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- Ascension Parish
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1
Introduction

Location and Hazard Risk

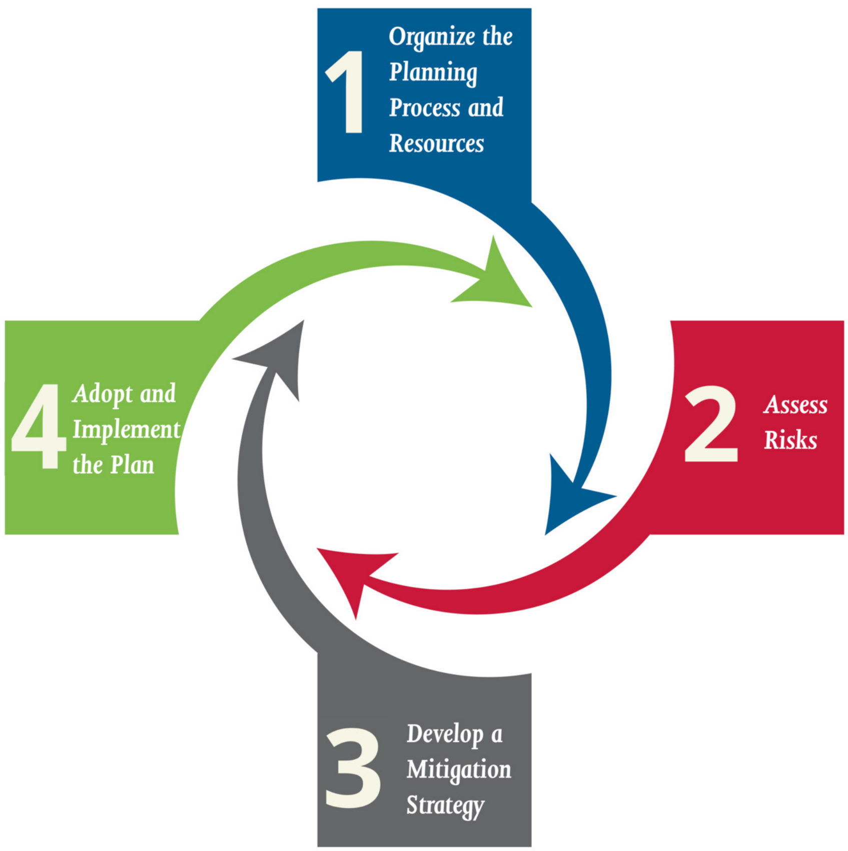
Located on the coast of Gulf of Mexico, as well as the mouth of the Mississippi River watershed, Louisiana is prone to both coastal storms and flooding. The state's historic reliance on engineered flood protection measures such as levees, floodwalls, and forced drainage systems compound the state's vulnerability. The combination of engineered flood protection measures and natural hazards increase the frequency and intensity of flooding throughout the state. Additionally, engineered flood protection measures increase subsidence; subsidence, severe weather, lack of new alluvial sediments, and saltwater intrusion from navigation and extraction activities cause coastal erosion; and climate change causes ocean temperature and sea level to increase across the coast. All of these hazards result in more frequent extreme weather events and increased coastal land loss. Furthermore, these hazards narrow the natural buffers between the Gulf of Mexico and inhabited land, resulting in less protection from high winds and storm surge, which are the greatest threats to the state. Therefore, Louisiana is prone to natural hazards that are compounded by human activities, including engineered flood protection measures and natural resource extraction.

In light of these challenges, the state is working to reduce hazardous events. In 2004, the state began a comprehensive planning process in order to improve hazard mitigation, which resulted in the State of Louisiana Hazard Mitigation Strategy of 2005. The 2005 hurricane season highlighted Louisiana's vulnerability to hazards and disasters. Hurricanes Katrina and Rita caused astonishing damage to human life and property. Following the 2005 hurricane season, Louisiana began updating its State Hazard Mitigation Plan, which was completed in 2008. The state then conduced the required plan update in 2011, and again in 2014.

Hazard Mitigation

FEMA defines hazard mitigation as the "effort to reduce loss of life and property by lessening the impact of disasters" (https://www.fema.gov/what-mitigation). Creating a hazard mitigation plan allows localities to reduce the damage of future hazards and disasters. A successful hazard mitigation plan increases the knowledge of hazards, builds partnerships across communities and stakeholders to reduce risk, creates long term risk reduction strategies that coincide with other planning objectives, creates strategies that combat the greatest threats to communities, and identifies sources of funding to implement these strategies.

Figure 1 below depicts the process of developing a hazard mitigation plan, from organizing the planning process and assessing risk, to developing a mitigation strategy and adopting and implementing the plan. The hazard mitigation planning process is important to Louisiana, as the natural hazards that threaten the state will likely increase in frequency, magnitude, and impact due to climate change.



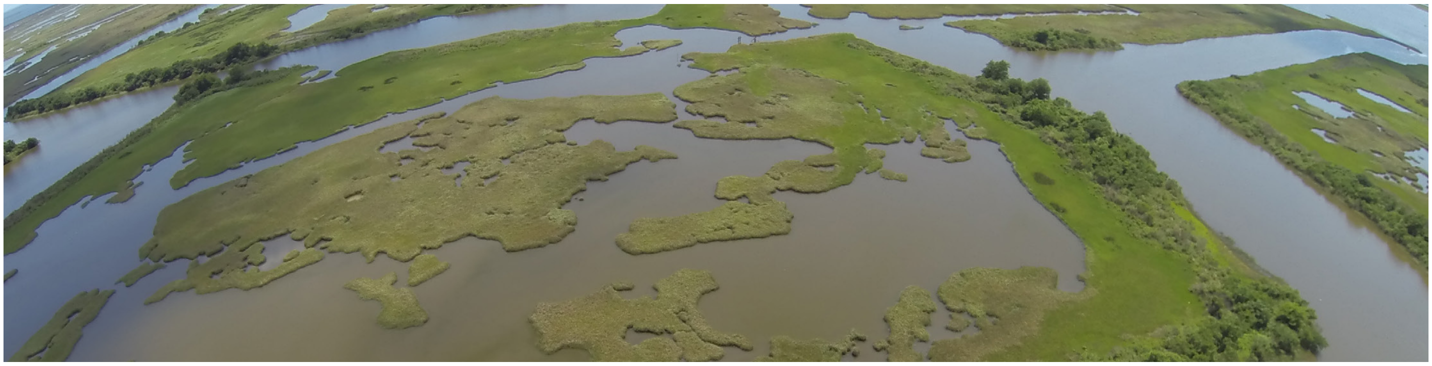
General Strategy

The Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP), with the assistance and cooperation of the State Hazard Mitigation Planning Committee (SHMPC), developed the comprehensive 2005 State of Louisiana Hazard Mitigation Strategy, which included four volumes:

I. **State of Louisiana Hazard Mitigation Plan**
II. **State of Louisiana Hazard Mitigation Plan Appendix**
III. **State of Louisiana Hazard Mitigation Program**
IV. **State of Louisiana Administrative Guidelines and Procedures**

During the 2005 plan update process, Katrina and Rita made landfall in Louisiana. Due to the enormity of the response effort, many of the recommendations in the 2005 plan update were not implemented. Therefore, as part of the 2011 plan update, the State Hazard Mitigation Team (SHMT) worked to better integrate the hazard mitigation strategy with other planning efforts across the state. The team broadened the strategy to include:

JULY 2009 — State of Louisiana Emergency Operations Plan
2009 — State of Louisiana GOHSEP Continuity of Operations Plan
2005 - 2009 — Regional and community-based long-term recovery plans



The 2011 plan update maintained the organization of the 2005 and 2008 plans, which loosely paralleled the order of requirements listed in the CFR. The plan included the following sections:

Section One	**Introduction**
Section Two	**Plan Adoption**
Section Three	**Planning Process**
Section Four	**Hazard Identification and Profiles**
Section Five	**Statewide Risk Assessment**
Section Six	**Risk Assessment for State-Owned Assets**
Section Seven	**Capability Assessment**
Section Eight	**Mitigation Action Plan**
Section Nine	**Coordination with Local Mitigation Planning**
Section Ten	**Plan Maintenance Process**

After three revisions, Louisiana's Hazard Mitigation Plan spanned nearly 1700 pages. In 2013, the SHMPC voted to revise the plan to make it more accessible to the public, and more efficient for state and local governmental use. The 2014 plan update reflected the clarity and usability goals identified by the committee, and included the following sections:

Section 1 / Introduction
Section 2 / Hazard Identification and Statewide Risk Assessment
Section 3 / State Historical Properties Risk Assessment
Section 4 / Capability Assessment
Section 5 / Mitigation Strategy
Section 6 / Mitigation in Action

Appendix

Planning Proces | Plan Maintenance | Mapping Methodology | Plan Adoption | Endnotes

The 2019 plan update continues the tradition of accessibility and clarity. Additionally, GOHSEP elected to add both a Repetitive Loss and Community Rating System strategy as appendices, in order to better combat issues of flooding and floodplain management across the state. The plan includes the following sections:

Introduction
Hazard Identification and Risk Assessment
Capability Assessment
Goals and Actions

Appendix A	Planning Process
Appendix B	Plan Maintenance
Appendix C	Mapping Methodology
Appendix D	Plan Adoption
Appendix E	Community Rating System Strategy
Appendix F	Repetitive Loss Strategy

During the 2019 plan update process, the committee decided to group the hazards that threaten the state of Louisiana into categories: temperature hazards, wind hazards, flood hazards (including coastal hazards), and geologic hazards. The temperature hazards include extreme heat, drought, wildfire, and winter storms. The wind hazards include tropical cyclones, thunderstorms (including high wind, hailstorms, and lightning), and tornadoes. The flood hazards include coastal hazards (subsidence, land loss, coastal erosion, saltwater intrusion, sea level rise, and storm surge), dam failure, levee failure, and flooding. The geologic hazards include earthquake, sinkholes, and expansive soil.

Because many local jurisdictions did not manage their plans on a routine basis, GOHSEP committed to support the update of FEMA-approved jurisdictional plans. Through this commitment, the state required all 64 parishes to submit hazard mitigation plans between October 2014 and December 2017. As of xxxx, all of the plans have been submitted and approved by FEMA. This process not only allowed jurisdictions to use similar, appropriate data sources and data processing steps, but created consistency in hazard mitigation planning across the state.

Through the 2019 plan update, the committee aims to provide an accessible, easy to use document that incorporates state and local planning goals, and provides a vehicle for local and regional cooperation for effective hazard mitigation.

2

Hazard Identification and Statewide Risk Assessment

State Hazard Mitigation Requirements

The FEMA State Mitigation Plan Review Guide asks the following:

Does the risk assessment provide an overview of the probabilities of future hazard events? [44CFR §201.4(c)(2)(i)]

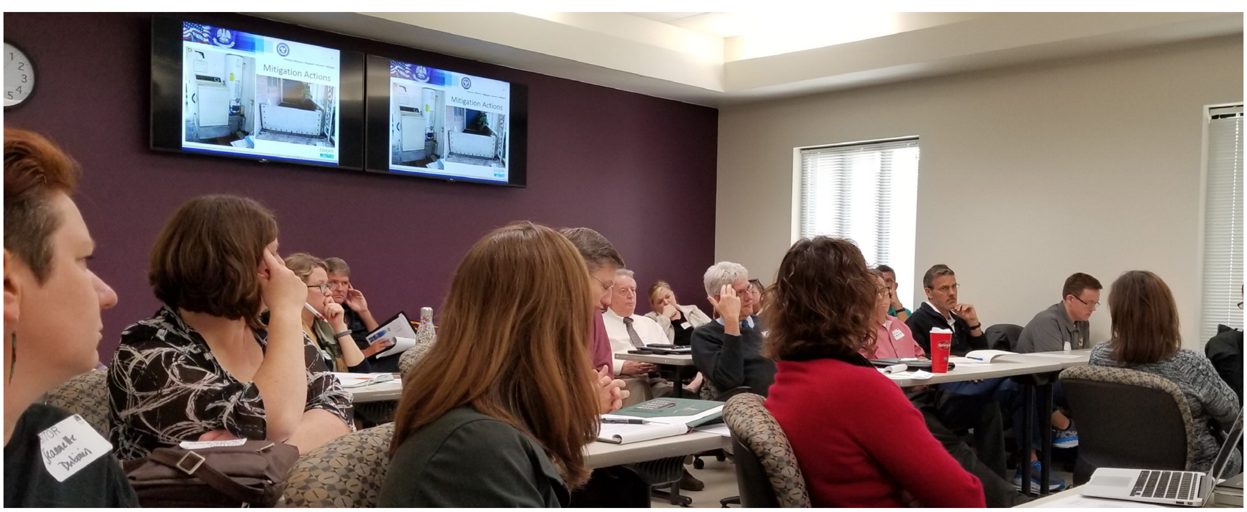
Does the risk assessment address the vulnerability of state assets located in hazard areas and estimate the potential dollar losses to these assets? [44 CFR §§201.4(c)(2)(ii) and 201.4(c)(2)(iii)]

Does the risk assessment include an overview and analysis of the vulnerability of jurisdictions to the identified hazards and the potential losses to vulnerable structures? [44 CFR §§201.4(c)(2)(ii) and 201.4(c)(2)(iii)]

Was the risk assessment revised to reflect changes in development? [44 CFR §201.4(d)]

To answer these questions,
the FEMA State Mitigation Plan Review Guide requires that:

- The risk assessment must provide a summary of the probability of future hazard events that includes projected changes in occurrences for each natural hazard in terms of location, extent, intensity, frequency, and/or duration.
- Probability must include considerations of changing future conditions, including the effects of long-term changes in weather patterns and climate on the identified hazards.
- The risk assessment must include an analysis of the potential impacts of hazard events to state assets and a summary of the assets most vulnerable to the identified hazards. These assets may be located in the identified hazard areas or affected by the probability of future hazard events.
- The risk assessment must estimate potential dollar losses to state assets located in identified hazard areas.
- The risk assessment must provide a current summary of the most vulnerable jurisdictions based on the state, local, and tribal, as applicable, risk assessments. Vulnerability must be analyzed in terms of:
    - Jurisdictions most threatened by the identified hazards (based on hazard location, extent, and probability).
    - Jurisdictions most susceptible to damage and loss from hazard events related to populations and assets (such as, structures, infrastructure, critical facilities, and systems). These populations and assets may be located in the identified hazard areas or affected by the probability of future hazard events.
    - The risk assessment must include a summary of the potential losses to the identified vulnerable structures based on estimates in the local risk assessments as well as the state risk assessment.
    - The risk assessment must address repetitive loss (RL) and severe repetitive loss (SRL) properties.
    - The plan must provide a summary of the changes in development that have occurred or are projected to occur in hazard prone areas based on the state, local, and tribal, as applicable, risk assessments, specifically:
    - Changes in land use and the built environment;
    - Changes in population demographics that may affect vulnerability to hazard events.
    - Changes to the vulnerability of state-owned or operated buildings, infrastructure, and critical facilities.



Hazards Summary

The information in this chapter describes the natural hazards that Louisiana faces and is expected to face in the future. A planning time horizon of 25 years was selected, projecting the potential impacts of natural hazards in the year 2043.
The following table summarizes the information presented in this section across Louisiana. Greater detail is found in this chapter and the Technical Appendix, including maps showing historic and future hazard probabilities and locations of projected losses.

State Asset Risk Assessment

Data from the Louisiana Office of Risk Management show 8,593 state buildings with a total building and contents replacement value of approximately $13 billion. In addition to state-owned assets, a number of historic properties of particular importance are identified. The potential average annual dollar losses for state assets are shown by hazard. A complete loss estimate table for each hazard by parish is provided in the Technical Appendix.

HAZARDS

- Extreme Heat
- Drought
- Wildfire
- Winter Storms
- High Wind
- Hailstorms
- Lightning
- Tornadoes
- FLooding
- Dam Failure
- Earthquake
- Sinkholes
- Expansive Soil

Extreme Heat

Past HIstory: 1 to 45 days per year (on average) with temperatures exceeding 95 degrees F

Projected Change by 2043: +20% days over 95 degees F

2043 Probability: Up to 55 days per year (on average) with temperatures exceeding 95 degrees F

Projected 2043 Average Annual Statewide Loss: $744,345

Estimated State Asset Annual Average Loss: $N/A

Drought

Past HIstory: 8 to 16 weeks of drought conditiions per year (16% to 31% weekly probability)

Projected Change by 2043: +25% probability of occurence

2043 Probability: 17% to 39% weekly probability of drought

Projected 2043 Average Annual Statewide Loss: $52,795,132

Estimated State Asset Annual Average Loss: $N/A

Wildfire

Past HIstory: More than 15,000 wildfires in past 11 years, 0% to 9.6% annual probability

Projected Change by 2043: +25% probability of occurence

2043 Probability: 0 to 12% annual probability

Projected 2043 Average Annual Statewide Loss: $5,876,211

Estimated State Asset Annual Average Loss: $157,889

Winter Storms

Past HIstory: 1 to 56 days per year (on average) with temperatures less than 32 degrees F

Projected Change by 2043: -20% days under 32 degrees F

2043 Probability: 1 to 45 days per year (on average) with temperatures less than 32 degrees F

Projected 2043 Average Annual Statewide Loss: $38,134,715

Estimated State Asset Annual Average Loss: $1,189,351

High Wind

Past HIstory: 700-year return period (0.14% annual probability) wind speeds ranging from 105mph to 170 mph

Projected Change by 2043: No projected change

2043 Probability: 700-year return period (0.14% annual probability) wind speeds ranging from 105mph to 170 mph

Projected 2043 Average Annual Statewide Loss: $N/A

Estimated State Asset Annual Average Loss: $N/A

Hail Storm

Past HIstory: 1 to 7 days per year (on average) experiencing hail >.75 inches in diameter

Projected Change by 2043: +10% days with hail

2043 Probability: 1 to 6 days per year (on average) experiencing hail >.75 inches in diameter

Projected 2043 Average Annual Statewide Loss: $2,086,269

Estimated State Asset Annual Average Loss: $64,803

Lightning

Past HIstory: 0 to 27 lightning flashes per square mile per year

Projected Change by 2043: +10% increase in flash intensity

2043 Probability: 0 to 30 lightning flashes per square mile per year

Projected 2043 Average Annual Statewide Loss: $2,920,890

Estimated State Asset Annual Average Loss: $94,702

Tornadoes

Past HIstory: 0 to 1.6 tornado touchdown days within 25 miles per year

Projected Change by 2043: +10% probability of occurrence

2043 Probability: 0 to 1.9 tornado touchdown days within 25 miles per year

Projected 2043 Average Annual Statewide Loss: $34,917,236

Estimated State Asset Annual Average Loss: $1,089,364

Flooding

Past HIstory: 100-year return period (1% annual probability) flood depths ranging from 0 ft to XX ft

Projected Change by 2043: No projected change

2043 Probability: 100-year return period (1% annual probability) flood depths ranging from 0 ft to XX ft

Projected 2043 Average Annual Statewide Loss: $Not yet complete

Estimated State Asset Annual Average Loss: $Not yet complete

Dam Failure

Past HIstory: One threatened out-of-state dam failure

Projected Change by 2043: No projected change

2043 Probability: .01% annual probability of failure

Projected 2043 Average Annual Statewide Loss: $Not Yet Complete

Estimated State Asset Annual Average Loss: $Not yet complete

Levee Failure

Past HIstory: Failures during 2005 Hurricane Katrina in New Orleans (0.006% annual probability)

Projected Change by 2043: No projected change

2043 Probability: .006% annual probability

Projected 2043 Average Annual Statewide Loss: $Due to the small probability of levee failure in Louisiana, losses were not estimated

Estimated State Asset Annual Average Loss: $N/A

Earthquake

Past HIstory: 5 minor earthquakes in past 25 years (20% annual probability statewide)

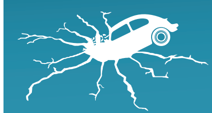
Projected Change by 2043: +10% probability of occurence

2043 Probability: .22% annual probability statewide

Projected 2043 Average Annual Statewide Loss: Due to the minor nature of earthquakes in Louisiana, losses were not estimated

Estimated State Asset Annual Average Loss: $N/A

Sinkholes



Past HIstory: 2 sinkholes in 70 years from 174 salt domes (0.01% annual probability)

Projected Change by 2043: +10% probability of occurence

2043 Probability: 0.02% annual probability

Projected 2043 Average Annual Statewide Loss: $219,914

Estimated State Asset Annual Average Loss: $955,295

Expansive Soil

Past HIstory: N/A

Projected Change by 2043: No projected change

2043 Probability:

Projected 2043 Average Annual Statewide Loss: $316,603,969

Estimated State Asset Annual Average Loss: $8,506,998

TOTAL State Property Average Annual Loss:

$12,058,403

Risk Assessment Summary

The statewide annual average loss for each hazard is shown below and summed for the state, excluding flood hazard losses, which represent the 1% annual chance event rather than average annual loss. Parish level loss estimates are provided in the Technical Appendix.

The most vulnerable jurisdictions for each of the hazards are shown visually on maps included in each of the hazard sections. The top 5 jurisdictions most susceptible to damage and loss from each of the identified hazards are listed in the following table, with 1 being the most susceptible. A complete loss estimate table for each hazard by parish is provided in the Technical Appendix.

Projected Average Annual Loss in 2043	Building Average Annual Loss	Crop Average Annual Loss	Total Average Annual Loss
Extreme Heat	-	$744,345	$744,345
Drought	-	$52,795,132	$52.795,132
Wildfire	$5,876,211	-	$5,876,211
Extreme Cold	$36,978,826	$1,155,889	$38,134,715
Wind	$642,927,351	-	$642,927,351
Hail	$1,976,212	$110,057	$2,086,269
Lightning	$2,917,407	$3,483	$2,920,890
Tornado	$31,725,662	$281,804	$32,007,466
Flood	$451,389,758	-	$451,389,758 - 1% annual chance event
Dam Failure	$1,011,414	-	$1,011,414
Sinkhole	$342,071	-	$342,071
Expansive Soil	$92,869,675	-	$92,869,675
Total Average Annual Projected Loss	**$816,624,830**	**$55,090,711**	**$818,176,063** (excludes flood loss)

	1.	2.	3.	4.	5.
Extreme Heat	Franklin	Richland	St.Landry	Tensas	Caddo
Drought	Vermilion	St.Landry	Franklin	Acadia	Richland
Wildfire	St Tammany	Tangipahoa	Orleans	Livingston	East Baton Rouge
Extrme Cold	Ouachita	Caddo	St.Tammany	East Baton Rouge	Bossier
Wind	Orleans	Jefferson	St.Tammany	Lafayette	Terrebonne
Hail	Orleans	East Baton Rouge	Caddo	Bossier	St.Tammany
Lightning	Orleans	East Baton Rouge	Jefferson	St.Tammany	Lafayette
Tornado	Orleans	Lafayette	Jefferson	East Baton Rouge	Caddo
Flood	St.Tammany	Jefferson	Terrebonne	Orleans	East Baton Rouge
Dam Failure	Bossier	Rapides	Caddo	Natchitoches	Grant
Sinkhole	Calcasieu	St.Martin	Acadia	St.Mary	Plaquemines
Expansive Soil	Orleans	Jefferson	St.Tammany	East Baton Rouge	Lafayette
Total Losses	Orleans	Jefferson	St.Tammany	Terrebonne	East Baton Rouge

Critical Facilities and State Asset Risk Assessment Summary

Critical Facilities. Data from FEMA Hazus-MH were used to identify critical facilities throughout the state, defined as fire stations, hospitals, police stations, and emergency response centers. Considering the projected damage from all hazards, critical facilities were assigned as low vulnerability (total annual probability of damage <0.5%), moderate vulnerability (total annual probability of damage 0.5% to 1.0%), or high vulnerability (total annual probability of damage >1%).

State Assets. Data from the Louisiana Office of Risk Management show 8,593 state-owned properties with a total building and contents replacement value of approximately $13 billion. The expected number of state-owned properties for the given annual loss ranges and the potential average annual dollar losses are shown by hazard. A complete loss estimate table for state assets for each hazard by parish is provided in the Technical Appendix. In addition to state-owned assets, a number of historic properties of particular importance are identified. Hazard exposure data are provided for the historic structures in the Technical Appendix.

Expected number of state assets for given annual loss						**Projected 2043 Average Annual State Asset Losses**
Hazard	>$100,000	$25,000-$100,000	$5,000-$25,000	$500-$5,000	<$500	
Wildfire	0	0	0	22	8,571	$157,889
Extreme Cold	0	0	6	213	8,374	$1,189,351
Wind	11	42	170	760	7,610	$20,544,070
Hail	0	0	1	2	8,590	$64,803
Lightning	0	0	2	4	8,587	$94,702
Tornado	1	1	5	157	8,429	$973,424
100-Year Flood	4	28	128	508	7,925	$9,138,278 (1% annual chance loss)
Dam Failure	0	0	0	10	8,583	$12,955
Sinkhole	0	0	0	0	8,593	$2,624
Expansive Soil	2	1	21	120	8,449	$3.211,214

2043 Vulnerability of Critical Facilities

2017

State Building Locations in Louisiana

2017 State Historic Preservation Office (SHPO) Properties Location in Louisiana

Changes in Development

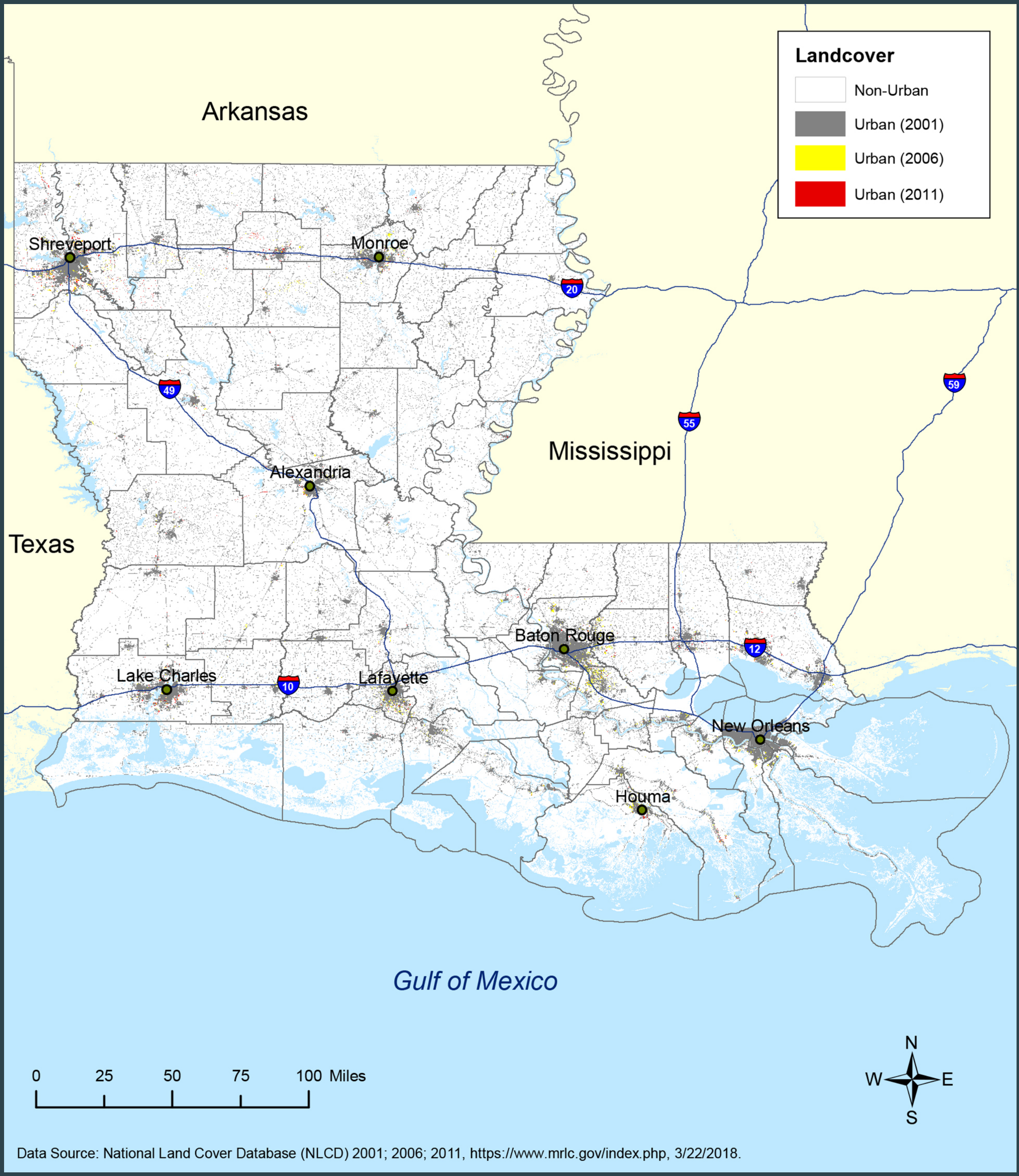
PARISH-LEVEL POPULATION

Based on land cover data for the state and major urban areas, urban growth in previously rural locations was limited in the last 12 years, with the majority of urban areas established in Louisiana by 2001. Recent development primarily occurred in outlying metro areas of Shreveport, Monroe, Alexandria, Lake Charles, Lafayette, Houma, Baton Rouge, and New Orleans. The population of Louisiana was 4,533,372 in the 2010 census, and is projected to grow to 5,518,889 by 2043. Due to data limitations, loss projections are based on densification of currently populated areas. Additional analysis of development patterns and areas is recommended prior to the next plan update in order to more accurately forecast future populations and development.

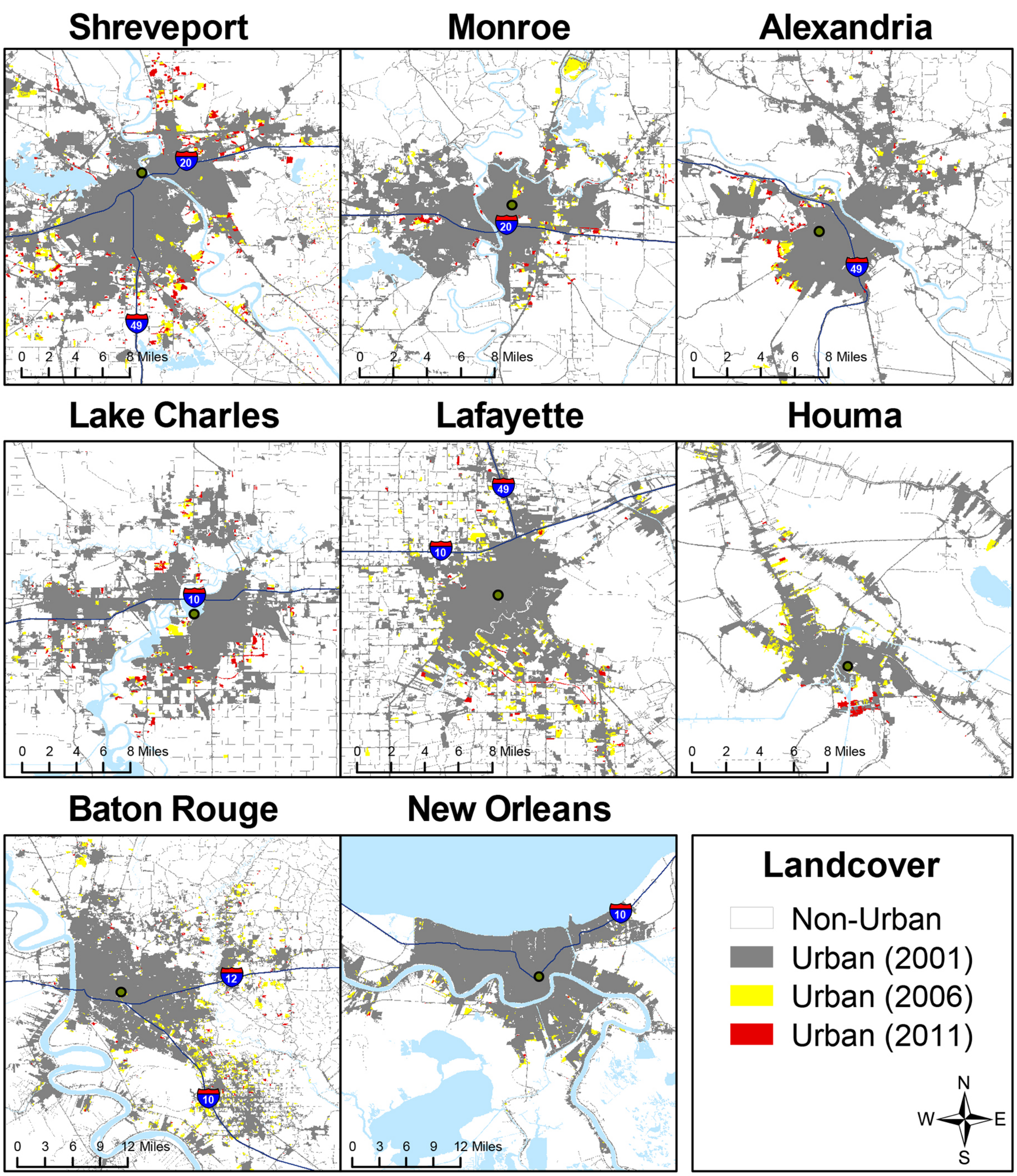
VULNERABLE POPULATIONS

The rates of growth of vulnerable populations were determined based on American Community Survey (ACS) 5-year estimates for population age, disability, poverty status, and manufactured homes from 2010 to 2016. The parishes with the highest sum of vulnerable population growth rates, indicating a greater likelihood of future increase in demographic vulnerability, are Beauregard, Vernon, Tangipahoa, Ascension, Plaquemines, and Terrebonne Parishes. A full listing of changes in vulnerable populations is provided in the Technical Appendix.

2001- -2011 Urban Landcover Change

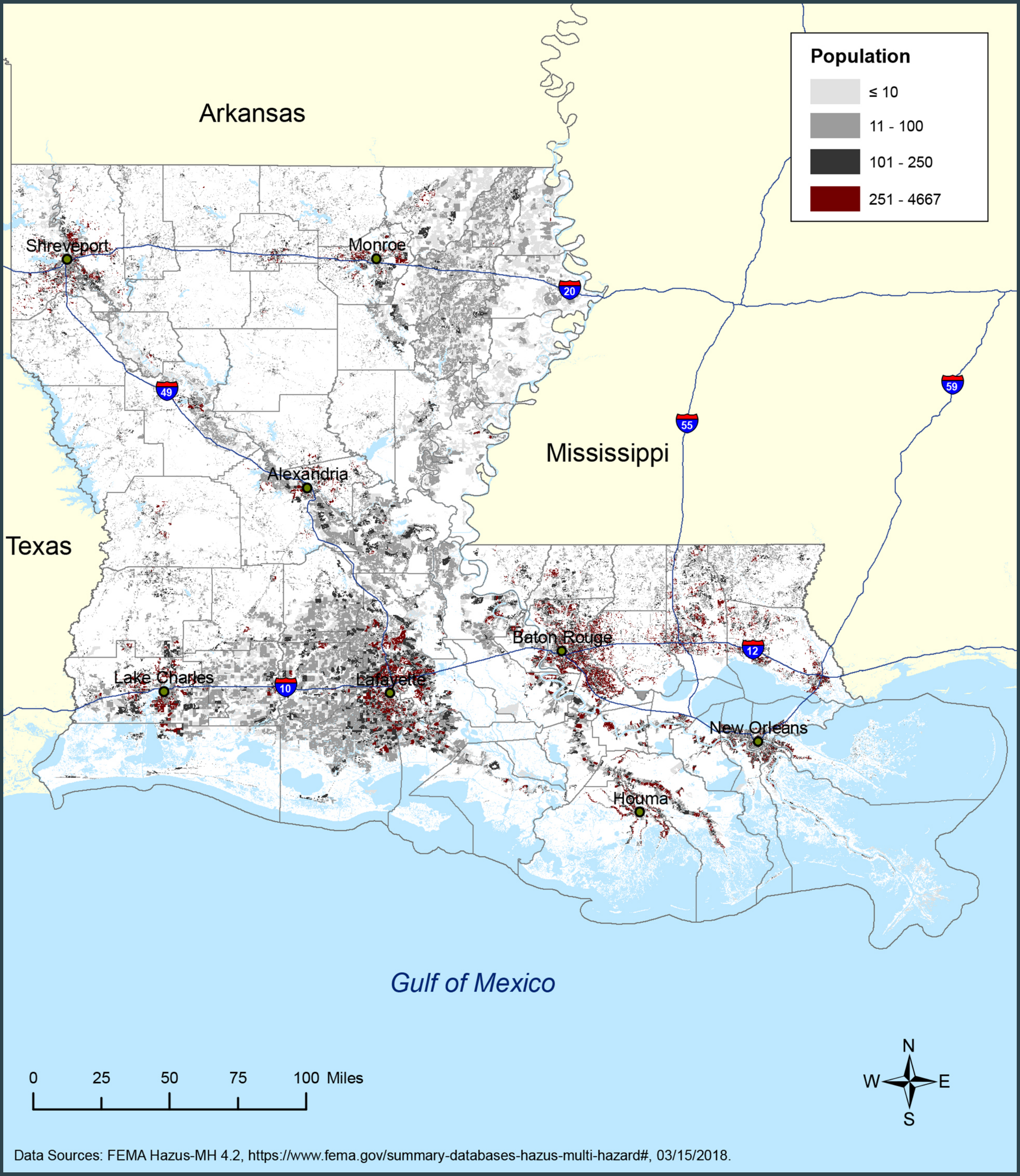


2001-2011 Major Urban Centers Landcover Change



Data Source: National Land Cover Database (NLCD) 2001; 2006; 2011, https://www.mrlc.gov/index.php, 3/22/2018.

2043 Projected Population Distribution at Census Block



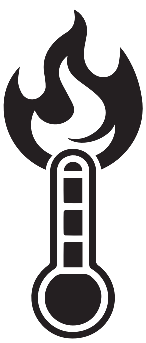
Risk Assessment Organization

The following sections depict the locations of historical hazards using maps created through analysis of previous occurrences. These data and maps were analyzed to determine annual probability of occurrence or number of days per year for each hazard where appropriate. Anticipated hazard maps, reflecting hazard conditions in the year 2043, were developed using the historical data and evaluation of future conditions, which are described in the Technical Appendix for each hazard. The 2043 hazard maps are used in the risk assessment for each hazard to estimate the annual losses expected to occur in Louisiana 25 years from now.

Temperature Hazards

Hazards in Louisiana related to temperature include extreme heat, drought, wildfire, and extreme cold. The following sections contain a discussion of each of these hazards as well as a risk assessment.

Extreme heat



OVERVIEW

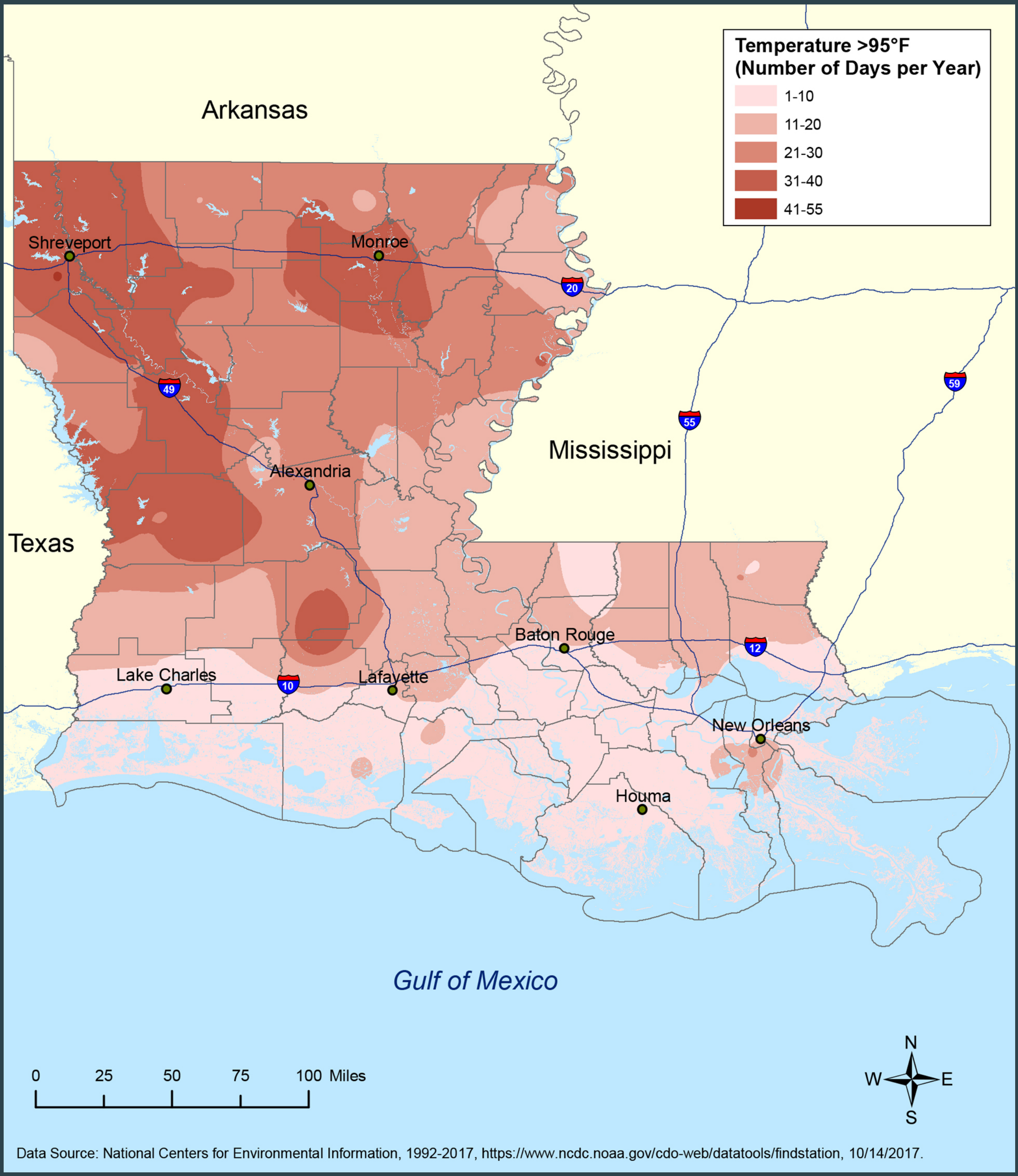
Although all of Louisiana is vulnerable to extreme heat, summer temperatures can often exceed 100° F in the northern parishes, particularly during dry spells when clear skies allow increased solar radiation to reach the surface. Afternoon highs in the north have occasionally reached 110° F, with an all-time extreme of 114° F recorded in Plain Dealing (Bossier Parish) on August 10, 1936, during the 1936 North American Heat Wave. A more recent occurrence of extreme heat hazards is the August 2007 Heatwave, affecting Lake Charles, Lafayette, New Iberia, and Alexandria, setting new record high temperatures of between 101°F and 103°F.

The following map shows the historic number of days with temperatures exceeding 95°F. Most studies on the topic focus on the number of days with temperatures exceeding 95°F. The 2043 temperature map showing number of days with temperatures exceeding 95°F considers the projected increases in the intensity of extreme heat hazards we could expect to see in the year 2043. This probability map is used in the risk assessment.

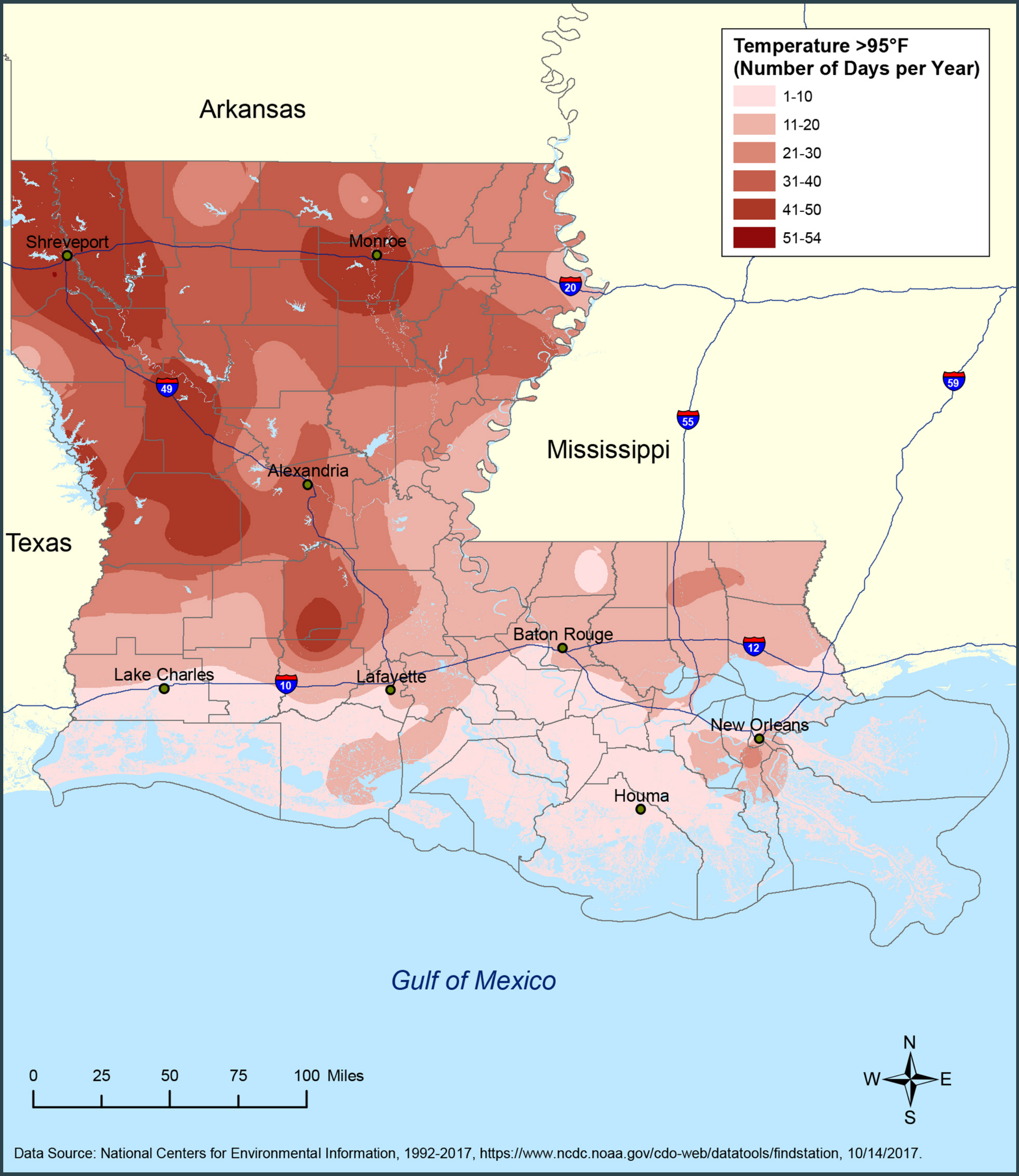
RISK ASSESSMENT

The projected crop loss map shows anticipated annual average losses due to extreme heat hazards by census block. Extreme heat has not historically caused property losses.

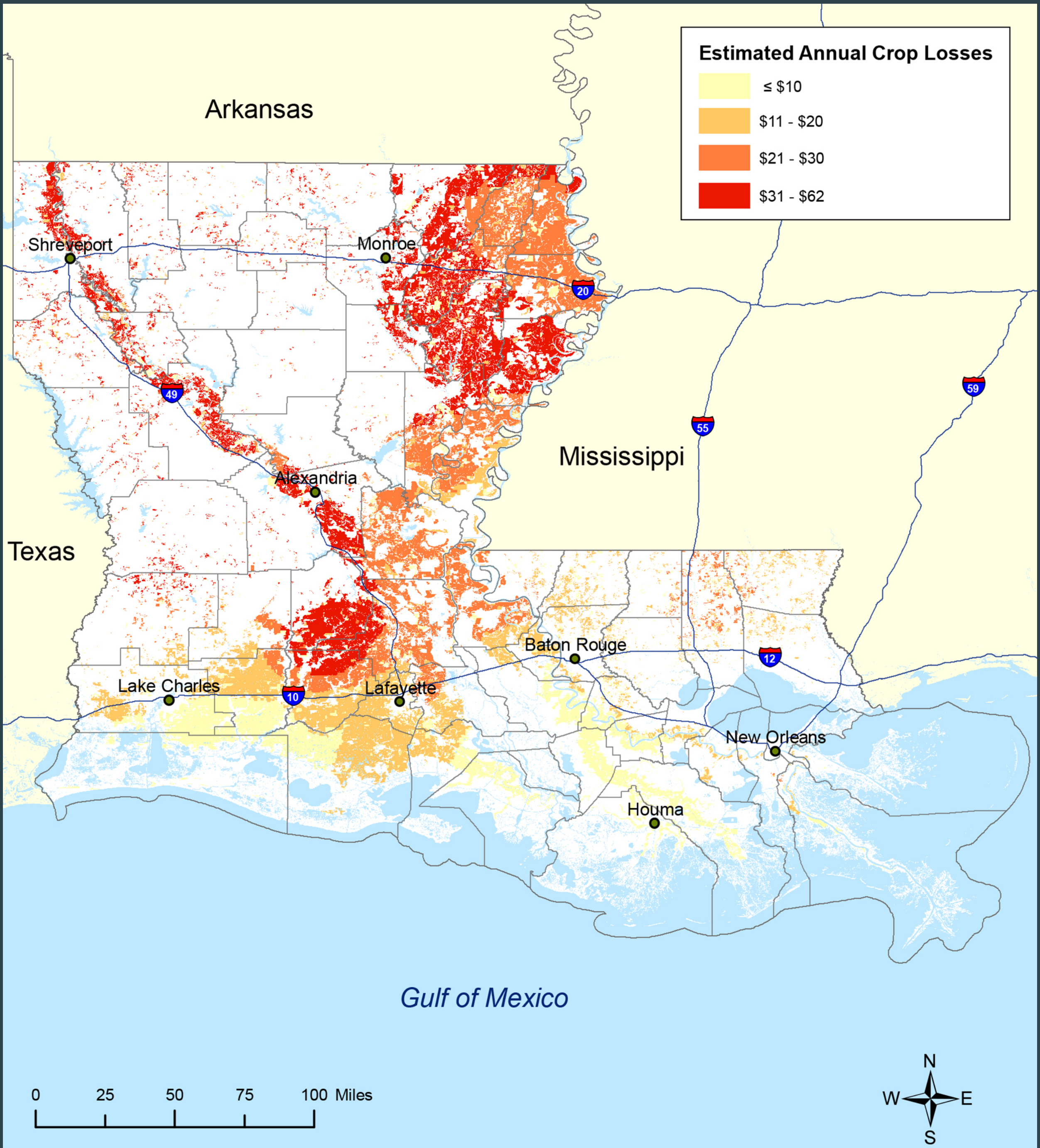
1992--2017 Number of Days per Year with Temperature Above 95°F



2043 Predicted Number of Days per Year with Temperature Above 95°F

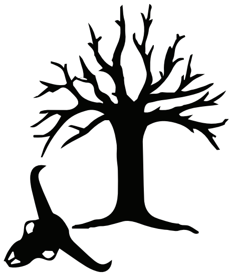


2043 Predicted Annual Crop Losses from Extreme Heat by Census Block



Data Sources: Spatial Hazard Events and Losses Database for the United States (SHELDUS), 1960-2016, http://hvri.geog.sc.edu/SHELDUS/, 03/02/2018.
FEMA Hazus-MH 4.2, https://www.fema.gov/summary-databases-hazus-multi-hazard#, 03/15/2018.
National Land Cover Database (NLCD), https://www.mrlc.gov/index.php, 03/28/2018.

Drought



OVERVIEW

A drought is a deficiency in water availability over an extended period of time, caused by precipitation totals and soil water storages that do not satisfy the environmental demand for water, either by evaporation or transpiration through plant leaves. It is important to note that the lack of precipitation alone does not constitute drought; the season during which the precipitation is lacking has a major impact on whether drought occurs. For example, a week of no precipitation in July, when the solar energy to evaporate water and vegetation's need for water to carry on photosynthesis are both high, may trigger a drought, while a week of no precipitation in January may not initiate a drought. The dryest year on record in Louisiana occurred in 1963. The second dryest year on record occurred in 2011, with parts of southeast Louisiana in extreme drought status.

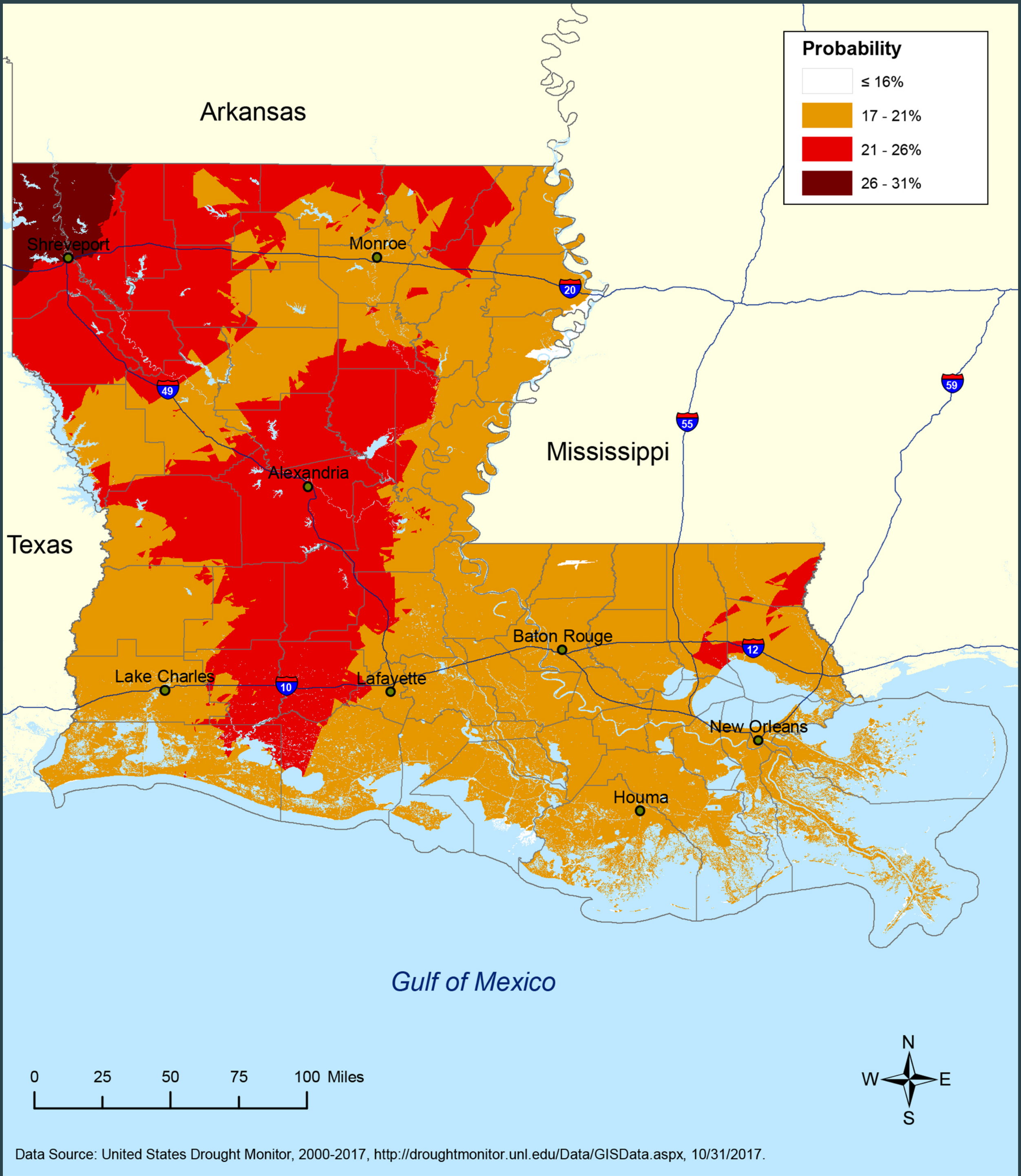
Drought is a unique and insidious hazard. Unlike other natural hazards, no specific, standard threshold of "dryness" exists for declaring a drought. In addition, the definition of drought depends on stakeholder needs. For instance, the onset (and demise) of agricultural drought is quick, as crops need water every few days; once they get rainfall, they improve. But hydrologic drought sets in (and is alleviated) only over longer time periods. A few dry days will not drain a reservoir, but a few rain showers cannot replenish it, either. Moreover, different geographical regions define drought differently based on the deviation from local, normal precipitation. And drought can occur anywhere, triggered by changes in the local-to-regional-scale atmospheric circulation over an area or by broader-scale circulation variations such as the expansion of semi-permanent oceanic high-pressure systems or the stalling of an upper-level atmospheric ridge in place over a region. The severity of a drought depends upon the degree and duration of moisture deficiency, as well as the size of the affected area. Periods of drought tend to be associated with other hazards such as wildfires and/or heat waves as well. Lastly, drought is a slow onset event, causing less direct—but tremendous indirect—damage. Depletion of aquifers, crop loss, and livestock and wildlife mortality rates are examples of direct impacts.

The 2000-2017 weekly drought probability map shows areas that have historically been affected by drought, while the 2043 probability map considers projected increases in the probability of drought hazards we could expect to see in the year 2043. This probability map is used in the risk assessment.

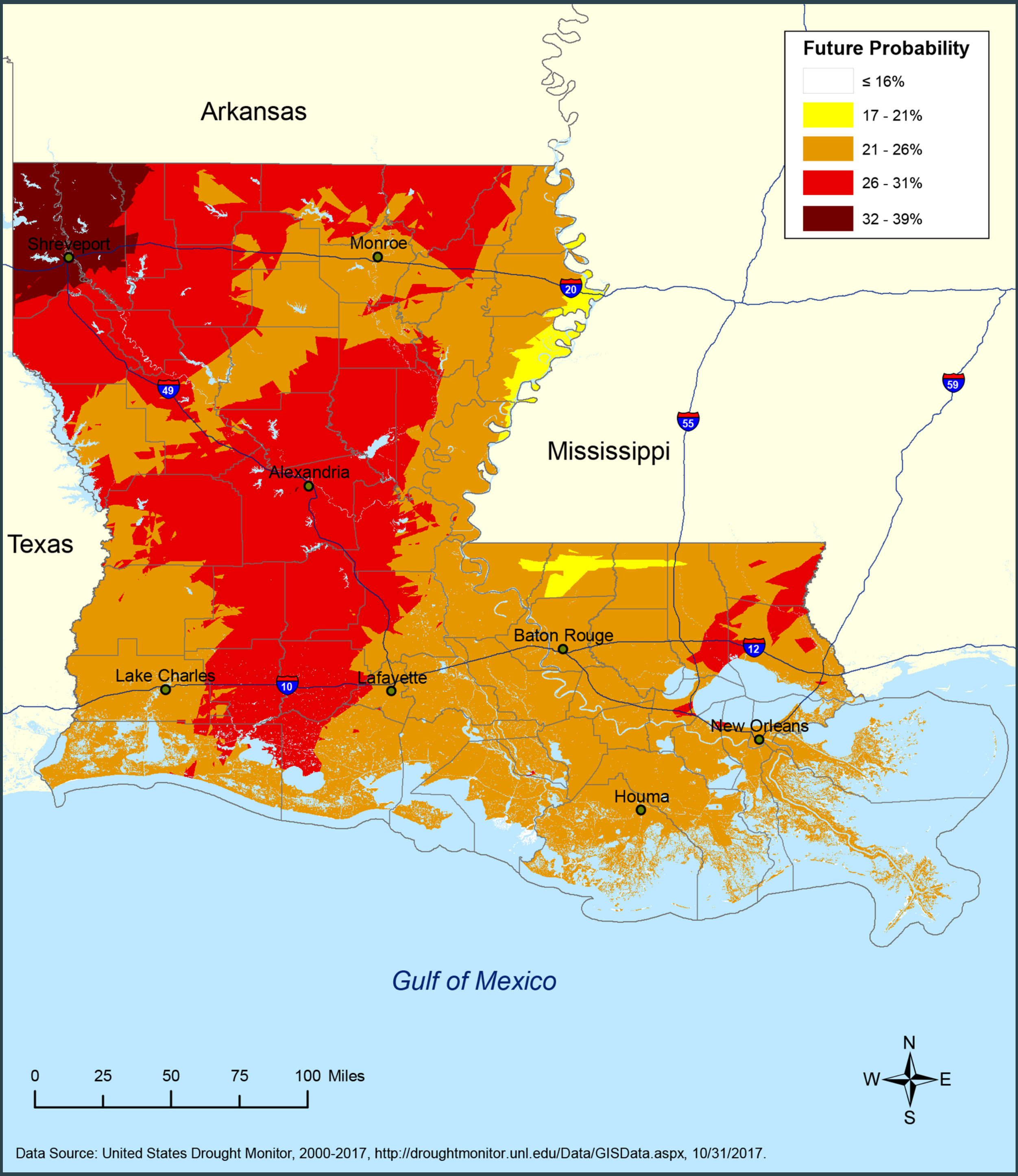
RISK ASSESSMENT

The projected crop loss map shows anticipated annual average loss due to drought hazards by census block.

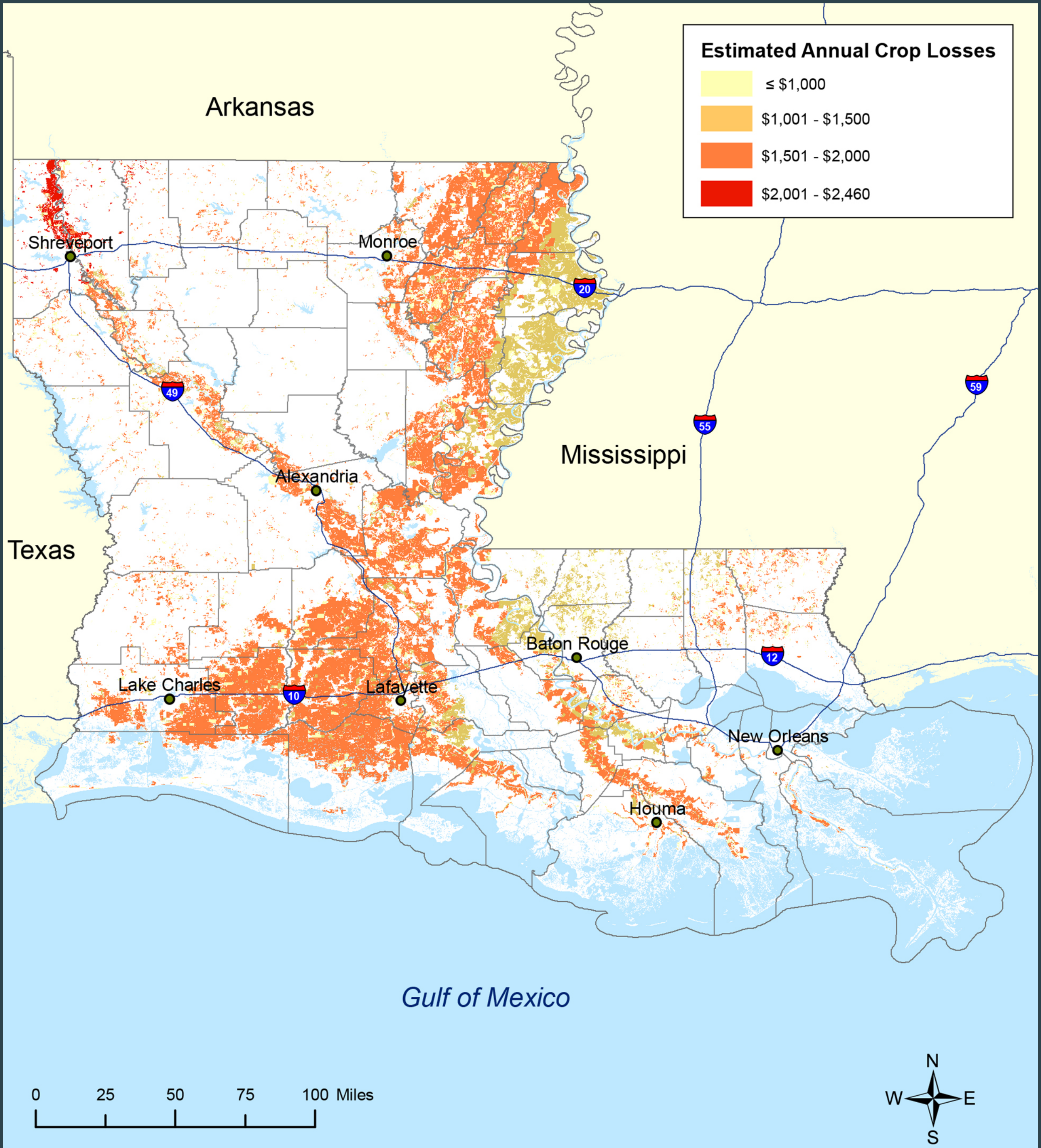
2000-2017 Weekly Probability of Drought in Louisiana



2043 Predicted Weekly Probability of Drought in Louisiana



2043 Predicted Annual Crop Losses from Extreme Cold by Census Block



Data Sources: Spatial Hazard Events and Losses Database for the United States (SHELDUS), 1996-2016, http://hvri.geog.sc.edu/SHELDUS/, 03/02/2018.
FEMA Hazus-MH 4.2, https://www.fema.gov/summary-databases-hazus-multi-hazard#, 03/15/2018.
National Land Cover Database (NLCD), https://www.mrlc.gov/index.php, 03/28/2018.

Wildfire

OVERVIEW

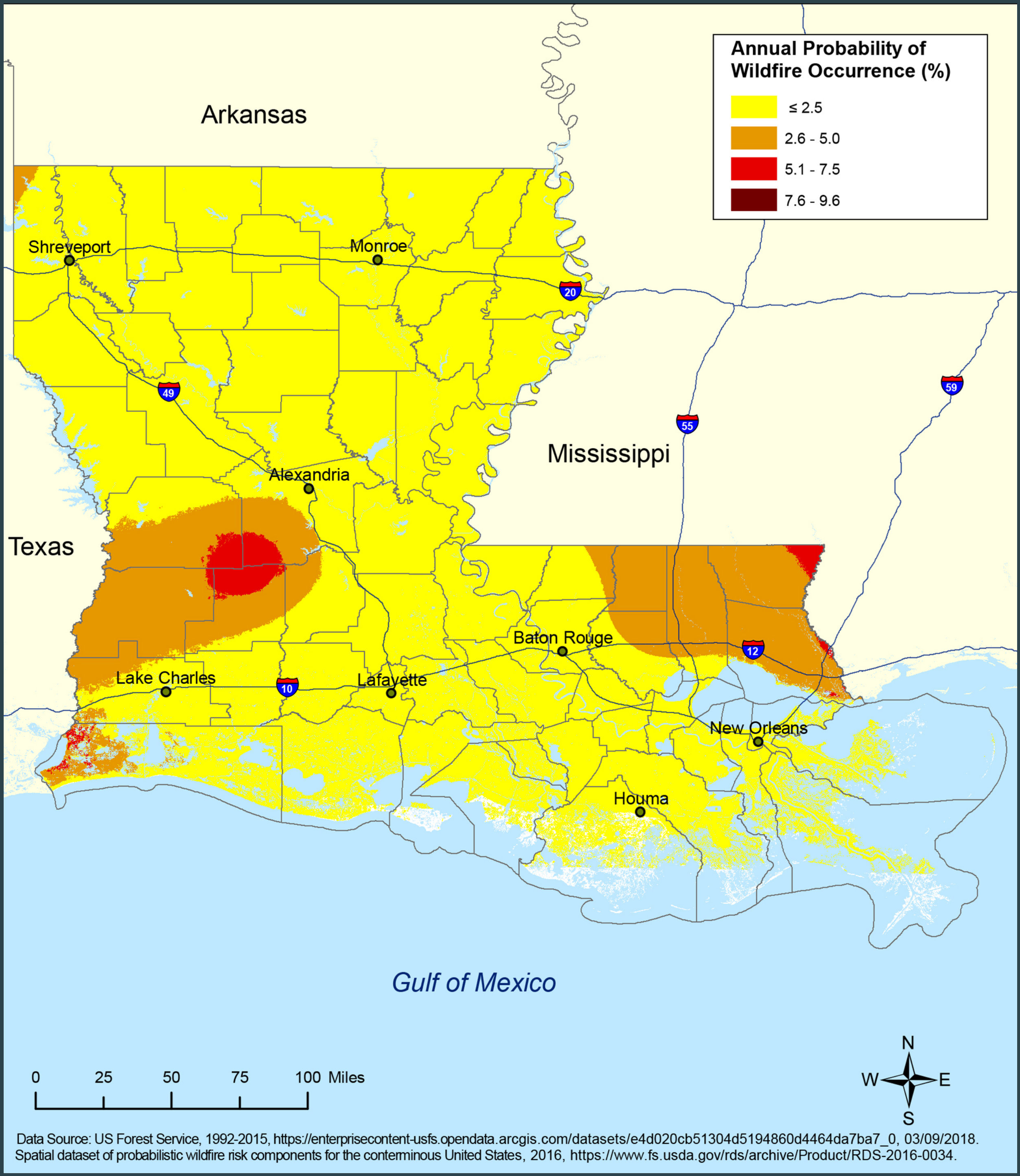
A wildfire is combustion in a natural setting, marked by flames or intense heat. According to the State of Louisiana Forestry Division, most forest fires in Louisiana are caused by intentional acts (arson) or carelessness and negligence committed by people, exacerbated by human confrontation with nature. The wildland–urban interface (WUI) is the area in which development meets wildland vegetation, where both vegetation and the built environment provide fuel for fires. As development near wildland settings continues, more people and property are exposed to wildfire danger.

Wildfires are common in Louisiana. In contrast with much of the U.S., Louisiana wildfires tend to be small, averaging 10 acres in size. Data from the Louisiana Department of Agriculture and Forestry show that in the past 11 years, there have been more that 15,000 wildfires, burning nearly 160,000 acres. On average, 3% of residences threatened by fires are damaged while 97% are protected. The year 2011 was the most active fire year in the past 11 years, with 2,888 fire events and 76 damaged structures. This same year, 2,764 residences were threatened by fire but protected from damage. Without the effort and dedication of Office of Forestry personnel, the loss from wildfire could be catastrophic. The 1992-2015 annual wildfire probability map was derived from previous wildfire occurrences, while the 2043 probability map considers projected increases in the probability of wildfire hazards we could expect to see in the year 2043. This probability map is used in the risk assessment.

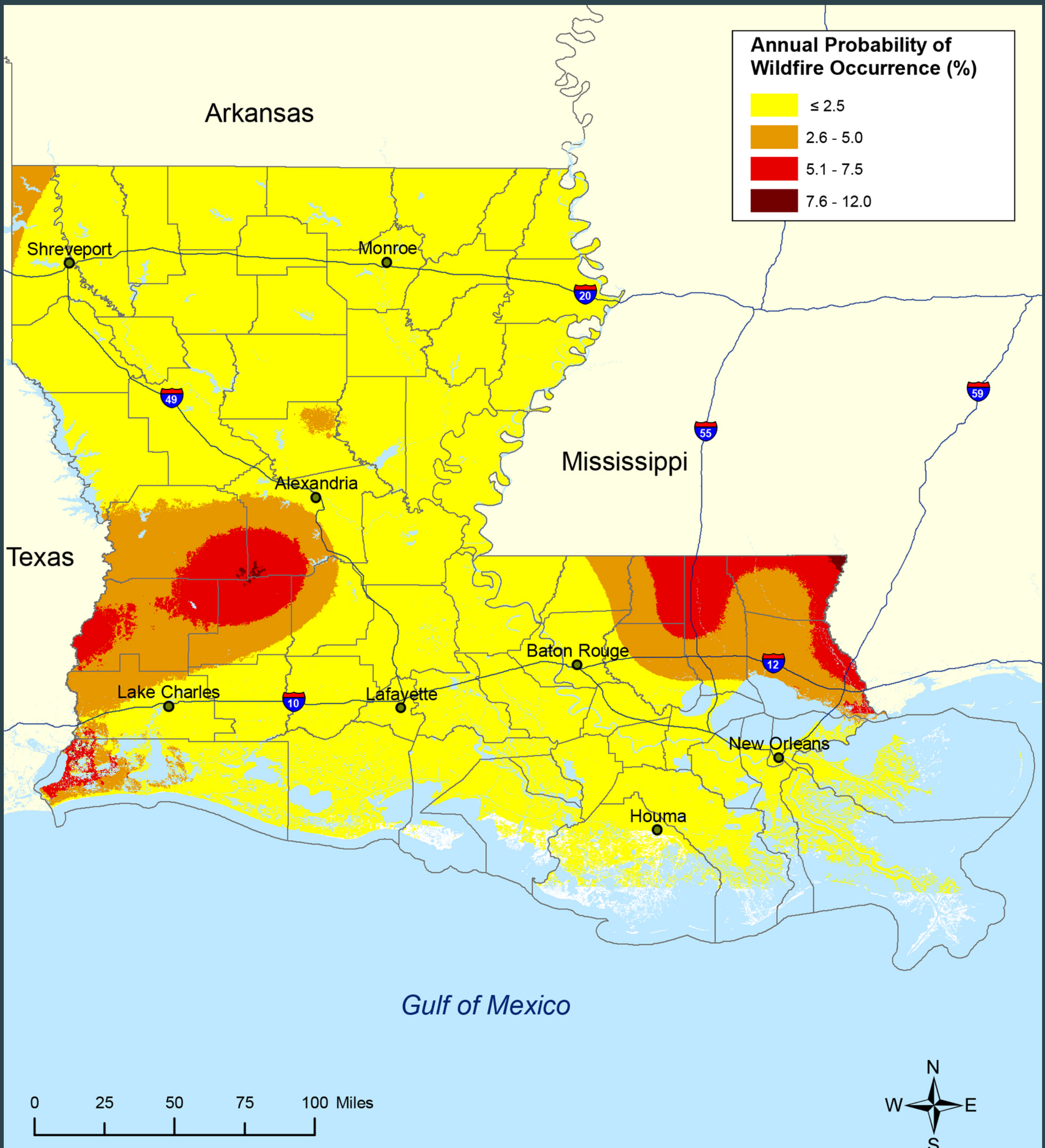
RISK ASSESSMENT

Projected property and crop loss maps show anticipated annual average losses due to wildfire hazards by census block.

1992- -2015 Annual Probability of Wildfire in Louisiana

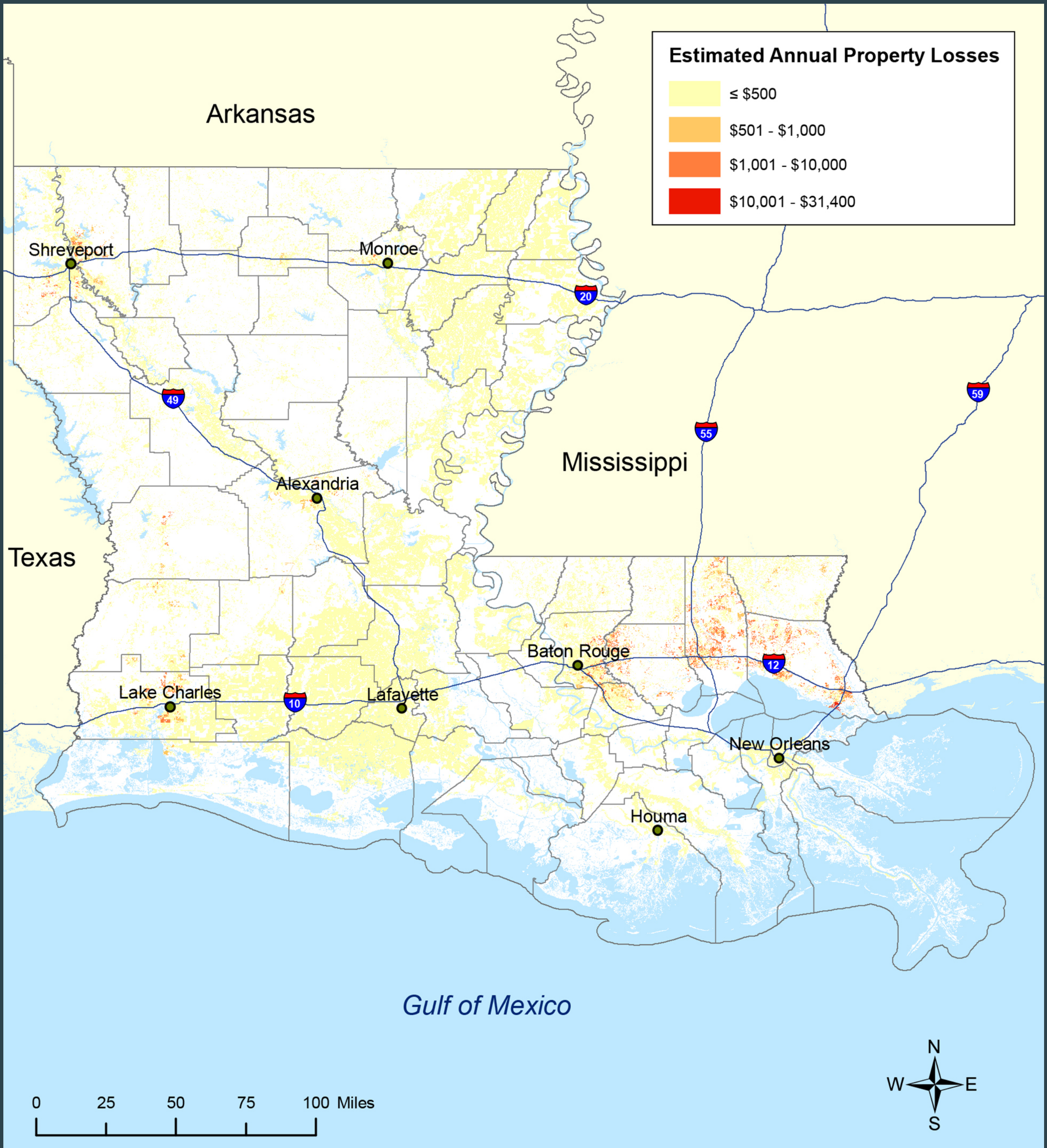


2043 Predicted Annual Probability of Wildfire in Louisiana



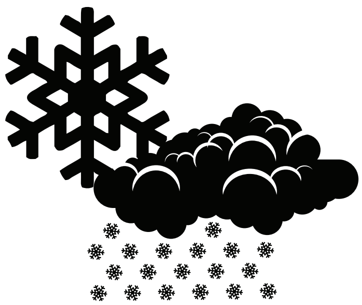
Data Source: US Forest Service, 1992-2015, https://enterprisecontent-usfs.opendata.arcgis.com/datasets/e4d020cb51304d5194860d4464da7ba7_0, 03/09/2018. Spatial dataset of probabilistic wildfire risk components for the conterminous United States, 2016, https://www.fs.usda.gov/rds/archive/Product/RDS-2016-0034.

2043 Predicted Annual Property Losses from Wildfire by Census Block



Data Sources: US Forest Service, 1992-2015, https://enterprisecontent-usfs.opendata.arcgis.com/datasets/e4d020cb51304d5194860d4464da7ba7_0, 03/09/2018. Spatial dataset of probabilistic wildfire risk components for the conterminous United States, 2016, https://www.fs.usda.gov/rds/archive/Product/RDS-2016-0034. FEMA Hazus-MH 4.2, https://www.fema.gov/summary-databases-hazus-multi-hazard#, 03/15/2018.

Extreme Cold



OVERVIEW

Extreme cold temperatures occur in Louisiana when the normal quasi-west-to-east upper-level steering circulation patterns undulate with an unusually strong north-to-south component of motion directed toward Louisiana. A cold front generally forms on the southwestern flank of the southward-moving air mass, trailing from a surface cyclone (i.e., low-pressure center). An anticyclone (high-pressure, clear-sky area) northwest of the cold front's associated low-pressure center then follows. Once the cold front passes, temperatures fall suddenly. After the cloudiness associated with the cold front and low-pressure areas passes through the area and higher pressure approaches, the clearing skies allow for rapid loss of radiant energy from the surface, especially at night, resulting in an even more abrupt drop in temperature. If air of Arctic origin traverses over snow-covered land on its trek southward, it can become even more bitterly cold by the time it reaches Louisiana. This scenario of cold temperatures, or "Arctic outbreaks," represents a formidable hazard in subtropical climates like Louisiana, where natural and human systems are ill-equipped to adapt, but yet are exposed to the hazard occasionally. Property and crops are particularly vulnerable, as extreme cold can cause freezing pipes, snow, freezing rain, etc.

Recent extreme cold events include January 18, 2018, when temperatures at the New Orleans International Airport and Baton Rouge Metro Airport (20°F and 14° F, respectively) broke the previous record lows at those locations, which had been set in 1977.

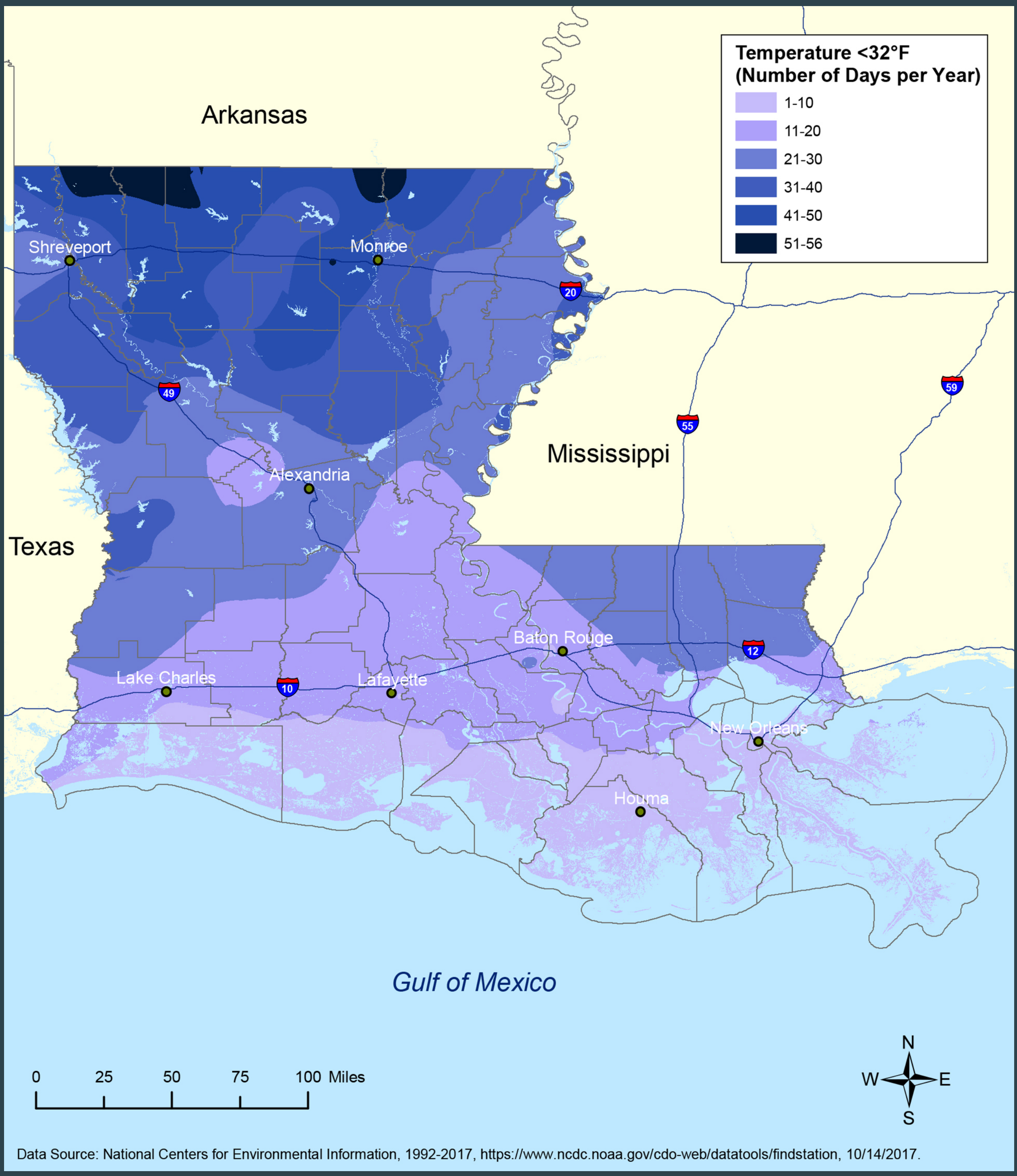
The following map shows the historic number of days with temperatures below 32°F. Most studies on the topic focus on the number of days with temperatures below 32°F. The 2043 temperature map showing number of days with temperatures below 32°F we could expect to see in the year 2043 considering projected decreases in the intensity of extreme cold hazards, and is used in the risk assessment.

RISK ASSESSMENT

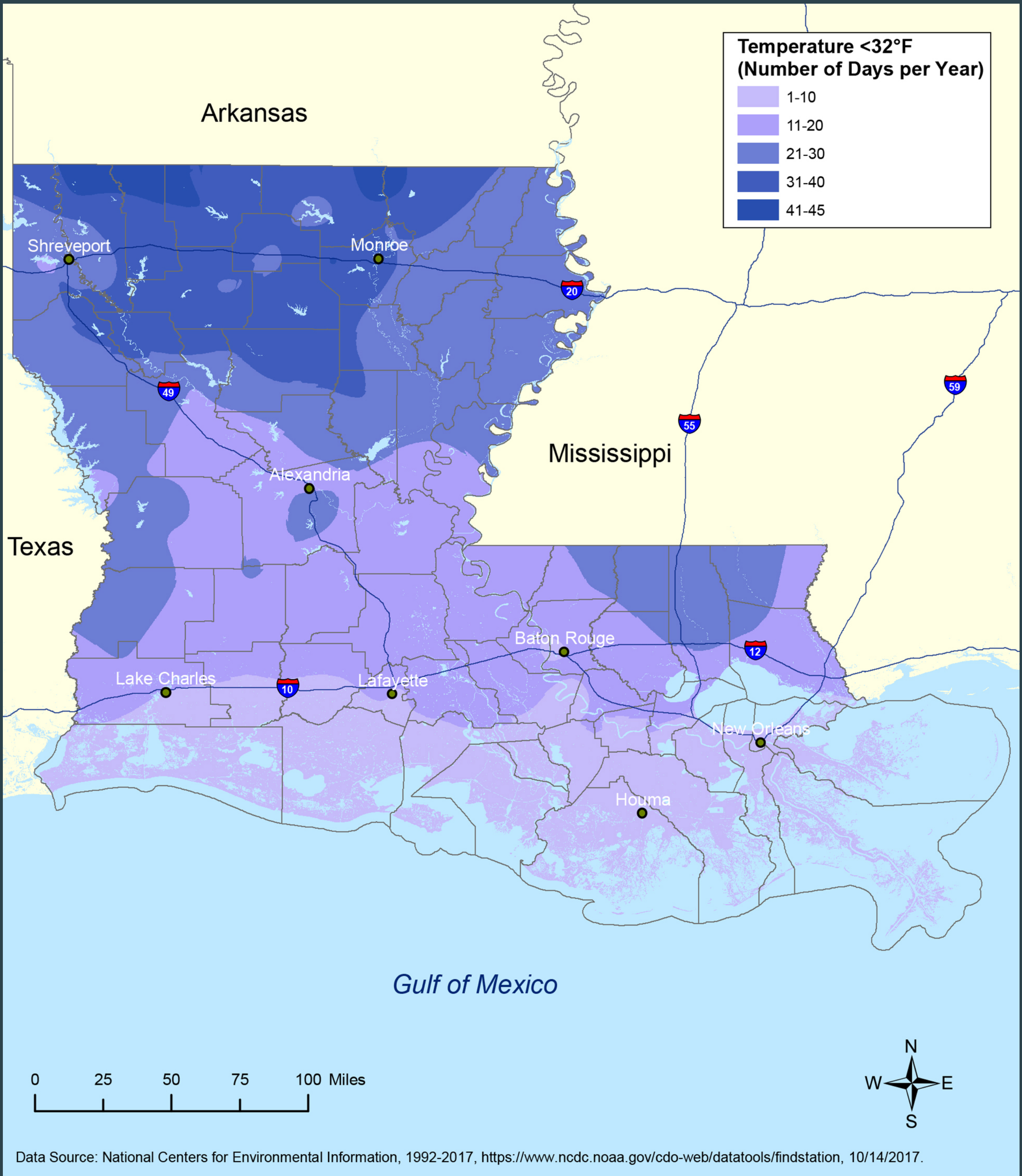
Projected property and crop loss maps show anticipated annual average losses due to extreme cold hazards by census block.

1992-
-2017

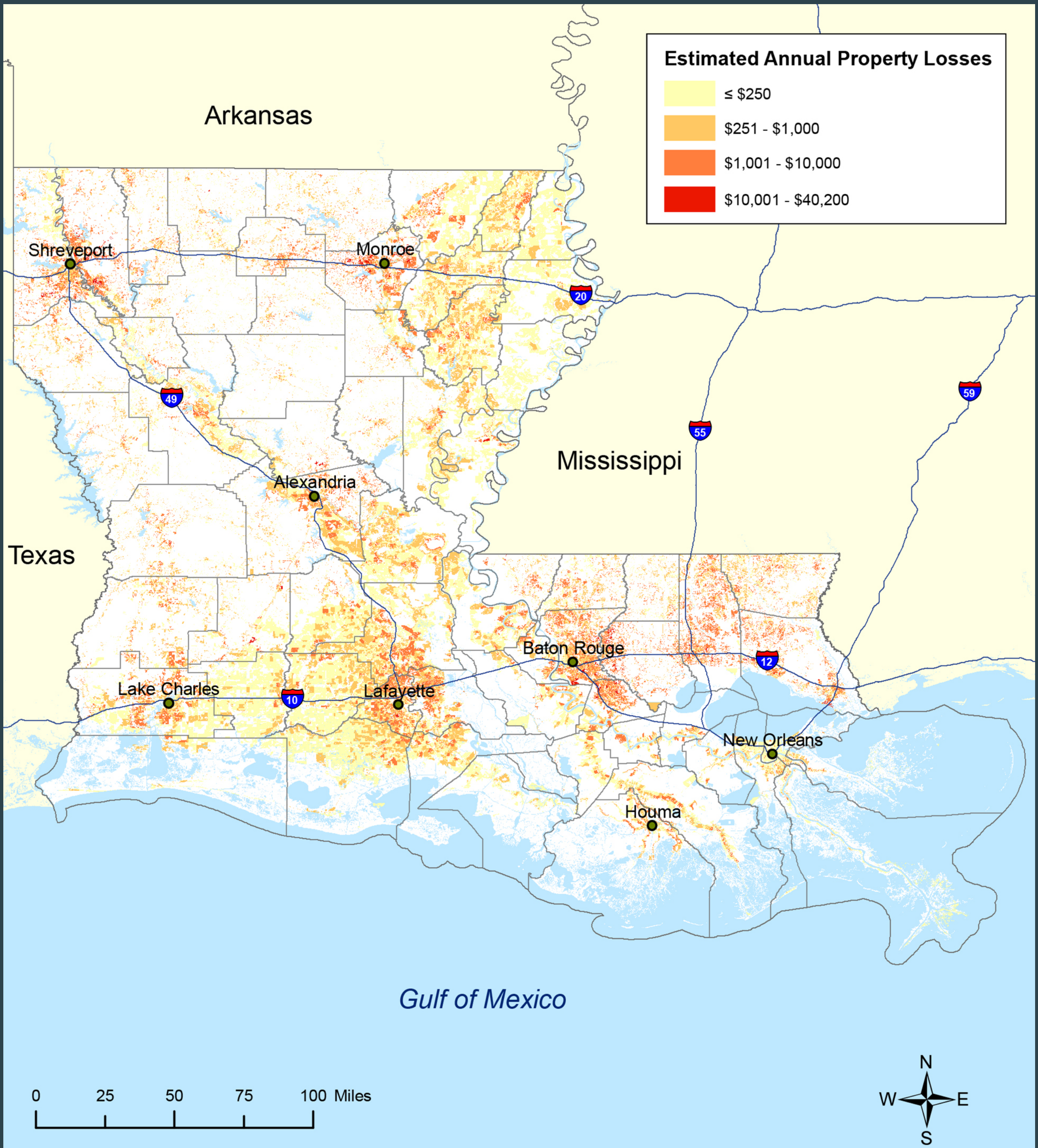
Number of Days per Year with Temperature Below 32°F



2043 Predicted Number of Days per Year with Temperature Below 32°F

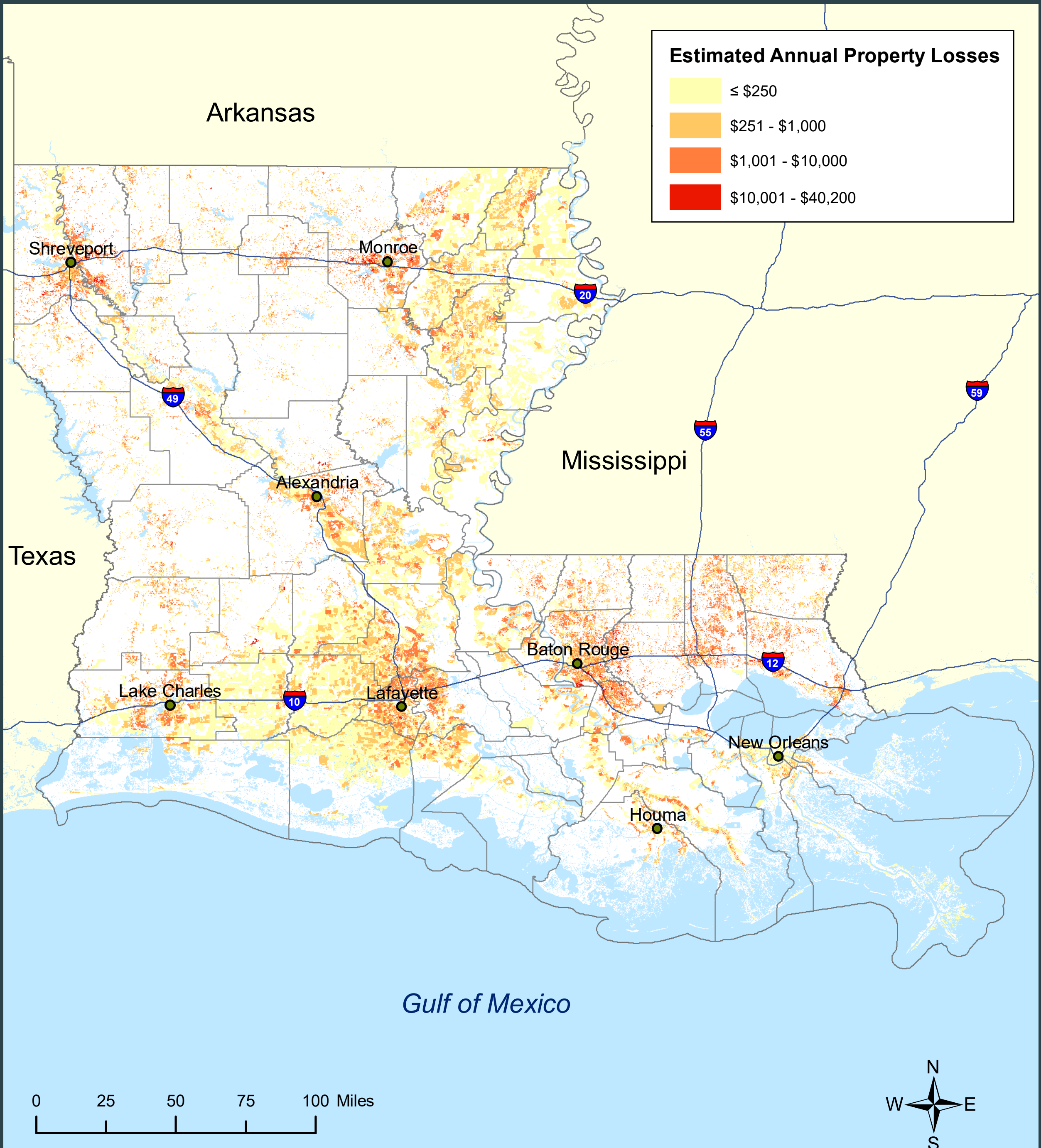


2043 Predicted Annual Property Losses from Winter Storms by Census Block



Data Sources: Spatial Hazard Events and Losses Database for the United States (SHELDUS), 1960-2016, http://hvri.geog.sc.edu/SHELDUS/, 03/02/2018.
FEMA Hazus-MH 4.2, https://www.fema.gov/summary-databases-hazus-multi-hazard#, 03/15/2018.

2043 Predicted Annual Crop Losses from Winter Storms by Census Block



Data Sources: Spatial Hazard Events and Losses Database for the United States (SHELDUS), 1960-2016, http://hvri.geog.sc.edu/SHELDUS/, 03/02/2018.
FEMA Hazus-MH 4.2, https://www.fema.gov/summary-databases-hazus-multi-hazard#, 03/15/2018.

Wind and Flood Hazards

Hazards in Louisiana related to wind and flood include tropical cyclones, high wind, hailstorms, lightning, tornadoes, flooding (coastal and riverine), dam failure, and levee failure. There have been five major disaster declarations since the 2014 State Hazard Mitigation Plan Update – all for wind and flood hazards.

Declaration Number	Description	Incident Period
DR-4345	Louisiana Tropical Storm Harvey	Aug. 28, 2017 / Sept. 10, 2017
DR-4300	Louisiana Severe Storms, Tornadoes and Straight-line Winds	February 7, 2017
DR-4277	Louisiana Severe Storms and Flooding	Aug. 11, 2016 / Aug. 31, 2016
DR-4263	Louisiana Severe Storms and Flooding	Mar. 8 2016 / April 8, 2016
DR-4228	Louisiana Severe Storms and Flooding	May 18, 2015 / June 20, 2015

An overview of tropical cyclones (which includes all storms of tropical origin, from weak easterly waves to the most intense hurricanes) is provided in the following section. However, many associated hazards can occur during a hurricane, including flooding, high winds, and tornadoes. Because these hazards are discussed individually in this chapter, a risk assessment is not performed for hurricane hazards themselves. The probabilities of occurrence and annualized losses for flooding, winds, and tornadoes are inclusive of hurricane-related incidents. The wind and flood hazards are discussed in the following sections, and a risk assessment is provided, except in the case of levee failure. Due to the low probability of levee failure, the losses have not been estimated.

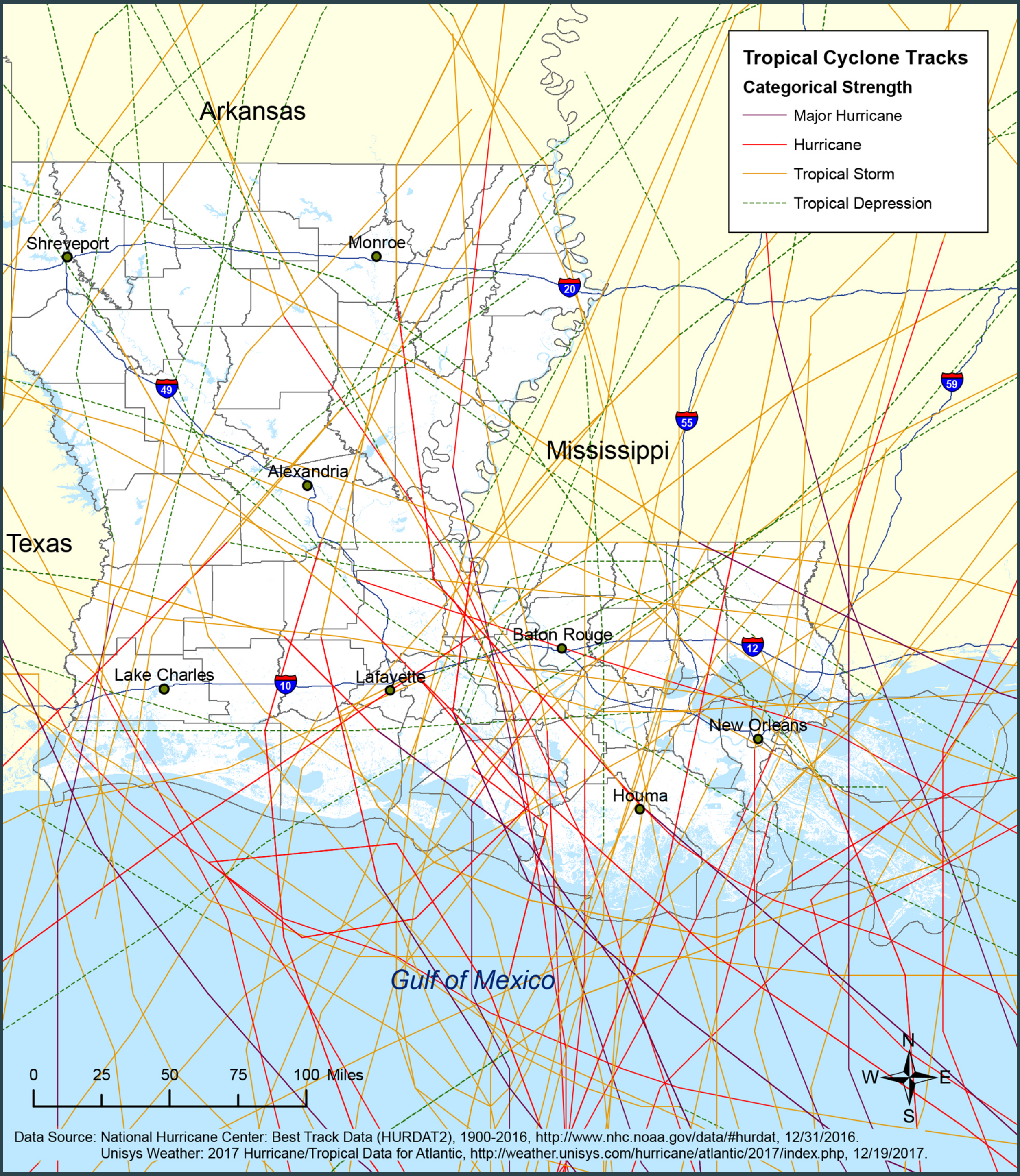
Tropical Cyclones

OVERVIEW

Tropical cyclones are spinning, low-pressure storms that draw surface low-latitude air into their centers and attain strength, ranging from weak tropical waves to the most intense hurricanes. Often, these storms begin as clusters of oceanic thunderstorms off the western coast of Africa, moving westward in the trade wind flow. These thunderstorms acquire a rotational component when a small "buckle" forms in the east-to-west trade wind, caused by the Earth's spin. This west-moving, counterclockwise-spinning collection of storms—now called a tropical disturbance—may then gather strength as it draws humid air toward its low-pressure center, forming a tropical depression (defined when the circulation is completely developed but maximum sustained surface wind speed is 38 mph or less), then a tropical storm (when the maximum sustained surface wind speed ranges from 39 mph to 73 mph), and finally a hurricane (when the maximum sustained surface wind speeds exceed 73 mph). Major hurricanes are those classified as Category 3 to 5 based on the Saffir-Simpson Hurricane Wind Scale.

Data from 1900 to 2017 show that the entire state has been impacted by tropical cyclones, often significantly. As an example, Hurricane Katrina in 2005 remains the costliest tropical cyclone in U.S. history. However, the probabilities of occurrence and historical losses for high winds, tornadoes, lightning, and flooding that constitute the tropical cyclone hazard are best represented within each hazard. Therefore, a risk assessment is not provided for tropical cyclones as a standalone hazard.

1900--2017 Tropical Cyclone Tracks Across Louisiana



High wind

OVERVIEW

High winds considered in this section are caused by thunderstorms, downbursts, straight-line winds, and tropical cyclones, with their scope defined in the table below.

Source, frequency, and duration of high winds (source: Making Critical Facilities Safe from High Wind, FEMA).

High Wind Type	Description	Relative Maximum Duration in Louisiana
Thunderstorm Winds	Wind blowing due to thunderstorms, and thus associated with temperature and pressure gradients	~Few minutes-several hours
Downbursts	Sudden wind blowing down due to downdraft in a thunderstorm; spreads out horizontally at the ground, possibly forming horizontal forming horizontal vortex rings around the downdraft	~15-20 minutes
Straight-line Winds	Wind blowing in straight line; usually associated with intense low-pressure area	Few minutes 1 day
Hurricane Winds	Wind blowing in spirals, converging with increasing speed toward eye; associated with temperature and pressure gradients between the Atlantic and Gulf and land	Several days

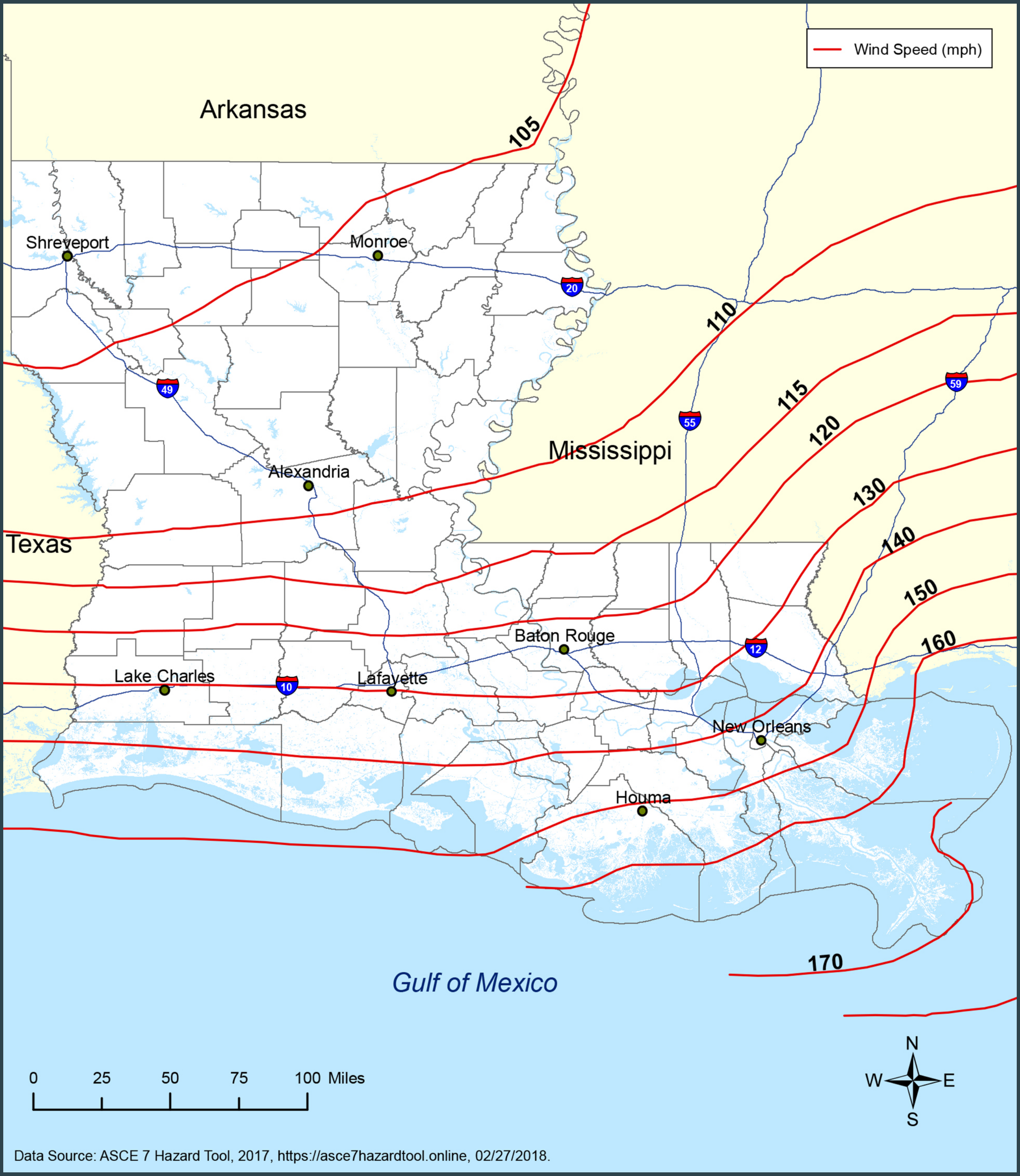
Recent high wind events (excluding tornadoes, which are discussed separately) include the severe storms and straight-line winds on February 7, 2017 impacting Livingston and Orleans Parishes (DR-4300), and the winds associated with Tropical Storm Harvey in 2017 (DR-4345).

The wind contour map depicts historic wind speeds by location, representing the 700-year return period wind speeds for Louisiana, corresponding to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.14%). Wind speeds for other return periods (e.g., 300-year, 1700-year return period) defined by the American Society of Civil Engineers are used to more fully describe the probability of hazard occurrence used in the risk assessment. Higher wind speeds near the coast reflect the intensity of tropical cyclone winds. These wind speeds are the basis for design of smaller buildings, including homes. No increase in wind speed is projected in 2043, therefore only one hazard map is provided, which is used in the risk assessment.

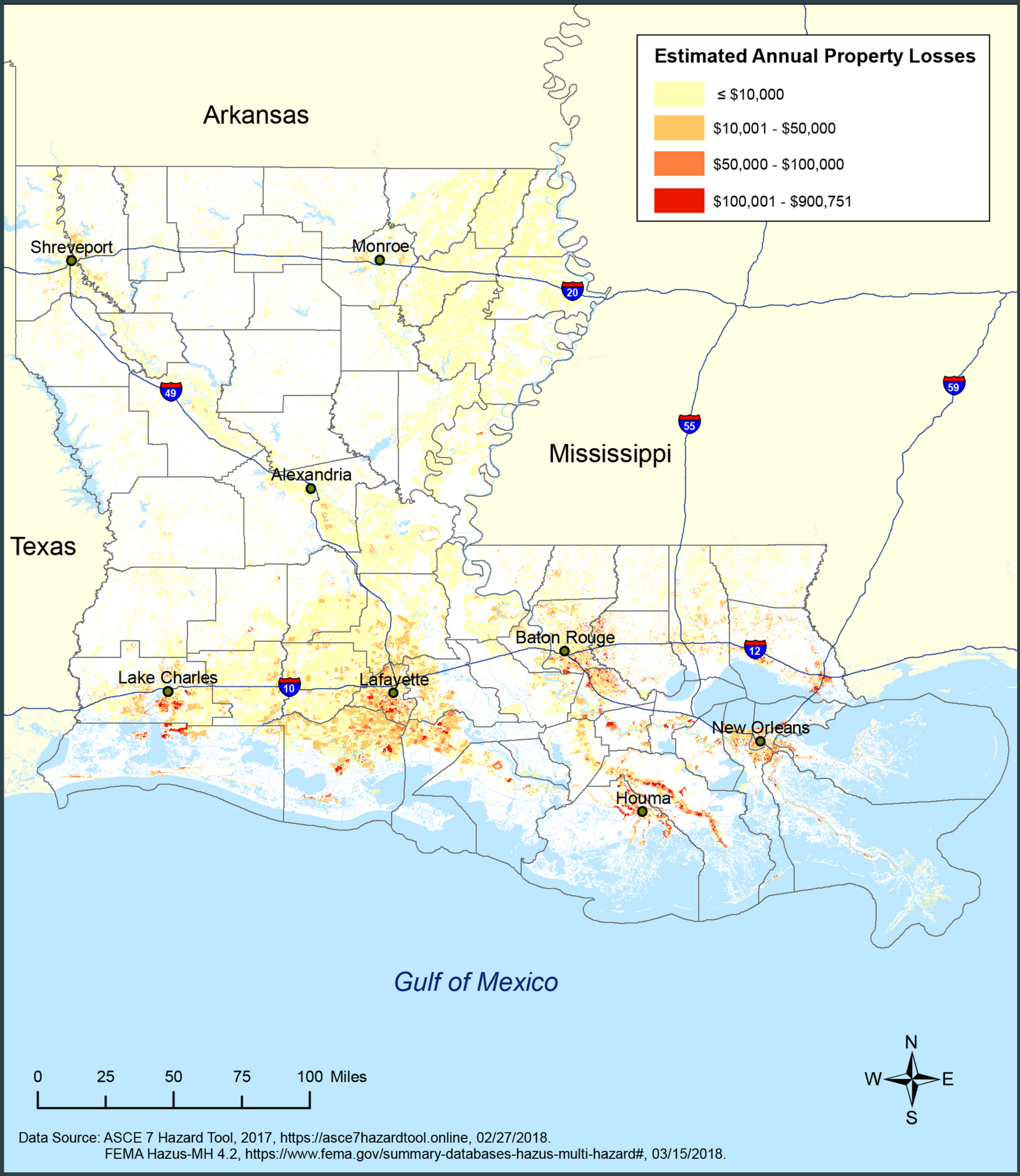
RISK ASSESSMENT

The projected property loss map shows anticipated annual average losses due to wind hazards by census block.

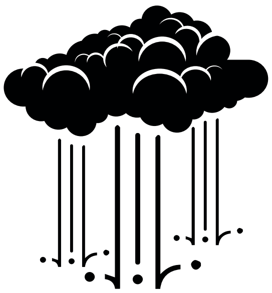
2017 700-Year 3-Second Peak Gust Wind Speeds in Louisiana



2043 Predicted Annual Property Losses from Wind by Census Block



Hailstorms



OVERVIEW

Hailstorms are severe thunderstorms in which balls or chunks of ice fall along with rain. Hail develops in the upper atmosphere as ice crystals that are bounced about by high-velocity updraft winds. The ice crystals grow through deposition of water vapor onto their surface, fall partially to a level in the cloud where the temperature exceeds the freezing point, melt partially, get caught in another updraft whereupon re-freezing and deposition grows another concentric layer of ice, and fall after developing enough weight, sometimes after several trips up and down the cloud. The size of hailstones varies depending on the severity and size of the thunderstorm.

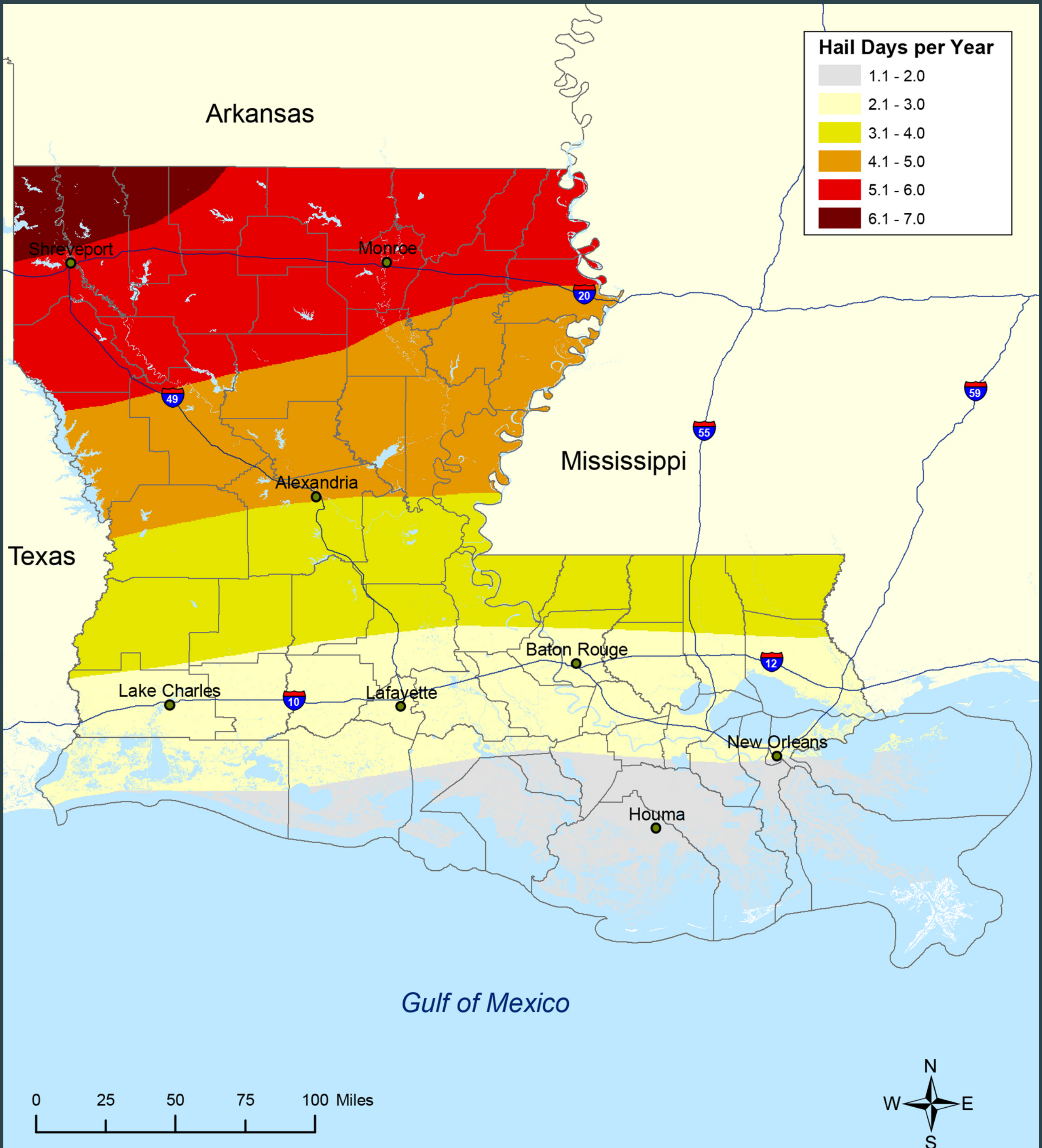
Because of this cycle, hailstorms generally occur more frequently during the late spring and early summer—a period of extreme variation between ground surface temperatures and upper atmospheric temperatures, which contributes to vigorous updrafts of air. Hailstorms can cause widespread damage to homes and other structures, automobiles, and crops. While the damage to individual structures or vehicles is often minor, the cumulative cost to communities, especially across large metropolitan areas, can be quite significant. Hailstorms can also be devastating to crops. Thus, the severity of hailstorms depends on the size of the hailstones, the length of time the storm lasts, and where it occurs. An example of a recent significant hail event is the January 21, 2017 severe weather event, where several reports of large hail, up to 2 inches in diameter, were documented in Northwest Louisiana.

