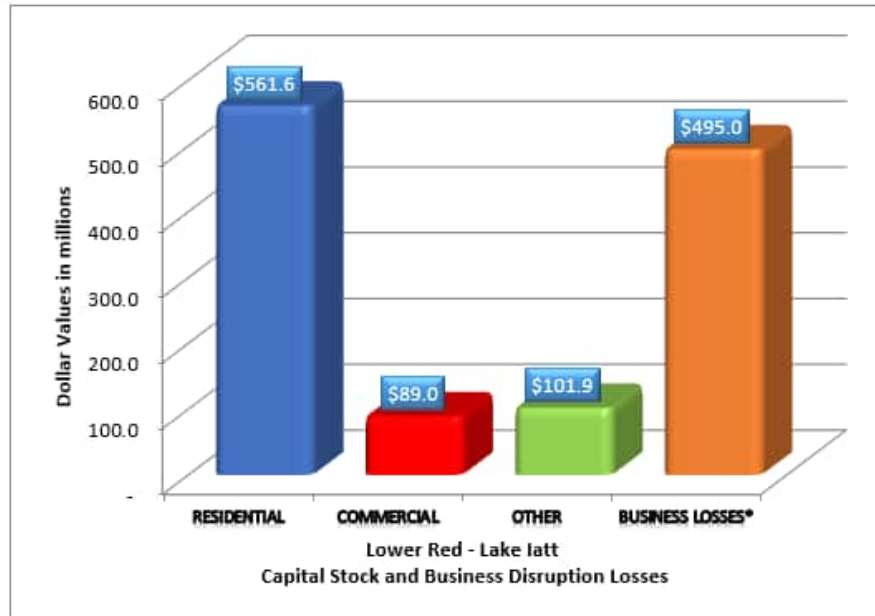


\*Business Losses are the sum of inventory Loss, Relocation Cost, Income Loss, Rental Income Loss, and Wage Loss.

# POST-DISCOVERY RESULTS

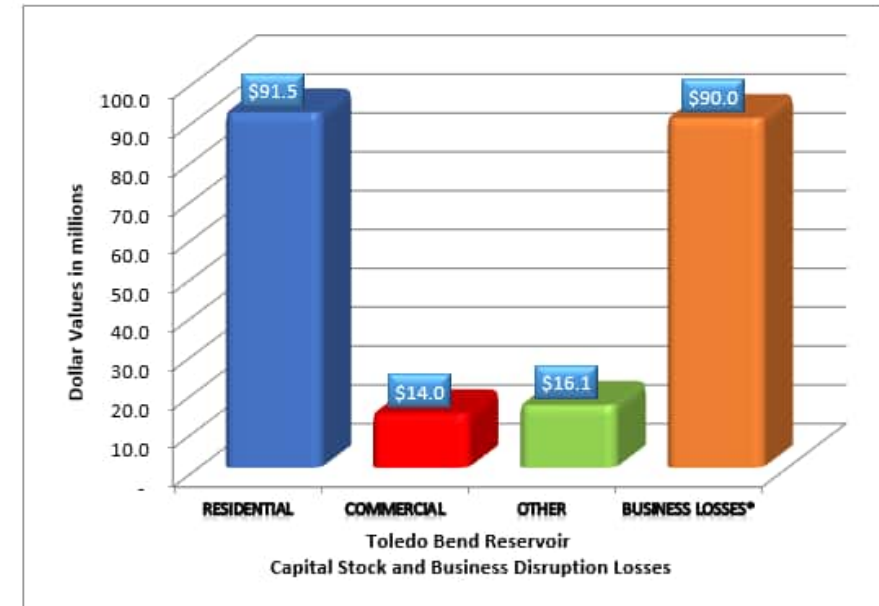
## HAZUS-BASED 100-YEAR POTENTIAL LOSS ESTIMATES

100-Year Flood Event Potential Losses



\*Business Losses are the sum of inventory Loss, Relocation Cost, Income Loss, Rental Income Loss, and Wage Loss.

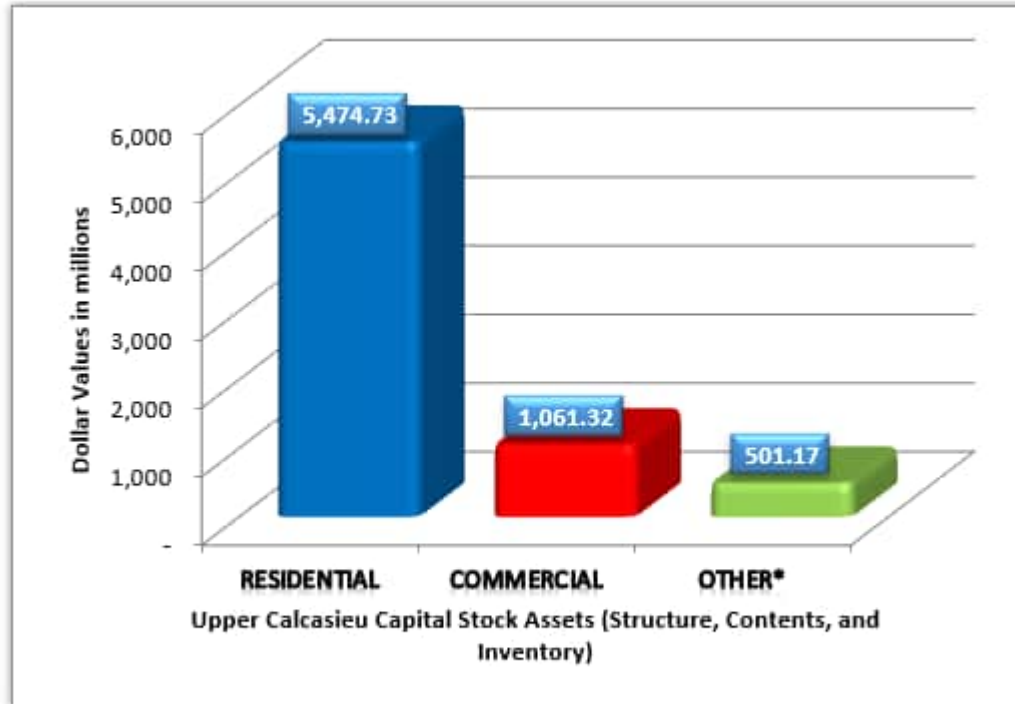
100-Year Flood Event Potential Losses



\*Business Losses are the sum of inventory Loss, Relocation Cost, Income Loss, Rental Income Loss, and Wage Loss.

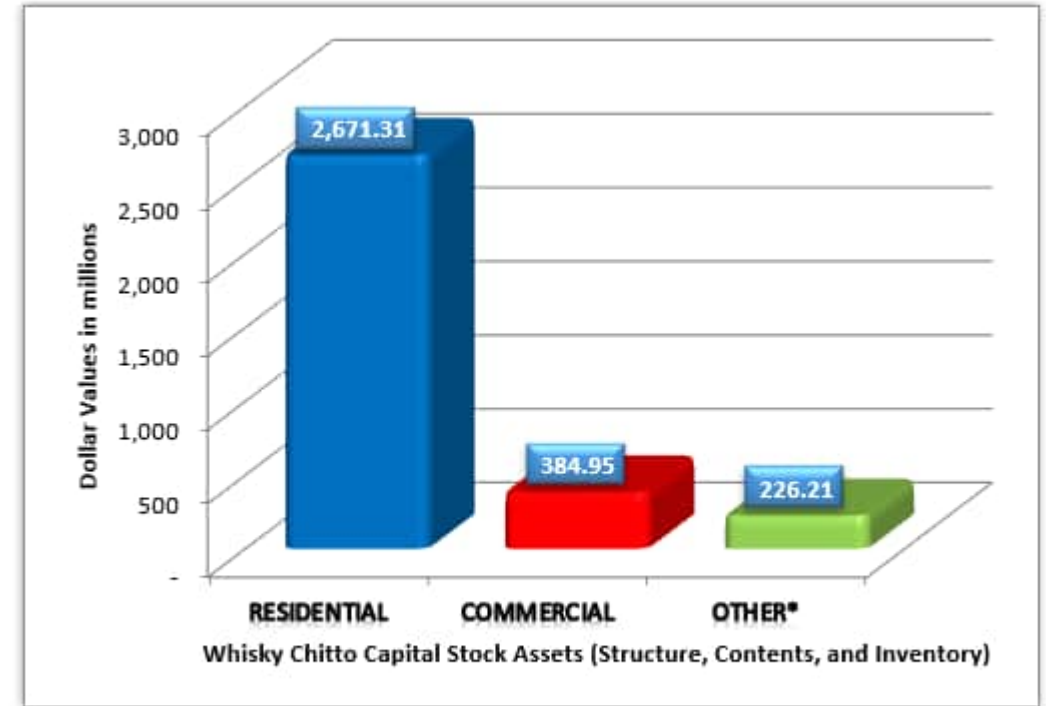
## HAZUS-BASED ASSET INVENTORY VALUES

### Asset Inventory Values



\*Other structure types include Industrial, Agricultural, Education, Religious and Government structures.

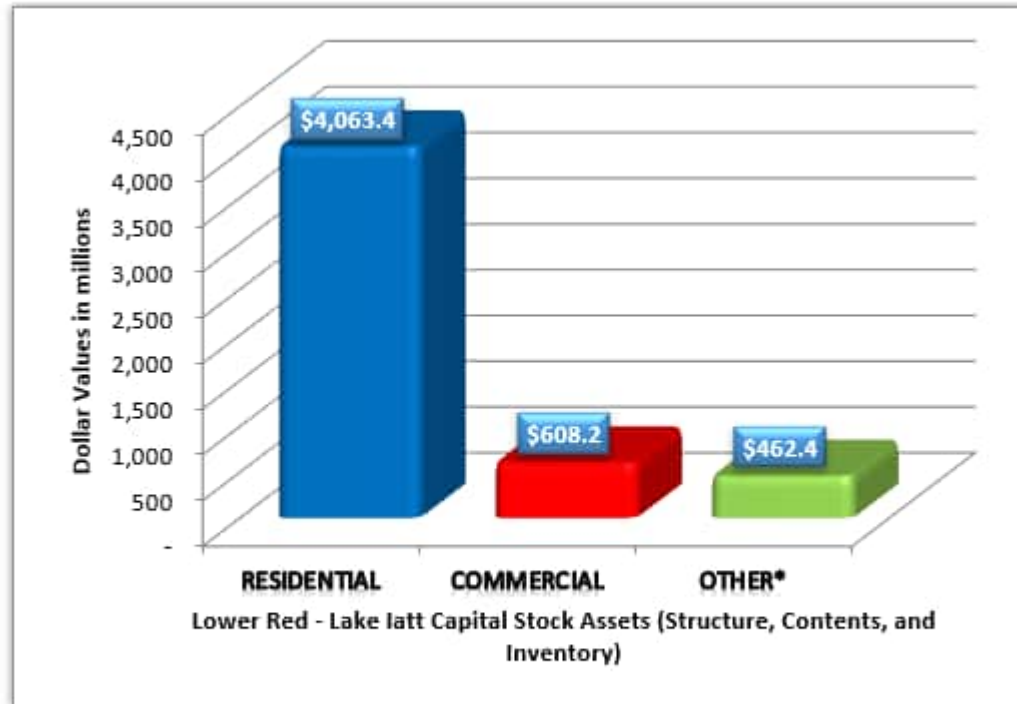
### Asset Inventory Values



\*Other structure types include Industrial, Agricultural, Education, Religious and Government structures.

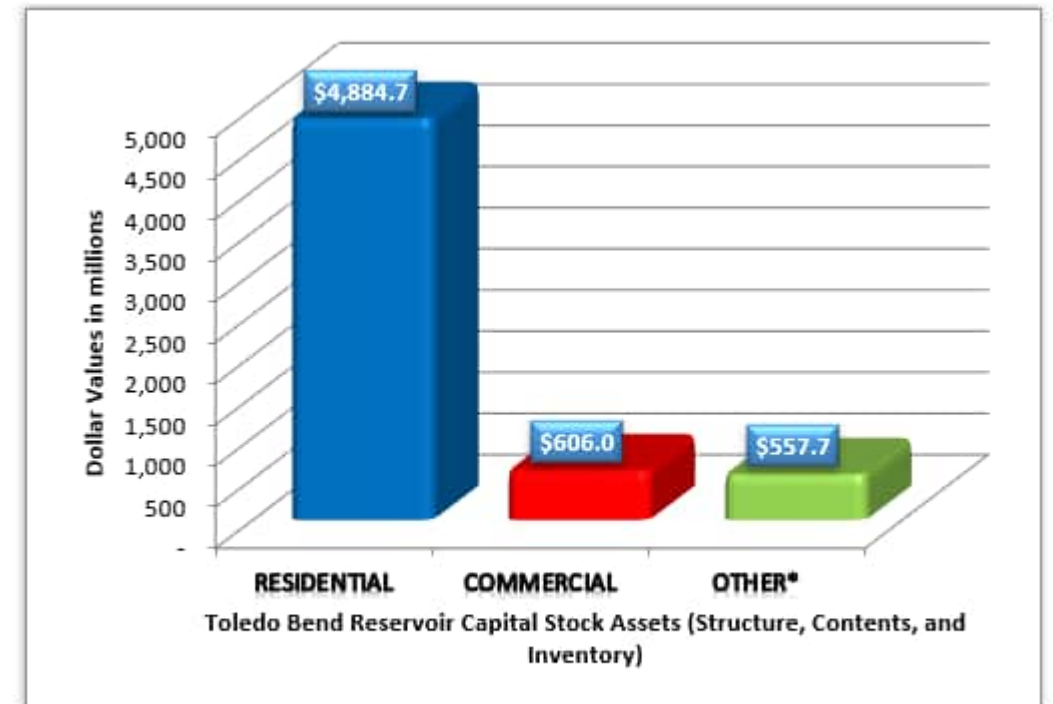
## HAZUS-BASED ASSET INVENTORY VALUES

### Asset Inventory Values



\*Other structure types include Industrial, Agricultural, Education, Religious and Government structures.

### Asset Inventory Values



\*Other structure types include Industrial, Agricultural, Education, Religious and Government structures.

# POST-DISCOVERY RESULTS

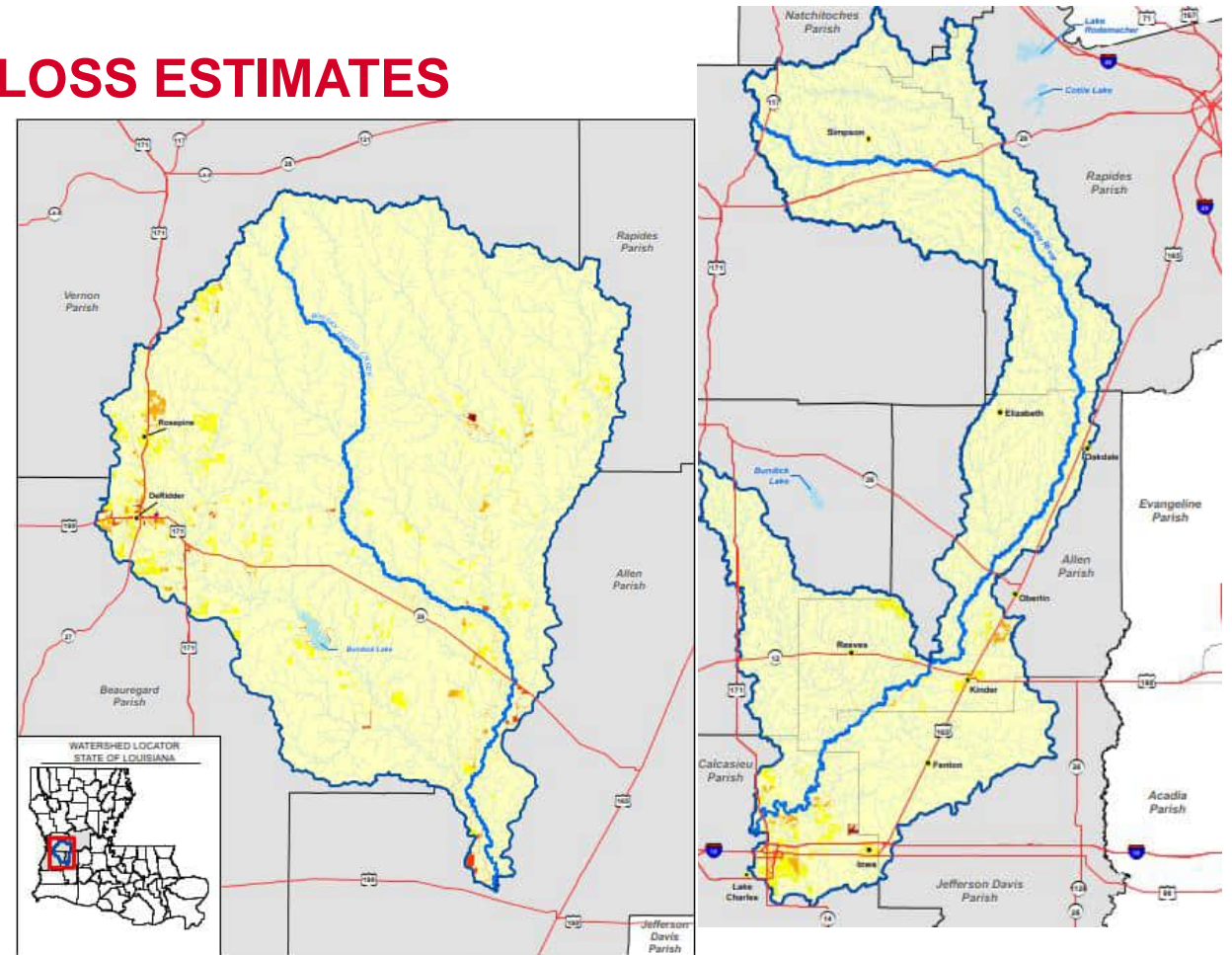
## HAZUS-BASED 1% ANNUAL CHANCE LOSS ESTIMATES

### Map Symbology

- Cities
- ~ Tensas Bayou & Tensas River
- ~ Other Streams
- ~ Major Highways
- ~ Watershed Boundary: HUC-8
- ~ Lake
- ~ States Boundary
- ~ Discovery Parish Boundary
- ~ Other Parish/County Boundary

### Hazus 1%-Annual-Chance Loss Study\*

- Very Low
- Low
- Medium
- High
- Very High

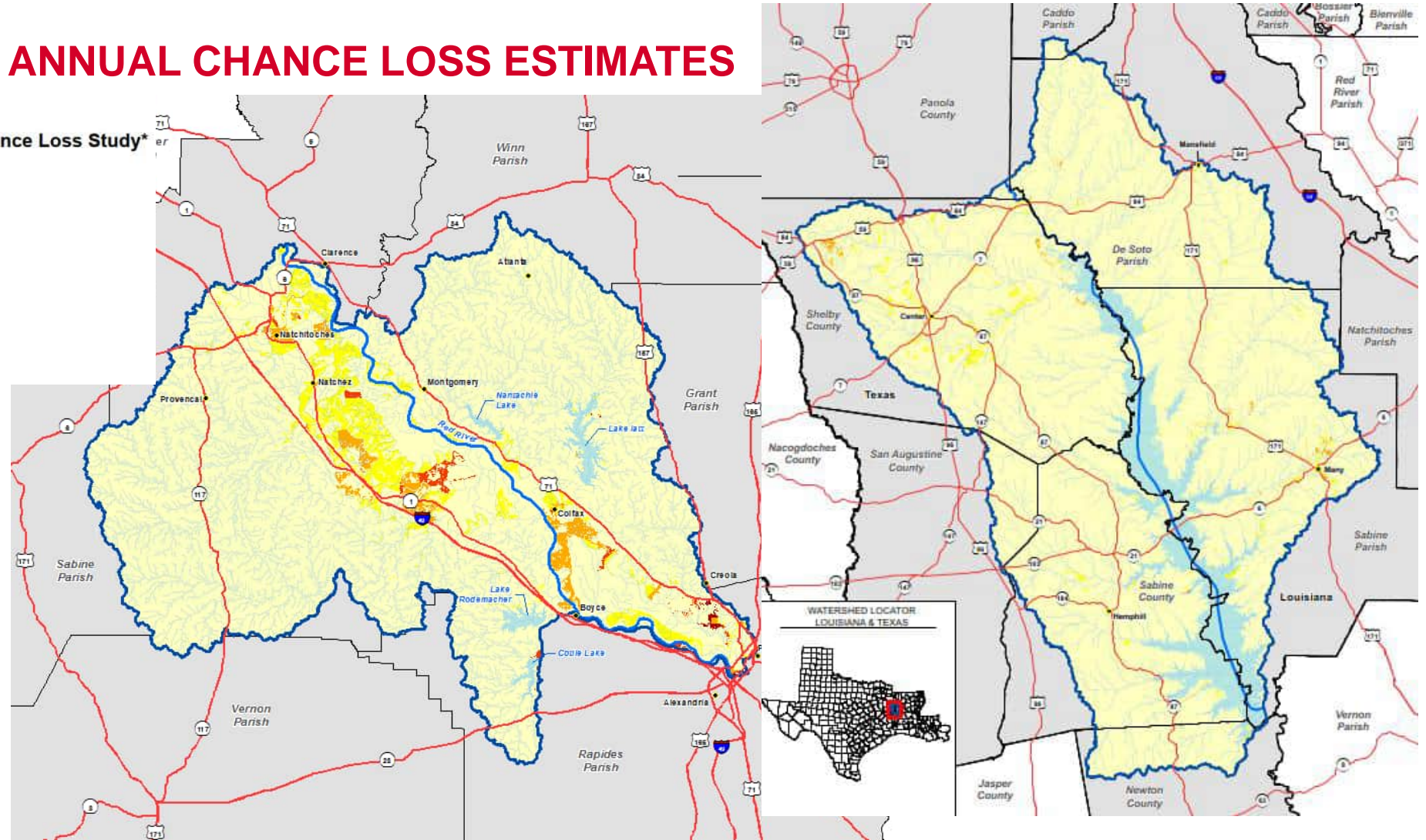


# POST-DISCOVERY RESULTS

## HAZUS-BASED 1% ANNUAL CHANCE LOSS ESTIMATES

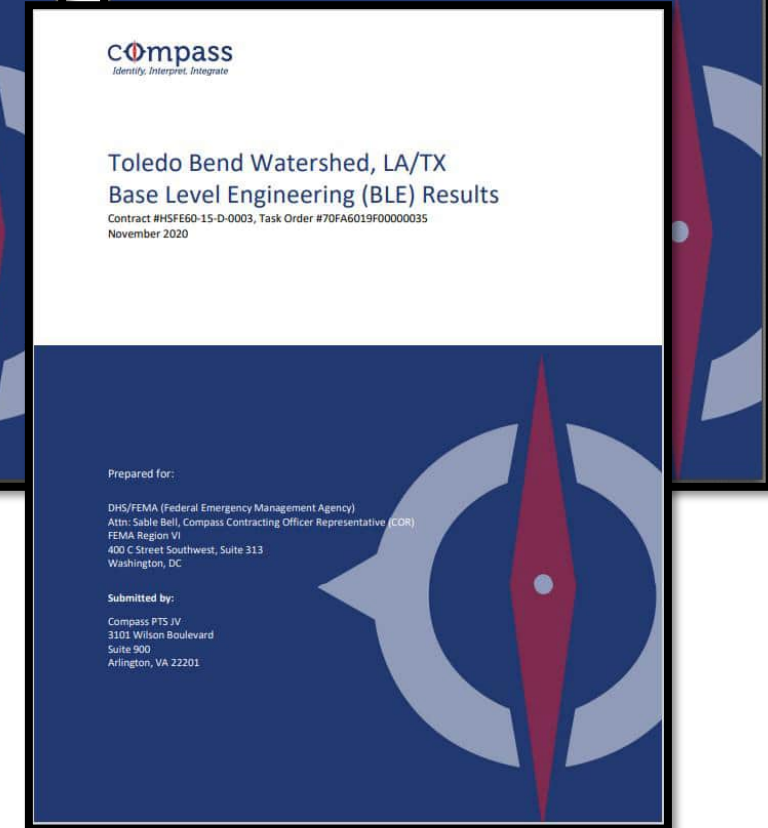
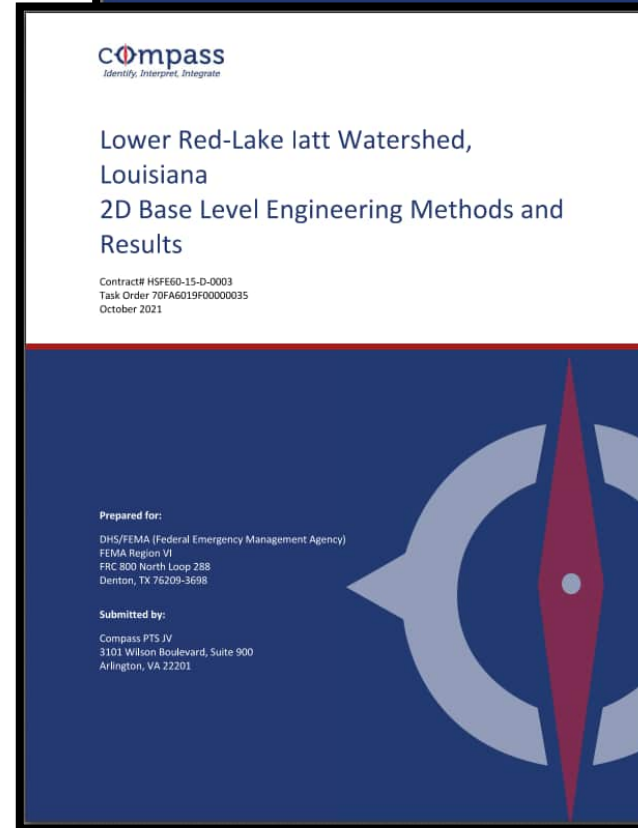
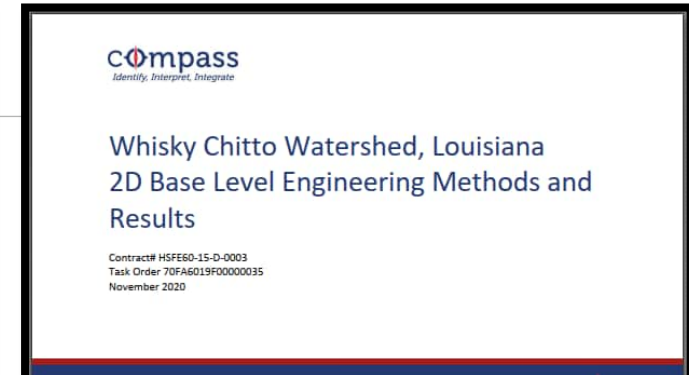
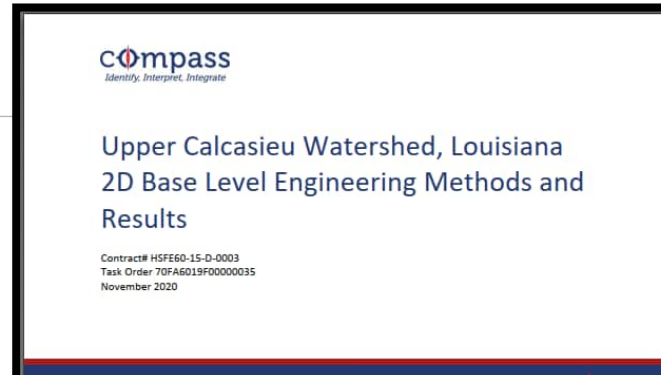
### Map Symbolology

- Cities
  - ~ Tensas Bayou & Tensas River
  - ~ Other Streams
  - ~ Major Highways
  - ~ Watershed Boundary: HUC-8
  - ~ Lake
  - ~ States Boundary
  - ~ Discovery Parish Boundary
  - ~ Other Parish/County Boundary
- Hazus 1%-Annual-Chance Loss Study\***
- Very Low
  - Low
  - Medium
  - High
  - Very High

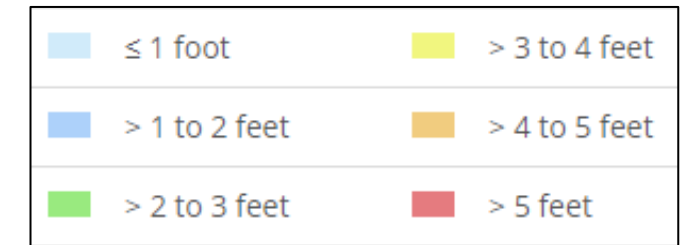
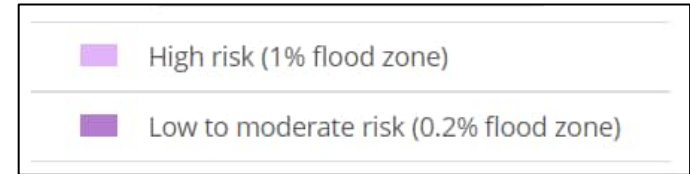
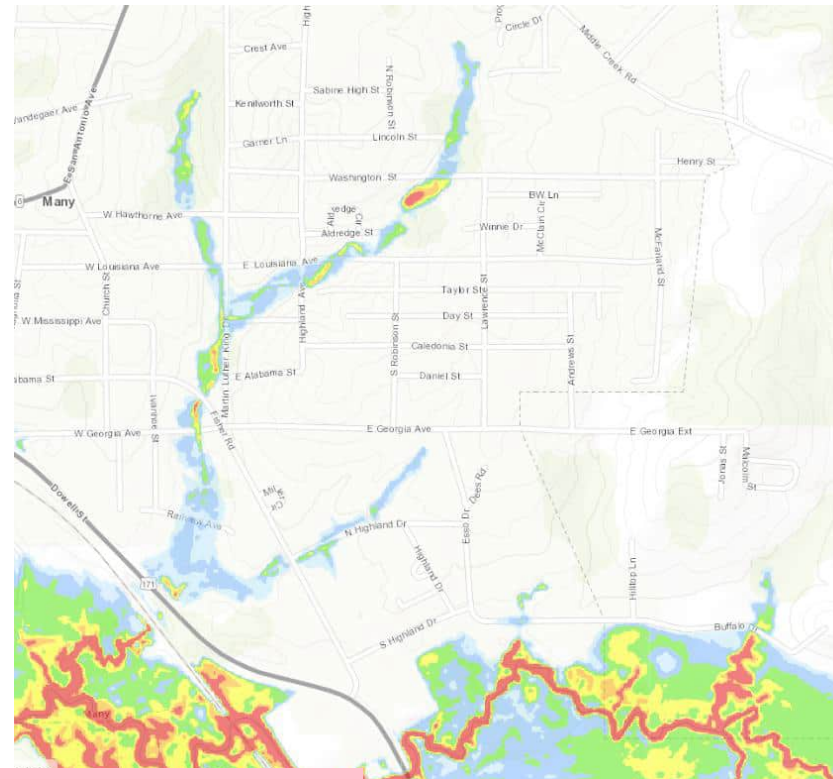
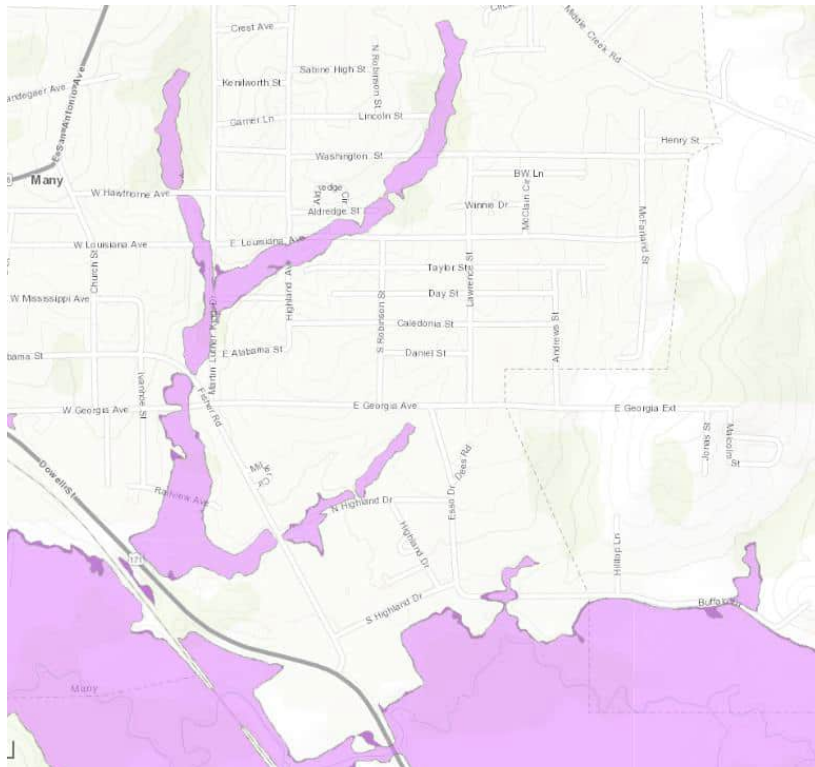


# BASE LEVEL ENGINEERING (BLE)

- BLE is developed at a larger scale (HUC8)
- LiDAR must be available
- Steps of Hydrology, Hydraulics & Terrain
- Model review and adjustments
- Gage review included in hydrology
- Used to assess flood risk



# BASE LEVEL ENGINEERING (BLE)



## OUTPUTS

- Hydrology modeling (Regression) flows w/gage analysis
- Hydraulic modeling (HEC-RAS) for 10%, 4%, 2%, 1% and 0.2% storm events
- 10%, 1% and 0.2% floodplain boundaries

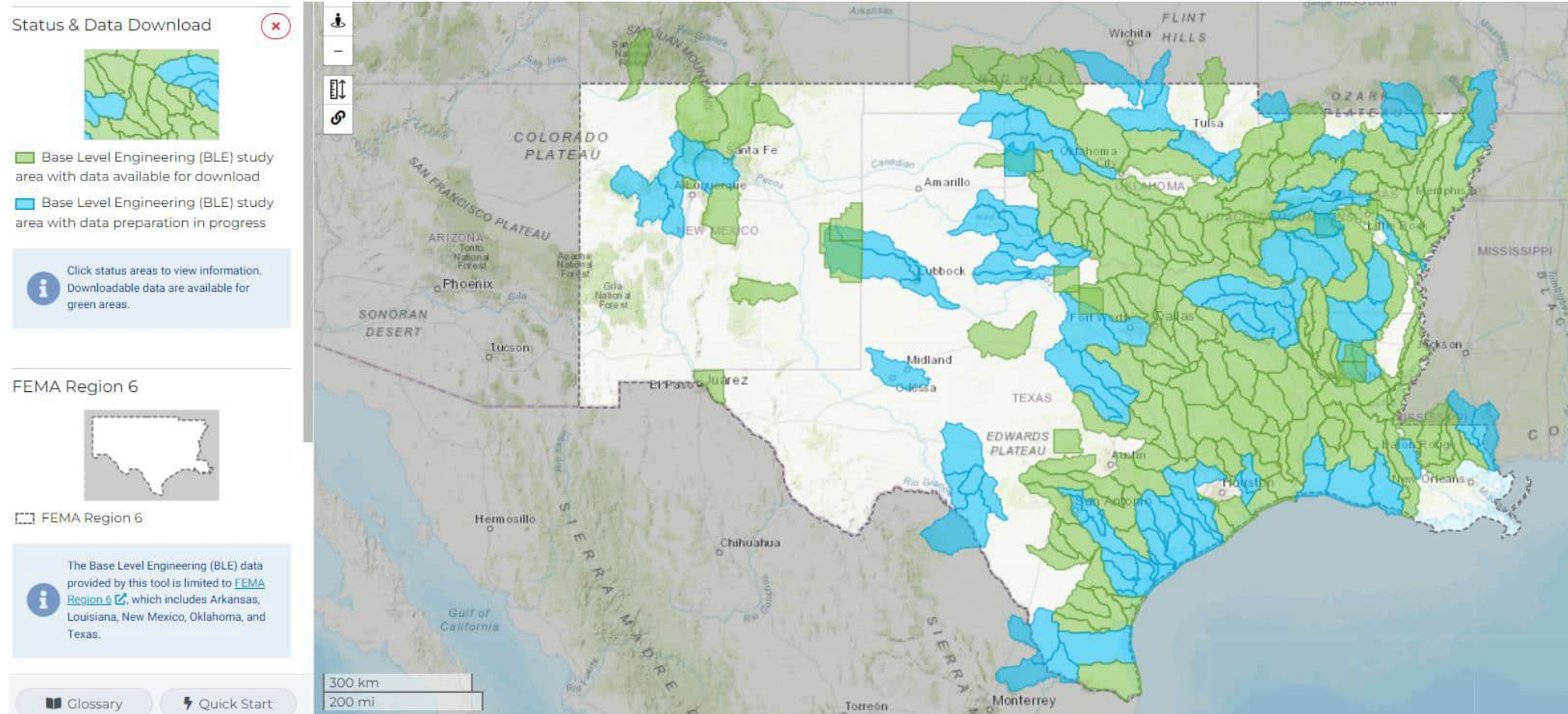
## Non-Regulatory

- Areas of Expanded Flood Risk
- Depth and Analysis Grids
- Flood Risk Assessment

# BASE LEVEL ENGINEERING (BLE)

- View and download completed BLE data
- Useful for determining BFEs for development

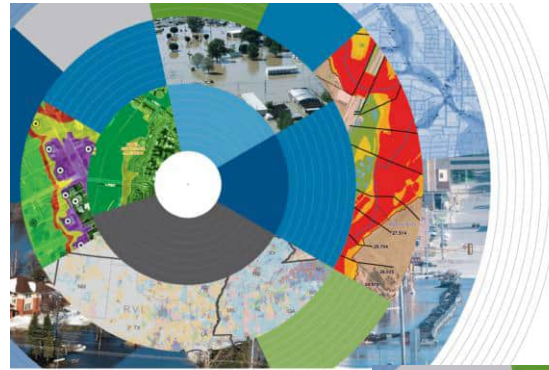
<https://webapps.usgs.gov/infrm/estBFE/>



# POST-DISCOVERY MEETING COORDINATION

## FLOOD RISK REPORT

- Prioritization Results
- Summary of Discovery Activities
- Historical Flooding
- Figures and Maps
- Community Snapshots
- Stakeholder Comments



### Flood Risk Report

Upper Calcasieu Watershed

HUC-8 08080203

FEMA CASE NUMBER: 21-06-0095

March 2023



### Flood Risk Report

Whisky Chitto Watershed

HUC-8 08080204

FEMA CASE NUMBER: 22-06-00145

March 2023



### Flood Risk Report

Lower Red-Lake Iatt Watershed

HUC-8 11140207

FEMA CASE NUMBER: 21-06-00085

March 2023



### Flood Risk Report

Toledo Bend Reservoir Watershed

HUC-8 12010004

FEMA CASE NUMBER: 22-06-00125

March 2023



## FLOOD RISK REPORT

- Stakeholder Comments
- Community Snapshots
- BLE Report



## FLOOD RISK REPORT

- Stakeholder Comments
- Community Snapshots
- BLE Report



# POST-DISCOVERY MEETING COORDINATION

## BLE DATASET AND REVIEW

**Compass**  
Identify. Interpret. Integrate.

Whisky Chitto Watershed, Louisiana  
2D Base Level Engineering Methods and Results

Contract# HSFE60-15-D-0003  
Task Order 70FAG6019F00000035  
November 2020

**Compass**  
Identify. Interpret. Integrate.

Upper Calcasieu Watershed, Louisiana  
2D Base Level Engineering Methods and Results

Contract# HSFE60-15-D-0003  
Task Order 70FAG6019F00000035  
November 2020

Prepared for:  
DHS/FEMA (Federal Emergency Management Agency)  
FEMA Region VI  
FRC 800 North Loop 288  
Denton, TX 76209-3698

Submitted by:  
Compass PTS JV  
3101 Wilson Boulevard, Suite 900  
Arlington, VA 22201

## FLOOD RISK REPORT



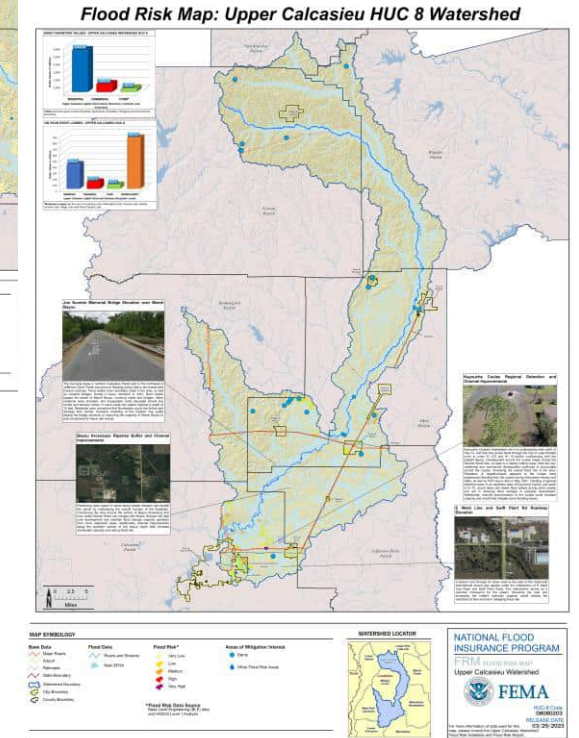
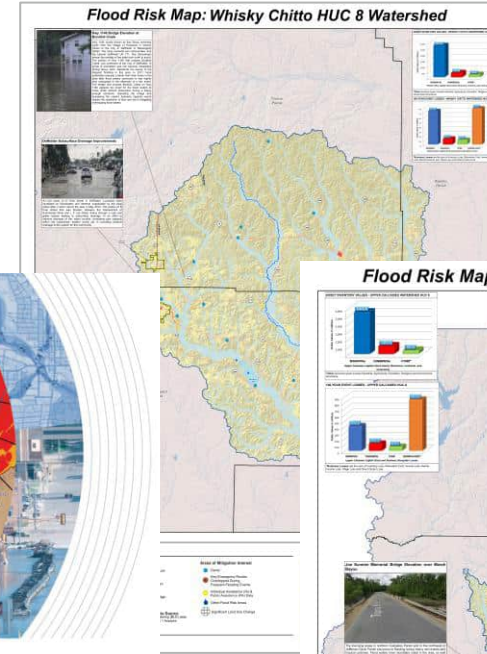
**Flood Risk Report**  
Whisky Chitto Watershed  
HUC-8 08080204  
FEMA CASE NUMBER: 22-06-0014S  
March 2023



**Flood Risk Report**  
Upper Calcasieu Watershed  
HUC-8 08080203  
FEMA CASE NUMBER: 21-06-009S  
March 2023



## FLOOD RISK MAP





# POST-DISCOVERY RESULTS

## MAPPING NEEDS PRIORITIZATION BY PARISH

### Upper Calcasieu Watershed

### Whisky Chitto Watershed

Mapping Needs Prioritization by Parish		
Parish	Priority	Reason
<b>Rapides</b>	Highest	More than 20% of the stream miles are unverified, and the oldest effective date exceeds the last 35 years. No DFIRM.
<b>Natchitoches</b>	High	More than 40% of the stream miles are unverified, but the oldest effective date is within the last 10 years. DFIRM available.
<b>Beauregard</b>	Moderate	More than 40% of the stream miles are unverified, but the oldest effective date is within the last 15 years. DFIRM available.
<b>Calcasieu</b>	Moderate	More than 25% of the stream miles are unverified, but the oldest effective date is within the last 15 years. DFIRM available.
<b>Allen</b>	Low	Less than 15% of the stream miles are unverified, and the oldest effective date is within the last 15 years. DFIRM available.
<b>Vernon</b>	Low	Less than 20% of the stream miles are unverified, and the oldest effective date is within the last 15 years. DFIRM available.
<b>Jefferson Davis</b>	Low	Less than 5% of the stream miles are unverified, and the oldest effective date is within the last 5 years. DFIRM available.