Historic hail occurrences are represented through the 1982-2011 annualized map showing the number of days per year experiencing events with hailstones 3/4" diameter or larger within 25 miles. The 2043 annual projected occurrence map considers projected increases in the probability of tornado hazards we could expect to see in the year 2043. This projected occurrence is used in the risk assessment.

RISK ASSESSMENT

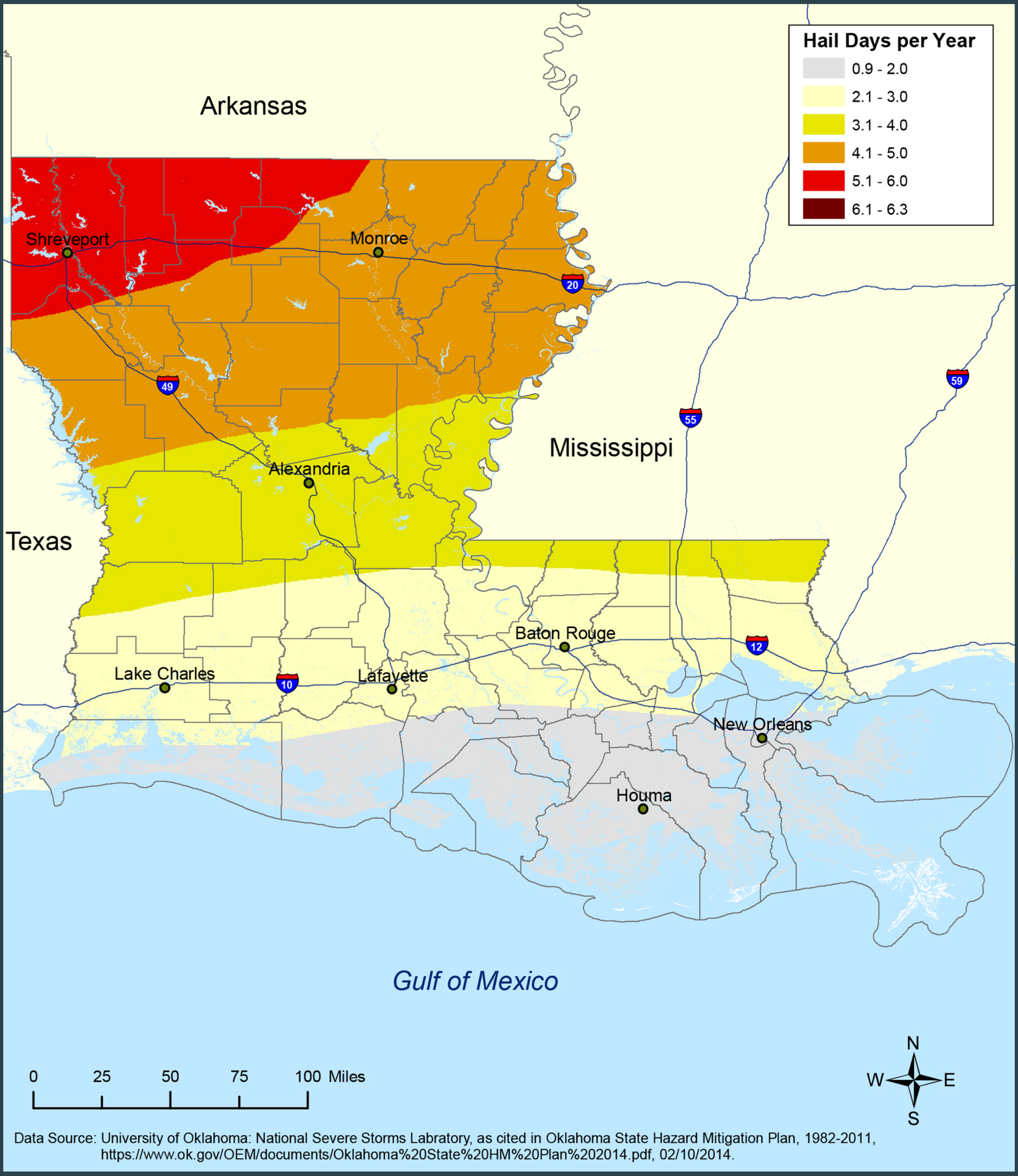
The projected property and crop loss maps show the anticipated annual average losses due to hail hazards by census block.

1982-2011 Number of Days per Year Experiencing Hail ≥ 0.75" within 25 Miles

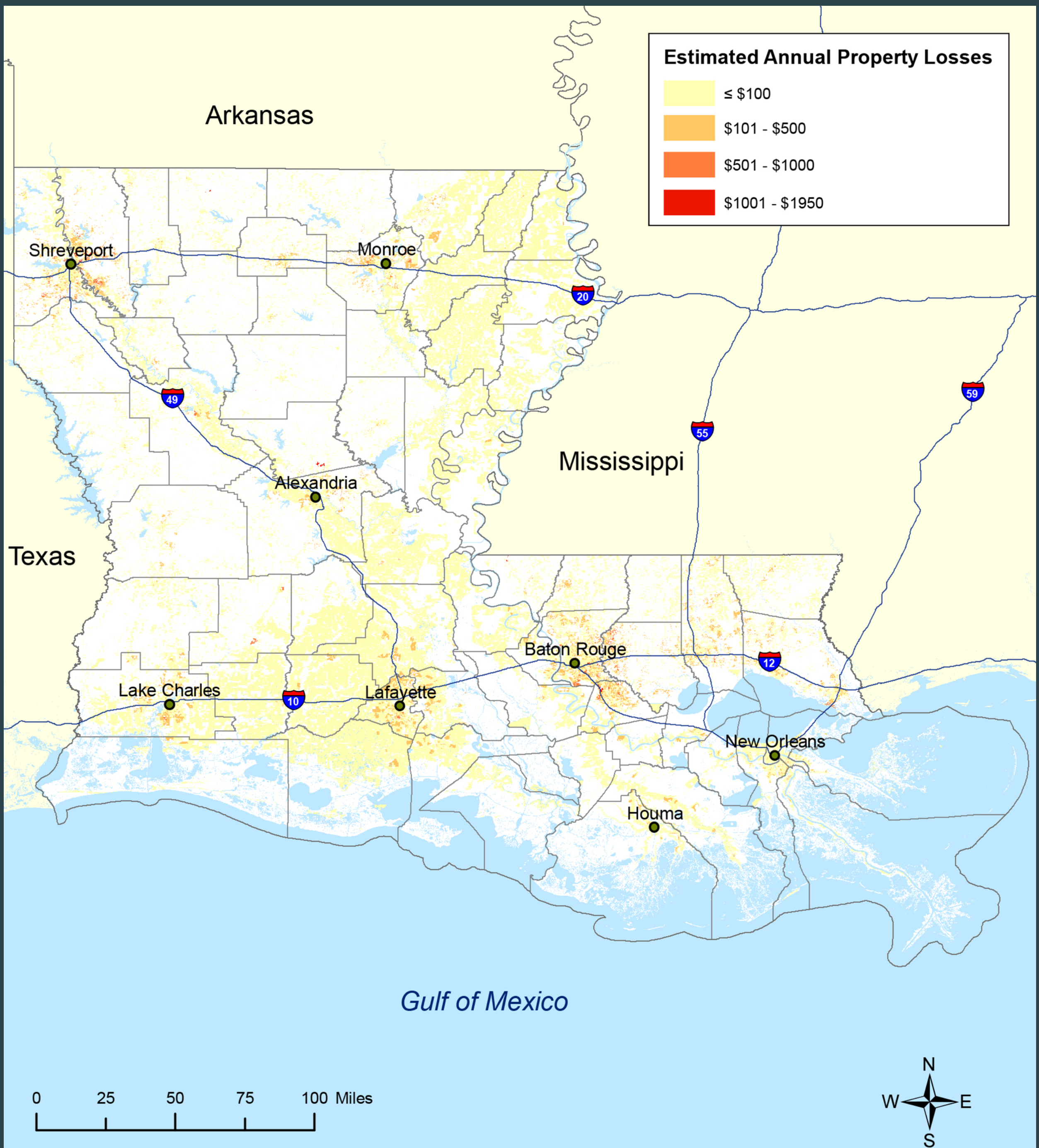


Data Source: University of Oklahoma: National Severe Storms Labratory, as cited in Oklahoma State Hazard Mitigation Plan, 1982-2011, https://www.ok.gov/OEM/documents/Oklahoma%20State%20HM%20Plan%202014.pdf, 02/10/2014.

2043 Predicted Number of Days per Year Experiencing Hail ≥ 0.75" within 25 Miles



2043 Predicted Annual Property Losses from Hail by Census Block

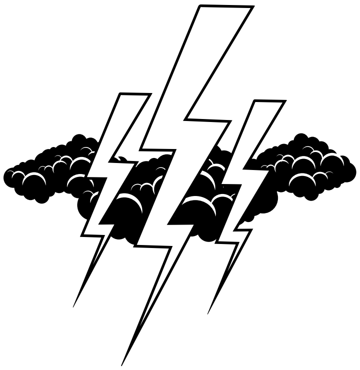


Data Sources: Spatial Hazard Events and Losses Database for the United States (SHELDUS), 1960-2016, http://hvri.geog.sc.edu/SHELDUS/, 03/02/2018. FEMA Hazus-MH 4.2, https://www.fema.gov/summary-databases-hazus-multi-hazard#, 03/15/2018.

2043 Predicted Annual Crop Losses from Hail by Census Block

Data Sources: Spatial Hazard Events and Losses Database for the United States (SHELDUS), 1960-2016, http://hvri.geog.sc.edu/SHELDUS/, 03/02/2018.
FEMA Hazus-MH 4.2, https://www.fema.gov/summary-databases-hazus-multi-hazard#, 03/15/2018.
National Land Cover Database (NLCD), https://www.mrlc.gov/index.php, 03/28/2018.

Lightning



OVERVIEW

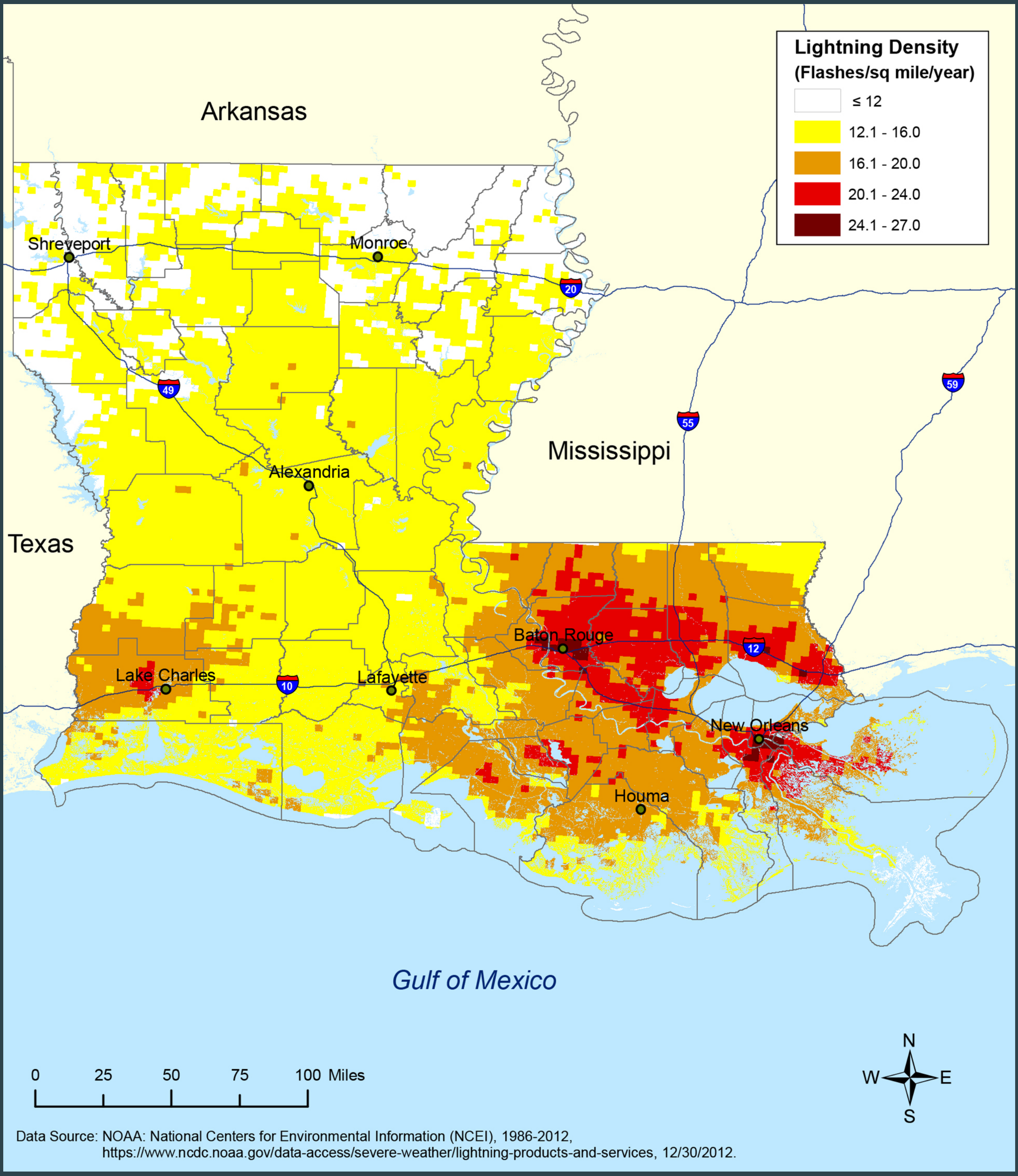
The warning signs for possible cloud-to-ground lightning strikes are high winds, rainfall, and darkening cloud cover. While many lightning casualties happen at the beginning of an approaching storm, more than half of lightning deaths occur after a thunderstorm has passed. The lightning threat diminishes after the last sound of thunder, but still may persist for more than 30 minutes. When thunderstorms are in the area, but not overhead, the lightning threat can exist even when overhead skies are clear. Lightning can even strike more than ten miles from the storm in an area with clear skies. According to NOAA, Louisiana is the second-most lightning-prone state, with around 825,000 lightning strikes per year, following Florida. The year 2016 was one of the worst years nationally for lightning deaths, with 38 fatalities around the country. Louisiana recorded 4 lightning-related deaths that year.

The 1986 to 2012 average annual lightning density is based on historic lightning observations, while the 2043 lightning density map considers projected increases in the probability of lightning hazards we could expect to see in the year 2043. The probability of lightning hazards in 2043 is used in the risk assessment.

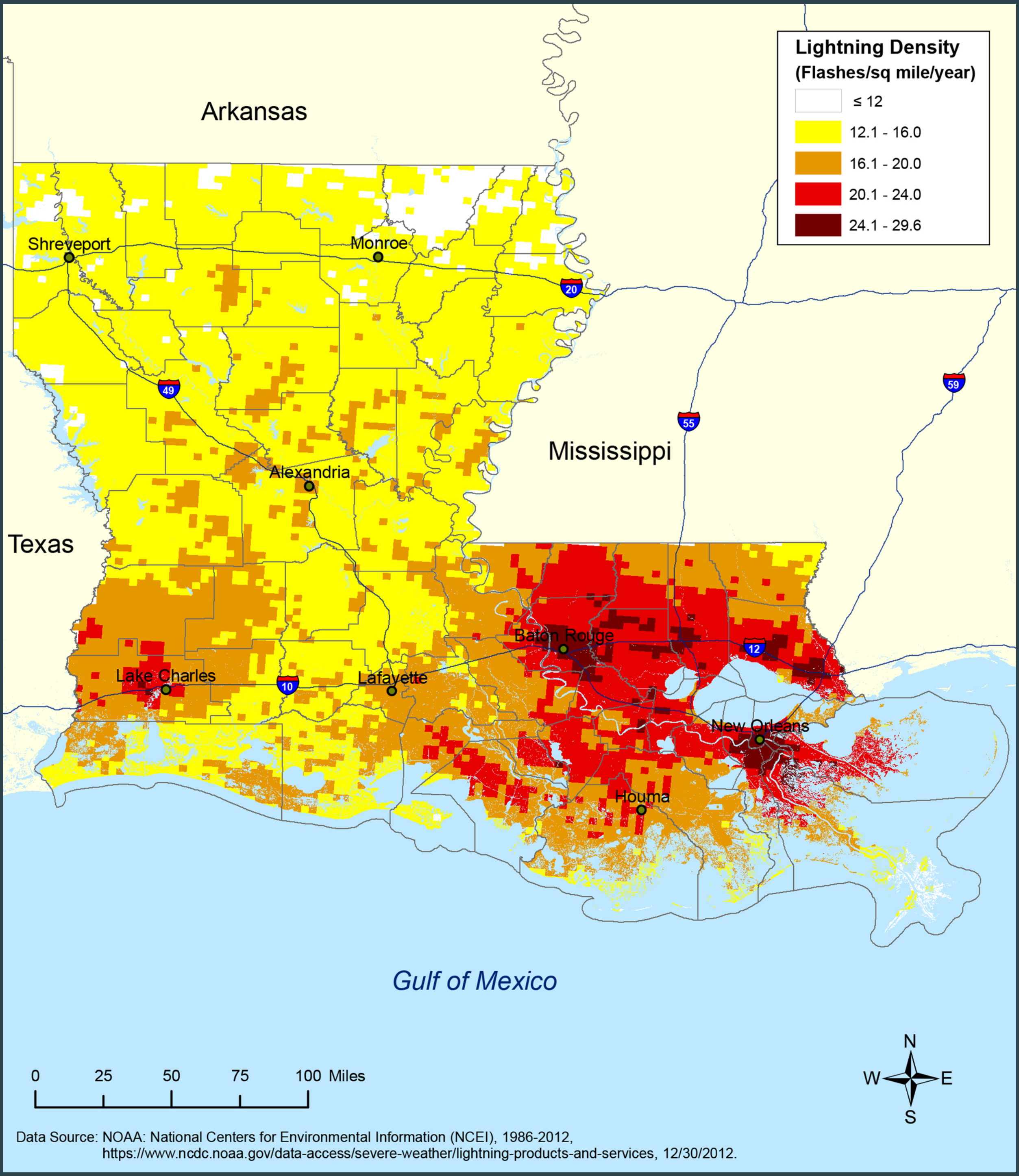
RISK ASSESSMENT

The projected property and crop loss maps show the anticipated annual average losses due to lightning hazards by census block.

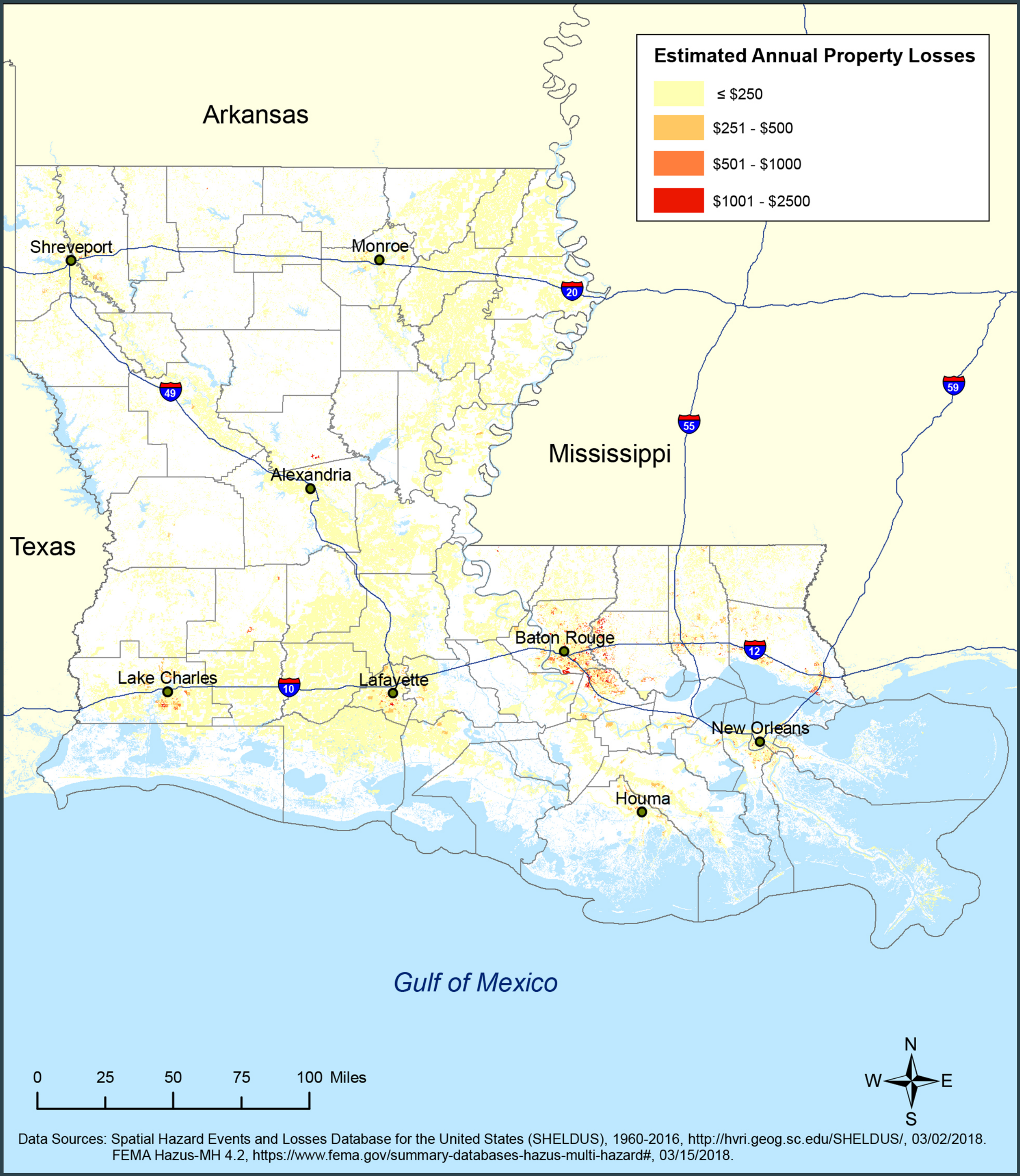
1986--2012 Average Lightning Density per Year in Louisiana



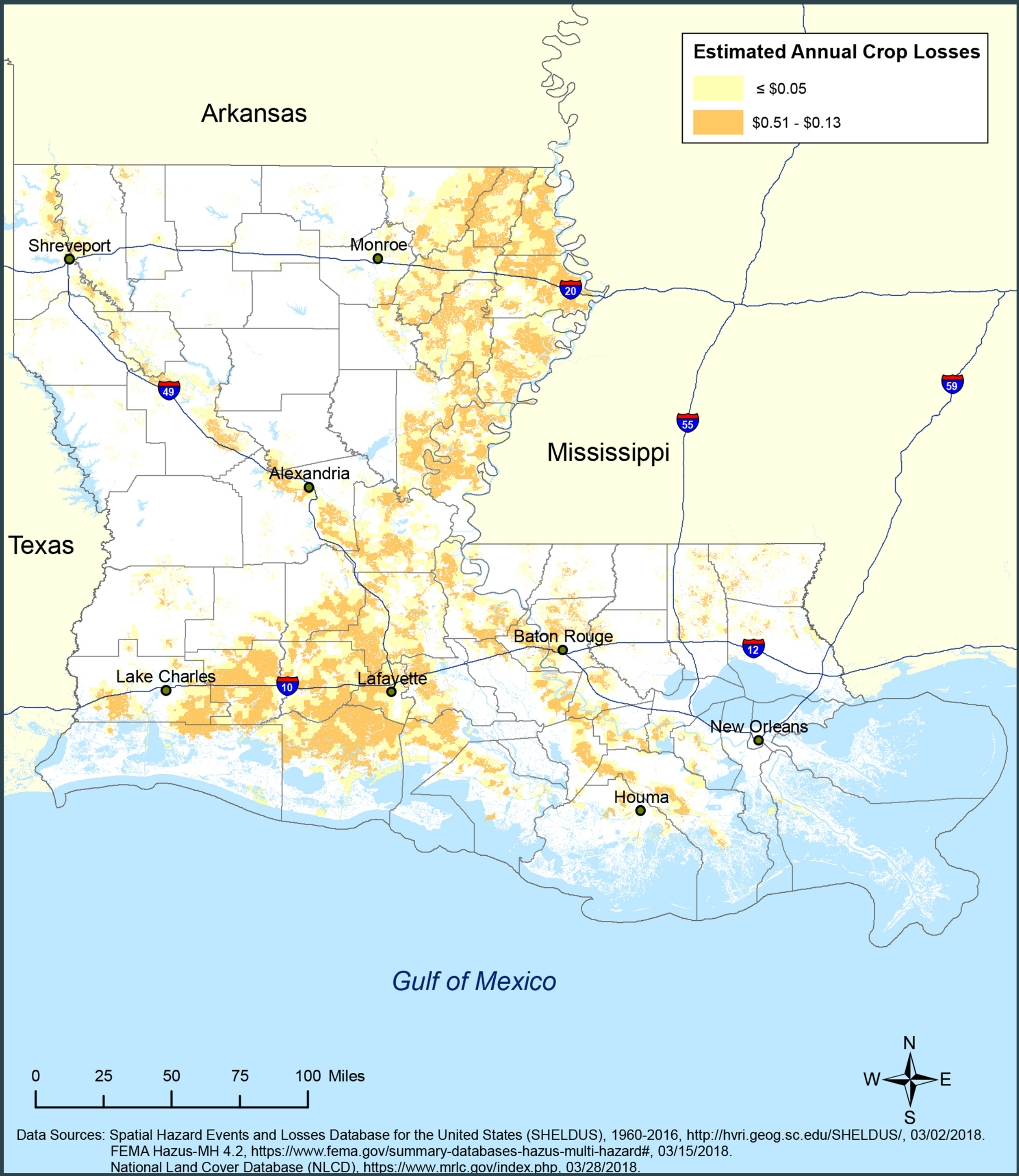
2043 Predicted Lightning Density per Year in Louisiana



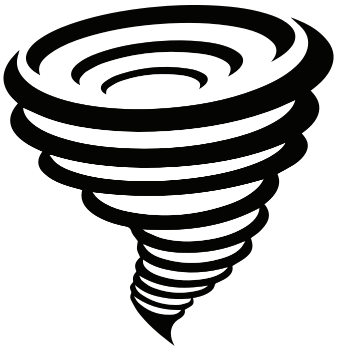
2043 Predicted Annual Property Losses from Lightning by Census Block



2043 Predicted Annual Crop Losses from Lightning by Census Block



Tornadoes



OVERVIEW

Tornadoes are rapidly rotating funnels of wind extending between storm clouds and the ground. For their size, tornadoes are the most severe storms. Approximately 70 percent of the world's reported tornadoes occur within the continental United States, making them one of the most significant hazards Americans face. When tornadoes exist over water, they are considered waterspouts. Tornadoes and waterspouts form during severe weather events, such as thunderstorms, when cold air overrides a layer of warm air, causing the warm air to rise rapidly, which usually occurs in a counterclockwise direction in the northern hemisphere. Tornadoes can also occur in association with hurricanes, but are more likely to be weaker in intensity than land-based tornadoes that occur shortly before a cold frontal passage.

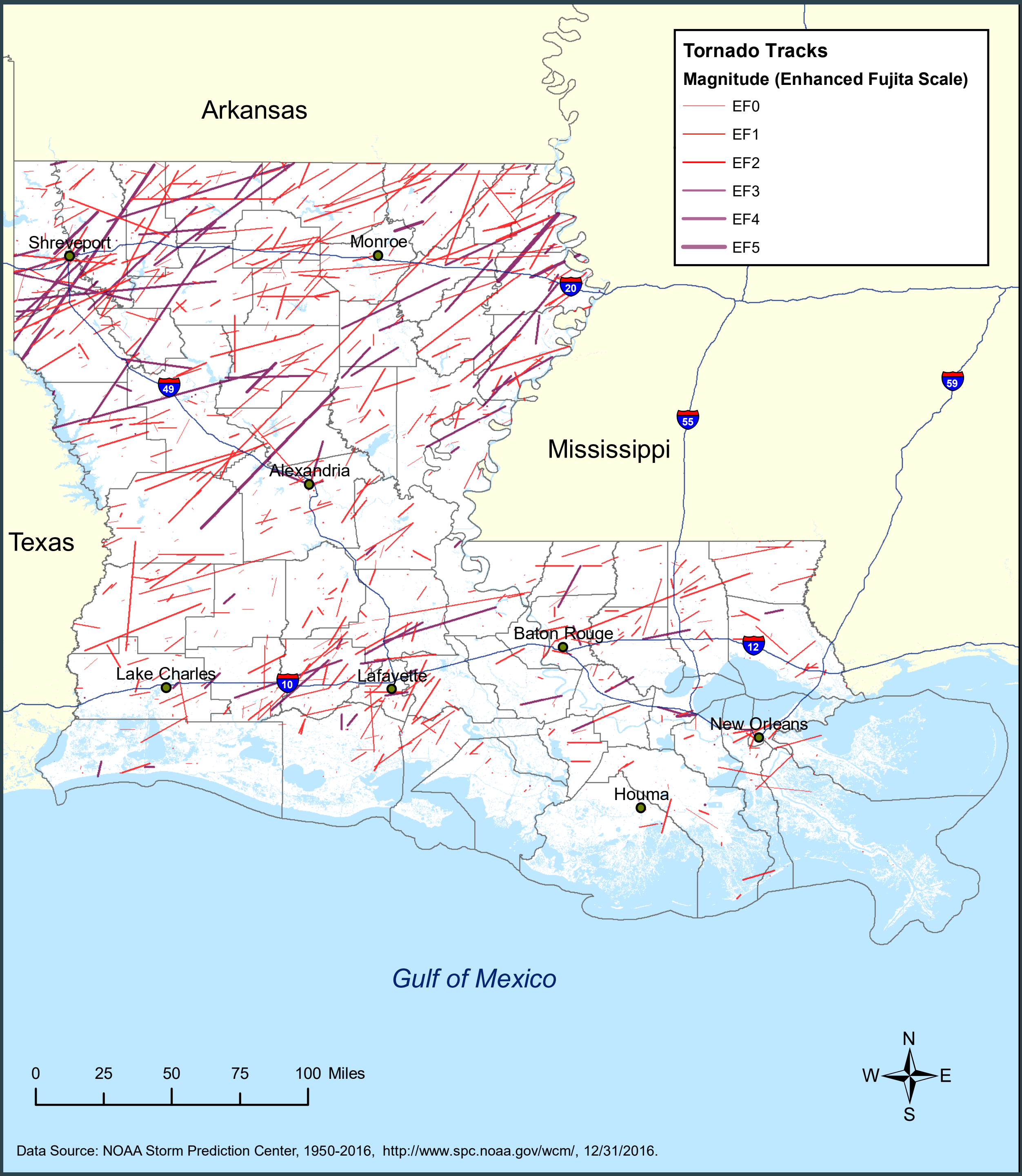
Peak tornado activity in Louisiana occurs during the spring, as it does in the rest of the United States. Nearly one-third of observed tornadoes in the U.S. occur during April and May. About half of the tornadoes in Louisiana, including many of the strongest, occur between March and June. Fall and winter tornadoes are less frequent, but the distribution of tornadoes throughout the year is more uniform in Louisiana than in locations farther north. Recent tornado outbreaks in Louisiana include at least 20 tornadoes on April 12-13, 2018, in northwest Louisiana, as well as the Eastern New Orleans Tornado on February 7, 2017 (DR-4300).

Historic tornado occurrence is shown by EF classification (from the weakest tornadoes starting at EF0 to the most powerful category of EF5) of tornado tracks, as well as through an annualized map depicting the number of days per year with a tornado touchdown within 25 miles. The 2043 annual projected occurrence map considers projected increases in the probability of tornado hazards we could expect to see in the year 2043. These projected increases are used in the risk assessment.

RISK ASSESSMENT

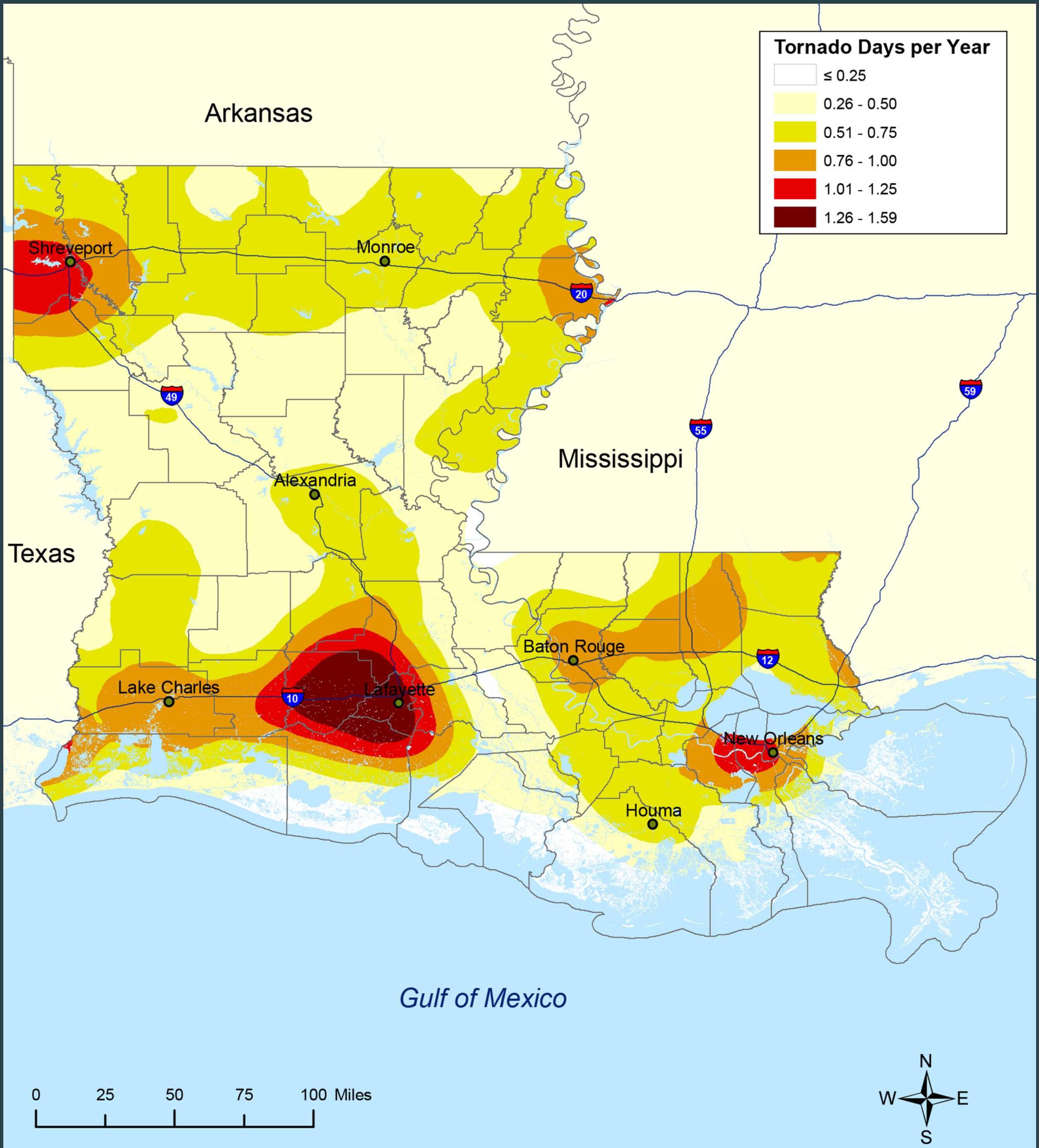
The projected property and crop loss maps show the anticipated annual average losses due to tornado hazards by census block.

1950-2016 Tornado Tracks in Louisiana



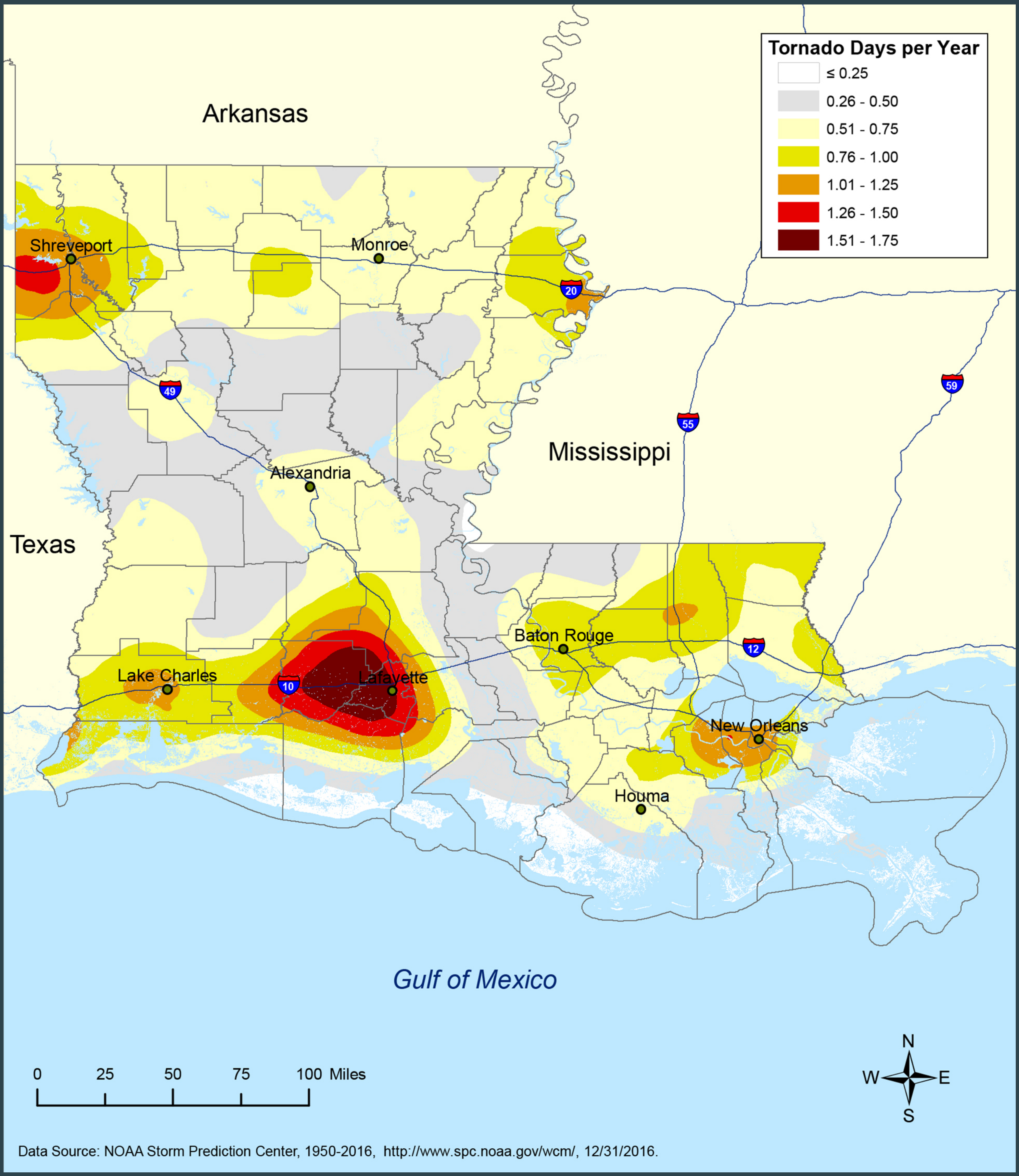
1950-
-2016

Number of Days per Year Having a Tornado Touchdown within 25 Miles

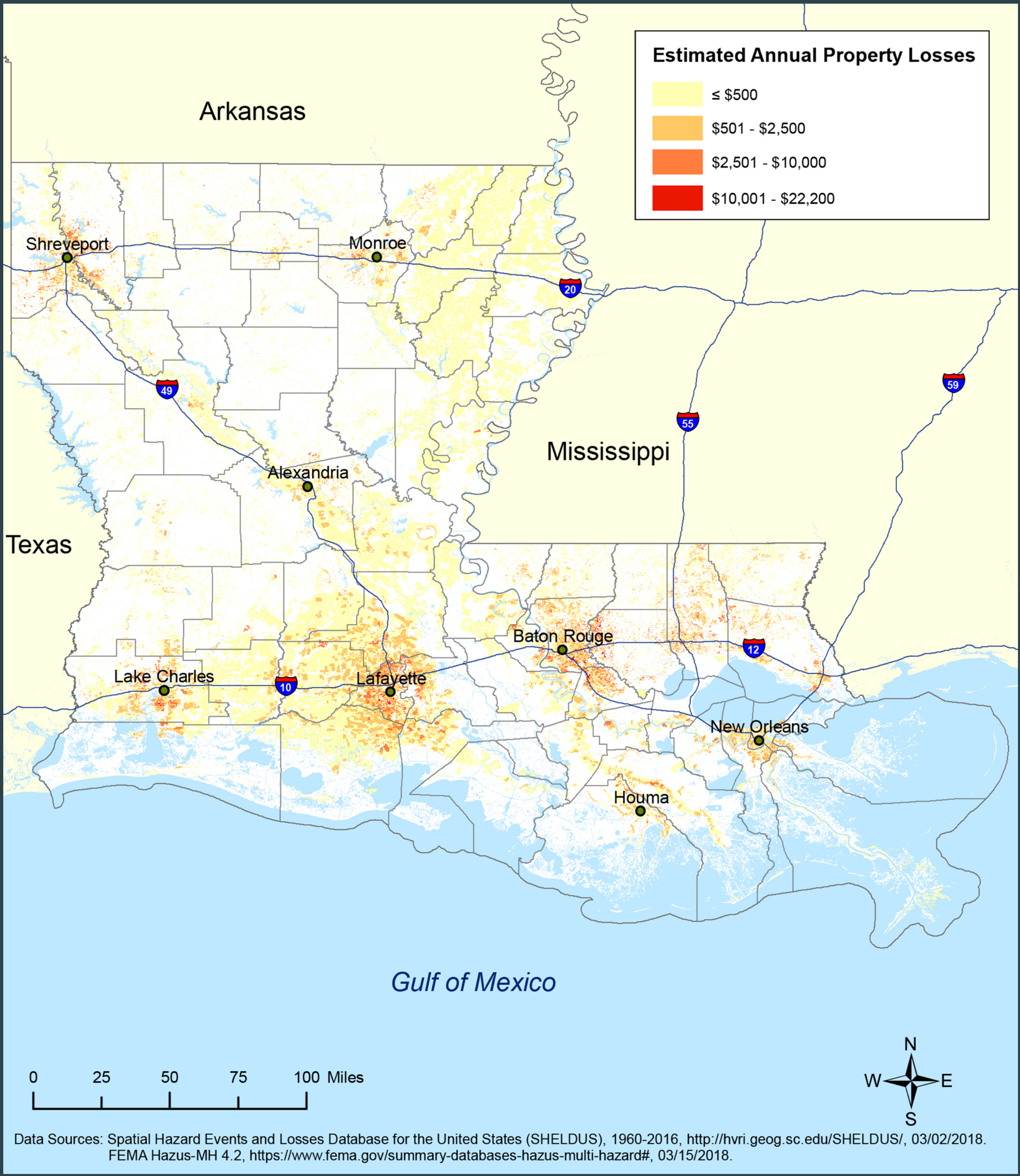


Data Source: NOAA Storm Prediction Center, 1950-2016, http://www.spc.noaa.gov/wcm/, 12/31/2016.

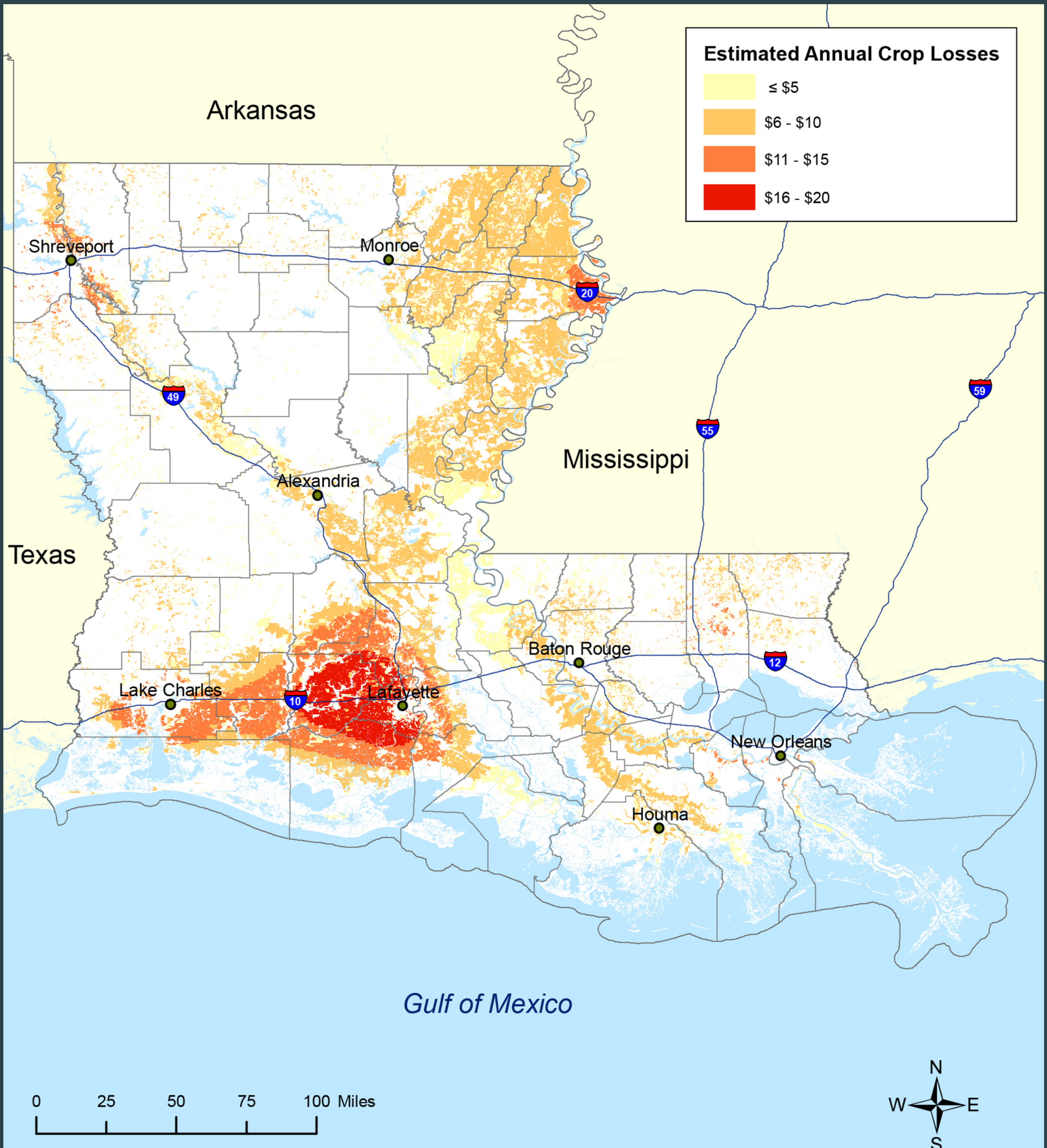
2043 Predicted Number of Days per Year Having a Tornado Touchdown within 25 Miles



2043 Predicted Annual Property Losses from Tornado by Census Block

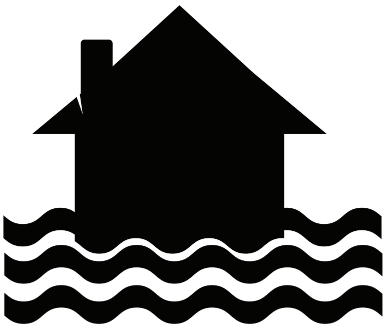


2043 Predicted Annual Crop Losses from Tornado by Census Block



Data Sources: Spatial Hazard Events and Losses Database for the United States (SHELDUS), 1960-2016, http://hvri.geog.sc.edu/SHELDUS/, 03/02/2018.
FEMA Hazus-MH 4.2, https://www.fema.gov/summary-databases-hazus-multi-hazard#, 03/15/2018.
National Land Cover Database (NLCD), https://www.mrlc.gov/index.php, 03/28/2018.

Flooding



OVERVIEW

A flood is the overflow of water onto land that is typically not inundated. Excess precipitation, produced from thunderstorms or hurricanes, is often the major initiating condition for flooding, and Louisiana can have high rainfall totals at any time of the day or year. In Louisiana, five specific types of floods are of main concern: riverine, flash, ponding, backwater, and urban. The 1% annual exceedance probability flood (often called the 100-year flood, corresponding to a mean recurrence interval of 100 years) is of particular significance, because it is used as the basis for regulatory standards, such as building codes and flood insurance requirements.

Over the period 1959 to 2005, Louisiana ranked 18th among the states in flood fatalities (excluding those related to Katrina), but third in flood-related injuries and in total flood casualties. Recent significant floods include the August 11-31, 2016 flood affecting southeast Louisiana (DR-4277), the March 8-April 8, 2016 flood affecting northern Louisiana (DR-4263), and the May 18-June 20, 2015 flood along the Red River in northwest Louisiana (DR-4228).

The flood hazard area is defined as the land area that has a 1% chance of flooding per year; however, this is not a complete picture of flood risk, as the flood inundation boundaries corresponding with other likelihoods have not yet been systematically defined. While no changes are projected for riverine flooding due to lack of data, the Louisiana Coastal Protection and Restoration Agency (CPRA) has predicted increases in coastal flooding. The map on the following page merges predicted (increased) 100-year coastal inundation under a medium environmental scenario with no mitigation action in 2042 with the current 100-year flood depths. This map represents the flood hazard we could expect to see in the year 2043. This 2043 representation was used in the risk assessment.

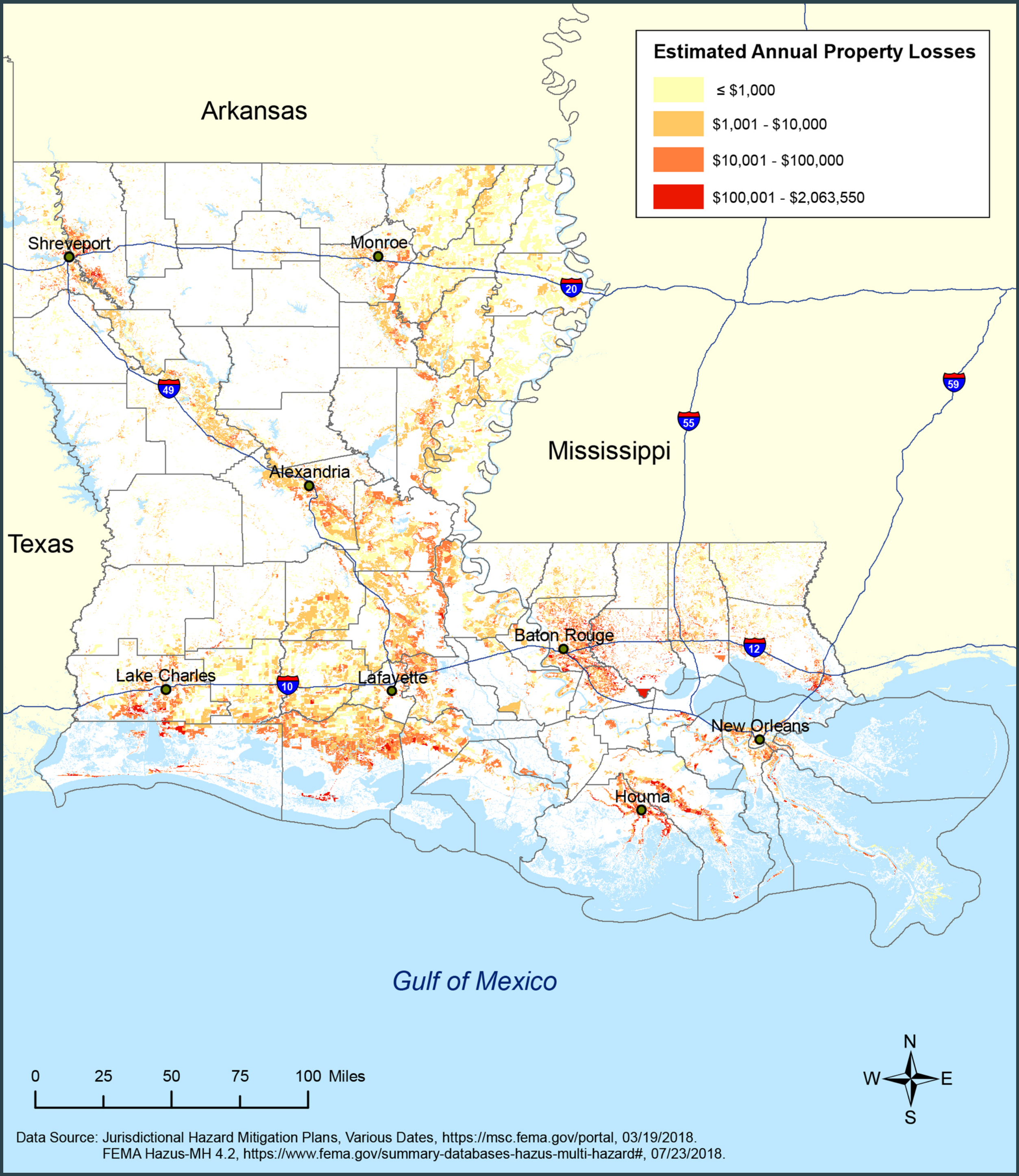
RISK ASSESSMENT

The projected property loss map shows losses associated with the 100-year flood event by census block. Due to insufficient data, annualized losses for parishes are not available for this plan update. Additional study is recommended prior to the next plan update to be able to forecast annualized flood losses.

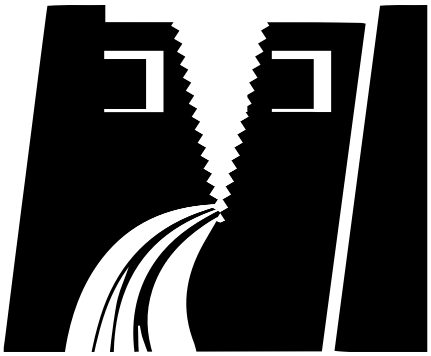
2017 100-Year Flood Inundation Area in Louisiana

2042 Predicted 100-Year Flood Coastal Inundation Medium Environmental Scenario with No Additional Action

2043 Predicted Annual Property Losses from 100-Year Flood by Census Block



Dam failure



OVERVIEW

Dams are water storage, control, or diversion barriers that impound water upstream in reservoirs. Dams are a vital part of our nation's infrastructure, providing drinking water, flood protection, renewable hydroelectric power, navigation, irrigation, and recreation. These critical daily benefits are also inextricably linked to the potential harmful consequences of a dam failure.

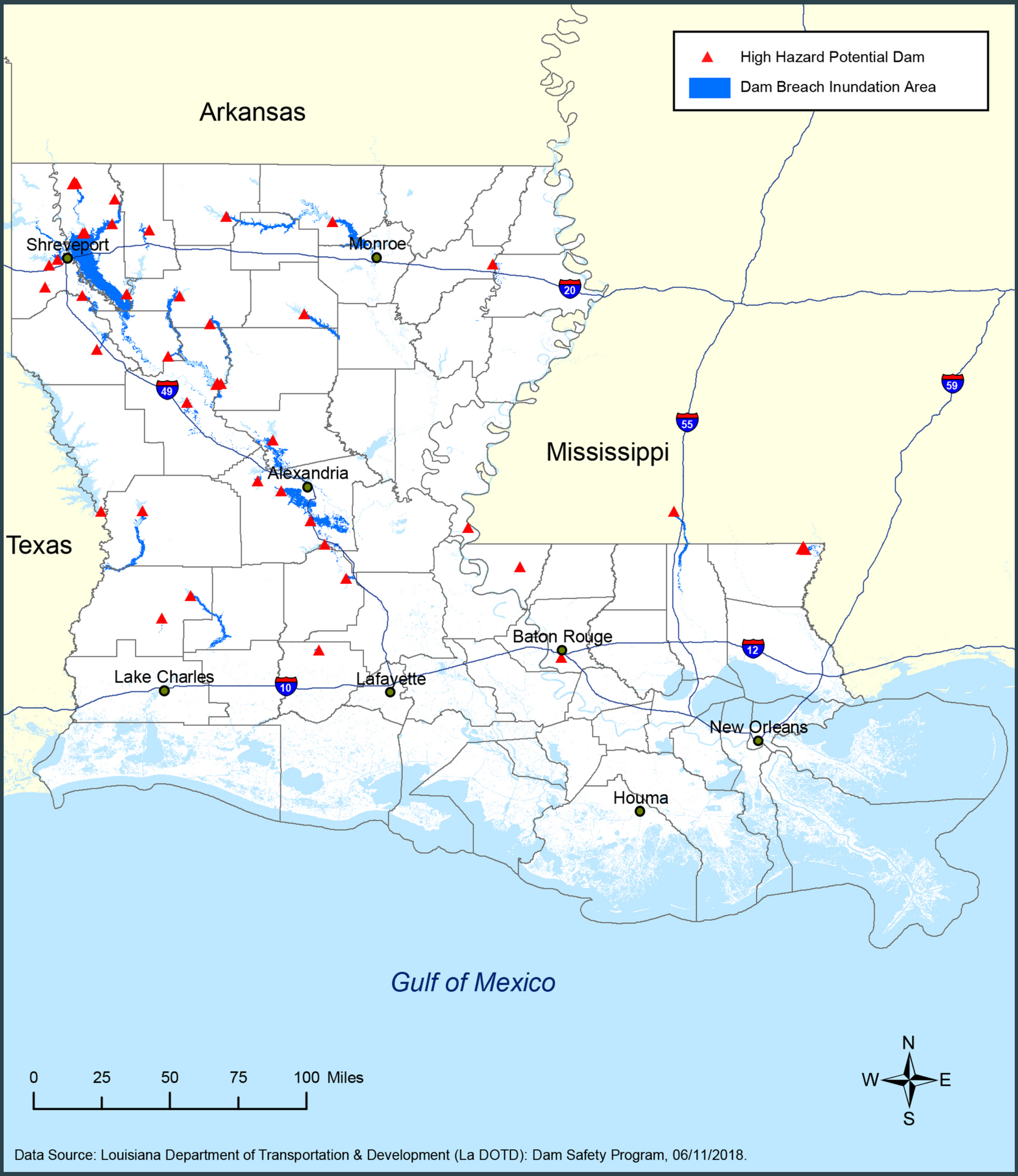
Dam failure is a collapse or breach in the structure. A dam failure can result in severe loss of life, economic disaster, and extensive environmental damage. While most dams have storage volumes small enough that failures have few repercussions, dams with large storage volumes can cause significant flooding downstream. Dam failures often have a rapid rate of onset, leaving little time for evacuation. The first signs of the failure may go unnoticed upon visual inspection of the dam structure. However, appropriate design and continual maintenance and inspection of dams often provide the opportunity to identify possible deficiencies in their early stages, and can prevent a possible catastrophic failure event. High hazard potential dams are dams where failure or improper operation will most likely cause loss of human life. Louisiana has 41 high hazard potential dams. There have been zero high hazard dam failures in the state of Louisiana, although a threatened failure of the Percy Quin Dam in Mississippi following 2012 Hurricane Isaac resulted in a mandatory evacuation for Tangipahoa Parish.

Because Louisiana does not have a history of high hazard dam failures, this section assumes a future probability of 0.0001 (0.01% annual probability) for dam failure in 2043 in consultation with the Louisiana Dam Safety Program. We assume no increases in the number of high hazard dams; therefore, the current data are used to represent conditions in 2043 for the risk assessment.

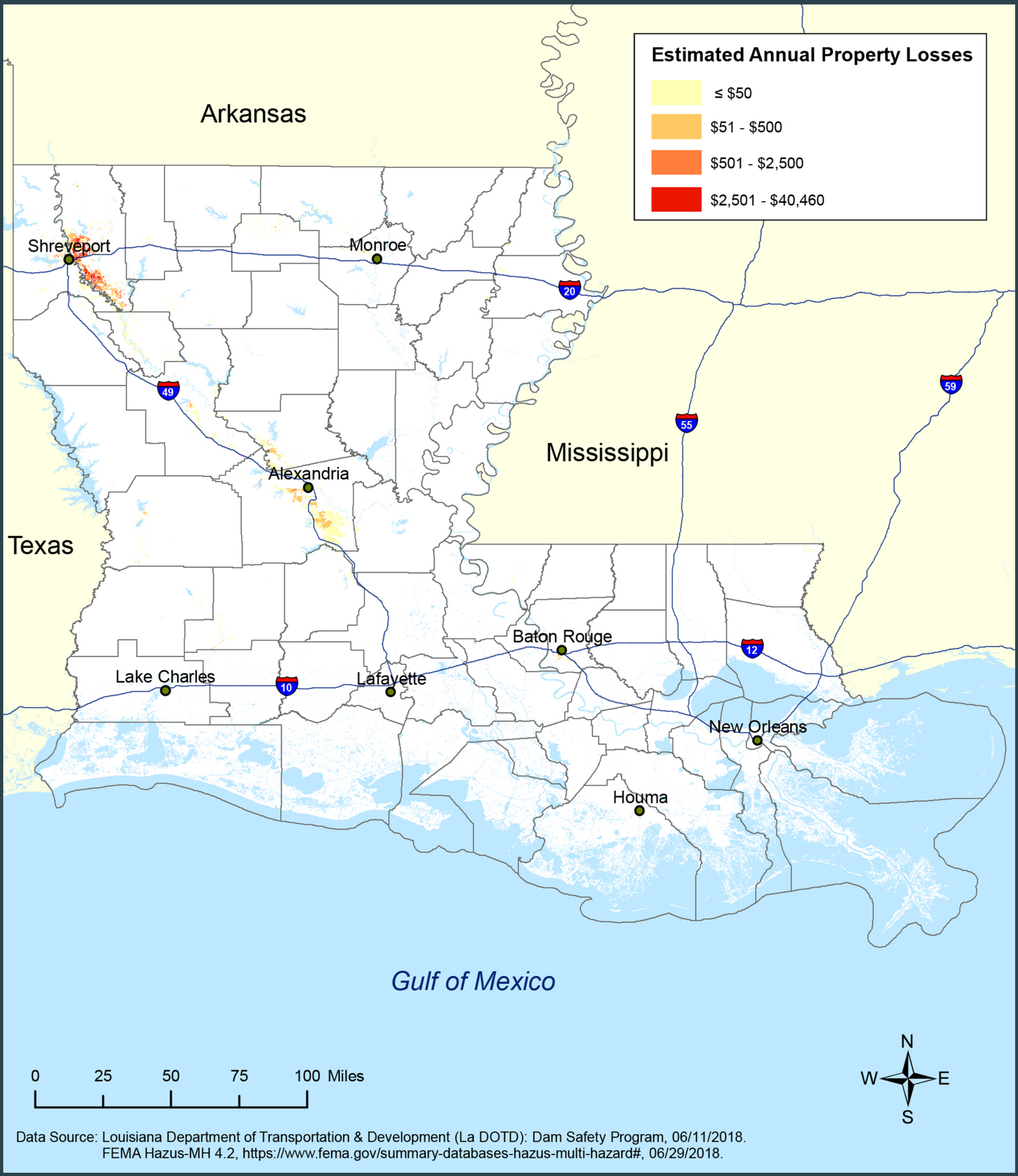
RISK ASSESSMENT

The map depicting dam inundation areas was developed using dam failure simulation data provided by the Louisiana Dam Safety Program. The projected property loss map shows anticipated annual average losses due to failure of high hazard dams by census block.

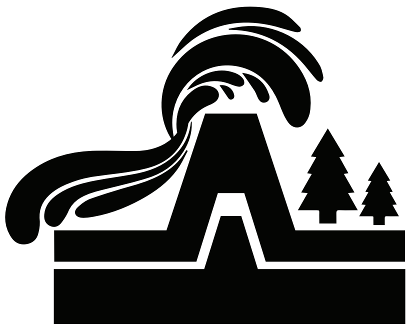
2017 High Hazard Potential Dams and Innundation Area



2043 Predicted Annual Property Losses from Dam Failure by Census Block



Levee failure



OVERVIEW

Levees and floodwalls are flood control barriers constructed of earth, concrete, or other materials. For the purposes of this plan, levees are distinguished from smaller flood barriers (such as berms) by their size and extent. Berms are barriers that only protect a small number of structures, or at times, only a single structure. Levees and floodwalls are barriers that protect significant areas of residential, commercial, or industrial development; at a minimum, they protect a neighborhood or small community.

Levees are commonplace throughout Louisiana. Northern Louisiana is protected by levees on the Ouachita River, under the authority of the Vicksburg District of the United States Army Corps of Engineers (USACE). The Vicksburg District encompasses 68,000 mi2 in the states of Arkansas, Mississippi, and Louisiana. They manage seven drainage basins, including the Yazoo, Pearl, Big Black, Red, Ouachita, and Mississippi Rivers; 12 locks and dams on the Pearl, Red, and Ouachita Rivers; 1,808 miles of levees, including 468 along the Mississippi River; and multiple lakes with 1,709 mi. of shoreline. The following map illustrates the leveed areas in the Vicksburg and New Orleans Districts.

Levee failure involves the overtopping, breach, or collapse of the levee. Levee failure can be especially destructive to nearby development during flood and hurricane events. The most well-known levee breaches in Louisiana occurred in association with Hurricane Katrina in 2005, when several sections along Lake Pontchartrain and along both navigation and drainage canals failed in New Orleans. The extent and depth of these levee failures resulting from Hurricane Katrina caused extreme flooding in New Orleans. However, given the quantity of levees in Louisiana, the annual probability of levee failure is 0.3%.

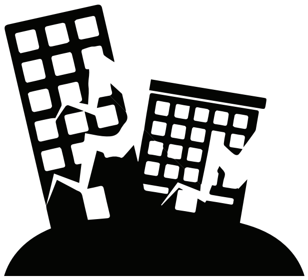
RISK ASSESSMENT

Due to the low probability of occurrence and insufficient failure model data, the annualized losses for parishes are not available.

2017 Levee Protected Areas in Louisiana

Data Source: NLD - National Levee Database, https://www.arcgis.com/home/item.html?id=75871cb313e1493685ea9b4262f47ed0#overview, 03/15/2017.

Earthquake



OVERVIEW

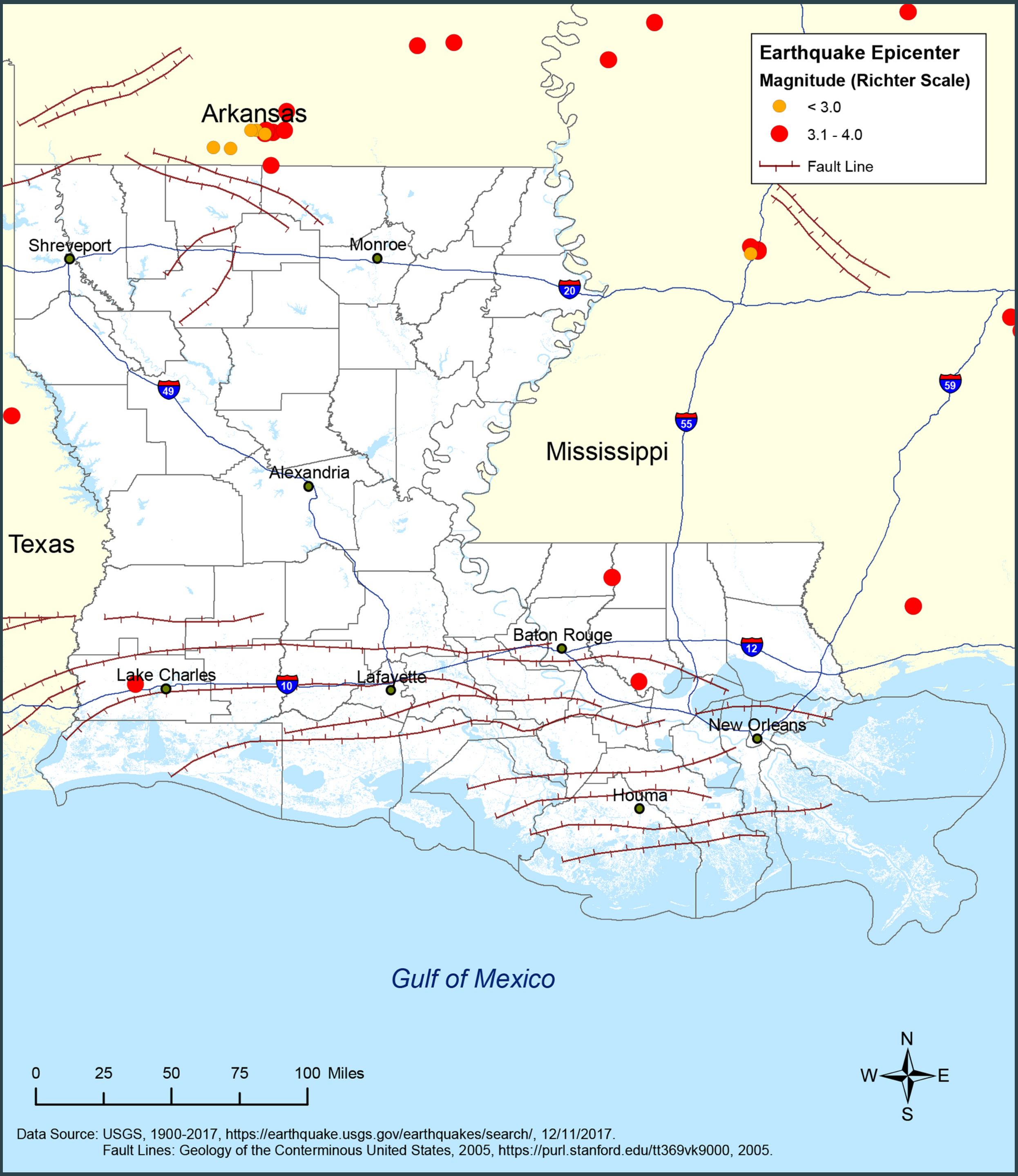
An earthquake is a sudden motion or trembling of the Earth caused by an abrupt release of stored energy in the rocks beneath the Earth's surface. The energy released results in vibrations known as seismic waves. Ground motion from seismic waves is expressed as peak ground acceleration (PGA), the fastest measured change in speed for a particle at ground level that is moving because of an earthquake. PGA is commonly measured as a percentage of acceleration due to Earth's gravity (%g). This measurement is considered in seismic load engineering design and construction requirements.

Based on historic events, the most severe earthquakes in the state are likely to occur to the very north (near the Arkansas–Mississippi border), originating from the New Madrid seismic zone, and to the south (near the coast) from the subsidence fault system. Nevertheless, the USGS has recorded only five minor earthquakes in Louisiana in the past 25 years. Historically, earthquakes have caused minimal damage in Louisiana.

RISK ASSESSMENT

Based on the results of the hazard profiling for this Plan Update, earthquakes are not considered significant by the SHMPC in comparison to the other profiled hazards. Therefore, a technical risk assessment is not included.

1900--2017 Earthquake Events and Fault Lines in and near Louisiana



Sinkholes

OVERVIEW

Sinkholes are areas of ground with no natural external surface drainage where the Earth's surface has collapsed. They vary in size from a few square feet to hundreds of acres, and reach in depth from 1 to more than 100 feet. In Louisiana, sinkholes are typically formed when a natural salt dome is perforated, fills with water, and the salt dissolves, leading to failure of the surface. Two recent sinkhole events are the Lake Peigneur sinkhole, which began to form in 1980, and the Bayou Corne sinkhole, which formed in 2012.

Both of these sinkholes were caused by the human-influenced collapse of salt dome caverns. Thus, the future sinkholes are more likely to occur in locations that contained salt domes. Based on historic sinkhole formation, the future annual probability of sinkholes in 2043 is 0.01%.

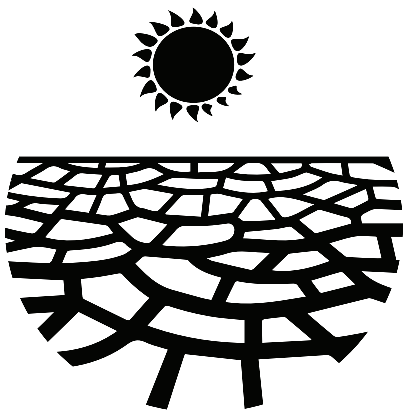
RISK ASSESSMENT

The projected property loss map shows the anticipated annual average losses due to sinkholes by census block.

1990 Location of Salt Domes in Louisiana

2043 Predicted Annual Property Losses from Sinkhole by Census Block

Expansive Soil



OVERVIEW

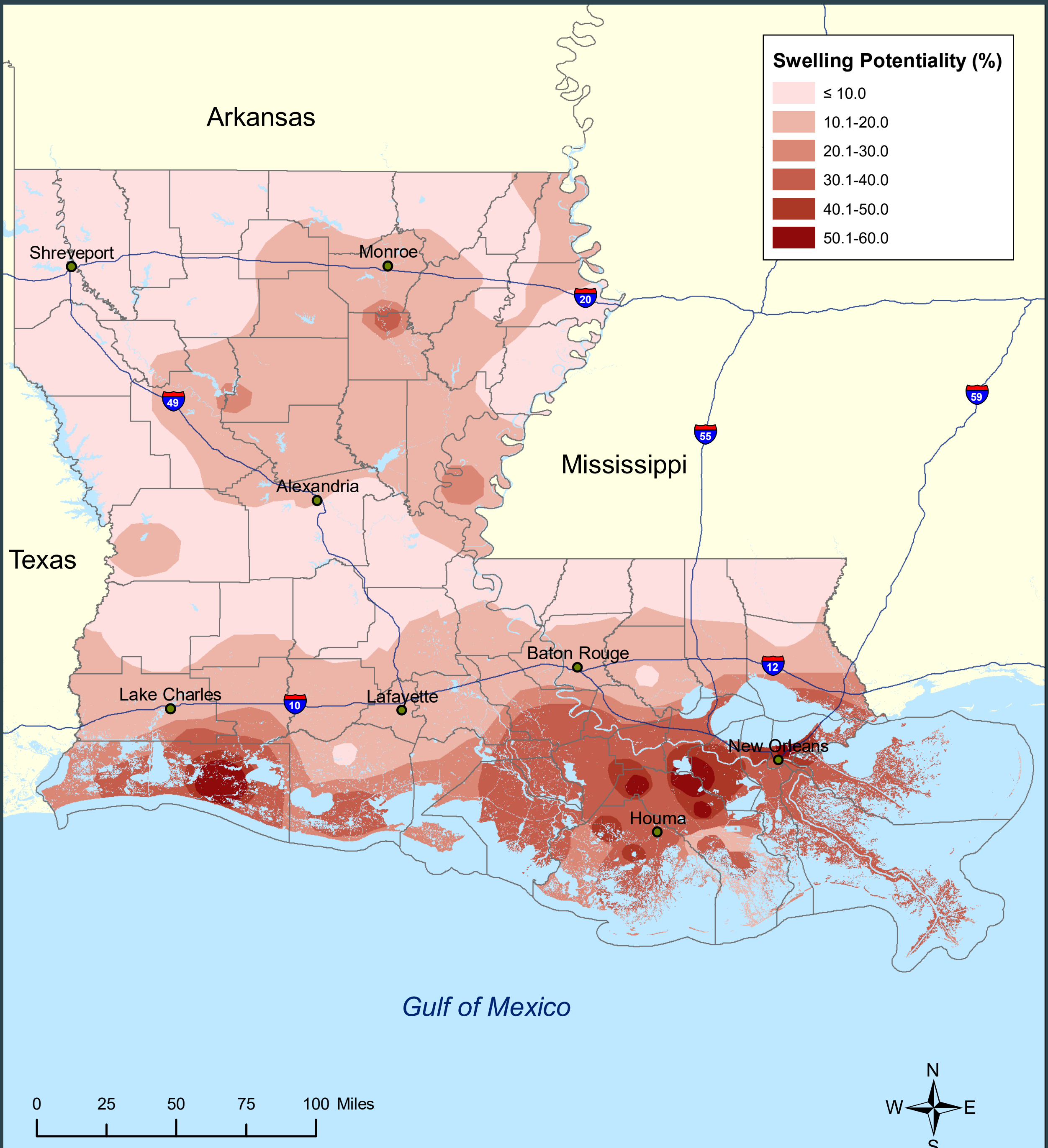
Soil and soft rock that tend to swell or shrink due to changes in moisture content are commonly known as expansive soil. Changes in soil volume present a hazard to lightweight structures built on top of expansive soil. Differential settlement of structures may occur, causing uneven shifting and settlement, cracks in the foundation and walls, and windows and doors that don't properly open. The American Society of Civil Engineers estimates that one-quarter of all homes in the United States are affected by expansive soil. Unlike the other hazards considered in this plan update, the effects of expansive soil are not manifested in a single event, but rather become evident over time. Therefore, no significant past events exist for discussion.

Researchers at Louisiana Tech University previously predicted the swelling potential of Louisiana soil. The following map indicates the existing severity of potential soil expansion. No increase in swelling potential is projected for 2043; therefore the current hazard map is used in the risk assessment.

RISK ASSESSMENT

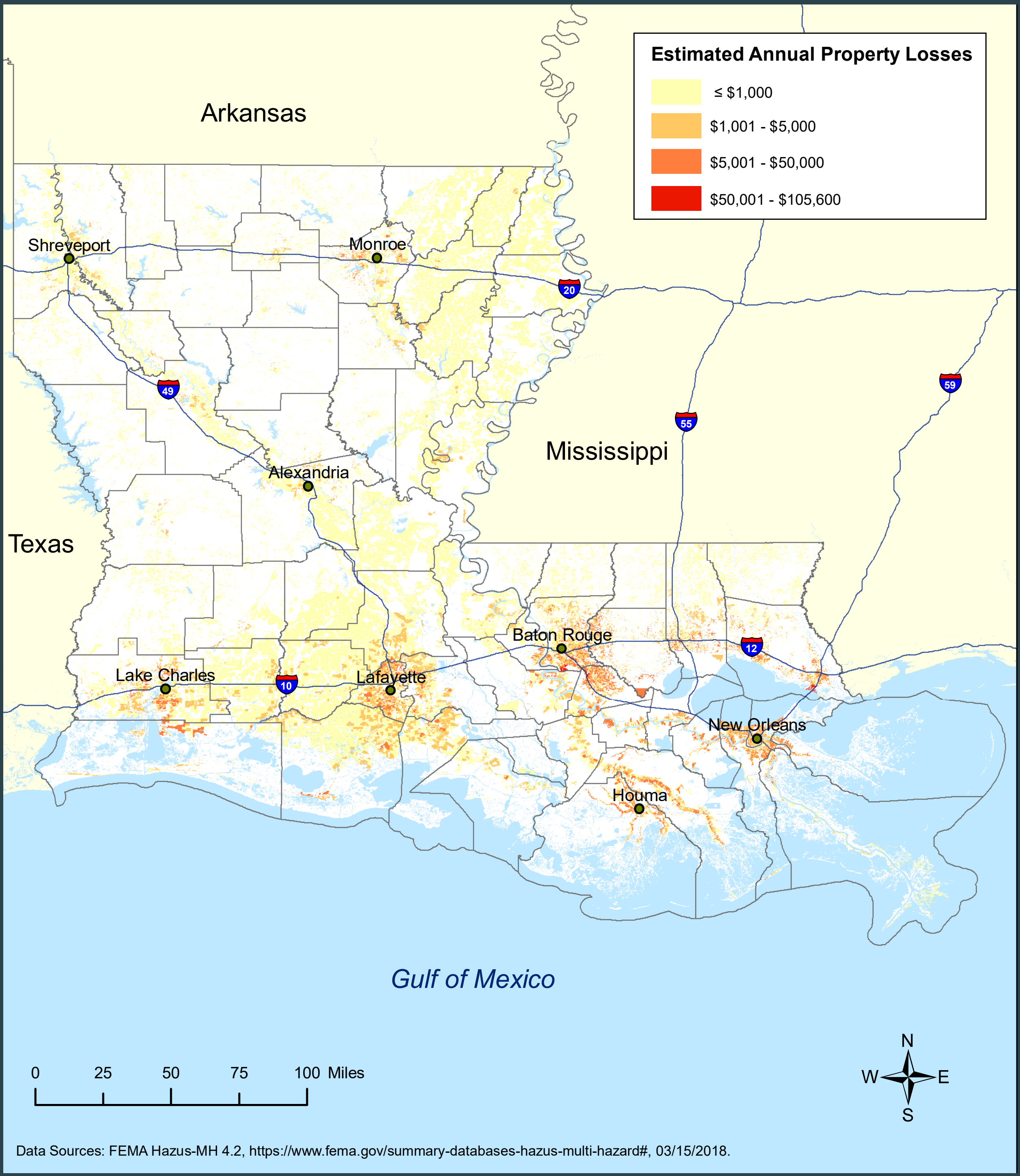
The projected property loss map shows anticipated annual average losses due to expansive soil by census block.

1962 Expansive Soil in Louisiana: Swelling Potential Distribution



Data Source: Expansive Soils and Practice in Foundation Engineering, 2016, http://www.ltrc.lsu.edu/ltc_16/pdf/presentations/10-University%20Transportation%20Centers%20(Part%201)-Characterization%20of%20Expansive%20Soils%20in%20Northern%20Louisiana.pdf, 03/07/2016.

2043 Predicted Annual Property Losses from Expansive Soil by Census Block



3
Capability Assessment

This chapter describes and evaluates the state of Louisiana's capabilities related to mitigation and its ability to implement its mitigation strategy. This section explores both pre- and post-disaster capabilities, including authorities, policies, programs, staff, funding, and other available resources. Information is also included on non-state stakeholder agents that collaborate with the state to reduce the impact of hazards.

This Capability Assessment not only summarizes the resources available to support mitigation, it identifies changes since the last plan update as well as opportunities for the state to improve its current capacity to reduce risk. As FEMA recognizes the connections between community resilience and areas such as the economy, housing, health and social services, infrastructure, and natural and cultural resources, these areas are addressed to the extent possible.

State Authorities, Policies, and Programs

This section describes the legal framework that supports hazard mitigation in Louisiana. It includes summaries of laws, planning and development authorities, state agencies, programs and policies, and other tools that directly or indirectly support statewide mitigation.

Overall, hazard mitigation directives originate mostly from the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) and the Coastal Protection and Restoration Authority (CPRA). Other state entities with planning and development related authority and programs in hazard-prone areas include:

- Department of Administration (DOA) - Office of Facility Planning and Control (FPC): regulation of state-owned property
- Department of Agriculture & Forestry (LDAF): enforcement of timber laws
- Department of Environmental Quality (DEQ): permitting programs
- Department of Natural Resources (DNR): Louisiana Coastal Resources Program (LCRP) and Coastal Use Permit (CUP)
- Department of Public Safety and Correction (DPS): Uniform Construction Code
- Department of Transportation and Development (DOTD): Statewide Flood Control Program; National Flood Insurance Program (NFIP) and the Community Rating System (CRS); Permits
- Department of Wildlife and Fisheries (LDWF): Scenic Rivers Program

The mitigation related activities of these state agencies as well as others are summarized in the next sections on plans, policies and programs.

Plans and Policies

The State of Louisiana has many mitigation related acts, plans, executive orders, and policies that support pre- and post-disaster hazard mitigation. Although some are integrated and take a holistic approach to hazard mitigation throughout the state, there is room for more coordination.

Examples of current mitigation related documents and responsible agencies include:

- Louisiana's Comprehensive Master Plan for a Sustainable Coast (CPRA)
- Louisiana State Continuity of Operations Plan (GOHSEP)
- Louisiana State Emergency Operations Plan (GOHSEP)
- Louisiana State Hazard Mitigation Plan (GOHSEP)
- Louisiana State Public Assistance Administrative Plan (GOHSEP)
- Louisiana State Uniform Construction Code (Department of Public Safety and Correction; Louisiana State Uniform Construction Code Council)
- Louisiana Unified Shelter Plan (GOHSEP)

Executive Order NO. JBE 2016-09, signed on April 4, 2016, directs all state agencies to operate in a manner consistent with Louisiana's Comprehensive Master Plan for a Sustainable Coast.

The Louisiana Homeland Security and Emergency Assistance and Disaster Act (Louisiana Disaster Act) R.S. 29:721-739 remains the driving legislation that affects preparedness, response, recovery, and mitigation programs. The Act provides structure and empowers the State and local governments to act in these phases of emergency management in the event of a natural or manmade disaster. Overall, the Louisiana Disaster Act defines roles for state, parish, local governments and non-governmental agencies and requires that emergency management functions be coordinated with those of the federal government and other states. Additionally, the Act provides guidance related to shelters, evacuations and curfews, financing, assistance identification, interstate and intrastate cooperation, liability limitations and immunity of personnel responding to disasters.

The goals of the Louisiana Disaster Act related to mitigation are as follows:

- To reduce vulnerability of people and communities of this state to damage, injury, and loss of life and property resulting from natural or man-made catastrophes, riots, or hostile military or paramilitary action;
- To authorize and provide for cooperation in emergency or disaster prevention, mitigation, preparedness, response, and recovery;
- To authorize and provide for management systems represented by coordination of activities relating to emergency or disaster prevention, mitigation, preparedness, response, and recovery by agencies and officers of this state, and similar state-local, interstate, and foreign activities in which the state and its political subdivisions may participate.

Among its many functions, the Louisiana Disaster Act established GOHSEP and its responsibilities. The Act authorizes GOHSEP's Hazard Mitigation Section in its Disaster Recovery Division to administer the Hazard Mitigation Grant Program and the Non-Disaster Hazard Mitigation Assistance Grants. The Hazard Mitigation Section, managed by the State Hazard Mitigation Officer and a Hazard Mitigation Section Chief, conducts outreach to communities, provides technical assistance to applicants, and manages grants to sub-grantees. Sub-grantees include state agencies, local governments, federally recognized Native American tribes, and private non-profit organizations.

Another notable policy is the establishment of the Coastal Zone Boundary in Louisiana Revised Statutes Article 49, §214.24. The Coastal Zone Boundary provides for state management of coastal resources in areas with a high level of coastal influence, ensures consistency with the Coastal Master Plan, and allows for reduction of coastal hazards and wetland impacts through permit review of development proposals. This work is conducted by DNR's Office of Coastal Management - Permits & Mitigation Division, and demonstrates Louisiana's strong commitment to coastal sustainability and improves the state's chances for federal funding for mitigation.

Programs

In addition to GOHSEP, various state departments implement programs and activities that support mitigation efforts throughout the state. Many of these programs are summarized here; although the programs often complement each other, they are not all implemented in coordination or support of one another.

Various offices under the DOA support mitigation activities throughout the state. These include the Office of Facility Planning and Control (FPC), the Office of Community Development

(OCD), and the Office of Risk Management (ORM). The Office of Facility Planning and Control (FPC) is responsible for administration of the state's capital outlay budget process, which includes preparation of a preliminary state construction plan. The state construction plan outlines state and local projects for possible funding. FPC is an effective mechanism for influencing the location of state-owned facilities within hazard areas. The DOA's regulation of state-owned property via capital outlay is effective because the funds are appropriated to FPC, and the design of the buildings is under that office's direction. For example, the FPC's location of new construction outside flood hazard areas and/or above base flood elevations actively supports the state's overall efforts to mitigate risk through land development. As the building code authority for state-owned property, FPC also enforces the International Building Code for all state buildings, whether or not they are funded through capital outlay. As the central leasing authority for all state-owned property, FPC further enforces standards in the procurement of leases and has the authority to set the geographic limits for the bidding of leases. FPC has less control over decisions related to construction of state-owned facilities because such construction usually takes place on existing state-owned sites. Decisions for such facilities are usually guided by proximity to existing facilities and similar functional concerns.

The Disaster Recovery Unit within the Division of Administration's Office of Community Development (OCD-DRU) is dedicated to helping Louisiana's residents recover from hurricanes Katrina, Rita, Gustav, Ike, Isaac and the Great Floods of 2016. As the state's central point for disaster recovery, OCD-DRU manages the most extensive rebuilding efforts in American history, working closely with local, state and federal partners to ensure that Louisiana's recovery is safer, stronger and smarter than before. Since the last plan update, OCD-DRU has closed Road Home offices (related to Hurricanes Katrina and Rita) and have developed the Restore Louisiana Homeowner Assistance Program in response to the significant flooding that occurred in 2016. Applicants of Restore Louisiana, who are required to elevate their homes, must agree to elevate to either the local jurisdiction's elevation height requirement or two feet above the Advisory Base Flood Elevation (ABFE), whichever is higher. OCD-DRU also administers two new planning efforts, LA SAFE and the relocation of Isle de Jean Charles (see Chapter 5 – Mitigation in Action for more details on these efforts).

The Office of Risk Management (ORM) administers the state's self-insurance program. ORM is responsible for managing all state insurance coverage covering property and liability exposure. It offers risk management training resources through conference presentations and on it's website.

The National Flood Insurance Program (NFIP) is another tool used by the State to mitigate the impacts of flooding through the regulation of development in vulnerable areas. All parishes in the state of Louisiana participate in the NFIP; a total of 316 communities participate in the program. LA DOTD houses Louisiana's Floodplain Management Office, which is a statewide resource for floodplain management activities to include the NFIP. Floodplain Management Office staff also serve as liaisons with FEMA Region VI and the regional NFIP office. Participation in the NFIP is required for a community to apply for Flood Mitigation Assistance (FMA) funds (administered by GOHSEP). As of June 2018, there were 489,260 NFIP policies in force across the state; an increase of 2.28% or 10,805 properties from June 2017.

LA DOTD also supports the participation of Louisiana communities in the NFIP's **Community Rating System** (CRS). The CRS is a voluntary program that rewards communities that implement floodplain management activities that go beyond those required by the NFIP. Forty-three Louisiana NFIP communities participate in the CRS. These 43 communities represent 83% of the state's NFIP policies and enjoy over $29 million dollars in premium savings. Since the last Plan update, two new communities have joined the CRS - the Town of Jean Lafitte and the City of Covington. Table 1 provides information on Louisiana communities that participate in the CRS along with their class ratings, related savings in NFIP premiums and the number of NFIP policies.

Table 1 - Louisiana Parish Participation in the NFIP CRS (Source: Community Information System (CIS), June 2018).

CRS Participation in Louisiana

COMMUNITY	CRS Rating	Savings	Number of Policies
Ascension Parish	8	$638,698	13,466
Baker	9	$23,568	802
Bossier City	8	$259,168	3,426
Caddo Parish	9	$22,345	761
Calcasieu Parish	8	$363,025	8,014
Carencro	8	$11,715	488
Central	8	$271,306	5,169
Covington	9	$39,192	1,529
Denham Springs	8	$261,747	2,127
East Baton Rouge Parish	7	$2,911,893	36,322
French Settlement	9	$6,825	201
Gonzales	8	$83,739	1,312
Gretna	8	$215,460	3,115
Harahan	8	$36,396	2,577
Houma	7	$197,877	4,850
Jean Lafitte	8	$38,362	271
Jefferson Parish	6	$11,918,167	86,875
Kenner	7	$1,915,814	16,026
Lafayette	8	$284,574	7,657
Lafayette Parish	8	$329,340	11,161
Lake Charles	9	$112,032	6,062

Livingston Parish	9	$459,548	15,767
Lutcher	9	$128	298
Mandeville*	6	$243,722	3,108
Morgan City	8	$121,564	1,694
New Orleans/Orleans Parish	8	$2,942,832	80,824
Quachita Parish	9	$70,783	2,415
Rayne	9	$4,487	320
Ruston	9	$1,618	81
Scott	8	$86,518	984
Shreveport	8	$324,444	4,796
Slidell	7	$1,000,037	6,718
Sorrento	9	$14,383	307
St. Charles Parish	8	$455,124	11,761
St. James Parish	7	$16,743	1,216
St. John the Baptist Parish	8	$353,792	7,026
St. Tammany Parish	7	$2,165,205	37,798
Tangipahoa Parish	9	$113,875	7,577
Terrebone	7	$854,562	11,242
Walker	8	$100,728	1,138
West Baton Rouge Parish	8	$18,385	917
Westwego	8	$38,790	1,272
Zachary	7	$65,172	1,171
TOTALS		**$29,393,683**	**405,472**

*The City of Mandeville increased to a class 6 but updated savings was unavailable.

Also following the last Plan update, the State Hazard Mitigation Officer (SHMO) attended a field deployed NFIP/CRS class demonstrating support of and potential coordination with AL DOTD and local CRS communities. Following the class, the SHMO has investigated ways in which GOHSEP can support communities in the implementation of CRS activities. The SHMO also participates in CRS Users group meetings. In addition, the State has collaborated with the University of New Orleans' Center for Hazards assessment, Response and Technology (UNO-CHART) to develop a CRS Strategy for the State that is found in Appendix D.

La DOTD also implements the **Statewide Flood Control Program**. This program supports flood risk reduction through the construction of flood control infrastructure. With funds allocated annually by the Legislature, La DOTD constructs projects that reduce or eliminate the incidence of flooding or damages in specific areas. Types of projects include channel modifications; levee, canal, and spillway construction; stormwater detention; flood proofing of structures; regulation of floodplains; relocation assistance; or other structural or non-structural measures.

FEMA is working with federal, state, tribal and local partners across the nation to identify flood risk and promote informed planning and development practices to help reduce that risk through the Risk Mapping, Assessment and Planning (**Risk MAP**) program. Since the last mitigation plan update, the State of Louisiana has become a more active participant in Risk MAP through the Cooperating Technical Partners (CTP) Program. DOTD – State Floodplain Management Office manages the CTP program with support from Dewberry Consultants, LLC. Since becoming a CTP, DOTD has been diligently planning and working with FEMA Region VI toward the release of updated flood risk information for Louisiana. LADOTD has made a significant investment in the development of the Project Prioritization Tool Decision Tool, which allows for a more efficient and effective selection and prioritization of projects based on key criteria like: (1) FEMA's Risk MAP metrics; (2) known flood risk concerns; (3) knowing where communities have conducted flood studies or produced other relevant data that can be used as leverage and count toward cash match contributions; (4) communities are at risk; and (5) the most current LiDAR data.

In 2015, the **Water Institute of the Gulf** was also selected a CTP and awarded funding to prepare a business plan describing how the organization can support FEMA's Risk Mapping, Assessment and Planning (Risk MAP) initiative, and the National Flood Insurance Program (NFIP).

Following Hurricanes Katrina and Rita in 2005, the **Coastal Protection and Restoration Authority** (CPRA) was established as the single state entity with authority to articulate a clear statement of priorities to achieve comprehensive coastal protection and create a more sustainable Louisiana. The Louisiana State Legislature charged CPRA with responsibility for "hurricane protection and the protection, conservation, restoration, and enhancement of coastal wetlands and barrier shorelines or reefs" throughout southern Louisiana's coastal zone, which is comprised of the contiguous areas subject to storm or tidal surge. CPRA's mandate is to develop, implement, and enforce a comprehensive, long-term coastal protection and restoration strategy. This is done through the Louisiana's Comprehensive Master Plan for a Sustainable Coast, a document with a 50-year planning horizon (updated every 6 years) and the Integrated Ecosystem Restoration and Hurricane Protection in Coastal Louisiana Annual Plan, a projection of expenditures (updated yearly).

CPRA acts in direct response to both legislative and executive orders. According to the Louisiana Revised Statutes §214.1(C),

> The state must act to conserve, restore, create, and enhance wetlands and barrier shorelines or reefs in coastal Louisiana while encouraging use of coastal resources and recognizing that it is in the public interest of the people of Louisiana to establish a responsible balance between development and conservation. Management of renewable coastal resources must proceed in a manner that is consistent with and complementary to the efforts to establish a proper balance between development and conservation.

Moreover, Governor Edwards' Executive Order No. 2016-09 highlights the need for the master plan to drive and expedite state action across agencies. The same need applies to the state's partners at the local and federal levels, consistent with their mandates and missions. Given the coastal erosion emergency facing Louisiana, it is imperative that all government agencies act quickly and in accordance with CPRA's Coastal Master Plan. To help achieve this, CPRA is working closely with other entities on coastal issues, including local and parish governments; the state legislature; the Governor's Advisory Commission on Coastal Protection, Restoration, and Conservation; the Louisiana Recovery Authority (LRA); LRA's Louisiana Speaks regional planning process; and Louisiana citizens and coastal stakeholders.

The Governor's executive assistant for coastal activities chairs the CPRA Board. Agency representatives on the CPRA Board include the secretaries of the: Department of Natural Resources (DNR), Department of Transportation and Development (DOTD), Department of Environmental Quality, Department of Wildlife and Fisheries, Department of Economic Development; the commissioners of the Department of Agriculture and Forestry, Department of Insurance, Division of Administration; and the director of the Governor's Office of Homeland Security and Emergency Preparedness. Additionally, CPRA Board membership includes executive board members of the Police Jury Association, levee district presidents from coastal Louisiana, and designees of the Senate President and Speaker of the House.

CPRA also administers the Flood Risk and Resilience Program, which is described in Chapter 5 – Mitigation in Action.

Coordination between state and local authorities is vital in hazard mitigation. For instance, although the Louisiana **Uniform Construction Code** (UCC) may be enforced at the state level through the Office of State Fire Marshal (upon request for commercial construction), local education regarding the UCC is coordinated and supported by DPS through the Louisiana State Uniform Construction Code Council (LSUCCC). Since it went into effect in 2007, the UCC has had a significant impact on lowering risk by reducing exposure to wind- and flood-related hazards in hazard areas through the direct regulation of land use and development. Additionally, the UCC is adopted on the state level and all parishes are required to provide enforcement of the UCC. Recent reviews by the LSUCCC indicate that a small percentage of local officials are either not aware of UCC-enforcement, or they are inadequately equipped to provide proper enforcement. Continuing education of local officials is needed.

Since the last plan update the LSUCCC adopted the 2015 editions of the International Building Code, International Residential Code, International Plumbing Code, International Existing Building Code, International Fuel Gas Code and International Mechanical Code, and the 2014 edition of the National Electric Code. Consequently, the minimum one foot of elevated space, also known as "freeboard," that had been required for special flood hazard areas, has been removed. While many local jurisdictions do enforce at least one foot of freeboard, many members of the State Hazard Mitigation Committee recommended a statewide freeboard requirement.

Many mitigation programs operate effectively and are integral to agency objectives. The permanent protection of wildlife habitat through cash sale acquisitions, donations, or conservation easements in the **Land Acquisition Program** is a way to help accomplish the DWF's mission and to advance hazard mitigation goals. Since its inception, the program has acquired almost 610,000 acres of wildlife habitat through fee title acquisitions, donations, or land transfers. An additional 516,167 acres are under variable-length, lease agreements between DWF and private corporations, governmental agencies, and non-governmental organizations. The leased properties represent unprotected fish and wildlife habitat. The owned and leased properties collectively make up the 61 Wildlife Management Areas and Refuges managed by DWF. The WMAs and refuges provide a wide variety of habitats that help fulfill DWF's mission. The success of the land acquisition programs depends upon several factors. Funding is the primary limiting factor and therefore, it is extremely important to have a sufficient and sustained funding source. Land prices continue to escalate, particularly within the past few years as competing interests from land development, alternative fuels, and environmental projects such as carbon sequestration have emerged. Unfortunately, DWF's funding source has been static, thereby severely limiting its ability to acquire habitat from willing sellers.

Another program related to mitigation and mission is the **Scenic Rivers Program** at DWF, which is responsible for preserving, protecting, developing, reclaiming, and enhancing the wilderness qualities, scenic beauties, and ecological regimes of certain free-flowing Louisiana streams. DWF identifies projects requiring Scenic River Permits by (1) conducting routine surveillance of these streams; (2) responding to information provided by the public and local governing authorities; and (3) reviewing notices published by those seeking other state and federal permits for potential impacts to these streams. Channelization, clearing and snagging, channel realignment, reservoir construction, commercial clear cutting of trees within 100 feet of the ordinary low water mark, and use of motor vehicles within the stream are prohibited on designated Scenic Rivers in Louisiana. By imposing restrictive permit conditions, modifying proposed activities in ways that minimize or eliminate impacts, and enforcing the provisions of the Scenic Rivers Act to insure compliance, DWF has been very effective in preserving vegetated stream buffers, protecting water quality, and minimizing the encroachment of development and protecting the natural character and flood-mitigation capacity of these streams. There are currently approximately 80 streams, rivers and bayous in Louisiana's Natural and Scenic Rivers System, which includes approximately 3,000 linear stream miles.

Established in 1980, the DNR's Louisiana Coastal Resources Program (LCRP) requires permits for activities which have direct and significant impacts on coastal waters. Coastal Use Permit (CUP) applications are processed with respect to the consistency of the proposed use with the LCRP. Impacts to wetlands and coastal protective features, as well as hazard potentials, are elements which are evaluated during the CUP review process. The DNR developed a strategic plan pursuant to state law that requires the creation of performance measures. The LCRP's major performance measure is wetland mitigation. The goal is for the LCRP to obtain 100% compensatory habitat mitigation for permitted wetland impacts. The performance measure is reported to the Legislature on a quarterly basis, is subject to auditing, and is available to the public. The LCRP mitigation performance measure has never been less than 100% and is usually greater than 100%.

The **Louisiana Coastal Wetland Conservation Plan** also provides documentation of the state's mitigation requirements through the conditional use permit (CUP) process managed by DNR. The documentation takes the form of a biannual report to Congress composed by the U.S. Fish and Wildlife Service, EPA, and USACE. Louisiana's Coastal Zone Inland boundary was modified in the 2012 Regular Session of the Louisiana Legislature with the passage of House Bill 656 (Act 588). Boundary changes are based on the recommendations of a scientific study conducted for and approved by CPRA.

Coastal forests in Louisiana are a valuable for many reasons including serving as buffers to hurricane storm surge and winds. The goal of the **Coastal Forest Conservation Initiative** (CFCI) is to conserve and protect coastal forest resources in Louisiana. The primary objective of the CFCI is to acquire land rights (fee title or conservation servitude/easement) from willing landowners to address demonstrated threats of conversion and/or opportunities for restoration, conservation, or enhanced sustainability of coastal forest tracts that provide significant ecological value and/or provide storm damage reduction functions. The primary objective of the CFCI is to acquire land rights that meet at least one of the following criteria:

- Provide direct storm damage reduction potential or protection of hurricane/storm protection features and measures (e.g., levees, cheniers, etc.);
- Areas of high ecological significance; or
- Tracts that are in danger of conversion to non-forested uses.

To date, the CFCI program has negotiated the purchase of a servitude on a 4,728-acre property in St. Mary Parish that includes high quality bald cypress/tupelo swamp as well as bottomland hardwoods, and provides protection to a hurricane protection levee. The program was also the major contributor to the acquisition of 29,630 acres of bald cypress/tupelo and bottomland hardwood forest in the Maurepas Swamp. This acquisition increased the size of the Maurepas Swamp Wildlife Management Area to over 100,000 acres, thereby conserving the property and expanding recreational opportunities.

These findings demonstrate the commitment to mitigation, pre- and post- disaster as well as through regulation of development, by numerous state entities. While many of the programs focus on mitigation through coastal zone monitoring, permitting and restoration, a variety of programs focus on risk reduction related to riverine and backwater flooding as well as high winds, wildfires, drought, and other hazards. While many of the programs included in this table are quite successful, many are impacted by limited resources (e.g., staff, funding, and/or technical support.

Table 2 summarizes the state policies, programs, and development authorities by state agency.

Agency	Pre-Disaster	Post-Disaster	Regulation of Development
CPRA	**Planning and implementation of structural and nonstructural protection programs and projects throughout coastal Louisiana** Quarterly and annual inspection of federal, state, and local levees and other flood protection projects in Louisiana coastal area Local cost-share partner for levee construction and other structural protection measures Provide technical assistance, training, and certification for levee inspectors and levee owners Review of permits on riverine and hurricane protection activities	None	None

Agency	Pre-Disaster	Post-Disaster	Regulation of Development
CPRA	Development and prioritization of nonstructural projects in 2017 Coastal Master Plan Support of land use planning through: CPRA's Flood Risk and Resilience Program, publication of Best Practices Manual for Development in Coastal Louisiana and the Louisiana Coastal Land Use Toolkit **Planning, engineereing, design, construction, operation, maintenance, and monitoring of coastal restoration projects** State-funded coastal restoration projects (e.g., sediment diversions, marsh creation, barrier island restoration, ridge restoration, hydrologic restoration, shoreline protection, bank stabilization, oyster barrier reefs, and others) Obtains federal cost-share funding for and implements coastal restoration programs, feasibility studies, and projects. **Public outreach and education** 4-H Youth Wetlands Education and Outreach Program Coastal Science Assistantship Program (CSAP) LSU Center for River Studies Master Plan Data Viewer	None	None

Agency	Pre-Disaster	Post-Disaster	Regulation of Development
GOHSEP	**State administration of federal grant programs:** · PDM · FMA Coordination of state and local mitigation planning Community Education and Outreach Training Programs	**State administration of federal grant programs:** · HMGP · Individual Assistance (IA) · Public Assistance (PA) · PA/406 HMGP	None
LA Department of Agriculture and Forestry (LDAF)	Fire weather forecasting Soil and water conservation Animal Health Services (food security) Formosan Termite Initiative Louisiana Project Learning Tree (K-12 environmental education) Partner with CPRA in pre-disaster exercises Hazard Mitigation is taken into consideration as part of planning, development projects and timber management	Production of reforestation seedlings Livestock recovery information and activities, working with CPRA	Enforcement of timber laws
LA Department of Corrections (DOC)	Mass care and evacuation support for municipal and parish correctional facilities. Loss Prevention Unit (employee injury, property and records loss) State and local emergency management planning (ESF-6, housing, feeding, medical and mental healthcare)	General Support EOC Task Force DOC HQ Incident Management Center Continued mass care and evacuation support for municipal and parish correctional facilities Backup power generation Information/Business Continuity–(DOA) Living Disaster Recovery Program (LDRP)	None

Agency	Pre-Disaster	Post-Disaster	Regulation of Development
Louisiana Economic Development (LED)	LED's Community Competitiveness Initiative offers support to community adherence to emergency preparedness principles including mitigation and emphasizes its importance in an "economic development" capacity building program.	Post-Disaster Economic Impact Analysis in coordination with LSU Work closely with Small Business Administration (SBA) and Small Business Development Centers to provide post-disaster support	None
LA Department of Environmental Quality (DEQ)	Nuclear Power Plant Off-site Emergency Preparedness Program Radiological Emergency Planning and Response Remediation program Ozone Action Drinking Water Well Protection Program Motor Vehicle Inspection and Enforcement Program EnviroFlash	Underground Storage Tank and Remediation Division (USTRD)	Permitting Programs (Air, Water, Waste)
LA Department of Health (LDH)	Fight the Bite Program (West Nile Virus) Bioterrorism Unit (training) Pandemic program	Disaster Case Management Regional Response Team Mobile Field Units Immunization Teams Evacuation Planning Requirement for Licensing Nursing Homes and Home Health Agencies Special Needs Shelters	None
LA Department of Insurance (LDI)	Consumer 101 public education includes oversight "watchdog" functions for protecting policyholders with private insurance companies and providing information on the NFIP. Also is proactive in storm mitigation education via press conferences, news releases and a mitigation brochure.	Office of Consumer Advocacy receives inquiries and complaints from consumers; prepares and disseminates information to inform and assist consumers; and may provide direct assistance and advocacy via one on one presentations and consultations. Office of Property and Casualty also receives complaints from consumers and seeks to resolve complaints in a timely manner with insurance companies.	Performs regulatory permit functions and mitigation activities related to the State's coastal zone; issues Coastal Use permits

Agency	Pre-Disaster	Post-Disaster	Regulation of Development
LA Department of Natural Resources (DNR)	Digital Mapping (Geographic Information System (GIS)) Distributes information on causes of coastal and wetland erosion and methodologies to restore coastal and wetland areas Coastal Zone Management program and grants Coastal Wetlands Reserve Program Parish Coastal Wetlands Restoration program Prepares and plans for large scale evacuations and/or disruptions to the public fuel supply	Surveys coastal restoration projects for damages and seeks FEMA funding as appropriate for needed repairs Digital Mapping (GIS) Provides visibility on the public fuel supply for large scale evacuations and/or disruptions to the public fuel supply	Performs regulatory permit functions and mitigation activities related to the State's coastal zone; issues Coastal Use permits
LA Department of Public Safety (DPS)	Provides for the administration of the Louisiana State Uniform Construction Code Council (LSUCCC) Provides assistance to the LSUCCC and supports local education and training of the UCC	OSFM Urban Search and Rescue and Rapid Response teams assist local efforts Louisiana Traffic Safety Incident Management System (ICS)	OSFM reviews all new construction and renovation of existing structures statewide for compliance with life safety, fire protection, and accessibility regulations OSFM provides enforcement of the LSUCC where requested by parishes and municipalities or individuals
LA Department of Culture, Recreation & Tourism (CRT)	Public education on disaster related topics are included in agency nature programs	Extended Recreation Sites operational hours for possible housing locations Sites used as staging areas	None
LA Department of Transportation & Development (DOTD)	State management of NFIP Statewide Flood Control Program Ports Construction and Development Program Dam Safety Program Floodplain Management Program FEMA Cooperating Technical Partner (CTP) Educates and assists communities with CRS participation	Floodplain Management Staff contacts each community within the declared disaster area to discuss the rules and regulations of the NFIP with a special emphasis on the community's post-disaster responsibilities Ports Construction and Development Program Post-disaster damage assessments	Permitting for all state roads and highways including road access and easements Permitting for all new construction and modifications to dams in Louisiana

Agency	Pre-Disaster	Post-Disaster	Regulation of Development
LA Department of Transportation & Development (DOTD)	Educates and encourages working relationships between community NFIP staff and local HMGP POCs Plans and conducts educational workshops for local officials Produces and distributes a quarterly NFIP newsletter LA. Emergency Evacuation Plan, including highway contra-flow and evacuation of persons without access to transportation		
LA Wildlife & Fisheries (WLF)	Environmental Education Commission Courses and Programs Woodworth & Waddill Outdoor Education Centers La Green Schools Program	Operates staging facilities for Search and Rescue (Enforcement Division) Utilizes building elevation and hardening in reconstruction effort	Land Acquisition for Wildlife Management Program Scenic Rivers Program
LA Division of Administration (DOA)	Construction of state-owned structures via Facility Planning and Control (FPC) Integrating mitigation design features when feasible Enforcement of State and Federal regulations for design and construction of State buildings Maintenance of Facilities Management database LA SAFE (OCD)	Disaster Recovery projects for state facilities (FPC) Designated applicant for public assistance to FEMA for all permanent repairs for Katrina and Rita (FPC) Administers Restore Louisiana Homeowner Assistance Program (OCD) Elevation, Pilot Reconstruction, and Individual Mitigation Measures (OCD) Administers CDBG infrastructure grants through the Office of Community Development	FPC is the Building Code authority for all State owned buildings (with limited exceptions) FPC administers development activities of all non-DOTD State owned property through administration of the capital outlay bill FPC is the central leasing authority for all State agencies

Hazard Mitigation Capabilities

This section describes the state's hazard mitigation capabilities, which include dedicated staff, technical expertise, and financial resources.

Mitigation Personnel

Since the 2014 Plan Update, GOHSEP continues to streamline internal processes and maintains a relatively smaller staff. The total number of employees in the Hazard Mitigation Division is 51; this number includes only seven contractors or about 14% of the staff. The relatively low number of contractors on staff reflects the continued building of internal capacity within the Mitigation Division. Staff members as are assigned as follows:

Assistant Deputy Director: 1 State Staff
Executive Officer: 1 State Staff
Grants Management: 14 State Staff / 0 contractors
Closeout: 12 State Staff / 4 Contract Staff
Technical Services: 5 State Staff / 1 Contract Staff
State Applicant Liaisons: 11 State Staff / 2 contract Staff

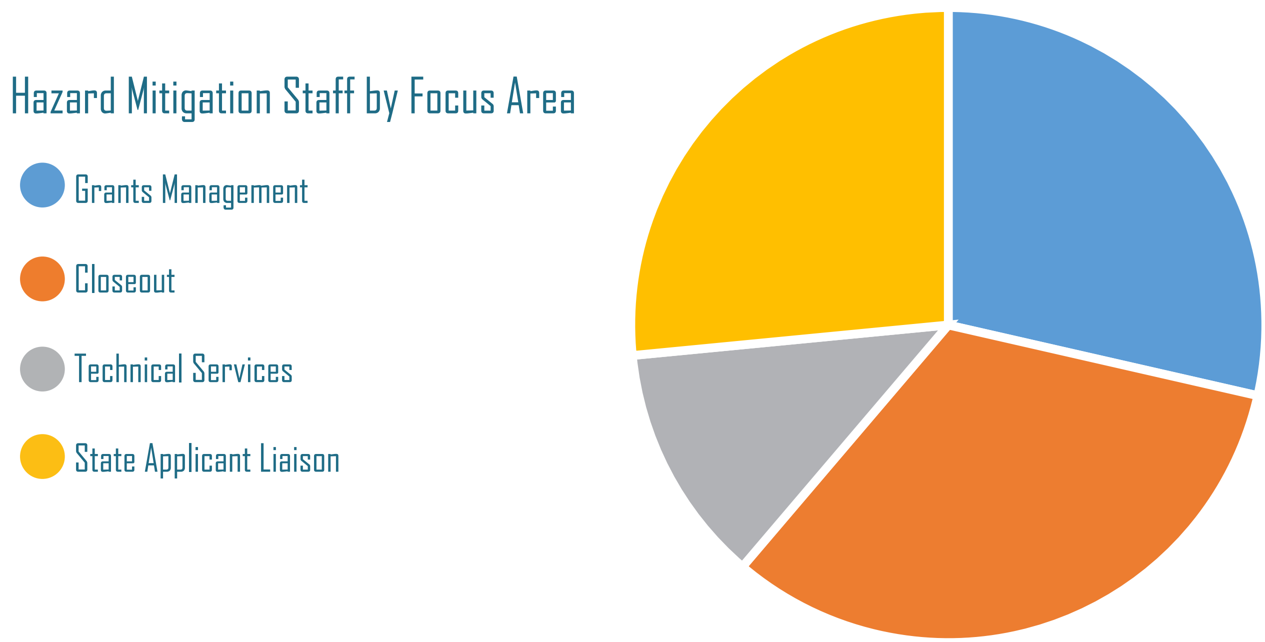


Figure 1 - Hazard Mitigation Staff by Focus Area

The staff's areas of focus appear relatively well balanced, but as expected during the last Plan update, the closeout staff is now the largest group followed by grants management and state applicant liaisons. The technical services team is the smallest of the groups (see Figure 1). Although there are no plans for additional staff at this time, there is a need for additional capacity to review and perform benefit cost analysis.

One issue that has remained constant since the last plan update relates to salary. Salary levels for mitigation staff remain non-competitive with salaries for similar work in the private sector and at federal levels. This remains a challenge for the state to maintain staff levels.

The Mitigation Division continues to participate with FEMA in the annual State Mitigation Program Consultation. The State Hazard Mitigation Officer attends the meeting along with various state agencies. This annual meeting allows GOHSEP to check-in with its FEMA partners and to review strengths and weaknesses.

Mitigation staff also attend federal and state sponsored training and professional development classes, in person and online. In 2018, staff attended the E0212 Hazard Mitigation Assistance: Developing Quality Application Elements course and the E0273 Managing Floodplain Development through the National Flood Insurance Program course.