Mapping Needs Prioritization by Parish		
Parish	Priority	Reason
<b>Rapides</b>	Highest	More than 20% of the stream miles are unverified, and the oldest effective date exceeds the last 35 years. No DFIRM.
<b>Beauregard</b>	Moderate	More than 40% of the stream miles are unverified, but the oldest effective date is within the last 15 years. DFIRM available.
<b>Allen</b>	Low	Less than 15% of the stream miles are unverified, and the oldest effective date is within the last 15 years. DFIRM available.
<b>Vernon</b>	Low	Less than 20% of the stream miles are unverified, and the oldest effective date is within the last 15 years. DFIRM available.

# POST-DISCOVERY RESULTS

## MAPPING NEEDS PRIORITIZATION BY PARISH

### Lower Red – Lake Iatt Watershed

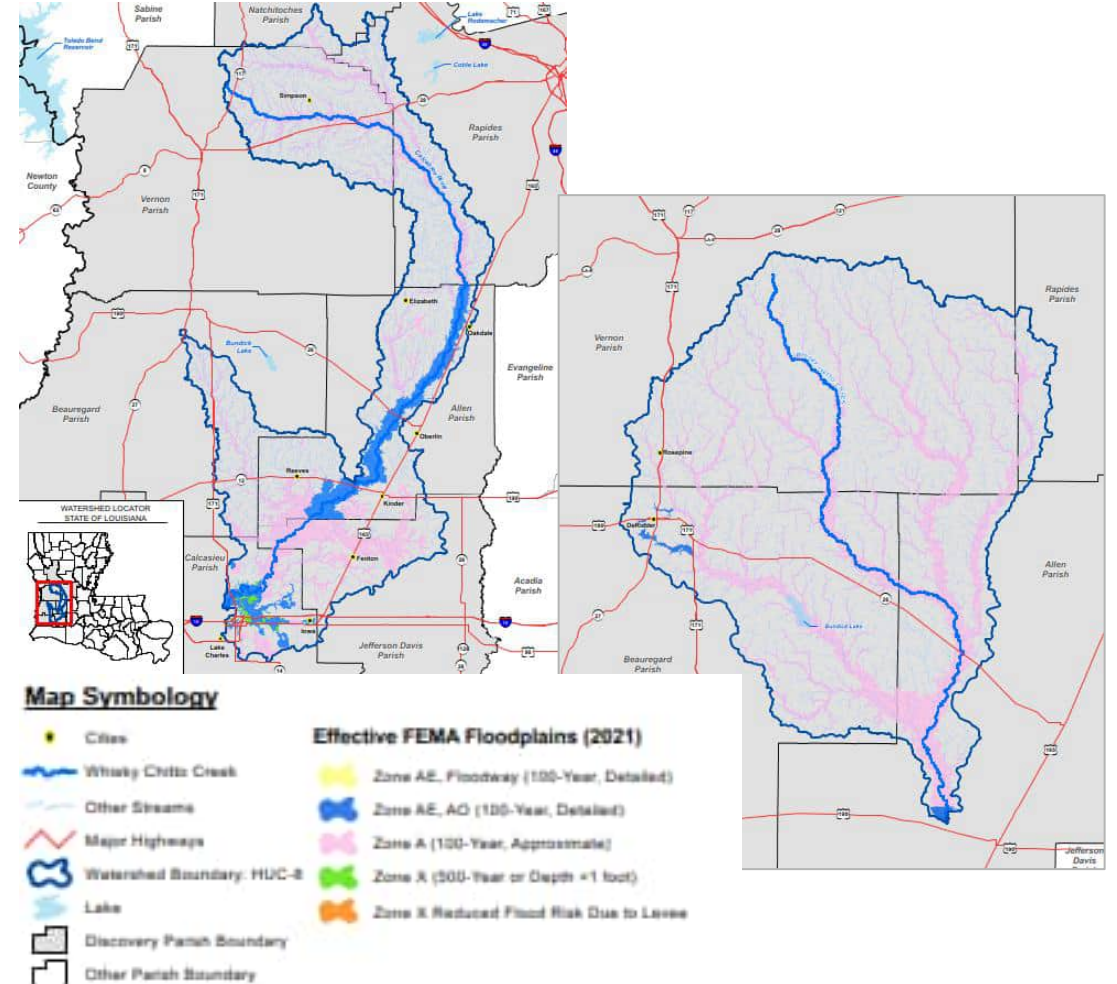
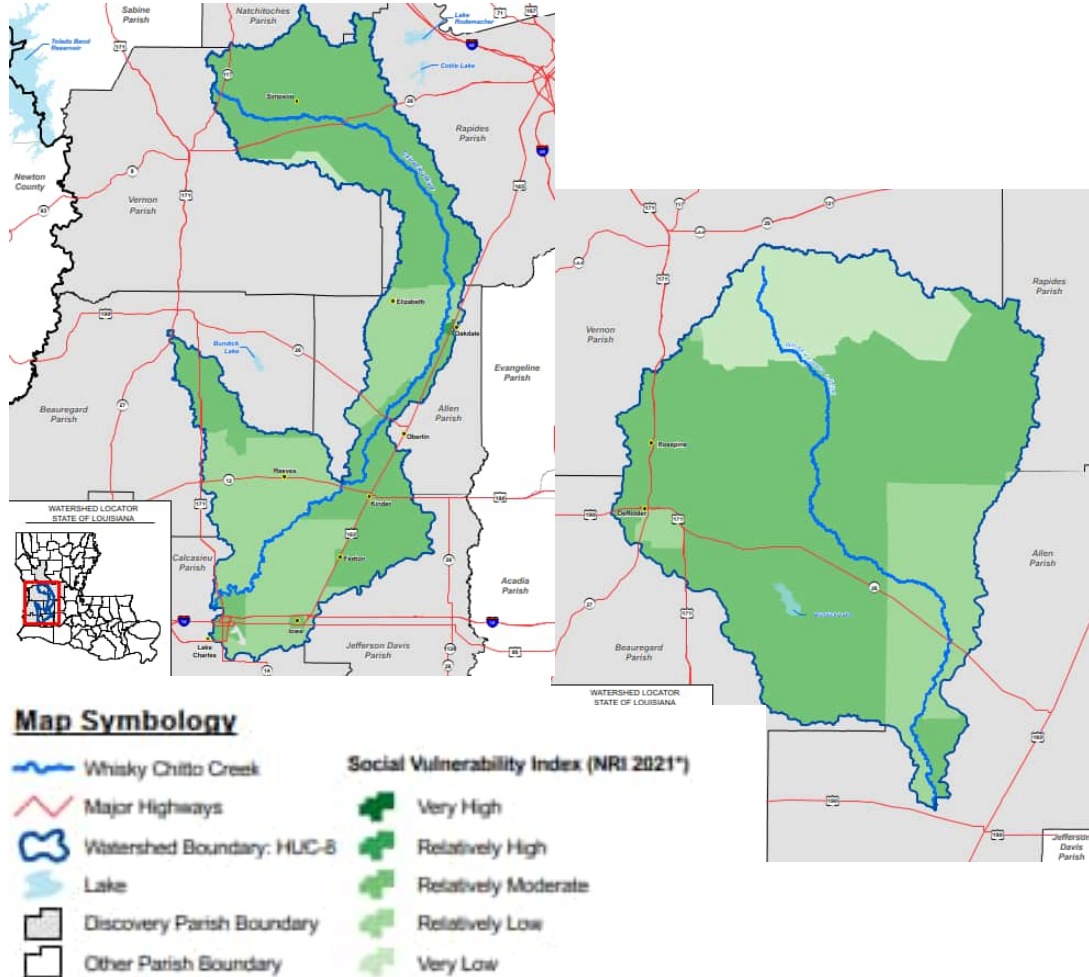
Mapping Needs Prioritization by Parish		
Parish	Priority	Reason
<b>Rapides</b>	Highest	More than 20% of the stream miles are unverified, and the oldest effective date exceeds the last 35 years. No DFIRM.
<b>Sabine</b>	High	More than 55% of the stream miles are unverified, and the oldest effective date exceeds the last 30 years. No DFIRM.
<b>Natchitoches</b>	High	More than 40% of the stream miles are unverified, but the oldest effective date is within the last 10 years. DFIRM available.
<b>Grant</b>	Moderate	More than 25% of the stream miles are unverified, but the oldest effective date is within the last 10 years. DFIRM available.
<b>Vernon</b>	Low	Less than 20% of the stream miles are unverified, and the oldest effective date is within the last 15 years. DFIRM available.
<b>Winn</b>	Low	Less than 5% of the stream miles are unverified, and the oldest effective date is within the last 5 years. DFIRM available.

### Toledo Bend Reservoir Watershed

Mapping Needs Prioritization by Parish		
Parish	Priority	Reason
<b>Sabine</b>	Highest	More than 55% of the stream miles are unverified, and the oldest effective date exceeds the last 30 years. No DFIRM.
<b>Natchitoches</b>	High	More than 40% of the stream miles are unverified, but the oldest effective date is within the last 10 years. DFIRM available.
<b>De Soto</b>	Moderate	More than 70% of the stream miles are unverified, but the oldest effective date is within the last 20 years. DFIRM available.
<b>Caddo</b>	Moderate	More than 30% of the stream miles are unverified, but the oldest effective date is within the last 10 years. DFIRM available.

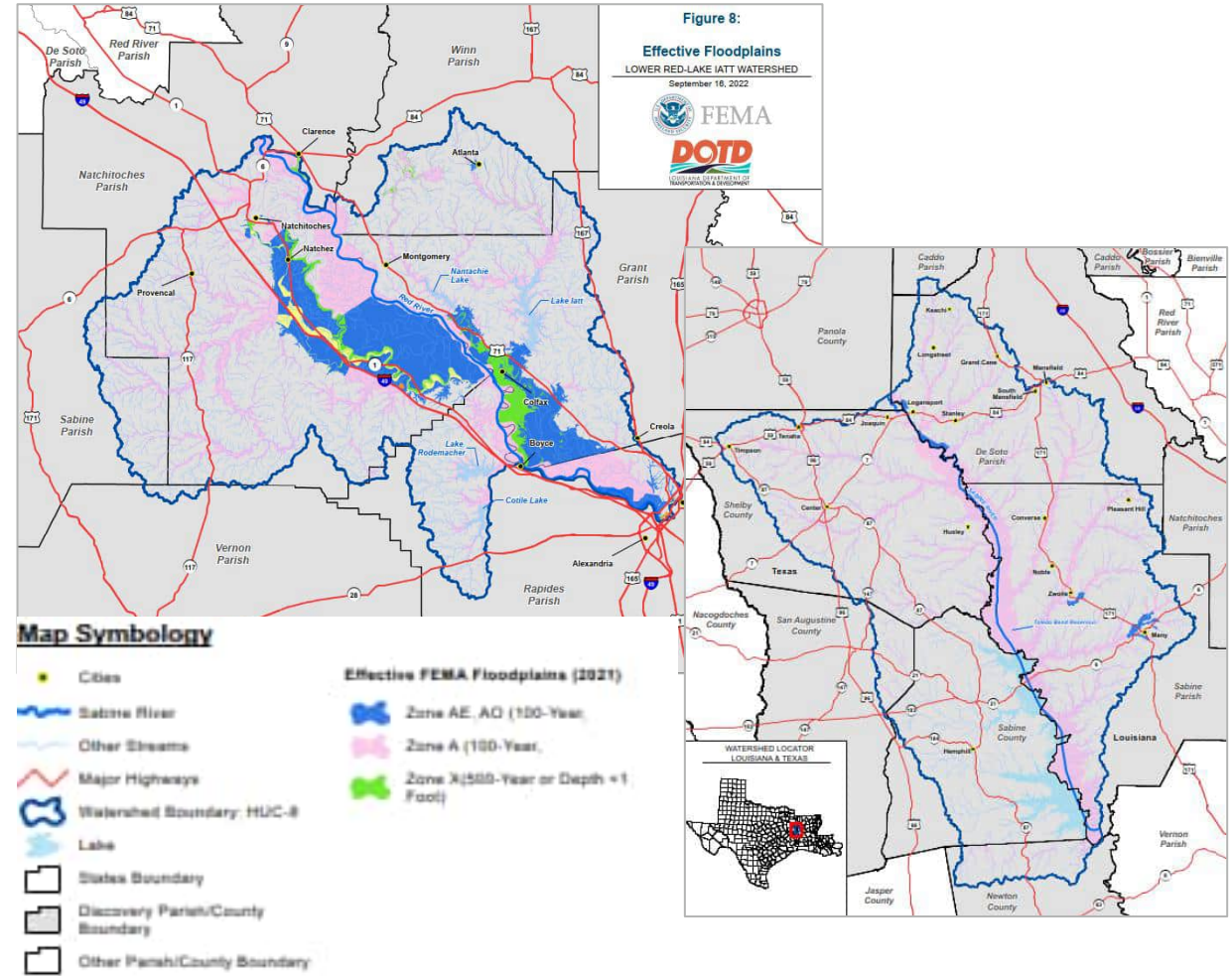
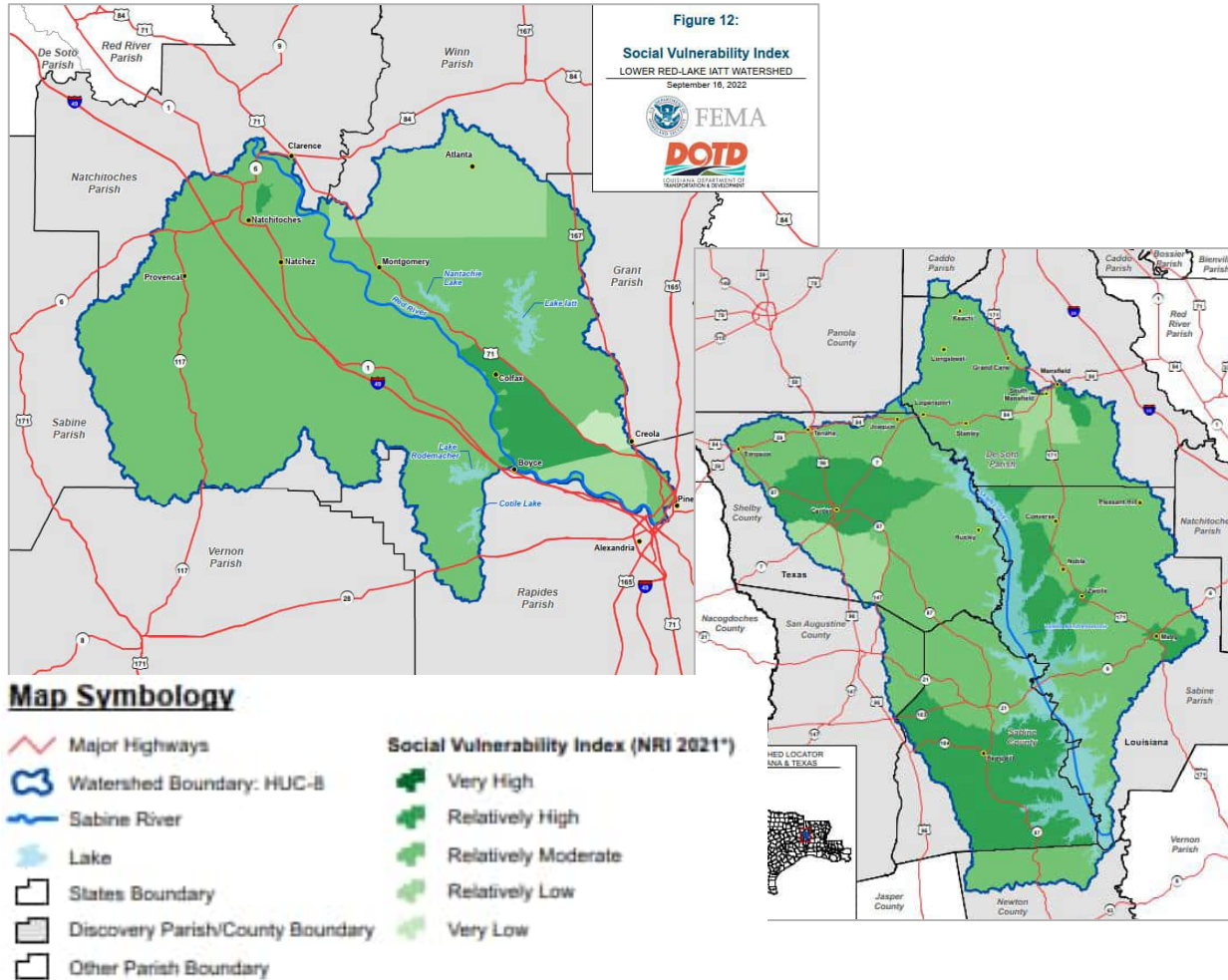
# RISK MAP PROJECT RECOMMENDATIONS TO FEMA

## OTHER CONSIDERATIONS FOR MAPPING UPDATES

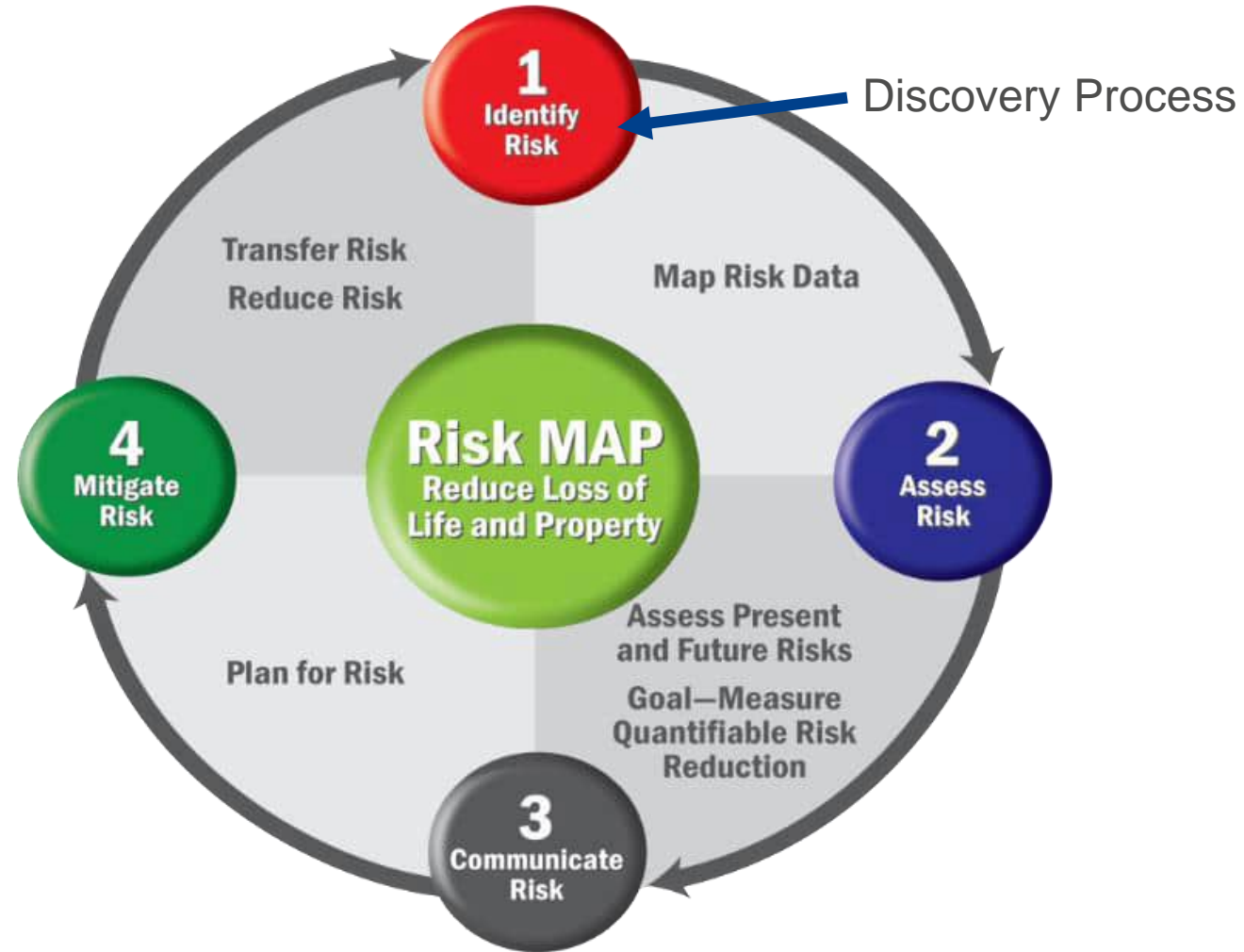


# RISK MAP PROJECT RECOMMENDATIONS TO FEMA

## OTHER CONSIDERATIONS FOR MAPPING UPDATES



FEMA'S RISK MAPPING, ASSESSMENT, AND PLANNING (MAP) PROGRAM



# QUESTIONS?



# THANK YOU!

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**Cindy O'Neal**  
State NFIP Coordinator  
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Floodplain Coordinator  
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**Jack Young**  
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**Victor Bivens**  
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Discovery GIS Lead  
(501) 801-2683  
dskultety@Halff.com

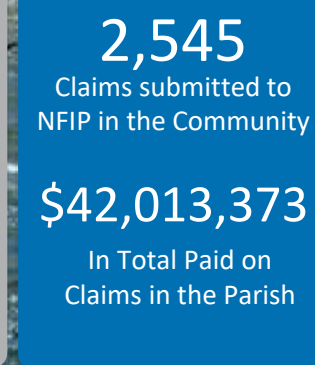
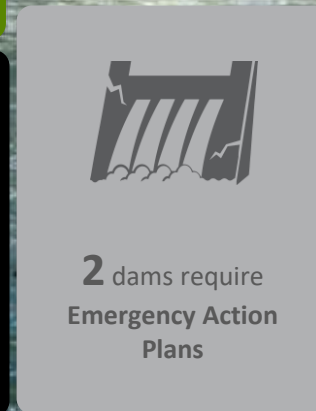
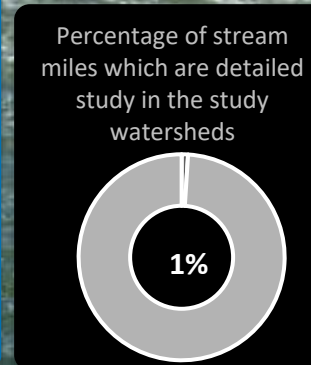
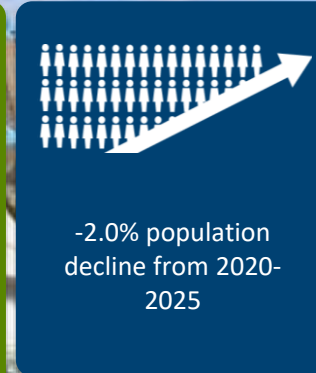


## Appendix II: Community-Specific Reports

# Snapshots

# WHISKY CHITTO WATERSHED

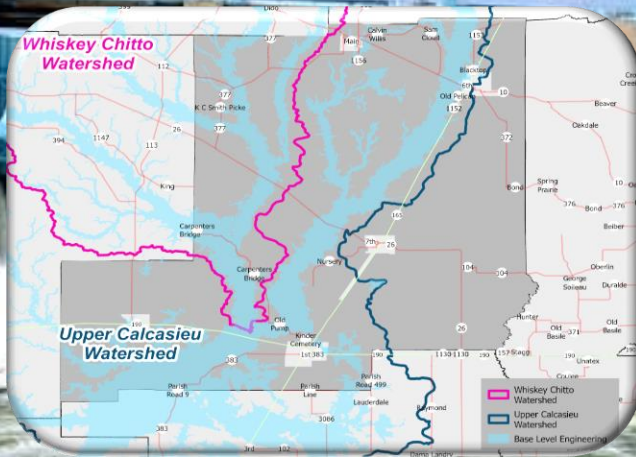
## KNOW YOUR RISK



\*Effective FIRMs within the study watersheds

# ALLEN PARISH

## KNOW YOUR RISK



145.55  
sq. mi.

of the community's land area is in the study watershed



2,306

Population based on 2020 Decennial Census in the study watershed



5% expected population growth predicted from 2017-2023 in the community



262

policies totaling approximately \$49,191,000 in coverage

155

Claims to NFIP in the Community

22%

Of the community's FEMA mapped\* 1%-annual-chance storm flood extent areas are in the Whiskey Chitto Watershed



Participating in the National Flood Insurance Program



CNMS Stream Miles in the study watershed

398.72

The are no detailed study stream miles in the study watershed

NA



Flood-related presidential disaster declarations in your Discovery study parish

\$1,851,659

In Total Paid on Claims in the Parish

\*National Flood Hazard Layer (NFHL)

# ALLEN PARISH

## TAKE ACTION: Potential Next Step



Your Hazard Mitigation Plan expiration date is **January 2023**.

The hazard mitigation goals identified projects for:

- Limit development in flood plain areas
- Buy-out repetitive loss properties
- Expand and coordinate Early Warning Systems currently in use
- Provide public education materials to residents and private sector
- Increase participation in the National Flood Insurance Program (NFIP) and Community Rating System (CRS)

FEMA's Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation Grant (PDM), and GOHSEP's Flood Mitigation Assistance (FMA) Grant Program all fund localized Flood Risk Reduction Projects. There may be eligibility, benefit cost analysis, and cost-share requirements. The 5% Initiative in the HMGP is used for projects for which it may be difficult to conduct a standard BCA to prove cost-effectiveness, such as emergency notification, public awareness, or sirens. Information about [FEMA's HMA grants](#)<sup>1</sup> can be found on our website, as well as on the [Louisiana Governor's Office of Homeland Security and Emergency Preparedness \(GOHSEP\)](#)<sup>2</sup> website. The State Hazard Mitigation Officer may be contacted for additional information. Participation in FEMA's [Community Rating System](#)<sup>3</sup> (CRS) reduces insurance premiums up to 45%, and FEMA will provide free technical assistance in designing and implementing programs designed to reduce flood damage. The State Hazard Mitigation Officer may be contacted for additional information.

The Louisiana Watershed Initiative (LWI) provides funding for local governments for flood risk reduction projects and project development capacity building through CDBG-Mitigation dollars. These funds are distributed through three rounds of competitive funding opportunities focused on projects that result in demonstrable flood mitigation<sup>4</sup>.

The minimum requirements for floodplain regulations are outlined in 44 Code of Federal Regulations 60.3, and local communities may choose to adopt more restrictive codes. FEMA Regional Office VI offers assistance in developing stricter codes, such as regulating construction or elevational changes in the floodplain.

1. <https://www.fema.gov/hazard-mitigation-assistance>.

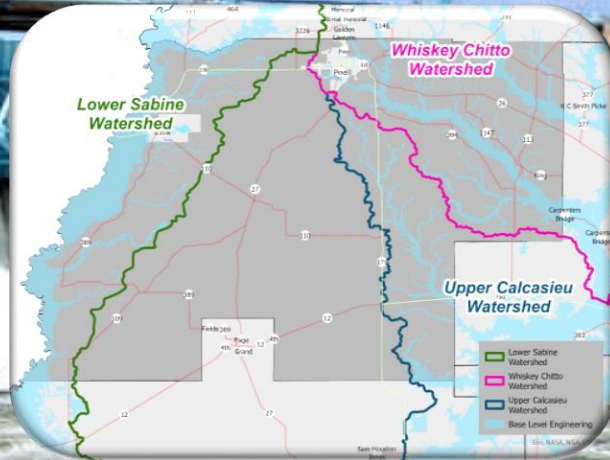
2. <https://gohsep.la.gov/GRANTS/RECOVERY-GRANTS/Hazard-Mitigation-Assistance/Hazard-Mitigation-Overview>

3. <https://www.fema.gov/national-flood-insurance-program-community-rating-system>

4. <https://watershed.la.gov/local-regional-projects-programs>

# BEAUREGARD PARISH

## KNOW YOUR RISK



267.95

sq. mi.

of the community's land area is in the study watershed



6,003

Population based on 2020 Decennial Census in the study watershed



3.6% expected population growth predicted from 2020-2025 in the community



309

policies totaling approximately \$79,142,300 in coverage

525

Claims submitted to NFIP in Community

24%

Of the community's FEMA mapped\* 1%-annual-chance storm flood extent areas are in the Whiskey Chitto Watershed



Participating in the National Flood Insurance Program



CNMS Stream Miles in the study watershed

674.69

Percentage of stream miles which are detailed study in the study watersheds

1%



Flood-related presidential disaster declarations in your Discovery study parish

\$7,577,502

In Total Paid on Claims in the Parish

\*National Flood Hazard Layer (NFHL)

# BEAUREGARD PARISH

## TAKE ACTION: Potential Next Step



Your Hazard Mitigation Plan expiration date is **May 2026**.

The hazard mitigation goals identified projects for:

- Improve education and outreach efforts regarding potential impacts of hazards and the identification of specific measures that can be taken to reduce their impact.
- Improve data collection, use, and sharing to reduce the impacts of hazards.
- Improve capabilities and coordination to plan and implement hazard mitigation projects.
- Pursue opportunities to reduce impacts from hazards through mitigation of repetitive and severe repetitive loss properties and other appropriate construction projects and related activities.

FEMA's Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation Grant (PDM), and GOHSEP's Flood Mitigation Assistance (FMA) Grant Program all fund localized Flood Risk Reduction Projects. There may be eligibility, benefit cost analysis, and cost-share requirements. The 5% Initiative in the HMGP is used for projects for which it may be difficult to conduct a standard BCA to prove cost-effectiveness, such as emergency notification, public awareness, or sirens. Information about [FEMA's HMA grants](#)<sup>1</sup> can be found on our website, as well as on the [Louisiana Governor's Office of Homeland Security and Emergency Preparedness \(GOHSEP\)](#)<sup>2</sup> website. The State Hazard Mitigation Officer may be contacted for additional information. Participation in FEMA's [Community Rating System](#)<sup>3</sup> (CRS) reduces insurance premiums up to 45%, and FEMA will provide free technical assistance in designing and implementing programs designed to reduce flood damage. The State Hazard Mitigation Officer may be contacted for additional information.

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The minimum requirements for floodplain regulations are outlined in 44 Code of Federal Regulations 60.3, and local communities may choose to adopt more restrictive codes. FEMA Regional Office VI offers assistance in developing stricter codes, such as regulating construction or elevational changes in the floodplain.

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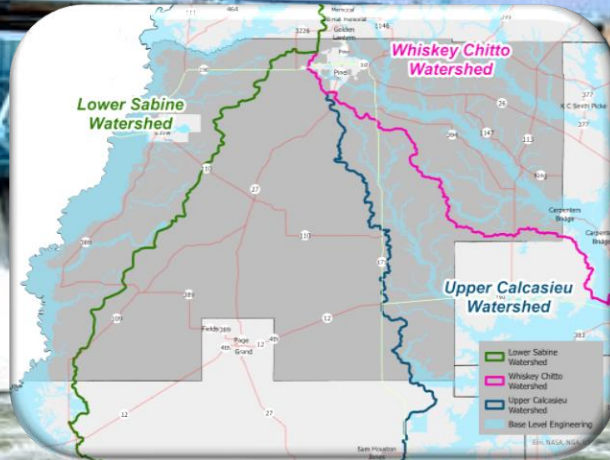
2. <https://gohsep.la.gov/GRANTS/RECOVERY-GRANTS/Hazard-Mitigation-Assistance/Hazard-Mitigation-Overview>

3. <https://www.fema.gov/national-flood-insurance-program-community-rating-system>

4. <https://watershed.la.gov/local-regional-projects-programs>

# CITY OF DERIDDER

## KNOW YOUR RISK



**9.16**  
sq. mi.

of the community's land area is in the study watershed

**9,675**

Population based on 2020 Decennial Census in the study watershed

**-3.5%** expected population growth predicted from 2020-2025 in the community

**106**

policies totaling approximately \$31,267,000 in coverage

**100%**

Of the community's FEMA mapped\* 1%-annual-chance storm flood extent areas are in the Whiskey Chitto Watershed

**Participating in the National Flood Insurance Program**

**17.66**

CNMS Stream Miles in the study watershed

**20%**

Percentage of stream miles which are detailed study in the study watersheds

**6**

Flood-related presidential disaster declarations in your Discovery study parish

**74**

Claims submitted to NFIP in the Community

**\$1,007,909**

In Total Paid on Claims in the Community

\*National Flood Hazard Layer (NFHL)

# CITY OF DERIDDER

## TAKE ACTION: Potential Next Step



Your Hazard Mitigation Plan expiration date is **May 2026**.

The hazard mitigation goals identified projects for:

- Improve education and outreach efforts regarding potential impacts of hazards and the identification of specific measures that can be taken to reduce their impact.
- Improve data collection, use, and sharing to reduce the impacts of hazards.
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- Pursue opportunities to reduce impacts from hazards through mitigation of repetitive and severe repetitive loss properties and other appropriate construction projects and related activities.

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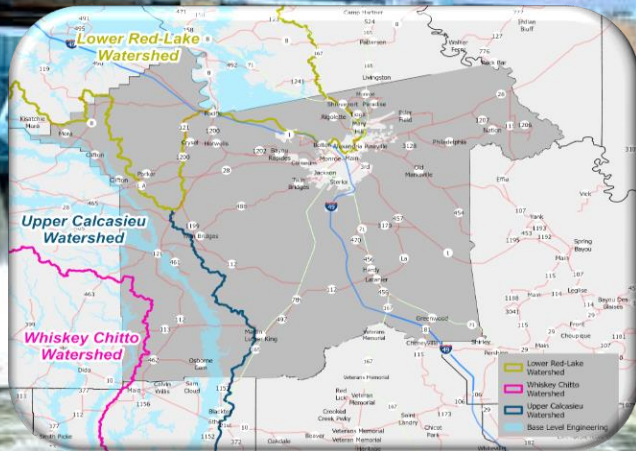
2. <https://gohsep.la.gov/GRANTS/RECOVERY-GRANTS/Hazard-Mitigation-Assistance/Hazard-Mitigation-Overview>

3. <https://www.fema.gov/national-flood-insurance-program-community-rating-system>

4. <https://watershed.la.gov/local-regional-projects-programs>

# RAPIDES PARISH

## KNOW YOUR RISK



**26.44**  
sq. mi.

of the community's land area is in the study watershed



**1,213**

Population based on 2020 Decennial Census in the study watershed



1.3% expected population growth predicted from 2020-2025 in the community



**1,455**

policies totaling approximately \$336,610,400 in coverage

**1,577**

Claims submitted to NFIP in the Community

**1%**

Of the community's FEMA mapped\* 1%-annual-chance storm flood extent areas are in the Whiskey Chitto Watershed



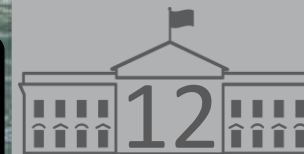
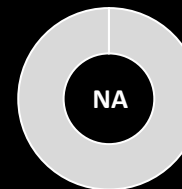
Participating in the National Flood Insurance Program



CNMS Stream Miles in the study watershed

**83.44**

The are no detailed study stream miles in the study watershed



Flood-related presidential disaster declarations in your Discovery study parish

**\$24,295,616**

In Total Paid on Claims in the Parish

\*National Flood Hazard Layer (NFHL)

# RAPIDES PARISH

## TAKE ACTION: Potential Next Step



Your Hazard Mitigation Plan expiration date is **November 2026**.

The hazard mitigation goals identified projects for:

- Limit development in flood plain areas
- Buy-out repetitive loss properties
- Expand and coordinate Early Warning Systems currently in use
- Provide public education materials to residents and private sector
- Increase participation in the National Flood Insurance Program (NFIP) and Community Rating System (CRS)

FEMA's Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation Grant (PDM), and GOHSEP's Flood Mitigation Assistance (FMA) Grant Program all fund localized Flood Risk Reduction Projects. There may be eligibility, benefit cost analysis, and cost-share requirements. The 5% Initiative in the HMGP is used for projects for which it may be difficult to conduct a standard BCA to prove cost-effectiveness, such as emergency notification, public awareness, or sirens. Information about [FEMA's HMA grants](#)<sup>1</sup> can be found on our website, as well as on the [Louisiana Governor's Office of Homeland Security and Emergency Preparedness \(GOHSEP\)](#)<sup>2</sup> website. The State Hazard Mitigation Officer may be contacted for additional information. Participation in FEMA's [Community Rating System](#)<sup>3</sup> (CRS) reduces insurance premiums up to 45%, and FEMA will provide free technical assistance in designing and implementing programs designed to reduce flood damage. The State Hazard Mitigation Officer may be contacted for additional information.

The Louisiana Watershed Initiative (LWI) provides funding for local governments for flood risk reduction projects and project development capacity building through CDBG-Mitigation dollars. These funds are distributed through three rounds of competitive funding opportunities focused on projects that result in demonstrable flood mitigation<sup>4</sup>.

The minimum requirements for floodplain regulations are outlined in 44 Code of Federal Regulations 60.3, and local communities may choose to adopt more restrictive codes. FEMA Regional Office VI offers assistance in developing stricter codes, such as regulating construction or elevational changes in the floodplain.

1. <https://www.fema.gov/hazard-mitigation-assistance>.

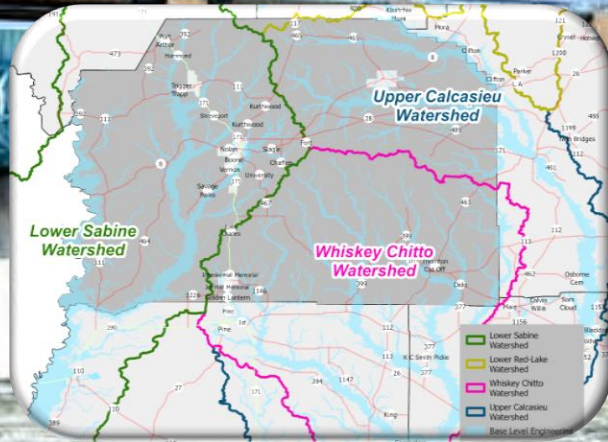
2. <https://gohsep.la.gov/GRANTS/RECOVERY-GRANTS/Hazard-Mitigation-Assistance/Hazard-Mitigation-Overview>

3. <https://www.fema.gov/national-flood-insurance-program-community-rating-system>

4. <https://watershed.la.gov/local-regional-projects-programs>

# VERNON PARISH

## KNOW YOUR RISK



429.76

sq. mi.

of the community's land area is in the study watershed



12,218

Population based on 2020 Decennial Census in the study watershed



-2.6% expected population growth predicted from 2020-2025 in the community



232

policies totaling approximately \$55,048,500 in coverage

212

Claims submitted to NFIP in the Community

24%

Of the community's FEMA mapped\* 1%-annual-chance storm flood extent areas are in the Whiskey Chitto Watershed



Participating in the National Flood Insurance Program



CNMS Stream Miles in the study watershed

1,041.41

The are no detailed study stream miles in the study watershed

NA



Flood-related presidential disaster declarations in your Discovery study parish

\$7,271,803

In Total Paid on Claims in the Community

\*National Flood Hazard Layer (NFHL)

# VERNON PARISH

## TAKE ACTION: Potential Next Step



Your Hazard Mitigation Plan expiration date is **October 2021**.

The hazard mitigation goals identified projects for:

- Limit development in flood plain areas
- Buy-out repetitive loss properties
- Expand and coordinate Early Warning Systems currently in use
- Provide public education materials to residents and private sector
- Increase participation in the National Flood Insurance Program (NFIP) and Community Rating System (CRS)

FEMA's Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation Grant (PDM), and GOHSEP's Flood Mitigation Assistance (FMA) Grant Program all fund localized Flood Risk Reduction Projects. There may be eligibility, benefit cost analysis, and cost-share requirements. The 5% Initiative in the HMGP is used for projects for which it may be difficult to conduct a standard BCA to prove cost-effectiveness, such as emergency notification, public awareness, or sirens. Information about [FEMA's HMA grants](#)<sup>1</sup> can be found on our website, as well as on the [Louisiana Governor's Office of Homeland Security and Emergency Preparedness \(GOHSEP\)](#)<sup>2</sup> website. The State Hazard Mitigation Officer may be contacted for additional information. Participation in FEMA's [Community Rating System](#)<sup>3</sup> (CRS) reduces insurance premiums up to 45%, and FEMA will provide free technical assistance in designing and implementing programs designed to reduce flood damage. The State Hazard Mitigation Officer may be contacted for additional information.

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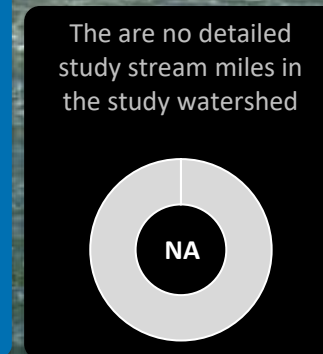
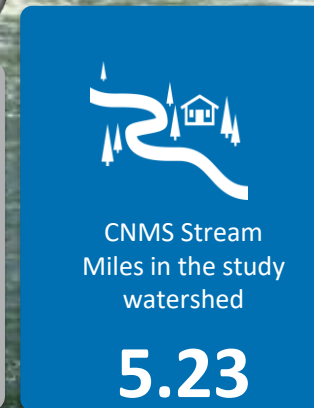
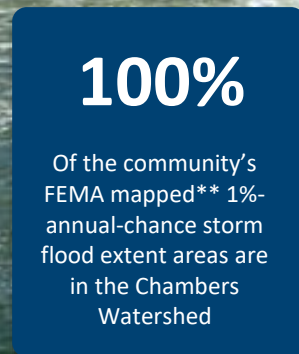
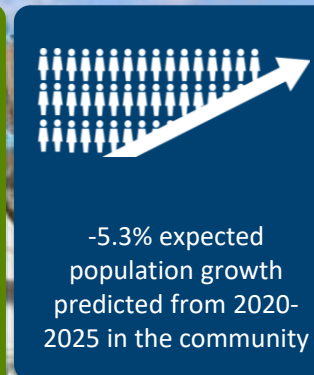
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4. <https://watershed.la.gov/local-regional-projects-programs>

# TOWN OF ROSEPINE

## KNOW YOUR RISK



\*National Flood Hazard Layer (NFHL)

# TOWN OF ROSEPINE

## TAKE ACTION: Potential Next Step



Your Hazard Mitigation Plan expiration date is **October 2021**.

The hazard mitigation goals identified projects for:

- Limit development in flood plain areas
- Buy-out repetitive loss properties
- Expand and coordinate Early Warning Systems currently in use
- Provide public education materials to residents and private sector
- Increase participation in the National Flood Insurance Program (NFIP) and Community Rating System (CRS)

FEMA's Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation Grant (PDM), and GOHSEP's Flood Mitigation Assistance (FMA) Grant Program all fund localized Flood Risk Reduction Projects. There may be eligibility, benefit cost analysis, and cost-share requirements. The 5% Initiative in the HMGP is used for projects for which it may be difficult to conduct a standard BCA to prove cost-effectiveness, such as emergency notification, public awareness, or sirens. Information about [FEMA's HMA grants](#)<sup>1</sup> can be found on our website, as well as on the [Louisiana Governor's Office of Homeland Security and Emergency Preparedness \(GOHSEP\)](#)<sup>2</sup> website. The State Hazard Mitigation Officer may be contacted for additional information. Participation in FEMA's [Community Rating System](#)<sup>3</sup> (CRS) reduces insurance premiums up to 45%, and FEMA will provide free technical assistance in designing and implementing programs designed to reduce flood damage. The State Hazard Mitigation Officer may be contacted for additional information.