Although many mitigation programs are implemented at the local level (e.g., floodplain management, Uniform Construction Code (UCC) enforcement, coastal zone management, etc.), the State is prepared to offer technical assistance in various areas related to mitigation, as referenced in the list of mitigation related programs (see Figure 2). GOHSEP leads the development, implementation, and maintenance of the Hazard Mitigation Plan Updates. In addition, it is the lead agency in the administration and management of FEMA related grants. Since the last Plan update, GOHSEP has completed the development of LouisianaHM.com

(LAHM), a web-based tool designed to manage all aspects of a State's activities relative to FEMA's Hazard Mitigation Assistance (HMA) grant programs. GOHSEP uses LouisianaHM.com for all open disasters as a tool to manage the relationship between a State or recipient and its applicants or subrecipients, and to serve as a central repository to track all data, documents and activities relative to a State's fiduciary responsibility to administer FEMA HMA grant funding. This tool also integrates with the State financial system so that payments approved and generated in the system trigger payments from the State to the subrecipients. The system also provides audit and history logs, and permissions based workflows and triggers.

In addition to staff within GOHSEP, various other state agencies and departments have staff dedicated to mitigation planning and project implementation. These include CPRA, DOTD, DNR, and OCD.

Technical Capacity

Various state agencies collect, maintain, and share GIS data that supports hazard mitigation. These agencies include CPRA, DOTD, DOA, DNR, DEQ and others. Additionally, there are regional entities, universities, and local jurisdictions that maintain and share GIS data with the State. The Louisiana Geographic Information Council (LAGIC), composed of representatives from various state agencies and several local, regional and federal organizations, also supports the coordination of data. CPRA makes its coastal protection and restoration data publically available through CIMS (Coastal Information Management System). CIMS provides geospatial, tabular database and document access to CPRA's suite of protection and restoration projects, Coastwide Reference Monitoring System (CRMS) stations, the 2017 Master Plan, geophysical data, and coastal community resiliency information. There are three options for viewing CPRA's spatial data: a main spatial viewer, a coastal project map portal, and the Master Plan Data Viewer. The Master Plan Data Viewer is an interactive tool that connects coastal Louisiana residents with more information about their current and future risk. The Viewer includes data collected for the 2017 Coastal Master Plan and includes information on land change, flood risk and economic damage, coastal vegetation change, social vulnerability, 2017 Coastal Master Plan projects, and resources to connect homeowners to resources to take action and further reduce risk. In addition, all of the information in the Master Plan Data Viewer is available to download. These data are a powerful resource for hazard mitigation.

Virtual Louisiana is a Google Earth Enterprise platform that serves as an information-sharing gateway for emergency management. It is available to various state agencies but is not widely used. Additional infrastructure to allow for GIS data sharing includes a Geospatial portal built by the Stephenson Disaster Management Institute (SDMI) at Louisiana State University. SDMI also developed Geospatial portal for GOHSEP in which it hosts all hazard mitigation related infrastructure data. The Geospatial portal is a one-stop shop; however, this may change as DOTD has also started a new GIS initiative.

Although the state's capacity to manage GIS data regarding risk and hazard mitigation continues to improve, areas for improvement remain since the last plan update. GOHSEP still relies on the GIS capabilities of other state agencies, as there is currently only one part-time staffer with GIS expertise. Overall, recommendations to provide better technical support for future mitigation planning and implementation remain since the last plan update:

Increase skill-specific professional development opportunities for hazard mitigation staff
Increase funding for GIS and hazard modeling software maintenance and licensing
Build an internship program to support staffing needs
Participate in EMAC events to share and implement best practices

As suggested in the last plan update, GOHSEP should continue to pursue collaborations with Louisiana universities and other state, regional and local entities to implement these recommendations and to address gaps in its technical capacity. In addition, the State should support the interest of some GOHSEP staff to pursue professional certification under programs such as the Certified Floodplain Management administered by the Association of State Floodplain Managers (ASFPM).

Financial Capacity

The State continues to implement hazard mitigation projects using both federal and state funding sources. These sources vary across federal and state agencies; the sources are summarized below beginning with federal programs upon which the state relies. Noteworthy is the fact that much of our funding supports hazard mitigation through coastal programs and projects; these programs are included in this section.

Federal Sources of Funding

FEMA provides funding for eligible mitigation planning and projects through the following three Hazard Mitigation Assistance (HMA) programs: the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance (FMA) Program, and the Pre-Disaster Mitigation (PDM) Program. HMA funds support the State of Louisiana in its implementation of mitigation activities that protect lives and property, and foster hazard resilience across the state. Activities that may be funded under HMA programs are described in FEMA's 2015 Hazard Mitigation Assistance Guidance and are summarized below in Error! Reference source not found.Error! Reference source not found.. Since the last mitigation plan update, the State of Louisiana has successfully applied for millions of dollars in HMA funds.

FEMA's Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments/private non-profits (through the state) to implement long-term hazard mitigation measures following a presidential disaster declaration. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable implementation of mitigation measures during the recovery phase. Mitigation projects for which the state has received funding include drainage projects, structure elevations, floodwalls, road elevations, property acquisitions, development of mitigation plans, development of land-use regulations, safe rooms, and more.

Table 3 - Eligible Activities by FEMA program (Hazard Mitigation Assistance Guidance, February 27, 2015)

Eligible Activities	HMGP	PDM	FMA
1. Mitigation Projects	X	X	X
Property Acquisition and Structure Demolition	X	X	X
Property Acquisition and Structure Relocation	X	X	X
Structure Elevation	X	X	X
Mitigation Reconstruction	X	X	X
Dry Floodproofing of Historic Residential Structures	X	X	X
Dry Floodproofing of Non-residential Structures	X	X	X
Generators	X	X	
Localized Flood Risk Reduction Projects	X	X	X
Non-localized Flood Risk Reduction Projects	X	X	
Structural Retrofitting of Existing Buildings and Facilities	X	X	X
Non-strucural Retrofitting of Existing Buildings and Facilities	X	X	X
Safe Room Construction	X	X	
Wind Retrofit for One- and Two-Family Residences	X	X	
Infrastructure Retrofit	X	X	X
Soil Stabilization	X	X	X
Wildfire Mitigation	X	X	
Post-Disaster Code Enforcement	X		
Advance Assistance	X		
5-Percent Initiative Projects	X		
Miscellaneous/Other (1)	X	X	X
2. Hazard Mitigation Planning	X	X	X
Planning Related Activities	X		
3. Technical Assistance			X
4. Management Cost	X	X	X

(1) Miscellaneous/Other indicates that any proposed action will be evaluated on its own merit against program requirements. Eligible projects will be approved provided fuding is available.

The goal of FEMA's Flood Mitigation Assistance (FMA) is to reduce or eliminate claims under the NFIP. FMA provides funding to assist states and NFIP-participating communities in implementing plans, projects, and programs to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. This includes acquisitions and elevations. In 2015, the University of New Orleans, in partnership with the State successfully applies for FMA funds to develop a CRS Strategy for the State of Louisiana (see Plan Appendix).

The state also successfully participates in FEMA's Pre-Disaster Mitigation (PDM) program, designed to reduce overall risk to people and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. This program awards planning and project grants focused on reducing future losses before disasters occur. Louisiana continues to compete for PDM funds to update current mitigation plans and to fund projects such as flood and wind retrofits.

Since the last plan update, Louisiana has also completed projects funded by two additional FEMA programs – Repetitive Flood Claims (RFC) and Severe Repetitive Loss (SRL) - eliminated by the Biggert Waters Flood Insurance Reform Act of 2012. The RFC grant program provided funding to reduce or eliminate the long-term risk of flood damage to structures insured under the National Flood Insurance Program (NFIP) that have had one or more claim payment(s) for flood damages. RFC funds could only be used to mitigate structures that are located within a state or community that participates in the NFIP and cannot meet the requirements of the FMA program because they cannot provide the non-federal cost share, or do not have the capacity to manage the activities.

The SRL grant program provided funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss structures insured under NFIP. An SRL property is defined as a residential property that is covered under an NFIP flood insurance policy and:

Had at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or
Had at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.
For both (a) and (b) above, at least two of the referenced claims must have occurred within any ten-year period, and must be greater than 10 days apart.

Elements of the RFC and SRL programs have been incorporated into FMA. The following table provides a summary of the funding awarded from the five aforementioned FEMA programs received by the state of Louisiana since the last Plan update. Per Table 4, most of the funds were awarded by FMA followed by the HMGP.

FEMA's Public Assistance (PA) also includes a mitigation program. PA provides supplemental federal disaster grant assistance for the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain private, non-profit organizations. Eligible projects include debris removal, emergency protective measures, repair to transportation infrastructure, repair to utility infrastructure, and more. PA covers a share of the costs, up to 75%. The PA program contains a mitigation component wherein eligible damaged infrastructure can be mitigated if mitigation measures are deemed cost-effective and environmentally-sound. The State of Louisiana has demonstrated its ability to administer a significant amount of PA funding as referenced in Table 5.

Table 4 - FEMA Funding Per Program

YEAR	FMA	HMGP	PDM	RFC	SRL	Total
2015	$12,163,017.76	$61,709,536.00	$5,978,405.61	$200,080.00		$80,051,039.37
2016	$45,229,559.57	$34,100,431.00	$1,424,454.26		$188,449.20	$80,942,894.03
2017	$47,263,874.71	$8,523,103.00				$55,786,977.71
2018	$4,593,277.19	$1,275,989.00				$5,869,216.19
Total	$109,249,679.23	$105,609,059.00	$7,402,859.87	$200,080.00	$188,449.20	$222,650,127.30

The Emergency Support Function #14, Long Term Recovery (ESF #14 LTCR) provides a structure under the National Response Framework (NRF) to promote successful long-term recoveries for tribes, territories, states, and communities suffering extraordinary damages, where local capacity to implement a recovery process is limited. ESF #14 LTCR provides coordination and technical assistance to support federal, state, and local recovery processes.

Table 5 - Local Mitigation Tools

Year	PA Funds Obligated per Year Cat C-G	PA 406 Mitigation Funding
2015	$269,674,050.91	$745,029.90
2016	$2,225,285,810.53	$2,636,752.41
2017	$335,385,107.76	$4,267,735.94
2018	$195,894,885.27	$2,379,362.59
	$3,026,239,854.47	$10,028,880.84

The **Office of Community Development (OCD)** relies on grants awarded by the U.S. Department of Housing and Urban Development to improve quality of life for Louisiana residents. These funds support mitigation through two specific programs - the Community Development Block Grant (CDBG) Program and the Disaster Recovery Unit (DRU). CDBG funds help communities provide a suitable living environment and expand economic opportunities for their residents, particularly in low to moderate income areas. The state's program awards and administers these funds to local governments for improvements to public facilities, economic development, demonstrated needs projects and LaSTEP projects, which funds materials for local community projects while citizens provide a portion of the labor. OCD-DRU administers disaster recovery grants to help residents recover from hurricanes Katrina, Rita, Gustav, Ike and Isaac. Funds are distributed through other state agencies, local governments, businesses and nonprofit organizations to support and improve housing, infrastructure, economic development, planning and resilience. As such, OCD-DRU manages the most extensive rebuilding effort in American history and works closely with local, state and federal partners to ensure that Louisiana recovers safer, stronger and smarter than before. OCD-DRU has appropriated the following funding to Louisiana for recovery from the 2005, 2008, 2012 and 2016 storms as follows:

$13.4 billion for recovery from hurricanes Katrina and Rita in 2005
$1.09 billion for recovery from hurricanes Gustav and Ike in 2008
$66.4 million for recovery from Hurricane Isaac in 2012
$92.6 million from HUD's National Disaster Resilience Competition in 2016
$1.7 billion for recovery from the Great Floods of 2016
$1.2 billion for mitigation recovery from a presidentially declared disaster since 2015 (Bipartisan Budget Act 2018)

Louisiana's Office of Rural Development (ORD), funded through the US Department of Agriculture, has a mission to reach all of Louisiana's rural communities with resources to help them grow and benefit the lives of their citizens. The organization serves as the single point of contact for rural government service providers, state and federal agencies, and individuals interested in rural policies and programs of the State. As such, it can play an integral role in the dissemination of mitigation actions.

State Sources of Funding

The following entities and/or programs are implemented by the State but are funded by state and/or federal funding sources. Those programs that have a statewide reach are listed first, followed by those that focus on Louisiana's coastal area.

The **Capital Outlay Section** of DOA prepares the capital outlay bill that contains state budget General Fund expenditures for acquiring lands, buildings, equipment or other properties, or for their preservation or development or permanent improvement. Capital outlay planning and budgeting are directed toward the acquisition or renovation of fixed assets.

The **Clean Water Act (CWA)** establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating water quality standards for surface waters. The CWA makes it unlawful to discharge any pollutant from a point source into navigable waters, unless a permit is obtained. Violations can result in both civil and criminal prosecutions and penalties. In 2016-2017, LDEQ reported fines totaling $507,000 related to violations of the CWA.

The **Louisiana Department of Environmental Quality (DEQ)** administers the Clean Water State Revolving Fund (CWSRF) Program. This program provides financial assistance in the form of low interest loans to finance eligible projects, bringing them into compliance with the requirements of the Clean Water Act. Funding for this program is provided by federal grants and match funds generated by the program's interest and loan repayments. Interest and loan repayments provide a permanent source for funding in future Louisiana projects.

As mentioned, the Department of Transportation and Development (DOTD) houses Louisiana's Floodplain Management Office, which is a statewide resource for floodplain management activities to include the NFIP. This office promotes local government compliance with NFIP regulations to ensure the availability of low-cost flood insurance and to minimize loss of life and property due to catastrophic flooding. This is accomplished through on-site assessments, distribution of a quarterly newsletter, conducting workshops, providing technical assistance on local government ordinance development, and participation in post-disaster flood hazard mitigation activities. The program is jointly funded by FEMA and the state based on a 75:25 cost share.

DOTD's statewide Flood Control Program provides an average of $10 million annually to parish and municipal governments, levee boards, and drainage districts to support projects that (1) reduce existing flood damages, (2) discourage additional development in flood-prone areas,(3) do not increase upstream or downstream flooding, and (4) have a total construction cost of$100,000 or more. Eligible projects include channel enlargement, levees, pump stations, relocation of dwellings and business structures, reservoirs, and other flood damage reduction measures. The budget for FY 2018-2019 was $9.9 million.

The **Natural Resources Damage Assessment (NRDA)** is the legal process used by the Louisiana Oil Spill Coordinator's Office (LOSCO) to seek compensation for damages to waterways, vegetation, or wildlife by oil spills. No new spills are listed by LOSCO since the Deepwater Horizon spill in 2010.

Supplemental Environmental Projects (SEPs) are tools used by the EPA and DOJ in civil settlements in environmental enforcement actions. The EPA describes SEPs as environmentally beneficial projects that a violator agrees to undertake when settling an enforcement action. The purpose of a SEP is to provide environmental or public health benefits beyond those required to remediate environmental damages.

The **Water Resources Development Act (WRDA)** refers to any of a set of public laws enacted by Congress to address various aspects of water resources including environmental, structural, navigation, flood protection, and hydrologic issues. The state is partnered with the USACE on multiple large-scale protection and restoration projects that have been authorized through past WRDA bills. Because WRDA projects are generally dependent upon Congressional appropriation for construction funding, federal fund procurement is the principal issue that affects project implementation. Other issues affecting WRDA projects include cost-share agreement issues with federal partners, land rights issues, and permitting issues.

Berm to Barrier is one of many coastal programs that support CPRA projects. As a result of the Deepwater Horizon oil in 2010, a significant amount of sand was pumped along Louisiana's barrier island chain to create berms to block oil threatening our marshes. CPRA continues to utilize that foundation of sand to build more substantial and sustainable barrier islands that can serve as our first line of defense against storm surge and ecosystem degradation.

The **Coastal Protection and Restoration (CPR) Trust Fund** was established in 1989 by the Louisiana Legislature to provide a dedicated source of funding for coastal restoration. Income for the fund is a dedication of a percentage of the state's mineral income and severance taxes from oil and gas production on state lands. This trust fund pays for the coastal program's ongoing operating expenses and for continuing state efforts in coastal restoration and protection, including activities such as the CPRA/NRCS/Soil and Water Conservation Committee Vegetation Planting Program, upfront costs for projects funded through federal grant programs (e.g., CIAP, NFWF, and RESTORE), and state cost-share through programs like CWPPRA or LCA. DWH settlement payments dispersed to the state are also deposited in a trust fund that pays for NRDA project implementation and OM&M as well as NRDA-funded adaptive management efforts. CPRA is charged with developing an annual plan for these expenditures, managing, and administering the funds, and implementing coastal restoration and protection activities.

The Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) was authorized by Congress in 1990 to identify, prepare, and fund the construction of coastal wetlands restoration projects. CWPPRA is managed by a Task Force comprised of the State and five Federal agencies, including the EPA, the U.S. Fish and Wildlife Service (USFWS), the Natural Resources Conservation Service (NRCS), the National Marine Fisheries Service (NMFS), and the USACE. The CWPPRA Task Force evaluates projects proposed for inclusion in the CWPPRA program and prepares a ranked list of candidate projects based on cost-effectiveness, longevity, risk, supporting partnerships, public support, and support of CWPPRA goals. From this ranked list, the Task Force annually selects a final list of projects, the Priority Project List, for implementation.

The **Coastal Impact Assistance Program (CIAP)** was authorized in 2005 as part of the Federal Energy Policy Act to help six coastal states (Louisiana, Texas, Mississippi, Alabama, Alaska, and California) mitigate the onshore effects of Outer Continental Shelf (OCS) oil and gas development. CIAP provided approximately $495.7 million to Louisiana from the federal administrator (the USFWS). The state of Louisiana received 65% of these funds with the remaining 35% being distributed to the 19 coastal parishes. The program was completed in December 2016 with the State expending 99.7% of the authorized funds on 39 projects. The 19 coastal parishes expended 96% of the authorized funds on 95 projects. Authorized uses of CIAP funds included projects and activities to conserve, protect or restore coastal areas, including wetlands; mitigation of damage to fish, wildlife or natural resources; planning assistance and the administrative costs of CIAP compliance; implementation of a federally approved marine, coastal or comprehensive conservation management plan; and onshore infrastructure projects and public service needs. Up to 23% of those funds can be spent on CIAP planning assistance and compliance and for onshore infrastructure projects and public service needs to mitigate OCS impacts.

The **CPRA/NRCS/Soil and Water Conservation Committee Vegetation Planting Program** ensures that native marsh vegetation is planted and monitored throughout the coastal zone of Louisiana. CPRA enters into annual cooperative agreements with the Louisiana Department of Agriculture and Forestry (DAF). It is through the DAF and the Soil and Water Conservation Committee, Soil and Water Conservation Districts (SWCD) that the planting tasks are selected, planned, evaluated, planted, and monitored. Each NRCS District Conservationist provides technical assistance to their respective SWCD throughout the planting task process.

The **Gulf of Mexico Energy Security Act (GOMESA)**, signed into law in 2006, provides four Gulf States, including Louisiana, with a share of revenues generated by oil and gas leasing in specific offshore areas of the Gulf of Mexico. GOMESA funds provide Louisiana with a consistent source of funding to address land loss. Louisiana voters constitutionally dedicated GOMESA funds to coastal protection through the Coastal Protection and Restoration Trust Fund. The state was projected to received $82 million in GOMESA funds in 2018; $65.6 million to be administered by CPRA and $16.4 million to be distributed to 20 coastal parishes.

Following Hurricane Katrina, the U.S. Army Corps of Engineers constructed the $14.5 billion **Hurricane and Storm Damage Risk Reduction System (HSDRRS)**. It is one of the most technically advanced coastal flood protection systems in the world. The HSDRRS includes a system of barriers, sector gates, floodwalls, floodgates and levees that provide a veritable "wall" around the New Orleans Metropolitan area. The System significantly reduces the risk of flooding for over 1 million residents from a 100- year storm. The system was authorized by Public Law 109 - 234 - Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 and requires non-federal cost share to pay for operation and maintenance. The state along with the local flood authorities serve as the non-federal sponsors.

As reported in the 2014 Plan, the ***Deepwater Horizon* oil spill of 2010** resulted in significant funding for Gulf Coast states including Louisiana. Under terms set by the US Department of Justice, BP and Transocean agreed to pay $2.394 billion and $150 million respectively. These payments were directed to the National Fish and Wildlife Foundation (NFWF) for natural resources restoration in the Gulf of Mexico. Approximately $1.2 billion of the funds directed to NFWF is dedicated to targeting Louisiana impacts by using the funds to "create or restore barrier islands off the coast of Louisiana and/or to implement river diversion projects on the Mississippi and/or Atchafalaya Rivers for the purpose of creating, preserving and restoring coastal habitat." The agreement states that NFWF must consider the Coastal Master Plan and the Mississippi River Hydrodynamic and Delta Management Study "to identify the highest priority projects, and to maximize the environmental benefits of such projects." Final payments were made in January 2018 but work continues to restore coastal areas damaged by the oil spill.

The **Resources and Ecosystems Sustainability, Tourist Opportunities and Revived Economies of the Gulf Coast States Act of 2012 (the RESTORE Act)** dedicates 80% of the administrative and civil penalties paid under the Federal Water Pollution Control Act related to the Deepwater Horizon oil spill to the Trust Fund for the restoration and protection of the Gulf Coast region. The RESTORE Act also outlines a structure by which the funds can be utilized to restore and protect the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, coastal wetlands, and economy of the Gulf Coast region.

The RESTORE Act sets forth the following framework for allocation of the Trust Fund:

35% to be divided equally between the five Gulf States (to include Louisiana) for ecological and economic restoration efforts in the region
30% through the Gulf Coast Ecosystem Restoration Council to implement a comprehensive plan for ecosystem and economic recovery of the Gulf Coast
30% for states' plans based on impacts from the Deepwater Horizon oil spill
2.5% to create the Gulf Coast Ecosystem Restoration Science, Observation, Monitoring and Technology Program within the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA)
2.5% to the Centers of Excellence Research grants, which will each focus on science, technology, and monitoring related to Gulf restoration.

In 2017, the Gulf Coast Ecosystem Restoration Council and the U.S. Department of Treasury accepted the CPRA's First Amended Multiyear Implementation and State Expenditure Plan (RESTORE Plan). This plan describes how the state intends to spend its total allocation of $811.9 million over 15 years from both the Spill Impact Component and the Direct Component of the Gulf Coast Restoration Trust Fund (RESTORE Trust Fund).

Since the last update, D**NR's Coastal Wetland Reserve Program** no longer exists – funds were provided by a federal grant that is no longer available.

Other Resources

Fortunately, numerous stakeholders support and collaborate with the state to plan for and implement mitigation activities. These stakeholders enhance the hazard mitigation capabilities of the state. While many are listed in this section, others are highlighted in Chapter 5–Mitigation in Action.

APA Louisiana, a chapter of the American Planning Association (APA), promotes the practice of community and regional planning in Louisiana by enhancing the effectiveness of planners in impacting public policy. Its' mission is carried out through community service and members services such as newsletters and professional development opportunities such as workshops and an annual state conference. Workshop and conference topics that support statewide mitigation efforts at the state and local levels include managing stormwater, coastal inundation mapping, green infrastructure, resilience and sustainability planning.

The **Capital Region Planning Commission (CRPC)** is a Council of Governments serving eleven Louisiana parishes: Ascension, East Baton Rouge, East Feliciana, Iberville, Livingston, Pointe Coupee, St. Helena, Tangipahoa, Washington, West Baton Rouge, and West Feliciana. Through planning and communication, CRPC coordinates and collaboratively addresses regional issues related to transportation, land use, economic development, and the environment. CRPS is currently working with FEMA to produce a series of webinars/seminars focused on flood risk and resiliency. Seemingly, there is a room for more coordination and collaboration between the state and regional planning entities, such as CRPC, as they provide training for planning commissioners and planning materials parishes. These trainings and materials could include more information provided by state agencies, such as GOHSEP, on mitigation.

The **Coastal Land Use Toolkit**, a document made for public use by the non-profit CPEX, has been used in numerous Louisiana communities to guide development code amendments. The Toolkit explains the national and local best management practices (BMPs) in coastal development for Louisiana on a range of scales. It also has recommendations based on geological land types. Strategies in the Toolkit include the following: natural resource protection; wetland restoration; streetscape/parking lot design, maintaining networks of infrastructure, and designing infrastructure in a resilient way while preserving local character. Specific zoning suggestions include the following: elevation standards, impervious land cover limitations, on-site design of elements to deal with stormwater management, and erosion control standards

Community Rating System Users Groups (CRS Users Groups) are informal organizations that support community representatives interested in the CRS. Four CRS Users groups currently exist in Louisiana including CRAFT, FLOAT, JUMP, and SWIFT. The Capital Region Area Floodplain Taskforce (CRAFT) includes the following communities: Ascension Parish, East Baton Rouge, West Baton Rouge Parish, City of Central, City of Denham Springs, City of Gonzales, City of Walker, and the City of Zachary. The Flood Loss Outreach & Awareness Task force (FLOAT) is made up of communities in the Greater New Orleans area including Lafourche Parish, Orleans Parish, St. Charles Parish, St. John the Baptist Parish, St. Tammany Parish, Tangipahoa Parish, Terrebonne Parish, City of Covington, City of Mandeville, and City of Slidell. The Jefferson United Mitigation Professionals (JUMP) is a Jefferson Parish based group, comprised of Unincorporated Jefferson Parish, the Cities of Gretna, Harahan, Kenner, Westwego, and the Town of Jean Lafitte. SWIFT is composed of communities in Southwest Louisiana; it is inactive as of Spring 2018.

The **Louisiana Business Emergency Operations Center (LABEOC)** is a partnership between LED, GOHSEP, and the National Incident Management Systems & Advanced Technologies (NIMSAT) Institute at the University of Louisiana at Lafayette. LABEOC focuses on providing situational awareness and resource support, supporting community recovery, mitigation, and economic stabilization within the business community.

The **Louisiana Floodplain Management Association (LFMA)** 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. LFMA supports comprehensive floodplain management, advocates for coordination among all levels of government and existing programs and provides and promotes training and assistance to local governance. LFMA's activities include an annual state conference, semi-annual workshops, a newsletter known as "Floodwatch", and active website.

Louisiana Sea Grant, part of the National Oceanic and Atmospheric Administration's (NOAA) National Sea Grant Program, works to promote stewardship of the state's coastal resources through a combination of research, education and outreach. Louisiana Sea Grant's strategic initiatives address four issues identified as especially pertinent to state, regional, and national needs: healthy coastal ecosystems, sustainable fisheries and aquaculture, resilient communities and economies, and environmental literacy and workforce development. Through educational programs and practical assistance, Sea Grant Extension agents serve Louisiana's coastal population – about 70 percent of the state's residents and connect residents to research in various areas such as coastal and wetland management. Sea Grant publications such as the Louisiana Homeowners Handbook to Prepare for Natural Hazards, helps citizens prepare for natural hazards so that risks to family and property may be reduced.

SBP, formerly known as the St. Bernard Project, is a national organization headquartered in New Orleans, LA. In addition to its recovery work, SBP provides free resilience training for households and businesses in communities facing disaster risks, equipping participants with information and tools to proactively identify and mitigate risks to life safety, property, and finances.

The **Stephenson Disaster Management Institute (SDMI) at Louisiana State University** conducts applied research with a focus on crisis and disaster management. Following the 2016 flooding, SDMI supported GOHSEP through its Disaster Lab. Specifically, SDMI provided statistical analyses highlighting the potential impacts of reported flooding for more than 20 parishes to help GOHSEP better understand the extent of the flooding. Additionally, SDMI, in partnership with Louisiana Sea Grant, is working to integrate SDMI's Storm Surge Consequence Model into LSU's CERA website which provides emergency managers with accurate extends and depths of storm surge. Since the last mitigation plan update, GOHSEP contracted SDMI to support Mitigation Plan updates for 56 parishes throughout Louisiana.

The mission of the **Louisiana State University Agricultural Center (LSU AgCenter)** is to provide the people of Louisiana with research-based educational information. The LSU AgCenter includes the Louisiana Agricultural Experiment Station, which conducts agricultural-based research, and the Louisiana Cooperative Extension Service, which extends knowledge derived from research to Louisiana residents. The LSU AgCenter plays an integral role in supporting agricultural industries, enhancing the environment, and improving the quality of life through its 4-H youth, family and consumer sciences, and community development programs. The Louisiana Cooperative Extension Service offers online and in-person classes, seminars, workshops, field days, publications and news releases to residents throughout Louisiana. Education efforts focus on various areas, with sustainable housing and coastal restoration as those that most support mitigation activities. The LSU AgCenter's Louisiana Home and Landscape Resource Center, also known as LaHouse, provides a model for how to build sustainable housing in the Deep South. The AgCenter also developed GIS Web Applications such as a wind speed map and elevation map and flood insurance rate maps, all of which are widely used by local and state officials as well as residents, and are accompanied by related floodplain management education. LSU AgCenter's Forestry Management Extension and Research Program conducts research and workshops focused on selection of species and genotypes resilient to drought, ice, and hurricanes. Additionally, LSU AgCenter developed the Resilient Communities and Economies Initiative Economic; administers a Master Farmer Program; and developed a youth program in hazard mitigation. LSU AgCenter staff also participate in local CRS committees and collaborates with LDAF in pre-disaster exercises.

In post-disaster times, LSU AgCenter provides general information and support regarding post-disaster recovery and related mitigation activities generated at the state level, using printed publications, web and social media; distributes recovery info by social media and to local government; state and local personnel participate in high- water mark studies; participates in Ag Crop and Animal commodity losses and damage assessments; provides food safety information; and provides livestock recovery information and activities in coordination with LDAF.

The **University of New Orleans' Center for Hazards Assessment, Response & Technology (UNO-CHART)** is an applied social science hazards research center that collaborates with and supports Louisiana communities in efforts to achieve disaster resilience with a focus on mitigation. UNO-CHART's applied research efforts address repetitive flooding, disaster mitigation planning, community resilience, coastal restoration, community continuity, risk literacy, risk management, adaptation planning and hurricane evacuation of vulnerable populations. UNO-CHART is currently the leading expert in conducting repetitive flood loss area analyses and facilitates two CRS Users groups.

The **Water Institute of the Gulf** is a not-for-profit, independent applied research and technical services institution with a mission to help coastal and deltaic communities thoughtfully prepare for an uncertain future. The Institute's focus areas include integrated watershed management; resilience lab; dynamics of rivers, deltas and coasts; ecosystem based management; and human and natural systems modeling. The Water Institute plays various roles in regional and statewide risk reduction including contributions to the Louisiana Coastal Master Plan; functions as a FEMA Cooperating Technical Partner; conducts real-time flood forecasting, flood modeling, critical facility identification, and nature-based defense planning and design. Technical data provided to the state in support of mitigation activities include 1-D, 2-D, and 3-D models, stakeholder participatory mapping, and real-time flood forecasting.

Coordination of Local Planning

As stated in Chapter 1, the State Hazard Mitigation Planning Committee set out to "provide an accessible, easy to use document that incorporates state and local planning goals, and provides a vehicle for local and regional cooperation for effective hazard mitigation." As a first step, the project team conducted a review of the hazards covered in parish mitigation plans to ensure those were also covered in the State's plan. Coordination efforts between the State and local parishes were then examined to include technical assistance provided by the State. The team also reviewed local mitigation capacity as well as successful mitigation projects implemented at the local level (see Chapter 5). Throughout the planning process, local risk information and local capacity were considered to the extent possible in developing the state mitigation strategy (see Chapter 4).

The State of Louisiana continues to provide support to local and tribal governments with mitigation planning efforts. This support includes training, technical assistance, sharing of data, and funding. As of the writing of this Plan Update, 53 (83%) of Louisiana's 64 parishes have approved mitigation plans. The remaining parishes include seven plans that are approved and await adoption, two plans that are under FEMA review and two plans that are have been through GOHSEP's technical review process. Two tribal plans exist in St. Mary and LaSalle Parishes.

HM Kick-off meetings

Immediately following the last plan update, GOHSEP held Hazard Mitigation Planning Workshops in New Orleans, Lafayette, Alexandria and West Monroe. These workshops were held for the benefit of local officials working on plan updates. Content included a review of the phases of hazard mitigation plans from process to risk assessment, mitigation strategy, plan review and adoption, project funding, community mitigation tools, hazard maps and critical facilities – speakers included GOHSEP, SDMI, UNO-CHART, LSU AgCenter.

Similar workshops have not continued as a majority of the current plans were developed in collaboration with local jurisdictions, the State, and SDMI at LSU. The State contracted SDMI with FEMA funds to support local mitigation planning. As stated in the last update, this framework provided a degree of uniformity across jurisdictions and resulted in a majority of the plans using similar but appropriate data sources and data processing steps. The State may again utilize a contractor to facilitated plan updates in the future.

GOHSEP also assisted jurisdictions that chose to lead mitigation plan updates without the support of SDMI in efforts to apply for PDM grant funds to support planning processes. GOHSEP is committed to continue its support of local and regional hazard mitigation planning and project efforts.

Local Capacity

An analysis of local mitigation capabilities reveal various existing authorities, polices and resources that reduce hazard impacts or could be used to implement hazard mitigation activities. The following table reveals a summary of the types of tools upon which Louisiana parishes rely to implement local mitigation programs.

Despite the local mitigation tools referenced in Table 6, the capacity to implement mitigation varies across Louisiana parishes and tribes. Many local entities face challenges in their attempts to implement mitigation policies and programs as they often do not have the necessary resources to implement certain mitigation activities. For

Table 6 - Local Mitigation Tools

LOCAL PLANAS
Comprehensive / Master Plan
Economic Development Plan
Local Emergency Operations Plan
Continuity of Operations Plan
Transportation Plan
Stormwater Management Plan
Community Wildfire Protection Plan
Other plans (redevelopment, recovery, coastal zone management)
LOCAL ORDINANCES
Zoning Ordinance
Subdivision Ordinance
Floodplain Ordinance
Natural Hazard Specific Ordinance (stormwater, steep slope, wildfire)
OTHER
Flood insurance Rate Maps
Acquisition of land for open space and public recreation uses
Other (green infrastructure, stormwater fees, etc.)

instance, many parishes lack the time and/or expertise to carry out mitigation policies and programs. Many local municipalities have one staff member or perhaps a part-time staffer focused on mitigation policies and programs. Some do not have staff with the required expertise to include GIS, floodplain management, planning, etc., which makes it difficult to apply for funding and/or carryout mitigation tasks.

Federally recognized tribes in Louisiana include the following: Chitimacha Tribe of Louisiana, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, and Tunica-Biloxi Indian Tribe of Louisiana. The State of Louisiana also recognizes the following tribes: Addai Caddo Tribe; Biloxi-Chitimacha Confederation of Muskogee; Choctaw-Apache Community of Ebarb; Clifton Choctaw; Four Winds Tribe Louisiana Cherokee Confederacy; Grand Caillou/Dulac Band; Isle de Jean Charles Band; Louisiana Choctaw Tribe; Pointe-Au-Chien Indian Tribe; and the United Houma Nation. The state does reach out to support tribal communities; however, only two tribal mitigation plans exist in Louisiana, one in St. Mary Parish and the other in LaSalle Parish. A major challenge here is the fact that only federally recognized tribes can act as state applicants; this right has not been exercised in Louisiana. Another challenge lies in the fact that the tribes that are not federally recognized must coordinate with the parishes in which they are located. The lack of resources and politics often make coordination difficult.

These challenges at the local and tribal level suggest additional support is needed from the State. Suggestions for this support include education and outreach related to funding opportunities, planning workshops, and reminders and site visits to local and tribal jurisdictions prior to plan expiration dates. Additional education and outreach efforts should concentrate on Louisiana tribes – both federally recognized and state recognized. These efforts should be coordinated with Louisiana's Director of Indian Affairs, as well as the tribal leaders, to be successful.
The timeframe for this review process is approximately six months. The six month timeframe does not include the time spent by parishes or municipalities to revise the plans in response to GOHSEP and FEMA comments. The timeframe is also based on the following assumptions:

Step 1 requires approximately 45 days for State review
Step 2 requires an additional 45 days for FEMA review
After resubmitting the plan for final review, the state-and FEMA are each given an additional 45-day review period

Prioritizing Parish and Municipal Assistance

It is stated in CFR Section 201.4(c)(4)(iii) that the State Hazard Mitigation Plan must include "[c]riteria for prioritizing communities and local jurisdictions that would receive planning and project grants under available funding programs, which should include consideration for communities with the highest risks, repetitive loss properties, and most intense development pressures. Further, that for non-planning grants, a principal criterion for prioritizing grants shall be the extent to which benefits are maximized according to a cost benefit review of proposed projects and their associated costs."
The sub-sections below discuss these criteria in addition to "community commitment to mitigation". Following are the details of how the state intends to prioritize applications for funding future planning efforts. In all cases, applicants must demonstrate that their risk is sufficient to merit grant funds, particularly when compared to the project cost, but there is often considerable uncertainty in risk determinations. Hence, the state considers a variety of factors in addition to risk and benefit-cost analysis in determining its priorities for mitigation grants.

The SHMPC had multiple discussions concerning how to prioritize funding selected mitigation projects. The committee underlined communities at highest risk as the most important priority, followed by communities with repetitive loss properties, communities undergoing development, and finally, community commitment to mitigation.

Communities at Highest Risk

One of the primary purposes of this update is to identify the areas in Louisiana with the highest risk

	Local Plan Review Process GOHSEP continues to use the following step-by-step local plan review process:
STEP 1	The initial draft of a parish or municipal plan is sent to GOHSEP for review. GOHSEP staff develop and provide parish or municipal officials with comprehensive guidance for improving the format and content of the plan.
STEP 2	Parish or municipal officials revise the plan in accordance with GOHSEP guidance, and re-submit the plan for GOHSEP review. With satisfactory revisions, GOHSEP forwards the plan, with comments, to FEMA Region VI.
STEP 3	FEMA Region VI reviews the plan and forwards comments to GOHSEP. GOHSEP relays these new comments back to the parish or municipality. GOHSEP continues to interface with parish or municipal officials to discuss and clarify all review comments on a point-by-point basis.
STEP 4	The parish or municipality addresses both GOHSEP and FEMA Region VI comments, and revises the plan.
STEP 5	The parish or municipality submits a revised draft to GOHSEP for review. GOHSEP staff evaluate the revisions and forward the updated plan to FEMA Region VI.
STEP 6	FEMA Region VI reviews the revised plan, and if it addresses all comments, FEMA mails a letter stating that the plan is "approvable pending adoption" to GOHSEP and the parish or municipality. In cases where the comments were not addressed, the parish or municipality again repeats the process.
STEP 7	All participating jurisdictions then formally adopt the plan through a Resolution.
STEP 8	The Regional Director of FEMA Region VI officially approves the plan.

from natural hazards. The parishes in Louisiana have different levels of exposure and risk. In general, the state will direct mitigation grant funds to the areas with the highest risk. However, in many cases, more localized risk assessments (possibly produced in the parish and municipal mitigation planning process), as well as risk assessments and benefit-cost analyses done in support of applications, may indicate areas with high risk outside the highest-risk parishes identified in this update. The most worthwhile mitigation projects are a product of both the risk in a particular place, and the effectiveness of a project. Although risk is clearly a good initial indicator of mitigation potential, the state will also carefully consider the effectiveness and cost of mitigation projects in determining funding priorities.

Communities with Repetitive Loss Properties

The State presently considers the repetitive loss status of properties in determining the grants it will support (i.e., forward to FEMA for consideration and funding), and will continue to do so as additional grant funds are available. The FMA program mandates that grant funds

are directed to NFIP repetitive loss properties, and the state will continue to comply with this requirement. The Flood Insurance Reform Act of 2004, which was signed into law by the President on June 30, 2004, requires the NFIP to provide a disincentive to property owners to live in repetitively flooded areas. Rather than continue to rebuild, the program provides repeatedly flooded homeowners assistance in either elevating or moving their homes away from floodwaters.
In addition, the Biggert-Waters Flood Insurance Reform Act of 2012 called for 25% annual increases for Severe Repetitive Loss Properties insured with subsidized rates until their premium rates are full risk premiums. The Homeowner Flood Insurance Affordability Act of 2014 later confirmed this increase.

Communities Undergoing Development

The state will also include development as a review criterion. Parish and municipal plans should provide some indication of the implications of future development, per DMA 2000 requirements for local plans. Although development is clearly a potential factor in any risk determination, development that occurs in accordance with adequate building codes, land use planning and floodplain management principles should in many cases be less risky than development that pre-dates these codes and principles. However, the state is aware that increased development does cause related increases in population, infrastructure, etc., and may in some cases have adverse impacts on existing areas. These factors will be carefully considered in GOHSEP reviews.

Community Commitment to Mitigation

Additionally, the state will consider parish and municipality commitment to mitigation when prioritizing projects. The commitment to mitigation should be clear in the plans submitted by the parish and municipality in addition to participation in the Community Rating System (CRS). By demonstrating their commitment to mitigation, the parishes and municipalities will show the need for various projects. The state will consider this commitment as the final review criterion.

Maximizing Benefits According to Benefit-Cost Review of Local Projects

Regulations for FEMA's HMA grant program state that proposed mitigation projects must be cost effective. Under some pre-established conditions, certain projects may be exempt from this regulation. However, in most cases, projects include a benefit-cost analysis, either prior to submission to GOHSEP and FEMA for funding consideration, or during the grant evaluation process.

In most cases, grant applications either include a benefit-cost analysis, or GOHSEP or FEMA performs one in accordance with FEMA and the Louisiana Office of Management and Budgets regulations. Projects that do not achieve the required 1.0 benefit-cost ratio, and are not exempted from benefit-cost analysis, are rejected from funding consideration. This is the case for all FEMA HMA grants.

Prioritization of Parishes to Receive HMGP Funding
GOHSEP shall submit recommendations to the Governor or his/her Designee for the use of available HMGP funds. These recommendations will include:

- Priority for use of funds, if any
- Allocation of funds to parishes based on their prorated share of damages as determined by the final damage assessment figures
- Allocations of available funds to State and Regional Agencies
- Use of all available initiative funds
- Other priority related issues as a result of the disaster

Funds will only be made available to those eligible applicants that have or are covered by a FEMA approved state or local mitigation plan. The parishes will submit eligible project applications to GOHSEP in prioritized order, up to the amount of their allocation. Parishes are encouraged to submit more projects than their allocation in case several projects are deemed ineligible.

Conclusion

The State of Louisiana has great capacity to develop and implement mitigation projects that reduce the impact of hazards throughout the state. Louisiana has various plans, policies, and programs that are necessary to implement a successful mitigation program. In addition to the state's own resources, there are many stakeholders mentioned in this Chapter and in Chapter 5 that enhance the state's capacity to implement the mitigation strategy proposed in this plan update.

YEAR	AWARDS
2018 Non-Disaster Grant Funding: Flood Mitigation Assistance (FMA) $43,926,442	Pre Disaster Mitigation (PDM) $ 952,478
2017 Incidents: Louisiana Tropical Storm Harvey (DR-4345) Incident period: August 28, 2017 to September 10, 2017 Major Disaster Declaration declared on October 16, 2017	HMGP Award: $ 1,139,906
Louisiana Severe Storms, Tornadoes, and Straight-line Winds (DR-4300) Incident period: February 07, 2017 Major Disaster Declaration declared on February 11, 2017	HMGP Award: $ 561,551
2017 Non-Disaster Grant Funding: Flood Mitigation Assistance (FMA) $53,213,734	Pre Disaster Mitigation (PDM) $ 522,562
2016 Incidents: Louisiana Severe Storms and Flooding (DR-4277) Incident period: August 11, 2016 to August 31, 2016 Major Disaster Declaration declared on August 14, 2016	HMGP Award: $ 261,971,744
2016 Non-Disaster Grant Funding: Flood Mitigation Assistance (FMA) $44,721,674	Pre Disaster Mitigation (PDM) $ 412,499
2015 Incidents: Louisiana Severe Storms and Flooding (DR-4228) Incident period: May 18, 2015 to June 20, 2015 Major Disaster Declaration declared on July 13, 2015	HMGP Award: $ 1,216,154
2015 Non-Disaster Grant Funding: Flood Mitigation Assistance (FMA) $11,246,286	Pre Disaster Mitigation (PDM) $ 5,978,405

This Capability Assessment not only summarizes the resources available to support mitigation, it identifies changes since the last plan update as well as opportunities for the state to improve its current capacity to reduce risk. As FEMA recognizes the connections between community resilience and areas such as the economy, housing, health and social services, infrastructure, and natural and cultural resources, these areas are addressed to the extent possible.

Since the last Plan update, in collaboration with local municipalities and other non-governmental stakeholders, the State has successfully managed a mitigation program through five federally declared disasters. The following are the five Major Declared Disasters since 2014, and the HMGP award funding for each disaster in addition to non-disaster grant funding obligated since 2015.

Simultaneously, Louisiana's mitigation capacity allowed GOHSEP, with local support, to continue to address repetitive loss properties through funding of numerous mitigation projects. Table 7 demonstrates that although the number of repetitive loss properties has increased since the last Plan update, the percentage of mitigated properties remains steady at about 25%. Table 8 provides a summary of mitigation measures utilized to address repetitive loss properties throughout the state. Of course, with such high numbers of repetitive loss, these properties should remain a priority for mitigation funding. See Appendix E for the state's Repetitive Loss Strategy.

Table 7 - Repetitive Loss Numbers for Louisiana as of July 31, 2018

End of Year	Non-Mitigated RL's	Mitigated RL's	Total RL's	% Mitigated
2015	24,091	7,795	31,886	24%
2016	25,515	8,119	33,634	24%
2017	25,825	8,219	34,044	24%
2018*	25,633	8,486	34,119	25%

Table 8 - Mitigation of Repetitive Loss Properties

Mitigation Measure	Number of RL Properties
Elevations	69
Elevations - Riverine	45
Acquisitions	0
Multi-Types	10
Reconstructions	16
Demo	10

As many of Louisiana's mitigation programs focus on the coastal area, CPRA is integral to the state's mitigation strategy. CPRA projects are funded by numerous sources, federal and/or state, to include Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA), Water Resources Development Act (WRDA), Capital Outlay, CDBG, Natural Resource Damage Assessment (NDRA) Restoration, BP and Transocean Settlements, Restore Act funding, and the Gulf of Mexico Energy Security Act (GOMESA). Table 9 lists current projects, funding sources, and demonstrates the capacity of the state through CPRA to administer several projects that will play an integral role in hazard reduction across Louisiana's coastal zone.

Table 9 - CPRA Projects and Funding Sources

Project Name	CPRA Program	First Year of Implementation	Total Budget Appropriated to Date (State Dollars)	Total Expended to Date (State Dollars)
Mid-Barataria Sediment Diversion (NFWF)	NFWF	2014	44,733,557.59	22,109,346.89
Grand Isle-Fifi Island Breakwaters	State	2014	6,054,694.00	5,919,221.38
Kraemer Bayou Boeuf Levee Lift	State	2014	1,020,151.00	967,139.20
Breach Management Plan	State	2014	433,749.00	154,698.08

Caminada Headlands Back Barrier Marsh Creation	CWPPRA	2014	3,304,628.00	2,593,619.58
Bayou Grande Cheniere Marsh & Ridge Restoration	CWPPRA	2014	2,646,668.00	706,890.18
South Grand Chenier Marsh Creation - Baker Tract	CWPPRA	2014	514,349.00	19,039.45
East LaBranche Shoreline Protection	CIAP	2014	2,015,001.00	2,004,754.48
SELA	HSDRRS	2014	315,377.00	306,917.40
Central Wetlands Demonstration Expansion	HSDRRS	2014	4,503,836.00	4,215,146.11
St. Tammany Coastal Reconnaissance Study	State	2014	2,035,195.00	41,574.65
Houma Navigation Canal Lock Complex	RESTORE	2014	18,415,023.00	17,612,654.47
St. Mary Backwater Flooding	State	2014	5,062,525.00	276,167.91
Island Road Marsh Creation & Nourishment	CWPPRA	2014	2,617,827.00	1,516,234.83
Bayou Tigre Flood Control Project	State	2014	6,327,968.00	746,274.49
No Name Bayou Marsh Creation	CWPPRA	2015	2,274,059.00	1,162,010.44
New Orleans Landbridge Shoreline Stabilization and Marsh Creation	CWPPRA	2015	1,636,775.00	954,225.57
Violet Canal North Levee Alignment	State	2015	1,161,336.00	937,844.37
Larose to Golden Meadow - Larose Sheetpile	State	2015	27,815,279.00	22,361,243.34
West Fourchon Marsh Creation	CWPPRA	2015	2,789,006.00	1,330,678.16
Bayou Tigre Flood Control Complex	State	2015	6,397,287.00	192,703.31
Surplus Freshwater Bayou Bank Stabilization	State	2015	1,320,998.00	1,290,378.64
Spanish Pass Ridge and Marsh Restoration	WRDA	2016	3,296,727.00	3,290,017.98
Barataria Large-Scale Component E-Planning	State	2016	7,570,394.00	263,798.03
Caminada Headlands Back Barrier Marsh Creation Increment 2	CWPPRA	2016	2,682,148.00	767,709.54
East Leeville Marsh Creation and Nourishment	CWPPRA	2016	2,456,518.00	819,146.55
Barataria Bay Rim Marsh Creation and Nourishment	CWPPRA	2016	559,325.00	458,229.63
West Grand Terre Beach Nourishment and Stabilization	RESTORE	2016	6,228,672.00	1,477,462.87
Calcasieu Ship Channel Salinity Control Measures	RESTORE	2016	29,237,020.00	7,221,585.78
Oyster Lake Marsh Creation and Nourishment	CWPPRA	2016	2,248,882.00	408,855.21

Sediment Diversion Implementation and Program Management	NFWF	2016	6,600,890.00	4,399,080.72
Golden Triangle Marsh Creation	RESTORE	2016	2,503,636.00	1,555,370.71
Fritchie Marsh Creation and Terracing	CWPPRA	2016	344,677.00	181,320.00
Biloxi Marsh Living Shoreline Project	RESTORE	2016	2,614,706.00	1,051,925.13
Queen Bess Island Restoration	NRDA	2017	2,113,400.00	687,598.65
Barataria Basin Ridge and Marsh Creation - Spanish Pass Increment	NRDA	2017	4,059,573.00	860,863.65
Mid Breton Sediment Diversion	CWPPRA	2017	5,371,862.52	1,024,121.73
Rabbit Island Restoration Project	NRDA	2017	2,157,027.00	812,589.15
Shoreline Protection, Preservation, and Restoration (SPPR) Panel	CWPPRA	2017	586,378.00	192,036.12
Salvinia Weevil Propagation Facility	CWPPRA	2017	565,099.00	282,155.86
Bayou La Loutre Ridge Restoration and Marsh Creation	CWPPRA	2017	875,353.00	229,521.44
St. Catherine Island Marsh Creation and Shoreline Protection	CWPPRA	2017	2,160,412.00	155,833.75
Lake Borgne Marsh Creation - Increment One	NRDA	2017	3,922,892.00	462,657.54
Bayou DeCade Ridge and Marsh Creation	CWPPRA	2017	1,463,875.00	859,921.96
Terrebonne Basin Ridge and Marsh Creation - Bayou Terrebonne Increment	NRDA	2017	3,164,165.00	305,580.80
Northeast Turtle Bay Marsh Creation & Critical Areas Shoreline Protection	CWPPRA	2018	234,662.55	202,798.67
Large-Scale Barataria Marsh Creation	NRDA	2018	153,504.00	8,576.42
Mid Breton Land Bridge Marsh Creation & Terracing	CWPPRA	2018	1,157,906.99	226,366.93
East Bank Sediment Transport Corridor	State	2018	527,325.00	1,366.99
Sabine Marsh Creation Cycles 6 & 7	CWPPRA	2018	204,077.00	202,375.52
Bayou Cane Marsh Creation	CWPPRA	2018	183,692.00	175,501.60
Increase Atchafalaya Flow to Terrebonne	NFWF	2018	4,511,559.00	3,970,432.09
Terrebonne Basin Barrier Island	NFWF	2018	1,968,451.19	369,324.16

Overall, the State of Louisiana continues to demonstrate its capacity to implement its mitigation strategy. Although there are opportunities for improvement mentioned in this chapter, the State of Louisiana has many examples of mitigation success throughout the state. Specific examples of successful projects are included in Chapter 5 – Mitigation in Action.

4
Mitigation Strategy

The State of Louisiana identified a hazard mitigation strategy in order to reduce and avoid long term vulnerabilities from the hazards identified in the hazard profiles and risk assessment (Chapter 2, Risk Assessment, Page 2). This includes identifying areas and situations experiencing a combination of geographic, social, and economic need. The State of Louisiana's hazard mitigation strategy is:

Reducing risks and the impacts of hazards by serving as a guide to decision makers on the commitment of resources, implementation of mitigation programs, and coordination of mitigation efforts that foster more resilient and sustainable people, property, and lifestyles across the State of Louisiana.

This demonstrates the state's commitment to reduce risks from hazards, and serves as a guide for state decision makers as they commit resources to help reduce the impacts of hazards.

The state, with the help of the hazard mitigation committee, identified goals and objectives to work to implement this strategy. This section allows the state to identify, evaluate, and prioritize, feasible, cost effective, and environmentally sound mitigation activities at the parish and municipal level. By doing so, the state can continue to work toward reducing identified risks.

For the purpose of this plan update, goals and objectives are defined as follows:

Goals are general guidelines that explain what the state wants to achieve, expressed as broad policy statemet representing long term results.
Objectives are more specific projects, policies, and programs that can advance each goal.

2014 Goals and Objectives

The current goals of this plan update represent long-term commitments by the State of Louisiana. The State Hazard Mitigation Planning Committee (SHMPC) reviewed the 2014 goals and objectives, and developed updated goals and objectives after this review.

The previous goals and objectives, from the 2014 plan update, are as follows:

GOAL 1 The State of Louisiana will improve education and outreach efforts regarding potential impacts of hazards and the identification of specific measures that can be taken to reduce their impact.

- 1.1 Statewide Education and Outreach
- 1.2 Education and Outreach for State Agencies
- 1.3 Analyze past Education and Outreach Activities

GOAL 2 The State of Louisiana will improve data collection, use and sharing to reduce the impacts of hazards.

- 2.1 Statewide Data-Related Effort
- 2.2 Data-Related Efforts for State Agencies

GOAL 3 The State of Louisiana will improve capabilities and coordination at the municipal, parish, regional and state level to plan and implement hazard mitigation projects.

- 3.1 Technical Support for Parish and Municipal Hazard Mitigation Planning
- 3.2 Technical Support for State Agencies Hazard Mitigation Planning
- 3.3 Plan Integration
- 3.4 Complete Web-Based Grant Application Tool

GOAL 4 The State of Louisiana will continue to pursue opportunities to reduce impacts to the State's manmade and natural environment through mitigation of repetitive and severe repetitive loss properties and other appropriate construction projects and related activities.

- 4.1 Identify Cost Effective Projects with Parishes and Municipalities
- 4.2 Identify Cost Effective projects with State Agencies
- 4.3 Legislative and Regulatory Enhancements
- 4.4 Enhance current State Hazard Mitigation Strategy

GOAL 5 The State of Louisiana will improve on the protection of Historic Structures/Buildings, Traditional Cultural Properties and Archaeological sites from natural and man-made hazards.

- 5.1 Integrate historic preservation into hazard mitigation planning
- 5.2 Education/Outreach for Historic Preservation Best Management Practices
- 5.3 Education/Outreach for Policies of Historic Preservation

2019 Goals and Objectives

Through reviewing the previous goals and objectives, the SHMPC identified common themes that the goals and objectives should address. These themes were hazard mitigation planning, coordination, outreach and education, implementation, and repetitive flood loss. The SHMPC used these themes to create updated goals, and specific objectives under each goal.

Using an online survey, the SHMPC ranked the goals and objectives according to funding priority. A total of 23 respondents prioritized the goals and objectives using the survey. The committee prioritized those objectives that would best reduce the vulnerabilities identified in the risk assessment (Chapter 2, Risk Assessment, Pages 3 and 4 – Table X). This includes identifying areas and situations experiencing a combination of geographic, social, and economic need.

The updated and prioritized goals and objectives are as follows:

GOAL 1 Protect the people, property and natural resources of Louisiana, by promoting strategies and policies that increase resiliency, and minimize vulnerability to natural hazards.

Objective 1.1: Support the capacity of the State to implement mitigation, policies, practices and programs.
Objective 1.2: Improve communication, collaboration, and integration among Stakeholders.
Objective 1.3: Boost commitment to mitigation and resilient measures, opportunities, and activities.
Objective 1.4: Identify technical feasibility and cost-effectiveness of proposed mitigation measures and projects.
Objective 1.5: Establish and coordinate effective partnerships between state agencies for floodplain and watershed management and development.

GOAL 2 Increase public and private sector awareness and support of mitigation activities and opportunities in Louisiana

Objective 2.1: Promote efforts to improve resiliency through public awareness/education, developments and improvements to infrastructure, planning and zoning requirements, floodplain management, and building codes.
Objective 2.2: Work with other state and regional entities to incorporate mitigation concepts and information into their outreach efforts.
Objective 2.3: Ensure that all communities are aware of available mitigation funding sources and cycles.
Objective 2.4: Educate risk management entities on mitigation incentives and benefits.
Objective 2.5: Educate Louisiana private sector about mitigation concepts and opportunities.

GOAL 3 Support local and regional mitigation initiatives and strategies.

Objective 3.1: Develop integrated solutions for the implementation of regional and local mitigation strategies and comprehensive emergency management plans.
Objective 3.2: Assist with the integration of local hazard mitigation plans and local land use plans, zoning codes, and other relevant plans a jurisdiction may maintain.
Objective 3.3: Support local and regional capacity.
Objective 3.4: Support floodplain management activities, such as the Community Rating System.
Objective 3.5: Support hazard mitigation research and development.

GOAL 4 Reduce Louisiana's repetitive and severe repetitive loss property inventory

Objective 4.1: Develop and implement the state Repetitive Loss Strategy for reducing RL and SRL properties.
Objective 4.2: Investigate possible actions to mitigate RL and SRL properties.
Objective 4.3: Update the RL and SRL inventory.
Objective 4.4: Prioritize repetitive loss properties for funding.

GOAL 5 Implement and maintain a comprehensive and effective enhanced statewide hazard mitigation plan.

Objective 5.1: Integrate mitigation practices throughout all state plans, programs, and policies.
Objective 5.2: Pursue methodologies that will enhance mitigation successes.
Objective 5.3: Develop plan performance and effectiveness strategy.
Objective 5.4: Provide training opportunities.

Changes in Priorities

From 2014 and 2019, some of the mitigation priorities changed. While the 2014 goals were similar, with mention of education and outreach, data collection, coordination, repetitive losses, and protecting buildings, the 2019 plan ranked them differently, with general mitigation planning given the most importance, followed by outreach and education, coordination with other strategies, reducing repetitive losses, and implementing the plan. Furthermore, the 2019 plan objectives contain more detail, with more measurable targets. As one committee member stated: "These represent a significant advancement over previous goals and objectives. Monitoring and achieving them is the next step."

Funding

The SHMPC had multiple discussions concerning how to prioritize funding selected mitigation projects. The committee underlined communities at highest risk as the most important priority, followed by communities with repetitive loss properties, communities undergoing development, and finally, community commitment to mitigation. The results of the committee survey are shown in the table below.

In a follow up survey, the committee underlined the need to reach out to under resourced communities, particularly low income and elderly residents. Committee members also pointed out the need to use insurance, including private insurance, and reform building codes. Respondents further emphasized the need to coordinate projects with other planning efforts, and analyze the goals and objectives over time to better plan for mitigation.

The State of Louisiana can utilize the following source of funding to implement the mitigation goals and objectives:

- FEMA HMA funding (HMGP, PDM, and FMA)
- HUD CDBG funding
- State of Louisiana Capital Outlay/general fund
- DOTD Statewide Flood Control program funding
- Private partnership funding
- CPRA funding to include:
- Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) funding
- Water Resources Development Act (WRDA) funding
- Capital Outlay/state funds
- HUD CDBG funding
- Natural Resource Damage Assessment (NDRA) Restoration funding
- BP and Transocean Settlements
- Restore Act funding
- Gulf of Mexico Energy Security Act (GOMESA) funding

Changes in Development

Parish-level population

Based on land cover data for the state and major urban areas, urban growth in previously rural locations was limited in the last 12 years, with the majority of urban areas established in Louisiana by 2001. Recent development primarily occurred in the outlying metropolitan areas of Shreveport, Monroe, Alexandria, Lake Charles, Lafayette, Houma, Baton Rouge, and New Orleans. The population of Louisiana was 4,533,372 in the 2010 census, and is projected to grow to 5,518,889 by 2043.

Vulnerable populations

The parishes with the highest sum of vulnerable population growth rates, indicating a greater likelihood of future increase in demographic vulnerability, are Ascension, Beauregard, Plaquemines, Tangipahoa, Terrebonne, and Vernon Parishes. Refer to Chapter 2, Risk Assessment, Page 8 and Appendix X, the Technical Appendix, for more information on development changes in Louisiana.

Statewide Mitigation Funding Since 2014

The following are the Major Declared Disasters since 2014, and the HMGP award funding for each disaster. The non-disaster grant funding obligated since 2015 is also included.

2018 Non Disaster Grant Funding

Flood Mitigation Assistance (FMA) — $ 43,926,442
Pre Disaster Mitigation (PDM) — $ 952,478

2017 Disaster Grant Funding:

Louisiana Tropical Storm Harvey (DR-4345)
Incident period:
August 28, 2017 to September 10, 2017
Major Disaster Declaration declared on October 16, 2017
HMGP Award: $ 1,139,906

Louisiana Severe Storms, Tornadoes, and Straight-line Winds (DR-4300)
Incident period: February 07, 2017
Major Disaster Declaration declared on February 11, 2017
HMGP Award: $ 561,551

2017 Non Disaster Grant Funding

Flood Mitigation Assistance (FMA) — $ 53,213,734
Pre Disaster Mitigation (PDM) — $ 522,562

2016 Disaster Grant Funding:

Louisiana Severe Storms and Flooding (DR-4277)
Incident period: August 11, 2016 to August 31, 2016
Major Disaster Declaration declared on August 14, 2016
HMGP Award: $ 261,971,744

Louisiana Severe Storms and Flooding (DR-4263)
Incident period: March 08, 2016 to April 08, 2016
Major Disaster Declaration declared on March 13, 2016
HMGP Award: $ 28,992,576

2016 Non Disaster Grant Funding

Flood Mitigation Assistance (FMA) — $ 44,721,674
Pre Disaster Mitigation (PDM) — $ 412,499

2015 Disaster Grant Funding:

Louisiana Severe Storms and Flooding (DR-4228)
Incident period: May 18, 2015 to June 20, 2015
Major Disaster Declaration declared on July 13, 2015
HMGP Award: $ 1,216,154

2015 Non Disaster Grant Funding:

Flood Mitigation Assistance (FMA) — $11,246,286
Pre Disaster Mitigation (PDM) — $5,978,405

Mitigation Monitoring and Review

Each mitigation project or activity has an established period of performance that GOHSEP and FEMA monitor throughout the development and execution of the activity. As described in the State of Louisiana Administrative Guidelines and Procedures, GOHSEP uses the following system for monitoring mitigation projects and project closeouts. No changes have been made to this system in this plan update.

Monitoring Mitigation Projects

Mitigation projects are generally monitored as follows:

- GOHSEP regularly meets with representatives from FEMA Region VI to coordinate project monitoring activities
- Every calendar quarter, GOHSEP sends correspondence to all sub-grantees with open projects (i.e., ones that have been funded but are not completed), requesting a project progress update
- Each of the sub-grantees responds to the GOHSEP request by preparing a standard report that details progress on individual mitigation projects and indicates a percent complete estimate
- GOHSEP compiles the sub-grantee progress reports and produces a consolidated quarterly report that is sent to FEMA Region VI for review. The consolidated quarterly report identifies changes from previous reports, areas of concern, and strategies to address problems

Monitoring Project Closeouts

Mitigation project closeouts generally occur in the following sequence, as established in the State of Louisiana Administrative Guidelines and Procedures, and in accordance with FEMA requirements for State Administrative Plans and Hazard Mitigation Grant Program (HMGP) guidelines set in the HMGP Desk Reference.

- Sub-grantee indicates that a mitigation project is 100% complete in a quarterly project progress report
- GOHSEP reconciles the FEMA SmartLink account for the project (by disaster)
- GOHSEP initiates a comprehensive internal financial audit of the project
- GOHSEP works with sub-grantees to resolve any issues discovered in the audit
- GOHSEP sends FEMA Region VI a closeout letter that identifies the final eligible cost of the project, de-obligations that are required, and any monies that will be recovered from the sub-grantee

In order to review progress on achieving goals, GOHSEP ensures that both the annual and five-year plan evaluations include a detailed examination and analysis of the goals and various objectives under each goal. This section of the plan update describes five major hazard mitigation goals and describes twenty-three objectives that the state and the SHMPC identified to address the identified goals. In updated versions of the plan, GOHSEP will indicate the status of the various objectives, and a general indication of progress.

In order to review progress on activities and projects included in the mitigation strategy, and as part of the yearly and five-year evaluations and updates to this plan, GOHSEP will initiate a review of all activities and projects noted in the mitigation strategy. The review takes place in five stages:

- In cooperation with the SHMPC, GOHSEP's Hazard Mitigation Planning Section will undertake a preliminary review and analysis of progress on the goals and objectives.
- GOHSEP's Hazard Mitigation Planning Section will prepare a draft report that describes progress, remaining tasks, and projected time to complete the tasks.
- The draft report will be presented to the SHMPC during the meeting(s) related to the yearly (and five-year) updates.
- After SHMPC review, comment, and approval, results of the progress review will be included as a new or updated column in the tabulation of mitigation goals and actions.

5 Mitigation in Action

The State of Louisiana has supported numerous successful mitigation efforts statewide. These include efforts at the local and parish level, as well as projects that span multiple regions. This section details some of the successful mitigation efforts implemented in the state, including the outreach work of the Coastal Protection and Restoration Authority (CPRA), a regional adaptation strategy implemented by the Office of Community Development (OCD), a statewide watershed plan called the Louisiana Watershed Initiative, the Louisiana Department of Transportation and Development's (LADOTD) risk mapping, assessment, and planning, state and local Community Rating System (CRS) efforts, a drainage project and safe room in Calcasieu Parish, and mitigation projects at the household level.

Actions to Reduce Vulnerability

As a means to reduce the number of repetitive and severe repetitive loss properties in the state of Louisiana, GOHSEP continues to promote FEMA Non-Disaster Grant Programs as well as state funded programs to the parishes in Louisiana. One recent example includes the 2018 FMA grant obligated to East Baton Rouge Parish for nearly 9 million dollar to elevate seventeen homes and acquire twenty-four more.

Additionally, GOHSEP also continues working with local jurisdictions promote the use of HMGP funding to Parishes to reduce the threat of flooding through drainage projects. Large drainage projects in New Orleans and Plaquemines Parishes are underway as a result of disaster 1603 and 1607. More recently many more localized drainage improvement projects are either underway or being developed in many parishes throughout Louisiana. GOHSEP continues to promote localized drainage projects through HMGP funding that has become available following disasters 4228, 4263, 4277, and 4300.

GOHSEP is working with sister agencies in Louisiana to prioritize implementation of risk reducing activities, such as focusing on drainage projects that work to restore and improve the functions of floodplains; retrofitting infrastructure to protect against future damages and ensure continuity of services; construction of safe rooms to protect citizens from tropical cyclones and tornadoes; and development and updates to local hazard mitigation plans to better identify actions and activities at local levels.

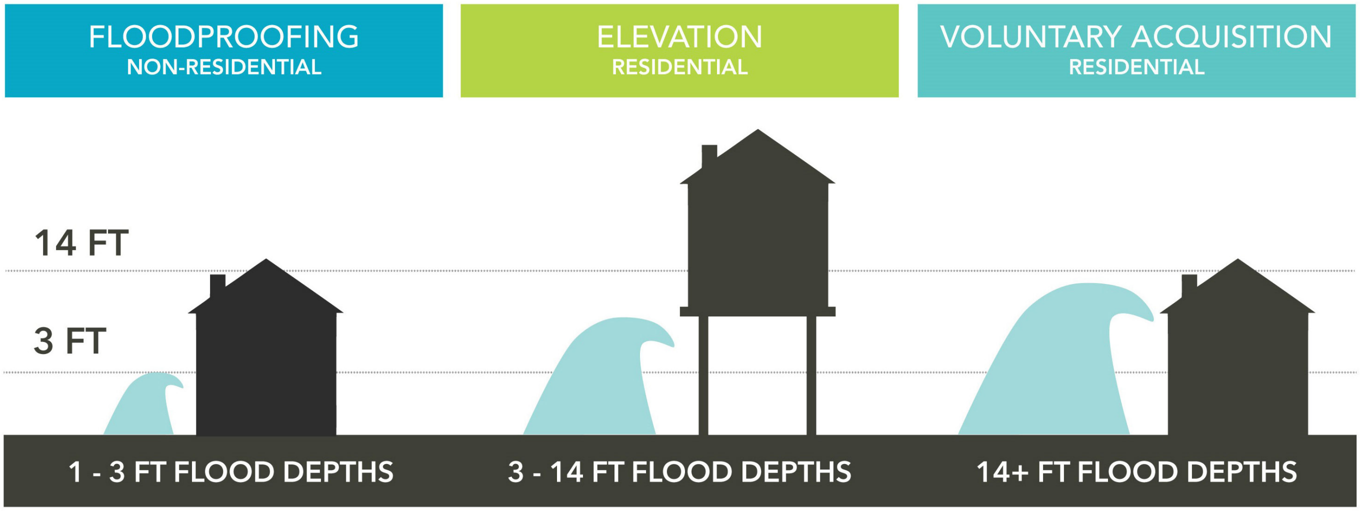
Flood Risk and Resilience Program

As a part of the 2017 Coastal Master Plan, the Coastal Protection and Restoration Authority (CPRA) is working to implement a Flood Risk and Resilience Program, focused on reducing the impacts of storm surge based flooding on Louisiana's coastal communities. The program emphasizes planning for and implementation of nonstructural risk reduction projects, and recommends the implementation of large-scale nonstructural risk reduction projects. These projects work to support the Coastal Master Plan.

CPRA

Coastal Protection and Restoration Authority

NONSTRUCTURAL PROJECT TYPES AND ASSOCIATED FLOOD DEPTHS



The Flood Risk and Resilience Program works at the local level to support local decision making through parish prioritization of structures to be mitigated. It also promotes higher standards of risk reduction by recommending the elevation of residential structures to 100 year flood depths plus two feet above grade. Unlike other nonstructural programs, it provides reduced cost requirements, with 90% CPRA funding and up to 100% full state funding when certain requirements are met. It further functions as a piece of the multiple lines of defense strategy, by complementing other structural risk reduction measures, such as levees and flood gates. Additionally, it helps the most vulnerable, by requiring the prioritization of low to moderate income households.

The nonstructural projects included in this program are activities that do not stop floodwaters, but reduce the impacts of flooding to buildings and infrastructure by floodproofing, elevation, or voluntary acquisition. The program recommends floodproofing for non-residential structures in areas where flood depths are less than 3 feet, elevation for residential structures in areas where flood depths are between 3 and 14 feet, and voluntary acquisition for residential structures in areas where flood depths are greater than 14 feet.

The 2017 Coastal Master Plan recommends thirty two nonstructural risk reduction projects, including floodproofing 1,400 non-residential structures, elevating 22,400 residences, and acquiring 2,400 residences. All floodproofing, elevation, and acquisition projects are strictly voluntary. This will total over 26,000 structures, at a cost of $6 billion over the next 50 years. The figure above depicts the areas where these mitigation activities can be implemented.

In order to implement these projects, CPRA will take advantage of different funding sources, with a focus on non-federal sources. CPRA has asked parishes to refine the recommendations and tailor the program to local needs and goals. CPRA has also asked parishes to prioritize properties by low to moderate income households, primary residences, contiguous properties, and properties with the highest flood depths.

Louisiana's Strategic Adaptations for Future Environments (LA SAFE)

LASAFE
Louisiana's Strategic Adaptations *for* Future Environments

In coastal Louisiana, subsidence and sea level rise, plus the threat of hurricanes and flooding, combine to create one of the highest rates of relative sea level rise in the world. This relative sea level rise and continual damage from hurricanes and flooding has an acute effect on coastal communities in southeast Louisiana. To help address these issues, the National Disaster Resilience Competition (NDRC), sponsored by the U.S. Department of Housing and Urban Development (HUD) and the Rockefeller Foundation, awarded funding for LA SAFE – Louisiana's Strategic Adaptations for Future Environments. The LA SAFE program, a partnership between the Office of Community Development (OCD) and the Foundation for Louisiana (FFL), supported an inclusive public process to identify adaptation strategies to enhance the resilience of coastal Louisiana, and is providing funding for at least one project in each of six identified parishes.

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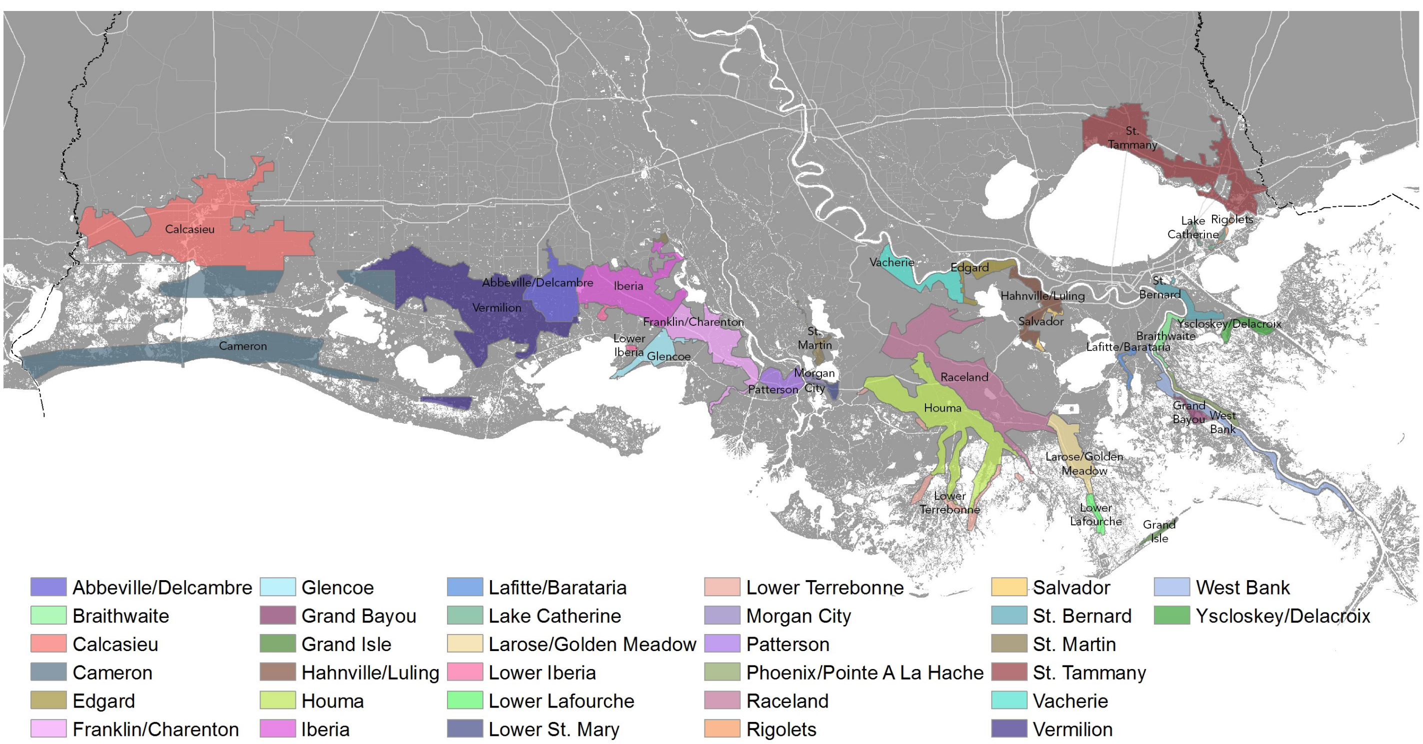
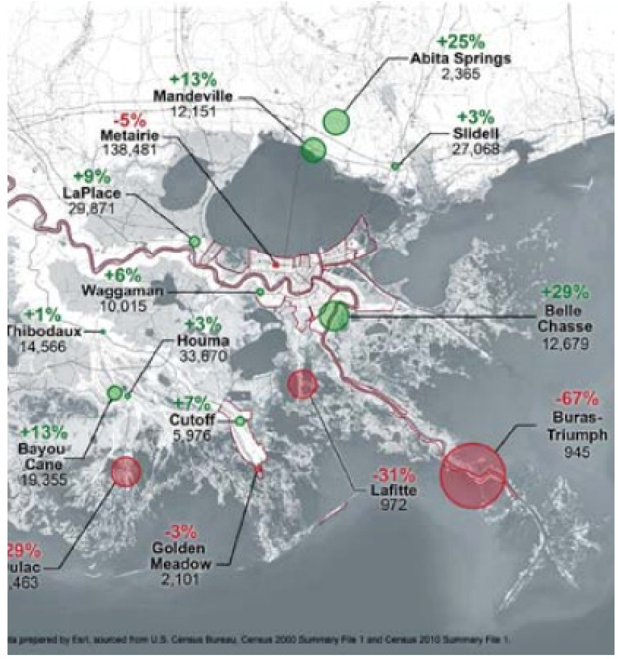
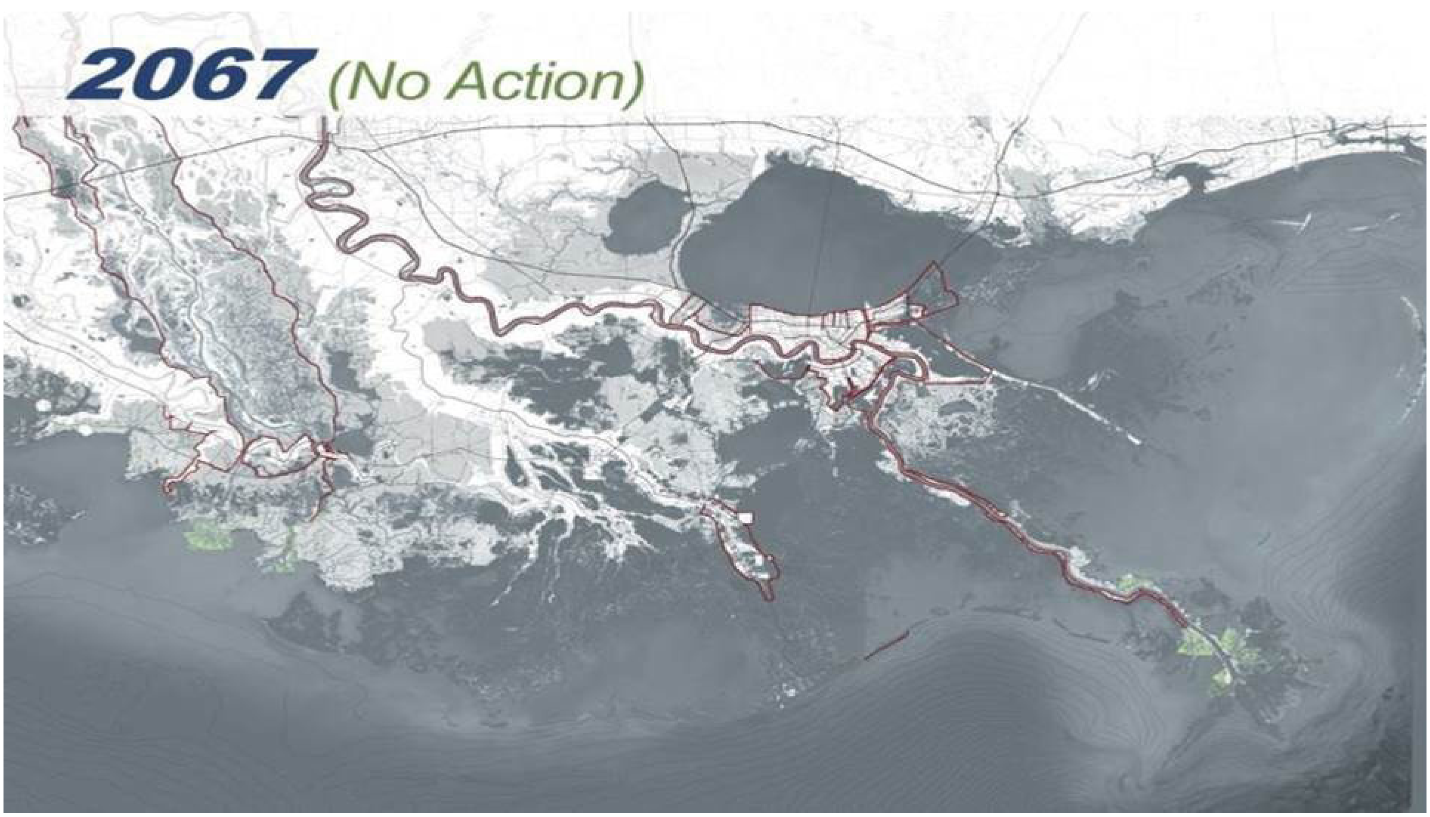


The LA SAFE program, a partnership between the Office of Community Development (OCD) and the Foundation for Louisiana (FFL), supported an inclusive public process to identify adaptation strategies to enhance the resilience of coastal Louisiana, and is providing funding for at least one project in each of six identified parishes. LA SAFE developed an intensive planning process that involved the six parishes most impacted by Hurricane Isaac in 2012: Jefferson, Lafourche, Plaquemines, St. John the Baptist, St. Tammany, and Terrebonne.

The figure above shows the population change over time in the six parishes from 2000 to 2010. As coastal Louisiana becomes more and more vulnerable to both chronic and acute flooding, populations with available resources are moving inland, away from the coast (The Data Center, 2017). In these vulnerable coastal areas, there are more workers commuting into the parish to work than workers that both reside and work in the parish. Additionally, the population in these areas is aging, and grappling with low incomes and high flood insurance rates.



% change in population, 2000-2010



Due to the high vulnerability of many of the LA SAFE parishes, the planning process had three main goals:

GOAL 1 To generate parish-wide, community-driven adaptation plans focused on opportunities for residents and stakeholders to proactively adapt and prepare for anticipated environmental changes over the next 10, 25, and 50 years.

GOAL 2 To implement a catalytic project in each of the six parishes that demonstrates adaptive development practices that conform to current and future flood risks. Furthermore, LA SAFE is intended to identify and support development of resilience-building projects and practices that can serve as models for the entire region

GOAL 3 To create a statewide adaptation model that enhances long-term sustainability and resiliency for all Louisiana parishes.

The project team held five round of meetings in each of the six parishes, for a total of 71 meetings, attended by nearly 3,000 coastal residents. From the meetings, the team drafted adaptation strategies for each of the participating parishes, as well as a regional strategy encompassing all six parishes. The adaptation strategies in LA SAFE's regional and parish plans integrate stormwater management, housing and development, transportation, education, economy and jobs, and culture and recreation to provide community benefits that improve quality of life while mitigating flood risk. The strategies include implementation recommendations for low risk, moderate risk, and high risk areas.

The strategies included a series of projects to implement. From the strategies, the planning team identified at least one project in each parish to fund as a pilot project. The projects identified for LA SAFE in a collaborative process with the residents, stakeholders, and the planning team, include a resilience district and wetlands education center in Jefferson Parish, a blue-green trail in St. Tammany Parish, complete streets in St. John the Baptist Parish, marsh mitigation and property buyouts in Terrebonne Parish, a business incubator and resilient housing in Lafourche Parish, and a harbor of refuge and mental health program in Plaquemines Parish. The projects chosen for LA SAFE are depicted in the table below.

In addition to the strategies and project list, the LA SAFE planning process is still ongoing. The Rockefeller Foundation in coordination with UNO-CHART, Foundation for Louisiana, and Concordia LLC is in the process of conducting three convenings using the learnings from LA SAFE in relation to global knowledge of resilience and adaptation. The convenings provide a place to share the lessons learned from LA SAFE with a greater knowledge base, as well as allow LA SAFE participants to learn from other planning efforts. The planning team also hopes to expand this planning effort to other parishes across Louisiana.

Parish	Project
Jefferson	Gretna Resilience District Kickstart Louisiana Wetland Education Center
St. Tammany	Safe Haven Blue-Green Campus & Trails
St. John the Baptist	Airline & Main Complete Streets
Terrebonne	Lake Boudreaux Living Mitigation Buyouts for Permanent Resident Households
Lafourche	Emerging Industry Business Incubator Resilient Housing Prototype
Plaquemines	Harbor of Refuge Mental Health & Substance Abuse Program

Louisiana Watershed Initiative

LOUISIANA
WATERSHED
INITIATIVE
working together for sustainability and resilience

In March and August of 2016, Louisiana experienced two historic rain events that produced trillions of gallons of rainwater and impacted 56 of Louisiana's 64 parishes. According to FEMA verified loss data, the resulting floodwaters impacted more than 145,000 rental and owner-occupied homes across the state, and caused more than $10 billion in damage, with recovery efforts that remain ongoing more than two years later.

These devastating events exposed key deficiencies in Louisiana's approach to floodplain management and community planning across all levels of government. Areas that were once considered to have low flood risks were devastated in 2016. While this flooding can be attributed to any number of causes, none are acceptable to Louisiana residents who rely on various government agencies to manage risk to their homes and businesses, develop effective solutions that protect the state's unique cultures, and improve quality of life.

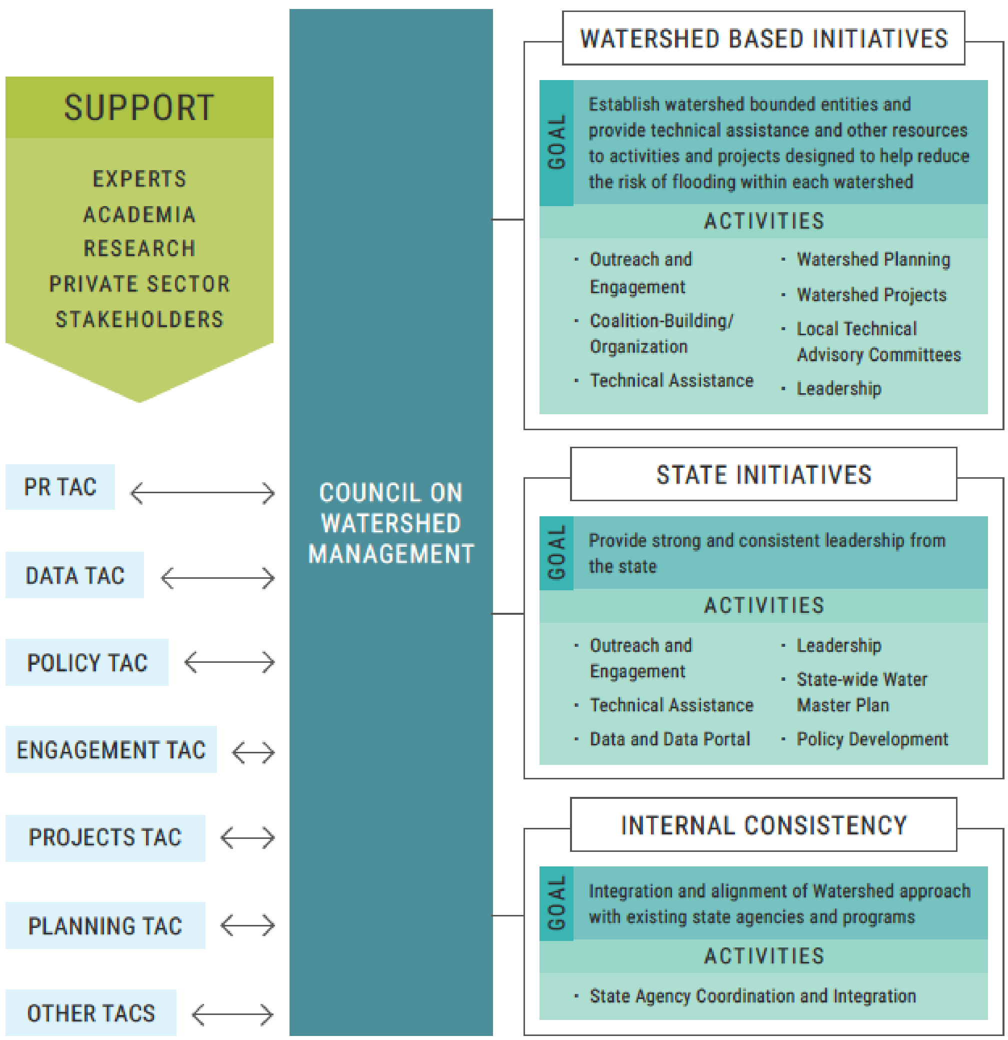
The state is addressing these weaknesses through the establishment of the Louisiana Watershed Initiative, and it is critical for communities and their residents to understand the long-term nature of solutions that must be put into place. While there are projects that can and should be undertaken to provide short-term relief – provided that funding is available – the reality is that proper flood risk management requires a coordinated, coherent and long-term vision for sustainability and resilience. Put simply, Louisiana can no longer afford to rely on a siloed approach to managing projects, plans and policies separate and apart from each other.

The state is committed to solving watershed management collaboratively with cities, parishes, federal agencies, research and nonprofit organizations, universities and private-sector partners, with an emphasis that the status quo is simply no longer an option. Water flows downhill and does not recognize political or arbitrary boundaries; thus, it must be managed, and associated risks mitigated, in a manner that takes this behavior into account.

Passed during the 2017 Regular Legislative Session, Senate Resolution 172 (SR172) directed state agencies to "provide recommendations to establish, implement, and enforce floodplain management plans for each watershed in Louisiana." This resolution helped to reinforce the efforts that had already been initiated by state agencies to assess the feasibility of establishing a coordinated, statewide model for watershed-based floodplain management, and identify the most appropriate path forward to implementing such a model. In May 2018, Gov. Edwards issued an executive order (EO JBE18-16) that further defined this level of interagency collaboration. The order established the Council on Watershed Management to oversee and coordinate Louisiana's progress toward a statewide vision for sustainability and resilience.

The state agencies that comprise this Council on Watershed Management are in the process of launching the Louisiana Watershed Initiative, a statewide, watershed-based floodplain management program. To date, significant work has taken place in establishing a coordinated approach to flood risk mitigation for floodplains across all governmental levels, including a process to synchronize local and statewide outreach and engagement, data management, policy development, technical assistance and master planning.

This new approach requires unprecedented coordination and cooperation across all facets and functions of government agencies, including the review of existing authorities and laws at both the state and local level that may impede watershed-based floodplain management. The figure on the previous page reveals the coordination model for the Council on Watershed Management. Through the interagency Council structure and programmatic approach established through the Louisiana Watershed Initiative, the state is demonstrating its commitment to this effort while asking municipalities, parishes, regional organizations and all stakeholders across the state to do the same.



DOTD as a FEMA Cooperating Technical Partner (CTP) for Risk MAP

LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

On March 11, 2015, the Louisiana Department of Transportation and Development (LADOTD) signed a partnership agreement with FEMA Region VI to become a Cooperating Technical Partner (CTP) for Risk MAP. Susan Veillon manages this program under the direction of the State Coordinator, Cindy O'Neal, for the National Flood Insurance Program (NFIP), which resides in the LADOTD Public Works/Water Resources Section within the Engineering Division.

LADOTD selected Dewberry Consultants, LLC as the project consultant through an open solicitation process. Ms. Jerri Daniels is the CTP Project Manager for Dewberry Consultants, LLC. The consultant will assist LADOTD in the CTP activities as stipulated in the contract.

Since becoming a CTP with FEMA Region VI, LADOTD has been diligently planning and working with FEMA Region VI toward the release of updated flood risk information for Louisiana. LADOTD has made a significant investment in a prioritization tool, which is used for prioritizing projects in Louisiana. The Project Prioritization Decision Tool for allows the department to efficiently and effectively prioritize and select projects based on key criteria such as:

1. **FEMA's Risk MAP metrics**
2. **Meeting specific needs to address known flood risk concerns**
3. **Knowing where communities have conducted flood studies or produced other relevant data that can be used as leverage and count toward cash-match contributions**
4. **Knowing which communities are at risk**
5. **Knowing where the most current LiDAR data exist in Louisiana**

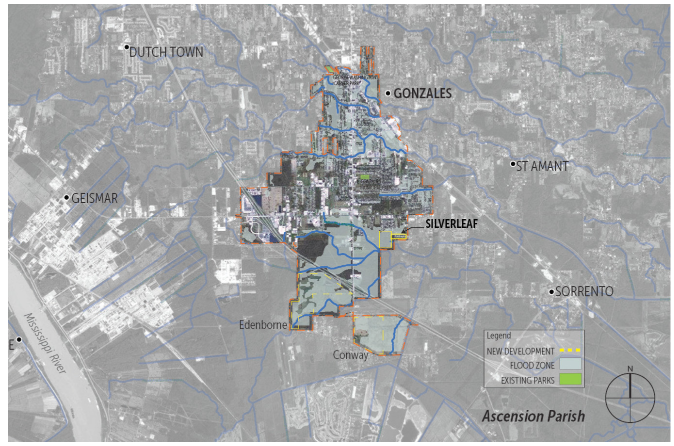
The final result is a project ranking list that best addresses the key criteria using the user's selected preferences.

Project Type	Project Description	Status
Year One Projects (2016)		
Castor and Little Watershed	Approximate A and limited detailed	Ongoing
Baou Sara Thompson Watershed	Phase 1, Discovery	Ongoing
Year Two Projects (2017)		
Phase 1, Bayou Teche Watershed	Discovery	TBD
Phase 1, Tickfaw Watershed	Discovery	TBD
Phase 1, Tangipahoa Watershed	Discovery	TBD
Phase 1, Liberty Bayou/Tchefuncta Watershed	Discovery	TBD
Phase 1, Amite Watershed	Discovery	TBD
West Carroll Parish, Special Project Flood Information Guide	Community Outreach and Mitigation Strategies	TBD

Flood Mitigation, Improved Resilience, and Community Enhancement for Gonzales, Louisiana

Following the storms of 2016, the City of Gonzales is exploring opportunities to acquire an area of repetitive loss properties, and then incorporating those properties into an adjacent park to increase the park's ability to mitigate flooding. Gonzales is interested in partnering with local and federal partners for design, funding, implementation, and maintenance, as appropriate. The Center for Planning Excellence (CPEX) is partnering with Gonzales on this project.

The area in question, E. Silverleaf Street, is a dead-end residential street of approximately 20 single-family homes on 11 acres. A number of these homes have flooded as many as four times in the past ten years. This property is adjacent to a city-owned 53-acre parcel, which is currently undeveloped but future plans call for a park with trails, parking, and other amenities. The city's vision is for the properties on Silverleaf to be bought out, so that the land can be incorporated into the proposed park. Doing this will allow for easier access to the park, as well as the opportunity to expand the park as a space that not only provides public amenities, but also as a flood mitigation element in an area that is routinely impacted by flooding. The opportunity to assist in the relocation of Silverleaf residents to other areas within Gonzales demonstrates the city's commitment to smart, responsible growth and development.



Silverleaf and the adjacent city-owned parcel (solid yellow outline) are situated at the edge of the city limits. These properties are just to the east of LA 44 (Burnside), a corridor of mixed commercial and industrial uses. Much of the surrounding land is low-lying and undeveloped, low density residential, or cultivated. The city's denser, more developed core is to the north. A number of waterways pass through the area and ultimately end up in Lake Maurepas.

This project provides an opportunity to reduce flood risk for Silverleaf residents by relocating them to less flood-vulnerable areas. It also allows the City of Gonzales to use property to manage stormwater, which can reduce flood risk for a larger area. This will further mitigate potential downstream flood risk, as well as provide recreational and nature amenities for area residents.

Local Community Rating System (CRS) Efforts

The Community Rating System (CRS) is a voluntary program, which provides incentives for communities to implement floodplain management activities that exceed those required by the National Flood Insurance Program (NFIP). The goals of the CRS are to (1) reduce flood damage to insurable property; (2) strengthen and support the insurance aspects of the NFIP; and (3) encourage a comprehensive approach to floodplain management. An incentive for communities to participate in the CRS is discounts on flood insurance premiums for local policyholders. A community earns points for each CRS activity completed; the number of points determines the amount of the flood insurance premium discount. The LADOTD Public Works/Water Resources Section within the Engineering Division assists with this program at the state level, providing resources, training, and assistance visits to participating communities. A number of communities throughout the State of Louisiana implement CRS efforts in order to receive flood insurance discounts. This section details efforts by a few of the CRS communities in the state.

CRS USers Group Support

The University of New Orleans' Center for Hazards Assessment, Response and Technology (UNO-CHART) facilitates two separate CRS User's Groups in Louisiana; one around the Lake Pontchartrain area, and one in the Baton Rouge area. The purpose of a CRS Users Group is to serve as a support and educational resource for local communities who participate in the CRS. These two groups are comprised of only 16 of the 42 CRS participating communities in of Louisiana, but make up almost half of the total CRS discounts in the state. The groups are comprised of local officials who have been designated as CRS Coordinator for their communities. UNO-CHART provides support through facilitation of meetings and research.

The Flood Loss Outreach & Awareness Task force (FLOAT) is one of the CRS Users Groups, made up of communities in the Greater New Orleans area. In 2011, the member jurisdictions of FLOAT decided to come together, with the invaluable help of the Office of the Louisiana State Coordinator for the NFIP, the Louisiana Region CRS Coordinator for ISO, and UNO-CHART. From the humble beginnings of FLOAT, the group has been able to develop a cohesive program to increase outreach to the public regarding natural hazard preparation, and to continue planning for sustainable communities in the face of the environment in which we live, work and play. FLOAT currently has 10 participating communities: Lafourche Parish, Orleans Parish, St. Charles Parish, St. John the Baptist Parish, St. Tammany Parish, Tangipahoa Parish, Terrebonne Parish, the City of Covington, the City of Mandeville, and the City of Slidell.

In June 2012, the Capital Region Area Floodplain Task-force (CRAFT) was formed. The group is composed of the following communities: Ascension Parish, East Baton Rouge, West Baton Rouge Parish, City of Central, City of Denham Springs, City of Gonzales, City of Scott, City of Walker, and the City of Zachary.

CRAFT and FLOAT are working towards joint outreach efforts to make the southeast region of Louisiana more aware of the inherent risks associated with this region, all while making the citizenry more capable of handling and mitigating these risks. A large part of the outreach efforts is a Program for Public Information (PPI) report. FLOAT and CRAFT, along with our member jurisdictions, developed educational and outreach projects over the years with input and support from environmental volunteers, numerous partners, and with the use of creative and innovative tools. With such aggressive outreach programs spread out over multiple jurisdictions, FLOAT and CRAFT decided to assemble all of these activities, opportunities and materials in a single coordinated multijurisdictional program for public information.

Elevation Certificates in the City of New Orleans

The City of New Orleans is working to gather all of the elevation certificates available in the city. As a minimum requirement of the Community Rating System, the City must collect elevation certificates for all new construction and substantial renovations. The City will keep these documents permanently for each property and make available upon request. By collecting elevation certificates, the city will get more points through the Community Rating System, and ultimately receive a discount on flood insurance rates for residents in the Special Flood Hazard Area (SFHA).

Improved CRS Rating for the City of Mandeville

The City of Mandeville recently improved its CRS rating, moving up to a Class 6 from a Class 7. A Class 7 provides a 15% discount on flood insurance for residents in the SFHA, and a 5% discount for residents not in the SFHA, while a Class 6 provides a 20% discount on flood insurance for residents in the SFHA, and a 10% discount for residents not in the SFHA. Therefore, the class improvement will provide an additional 5% discount to residents with flood insurance. The city improved its ranking through improving drainage, elevating structures, and creating green space.

Outreach Projects in Jefferson Parish

Jefferson United Mitigation Professionals (JUMP), the Jefferson Parish based CRS Users Group, is comprised of Unincorporated Jefferson Parish, the Cities of Gretna, Harahan, Kenner, Westwego, and the Town of Jean Lafitte. Part of JUMP's mission is to take action in protecting the people and property of Jefferson Parish from future flooding. JUMP, like CRAFT and FLOAT, developed a Program for Public Information (PPI) in coordination with participants from real estate, banking, insurance and other private sectors. JUMP was the first group in Southeast Louisiana to complete and adopt a multijurisdictional PPI.

The PPI serves as an official strategy for joint education and outreach efforts focusing on flood protection. The benefits of a multijurisdictional PPI include a comprehensive outreach approach by providing communities and residents with clear, coordinated messages that are delivered in a cost-effective and consistent manner. The better access residents have to the flood risk and impacts, the higher chance these residents will be prepared to take action in reducing their risk. The result is a well-informed public, safer living environment, and lower costs associated with flood loss.

The parish identified a total of 114 outreach projects that reach 11 different priority audiences. They created Marsha the Pelican to impart information on how to protect people and property from hazards, and suggest ways to build more sustainably in the parish. The parish's newest outreach project, Brooms to Basins, encourages residents to clean catch basins in order to reduce flooding and pollution across the parish. The program provides an opportunity for residents to adopt a catch basin, help maintain it, and share their efforts on social media.

Belfield Ditch Drainage Improvement Project

In October 2006, approximately 400 homes were damages due to an estimated 25-year flooding event in Calcasieu Parish. Therefore, the State of Louisiana funded a drainage project in the area. The Belfield Ditch Drainage Improvement Project increased the size of the Belfield Ditch from its connection point with the Belfield North-South Ditch west to 150 feet downstream of North Perkins Ferry Road. The project allows for greater flow through the channel to relieve the flooding in the area. The project also includes added overflow pipes at Belfield Road, so the structure can accommodate the additional capacity of the modified ditch, as well as increase the capacities of North Perkins Ferry Road and Stafford Lane.

The State of Louisiana provided funding for a dual-use hurricane safe room, in compliance with all applicable guidance, including FEMA 361, Design and Construction Guidance for Community Safe Rooms (second edition, August 2008), and all applicable codes, standards, and regulations. This dual-use hurricane safe room provides near-absolute life safety protection for the people of Calcasieu Parish in the event of a hurricane.

After experiencing frequent flooding, a house in Calcasieu Parish was elevated to mitigate it from future damage. The photograph on the following page shows the home during one of the floods.

Calcasieu Parish Safe Room

House Elevation in Calcasieu Parish

After experiencing frequent flooding, a house in Calcasieu Parish was elevated to mitigate it from future damage. The photograph on the following page shows the home during one of the floods.

The house was elevated before Hurricane Harvey hit Calcasieu Parish in September 2017. The photograph below reveals that the home was not flooded from the storm due to its new elevation.

House Reconstruction in Golden Meadow

The State of Louisiana also uses mitigation funding to mitigate individual properties. One mitigation success story is located in Golden Meadow. In 2005, Hurricane Katrina and Hurricane Rita hit south Louisiana, devastating the coast. After Hurricane Rita, the Golden Meadow home was approved for elevation. The structure was slightly elevated, but not enough to protect it from further flooding and storm surge. During Gustav, the building was flooded and damaged by a boat, which completely knocked it off of its structure.

In 2008, Hurricane Ike hit Lafourche Parish, causing the house to be flooded and damaged even more. Due to the extended damage from Gustav and Ike, the project was amended to a reconstruction. The house is now reconstructed, and elevated many feet in the air, in order to properly mitigate future flooding and storm surge.

Technical Appendix A

Local Risk Assessments

As part of the hazard identification and risk assessment process, the planning team reviewed parish plans in order to identify profiled hazards that were consistent with the State Hazard Mitigation Plan Committee's (SHMPC's) evaluation of the most serious natural hazard threats to the state. Some hazards identified in parish and municipal plans are not addressed directly in this plan update. Generally, these hazards appear in a small number of parish and municipal plans, and were not consistent with the SHMPC's evaluation of the most serious natural hazard threats to the state.

Members from the SHMPC and the LSU Advisory Team reviewed each of the 64 current parish plans in the state to identify the hazards profiled in each plan in order to determine (1) the frequency with which each was addressed, and (2) whether sufficient consistency between the local plans exists to integrate the data, methods, and results systematically into the plan update.

The following table lists the hazards profiled in the existing 64 parish plans for each of the hazards (or sub-hazards) included in this plan update. The hazard most often addressed by parish plans was tropical cyclones, with 62 of the 64 parishes including cyclones in the hazard profile. None of the existing parish plans profiled sinkhole hazards, and only two parish plans profiled sea level rise as a hazard. Parish plans included an average of 11 of the 20 hazards (or sub-hazards) included in this plan update. The Iberville Parish plan considers the fewest hazards profiled in this plan update (4 hazards), while five parish plans (Assumption, Claiborne, Lincoln, Orleans, and Red River) consider 15 of the 20 hazards profiled in this plan update.

Overall, the parish plans and the plan update were found to be consistent in identifying natural hazards that impact areas of the state. Although the identified hazards are largely consistent, the parish plans vary widely in key characteristics, including hazard identification definitions, risk assessment data, risk assessment methodologies, and economic loss estimation. The primary commonality among the plans is the inclusion of Hazus Level 1 analyses. This update includes Level 1 flood, wind, and combined wind and flood model results. Thus, the risk assessments for these prevalent hazards are consistent among the parish and state plans.

X - Hazard Profiled

*** - Hazard Profiled but Discounted**

+ - Hazard Profiled but Plan Cited a Data Deficiency

	Subsidence	Land Loss	Coastal Erosion	Saltwater Intrusion	Sea Level Rise	Drought	Earthquake	Flooding	Extreme Heat	Thunderstorms	Tornadoes	Tropical Cyclones	Wildfires	Winter Storms	Dam Failure	Levee Failure	Sinkholes	Storm Surge	Fog	Expansive Soil	Hail Storms	Hazardous Materials
Acadia						X		X		X	X	X		X								
Ascension	X							X		X	X	X		X		X						
Assumption								X		X	X	X		X			X					
Beauregard						X		X	X	X	X	X	X				X					
Bossier						X	*	X		X	X	X		X	+	+						
Caddo						X	*	X	X	X	X	X	X	X	+	+						
Caldwell						X	*	X		X	X	X	X	X	+	+						
Cameron		X				X		X	X	X	X	X	X				X					
Catahoula						X		X		X	X	X		X								
Claiborne						X	*	X	X	X	X	X	X	X	+	+						
Concordia						X	*	X	X	X	X	X	X	X	+	+						
DeSoto						X	*	X	X	X	X	X	X	X	*	*						
East Baton Rouge	*	*				X	*	X		X	X	X	X	X	+	+						
East Carroll						X	*	X		X	X	X	X	X	*	X						
Evangeline						X		X		X	X	X		X	+		X					
Franklin						X		X	X	X	X	X		X	+	+	X					
Grant						X		X		X	X	X	X	X		X						
Iberia		X				X		X		X	X	X			X		X					
Iberville	*	*						X		X	X	X				+	X					
Jefferson	X		X			X	X	X			X	X	X	X				X			X	
Jefferson Davis						X		X		X	X	X	X	X		X						
La Salle						X		X		X	X	X	X	X								
Lincoln						X	*	X	X	X	X	X	X	X	+							
Livingston	X	X				X		X		X	X	X									X	
Madison								X		X	X	X		X		+	X					
Morehouse						X		X	X	X	X	X	X	X	+	+						
Natchitoches						X		X		X	X	X	X	X								
Orleans	X		X			X		X	X		X	X		X	X	X		X				
Plaquemines	X			X	X			X			X	X				X	X					
Point Coupee						X		X		X	X	X		X	+	+						
Rapides	*	*				X		X		X	X	X	X	X								
Red River						X	*	X	X	X	X	X	X	X	+	+				*		
Richland						X		X		X	X	X		X	+	+						
Sabine						X		X		X	X	X	X	X	+							
St. Bernard	X			X				X		X	X	X					X					
St. Charles		X	X	X								X		X		X						X
St. Helena								X		X	X	X										
St. James	X					X		X		X	X	X	X	X			X			X		
St. John the Baptist						X		X	*	X	X	X		X						X		
St. Landry	*	*				X		X		X	X	X	X	X								
St. Martin	X					X		X			X	X				X				X	X	
St. Mary			X					X			X	X				X						
St. Tammany		X				X	X	X		X	X	X	X		X	X			X			
Tangipahoa	X	X				X		X		X	X	X	X	X						X		
Tensas						X	*	X	X	X	X	X	X	X		X	X					
Terrebone	X		X	X		X		X		X	X	X			X	X						
Vermilion		X						X			X	X					X					
Vernon						X	*	X	X	X	X	X	X	X	+	+						
Washington								X			X	X	X									
Webster						X	*	X	X	X	X	X	X	X	+	*	X					
West Baton Rouge	*	*				X	*	X	*	X	X	X	X	X			X					
West Carroll						X		X		X	X	X		X								
Winn						X		X		X	X	X	X				X					

The majority of the recent updates to jurisdictional plans follow the general methodology of the 2014 State Hazard Mitigation Plan. This current update enhanced these methodologies significantly. This plan update utilizes data from the Spatial Hazard Events and Losses Database for the United States (SHELDUS). This is considered an improvement over parish plan data, as SHELDUS integrates data from National Centers for Environmental Information with additional data from the NOAA Storm Prediction Center, National Hurricane Center, and U.S. Fire Administration. Additionally, data from multiple state agencies have been integrated into the current plan.

Changes in Development

PARISH-LEVEL POPULATION

Future population estimations were calculated at the block level of each Louisiana parish for 2043. "Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2016" data were obtained from United States Census Bureau American Fact Finder for each parish. The file consists of yearly population estimates (Pyear) for each parish from 2010 to 2016. These population estimates are used to calculate how the population changed from the previous year up until 2016 for each parish. The overall average rate (r) of population change was calculated based of the six annual population changes determined for each parish (Equation 1).

Average population change from 2010 to 2016

$$r = \left(\frac{(P_{11} - P_{10})}{P_{10}} + \frac{(P_{12} - P_{11})}{P_{11}} + \frac{(P_{13} - P_{12})}{P_{12}} + \frac{(P_{14} - P_{13})}{P_{13}} + \frac{(P_{15} - P_{14})}{P_{14}} + \frac{(P_{16} - P_{15})}{P_{15}} \right) / 6 \quad \text{(Equation 1)}$$

After the average annual population rate (r) was determined, future population estimates (Pf) for each Louisiana parish at the census block level were calculated for 2043 (Equation 2). The 2010 block level U.S. Census population data (P0) was used as the initial base to estimate how the future population Louisiana changed during the 33-year period (t).

$$P_f = P_0 e^{rt} \quad \text{(Equation 2)}$$

The latest three National Land Cover Databases (NLCD) are used to describe how the urban land cover across Louisiana has changed between 2001 and 2011. A description of the datasets used in the analysis is readily available and stated below from NLCD (https://www.mrlc.gov/finddata.php).

National Land Cover Database 2011 (NLCD 2011) is the most recent national land cover product created by the Multi-Resolution Land Characteristics (MRLC) Consortium. NLCD 2011 provides – for the first time – the capability to assess wall-to-wall, spatially explicit, national land cover changes and trends across the United States from 2001 to 2011. As with two previous NLCD land cover products, NLCD 2011 keeps the same 16-class land cover classification scheme that has been applied consistently across the United States at a spatial resolution of 30 meters. NLCD 2011 is based primarily on a decision-tree classification of circa 2011 Landsat satellite data.

The following table presents the parish-level population results.

Parish	Population 2010	Population 2043
Acadia	61,773	66,212
Allen	25,764	25,604
Ascension	107,215	207,443
Assumption	23,421	20,067
Avoyelles	42,073	37,030
Beauregard	35,654	42,041
Bienville	14,353	12,055
Bossier	116,979	171,127
Caddo	254,969	219,774
Calcasieu	192,768	237,906
Caldwell	10,132	9,905
Cameron	6,839	6,783
Catahoula	10,407	8,144
Claiborne	17,195	12,260
Concordia	20,822	16,306
De Soto	26,656	29,343
East Baton Roug	440,171	476,354
East Carroll	7,759	5,567
East Feliciana	20,267	17,786
Evangeline	33,984	32,612
Franklin	20,767	18,291
Grant	22,309	22,383
Iberia	73,240	73,340
Iberville	33,387	31,066
Jackson	16,274	13,800
Jefferson	432,552	452,995
Jefferson Davis	31,594	30,562
Lafayette	221,578	349,498
Lafourche	96,318	105,606
La Salle	14,890	15,602
Lincoln	46,735	51,769
Livingston	128,026	204,557
Madison	12,093	9,327
Morehouse	27,979	19,297
Natchitoches	39,566	37,736
Orleans	343,829	658,783
Ouachita	153,720	170,757
Plaquemines	23,042	24,997
Pointe Coupee	22,802	19,728
Rapides	131,613	135,018
Red River	9,091	6,625
Richland	20,725	19,129
Sabine	24,233	22,903
St Bernard	35,897	118,691
St Charles	52,780	53,235
St Helena	11,203	8,034
St James	22,102	19,755
St John the Bap	45,924	35,962
St Landry	83,384	85,518
St Martin	52,160	62,528
St Mary	54,650	42,509
St Tammany	233,740	359,274
Tangipahoa	121,097	180,940
Tensas	5,252	2,529
Terrebonne	111,860	121,429
Union	22,721	20,964
Vermilion	57,999	70,621
Vernon	52,334	41,835
Washington	47,168	43,001
Webster	41,207	33,704
West Baton Rou	23,788	35,889
West Carroll	11,604	9,303
West Feliciana	15,625	14,141
Winn	15,313	10,939
Total	**4,533,372**	**5,518,889**

National Land Cover Database 2006 (NLCD 2006) is a 16-class land cover classification scheme that has been applied consistently across the conterminous United States at a spatial resolution of 30 meters. NLCD 2006 is based primarily on a decision-tree classification of circa 2006 Landsat satellite data. NLCD 2006 also quantifies land cover change between the years 2001 to 2006. The NLCD2006 land cover change product was generated by comparing spectral characteristics of Landsat imagery between 2001 and 2006, on an individual path/row basis, using protocols to identify and label change based on the trajectory from NLCD 2001 products.

National Land Cover Database 2001 (NLCD 2001) is a 16-class (additional four classes in Alaska only) land cover classification scheme that has been applied consistently across all 50 states of the United States and Puerto Rico at a spatial resolution of 30 meters. NLCD 2001 is based primarily on a decision-tree classification of circa 2001 Landsat satellite data. NLCD 2001 improves on NLCD92 in that it is comprised of three different elements: land cover, percent developed impervious surface, and percent tree canopy density.

To understand how the urban landscape has changed across Louisiana, NLCDs from 2001, 2006, and 2011 were obtained. Pixel values that are classified as "Developed" (21, 22, 23, and 24) are used to define an urban location in Louisiana for each NLCD. Once the urban pixels were selected for each database, a cross-comparison was conducted using the raster calculator made available in ArcGIS. This method determines how the urban landscape has changed between the two periods of 2001 to 2006 and 2006 to 2011 for the state of Louisiana and its major cities (Shreveport, Monroe, Alexandria, Lake Charles, Lafayette, Houma, Baton Rouge, and New Orleans).

Developed	
21	**Developed, Open Space**- areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
22	**Developed, Low Intensity**- areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.
23	**Developed, Medium Intensity** -areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
24	**Developed High Intensity**-highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.

VULNERABLE POPULATIONS

Age demographics

Age demographic population estimations for young (<20 years old) and aging (>64 years old) populations were calculated at the parish level of each Louisiana parish for the year of 2043. Annual American Community Survey (ACS) 5-year estimates of the Age and Sex File (S0101) from 2010 to 2016 were obtained from United States Census Bureau American Fact Finder for each parish. The file consists of yearly population estimates (Pyear) for each parish from 2010 to 2016. These population estimates were used to calculate how the population changed in recent history until 2016 for each parish.

The overall average rate (r) of vulnerable population change was calculated based of the six annual population changes determined for each parish (Equation 1).

Average population vulnerable population change from 2010 to 2016:

$$r = \left(\frac{(P_{11} - P_{10})}{P_{10}} + \frac{(P_{12} - P_{11})}{P_{11}} + \frac{(P_{13} - P_{12})}{P_{12}} + \frac{(P_{14} - P_{13})}{P_{13}} + \frac{(P_{15} - P_{14})}{P_{14}} + \frac{(P_{16} - P_{15})}{P_{15}} \right) / 6 \quad \text{(Equation 1)}$$

Positive rates of change indicate parishes that have experienced increases in vulnerable populations over the past six years. Negative rates of change indicate parishes that have experienced overall average decreases in vulnerable populations over the past six years.

Using the same growth rate model, the following rates of change of vulnerable populations were evaluated.

Disability demographics

Annual ACS 5-year estimates of Disability Characteristics (S1810) data were obtained from United States Census Bureau American Fact Finder for each parish from 2012 to 2016.