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3. <https://www.fema.gov/national-flood-insurance-program-community-rating-system>

4. <https://watershed.la.gov/local-regional-projects-programs>

Table 10: Whisky Chitto Watershed Community Overview

CID	Community	Total Community Population <sup>1</sup>	Percent of Population in Study Watershed	Total Community Land Area (sq. mi)	Percent of Land Area of Study watershed	NFIP Participant
220009	Allen Parish	11,848	8.1%	747.0	16.44%	Y
220026	Beauregard Parish	25,730	17.5%	1147.2	25.25%	Y
220027	City of DeRidder	9,852	6.7%	9.3	0.20%	Y
220145	Rapides Parish	60,547	41.2%	1319.4	29.04%	Y
220228	Vernon Parish	37,503	25.5%	1317.9	29.01%	Y
220346	Town of Rosepine	1,519	1.0%	2.4	0.05%	Y
<sup>1</sup> 2020 United States Census Bureau Population Estimate						

## Appendix III: Base Level Engineering Report

# Whisky Chitto Watershed, Louisiana 2D Base Level Engineering Methods and Results

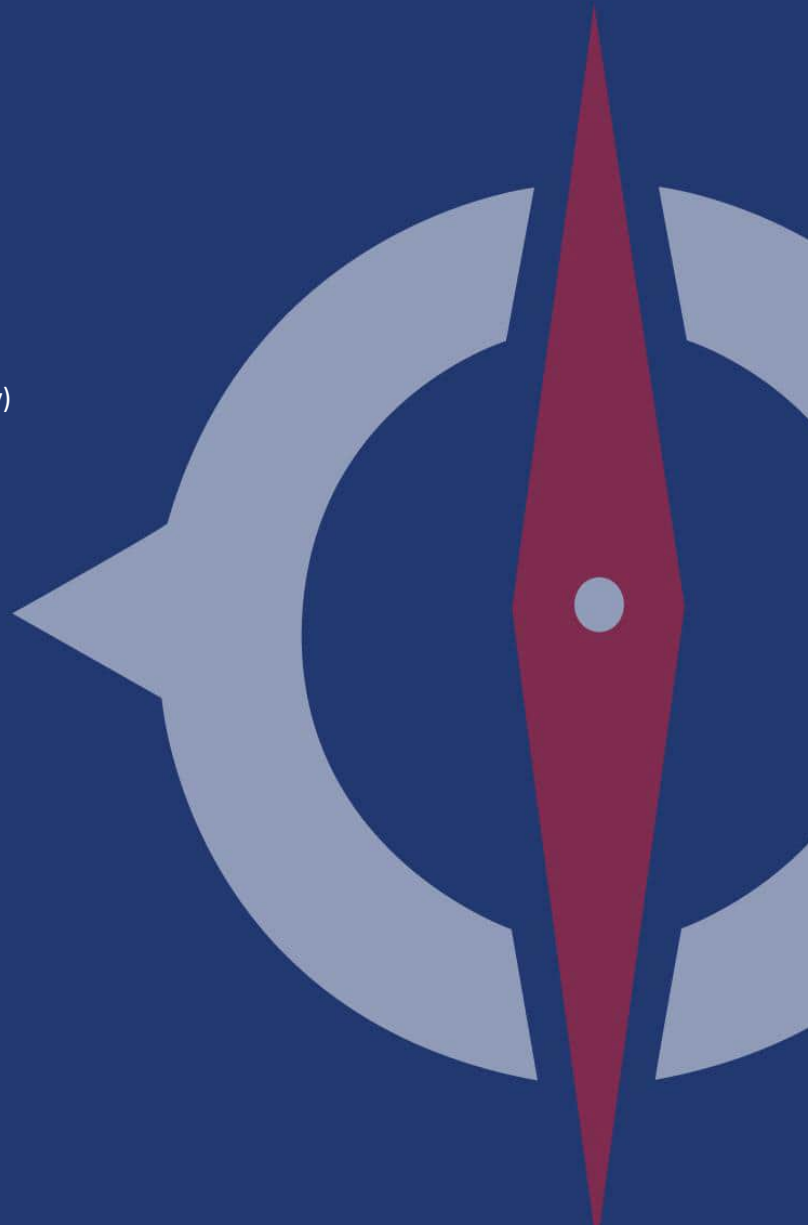
Contract# HSFE60-15-D-0003  
Task Order 70FA6019F00000035  
November 2020

**Prepared for:**

DHS/FEMA (Federal Emergency Management Agency)  
FEMA Region VI  
FRC 800 North Loop 288  
Denton, TX 76209-3698

**Submitted by:**

Compass PTS JV  
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Arlington, VA 22201



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## APPROVALS

This document requires the approval of the following persons:

Role	Name	Phone	Title (CLIN/RMC)	Review Date	Approved Date
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## CLIENT DISTRIBUTION

Name	Title/Organization	Location
Diane Howe	FEMA Region VI Risk MAP Lead	Denton, TX



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## 01 Introduction

Recent innovations and efficiencies in floodplain mapping have allowed the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) to develop a process formerly known as First Order Approximation (FOA), now labeled Base Level Engineering (BLE), which can be used to address current program challenges, including the validation of Zone A studies and the availability of flood risk data in the early stages of a Flood Risk Project. The BLE process involves using best available data and automated techniques to produce estimates of flood hazard boundaries for multiple recurrence intervals. The Whisky Chitto Watershed BLE documented here was designed to use 2-dimensional (2D) modeling efforts with enhancements and calibration to develop products intended to be transitioned into regulatory data development workflows.

As described in Title 42 of the Code of Federal Regulations, Chapter III, Section 4101(e), once every five years, FEMA must evaluate whether the information on Flood Insurance Rate Maps (FIRMs) reflects the current risks in flood prone areas. FEMA makes this determination of flood hazard data validity by examining flood study attributes and change characteristics, as specified in the Validation Checklist of the Coordinated Needs Management Strategy (CNMS) Technical Reference. The CNMS Validation Checklist provides a series of critical and secondary checks to determine the validity of flood hazard areas studied by detailed methods (e.g., Zone AE, AH, or AO). While the critical and secondary elements in CNMS provide a comprehensive method of evaluating the validity of Zone AE studies, a cost-effective approach for evaluating Zone A studies has been lacking.

In addition to the need for Zone A validation guidance, FEMA standards require flood risk data to be provided in the early stages of a Flood Risk Project. FEMA Program Standard Identification (SID) #29 requires that during Discovery, data must be identified that illustrates potential changes in flood elevation and mapping which may result from the proposed project scope. If available data does not clearly illustrate the likely changes, an analysis is required that estimates the likely changes. This data and any associated analyses should be shared, and results should be discussed with stakeholders.

An important goal of the BLE process is the scalability of the results. Scalability means that the results of a BLE should not only be used for CNMS evaluations of Zone A studies, but can also be leveraged throughout the Risk MAP program. The large volume of data resulting from a BLE can be updated as needed and used for the eventual production of regulatory and non-regulatory products, outreach and risk communication, and MT-1 processing. Leveraging this data outside the Risk MAP program may also be valuable to external stakeholders.

In an effort to increase and enhance the flood risk products in Louisiana, FEMA Region VI contracted the Compass PTS JV to perform a BLE analysis for the Whisky Chitto Watershed. This report documents the BLE process, products, and results for this watershed. Figure 1 depicts the Whisky Chitto Watershed footprint.

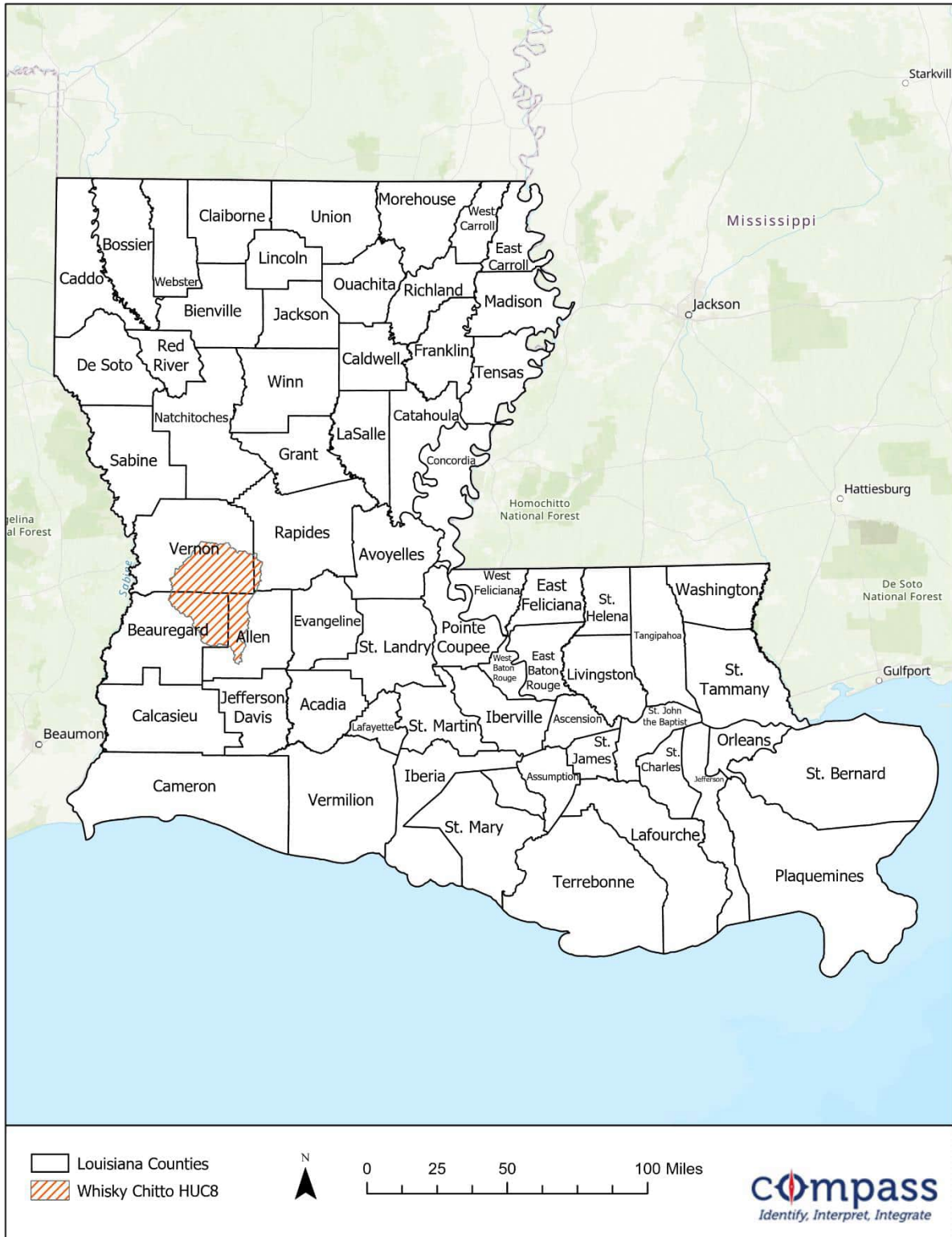


Figure 1: Whisky Chitto Watershed



## 02 2D BLE Modeling Inputs and Controls

Section 2 presents fundamental components required to execute a two-dimensional (2D) hydraulic engineering analysis for the Whisky Chitto watershed. Inputs such as elevation data, hydrology from rain-on-grid and inflow hydrographs, and hydraulic analyses and variables are defined herein. HEC-RAS 5.0.7 rain-on-grid utility was applied in the production of these Louisiana 2D BLE products.

### 2.1 Topographic Data

A high-resolution Digital Elevation Model (DEM) is a fundamental component for two-dimensional engineering analyses by providing a detailed representation of the surface for hydraulic routing through the model area. As such, DEMs were developed for the Whisky Chitto BLE project by leveraging available high-resolution gridded elevation data derived from Light Detection and Ranging (LiDAR) collections throughout the entire State of Louisiana. The 10-foot DEM developed to support the 2D BLE modeling and analysis, within the Whisky Chitto Watershed, was executed using the following steps:

1. Available elevation data for the project area were inventoried and collected.
2. Leveraged elevation data were evaluated and prioritized based on source vertical accuracy, year of collection, and resolution.
3. Seamless DEMs were processed using GIS.
4. Quality was assured using quantitative and qualitative assessment.

Documentation regarding leveraged data including coverage, accuracy, acquisition dates, and source contact/agency are presented in the figures, tables and text within Section 2.1. All vertical accuracy specifications were obtained from the metadata or survey reports provided with the leverage datasets. All available metadata, survey reports, and other leverage documentation are included in the FEMA Data Capture Technical Reference compliant submittal content for the Whisky Chitto Watershed.

#### 2.1.1 Inventory

An inventory of existing topographic data was conducted for the Whisky Chitto BLE project footprint. Figure 2 depicts the datasets identified across the project area. FEMA, NOAA, USGS, and other State and Federal agencies were queried to build the inventory with the most current and available data sources.

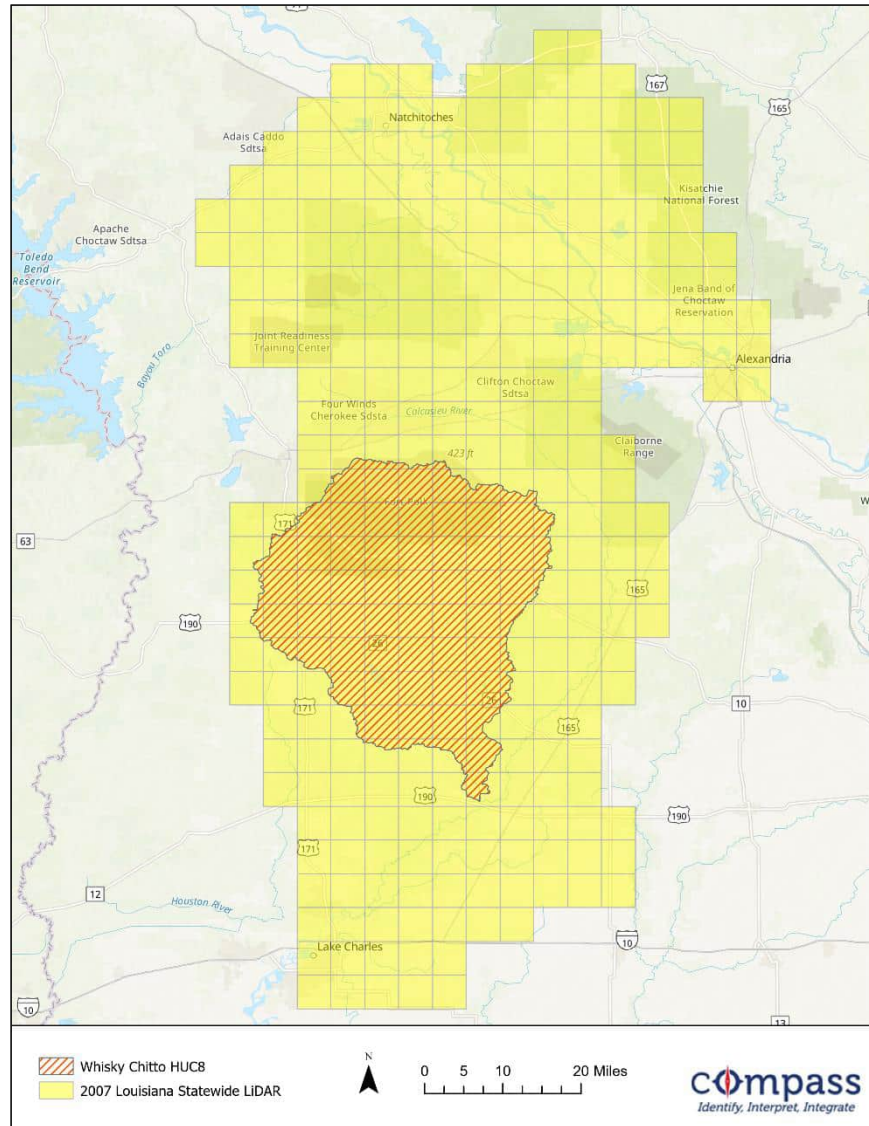


Figure 2: Whisky Chitto Watershed BLE Source Terrain Data

### 2.1.2 Evaluation

A data coverage assessment was conducted to check for data gaps, extent, accuracy, and completeness. A review of related documentation, reports, indexes, and metadata associated with the leveraged datasets ensured each dataset meets FEMA accuracy requirements for topographic data. Decisions to leverage or exclude a dataset (or portion of it), were based generally on the following criteria coupled with engineering judgment:

- Data meet FEMA vertical accuracy standards (Table 1)
- Date of origination
- Data density and coverage

Table 1 depicts the Risk Map SID 43 vertical accuracy requirements based on flood risk and terrain slope within the floodplain being mapped.



Table 1: FEMA Vertical Accuracy Requirements for Leveraged Data

Level of Flood Risk	Typical Slopes	Specification Level	Vertical Accuracy*	LiDAR Nominal Pulse Spacing (NPS)
High (Deciles 1,2,3)	Flattest	Highest	24.5 cm / 36.3 cm	≤ 2 meters
High (Deciles 1,2,3)	Rolling or Hilly	High	49.0 cm / 72.6 cm	≤ 2 meters
High (Deciles 2,3,4,5)	Hilly	Medium	98.0 cm / 145 cm	≤ 3.5 meters
Medium (Deciles 3,4,5,6,7)	Flattest	High	49.0 cm / 72.6 cm	≤ 2 meters
Medium (Deciles 3,4,5,6,7)	Rolling	Medium	98.0 cm / 145 cm	≤ 3.5 meters
Medium (Deciles 3,4,5,6,7)	Hilly	Low	147 cm / 218 cm	≤ 5 meters
Low (Deciles 7,8,9,10)	All	Low	147 cm / 218 cm	≤ 5 meters

\*Vertical Accuracy at 95% Confidence Level (FVA or NVA)/(CVA or VVA)

Table 2 depicts the complete list of source elevation data and attributes leveraged for the Whisky Chitto Watershed BLE project. All datasets used for hydraulic analyses and mapping meet the highest specification level defined in Table 1. Further explanation of the Table 2 datasets can be referenced in section 2.1.2.1.

Table 2: Source Topographic Data Available for the Whisky Chitto Watershed

Year	Description	Data Type	RMSE	Source/Owner
2007	Louisiana Statewide LiDAR	Airborne LiDAR	15-30 cm	LSU/USGS

### 2.1.2.1 Whisky Chitto Watershed Source Terrain Data

The source elevation data for the Whisky Chitto Watershed are DEMs derived from the 2007 Louisiana Statewide dataset. Only points classified as “ground” points (i.e., bare earth) were imported from the LiDAR and used for development of the project DEMs. Bare-earth LiDAR data are typically made by filtering non-ground returns (e.g. buildings, vegetation, etc.) from the raw laser returns. Figure 2 depicts the extent of the data defined in Table 2.

The RMSEz reported for the dataset was ranged from 15 cm to 30 cm at the 95% confidence level which meets project accuracy specifications of the National Standard for Spatial Data Accuracy (NSSDA).

### 2.1.3 Data Development Methodology

The source topographic data were processed for an area covering the Whisky Chitto Watershed and contributing drainage areas for the Whisky Chitto BLE modeling efforts. The topographic data for Whisky Chitto Watershed was projected horizontally, as needed, to North American Datum of 1983 (NAD83), State Plane Coordinate System (SPCS) Louisiana North in feet (1701). All topographic data were adjusted vertically, as needed, to NAVD88 in feet. Compass used a combination of ArcGIS and other software tools to apply any vertical datum shifts and/or any horizontal projection transformations to the topographic data.

### 2.1.4 DEM QA/QC

DEMs developed for use in the Whisky Chitto Watershed BLE analysis were developed and independently assured to meet quality standards of the project. The data were developed using a controlled process, were evaluated and assured by a topographic data development team, and were evaluated and assured



by the engineering team. Quality assurance during the data development process includes, but is not limited to the following QC checks:

- Horizontal Projection Check
- Vertical Datum Check
- Resolution Check
- Format Check
- Seamless Data Check to ensure the DEM files are consistent and seamless along source data edges

The quality control after the development process by the DEM development team included visual observations using hillshade, contouring, color rendering, and/or other visual aids to review and identify potential impactful anomalies within the DEM surface. This QC step included, but were not limited to the following QC checks:

- Seamless Data Check to ensure no voids along the edges and between the prioritized datasets
- NoData Value Check to ensure no null values
- Manual Elevation Check using hillshade rasters to find erroneous elevation issues
- Unit Consistency Check
- Legacy Cell Value Anomalies

Quality assurance conducted after the seamless DEM development conducted by the engineering team included visual or automated assessments to identify potentially impactful anomalies or slope changes that may adversely impact the hydraulic modeling. Based on quality reviews, two errors were identified in the DEM and addressed, as discussed below.

The first type of error were depth anomalies a couple cells wide and stretching almost the entire tile side. They reached depths and heights of almost forty feet from the nearby terrain. Since they were only a couple cells wide, the bad terrain data were removed. The ESRI Focal Statistics tool was applied to interpolate the surface from adjacent cells for the piece of terrain that was removed. The DEM was then converted to points for manual cleanup to smooth out the interpolated patch of terrain. The individual points were adjusted and then converted back to a DEM.

The second type of error was found in two different stream channels. There was a definitive change in data along the tile boundary that increased in elevation up to four feet. Manual cleanup was performed so that water could flow unimpeded across the seam. The DEM was converted to points so that the streams with this error could be manually adjusted from surrounding elevations. Efforts were made to make the transition as smooth as possible. The terrain lost resolution in these areas after the above fixes were applied; however, these fixes prevent unrealistic backwater and allow increase hydraulic routing accuracy.

The final DEM data developed for the Whisky Chitto Watershed meet FEMA standards and provide a representative terrain surface to perform 2D BLE.



## 2.2 2D BLE Methods

The following sections describe the 2D computational mesh and program settings considerations, followed by discussion and tabulation of hydrologic and hydraulic engineering methods and model inputs.

### 2.2.1 2D Computational Mesh and Settings

The HEC-RAS 2D computational mesh defines the extents of the 2D flow and can affect the accuracy of the 2D calculations. A denser mesh may provide more accurate results, but it can dramatically increase computation times. The 2D mesh for the model was set as evenly spaced cells at 200 feet. The mesh was further refined by placing breaklines along roads, berms, ridges, and other high ground that can influence the flow.

To ensure the entire Whisky Chitto watershed was represented, a 100-foot buffer was added to HUC boundary. The model boundary was also expanded beyond the HUC boundary at the southern end of the model to encompass more of the eastern floodplain where Whisky Chitto Creek flows into Calcasieu River.

The HEC-RAS 2D computational mesh was created for Whisky Chitto watershed based on HUC boundaries using ArcGIS toolsets, such as smoothing and simplification routines; ultimately, significantly reducing the need for manual edits to mesh cells within HEC-RAS that happen to generate errors. The 2D mesh consists of 662,378 cells and a 200-foot nominal mesh cell size; there are factors that could result in either larger or smaller cell sizes including proximity to the edge of the 2D mesh or the presence of breaklines. A 30-second time step was used in the HEC-RAS model, applying the Diffusion Wave (simplified Full Momentum) equations.

### 2.2.2 Model and Boundary Condition Setup

HEC-RAS rain-on-grid modeling requires establishing a 2D computational mesh boundary. The Whisky Chitto watershed is a headwater basin, meaning there are no external inflows to the watershed. The only inflow to the model was excess precipitation applied to the mesh. Figure 3 shows the 2D computational mesh for the Whisky Chitto basin, along with the USGS peak streamflow gage pertinent to the study.

The development of the excess precipitation hyetographs for the 2D mesh is described in the following Section 2.2.3.

Outflow boundary conditions (from the computational 2D mesh) were utilized along basin boundaries. A unique outflow boundary was established for Whisky Chitto Creek outflows, while the remaining boundaries were defined as continuous boundaries to allow drainage from adjacent basins to leave the model area freely. Normal depth was used for all outflow boundary conditions using approximate energy grade-line slopes estimated from the LiDAR terrain data.

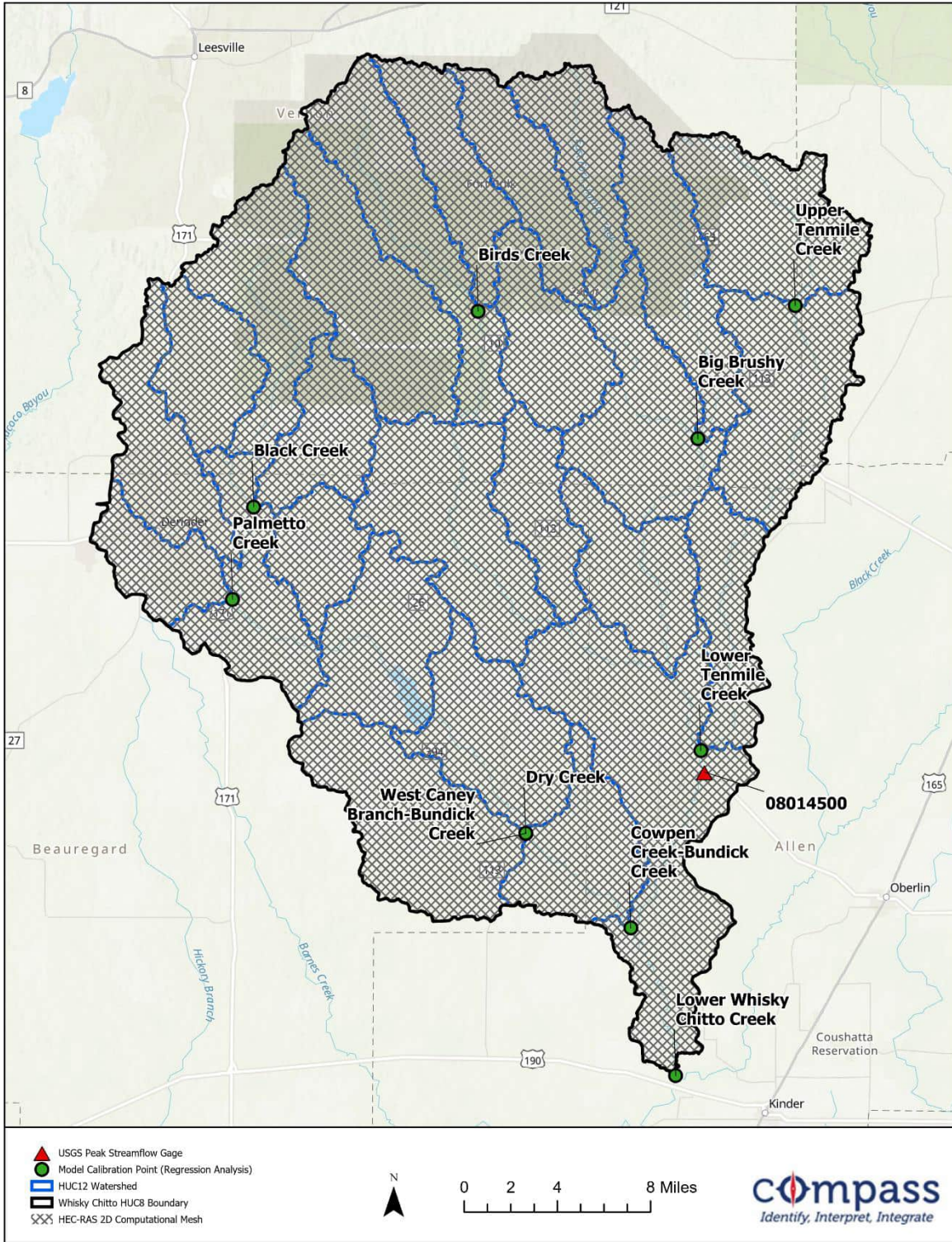


Figure 3: HEC-RAS 2D Computational Mesh and USGS Peak Streamflow Gages



### 2.2.3 Hydrology

Precipitation data for this study were referenced from NOAA's Precipitation Frequency Data Server, and appropriate values for all sub-basin elements were determined considering spatial variation and a representative total for each particular sub-basin. Excess precipitation for the 2D mesh was developed as described in Section 2.2.3.1. Only one USGS streamflow gage was located within the watershed boundary. Data from this gage was used to estimate peak flows for calibration purposes. To check the calibration at multiple points within the watershed, regional regression equations for the Pine Hills region of Louisiana were used to estimate 100-year flows at ten additional locations in the watershed (Watson et al., 2017). These ten additional calibration points were located at the base of HUC-12 boundaries to simplify the calculation of drainage areas based on existing HUC-12 boundaries. Locations were chosen to represent a range of drainage areas and areas within the watershed. Calibration is discussed further in Section 2.3.1.

Precipitation frequency data published in NOAA Atlas 14, Volume 9 Version 2.0 (NOAA, 2013) were used for this Study. These data were obtained from NOAA's Precipitation Frequency Data Server (PFDS) (<http://hdsc.nws.noaa.gov/hdsc/pfds/index.html>). The 10-, 4-, 2-, 1-, and 0.2-percent annual chance 24-hour precipitation depths for all sub-basin elements were determined by area-weighted intersection of gridded PFDS data with the watershed. Excess precipitation for the 2D mesh was developed as described in Section 2.2.3.1. The gage utilized for this study is presented in Table 3.

**Table 3: USGS Peak Streamflow Gages**

Gage ID	Flooding Source and Location	Published Drainage Area (mi <sup>2</sup> )	Period of Record
08014500	Ouisca Chitto Creek Near Oberlin, LA	510	1939-2020

Annual chance peak flows were calculated at each gage using USGS Bulletin 17C methodology. The 84% confidence interval was used to determine the 1% plus and minus chance events. Calculated discharges for the 1%, 1% plus, and 1% minus events are presented in Table 4 for each gage utilized in this study.

**Table 4: USGS Peak Streamflow Gage Analysis Results**

Gage ID	Flooding Source and Location	1% Peak Q (cfs)	1%- Peak Q (cfs)	1%+ Peak Q (cfs)
08014500	Ouisca Chitto Creek Near Oberlin, LA	76,805	62,810	99,911

Annual chance peak flows for the 1% event were calculated for the ten locations based at the base of HUC-12 boundaries identified in Table 5.

**Table 5: Regression Analysis Results**

HUC-12	HUC-12 Drainage Area (mi <sup>2</sup> )	Cumulative Drainage Area (mi <sup>2</sup> )	Main Channel Slope (ft/mi)	Mean Annual Precip. (in) 1951-1980	1% Peak Q (cfs)
Big Brushy Creek	35	35	4	58.1	8,415
Birds Creek	25	25	8	56.6	7,965
Black Creek	23	23	6	56.8	6,821



HUC-12	HUC-12 Drainage Area (mi <sup>2</sup> )	Cumulative Drainage Area (mi <sup>2</sup> )	Main Channel Slope (ft/mi)	Mean Annual Precip. (in) 1951-1980	1% Peak Q (cfs)
Cowpen Creek-Bundick Creek	28	324	2	57.8	36,565
Dry Creek	49	49	11	57.4	15,658
Lower Tenmile Creek	24	109	4	59.2	20,196
Lower Whisky Chitto Creek	29	881	5	57.9	118,008
Palmetto Creek	18	18	7	56.5	5,752
Upper Tenmile Creek	41	41	6	58.5	11,229
West Caney Branch- Bundick Creek	36	247	4	57.7	37,001

### 2.2.3.1 Excess Precipitation for 2D Computational Mesh

An excel tool was used to apply the SCS Curve Number method to calculate losses and define excess precipitation for each watershed. Temporal distributions of point rainfall totals were defined using 24-hour, SCS Type III storm distributions. The plus and minus standard error for the 1-percent annual chance precipitation depths were determined as the upper and lower 84% confidence limits on the nominal 1-percent depth, assuming a normal distribution of the logarithms for the precipitation depths.

In addition to recurrence interval precipitation estimates, NOAA Atlas 14 provides 90% confidence intervals of reported precipitation values. On a normal distribution curve, 90% confidence intervals (i.e. the upper and lower 95% confidence limits) correspond to +/- 1.645 standard deviations. The 1% plus and minus events are defined to be one standard deviation above and below the 1% event. It should be noted that the standard errors for the 1% rainfall depth were based on the depth used post-areal reduction.

Curve Numbers were computed by intersecting the National Land Cover Dataset (NLCD) 2016 coverage and NRCS soils data based on the matrix presented in Table 6.

Table 6: Land Use-Soils-CN Matrix for Computing Initial Curve Numbers

LU_GridCode	NLCD LU Description	Hydrologic Soil Group			
		A	B	C	D
11	Open Water	99	99	99	99
21	Developed Open Space	49	69	79	84
22	Developed Low Intensity	61	75	83	87
23	Developed Medium Intensity	81	88	91	93
24	Developed High Intensity	89	92	94	95
31	Barren Land	39	61	74	80
41	Deciduous Forest	30	55	70	77
42	Evergreen Forest	30	55	70	77
43	Mixed Forest	30	55	70	77



LU_GridCode	NLCD LU Description	Hydrologic Soil Group			
52	Shrub Scrub	30	48	65	73
71	Herbaceous	49	62	74	85
81	Hay Pasture	39	61	74	84
82	Cultivated Crops	51	67	76	80
90	Woody Wetlands	72	80	87	93
95	Emergent Herbaceous Wetlands	72	80	87	93

A Curve Number (CN) can be considered a parameter, exhibiting variability that follows some frequency distribution. While Antecedent Runoff Condition (ARC) II CNs were used for a 1% event, the range between ARC I and ARC III for the ARC II CN was assumed to correspond to an 80% confidence interval of the ARC II CN. The CN Loss method assumes a maximum potential retention parameter,  $S$ , is inversely related to a CN by  $S = 1000 / CN - 10$ ; this relationship is based on a median value of  $S$  determined from plotting a large number of observations.

Chapter 5 of the NRCS NEH Part 630 provides an example of computing a CN for a watershed based on annual peak gage observations. The example involves computing a CN and corresponding  $S$  value for each event, then taking the logarithms of the  $S$  values. Further, the logarithm of  $S$  is assumed to vary normally, and the mean of the logarithms corresponds to the arithmetic median. Therefore, 10% ( $S_{10}$ ) and 90% ( $S_{90}$ ) extremes of lognormally distributed  $S$  values can be assumed to correspond to ARC III and ARC I condition CN values, respectively. This range represents an 80% confidence interval, corresponding to  $\pm 1.282$  standard deviations from the mean. The following procedure was used to estimate one standard deviation of a given CN (in fact, one standard deviation of the logarithm of  $S$ ) for the purposes of modeling 1% plus and minus events. First, ARC III (corresponding to  $S_{10}$ ) and ARC I (corresponding to  $S_{90}$ ) CN values can be estimated from a 1% CN (ARC II) by:

$$\begin{aligned} \text{CNI} &= 4.2 * \text{CNII} / (10 - 0.058 * \text{CNII}) \\ \text{CNIII} &= 23 * \text{CNII} / (10 + 0.13 * \text{CNII}) \end{aligned}$$

Next,  $S_{90}$  and  $S_{10}$  can be computed by:

$$\begin{aligned} S_{10} &= 1000 / \text{CNIII} - 10 \\ S_{90} &= 1000 / \text{CNI} - 10 \end{aligned}$$

The following relationship can then be used to compute one standard deviation of the logarithm of  $S$ :

$$\begin{aligned} \log(S_{10}) &= \text{mean}(\log S) + 1.282 \text{ std. dev.}(\log S) \\ \log(S_{90}) &= \text{mean}(\log S) - 1.282 \text{ std. dev.}(\log S) \\ 1 \text{ std. dev.}(\log S) &= (\log S_{10} - \log S_{90}) / 1.282 \end{aligned}$$

Therefore, 1% plus and minus  $S$  values can be estimated by:

$$\begin{aligned} \log S_{\text{Plus}} &= \log S + [1 \text{ std. dev.}(\log S)] \\ \log S_{\text{Minus}} &= \log S - [1 \text{ std. dev.}(\log S)] \end{aligned}$$



Finally, 1% plus and minus CNs can be computed by:

$$\begin{aligned} \text{CNPlus} &= 1000 / (\text{SPlus} + 10) \\ \text{CNMinus} &= 1000 / (\text{SMinus} + 10) \end{aligned}$$

Since the 1% plus and minus events represent plus and minus one standard deviation of a 1% event, CNs used in a rainfall-runoff simulation for modeling 1% Plus and Minus events were developed, as described above.

**Table 7: Rainfall-Runoff Parameters (Curve Number)**

Sub-basin Description	CN	CN 1% Minus	CN 1% Plus
Whisky Chitto	71.25	56.1	82.8

NRCS rainfall-runoff methods were used to define excess precipitation applied to the 2D mesh, including Curve Numbers for defining rainfall losses. No routing was considered in the rainfall-runoff modeling. NRCS Type III storm distributions were used for defining temporal distributions of point rainfall totals. An Areal Reduction Factor (ARF) of 0.92 was used on all recurrence interval total precipitation depths in order to determine the effective precipitation for the sub-basin representing the 2D mesh. Table 8 provides the precipitation totals used for determining excess precipitation.

**Table 8: Precipitation Totals for HEC-RAS 2D Computational Mesh (post ARF)**

Sub-basin Description	Percent Annual Chance Precipitation Total (in)						
	10	4	2	1	0.2	1% Minus	1% Plus
Whisky Chitto	7.2	9.1	10.8	12.7	17.9	10.6	14.8

Figure 4 shows the hyetographs applied to the 2D computational mesh.

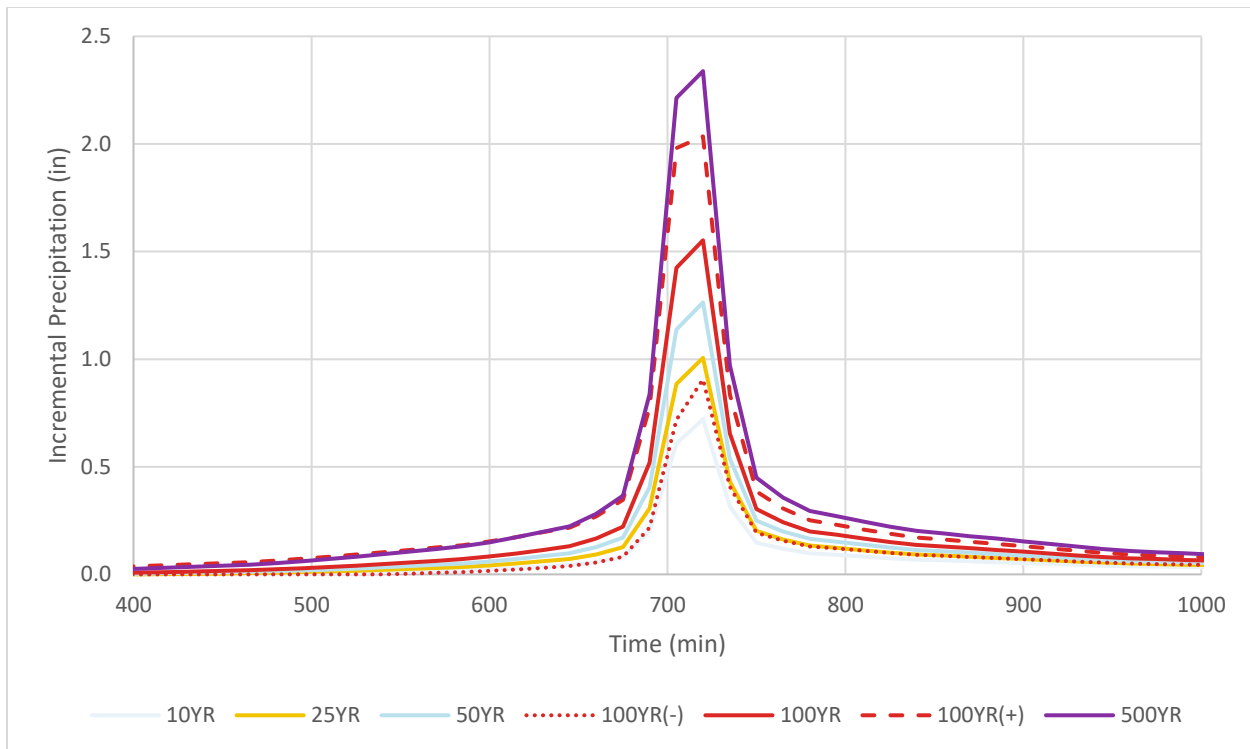


Figure 4: Precipitation Hyetographs (post ARF) applied to the Computational Mesh

## 2.2.4 Hydraulics

This section describes the remaining hydraulic modeling considerations, including implementation of Manning’s roughness, breaklines, and hydraulic structures within the 2D computational mesh.

### 2.2.4.1 Roughness Coefficients

A Manning’s n roughness coverage was developed for the 2D computational mesh using typical values for roughness for given NLCD land classifications. The table below shows a typical land use-roughness matrix used in defining the roughness coverage for the study area.

Table 9: NLCD 2011-Manning’s N Roughness Matrix

NLCD Classification	Manning’s N	Minimum	Normal	Maximum	Source
Open Water	0.03	0.025	0.03	0.033	Chow 1959
Developed, Open Space <sup>1</sup>	0.04	0.03	0.04	0.05	Recommended for 2020 2D BLE studies
Developed, Low Intensity	0.06	0.038	0.05	0.063	Calenda, et al. 2005
Developed, Medium Intensity	0.08	0.056	0.075	0.094	Calenda, et al. 2005
Developed, High Intensity	0.12	0.075	0.1	0.125	Calenda, et al. 2005
Barren Land	0.03	0.025	0.03	0.035	Chow 1959
Deciduous Forest	0.12	0.1	0.12	0.16	Chow 1959
Evergreen Forest	0.12	0.1	0.12	0.16	Chow 1959
Mixed Forest	0.12	0.1	0.12	0.16	Chow 1959



NLCD Classification	Manning's N	Minimum	Normal	Maximum	Source
Scrub/Shrub	0.06	0.035	0.05	0.07	Chow 1959
Grassland/Herbaceous	0.03	0.025	0.03	0.035	Chow 1959
Pasture/Hay	0.04	0.03	0.04	0.05	Chow 1959
Cultivated Crops	0.04	0.025	0.035	0.045	Chow 1959
Woody Wetlands	0.1	0.08	0.1	0.12	Chow 1959
Emergent Herbaceous Wetland	0.08	0.075	0.1	0.15	Chow 1959
Main Channel <sup>2</sup>	0.045	NA	NA	NA	HEC-RAS User's Manual (adjust as needed)

<sup>1</sup>Choose values from other classifications. Developed, open space involves 20% impervious area, large lot single homes, and mostly grassy areas.

<sup>2</sup>Clean, winding, some pools and shoals, some weeds and stones, lower stages, more ineffective slopes and sections

#### 2.2.4.2 Breaklines

Breaklines align grid cell faces and were used within the 2D mesh area to define prominent features including, road embankments and hydraulic structures as well as the stream centerlines. Road embankments were identified in GIS and imported into HEC-RAS as breaklines to ensure that water was not routed past roads until it was deep enough to overtop the road. The same was done for dam embankments. Aerial imagery was used to assess whether culverts or bridges were present at locations where water was backing up along roads in preliminary model simulations. If such a structure was identified, the road breakline was modified with a v-notch breakline to force the cell alignment to cross the embankment to allow water to pass over the road. The stream centerlines were as input as breaklines to ensure cells lined up perpendicular to the stream and to capture stream conveyance. No levees were present in the study area.

#### 2.2.4.3 Initial Conditions

Initial conditions were not used in the Whisky Chitto 2D BLE model.

### 2.3 Model Results

The 2D BLE results for the study produced an SFHA that compared reasonably well with the effective SFHA in most cases, and provides additional estimated SFHA in areas that do not currently have an SFHA mapped. While the results provide context for flood risk communication as part of the Discovery process, and are scalable, the results require further analysis to be used for regulatory purposes. There were no effective SFHA data to compare the results to in this watershed. The validity of the 2D BLE results should be verified through community work map meetings before being applied to a regulatory product.

#### 2.3.1 Calibration & Sensitivity Analysis

The one USGS gage within the model area was used for calibration and validation of the 1% annual chance event. Peak flows within the model were compared with a Bulletin 17C Analysis of the gage data using HEC-SSP version 2.1.1. A rating curve at the gage location was also extracted from HEC-RAS and



compared to the USGS published rating curve. Initial runs indicated the model was overestimating peak flows and underestimating water surface elevations. Six model variations were tested where curve numbers and Manning's n for woody wetlands were adjusted. Woody wetlands were the dominant landcover adjacent to streams. Curve numbers between 88% and 105% of the calculated curve number and Manning's n values between 0.1 and 0.15 were tested. Curve numbers were decreased to lower the peak flow at the gage location. Manning's n values were increased to raise the water surface elevation. Increasing the Manning's n value also has the impact of reducing peak flow because lag times of sub-watershed hydrograph peaks are delayed. Ultimately the scenario with a CN increased by 5% and a Manning's n of 0.015 for woody wetlands was determined to yield the best calibration. The manning n of 0.015 was necessary to increase the water surface elevation to be more comparable to the water surface elevations indicated by the USGS rating curve. Although this Manning's n value is outside of the range of 0.08 to 0.012 indicated in Table 9, it was deemed reasonable based on the dense vegetation observed in aerial imagery. Results of the flow comparisons are presented in Table 10.