Poverty demographics

Annual ACS 5-year estimates of Poverty Status in the Past 12 Months (B17001) data were obtained from United States Census Bureau American Fact Finder for each parish from 2012 to 2016.

Manufactured home estimates

Annual ACS 5-year estimates of Units in Structure (B25024) data were obtained from United States Census Bureau American Fact Finder for each parish from 2010 to 2016.

The table below provides the parish level average annual growth rates for each of the identified vulnerable populations. These values are summed by parish to provide an overarching indication of the direction of change for each parish across populations, where higher positive numbers indicate increased vulnerability, and higher negative numbers indicate decreased vulnerability. Rates closer to zero indicate less change from the current populations. The change rates are also averaged for the parishes, showing that on average, across the state, change in demographic vulnerability is modest in a positive or negative direction. By contrast, many parishes show more exaggerated increases in vulnerable populations. The parishes with the highest sum of vulnerable population growth rates, indicating a greater likelihood of future increase in demographic vulnerability, are Beauregard, Vernon, Tangipahoa, Ascension, Plaquemines, and Terrebonne Parishes. It is noted that no parishes have a negative growth rate for aging populations, defined as older than 64 years old.

Table X: Average annual vulnerable population growth rates; positive values indicate increases in vulnerability while negative values indicate decreases in vulnerability

Parish	Younger than 20	Older than 64	Population with disabilities	Population living in poverty	Population living in manufactured housing	Sum of vulnerable population growth rates
Calcasieu	0%	2%	1%	1%	0%	5%
Union	-1%	2%	-3%	-2%	4%	0%
Tangipahoa	0%	4%	5%	2%	2%	14%
Caldwell	-2%	2%	-5%	0%	1%	-3%
Tensas	-2%	2%	-3%	-1%	11%	8%
Jackson	-1%	2%	0%	8%	-2%	6%
Grant	-2%	3%	-3%	-2%	5%	2%
Lincoln	-1%	2%	0%	4%	2%	8%
Jefferson Davis	-1%	1%	-2%	2%	1%	1%
Lafayette	0%	3%	1%	2%	1%	7%
Vermilion	0%	1%	3%	2%	1%	8%
East Carroll	-3%	0%	-3%	-5%	4%	-6%
East Feliciana	-2%	4%	-5%	-4%	0%	-7%
St. Bernard	9%	7%	2%	1%	-11%	8%
Iberville	-2%	3%	4%	-1%	2%	6%
Richland	0%	1%	1%	5%	3%	11%
St. Martin	-1%	3%	2%	2%	2%	8%
Claiborne	-1%	1%	1%	0%	1%	3%
Evangeline	-1%	1%	5%	-5%	1%	2%
St. Landry	-1%	1%	-2%	4%	1%	3%
Pointe Coupee	-1%	3%	2%	1%	1%	5%
LaSalle	-1%	2%	0%	2%	5%	9%
Webster	-1%	1%	-1%	-1%	1%	-1%
St. James	-2%	3%	2%	1%	0%	4%
Plaquemines	0%	2%	-5%	9%	6%	13%
Morehouse	-2%	1%	-3%	2%	0%	-2%
Rapides	0%	2%	-2%	3%	2%	5%
Avoyelles	-1%	1%	-6%	2%	1%	-3%
Winn	-2%	1%	-5%	0%	0%	-5%
Vernon	0%	2%	1%	11%	1%	15%
Catahoula	-1%	2%	-10%	4%	4%	-2%
Assumption	-2%	3%	0%	6%	0%	7%
DeSoto	-1%	3%	0%	2%	1%	6%
Caddo	-1%	2%	1%	0%	-1%	1%
Red River	-2%	1%	-3%	1%	7%	4%
Washington	-1%	2%	0%	6%	3%	10%
Sabine	-1%	2%	-6%	2%	1%	-2%
Jefferson	-1%	2%	0%	8%	-3%	7%
St. Tammany	0%	5%	3%	-1%	-1%	7%
Cameron	-2%	2%	-1%	2%	0%	1%
East Baton Rouge	-1%	3%	3%	1%	0%	6%
Iberia	-1%	2%	2%	3%	2%	8%
Natchitoches	-1%	3%	0%	-1%	1%	1%
Terrebonne	0%	3%	-3%	14%	-1%	12%
Bienville	-2%	0%	-4%	0%	4%	-2%
Bossier	1%	3%	2%	2%	2%	10%
Allen	-2%	1%	6%	3%	2%	10%
Ouachita	0%	2%	1%	2%	-1%	4%
St. John the Baptist	-3%	3%	-1%	0%	1%	0%
St. Helena	-3%	3%	1%	1%	1%	2%
West Feliciana	3%	6%	-5%	0%	2%	5%
St. Mary	-2%	2%	-4%	4%	0%	0%
Lafourche	-1%	2%	2%	1%	1%	6%
West Carroll	-1%	1%	-5%	0%	1%	-4%
Concordia	-2%	1%	-14%	3%	1%	-10%
Livingston	1%	5%	3%	2%	0%	11%
West Baton Rouge	1%	3%	3%	1%	0%	8%
Madison	-2%	1%	-6%	0%	-1%	-8%
Orleans	3%	6%	3%	0%	-17%	-5%
Ascension	2%	6%	2%	2%	2%	13%
Acadia	-1%	2%	0%	6%	1%	8%
St. Charles	-1%	2%	-5%	2%	0%	-2%
Beauregard	0%	3%	6%	7%	0%	15%
Franklin	-1%	1%	-3%	0%	4%	1%
Parish Average	-1%	2%	-1%	2%	1%	4%

Risk Assessment Approaches

The risk assessment calculates average annual losses in 2043 using an approach that considers the annual probability of occurrence and loss given that occurrence.

SHELDUS LOSS APPROACH

For extreme heat, drought, extreme cold, hail, lightning, and tornado hazards, the planning team used the SHELDUS per capita property loss data to calculate losses at the census block level. This value is adjusted to 2016 dollars, but it is not population-adjusted. The team then normalized the SHELDUS average per capita property loss by the hazard intensity and population, to represent hazard loss properly as a function of hazard and population.

$$L_{2043,i} = \frac{C_{2016} \sum_{i=1}^{N} P_{2010,i}}{\sum_{i=1}^{N} (H_i \times P_{2010,i})} \times H_i \times F_i \times P_{2043,i}$$

where,

$L_{2043,i}$ =projected annual property loss of census block i in 2043
C_{2016} =total SHELDUS average per capita property loss (2016 dollars)
$P_{2010,i}$ = population of census block i in 2010
H_i =average hazard intensity of census block i
F_i =future hazard multification factor for census block i in 2043
$P_{2043,i}$ =projected population in census block i in 2043

Crop Loss

The planning team used the SHELDUS average annual crop loss data, which is already adjusted to 2016 dollars, to calculate the losses by census block. The team did not consider population growth in the annual crop loss of each census block.

$$CL_{2043,i} = \frac{A_{2016}}{\sum_{i=1}^{N} Hi} \times H_i \times F_i$$

where,

$CL_{2043,i}$ = projected annual crop loss of census block i in 2043
A_{2016} = total SHELDUS average annual crop loss (2016 dollars)
H_i = average hazard intensity of census block i
F_i = future hazard multification factor for census block i in 2043

Ten critical facilities were identified within the high vulnerability classification (total average annual probability of damage >1.0%) are listed below.

Name	Address	City
Bossier City Fire Department	620 Benton Rd.	Bossier City
Mermentau Police Department	104 7th St.	Mermentau
Cameron Volunteer Fire Department	449 Marshall St.	Cameron
Grand Isle Police Department	170 Ludwig Ln.	Grand Isle
Grand Caillou Fire Department	6129 Grand Caillou Rd.	Dulac
Veterans Affairs Medical Center	1601 Perdido St.	New Orleans
District 13 Volunteer Fire Department	18838 W Hwy 82	Abbeville
Branch Volunteer Fire Department	173 Dr. Parrot Ave.	Branch
Plaquemines Parish Sheriff's	**123 Civic Dr.**	**Port Sulphur**
Slidell City Marshall	**501 Bouscaren St.**	**Slidell**

Parish	State Bulding Count	State Property Value	Total Building Value
Acadia	105	$93,539,938	$5,261,039,000
Allen	77	$49,922,070	$2,024,039,000
Ascension	23	$30,576,826	$10,207,618,000
Assumption	13	$19,953,012	$2,015,149,000
Avoyelles	140	$65,730,542	$3,372,286,000
Beauregard	123	$48,331,176	$2,901,477,000
Bienville	13	$1,331,134	$1,346,140,000
Bossier	186	$142,311,319	$11,612,653,000
Caddo	153	$382,440,080	$26,657,728,000
Calcasieu	207	$334,881,436	$18,611,725,000
Caldwell	43	$9,703,200	$929,825,000
Cameron	31	$10,539,160	$895,188,000
Catahoula	13	$1,581,482	$977,958,000
Claiborne	166	$54,445,393	$1,440,129,000
Concordia	31	$12,877,838	$1,783,169,000
De Soto	22	$6,846,428	$2,141,629,000
East Baton Rouge	713	$2,057,111,716	$49,284,426,000
East Carroll	26	$5,920,179	$579,023,000
East Feliciana	272	$209,468,911	$1,619,061,000
Evangeline	77	$17,374,408	$2,964,639,000
Franklin	61	$19,183,809	$1,793,669,000
Grant	59	$11,895,802	$1,693,683,000
Iberia	127	$68,471,341	$6,785,524,000
Iberville	305	$286,971,615	$2,967,884,000
Jackson	61	$13,529,932	$1,510,301,000
Jefferson	163	$244,190,198	$50,605,370,000
Jefferson Davis	33	$39,903,073	$2,938,401,000
Lafayette	252	$831,889,008	$23,926,875,000
Lafourche	149	$279,206,366	$8,747,345,000
LaSalle	34	$7,625,887	$1,320,148,000
Lincoln	357	$862,718,123	$3,982,863,000
Livingston	69	$22,448,862	$10,662,695,000
Madison	63	$25,903,321	$970,404,000
Morehouse	50	$12,106,524	$2,365,339,000
Natchitoches	136	$271,931,250	$3,467,710,000
Orleans	650	$3,981,504,056	$45,552,878,000
Ouachita	249	$554,634,691	$15,086,274,000
Plaquemines	26	$14,049,541	$2,370,738,000
Pointe Coupee	22	$5,528,886	$2,223,805,000
Rapides	822	$481,115,026	$13,188,443,000
Red River	9	$1,997,569	$777,721,000
Richland	66	$13,966,780	$1,757,520,000
Sabine	244	$45,155,183	$2,268,227,000
St. Bernard	44	$46,143,606	$3,740,400,000
St. Charles	16	$5,476,224	$5,579,051,000
St. Helena	13	$10,722,040	$833,445,000
St. James	3	$383,691	$2,072,726,000
St. John the Baptist	31	$56,522,577	$4,280,777,000
St. Landry	45	$38,264,319	$6,730,749,000
St. Martin	74	$23,992,392	$4,340,891,000
St. Mary	35	$21,184,799	$5,159,935,000
St. Tammany	134	$65,397,293	$25,683,122,000
Tangipahoa	279	$521,892,351	$9,555,337,000
Tensas	50	$6,497,772	$620,904,000
Terrebonne	40	$80,582,574	$11,560,024,000
Union	50	$8,632,322	$2,038,897,000
Vermilion	74	$20,589,386	$5,226,262,000
Vernon	69	$20,801,496	$4,111,654,000
Washington	182	$80,834,855	$3,581,078,000
Webster	333	$138,916,940	$3,887,221,000
West Baton Rouge	20	$5,833,301	$2,174,975,000
West Carroll	23	$4,981,614	$966,669,000
West Feliciana	559	$226,529,275	$1,171,689,000
Winn	78	$61,977,614	$1,311,667,000
Total	**8593**	**$13,096,969,532**	**$458,216,191,000**

ALTERNATIVE LOSS APPROACHES

For wildfire, sinkholes, and expansive soil, we developed customized loss estimation approaches based on consultation with state agencies and members of the SHMPC. For wind, flood, and dam failure, loss estimation used the data from FEMA's Hazus model. The methods for alternative loss approaches are described in the following sections.

CRITICAL FACILITY AND STATE ASSET LOSS APPROACH

All critical facilities and state buildings are vulnerable to hazards. At the state level, historic hazard losses for state buildings and detailed building stock information are lacking. These data limitations preclude utilization of either of the previously defined loss approaches. Therefore, because of this data deficiency and in consultation with the Louisiana Department of Insurance, the planning team derived a methodology to estimate average annual state asset losses. The methodology assumes that average annual losses for state buildings would echo historic/modeled losses for other occupancies, considering that the state building inventory is representative of the total building inventory in Louisiana.

Utilizing building-level data from the Louisiana Office of Risk Management, 8,593 state buildings were included in the loss assessment, considering a total building and contents replacement value of approximately $13 billion. The following table details the buildings considered in each parish, along with the replacement value of state buildings and the total building value within each parish. State asset losses were calculated using the ratio of state property value to total building value, and multiplied by the loss assessment results for each individual hazard. State asset losses are included in the total loss results and also reported separately.

PROPERTY LOSS RESULTS

The following parish-level property losses were determined for each hazard. All losses represent average annual losses, with the exception of flood hazards, which are reported for the 1% annual probability event. Although the annual losses are not truly additive with the 1% annual flood losses, the parish total reflects the summation of these values in an attempt to portray the relative risk for Louisiana parishes.

Parish	Wildfire Property Loss	Extreme Cold Property Loss	Wind Property Loss	Hail Property Loss	Lightning Property Loss	Tornado Property Loss	Flood Property Loss (1% annual chance event)	Dam Failure Property Loss	Sinkhole Property Loss	Expansive Soil Property Loss	Parish Average Annual Loss + 1% Annual Chance Flood Loss
Acadia	$4,657	$334,576	$6,960,833	$20,578	$26,912	$646,905	$3,974,012	$0	$48,849	$480,233	**$12,497,555**
Allen	$53,354	$201,258	$1,008,504	$9,841	$10,866	$71,725	$805,454	$194	$0	$95,869	**$2,257,065**
Ascension	$113,843	$1,233,057	$16,007,213	$60,235	$126,122	$938,322	$15,696,666	$0	$3,094	$3,688,243	**$37,866,794**
Assumption	$106	$80,929	$3,491,462	$4,634	$10,915	$78,166	$1,353,836	$0	$674	$495,381	**$5,516,104**
Avoyelles	$9,425	$255,341	$1,914,376	$16,015	$14,661	$140,980	$2,555,262	$6	$0	$85,400	**$4,991,465**
Beauregard	$119,904	$448,784	$1,507,995	$17,206	$18,184	$165,707	$594,851	$233	$241	$98,103	**$2,971,209**
Bienville	$9,083	$205,894	$249,843	$7,935	$4,339	$49,134	$106,379	$272	$2,607	$31,552	**$667,037**
Bossier	$175,905	$2,338,331	$4,788,258	$120,653	$56,470	$1,089,388	$11,311,567	$987,684	$0	$452,910	**$21,321,166**
Caddo	$259,465	$2,804,165	$5,744,359	$153,657	$74,166	$1,611,784	$7,341,406	$5,840	$0	$564,134	**$18,558,975**
Calcasieu	$253,951	$1,311,489	$23,665,716	$76,615	$126,633	$1,463,527	$13,049,845	$0	$81,201	$2,854,138	**$42,883,114**
Caldwell	$6,597	$141,820	$217,155	$5,772	$3,576	$23,521	$646,973	$1	$24	$118,280	**$1,163,718**
Cameron	$7,523	$22,497	$3,674,504	$1,841	$2,703	$33,190	$5,583,446	$0	$9,878	$196,269	**$9,531,850**
Catahoula	$2,511	$95,963	$265,060	$4,279	$3,211	$28,116	$1,099,314	$0	$200	$77,906	**$1,576,560**
Claiborne	$9,752	$243,447	$184,770	$8,661	$4,174	$41,658	$108,970	$40	$50	$26,228	**$627,749**
Concordia	$2,383	$191,049	$559,783	$8,288	$6,625	$67,374	$461,558	$0	$0	$123,529	**$1,420,589**
De Soto	$18,502	$427,465	$652,733	$18,987	$10,282	$145,053	$433,113	$280	$0	$61,999	**$1,768,413**
East Baton Roug	$302,810	$2,763,938	$24,483,495	$156,232	$316,994	$2,651,974	$27,491,184	$718	$0	$5,535,043	**$63,702,387**
East Carroll	$419	$66,679	$210,837	$3,507	$1,785	$24,750	$10,953	$0	$0	$32,736	**$351,667**
East Feliciana	$21,167	$166,644	$827,313	$6,985	$9,926	$55,578	$253,881	$0	$0	$36,105	**$1,377,599**
Evangeline	$25,901	$234,191	$2,035,458	$12,307	$12,865	$176,177	$1,457,856	$72	$2,439	$89,110	**$4,046,376**
Franklin	$2,323	$220,012	$788,450	$10,519	$6,532	$54,765	$552,308	$3	$1,586	$119,644	**$1,756,141**
Grant	$24,214	$228,603	$334,778	$11,622	$8,879	$64,061	$624,236	$1,587	$0	$161,658	**$1,459,638**
Iberia	$205	$291,830	$15,199,157	$18,371	$36,832	$425,347	$6,601,218	$0	$4,414	$924,033	**$23,501,406**
Iberville	$979	$180,850	$2,175,828	$9,062	$16,238	$126,713	$1,272,617	$0	$3,857	$513,408	**$4,299,552**
Jackson	$11,749	$228,845	$232,447	$8,681	$5,219	$59,282	$131,409	$294	$124	$119,560	**$797,610**
Jefferson	$101,698	$777,224	$93,277,706	$109,013	$282,945	$3,231,699	$43,788,687	$0	$8,778	$15,426,414	**$157,004,164**
Jefferson Davis	$8,805	$150,053	$4,118,518	$9,627	$12,371	$210,456	$1,464,005	$0	$5,036	$406,659	**$6,385,529**
Lafayette	$10,166	$1,774,949	$41,758,869	$101,558	$151,130	$3,303,632	$8,325,476	$0	$31	$4,432,987	**$59,858,797**
Lafourche	$467	$339,638	$32,330,442	$20,631	$54,645	$401,711	$17,528,704	$0	$3,129	$2,888,633	**$53,568,000**
La Salle	$14,943	$230,935	$268,505	$8,463	$6,143	$36,870	$278,653	$0	$6,139	$116,807	**$967,458**
Lincoln	$52,472	$803,113	$850,601	$34,136	$19,620	$242,644	$495,265	$781	$180	$290,524	**$2,789,337**
Livingston	$385,807	$1,689,598	$9,876,048	$68,344	$125,112	$1,087,519	$23,789,561	$0	$0	$1,561,912	**$38,583,900**
Madison	$494	$110,838	$228,753	$5,550	$3,204	$51,375	$337,035	$48	$1,963	$44,621	**$783,882**
Morehouse	$8,422	$347,278	$518,268	$12,268	$5,852	$78,175	$235,775	$0	$0	$48,461	**$1,254,500**
Natchitoches	$37,391	$396,163	$969,937	$21,592	$13,812	$119,187	$1,351,070	$2,851	$358	$309,612	**$3,221,973**
Orleans	$418,055	$815,479	$148,495,772	$160,785	$428,651	$4,427,779	$37,799,756	$0	$0	$24,020,446	**$216,566,722**
Ouachita	$105,478	$2,878,933	$4,212,412	$107,032	$59,856	$714,023	$5,144,834	$1,292	$0	$1,434,469	**$14,658,330**
Plaquemines	$3,023	$46,793	$9,661,428	$4,914	$15,098	$110,127	$11,254,362	$0	$16,504	$655,054	**$21,767,304**
Pointe Coupee	$1,630	$134,695	$1,215,358	$7,184	$9,228	$56,934	$1,306,603	$0	$0	$124,166	**$2,855,799**
Rapides	$223,272	$1,319,827	$3,879,291	$64,380	$55,193	$529,017	$18,044,297	$6,883	$84	$609,947	**$24,732,190**
Red River	$3,603	$105,244	$156,833	$4,134	$2,375	$21,075	$158,870	$200	$0	$28,847	**$481,181**
Richland	$3,419	$230,010	$716,029	$11,598	$6,430	$73,495	$632,580	$30	$0	$109,337	**$1,782,928**
Sabine	$29,018	$277,184	$621,912	$12,850	$8,130	$58,018	$1,679,245	$0	$0	$52,950	**$2,739,306**
St Bernard	$33,990	$237,692	$24,945,961	$27,792	$81,091	$645,944	$7,419,962	$0	$319	$3,886,376	**$37,279,127**
St Charles	$1,523	$161,913	$7,995,395	$12,857	$29,443	$360,073	$15,908,384	$0	$10,402	$2,124,986	**$26,604,976**
St Helena	$25,867	$90,922	$279,899	$3,140	$4,289	$35,391	$237,647	$0	$0	$24,926	**$702,082**
St James	$1,483	$92,867	$3,587,603	$4,971	$11,207	$83,253	$445,118	$0	$14,270	$484,857	**$4,725,630**
St John the Bapt	$5,623	$176,463	$4,322,322	$9,482	$20,392	$176,103	$5,552,716	$0	$0	$1,063,372	**$11,326,472**
St Landry	$10,470	$544,661	$4,672,238	$29,394	$33,395	$590,424	$5,113,660	$0	$2,185	$424,371	**$11,420,797**
St Martin	$929	$426,893	$5,854,555	$18,091	$29,387	$388,273	$4,299,088	$0	$59,763	$746,659	**$11,823,637**
St Mary	$26	$109,140	$9,753,500	$8,567	$22,101	$101,175	$10,843,573	$0	$41,298	$890,621	**$21,770,001**
St Tammany	$1,908,055	$2,778,390	$47,004,794	$115,238	$218,916	$1,465,355	$56,705,395	$0	$0	$7,160,021	**$117,356,164**
Tangipahoa	$762,680	$1,999,557	$7,148,748	$63,977	$107,985	$998,165	$8,902,431	$0	$0	$1,441,653	**$21,425,195**
Tensas	$630	$28,969	$152,302	$1,385	$941	$10,189	$136,185	$0	$758	$8,111	**$339,469**
Terrebonne	$172	$357,147	$33,650,164	$22,020	$62,402	$501,191	$41,496,891	$0	$2,829	$3,295,111	**$79,387,928**
Union	$14,625	$346,275	$347,125	$13,890	$7,176	$74,902	$622,413	$1,313	$0	$72,058	**$1,499,777**
Vermilion	$553	$265,618	$15,995,851	$18,378	$30,169	$548,048	$13,501,325	$0	$1,051	$770,805	**$31,131,798**
Vernon	$77,657	$496,403	$1,069,147	$19,540	$16,458	$147,324	$462,284	$430	$0	$177,584	**$2,466,827**
Washington	$135,834	$442,844	$2,346,171	$17,465	$19,521	$203,367	$1,326,370	$243	$0	$95,339	**$4,587,155**
Webster	$32,421	$655,529	$737,886	$23,887	$12,088	$144,249	$355,690	$39	$2,616	$85,777	**$2,050,179**
West Baton Rou	$2,894	$215,595	$1,718,713	$11,617	$21,482	$170,239	$275,318	$0	$287	$396,101	**$2,812,247**
West Carroll	$2,330	$127,366	$418,139	$5,899	$2,953	$34,903	$210,089	$0	$0	$36,035	**$837,713**
West Feliciana	$5,125	$108,101	$431,262	$5,685	$6,788	$33,754	$235,681	$3	$0	$27,445	**$853,843**
Winn	$8,436	$170,874	$158,567	$6,399	$4,320	$26,408	$206,444	$75	$4,855	$114,152	**$700,530**
Total Loss	**$5,876,211**	**$36,978,826**	**$642,927,351**	**$1,976,212**	**$2,917,407**	**$31,725,662**	**$451,389,758**	**$1,011,414**	**$342,071**	**$92,869,675**	**$1,268,014,588**

CROP LOSS RESULTS

The following parish-level crop losses were determined for each hazard. All losses represent average annual losses, with the exception of flood hazards.

Parish	Extreme Heat Crop Loss	Drought Crop Loss	Extreme Cold Crop Loss	Hail Crop Loss	Lightning Crop Loss	Tornado Crop Loss	Parish Average Annual Crop Loss
Acadia	$25,181	$1,968,721	$24,276	$3,405	$146	$19,324	**$2,041,052**
Allen	$5,301	$430,953	$7,246	$770	$19	$1,400	**$445,689**
Ascension	$5,161	$759,174	$11,915	$1,206	$75	$3,840	**$781,371**
Assumption	$3,564	$942,335	$10,782	$1,021	$43	$4,276	**$962,020**
Avoyelles	$25,004	$1,711,877	$28,698	$3,691	$85	$6,670	**$1,776,026**
Beauregard	$14,694	$867,575	$23,205	$1,052	$34	$3,634	**$910,193**
Bienville	$4,395	$194,459	$7,934	$417	$6	$795	**$208,006**
Bossier	$19,457	$897,249	$27,477	$2,338	$35	$4,398	**$950,954**
Caddo	$28,829	$1,357,751	$38,649	$3,261	$66	$6,108	**$1,434,663**
Calcasieu	$7,250	$1,118,983	$15,724	$1,684	$80	$7,091	**$1,150,810**
Caldwell	$5,009	$218,361	$7,353	$506	$9	$594	**$231,832**
Cameron	$1,510	$358,893	$3,213	$372	$15	$1,893	**$365,896**
Catahoula	$18,055	$1,048,388	$27,910	$2,695	$60	$3,992	**$1,101,101**
Claiborne	$5,395	$293,152	$13,223	$603	$1	$1,045	**$313,418**
Concordia	$18,644	$1,230,091	$37,899	$3,845	$86	$5,718	**$1,296,283**
De Soto	$16,004	$804,616	$25,746	$1,736	$13	$3,544	**$851,660**
East Baton Rouge	$4,760	$451,966	$9,677	$1,093	$272	$2,845	**$470,613**
East Carroll	$10,595	$615,742	$20,438	$2,333	$34	$3,464	**$652,606**
East Feliciana	$2,880	$280,408	$7,839	$455	$6	$1,102	**$292,690**
Evangeline	$28,821	$1,301,506	$21,689	$2,823	$71	$7,387	**$1,362,297**
Franklin	$45,457	$1,987,494	$62,264	$5,824	$96	$6,730	**$2,107,866**
Grant	$4,368	$267,787	$5,125	$642	$6	$734	**$278,662**
Iberia	$8,511	$1,085,056	$12,090	$1,977	$119	$7,561	**$1,115,314**
Iberville	$3,752	$567,412	$9,003	$1,091	$70	$2,611	**$583,939**
Jackson	$2,066	$85,863	$3,801	$164	$0	$422	**$92,316**
Jefferson	$614	$59,112	$286	$99	$0	$473	**$60,584**
Jefferson Davis	$12,135	$1,672,634	$20,251	$2,611	$102	$10,669	**$1,718,401**
Lafayette	$14,226	$1,730,778	$22,630	$3,198	$149	$18,646	**$1,789,627**
Lafourche	$7,007	$1,796,948	$15,661	$1,897	$138	$8,273	**$1,829,924**
La Salle	$2,649	$160,429	$4,993	$275	$0	$364	**$168,710**
Lincoln	$4,444	$192,651	$7,816	$364	$3	$895	**$206,172**
Livingston	$5,547	$541,051	$12,959	$741	$52	$3,088	**$563,438**
Madison	$23,620	$1,338,454	$46,928	$5,305	$88	$9,426	**$1,423,822**
Morehouse	$17,036	$891,638	$36,574	$2,512	$47	$3,596	**$951,404**
Natchitoches	$27,086	$1,073,202	$27,667	$2,640	$34	$3,480	**$1,134,108**
Orleans	$273	$36,934	$176	$2	$0	$158	**$37,543**
Ouachita	$19,677	$769,596	$30,701	$2,265	$37	$3,495	**$825,770**
Plaquemines	$2,118	$318,929	$1,619	$237	$3	$994	**$323,900**
Pointe Coupee	$14,227	$1,045,998	$19,952	$2,060	$55	$3,544	**$1,085,836**
Rapides	$19,069	$1,045,358	$22,623	$2,457	$99	$3,925	**$1,093,530**
Red River	$9,136	$400,325	$14,597	$990	$13	$1,397	**$426,458**
Richland	$38,633	$1,870,910	$57,616	$5,376	$87	$7,300	**$1,979,923**
Sabine	$8,697	$371,114	$11,540	$654	$5	$1,056	**$393,065**
St Bernard	$194	$25,408	$138	$160	$0	$227	**$26,127**
St Charles	$4,037	$512,644	$4,774	$671	$59	$3,641	**$525,826**
St Helena	$2,155	$155,536	$5,125	$192	$1	$831	**$163,840**
St James	$4,799	$776,109	$10,334	$1,061	$35	$3,770	**$796,109**
St John the Baptist	$2,473	$361,785	$4,797	$822	$20	$1,812	**$371,709**
St Landry	$36,645	$2,255,969	$36,026	$5,363	$184	$16,587	**$2,350,776**
St Martin	$15,234	$1,378,884	$25,162	$2,251	$77	$9,797	**$1,431,404**
St Mary	$1,868	$1,285,577	$9,814	$1,617	$113	$3,355	**$1,302,345**
St Tammany	$8,868	$888,174	$22,149	$1,131	$42	$3,857	**$924,220**
Tangipahoa	$11,562	$835,298	$25,518	$1,239	$55	$5,087	**$878,759**
Tensas	$31,042	$1,221,734	$43,658	$3,894	$70	$6,518	**$1,306,916**
Terrebonne	$1,390	$510,730	$4,035	$693	$41	$2,465	**$519,353**
Union	$6,178	$290,962	$12,176	$694	$7	$1,095	**$311,113**
Vermilion	$15,992	$2,332,045	$22,154	$3,245	$193	$18,179	**$2,391,808**
Vernon	$11,397	$457,902	$12,263	$646	$2	$1,605	**$483,816**
Washington	$7,039	$601,427	$16,162	$816	$40	$3,127	**$628,611**
Webster	$11,427	$567,002	$23,655	$1,327	$52	$1,937	**$605,400**
West Baton Rouge	$6,638	$717,844	$13,389	$1,875	$84	$4,433	**$744,262**
West Carroll	$20,011	$1,151,958	$39,555	$3,156	$43	$4,711	**$1,219,434**
West Feliciana	$3,303	$242,758	$4,940	$377	$5	$627	**$252,011**
Winn	$1,241	$63,512	$2,297	$144	$0	$187	**$67,381**
Total Loss	**$744,345**	**$52,795,132**	**$1,155,889**	**$110,057**	**$3,483**	**$281,804**	**$55,090,711**

TOTAL LOSS RESULTS

The following parish level total (property and crop) losses were determined for each hazard.
All losses represent average annual losses, with the exception of flood hazards, which are reported for the 1% annual probability event. Although the annual losses are not truly additive with the 1% annual flood losses, the parish total reflects the summation of these values, in an attempt to portray the relative risk for Louisiana parishes.

Parish	Extreme Heat Loss	Drought Loss	Wildfire Loss	Extreme Cold Loss	Wind Loss	Hail Loss	Lightning Loss	Tornado Loss	Flood Loss	Dam Failure Loss	Sinkhole Loss	Expansive Soil Loss	Parish Average Annual Loss + 1% Annual Chance Flood Loss
Acadia	$25,181	$1,968,721	$4,657	$358,852	$6,960,833	$23,982	$27,059	$666,229	$3,974,012	$0	$48,849	$480,233	**$14,538,607**
Allen	$5,301	$430,953	$53,354	$208,504	$1,008,504	$10,611	$10,884	$73,125	$805,454	$194	$0	$95,869	**$2,702,754**
Ascension	$5,161	$759,174	$113,843	$1,244,971	$16,007,213	$61,441	$126,198	$942,162	$15,696,666	$0	$3,094	$3,688,243	**$38,648,165**
Assumption	$3,564	$942,335	$106	$91,711	$3,491,462	$5,655	$10,958	$82,442	$1,353,836	$0	$674	$495,381	**$6,478,124**
Avoyelles	$25,004	$1,711,877	$9,425	$284,039	$1,914,376	$19,706	$14,746	$147,650	$2,555,262	$6	$0	$85,400	**$6,767,491**
Beauregard	$14,694	$867,575	$119,904	$471,989	$1,507,995	$18,258	$18,218	$169,341	$594,851	$233	$241	$98,103	**$3,881,403**
Bienville	$4,395	$194,459	$9,083	$213,828	$249,843	$8,352	$4,344	$49,930	$106,379	$272	$2,607	$31,552	**$875,043**
Bossier	$19,457	$897,249	$175,905	$2,365,808	$4,788,258	$122,991	$56,506	$1,093,786	$11,311,567	$987,684	$0	$452,910	**$22,272,120**
Caddo	$28,829	$1,357,751	$259,465	$2,842,814	$5,744,359	$156,918	$74,231	$1,617,892	$7,341,406	$5,840	$0	$564,134	**$19,993,639**
Calcasieu	$7,250	$1,118,983	$253,951	$1,327,213	$23,665,716	$78,299	$126,712	$1,470,618	$13,049,845	$0	$81,201	$2,854,138	**$44,033,924**
Caldwell	$5,009	$218,361	$6,597	$149,173	$217,155	$6,278	$3,585	$24,114	$646,973	$1	$24	$118,280	**$1,395,549**
Cameron	$1,510	$358,893	$7,523	$25,710	$3,674,504	$2,213	$2,718	$35,083	$5,583,446	$0	$9,878	$196,269	**$9,897,746**
Catahoula	$18,055	$1,048,388	$2,511	$123,873	$265,060	$6,975	$3,271	$32,108	$1,099,314	$0	$200	$77,906	**$2,677,660**
Claiborne	$5,395	$293,152	$9,752	$256,670	$184,770	$9,263	$4,175	$42,702	$108,970	$40	$50	$26,228	**$941,167**
Concordia	$18,644	$1,230,091	$2,383	$228,948	$559,783	$12,132	$6,711	$73,092	$461,558	$0	$0	$123,529	**$2,716,872**
De Soto	$16,004	$804,616	$18,502	$453,211	$652,733	$20,723	$10,295	$148,597	$433,113	$280	$0	$61,999	**$2,620,073**
East Baton Roug	$4,760	$451,966	$302,810	$2,773,615	$24,483,495	$157,325	$317,266	$2,654,819	$27,491,184	$718	$0	$5,535,043	**$64,173,000**
East Carroll	$10,595	$615,742	$419	$87,117	$210,837	$5,840	$1,819	$28,214	$10,953	$0	$0	$32,736	**$1,004,273**
East Feliciana	$2,880	$280,408	$21,167	$174,483	$827,313	$7,440	$9,932	$56,681	$253,881	$0	$0	$36,105	**$1,670,289**
Evangeline	$28,821	$1,301,506	$25,901	$255,881	$2,035,458	$15,130	$12,936	$183,564	$1,457,856	$72	$2,439	$89,110	**$5,408,673**
Franklin	$45,457	$1,987,494	$2,323	$282,276	$788,450	$16,343	$6,628	$61,495	$552,308	$3	$1,586	$119,644	**$3,864,007**
Grant	$4,368	$267,787	$24,214	$233,728	$334,778	$12,264	$8,885	$64,795	$624,236	$1,587	$0	$161,658	**$1,738,300**
Iberia	$8,511	$1,085,056	$205	$303,919	$15,199,157	$20,348	$36,951	$432,908	$6,601,218	$0	$4,414	$924,033	**$24,616,721**
Iberville	$3,752	$567,412	$979	$189,853	$2,175,828	$10,153	$16,308	$129,324	$1,272,617	$0	$3,857	$513,408	**$4,883,491**
Jackson	$2,066	$85,863	$11,749	$232,646	$232,447	$8,845	$5,220	$59,704	$131,409	$294	$124	$119,560	**$889,926**
Jefferson	$614	$59,112	$101,698	$777,510	$93,277,706	$109,112	$282,946	$3,232,172	$43,788,687	$0	$8,778	$15,426,414	**$157,064,748**
Jefferson Davis	$12,135	$1,672,634	$8,805	$170,303	$4,118,518	$12,238	$12,473	$221,125	$1,464,005	$0	$5,036	$406,659	**$8,103,931**
Lafayette	$14,226	$1,730,778	$10,166	$1,797,580	$41,758,869	$104,756	$151,279	$3,322,278	$8,325,476	$0	$31	$4,432,987	**$61,648,425**
Lafourche	$7,007	$1,796,948	$467	$355,299	$32,330,442	$22,528	$54,782	$409,983	$17,528,704	$0	$3,129	$2,888,633	**$55,397,924**
La Salle	$2,649	$160,429	$14,943	$235,928	$268,505	$8,738	$6,143	$37,234	$278,653	$0	$6,139	$116,807	**$1,136,168**
Lincoln	$4,444	$192,651	$52,472	$810,929	$850,601	$34,500	$19,623	$243,539	$495,265	$781	$180	$290,524	**$2,995,508**
Livingston	$5,547	$541,051	$385,807	$1,702,557	$9,876,048	$69,085	$125,164	$1,090,607	$23,789,561	$0	$0	$1,561,912	**$39,147,338**
Madison	$23,620	$1,338,454	$494	$157,766	$228,753	$10,855	$3,292	$60,801	$337,035	$48	$1,963	$44,621	**$2,207,704**
Morehouse	$17,036	$891,638	$8,422	$383,852	$518,268	$14,780	$5,898	$81,771	$235,775	$0	$0	$48,461	**$2,205,903**
Natchitoches	$27,086	$1,073,202	$37,391	$423,830	$969,937	$24,232	$13,846	$122,666	$1,351,070	$2,851	$358	$309,612	**$4,356,081**
Orleans	$273	$36,934	$418,055	$815,655	$148,495,772	$160,787	$428,651	$4,427,938	$37,799,756	$0	$0	$24,020,446	**$216,604,265**
Ouachita	$19,677	$769,596	$105,478	$2,909,633	$4,212,412	$109,297	$59,893	$717,519	$5,144,834	$1,292	$0	$1,434,469	**$15,484,100**
Plaquemines	$2,118	$318,929	$3,023	$48,412	$9,661,428	$5,150	$15,101	$111,121	$11,254,362	$0	$16,504	$655,054	**$22,091,204**
Pointe Coupee	$14,227	$1,045,998	$1,630	$154,648	$1,215,358	$9,244	$9,284	$60,478	$1,306,603	$0	$0	$124,166	**$3,941,634**
Rapides	$19,069	$1,045,358	$223,272	$1,342,450	$3,879,291	$66,837	$55,291	$532,942	$18,044,297	$6,883	$84	$609,947	**$25,825,720**
Red River	$9,136	$400,325	$3,603	$119,841	$156,833	$5,124	$2,388	$22,472	$158,870	$200	$0	$28,847	**$907,639**
Richland	$38,633	$1,870,910	$3,419	$287,626	$716,029	$16,974	$6,516	$80,795	$632,580	$30	$0	$109,337	**$3,762,851**
Sabine	$8,697	$371,114	$29,018	$288,724	$621,912	$13,503	$8,134	$59,074	$1,679,245	$0	$0	$52,950	**$3,132,371**
St Bernard	$194	$25,408	$33,990	$237,830	$24,945,961	$27,952	$81,091	$646,171	$7,419,962	$0	$319	$3,886,376	**$37,305,254**
St Charles	$4,037	$512,644	$1,523	$166,687	$7,995,395	$13,528	$29,502	$363,714	$15,908,384	$0	$10,402	$2,124,986	**$27,130,802**
St Helena	$2,155	$155,536	$25,867	$96,047	$279,899	$3,332	$4,290	$36,223	$237,647	$0	$0	$24,926	**$865,922**
St James	$4,799	$776,109	$1,483	$103,201	$3,587,603	$6,033	$11,243	$87,023	$445,118	$0	$14,270	$484,857	**$5,521,739**
St John the Bapt	$2,473	$361,785	$5,623	$181,259	$4,322,322	$10,304	$20,412	$177,915	$5,552,716	$0	$0	$1,063,372	**$11,698,181**
St Landry	$36,645	$2,255,969	$10,470	$580,687	$4,672,238	$34,757	$33,579	$607,011	$5,113,660	$0	$2,185	$424,371	**$13,771,572**
St Martin	$15,234	$1,378,884	$929	$452,055	$5,854,555	$20,342	$29,464	$398,070	$4,299,088	$0	$59,763	$746,659	**$13,255,042**
St Mary	$1,868	$1,285,577	$26	$118,955	$9,753,500	$10,184	$22,215	$104,530	$10,843,573	$0	$41,298	$890,621	**$23,072,346**
St Tammany	$8,868	$888,174	$1,908,055	$2,800,539	$47,004,794	$116,369	$218,958	$1,469,212	$56,705,395	$0	$0	$7,160,021	**$118,280,384**
Tangipahoa	$11,562	$835,298	$762,680	$2,025,075	$7,148,748	$65,216	$108,040	$1,003,252	$8,902,431	$0	$0	$1,441,653	**$22,303,955**
Tensas	$31,042	$1,221,734	$630	$72,628	$152,302	$5,279	$1,011	$16,707	$136,185	$0	$758	$8,111	**$1,646,386**
Terrebonne	$1,390	$510,730	$172	$361,181	$33,650,164	$22,713	$62,443	$503,656	$41,496,891	$0	$2,829	$3,295,111	**$79,907,281**
Union	$6,178	$290,962	$14,625	$358,451	$347,125	$14,584	$7,184	$75,997	$622,413	$1,313	$0	$72,058	**$1,810,890**
Vermilion	$15,992	$2,332,045	$553	$287,772	$15,995,851	$21,622	$30,362	$566,227	$13,501,325	$0	$1,051	$770,805	**$33,523,605**
Vernon	$11,397	$457,902	$77,657	$508,667	$1,069,147	$20,186	$16,460	$148,929	$462,284	$430	$0	$177,584	**$2,950,643**
Washington	$7,039	$601,427	$135,834	$459,006	$2,346,171	$18,282	$19,561	$206,494	$1,326,370	$243	$0	$95,339	**$5,215,766**
Webster	$11,427	$567,002	$32,421	$679,183	$737,886	$25,214	$12,139	$146,186	$355,690	$39	$2,616	$85,777	**$2,655,579**
West Baton Rou	$6,638	$717,844	$2,894	$228,984	$1,718,713	$13,492	$21,566	$174,671	$275,318	$0	$287	$396,101	**$3,556,509**
West Carroll	$20,011	$1,151,958	$2,330	$166,921	$418,139	$9,055	$2,996	$39,613	$210,089	$0	$0	$36,035	**$2,057,147**
West Feliciana	$3,303	$242,758	$5,125	$113,041	$431,262	$6,062	$6,793	$34,380	$235,681	$3	$0	$27,445	**$1,105,854**
Winn	$1,241	$63,512	$8,436	$173,171	$158,567	$6,543	$4,320	$26,594	$206,444	$75	$4,855	$114,152	**$767,911**
Total Loss	**$744,345**	**$52,795,132**	**$5,876,211**	**$38,134,715**	**$642,927,351**	**$2,086,269**	**$2,920,890**	**$32,007,466**	**$451,389,758**	**$1,011,414**	**$342,071**	**$92,869,675**	**$1,323,105,298**

STATE ASSET LOSS RESULTS

The following parish-level state asset losses were determined for each hazard. All losses represent average annual losses, with the exception of flood hazards, which are reported for the 1% annual probability event. Although the annual losses are not truly additive with the 1% annual flood losses, the parish total reflects the summation of these values, in an attempt to portray the relative risk for Louisiana parishes.

Parish	Wildfire Property Loss	Extreme Cold Property Loss	Wind Property Loss	Hail Property Loss	Lightning Property Loss	Tornado Property Loss	Flood Property Loss	Dam Failure Property Loss	Sinkhole Property Loss	Expansive Soil Property Loss	State Property Average Annual Loss + 1% Annual Chance Flood Loss
Acadia	$83	$5,949	$123,762	$366	$478	$11,502	$70,657	$0	$533	$8,538	**$221,868**
Allen	$1,316	$4,964	$24,874	$243	$268	$1,769	$19,866	$5	$0	$2,365	**$55,670**
Ascension	$341	$3,694	$47,949	$180	$378	$2,811	$47,019	$0	$6	$11,048	**$113,426**
Assumption	$1	$801	$34,571	$46	$108	$774	$13,405	$0	$4	$4,905	**$54,615**
Avoyelles	$184	$4,977	$37,314	$312	$286	$2,748	$49,806	$0	$0	$1,665	**$97,291**
Beauregard	$1,997	$7,476	$25,119	$287	$303	$2,760	$9,909	$4	$3	$1,634	**$49,491**
Bienville	$9	$204	$247	$8	$4	$49	$105	$0	$2	$31	**$659**
Bossier	$2,156	$28,656	$58,679	$1,479	$692	$13,350	$138,622	$12,104	$0	$5,550	**$261,288**
Caddo	$3,722	$40,229	$82,410	$2,204	$1,064	$23,123	$105,322	$84	$0	$8,093	**$266,253**
Calcasieu	$4,569	$23,598	$425,818	$1,379	$2,279	$26,333	$234,806	$0	$897	$51,355	**$771,034**
Caldwell	$69	$1,480	$2,266	$60	$37	$245	$6,751	$0	$0	$1,234	**$12,144**
Cameron	$89	$265	$43,260	$22	$32	$391	$65,735	$0	$70	$2,311	**$112,174**
Catahoula	$4	$155	$429	$7	$5	$45	$1,778	$0	$0	$126	**$2,549**
Claiborne	$369	$9,204	$6,985	$327	$158	$1,575	$4,120	$2	$1	$992	**$23,732**
Concordia	$17	$1,380	$4,043	$60	$48	$487	$3,333	$0	$0	$892	**$10,259**
De Soto	$59	$1,367	$2,087	$61	$33	$464	$1,385	$1	$0	$198	**$5,653**
East Baton Rouge	$12,639	$115,366	$1,021,931	$6,521	$13,231	$110,692	$1,147,471	$30	$0	$231,030	**$2,658,911**
East Carroll	$4	$682	$2,156	$36	$18	$253	$112	$0	$0	$335	**$3,596**
East Feliciana	$2,739	$21,560	$107,035	$904	$1,284	$7,191	$32,846	$0	$0	$4,671	**$178,229**
Evangeline	$152	$1,372	$11,929	$72	$75	$1,032	$8,544	$0	$9	$522	**$23,709**
Franklin	$25	$2,353	$8,433	$113	$70	$586	$5,907	$0	$11	$1,280	**$18,776**
Grant	$170	$1,606	$2,351	$82	$62	$450	$4,384	$11	$0	$1,135	**$10,252**
Iberia	$2	$2,945	$153,372	$185	$372	$4,292	$66,612	$0	$27	$9,324	**$237,130**
Iberville	$95	$17,487	$210,386	$876	$1,570	$12,252	$123,052	$0	$228	$49,643	**$415,588**
Jackson	$105	$2,050	$2,082	$78	$47	$531	$1,177	$3	$1	$1,071	**$7,145**
Jefferson	$491	$3,750	$450,100	$526	$1,365	$15,594	$211,297	$0	$26	$74,438	**$757,589**
Jefferson Davis	$120	$2,038	$55,929	$131	$168	$2,858	$19,881	$0	$43	$5,522	**$86,689**
Lafayette	$353	$61,711	$1,451,871	$3,531	$5,254	$114,861	$289,460	$0	$1	$154,126	**$2,081,169**
Lafourche	$15	$10,841	$1,031,955	$659	$1,744	$12,822	$559,498	$0	$62	$92,202	**$1,709,798**
LaSalle	$86	$1,334	$1,551	$49	$35	$213	$1,610	$0	$22	$675	**$5,575**
Lincoln	$11,366	$173,960	$184,247	$7,394	$4,250	$52,559	$107,278	$169	$24	$62,930	**$604,176**
Livingston	$812	$3,557	$20,793	$144	$263	$2,290	$50,086	$0	$0	$3,288	**$81,233**
Madison	$13	$2,959	$6,106	$148	$86	$1,371	$8,997	$1	$32	$1,191	**$20,904**
Morehouse	$43	$1,777	$2,653	$63	$30	$400	$1,207	$0	$0	$248	**$6,421**
Natchitoches	$2,932	$31,066	$76,061	$1,693	$1,083	$9,346	$105,948	$224	$17	$24,279	**$252,650**
Orleans	$36,540	$71,276	$12,979,125	$14,053	$37,466	$387,006	$3,303,850	$0	$0	$2,099,483	**$18,928,799**
Ouachita	$3,878	$105,842	$154,866	$3,935	$2,201	$26,250	$189,146	$48	$0	$52,737	**$538,902**
Plaquemines	$18	$277	$57,256	$29	$89	$653	$66,696	$0	$59	$3,882	**$128,959**
Pointe Coupee	$4	$335	$3,022	$18	$23	$142	$3,249	$0	$0	$309	**$7,100**
Rapides	$8,145	$48,147	$141,517	$2,349	$2,013	$19,299	$658,257	$251	$2	$22,251	**$902,230**
Red River	$9	$270	$403	$11	$6	$54	$408	$1	$0	$74	**$1,236**
Richland	$27	$1,828	$5,690	$92	$51	$584	$5,027	$0	$0	$869	**$14,169**
Sabine	$578	$5,518	$12,381	$256	$162	$1,155	$33,430	$0	$0	$1,054	**$54,533**
St. Bernard	$419	$2,932	$307,747	$343	$1,000	$7,969	$91,537	$0	$2	$47,944	**$459,894**
St. Charles	$1	$159	$7,848	$13	$29	$353	$15,615	$0	$6	$2,086	**$26,111**
St. Helena	$333	$1,170	$3,601	$40	$55	$455	$3,057	$0	$0	$321	**$9,032**
St. James	$0	$17	$664	$1	$2	$15	$82	$0	$2	$90	**$874**
St. John the Baptist	$74	$2,330	$57,071	$125	$269	$2,325	$73,317	$0	$0	$14,041	**$149,553**
St. Landry	$60	$3,096	$26,562	$167	$190	$3,357	$29,071	$0	$8	$2,413	**$64,923**
St. Martin	$5	$2,359	$32,359	$100	$162	$2,146	$23,761	$0	$207	$4,127	**$65,227**
St. Mary	$0	$448	$40,044	$35	$91	$415	$44,520	$0	$101	$3,657	**$89,311**
St. Tammany	$4,859	$7,075	$119,689	$293	$557	$3,731	$144,390	$0	$0	$18,232	**$298,826**
Tangipahoa	$41,656	$109,212	$390,450	$3,494	$5,898	$54,518	$486,232	$0	$0	$78,740	**$1,170,199**
Tensas	$7	$303	$1,594	$14	$10	$107	$1,425	$0	$5	$85	**$3,550**
Terrebonne	$1	$2,490	$234,568	$153	$435	$3,494	$289,266	$0	$12	$22,970	**$553,389**
Union	$62	$1,466	$1,470	$59	$30	$317	$2,635	$6	$0	$305	**$6,350**
Vermilion	$2	$1,046	$63,017	$72	$119	$2,159	$53,190	$0	$3	$3,037	**$122,645**
Vernon	$393	$2,511	$5,409	$99	$83	$745	$2,339	$2	$0	$898	**$12,480**
Washington	$3,066	$9,996	$52,960	$394	$441	$4,591	$29,940	$5	$0	$2,152	**$103,545**
Webster	$1,159	$23,427	$26,370	$854	$432	$5,155	$12,711	$1	$58	$3,065	**$73,231**
West Baton Rouge	$8	$578	$4,610	$31	$58	$457	$738	$0	$0	$1,062	**$7,542**
West Carroll	$12	$656	$2,155	$30	$15	$180	$1,083	$0	$0	$186	**$4,317**
West Feliciana	$991	$20,900	$83,378	$1,099	$1,312	$6,526	$45,566	$1	$0	$5,306	**$165,078**
Winn	$8,436	$170,874	$7,492	$6,399	$4,320	$1,248	$9,755	$4	$142	$991	**$209,662**
Total	**$157,889**	**$1,189,351**	**$20,544,070**	**$64,803**	**$94,702**	**$973,424**	**$9,138,278**	**$12,955**	**$2,624**	**$3,211,214**	**$35,389,312**

HISTORIC PROPERTIES HAZARD EXPOSURE

Because building and contents values are not available for many historic sites, hazard parameters were extracted for each of the evaluated historic properties, which can help inform risk for these properties.

Name	Parish	Days over 95°F (Yearly)	Weekly Drought Probability (%)	Annual Wildfire Burn Probability (%)	Days under 32°F (Yearly)	700 Year Peak Gust Wind Speed (mph)	Hail Days per Year	Flashes/sq. mile/year	Tornado Days per Year	Diatance to Nearest High Hazard Potential Dam (miles)	Flood Zone	Distance to Nearest Sinkhole (miles)	Soil Clay Content of High Swelling Potentiality (%)
Blanchard Bldg.	Natchitoches	42	26.2	1.31	19	107	4	13	1	1.7	X	11.4	< 50
Cabildo	Orleans	13	25.4	0.25	2	144	2	28	1	70.5	X	10.7	> 50
Congo Square	Orleans	12	25.4	0.25	2	144	2	28	1	70.1	X	11.0	> 50
Destrehan Platation	St. Charles	11	24.3	0.02	6	141	2	21	1	55.2	A	3.9	> 50
Ducournau Square	Natchitoches	42	26.2	1.31	19	107	4	14	1	1.6	X	11.4	< 50
Evergreen Plantation	St. John the Baptist	8	23.5	0.12	10	141	2	23	1	38.7	X	6.0	> 50
Fort Jackson	Plaquemines	0	23.2	0.00	2	165	1	14	0	113.5	A	5.1	> 50
Fort Pike	Orleans	4	24.7	2.46	9	144	2	20	1	55.7	VE	19.3	< 50
Fort Proctor	St. Bernard	3	24.6	0.29	5	150	2	23	0	76.6	VE	6.9	> 50
Gallier Hall	Orleans	14	25.4	0.21	2	144	2	28	1	70.3	X	10.2	> 50
GB Cooley House	Ouachita	38	25.4	0.70	32	106	5	14	1	20.1	X	26.2	< 50
Jackson Barracks	Orleans	12	25.0	0.31	3	145	2	28	1	70.8	X	10.0	> 50
Jackson Square	Orleans	13	25.4	0.25	2	144	2	28	1	70.5	X	10.6	> 50
Kaffie-Frederick Hardware Store	Natchitoches	42	26.2	1.31	19	107	4	13	1	1.7	X	11.3	< 50
Los Adaes State Historic Site	Natchitoches	36	25.5	1.33	22	108	4	15	1	11.1	X	22.7	< 50
Louisiana State Capital	East Baton Rouge	10	23.1	0.21	7	124	2	26	1	5.4	X	7.9	> 50
Lower Pontalba Building	Orleans	13	25.4	0.25	2	144	2	28	1	70.5	X	10.7	> 50
LSU Indian Mounds	East Baton Rouge	10	23.2	0.17	7	125	2	25	1	3.6	X	8.6	> 50
Madame Johns Legacy	Orleans	13	25.4	0.25	2	144	2	28	1	70.5	X	10.8	> 50
Marksville State Historic Site	Avoyelles	20	26.9	0.27	13	112	3	15	1	21.5	X	16.0	< 50
Melrose Plantation	Natchitoches	34	25.9	1.39	17	109	4	16	1	13.5	X	16.4	< 50
NatchitochesOld Courthouse Museum	Natchitoches	42	26.2	1.31	19	107	4	14	1	1.5	X	11.5	< 50
Oak Alley Plantation	St. James	7	23.2	0.07	9	139	2	21	1	34.4	X	2.8	> 50
Oakley Plantation	West Feliciana	18	21.9	0.28	13	119	3	20	1	7.1	X	22.7	< 50
Old Courthouse Natchitoches	Natchitoches	42	26.2	1.31	19	107	4	14	1	1.5	X	11.5	< 50
Old Governor's Mansion	East Baton Rouge	10	23.1	0.20	7	124	2	27	1	4.8	X	8.1	> 50
Old State Capital	East Baton Rouge	10	23.1	0.19	6	124	2	27	1	5.0	X	7.8	> 50
Old U.S. Mint	Orleans	12	25.4	0.26	2	144	2	28	1	70.7	X	10.8	> 50
Old Urseline Convent	Orleans	13	25.4	0.26	2	144	2	28	1	70.5	X	10.8	> 50
Ormond Planation	St. Charles	10	23.4	0.02	6	141	2	21	1	53.8	A	3.2	> 50
Poche Plantation	St. James	7	23.1	0.06	9	137	2	20	1	32.2	X	5.4	> 50
Port Hudson State Historic Site	East Feliciana	16	21.6	0.27	13	119	3	21	1	14.1	X	16.2	< 50
Poverty Point National Monument	West Carroll	22	25.4	0.44	24	106	5	13	1	11.2	X	19.1	< 50
Presbytere-LA state museum	Orleans	13	25.4	0.25	2	144	2	28	1	70.5	X	10.7	> 50
Prudhomme Bldg.	Natchitoches	42	26.2	1.31	19	107	4	14	1	1.7	X	11.4	< 50
Ruston POW Camp Bldgs.	Lincoln	31	26.2	1.29	30	105	5	14	1	20.8	X	14.7	< 50
Sabine Pass Lighthouse	Cameron	7	23.9	2.65	8	145	2	14	1	71.2	AE	14.9	< 50
San Fransico Plantation	St. John the Baptist	9	24.0	0.16	10	136	2	23	1	39.5	X	8.4	> 50
Southern Forest Heritage Museum and Research Center	Rapides	29	28.9	5.18	20	114	3	16	1	10.3	X	17.9	< 50
St. Louis Cathedral	Orleans	13	25.4	0.25	2	144	2	28	1	70.5	X	10.7	> 50
Upper Pontalba Building	Orleans	13	25.4	0.24	2	144	2	28	1	70.5	X	10.6	> 50
US Bureau of Immigration & Customs Enforcement	Orleans	14	25.4	0.21	2	144	2	28	1	70.0	X	10.5	> 50
USS Kidd	East Baton Rouge	10	23.1	0.19	6	124	2	27	1	5.0	AE	7.7	> 50

Changes in Future Hazard Conditions

The following sections describe the rationale behind the selection of changes in future hazard conditions projections, and also describe specialized risk assessment approaches for hazards that did not use the SHELDUS loss approach.

Temperature Hazards

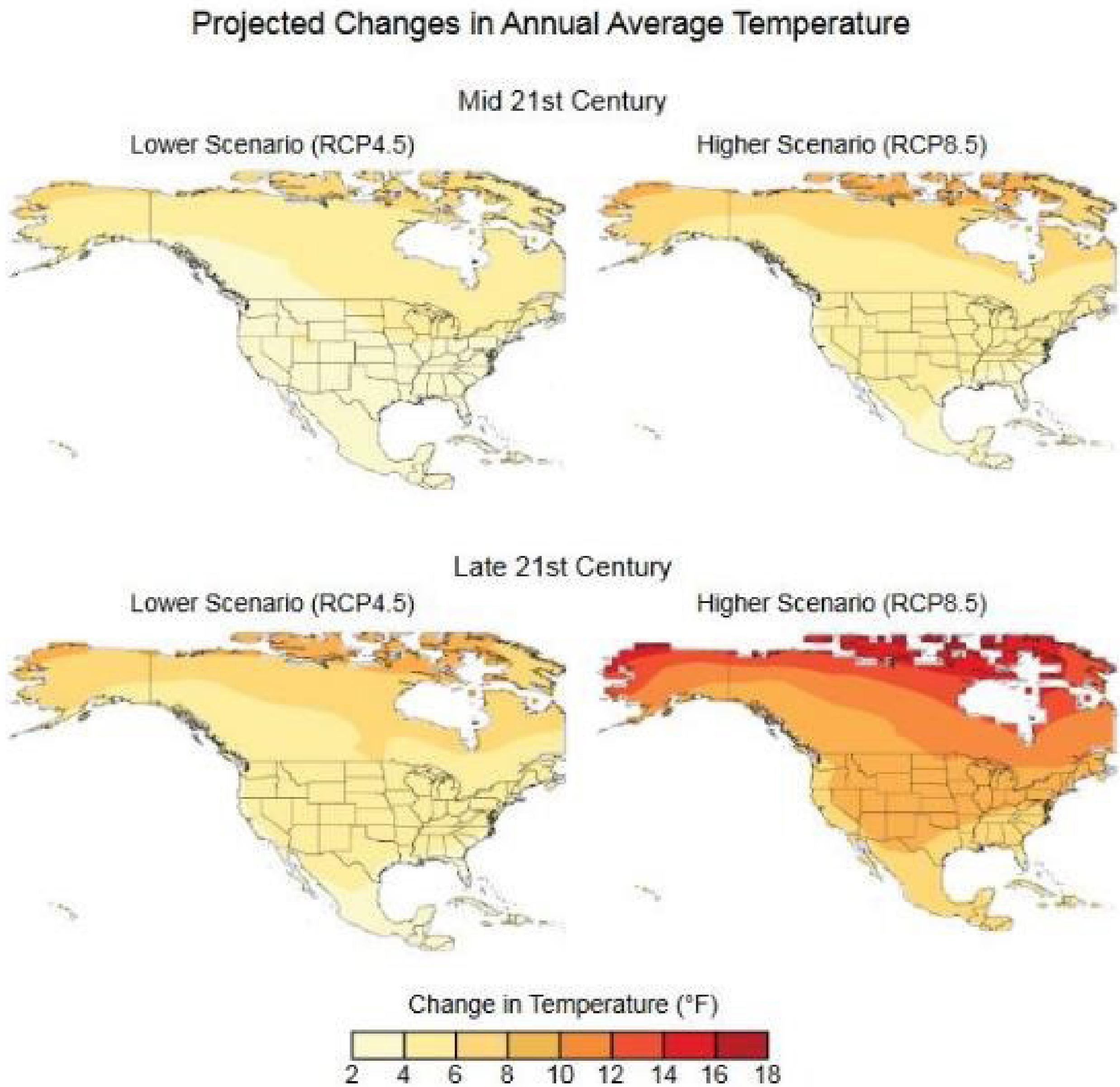
Future Conditions: Extreme Heat and Cold

Any reasonable assessment of future vulnerability to extreme temperatures must begin with a review of the consensus of the major general circulation model (GCM) output for mean temperature. From that point, more specific estimates of extreme temperatures might be possible. The Fourth National Climate Assessment (NCA4; 2017; https://science2017.globalchange.gov) utilizes output from the Intergovernmental Panel for Climate Change (IPCC) reports, with specialized focus on each world region.

The southeastern U.S., including Louisiana, exhibited little or no change in temperature from 1986 to 2015 relative to 1901 to 1960 (Wuebbles et al., 2017; their Figure 1.3). The observed temperature record of the southeastern is characterized by a warm peak during the 1930s and 1940s, followed by a cool period in the 1960s and 1970s, with temperatures increasing again since 1970 (NCA, 2017). Louisiana has exhibited little overall warming in surface temperatures over the 20th century (Frankson et al., 2017). Vose et al. (2017) suggest that the 1986 to 2016 period was up to 1°F warmer than the 1901 to 1960 period in Louisiana, with the most Louisiana warming in the northeastern and coastal southeastern parts of the state. This warming is much less than that reported in most of the northern and western United States. The confidence in these conclusions by NCA4 (2017) is reported as "very high."

By 2050, warming is expected to intensify for the southeastern United States, including Louisiana. More specifically, NCA4 (2017) says that, "statistically significant warming is projected for all parts of the United States throughout the [21st] century…warming rates (and spatial gradients) are greater at higher latitudes." The confidence in these conclusions by NCA4 (2017) is reported as "high." The additional evapotranspiration in the Southeast, due to warming, will allow additional condensation and cloud cover, which will in turn suppress further warming. This contrasts with other regions in which moisture is not as abundant. In those regions, the extra energy input will result in higher increases in temperature.

NCA4 (2017) analyzed modeled changes in mean temperature by 2036-2065, as compared to 1976-2005. Two scenarios were chosen, to conform to those used by the Intergovernmental Panel on Climate Change. The higher radiative forcing scenario (Representative Concentration Pathway (RCP) 8.5 (suggesting an increase of 8.5 Watts per square meter of energy loading)) would result in a mean temperature increase of 2-6 °F in Louisiana across the two thirty-year periods (Figure X; same as Figure 6.7 in NCA4 (2017)), with a mean increase across the U.S. Southeast of 4.30 °F. The lower forcing scenario (RCP4.5) would result in 2-4 °F increases in mean temperature across Louisiana, with a mean increase by mid-century of 3.40 °F for the U.S. Southeast region. Under a higher emissions pathway, historically unprecedented warming is projected for Louisiana by the end of the 21st century (Frankson et al., 2017; https://statesummaries.ncics.org/la).



NCA4 (2017) also projected changes to temperature extremes. RCP8.5 would increase the temperature of the coldest day of the year by 2-4 °F and the warmest day of the year by 2-4 °F in Louisiana, except for the extreme coastal southeast, where increases of 0-2 °F are projected (Figure Y – Same as Figure 6.8 in Vose et al., 2017). Mean increases for the U.S. Southeast region are 4.97 °F and 5.79 °F, respectively (Vose et al., 2017). Louisiana might expect 20 to 30 more days annually with temperatures above 90 °F and 1 to 20 fewer days per year with freezing temperatures by the 2036-2065 period (Figure Z – same as Figure 6.9 in Vose et al., 2017). Larger increases in extreme high temperature frequency are expected in inland regions, including northern Louisiana. Much smaller increases in the mean number of days per year exceeding 95 °F are expected in coastal Louisiana, but on a percentage basis, these increases are also substantial. The confidence in these conclusions by NCA4 (2017) about changes to U.S. extreme temperature days is reported as "very high." NCA4 (2017) does not examine the changes to extremes that would occur in an RCP4.5 scenario.

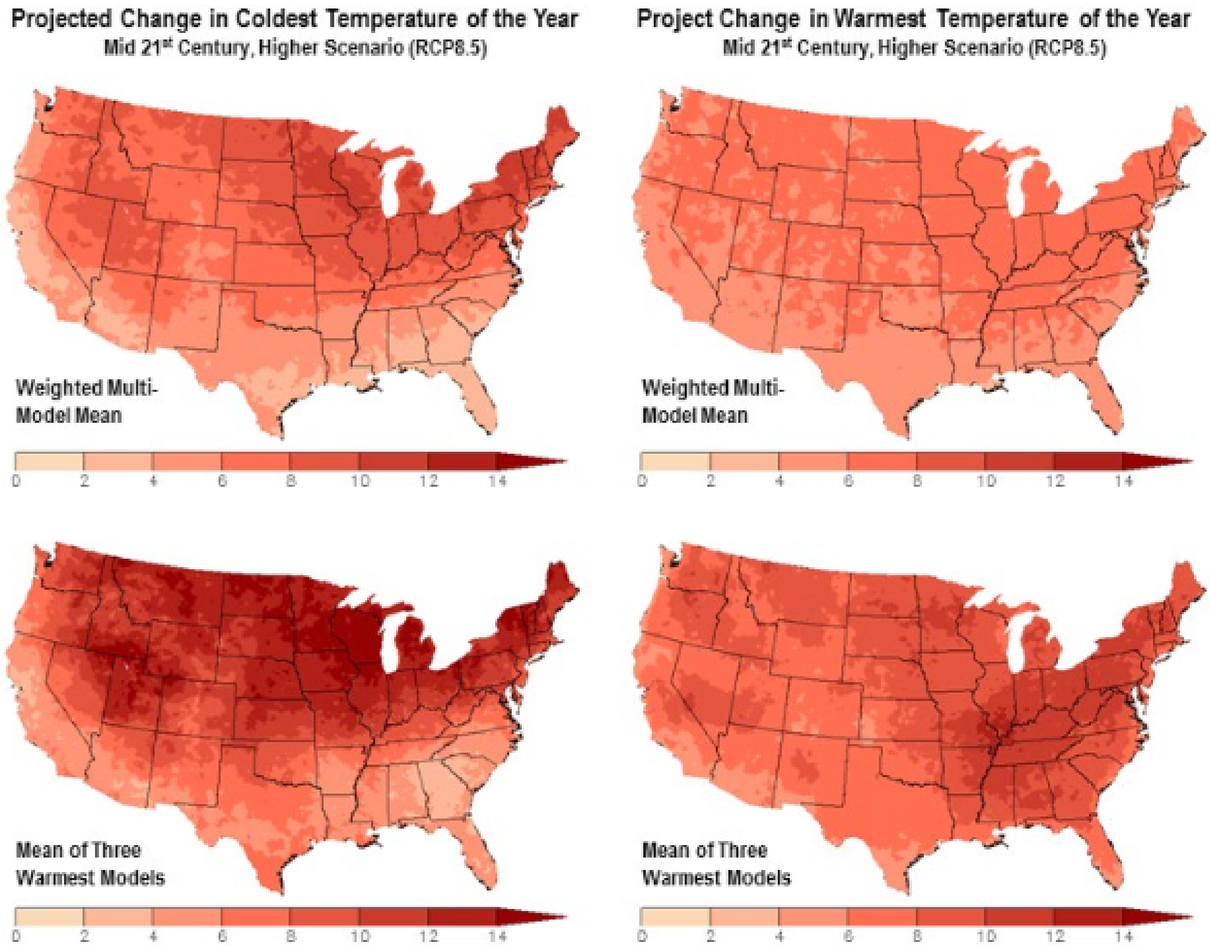


Figure 6.8. Projected changes in the coldest and warmest daily temperatures (°F) of the year in the contiguous United States. Changes are the difference between the average for mid-century (2036–2065) and the average for near-present (1976–2005) under the higher scenario (RCP8.5). Maps in the top row depict the weighted multimodel mean whereas maps on the bottom row depict the mean of the three warmest models (that is, the models with the largest temperature increase). Maps are derived from 32 climate model projections that were statistically downscaled using the Localized Constructed Analogs technique.[51] Increases are statistically significant in all areas (that is, more than 50% of the models show a statistically significant change, and more than 67% agree on the sign of the change[45]). (Figure source: CICS-NC and NOAA NCEI).

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Wuebbles, D.J., D.R. Easterling, K. Hayhoe, T. Knutson, R.E. Kopp, J.P. Kossin, K.E. Kunkel, A.N. LeGrande, C. Mears, W.V. Sweet, P.C. Taylor, R.S. Vose, and M.F. Wehner, 2017: Our globally changing climate. In: Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 35-72, doi: 10.7930/J08S4N35.

Future Conditions: Drought and Wildfire

The definitive study on future conditions of drought and wildfire in the U.S. is the Fourth National Climate Assessment (NCA4, 2017; https://science2017.globalchange.gov). The Drought, Floods, and Wildfire section of that report (Wehner et al., 2017) concludes that:

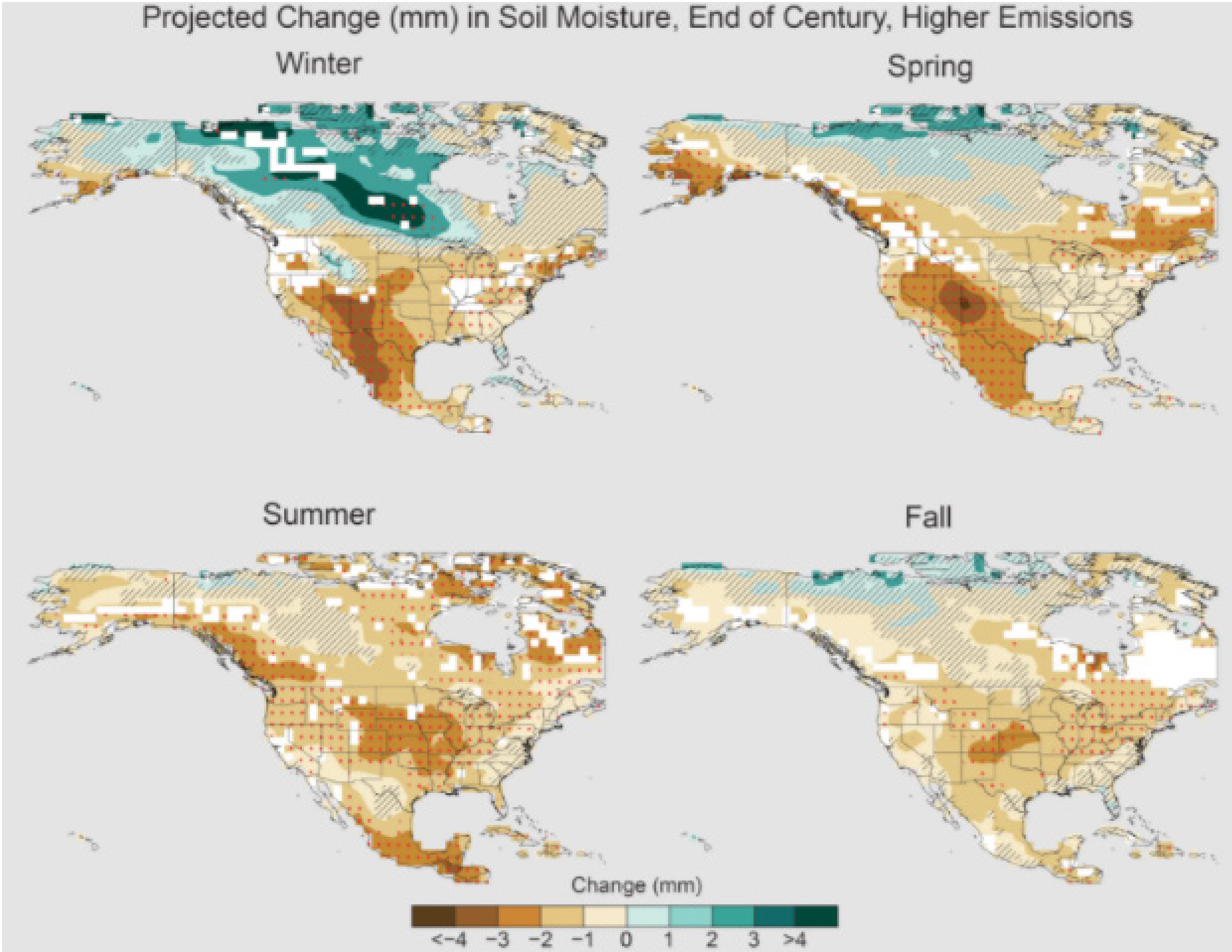
"The human effect on recent major U.S. droughts is complicated. Little evidence is found for a human influence on observed precipitation deficits, but much evidence is found for a human influence on surface soil moisture deficits due to increased evapotranspiration caused by higher temperatures."

Wehner et al. (2017) suggest that by 2050, daily precipitation will increase by 9–13 percent in Louisiana, with higher increases corresponding to the higher radiative forcing scenario. The report also uses dynamically downscaled model output to find that, for the U.S. as a whole in the higher forcing scenario, a more extreme precipitation climate is to be expected by 2100. This includes substantial increases in the frequency of "no precipitation" and the (present) zero-to-tenth-percentile precipitation daily totals, sharp increases in the frequency of days having a greater than 90th percentile of precipitation, and decreases in every other decile of precipitation totals.

The projected increases in temperature and precipitation, and the seasonality of each, would induce changes in soil moisture, which in turn would cause changes in drought and wildfire. Therefore, it is appropriate to search the literature for projected changes in soil moisture by mid-century. Wehner et al. (2017) acknowledge that projections of seasonal precipitation deficits lack confidence, but they recognize that the preponderance of evidence suggests that evapotranspiration caused by increased temperatures will outpace the projected increasing precipitation totals, resulting in drying soils by 2100 over much of the continental United States, including Louisiana, at least under higher radiative forcing and emissions scenario (Figure X). These changes will impact soil moisture availability in Louisiana. Specifically, in Louisiana, soil moisture decreases in autumn are expected to be small relative to natural variability, but in the other three seasons the soil moisture decreases are projected to be large relative to natural variability. These soil moisture forecasts are made with a "medium" degree of confidence.

Soil moisture changes could be expected to produce changes in wildfire vulnerability. However, because the Fourth NCA focuses on the western U.S. in its discussion of wildfire, other sources must be used to assess the threat to Louisiana by 2050. Prestemon et al. (2016) used three general circulation models and three IPCC-based emission scenarios to assess future conditions of wildfire in the U.S. Southeast; the study concluded that median annual area affected by lightning-ignited wildfire will increase by 34 percent, and that total wildfire will increase by 4 percent by 2056–60 compared with the years 2016–2020.

A few other studies have been conducted in the last ten years to make projections to changes in wildfire vulnerability. For such purposes, the Keetch-Byram Drought Index (KBDI), which is calculated based on observed or simulated changes in maximum temperature and precipitation, is most useful. The KBDI was developed by the U.S. Forest Service using a water balance approach. Specifically, it examines the relationship of modeled evapotranspiration (driven largely by temperature and latitude, the latter of which controls sun angle and number of hours of daylight) to precipitation in the organic matter on a forest floor and in the highest soil layers. The KBDI actually represents the number of millimeters of precipitation that would be required to saturate the soil (i.e., reduce the KBDI to zero). Values from 0 to 200 indicate minimal wildfire threat, with values of 200 to400 suggesting that the lower litter layer is drying and beginning to be susceptible to drought. Values from 400 to 600, which are more typical of late summer and early autumn, indicate that there is a moderate burn potential. Values of 600 to 800 are associated with more severe drought and active potential for burning.



Projected end of the 21st century weighted CMIP5 multimodel average percent changes in near surface seasonal soil moisture (mrsos) under the higher scenario (RCP8.5). Stippling indicates that changes are assessed to be large compared to natural variations. Hashing indicates that changes are assessed to be small compared to natural variations. Blank regions (if any) are where projections are assessed to be inconclusive (Appendix B). (Figure source: NOAA NCEI and CICS-NC).

Liu et al. (2009) modeled seasonal changes to the KBDI using the A2a scenario – the "non-fossil-intensive" variety of the "A2" scenario that had been used by NCA before its fourth assessment report. The A2a scenario assumed that global population surpasses 10 billion by 2050, with relatively slow economic and technological development, creating global CO2 mixing ratios of 575 parts per million (ppm) by 2050 and 870 ppm by 2100 (compared to the current 407 ppm). Validation of output from four general circulation models for global climate for the 1961-1990 period led Liu et al. (2009) to conclude that the Hadley Centre climate model version 3 (Pope et al. 2000) is most effective for simulating global KBDI for the 2070-2100 period. Figure Y shows those projected changes to the KBDI (2070-2100 minus 1961-1990) for the United States. In autumn and winter (September through February), decreases of 50–150 mm per three-month period were forecasted in Louisiana, while in March through May and June through August decreases of 200-250 mm per three-month period were projected in Louisiana.

The midpoint of the time series of the projection by Liu et al. (2009) is 2085, so we assumed that half of the projected changes in KBDI will occur by 2050. Thus, decreases of 25-75 mm per three-month period (or 8-25 mm per month, with 17 mm per month as the midpoint) are projected for each month from September through February in Louisiana by 2050. Decreases of 100-125 mm per three-month period (or 33-42 mm per month, with 38 mm per month as the midpoint) are projected for each month from March through August in Louisiana by 2050 (Table 1).

To provide more detail for Louisiana based on Liu et al.'s (2009) results, we collected average monthly precipitation data for 31ºN, 91.5ºW from the Web-based, Water-Budget, Interactive, Modeling Program (WebWIMP, http://climate.geog.udel.edu/~wimp/wimp_map_input.php). Results suggest that decreases in soil moisture in the upper-layers of 12.2 percent (February) to 46.1 percent (August) are projected.

Based on these model results, we project a 25 percent decrease in available moisture in the organic matter and uppermost soil layers, and a 25 percent increase in wildfire susceptibility across Louisiana by 2050.

Our projections are not without their caveats. For example, these changes do not take into account projected changes in global air temperature. According to NCICS (https://statesummaries.ncics.org/la), Louisiana's mean air temperature trends have not mimicked global temperature trends, as:

> "Louisiana has exhibited little overall warming in surface temperatures over the 20th century. However, under a higher emissions pathway, historically unprecedented warming is projected by the end of the 21st century."
>
> The changes described here assume no change in temperature by 2050 from current values. Nor do they take into account the precipitation changes that are expected to replenish the soil layers during wet times, but also desiccate the soil more rapidly during the lengthening dry periods. Thus, caution should be exercised in our interpretation of the results.

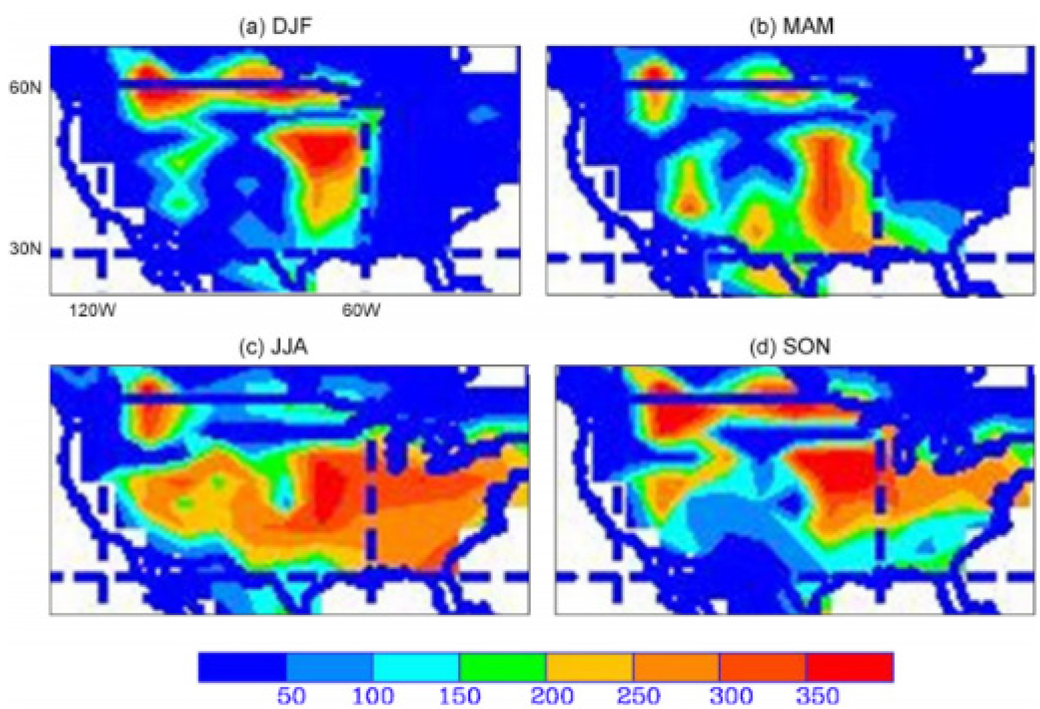


Figure Y – Projected changes to KBDI (mm) by annual quarter (Liu et al., 2009)

Table 1: Current monthly precipitation and projected decrease in KBDI and available water for precipitation by 2050, for 31°N, 91.5°W.

	Mean current precipitation (mm)	Projected decrease (mm) in available moisture in upper litter layers (KBDI)	Projected decrease in available water as a percentage of current precipitation (%)
January	133.8	17	12.7
February	139.5	17	12.2
March	159.7	38	23.8
April	130	38	29.2
May	132.6	38	28.7
June	95.6	38	39.7
July	94	38	40.4
August	82.4	38	46.1
September	80.1	17	21.2
October	74.1	17	22.9
November	113	17	15
December	128.6	17	13.2

Recent research (Krueger et al., 2017) suggests that the fraction of available water (FAW) is a better predictor of large growing-season wildfires than the KBDI. FAW is calculated as the ratio of plant available water to soil water capacity. But FAW has not yet been projected as confidently to 2050 as precipitation.

Wildfire Risk Assessment:

Property loss due to wildfire is calculated as

$$L_{2043,i} = I_{2043,i} \times p(f)_i \times p(d|f)_i \times F_i$$

where,

$L_{2043,i}$=projected annual preperty loss of census block i in 2043
$I_{2043,i}$=estimated total building inventory value of census block i in 2043
$p(d|f)_i$ = conditional probability of damage of census block i when a fire occurs
$p(f)_i$ = probability of fire occurrence of census block i
F_i= future hazard multiplication factor for census block i in 2043

We summed the probability of large fires from FSim and calculated the annual probability of small fires using FPA data. Based on LDAF records 2007–2017, 12,979 Louisiana residences have been threatened by fire. Of these, 389 were damaged and 12,590 were protected, a relative damage frequency of 0.03. Therefore, p(d|f) = 0.03. The losses were calculated, assuming that 3% of buildings exposed to fire were damaged, with a relative loss of 5% of the value of each building.

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Wind and Flood Hazards

Future Conditions: Tropical Cyclones

Future vulnerability to tropical cyclones has been a topic of intense scrutiny in the scholarly literature of the last decade. On the one hand, several natural processes linked to enhancement of tropical cyclones might seem to become more favored in a warming world. For example, warming would increase the geographic extent at which water temperatures are high enough to provide the energy required to support or enhance a tropical cyclone and/or lead to a longer period in the year in which tropical cyclones may occur. Also, because the Earth's surface is anticipated to warm at a greater rate than the upper-level atmosphere, thermal turbulence and atmospheric instability would be enhanced, possibly leading to more evaporation from the surface. Atmospheric water vapor capacity would also increase under warmer conditions. Furthermore, a warming world could also be likely to cause a poleward retreat in the west-to-east-moving subtropical and polar front jet stream, both of which separate tropical air from much colder air. Because the jet streams shear the tops off of developing tropical cyclones, their migration poleward would provide a more favorable environment for growth of tropical systems, unimpeded by the shear that might weaken them or carry them eastward across the Atlantic Ocean, away from Louisiana. These concerns are exacerbated by research that suggests a tight linkage between global temperature and tropical cyclone activity via feedbacks related to ocean mixing and transport (Sriver, 2010).

On the other hand, simulation models do not necessarily agree that the frequency of tropical cyclones will increase in a warming world. Bengtsson et al. (2007) projected a 20 percent decrease in frequency by the end of the 21st Century, including a 5-10 percent decrease in the Gulf of Mexico from the 20th to the 21st Century. Ensemble modeling by Colbert et al. (2013) suggested that the weakening easterly trade winds under double CO_2 conditions (i.e., 720 ppm) by 2100 would decrease the frequency of tropical cyclones in the Gulf of Mexico by one to 1.5 per decade. Wang and Wu (2013) isolated the impacts of global warming from that attributable to the Atlantic Multidecadal Oscillation (AMO) a naturally-occurring warm-cold oscillation of Atlantic Ocean temperatures that began its most recent warm phase in 1995 with the conclusion that global warming causes an eastward shift in the Atlantic tropical cyclone genesis zone, while the warm-phase AMO is responsible for basinwide enhancement. The implication is that frequency may decrease when the AMO flips back to the cold phase in the coming decades. More recent work, summarized in the Fourth National Climate Program Assessment (Kossin et al., 2017) suggests that, with low confidence, the frequency of the most intense Atlantic tropical cyclones is projected to increase.

The impact of global warming on the intensity of tropical cyclones, however, is a different matter. Bengtsson et al. (2007) projected no decreases, and perhaps a substantial increase, in the frequency of the most intense tropical cyclones. Tory et al. (2013) confirmed such projections with a new generation of models.

The most recent research on the topic generally seems to confirm the "increased intensity" conclusions of previous studies, with warning of additional dangers associated with the increased intensity of tropical cyclones under a warming global climate. For example, Moore et al. (2015) concurred with the previous conclusions, while also anticipating a decrease in the periodicity of the El Niño/Southern Oscillation, which is known to suppress Gulf-Caribbean-Atlantic tropical cyclone activity. The resulting increased interannual variability could leave people uncertain of the trend of the hazard. Walsh et al. (2016) projected increases in tropical cyclone precipitation intensities in addition to the changes previously discussed. Such precipitation could increase even farther inland than today. Sun et al. (2017) noted that the area of the tropical cyclone-induced high winds will increase under global warming scenarios. And Appendini et al. (2017) warned that the wave activity associated with tropical cyclones will likely increase in the northern Gulf of Mexico under global warming scenarios. The Fourth National Climate Assessment (Kossin et al., 2017) provides an ominous reminder that atmospheric scientists tend to be converging toward a conclusion on the matter:

"Both theory and numerical modeling simulations generally indicate an increase in tropical cyclone (TC) intensity in a warmer world, and the models generally show an increase in the number of very intense TCs. For Atlantic and eastern North Pacific hurricanes and western North Pacific typhoons, increases are projected in precipitation rates (high confidence) and intensity (medium confidence)."

In general, however, more work is needed, particularly under assumptions of less drastic increases in CO2 emissions, with a focus on the middle of the 21st century rather than the end, and at the regional rather than the basinwide scale.

Scholars have also estimated the future impacts resulting from such a consensus of increases in intensity and/or frequency of the most intense tropical cyclones. While emphasizing the inherent uncertainty and difficulty with projecting the future tropical cyclone hazard, Knutson et al. (2010) cautiously projected no major macro-scale changes in tropical cyclone genesis location, tracks, duration, or areas of impact, but cautioned that the future vulnerability to tropical-cyclone-induced storm surge-related flooding will increase due to sea level rise and coastal development. Ranson et al. (2014) used ensemble models to project a 63 percent increase in tropical cyclone damage in the North Atlantic basin, the highest increase of any basin in the world.

Regardless of projections of the impact of global warming on regional tropical cyclone activity, Louisiana will always be in a geographic position in which tropical cyclones may track. Any increased intensities in the future, even with decreased frequencies, are likely to enhance Louisiana's future vulnerability, given that the intense storms have enormous potential to devastate the physical, urban, agricultural, economic, and sociocultural infrastructure of our state. We project a 25 percent increase in the future vulnerability to tropical cyclones, with a near-certain expectation that Louisiana will experience another major tropical cyclone before mid-century.

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Future Conditions: High Wind

Future frequency of high wind events is particularly difficult to predict, because high wind may accompany many different types of storms, each with their own distinct patterns of projected changes. NCA4 (2017; https://science2017.globalchange.gov) is again the most comprehensive source that synthesizes recent research on the topic. That document reports:

"Climate models consistently project environmental changes that would putatively support an increase in the frequency and intensity of severe thunderstorms (a category that combines tornadoes, hail, and winds), especially over regions that are currently prone to these hazards, but confidence in the details of this projected increase is low."

Even though the frequency of the most intense tropical cyclones and tornadoes is expected to increase, such events are rare. High wind events are much more commonly linked to thunderstorms, for which there is presently little evidence of a change in frequency by mid-century. Therefore, we estimate no change to future conditions.

Future Conditions: Hail

Unlike most other forms of severe weather, hail has been studied fairly comprehensively for temporal trends and relationship to global climate change. As was described in the severe thunderstorm future vulnerability section, intuitively, several counteracting potential forces seem to be at work. Increases in surface temperatures, at a rate exceeding the increase in upper-atmospheric temperatures, would destabilize the atmosphere further. In other words, the warmed air at the surface would acquire increased buoyancy, allowing for enhancement in vertical cloud growth, assuming that adequate moisture is present, which would in turn support stronger and perhaps more frequent hail events. The energized atmosphere under global warming situations would also presumably provide more evaporation over the oceans, which would indeed contribute the moisture needed to produce the enhanced cumulonimbus clouds that would support hail-bearing thunderstorms. However, an atmosphere in which the poles warm more strongly than the tropical parts of the Earth might be expected to weaken the tropical-to-pole gradient of energy, and therefore weaken frontal boundaries separating the two, making hail-bearing thunderstorms less frequent and intense. Likewise, any increases in atmospheric temperature might be more likely to allow hail that forms to melt partially or completely when precipitating.

In China, observational reports of a decrease in both the number of hail days (Xie et al., 2008) and the size of hail (Ni et al. 2017) have been identified. In a follow up study, Xie et al. (2010) found no significant trends in hail size across five provinces analyzed, as increases in convective available potential energy (CAPE) – a thermodynamic indicator of severe thunderstorms that often produce hail – tended to be offset by an increase in the height of the freezing level, which would tend to oppose hail generation. These results generally support the notion that opposing meteorological factors are at work.

Recent studies in a given part of the world often have conflicting results regarding future hail occurrence. For example, modeling work suggests future decreases in CAPE in southeastern Australia under enhanced greenhouse concentrations (Niall and Walsh, 2005). However, Leslie et al. (2008) disagree, reporting model simulations of a gradual increase in frequency and intensity of hailstorms in the Sydney Basin out to 2050. In Europe, Sanderson et al. (2015) projected a decrease in damaging hailstorms in the United Kingdom throughout the 21st century. Dessens et al. (2015) generally concur for the southern Atlantic French coast, forecasting a slight decrease in the number of hailstorms, but with no significant change in hail frequency by 2040. On the other hand, observational studies suggest that synoptic environments that favor hail precipitation have increased in the Mediterranean region (Sanchez et al., 2017) and much of central Europe (Mohr and Kunz, 2013). Bayesian modeling suggests a modest increase in the number of hail days by 2031-2045 in Germany (Kapsch et al., 2015). In the United States, Mahoney et al. (2012) used high-resolution modeling to predict substantial decreases in hail frequency in the Colorado mountains by mid-century (2041-2070). But Allen (2017) disagreed, suggesting a potential increase in both the mean hail size and the frequency of major hailstorms in North America. Brooks (2013) summarized previous work by suggesting that CAPE can be expected to increase in the future, while wind shear will decrease, leaving the net effect on tornado and hail occurrence in the future open to question. Again, this conclusion supports the notion that theoretical factors important to generating hail under a warming climate are in opposition.

In perhaps the most comprehensive recent study of future hail events in North America, Brimelow et al. (2017) used sophisticated modeling techniques to conclude that fewer days of small, medium, and large hail are expected over much of North America over the 2041-2070 period, including the U.S. Southeast and Louisiana, in spring and summer (Figure X). Figure X does suggest some possible increase in the frequency of large hail for southeastern Louisiana.

The Fourth National Climate Assessment (2017) cites Allen and Tippett (2015) in reaching the conclusion that although evidence exists for an increasing hail frequency in the U.S., the uncertainty in reported hailstone size reduces the confidence in projections (Kossin et al. 2017). Given the conflicting theoretical impacts of hail above, the comprehensiveness of the Brimelow et al. (2017) work, and the near-certainty of an increased population to be impacted, we project no net change in the future vulnerability to hail in Louisiana by mid-century.

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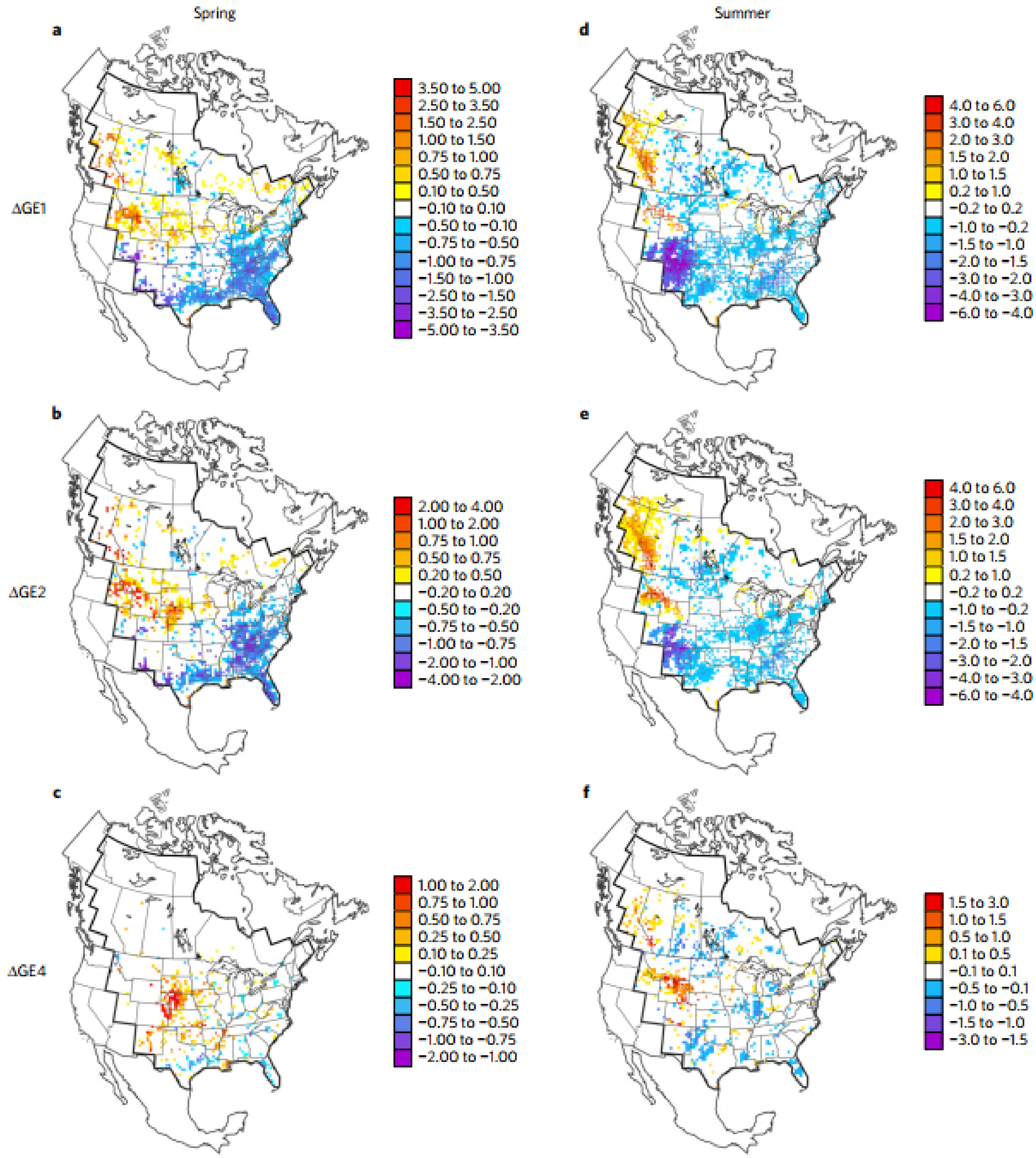
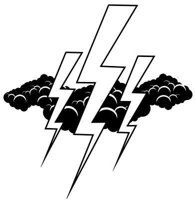


Figure 1 | Spatial changes in hail diameter classes for spring and summer. a–c, Mean multi-model changes in future (2041–2070) minus present (1971–2000) for spring hail days (GE1; $D_s \geq 1.0$ cm) per season (**a**), severe hail days (GE2; $D_s \geq 2$ cm) per season (**b**), and very large-hail days (GE4; $D_s \geq 4$ cm) per season (**c**). **d–f**, The same variables as for **a–c**, except for summer. Coloured cells indicate mean changes for all model pairings that agree on the direction of change; cells with coloured circles indicate mean changes for at least two model pairings that are statistically significant (90% significance).

Source: Verbatim from Brimelow et al. (2017)



Future Conditions: Lightning

Future changes to lightning frequency in the southern U.S. are not discussed directly in NCA4 (2017), nor is the topic covered extensively in the refereed literature. As was described in the assessment of future conditions for high winds, there is currently low confidence in projection of severe thunderstorms. Furthermore, there is even less evidence for changes in weak to moderate thunderstorms. Because weak to moderate thunderstorms are much more frequent than severe thunderstorms, collectively they produce most of the lightning strokes. Therefore, there is very little certainty in any changes in lightning by mid-century. Recent research from China (Yang et al. 2018) suggests that future increases can be expected. For the U.S. as a whole, a suite of 11 general circulation models predicted mean increases in lightning strikes for the 2079-2088 period of between 3.4% and 17.6% per °C of temperature increase (Romps et al. 2014). Based on this seminal paper, a 10 percent increase in the lightning hazard is assumed by 2050 for Louisiana.

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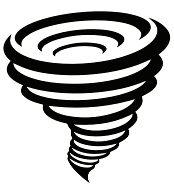

Future Conditions: Tornadoes

The updraft of air in tornadoes always rotates because of wind shear (differing horizontal speed height), and it can rotate in either a clockwise or counterclockwise direction. Clockwise rotations (in the northern hemisphere) will always result in near-immediate demise, but counterclockwise rotations (in the northern hemisphere) will sustain the system, at least until other forces cause it to die seconds to minutes later.

The Enhanced Fujita (EF) Scale is used to classify tornadoes based on their damage pattern, not wind speed; wind speed is then derived and estimated. This contrasts with the Saffir-Simpson scale used for hurricane classification, which is based on measured wind speed.

Enhanced Fujita (EF) Scale.

Enhanced Fujita Scale						
	EF0	EF1	EF2	EF3	EF4	EF5
Wind Speed	65-85 mph	86-110 mph	111-135 mph	136-165 mph	166-200 mph	>200 mph

Any estimates on changing tornado frequencies or intensities should begin with an assessment of the likelihood of changing precursor conditions for tornadoes. Increases in the frequency of convergence of very warm, humid air masses with very cold air masses and/or increases in the intensity of the temperature gradient across air masses would be likely to increase the tornado frequency and/or intensity, and therefore presumably increase vulnerability to tornadoes. Likewise, increasing vertical temperature gradients between the surface and aloft (i.e. more rapid decreases in temperature with increasing height) would also make tornadoes stronger and/or more likely, and therefore exacerbate tornado vulnerability. A related ingredient is vertical wind shear (i.e., sharp increases in wind speed with increasing height), with increasing vertical wind shear over time promoting increasing situations of the horizontal rotation that could then be raised to a vertically oriented rotating mass if warming air near the surface increases the tendency for it to rise. Increases in tropical cyclone frequency would also be likely to increase the number of tropical cyclone-induced tornadoes, and presumably tornado vulnerability. And finally, enhancements in detection capabilities and increasing population generally would increase the number of reported tornadoes, particularly weaker ones.

There remains a general lack of consensus regarding the impact of global climatic change on tornado frequency and/or intensity (Long and Stoy, 2014). Part of the difficulty in making such projections is the large difference in scale between global climate change projections and the local nature of the weather conditions that create tornadoes (Mika, 2013), along with an incomplete understanding of the physics involved (Moore et al., 2015). Nevertheless, the existing scientific literature can give at least some basis for assessing tornado vulnerability regarding the scenarios described in the previous paragraph. Atmospheric scientists overwhelmingly agree that global temperatures will continue increasing, though the magnitude and rate of increase will vary spatially, seasonally, and within the diurnal cycle (National Climate Assessment, 2017; https://science2017.globalchange.gov).

As was discussed, temperature is expected to increase in Louisiana at least through mid-century. Increasing temperatures would logically move the boundary between the cold and warm air masses poleward, leaving Louisiana farther from the most dangerous zone for tornadic development a larger percentage of the time, and therefore reduce tornado frequency and/or intensity. Because tornado frequency in Louisiana is less seasonal than in most other places, the nuances of changing tornado vulnerability may be slightly less dependent on the uncertainties of the seasonal temperature changes than in most other places.

However, the other factors that also impact tornado frequencies must also be considered. As suggested above, tornadic activity is also favored when very warm, humid air near the surface underlies air that is much colder aloft. Thus, amplification of the temperature difference between the surface and the upper atmosphere (i.e., destabilizing the atmosphere) might be considered to enhance the probability of tornadic development. Brooks (2013) used climate model simulations to conclude that indeed, that vertical gradient, as represented by convective available potential energy (CAPE), is projected to increase into the future. However, Brooks (2013) also noted that the vertical wind shear needed for tornadic development is generally weakening under global change climate simulations. Gensini et al. (2014) noted through the use of a regional model simulation that extreme destabilization of the atmosphere (in the form of the number of days having an extremely high CAPE) is likely to increase over a large section of the northeastern U.S.A., which would make tornadoes more likely. However, the same study showed that CAPE is likely to decrease over nearly all of Louisiana, at least when the 2041-2065 period is compared to the 1981-1995 interval, which would create a less favorable environment for tornadoes.

On the other hand, Diffenbaugh et al. (2013) disagreed, noting that the days with weakening vertical wind shear tend to be concentrated on days when CAPE is low; with high-CAPE days showing less evidence of weakening shear. Seeley and Romps (2015) generally concurred with Diffenbaugh et al. (2013), excepting that their analysis was for severe thunderstorms rather than tornadoes per se. Through ensemble modeling, Seeley and Romps (2015) found consistent spring and summer increases in the frequency of severe-thunderstorm environments over the U.S., including Louisiana, from 2079-2088, as represented by high CAPE days and vertical wind shear, under medium and high scenarios of greenhouse forcing.

Furthermore, tornadic development also occurs in association with tropical cyclones, so any changes in tropical cyclone frequency and/or intensity might be coincident with a change in tropical-cyclone-induced tornadic development. As previously discussed, tropical cyclones are expected to become more problematic in the future, even if only because of increased coastal population. Therefore, in the absence of prevailing scientific consensus on the topic in the refereed literature, it seems reasonable to suggest that the tropical-cyclone-induced tornado hazard will follow a proportionate increase to that of tropical cyclones for Louisiana.

And finally, as tornado detection capabilities continue to improve due to larger populations and improved equipment to observe their occurrence, tornado frequencies are expected to increase.

When comparing the 1954–1983 period to the 1984–2013 period, Agee et al. (2016) found that, not surprisingly, winter was the season in which the most prominent tornado frequency increases occurred. For Louisiana, that study showed an increase in the latter period in (E)F1–(E)F5 tornadoes, but decreases in the (E)F2–(E)F5 and in the (E)F3–(E)F5 tornadoes. However, Louisiana experienced a simultaneous decrease in the number of days on which a tornado occurred (Agee et al, 2016), which suggests that tornado outbreaks may be becoming more frequent, even while tornado frequencies are not. Tippett et al. (2016) concurred, suggesting that increases in larger outbreaks will be more pronounced than increases in smaller outbreaks. And importantly, NCA4 (2017) agrees that the frequency of tornado days in the U.S. as a whole has decreased since 1970, but that the number of tornadoes touching down on those days has increased over the same time period (Kossin et al., 2017). The latter study also reports an earlier onset of tornado season in the United States.

Modeling studies of future tornadic activity reveal a mixed bag. Trapp and Hoogewind (2016) found that updrafts, while intense under projected increases in CAPE by the latter 21st century, do not increase proportionately to the projected CAPE. Kossin et al. (2017) agree in NCA4, as historical tornado outbreaks such as the Joplin, Missouri, tornadoes of 2011 do not become even more severe when placed in an environment of CAPE by the late 21st century, but nor do such outbreaks break apart either.

As coastal population increases and temperature rises, the destabilization in the atmosphere could result in more frequent tornado outbreaks, which would occur when abundant vertical wind shear is present over Louisiana and/or in the presence of a tropical cyclone. However, the literature is uncertain on whether the windows of time in which these conditions are met may change.

All of these factors lead us to estimate an increase in future vulnerability to tornadoes by 10% by 2050.

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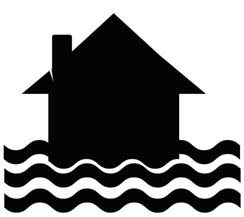

Future Conditions: Floods

As noted in NCA4 (2017), projection of the flood hazard to 2050 is a complex multivariate problem, as human activities such as deforestation, urban development, construction of dams, flood mitigation measures, and changes in agricultural practices impact future flood statistics. In addition, Louisiana's geography superimposes such local-to-regional-scale changes on similar changes upstream over a significant portion of the nation, and these changes are superimposed on climatic changes and eustatic sea level rise.

Despite the fact that these complications invite caution in the interpretation of results, it is safe to conclude that flood is likely to remain Louisiana's costliest, most ubiquitous, and most life-threatening hazard. This is because floods are the by-product of several other hazards profiled earlier in this report, including thunderstorms, tropical cyclones, coastal hazards, dam failure, and levee failure. The "future conditions" sections of those hazards (presented earlier in this report) projected changes in vulnerability as summarized in Table X below.

Table X. Estimated change in future vulnerability in Louisiana by 2050, by hazard

Hazard	Estimated Change in Future Vulnerability by 2050 (%)
Severe thunderstorms	10
Tropical cyclones	25
Coastal hazards	"High"
Dam failure	0
Levee failure	0

Based on the information summarized in Table X, there is no reason to expect that the flood hazard in Louisiana will abate, particularly as population increases. We fully support the use of Louisiana's Comprehensive Master Plan for a Sustainable Coast in planning for the future flood hazard.

However, the news is not all dire, nor is the situation hopeless. By some accounts, the rate of coastal land loss has shown some signs of slowing. Renewed commitment to smart-growth strategies, especially in floodplains, levee-protected areas, and in the area vulnerable to direct inundation from storm surge or meteotsunami, will mitigate the future flood disaster. These strategies include, but are not limited to, the "multiple lines of defense" approach (Lopez, 2009) and effective implementation of recommendations in Louisiana's Comprehensive Master Plan for a Sustainable Coast (Coastal Protection and Restoration Authority of Louisiana, 2017). And there are several effective examples of environmental challenges that have been mitigated through public awareness/education, and mutual resolve (e.g., ozone hole, oil spills, nuclear power plant meltdowns, etc.). While the flooding hazard in Louisiana will never be eliminated, it is possible that we can coexist sustainably alongside the hazard.

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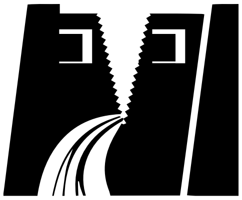
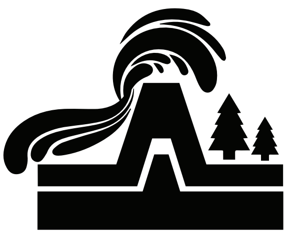


Future Conditions: Dam Failures

Even if extreme precipitation events would increase in frequency and/or magnitude in the future and earthquake probability increases, there is no evidence to suggest that future conditions would contribute to an enhanced likelihood of dam failures due to natural causes. As the dams are designed to standards, this should already be contemplated in the design guidance. The anthropogenic component of the dam failure hazard is beyond the scope of this analysis. Therefore, despite anticipated increases in other natural hazards, there is no indication that these increases will result in additional dam failures, at least from a natural hazard perspective.



Future Conditions: Levee Failures

Any assessment of the future conditions relating to levee failures in Louisiana must begin with an assessment of the future conditions relative to the natural hazards that would most likely cause the levees to fail. These hazards include tropical cyclones (including storm surge), flooding, and earthquakes. Earlier reports in this document have assessed each of these hazards as likely to increase in the future.

Possible opposing forces that might mitigate the levee hazard include smart growth, lessons learned from the Katrina levee failures, new science and technology, and improved engineering.

To calculate the current probability of failure, it is conservatively assumed that 2,000 distinct levee breaches have occurred nationally in the past 25 years. This figure includes The Great Flood of 1993, where Mississippi River levees were overtopped or breached in over 1,000 locations, and Hurricane Katrina in 2005, where 50 levee breaches were reported to have occurred. Assuming a distance of 1 mile between distinct breaches and the 29,828 miles of levees in the U.S. (https://levees.sec.usace.army.mil/#/), the probability of failure within one mile of levee is calculated as:

$$\frac{\frac{\text{2,000 breaches}}{\text{29,828 miles of levees}}}{\text{25 years}} = 0.3\% \text{ annual probability}$$

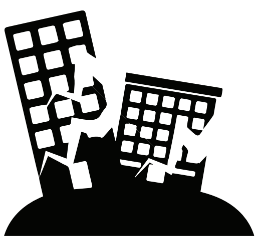
But because the previous occurrences for this hazard are rare, the increased hazard in the future will be minimal.

There are no future conditions related to the levees themselves that would enhance the probability of levee failures due to natural causes. Design guidance and oversight in the future should ensure that the levees are designed to appropriate engineering standards. Therefore, even though we anticipate increases in rainfall and earthquake hazards, there is no indication that these increases will result in additional levee failures.

Geologic Hazards

Earthquake

Earthquakes are typically described in terms of magnitude and intensity. Magnitude is the measure of the amplitude of the seismic wave, and is often expressed by the Richter scale. The Richter scale is a logarithmic measurement, whereby an increase in the scale by one whole number represents a tenfold increase in measured ground motion of the earthquake (and a more than thirty-fold increase in energy released). An increase by two whole numbers represents a 102 (or 100-fold) increase in ground motion, and thus more than 302 (or 900) times the energy released. Intensity is a measure of how strongly the shock was felt at a particular location, indexed by the Modified Mercalli Intensity (MMI) scale.
A fault is a fracture in the Earth's crust where movement occurs on one side relative to the other. Known faults in Louisiana are often caused by subsidence. The system of subsidence faults in southern Louisiana developed due to accelerated land subsidence and rapid sediment deposition from the Mississippi River. The system stretches across the southern portion of the state from Beauregard Parish in the west to St. Tammany Parish in the east, including every parish south of this line. This system is thought to be responsible for many of the recorded earthquakes from 1843 to the present. All of the earthquakes that occurred over this period of time were of low magnitude, resulting mostly in limited property damage (such as broken windows, damaged chimneys, and cracked plaster).



Future Conditions: Earthquakes

Earthquakes are considered by most to be among the least ominous hazards in Louisiana's future. However, there are several indications that the hazard in Louisiana is likely to increase in the future. First, wastewater injection into deep wells, oil and gas exploration, and hydraulic fracturing ("fracking") are believed to be contributing to a sudden increase in earthquake activity, especially in the oil and gas mining areas, with such activities showing no signs of decrease in the near future. In the most comprehensive recent research on the earthquake hazard for the central and eastern U.S., Petersen et al. (2016) found that seismicity has increased by up to one order of magnitude over the last decade in some oil and gas-producing areas. While Petersen et al. (2016) found no induced earthquakes reported in Louisiana over the 2014–2015 period, several earthquakes associated with wells were reported in nearby adjacent Arkansas and Texas (Figure X.Y). Walter et al. (2016) suggested that seismicity is indeed increasing in northwestern Louisiana in response to energy extraction activities. Second, Louisiana lies sufficiently near the New Madrid fault to be impacted by future movement, as it was during the series of quakes from 1811 to 1812. Page and Hough (2014) found no evidence to suggest that the seismicity associated with this fault is decaying with time. Increasing development over time would make any impacts to the Mississippi River, including but not limited to a catastrophic change of its course as happened in 1811-1812, catastrophic. These impacts could trigger a levee failure. And third, the continuing lax building codes for mitigating earthquake damage invites additional concern for an increased future vulnerability to this hazard. If anything, elevation of structures to mitigate the flood, storm surge, rising sea level, and tropical cyclone hazards might increase vulnerability to damage from non-Mississippi-River-impacted earthquakes.

For these reasons, the team assessed the future conditions relative to the earthquake hazard over the next thirty years as increasing by 10 percent.

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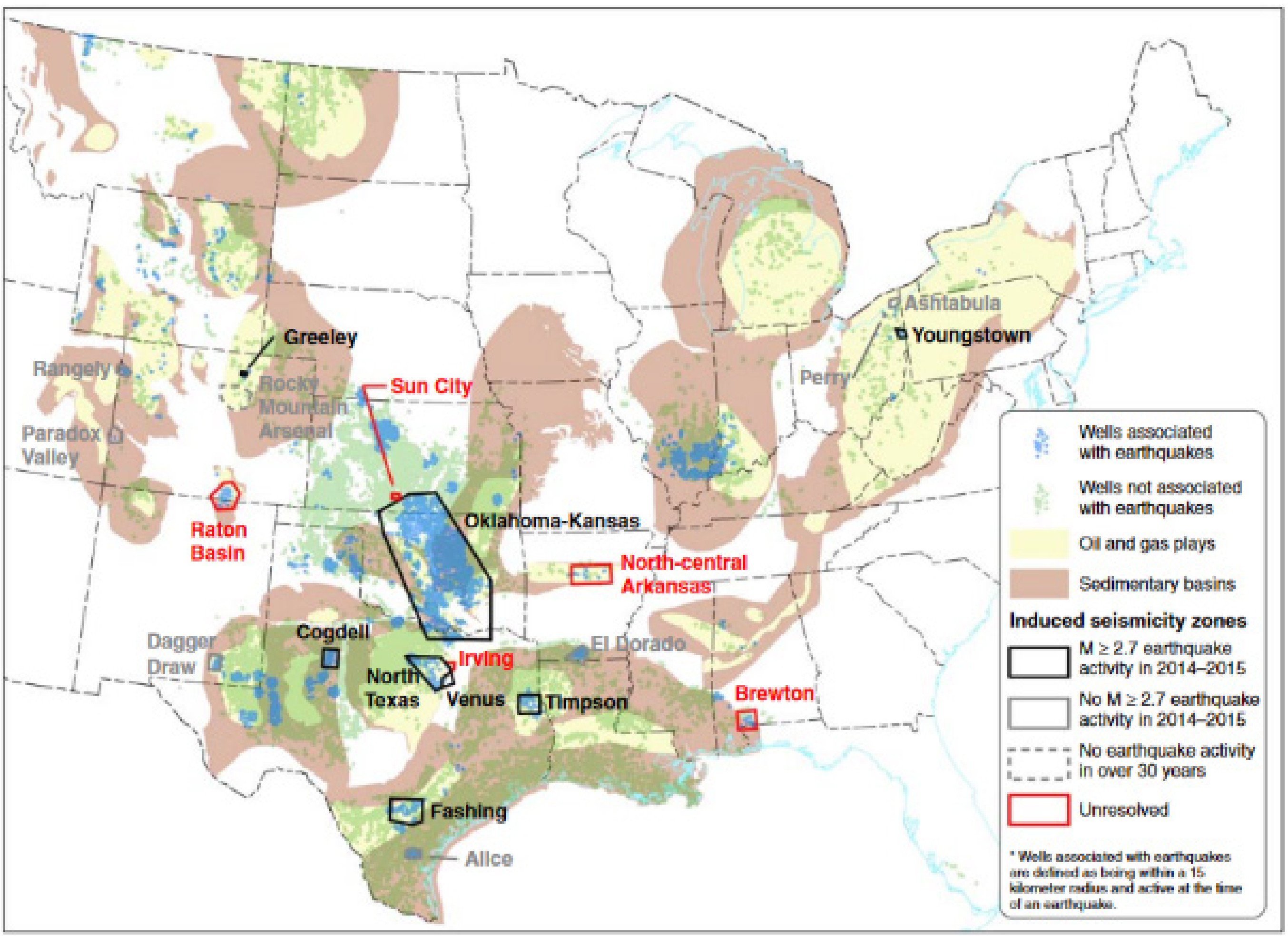


▲ **Figure 1.** Zones of induced seismicity defined in this report. Additional details about the zones are provided in Table 1. Information on oil and gas plays, sedimentary basins (U.S. Energy Information Administration, 2015), wells that are associated with earthquakes (Weingarten *et al.*, 2015), and the earthquake zones applied in this analysis. (Figure from Petersen *et al.*, 2016). The color version of this figure is available only in the electronic edition.