**Table 10: 1% Annual Chance Reasonability Comparisons**

Flooding Source	USGS Gage Used for Verification	HEC-RAS 5.0.7 (2D)		Reference	
		WSEL (ft)	Discharge (cfs)	WSEL (ft)	Discharge (cfs)
Ouiska Chitto Creek	08014500	74.1 <sup>1</sup>	79,692	74.9 <sup>2</sup>	76,805

<sup>1</sup> Water surface elevation is approximate based on USGS rating curve at a flow of 76,810 cfs.

<sup>2</sup> Water surface elevation is approximate based on simulated rating curve at a flow of 79,418 cfs.

Although calibration emphasis was placed on matching the USGS gage peak flow where a more detailed analysis based on 79 years of flow data was possible, simulated flows for the 1% annual chance event were also compared to peak flows based on regression equations. Simulated flows for three of the ten points were outside the 1%+ and 1%- window of estimated flow. Since flow was well calibrated at the USGS gage and there was no bias among the regression locations towards over- or under-estimating flows, calibration was deemed acceptable. Results of the flow comparisons to the regression locations are presented in Table 11.

**Table 11: Regression Analysis Results**

HUC-12 Calibration Point	Regression Equation Based Flows			HEC-RAS 5.0.7 (2D) Peak Q (cfs)
	1% Peak Q (cfs)	1%+ Peak Q (cfs)	1%- Peak Q (cfs)	
Big Brushy Creek	8,415	12,538	4,292	15,156
Birds Creek	7,965	11,867	4,062	10,759
Black Creek	6,821	10,163	3,479	5,288
Cowpen Creek-Bundick Creek	36,565	54,482	18,648	34,701
Dry Creek	15,658	23,331	7,986	14,380
Lower Tenmile Creek	20,196	30,092	10,300	18,113
Lower Whisky Chitto Creek	118,008	175,832	60,184	104,895
Palmetto Creek	5,752	8,571	2,934	9,753
Upper Tenmile Creek	11,229	16,732	5,727	19,107
West Caney Branch-Bundick Creek	37,001	55,131	18,870	35,165



## 2.4 Challenges

One major challenge encountered was the terrain issues discussed in Section 2.1. The terrain ridges and ditches that were confined to a linear feature were able to be rectified. The discrepancies from one tile to the next downstream tile were more challenging to correct. The resolution to these issues successfully prevents backwater along the edge of such seams; however, some resolution was lost during the modification of these areas. The stream channel in the modified terrain is not as well defined which may cause minor errors in depths nearest to the stream. There are no houses or structures within these areas so repercussions should be limited.

Another issue was a lack of peak streamflow records within the watershed and at the outlet of the watershed. With the addition of regression equation calibration points, though, sufficient data was available to provide confidence in the results. A streamflow gage at the downstream end of the watershed would have been helpful to assess overall calibration throughout the entire watershed as well as provide confidence in the results at the boundary between the Whisky Chitto watershed and the downstream Upper Calcasieu watershed. Without this information, GIS procedures were necessary to smooth the simulated water surface elevation between the two models.

Culverts and bridges have not been added to the BLE model despite evidence of cross structures which allow the streams to convey water through numerous structures. The function of these structures was approximated in the model by adjusting breaklines to force cell boundaries to cross the terrain ridge, permitting flow to pass to the downstream side of the ridge. The approximate sizes of structures were considered by creating the width of the cell at the ridge approximately equal to the width of the culvert or bridge identified through aerial imagery. This approximation may cause overestimation or underestimation of the flow passing through the structures, impacting water surfaces upstream and downstream of the ridge.

The final challenge for the Whisky Chitto watershed was achieving reasonable tie-ins with the Upper Calcasieu Watershed. The main riverine outflow flows from the Whisky Chitto HUC into the Upper Calcasieu HUC. The outflow hydrograph was exported and provided to the Upper Calcasieu modeling team to use as an inflow. A reasonable overlap between the models was established, such that results could be reconciled to provide a seamless mapping tie-in after finalization of the models. Other areas along the two watershed boundaries were reviewed during floodplain mapping to ensure results are spatially seamless.

## 2.5 Recommendations

This study provides significant information useful for flood identification and communication among those affected. The study is highly scalable, and stakeholder input and further analysis would enhance the product and inform implementation of regulatory flood hazard areas. In addition, the validity of the 2D BLE results should be verified through community work map meetings before being applied as a regulatory product.



## 03 Floodplain Mapping and Effective Zone A Validation

The following sections provide a synopsis of how raw modeled depths were translated into SFHAs. In addition to developing a new SFHA, the BLE model data was leveraged to validate the effective zone A studies within the project footprint. The results of the validation effort can be found below in section 3.2.

### 3.1 Special Flood Hazard Area

#### 3.1.1 Model Outputs

The floodplains are derived from the raw modeled depth grids using the maximum value. These depth grids are exported from HEC-RAS as TIFF format rasters with an interpolated rendering that slope values at the center and along the faces/edges of the computational mesh cells. Using GIS, the TIFF rasters are post processed into 1% SFHA and 0.2% shaded X polygons.

#### 3.1.2 Methodology

The use of 2D modeling methods results in water surface elevation values at every cell in the model's computational mesh. In order to represent the desired model results and eliminate extraneous disconnected cells, post processing of the depth grids is required. Floodplain mapping delineation was completed using connected raster cells within the project footprint. For mapping purposes, the depth grids were reclassified to eliminate depths less than half of a foot before converting the rasters to polygons. The water surface elevation grids were then masked to the extent of the reclassified depth grids. Polygons were created from the reclassified grids and cleaned up against the criteria of being larger than 2 acres. For example, if flooding polygons were disconnected from a flooding source and less than two acres, the polygon was removed from the SFHA. Flood polygon less than 2 acres that intersected a flooding source were assessed individually. Because the new mapping, based on gridded engineering, retains the blocky shape of a raster, a simplification process was applied using GIS to smooth the boundaries. These processes remove unnecessary points, bends, and angles while preserving the natural shape of the polygon. Furthermore, small voids of less than 2 acres, or "holes" inside of the floodplain, were aggregated with the larger surrounding polygons to merge them and make the floodplain complete. These edits adhere to traditional and approved floodplain mapping approaches.

In addition to the SFHA, all other flooding associated with the 1% and 0.2% raw results were retained as "on the shelf" data that may be leveraged for future needs and analysis.

#### 3.1.3 Flood Hazard Area Layer

Special Flood Hazard Areas, as noted above, were developed to the extent of connected raster cells in the water surface elevation grid within the project footprint. The Regional CNMS database, National Flood Hazard Layer, and paper inventory were used as reference data to ensure extent of the BLE results represents appropriate flooding extent.

The 0.2% flood areas were produced using the same methods as the 1% SFHA. After both layers were developed, a union of the two products was performed to develop the deliverable format EBFE\_FLD\_HAZ\_AR.



## 3.2 Validation of Effective Zone A SFHA

The following summarizes the results of the CNMS validation assessments for the effective Zone A studies in the Whisky Chitto Watershed.

### 3.2.1 Initial Assessment A1 – Significant Topography Update Check

The significant topography update check determines whether a topographic data source is available that is significantly better than what was used for the effective Zone A modeling and mapping. For the study area in the Whisky Chitto Watershed the effective Zone A topographic data source was 2004 State of Louisiana LiDAR LSU CADGIS tiles. This LiDAR was flown in 2003 and covered the entire Whisky Chitto Watershed. The topographic data source for the BLE was derived from LiDAR flown for the state of Louisiana in 2007. This elevation data represents a significant improvement from the effective Zone A topographic source for all reaches and were, therefore, set to FAIL this check. To add, any new reaches added to the CNMS inventory were marked as PASS for this check.

### 3.2.2 Initial Assessment A2 – Check for Significant Hydrology Changes

The significant development check, using the National Urban Change Indicator (NUCI) dataset, assesses increased urbanization in the watershed of the BLE. If the percentage of urban area within the HUC-12 watershed containing the effective Zone A study is 15-percent or more and has increased by 50-percent or more since the effective analysis, the study would fail this check. The check for significant development in the Whisky Chitto Watershed was completed by evaluating percentage of urban change at the HUC-12 level. Since there were significant urban development changes throughout the HUC12's within the Whisky Chitto Watershed, all streams were set to FAIL for the A3 check.

Table 12 presents the summarized results of checks A1 through A3.

Table 12: A1-A3 Validation Results

Assessment Checks	Pass / Fail	Notes
A1 – Topography	Fail/Pass	LiDAR significantly better than effective USGS topo source/Effective mapping leveraged LiDAR data.
A2 – Hydrology	Pass	Effective hydrology methods are unknown
A3- Development	Pass/Fail	Less than 15% of study area is under urban cover/>50% increase in urban area in an urban HUC-12

### 3.2.3 Validation Check A4 – Check of Studies Backed by Technical Data

Zone A studies that pass all initial assessment checks described above may be categorized as “Valid” in the CNMS Inventory only if the effective Zone A study is supported by modeling or sound engineering judgment and all regulatory products are in agreement. If the effective Zone A study passes all initial assessment checks, but is not supported by modeling, or if the original engineering method used is unsupported or undocumented, a comparison of the BLE results and effective Zone A's is performed. Due to lack of documentation of the original engineering methods in the Whisky Chitto Watershed, check A4 has been marked as FAIL for all reaches in the study area except for which are new to the CNMS inventory. These new reaches are marked as UNKNOWN for the A4 check.

### 3.2.4 Validation Check A5 – Comparison of BLE and Effective Zone A

The effective Zone A comparison was performed at the full extent of the Whisky Chitto Watershed. The validation of the effective Zone A boundaries using 2D flood hazard products differ from the standard 1D



methods due to the lack of cross sections and their use with standard FBS methodology. For this 2D study, the effective A zone boundaries were compiled using the National Flood Hazard Layer. These data were dissolved to one continuous A-zone layer, which then had points placed along its perimeter every 500 feet.

For each test point, a 75-foot buffer was created. Using this buffer, the minimum and maximum values of the DEM were extracted, as a proxy for the effective base flood elevation. The minimum value of the 1% minus raster, and the maximum value of the 1% plus raster were also extracted. These 1% plus maximum and 1% minus minimum values are products of the new 2D BLE study and act as the vertical tolerance. The test point passes if the DEM maximum value is less than or equal to the 1% plus maximum value and the DEM minimum value is greater than or equal to the 1% minus minimum value. This can be visualized as a short 75-foot radius cylinder, with a height of 1% plus maximum – 1% minus minimum. This test verifies that at least one point from the ground surface (i.e. proxy BFE) falls both vertically and horizontally within this range.

### 3.2.5 Validation Results

All 958.1 total miles of available CNMS features representing the effective Zone A studies were categorized as ASSESSED – BEING STUDIED, UNVERIFIED – BEING STUDIED, or UNVERIFIED – NVUE COMPLIANT. Total miles in each of these categories are summarized in Table 13 and illustrated in Figure 5 below. Table 14 summarizes the validation results based on the individual HUC 12 watersheds within Whisky Chitto Watershed.

Table 13: Aggregated Zone A Validation Results

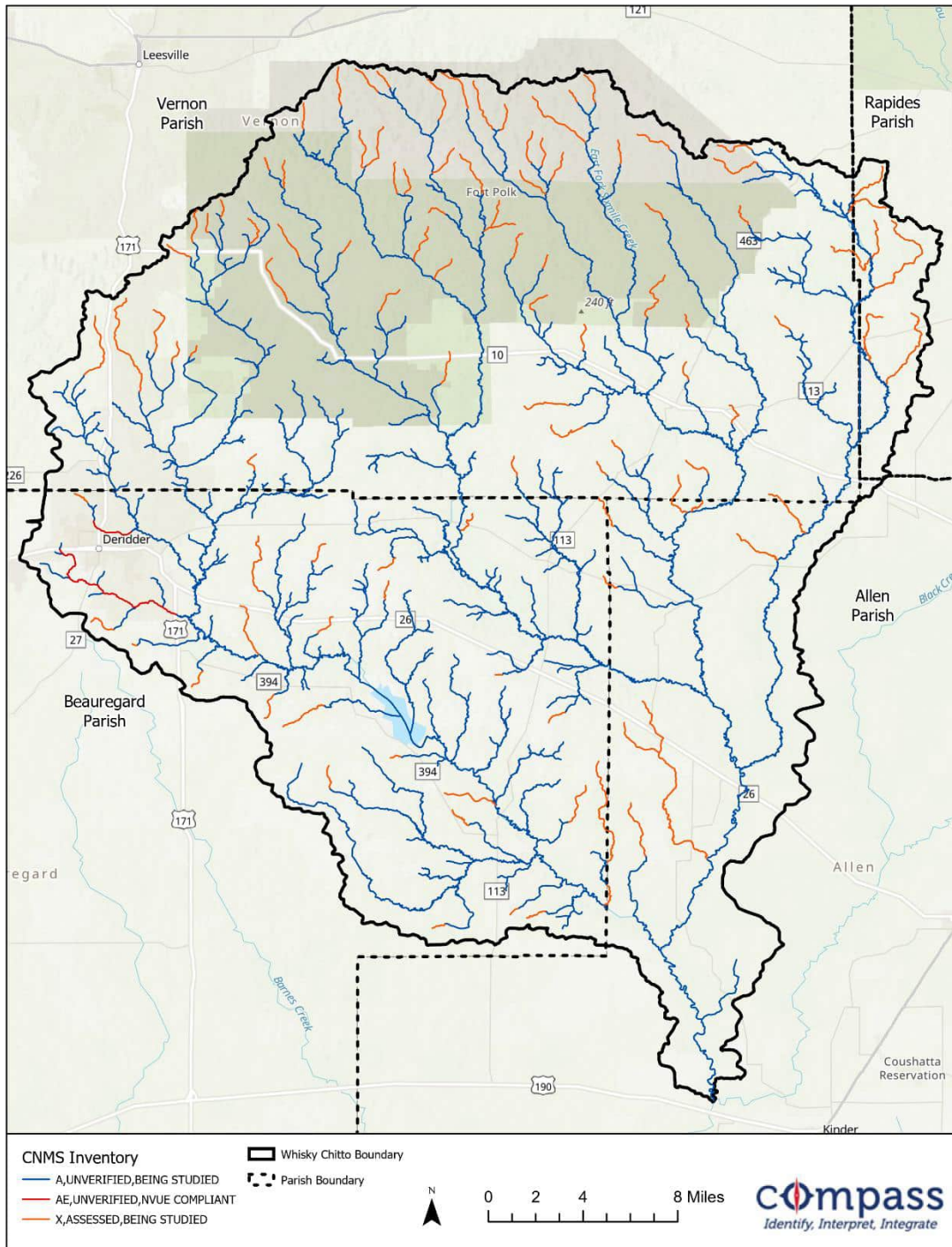
Validation Status	Status Type	Total Miles
ASSESSED	BEING STUDIED	168.6
UNVERIFIED	BEING STUDIED	780.6
UNVERIFIED	NVUE COMPLIANT	8.9

Table 14: HUC 12 Zone A Validation Results

HUC-12 Watershed		Total FBS points	Fail	Pass	%Pass	BLE Comparison Pass? (>90%)	Priority Score
Watershed Name	Watershed Number						
Whisky Chitto	All Streams	47,700	47,700	0	0	FAIL	N/A
Birds Creek	080802040401	1,177	1,177	0	0	FAIL	25.0
Black Creek	080802040303	1,784	1,784	0	0	FAIL	30.5
Bundick Lake-Bundick Creek	080802040308	2,517	2,517	0	0	FAIL	76.0
Clear Creek	080802040302	1,234	1,234	0	0	FAIL	25.0
Cowpen Creek-Bundick Creek	080802040311	1,196	1,196	0	0	FAIL	50.0
Deer Creek	080802040307	1,150	1,150	0	0	FAIL	53.1
Drakes Creek	080802040403	2,077	2,077	0	0	FAIL	25.0
Dry Creek	080802040310	3,594	3,594	0	0	FAIL	57.2
East Fork Sixmile Creek	080802040101	972	972	0	0	FAIL	25.0
Flat Creek	080802040304	1,576	1,576	0	0	FAIL	41.3



HUC-12 Watershed		Total FBS	Fail	Pass	%Pass	BLE	Priority
Hogpen Branch-Bundick Creek	080802040301	2,031	2,031	0	0	FAIL	26.4
Little Sixmile Creek	080802040103	1,527	1,527	0	0	FAIL	35.7
Lower Tenmile Creek	080802040203	1,171	1,171	0	0	FAIL	50.0
Lower Whisky Chitto Creek	080802040407	1,473	1,473	0	0	FAIL	50.0
Middle Tenmile Creek	080802040202	1,524	1,524	0	0	FAIL	45.7
Middle Whisky Chitto Creek	080802040406	2,079	2,079	0	0	FAIL	50.0
Palmetto Creek	080802040305	377	377	0	0	FAIL	49.0
Perkins Branch-Sixmile Creek	080802040106	1,439	1,439	0	0	FAIL	50.0
Soapstone Creek-Sixmile Creek	080802040105	2,436	2,436	0	0	FAIL	44.2
Sugar Creek	080802040404	1,562	1,562	0	0	FAIL	50.0
Turkey Hollow Creek-Bundick Creek	080802040306	1,914	1,914	0	0	FAIL	51.3
Upper Tenmile Creek	080802040201	1,732	1,732	0	0	FAIL	54.9
Upper Whisky Chitto Creek	080802040405	3,289	3,289	0	0	FAIL	45.0
West Caney Branch-Bundick Creek	080802040309	2,561	2,561	0	0	FAIL	57.2
West Fork Sixmile Creek	080802040102	1,063	1,063	0	0	FAIL	25.0
Whisky Chitto Creek Headwaters	080802040402	2,076	2,076	0	0	FAIL	27.1



**Figure 5: Whisky Chitto Watershed CNMS Validation Results**

An overall risk for each HUC-12 watershed was calculated using the National Flood Risk Percentages Dataset and its proportional area. The weighted risk was multiplied by the percentage of points in the watershed that failed the CNMS comparison to effectively determine the priority score. Figure 6 below shows the range of the HUC-12 priority scores within the Whisky Chitto Watershed which can be used to initiate discussions during the Discovery phase. Bundick Lake-Bundick Creek HUC-12 was determined to



have the highest priority score and the most need while Birds Creek, Clear Creek, Drakes Creek, East Fork Sixmile Creek, and West Fork Sixmile Creek HUC-12's were tied for the lowest score.

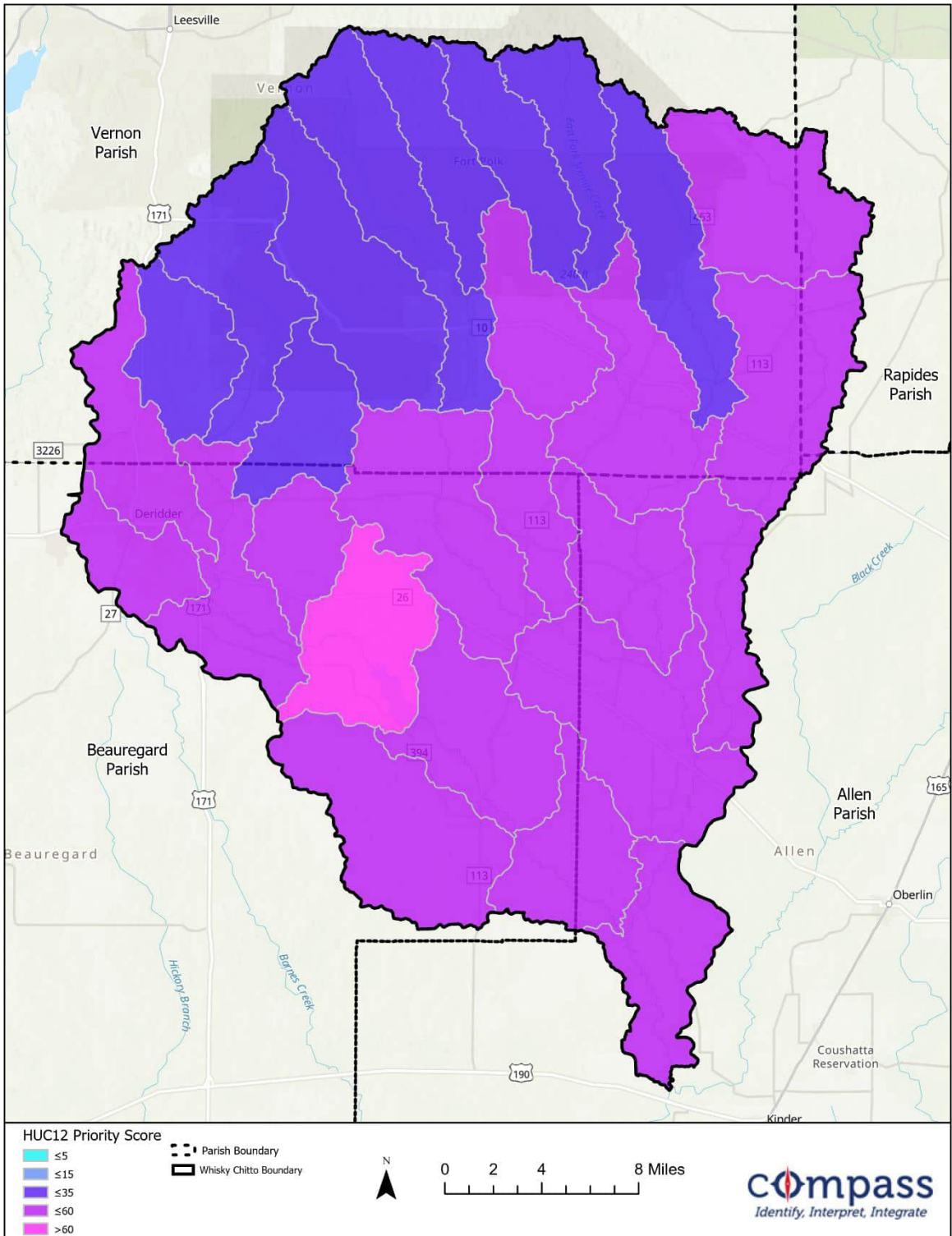


Figure 6: Ranking of Whisky Chitto Watershed HUC-12s



### 3.3 Flood Risk Analysis

A flood risk analysis was performed for this project. The updated 1-percent annual chance and 0.2 percent annual chance depth grids were used to calculate the potential flood losses. The loss results are stored in the S\_FRAC\_AR spatial file within the FRD geodatabase. All results are reported in whole dollar values.

Hazus version 4.2 (SP02) was used for the basic and refined loss analysis.

The losses are reported via census blocks. It is important to note that Hazus version 4.2 (SP02) uses dasymetric census blocks. Dasymetric mapping removes undeveloped areas (such as areas covered by other bodies of water, wetlands, or forests) from the census blocks, changing their shape and reducing their size in these areas. For more information on dasymetric data visit FEMA's [Media Library](#) for the [Hazus-MH Data Inventories: Dasymetric vs. Homogenous](#), or [Hazus 3.0 Dasymetric Data Overview](#).

Hazus analysis was performed by parish within the project watershed extends for each return period to ensure proper model processing. A summary of results per parish for the 100-year scenarios are shown in Table 15.

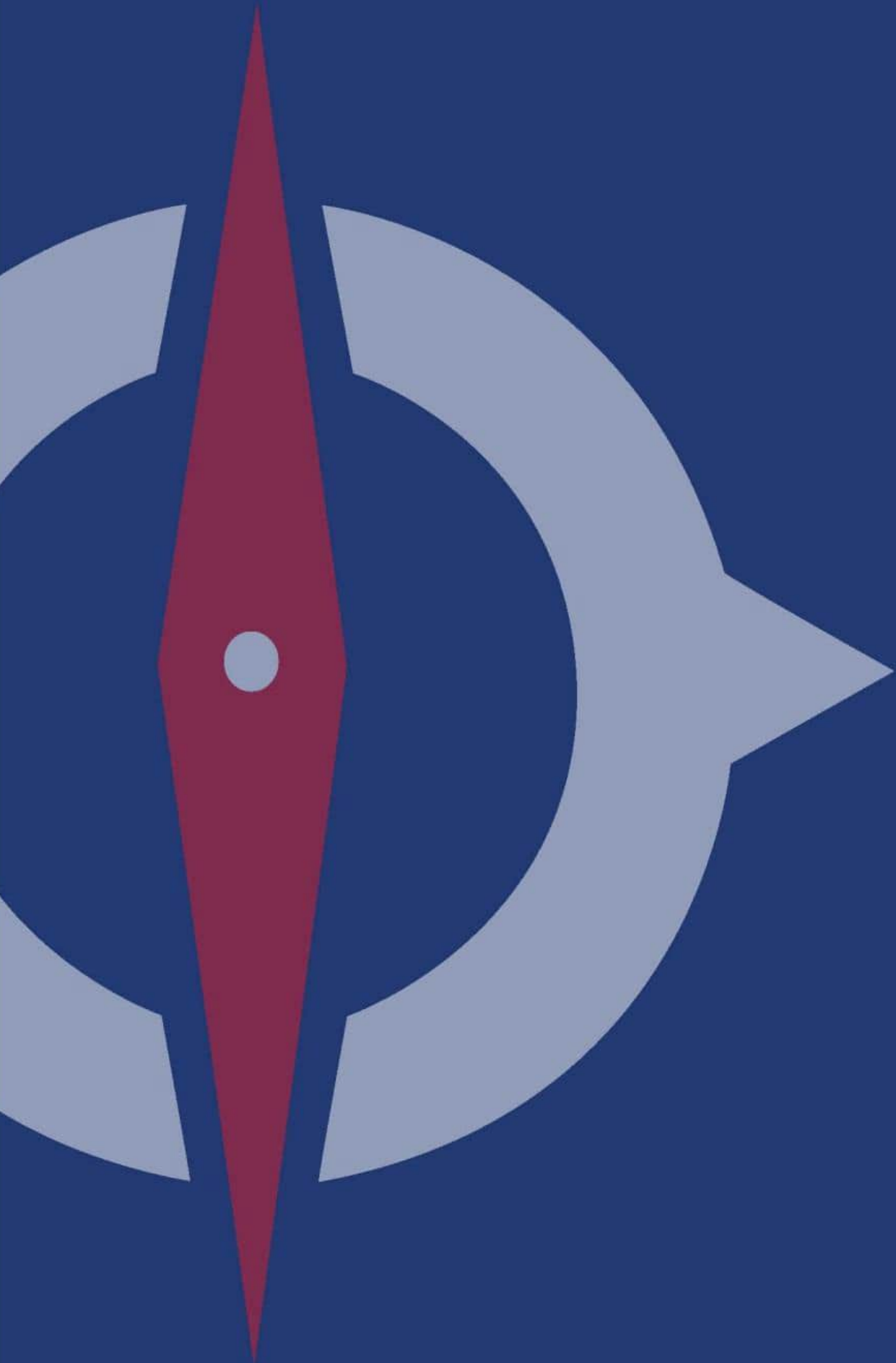
**Table 15: Hazus 4.2 (SP02) Results for 1-percent-annual-chance (100 year) scenario for Whisky Chitto Watershed, Louisiana**

Parish	Full Replacement - Total Loss	Dollar Exposure (Replacement Value) - Buildings	Dollar Exposure (Replacement Value) - Contents
Allen	\$24,966,000	\$8,960,000	\$6,605,000
Beauregard	\$174,734,000	\$36,057,000	\$30,160,000
Vernon	\$50,205,000	\$12,084,000	\$11,424,000
Rapides	\$7,917,000	\$581,000	\$514,000
Total	\$257,822,000	\$57,682,000	\$48,703,000



## 04 References

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2. FEMA, "Guidance for Flood Risk Analysis and Mapping – Base Level Engineering (BLE) Analyses and Mapping", February 2018. ([https://www.fema.gov/media-library-data/1526489690918-2862bece100f28564c4167aaf4b2378b/Base\\_Level\\_Engineering\\_Guidance\\_Feb\\_2018.pdf](https://www.fema.gov/media-library-data/1526489690918-2862bece100f28564c4167aaf4b2378b/Base_Level_Engineering_Guidance_Feb_2018.pdf)).
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4. U.S. Army Corps of Engineers, Hydrologic Engineering Center. (September 2016). HEC-RAS River Analysis System, Version 5.0.3 Davis, California.
5. USGS, "Estimating Magnitude and Frequency of Floods Using PeakFQ Program: USGS Fact Sheet", 2006.
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7. USGS, "Flood Characteristics of Mississippi Streams; Water-Resources Investigations Report 91-4037", 1991.
8. USGS, "Water Resources Technical Report No. 75: Regionalized Regression Equations for Estimating Low-Flow Characteristics for Selected Louisiana Streams", 2004.
9. USGS. Multi-Resolution Land Characteristics Consortium. *National Land Cover Database 2011*. (<http://www.mrlc.gov/nlcd2011.php>).



## Appendix IV: Resources

## FEMA Points of Contact

Subject/Topic of Interest	Name	Contact Information
FEMA Region 6 Risk MAP Lead <i>Project Outreach</i>	Diane Howe Risk Analysis Branch FEMA Region 6	Phone: (940) 898 5171 Email: <a href="mailto:diane.howe@fema.dhs.gov">diane.howe@fema.dhs.gov</a>
FEMA Technical Monitor	Dustin Busse Risk Analysis Branch FEMA Region 6	Phone: (940) 383 7214 Email: <a href="mailto:dustin.busse@fema.dhs.gov">dustin.busse@fema.dhs.gov</a>
<ul style="list-style-type: none"> <li>• How to find and read FIRMs</li> <li>• Letters of Map Change and Elevation Certificates</li> <li>• Flood zone disputes</li> <li>• Mandatory insurance purchase guidelines</li> <li>• Map Service Center (MSC) and National Flood Hazard Layer</li> </ul>	FEMA Map Information eXchange (FMIX)	Phone: 877-FEMA-MAP (336-2627) Email: <a href="mailto:FEMAMapSpecialist@RiskMAPcds.com">FEMAMapSpecialist@RiskMAPcds.com</a> Live Chat: <a href="https://www.floodmaps.fema.gov/fhm/fmx_main.html">https://www.floodmaps.fema.gov/fhm/fmx_main.html</a>
FEMA Project Monitor Project Outreach	Diane Howe, CFM	Phone: (940) 898 5171 Email: <a href="mailto:diane.howe@fema.dhs.gov">diane.howe@fema.dhs.gov</a>

## State Partners

Organization/Title	Name	Partner Location	Contact Information
Louisiana Water Resources Development Program <i>Deputy Assistant Secretary, OPW</i>	Patrick J Landry, P.E. Edward M. Knight, P.E.	P.O. Box 94245 Baton Rouge, LA 70804-9245	Phone: (225) 379 3000 Email: <a href="mailto:patrick.landry@la.gov">patrick.landry@la.gov</a> Email: <a href="mailto:Edward.knight@la.gov">Edward.knight@la.gov</a> Web Page: <a href="http://WaterResourcesProgram(la.gov)">Water Resources Program (la.gov)</a>
Louisiana State NFIP Coordinator	Cindy O'Neal, CFM Susan Veillon, CFM	P.O. Box 94245 Baton Rouge, LA 70804-9245	Phone: (225) 379 3005 Email: <a href="mailto:cindy.oneal@la.gov">cindy.oneal@la.gov</a> Email: <a href="mailto:susan.veillon@la.gov">susan.veillon@la.gov</a> Web Page: <a href="http://NationalFloodInsuranceProgram(NFIP)(la.gov)">National Flood Insurance Program (NFIP) (la.gov)</a>
DOTD CTP & CRS Program Manager	Pamela Lightfoot, CFM	P.O. Box 94245 Baton Rouge, LA 70804-9245	Phone: (225) 379 3005 Email: <a href="mailto:pam.lightfoot@la.gov">pam.lightfoot@la.gov</a> Web Page: <a href="http://LaDOTD-FloodplainManagementContacts">La DOTD - Floodplain Management Contacts</a>
State Hazard Mitigation Officer	Jeffrey Giering	7667 Independence Blvd. Baton Rouge, Louisiana 70806	Phone: (225) 267 2516 Email: <a href="mailto:jeffrey.giering@la.gov">jeffrey.giering@la.gov</a> Web Page: <a href="http://GovernorsOfficeofHomelandSecurity&amp;EmergencyPreparedness">Governor's Office of Homeland Security &amp; Emergency Preparedness</a>

Organization/Title	Name	Partner Location	Contact Information
LADOTD <i>Statewide Flood Control Program Manager</i>	William J Williamson, P.E.	Public Works & Water Resources 1201 Capital Access Rd. Baton Rouge, LA 70802	Phone: (225) 379 3023 Email: <a href="mailto:billy.williamson@la.gov">billy.williamson@la.gov</a> Web Page: <a href="#">Statewide Flood Control Program (la.gov)</a>
Louisiana Department of Transportation and Development <i>Communications Director</i>	Rodney Mallett		Phone: (225) 379 1275 Email: <a href="mailto:rodney.mallett@la.gov">rodney.mallett@la.gov</a> Web Page: <a href="#">Administration Contacts (la.gov)</a>

Governor’s Office of Homeland Security and Emergency Preparedness  
[GOHSEP \(la.gov\)](#)

Louisiana is a high-risk state for emergency events and disasters. The Governor’s Office of Homeland Security and Emergency Preparedness (GOHSEP) is the agency responsible for coordinating the state’s efforts throughout the emergency management cycle to prepare for, prevent where possible, respond to, recover from, and mitigate against hazards to lessen the effects of man-made or natural disasters that threaten the state. GOHSEP can save lives and reduce property damage by understanding risks and taking action to address those risks, as well as minimizing disaster impacts and increasing the resiliency in our communities, environment, and economy.

Louisiana Department of Transportation and Development (LADOTD)  
[Risk MAP / CTP \(la.gov\)](#)

On March 11, 2015, the Louisiana Department of Transportation and Development (LADOTD) signed a partnership agreement with FEMA Region 6 to become a Cooperating Technical Partner (CTP) in FEMA’s Risk MAP Program. Since becoming a CTP, LADOTD has been diligently planning and working toward the release of updated flood risk information for Louisiana.



The hope is that in the future, other stakeholders will become involved in the program to make good and efficient use of the data for floodplain management decisions and mitigation actions.

## Louisiana Floodplain Management Association (LFMA)

The Louisiana Floodplain Management Association serves as a forum for parish and municipal employees, state and federal officials, and the private sector to meet and share experiences, ideas, and solutions to common flooding problems. As a grassroots effort, we assist and support each other when confronted by flooding. Flood damage reduction can best be achieved through floodplain management, that is, a balanced combination of structural and nonstructural measures. Structural measures include levees, pumps, dams, channelization, diversions, and detention/retention ponds. Of equal importance are nonstructural measures, which encompass flood insurance, federal and state legislation, voluntary relocation, local codes, emergency preparedness, floodproofing, and mitigation plans and activities.

Organization	Contact Information	Website
Louisiana Floodplain Management Association (Chairman)	Phone: 504-736-6653	<a href="http://lfma.memberclicks.net">lfma.memberclicks.net</a>

## Certified Floodplain Manager (CFM) Certification

The Association of State Floodplain Managers (ASFPM) established a national program for certifying floodplain managers. This program recognizes continuing education and professional development that enhances the knowledge and performance of local, state, federal, and private-sector floodplain management professionals.

The role of the nation's floodplain managers is expanding due to increases in disaster losses, the emphasis on mitigation to alleviate the cycle of damage-rebuild-damage, and a recognized need for professionals to adequately address these issues. This certification program will lay the foundation for ensuring that highly qualified individuals are available to meet the challenge of breaking the damage cycle and stopping its negative drain on the nation's human, financial, and natural resources.

CFM® is a registered trademark and available only to individuals certified and in good standing under the ASFPM Certified Floodplain Manager Program.

For more information, you may want to review these available CFM Awareness Videos:

- [What is the CFM Program?](#)
- [Becoming a CFM](#)
- [What are the Benefits of a CFM?](#)

Study materials for those interested in applying for the CFM certification can be found on the ASFPM Website at: [Getting Certified \(floods.org\)](#)

Check the [Training & Education | Association of State Floodplain Management \(floods.org\)](#) for in-person training sessions near you.

For information on becoming a member and the exam application process in the State of Louisiana visit [Getting Certified \(floods.org\)](#)

## Interactive Preliminary Data Viewer [KS1]

[Risk Mapping, Assessment and Planning \(Risk MAP\) | FEMA.gov](#)

To support community review of the study information and promote risk communication efforts, FEMA launched an interactive web tool accessible on-line at [ArcGIS - Mapping Information Platform Studies Tracker](#) for the project areas.

For more information on the Interactive Preliminary Data Viewer in the Region 6 area: [KS2]

[Region 6 | FEMA.gov](#)

[FEMA's Flood Map Changes Viewer](#)

[Flood Map Changes Viewer \(arcgis.com\)](#)

## Estimated Base Flood Elevation (BFE) Viewer

As a part of the Risk MAP process, FEMA is completing **BLE** to provide a complete picture of flood hazard throughout a watershed. The BLE analysis uses high resolution ground elevation data, flood flow calculations, and fundamental engineering modeling techniques to define flood extents for streams.

To provide a look at BLE data availability and relative engineering analysis, FEMA developed the through the **Estimated BFE Viewer** for community officials, property owners, and land developers to identify the flood risk (high, moderate, low), expected flood elevation, and estimated flood depth near any property or structure within watersheds where BLE has been prepared.

Visit the Estimated BFE Viewer (<https://apps.femadata.com/estbfe>) application to learn the status of BLE in your area of interest or surrounding communities, to view the flood hazard data developed, or to utilize the tool's flood risk reporting features for a location where BLE has been made available.

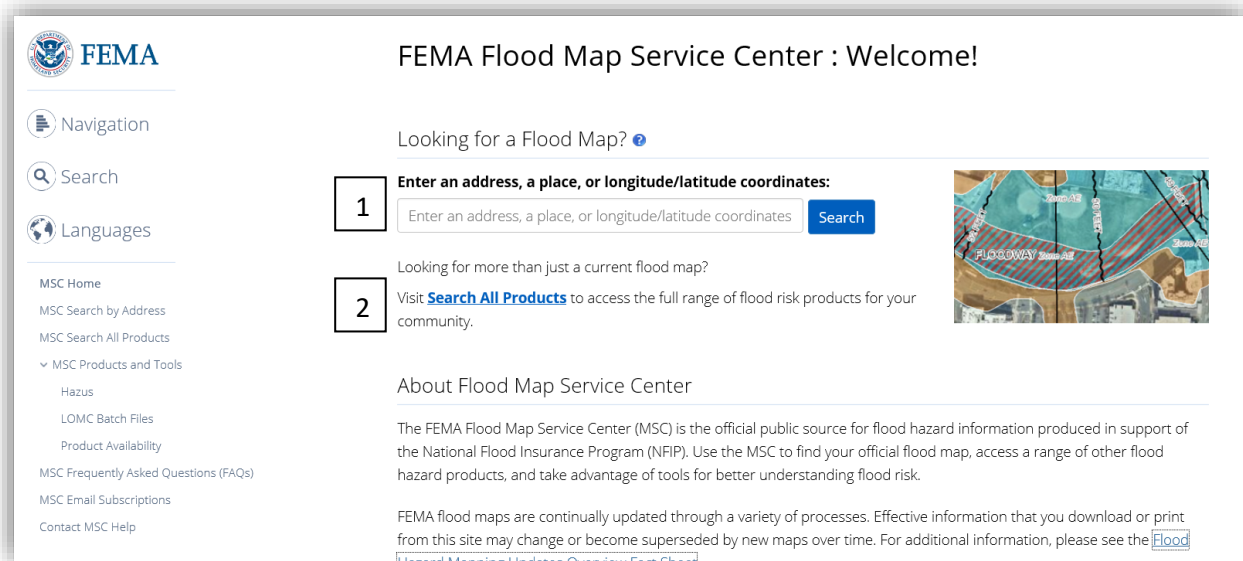
## Map Service Center – Available Map Data

The [FEMA Flood Map Service Center \(MSC\)](#) is the official public source for flood hazard information produced in support of the NFIP. Use the MSC to find your official effective flood map, preliminary flood maps, and access a range of other flood hazard products.

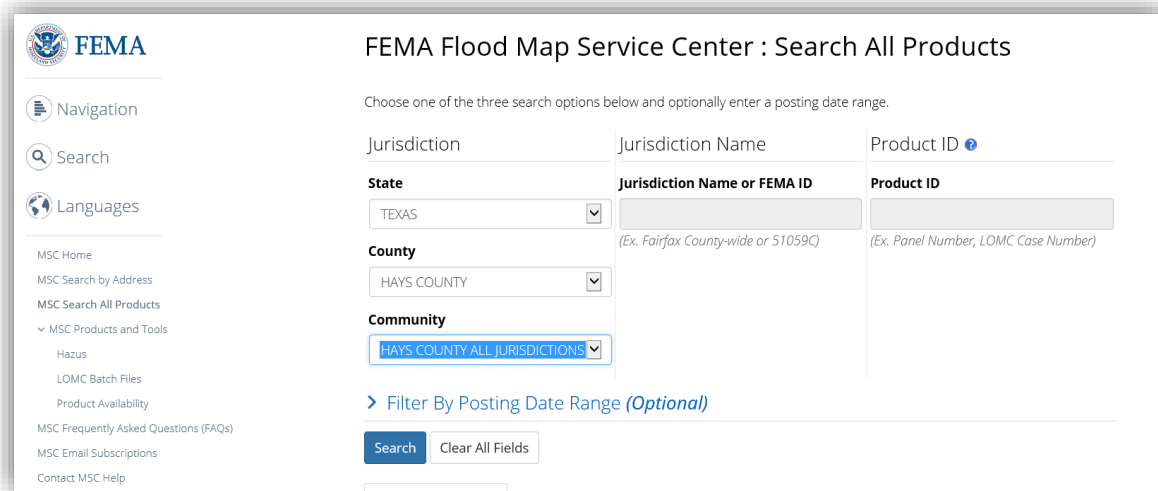
FEMA flood maps are continually updated through a variety of processes. Effective information that you download or print from this site may change or become superseded by new maps over time. For additional information, please see the [Flood Hazard Mapping Updates Overview Fact Sheet](#).

At the MSC, there are two ways to locate flood maps in your vicinity.

1. Enter an address, place name, or latitude/longitude coordinates and click search. This will provide the current effective FIRM panel where the location is shown.
2. Or [Search All Products](#), which will provide access to the full range of flood risk information available.

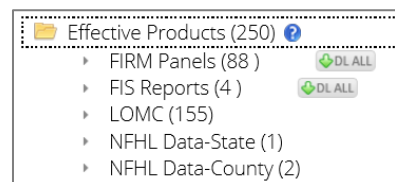


By using the more advanced search option, “Search All Products,” users may access current, preliminary, pending, and historic flood maps. Additionally, GIS data and flood risk products may be accessed through the site with these few steps.

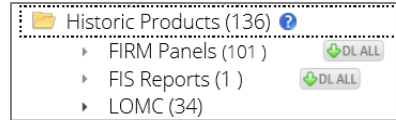


Using the pull down menus, select your state, county, and community of interest. For this example, we selected Hays County - All Jurisdictions. After the search button is selected, the MSC will return all items in the area. There are five types of data available.

**Effective Products.** The current effective FIS, FIRM, and DFIRM database (if available) is available through the MSC. If users click on the available effective products, they are presented a breakdown of the available products. FIRM panels, FIS reports, LOMRs, statewide National Flood Hazard Layer (NFHL) data, and countywide NFHL data may be available, as indicated in the breakdown on the right of the page.



**Historic Products.** A range of historic flood hazard maps, FIS texts, and LOMCs are available through the MSC.



**Flood Risk Products.** The Flood Risk Report, Flood Risk Map, and Flood Risk Database will be made available through the MSC once they have been compiled and completed. These products are made available after the flood study analysis and mapping have been reviewed and community comments incorporated.