Future Conditions: Sinkholes

The geological bedrock and regolith underlying Louisiana will not change on human timescales, and the relatively small percentage of Louisiana's land area composed of carbonate bedrock points to a small hazard related to karst-induced sinkholes. Nevertheless, Autin (2002) emphasizes that uplift of the Five Islands of southwestern Louisiana is probably still active, leaving tectonic and geomorphic instability possible in the future. The hazard relative to sinkholes could change much more rapidly with land use change and the pressures of increased resource extraction and population growth. Vulnerability to sinkholes could also increase as a "side effect" to changes in the vulnerability to in other hazards. More specifically, sea level rise contributes to saltwater intrusion, which contributes to the formation of salt domes, which—when mined extensively—can form sinkholes.

Inasmuch as the increasing pressures of increased population (and therefore groundwater pumping) and resource extraction (including hydraulic fracture drilling), along with both global and regional sea level rise, appear to be inevitable, the sinkhole hazard appears to be increasing. We project a 10 percent increase in the state's sinkhole hazard by 2050.

Sinkhole Risk Assessment:

Property loss due to sinkhole is calculated as

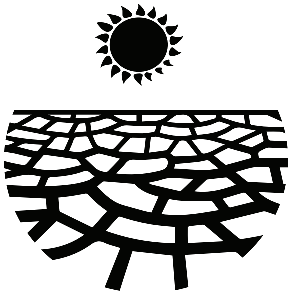
$$L_{2043,i} = I_i \times \frac{A_i}{100} \times R_{SS} \times F_i \times P_i$$

where

$L_{2043,i}$=projected annual preperty loss of census block *i* in 2043
I_i =total building inventory value of census block *i*
F_i =future hazard multification factor for census block *i* in 2043
A_i =percentage of area of census block *i* under saltdomes
P_i = probability of sinkhole incident in census block *i*
R_{SS} = ratio between sinkholes to salt domes

We consider the ratio of largest sinkhole incident area in Louisiana (although there were only two incidents) to the largest salt dome area to calculate the losses. Caution should be exercised in the interpretation of results because identification of which portion/part of salt domes will turn into sinkholes is highly uncertain.

Autin, W.J., 2002: Landscape evolution of the Five Islands of south Louisiana: Scientific policy and salt dome utilization and management. Geomorphology 47(2-4):227-244.



Future Conditions: Expansive Soil

The soil structure will remain largely unchanged on anthropogenic time scales. However, long-term changes in the freeze-thaw climatology and/or precipitation climatology could impact the stability of the soil structure for supporting construction. The anticipated decrease in number of freezing-temperature days would diminish the future expansive soil hazard due to freeze-thaw expansion/contraction. However, the likelihood of heavier precipitation interrupted by lengthening dry periods might be expected to offset this effect by increasing expansion/contraction due to more frequent and/or amplified water absorption/desiccation cycles. Therefore, we project no net change in the expansive soil hazard by 2050.

Expansive Soil Risk Assessment:

Property loss due to expansive soil is calculated as

$$L_{2043,i} = 0.075 \times I_i \times \frac{SP_i}{R} \times F_i$$

where

$L_{2043,i}$ =projected annual property loss of census block *i* in 2043
I_i =total building inventory value of census block *i*
F_i =future hazard multiplication factor for census block *i* in 2043
SP_i =average swelling potentiality of census block *i*
R =average life span of a residential building

The inventory value of one-story, single-family and multi-family residential properties were calculated. This assumes that the annual loss is 7.5% of the property value over the 70-year assumed building life, at the census block level, for census blocks having swelling potential (SP). The expansive soil risk assessment includes data derived from Wang (2016), who developed the function for SP – the percentage of soil swell from optimum to saturated moisture content:

$$SP = 0.00216 I_p^{\ 2.44}$$

where
I_p = plasticity index

Wang's (2016) point-based SP was mapped based on data measured by Seed et al. (1962).

Seed HB, Woodward, Lundgren R. 1962. Prediction of Swelling Potential for Compacted Clays. Journal of the Soil Mechanics and Foundations Division 88(3), 53-88.
Wang, J.X., 2016. Expansive Soils and Practice in Foundation Engineering. A presentation delivered at the 2016 Louisiana Transportation Conference 03/07/2016. http://www.ltrc.lsu.edu/ltc_16/pdf/presentations/10-University%20Transportation%20Centers%20(Part%201)-Characterization%20of%20Expansive%20Soils%20in%20Northern%20Louisiana.pdf

Appendix B

PLANNING PROCESS

PURPOSE

The Code of Federal Regulations (CFR) requires every state to have a State Mitigation Plan that is approved by the Federal Emergency Management Agency (FEMA) if it is to receive non emergency Stafford Act assistance and FEMA mitigation grants.i The section of the code pertaining to State Mitigation Plans lists seven required components for each plan: a description of the planning process; risk assessments; mitigation strategies; a description of coordination of local mitigation planning; a method and system for plan maintenance; verification of plan adoption; and assurances of state compliance with the plan. This Appendix details the planning process to demonstrate Louisiana's observance of §201.4's suggestions that the planning should include "coordination with other State agencies, appropriate Federal agencies, interested groups, and…[integration] with other ongoing State planning efforts as well as other FEMA mitigation programs and initiatives."

The Disaster Mitigation Act of 2000 provided a strong incentive for the development of a Standard State Hazard Mitigation Plan. Thus, the State of Louisiana, through the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP), began the process of developing the first State Hazard Mitigation Plan in 2003. The planning process began in May 2004 and the plan was adopted by the Governor and approved by FEMA on April 26, 2005.

PLANNING

To comply with Emergency Management Accreditation Program (EMAP) requirements, an interim update of the plan was prepared by GOHSEP in 2007. This update included improving integration between this plan and the state Emergency Operations Plan (EOP) and Continuity of Operations Plan (COOP). The Update was presented to and approved by the State Hazard Mitigation Team (SHMT) in 2007. This Update consisted of updating all sections of the 2005 Plan using the best available data and methodologies, culminating with FEMA approval in April 2008. These changes were integrated into the 2011 update, as well, and have been brought forward.

Prior to 2018, plan updates and FEMA re-approvals are required every three years. Thus, the process to update the plan a second time was formally initiated in December 2009. The scope of work initiated by all participants consisted of updating each section of the 2008 Plan using the best available data and methodologies, culminating with FEMA approval on April 7, 2011. The process for updating the third plan began in early 2013, and received official approval from FEMA R6 on April 2, 2014. The process for updating the 2019 plan began in November 2017.

After the 2019 plan update process was initiated, the CFR 44, 201.3 was updated, which changed the frequency of updates to every 5 years.

It is GOHSEP's duty to ensure that preparations of this state will be adequate to deal with emergencies or disasters and so the Strategic Plan was updated July 1, 2013. GOHSEP strives to continue to improve Louisiana's (1) preparation for, (2) response to, and (3) recovery from the next emergency. To become better prepared, Louisiana needs protected communities that are prepared to respond to emergencies and disasters. To do this, the state must have emergency response capabilities which focus on the protection of life, property, and the environment.
Further, it is vital for the state to have the capabilities to execute and sustain safe and timely recovery from emergencies and disasters. All of GOHSEP's existing programs support these goals and are essential to the State's efforts, to protect its citizens, and to create a resilient infrastructure.

The Plan Maintenance Section of the State Plan states that the Plan will be done by the State Hazard Planning Committee (SHMPC), and this plan is supported by GOHSEP. The SHMPC is an ad-hoc committee, consisting of state agencies, academia, and Louisiana residents. As directed by the Governor or Governor's Authorized Representative, the SHMPC should:

Direct the development of the plan

Act as a voice for the state

Convene stakeholders (including state, local, and non-profit agencies) for meetings in large attendance since their feedback is necessary to facilitate an effective planning process

Comment on drafts (through Google Drive which includes all drafts and communication done through the plan update process)

Publish all presentation and meeting notes on Google Drive

The SHMPC met on six separate occasions while developing the 2019 Plan Update. The table below provides a summary of the six meetings that contributed to the current update of the plan.

Meeting Number	Date / Place	Subject
1	November 16, 2017	SHMPC Meeting #1—Kick off meeting
2	January 09, 2018	SHMPC Meeting #2— Review Hazard Profiles
3	March 06, 2018	SHMPC Meeting #3—Repetitive Flood Loss and Community Rating System Strategy
4	April 10, 2018	SHMPC Meeting #4—Risk Assessment: Changing Future Conditions
5	May 22, 2018	SHMPC Meeting #5—Risk Assessment of state-owned assets and most vulnerable jurisdictions
6	June 12, 2018	SHMPC Meeting #6—Goals and Actions

These workshops and meetings were facilitated by GOHSEP and its consultants. Prior to these meetings, the SHMPC and key stakeholders received packets of information that were subsequently presented and discussed at the meetings. The products were also distributed online for those who could not attend the meetings. The SHMPC discussed each section of the at Plan Update meetings, where comments and questions were encouraged from all attendees. After the presentations, the SHMPC reviewed modified proposed elements of the Plan Update. A full draft of the Plan Update was circulated to SHMPC state agencies and key stakeholders for final review and comment.

A number of individuals and agencies played key roles in preparing the entire Plan Update including:

Governor's Authorized Representative State Hazard Mitigation Planning Committee (SHMPC)

Federal Emergency Management Agency, Region VI

Consultants from Louisiana State University

Consultants from University of New Orleans Center for Hazards Assessment, Response & Technology (UNO-CHART)

The Governor's Authorized Representative was responsible for authorizing the SHMPC to develop the State of Louisiana Hazard Mitigation Plan; reviewing the recommendations of GOHSEP and the SHMPC to adopt the plan on behalf of the state; requesting revisions to the plan contents if deemed necessary; and formally adopting the plan.

GOHSEP was the lead state agency for developing the Plan Update, with specific responsibility for project management resting with the State Hazard Mitigation Officer. Although the SHMPC was responsible to the Governor's Authorized Representative for the actual development and production of the Plan Update, GOHSEP performed an important coordination function throughout its development. GOHSEP directly supervised the consultants' activities and facilitated the involvement of the SHMPC members. GOHSEP also provided important oversight and quality control to ensure that the plan and the associated process met federal requirements. At the end of the process, GOHSEP provided a formal recommendation for the Governor's Authorized Representative to adopt the Plan Update.

At GOHSEP, the SHMT was responsible for developing, reviewing, and approving the 2005 Plan, the 2007 Interim Plan Update, the 2008 Plan Update, the 2011 Plan Update, and the 2014 Plan Update. The 2019 Plan Update was developed by the SHMPC according to principles it decided at its first meeting on November 16, 2017.

The SHMT developed the plan with the assistance of the SHMPC. The SHMPC's duties and functions include (but are not limited to) identifying the state's vulnerability to hazards; reviewing existing mitigation plans and prioritizing recommendations; developing or updating Hazard Mitigation Plans; developing a comprehensive strategy for the development and implementation of a State Mitigation Program; reviewing, assigning priority, and recommending mitigation actions for implementation; and seeking funding for implementation of mitigation measures.

FEMA, through its Region VI office in Denton, Texas, is the responsible party for reviewing the plan for compliance with DMA 2000 and the CFR. Representatives of FEMA Region VI also helped facilitate completion of this plan through on-going review of the plan as it was developed and updated.

The consultants for the 2019 Hazard Mitigation Plan Update were a group from Louisiana State University, comprising Dr. Carol Friedland, Dr. Robert Rohli, and Mr. Rubayet Bin Mostafiz, and a group from UNO-CHART, comprising Dr. Monica Farris, Dr. Tara Lambeth, Mr. John McCandless, and Ms. Samantha Romain. The consultants assisted in a variety of ways, including the following:

Assembling information for inclusion in the plan

Editing previous editions of the plan

Writing new material as needed

Providing technical support in profiling the hazards and in performing the risk assessments

Developing written materials for meetings

Making presentations at THE SHMPC meetings and workshops

Providing support for outreach to interested parties and coordination efforts among federal and state agencies

COORDINATION AMONG AGENCIES

The CFR requires that states describe how federal and state agencies were involved in the planning process. It also requires that states describe how interested groups and individuals were involved in the planning process.

For the purposes of this Plan Update, a distinction is made between stakeholders and interested parties. "Stakeholders" are primarily organizations and agencies that will potentially play a direct role and/or receive a direct benefit in implementing the recommendations in the Mitigation Action Plan. Interested parties include anyone else who could potentially benefit either directly or indirectly from the Plan Update recommendations. This primarily refers to residents, property owners, and business owners in the State of Louisiana.

This subsection describes the following:

The involvement of other Federal and state agencies and stakeholders

The process by which GOHSEP and the SHMPC coordinated various agencies, stakeholders, and interested parties during the plan update's development

FEMA and the state agencies that are members of the SHMPC had regular involvement in developing the Plan Update. GOHSEP and the SHMPC also sought participation from additional federal and state agencies and stakeholders while developing the Plan Update. As part of this process, GOHSEP and the SHMPC solicited the participation of universities, private citizens, businesses, and non-profit and non-governmental organizations.

In addition, GOHSEP and the SHMPC made contact with federal and state agencies to inform them of the Plan Update, and to for ask for assistance in providing the most current data. Correspondence with these agencies indicates GOHSEP and the SHMPC's desire to establish long-term partnerships as part of implementing the plan's recommendations. Correspondence similar to that sent to the federal and state agencies was sent to parish emergency management agency directors, as well as parish and community floodplain administrators, based on participation in the 2014 plan update. Various stakeholders were contacted to assist with the plan update. Selected groups were asked to provide subject matter expertise, and review and provide comments on relevant sections of the plan.

PROGRAM INTEGRATION

The CFR requires that states describe how their mitigation planning process is integrated with other ongoing state planning efforts, as well as FEMA mitigation programs and initiatives. Thus, this subsection describes State Mitigation Programs and Initiatives and FEMA Mitigation Programs and Initiatives.

A measure of integration and coordination is achieved through the participation of representatives of state agencies on the SHMPC who administer three programs: floodplain management under the National Flood Insurance Program (NFIP), coastal protection and restoration under the provisions Act 8 of the First Extraordinary Session of 2005, and the State Uniform Construction Code. Furthermore, in order to achieve EMAP compliance, the SHMT submitted a number of refinements and changes for the Plan Update in late 2007. These changes have been brought forward through the 2011 Plan Update, 2014 Plan Update, the current 2019 Plan Update, and will be integrated into subsequent plan updates.

There are also several initiatives that have fostered further coordination and integration of the SHMPC which was developed to address the roles and responsibilities of state and non- governmental (NGO) partners in responding to all threats and hazards, but especially those outlined in the State Hazard Mitigation Plan. Coordination efforts between the two plans range from seeking consistency in the way hazards are identified, to identifying opportunities to integrate mitigation practices in response and recovery operations.

Another program is the GOHSEP Continuity of Operations Plan (COOP), which was updated in 2017. The COOP was incorporated into the overall State of Louisiana Hazard Mitigation Strategy to specifically acknowledge that key provisions of that plan were part of the total approach to reducing risk and the impacts of hazards. In particular, GOHSEP considered providing for redundancy of critical systems, equipment, flow of information, operations, and materials consistent with the overall goals and objectives of the plan.

GOHSEP also provides leadership for state and local mitigation planning efforts and administers and oversees FEMA-related hazard mitigation grant programs (HMGPs) for the state that are related to hazard mitigation, emergency management, and disaster relief. Based on this role, GOHSEP has the opportunity to integrate mitigation planning and project information with the FEMA grant application process for the following:

HMGP

Pre-Disaster Mitigation Competitive Grant Program

Flood Mitigation Assistance (FMA) Program

Public Assistance Grant Program

The objective of HMGP is to accomplish long-term hazard mitigation measures that reduce the loss of life and property from future disasters. Hazard mitigation activities funded may not necessarily relate to the damages caused by the disasters, though. Grants under HMGP are available statewide.

DOCUMENTATION

The following pages contain documentation (in their original format) of the attendees, agendas, minutes, and sign-in sheets (as well as any related, accompanying documents) for the six meetings of the SHMPC held during the development of the Plan Update.

Louisiana State Hazard Mitigation Plan Update 2018

Meeting #1: November 16, 2017 10am to 12pm

Meeting Name

Kick Off Meeting

Location

Louisiana Recovery Office
1500 Main Street Baton Rouge, LA

Attendees:

Name	Agency
James Gomillion	Department of Wildlife and Fisheries
Colonel James Wesley	Department of Public Safety
Gregory Langley	Department of Environmental Quality
Chuck Carr Brown, Ph.D.	Department of Environmental Quality
Rosanne Prats	Department of Health
Charles "Chip" McGimsey, Ph.D.	Office of Cultural Development
Nicole Hobson-Morris	Office of Cultural Development
Felicia H. Cooper	Office of State Fire Marshal
John Hodnett	Facilities Planning and Control
Mark Gates	Facilities Planning and Control
Pat Forbes	Office of Community Development
Warren Byrd	Department of Insurance
Susan Veillon	Department of Transportation and Development
Cindy O'Neal	Department of Transportation and Development
Vincent Brown	Southern Climate Impacts Planning Program/LSU
Alan Black	Southern Climate Impacts Planning Program/LSU
Barry Keim, Ph.D.	Southern Climate Impacts Planning Program/LSU
Kara Moree	Louisiana Floodplain Managers Association
Jeffrey Giering	Governor's Office of Homeland Security & Emergency Preparedness
Steve Garcia	Governor's Office of Homeland Security & Emergency Preparedness
Ellen Ibert	Governor's Office of Homeland Security & Emergency Preparedness
Drew Ratcliff	Capital Region Planning Commission
Patricia Skinner	LSU Agricultural Center
Maggie Olivier	Jefferson Parish
Michelle Gonzales	Jefferson Parish
Scott Hemmerling, Ph.D.	The Water Institute of the Gulf
Ryan Clark	The Water Institute of the Gulf
Traci Birch, Ph.D.	LSU Coastal Sustainability Studio
Ryan Mast	City of New Orleans
Zachary Rosen	Coastal Protection and Restoration Authority
Ashley Cobb	Coastal Protection and Restoration Authority
Martha P. Collins	Ascension Parish

Carol J. Friedland, Ph.D., P.E., C.F.M.	LSU Department of Construction Management
Robert V. Rohli, Ph.D.	LSU Department of Oceanography and Coastal Sciences
Monica Farris, Ph.D.	University of New Orleans-Center for Hazards Assessment, Response & Technology (UNO-CHART)
Tara Lambeth, Ph.D.	University of New Orleans-Center for Hazards Assessment, Response & Technology (UNO-CHART)
John McCandless	University of New Orleans-Center for Hazards Assessment, Response & Technology (UNO-CHART)

Meeting #1 Agenda

- What is a State Hazard Mitigation Plan?
- Why does every state need one?
- Roles of State Hazard Mitigation Planning Committee
- Goals and Actions Progress Update
- Overview of the Planning Process
- UNO/LSU Roles and Responsibilities in the Plan Update
- Utilization of Google Drive in the Plan Update Process
- Next Steps

Governor's Office of Homeland Security And Emergency Preparedness

SHMPC - Meeting #1

Briefing / Meeting: State Hazard Mitigation Plan Update Meeting
Location: 1500 Main Street, Baton Rouge, LA   Date: 11/16/2017   Time 10:00 A.M. till Noon

Name	Company	Phone Number	Job Title	Email Address
Chip McGimsey	SHPO	225-219-4598	State Archaeologist	cmcgimsey@crt.la.gov
Zach Rosen	CPRA	225-342-3938	Coastal Resources Scientist	zachary.rosen@la.gov
Kara Moree	LFMA	3375018211	Chairman	Kara.moree@csrsinc.com
Ellen Ibert	GOHSEP	225-334-7748	PRO-EHP	ellen.ibert@la.gov
Rosanne Prats	LDH	225-342-3417	Director, Emer Prep	Rosanne.Prats@la.gov
Chuck Carr Brown	LDEQ	225-219-3550	Secretary	Chuck.brown@la.gov
Greg Langley	LDEQ	225-219-3964	Press Secretary	gregory.langley@la.gov
Pat Forbes	OCD	225-342-1626	Exec. Dir	pat.forbes@la.gov
Tracy Birch	LSU	2255784990	Asst Prof	TBirch@LSU.EDU
Robert Rohli	LSU	225-578-6346	Professor	rohli@lsu.edu
Barry Keim	LSU	225-328-0749	Prof and LA State Climatologist	keim@lsu.edu
Pat Skinner	LSU AgCenter	225-931-5657	Mitigation Specialist	pskinner@agcenter.lsu.edu

Page ____ of ____

Governor's Office of Homeland Security And Emergency Preparedness

Briefing / Meeting: State Hazard Mitigation Plan Update Meeting
Location: 1500 Main Street, Baton Rouge, LA Date: 11/16/2017 Time 10:00 A.M. till Noon

Name	Company	Phone Number	Job Title	Email Address
James Gomillion	LDWF/Enf.	765-2980	Captain/Law Enf.	jgomillion@wlf.la.gov
James R Wesley	DOC	(225)360-5142	Corrections Colonel	jameswesley@corrections.state.la.us
Ryan Mast	Orleans Parish	504-658-8743	HM Administrator	rcmast@nola.gov
Nacie Gates	FPC	225-219-4422	Ass't Director	mack.Gates@la.Gov
John Hodnett	FP&C	225-219-4404	Assistant Director	John.Hodnett@LA.GOV
Ashley Cobb	CPRA	342-3894	CRS	ashley.cobb@la.gov
Susan Veillon	LADOTD	379-3005	CTP Manager	Susan.Veillon@la.gov
Cindy O'Neal	"	"	NFIP Coordinator	~~cind~~ cindy.oneal@la.gov
FELICIA COOPER	STATE FIRE MARSHAL	225-268-4424	DEP. ASSISTANT SECRETARY	Felicia.Cooper@la.gov
Nicole Hobson-Morris	LSHPO	225-342-8172	Director	nmorris@crt.la.gov
Vincent M. Brown	SCIPP	240-626-9307	Research	Vbrow31@lsu.edu
Maggie Olivier	Jeff Parish Floodplain	(504)736-6541	Floodplain/CRS Specialist	molivier@jeffparish.net

Page ____ of ____

(Cont'd)

Briefing / Meeting: ____________________ Date: ____________

Name	Company	Phone Number	Fax Number	Email Address
RYAN CLARK	THE WATER INSTITUTE	225.227-2725		rclark@thewaterinstitute.org
Michelle Gonzales	Jeff Parish	225-223-2719		mgonzales@jeffparish.net
WARREN BYRD	LA DEPT OF INSURANCE	225 342-5203	225-342-6057	warren.byrd@ldi.la.gov
~~Drew Ratcliff~~	~~Ratcliff~~	Deputy Commissioner		Ccrpcla.org
Drew Ratcliff	CRPC	225-383-5203		dratcliff@crpcla.org
ALAN BLACK	LSU / Southern Climate Impacts Planning Prog	217 898 9839		ABLACK@LSU.EDU
Scott Hemmerling	The Water Institute	225-228-2101		shemmerling@thewaterinstitute.org
John McCandless	UNO-CHART	228-493-4735		Jgmccand@uno.edu
CAROL FRIEDLAND	LSU	225-578-1155		friedland@lsu.edu
Steve Garcia	GOHSEP	225-439-5343		Steven.garcia@la.gov

Page ____ of ____

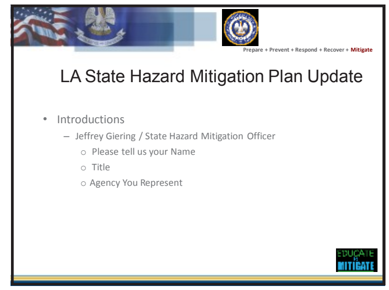
(Cont'd)

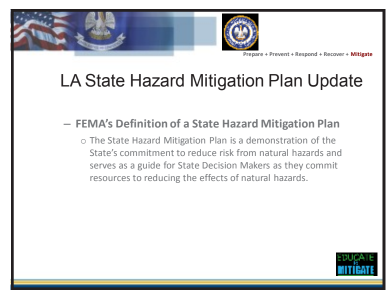
Briefing / Meeting: ______________________ Date: 11-17-2017

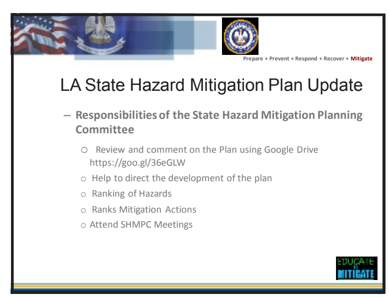
Name	Company	Phone Number	Fax Number	Email Address
Martha P. Collins	Ascension Parish	225-450-1122	225-644-1502	mcollins@apgov.us
Tara Lumbeth	UNO-CHART	504-280-6071	504-280-4023	tlumbet1@uno.edu
[illegible]	UNO-CHART	504 280-4016	504 280-4023	mateets@uno.edu
Jeffrey Giering	GOHSEP	225-267-2516		jeffrey.giering@LA.GOV

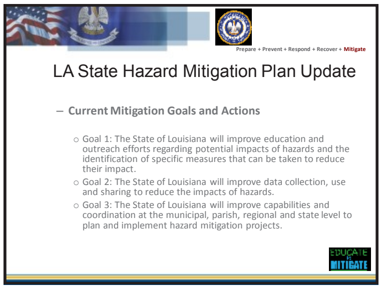
Page ____ of ____

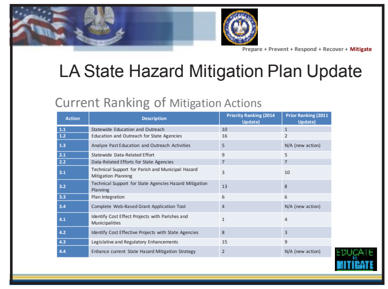
2019 State Hazard Mitigation Plan
Meeting #1
November 16, 2017





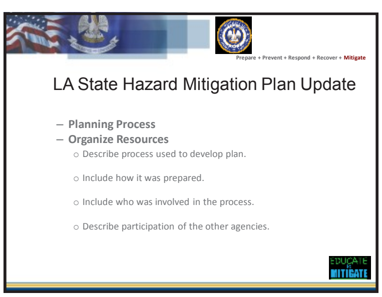




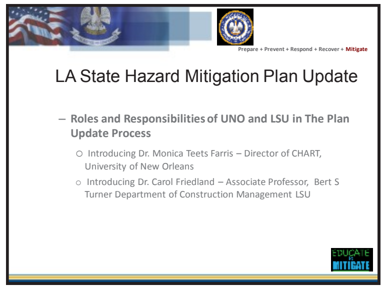


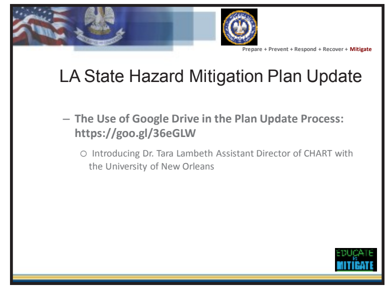
Action	Description	Priority Ranking (2014 Update)	Prior Ranking (2011 Update)
1.1	Statewide Education and Outreach	10	1
1.2	Education and Outreach for State Agencies	16	2
1.3	Analyze Past Education and Outreach Activities	5	N/A (new action)
2.1	Statewide Data-Related Effort	9	5
2.2	Data-Related Efforts for State Agencies	7	7
3.1	Technical Support for Parish and Municipal Hazard Mitigation Planning	3	10
3.2	Technical Support for State Agencies Hazard Mitigation Planning	13	8
3.3	Plan Integration	6	6
3.4	Complete Web-Based Grant Application Tool	4	N/A (new action)
4.1	Identify Cost Effect Projects with Parishes and Municipalities	1	4
4.2	Identify Cost Effective Projects with State Agencies	8	3
4.3	Legislative and Regulatory Enhancements	15	9
4.4	Enhance current State Hazard Mitigation Strategy	2	N/A (new action)

4.1	Identify Cost Effect Projects with Parishes and Municipalities	1	4
4.2	Identify Cost Effective Projects with State Agencies	8	3
4.3	Legislative and Regulatory Enhancements	15	9
4.4	Enhance current State Hazard Mitigation Strategy	2	N/A (new action)
5.1	Integrate historic preservation into hazard mitigation planning	12	N/A (new action)
5.2	Education/ Outreach for Historic Perseveration Best Management Practices	11	N/A (new action)
5.3	Education/Outreach for Polices of Historic Preservation	14	N/A (new action)




Prepare + Prevent + Respond + Recover + Mitigate
LA State Hazard Mitigation Plan Update
– Planning Process
– Adopt and Implement the Plan
○ Incorporate new hazard and risk information
○ Determine effectiveness of existing plans and implementation
○ Prepare future periodic SHMP updates.
EDUCATE
MITIGATE

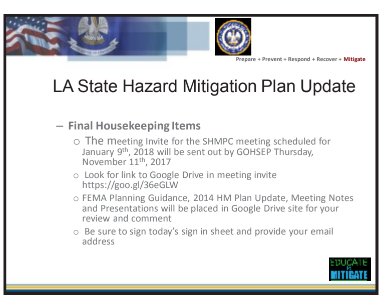

Prepare + Prevent + Respond + Recover + Mitigate
LA State Hazard Mitigation Plan Update
– Roles and Responsibilities of UNO and LSU in The Plan Update Process
○ Introducing Dr. Monica Teets Farris – Director of CHART, University of New Orleans
○ Introducing Dr. Carol Friedland – Associate Professor, Bert S Turner Department of Construction Management LSU
EDUCATE
MITIGATE

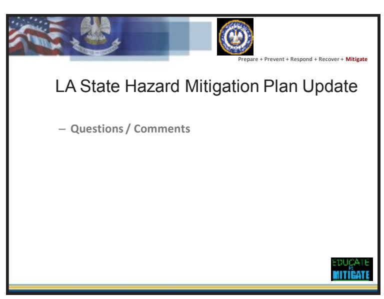

Prepare + Prevent + Respond + Recover + Mitigate
LA State Hazard Mitigation Plan Update
– The Use of Google Drive in the Plan Update Process: https://goo.gl/36eGLW
○ Introducing Dr. Tara Lambeth Assistant Director of CHART with the University of New Orleans
EDUCATE
MITIGATE


Prepare + Prevent + Respond + Recover + Mitigate
LA State Hazard Mitigation Plan Update
– Next Steps
– Marion Pearson / Senior Problem Resolution Officer
○ The Governor's Office of Homeland Security and Emergency Preparedness
○ Hazard Mitigation
EDUCATE
MITIGATE


Prepare + Prevent + Respond + Recover + Mitigate
LA State Hazard Mitigation Plan Update
– State Hazard Mitigation Planning Committee (SHMPC) Meeting Dates and Topics
○ January 9, 2018 (Hazard Profiles Identification and Ranking)
○ March 13, 2018 (Review Hazard Profile Ranking)
○ April 10, 2018 (Risk Assessment)
○ May 8, 2018 (Risk Assessment for State Owned Assets)
○ May 22, 2018 – (Goals and Actions)
EDUCATE
MITIGATE


Prepare + Prevent + Respond + Recover + Mitigate
LA State Hazard Mitigation Plan Update
– Schedule to Turn Plan into FEMA
○ December 29, 2017 (Introduction)
○ March 30, 2018 (Capability Assessment)
○ April 30, 2018 (Hazard Identification and Risk Assessment)
○ May 31, 2018 (Mitigation Strategy – Goals/Actions)
○ June 26, 2018 (Entire Draft Plan Turn into FEMA for Review)
EDUCATE
MITIGATE


Prepare + Prevent + Respond + Recover + Mitigate
LA State Hazard Mitigation Plan Update
– Final Housekeeping Items
○ The meeting Invite for the SHMPC meeting scheduled for January 9th, 2018 will be sent out by GOHSEP Thursday, November 11th, 2017
○ Look for link to Google Drive in meeting invite https://goo.gl/36eGLW
○ FEMA Planning Guidance, 2014 HM Plan Update, Meeting Notes and Presentations will be placed in Google Drive site for your review and comment
○ Be sure to sign today's sign in sheet and provide your email address
EDUCATE
MITIGATE


Prepare + Prevent + Respond + Recover + Mitigate
LA State Hazard Mitigation Plan Update
– Questions / Comments
EDUCATE
MITIGATE

Louisiana State Hazard Mitigation Plan Update 2018

Meeting #2: January 9, 2018 10am to 12pm

Meeting Name

Hazard Profiles Review

Location

Transportation Training and Education Center 4099 Gourrier Avenue, Baton Rouge, LA 70806

Attendees:

Name	**Agency**
Drew Ratcliff	CRPC
Jeanette Dubinin	CPEX
Rubayet Bin Mostafiz	LSU College of the Coast and Environment
Andrea Galinski	CPRA
Rosanne Prats	Department of Health
Warren Byrd	LDI
Cindy O'Neal	DOTD
Edward Knight	DOTD
Susan Veillon	DOTD
Jeffrey Giering	GOHSEP
Marion Pearson	GOHSEP
Steve Garcia	GOHSEP
Maggie Olivier	Jefferson Parish
Michelle Gonzales	Jefferson Parish
Bret Lane	LDAF
Kara Moree	LFMA
Patricia Skinner	LSU Agricultural Center
Carol J. Friedland, Ph.D., P.E., C.F.M.	LSU Department of Construction Management
Robert V. Rohli, Ph.D.	LSU Department of Oceanography and Coastal Sciences
Pat Forbes	OCD
Charles "Chip" McGimsey, Ph.D.	Office of Cultural Development
Nicole Hobson-Morris	Office of Cultural Development
Brett Beoubay	Office of Risk Management
Alan Black	Southern Climate Impacts Planning Program/LSU
Barry Keim, Ph.D.	Southern Climate Impacts Planning Program/LSU
Vincent Brown	Southern Climate Impacts Planning Program/LSU
Leon Contreras	SWBNO
Ryan Clark	The Water Institute of the Gulf
Scott Hemmerling, Ph.D.	The Water Institute of the Gulf
Monica Farris, Ph.D.	UNO CHART
Tara Lambeth, Ph.D.	UNO CHART
Eddie Skena	LA Wildlife and Fisheries

Meeting #2 Agenda

- Hazard Profile Requirements
- Hazards Profiled by Parishes
- For each hazard:
- Methodology and updates from 2014 Plan
- Hazard profiles
- Evaluation of future conditions
- Questions and discussion

Governor's Office of Homeland Security And Emergency Preparedness

SHMPC - Meeting # 2

Briefing / Meeting: State Hazard Mitigation Plan Update Meeting
Location: 4099 Gourrier Ave., Baton Rouge, LA Date: 1/9/2018 Time 10:00 A.M. till Noon

Name	Signature	Agency/Company		
✓ Brett Beoubay	[illegible]	Office of Risk Management		
Traci Birch		LSU Coastal Sustainability Studio		
Alan Black	[illegible]	Southern Climate Impact		
Vinny Brown	[illegible]	Southern Climate Impact		
Warren Byrd	[illegible]	LA Department of Insurance		
✓ Ryan Clark	Ryan Clark	The Water Inst. of the Gulf		
Leon Contreras	[illegible]	SWBNO		
Kevin Crosby		Ouachita Parish		
Pat Forbes	[illegible]	Off of Community Development		
Carol Friedland	[illegible]	LSU		
Andrea Galinski	[illegible]	CPRA		
Steve Garcia	[illegible]	GOHSEP		

Page ____ of ____

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Briefing / Meeting: State Hazard Mitigation Plan Update Meeting Location: 4099 Gourrier Ave., Baton Rouge, LA
Date: 1/9/2018 Time 10:00 A.M. till Noon

Name	Signature	Agency / Company		
Jeffrey Giering	Jeffrey Giering	GOHSEP		
✓ Michelle Gonzales	[illegible]	Jefferson Parish		
Scott Hemmerling	[illegible]	The Water Inst of the Gulf		
Nicole Hobson-Morris	[illegible]	Office of Cultural Development		
Ellen Ibert		GOHSEP		
Lee John III		GOHSEP		
Barry Keim	Barry Keim	Southern Climate Impact		
Edward Knight	[illegible]	DOTD		
Tara Lamb~~ert~~h	[illegible]	UNO		
Bret Lane	[illegible]	LA Dept. of Ag and Forestry		
John McCandless		UNO		
✓ Chip McGimsey	[illegible]	Office of Cultural Development		
Kara Moree		LFMA		

Page ____ of ____

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Briefing / Meeting: State Hazard Mitigation Plan Update Meeting, Location: 4099 Gourrier Ave., Baton Rouge, LA
Date: 1/9/2018 Time 10:00 A.M. till Noon

Name	Signature	Agency / Company		
Maggie Olivier	Maggie Olivier	Jefferson Parish		
Cindy ONeal	Cindy O'Neal	DOTD		
Marion Pearson	Marion Pearson	GOHSEP		
Rosanne Prats	[illegible]	LA Dept. of Health		on behalf of Rosanne Prats
Drew Ratcliff	[illegible]	CPRC		
Bob Rohli	[illegible]	LSU		
Eddie Skena	[illegible]	Wild Life and Fisheries		
Pat Skinner	[illegible]	LSU Ag		
Monica Farris Teets	[illegible]	UNO		
Boo Thomas	Jeannette Dubinin	Center for Plan Exc	on Behalf of	B. Thomas
Susan Vermillion		DOTD		

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Briefing / Meeting: State Hazard Mitigation Plan Update Meeting, Location: 4099 Gourrier Ave., Baton Rouge, LA
Date: 1/9/2018 Time 10:00 A.M. till Noon

Name	Signature	Agency / Company		
Rubayet Bin Mustafiz	[signature]	LSU		

Page ____ of ____

2019 State Hazard Mitigation Plan
Meeting #2
January 09, 2018

Prepare • Prevent • Respond • Recover • Mitigate

2019 State Hazard Mitigation Plan Update

Hazard Profiles

Carol Friedland, Ph.D., P.E., C.F.M.
Robert Rohli, Ph.D.
Rubayet Bin Mostafiz, M.S.
State Plan Update Stakeholder Meeting
January 9, 2018

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Presentation Overview

- Hazard profile requirements
- Hazards profiled by parishes
- For each hazard:
  - Methodology and updates from 2014 Plan
  - Hazard profiles
  - Evaluation of future conditions

The presentation will be divided into groups of 3-4 hazards, followed by questions and discussion for each hazard group

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PROFILE REQUIREMENTS

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Hazard Profiles

44 CFR §201.4(c)(2)(i): "An overview of the type and location of all natural hazards that can affect the state, including information on previous occurrences of hazard events, as well as the probability of future hazard events, using maps where appropriate"

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Hazard Profiles

a) The plan must include a current summary of the natural hazards that can affect the state. The summary must include information on **location** and **previous occurrences** for each natural hazard, using maps where appropriate.

b) If any commonly recognized natural hazards are omitted, the plan must provide an explanation.

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HAZARDS IN LOUISIANA

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Hazards Profiled by Parishes

Temperature hazards
- Extreme heat (20)
- Drought (49)
- Wildfire (38)
- Winter storms (47)

Wind hazards
- Tropical cyclones (64)
- Thunderstorms (54)
  - High wind (4)
  - Hailstorms
  - Lightning (2)
- Tornadoes (63)

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Hazards Profiled by Parishes

Flood hazards
- Coastal hazards (26)
- Dam failure (30)
- Levee failure (34)
- Flooding (63)

Coastal hazards
- Subsidence (20)
- Land loss (15)
- Coastal erosion (5)
- Saltwater intrusion (4)
- Sea level rise (1)
- Storm surge (2)

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Hazards Profiled by Parishes

Geologic hazards
- Earthquake (20)
- Sinkholes (19)
- Expansive soil (5)

Other hazards (not profiled)
- Fog (1)
- Hazardous materials (1)

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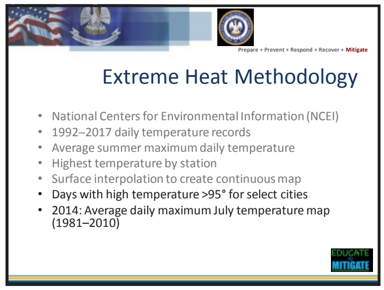
TEMPERATURE HAZARDS
EXTREME HEAT, DROUGHT, WILDFIRE, WINTER STORMS


Prepare • Prevent • Respond • Recover • Mitigate
Extreme Heat Methodology
National Centers for Environmental Information (NCEI)
1992–2017 daily temperature records
Average summer maximum daily temperature
Highest temperature by station
Surface interpolation to create continuous map
Days with high temperature >95° for select cities
2014: Average daily maximum July temperature map (1981–2010)
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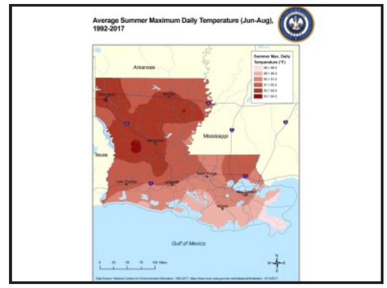
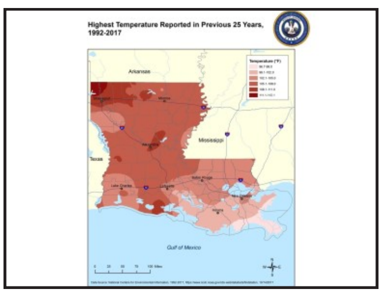
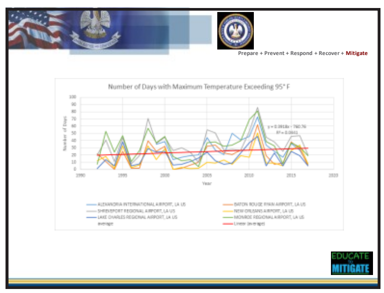

Average Summer Maximum Daily Temperature (Jun-Aug), 1992-2017
Arkansas
Mississippi
Texas
Gulf of Mexico


Highest Temperature Reported in Previous 25 Years, 1992-2017
Arkansas
Mississippi
Texas
Gulf of Mexico


Prepare • Prevent • Respond • Recover • Mitigate
Number of Days with Maximum Temperature Exceeding 95° F
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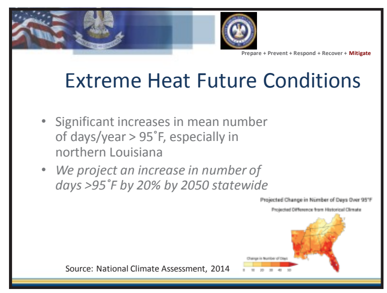
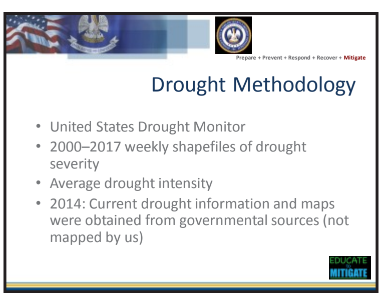

Prepare • Prevent • Respond • Recover • Mitigate
Extreme Heat Future Conditions
Significant increases in mean number of days/year > 95˚F, especially in northern Louisiana
We project an increase in number of days >95˚F by 20% by 2050 statewide
Projected Change in Number of Days Over 95°F
Source: National Climate Assessment, 2014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Drought Methodology
United States Drought Monitor
2000–2017 weekly shapefiles of drought severity
Average drought intensity
2014: Current drought information and maps were obtained from governmental sources (not mapped by us)
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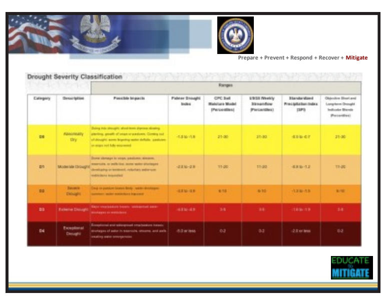
Prepare • Prevent • Respond • Recover • Mitigate
Drought Severity Classification
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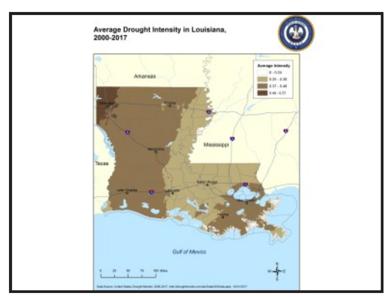
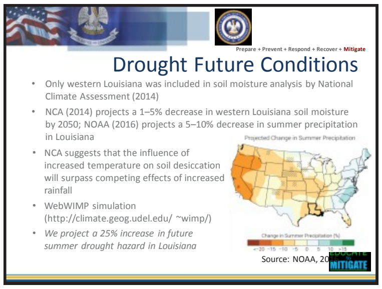

Average Drought Intensity in Louisiana, 2000-2017
Arkansas
Mississippi
Texas
Gulf of Mexico


Prepare + Prevent + Respond + Recover + Mitigate
Drought Future Conditions
• Only western Louisiana was included in soil moisture analysis by National Climate Assessment (2014)
• NCA (2014) projects a 1–5% decrease in western Louisiana soil moisture by 2050; NOAA (2016) projects a 5–10% decrease in summer precipitation in Louisiana
• NCA suggests that the influence of increased temperature on soil desiccation will surpass competing effects of increased rainfall
• WebWIMP simulation (http://climate.geog.udel.edu/ ~wimp/)
• We project a 25% increase in future summer drought hazard in Louisiana
Projected Change in Summer Precipitation
Change in Summer Precipitation (%)
Source: NOAA, 2016
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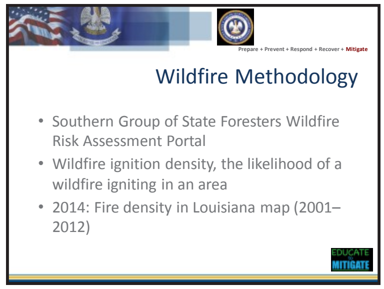
Prepare + Prevent + Respond + Recover + Mitigate
Wildfire Methodology
• Southern Group of State Foresters Wildfire Risk Assessment Portal
• Wildfire ignition density, the likelihood of a wildfire igniting in an area
• 2014: Fire density in Louisiana map (2001–2012)
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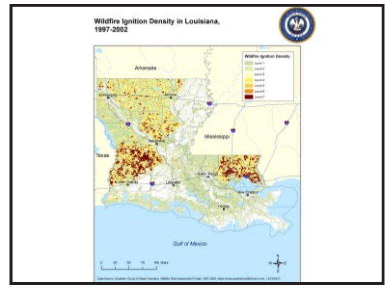
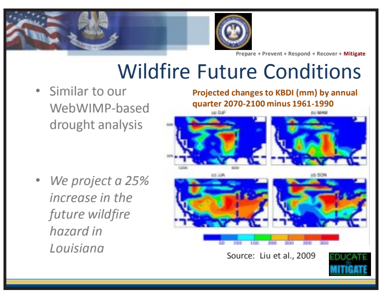

Wildfire Ignition Density in Louisiana, 1997-2002
Arkansas
Mississippi
Texas
Gulf of Mexico


Prepare + Prevent + Respond + Recover + Mitigate
Wildfire Future Conditions
• Similar to our WebWIMP-based drought analysis
• We project a 25% increase in the future wildfire hazard in Louisiana
Projected changes to KBDI (mm) by annual quarter 2070-2100 minus 1961-1990
Source: Liu et al., 2009
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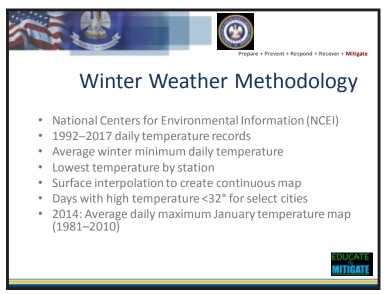
Prepare + Prevent + Respond + Recover + Mitigate
Winter Weather Methodology
• National Centers for Environmental Information (NCEI)
• 1992–2017 daily temperature records
• Average winter minimum daily temperature
• Lowest temperature by station
• Surface interpolation to create continuous map
• Days with high temperature <32° for select cities
• 2014: Average daily maximum January temperature map (1981–2010)
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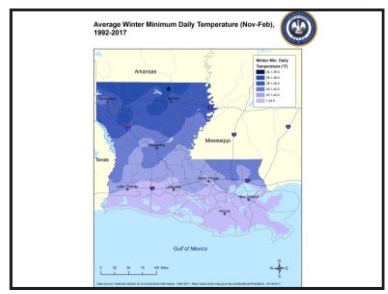
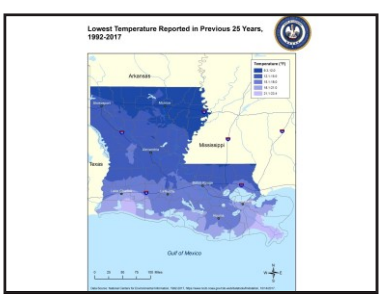
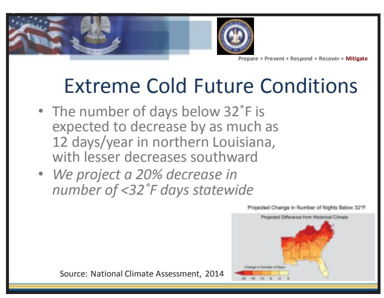
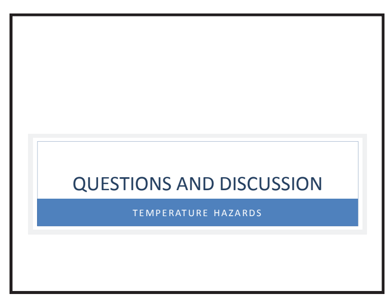

Average Winter Minimum Daily Temperature (Nov-Feb), 1992-2017
Arkansas
Mississippi
Texas
Gulf of Mexico


Lowest Temperature Reported in Previous 25 Years, 1992-2017
Arkansas
Mississippi
Texas
Gulf of Mexico


Prepare + Prevent + Respond + Recover + Mitigate
Extreme Cold Future Conditions
• The number of days below 32˚F is expected to decrease by as much as 12 days/year in northern Louisiana, with lesser decreases southward
• We project a 20% decrease in number of <32˚F days statewide
Source: National Climate Assessment, 2014


QUESTIONS AND DISCUSSION
TEMPERATURE HAZARDS

WIND HAZARDS

TROPICAL CYCLONES, THUNDERSTORMS, TORNADOES

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Tropical Cyclone Methodology

- National Hurricane Center and Unisys Weather
- Best Track Data (HURDAT2) and 2017 hurricane/tropical data for Atlantic Basin
- 1900–2017 tropical cyclone tracks
- Classify tropical cyclones based on sustained wind speed using Saffir-Simpson Scale
- 2014: Historical tracks of tropical cyclones affecting Louisiana (1851–2012)

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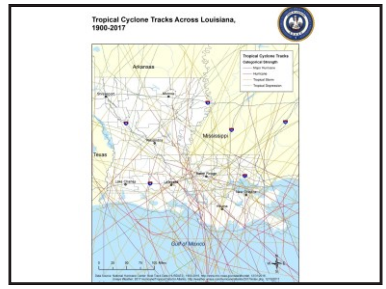

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Tropical Cyclone Future Conditions

- Decreasing frequency but increasing intensity, and perhaps increasing frequency of the strongest tropical cyclones, by 2050
- Role of Atlantic Multidecadal Oscillation?
- Decreasing periodicity of El Niño?
- Exacerbation of impacts by sea level rise and coastal development
- *We recommend use of the Coastal Master Plan predictions for coastal flood hazards; wind hazards discussed with thunderstorms*

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Thunderstorm Methodology

- Wind
- Hail
- Lightning

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Wind Methodology

- ASCE 7 Hazard Tool
- Combines all wind speed data, except tornadoes
- 2014: Wind zones in the United States

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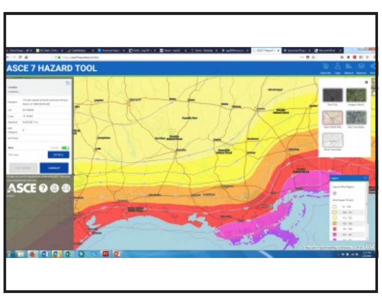

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Hail Methodology

- NOAA's National Weather Service
- Storm Prediction Center
- 1987-2016 hail events
- Damaging hail days per year
- Used only hail events those caused damage (injuries, fatalities, property loss, and crop loss)
- Generate raster heat map through QGIS then divide by total number of years
- 2014: Hail density map (1955–2012)

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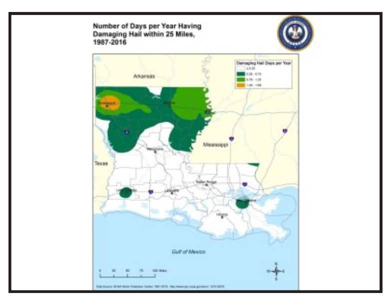
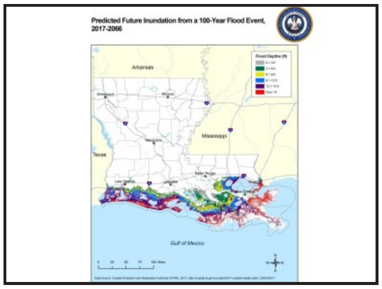
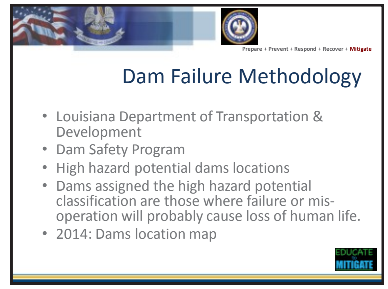



Predicted Future Inundation from a 100-Year Flood Event, 2017-2066
Arkansas
Mississippi
Texas
Gulf of Mexico


Predicted Land Change Over the Next 50 Years, 2017-2066
Arkansas
Mississippi
Texas
Gulf of Mexico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Dam Failure Methodology
• Louisiana Department of Transportation & Development
• Dam Safety Program
• High hazard potential dams locations
• Dams assigned the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life.
• 2014: Dams location map
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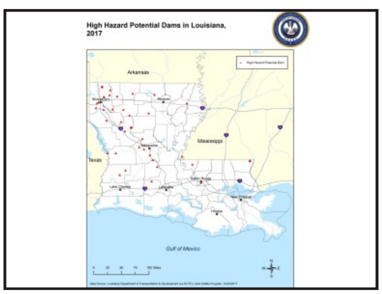
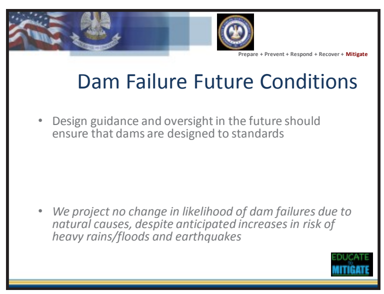

High Hazard Potential Dams in Louisiana, 2017
Arkansas
Mississippi
Texas
Gulf of Mexico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Dam Failure Future Conditions
• Design guidance and oversight in the future should ensure that dams are designed to standards
• We project no change in likelihood of dam failures due to natural causes, despite anticipated increases in risk of heavy rains/floods and earthquakes
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Levee Failure Methodology
• US Army Corps of Engineers
• National Levee Database
• 2017 national levee location
• Levee protected areas
• 2014: Leveed areas map and levee districts map
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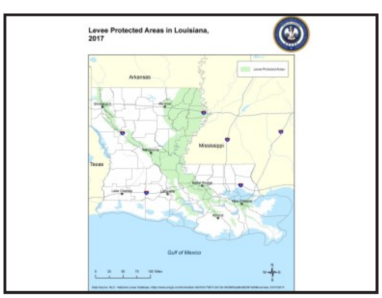
Levee Protected Areas in Louisiana, 2017
Arkansas
Mississippi
Texas
Gulf of Mexico


Prepare • Prevent • Respond • Recover • Mitigate
Levee Failure Future Conditions
• Design guidance and oversight in the future should ensure that levees are designed to standards
• We project no change in likelihood of levee failures due to natural causes, despite anticipated increases in risk of heavy rains/floods and earthquakes
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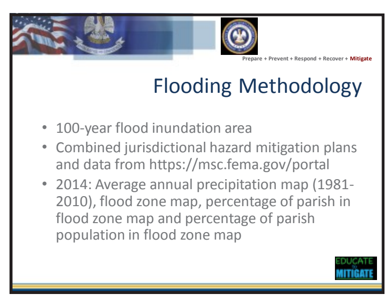
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Flooding Methodology
• 100-year flood inundation area
• Combined jurisdictional hazard mitigation plans and data from https://msc.fema.gov/portal
• 2014: Average annual precipitation map (1981-2010), flood zone map, percentage of parish in flood zone map and percentage of parish population in flood zone map
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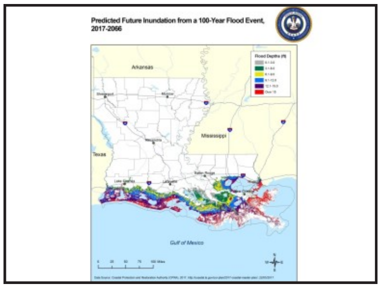

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Dam Failure Methodology

- Louisiana Department of Transportation & Development
- Dam Safety Program
- High hazard potential dams locations
- Dams assigned the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life.
- 2014: Dams location map

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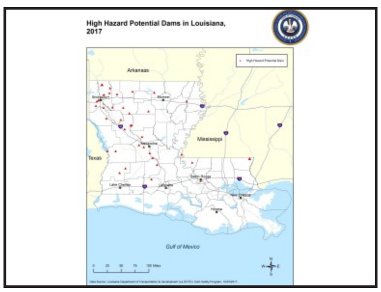

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Dam Failure Future Conditions

- Design guidance and oversight in the future should ensure that dams are designed to standards
- *We project no change in likelihood of dam failures due to natural causes, despite anticipated increases in risk of heavy rains/floods and earthquakes*

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Levee Failure Methodology

- US Army Corps of Engineers
- National Levee Database
- 2017 national levee location
- Levee protected areas
- 2014: Leveed areas map and levee districts map

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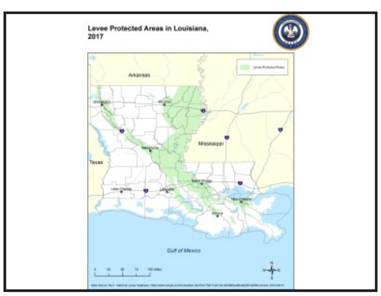

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Levee Failure Future Conditions

- Design guidance and oversight in the future should ensure that levees are designed to standards
- *We project no change in likelihood of levee failures due to natural causes, despite anticipated increases in risk of heavy rains/floods and earthquakes*

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Flooding Methodology

- 100-year flood inundation area
- Combined jurisdictional hazard mitigation plans and data from https://msc.fema.gov/portal
- 2014: Average annual precipitation map (1981-2010), flood zone map, percentage of parish in flood zone map and percentage of parish population in flood zone map

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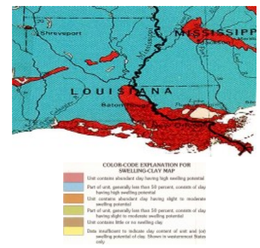
Sinkhole Future Conditions

- Continuing land use change and pressures of increased resource extraction and population growth
- Sinkholes as a "side effect" to sea level rise, which contributes to saltwater intrusion, which contributes to the formation of salt domes, which—when mined extensively—can form sinkholes
- *We project a 10% increase in the future sinkhole hazard in Louisiana*

Expansive Soil Methodology

- *Source:* "Swelling Clays Map of the Conterminous United States" by W. Olive, A. Chleborad, C. Frahme, J. Schlocker, R. Schneider, and R. Schuster; 1989
- 2014: Not profiled



Expansive Soil Future Conditions

- Fewer freeze-thaw cycles would reduce the hazard
- But more heavy rainfall events interrupted by longer dry periods would increase the hazard
- *We project no net change in the expansive soil hazard statewide by 2050*

QUESTIONS AND DISCUSSION

GEOLOGIC HAZARDS

2019 State Hazard Mitigation Plan Update

Hazard Profiles

Carol Friedland, Ph.D., P.E., C.F.M.
Robert Rohli, Ph.D.
Rubayet Bin Mostafiz, M.S.
State Plan Update Stakeholder Meeting
January 9, 2018

Louisiana State Hazard Mitigation Plan Update 2018

Meeting #3: March 6, 2018 10am to 12pm

Meeting Name

Repetitive Flood Loss and Community Rating System Strategy

Location

Transportation Training and Education Center 4099 Gourrier Avenue, Baton Rouge, LA 70806

Attendees:

Name	**Agency**
Jeanette Dubinin	CPEX
Ryan Mast	City of New Orleans
Andrea Galinski	CPRA
Carol J. Friedland, Ph.D., P.E., C.F.M.	Department of Construction Management
Warren Byrd	LDI
Robert V. Rohli, Ph.D.	LSU Department of Oceanography and Coastal Sciences
Susan Veillon	DOTD
Pam Lightfoot	DOTD
Mark Gates	Facilities Planning and Control
Jamelyn Trucks	Atkins/Federal BU
French Wetmore	French & Associates Limited/UNO CHART
Ellen Ibert	GOHSEP
Jeffrey Giering	GOHSEP
Marion Pearson	GOHSEP
Steve Garcia	GOHSEP
Michelle Gonzales	Jefferson Parish
Kenyatta Esters	LDH
Nici English	LDH
Patricia Skinner	LSU Agricultural Center
Traci Birch, Ph.D.	LSU Coastal Sustainability Studio
Charles "Chip" McGimsey, Ph.D.	Office of Cultural Development
Nicole Hobson-Morris	Office of Cultural Development
Brett Beoubay	Office of Risk Management
Barry Keim, Ph.D.	Southern Climate Impacts Planning Program/LSU
Ryan Clark	The Water Institute of the Gulf
Katherine Van Marter	Tulane Institute of Water Resources
Mark Davis	Tulane Institute of Water Resources
Monica Farris, Ph.D.	UNO CHART
Brett Wilks	UNO CHART

Meeting #3 Agenda

- Welcome
- Planning Process
- Follow up from previous meeting
- Hazard Mitigation Effectiveness Project
- Repetitive Loss Strategy
- Community Rating System Strategy

Governor's Office of Homeland Security And Emergency Preparedness

SHMPC - Meeting # 3

Briefing / Meeting: State Hazard Mitigation Plan Update Meeting
Location: 4099 Gourrier Ave., Baton Rouge, LA Date: 3/6/2018 Time 10:00 A.M. till Noon

Name	Signature	Agency/Company		
Mark Davis		Tulane Institute of water Resources		
Jamelyn Trucks		Federal BU		
Leon Contreras		SWBNO		
Drew Ratcliff		Capital Region Planning Commission		
Alan Black		Southern Climate Impacts Planning Program/LSU		
Mark Gates		Facilities Planning and Control		
Brett Beoubay		Office of Risk Management		
Alan Black		Southern Climate Impact		
Nici English		LDH		
Andrea Galinski		CPRA		
Michelle Gonzales		Jefferson Parish		
Maggie Oliver		Jefferson Parish		

Page ____ of ____

(Cont'd)

Briefing / Meeting: State Hazard Mitigation Plan Update Meeting Location: 4099 Gourrier Ave., Baton Rouge, LA
Date: 3/6/2018 Time 10:00 A.M. till Noon

Name	Signature	Agency / Company		
Kenyatta Esters		LA Dept. of Health		
Ellen Ibert		GOHSEP		
Steve Garcia		GOHSEP		
Jeffrey Giering		GOHSEP		
Marion Pearson		GOHSEP		
Carol Friedland		LSU		
Bob Rohli		LSU		
Monica Farris ~~Teets~~		UNO		
Tara Lambert		UNO		
Chip McGimsey		Office of Cultural Development		
Traci Birch		LSU Coastal Sustainability Studio.		
Pat Skinner		LSU Ag		

Page ____ of ____

(Cont'd)

Briefing / Meeting: State Hazard Mitigation Plan Update Meeting, Location: 4099 Gourrier Ave., Baton Rouge, LA
Date: 3/6/2018 Time 10:00 A.M. till Noon

Name	Signature	Agency / Company		
Ryan Clark	[illegible]	The Water Inst. of the Gulf		
Bret Lane		LA Dept. of Ag and Forestry		
Susan Vermillion	[illegible]	DOTD		
Pam Lightfoot	[illegible]	DOTD		
French Wetmore	[illegible]	UNO - CHART		
Brett Wills	[illegible]	UNO - CHART		
Mark Gostes	[illegible]	FCA/FPC		
Ryan Mast	[illegible]	City of New Orleans.		
Jeannette Dubinin	[illegible]	CPEX		
Nicole Hobson Morris	[illegible]	LA SHPO		
Katherine VanMarke	[illegible]	Tulane Inst. on H2O		
Barry Keim	[illegible]	keim@lsu.edu		

Page ____ of ____

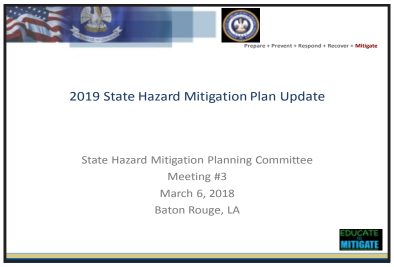
(Cont'd)

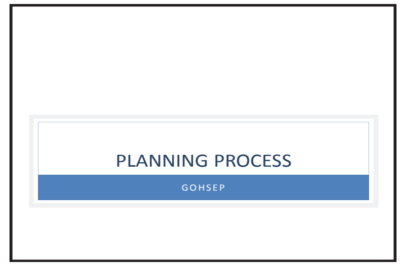
Briefing / Meeting: State Hazard Mitigation Plan Update Meeting, Location: 4099 Gourrier Ave., Baton Rouge, LA
Date: ~~1/9/2018~~ 3/6/18 Time 10:00 A.M. till Noon

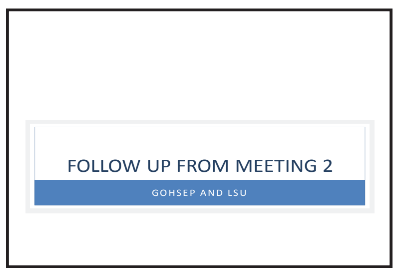
Name	Signature	Agency / Company		
WARREN BYRD		LA DEPT OF INSURANCE		
NI'				

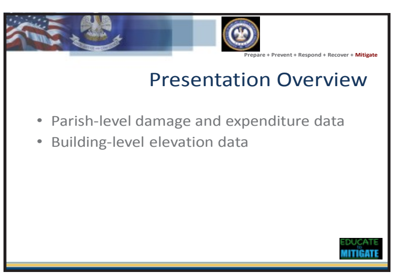
Page ____ of ____

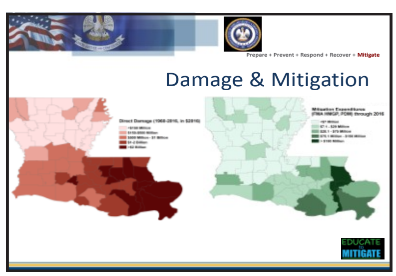
2019 State Hazard Mitigation Plan Update
Meeting #3
March 6, 2018

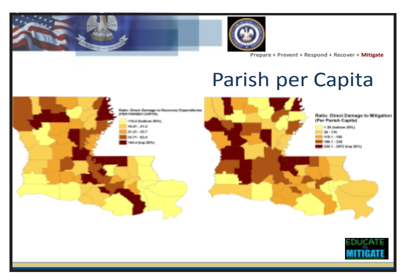


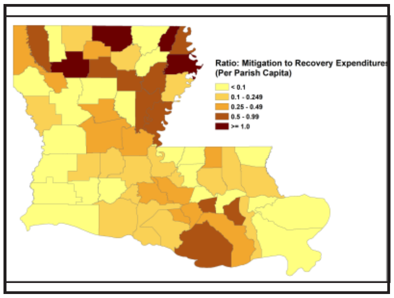


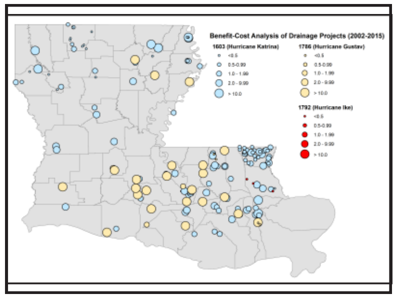


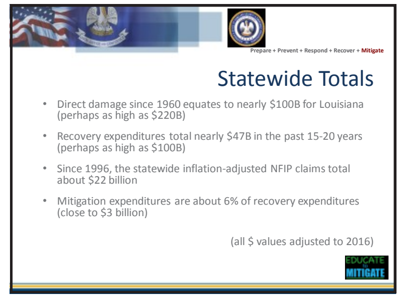


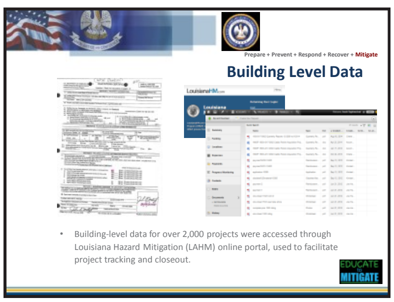


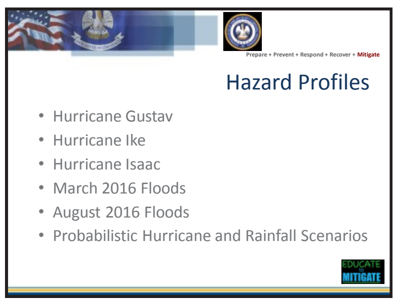


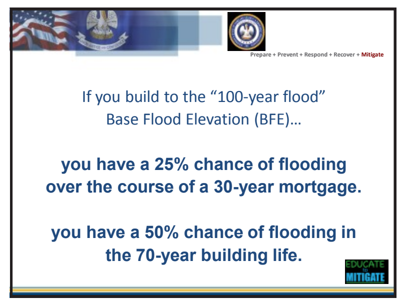

Ratio: Mitigation to Recovery Expenditure
(Per Parish Capita)
< 0.1
0.1 - 0.249
0.25 - 0.49
0.5 - 0.99
>= 1.0

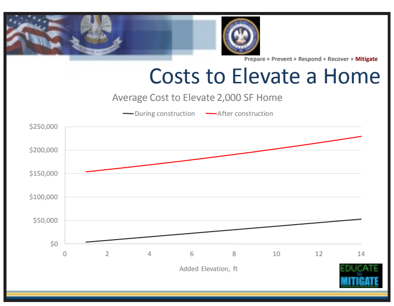

Benefit-Cost Analysis of Drainage Projects (2002-2015)
1603 (Hurricane Katrina)
<0.5
0.5-0.99
1.0 - 1.99
2.0 - 9.99
> 10.0
1786 (Hurricane Gustav)
<0.5
0.5-0.99
1.0 - 1.99
2.0 - 9.99
> 10.0
1792 (Hurricane Ike)
<0.5
0.5-0.99
1.0 - 1.99
2.0 - 9.99
> 10.0


Prepare + Prevent + Respond + Recover + Mitigate
Statewide Totals
• Direct damage since 1960 equates to nearly $100B for Louisiana (perhaps as high as $220B)
• Recovery expenditures total nearly $47B in the past 15-20 years (perhaps as high as $100B)
• Since 1996, the statewide inflation-adjusted NFIP claims total about $22 billion
• Mitigation expenditures are about 6% of recovery expenditures (close to $3 billion)
(all $ values adjusted to 2016)
EDUCATE to MITIGATE


Prepare + Prevent + Respond + Recover + Mitigate
Building Level Data
• Building-level data for over 2,000 projects were accessed through Louisiana Hazard Mitigation (LAHM) online portal, used to facilitate project tracking and closeout.
EDUCATE to MITIGATE

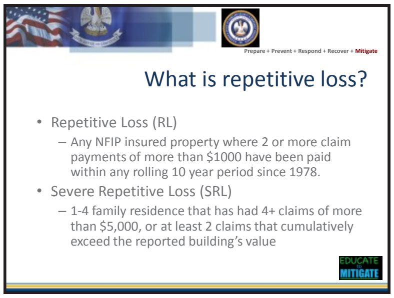

Prepare + Prevent + Respond + Recover + Mitigate
Hazard Profiles
• Hurricane Gustav
• Hurricane Ike
• Hurricane Isaac
• March 2016 Floods
• August 2016 Floods
• Probabilistic Hurricane and Rainfall Scenarios
EDUCATE to MITIGATE

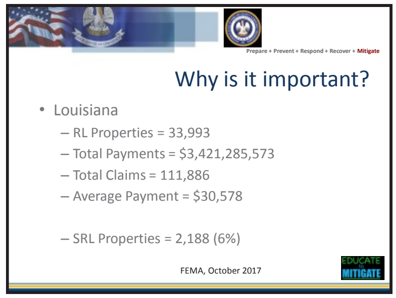

Prepare + Prevent + Respond + Recover + Mitigate
If you build to the "100-year flood" Base Flood Elevation (BFE)…
you have a 25% chance of flooding over the course of a 30-year mortgage.
you have a 50% chance of flooding in the 70-year building life.
EDUCATE to MITIGATE

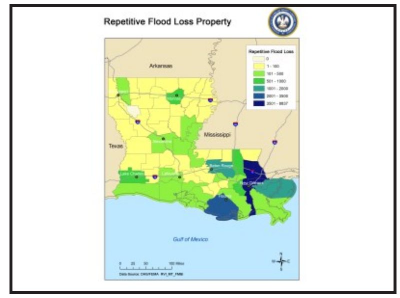

Prepare + Prevent + Respond + Recover + Mitigate
Costs to Elevate a Home
Average Cost to Elevate 2,000 SF Home
During construction
After construction
$250,000
$200,000
$150,000
$100,000
$50,000
$0
0
2
4
6
8
10
12
14
Added Elevation, ft
EDUCATE to MITIGATE

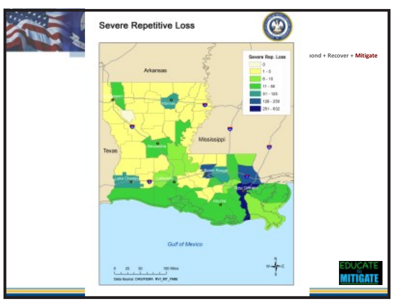

Prepare + Prevent + Respond + Recover + Mitigate
Building Level Elevation Findings
• One-third of the properties evaluated were affected by more than one hazard event
• Elevated buildings avoided up to $14,000 in loss for each foot the building was elevated (per event); average avoided loss for elevated buildings was ~$5.50/SF per foot elevated
• Post-flood elevation costs average from $10-$85/SF per foot elevated, with decreasing cost for higher elevations
• Construction costs to elevate (~$2/SF per foot elevated) demonstrate building code changes should be strongly considered
EDUCATE to MITIGATE

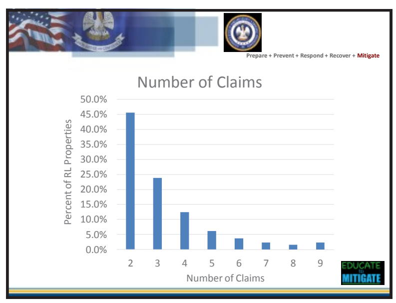

REPETITIVE LOSS STRATEGY
UNO

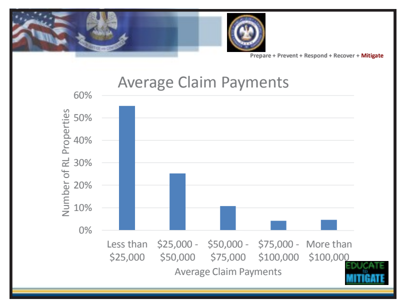

Prepare • Prevent • Respond • Recover • Mitigate
What is repetitive loss?
• Repetitive Loss (RL)
– Any NFIP insured property where 2 or more claim payments of more than $1000 have been paid within any rolling 10 year period since 1978.
• Severe Repetitive Loss (SRL)
– 1-4 family residence that has had 4+ claims of more than $5,000, or at least 2 claims that cumulatively exceed the reported building's value
EDUCATE
MITIGATE

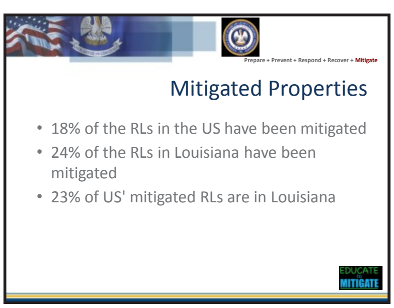

Prepare • Prevent • Respond • Recover • Mitigate
Why is it important?
• Louisiana
– RL Properties = 33,993
– Total Payments = $3,421,285,573
– Total Claims = 111,886
– Average Payment = $30,578
– SRL Properties = 2,188 (6%)
FEMA, October 2017
EDUCATE
MITIGATE


Repetitive Flood Loss Property
Arkansas
Mississippi
Texas
Gulf of Mexico


Severe Repetitive Loss
Arkansas
Mississippi
Texas
Gulf of Mexico
EDUCATE
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Number of Claims
Percent of RL Properties
50.0%
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
2
3
4
5
6
7
8
9
Number of Claims
EDUCATE
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Average Claim Payments
Number of RL Properties
60%
50%
40%
30%
20%
10%
0%
Less than $25,000
$25,000 - $50,000
$50,000 - $75,000
$75,000 - $100,000
More than $100,000
Average Claim Payments
EDUCATE
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Mitigated Properties
• 18% of the RLs in the US have been mitigated
• 24% of the RLs in Louisiana have been mitigated
• 23% of US' mitigated RLs are in Louisiana
EDUCATE
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Rep Loss Strategy Outline
• Risk assessment
• Mitigation goals
• Mitigation actions
• Funding
• Summary of local plans
• Recommendations
EDUCATE
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Mitigation Actions
• Acquisition
• Elevation
• Flood control
• Drainage improvements
• Low cost retrofitting
• Flood insurance
EDUCATE
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
• Acquisition
• Elevation


Prepare • Prevent • Respond • Recover • Mitigate
Mitigation Actions
• Flood control
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Mitigation Actions
• Drainage improvements
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Mitigation Actions
• Low cost retrofitting
EDUCATE
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Mitigation Actions
• Low cost retrofitting
EDUCATE
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Mitigation Actions
MITIGATE

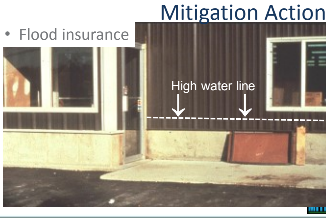

Prepare • Prevent • Respond • Recover • Mitigate
Mitigation Actions
EDUCATE
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Mitigation Actions


Prepare • Prevent • Respond • Recover • Mitigate
Mitigation Actions
EDUCATE
MITIGATE

Mitigation Actions

- Flood insurance



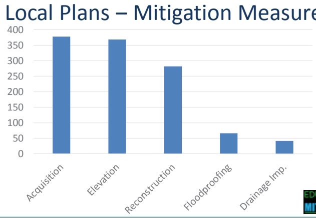
Mitigation Actions

- Acquisition
- Elevation
- Flood control
- Drainage improvements
- Low cost retrofitting
- Flood insurance

Rep Loss Strategy

- Risk assessment
- Mitigation goals
- Mitigation actions
- Funding
- Summary of local plans
- Recommendations

Local Plans – Mitigation Measures



Local Plans – Funding Sources

$ Hazard Mitigation Grant Program
$ Flood Mitigation Assistance
$ Pre-Disaster Mitigation
$ Community Development Block Grant
$ Small Business Administration
$ Other grants
$ Corps of Engineers
$ State Capital Projects
$ Local Businesses
$ Parish/City Funds

Enhanced Plan

- Standard Plan Elements
- Integrated Planning
- State Mitigation Capabilities
- HMA Grants Management Performance

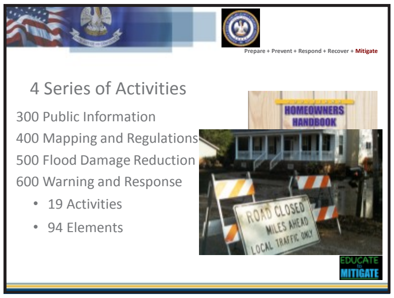
COMMUNITY RATING SYSTEM STRATEGY

UNO

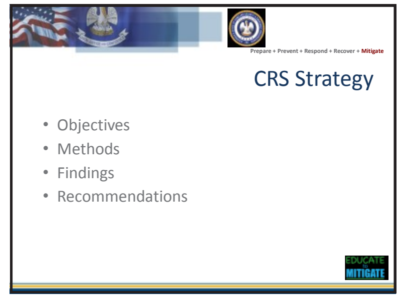
What is CRS?

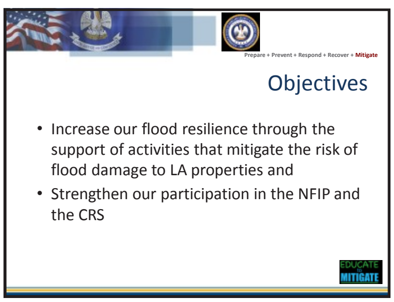
- A voluntary program offered to all NFIP communities
- Offers “points” for going above & beyond minimum standards
- Points increase the community’s “CRS Class”
- CRS Class has a % discount on flood insurance premiums

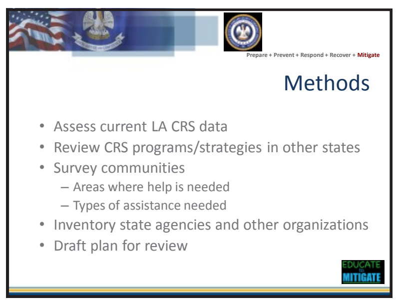
Class	Points	SFHA	Non-SFHA	PRP
1	4,500	45%	10%	0
2	4,000	40%	10%	0
3	3,500	35%	10%	0
4	3,000	30%	10%	0
5	2,500	25%	10%	0
6	2,000	20%	10%	0
7	1,500	15%	5%	0
8	1,000	10%	5%	0
9	500	5%	5%	0
10	< 500	0	0	0


Prepare • Prevent • Respond • Recover • Mitigate
4 Series of Activities
300 Public Information
400 Mapping and Regulations
500 Flood Damage Reduction
600 Warning and Response
• 19 Activities
• 94 Elements
HOMEOWNERS HANDBOOK
ROAD CLOSED
MILES AHEAD
LOCAL TRAFFIC ONLY
EDUCATE
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
National Flood Insurance Program
Community Rating System
Coordinator's Manual
FEMA
EDUCATE
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
CRS Strategy
• Objectives
• Methods
• Findings
• Recommendations
EDUCATE
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Objectives
• Increase our flood resilience through the support of activities that mitigate the risk of flood damage to LA properties and
• Strengthen our participation in the NFIP and the CRS
EDUCATE
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Methods
• Assess current LA CRS data
• Review CRS programs/strategies in other states
• Survey communities
– Areas where help is needed
– Types of assistance needed
• Inventory state agencies and other organizations
• Draft plan for review
EDUCATE
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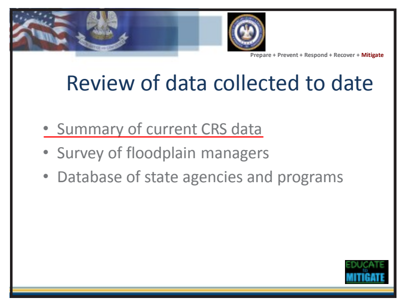
Prepare • Prevent • Respond • Recover • Mitigate
Review of data collected to date
• Summary of current CRS data
• Survey of floodplain managers
• Database of state agencies and programs
EDUCATE
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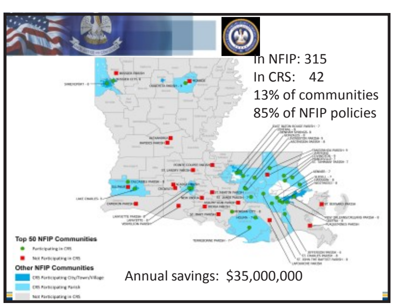
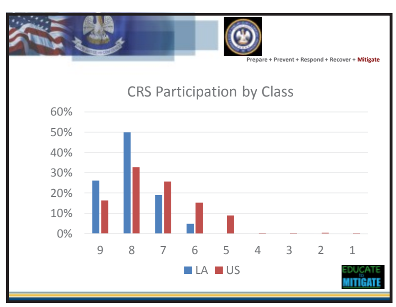
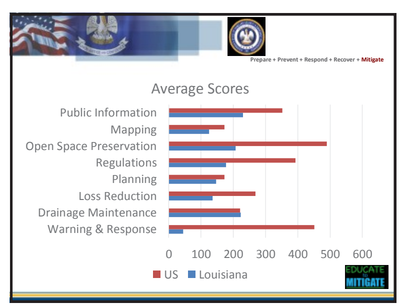

In NFIP: 315
In CRS: 42
13% of communities
85% of NFIP policies
Top 50 NFIP Communities
Other NFIP Communities
Annual savings: $35,000,000


Prepare • Prevent • Respond • Recover • Mitigate
CRS Participation by Class
60%
50%
40%
30%
20%
10%
0%
9
8
7
6
5
4
3
2
1
LA
US
EDUCATE
MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Average Scores
Public Information
Mapping
Open Space Preservation
Regulations
Planning
Loss Reduction
Drainage Maintenance
Warning & Response
0
100
200
300
400
500
600
US
Louisiana
EDUCATE
MITIGATE

Louisiana State Hazard Mitigation Plan Update 2018

Meeting #4: April 10, 2018 10am to 12pm

Meeting Name

Risk Assessment: Changing Future Conditions

Location

Transportation Training and Education Center 4099 Gourrier Avenue, Baton Rouge, LA 70806

Attendees:

Name	**Agency**
Jamelyn Trucks	Atkins/Federal BU
Drew Ratcliff	Capital Region Planning Commission
Andrea Galinski	CPRA
Justin Kozak	CPEX
Pam Lightfoot	DOTD
Susan Veillon	DOTD
Jeffrey Giering	GOHSEP
Marion Pearson	GOHSEP
Steve Garcia	GOHSEP
Maggie Olivier	Jefferson Parish
Michelle Gonzales	Jefferson Parish
Warren Byrd	LDI
Bob Rohli	LSU Department of Oceanography and Coastal Sciences
Carol Friedland	LSU Department of Construction Management
Kong Lee	LSU
Pat Skinner	LSU Agricultural Center
Rubayet Bin Mostafiz	LSU College of the Coast and Environment
Traci Birch	LSU Costal Sustainability Studio
Stacy Bonnaffons	OCD
Chip McGimsey	Office of Cultural Development
Nicole Hobson-Morris	Office of Cultural Development
Jason Higginbotham	SWBNO
Leon Contreras	SWBNO
Ryan Clark	The Water Institute of the Gulf
Monica Teets Farris	UNO CHART
Tara Lambeth	UNO CHART
John McCandless	UNO CHART

Meeting #4 Agenda

- Welcome
- Planning Process
- Revisions to Hazard Profiles
- Risk Assessment Requirements
- Changes between 2014 and 2019 Plans
- Risk Assessment Methodology and Results
- Questions and Discussion
- Next Meeting Information

Governor's Office of Homeland Security And Emergency Preparedness

SHMPC – Meeting #4

Briefing / Meeting: State Hazard Mitigation Plan Update Meeting
Location: 4099 Gourrier Ave., Baton Rouge, LA Date: 4/10/2018 Time 10:00 A.M. till Noon

Name	Signature	Agency/Company		
Susan ~~Vermillion~~ Veillon	Susan Veillon	DOTD		
Jason Higginbotham	[illegible]	SWBNO		
Leon Contreras	[illegible]	SWBNO		
Drew Ratcliff	Drew [illegible]	Capital Region Planning Commission		
Ryan Clark	[illegible]	The Water Inst. of the Gulf		
Jeannette Dubinin		Director of Coastal Program	Justin Kozak came in	her Place
Chip McGimsey	[illegible]	Office of Cultural Development		
Nicole Hobson-Morris	[illegible]	Office of Cultural Development		
Pat Forbes		Office of Community Development	Stacy B- came in	His Place
Andrea Galinski	[illegible]	CPRA		
Michelle Gonzales	[illegible]	Jefferson Parish		
Maggie Oliver	Maggie Olivier	Jefferson Parish		

(Cont'd)
Page ____ of ____

Briefing / Meeting: State Hazard Mitigation Plan Update Meeting Location: 4099 Gourrier Ave., Baton Rouge, LA
Date: 3/6/2018 Time 10:00 A.M. till Noon

Name	Signature	Agency / Company		
Kara Moree		Louisiana Floodplain Managers Association		
Ellen Ibert		GOHSEP		
Steve Garcia		GOHSEP		
Jeffrey Giering		GOHSEP		
Marion Pearson		GOHSEP		
Carol Friedland		LSU		
Bob Rohli		LSU		
Monica Teets Farris		UNO		
Tara Lambert		UNO		
Warren Byrd		Louisiana Department of Insurance		
Traci Birch		LSU Coastal Sustainability Studio.		
Pat Skinner		LSU Ag		

Page ____ of ____

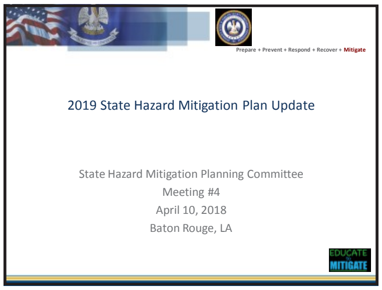
(Cont'd)

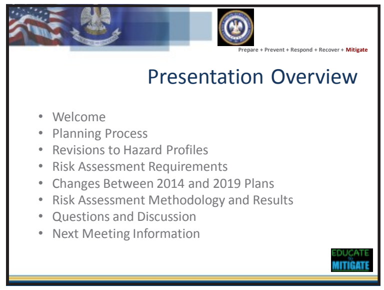
Briefing / Meeting: State Hazard Mitigation Plan Update Meeting, Location: 4099 Gourrier Ave., Baton Rouge, LA
Date: 3/6/2018 Time 10:00 A.M. till Noon

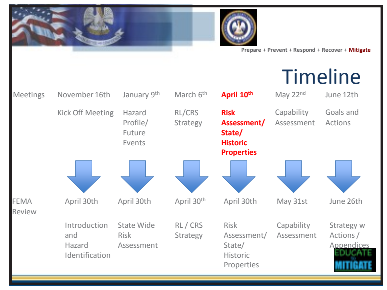
Name	Signature	Agency / Company		
Jamelyn Trucks		Federal BU		
John McCandless	[illegible]	UNO		
Rubayet Bin Mostafiz	[illegible]	LSU		
Justin Kozak	Justin Kozak	CPEX		
Pam Lightfoot	Pam Lightfoot	LaDOTD		
Jamelyn Trucks	[illegible]	Atkins		
Kong Lee	[illegible]	LSU		
Stacy Bonnaffons	[illegible]	OCD		

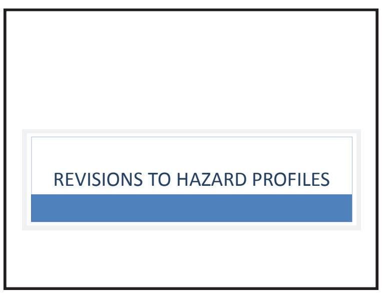
Page ____ of ____

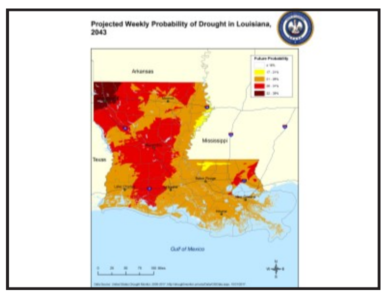
2019 State Hazard Mitigation Update
Meeting #4
April 10, 2018

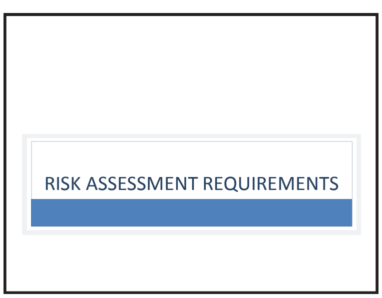


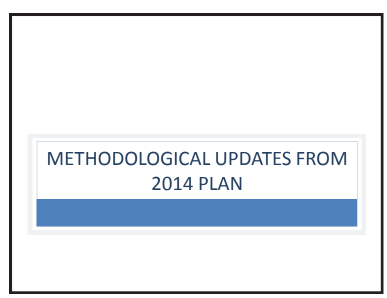


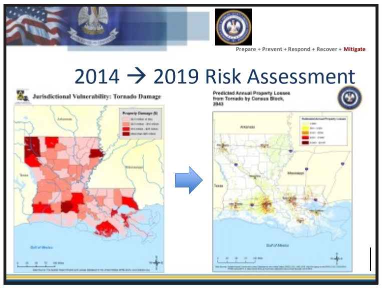


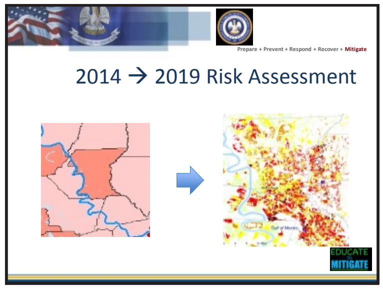




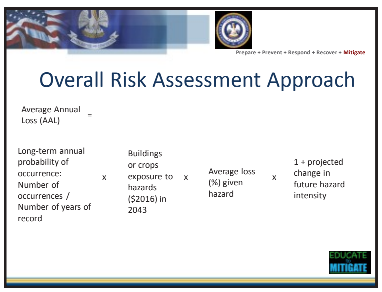


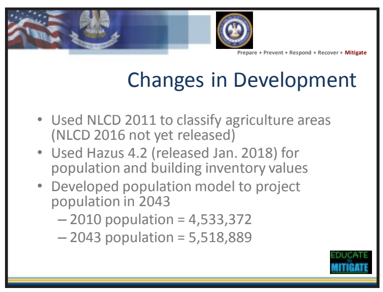


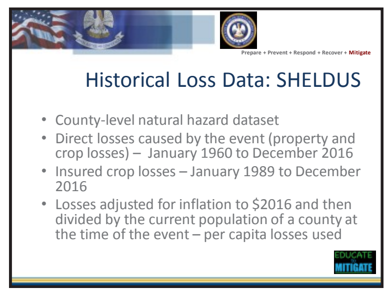

Prepare + Prevent + Respond + Recover + Mitigate
2014 → 2019 Risk Assessment
Jurisdictional Vulnerability: Tornado Damage
Predicted Annual Property Losses from Tornado by Census Block, 2043

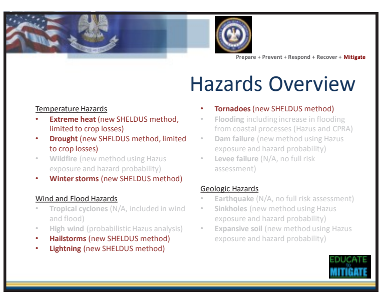

Prepare + Prevent + Respond + Recover + Mitigate
2014 → 2019 Risk Assessment
EDUCATE to MITIGATE

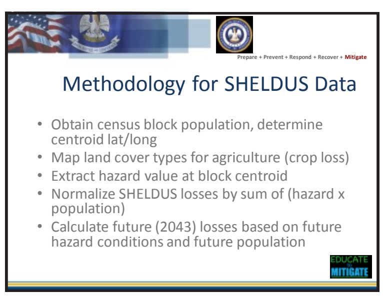

RISK ASSESSMENT METHODOLOGY AND RESULTS

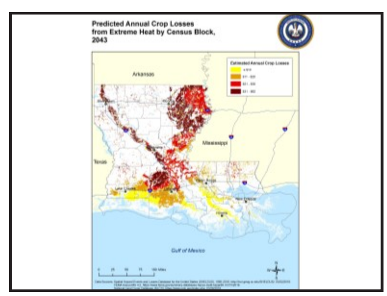

Prepare + Prevent + Respond + Recover + Mitigate
Overall Risk Assessment Approach
Average Annual Loss (AAL) =
Long-term annual probability of occurrence: Number of occurrences / Number of years of record
x
Buildings or crops exposure to hazards ($2016) in 2043
x
Average loss (%) given hazard
x
1 + projected change in future hazard intensity
EDUCATE to MITIGATE

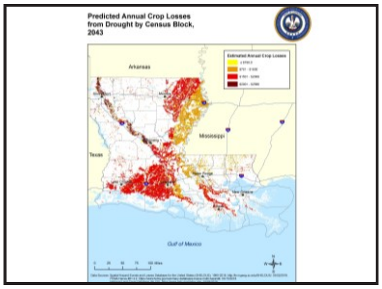

Prepare + Prevent + Respond + Recover + Mitigate
Changes in Development
• Used NLCD 2011 to classify agriculture areas (NLCD 2016 not yet released)
• Used Hazus 4.2 (released Jan. 2018) for population and building inventory values
• Developed population model to project population in 2043
– 2010 population = 4,533,372
– 2043 population = 5,518,889
EDUCATE to MITIGATE

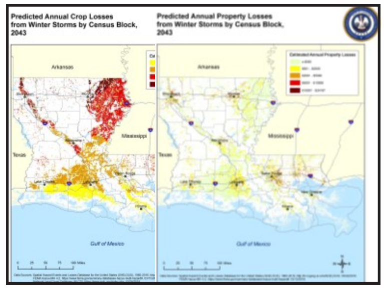

Prepare + Prevent + Respond + Recover + Mitigate
Historical Loss Data: SHELDUS
• County-level natural hazard dataset
• Direct losses caused by the event (property and crop losses) – January 1960 to December 2016
• Insured crop losses – January 1989 to December 2016
• Losses adjusted for inflation to $2016 and then divided by the current population of a county at the time of the event – per capita losses used
EDUCATE to MITIGATE

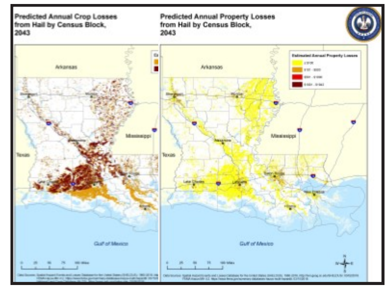

Prepare + Prevent + Respond + Recover + Mitigate
Hazards Overview
Temperature Hazards
• Extreme heat (new SHELDUS method, limited to crop losses)
• Drought (new SHELDUS method, limited to crop losses)
• Wildfire (new method using Hazus exposure and hazard probability)
• Winter storms (new SHELDUS method)
Wind and Flood Hazards
• Tropical cyclones (N/A, included in wind and flood)
• High wind (probabilistic Hazus analysis)
• Hailstorms (new SHELDUS method)
• Lightning (new SHELDUS method)
• Tornadoes (new SHELDUS method)
• Flooding including increase in flooding from coastal processes (Hazus and CPRA)
• Dam failure (new method using Hazus exposure and hazard probability)
• Levee failure (N/A, no full risk assessment)
Geologic Hazards
• Earthquake (N/A, no full risk assessment)
• Sinkholes (new method using Hazus exposure and hazard probability)
• Expansive soil (new method using Hazus exposure and hazard probability)
EDUCATE to MITIGATE

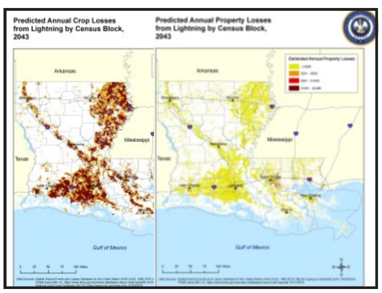

Prepare + Prevent + Respond + Recover + Mitigate
Methodology for SHELDUS Data
• Obtain census block population, determine centroid lat/long
• Map land cover types for agriculture (crop loss)
• Extract hazard value at block centroid
• Normalize SHELDUS losses by sum of (hazard x population)
• Calculate future (2043) losses based on future hazard conditions and future population
EDUCATE to MITIGATE

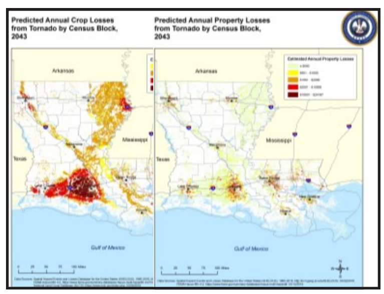

Predicted Annual Crop Losses from Extreme Heat by Census Block, 2043
Arkansas
Gulf of Mexico


Predicted Annual Crop Losses
from Drought by Census Block,
2043
Arkansas
Mississippi
Texas
Gulf of Mexico


Predicted Annual Crop Losses
from Winter Storms by Census Block,
2043
Predicted Annual Property Losses
from Winter Storms by Census Block,
2043
Arkansas
Mississippi
Texas
Gulf of Mexico


Predicted Annual Crop Losses
from Hail by Census Block,
2043
Predicted Annual Property Losses
from Hail by Census Block,
2043
Arkansas
Mississippi
Texas
Gulf of Mexico


Predicted Annual Crop Losses
from Lightning by Census Block,
2043
Predicted Annual Property Losses
from Lightning by Census Block,
2043
Arkansas
Mississippi
Texas
Gulf of Mexico


Predicted Annual Crop Losses
from Tornado by Census Block,
2043
Predicted Annual Property Losses
from Tornado by Census Block,
2043
Arkansas
Mississippi
Texas
Gulf of Mexico


Prepare + Prevent + Respond + Recover + Mitigate
Hazards Overview
Temperature Hazards
• Extreme heat (new SHELDUS method, limited to crop losses)
• Drought (new SHELDUS method, limited to crop losses)
• Wildfire (new method using Hazus exposure and hazard probability)
• Winter storms (new SHELDUS method)
Wind and Flood Hazards
• Tropical cyclones (N/A, included in wind and flood)
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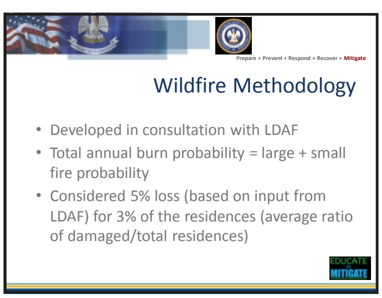
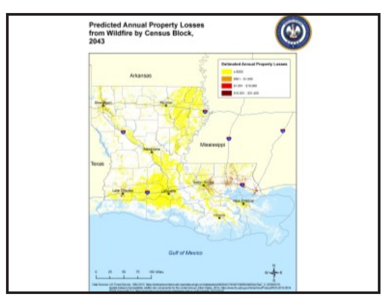
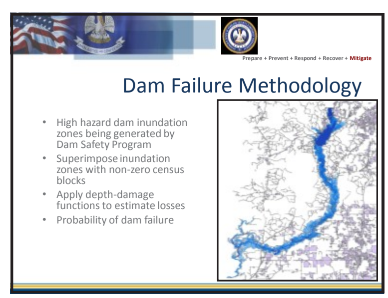
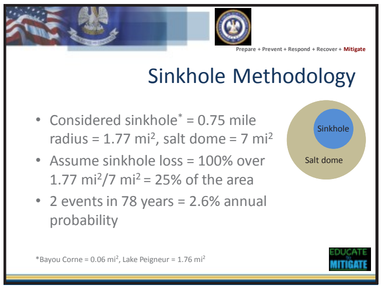
• Levee failure (N/A, no full risk assessment)
Geologic Hazards
• Earthquake (N/A, no full risk assessment)
• Sinkholes (new method using Hazus exposure and hazard probability)
• Expansive soil (new method using Hazus exposure and hazard probability)
EDUCATE
MITIGATE

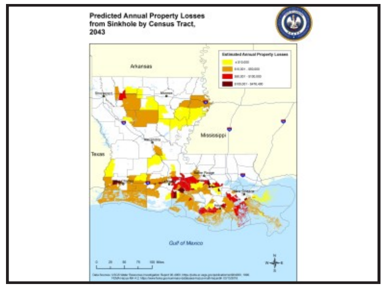

Prepare + Prevent + Respond + Recover + Mitigate
Wildfire Methodology
• Developed in consultation with LDAF
• Total annual burn probability = large + small fire probability
• Considered 5% loss (based on input from LDAF) for 3% of the residences (average ratio of damaged/total residences)
EDUCATE
MITIGATE


Predicted Annual Property Losses
from Wildfire by Census Block,
2043
Arkansas
Mississippi
Texas
Gulf of Mexico

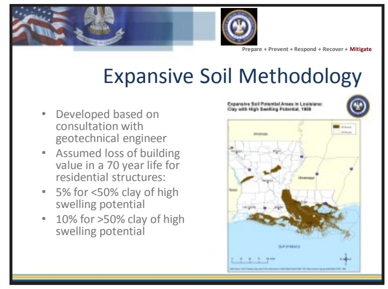

Prepare + Prevent + Respond + Recover + Mitigate
Dam Failure Methodology
• High hazard dam inundation zones being generated by Dam Safety Program
• Superimpose inundation zones with non-zero census blocks
• Apply depth-damage functions to estimate losses
• Probability of dam failure



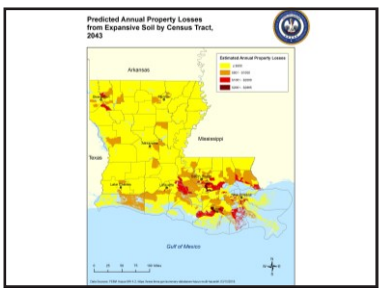
Prepare + Prevent + Respond + Recover + Mitigate
Sinkhole Methodology
• Considered sinkhole* = 0.75 mile radius = 1.77 mi², salt dome = 7 mi²
• Assume sinkhole loss = 100% over 1.77 mi²/7 mi² = 25% of the area
• 2 events in 78 years = 2.6% annual probability
Sinkhole
Salt dome
*Bayou Corne = 0.06 mi², Lake Peigneur = 1.76 mi²
EDUCATE to MITIGATE



Predicted Annual Property Losses from Sinkhole by Census Tract, 2043
Arkansas
Mississippi
Texas
Gulf of Mexico



Prepare + Prevent + Respond + Recover + Mitigate
Expansive Soil Methodology
• Developed based on consultation with geotechnical engineer
• Assumed loss of building value in a 70 year life for residential structures:
• 5% for <50% clay of high swelling potential
• 10% for >50% clay of high swelling potential
EDUCATE to MITIGATE



Predicted Annual Property Losses from Expansive Soil by Census Tract, 2043
Arkansas
Mississippi
Texas
Gulf of Mexico

Prepare + Prevent + Respond + Recover + Mitigate
Hazards Overview
Temperature Hazards
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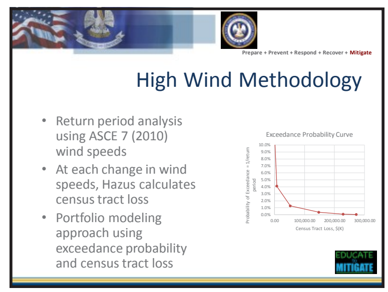
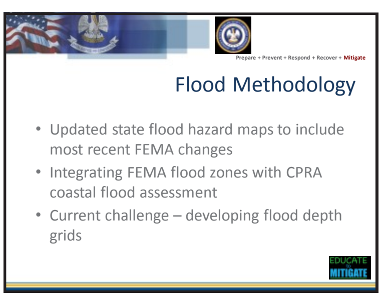
EDUCATE to MITIGATE

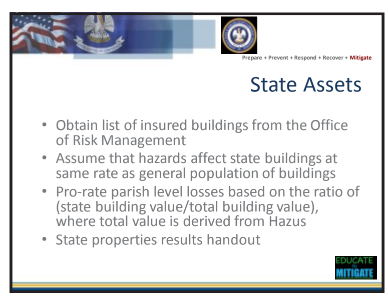


Prepare + Prevent + Respond + Recover + Mitigate
High Wind Methodology
• Return period analysis using ASCE 7 (2010) wind speeds
• At each change in wind speeds, Hazus calculates census tract loss
• Portfolio modeling approach using exceedance probability and census tract loss
Exceedance Probability Curve
Probability of Exceedance = 1/return period
10.0%
9.0%
8.0%
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
0.00
100,000.00
200,000.00
300,000.00
Census Tract Loss, $(K)
EDUCATE to MITIGATE



Prepare + Prevent + Respond + Recover + Mitigate
Flood Methodology
• Updated state flood hazard maps to include most recent FEMA changes
• Integrating FEMA flood zones with CPRA coastal flood assessment
• Current challenge – developing flood depth grids
EDUCATE to MITIGATE

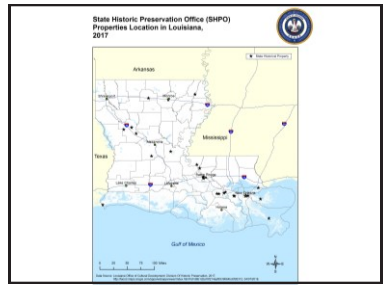
Prepare + Prevent + Respond + Recover + Mitigate
Jurisdictional Loss Results
• Aggregate census block losses by parish
• Draft results table handout
EDUCATE to MITIGATE

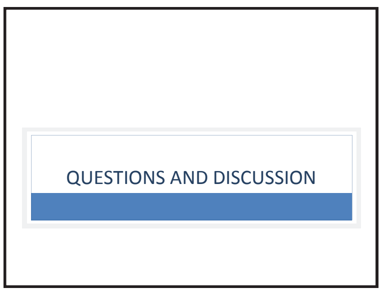


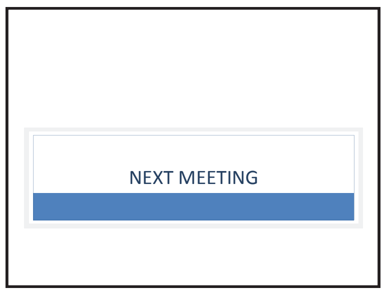
Prepare + Prevent + Respond + Recover + Mitigate
State Assets
• Obtain list of insured buildings from the Office of Risk Management
• Assume that hazards affect state buildings at same rate as general population of buildings
• Pro-rate parish level losses based on the ratio of (state building value/total building value), where total value is derived from Hazus
• State properties results handout
EDUCATE to MITIGATE

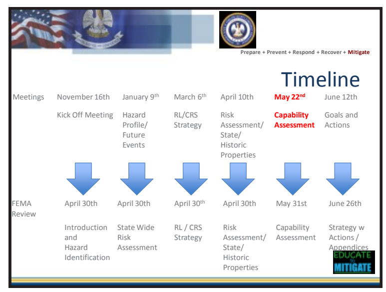

State-Owned Building Locations in Louisiana, 2017

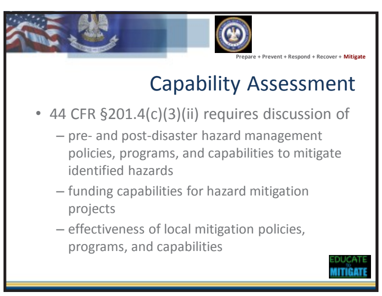

Prepare • Prevent • Respond • Recover • Mitigate
State Historic Properties
• In the 2014 Plan, 43 historic properties were inspected in detail
• Traditional loss assessment doesn't address the historic/cultural value of these sites
• Hazard probabilities for each site
EDUCATE MITIGATE

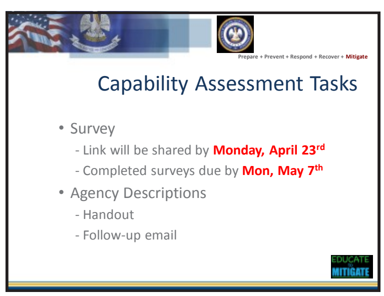

State Historic Preservation Office (SHPO) Properties Location in Louisiana, 2017


QUESTIONS AND DISCUSSION


NEXT MEETING


Prepare • Prevent • Respond • Recover • Mitigate
Timeline
Meetings
November 16th
Kick Off Meeting
January 9th
Hazard Profile/ Future Events
March 6th
RL/CRS Strategy
April 10th
Risk Assessment/ State/ Historic Properties
May 22nd
Capability Assessment
June 12th
Goals and Actions
FEMA Review
April 30th
Introduction and Hazard Identification
April 30th
State Wide Risk Assessment
April 30th
RL / CRS Strategy
April 30th
Risk Assessment/ State/ Historic Properties
May 31st
Capability Assessment
June 26th
Strategy w Actions / Appendices
EDUCATE MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Capability Assessment
• 44 CFR §201.4(c)(3)(ii) requires discussion of
– pre- and post-disaster hazard management policies, programs, and capabilities to mitigate identified hazards
– funding capabilities for hazard mitigation projects
– effectiveness of local mitigation policies, programs, and capabilities
EDUCATE MITIGATE


Prepare • Prevent • Respond • Recover • Mitigate
Capability Assessment Tasks
• Survey
- Link will be shared by Monday, April 23rd
- Completed surveys due by Mon, May 7th
• Agency Descriptions
- Handout
- Follow-up email
EDUCATE MITIGATE

Louisiana State Hazard Mitigation Plan Update 2018

Meeting #5: May 22, 2018 10am to 12pm

Meeting Name
State Risk Assessment

Location
Transportation Training and Education Center 4099 Gourrier Avenue, Baton Rouge, LA 70806

Attendees:

Name	**Agency**
Justin Kozak	CPEX
Zach Rosen	CPRA
Jeanette Dubinin	CPEX
Jennifer Rachal	DOTD
Ellen Ibert	GOSHEP
Jeffrey Giering	GOSHEP
Marion Pearson	GOSHEP
Steve Garcia	GOSHEP
Michelle Gonzales	Jefferson Parish
Maggie Olivier	Jefferson Parish
Bret Lane	LDAF
Warren Byrd	LDI
Carol Friedland	LSU Department of Construction Management
Robayet Bin Mostafiz	LSU College of the Coast and Environment
Rob Rohli	LSU Department of Oceanography and Coastal Sciences
Pat Skinner	LSU AgCenter
Stacy Bonnaffons	OCD
Chip McGimsey	Office of Cultural Development
Nicole Hobson-Morris	Office of Cultural Development
Brett Beoubay	Office of Risk Management
Monica Teets Farris	UNO CHART
Tara Lambeth	UNO CHART
Samantha Romain	UNO CHART

Meeting #5 Agenda

- Welcome
- Planning Process
- Update on Risk Assessment
- Capability Assessment
- Next Steps

Governor's Office of Homeland Security And Emergency Preparedness

Briefing / Meeting: State Hazard Mitigation Plan Update Meeting
Location: 4099 Gourrier Ave., Baton Rouge, LA Date: 5/22/2018 Time 10:00 A.M. till Noon

Name	Signature	Agency/Company		
Brett Beoubay	[illegible]	Office of Risk Management		
Jennifer Rachal	[illegible]	DOTD		
Bret Lane	[illegible]	LA Dept. of Agriculture & Forestry		
Alan Black		Southern Climate Impacts Planning		
Zach Rosen	[illegible]	CPRA		
Jeannette Dubinin	Sub	Director of Coastal Program		
Chip McGimsey	[illegible]	Office of Cultural Development		
Nicole Hobson-Morris	[illegible]	Office of Cultural Development		
Pat Forbes	[illegible]	Office of Community Development	Sub	
Andrea Galinski		CPRA		
Michelle Gonzales	[illegible]	Jefferson Parish		
Maggie Oliver	Maggie Oliver	Jefferson Parish		
Rubayet Bin Mostafiz	[illegible]	LSU		
[illegible]	[illegible]	LSU		

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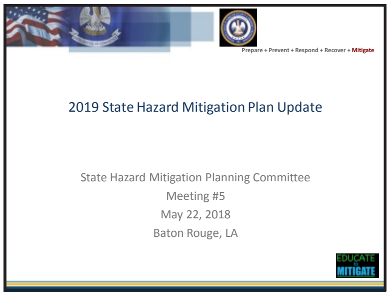
Page ____ of ____

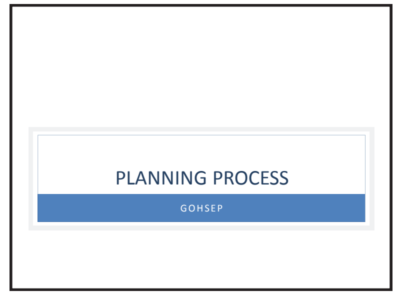
Briefing / Meeting: State Hazard Mitigation Plan Update Meeting Location: 4099 Gourrier Ave., Baton Rouge, LA
Date: 5/22/2018 Time 10:00 A.M. till Noon

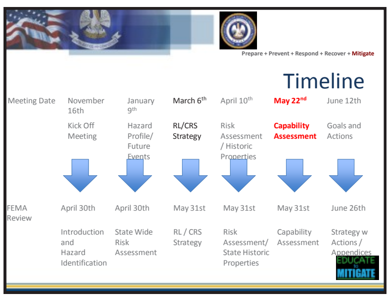
Name	Signature	Agency / Company		
Kara Moree		LA Floodplain Managers Assoc		
Warren Byrd		LA Dept. of Insurance		
Steve Garcia		GOHSEP		
Jeffrey Giering		GOHSEP		
Marion Pearson		GOHSEP		
Ellen Ebert		GOHSEP		
Samantha Romain		UNO		
Monica Teets Farris		UNO		
Tara Lambeth		UNO		
Rob Rohli		LSU		
Carol Friedland		LSU		
Pat Skinner		LSU Ag		
Justin Kozak		CPEX		

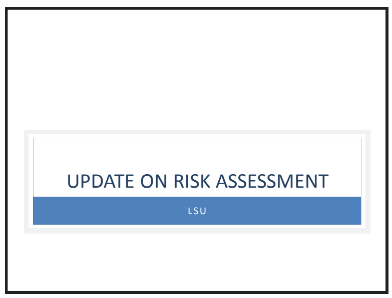
Page ____ of ____

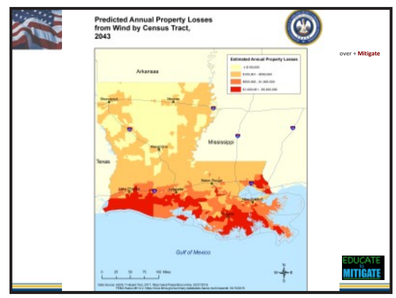
2019 State Hazard Mitigation Plan Update
Meeting #5
May 22, 2018

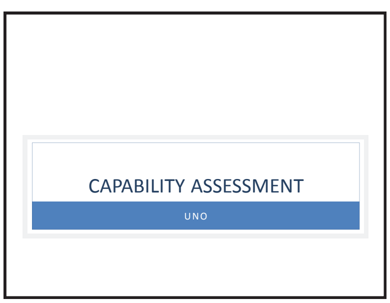


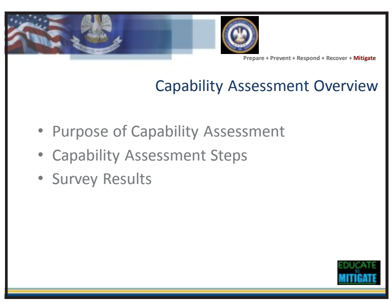


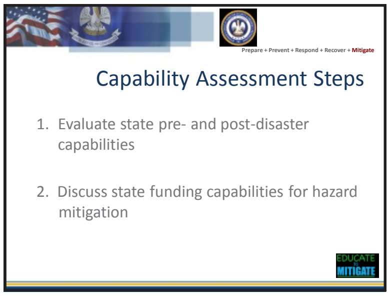


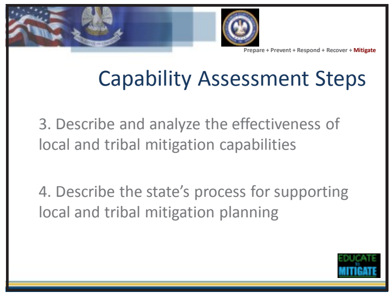


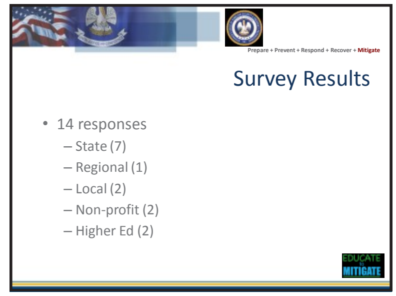


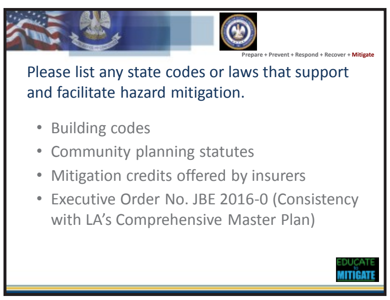




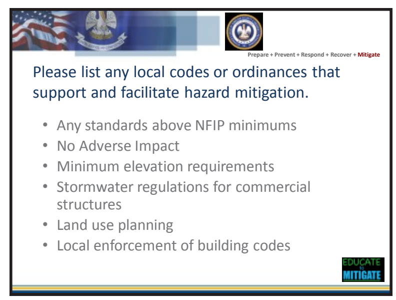

Capability Assessment Steps
1. Evaluate state pre- and post-disaster capabilities
2. Discuss state funding capabilities for hazard mitigation

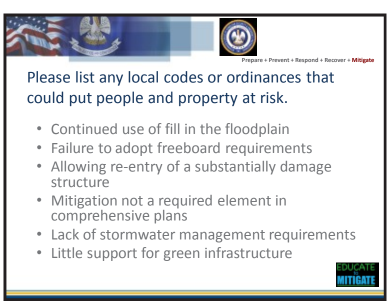

Capability Assessment Steps
3. Describe and analyze the effectiveness of local and tribal mitigation capabilities
4. Describe the state's process for supporting local and tribal mitigation planning

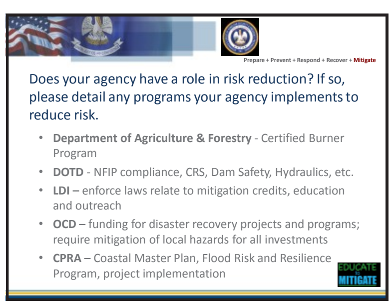

Survey Results
• 14 responses
– State (7)
– Regional (1)
– Local (2)
– Non-profit (2)
– Higher Ed (2)

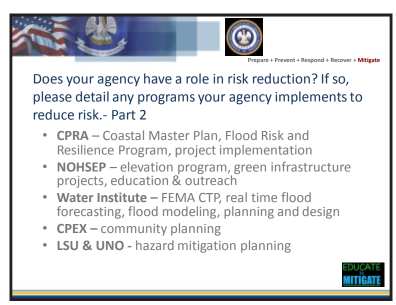

Please list any state codes or laws that support and facilitate hazard mitigation.
• Building codes
• Community planning statutes
• Mitigation credits offered by insurers
• Executive Order No. JBE 2016-0 (Consistency with LA's Comprehensive Master Plan)


Please list any state codes or laws that could put people and property at risk.
• Continued use of fill in the floodplain
• Failure to adopt statewide freeboard requirements
• Allowing re-entry of a substantially damage structure


Please list any local codes or ordinances that support and facilitate hazard mitigation.
• Any standards above NFIP minimums
• No Adverse Impact
• Minimum elevation requirements
• Stormwater regulations for commercial structures
• Land use planning
• Local enforcement of building codes


Please list any local codes or ordinances that could put people and property at risk.
• Continued use of fill in the floodplain
• Failure to adopt freeboard requirements
• Allowing re-entry of a substantially damage structure
• Mitigation not a required element in comprehensive plans
• Lack of stormwater management requirements
• Little support for green infrastructure


Does your agency have a role in risk reduction? If so, please detail any programs your agency implements to reduce risk.
• Department of Agriculture & Forestry - Certified Burner Program
• DOTD - NFIP compliance, CRS, Dam Safety, Hydraulics, etc.
• LDI – enforce laws relate to mitigation credits, education and outreach
• OCD – funding for disaster recovery projects and programs; require mitigation of local hazards for all investments
• CPRA – Coastal Master Plan, Flood Risk and Resilience Program, project implementation


Does your agency have a role in risk reduction? If so, please detail any programs your agency implements to reduce risk.- Part 2
• CPRA – Coastal Master Plan, Flood Risk and Resilience Program, project implementation
• NOHSEP – elevation program, green infrastructure projects, education & outreach
• Water Institute – FEMA CTP, real time flood forecasting, flood modeling, planning and design
• CPEX – community planning
• LSU & UNO - hazard mitigation planning

Please list any programs implemented by your agency that need to be revised to more successfully mitigate risk.

- NFIP Compliance, Post Disaster Compliance Visits, CRS, Dam Safety, Levee Safety, Hydraulics
- Recovery funding could carry more stringent mitigation and resilience requirements.
- The coastal master plan is currently updated every 5 years.

Please list any technical and data resources produced by your agency that can assist the state with mitigation.

- Education and outreach
- Technical assistance to residents and local officials
- Statewide LIDAR
- Climate Smart Cities tool
- Green Infrastructure toolkit
- NOLA/Ready
- Master Plan Data Viewer
- Flood Risk and Resilience Program Documents & Resources

Please list any trainings your agency offers to support local planning.

- NFIP 101
- CRS
- Floodway class
- Green Infrastructure
- Climate Smart Cities
- LA SAFE
- Post-disaster insurance claims
- Application development
- NEPA compliance
- Master Plan Data Viewer

Please list any barriers you know of to implementing mitigation projects.

- Lack of staff
- Lack of sustainable funding
- Lack of coordination with land use, comprehensive plans
- Complex federal regulations
- Lack of incentives to developers/businesses
- Misaligned political priories

Please list ways your agency assists with the NFIP and the CRS. *(DOTD is coordinating agency)*

- Considers CRS in selection of projects
- Higher development codes
- Education and outreach
- Mitigation planning
- Requires compliance with local floodplain programs
- CTP

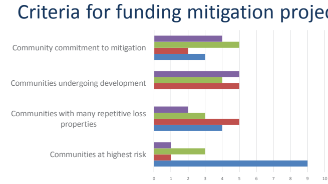
Please list public resources available on your website.

- Newsletters
- La Floodplain Management Desk Reference
- Ready.nola.gov
- Lasafe.la.gov
- www.cpex.org/resources
- American Association of Community Planners
- La's Working Coast Story Map

Please list any funding sources you know about that could help the state with hazard mitigation.

- FEMA, HUD, EPA, USDOT, DHHS, USDA
- GOMESA, WRDA
- Green bonds
- Corporate grants
- Social Impact Bonds
- New Market Tax Credits

Criteria for funding mitigation projects



Other Criteria

- Demonstrated commitment to mitigation
- Communities with necessary structure in place to implement projects
- Communities with the most need for support in terms of staff, funding
- Communities that are most vulnerable to flood risk


QUESTIONS AND DISCUSSION


NEXT STEPS
GOHSEP


Prepare + Prevent + Respond + Recover + Mitigate
Timeline
Meeting Date
November 16th
January 9th
March 6th
April 10th
May 22nd
June 12th
Kick Off Meeting
Hazard Profile/ Future Events
RL/CRS Strategy
Risk Assessment / Historic Properties
Capability Assessment
Goals and Actions
FEMA Review
April 30th
April 30th
May 31st
May 31st
May 31st
June 26th
Introduction and Hazard Identification
State Wide Risk Assessment
RL / CRS Strategy
Risk Assessment/ State Historic Properties
Capability Assessment
Strategy w Actions / Appendices
EDUCATE to MITIGATE

Louisiana State Hazard Mitigation Plan Update 2018

Meeting #6: June 12, 2018 10am to 12pm

Meeting Name

Mitigation Strategy Goals and Actions

Location

Transportation Training and Education Center 4099 Gourrier Avenue, Baton Rouge, LA 70806

Attendees:

Name	**Agency**
Drew Ratcliff	CARPC
Zach Rosen	CPRA
Jeanette Dubinin	CPEX
Ellen Ibert	GOHSEP
Jeffrey Giering	GOHSEP
Marion Pearson	GOHSEP
Bret Lane	LDAF
Rosanne Prats	LA Department of Health
Warren Byrd	LDI
Pam Lightfoot	LA DOTD
Nici English	LDH
Rob Rohli	LSU Department of Oceanography and Coastal Sciences
Rubayet Bin Mostafiz	LSU College of the Coast and Environment
Pat Skinner	LSU AgCenter
Alan Black	LSU SCIPP
Barry Keim	LSU SCIPP
Stacy Bonnaffons	OCD
Tara Lambeth	UNO CHART

Meeting #6 Agenda

- Welcome
- Planning Process
- Follow up from previous meeting
- 2014 Goals and Actions
- 2019 Goals and Actions Activity

Governor's Office of Homeland Security And Emergency Preparedness

Briefing / Meeting: State Hazard Mitigation Plan Update Meeting
Location: 4099 Gourrier Ave., Baton Rouge, LA Date: 6/12/2018 Time 10:00 A.M. till Noon

Name	Signature	Agency/Company		
Brett Beoubay		Office of Risk Management		
Drew Ratcliff		Capital Area Planning		
Bret Lane		LA Dept. of Agriculture & Forestry		
Rosanne Prats		LA Dept of Health		
Zach Rosen		CPRA		
Jeannette Dubinin		Director of Coastal Program		
Chip McGimsey		Office of Cultural Development		
Nicole Hobson-Morris		Office of Cultural Development		
Nici English		LDH		
Stacy Bonnaffons		OCD		
Warren Byrd		LA Dept. of Insurance		
Kara Morre		LA Floodplain Managers Assoc		

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Page ____ of ____

Briefing / Meeting: State Hazard Mitigation Plan Update Meeting Location: 4099 Gourrier Ave., Baton Rouge, LA
Date: 6/12/2018 Time 10:00 A.M. till Noon

Name	Signature	Agency / Company		
Jeffrey Giering	[illegible]	GOHSEP		
Marion Pearson	Marion Pearson	GOHSEP		
Ellen ~~Ebert~~ Ibert	Ellen Ibert	GOHSEP		
Carol Friedland		LSU		
Rob Rohli	[illegible]	LSU		
Young Cheol Lee		LSU		
Pat Skinner	[illegible]	LSU Ag		
Monica Teets Farris		UNO		
Tara Lambeth	[illegible]	UNO		
Samantha Romain	Samantha Romain	UNO		
Pam Lightfoot	Pam Lightfoot	LaDOTD		
Rubayet Mostafiz	[illegible]	LSU		

Page ____ of ____

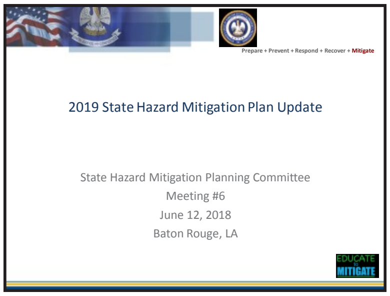
(Cont'd)

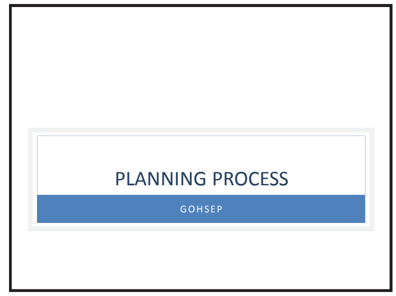
Briefing / Meeting: State Hazard Mitigation Plan Update Meeting, Location: 4099 Gourrier Ave., Baton Rouge, LA
Date: 6/12/2018 Time 10:00 A.M. till Noon

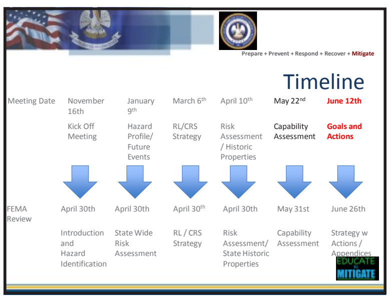
Name	Signature	Agency / Company		
Alan Black	[illegible]	LSU -SCIPP		
Barry Keim	Barry Keim	LSU-SCIPP		

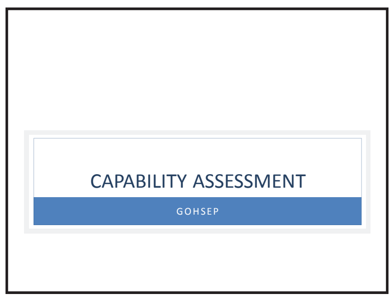
Page ____ of ____

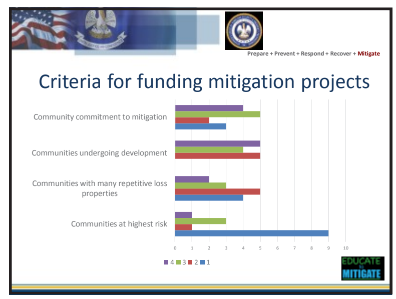
2019 State Hazard Mitigation Plan
Meeting #6
June 12, 2018

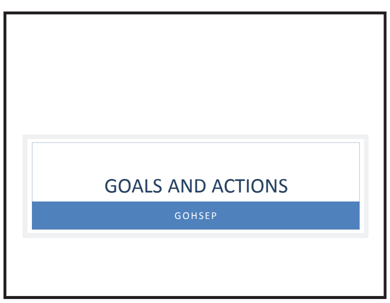


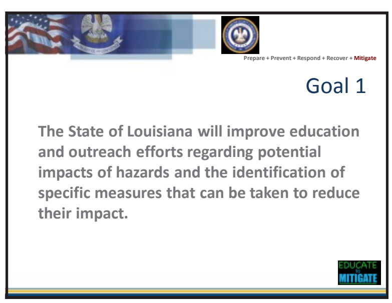


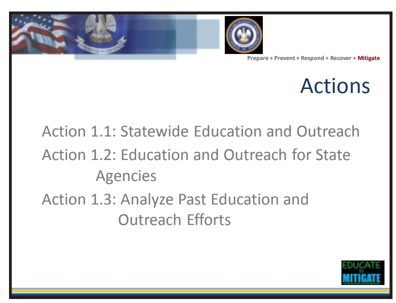


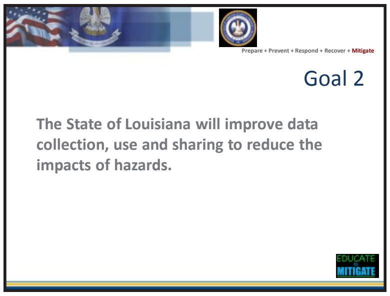


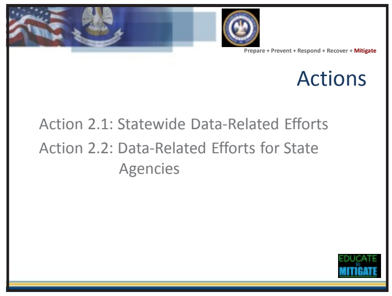


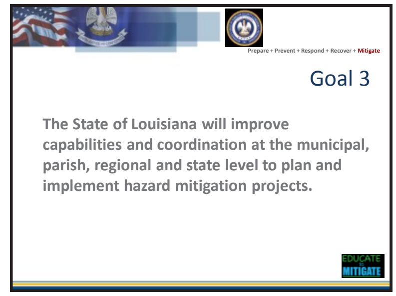


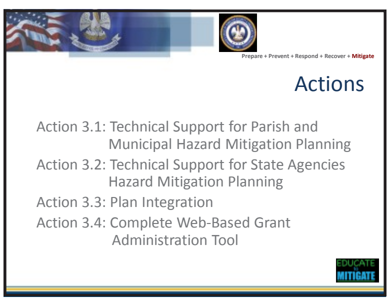


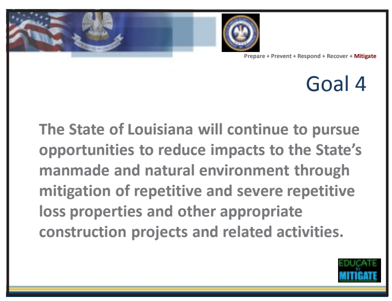


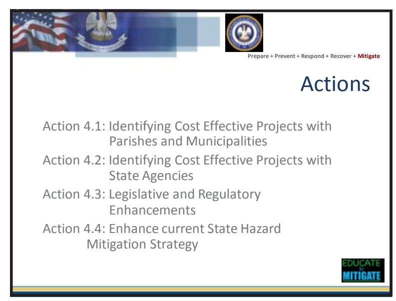

Goal 2
The State of Louisiana will improve data collection, use and sharing to reduce the impacts of hazards.

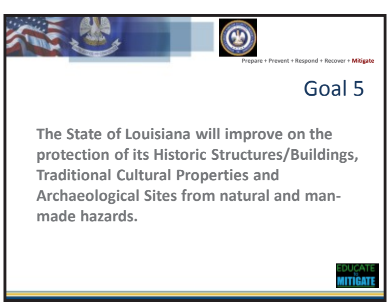

Actions
Action 2.1: Statewide Data-Related Efforts
Action 2.2: Data-Related Efforts for State Agencies

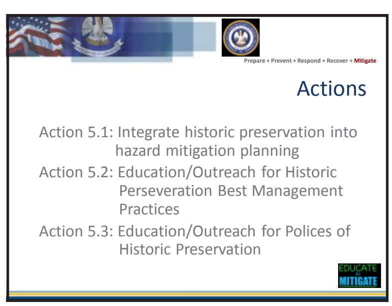

Goal 3
The State of Louisiana will improve capabilities and coordination at the municipal, parish, regional and state level to plan and implement hazard mitigation projects.

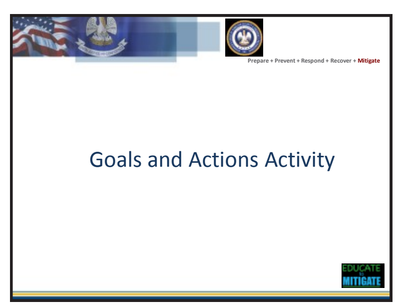

Actions
Action 3.1: Technical Support for Parish and Municipal Hazard Mitigation Planning
Action 3.2: Technical Support for State Agencies Hazard Mitigation Planning
Action 3.3: Plan Integration
Action 3.4: Complete Web-Based Grant Administration Tool

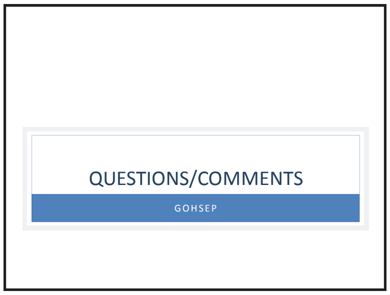

Goal 4
The State of Louisiana will continue to pursue opportunities to reduce impacts to the State's manmade and natural environment through mitigation of repetitive and severe repetitive loss properties and other appropriate construction projects and related activities.


Actions
Action 4.1: Identifying Cost Effective Projects with Parishes and Municipalities
Action 4.2: Identifying Cost Effective Projects with State Agencies
Action 4.3: Legislative and Regulatory Enhancements
Action 4.4: Enhance current State Hazard Mitigation Strategy


Goal 5
The State of Louisiana will improve on the protection of its Historic Structures/Buildings, Traditional Cultural Properties and Archaeological Sites from natural and man-made hazards.


Actions
Action 5.1: Integrate historic preservation into hazard mitigation planning
Action 5.2: Education/Outreach for Historic Perseveration Best Management Practices
Action 5.3: Education/Outreach for Polices of Historic Preservation


Goals and Actions Activity


QUESTIONS/COMMENTS
GOHSEP

PLAN MAINTENANCE

PURPOSE

The section of the Code of Federal Regulations (CFR) pertaining to State Mitigation Plans lists seven required components for each plan: a description of the planning process; risk assessments; mitigation strategies; a description of coordination of local mitigation planning; a method and system for plan maintenance; verification of plan adoption; and assurances of state compliance with the plan. This Appendix details the method and system for plan maintenance, following the CFR's guidelines that the Plan Update must include (1) "an established method and schedule for monitoring, evaluating, and updating the plan," (2) "a system for monitoring implementation of mitigation measures and project closeouts," and (3) "a system for reviewing progress on achieving goals as well as activities and projects identified in the Mitigation Strategy."

MONITORING, EVALUATING AND UPDATING THE PLAN

By law, the Plan must be updated every five years prior to re-submittal to the Federal Emergency Management Agency (FEMA) for re-approval. The first part of this subsection describes the whole update process, including the responsible parties, methods to be used, evaluation criteria to be applied, and schedule for monitoring and evaluating the plan. These descriptions are followed by an explanation of how and when the plan will be periodically updated. The first part of this subsection describes the whole update process, including sections on the following:

1. Responsible parties
2. Methods to be used
3. Evaluation criteria to be applied
4. Scheduling for monitoring and evaluating the plan

These descriptions are followed by an explanation of how and when the plan will be periodically updated.

RESPONSIBLE PARTIES

The Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) is the state agency directly responsible for maintaining the plan. Within that agency, the State Hazard Mitigation Officer (SHMO) is the individual responsible for assuring that plan monitoring and evaluating are done in accordance with the procedures outlined in this section. The State Hazard Mitigation Planning Committee (SHMPC) is responsible for developing periodic updates to the plan.

METHODS FOR MONITORING AND EVALUATING THE PLAN

On an annual basis (and as warranted by circumstances such as a major disaster declaration), GOHSEP will monitor the plan in order to assess the degree to which assumptions and underlying information contained in the plan may have changed. For example, GOHSEP will look for the following:

1. Changes in the information available to perform vulnerability assessments and loss estimates. For example: as parish and municipal risk assessments and plans are integrated into this Plan Update, GOHSEP will solicit feedback from parish and municipal emergency management directors about any changes in their real or perceived risks.

2. Changes in laws, policies and regulations. Changes in state agencies and/or their procedures, including GOHSEP and the administration of grant programs.

3. The results of these monitoring efforts will be made available to the SHMPC as they are produced.

Using the compiled results of ongoing monitoring efforts, the plan will be evaluated annually, generally starting in the month of January (unless circumstances indicate otherwise). GOHSEP will initiate evaluations by contacting state agencies identified as responsible parties in the Mitigation Action Plan, as well as other agencies and organizations that have been involved in developing the plan.

GOHSEP and the SHMPC have the authority to determine if other organizations should also be involved in the process. The SHMPC will be encouraged to include other agencies/ organizations which have specific technical knowledge and/or data pertaining to risks. The initial contacts will be made no later than December of each year for the first two years and in September in the third year (in anticipation of the required Plan Update for FEMA re- approval). The initial contact will advise the appropriate agencies/organizations that the plan will be re-evaluated in the coming months, and request their participation in the process.

GOHSEP also has the authority to evaluate and update the plan at times other than those identified in this section under the following general conditions: (1) After a major disaster declaration; (2) At the request of the Governor; or (3) When significant new information regarding risks or vulnerabilities is identified.

PLAN EVALUATION CRITERIA

The factors that will be taken into consideration during periodic evaluations of the plan include the following:

1. Changes in vulnerability assessments and loss estimations. The evaluation will include an examination of the analyses conducted for hazards identified in the plan and determine if there have been changes in the level of risk to the state and its citizens to the extent that the plan (in particular the strategies and prioritized actions the state is considering) should be modified.

2. Changes in laws, policies, or regulations. The evaluation will include an assessment of the impact of changes in relevant laws, policies, and regulations pertaining to elements of the plan.

3. Changes in state agencies or their procedures (in particular GOHSEP, which is responsible for maintaining the plan) that will affect how mitigation programs or funds are administered

4. Significant changes in funding sources or capabilities.
   Progress on mitigation actions (including project closeouts) or new mitigation actions that the state is considering.

UPDATING THE PLAN

Updates will follow the original planning process outlined in Appendix B. The update process will entail a detailed and structured re-examination of all aspects of the original plan, followed by recommended updates. GOHSEP will lead the update process with assistance from the SHMPC. GOHSEP will present the recommendations to the SHMPC for consideration and approval. It is expected that the Governor will issue a letter of adoption for each update of the plan.

At a minimum, the plan will be updated and re-submitted to FEMA for re-approval every five years, as required by DMA 2000. The five-year update for FEMA re-approval requires that the SHMPC revisit all of the original steps outlined in Appendix B to make sure the plan assumptions and results remain valid as a basis for further decision-making and priority-setting. The plan will also be subject to interim updates as significant changes or new information is identified. The degree to which the entire process is repeated will depend on the circumstances that precipitate the update. GOHSEP will initiate, coordinate and lead all plan updates in conjunction with the SHMPC. The next two paragraphs describe the procedures for interim and three-year updates, respectively.

The nature of Plan Updates will be determined by the evaluation process described above. In general, GOHSEP will notify the SHMPC that the agency is initiating an interim Plan Update, and describe the circumstances that created the need for the update (per the list in the Plan Evaluation Criteria section above). GOHSEP will determine if the SHMPC should be consulted regarding potential changes. If it is determined that the SHMPC should be involved, the nature of the involvement will be at the discretion of GOHSEP.

When interim updates are completed absent the involvement of the SHMPC, GOHSEP will advise all SHMPC members via email that the plan has been updated, and describe the nature of the update. In addition, GOHSEP will provide FEMA Region VI with a copy (although there is no requirement to have the plan re-approved by FEMA for interim updates).

As required by the DMA 2000, the plan will be updated every three years and re-submitted to FEMA for re-approval. In those years, the evaluation process will be more rigorous, and will examine all aspects of the plan in detail. It is anticipated that several meetings of the SHMPC will be required, and that the Governor's Authorized Representative will formally re-approve the plan prior to its submission to FEMA.

The following basic schedule will be undertaken for monitoring, evaluating and updating the plan:

1. At a minimum, monitoring activities by GOHSEP should be done on a quarterly basis

2. Notices regarding annual evaluations should be sent by GOHSEP to the SHMPC in December of the first two years of the plan and in September of the third year

3. The timetable for evaluations and updates for the first two years is expected to last up to four months (January–April), and up to six months for the update in the third year for re-submittal to FEMA (November–April)

2019 PLAN METHOD AND SCHEDULE EVALUATION

For the current Update, the previously approved plan's method and schedule were evaluated to determine if the elements and processes still worked for this update. Based on this analysis, the method and schedule were deemed to be acceptable, and nothing was changed for this update. The process was very successful, as the majority of the **plan** was significantly revised.

PLAN ADOPTION

The Code of Federal Regulations requires that each state's hazard mitigation plan update be formally adopted by the state itself before it is submitted to the Federal Emergency Management Agency for final review and approval. This plan reproduces on the following page the statement of the plan's adoption by James Waskom, Director of the Governor's Office of Homeland Security and Emergency Management and the Governor's Authorized Representative for this action.

Appendix D
Community Rating System Strategy

Introduction
The University of New Orleans' Center for Hazards Assessment, Response and Technology (UNO-CHART) was awarded a Flood Mitigation Assistance (FMA) grant to develop a statewide Community Rating System (CRS) Strategy for Louisiana as part of the 2019 State Hazard Mitigation Plan Update. UNO-CHART accomplished this work in partnership with the State of Louisiana and various stakeholders, including the State Hazard Mitigation Plan Committee, CRS Users groups, and local floodplain management officials. The goals of the strategy are to increase the resources available to Louisiana CRS communities, and to improve coordination among the various state and statewide or regional programs that can help communities reduce flood losses and protect natural floodplain functions. The strategy is based on an analysis of state and national CRS scores, a survey of state and local floodplain managers and state organizations, and suggestions from CRS Users groups and other stakeholders. The strategy includes recommendations on how CRS communities in Louisiana can work to improve their CRS scores, and how the state and other entities may support these efforts.

The Community Rating System (CRS)

The CRS is a voluntary program, which provides incentives for communities to implement floodplain management activities that exceed those required by the National Flood Insurance Program (NFIP). The goals of the CRS are to (1) reduce flood damage to insurable property; (2) strengthen and support all insurance aspects of the NFIP; and (3) encourage a comprehensive approach to floodplain management. An incentive for communities to participate in the CRS is discounts on flood insurance premiums for local policyholders. A community earns points for each CRS activity completed; the number of points earned determines the amount of the flood insurance premium discount. Premium discounts for policies on properties located within the Special Flood Hazard Area (SFHA) range from 5% for a Class 9 community, to 45% for a Class 1. See Table 1 for the number of points needed per class, along with corresponding premium discounts.

Table 1 - Premium Reductions under the Community Rating System

Credit Points	Class	Premium Reduction	Premium Reduction
		SFHA*	Non-SFHA**
4,500+	1	45%	10%
4,000 – 4,499	2	40%	10%
3,500 – 3,999	3	35%	10%
3,000 – 3,499	4	30%	10%
2,500 – 2,999	5	25%	10%
2,000 – 2,499	6	20%	10%
1,500 – 1,999	7	15%	5%
1,000 – 1,499	8	10%	5%
500 – 999	9	5%	5%
0 – 499	10	0	0

* Special Flood Hazard Area also known as the A and V Zones on a Flood Insurance Rate Map
** The Preferred Risk Policy does not receive premium rate credits under the CRS because it already has a lower premium than other policies

The Community Rating System is made up of four series of activities, numbered from 300 to 600. Each series has a number of activities within it, for a total of 19 activities. There are subsequent elements under each activity, totaling 94. Communities earn points for completing the elements under each activity. The 300 series includes public information activities, the 400 series includes activities that encompass mapping and regulations, the 500 series covers flood damage reduction activities, and the 600 series includes activities that cover flood warning and response.

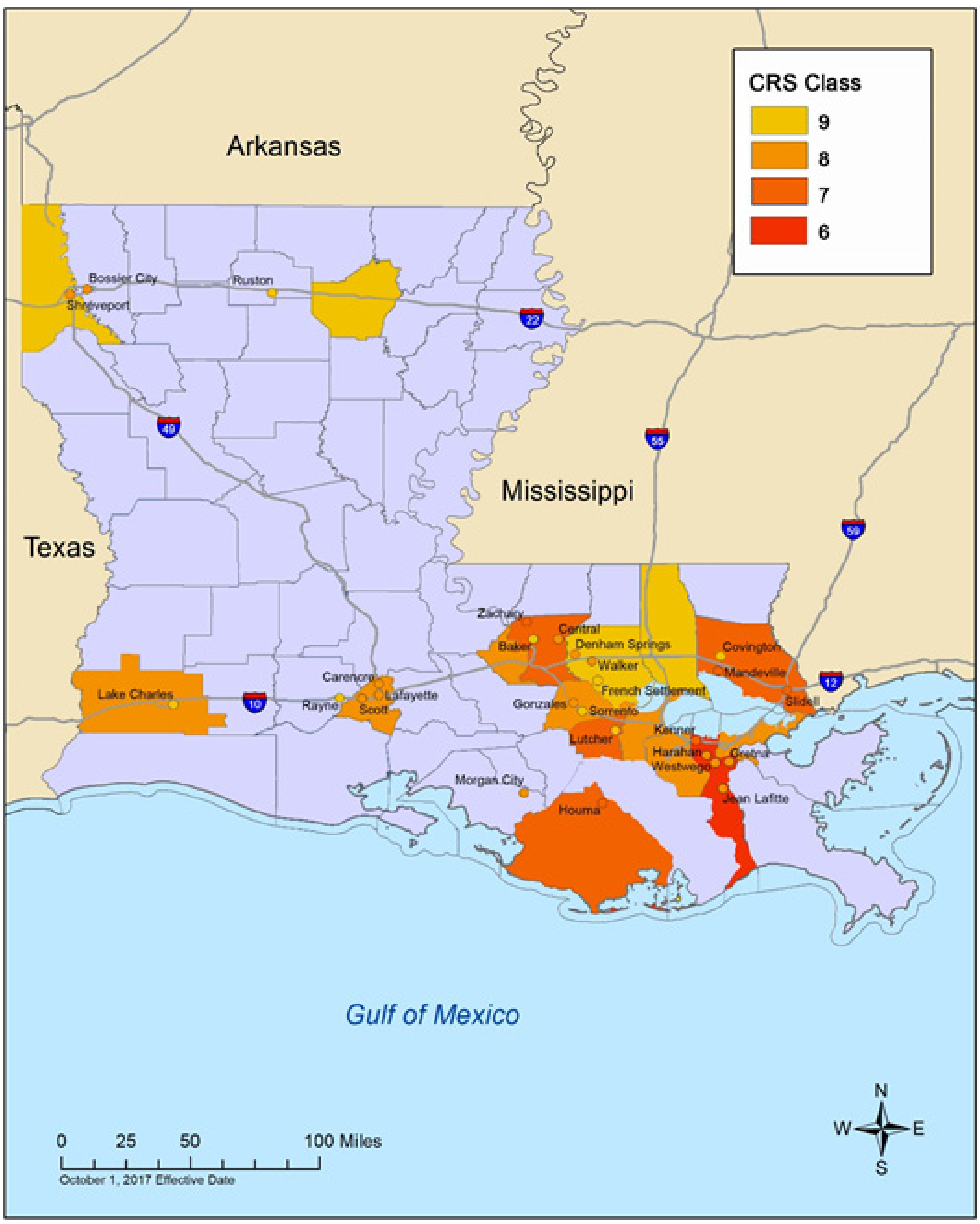
Louisiana CRS Communities

There are 314 communities in Louisiana that participate in the NFIP. Of those, 43 also participate in the CRS. These 43 make up 14% of the communities in the NFIP, and 85% of the policies . Participation in the CRS provides these communities with an annual savings of over $29,000,000 . In comparison to the national rate of participation of 5%, Louisiana communities are very active in the CRS .

The map on the following page reveals that most of the CRS communities are in the southern portion of the state, with the large majority clustered around urban areas. The CRS communities in the northern part of the state are also clustered around urban areas.

1. These statistics were calculated per a June 2018 report from FEMA's Community Information System.
2. Per a June 2018 report from FEMA's Community Information System, Louisiana's total community savings was $29,394,077.
3. https://www.fema.gov/media-library-data/1507029324530-082938e6607d4d9eba4004890dbad39c/NFIP_CRS_Fact_Sheet_2017_508OK.pdf

CRS Communities and Parishes in Louisiana



Methods and Findings

The UNO project team relied on various sources of data to develop this CRS Strategy for the State of Louisiana.
The team developed and implemented a survey for local and state floodplain management officials to identify: (1) the types of assistance needed to implement CRS activities (CRS communities) and (2) the obstacles to enter the CRS for non-CRS communities. UNO-CHART conducted the survey in two phases with the assistance of the Louisiana Department of Transportation and Development (LA DOTD) Public Works and Water Resources Division and the Louisiana Floodplain Management Association (LFMA).

With the assistance of the Insurance Services Office, Inc. (ISO), which is FEMA's CRS management contractor, team members analyzed CRS data for communities across the State of Louisiana. This analysis provided the team with a baseline for further data collection and recommendations.

As this strategy is part of the State's Hazard Mitigation Plan Update, the project team also surveyed members of the Mitigation Plan Update Committee. As the committee is composed of local, regional and state entities, the survey results contribute to the list of potential resources for CRS communities. The survey also served as an education and outreach opportunity, allowing the agencies to become more familiar with specific CRS tasks – especially those in which they may be able to provide support.

Another important task in the development of this strategy was an inventory of state agencies. This allowed the project team to identify programs that can assist communities with floodplain management activities. The team also had the opportunity to reach out to other stakeholders including CRS Users Groups, participants at the 2018 Association of State Floodplain Managers (ASFPM) Annual Conference, and the 2018 LFMA Summer Workshop.

Finally, the team reviewed CRS programs in other states, as well as other states' CRS strategies and outside reports.

CRS Activity Introduction

As an introduction, Table 2 lists each of the activities available for credit under the Community Rating System. CRS activities are numbered according to series 300 through 600. Each activity in the series lists elements for potential points. For example, 300 is the series for Public Information Activities, and 310 is the Elevation Certificate activity that has three elements: a, b, and c.

Table 2 – CRS Activity Breakdown

300 Series: Public Information Activities	
310 (Elevation Certificates)	
a	Elevation Certificates (after CRS application date)
b	Elevation Certificate on post-FIRM buildings
c	Elevation Certificate on pre-FIRM buildings
320 (Map Information Service)	
a	Providing insurance information from the FIRM
b	LiMWA/floodway info/CBRS area
c	Other flood problems not shown on FIRM
d	Flood depth data
e	Special flood-related hazards
f	Historical flood information/repetitive flooding
g	Natural floodplain functions
330 (Outreach Projects)	
a	Outreach projects
b	Flood response preparations
c	Program for Public Information bonus
d	Stakeholder bonus
340 (Hazard Disclosure)	
a	Real estate agent disclosure of SFHA
b	Other disclosure requirements
c	Real estate brochure
d	Disclosure of other hazards
350 (Flood Protection Information)	
a	Library
b	Locally pertinent documents in the library
c	Website
360 (Flood Protection Assistance)	
a	Property protection advice
b	Advice after a site visit
c	Financial assistance advice
d	Training

370 (Flood Insurance Promotion)	
a	Flood insurance assessment
b	Coverage plan
c	Plan implementation
d	Technical assistance
400 Series: Mapping and Regulations	
403 Impact Adjustment Mapping	
410 (Floodplain Mapping)	
a	New study
b	Leverage
c	State review
d	Higher study standards
e	Floodway standard
f	Special hazards mapping
420 (Open Space Preservation)	
a	Preserved open space
b	Deed restriction
c	Natural functions open space
d	Special hazards open space
e	Open space incentives
f	Low density zoning
g	Natural shoreline protection
430 (Higher Regulatory Standards)	
a	Development limitations
b	Freeboard
c	Foundation protection
d	Cumulative substantial improvements
e	Lower substantial improvements
f	Protection of critical facilities
g	Enclosure limitations
h	Building code
i	Local drainage protection
j	Manufactured home park
k	Coastal A Zone regulations
l	Special hazards regulations
m	Other higher standards
n	State mandated standards
o	Regulations Administration
440 (Flood Data Maintenance)	
a	Additional Map Data
b	FIRM maintenance
c	Benchmark maintenance
d	Erosion data maintenance
450 (Stormwater Management)	
a	Stormwater management regulations
b	Watershed master plan
c	Erosion and sedimentation control
d	Water quality regulations
500 Series: Flood Damage Reduction Activities	
510 (Floodplain Management Planning)	
a	Floodplain management planning
b	Repetitive loss area analyses
c	Natural floodplain functions plan
520 (Acquisition and Relocation)	
	Acquisition and relocation of buildings
530 (Flood Protection)	
Retrofitted buildings	
540 (Drainage System Maintenance)	
a	Channel debris removal
b	Problem site maintenance
c	Capital improvements program
d	Stream dumping regulations
e	Storage basin maintenance
600 Series: Warning and Response	
610 (Flood Warning and Response)	
a	Flood threat recognition system
b	Emergency warning dissemination
c	Flood response operations plan
d	Critical facilities planning
e	StormReady community
f	TsunamiReady community

620 (Levees)	
a	**Levee maintenance**
b	**Levee failure threat recognition system**
c	**Levee failure warning**
d	**Levee failure response operations**
e	**Levee failure critical facilities**
630 (Dams)	
a	**State dam safety program**
b	**Dam failure threat recognition system**
c	**Dam failure warning**
d	**Dam failure response operations**
e	**Dam failure critical facilities**

Note that the CRS activities in the table above are divided by series. The 300 series, or public information activities, includes activities that involve providing information through brochures, the library, a website, or in other mediums. The 400 series, or mapping and regulations, spans floodplain mapping, open space preservation, higher regulatory standards, flood data maintenance, and stormwater management. The 500 series, or flood damage reduction activities, involves floodplain management planning, acquisition and relocation, flood protection, and drainage system maintenance. The 600 series, or warning and response, includes activities that have to do with flood threats, levees, and dams. Each series has a number of activities and elements within it. The following section provides more details on the activities and elements in each series.

310: Elevation Certificates

This activity provides credit for communities to maintain elevation certificates on newly constructed buildings. Communities can also get credit for maintaining elevation certificates on buildings built before and after their current flood maps.

320: Map Information Service

This activity credits the community for providing information from the Flood Insurance Rate Map (FIRM). The 2017 CRS Coordinator's Manual expanded this credit from simply reading the FIRM to residents, to providing additional flood-related information that might be on other maps. This additional information can include repetitive flood loss areas, wetlands, and natural functions.

330: Outreach Projects

This activity credits projects that provide information to the public. Communities receive credit for outreach projects by distributing one or more messages, through one or more methods, at least once a year. For instance, communities can provide information on flood hazards by placing a brochure in residents' water bills on an annual basis.

340: Hazard Disclosure

This activity credits communities for advising people looking to purchase property in the flood hazard area. All communities in Louisiana receive 15 points under other disclosure requirements for state laws that require sellers to disclose a property's hazard.

350: Flood Protection Information

The flood protection information activity provides credit to communities who share information about flood protection with the public. These documents can include flood insurance information, flood protection information, general information about flood risk and how to prepare for future storms, and local plans pertaining to flood risk.

360: Flood Protection Assistance

This activity credits communities that give one-on-one flood protection advice to residents. This advice can include flood protection, advice after visiting a property, and financial assistance advice. Communities also get credit for training their staff on this type of assistance.

370: Flood Insurance Promotion

Activity 370 encourages communities to analyze their level of flood insurance coverage and promote flood insurance where it is most needed. This is a new activity, so few communities receive credit for it.

410: Floodplain Mapping

In this activity, communities receive credit for conducting new floodplain mapping studies, contributing to FEMA's studies, or having studies that use higher standards than FEMA's mapping criteria. Very few communities receive credit for this activity, as floodplain mapping studies take a large effort to accomplish.

420: Open Space Preservation

In this activity, communities receive credit for keeping land vacant through ownership or regulations. Open space areas are areas that are preserved as public land, which can include public beaches, state parks, or school playing fields intended to be kept as an open space; private wildlife or nature preserves; or preserved land that prohibits new development.

430: Higher Regulatory Standards

This activity provides credit to communities that require higher standards of floodplain protection. This activity has more elements than any other activity.

440: Flood Data Maintenance

The flood data maintenance activity offers credit for providing additional flood map data. This data can include flood map maintenance, information on benchmarks, and data on erosion.

450: Stormwater Management

This activity includes managing stormwater in the community. Credits for this activity include four different approaches to managing new development in the watershed:

- Requiring larger new developments to construct on site retention or detention basins;
- Developing and implementing a watershed master plan that addresses existing and expected issues of drainage resulting from new or redevelopment;
- Requiring erosion and sediment control measures on construction sites; and
- Requiring water quality measures in new drainage and stormwater facilities.

510: Floodplain Management Planning

The Floodplain Management Planning activity provides points to communities who create plans to manage their floodplains. Activity 510 provides points to communities that develop and adopt three types of these plans:

- A floodplain management or multi-hazard mitigation plan to provide overall guidance for preventing and reducing flood problems;
- Area analyses for repetitive loss areas; or
- Plans that protect natural floodplain functions (typically, this credit is for existing plans).

520: Acquisition and Relocation

Under this activity, communities can receive credit for the removal, demolition, or relocation of a building from the regulatory floodplain. Points for this activity are based on the number of buildings cleared in proportion to the number of buildings that exist in the floodplain.

530: Flood Protection

Credit is available for flood protection projects such as elevating or retrofitting buildings, and constructing structural flood control and drainage projects. Points for this activity are based on the technique used, and the number of buildings protected by the technique. For example, as the most effective retrofitting technique, elevation projects receive the most points.

540: Drainage System Maintenance

The drainage system maintenance activity provides credit based on the community's drainage inspection and maintenance program. Communities receive points by making annual inspections and documenting the follow up maintenance. It is important to note that credit for this activity focuses on the maintenance of a community's natural drainage system; a number of Louisiana communities are unable to earn credit for this activity, as they do not have natural streams, creeks or rivers.

610: Flood Warning and Response
Communities receive credit for four flood warning and response activities:

- Receiving advanced notification of an impending flood (threat recognition);
- Issuing warnings to the threatened population (warning dissemination);
- Taking steps to protect life and reduce losses during the flood (response operations); and
- Coordinating with critical facilities (critical facilities planning).
-

Once credit from all four of these elements is verified, a StormReady community could receive additional credit. Under the 2017 CRS Coordinator's Manual, a community must receive some points under all four of these elements.

620: Levees
Under this activity, communities receive points for levee maintenance and levee failure warning and response procedures. Very few communities (none in Louisiana) receive any credit for this activity.

630: Dams
Communities can also receive credit for dam failure warning and response programs. The 2017 CRS Coordinator's Manual limits credit to those communities that can flood due to a dam failure.

Louisiana CRS Communities by Class
The project team also examined classifications of Louisiana CRS communities. Figure 1 provides a comparison of Louisiana community CRS classifications to communities across the United States. A CRS Class 1 receives the maximum discount (45%), while a Class 9 receives the minimum flood insurance discount (5%). Most CRS communities in Louisiana are Class 8 communities, followed by Class 9 and Class 7. While there are communities with classifications of 5 and higher, Louisiana's highest scoring community is a Class 6. However, 50% of CRS communities in Louisiana, and over 30% of communities across the nation, are Class 8s, receiving a 10% discount on flood insurance rates in the SFHA, and 5% in the non-SFHA. In comparison, Class 1 communities receive a 45% flood insurance discount in the SFHA.

Figure 1 – CRS Participation by Class

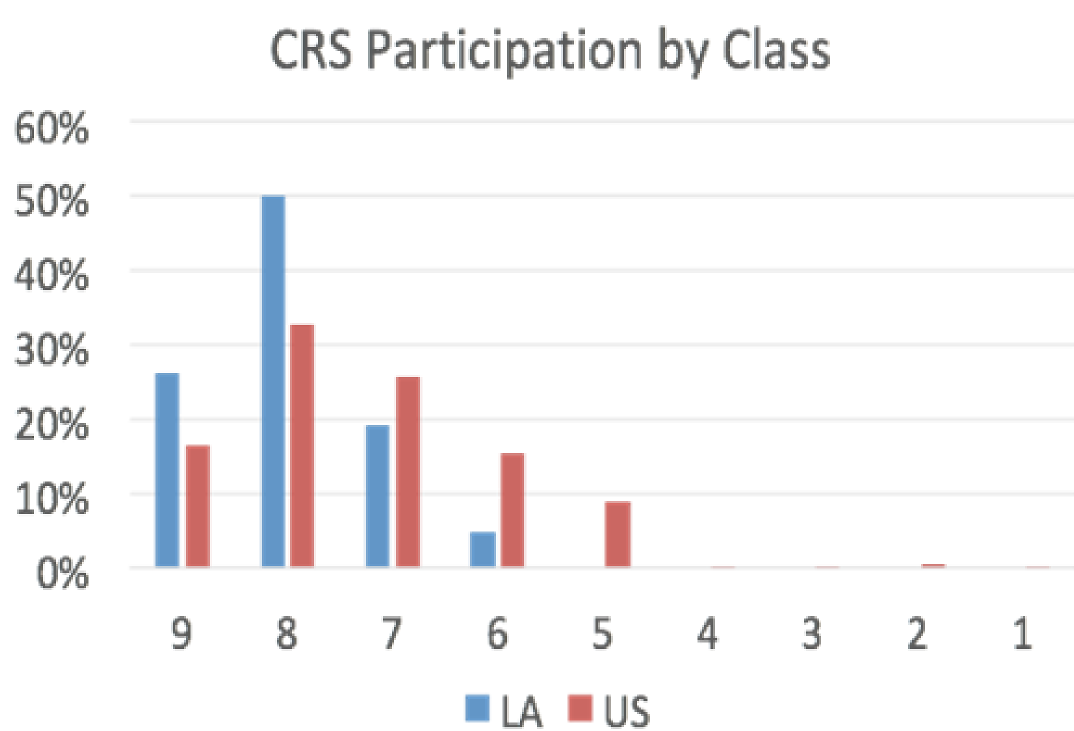
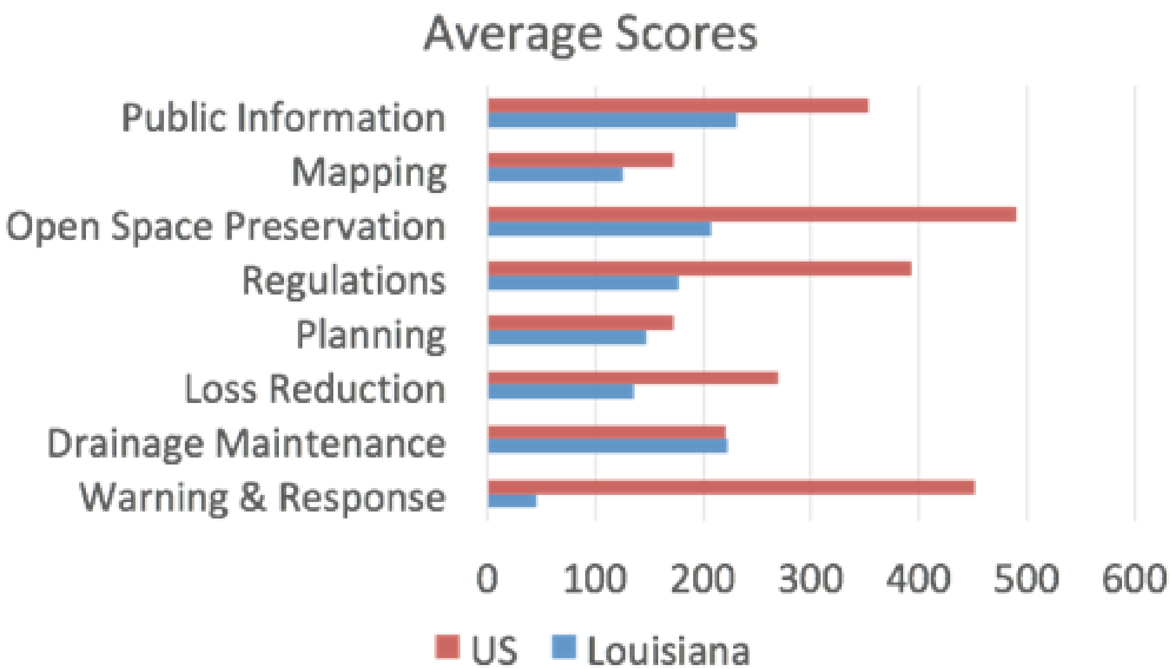


Figure 2 reveals the average scores of Louisiana and the nation in the main CRS activities. While Louisiana's averages are similar to nationwide averages in mapping, planning, and drainage maintenance, the state is behind in open space preservation , regulations, and warning and response. The state could also improve in public information and loss reduction in comparison to the national average.

Figure 2 - Average CRS Scores



Survey of Floodplain Managers

In addition to the CRS data analysis, UNO-CHART conducted a survey to collect perspectives on the CRS from floodplain managers, planners, CRS coordinators, and other local and state officials. The goal of the survey was to identify the CRS activities that Louisiana communities require more support for across the state, in order to participate, or more fully participate, in the CRS. The team received 61 survey responses, which indicate a range of floodplain management needs. Overall, the survey responses underlined the need for increased training, education, and resources across Louisiana. UNO-CHART conducted the survey in two phases. First, the team administered the survey at the 34th Annual LFMA Technical and Business Conference in April 2017, receiving 41 responses. Then, in order to broaden the reach of the survey, the team distributed an online survey to building officials, floodplain managers, CRS coordinators, and state officials throughout Louisiana in October 2017. The online survey garnered 20 responses, resulting in a total of 61 survey responses. The survey asked respondents to identify the top five CRS activities in which their community could use outside support, and the top three types of assistance that could help their community implement CRS activities. Other questions asked participants to specify their job title, and if their community participates in the CRS. The survey also asked participants to discuss any obstacles that prevent their community from participating in the CRS.

4. Credit for open space is determined by a ratio calculated by dividing the total area of preserved open space by the total area of the Special Flood Hazard Area (SFHA). The fact that many Louisiana communities have a significant SFHA makes it difficult for these communities to earn credit under the open space activity.

Figure 3 - Survey Participants

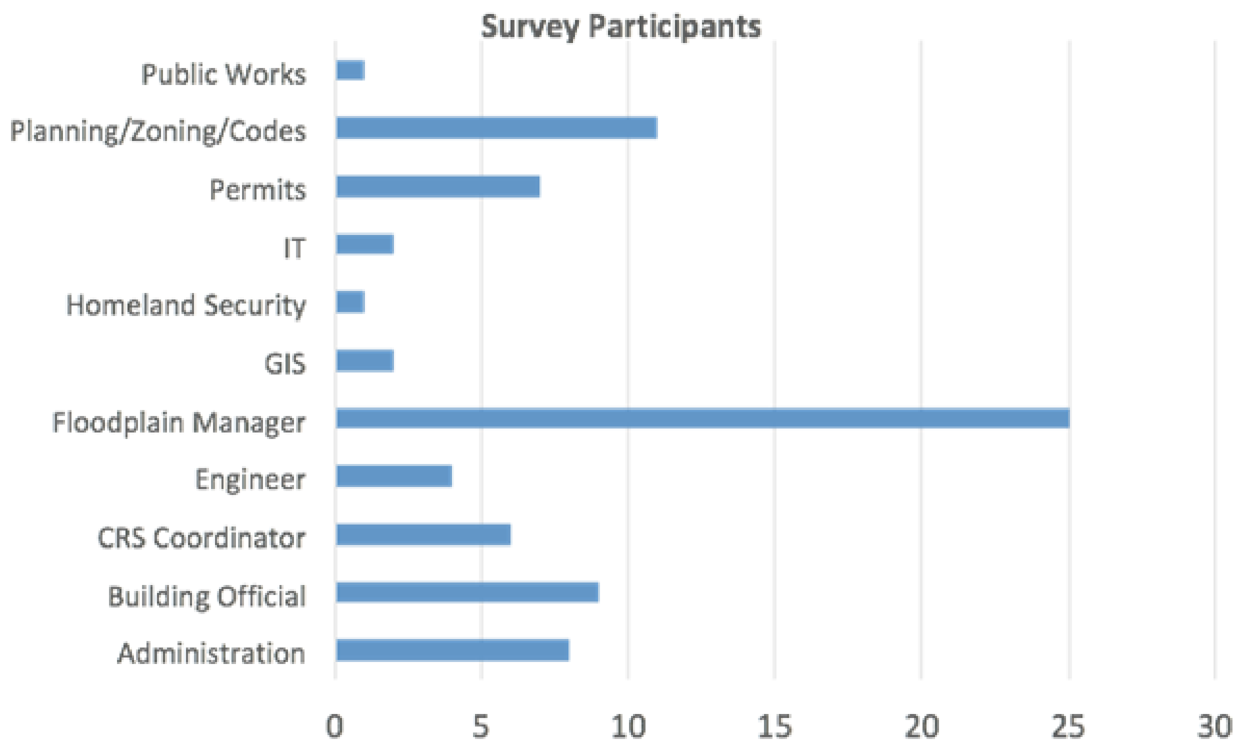
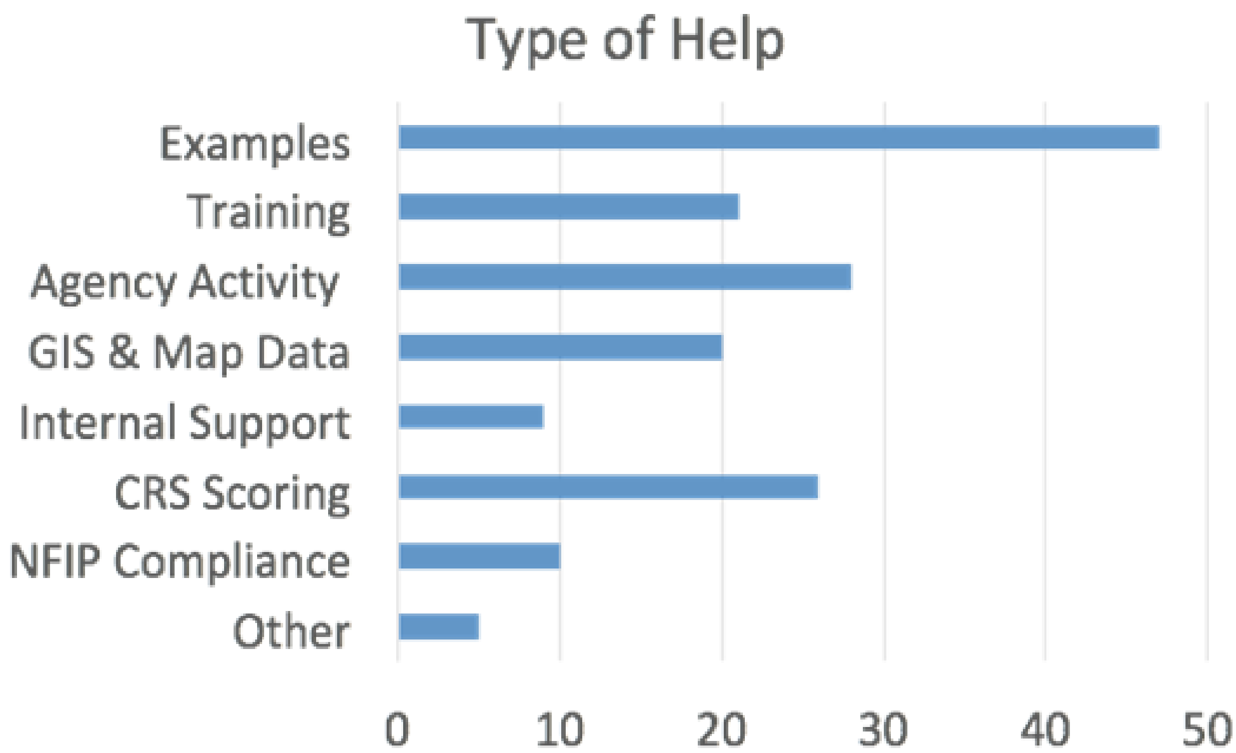


Figure 3 above depicts the survey participants. The vast majority of the 61 respondents were floodplain managers, but the respondents also included planning/zoning officials, building officials, administrative officials, permit department officials, and CRS Coordinators. Members of Engineering, GIS, IT, Public Works and Homeland Security departments also completed the survey. A total of 39, or 64%, of the survey respondents participate in the CRS.

Figure 4- Requested Help

Many survey participants requested help with public information activities. Respondents also noted the need for help in loss reduction and warning and response. The officials further requested help with regulations, planning, drainage maintenance, open space, and mapping. See Figure 4 for more information on requests.

Figure 5 - Type of Help



The survey participants also detailed the type of help that could support the implementation of their CRS programs (Figure 5). The majority of respondents asked for examples, or templates, of CRS activities. The officials also requested help with documenting outside agency activities, CRS scoring, and training. The other subjects identified for additional help were NFIP compliance and internal support. One community expressed difficulty in passing a Community Assistance Visit (CAV) conducted by or on behalf of FEMA. The purpose of a CAV is to provide technical assistance and to ensure a community is enforcing its floodplain management regulations. Passing a CAV is the most important obstacle for communities that consider joining the CRS, as it is the first step in becoming a CRS community.

Finally, the open-ended questions in the survey asked for non-participating communities to discuss any significant obstacles that may prevent the community from joining the CRS. Survey participants generally agreed on a lack of CRS personnel, lack of support from governing officials, and financial constraints as obstacles to CRS participation in their communities. Lastly, the survey asked respondents for any comments. One official said, "Any information would be helpful," and another participant stated, "The point system is very confusing." Respondents not in the CRS remarked that they were, "not sure what requirements are necessary," and emphasized a general "lack of knowledge" when trying to understand CRS objectives. These comments reveal that many communities would benefit from CRS training.

Overall, the survey results reveal that many communities do not have the resources available to implement a CRS program, and those that participate in the CRS need assistance with activity templates, particularly for outreach projects, CRS training, and would also benefit from information provided by state agencies, such as GIS maps.

Similarly, the Center for Planning Excellence, in a report entitled The Community Rating System: Making it work for Louisiana, suggests that small coastal communities with low incomes experiencing high insurance premiums are the communities most in need of CRS help. These communities could benefit from trainings, advice from users groups, and CRS Coordinator trainings.

Discussion

Based on the data collected, it appears there are many opportunities for communities to improve their CRS scores across series and activities. The level of resources needed for implementation varies according to activity. Each community, of course, must consider the costs and benefits of each additional activity.

The project team analyzed current data for Louisiana CRS communities. After summarizing the data per activity across these communities, the team compared that data to summary data collected from communities across the United States. The CRS Activity Breakdown (Table 3) below shows CRS activities and elements for which Louisiana communities receive credit, based on the 2013 CRS Coordinator's Manual. CRS credit scores are based on community ISO CRS specialist visits. The US Percent column shows the percentage of communities in the nation that get credit for each activity; the LA Percent column shows the percentage of Louisiana communities that get credit for each activity. The US Average column shows the average points for each activity nationwide, and the Louisiana Average column shows the average points for each activity in Louisiana. The Max column shows the maximum amount of points available in each activity. The LA Points vs. US column shows the percentage of Louisiana points compared to the points nationwide. The Assistance Requests column is the percentage of surveyed floodplain managers that asked for help with each activity. This percentage only appears under the activities in which the floodplain managers asked for help. The cells highlighted in yellow show where Louisiana communities could use improvement in comparison to national participation rates and/or points earned. A further discussion of the underutilized CRS activities/elements in Louisiana follows the table.

Table 3 – CRS Activity Breakdown Based on the 2013 CRS Coordinator's Manual

		Participation		Points			LA points vs. US	Assistance Requests
Activity / Element		US Pct.	LA Pct.	US Avg.	LA Avg.	Max		
300 Series: Public Information Activities								
310 (Elevation Certificates)								
a	Elevation Certificates (after CRS application date)	100%	100%	33	33	38	100%	
b	Elevation Certificate on post-FIRM buildings	13%	26%	27	10	48	37%	
c	Elevation Certificate on pre-FIRM buildings	2%	0%	9	0	30	0%	
Activity total		100%	100%	37	35	116	95%	22%

320 (Map Information Service)								
a	Providing insurance information from the FIRM	85%	100%	30	29	30	97%	
b	LiMWA/floodway info/CBRS area	57%	5%	20	20	20	100%	
c	Other flood problems not shown on FIRM	32%	5%	20	20	20	100%	
d	Flood depth data	33%	11%	20	20	20	100%	
e	Special flood-related hazards	11%	5%	20	20	20	100%	
f	Historical flood information/ repetitive flooding	45%	11%	20	20	20	100%	
g	Natural floodplain functions	34%	0%	0	0	20	0%	
Activity total		88%	100%	73	35	90	48%	30%
330 (Outreach Projects)								
a	Outreach projects	94%	100%	89	48	200	54%	
b	Flood response preparations	11%	5%	35	6	50	17%	
c	Program for Public Information bonus	6%	5%	61	37	80	61%	
d	Stakeholder bonus	4%	5%	23	13	20	57%	
Activity total		94%	100%	92	48	350	52%	57%
340 (Hazard Disclosure)								
a	Real estate agent disclosure of SFHA	2%	0%	24	0	35	0%	
b	Other disclosure requirements	80%	100%	12	16	25	133%	
c	Real estate brochure	16%	42%	8	8	12	100%	
d	Disclosure of other hazards	1%	0%	8	0	8	0%	
Activity total		83%	100%	14	19	80	136%	
350 (Flood Protection Information)								

a	Library	80%	79%	8	7	10	88%	
b	Locally pertinent documents in the library	63%	47%	5	3	10	60%	
c	Website	73%	79%	34	21	105	62%	13%
Activity total		89%	89%	39	26	125	67%	
360 (Flood Protection Assistance)								
a	Property protection advice	43%	42%	26	25	40	96%	
b	Advice after a site visit	40%	37%	30	30	45	100%	
c	Financial assistance advice	4%	0%	10	0	15	0%	
d	Training	4%	5%	5	4	10	80%	
Activity total		473%	42%	55	52	110	95%	
370 (Flood Insurance Promotion)								
a	Flood insurance assessment	3%	5%	15	15	15	100%	
b	Coverage plan	2%	0%	15	0	15	0%	
c	Plan implementation	1%	0%	52	0	60	0%	
d	Technical assistance	2%	0%	15	0	20	0%	
Activity total		4%	5%	42	15	110	36%	30%
400 Series: Mapping and Regulations								
403 Impact Adjustment Mapping								
410 (Floodplain Mapping)								
a	New study	16%	11%	*	*	350		
b	Leverage	16%	11%	*	*	N/A		
c	State review	18%	0%	*	*	60		
d	Higher study standards	16%	0%	*	*	200		
e	Floodway standard	14%	0%	*	*	140		
f	Special hazards mapping	4%	0%	*	*	100		
Activity total		53%	37%	57	23	850	40%	17%
420 (Open Space Preservation)								

a	Preserved open space	87%	89%	438	203	1,450	46%	
b	Deed restriction	29%	0%	5	0	50	0%	
c	Natural functions open space	42%	37%	43	34	170	79%	
d	Special hazards open space	3%	0%	60	0	50	0%	
e	Open space incentives	15%	11%	36	15	250	42%	
f	Low density zoning	15%	0%	211	0	600	0%	
g	Natural shoreline protection	2%	0%	24	0	120	0%	
Activity total		91%	95%	490	207	2,870	42%	25%
430 (Higher Regulatory Standards)								
a	Development limitations	37%	11%	83	70	1,330	84%	
b	Freeboard	83%	42%	97	52	500	54%	
c	Foundation protection	20%	0%	33	0	80	0%	
d	Cumulative substantial improvements	34%	26%	44	60	90	136%	
e	Lower substantial improvements	8%	5%	11	20	20	182%	
f	Protection of critical facilities	20%	0%	32	0	80	0%	
g	Enclosure limitations	10%	5%	65	214	240	329%	
h	Building code	88%	100%	62	52	100	84%	
i	Local drainage protection	77%	89%	16	18	120	113%	
j	Manufactured home park	4%	0%	15	0	15	0%	
k	Coastal A Zone regulations	5%	0%	324	0	650	0%	
l	Special hazards regulations	4%	0%	88	0	100	0%	
m	Other higher standards	22%	5%	51	25	100	49%	

n	State mandated standards	78%	0%	13	0	20	0%	
o	Regulations Administration	67%	68%	17	12	67	71%	
Activity total		100%	100%	267	134	2,462	50%	19%
440 (Flood Data Maintenance)								
a	Additional Map Data	92%	95%	107	94	160	88%	
b	FIRM maintenance	49%	53%	11	11	15	100%	
c	Benchmark maintenance	26%	11%	23	27	27	117%	
d	Erosion data maintenance	3%	0%	15	0	20	0%	
Activity total		96%	95%	115	102	222	89%	
450 (Stormwater Management)								
a	Stormwater management regulations	59%	37%	125	59	380	47%	
b	Watershed master plan	7%	0%	126	0	315	0%	
c	Erosion and sedimentation control	86%	79%	17	11	40	65%	
d	Water quality regulations	66%	32%	20	20	20	100%	
Activity total		88%	84%	126	44	755	35%	19%
500 Series: Flood Damage Reduction Activities								
510 (Floodplain Management Planning)								
a	Floodplain management planning	67%	89%	171	147	382	86%	37%
b	Repetitive loss area analyses	2%	0%	140	0	140	0%	33%
c	Natural floodplain functions plan	6%	0%	23	0	100	0%	
Activity total		68%	89%	173	147	622	85%	
520 (Acquisition and Relocation)								
	Acquisition and relocation of buildings	28%	42%	201	79	2,250	39%	
530 (Flood Protection)								

	Retrofitted buildings	13%	26%	68	57	1,600	84%	30%
540 (Drainage System Maintenance)								
a	Channel debris removal	41%	79%	152	176	200	116%	
b	Problem site maintenance	25%	26%	39	41	50	105%	
c	Capital improvements program	21%	42%	31	28	70	90%	
d	Stream dumping regulations	32%	37%	22	22	30	100%	
e	Storage basin maintenance	11%	5%	64	120	120	188%	
Activity total		42%	79%	221	223	470	101%	29%
600 Series: Warning and Response								
610 (Flood Warning and Response)								
a	Flood threat recognition system	20%	0%	73	4	75	5%	
b	Emergency warning dissemination	20%	0%	62	0	75	0%	
c	Flood response operations plan	20%	0%	71	0	115	0%	
d	Critical facilities planning	20%	0%	37	0	75	0%	
e	StormReady community	11%	0%	25	0	25	0%	
f	TsunamiReady community	1%	0%	30	0	30	0%	
Activity total		20%	0%	258	0	395	0%	32%
620 (Levees)								
a	Levee maintenance	1%	0%	95	0	95	0%	
b	Levee failure threat recognition system	1%	0%	30	0	30	0%	
c	Levee failure warning	1%	0%	27	0	50	0%	
d	Levee failure response operations	1%	0%	22	0	30	0%	

e	Levee failure critical facilities	1%	0%	15	0	30	0%	
Activity total		1%	0%	157	0	235	0%	17%
630 (Dams)								
a	State dam safety program	35%	16%	35	45	45	129%	
b	Dam failure threat recognition system	1%	0%	25	0	30	0%	
c	Dam failure warning	1%	0%	22	0	35	0%	
d	Dam failure response operations	1%	0%	10	0	30	0%	
e	Dam failure critical facilities	1%	0%	5	0	20	0%	
Activity total		35%	16%	36	45	160	125%	0%

Underutilized Activities

There are a number of activities where Louisiana scores low in comparison to other states across the nation. Communities can accomplish many of these activities in the short term through training, use of templates, and utilization of additional maps and/or map layers while other activities may serve as longer-term community goals.

320: Map Information Service

Louisiana could improve credit in multiple map information service activities, including other flood problems not shown on the FIRM, flood depth data, special flood-related hazards, historical flood information and/or repetitive flooding information, and natural floodplain functions. This type of map information is worth 20 points each, and can be created using GIS layers. Providing training to the individuals tasked with creating maps at the local level could help to improve these scores. Outside agencies may also have map layers that may be of use at the local level. Additionally, understanding how to communicate the information provided on the maps is also important.

330: Outreach Projects

In the outreach project activity, Louisiana receives only 52% of the total points earned nationwide. Louisiana communities could improve their scores through implementing more outreach projects, and creating specific outreach for flood response. All outreach projects can be listed in a Program for Public Information (PPI), which provides even more credit to communities who create outreach projects and evaluate them over time. CRS communities in the state could further improve in this category if outside agencies shared outreach project documentation, including templates and/or outreach schedules, and trained communities on PPIs and scoring methods.

350: Flood Protection Information

While the maximum points available for providing flood protection information on websites is 105, Louisiana's average is only 21. CRS communities in the state could improve in this category if state and/or regional agencies provided training and website templates.

360: Flood Protection Assistance

Louisiana currently receives an average of 4 points for training on flood protection, while the rest of the nation averages 10 points. State agencies could assist CRS communities by training their staff on this type of assistance.

370: Flood Insurance Promotion

Right now, Louisiana does not have any points in the flood insurance coverage plan and implementation categories. Many communities include flood insurance promotion plans in their Programs for Public Information (PPI) and hope to earn credit during future CRS cycle visits. Training on PPI implementation could help with this activity as well.

410: Floodplain Mapping

Louisiana has a low score in this activity, earning 23 points on average out of the 850 possible points. However, this activity is difficult to accomplish, as it requires creating new studies and plans. Still, training on the points possible from already existing studies could help communities increase their score.

420: Open Space Preservation

Compared to the nationwide average, Louisiana has low scores in the open space preservation activity. This activity involves policy as well as GIS mapping. Example policies and regulations, in addition to mapping training, could help communities to earn better scores.

430: Higher Regulatory Standards

Louisiana could improve in multiple categories under this activity. First, Louisiana is only earning about one-half of the points of the nationwide average in freeboard. Communities can improve their scores by implementing freeboard ordinances, and outside entities could provide regulatory language for those ordinances. Louisiana has little to no participation in protection of critical facilities, enclosure limitations, special hazards regulations and state mandated standards. Through example regulatory language, training of local regulatory staff on CRS scoring, and review of the state building code for better minimum standards, state/regional agencies and associations could help improve scoring in this activity.

450: Stormwater Management

In this activity, the Louisiana average is well below the national average. The state could improve this activity through the development and implementation of stormwater management regulations and water quality regulations. State agencies could provide example regulatory language and training on the scoring in this activity to help CRS communities improve their scores.

510: Floodplain Management Planning

The Louisiana average in the floodplain management category is over 400 points below the maximum, so there is room for improvement. Communities can receive more points in this activity by writing and implementing floodplain management plans, conducting repetitive loss area analyses, and developing and implementing natural functions plans. State agencies could draft planning process criteria to help with this activity. As well, UNO-CHART has conducted repetitive loss area analyses across the state, which CRS communities can access as a template (floodhelp.uno.edu). Further, there may be studies already in existence for which communities may earn credit. State agencies could provide training to help CRS communities identify these studies.

540: Drainage System Maintenance

While Louisiana on average scores well in this activity, there is room for improvement in storage basin maintenance. State/regional/local agencies could assist with this by providing a maintenance language template and training on the scoring in this activity.

Locally Important Activities

There are activities that are difficult to earn credit for but are essential for the safety of Louisiana communities. These include flood warning and response and levees.

610: Flood Warning and Response

Currently, only one Louisiana community (Jefferson Parish) receives any points in this activity which is why the average score is quite low. However, this activity is important, as communities in Louisiana flood frequently. State agencies could provide training on flood threat recognition systems and emergency warning dissemination to help with this activity. In addition, state agencies could provide templates for flood response operations plans as well as critical facilities planning to help CRS communities with flood warning and response.

620: Levees

Louisiana communities do not receive any points for levees at this time. Even so, many Louisiana communities have levees. State and/or regional agencies could provide templates for levee maintenance, failure warning and response plans, and critical facilities to help with this activity. In addition, communities could coordinate with levee districts to receive points in this activity.

Recommendations and Resources

The overall intent of this strategy is to identify potential sources of support for CRS communities, thereby increasing the number of activities that can be implemented at the local level. This section details a survey of state agencies that could assist with CRS activities. This section also includes a summary of potential sources of help per CRS activity. The section concludes with summary lists of needs for training, direct assistance, and models and templates, for various CRS activities. The final lists include federal agencies, state agencies, professional associations, and other stakeholders whose current work could potentially meet these needs.

Survey of Hazard Mitigation Plan Update Committee

In a survey of the State Hazard Mitigation Plan Update Committee, six agencies and one local community indicated they could assist the state with the implementation of CRS activities. The agencies included The Water Institute of the Gulf (TWIG), the Coastal Protection and Restoration Authority (CPRA), Louisiana State University's Coastal Sustainability Studio (LSU CSS), the Louisiana Department of Insurance (LDI), Louisiana State University's Department of Construction Management (LSU DCM), and the Center for Planning Excellence (CPEX). The City of New Orleans also indicated ability to aid with CRS activities.

Table 4 provides a summary of the specific CRS activities in which the aforementioned groups could provide support. In addition to the entities listed in this table, Louisiana has a State Floodplain Manager and a CRS Coordinator who are overall resources to all CRS and non-CRS communities. These positions are housed in the Louisiana Department of Transportation and Development Public Works and Water Resources Division.

Activity	Agency						
	CNO	TWIG	CPRA	LSU CSS	LDI	LSU DCM	CPEX
320d: Flood depth data	X						
320e: Special flood-related hazards	X						
320f: Historical/repetitive flood information	X						
320g: Natural floodplain functions	X						
330: Outreach projects			X		X		
330a: Outreach projects	X			X		X	
330b: Flood response preparations	X						
330c: Program for public information bonus	X					X	
330d: Stakeholder bonus						X	
340: Hazard disclosure			X		X		
360a: Property protection advice	X						
360c: Financial assistance advice	X						
360d: Training	X						
370: Flood insurance promotion	X				X		
420: Open space preservation							
420a: Preserved open space		X					
420c: Natural functions open space		X		X			
420e: Coastal erosion open space		X					
420g: Low density zoning							X
420h: Natural shoreline protection		X					
430: Higher regulatory standards							X
430k: Coastal A zone regulations	X						
430f: Protection of critical facilities	X						
440: Flood data maintenance							
450: Stormwater management							
450a: Stormwater management regulations	X						X
450b: Watershed master plan		X					
450c: Erosion and sedimentation control	X	X					X
450d: Water quality regulations	X						
500: Flood damage reduction activities							X
510a: Floodplain management planning		X		X			
510b: Repetitive loss area analysis	X			X			
510c: Natural floodplain functions plan		X					
530: Flood protection	X						

540c: Capital improvements program	X						
610a: Flood threat recognition system	X	X					
610b: Emergency warning dissemination	X	X					
610c: Flood response operations plan	X	X					
610d: Critical facilities planning	X	X					
610e: StormReady community	X						
620b: Levee failure threat recognition		X					
620e: Levee failure critical facilities		X					

As depicted in Table 4, five of the seven responding agencies can assist with the 300 series, which includes all public information activities. A total of four of the seven agencies said they could provide help with the 400 series, which encompasses mapping and regulations. Only three of the seven organizations indicated the ability to help with the 500 series, which includes all flood damage reduction activities. Finally, two of the seven organizations responded that they could assist with the 600 series, which involves warning and response activities. The following section details how multiple agencies could assist communities with CRS activities.

Sources of Assistance per CRS Activity

During the preparation of this strategy, the team contacted a variety of local, state, federal, and private agencies and organizations to determine their missions and duties, and how they could help communities implement CRS-credited activities. CPEX's report The Community Rating System: Making it work for Louisiana, suggests state agencies work together to more effectively combat flood risk and enhance floodplain management activities. This section reviews the current and potential things agencies are doing now, or could do in the future.

During this process, the research team found that missions and resources often change over the years. What an agency does today, it may not be doing (or it may not be funded to do) next year. Therefore, this section only summarizes what could be done. When there is interest in designing or implementing an activity, the interested community should contact the relevant agency or organization to learn about the programs that are in effect at that time. A list of state agencies and related contact information is provided in Attachment A, although that, too, could become outdated at the time of interest.

The three agencies listed below could conduct or organize training and provide other types of assistance on any of the 19 CRS activities:

- The Department of Transportation and Development's Floodplain Management Office. It is the state coordinating agency for the National Flood Insurance Program, and houses the State's CRS Coordinator.
- FEMA Region VI
- Louisiana Floodplain Management Association (LFMA)

The below list, categorized by CRS activity, includes recommendations related to agencies that could potentially provide support to CRS communities. A State Resource contact list is attached to the Strategy.

300 Series: Public Information Activities

Activity 310 (Elevation Certificates)

- The Louisiana Society of Professional Surveyors could assist in training surveyors on completing Elevation Certificates.

Activity 320 (Map Information Service)

- The US Army Corps of Engineers, the United States Department of Agriculture's Natural Resources Conservation Service, and the National Oceanic and Atmospheric Administration could provide assistance in obtaining maps or mapping data other than Flood Insurance Rate Maps.
- The Louisiana Geographic Information Center can help with GIS issues and locating other source materials.
- Local communities, like Jefferson Parish and the City of New Orleans, may provide guidance based on experience with flood depth data, special flood-related hazards, historical and repetitive flood information, as well as natural floodplain functions.

Activity 330 (Outreach Projects)

- Brochures and publications from any agency can receive credit, as long as they have a message on one or more of the six credited outreach project topics. A good example is the Louisiana Sea Grant's Homeowners Handbook to Prepare for Natural Hazards. CPRA, LSU's Coastal Sustainability Studio and Construction Management Department, LSU AgCenter, LOI, and non-profits such as SBP, can also provide outreach materials.
- CRS users groups can be very helpful in organizing, implementing and sharing templates related to multi-jurisdictional Programs for Public Information.

Activity 340 (Hazard Disclosure)

- All CRS communities receive credit for state laws that require sellers to disclose whether a property is in a wetland, has been flooded in the past, or is located in a flood zone.
- Communities or PPI committees should contact their local or regional real estate associations to determine what they are already doing and/or to mutually develop new activities or materials to advise house hunters about flood hazards.
- CPRA and LDI can also provide support for this activity.

Activity 350 (Flood Protection Information)

- Publications from any organization that cover topics pertinent to the flood situation or natural floodplain functions in the area can receive credit.
- UNO-CHART has a model website that communities can link to for credit (floodhelp.uno.edu).
- Communities can link to other agencies with sites on creditable topics. Two website examples are the LSU Ag Center's information on property protection (http://www.lsuagcenter.com/topics/family_home/home/lahouse/my_house/home%20improvement/flood%20recovery) and the National Weather Service's flood warning website (https://water.weather.gov/ahps/).
- Communities that do not have their own FIRMs online can link to http://maps.lsuagcenter.com/floodmaps/.
- The National Oceanic and Atmospheric Administration's Digital Coast details future flood hazards (https://coast.noaa.gov/digitalcoast/).
- Floodsmart.gov is a good source for links on flood risk and flood insurance.

The purpose of a CRS users group is to serve as a support and educational resource for the local communities who participate in the CRS. Users groups work together to take on activities aimed at increasing floodplain regulation and mitigating existing flood hazards and risks. There are four CRS users groups in Louisiana: the Capital Region Area Floodplain Taskforce (CRAFT), the Flood Loss Outreach and Awareness Taskforce (FLOAT), Jefferson Parish United Mitigation Professionals (JUMP), and the Louisiana Southwest Informational Floodplain Team (SWIFT). CRS users groups often work together to develop Programs for Public Information, share outreach projects, and, in JUMP's case, work together on updates to multijurisdictional hazard mitigation plans. Groups also host speakers and trainings, in order to learn updated information on the CRS and the resources available. Joining or forming a CRS users group gives communities access to knowledge, resources, and training that they may not typically have access to.

Activity 360 (Flood Protection Assistance)

- The best training for implementing this activity is the Emergency Management Institute's retrofitting course, E0279 Retrofitting Flood-Prone Residential Buildings.
- There is also a home study course, Overview of Engineering Principles and Practices for Retrofitting Flood-Prone Residential Structures. Visit https://www.firstrespondertraining.gov/frt/npccatalog/EMI#anc-search-results to learn about both courses.
- Communities can obtain the information needed for the Financial Assistance Advice element (FAA) from the agencies that provide the assistance. These include GOHSEP, CPRA, and the Division of Administration's Office of Community Development (OCD).
- Local communities, such as the City of New Orleans and Jefferson Parish, can provide examples of model programs related to this activity.

Activity 370 (Flood Insurance Promotion)

- Full credit is dependent on preparing a document following the Program for Public Information model, so most communities include what is needed in their PPI. As noted under Activity 330, users groups have been the best source of help for these.
- Upon request, LDI can provide brochures and assist with local presentations on flood insurance in support of this activity.
- Local communities, such as the City of New Orleans and Jefferson Parish, can also provide assistance with this activity.

Activity 410 (Floodplain Mapping)

- A review of the Engineering Methods and the Bibliography and References sections of the community's Flood Insurance Study will show what agencies assisted in floodplain mapping. These sections will identify whether an agency other than FEMA provided mapping data. Where that is the case, the community may be able to obtain New Study (NS) credit for their earlier work.
- DOTD and the Water Institute of the Gulf are partners in FEMA's Cooperating Technical Partnership (CTP) Program.

Activity 420 (Open Space Preservation)

- State parks and other public lands can qualify for open space credit. The owning agencies can provide materials that can document the property's natural floodplain functions.
- Properties purchased or improved with funding support from FEMA and some other agencies often have deed restrictions that the agencies can help locate.
- Nonprofit organizations that own or work on protecting natural floodplain functions can help with documentation. Examples are America's Wetland Foundation (https://www.americaswetland.com/) and the Nature Conservancy in Louisiana (https://www.nature.org/en-us/about-us/where-we-work/united-states/louisiana/).
- The Water Institute, LSU's Coastal Sustainability Studio, and CPEX can also provide support for this activity.

Activity 430 (Higher Regulatory Standards)

- DOTD's model ordinance language could include creditable higher standards.
- All communities receive credit for the Louisiana State Uniform Construction Code. The Louisiana State Uniform Code Council could include creditable higher standards when the code is next revised.
- Local communities, such as the Cities of New Orleans and Mandeville and Jefferson Parish, can provide information on higher regulatory standards implemented at the local level.

Activity 440 (Flood Data Maintenance)

- The Louisiana Geographic Information Center can help with GIS issues and locating source materials.
- FEMA and DOTD often have copies of old Flood Insurance Rate Maps. The first place to look is on FEMA's Flood Map Service Center website, https://msc.fema.gov/portal/home.
- Benchmark maintenance credit (BMM) requires documentation of the location and status of benchmarks. Entities that can help with this include the US Geological Survey, the National Geodetic Survey, the Louisiana Geological Survey, and the Louisiana Society of Professional Surveyors.

Activity 450 (Stormwater Management)

- The Louisiana Department of Environmental Quality and the US Environmental Protection Agency can provide recommendations and regulatory language that would qualify for credit.
- Nonprofit organizations that focus on protecting water quality and natural floodplain functions can inform the public and support adoption of creditable regulatory standards. An example is the Louisiana Environmental Action Network (https://leanweb.org/).
- The City of New Orleans, Jefferson Parish, the Water Institute, and CPEX can also provide assistance with this activity.

Activity 503 (Repetitive Losses)

- UNO-CHART has expertise in mapping repetitive loss areas and updating repetitive loss lists. Visit floodhelp.uno.edu for more information.

Activity 510 (Floodplain Management Planning)

- The Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) provides mitigation plan guidance. Guidance may include the ten-step planning process prescribed by the CRS.
- UNO-CHART has prepared more repetitive loss area analyses (RLAA) than any other organization in the country. These can be useful templates for others. Most are located online at floodhelp.uno.edu.
- Communities should check with the natural resources agencies, such as state parks (Department of Culture, Recreation and Tourism), the Department of Wildlife and Fisheries, the Department of Natural Resources, and

the Department of Environmental Quality for natural floodplain functions plans that impact their area.
- The City of New Orleans, Jefferson Parish, the Water Institute of the Gulf, and LSU's Coastal Sustainability Studio can also provide assistance with this activity.

Activity 520 (Acquisition and Relocation)

- Funding support for acquiring and relocating buildings out of the floodplain and documentation assistance can be obtained from GOHSEP, CPRA, and OCD. GOHSEP manages FEMA funds, and both GOHSEP and OCD manage the Department of Housing and Urban Development's (HUD) Community Development Block Grant funds.

Activity 530 (Flood Protection)

- Funding support for elevating and retrofitting buildings and other flood protection projects and documentation assistance can be obtained from GOHSEP, CPRA, and OCD.
- The Corps of Engineers, the Natural Resources Conservation Service, and regional level authorities are the agencies that help with flood control and drainage improvement projects.
- Local communities, such as the City of New Orleans and Jefferson Parish, can also provide assistance with this activity.

Activity 540 (Drainage System Maintenance)

- As with some of the public information activities, this activity is essentially designed and managed locally. Users groups have been helpful with this activity by sharing procedures, records, and similar aspects of a maintenance program.
- The Cities of Covington and New Orleans can also provide assistance with this activity.

Activity 610 (Flood Warning and Response)

- Flood warning and response guidance comes from the CRS, but agencies such as GOHSEP, and organizations like the Louisiana Emergency Preparedness Association (https://lepa.org/) could provide training and more localized templates.
- The City of New Orleans, Jefferson Parish, and the Water Institute can also provide assistance with this activity.

Activity 620 (Levees)

- As with 610, GOHSEP, the Louisiana Association of Levee Boards, and individual regional levee authorities could help with templates and/or a model program.
- The Water Institute can also provide assistance with this activity.

Activity 630 (Dams)

- DOTD's Dam Safety Program is the source for the credit for the state dam safety program (SDS). It can also help with guidance for community programs.

Although multiple state agencies can assist communities with CRS activities, they may not always know the best way to do so. State agencies can assist communities with CRS activities in many different ways. The below lists detail the ways agencies can assist with training, direct assistance, and models and templates. Trainings can be delivered by multiple entities and through multiple methods (i.e., webinars, workshops, one on one, etc.). For example, DOTD may be able to sponsor a training on a specific element of CRS scoring; the Water Institute could sponsor a training on a particular GIS driven activity; and/or UNO-CHART could collaborate with Jefferson Parish to facilitate a training on developing a multijurisdictional PPI.

Training on CRS Scoring

Activity 320: Map Information Service	
	Communicating map information to the public
Activity 330: Outreach Projects	
	How to receive scores for outreach projects conducted by community officials and other stakeholders
	Developing a Program for Public Information (PPI)
Activity 350: Flood Protection Information	
	How to receive scores for websites
Activity 370: Flood Insurance Promotion	
	How to incorporate as part of a Program for Public Information (PPI)
Activity 410: Floodplain Mapping	
	How to score existing maps
	Help with impact adjustment mapping
Activity 420: Open Space Preservation	
	How to score open space in your community
Activity 430: Higher Regulatory Standards	
	Scores received from implementing higher regulatory standards
Activity 450: Stormwater Management	
	Scoring and implementing stormwater management regulations
Activity 510: Floodplain Management Planning	
	How to score existing plans
Activity 540: Drainage System Maintenance	
	How to conduct and score maintenance procedures
Training on GIS Methods	
Activity 320: Map Information Service	
	How to use GIS to map flood information
Activity 410: Floodplain Mapping	
	How to use GIS in floodplain mapping
Activity 420: Open Space Preservation	
	How to map open space in your community

Direct Assistance	
Activity 430: Higher Regulatory Standards	
	Change state standards to higher regulatory standards
Activity 510: Floodplain Management Planning	
	Conducting state, regional and local studies that impact floodplain management
Activity 610: Flood Warning and Response	
	Provide hands on assistance and training for flood warning and response procedure drafting, coordination, and updates
Activity 620: Levees	
	Provide hands on assistance and training for levee maintenance, warning and response procedure, drafting, coordination, and updates
Models and Templates	
Activity 330: Outreach Projects	
	Sample brochures, mailers, and other promotional materials
Activity 350: Flood Protection Information	
	What to include on a floodplain management website
Activity 420: Open Space Preservation	
	Open space preservation model ordinances and regulatory language
Activity 430: Higher Regulatory Standards	
	Model ordinances for implementing higher regulatory standards
Activity 510: Floodplain Management Planning	
	How to score existing plans
Activity 540: Drainage System Maintenance	
	Model ordinances and templates of maintenance procedures

Beyond the state, there are resources available from federal agencies. These resources can also include training, assistance, and templates.

Federal Agencies

The table below lists resources available from federal agencies.

Table5 - Resources from Federal Agencies

Agency	Website	Resources Available
Community Rating System	crsresources.org	• Best practices • Community Rating System manual • Informational webinar • Activity checklists
Emergency Management Institute (EMI)	training.fema.gov/emi	• In person CRS training in Emmitsburg, MD • Online CRS courses

Federal Emergency Management Agency (FEMA)	FEMA.gov	• Mitigation guidance • Outreach project templates • Preparedness and recovery materials • Risk MAP • Social media templates • NFIP/CRS Update Newsletter
National Flood Insurance Program (NFIP)	www.floodsmart.gov	• Information for homeowners and businesses on flood insurance claims and policies
NOAA Digital Coast	coast.noaa.gov/digitalcoast	• Flood exposure mapper • Historical hurricane tracks • Land cover data • Risk communication basics • Sea level rise viewer

Professional Associations

Floodplain managers and local officials can choose to join professional associations, which are available at the state-wide and national level. These associations host conferences, offer trainings, and provide an avenue for officials to network and share resources.

Table 6 – Resources from Professional Associations

Association	Website	Resources
Association of State Floodplain Managers (ASFPM)	https://www.floods.org/	• Annual conference • Webinars • Website
Louisiana Floodplain Management Association (LFMA)	https://lfma.org/	• Annual conference • Monthly newsletter • Workshops • Website
Louisiana Emergency Preparedness Association (LEPA)	https://lepa.org	• Annual conference • Education and outreach • Can provide CRS related education and outreach opportunities for emergency managers
Louisiana Municipal Association (LMA)	https://www.lma.org/	• Annual conference • Monthly newsletter • Website • Can provide CRS related education and outreach opportunities for local officials
Louisiana Society for Professional Surveyors	https://lsps.net/	• Education and outreach • Newsletter • Website • Can provide CRS related education and outreach opportunites for surveyors

Others

There are other nonprofits and educational institutions that provide resources to CRS communities. The table below lists these organizations and the resources available.

Table 7 – Resources from Other Institutions

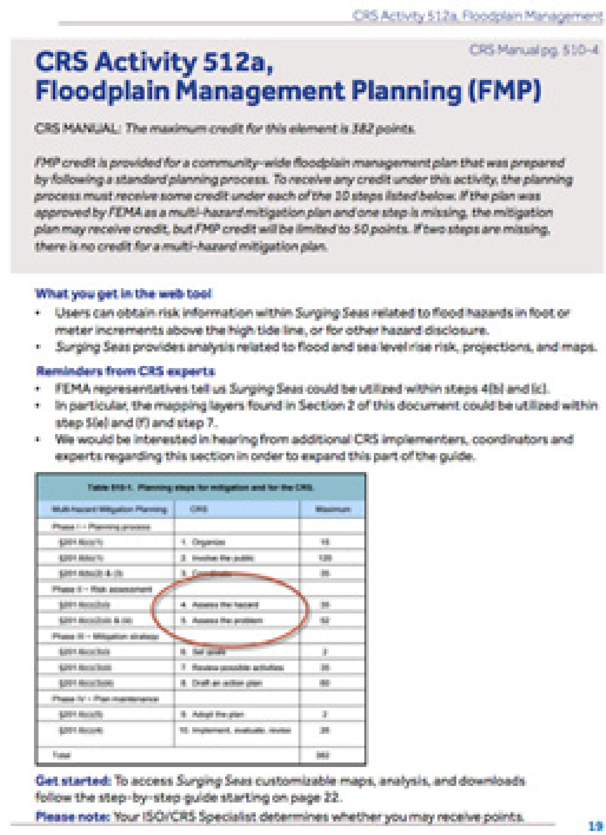
Organization	Website	Resources Available
Climate Central	sealevel.climatecentral.org/crs	• Risk Finder • Risk Zone Map • Surging Seas CRS Guide
Louisiana Sea Grant	https://www.laseagrant.org/	• Training courses and workshops • Education and outreach • Local partner for grant opportunities
Louisiana State University AgCenter's Louisiana Flood Maps	maps.lsuagcenter.com/floodmaps	• Louisiana flood maps • FIRMs and dFIRMS • Information for homeowners
The Nature Conservancy's Coastal Resilience Community Rating System Explorer	coastalresience.org/project/community-rating-system-explorer	• Open space preservation credit information • Training materials
RainReady	rainready.org	• Outreach and education • Training courses and workshops
SBP	sbpusa.org	• Disaster recovery • Outreach materials
University of New Orleans Center for Hazards Assessment, Response & Technology (UNO-CHART)	floodhelp.uno.edu	• CRS users group facilitation/information • CRS resources • Floodplain management resources • Planning for repetitive flood loss
The Water Institute of the Gulf	https://thewaterinstitute.org/	• Natural system modeling • Real time data collection and monitoring • Outreach

Track Progress, Evaluate and Revise

State agencies can use the above recommendations to track their progress in providing assistance with the Community Rating System. The state could evaluate and revise these progress reports on an annual basis to understand what needs are being met, and which gaps agencies still need to fill to support communities in the implementation of CRS activities and ultimately, increase reductions in flood risks and flood insurance rates.

Overall, agencies and associations such as DOTD, GOHSEP, LFMA, and LMA can continue to promote the overall benefits of CRS; it is hoped that other agencies can follow their lead. This type of support may increase the likelihood that community leaders will better understand the benefits of the CRS and provide appropriate resources for implementation at the local level. Of course, each community must consider the benefits and costs of participation in the CRS as it is a prescriptive program that can be quite resource intense. CRS Users groups can be helpful to CRS and non-CRS communities that may have questions about the level of resources necessary to implement specific CRS activities.

Climate Central has prepared a guide specifically for the CRS. The Surging Seas web tool provides step-by-step instructions on how to access information and downloads that can help receive credit in activities 320, 330, 340, 350, 410, 420, 430, 450, 510, and 610.


CRS Activity 512a, Floodplain Management

CRS Manual pg. 510-4

CRS Activity 512a, Floodplain Management Planning (FMP)

CRS MANUAL: *The maximum credit for this element is 382 points.*

FMP credit is provided for a community-wide floodplain management plan that was prepared by following a standard planning process. To receive any credit under this activity, the planning process must receive some credit under each of the 10 steps listed below. If the plan was approved by FEMA as a multi-hazard mitigation plan and one step is missing, the mitigation plan may receive credit, but FMP credit will be limited to 50 points. If two steps are missing, there is no credit for a multi-hazard mitigation plan.

What you get in the web tool

- Users can obtain risk information within *Surging Seas* related to flood hazards in foot or meter increments above the high tide line, or for other hazard disclosure.
- *Surging Seas* provides analysis related to flood and sea level rise risk, projections, and maps.

Reminders from CRS experts

- FEMA representatives tell us *Surging Seas* could be utilized within steps 4(b) and (c).
- In particular, the mapping layers found in Section 2 of this document could be utilized within step 5(e) and (f) and step 7.
- We would be interested in hearing from additional CRS implementers, coordinators and experts regarding this section in order to expand this part of the guide.

Table 510-1. Planning steps for mitigation and for the CRS.

Multi-hazard Mitigation Planning	CRS	Maximum
Phase I – Planning process		
[illegible]	1. Organize	15
[illegible]	2. Involve the public	120
[illegible]	3. Coordinate	35
Phase II – Risk assessment		
[illegible]	4. Assess the hazard	35
[illegible]	5. Assess the problem	52
Phase III – Mitigation strategy		
[illegible]	6. Set goals	2
[illegible]	7. Review possible activities	35
[illegible]	8. Draft an action plan	60
Phase IV – Plan maintenance		
[illegible]	9. Adopt the plan	2
[illegible]	10. Implement, evaluate, revise	26
Total		382

Get started: To access *Surging Seas* customizable maps, analysis, and downloads follow the step-by-step guide starting on page 22.

Please note: Your ISO/CRS Specialist determines whether you may receive points.

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Environmental Protection Agency			144 Ross Avenue, Suite 1200, Dallas, TX 75202	(800) 887-6063		
FEMA						
Regional Office (Region VI)			FRIC 800 North Loop 288, Denton, TX, 76209	(940) 898-5399 (main); (225) 242-6000 (LA Recovery Office)		
National Flood Insurance Program (NFIP)			500 St SW, Washington, D.C. 20472	(800) 427-4661		
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Office of State Register			1201 North Third Street, Suite 7-210 Baton Rouge, LA 70122	(225) 342-7000		
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Louisiana Division of Historic Preservation						
Office of Historic Preservation			Capitol Annex Building, 1051 North Third Street, Baton Rouge, LA 70802	(225) 342-8160		
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Appendix E
Repetitive Loss Strategy

Risk Assessment

Flooding is a problem for many people across the United States. Enduring the consequences of repetitive flooding can put a strain on residents and on state and local resources. When the water rises, communities face the disruption of life, damaged belongings, and the high cost of rebuilding.

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP), which pays flood claims, while also keeping the price of flood insurance at an affordable level. Repetitive and severe repetitive flood loss properties are particularly costly, with claims since 1978 reaching approximately $13 billion nationwide, and over $2 billion in Louisiana. Repetitive flood loss properties represent only 1.3% of all flood insurance policies, yet historically they account for nearly one-fourth of the claim payments. Mitigating these repeatedly flooded properties reduces the overall costs to the NFIP, the communities in which they are located, and the individual homeowners. Therefore, mitigating repeatedly flooded properties benefits the entire state.

For about 14 years, UNO-CHART worked with FEMA Region 6 and communities located throughout Louisiana to develop Repetitive Loss Area Analyses, which are flood mitigation plans for defined repetitive flood loss areas. Based on UNO-CHART's experience, the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) asked the research center to develop a statewide Repetitive Loss Strategy as part of the State Hazard Mitigation Plan update process. The goal of this Repetitive Loss Strategy is to identify actions to reduce damage to repetitive loss and severe repetitive loss properties throughout the state. GOHSEP continues to focus effort on mitigation repetitive loss and severe repetitive loss properties as a priority. By identifying these properties as a priority and including a Repetitive Loss Strategy in the Hazard Mitigation Plan, Louisiana can qualify for an increased federal cost share in FEMA's Flood Mitigation Assistance Grant Program.

The Repetitive Loss Database

Per the NFIP, a Repetitive Loss (RL) property is an insurable structure that has two or more claim payments of more than $1,000 each that have been paid within a ten-year period since 1978; two of those claims must be more than ten days apart. As defined by the Flood Insurance Reform Act of 2004 , a Severe Repetitive Loss (SRL) structure is a residential structure has had either four or more NFIP claim payments, more than ten days apart, of more than $5,000 each, and the cumulative amount of the claims exceeds $20,000. SRLs also include properties that made two separate claims that cumulatively exceed value of the property.

FEMA maintains a database of RL and SRL properties, and sends the list to states and localities periodically, so that they can understand and mitigate their flooded properties. FEMA's Flood Mitigation Assistance Grant Program (FMA) provides funding to mitigate flood damage to at least 50 percent of SRL buildings. The program defines these buildings as those that have had at least two separate claim payments that together exceed the market value of the building. The program also identifies properties as SRLs that have four or more claim payments greater than $5,000 each, or greater than $20,000 total. The FMA program also includes funding that will mitigate at least 50 percent of RL properties, which are defined as properties that have flooded on two occasions, which together equaled or exceeded 25% of the market value of the property. The funding for the program included $112 million for 2014, $150 million for 2015, $200 million in 2016, and $160 million in 2017. The Louisiana Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) receives an updated list of RLs and SRLs on a monthly basis. UNO-CHART reviewed Louisiana's list of RL and SRL properties, as well as state and local parish hazard mitigation plans, in order to analyze the repetitive flood issues in the state and make recommendations for appropriate mitigation measures.

State Data Summary

The RL and SRL properties lists, as well as the 2014 State Hazard Mitigation Plan, provide a detailed outlook on the status of repetitive losses in Louisiana. UNO-CHART mapped RLs and SRLs, total claims, average claim amount, and mitigated properties, in order to analyze the impact of repetitive flood loss on the state. As of September 2018, there are 25,522 repetitive loss properties and 1,988 severe repetitive loss properties in the state of Louisiana.

The Risk Assessment identified flooding to continue to impact Louisiana. The projected average annual statewide loss is $451,389,757.

1. https://www.fema.gov/media-library/assets/documents/20381
2. While the 2018 numbers are mentioned here, the charts, tables and maps in this strategy reflect 2017 numbers, in order to be consistent with the rest of the 2019 State Hazard Mitigation Plan Update

Figure 1
Repetitive Loss Properties

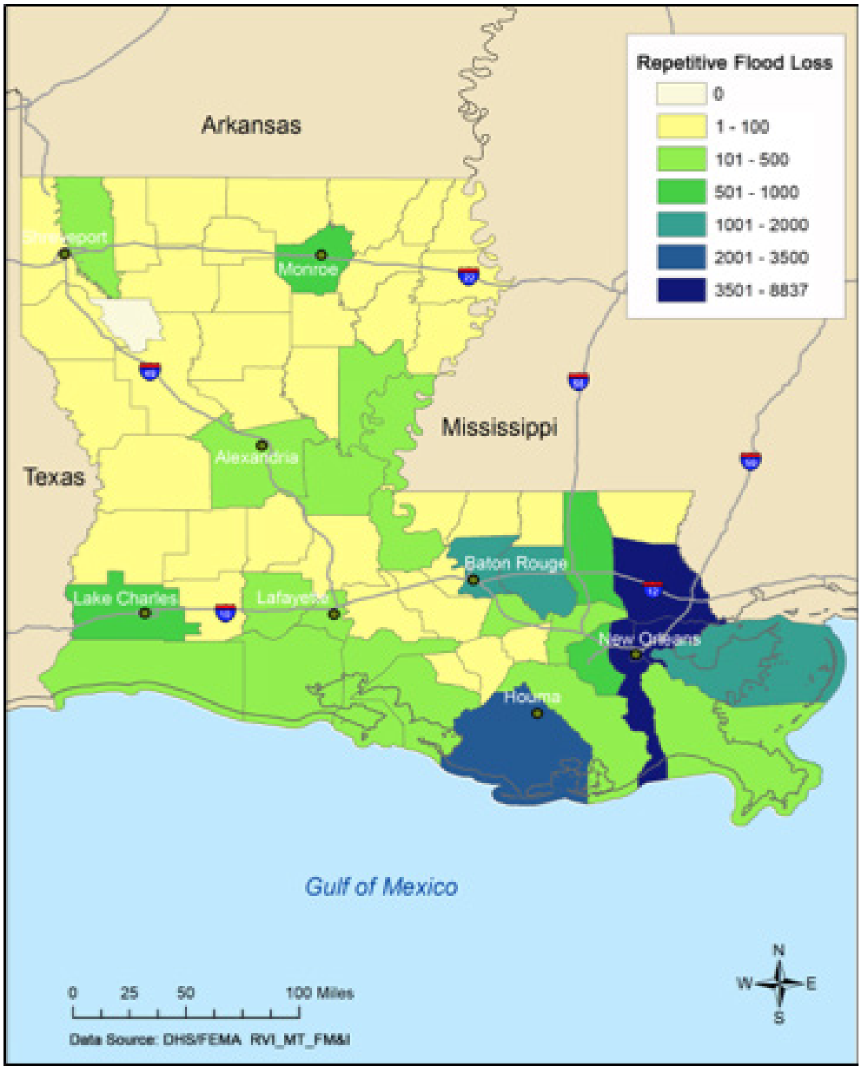


Figure 1 helps demonstrate the distribution of repetitive loss properties across the state. All but one parish has at least one repetitive loss property. Red River Parish is the only parish without repetitive loss properties. Orleans, Jefferson, and St. Tammany parishes (along with the cities in the parishes) have the highest number of repetitive loss properties. The majority of repetitive loss properties are clustered at the southern part of the state. As referenced in the 2014 plan, the largest concentrations of repetitive loss properties in the state occur in the heavily populated areas of the coastal region. In the central parishes, repetitive loss properties occur in urban areas. In the northern part of the state, there are also repetitive losses in urban areas, but the majority of the parishes in the northern region have relatively low numbers of repetitive losses.

Figure 2
Severe Repetitive Loss Properties

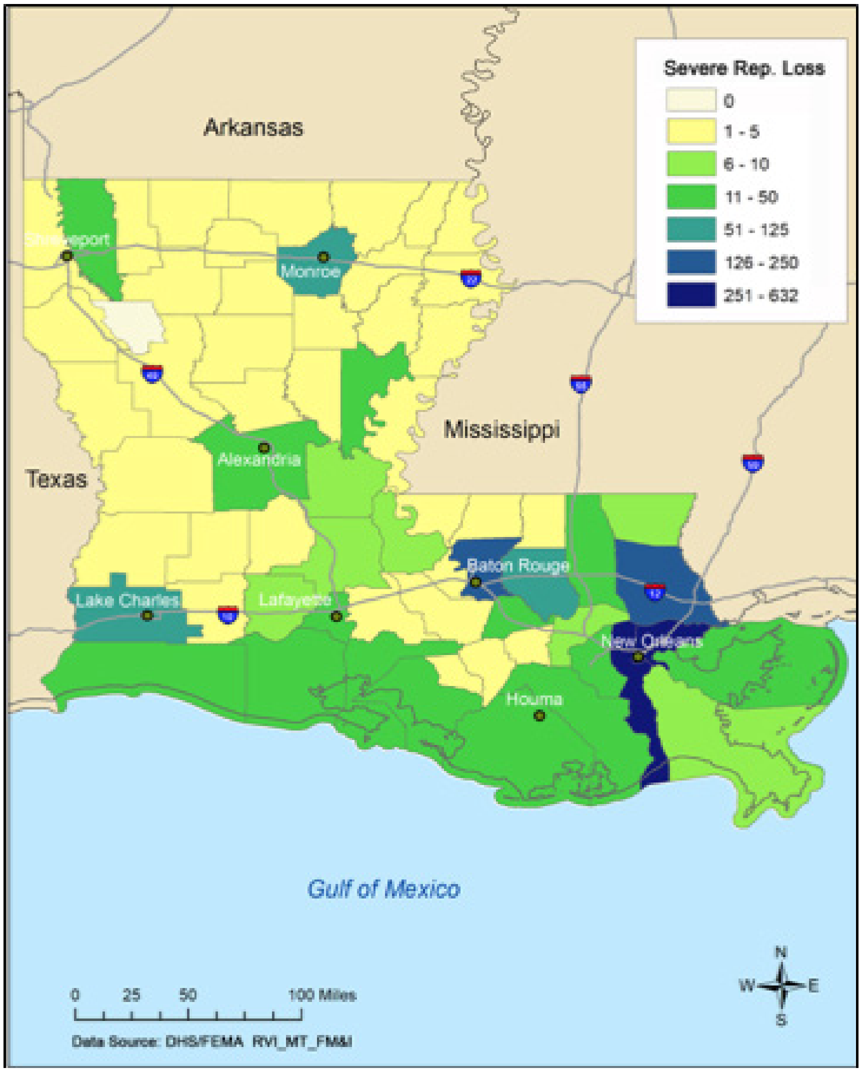


Figure 2 depicts the distribution of severe repetitive loss properties across the state. Again, Red River Parish is the only parish without severe repetitive loss properties, and Orleans and Jefferson parishes have the highest number of severe repetitive loss properties. Like repetitive loss properties, the majority of severe repetitive loss properties are in the southern part of the state. As referenced in the 2014 plan, the largest concentrations of severe repetitive loss properties in the state occur in the heavily populated areas of the coastal region. In the central parishes, severe repetitive loss properties occur in urban areas. In the northern part of the state, there are also severe repetitive losses in urban areas, but the majority of the parishes in the northern region have comparatively low numbers of severe repetitive losses.

Figure 3
Total Flood Claims

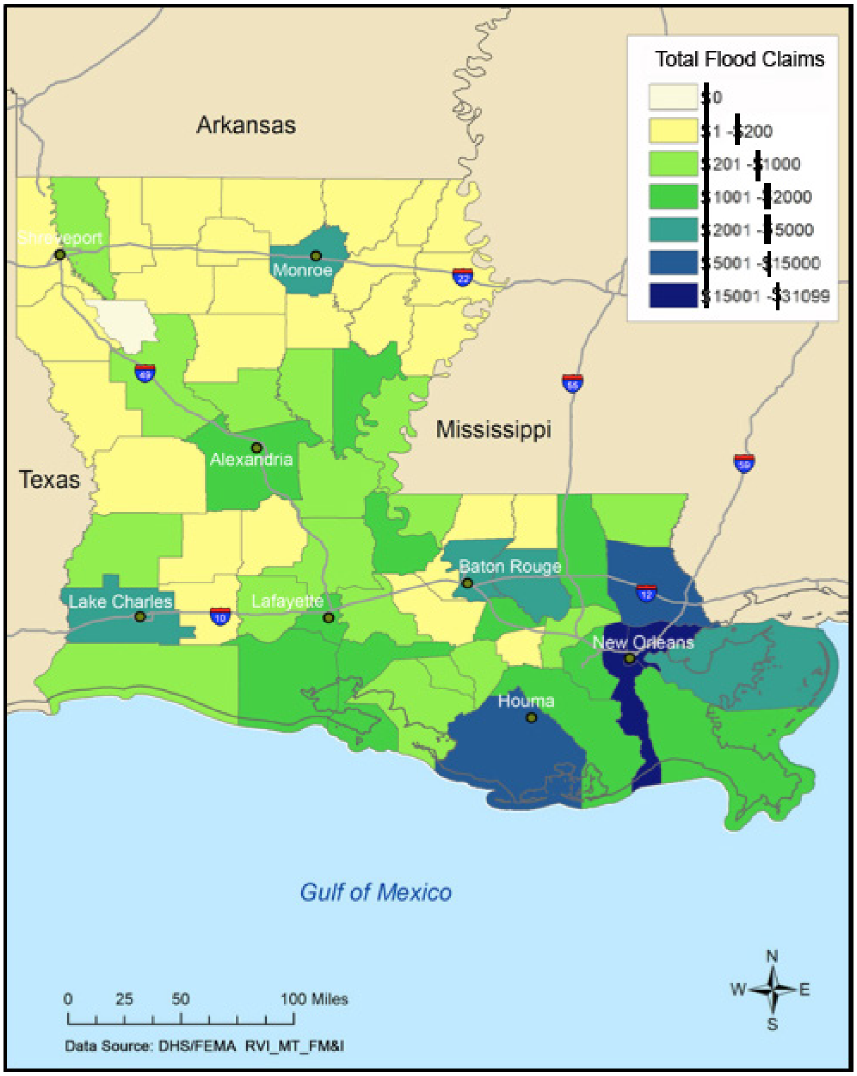


Figure 3 details the total flood claims in each parish. As in the repetitive loss and severe repetitive loss maps, the claims are concentrated in urban areas, with the majority of claims in the coastal and central regions. Orleans and Jefferson Parishes have the highest number of claims, with St. Tammany and Terrebonne Parishes close behind. The highest number of claims in a parish exceeds $30,000.

Figure 4
Average Claim Payment

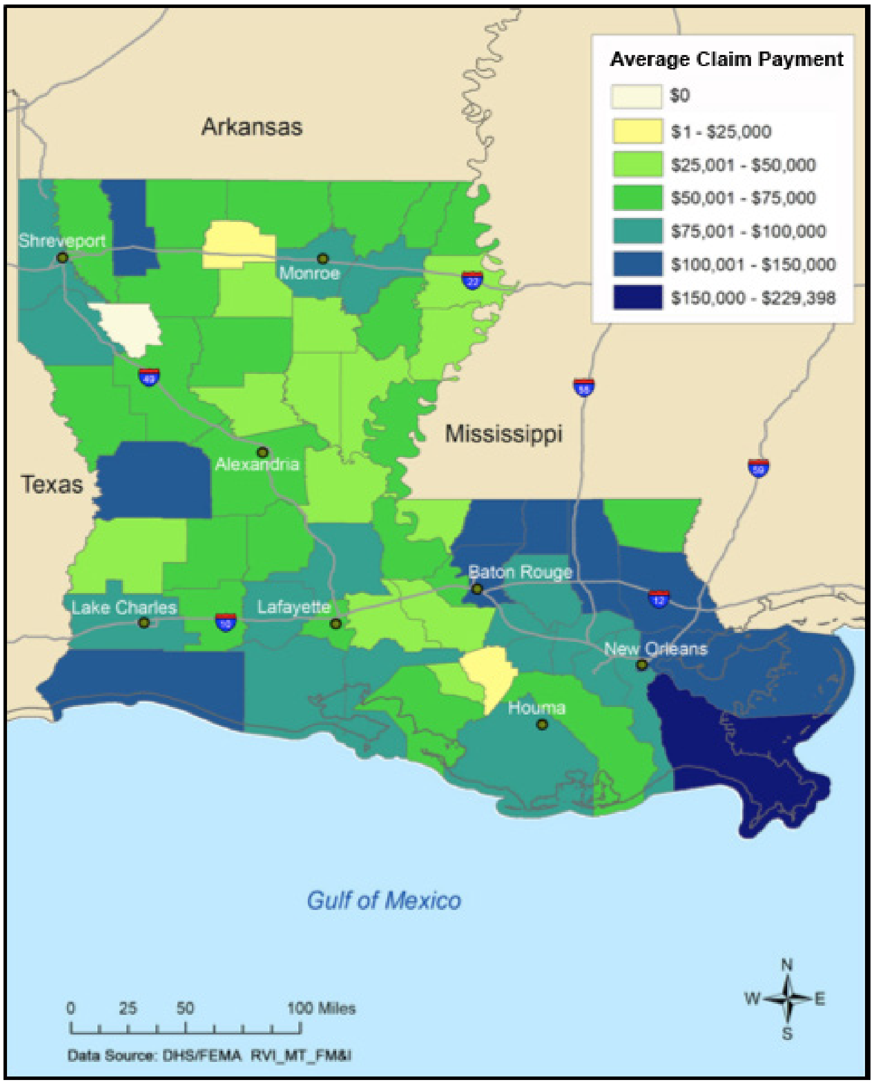
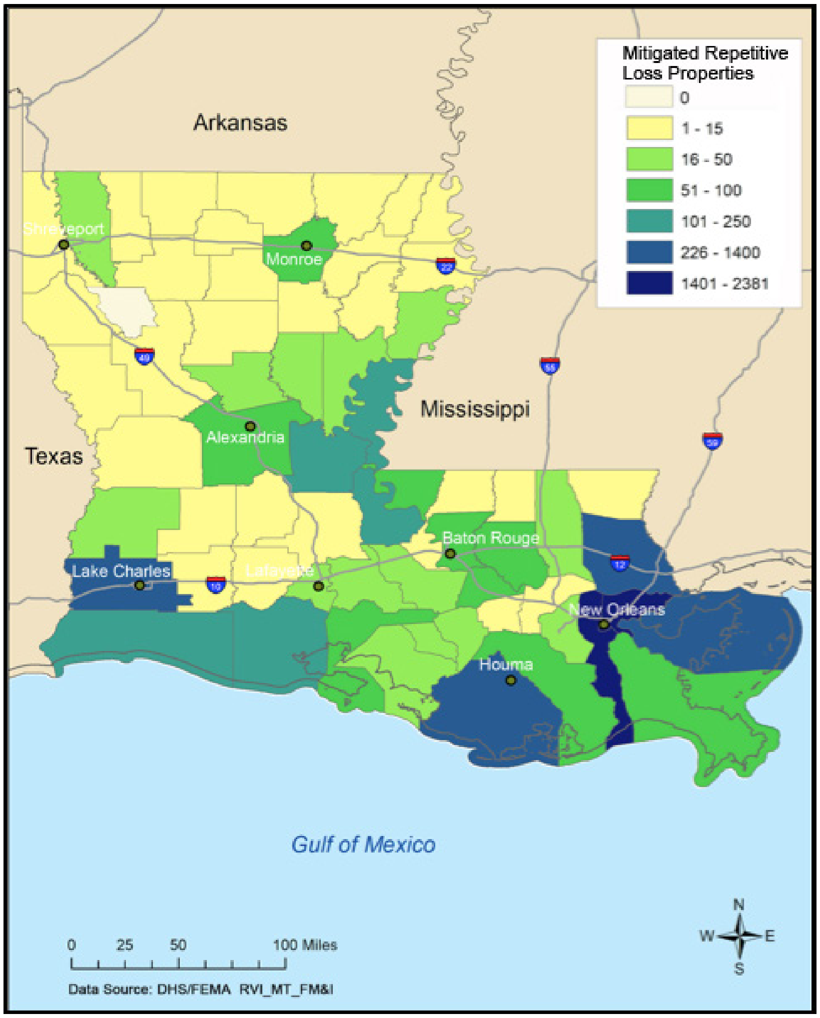


Figure 4 above breaks down the average payment amount in each parish. This map highlights the breadth and depth of the cost of flooding in the state - with even northern parishes averaging claim payments around $50,000. The highest average claim payments are in Plaquemines Parish, exceeding $200,000. East Baton Rouge, East Feliciana, St. Helena, Tangipahoa, St. Tammany, St. Bernard, Cameron, Vernon, and Webster parishes also have high average claim payments. Red River Parish has no claims, and Lincoln and Assumption parishes have average payments under $25,000.

Figure 5
Mitigated Repetitive Loss Properties

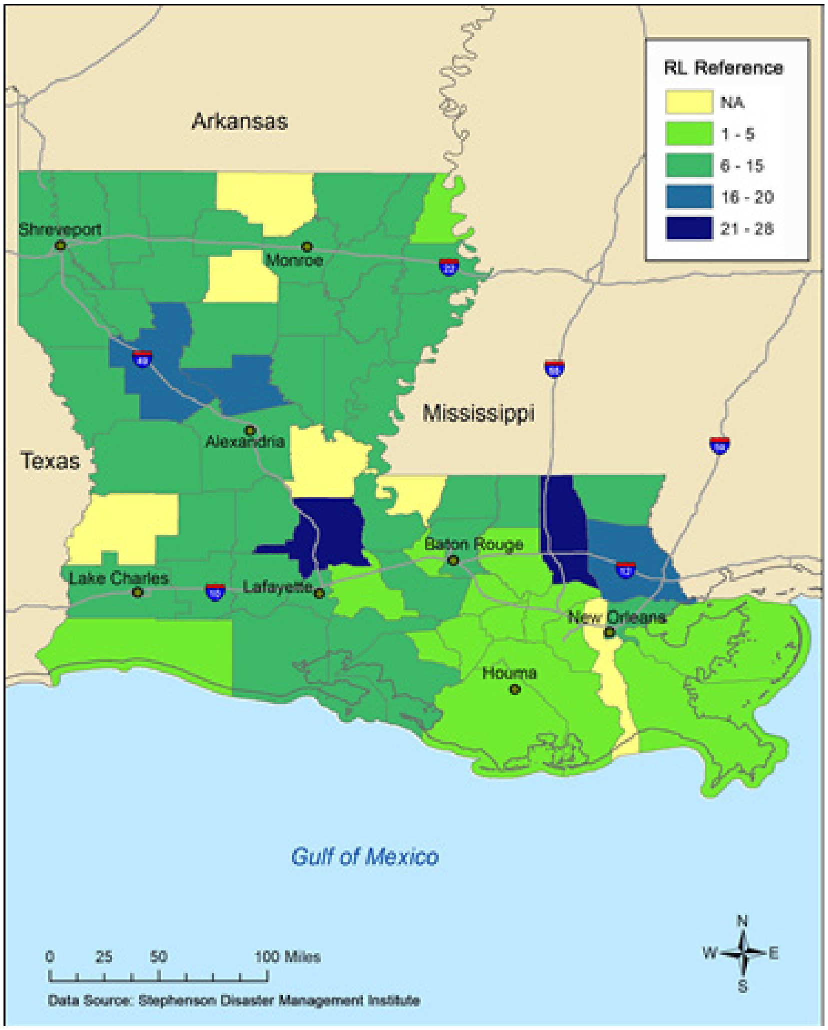


With support from the State, the municipalities in Louisiana are working to mitigate their repetitive flood losses. A total of 25% of the Repetitive Loss properties in Louisiana have been mitigated, which is more than the 18% of Repetitive Loss properties mitigated nationwide. In fact, 23% of the mitigated Repetitive Loss properties in the United States are located in Louisiana. The parishes with the highest number of mitigated properties are Orleans and Jefferson, followed by St. Bernard, St. Tammany, and Calcasieu.

Data Summaries by Parish

It is useful to note statewide trends but examining repetitive loss strategies at the parish level is helpful as well. In order to understand parish specific mitigation goals for repetitive losses, what has been accomplished, and what parishes plan to accomplish in the future, UNO-CHART reviewed the hazard mitigation plans for each parish in the state.

Figure 6
References of Repetitive Loss Properties in Parish Plans



Most of the parishes in Louisiana reference repetitive losses in their hazard mitigation plans. A total of 57 of the 64 parishes include references to repetitive loss properties. These parishes include Acadia, Allen, Ascension, Beauregard, Bienville, Bossier, Caddo, Calcasieu, Caldwell, Cameron, Catahoula, Claiborne, Concordia, Desoto, East Carroll, East Feliciana, East Baton Rouge, Evangeline, Franklin, Grant, Iberia, Iberville, Jefferson Davis, Jefferson, Lafayette, Lafourche, LaSalle, Lincoln, Livingston, Madison, Morehouse, Natchitoches, Orleans, Ouachita, Plaquemines, Rapides, Red River, Richland, Sabine, St. Mary, St. Charles, St. Martin, St. Bernard, St. Helena, St. John the Baptist, St. Landry, St. James, St. Tammany, Tangipahoa, Terrebonne, Vermillion, Vernon, Washington, West Baton Rouge, Webster, West Carroll and Winn. All but Beauregard, Lafourche, and St. Bernard Parishes also include repetitive loss properties in the action, objective, and goal sections of the hazard mitigation plans. While referencing repetitive loss properties, the parishes identify mitigation methods, funding sources, responsible parties, hazards, and project status for each goal, objective or action.

The parishes further identify mitigation methods used to mitigate these properties, including elevation, acquisition, floodproofing, reconstruction, drainage projects, maintaining an active list of repetitive loss structures, and annual review.

Figure 7
Mitigation Methods Identified in Parish Plans

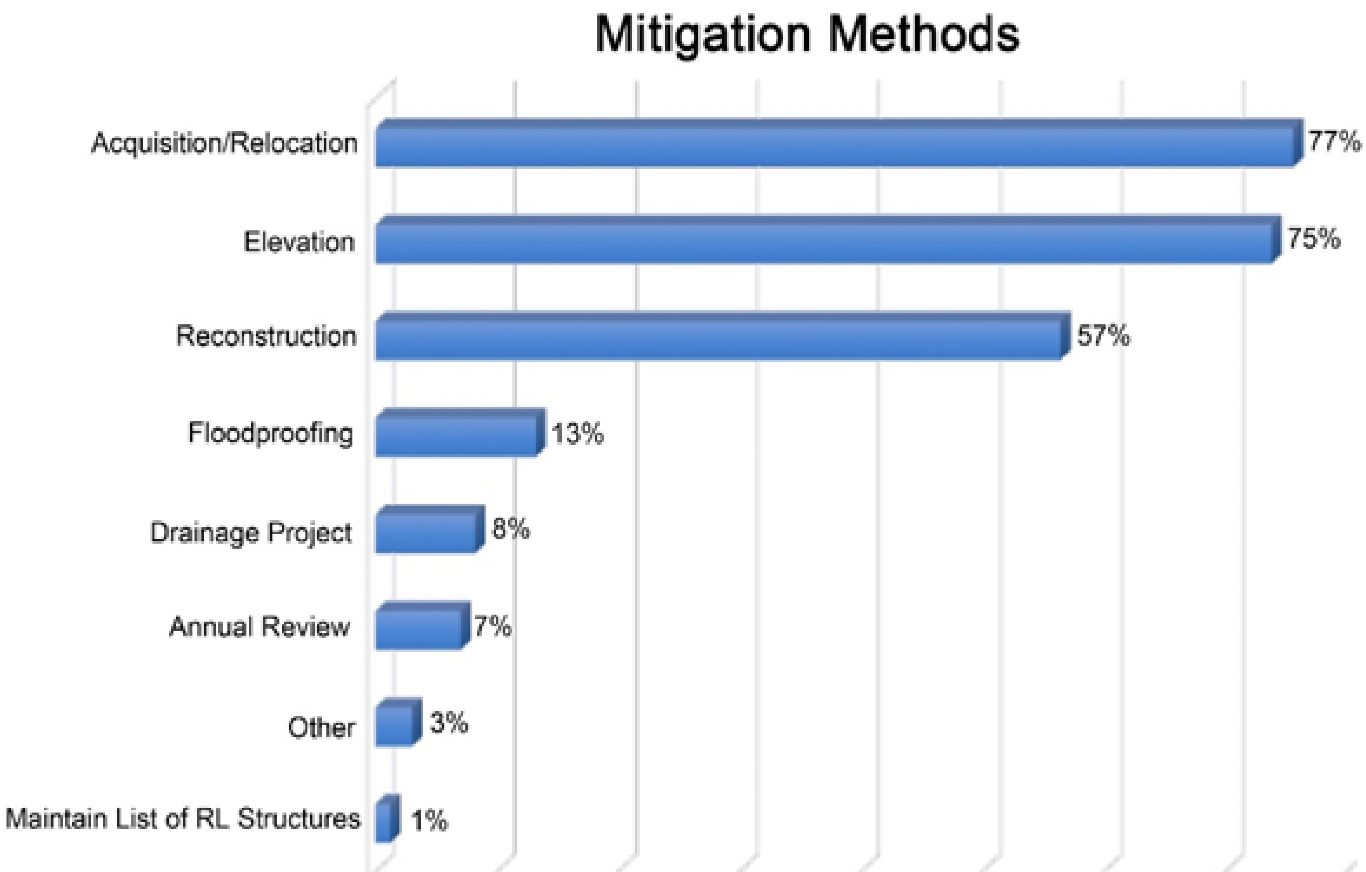
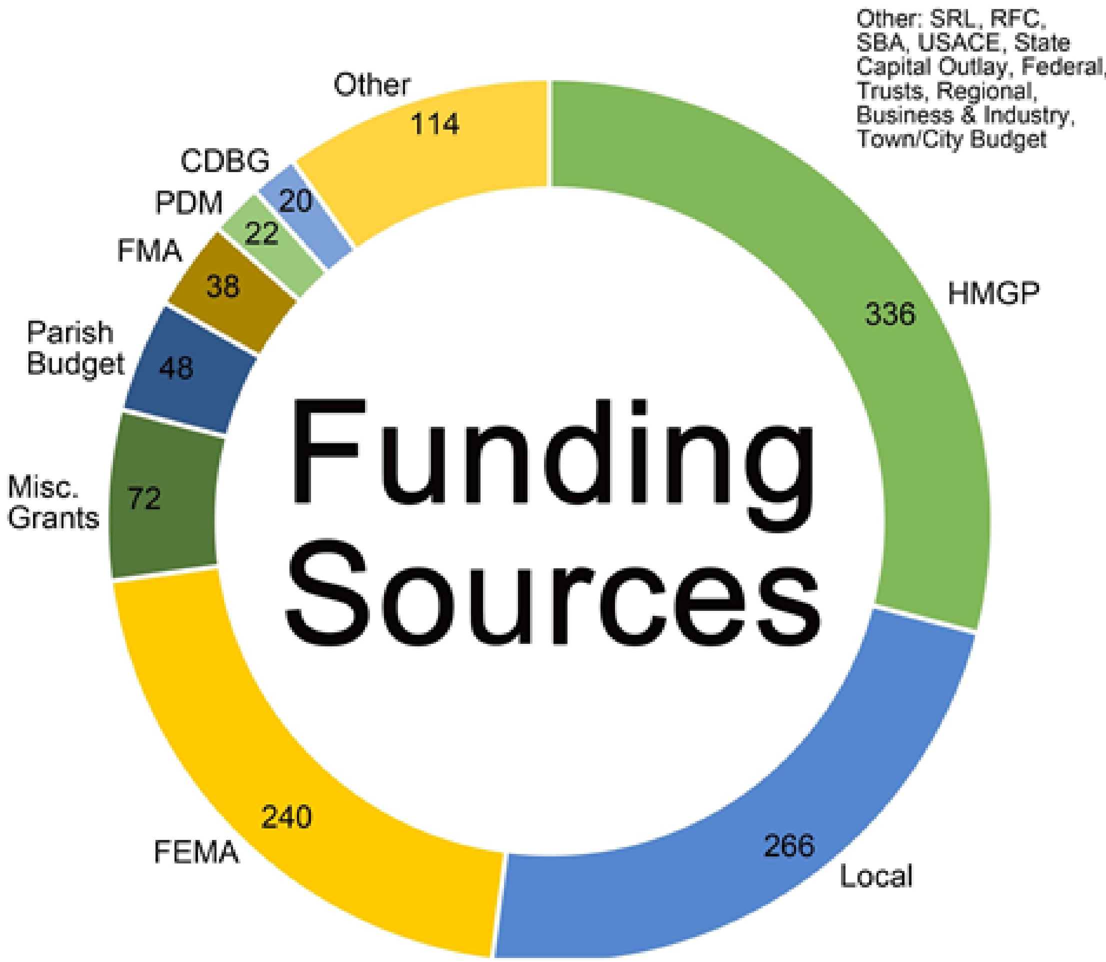


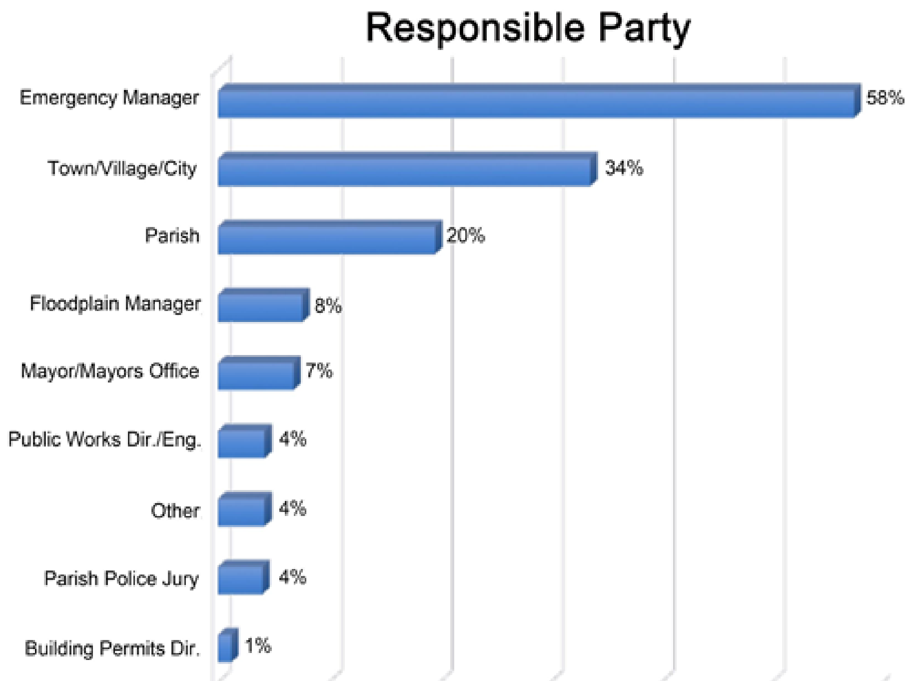
Figure 7 illustrates the mitigation methods detailed in the parish hazard mitigation plans. The majority of the parishes plan to mitigate repetitive losses through elevating properties, reconstructing buildings, and acquiring property (for the purposes of demolition/relocation). A significant number of parishes also intend to floodproof existing structures.

Figure 8
Funding Sources



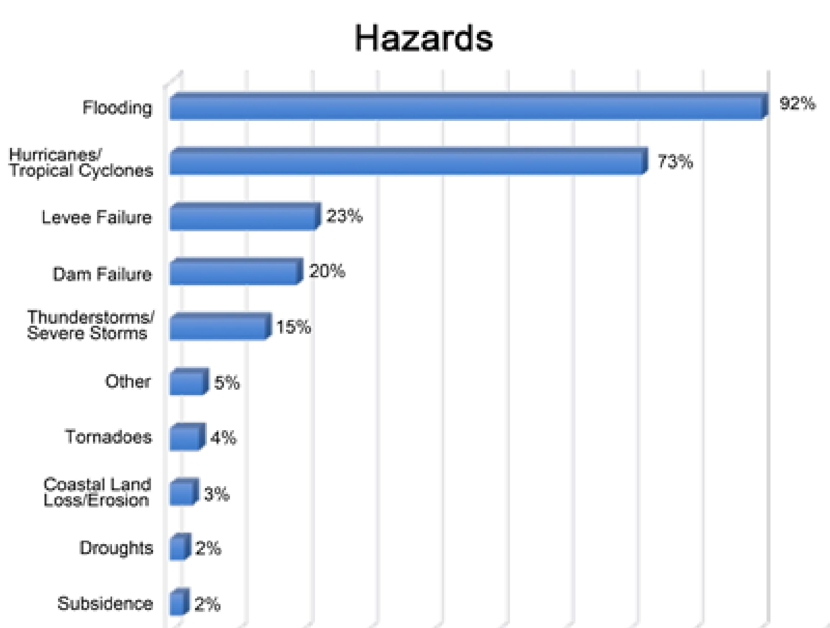
There are also funding sources listed in each plan, including parish budgets, HMGP, FEMA, CDBG, FMA, SBA, USACE, State Capital Outlay, PDM, RFC, trusts, and town/city budgets. Figure 7 depicts the funding sources used by parishes to mitigate repetitive loss properties. The most popular source is HMGP, followed by local and FEMA funds. Miscellaneous grants, parish budgets, FMA, PDM, and CDBG funding are used less often.

Figure 9 - Parish Plans & Responsible Party



The parish hazard mitigation plans designate responsible parties in charge of implementing the plan. Most commonly, parishes assign their emergency manager this responsibility. Additionally, parishes generally assign municipalities to implement the plan, and sometimes even a Parish Police Jury.

Figure 10 - Hazards Identified in Parish Plans in Reference to RL Properties



The local parish hazard mitigation plans detail the cause of damage to repetitive loss properties. Flooding is the most common hazard identified, followed by hurricanes and tropical cyclones. Some parishes identified levee and dam failure as causes as well.

Additionally, the parish level hazard mitigation plans often monitor the status of these projects, noting if they are completed, ongoing, in progress, or new.

The pie chart below shows the status of the mitigation projects listed in the parish hazard mitigation plans. Of all the action items regarding repetitive loss in the parish plans, only 12 have been completed; the vast majority are new.

For more detail on the references to repetitive loss properties in the parish hazard mitigation plans, please refer to Attachment A.

Impact of Repetitive Flooding on People and Property

While understanding parish and state level summaries and goals and objectives towards mitigation repetitive loss properties, it is also useful to delve into the financial impacts of these properties on homeowners, as well as state and local governments. Repetitive flooding has a significant impact on people and property in Louisiana. Owners of repetitive loss properties are often confronted with the stresses of associated repetitive flooding, including worry about how high the water may rise, potential loss of life, loss of personal belongings, possibility of mold, and uncertainty of return. Repeatedly damaged properties put a financial strain on individuals, families, businesses, and local and state government. To assess this cost, UNO-CHART further examined the number of claims, average claim payments, and hazard impact of RLs and SRLs in the state.

Figure 11
Mitigation Project Status in Parish Plans

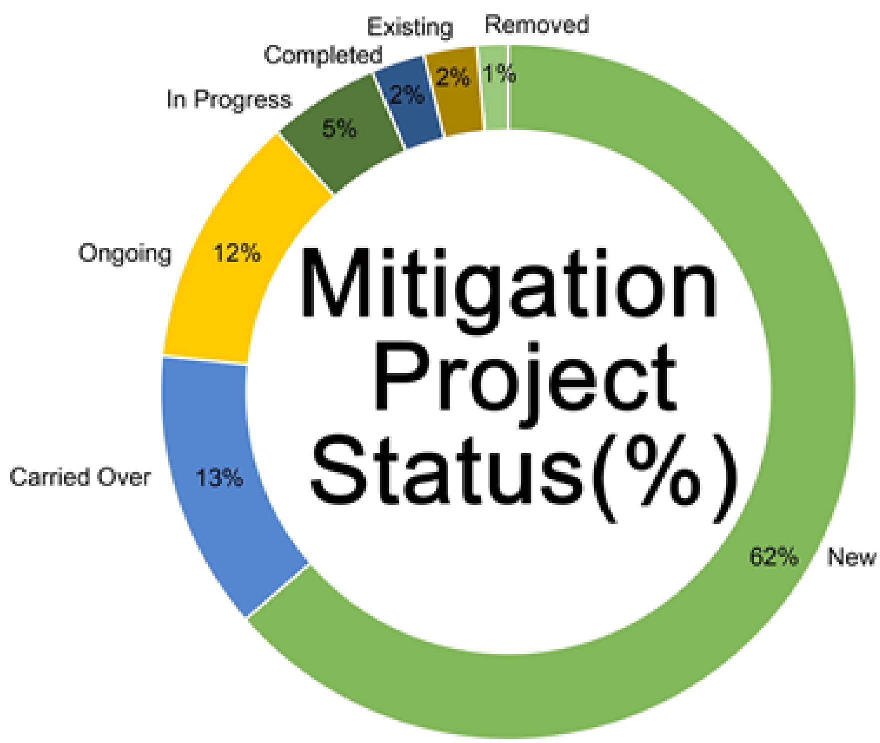
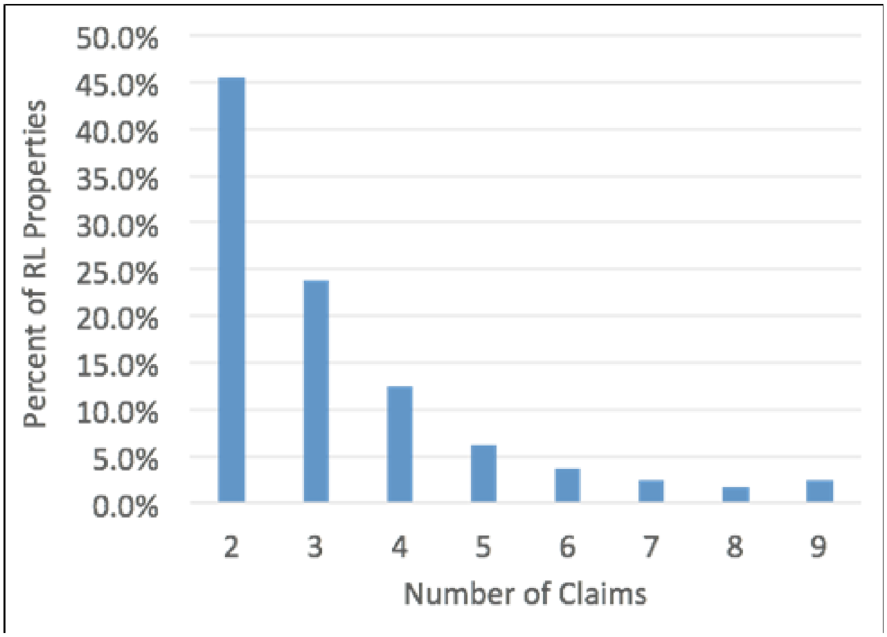
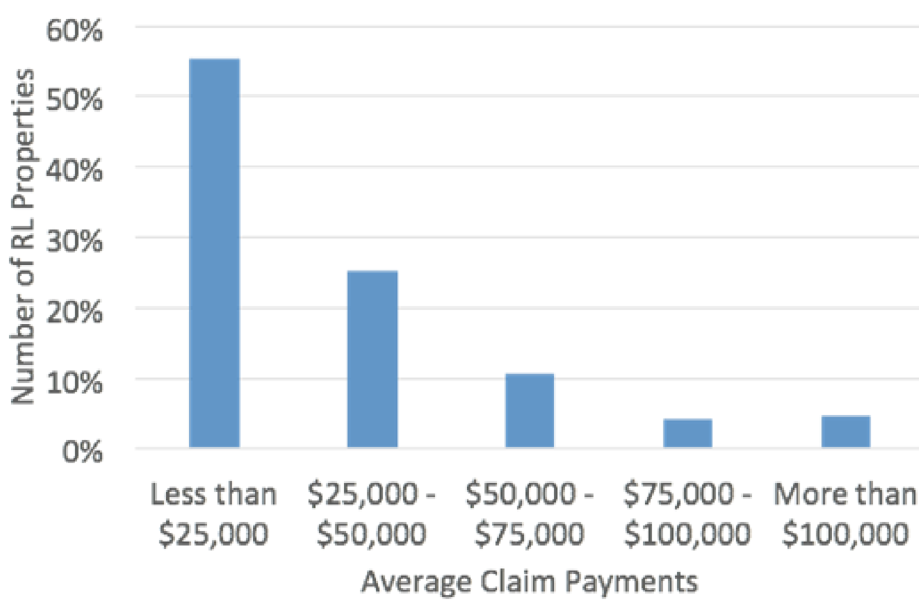


Figure 12 – Number of Claims on Repetitive Loss Properties



The number of claims on an individual property help to demonstrate the frequency of repeat flooding. A total of 45% of the 34,121 repetitive loss properties in Louisiana had only two claims. Therefore, many of the properties on the repetitive loss list do not have chronic repetitive flood problems.

Figure 13 – Average Repetitive Loss Claim Payments



The average claim payments help to demonstrate the damage done to repetitive loss properties. Approximately 80% of the Repetitive Loss properties had claims of less than $50,000, and 55% of the 34,000 Repetitive Loss properties had average claims of less than

$25,000. Roughly 9,000 properties (26%) had less than $10,000 in average claim payments. These 9,000 properties most likely flooded due to local drainage issues and/or shallow flooding. This is important information as these relatively low claim payments are not likely to trigger substantial damage requirements for these properties; hence, mitigation will not be required.

Conclusion

Repetitive and severe repetitive loss is a statewide issue, occurring in urban areas, and across the coast and central regions of the state. Repetitive loss properties put a strain on individual, local and state resources, resulting in multiple flood claims that cost thousands of dollars. Although there are multiple hazards that are multiple sources of repetitive flooding, the impacts are the same, damaging property and impacting resources across the state. Therefore, mitigating repeatedly flooded properties would benefit the entire state.

Mitigation Goals

Introduction

As repetitive flooding is a statewide issue, mitigating repetitive and severe repetitive loss properties is an essential goal. The State Hazard Mitigation Plan details this mitigation in the mitigation goals and sets the mitigation of repetitive loss properties as a main priority for mitigation funding. Refer to Chapter 4 – Mitigation Strategy on page X for more information on the goals and objectives in the State Hazard Mitigation Plan.

In 2014, Goal 4 of the plan addressed repetitive and severe repetitive loss properties. The goal read: The State of Louisiana will continue to pursue opportunities to reduce impacts to the state's manmade and natural environment through mitigation of repetitive and severe repetitive loss properties and other appropriate construction projects and related activities. In fact, the plan asserted that the primary focus in Louisiana for flood mitigation is on repetitive losses. As well, number of repetitive loss properties is listed as a criteria for funding in the 2014 plan, with jurisdictions with high numbers of repetitive loss properties given priority for mitigation funding. Since 2014, a total of 900 repetitive loss properties were mitigated statewide, including 250 SRL properties and 650 RL properties.

For the 2019 update, repetitive and severe repetitive loss properties remain a priority for the state. Goal 4 asserts: Reduce Louisiana's repetitive and severe repetitive loss property inventory. Goal 4 includes four objectives that provide more direction as to how the State may achieve this goal. The objectives are as follows:

Objective 4.1: Develop and implement the state Repetitive Loss Strategy for reducing RL and SRL properties.
Objective 4.2: Investigate possible actions to mitigate RL and SRL properties.
Objective 4.3: Update the RL and SRL inventory.
Objective 4.4: Prioritize repetitive loss properties for funding.

Changes in Priorities

From 2014 to 2019, some of the mitigation priorities changed. While the 2014 goals were similar, with mention of education and outreach, data collection, coordination, repetitive losses, and protecting buildings, the 2019 plan ranked them differently, with general mitigation planning given the most importance, followed by outreach and education, coordination with other strategies, reducing repetitive losses, and implementing the plan. Furthermore, the 2019 plan objectives contain more detail, with more measurable targets. As one committee member stated: "These represent a significant advancement over previous goals and objectives. Monitoring and achieving them is the next step."

Funding

The SHMPC had multiple discussions concerning how to prioritize funding selected mitigation projects. The committee underlined communities at highest risk as the most important priority, followed by communities with repetitive loss properties, communities undergoing development, and finally, community commitment to mitigation.

Mitigation Monitoring

The monitoring of repetitive loss mitigation efforts will mirror the monitoring procedures listed in Chapter 4 - Mitigation Strategy. Mitigation project closeouts generally occur in the following sequence, as established in the State of Louisiana Administrative Guidelines and Procedures, and in accordance with FEMA requirements for State Administrative Plans and Hazard Mitigation Grant Program (HMGP) guidelines set in the HMGP Desk Reference.

1. Sub-grantee indicates that a mitigation project is 100% complete in a quarterly project progress report
2. GOHSEP reconciles the FEMA SmartLink account for the project (by disaster)
3. GOHSEP initiates a comprehensive internal financial audit of the project
4. GOHSEP works with sub-grantees to resolve any issues discovered in the audit
5. GOHSEP sends FEMA Region VI a closeout letter that identifies the final eligible cost of the project, de-obligations that are required, and any monies that will be recovered from the sub-grantee

Over the period 1959 to 2005, Louisiana ranked 18th among the states in flood fatalities (excluding those related to Katrina), but third in flood-related injuries and in total flood casualties. Recent significant floods include the August 11-31, 2016 flood affecting southeast Louisiana (DR-4277), the March 8-April 8, 2016 flood affecting northern Louisiana (DR-4263), and the May 18-June 20, 2015 flood along the Red River in northwest Louisiana (DR-4228).

Table 1 – Mitigated RLs 2015-2018

End of Year	Non-Mitigated RLs	Mitigated RLs	Total RLs	% Mitigated
2015	24,091	7,795	31,886	24%
2016	25,515	8,119	33,634	24%
2017	25,825	8,219	34,044	24%
2018*	25,633	8,486	34,119	25%
*Data through end of July 31, 2018				

Table 1 illustrates the number of repetitive loss properties mitigated since the 2014 Hazard Mitigation Plan Update. The mitigated properties have increased each year, from 31,886 in 2015 to 34,119 in 2018. However, the flooding in Louisiana has increased as well, meaning only about a quarter of the repetitive loss properties have been mitigated each year. In order to review progress on achieving goals, GOHSEP ensures that both the annual and five-year plan evaluations include a detailed examination and analysis of the goals and various objectives under each goal. The repetitive loss strategy details one goal and 4 major objectives under that goal.

In order to review progress on the goal and objectives in the repetitive loss strategy, and as part of the yearly and five-year evaluations and updates to this plan, GOHSEP will initiate a review of all activities and projects noted in the repetitive loss strategy.

Conclusion

The State Hazard Mitigation Plan sets the mitigation of repetitive loss properties as a main priority for mitigation funding. Through four specific objectives, funding prioritization, and annual monitoring, the state aims for successful mitigation of these properties.

Repetitive Loss Mitigation Actions

Introduction

There are multiple mitigation actions that can help to reduce repeat flooding across the state. These include education and outreach, flood control measures, acquisition; retrofitting, utility protection, emergency measures, green infrastructure, higher building requirements, and, perhaps most importantly, flood insurance. More details on each of these measures are included in the following sections; the cost and feasibility of each measure are also included.

Mitigation Actions

- Education and Outreach
- Flood Control
- Drainage Improvements
- Acquisition
- Retrofitting
- Utility Protection
- Higher Building Requirements
- Flood Insurance
- Emergency Measures

Education and Outreach

Communities can use education and outreach to help mitigate repetitive loss properties. Many communities send an annual mailing to repetitive loss property owners detailing their risk and ways they can mitigate that risk. Additionally, municipalities can share information with homeowners on available funding streams available for mitigation projects. Many funding opportunities prioritize the mitigation of repetitive loss properties.

Flood Control

Large structural flood control projects, such as dams and levees, have regional or watershed-wide implications and can be very expensive. Because of this, they are often planned, funded and implemented at a regional level by agencies, such as the U.S. Army Corps of Engineers and the USDA Natural Resources Conservation Service.

There are many local levees and dams throughout the state, but the largest levee projects are in the southeastern coastal region. Authorized by U.S. Congress in 1996, the Southeast Louisiana Urban Flood Control Project (SELA) drainage program is designed to reduce flood-related damage to property and infrastructure in Orleans, Jefferson, and St. Tammany parishes. This was a federal legislative response to repetitive flood losses in the region, particularly due to the heavy rainfalls, which occurred during May 8-10, 1995. Through SELA, new pump stations and better drainage canals were installed throughout the parishes. The program was authorized and administered under a project cooperative agreement between local agencies and the U.S. Army Corps of Engineers.

Cost and Feasibility of Flood Control

The US Army Corps of Engineers funds flood control projects that are shown to have a favorable benefit/cost ratio and where a local sponsor agrees to participate. Municipalities must contribute a cost share to the projects. Corps funds are not used on an individual property basis.

Drainage Improvements

Sometimes residents can improve drainage at the household level. Some residents in Louisiana have installed drains or pipes to improve drainage. At the neighborhood level, the community can improve drainage by cleaning and maintaining drains, ensuring that they are free of debris and allowing water to flow unobstructed. Additionally, many municipalities have Public Works departments that oversee drainage in their areas.

Cost and Feasibility of Drainage Improvements

While household level drainage improvements can be relatively inexpensive, it is more costly to operate a drainage department at the municipal level. Localities must hire staff, and contribute staff time to maintenance and repairs. However, preventative maintenance is less expensive than rebuilding homes and neighborhoods after a drainage failure. Programs such as Brooms to Basins in Jefferson Parish and Adopt A Catch Basin in Orleans Parish promotes preventative maintenance (cleaning of catch basins) by residents and business owners.

Acquisition

This measure involves buying one or more properties and clearing the site. If there is no building subject to flooding, there is no flood damage. Acquisitions are usually recommended where the flood hazard is so great or so frequent that it is not safe to leave the structure on site.

Municipalities can choose to buy and clear whole subdivisions or buy out individual structures with federal funds. This approach involves purchasing and clearing the homes with lowest elevation, or the most severe repetitive losses.

If a municipality makes use of FEMA funds, three requirements apply:

1. The applicant must demonstrate that the benefits exceed the costs, using FEMA's benefit/cost methods.
2. The owner must be a willing seller.
3. The parcel must be deeded to a public agency that agrees to maintain the lot and keep it as open space permanently.

Acquisition Cost

Acquisition can be costly, and it is difficult to obtain a favorable benefit/cost ratio in shallow flooding areas. Other factors can increase the cost of this measure:

- If relying on FEMA funds, the FEMA share is 75% of the market value of the property before it was flooded. The property owner makes up the difference. In effect, the owner only receives 75% of the value of the property.
- The community must still pay for maintaining the streets, water lines, and other infrastructure to serve those who remain.
- The vacant lots must be maintained by the new owner agency (often the local government), even though the municipality does not receive taxes for the property.

Feasibility of Acquisition

Acquisitions also disrupt communities and neighborhoods. Not everyone is willing to sell their home, so a checker-board pattern of vacant and occupied lots often remains after a buyout project, leaving gaps in the neighborhood. Additionally, if the lot is only minimally maintained, its presence may reduce the property values of the remaining houses.

Retrofitting

To retrofit a structure means to make a change to protect it from hazards such as flooding or high winds. This section reviews several ways that a repetitive loss property could be retrofitted to reduce flood risk. These different measures vary in costs and feasibility.

Elevation

Raising the structure above the flood level is generally viewed as the best flood protection measure, short of removing the building from the floodplain. All damageable portions of the building and its contents are high and dry during a flood, which flows under the building instead of into the house. Houses can be elevated on posts/piles or a crawlspace. A house elevated on posts is either built or raised on a foundation of piers that rise high enough above the ground to elevate the house above the flow of flood water. A house elevated on a crawlspace is built or raised on a continuous wall-like foundation that elevates the house above the flood level. If a crawl space is used, it is important to include vents or openings in the walls that are appropriately sized: one square inch for each square foot of the building's footprint.

Cost to Elevate

Most of the cost to elevate a building is in the preparation and foundation construction. Elevation is usually most cost-effective for wood frame buildings on posts/piles or crawlspace, because it is easiest to get lifting equipment under the floor, and disruption to the habitable part of the house is minimal.

Elevating a slab house is much more costly and disruptive. The actual cost of elevating a particular building depends on factors such as its condition, whether it is brick faced, and if additions have been added on over time. According to a study conducted by Dr. Carol Friedland of LSU's Department of Construction Management, the average cost of elevating a slab on grade home utilizing HMGP funds is $83 per square foot to elevate 3 feet; $91 per square foot to elevate 6 feet; and $100 per square foot to elevate 9 feet. These costs are based on projects undertaken in Louisiana, adjusted to 2015 dollars. Because many areas of Louisiana are experiencing subsidence, it may be a good idea to elevate higher than the suggested elevation, in order to prepare for more subsidence in the future.

While the cost of elevating a home can be high, there are funding programs that can help. In most cases, a FEMA grant pays for 75% of the cost, while the owner pays the other 25%. In the case of elevating a slab foundation, the homeowner's portion could be as high as $25,000 or more. In some cases, the Increased Cost of Compliance (ICC) provision of a flood insurance claim payment can provide payment assistance. Property owners can also use ICC toward the non-federal cost-share.

Federal funding support for an elevation project requires a study that shows that the benefits of the project exceed the cost of the elevation. The cost of elevating a masonry home or a slab can cost over $100,000. Benefits are determined by such factors as building replacement value, past flood insurance claims, and displacement costs. Hence, funding is often allocated to those properties that are low in elevation and subject to frequent flooding.

Barriers

Homes that typically receive 3 feet of floodwater or less, or where the water does not remain for a considerable amount of time, can benefit from small floodwalls, levees or berms. Levees and berms are more suitable for larger lots, while small floodwalls that are located close to the house are appropriate for suburban style neighborhoods with limited front and side yard space. During shallow flooding, barriers could be an appropriate mitigation measure for some homes. However, with homes that experience flood depths greater than 2 or 3 feet, another option would be more suitable.

When considering barriers, residents who experience floodwaters that remain for several hours or days should include internal drainage provisions, as seepage can occur, and water will end up inside the barrier. The more permeable the soil, the more floodwaters seep under the barrier. It is important to have a soil sample checked by an engineer to **determine the rate of permeability.**

Figure 14 - A small flood wall stops the water from entering the house. If water overtops the wall, it collects in this basin, or sump, and is pumped out by a sump pump.

Homeowners who are interested in constructing a barrier to protect their house should consider the following requirements:

- A method to close openings; generally, this requires human intervention, as someone needs to be available and have enough time to take action prior to the flood event.
- A system to prevent sanitary sewer backup from flowing into the building.
- Internal drainage improvements, including:
- A system of drain tile (perforated pipes) that collects water that falls or seeps into the protected area and sends it to a collecting basin or sump,
- A sump pump to send the collected water outside the barrier, and
- Power to operate the sump pump around the clock during a storm.

Barrier Cost

The cost of a local barrier depends on the depth of flooding and the level of engineering needed for the design. Where flooding is only inches deep and of short duration, almost any barrier of concrete or earth will work. Regrading a yard to build a berm could cost a few hundred dollars while a long concrete floodwall will cost much more. FEMA does not fund individual floodwalls for residential properties; therefore, the homeowner must pay 100% of the cost for a floodwall. However, each person can determine how much of their own labor they want to contribute (which reduces out-of-pocket costs), and whether the cost of the wall is worth the protection that it may provide.

Barrier Feasibility

Residents interested in pursuing a retrofitting measure to protect their home or utilities should contact their local department of planning and zoning to determine whether a permit is required. Flood barriers are not recognized as a mitigation method by FEMA and will not reduce flood insurance premiums – they are strictly for flood protection. The installation of a flood barrier may cause nearby neighbors to flood, so it is best to get a renovation permit before installation. This type of mitigation should be restricted to a small area so that it does not cause negative impacts to adjacent properties. Residents cannot drain water to their neighbors' properties. Instead, the water should drain to the front of the property, or into an adjoining drainage ditch. In addition, residents cannot build a flood barrier over a servitude, right-of-way, or easement. Residents can check their plat for these issues.

Figure 15 - This home is surrounded by a floodwall that doubles as a planter. The driveway must be sandbagged during a flood event.

Dry Floodproofing

This measure prevents flood waters from entering a building with a slab foundation by modifying the structure. To dry floodproof, coat the walls with waterproofing compounds or plastic sheeting. In addition, close openings (e.g., doors, windows, and vents), permanently or temporarily, with removable shields or sandbags.

To complete a floodproofing project, a property owner must:

- Make the walls watertight. This is easiest to do for brick faced walls. Cover brick or stucco walls with a waterproof sealant and brick (or stucco) over with a veneer to camouflage the sealant. Wrap houses with wood, vinyl, or metal siding with plastic sheeting to make the walls watertight, and then cover with a veneer to camouflage and protect the plastic sheeting.
- Provide closures, such as removable shields or sandbags, for the openings. Openings include doors, windows, dryer vents, and weep holes.
- Account for sewer backup and other sources of water entering the building. For shallow flood levels, this can be accomplished with a floor drain plug or standpipe. However, a valve system is more secure.

Dry floodproofing employs the building itself as part of the barrier to the passage of flood waters, and this technique is only recommended for buildings with slab foundations that are in good condition (i.e., no cracks). The solid slab foundation prevents flood waters from entering a building from below. Also, even if the building is in sound condition, tests by the U.S. Army Corps of Engineers recommend not using floodproofing for flood depths greater than two feet over the floor, because water pressure on the structure can collapse the walls and/or buckle the floor.

Figure 16 - Flooding of this slab-on-grade house was up to 1 1/2 feet. Damage could have been prevented by dry floodproofing.

Dry floodproofing is a mitigation technique that is appropriate for most houses with slab foundations that typically receive floodwater of less than two feet in the house. This method is only recommended for homes that have experienced flooding less than two feet deep. Property owners interested in pursuing a retrofitting measure to protect their utilities should contact their local planning and zoning department to determine whether a permit is required.

Not all parts of a structure need to be floodproofed. It is difficult to floodproof a garage door, for example, so some owners may allow the garage flood, and floodproof the walls between the garage and the rest of the house. Elevate appliances, electrical outlets, and other damage-prone materials located in the garage above the expected flood levels.

Cost of Dry Floodproofing

The cost for a dry floodproofing project can vary according to the building's construction and condition. It can range from $5,000 to $20,000, or$10 to $20 per square foot, depending on how secure the owner wants to be. Owners can do some of the work by themselves, although an experienced contractor provides greater security. Each property owner can determine how much of its own labor they can contribute, and whether the cost and appearance of a project is worth the protection from flooding that it may provide.

Feasibility of Dry Floodproofing

As with floodwalls, floodproofing is appropriate where flood depths are shallow and are of relatively short duration. It can be an effective measure for some of the structures and flood conditions found in Louisiana. It can also be more attractive than a floodwall around a house. However, dry floodproofing has the following shortcomings as a flood protection measure:

- It usually requires human intervention, so someone must be home to close the openings.
- The success of dry floodproofing depends on the building's condition, which may not be readily evident. It is very difficult to tell if there are cracks in the slab under the floor covering.
- It requires periodic maintenance to check for cracks in the walls, and to ensure that the waterproofing compounds do not decompose.
- There are no government financial assistance programs available for the dry floodproofing of residential buildings, therefore the homeowner must pay the entire cost of the project.
- The NFIP will not offer a lower insurance rate for dry floodproofed residences, but will for nonresidential structures, if they are protected to at least the base flood elevation.

For more details on dry floodproofing, visit http://www.lsuagcenter.com.

Figure 17 - This Baton Rouge, LA home had thin facing brick placed over the waterproofing materials.

Figure 18 - This Terrebonne Parish home has a steel door to keep flood waters out.

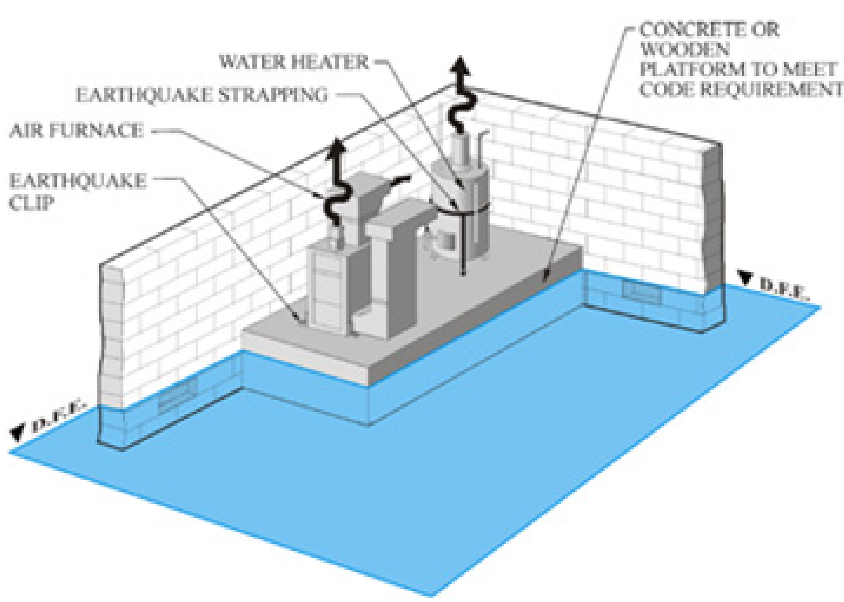
Figure 19 - This dry floodproofed building in Mandeville, LA has the walls waterproofed and removable shields placed in front of the windows.

Figure 20 - This home in Jefferson Parish, LA has permanent shields sealing the space under the windows.

Utility Protection

This measure applies to several different utilities that can be damaged by floodwaters such as: heating, ventilation, and air conditioning (HVAC) systems; fuel meters and pipes; electrical service boxes, wiring, and fixtures; sewage systems; and water systems. Damage to utilities can prevent residents from returning to their homes. Retrofitting utilities includes things as simple as raising them above the expected flood level or building small walls around furnaces and water heaters to protect from shallow flooding. FEMA document 348: Protecting Building Utilities from Flood Damage covers various ways to protect utilities, whether the building is a new construction, declared substantially damaged, or simply an existing structure in need of retrofitting.

Figure 21
Elevation of mechanical equipment, FEMA 348



Cost of Utility Protection

The cost for protecting utilities varies and is dependent upon the measure itself, and the condition of the system, structure, and foundation. Although there are methods that property owners can utilize on their own to protect utilities, it is always a good idea to consult a professional contractor and/or engineer (depending on the project). Homeowners can lower the costs by performing the retrofits as part of a repair or remodeling project. Residents interested in pursuing a retrofitting measure to protect their utilities should contact their local building department or department of planning and zoning to determine whether a permit is required.

Feasibility of Utility Protection

Since the flooding experienced by residents in Louisiana includes both shallow and deep flooding, utility protection is a recommended mitigation measure. Residents should incorporate utility protection even if the building will be protected by a levee or dry floodproofing, in order to provide an extra layer of protection.

Green Infrastructure

Another flood mitigation measure is green infrastructure. Green infrastructure maximizes stormwater storage through the use of porous surfaces and natural plants and systems. This allows rainwater to be stored rather than flooding streets, sidewalks and homes. It also removes some of the excess water from the local drainage system and reduces subsidence. Green infrastructure can be employed at the neighborhood and/ household levels.

Figure 22 - Elevation of HVAC in Terrebonne Parish

Figure 23 -Raingarden, Source: The Joy of Water

Neighborhood Level

Green infrastructure at the neighborhood level can be made up of bioswales, rain gardens, constructed wetlands, retention ponds, detention ponds, pervious pavement and structural soils.

- Bioswales are a natural culvert that moves water from one place to another. They are planted with native grasses and plants and used for stormwater management.
- Rain gardens, another type of green infrastructure, are composed of plants planted in holes of sand rather than soil to allow for maximum drainage.
- Constructed wetlands mimic natural wetlands and serve to absorb runoff from a large area.
- Retention ponds hold water over the long term, while detention ponds detain water before letting it slowly drain. It is important to install filters or other measures in order to reduce breeding grounds for insects. Retention and detention ponds need to drain or flow at a rate that prevents insect breeding.
- Pervious pavement and structural soils allow for stormwater to infiltrate the soil and reduce the burden on local drainage systems.

Figure 24 - Pervious Pavement, Source: EPA

Household Level

French drains are a type of green infrastructure that can be installed by individual property owners. They are channels filled with rock to direct flow, while allowing much of it to filter into the surrounding ground. They act as drains that filter water and can be installed in front, back and side yards.

Another option for stormwater management at the household level is the use of rain barrels. Rain barrels collect rainwater from household gutters and store it as gray water. Gray water includes waste water that is relatively clean. It is not used for drinking water, but can be used to water gardens, lawns, etc.

Cost and Feasibility

The cost of green infrastructure varies. Residents can install the household level solutions can themselves. For more information on green infrastructure projects, view The Joy of Water booklet, located at http://issuu.com/waterworksla/docs/the_joy_of_water_booklet_web. For additional information, visit the EPA's website at http://water.epa.gov/infrastructure/greeninfrastructure/gi_what.cfm. Please note that these measures will not impact storm surge flooding.

More Effective Construction Standards

There are multiple ways localities could institute more effective construction standards to further protect buildings from flooding. These include adopting flood of record data, requiring freeboard, and requiring nonconversion agreements.

Flood of record

A local municipality may adopt flood of record data to determine the extent of the regulatory floodplain, and the regulatory flood elevation where there is no base flood elevation (BFE) shown on the FIRM, or where the flood of record is higher than the BFE. This means the parish would use historical data from past floods to determine elevation, rather than the flood maps. In some cases, the flood height of the flood of record may be higher than the recommended base flood elevation.

Figure 25 - French Drain, Source: The Joy of Water

Benefits of Adopting the Flood of Record
It may be easier to convince people that the protection level is based on a real hazard that has already occurred. Also, new buildings built to the higher level will have lower flood insurance rates because the rates are based on the BFE shown on the FIRM, which is often lower than the flood of record.

Freeboard
Instead of the minimum NFIP protection standard, the BFE, new buildings could be protected to the BFE plus an additional number of feet. Many municipalities add up to three feet to the BFE for more effective flood protection. This could also apply to substantial improvements of existing buildings.

Benefits of Adopting Freeboard
Freeboard accounts for flood study errors, floods greater than 100-year floods, increased flood heights due to climate change, and development in the watershed. Additionally, new buildings built to the higher level will have lower flood insurance rates. Three feet of freeboard can substantially cut the premium on a single-family home.

Nonconversion Agreements
When a building is elevated on enclosed walls, over time the owner or new owner may forget that the lower area needs to be kept open for floodwaters and free of damage-prone equipment and materials. It is not uncommon for residents to convert the lower area to finished rooms or an apartment. Because the lower area is enclosed, the permit office is often unaware of the conversion. This higher standard requires the applicant for a permit that elevates or improves a building on walls to sign an agreement that the area will not be converted. This means no insulation, carpeting, plumbing, etc. If enforcing nonconversion agreements, communities should include a notice on the property deed to advise future buyers of the restriction.

Benefits of Nonconversion Agreements
This removes the strong temptation to occupy or finish the lower, floodable, story of an elevated building. Also, the building maintains its protection from flood damage in accordance with the permit.

Cumulative Substantial Improvement
The local municipality could add language to the Code of Ordinances defining substantial damage/improvement as restoration/reconstruction that equals or exceeds 50 percent of the market value of the structure. Additionally, the locality could add a cumulative substantial damage requirement; wherein any repairs or changes made over a 10-year period cannot equal or exceed 50% of the market value of the structure.

Benefits of Cumulative Substantial Improvement
The implantation of cumulative substantial improvement allows the use of ICC funds for more buildings and ensures that more buildings are mitigated against flooding.

Cost and Feasibility of Higher Building Requirements
The writing and adopting of ordinances only costs staff time, and the benefits to the community are quite high. Although some of these ordinances could be difficult to find political support for, FEMA has many brochures and fact sheets detailing the long term cost savings that communities can share with decision makers.

Flood Insurance

Although flood insurance is not a mitigation measure that reduces property damage from a flood, an NFIP policy does the following for the property owner or renter for the following reasons:

- A flood insurance policy covers surface flooding from the overflow of inland or tidal waters or from stormwater runoff, while homeowners insurance does not.
- Flood insurance may be the only source of assistance to help owners of flood damaged property pay for clean-up and repairs.
- Once in effect there is no need for human intervention.
- Coverage is available for the contents of a home, as well as for the structure.
- Renters can buy contents coverage, even if the building owner does not buy coverage for the structure itself.

Cost of Flood Insurance

Flood insurance rates are based on several factors, including what flood zone the building is in, the elevation of the building, and the age of the structure. Pre-FIRM buildings are structures that were built before the date of the first Flood Insurance Rate Map (FIRM) for the community. Rates on pre-FIRM buildings that are currently insured are subsidized, because the flood risk was unknown at the time of construction.

A building that is located in the Special Flood Hazard Area (SFHA) on today's FIRM and constructed, substantially improved, or substantially damaged is required to be built above the base flood elevation. It is also subject to rates based on the actual risk, rather than a subsidized rate.

Feasibility: Insurance Reform and the Community Rating System

In July 2012, Congress passed the Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12). BW-12 was enacted to ensure the financial viability of the National Flood Insurance Program. Major components called for the elimination of subsidies on pre-FIRM buildings. BW-12 was amended by the Homeowner Flood Insurance Affordability Act of 2014. The major impact of this law was to slow the flood insurance premium increases for pre-FIRM buildings. However, the increases have not been eliminated.

As of April 2015, newly written and mapped policies substantially increased, and a surcharge and annual percentage increase was applied to existing policies, in order to reach actuarial rates. Therefore, it is just a matter of time for pre-FIRM buildings to be subject to the actuarial rates. That means that a home that is two or three feet below the base flood elevation could be paying much higher premiums, unless it is elevated. Any resident who wants to know more about flood insurance reform should go to: http://www.fema.gov/flood-insurance-reform. It is also important to talk with your flood insurance agent to make sure your policy is current, and to learn more about the impending changes.

The Community Rating System (CRS) is a voluntary program that recognizes NFIP participating communities that go above and beyond the minimum requirements for floodplain management. Policyholders in participating communities receive reduced insurance premiums. CRS communities receive various credits for the floodplain management activities they implement. The more credit earned, the better the class ranking of that community. The CRS has 10 classes; a class ranking of 10 has no flood insurance premium reduction, whereas a class 1 carries the maximum discount. Refer to the State of Louisiana CRS Strategy in Appendix D for more information.

Emergency Measures

Mitigation of repetitive loss properties can also include taking emergency measures during a flood. When flooding is expected, it is important to listen to the radio, television, or NOAA weather radio to stay informed. It is also a good idea to have an emergency plan and to have everything prepared to evacuate the area if the flooding gets worse. High ground is safer than lower ground during a flood. Walking or driving through floodwaters is dangerous – six inches of moving water can knock a person down, and two feet of water can sweep a vehicle away.

If the expected flooding will be three feet or less, you can install panels, sandbags, water-inflated barriers, flood wraps and shields, or pumps to protect your home. Property owners can visit http://maps.lsuagcenter.com/floodmaps/ to get more information on the ground elevation and base flood elevation for their properties.

If flooding or storms are expected, you can visit www.lsuagcenter.com/topics/family_home/hazards_and_threats/floods_hurricanes/flood_weather_watch/rivers-and-the-weather--conditions-and-forecast for information from the National Hurricane Center, Louisiana Agroclimatic Information Service, and the National Weather Service. The site also contains information on river forecasts, rainfall and the national flood outlook.

Cost and Feasibility

Preparing for hazardous events ahead of time can be less expensive than paying for damage after an event. Residents can save time and money by staying aware of hazards, preparing a disaster kit, and staying out of harm's way during an event.

Funding sources

There are several possible sources of funding for mitigation of repetitive loss structures, including FEMA grants, Increased Cost of Compliance, other federal agencies, post-disaster funding, state and local funds, and the property owners themselves.

FEMA Mitigation Funds

Most FEMA programs provide 75% of the cost of a project. In the majority of communities, the benefitting property owner pays the 25% non-FEMA share. Each program has different Congressional authorization, and slightly different rules.
The state administers the grants, and communities apply on behalf of their residents. Although repetitive loss property owners cannot apply for these grants on their own, they can partner with their locality and the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) to apply for the funds. Therefore, individual homeowners are the eventual recipients of the money.

Figure 26

Hazard Mitigation Assistance Mitigation Activity Chart, May 2018 (elegible activities are subject to change with each fiscal year's program)

Hazard Mitigation Assistance Mitigation Activity Chart			
Eligible Activities	HMGP	PDM	FMA
1. Mitigation Projects	X	X	X
2. Hazard Mitigation Planning	X	X	X
3. Technical Assistance			X
4. Management Costs	X	X	X
5 Percent Initiative Projects*	X		
Advance Assistance	X		
Aquifer and Storage Recovery**	X	X	X
Dry Floodproofing of Historic Residential Structures	X	X	X
Dry Floodproofing of Non-residential Structures	X	X	X
Flood Diversion and Storage**	X	X	X
Floodplain and Stream Restoration**	X	X	X
Generators	X	X	
Green Infrastructure**	X	X	X
Infrastructure Retrofit	X	X	X
Localized Flood Risk Reduction Projects	X	X	X
Miscellaneous/Other**	X	X	X
Mitigation Reconstruction	X	X	X
Non-Localized Flood Risk Reduction Projects	X	X	
Non-structural Retrofitting of Existing Buildings and Facilities	X	X	X
Post-Disaster Code Enforcement	X		
Property Acquisition and Structure Demolition	X	X	X
Property Acquisition and Structure Relocation	X	X	X
Safe Room Construction	X	X	
Soil Stabilization	X	X	X
Structural Retrofitting of Existing Buildings	X	X	X
Structure Elevation	X	X	X
Wildfire Mitigation	X	X	
Wind Retrofit for One- and Two-Family Residences	X	X	

NOTE:
*FEMA allows increasing the 5% Initiative amount up to 10% for a Presidential major disaster declaration under HMGP. The additional 5% Initiative funding can be used for activities that promote disaster-resistant codes for all hazards. As a condition of the award, either a disaster-resistant building code must be adopted or an improved Building Code Effectiveness Grading Schedule is required.

**Indicates that any proposed action will be evaluated on its own merit against program requirements. Eligible projects will be approved provided funding is available.

Data Source: www.fema.gov/hazard-mitigation-assistance-mitigation-activity-chart

FEMA provides mitigation funding through the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance Program (FMA), and the Pre-Disaster Mitigation Program (PDM). These programs provide funding for mitigation projects, mitigation planning, green infrastructure, and property acquisition. The full list of mitigation activities funded by these programs is found in Figure 26.

The Hazard Mitigation Grant Program (HMGP)

The HMGP provides grants to states and local governments to implement long term hazard mitigation measures after a major disaster declaration. Projects must provide a long-term solution to a problem. For example, elevating a home to reduce the risk of flood damage is a long-term solution, while buying and placing sandbags is a short-term solution. Examples of eligible projects include acquisition and elevation, as well as local drainage projects – all of which can reduce repetitive flooding.

The Flood Mitigation Assistance Program (FMA)

FMA funds help states and communities implement measures that reduce or eliminate the long-term risk of flood damage to structures insured under the NFIP. FMA includes project grants to implement measures that reduce flood losses, such as elevation, acquisition, or relocation of NFIP-insured structures. These include up to 100% federal cost share for SRLs, 90% for RLs, and 75% for properties insured by the NFIP.

Pre-Disaster Mitigation Program (PDM)

The PDM program provides funds to states, territories, tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Projects may include elevation, acquisition, relocation, etc.

Increased Cost of Compliance

There is a funding provision in the NFIP for insured buildings that have been substantially damaged by a flood called Increased Cost of Compliance (ICC). ICC coverage pays for the cost to comply with floodplain management regulations after a flood, if the building is substantially damaged. ICC will pay up to $30,000 to help cover elevation, relocation, demolition, and nonresidential floodproofing. The funding can also help pay the 25% non-federal share of a FEMA funded mitigation project. State, parishes, and cities can help to pay the 25% as well.

To make use of the funding, the building must have had flood insurance during the flood. This funding is provided in addition to the damage claim payment made under the regular policy coverage; however, the total damage claim cannot exceed $250,000. ICC claims must include a substantial or repetitive damage determination from the local floodplain administrator.

If municipalities adopt alternative language into the local floodplain management ordinance, residents with shallower flooding would have access to ICC funding. Since local ordinances determine the threshold at which substantial damage and/or repetitive claims are reached, adopting language that lowers these thresholds would benefit the homeowners of repetitive loss properties. Adopting alternative language allows for cumulative damage to reach the threshold for federal mitigation resources more quickly, allowing some of the properties in the state that sustain minor damage regularly to qualify for mitigation assistance through ICC. This alternative language would require these properties to be elevated after a degree of cumulative damage.

US Army Corps of Engineers

The US Army Corps of Engineers funds flood control projects that are shown to have a favorable benefit/cost ratio and where a local sponsor agrees to participate. Corps funds are not used on an individual property basis.

US Department of Housing and Urban Development (HUD)
HUD provides assistance after a disaster through the Community Development Block Grant (CDBG) Disaster Recovery Program. These grants serve to help rebuild and recover in the areas impacted by disasters. These funds cover a variety of activities and may have more flexible uses than other federal funds.

USDA Emergency Watershed Protection Program
The USDA's Emergency Watershed Protection Program helps communities and homeowners through maintaining and repairing infrastructure through debris removal, stream protection, and drainage facility and levee repair.

Small Business Administration Mitigation Loans
The Small Business Administration (SBA) offers mitigation loans to SBA disaster loan applicants who have not yet closed on their disaster loan. Applicants who have already closed must demonstrate that the delay in application was beyond their control. Measures eligible for SBA mitigation loans may only protect real estate property, not personal items, from the same type of future declared disaster. For example, mitigation loans made following a flood can only pay for a measure to protect against future flooding, not a tornado. If the mitigation measure existed prior to the declared disaster, an SBA mitigation loan will cover the replacement cost. If the mitigation measure did not exist prior to the declared disaster, the mitigation loan will only cover the cost of the measure if it is deemed absolutely necessary for repairing the property by a professional third party, such as an engineer.

State funds

Federal Resources
The State of Louisiana can utilize federal sources of funding, such as FEMA HMA funding, which includes HMGP, PDM, and FMA funds. The state can also make use of HUD CDBG funding. All of these funding sources are described in the previous section.

State Resources
As well, the State of Louisiana makes use of statewide funds for mitigation projects. Statewide funding includes the, State of Louisiana Capital Outlay fund, the DOTD Statewide Flood Control program funding, and private partnership funding.

Coastal Protection and Restoration Authority (CPRA) Resources
The State of Louisiana can also make use of funding from the Coastal Protection and Restoration Authority (CPRA). CPRA obtains funding from the following the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) as well as the Water Resources Development Act (WRDA). CPRA further receives funding from Natural Resource Damage Assessment (NDRA) Restoration, BP and Transocean Settlements, the Restore Act, and the Gulf of Mexico Energy Security Act (GOMESA).

Local funds

Hazard Mitigation Plans
Parishes use Hazard Mitigation Plans to identify projects and prioritize funding for mitigation. Parishes can identify repetitive and severe repetitive loss properties as priorities for mitigation funding and apply for funds through the State to mitigate these properties as they become available.

Rebates
A rebate is a grant in which the homeowner and another source, such as the local government, share the costs. The property owner receives the rebate after completing an approved project. Many communities favor it because the owner handles all the design details, contracting, and payment before the community provides funding. The owner ensures that the project meets all of the program's criteria, pays for project construction, and then goes to the community for the rebate after the completed project passes inspection. Rebates are more successful where the cost of the project is relatively small, e.g., under $5,000, because the owner can more likely afford the majority of the cost. The rebate acts as an incentive, rather than as a grant that covers most of the cost. For more information on how communities can fund mitigation, consult the Army Corps of Engineers' Local Flood Proofing Programs at https://usace.contentdm.oclc.org/digital/collection/p16021coll11/id/358/.

Property Owners
All repetitive loss property owners should purchase and maintain flood insurance. In addition, property owners can choose to invest in green infrastructure, retrofits, or other small projects to protect themselves. As well, neighborhoods can invest in larger green infrastructure projects for their area.

Other Mitigation Organizations
Other entities also provide funding for mitigation of repetitive loss properties. These include volunteer organizations, private foundations, and other fundraisers. Volunteer organizations such as religious organizations and nonprofits can help property owners with their mitigation costs. Local private foundations also can contribute to the cost of mitigation, particularly for public buildings.

State and Local Capabilities

Chapter 3, the Capability Assessment of the State Hazard Mitigation Plan, summarizes the state and local policies, programs, and activities that support a wide range of hazard mitigation actions. This section follows the same organization but does not repeat the state plan's assessment. Instead, it identifies which of the capabilities are appropriate for mitigating repetitive flood losses.

State Authorities, Policies, and Programs

Policies
Most of the state policies and programs that support hazard mitigation in general support mitigation of repetitive loss properties. The following currently have or could have provisions that would particularly impact mitigation of repetitive loss properties:

<u>Coastal zone and floodplain land use regulations</u>. While zoning and construction standards for hazard-prone areas primarily impact new development, they can help mitigate flood damage to existing buildings. There are two main policies/regulatory standards that do this:

- Some standards keep the flood problem from being exacerbated by new development. For example, no new development in the mapped floodway can cause an increase in the height of the base flood. Standards for seawalls and beach alterations can prevent increases in erosion or transferring erosion problems to other properties.
- All communities in the National Flood Insurance Program must adopt and enforce the substantial improvement rule, which requires buildings undergoing substantial improvements or that were substantially damaged to be brought up to the flood protection standards for new construction.

Stormwater management regulations. These prevent increases in stormwater runoff on downstream properties. These are especially important for repetitive loss areas that are subject to local drainage problems, not from overbank river or coastal flooding.

Programs

Several state programs can directly reduce flood problems in repetitive loss areas. The most important one is the Community Rating System. Here are some of the reasons why the CRS is such an important program for mitigating repetitive losses:

- Eighty percent (80%) of the State's repetitive loss properties are in CRS communities.
- The Community Rating System requires all participating communities to map and evaluate their repetitive loss areas.
- CRS communities with 50 or more repetitive loss properties are required to adopt plans that address repetitive flooding. Most such communities in Louisiana have relied on their hazard mitigation plans to fulfill this prerequisite to joining the program. Of the 391 Louisiana communities with repetitive loss properties, 86 have more than 50 such properties (FEMA 2017). Of them, 29 (34%) are in the CRS.
- The Community Rating System provides an incentive and sets criteria for actions that mitigate flood losses. In some cases, extra credit is provided for actions that address repetitive losses. The mitigation actions include:
    - Public information projects to encourage owners to take steps to protect their buildings from flood damage.
    - Providing technical assistance to people who want to take steps to protect their buildings.
    - Mapping and regulating development and redevelop¬ment in flood problem areas not shown as flood hazard areas on the community's Flood Insurance Rate Map.
    - Adopting higher standards for retrofitting existing floodprone buildings, such as tracking improvements and damage cumulatively and requiring that buildings be protected to a level higher than the base flood.
    - Expanding the number of projects affected and the level of protection for stormwater management requirements.
    - Including repetitive loss areas in the community-wide mitigation plan.
    - Preparing repetitive loss area analyses, i.e., more detailed mitigation plans for each repetitive loss area.

Figure 27 – The CRS Coordinator's Manual

- Removing floodprone buildings from the flood hazard area (double credit if the buildings are on the repetitive loss list, triple credit if they are severe repetitive loss properties).

- Retrofitting floodprone buildings to provide flood protection (double credit if the buildings are on the repetitive loss list, triple credit if they are severe repetitive loss properties).

- Constructing flood control or drainage improvement projects (double credit for those protected buildings that are on the repetitive loss list, triple credit if they are severe repetitive loss properties).

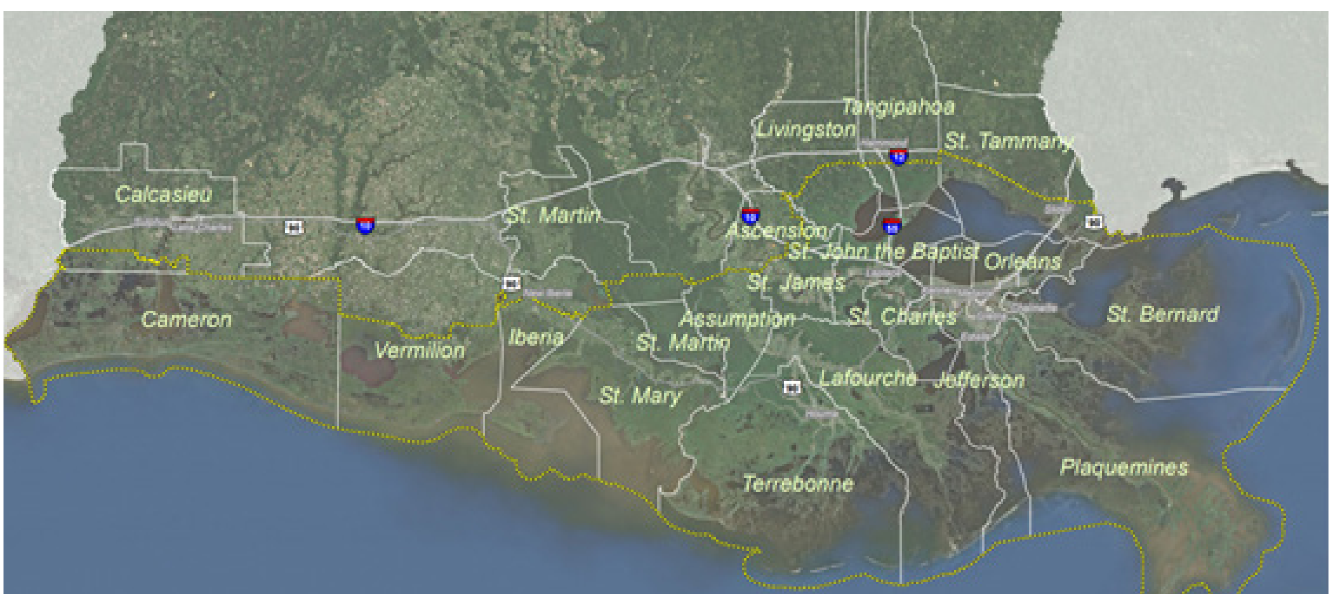
- Maintaining the drainage system that serves repetitive loss areas to minimize the chance of flooding due to drainage obstructions.

Other programs that can be particularly effective in mitigating repetitive losses include:

- The Statewide Flood Control Program, which manages flood control and drainage improvement projects.

- The Coastal Protection and Restoration Authority can have quite an impact as it has jurisdiction over 79 of the 205 (39%) repetitive loss communities. Those communities have had 83% of all the repetitive loss claims. CPRA's programs are given a full page of coverage in the hazard mitigation plan.

Figure 28
The Coastal Zone Boundary includes 79 repetitive loss communities that account for 83% of all repetitive loss claims



The Uniform Construction Code sets minimal standards for building codes. It could require more effective flood protection measures for existing buildings, such as tighter substantial improvement rules and freeboard.

There are several programs that preserve open space, such as the Land Acquisition Program and the Louisiana Coastal Wetland Conservation Plan. Their primary mitigation benefit is preventing increased runoff caused by new development.

The Department of Natural Resources and the Department of Transportation and Development have coastal or floodplain management programs that provide advice and assistance to communities. Such work can be very successful in encouraging communities to adopt higher standards and/or give special attention to repetitive loss properties.

Hazard Mitigation Capabilities

Personnel and Technical Capability

Although the number of repetitive loss properties continues to increase, the State has made progress in the mitigation of these properties. Per the below table, the percentage of mitigated properties remains constant even though the number of repetitive loss properties has increased since the last plan update.

Table 2 - Mitigation of Repetitive Loss Properties

End of Year	Non-Mitigated RLs	Mitigated RLs	Total RLs	% Mitigated
2015	24,091	7,795	31,886	24%
2016	25,515	8,119	33,634	24%
2017	25,825	8,219	34,044	24%
2018*	25,633	8,486	34,119	25%
*Data through end of July 31, 2018				

Repetitive loss mitigation could be more effective if more staffing were added to the programs noted in the previous section in addition to funding sources.

Financial Capability

Chapter 3, the Capability Assessment of the state Hazard Mitigation Plan, summarizes the variety of federal and state grant and funding programs. Those most appropriate for repetitive loss mitigation are:

- The FEMA pre-disaster mitigation grant programs that fund clearance or retrofitting of repetitive loss buildings, i.e., PDM and FMA.
- The FEMA post-disaster mitigation grant programs that fund clearance or retrofitting of repetitive loss buildings, i.e., HMGP and Section 406 (for buildings owned by public agencies and non-profit organizations).
- The Water Resources Development Act that authorizes Corps of Engineers flood protection projects.
- The Hurricane and Storm Damage Risk Reduction System, which appropriated funds for flood protection in the greater New Orleans area.
- The Increased Cost of Compliance provision of an NFIP flood insurance policy that covers up to $30,000 toward mitigating a structure substantially damaged by a flood.
- Community Development Block Grants, which have been used very effectively to fund building elevations and other mitigation projects. Following Hurricane Katrina, repetitive loss properties were given a priority for attention.

One funding source not listed in the Hazard Mitigation Plan is the property owner. Owners typically pay the non-federal share of FEMA grants. FEMA funds are restricted to the more effective measures, such as acquisition and elevation. These are also the more expensive measures, often costing over $100,000, so a state or federal grant is necessary.

As noted in Section 2, 55% of the state's repetitive loss properties had average claim payments of less than $25,000 and 26% had average payments less than $10,000. These payments indicate that a good portion of the problem is caused by shallow flooding and drainage issues. These issues can often be mitigated using lower cost measures, such as regrading yards and erecting barriers.

While some property owners may not be able to afford projects that cost as little as $10,000 or $20,000, they may be able to afford to pay more than 25% of cost of such projects. In other areas of the country, property owners have paid 75% of the cost of relatively inexpensive mitigation projects, such as sewer backup and basement flooding protection measures at or less than $5,000. These approaches are discussed in the Corps of Engineers' guide, Local Flood Proofing Programs located at:

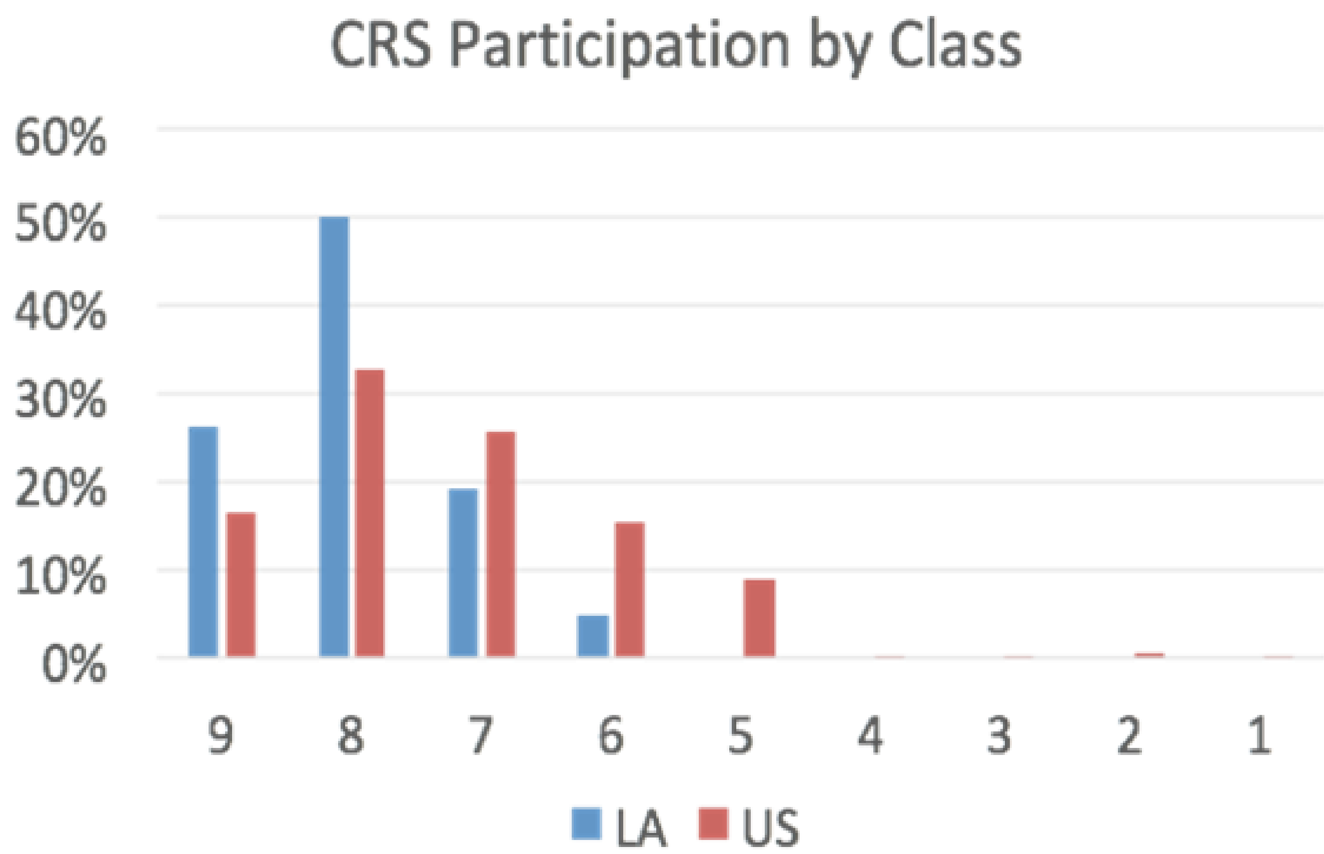
https://crsresources.org/files/300/360_local_flood_proofing_programs_2005.pdf.

Local Capacity

The State Hazard Mitigation Plan's assessment of local capabilities focuses on the demands placed on Parish Office of Emergency Preparedness staff. As shown in the local Hazard Mitigation Plan section above, communities are capable of designing extensive mitigation actions, but they have a lot to do to implement them all. This is due to both staff and financial limitations.

The State Plan states that floodplain management staff have been able to bring 39 communities into the Community Rating System. As noted earlier, CRS communities have almost 80% of the State's unmitigated repetitive loss properties and CRS requirements and incentives can do a lot to mitigate damage to repetitive loss properties.

Figure 29
CRS Participation by Class



While the 39 communities should be proud of their accomplishment, as a whole, Louisiana's CRS participation is below the national average. The comparison graph to the right shows that most Louisiana CRS communities are in the "entry level" classes, there is only one Class 6, and none are a Class 5 or better.

Providing communities with the capability to design and implement CRS-credited mitigation programs and projects would help reduce repetitive losses, strengthen floodplain management programs, and lower the cost of flood insurance for many policy holders in the State.

A separate State CRS Strategy reviews CRS participation and activities and has recommenda¬tions that are included in Appendix D. While grants might help provide support to local staffs, they are not considered a long-term solution. Instead, the Strategy recommends technical assistance from state agencies and statewide organizations and encouraging communities to help themselves (as their residents are the immediate beneficiaries of the CRS).

Coordination of Local Planning

Effective mitigation planning depends on adequate staffing, funding, and state support. These are discussed in the "Coordination of Local Planning" section in the State Hazard Mitigation Plan. Repetitive loss communities will continue to be dependent on GOHSEP's mitigation planning and grant programs. The 2014 Plan lists the priorities for such support, as "jurisdictions with repetitive loss properties" are included on the priority list. The 2019 plan continues this prioritization, as Goal 4 states "Reduce Louisiana's repetitive and severe repetitive loss property inventory."
There is an effort nationally to better coordinate mitigation planning and the floodplain management planning credited under the Community Rating System. FEMA published a bulletin and is sponsoring webinars on how to do this: https://www.fema.gov/media-library/assets/documents/171290. Such actions will help all communities by producing mitigation plans that better address flooding and repetitive losses and CRS credited plans that are better coordinated with other hazard mitigation initiatives.

Funding Projects

As noted in the previous sections, there are several different ways to protect a building from repetitive flooding, especially shallow repetitive flooding. Every building would be best protected by purchasing and moving it out of the flood problem area. However, there is not enough money to use this most effective measure and, in some cases, it would result in removing entire communities.

Each community needs to adopt a method to determine which measures are appropriate for each situation. The first step in such methods is to collect sufficient information on the local situation, i.e., the building and the flood problem. This section reviews three levels of data collection, varying from the most general to the most detailed. The next section reviews factors that should be part of the measure selection process.

Identifying Projects

Mapping Repetitive Loss Areas

The most general approach is to map the repetitive loss areas and describe the overall situation. Communities in the Community Rating System have already done this, as such maps are a prerequisite to participate in the program.

Guidance for CRS repetitive loss maps is found in Section 3 of Developing a Repetitive Loss Area Analysis. It is important to note that these maps include properties not designated as repetitive loss properties by FEMA. As noted in the guidance "If only the properties on the list are examined, then only part of the entire problem is being addressed. Therefore, it is important that all buildings with the same exposure to repetitive flooding be identified in an 'area.'"

The situation description need not be lengthy. A description for the Area #1 example (right) could read "There are six single family homes in Area #1. They are all slab-on-grade buildings that were constructed at the same time. The sites are at or lower than the level of Grace Drive and the lots flood whenever there is more than two inches of rain in 24 hours."

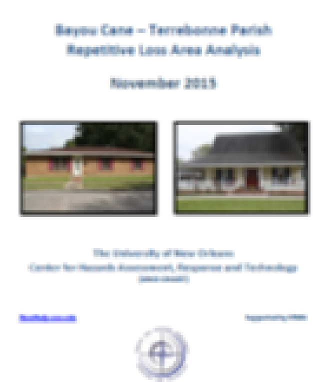


Figure 31 – Repetitive Loss Area Analysis

Area Analyses

Area analyses are more detailed examinations of the flood problem and possible corrective measures. Their primary audience is local decision makers, but they are also useful for the property owners. In addition to the greater level of detail, they differ from area maps by including recommendations for each building in the area.

Figure 30 – Repetitive Loss Area

In this map, Rep Loss Area #1 includes properties in and out of the mapped floodplain because they are all the same type of building subject to the same source of flooding.

The Community Rating System provides credit for preparing Repetitive Loss Area Analyses, so there is good guidance in FEMA and CRS materials, including Section 4 of Developing a Repetitive Loss Area Analysis and Chapter 7 of FEMA's Reducing Damage from Localized Flooding. CRS credited area analyses must be made available to the area's property owners.

The building by building reviews are usually done in tabular form, as in the example below. They should include recommendations for mitigation actions to be taken by both the local government and the property owners.

The University of New Orleans's Center for Hazards Assessment, Response and Technology (UNO-CHART) has prepared many repetitive loss area analyses for Louisiana communities. They are posted on CHART's repetitive loss website. CHART can also assist communities in preparing their own analyses.

Figure 32
Repetitive Loss Area Analysis

Street Name	Building number	Neighborhood	Occupied	EC Diagram	# of Stories	Elevated above grade	Elevated above street	Structure type	Mitigation Recommendations
Alexander	1504	North Arabi	Yes	8	2	2-3	3-4	M	E,B,UP
Alexander	1505	North Arabi	Yes	5	1	4-5	4-5	M	E,B,UP
Alexander	1509	North Arabi	Yes	5	1	2-3	2-3	M	E,B,UP
Alexander	1515	North Arabi	Yes	5	1	2-3	2-3	M	E,B,UP
Alexander	1516	North Arabi	Yes	5	1	1-2	1-2	W	E,B,UP
Alexander	1520	North Arabi	Yes	5	2	4-5	5-6	W	E,B,UP
Alexander	1521	North Arabi	Yes	5	1	4-5	4-5	M	E,B,UP
Alexander	1524	North Arabi	Yes	1A	1	0-1	1-2	M	B,DF,E,UP

The figure above depicts a way to take field notes on properties in repetitive loss areas, as well as show mitigation recommendations for each listed property.

Building Audits

The most detailed review of repetitive loss mitigation measures are reports on each floodprone building. There is no official format for an audit, but they should include a site visit, description of the property, and a review of alternatives. Often, they include standard language about the measures, local warning procedures, flood insurance, etc.

The audience for an audit is the property owner, who should be interviewed and otherwise involved in the preparation. Much of the information can be taken from or used to prepare an area analysis. The summary recommendations from one are shown below.

Past protection measures taken	sump pump, regraded yard, moved things out of the basement, gas powered pumps
First retrofitting recommendation	Elevate and fill in the basement/relocate
Estimated cost	Up to $30,000/up to $145,000
Second retrofitting recommendation	Barrier
Estimated cost	Up to $12,500

Selecting Projects

Once the building and the flood hazard have been reviewed and summarized in an area analysis or building audit, there should be one or more recommendations on how to mitigate the repetitive flooding problem. The mitigation options are discussed above. This section provides guidance on how to determine which options are most appropriate for each situation. The earlier discussions on the individual mitigation options provide more information on where they are appropriate and not appropriate. The worksheet on page 48 also provides a way to collate the factors such as flood hazard and building type.

Flood hazard

The first and most important selection factor is the flood hazard. Very hazardous locations include areas subject to flash flooding, deep and fast-moving flooding, wave action, or related factors, such as coastal erosion. If a major flood control project is not slated for these types of areas, the best option is to remove the building from harm's way, i.e., the acquisition or relocation measures.

If the hazard is shallow (less than one or two feet) and the water is still or slow moving, there are more options. These are less expensive, including local barriers and dry floodproofing.

In areas subject to deeper, but less dangerous, flooding, there are effective building protection measures, especially elevation. However, depending on warning time and proximity to high ground, there can still be a danger posed to the occupants that should be considered.

Flood hazard factors to account for include:

- Warning time
- Velocity
- Wave action (coastal floodplains)
- Depth
- Rate of rise and fall
- Duration
- Debris

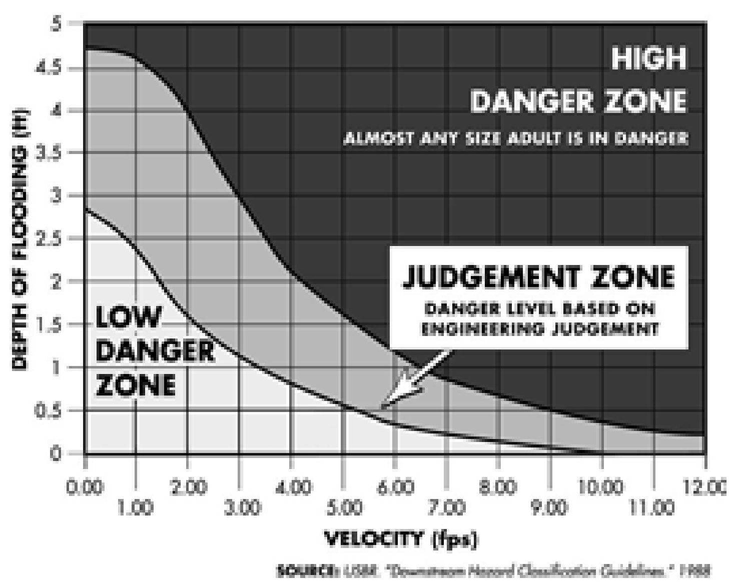
Building Type and Condition

While a mitigation measure may look appropriate for the flood hazard, it may not be appropriate for the building. Things to consider:

- Deteriorating or heavily damaged structures may not survive the relocation or retrofitting process.
- Very large buildings can be moved or elevated, but the cost may be prohibitive. Very large masonry buildings can often be protected by dry floodproofing measures, especially if there is an engineering analysis of the structure's condition.
- Slab-on-grade structures are more expensive to elevate while elevating buildings on crawlspaces can be relatively easy.
- Conversely, dry floodproofing will only work on buildings on a solid slab foundation.
- Critical facilities warrant a higher level of protection for both the structure and the occupants.
- There are legal limitations on how much an historic structure can be altered.
- Flood control and drainage improvement projects protect all types of buildings.

Figure 33
Flood Hazards

The flood hazard to people increases as velocity increases and as the flooding gets deeper. Both hazards should be considered together.



Regulatory Requirements

While a mitigation measure may be feasible for the flood hazard and the building condition, there are three types of regulations that can limit or dictate which measure is used.

If the building has been substantially damaged or the mitigation measure will cost 50% or more of the value of the building, the substantial improvement rule will govern. Local regulations must meet the requirement of the National Flood Insurance Program that the building be brought into compliance with the standards for a new building. For most residential buildings, this results in elevating the structure and/or moving equipment and ductwork out of a crawlspace. A non-residential building must elevated or dry floodproofed.

Because the cost to meet this code requirement can be so high, the owner may opt to demolish the structure and rebuild it to meet all building code and floodplain management require¬ments. On the other hand, the substantial improvement rule may encourage owners to implement a less expensive measure, which can provide less protection.

Some projects, such as drainage improvements and barriers, are not affected because they are not modifications to the structure – they are located away from the building. Projects on properties outside the regulated floodplain are also not affected.

The second regulatory constraint comes into effect if the building is located in the floodway.
The floodway is the channel of a river and the portion of the overbank floodplain that must be reserved in order to carry the base flood without cumulatively increasing the flood level by one foot. Local ordinances must meet the NFIP requirement that a project in the floodway cannot cause any increase in flood heights.

The floodway rule means that a mitigation project cannot obstruct flood flows. This means that barriers, elevating buildings on file, and some types of flood control and drainage improvements are precluded for projects located in the mapped floodway.

Some communities have enacted other higher stan¬dards, such as the ones recommended in above. Some of these may limit the freedom of choice of mitigation measures. For example, a cumulative substantial improve¬ment standard could bring the substantial improvement rule into effect for a relatively small retrofitting project.

Local Plans and Priorities

Almost every community has a land use plan and most have zoning ordinances. These documents govern what types of development are allowed in different areas of the community. Sometimes the plans call for redeveloping an area to be different than the existing development.

For example, a plan that calls for converting a developed portion of the floodplain to open space will impact proposals to retrofit buildings. If a building is substantially damaged or improved, the land use plan or zoning ordinance may prohibit continued occupancy of the site.

Even if there is no legal restrictions on retrofitting buildings, there may be a plan to expand parks or a community or neighborhood desire to stop the problems caused by repetitive flooding. In such cases, the decisions makers should try to make acquisition or relocation the mitigation measures of choice. More on local strategies for floodprone areas and redevelopment approaches can be found in Chapters 3 and 7 of FEMA's Reducing Damage from Localized Flooding located at https://www.fema.gov/media-library/assets/documents/1012.

Benefits and Costs

Sometimes the cost of a mitigation measure can exceed the benefits. Acquisition and elevation projects, for example, can cost over $100,000. Are such projects appropriate for a building subject to flooding by less than a foot of slow moving water, especially if there is another, less expensive, measure?

Reviewing the benefits and the costs is especially important when funding a project with public money. Federal funding of a project requires an analysis of the benefits and costs. FEMA's Benefit-Cost Analysis process is a good one to follow and is needed for FEMA funding of a mitigation project. Details on this process can be found at https://www.fema.gov/benefit-cost-analysis.

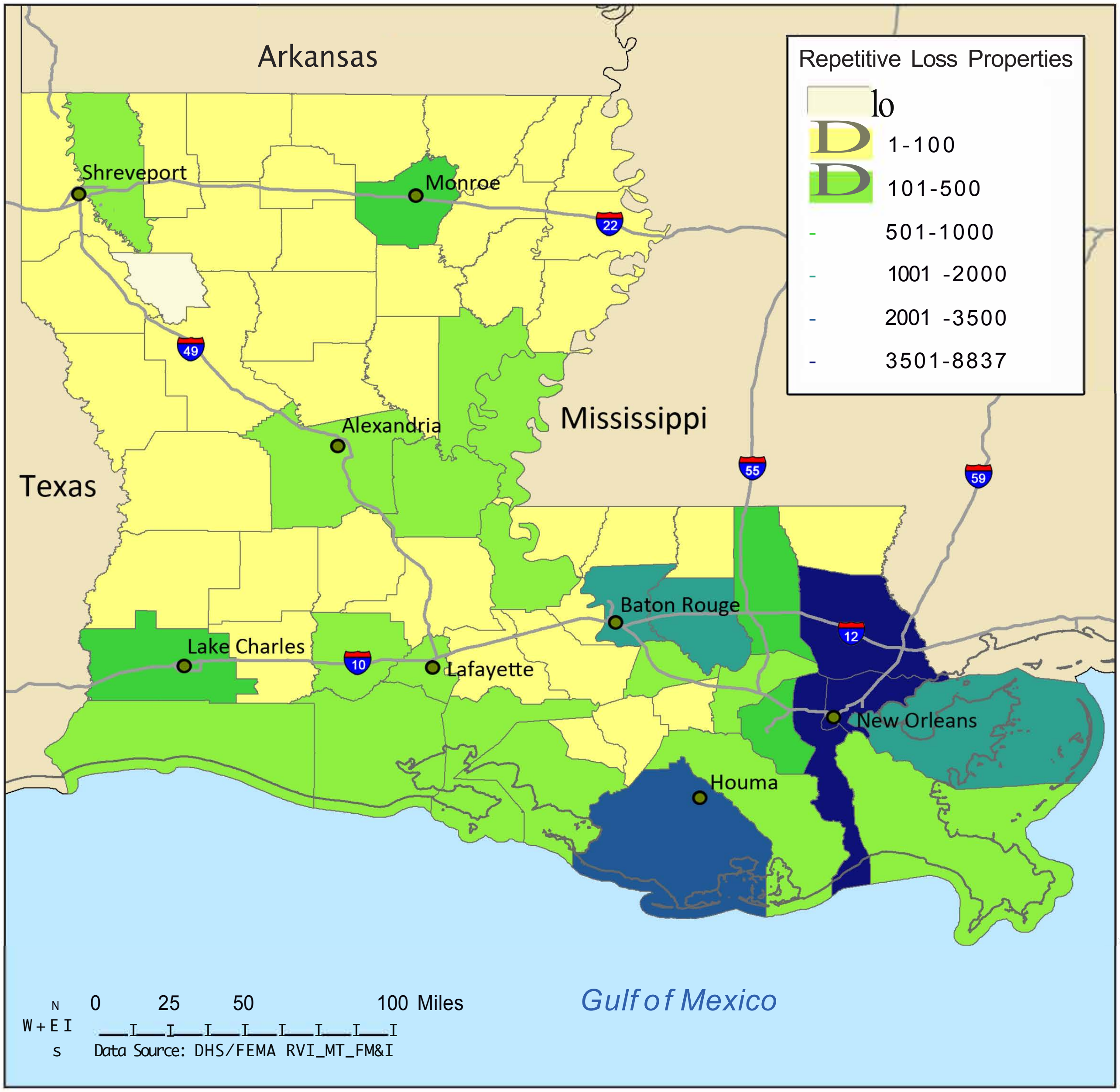
Figure 34 – St. Louis Missouri Worksheet

Address ______ 100-Year Elevation: ______ 10-Year Elevation: ______ 1st Floor Elevation: ______ Flood Protection Level: ______	Relocation	Elevation	Dry Floodproofing	Wet Floodproofing	Permanent Barriers	Emergency Barriers
Depth of flooding over first floor						
< 3 feet	5	5	3	1	4	2
3 – 6 feet	5	4	X	1	2	X
> 6 feet	5	3	X	1	0	X
In floodway	3	0	0	0	X	X
Average floodway velocity > 5 fps	5	3	1	3	1	-2
Debris	0	–3	–4	–3	–2	–5
No flood warning available	2	0	0	–2	0	X
Permeable soil	0	0	–2	0	–2	–2
Foundation						
Slab on grade – finished first floor	1	1	4	X	5	4
Slab on grade – unfinished first floor	1	3	4	4	5	4
Crawlspace	5	5	X	X	5	4
Full basement	5	3	X	4	5	4
Bilevel/trilevel	2	0	4	X	5	4
Walls						
Concrete, masonry, or brick	3	3	5	4	5	4
Wood or brick faced	5	5	2	2	5	4
Structural problems	–5	–5	–3	–2	0	0
Subtotal						
Cost multiplier						
Cost-effectiveness score						
Completed by:			*Date:*			

Example Mitigation Measure Worksheet

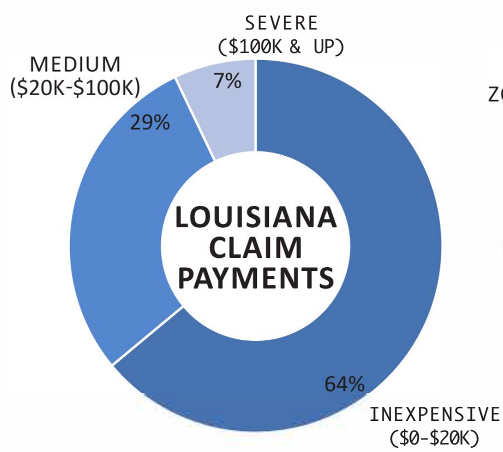
This worksheet is taken from one developed for the St. Louis, MO, Metropolitan Sewer District. The district developed a scoring system to help select mitigation measures appropriate for the flood, building, and regulatory conditions. It is completed for each property under consideration. The numbers in the columns are totaled. The higher the total, the more appropriate the measure for the flood, building, and regulatory conditions. Then additional factors are incorporated related to cost and cost-benefits.

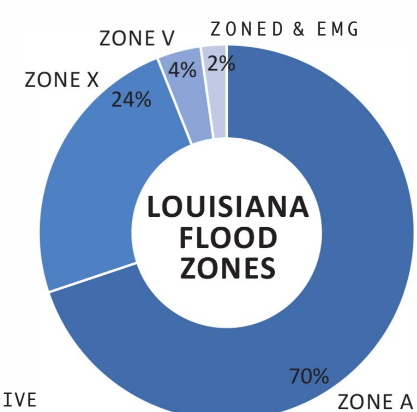
Attachment B



LOUISIANA	COUNT
RL PROPERTIES	33,993
INEXPENSIVE ($0-$20K)	70,703
MEDIUM ($20K-$100K)	31,981
SEVERE ($100K & UP)	7,843
FLOOD ZONE A	23,645
FLOOD ZONE X (B,C)	8,162
FLOOD ZONE V	1,284
FLOOD ZONED	224
EMG *	528

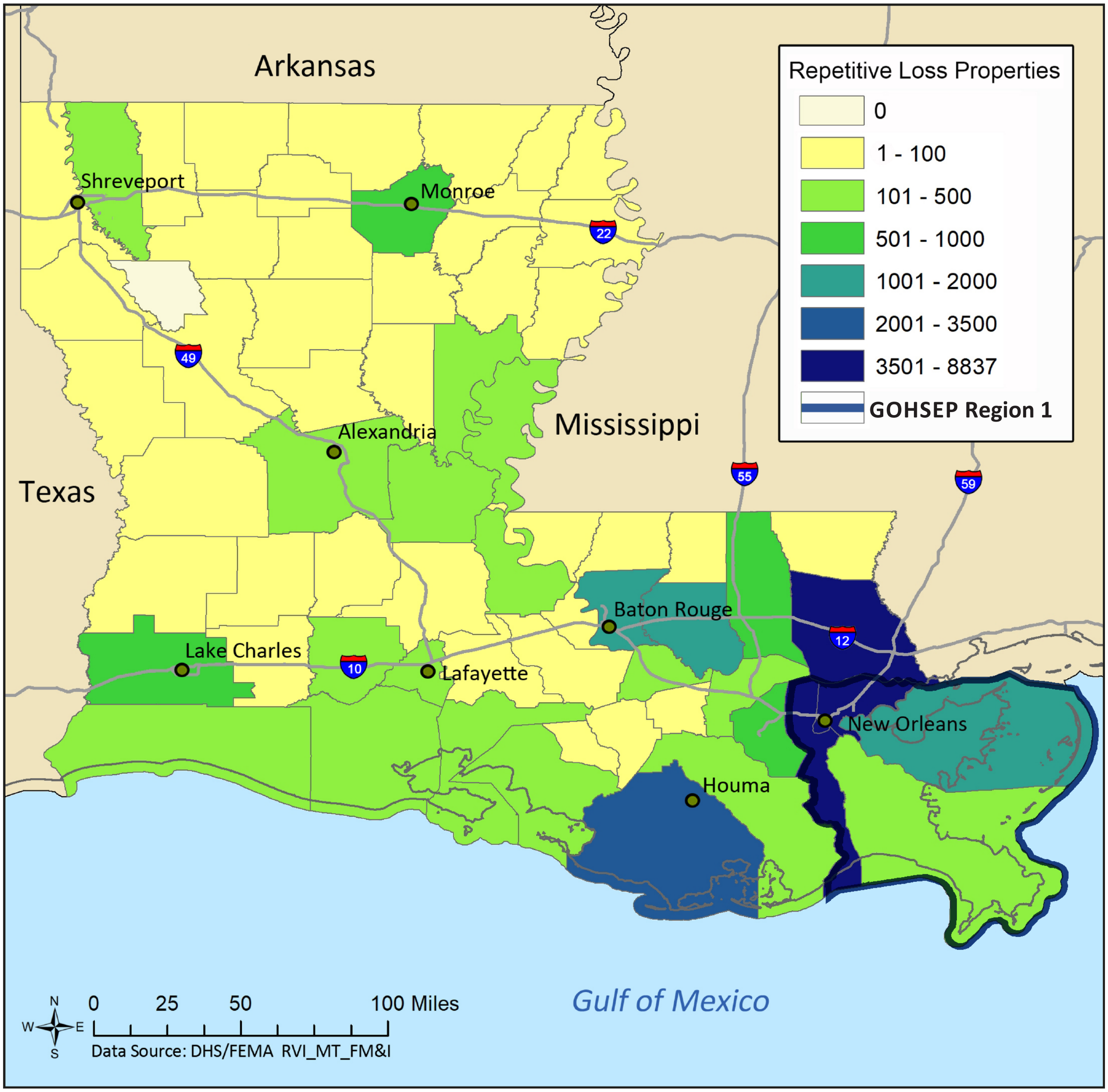
*NOTE: EMG is before Initial FIRM Identified





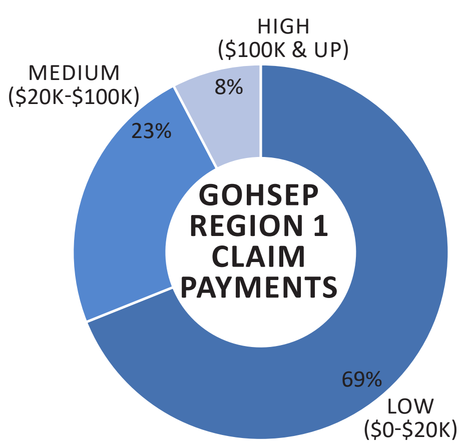
B-1

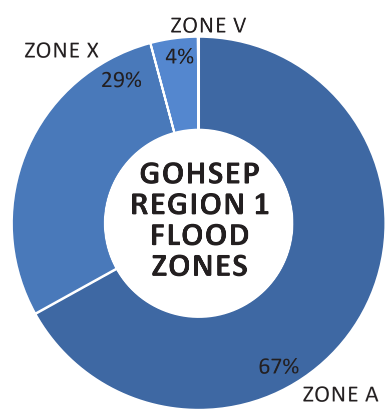
Attachment B



GOHSEP REGION 1	COUNT
RL PROPERTIES	16,987
LOW ($0-$20K)	41,255
MEDIUM ($20K-$100K)	14,000
HIGH ($100K & UP)	4593
FLOOD ZONE A	11,309
FLOOD ZONE X (B,C)	4,882
FLOOD ZONE V	692
FLOOD ZONE D	3
EMG*	8

*NOTE: EMG is before Initial FIRM Identified





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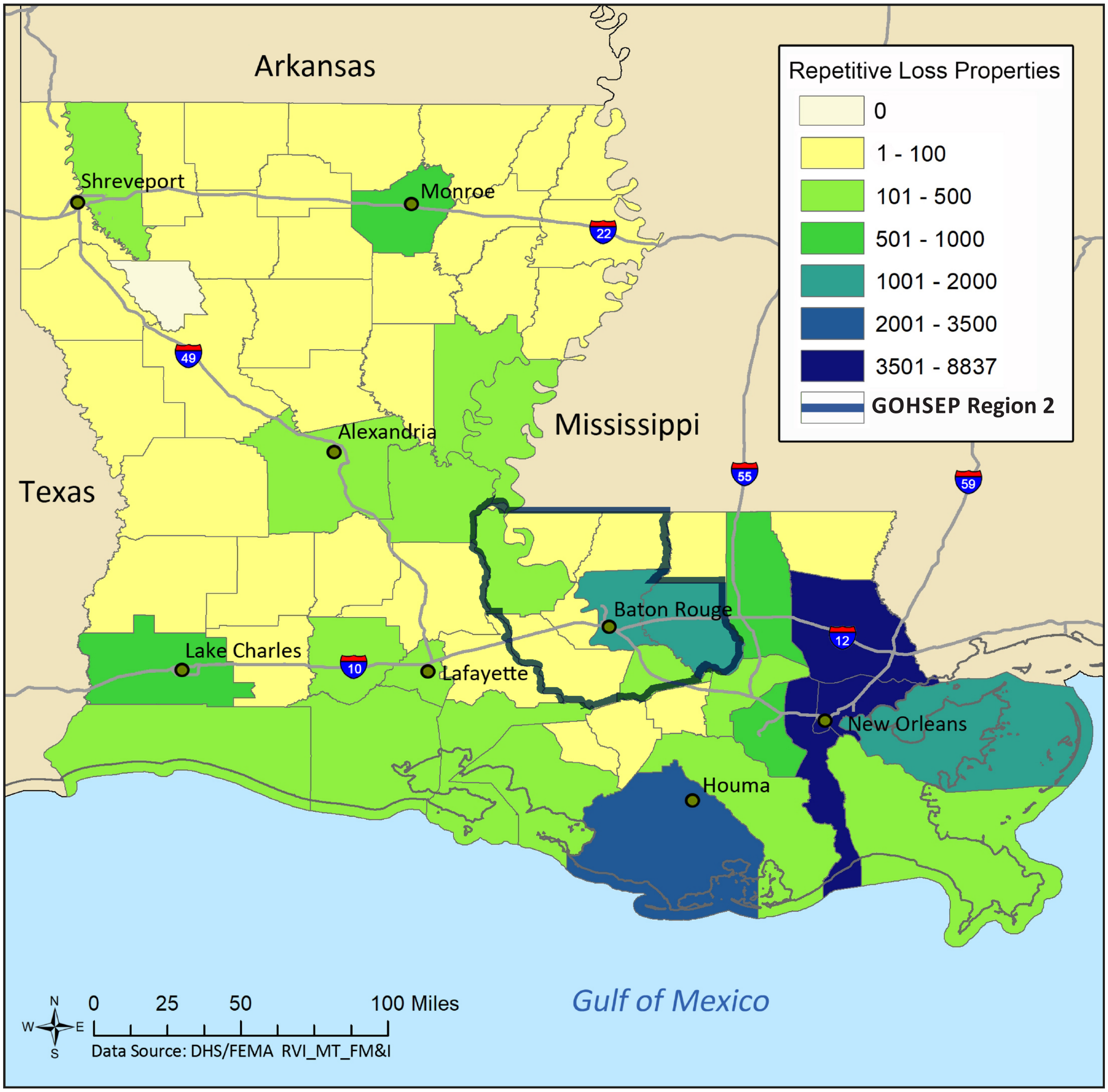
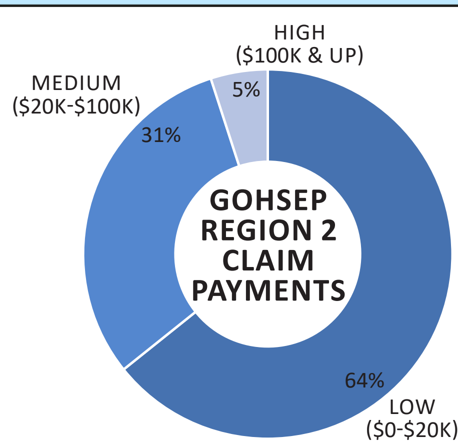
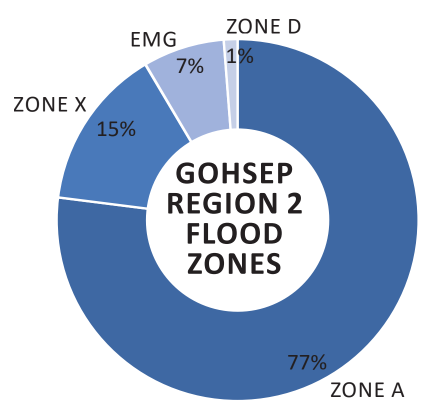


GOHSEP REGION 2	COUNT
RL PROPERTIES	3,265
LOW ($0-$20K)	7,294
MEDIUM ($20K-$100K)	3,490
HIGH ($100K & UP)	567
FLOOD ZONE A	2,511
FLOOD ZONE X (B,C)	472
FLOOD ZONE V	1
FLOOD ZONE D	25
EMG*	237

*NOTE: EMG is before Initial FIRM Identified





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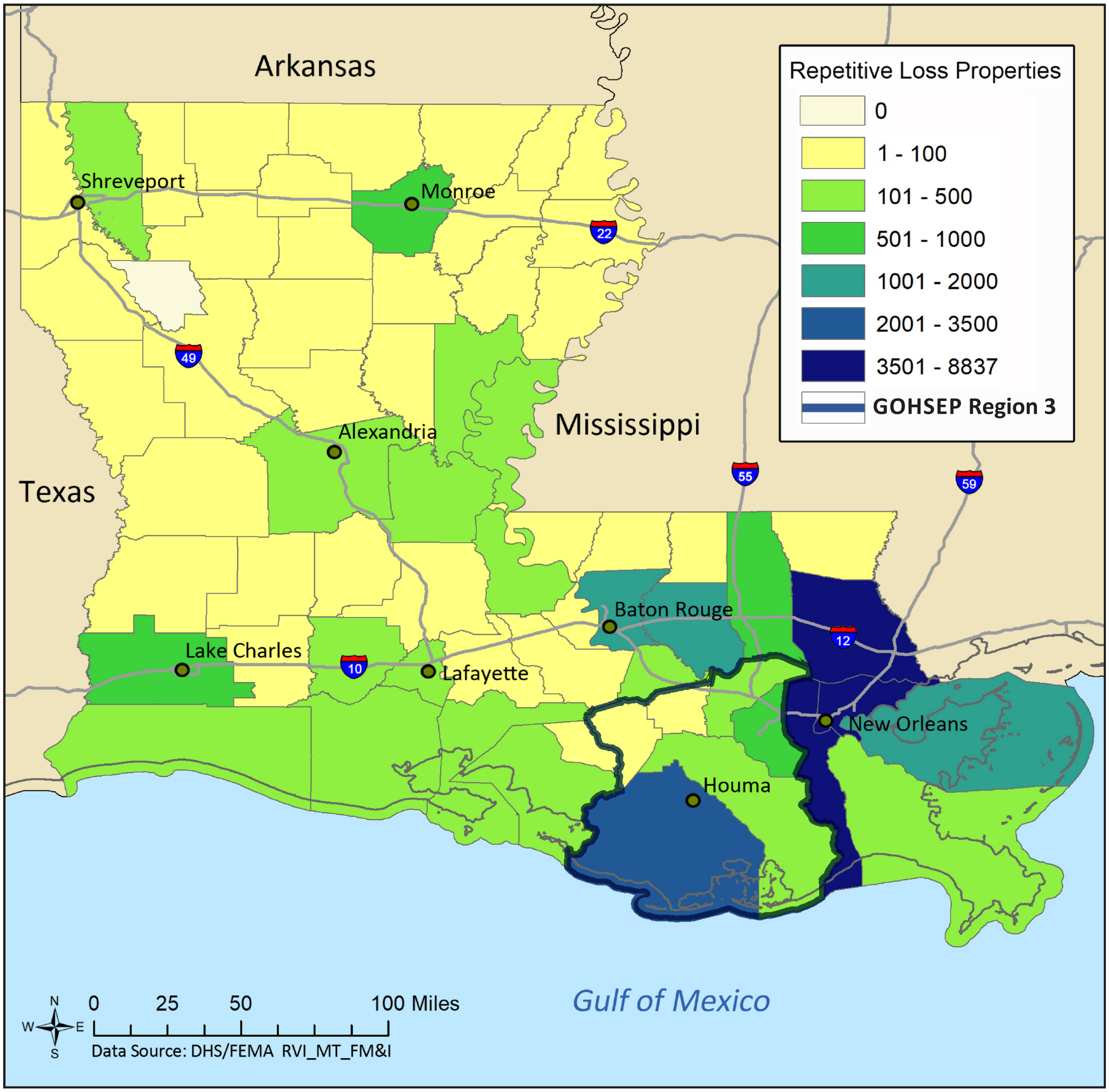
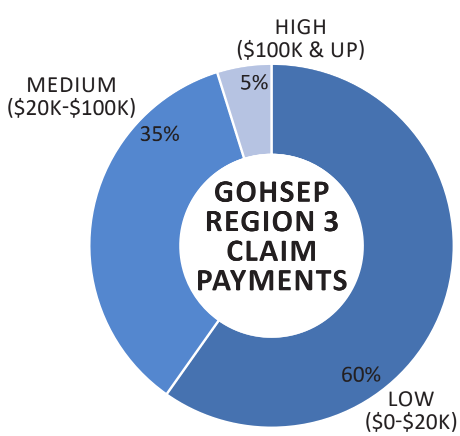
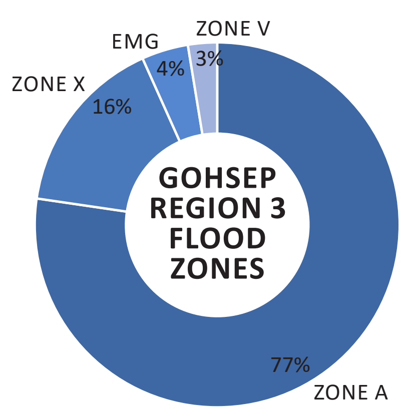


GOHSEP REGION 3	COUNT
RL PROPERTIES	6,690
LOW ($0-$20K)	12,291
MEDIUM ($20K-$100K)	7,274
HIGH ($100K & UP)	993
FLOOD ZONE A	5,129
FLOOD ZONE X (B,C)	1,060
FLOOD ZONE V	171
FLOOD ZONE D	25
EMG*	274

*NOTE: EMG is before Initial FIRM Identified





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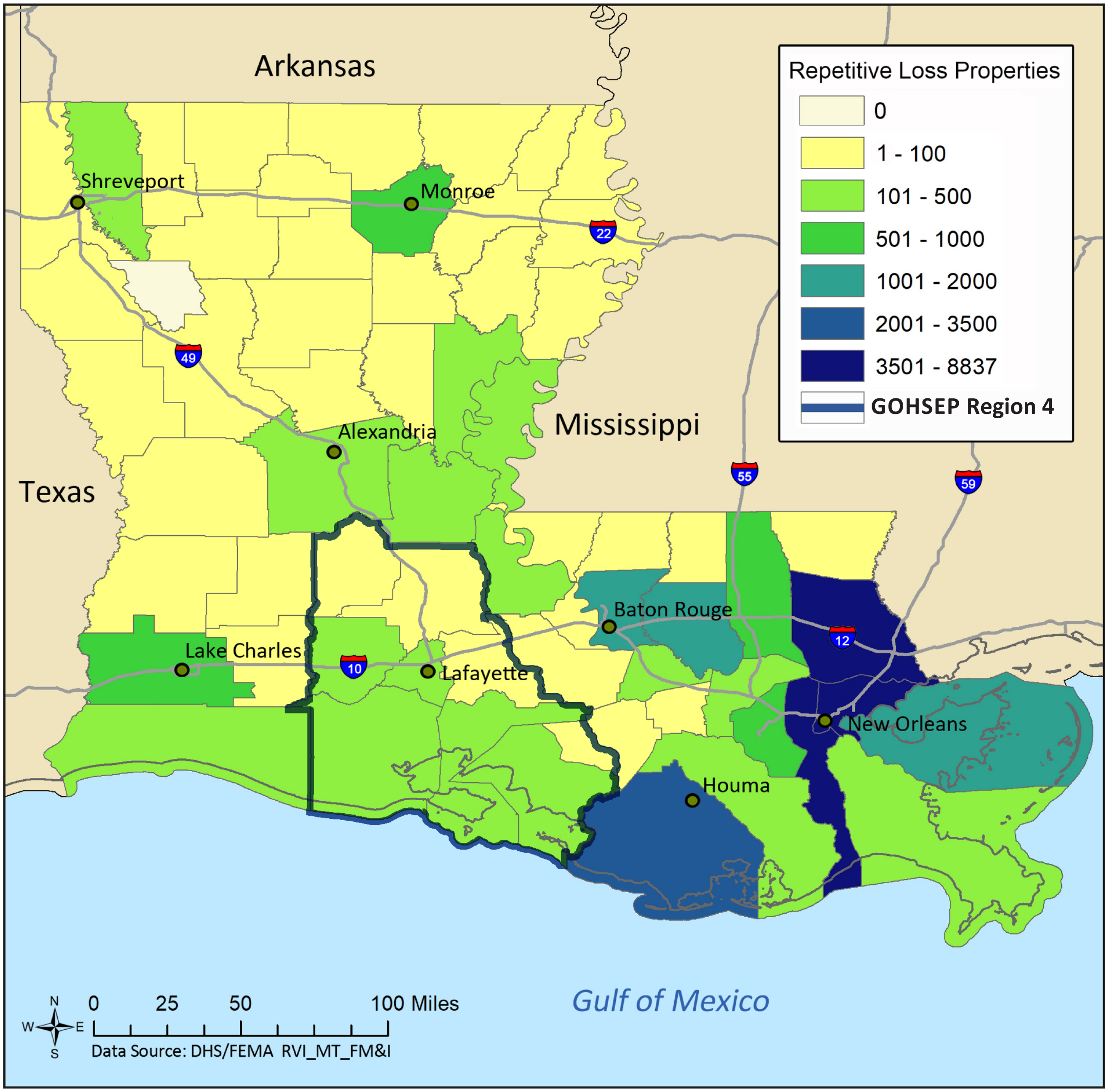
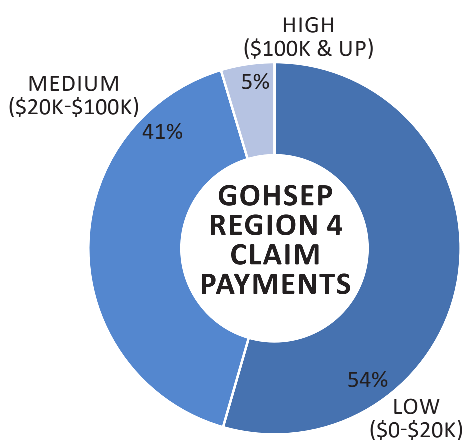
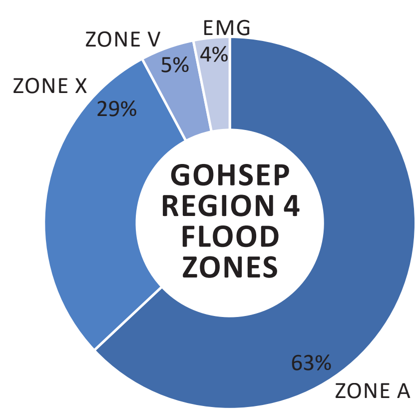


GOHSEP REGION 4	COUNT
RL PROPERTIES	1,914
LOW ($0-$20K)	2,789
MEDIUM ($20K-$100K)	2,094
HIGH ($100K & UP)	238
FLOOD ZONE A	1,201
FLOOD ZONE X (B,C)	556
FLOOD ZONE V	89
FLOOD ZONE D	3
EMG*	60

*NOTE: EMG is before Initial FIRM Identified





B-5

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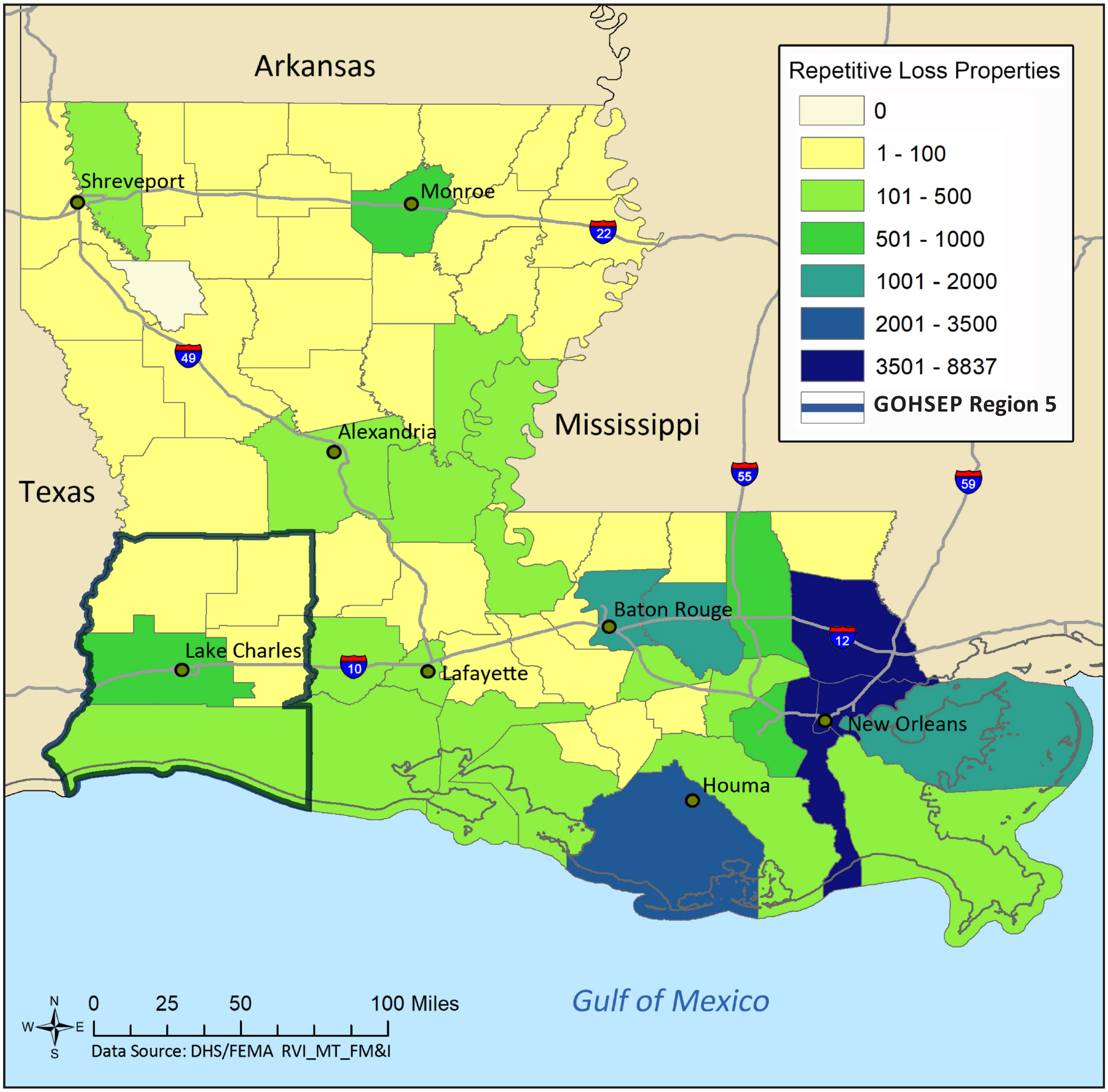
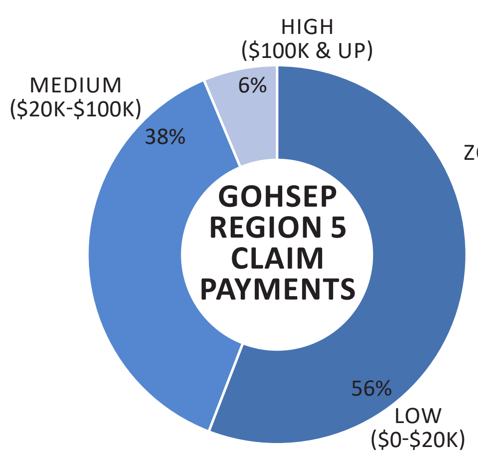
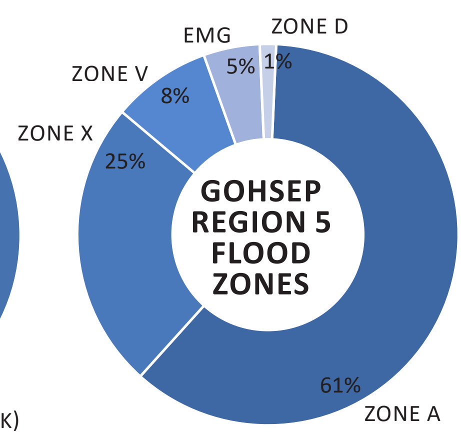


GOHSEP REGION 5	COUNT
RL PROPERTIES	3,618
LOW ($0-$20K)	5,430
MEDIUM ($20K-$100K)	3,676
HIGH ($100K & UP)	613
FLOOD ZONE A	2,211
FLOOD ZONE X (B,C)	887
FLOOD ZONE V	305
FLOOD ZONE D	31
EMG*	173

*NOTE: EMG is before Initial FIRM Identified





B-6

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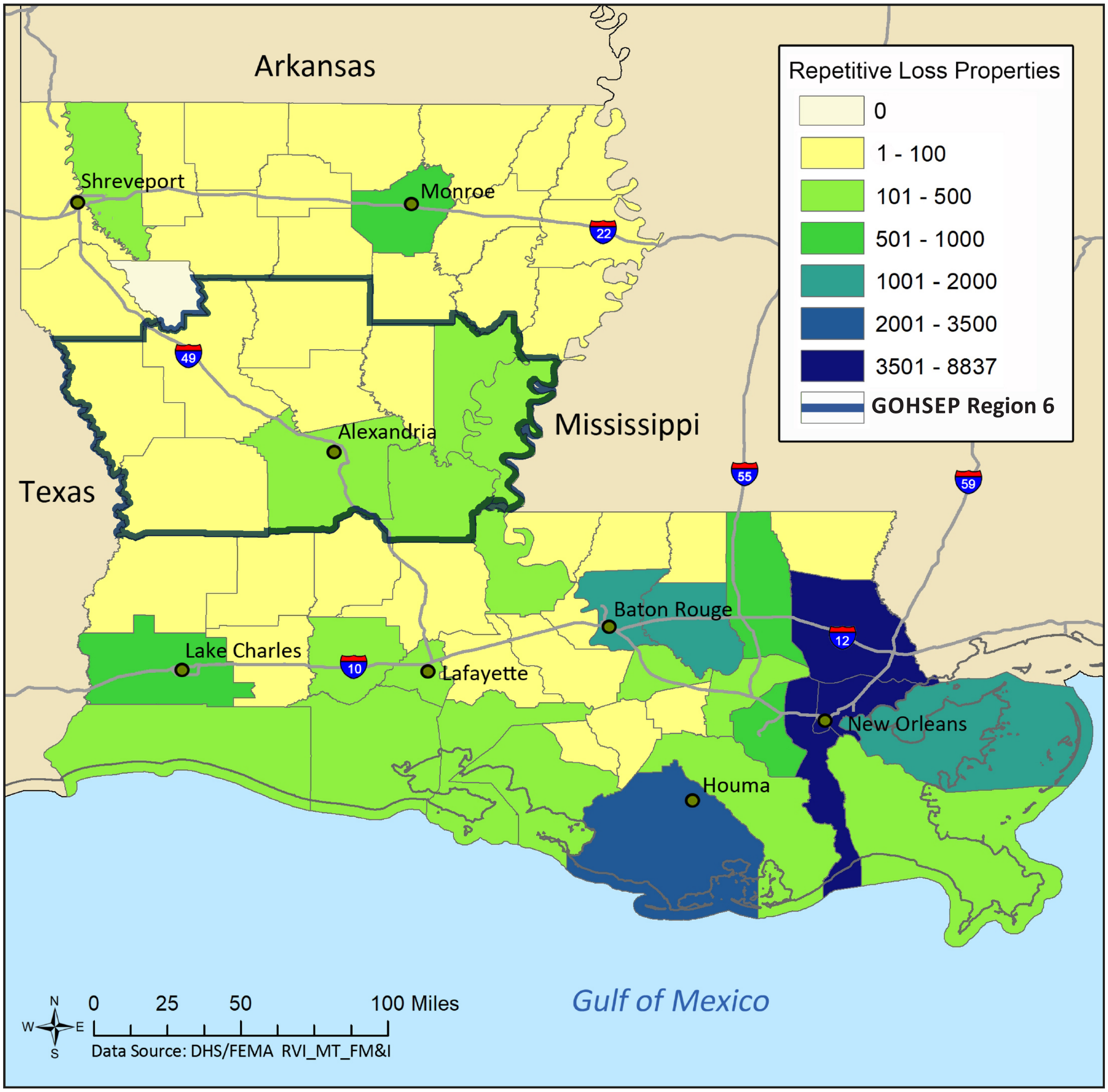
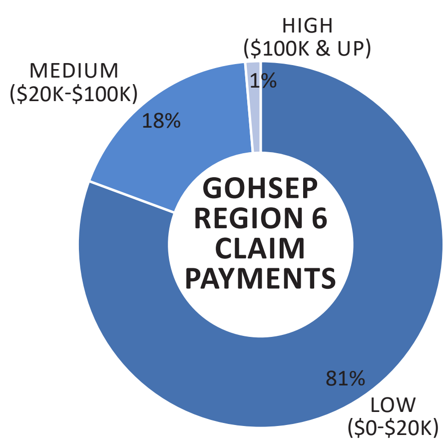
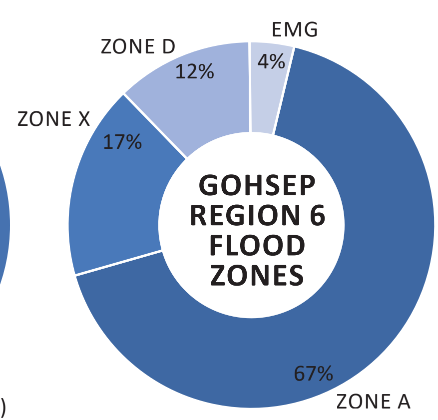


GOHSEP REGION 6	COUNT
RL PROPERTIES	1,309
LOW ($0-$20K)	3,571
MEDIUM ($20K-$100K)	798
HIGH ($100K & UP)	37
FLOOD ZONE A	872
FLOOD ZONE X (B,C)	224
FLOOD ZONE V	0
FLOOD ZONE D	158
EMG*	51

*NOTE: EMG is before Initial FIRM Identified





B-7

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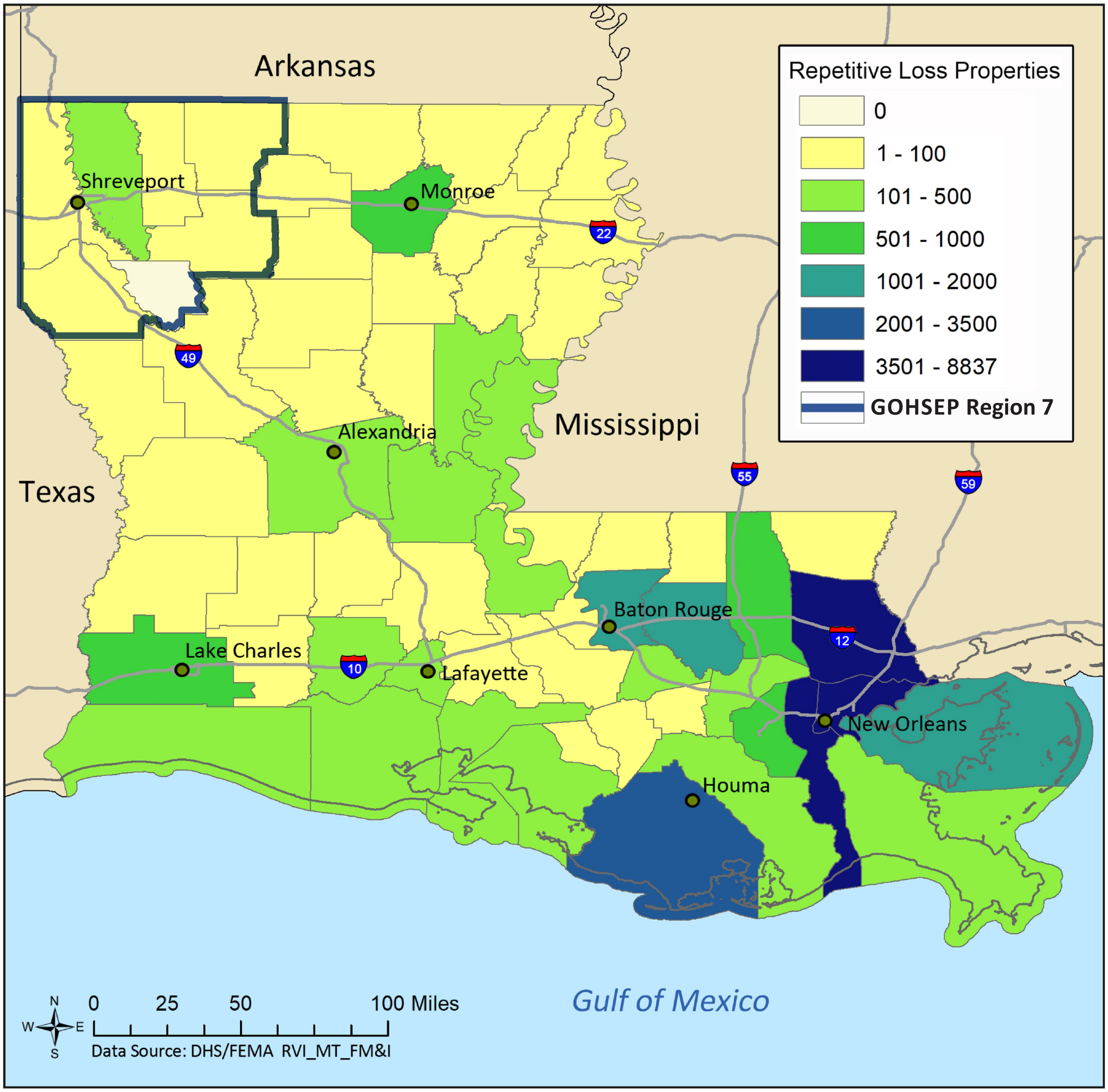
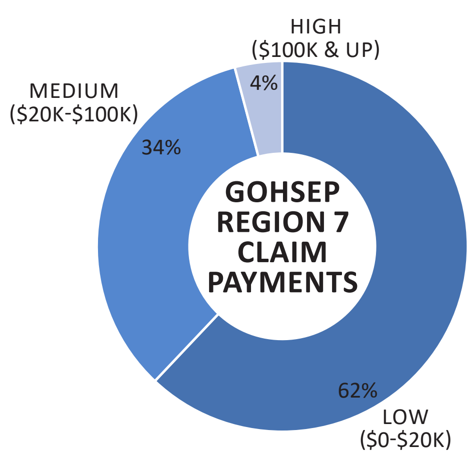
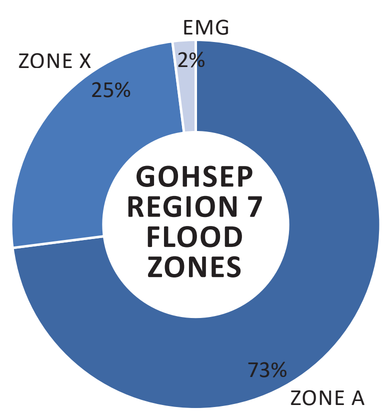


GOHSEP REGION 7	COUNT
RL PROPERTIES	397
LOW ($0-$20K)	721
MEDIUM ($20K-$100K)	393
HIGH ($100K & UP)	48
FLOOD ZONE A	289
FLOOD ZONE X (B,C)	99
FLOOD ZONE V	0
FLOOD ZONE D	0
EMG*	8

*NOTE: EMG is before Initial FIRM Identified





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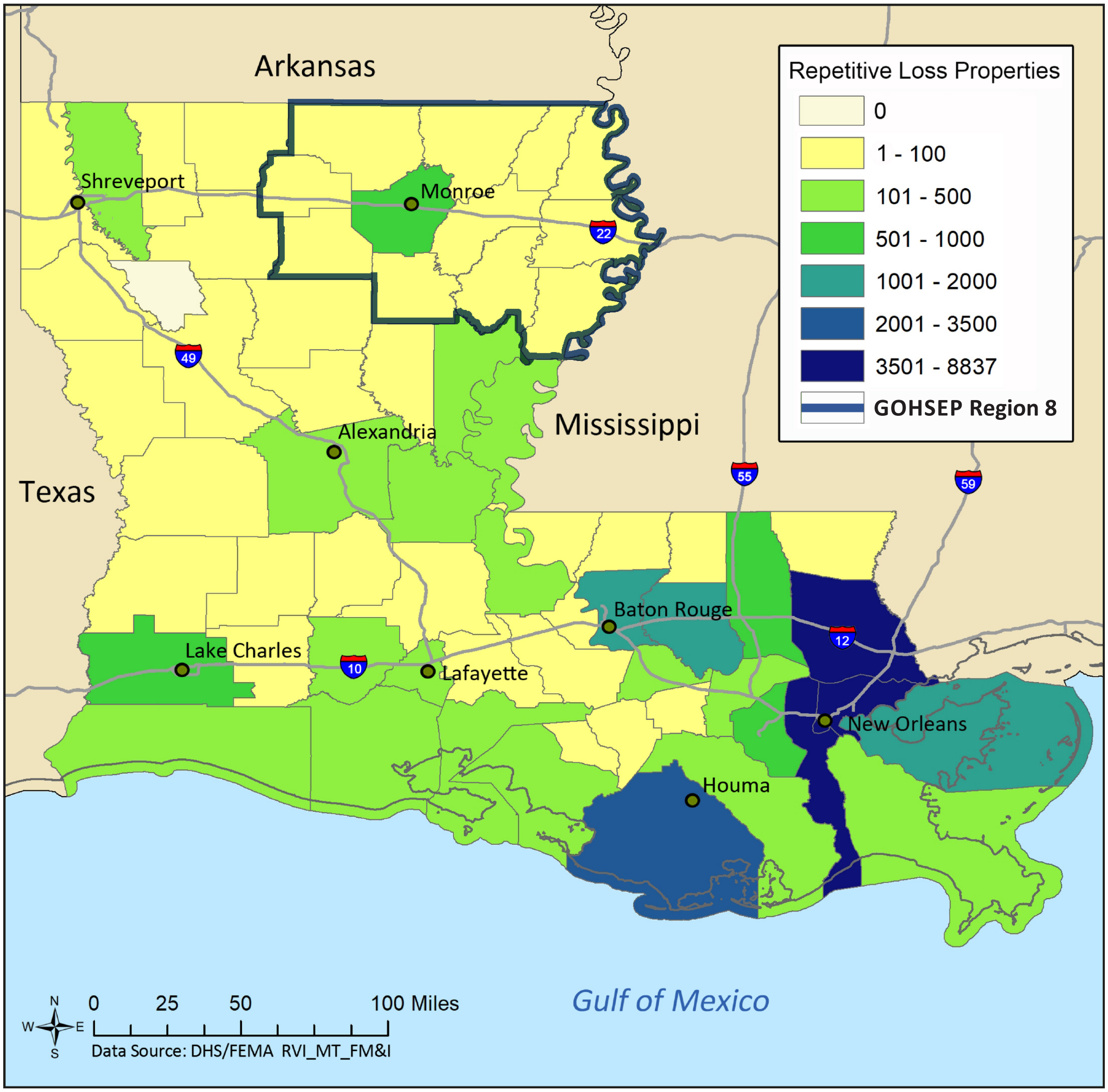
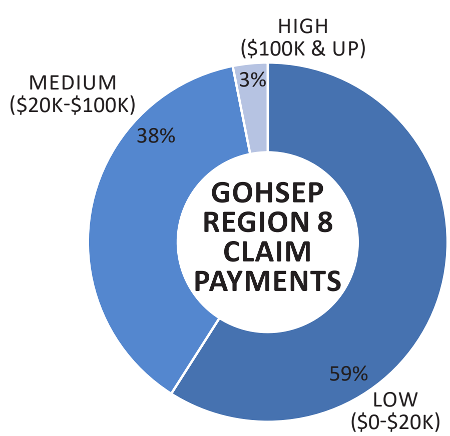
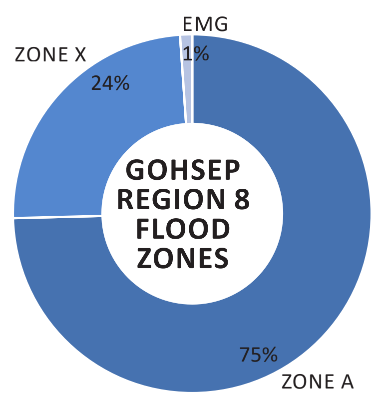


GOHSEP REGION 8	COUNT
RL PROPERTIES	1,012
LOW ($0-$20K)	1,852
MEDIUM ($20K-$100K)	1,188
HIGH ($100K & UP)	98
FLOOD ZONE A	752
FLOOD ZONE X (B,C)	245
FLOOD ZONE V	1
FLOOD ZONE D	1
EMG*	9

*NOTE: EMG is before Initial FIRM Identified





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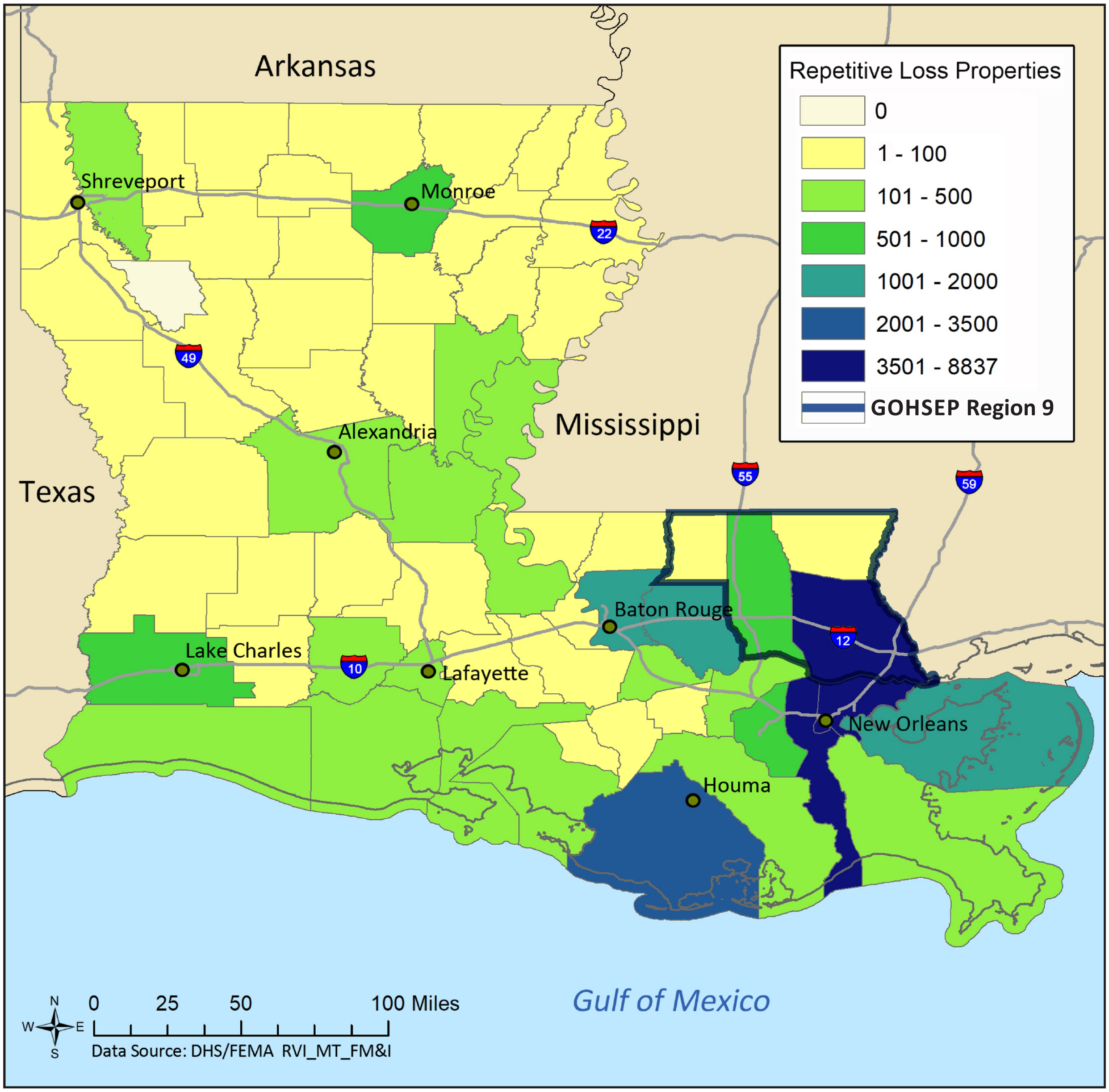
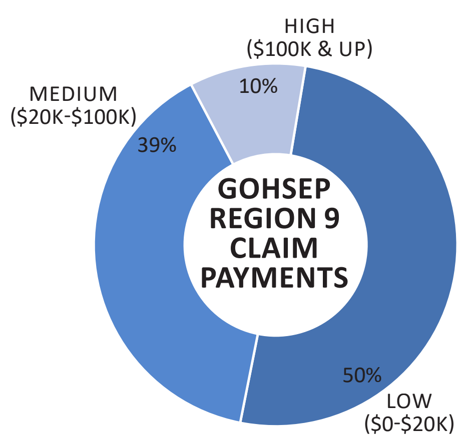
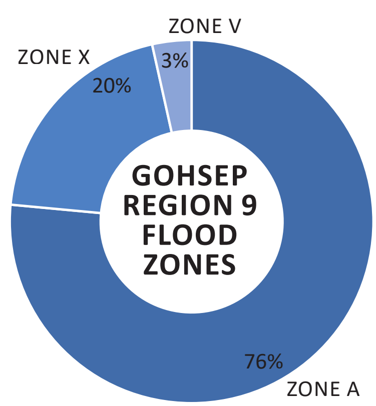


GOHSEP REGION 9	COUNT
RL PROPERTIES	5,135
LOW ($0-$20K)	7,664
MEDIUM ($20K-$100K)	5,947
HIGH ($100K & UP)	1,570
FLOOD ZONE A	3,900
FLOOD ZONE X (B,C)	1,021
FLOOD ZONE V	178
FLOOD ZONE D	4
EMG*	21

*NOTE: EMG is before Initial FIRM Identified





B-10

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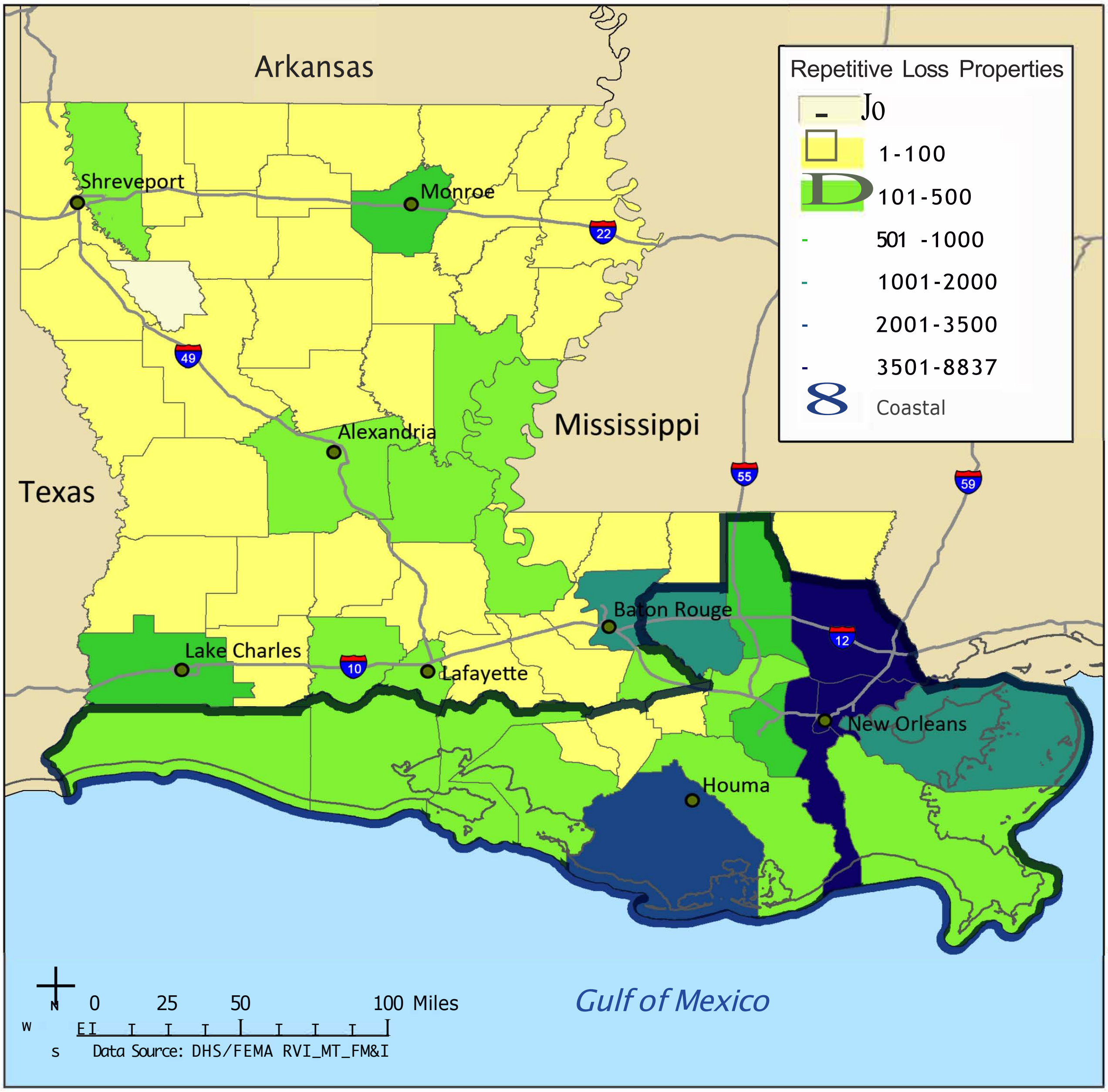
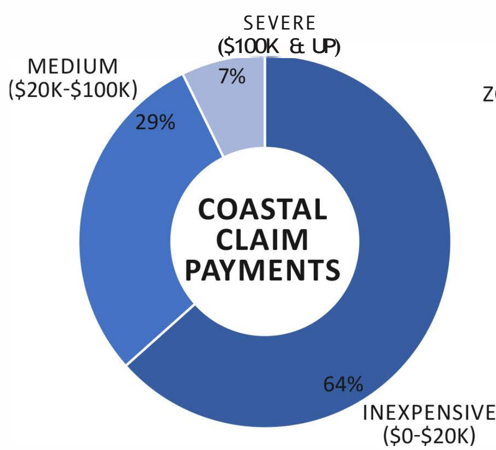
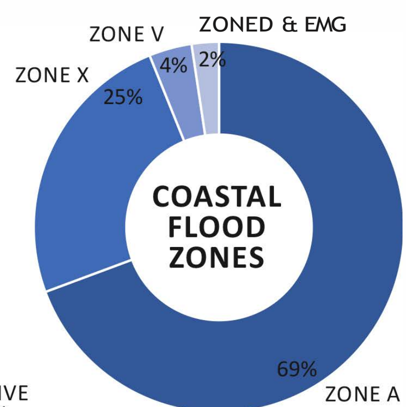


COASTAL	COUNT
RL PROPERTIES	34,962
INEXPENSIVE ($0-$20K)	72,256
MEDIUM $20K-$100K)	33,428
SEVERE ($100K & UP)	8,276
FLOOD ZONE A	24168
FLOOD ZONE X (B,C)	8,553
FLOOD ZONE V	1,303
FLOOD ZONED	166
EMG*	663

*NOTE: EMG is before Initial FIRM Identified





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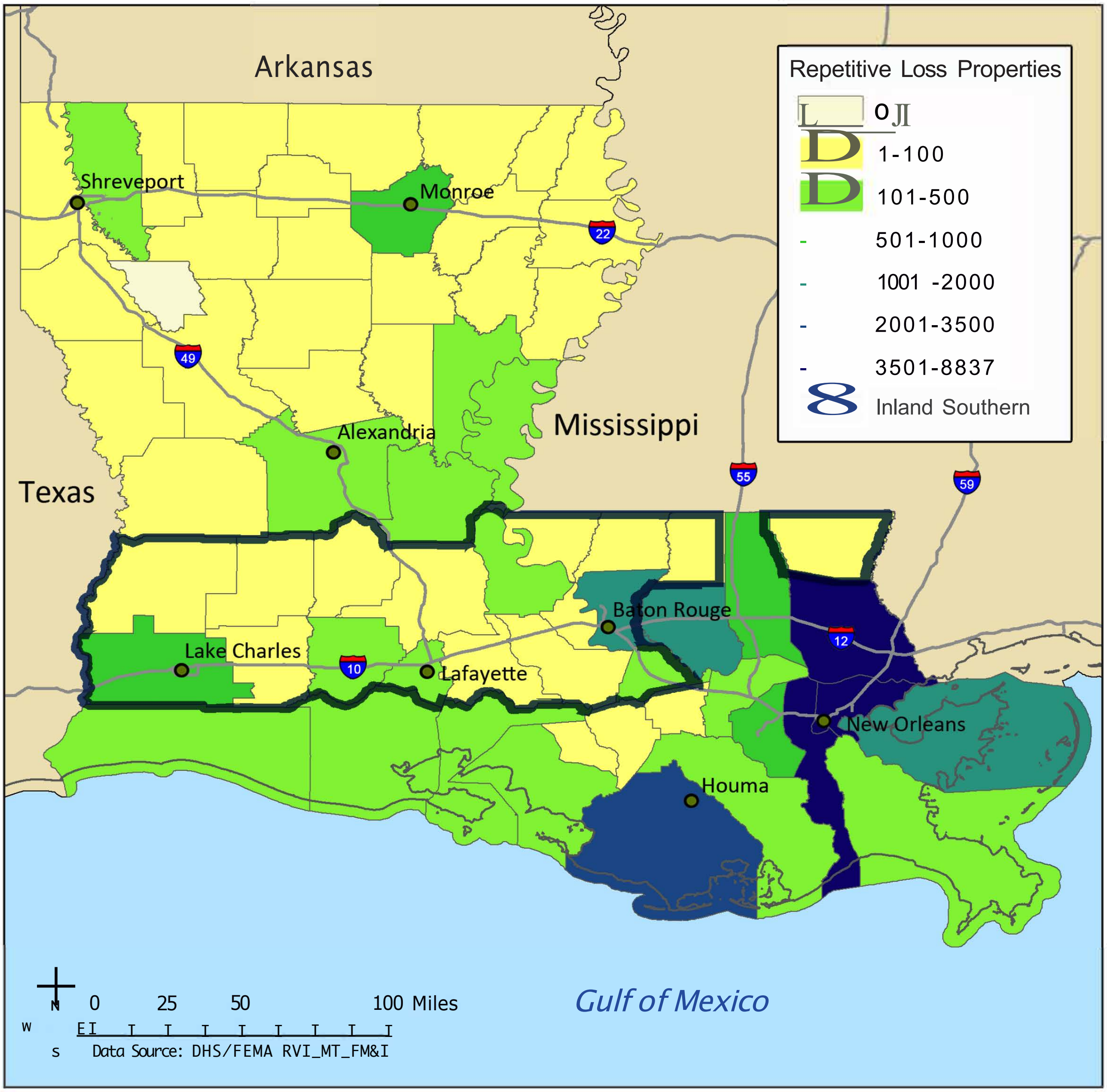
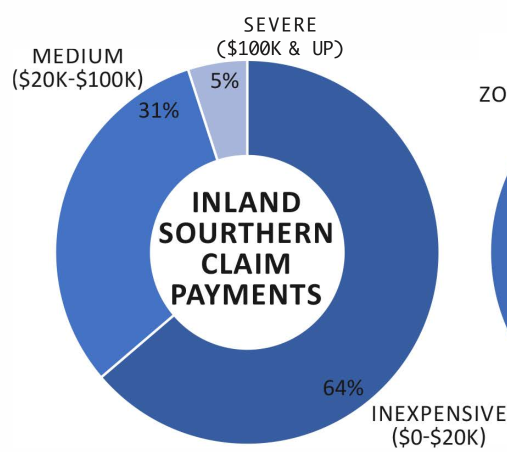
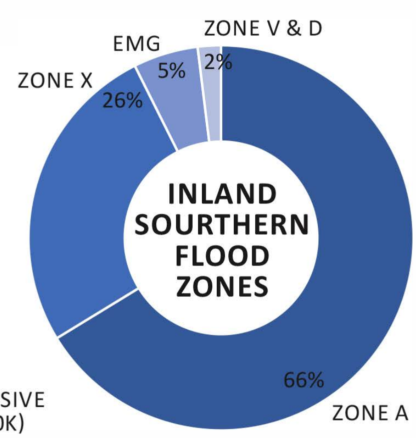


INLAND SOUTHERN	COUNT
RL PROPERTIES	3,819
INEXPENSIVE ($0-$20K)	7,998
MEDIUM ($20K-$100K)	3,922
SEVERE ($100K & UP)	626
FLOOD ZONE A	2,519
FLOOD ZONE X (B,C)	1,001
FLOOD ZONE V	20
FLOOD ZONED	54
EMG *	207

*NOTE: EMG is before Initial FIRM Identified





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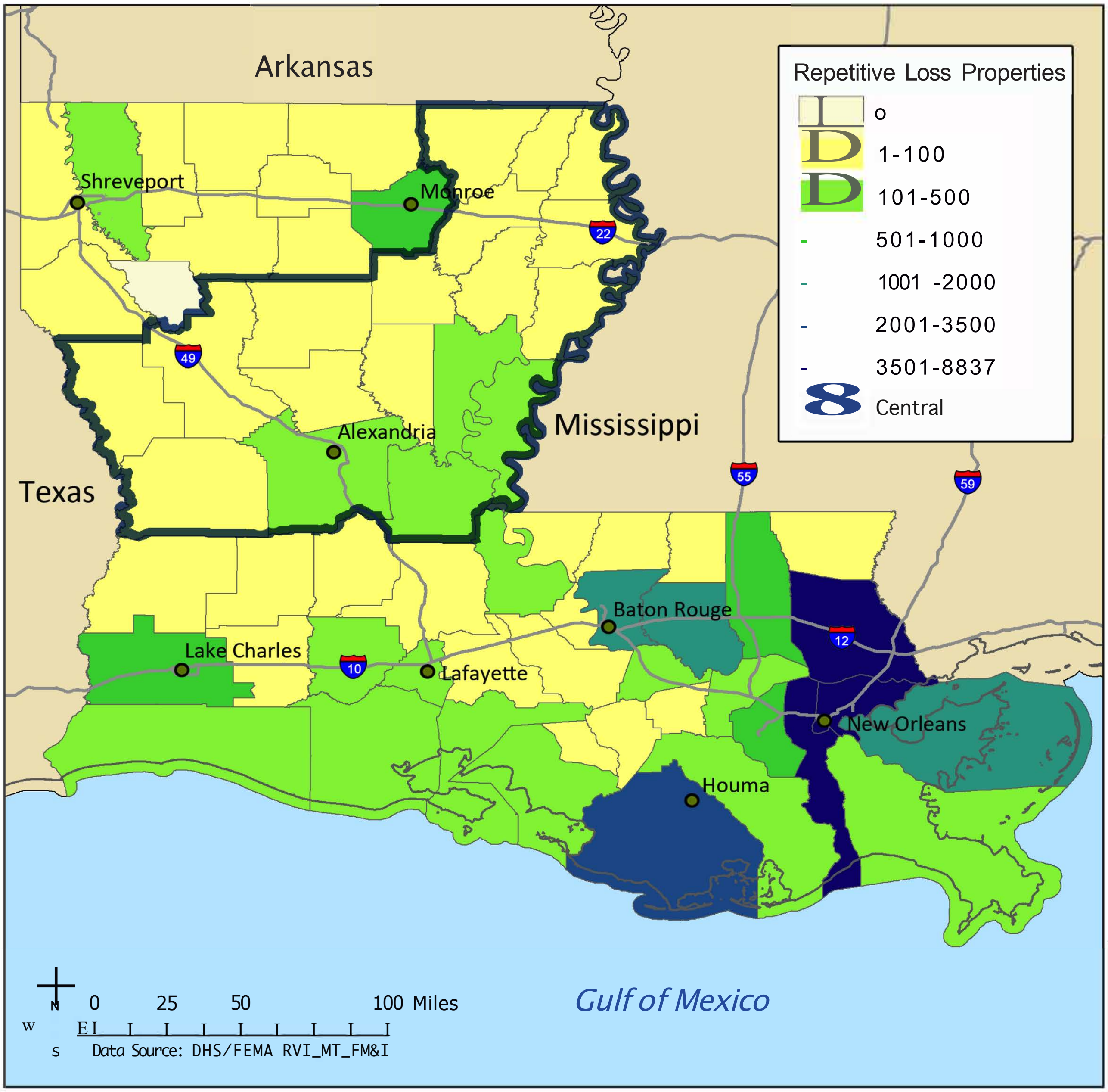
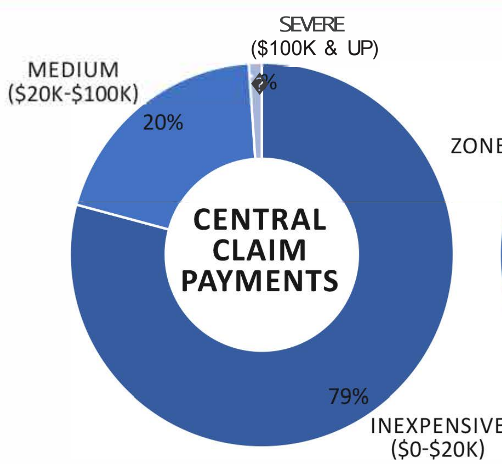
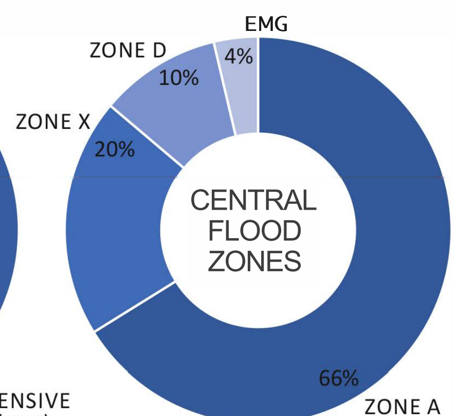


CENTRAL	COUNT
RL PROPERTIES	1,600
INEXPENSIVE ($0-$20K)	4,158
MEDIUM ($20K-$100K)	1,037
SEVERE ($100K & UP)	57
FLOOD ZONE A	1,056
FLOOD ZONE X (B,C)	319
FLOOD ZONE V	0
FLOOD ZONED	162
EMG *	59

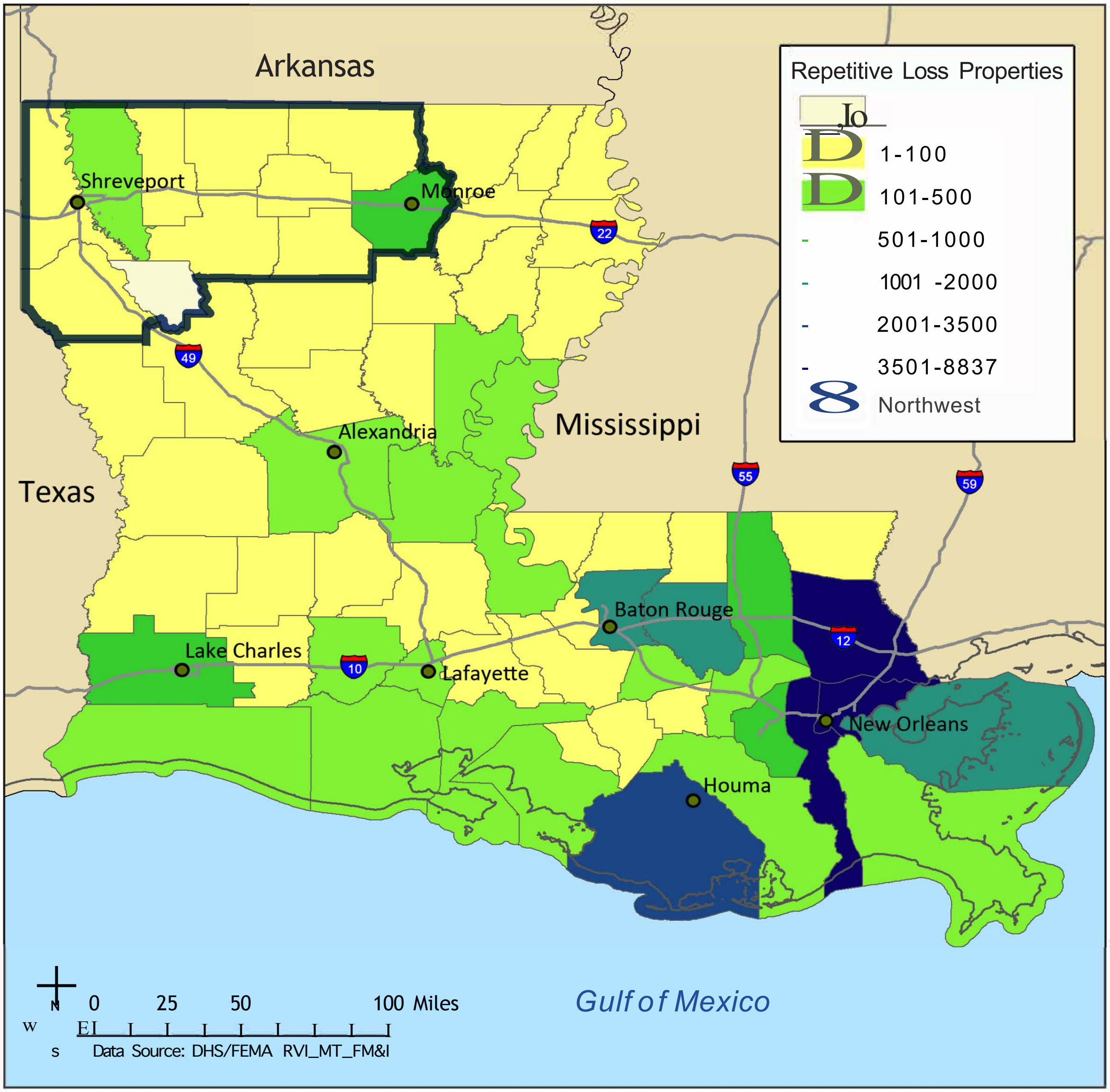
*NOTE: EMG is before Initial FIRM Identified





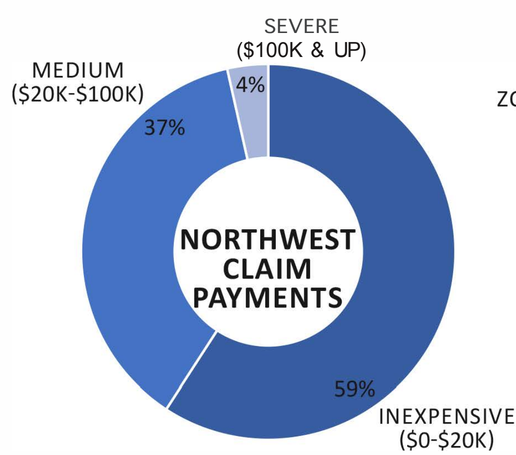
B-13

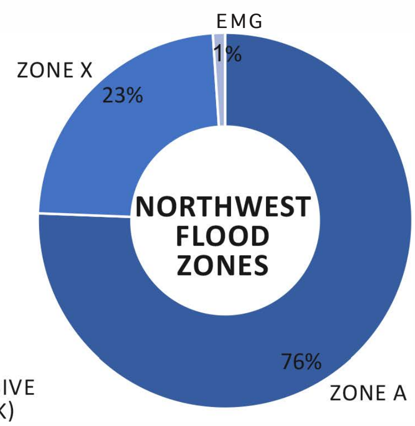
Attachment B



NORTHWEST	COUNT
RL PROPERTIES	1,247
INEXPENSIVE ($0-$20K)	2,281
MEDIUM ($20K-$100K)	1,437
SEVERE ($100K & UP)	136
FLOOD ZONE A	939
FLOOD ZONE X (B,C)	290
FLOOD ZONE V	1
FLOOD ZONED	0
EMG *	12

*NOTE: EMG is before Initial FIRM Identified





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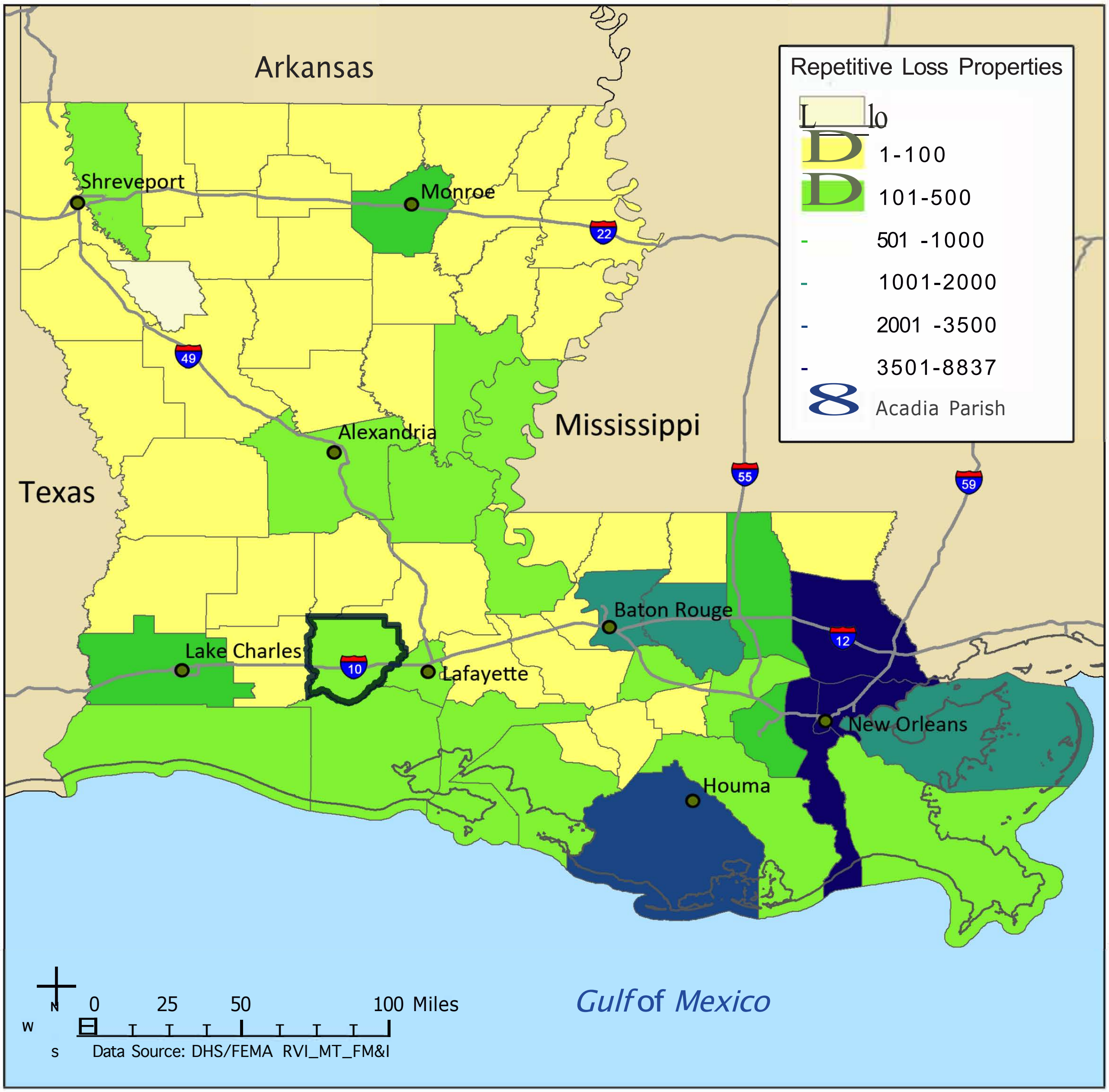
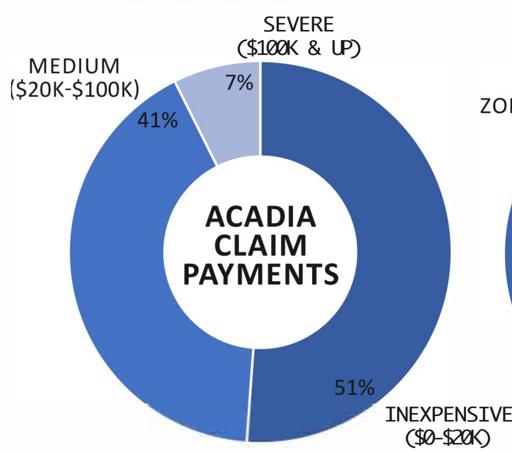
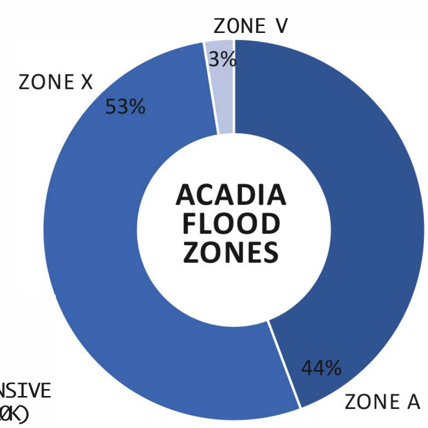


ACADIA PARISH	COUNT
RL PROPERTIES	157
INEXPENSIVE ($0-$20K)	201
MEDIUM $20K-$100K)	163
SEVERE ($100K & UP)	29
FLOOD ZONE A	70
FLOOD ZONE X (B,C)	84
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	4

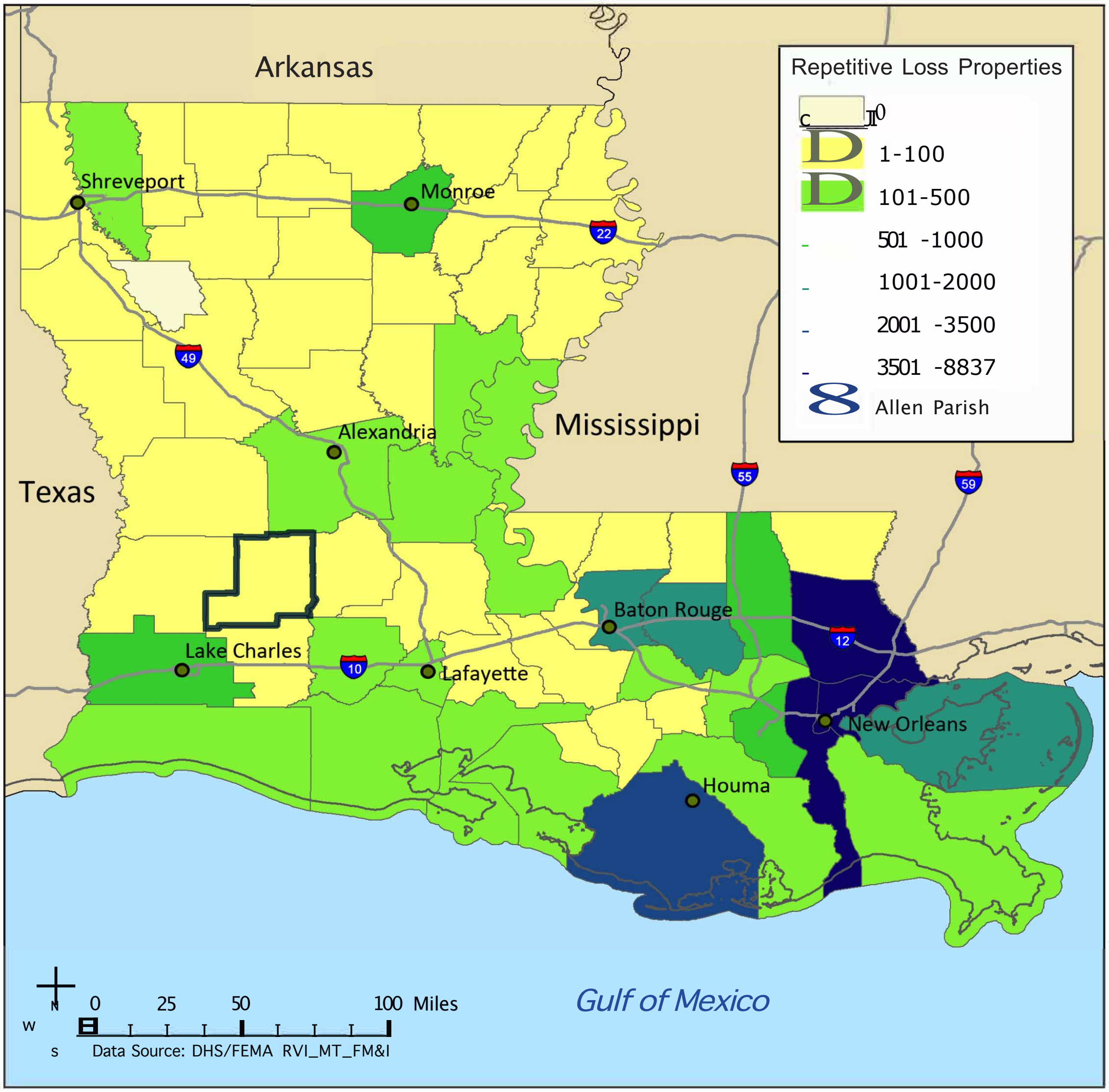
*NOTE: EMG is before Initial FIRM Identified





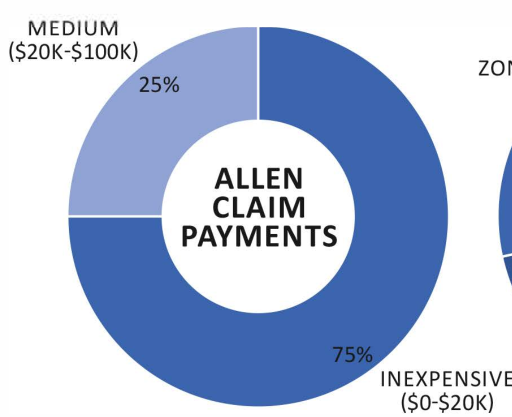
B-15

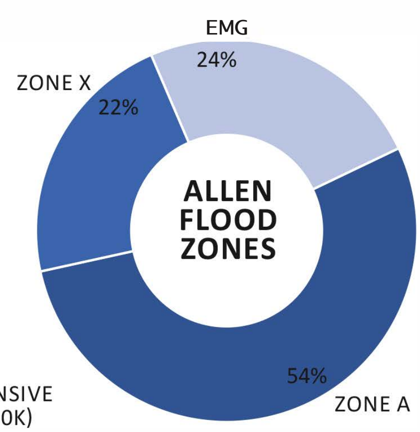
Attachment B



ALLEN PARISH	COUNT
RL PROPERTIES	43
INEXPENSIVE ($0-$20K)	108
MEDIUM $20K-$100K)	36
SEVERE ($100K & UP)	0
FLOOD ZONE A	22
FLOOD ZONE X (B,C)	9
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	10

*NOTE: EMG is before Initial FIRM Identified





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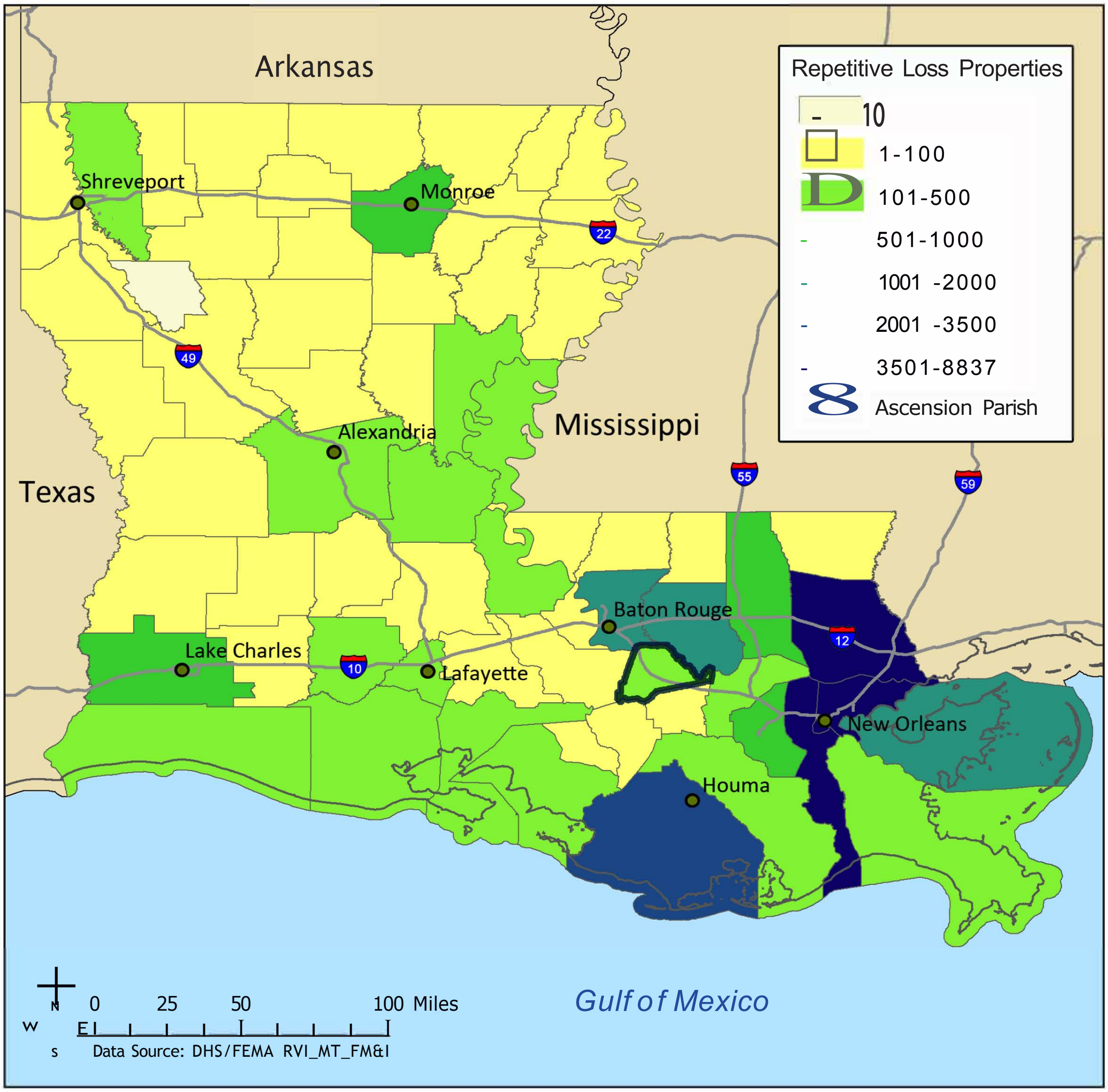
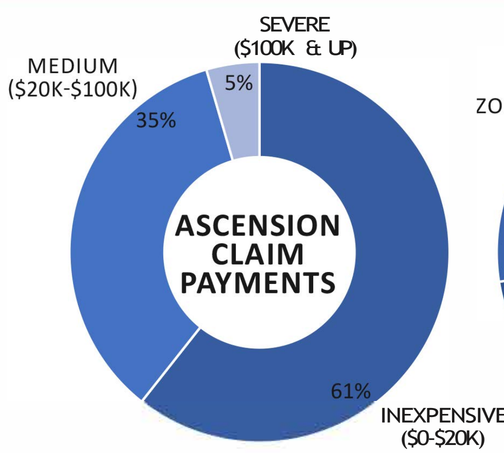
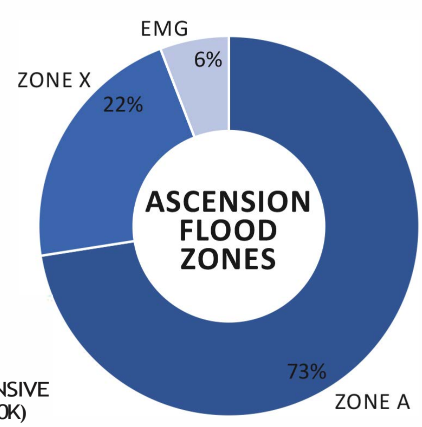
Attachment B



ASCENSION PARISH	COUNT
RL PROPERTIES	394
INEXPENSIVE ($0-$20K)	766
MEDIUM $20K-$100K)	440
SEVERE ($100K & UP)	57
FLOOD ZONE A	285
FLOOD ZONE X (B,C)	85
FLOOD ZONE V	0
FLOOD ZONE D	0
EMG*	23

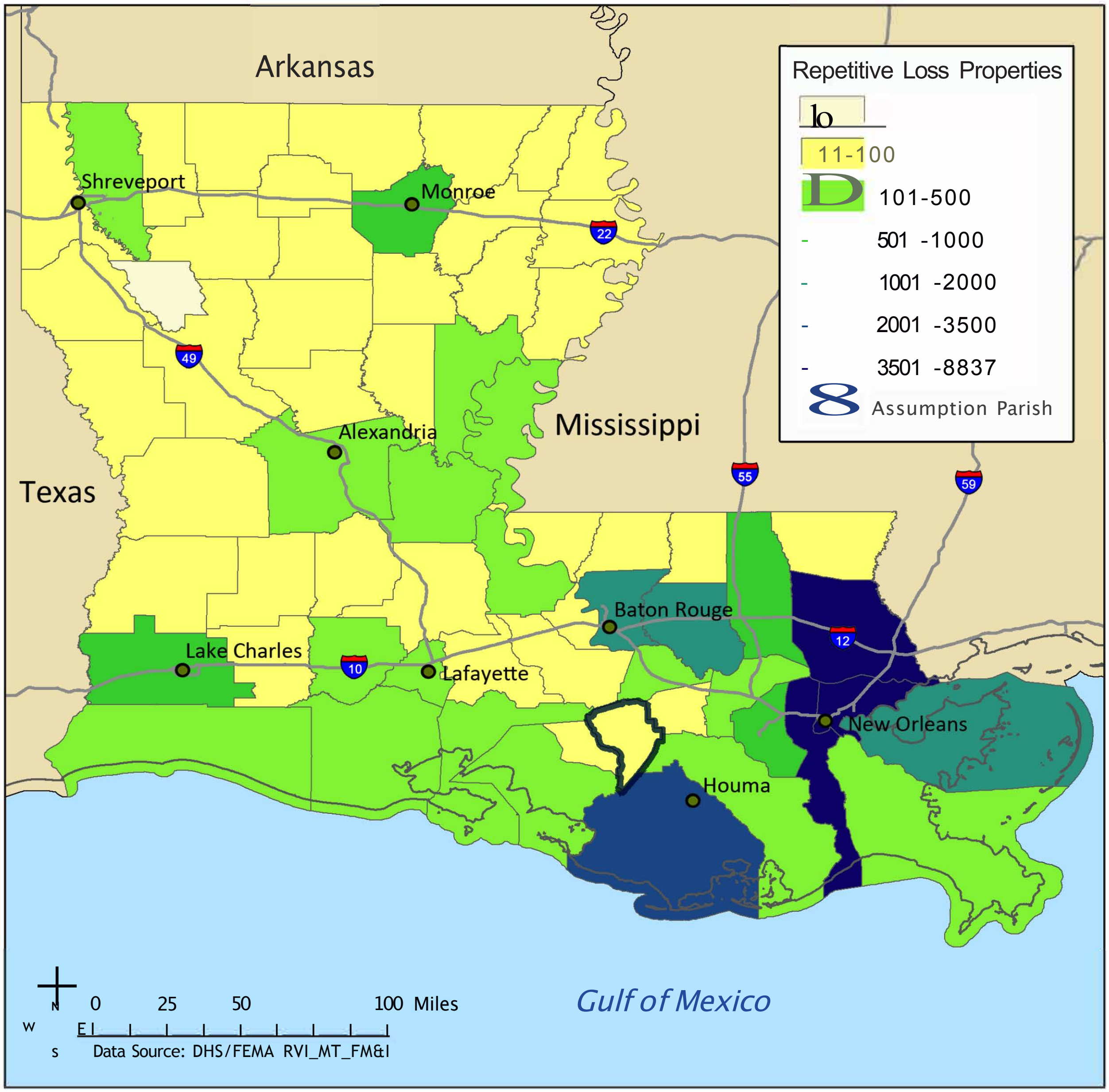
*NOTE: EMG is before Initial FIRM Identified





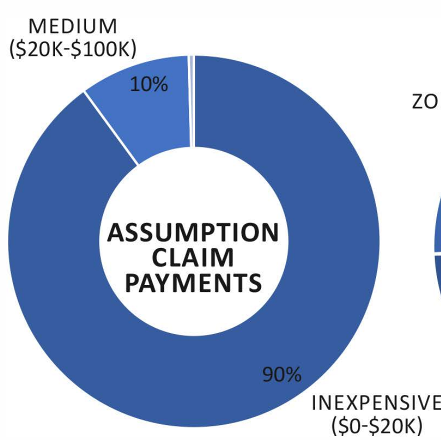
B-17

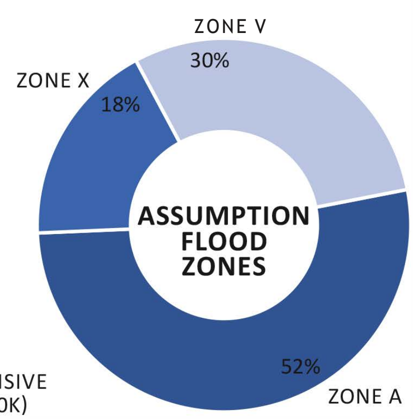
Attachment B



ASSUMPTION PARISH	COUNT
RL PROPERTIES	84
INEXPENSIVE ($0–$20K)	206
MEDIUM $20K–$100K)	22
SEVERE ($100K & UP)	1
FLOOD ZONE A	44
FLOOD ZONE X (B,C)	15
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	25

*NOTE: EMG is before Initial FIRM Identified





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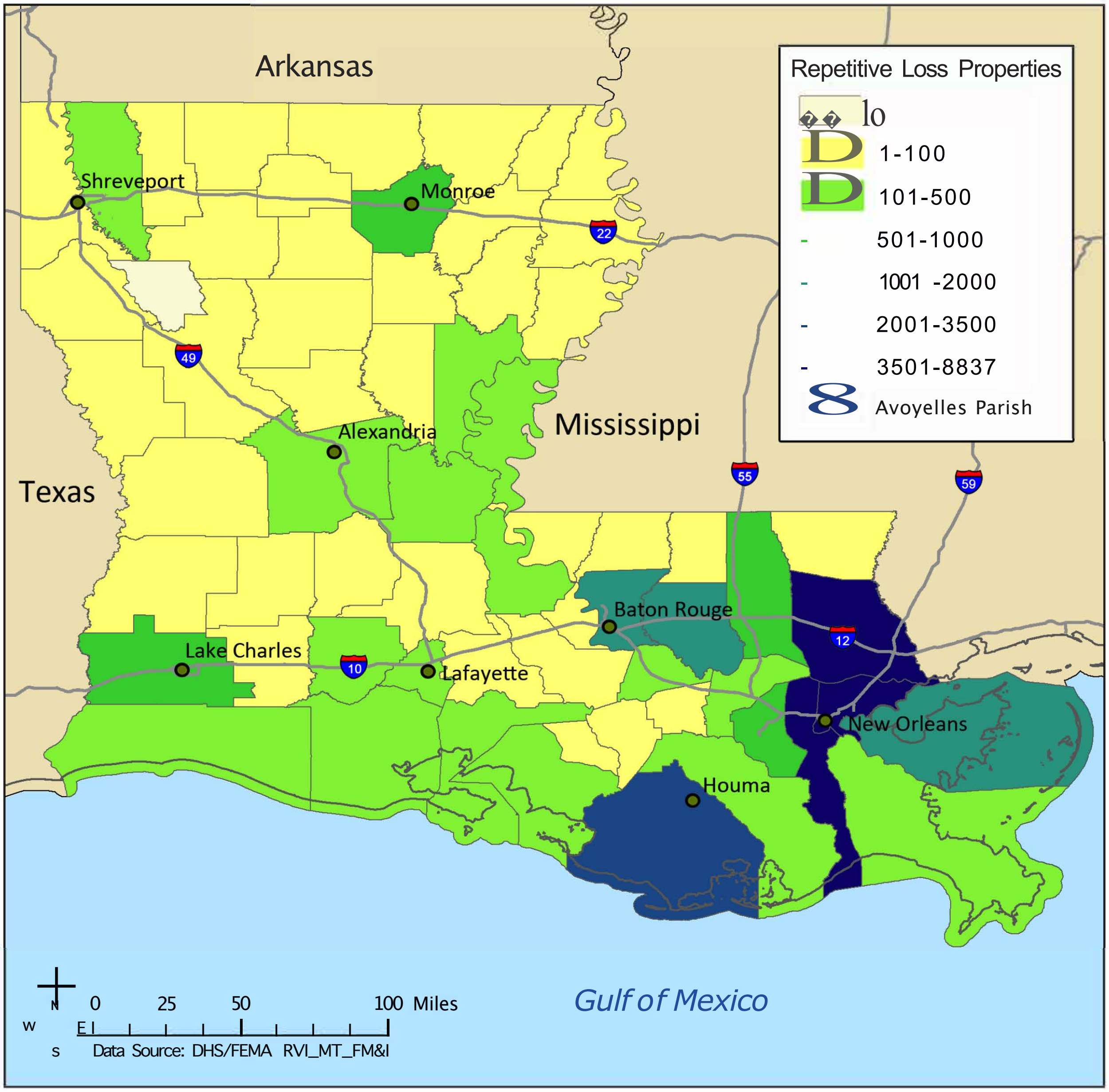
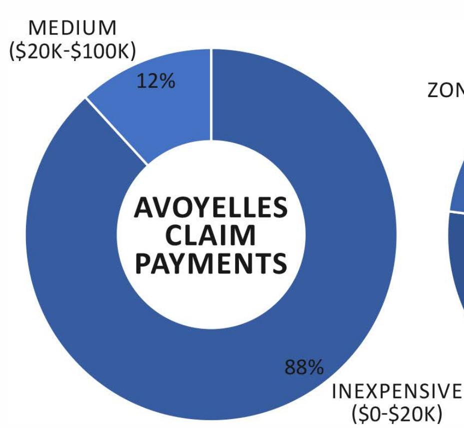
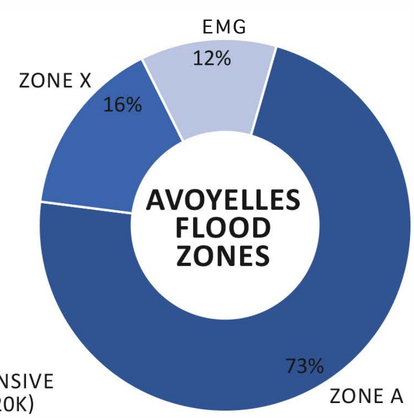
Attachment B



AVOYELLES PARISH	COUNT
RL PROPERTIES	187
INEXPENSIVE ($0–$20K)	493
MEDIUM $20K–$100K)	66
SEVERE ($100K & UP)	0
FLOOD ZONE A	135
FLOOD ZONE X (B,C)	29
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	22

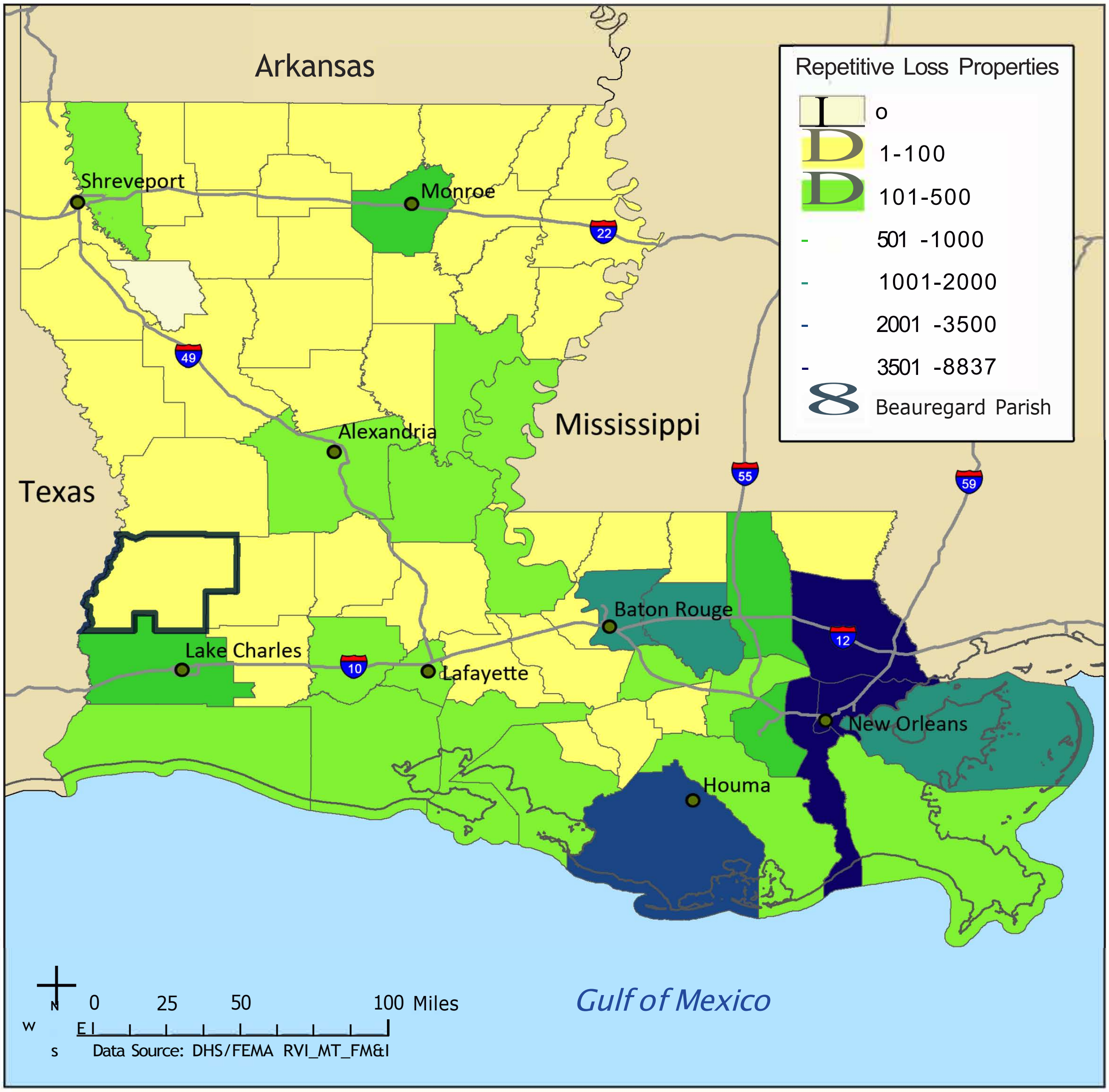
*NOTE: EMG is before Initial FIRM Identified





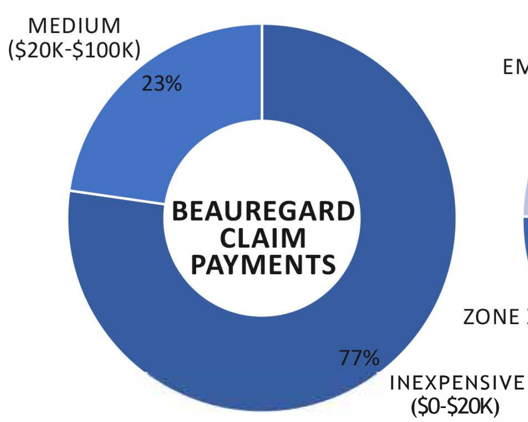
B-19

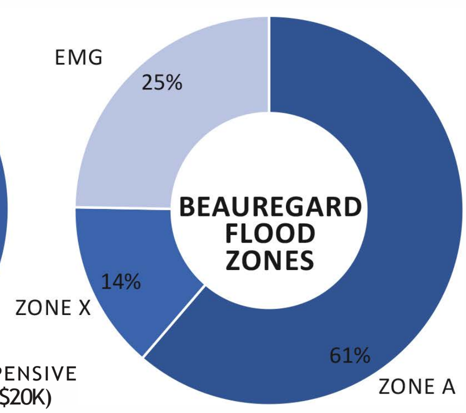
Attachment B



BEAUREGARD PARISH	COUNT
RL PROPERTIES	93
INEXPENSIVE ($0-$20K)	221
MEDIUM $20K-$100K)	65
SEVERE ($100K & UP)	0
FLOOD ZONE A	57
FLOOD ZONE X (B,C)	13
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	23

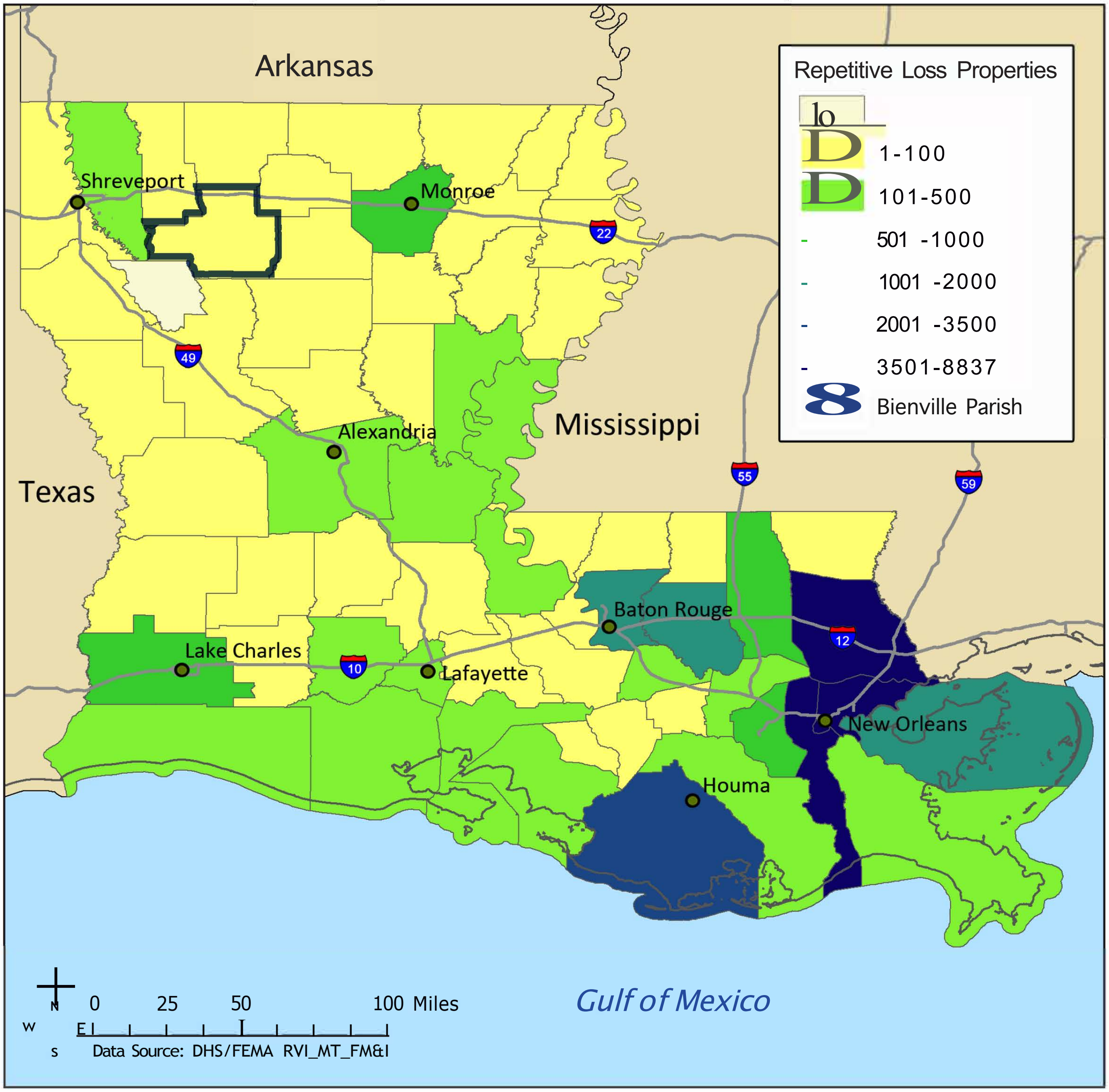
*NOTE: EMG is before Initial FIRM Identified





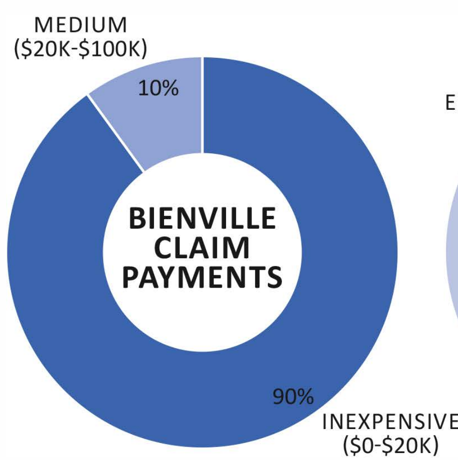
B-20

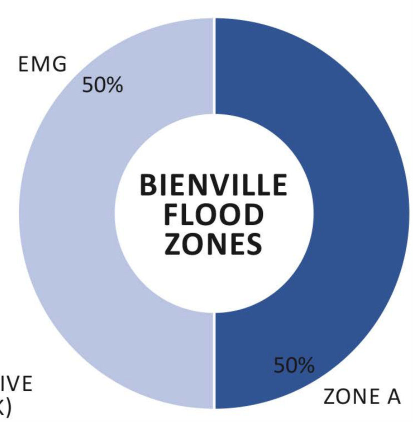
Attachment B



BIENVILLE PARISH	COUNT
RL PROPERTIES	2
INEXPENSIVE ($0-$20K)	9
MEDIUM $20K-$100K)	1
SEVERE ($100K & UP)	0
FLOOD ZONE A	1
FLOOD ZONE X (B,C)	0
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	1

*NOTE: EMG is before Initial FIRM Identified





B-21

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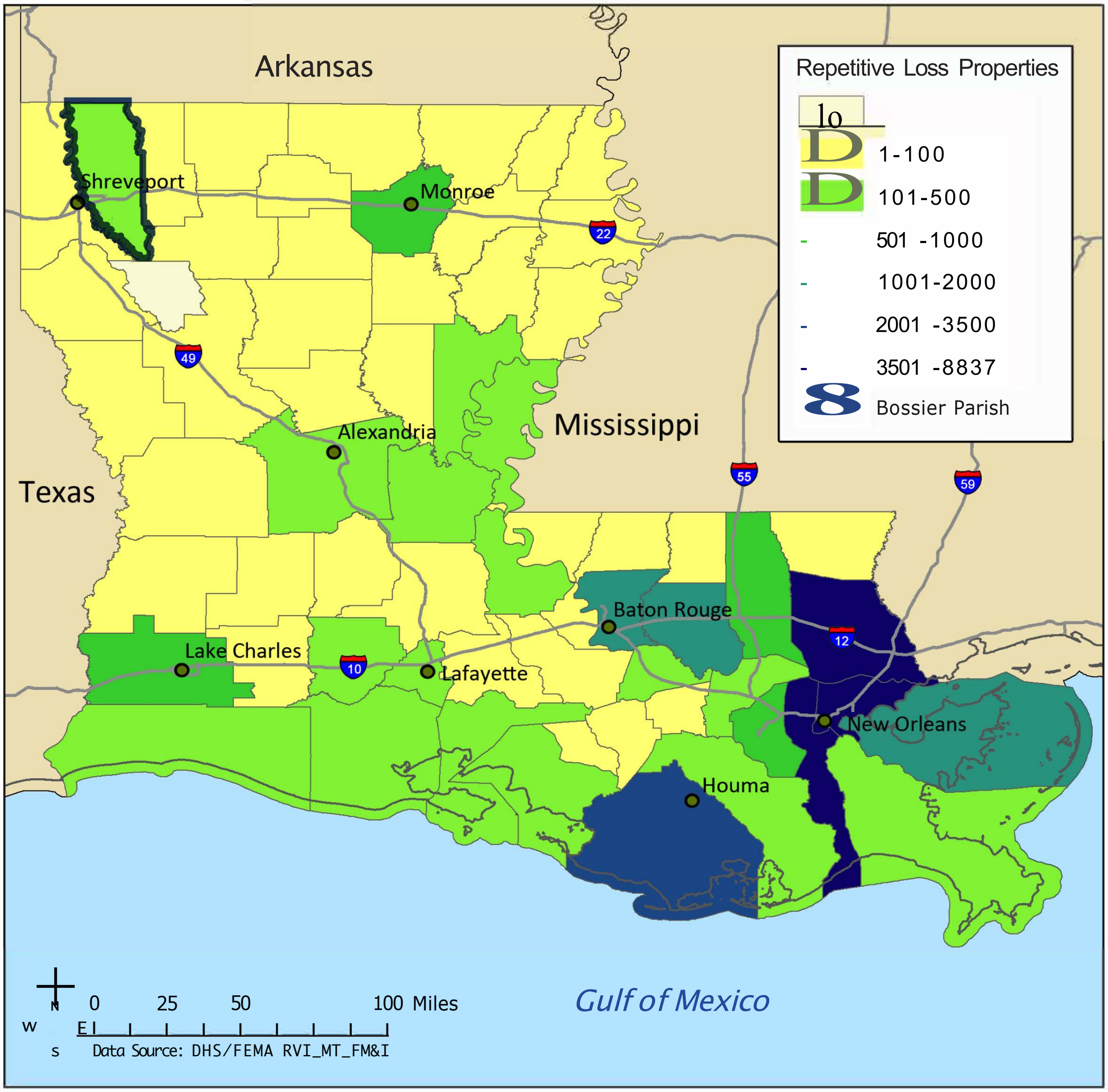
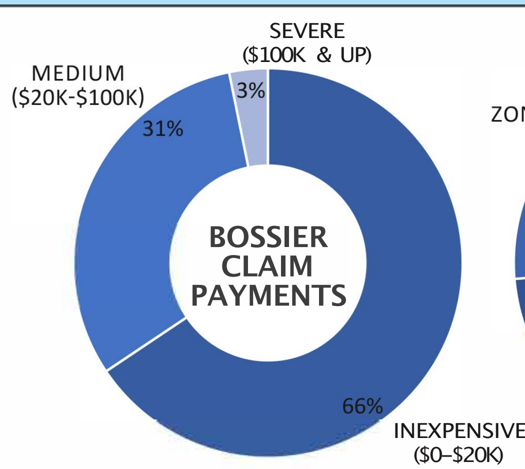
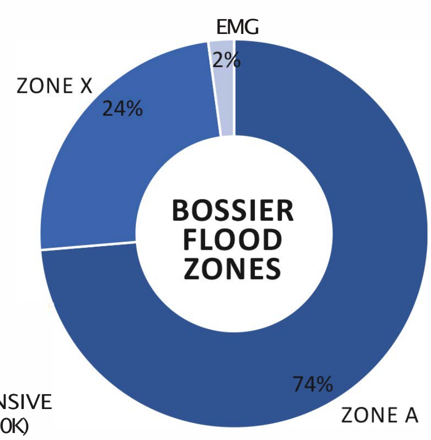


BOSSIER PARISH	COUNT
RL PROPERTIES	281
INEXPENSIVE ($0-$20K)	555
MEDIUM $20K-$100K)	264
SEVERE ($100K & UP)	27
FLOOD ZONE A	207
FLOOD ZONE X (B,C)	68
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	6

*NOTE: EMG isbefore Initial FIRM Identified





B-22

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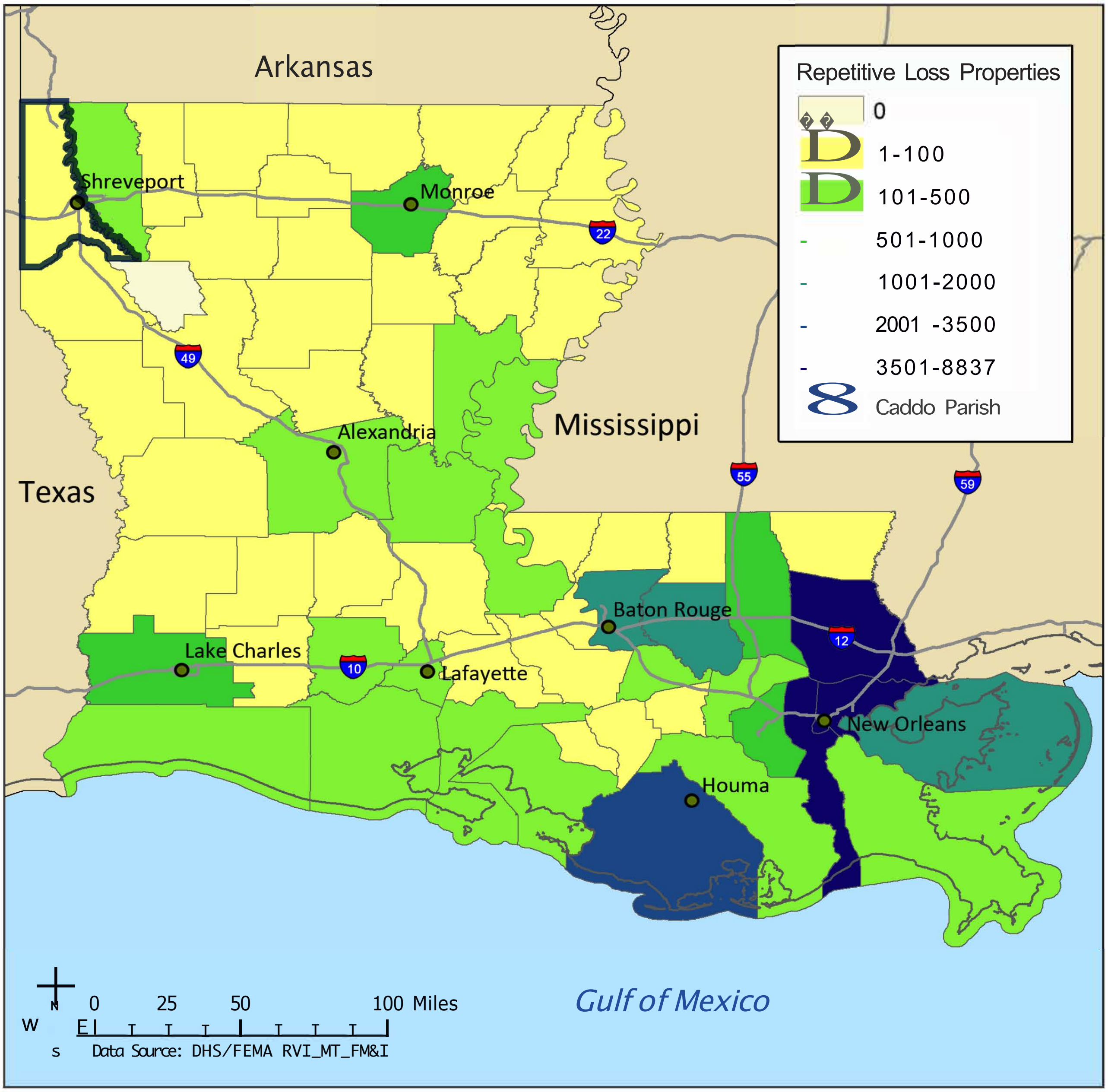
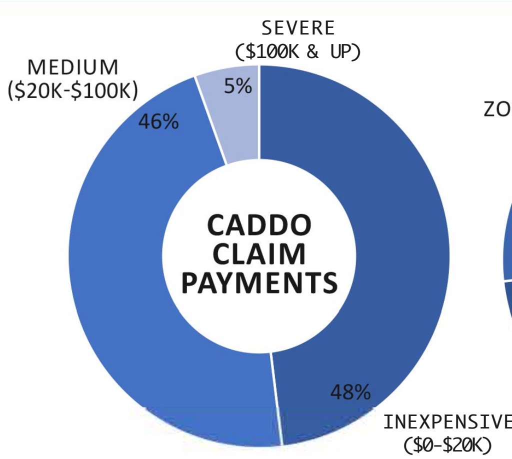
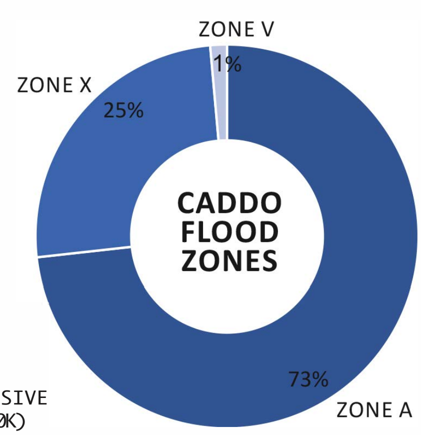


CADDO PARISH	COUNT
RL PROPERTIES	71
INEXPENSIVE ($0-$20K)	88
MEDIUM $20K-$100K)	85
SEVERE ($100K & UP)	10
FLOOD ZONE A	52
FLOOD ZONE X (B,C)	18
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	1

*NOTE: EMG is before Initial FIRM Identified





B-23

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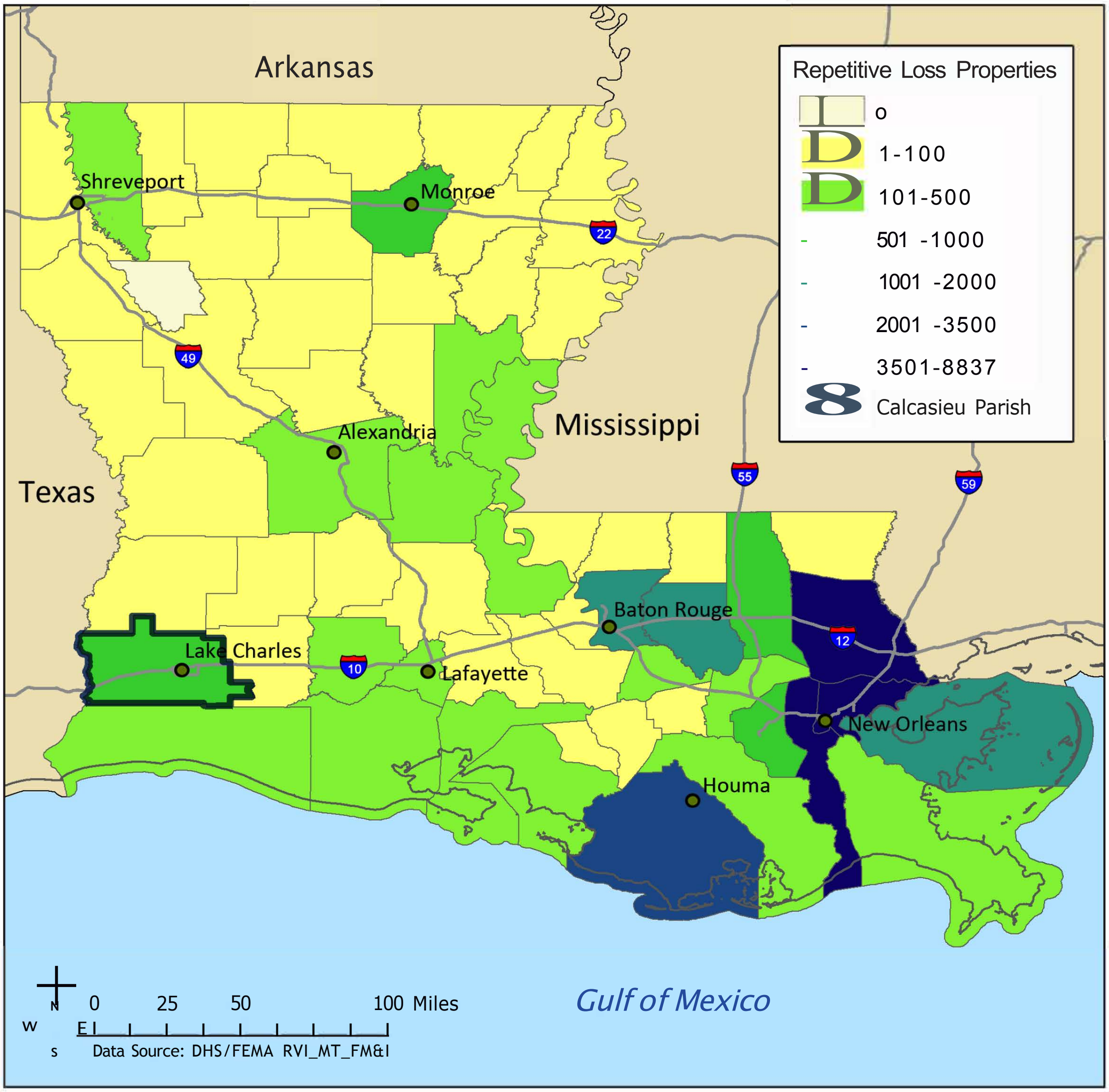
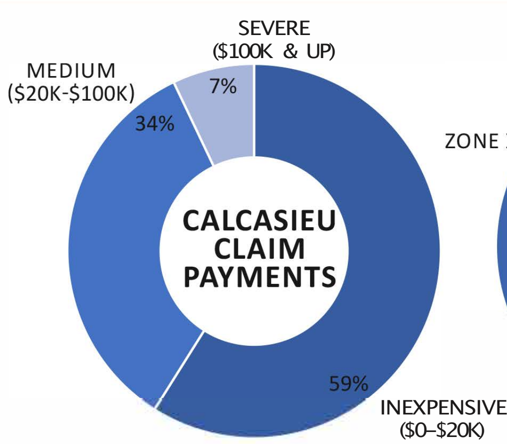
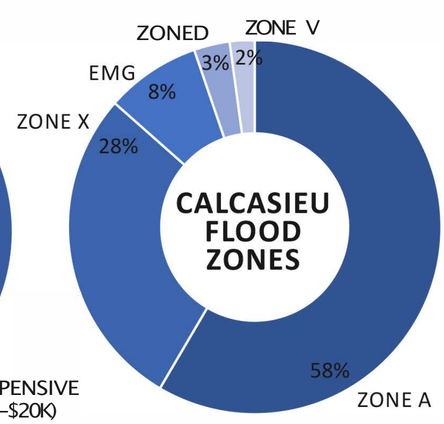


CALCASIEU PARISH	COUNT
RL PROPERTIES	841
INEXPENSIVE ($0-$20K)	1,439
MEDIUM $20K-$100K)	829
SEVERE ($100K & UP)	173
FLOOD ZONE A	490
FLOOD ZONE X (B,C)	235
FLOOD ZONE V	18
FLOOD ZONED	26
EMG*	69

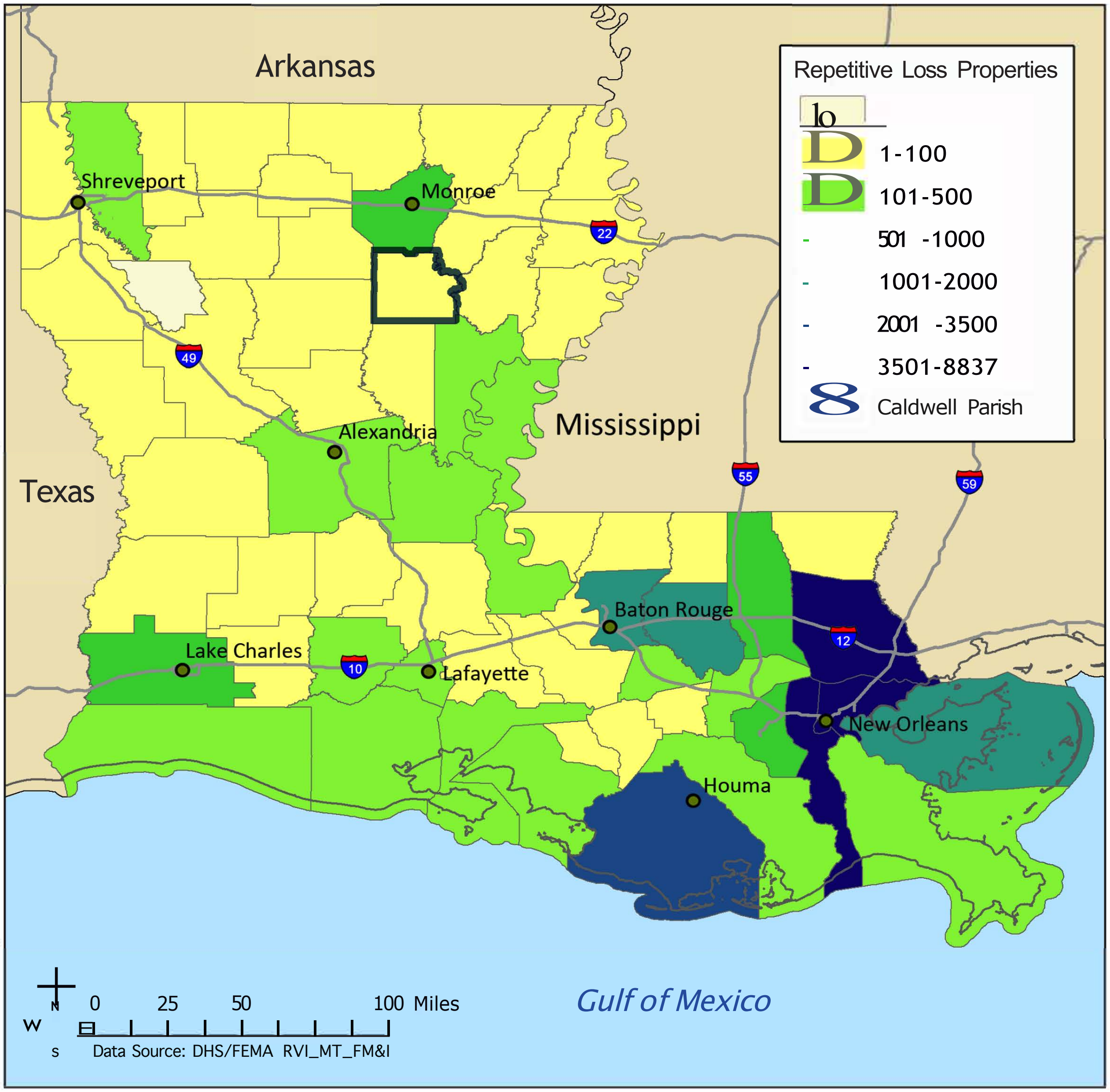
*NOTE: EMG is before Initial FIRM Identified





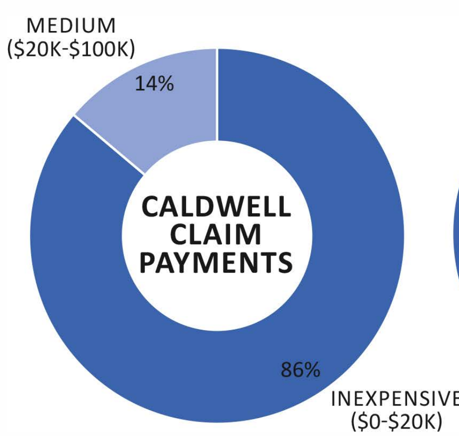
B-24

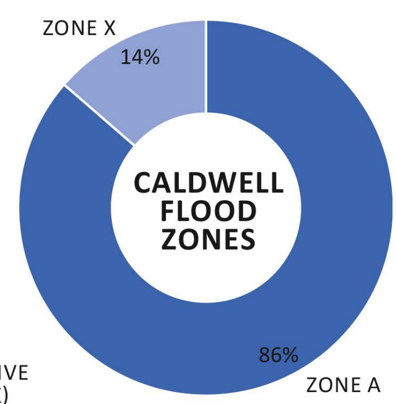
Attachment B



CALDWELL PARISH	COUNT
RL PROPERTIES	22
INEXPENSIVE ($0-$20K)	56
MEDIUM $20K-$100K)	9
SEVERE ($100K & UP)	0
FLOOD ZONE A	19
FLOOD ZONE X (B,C)	3
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	0

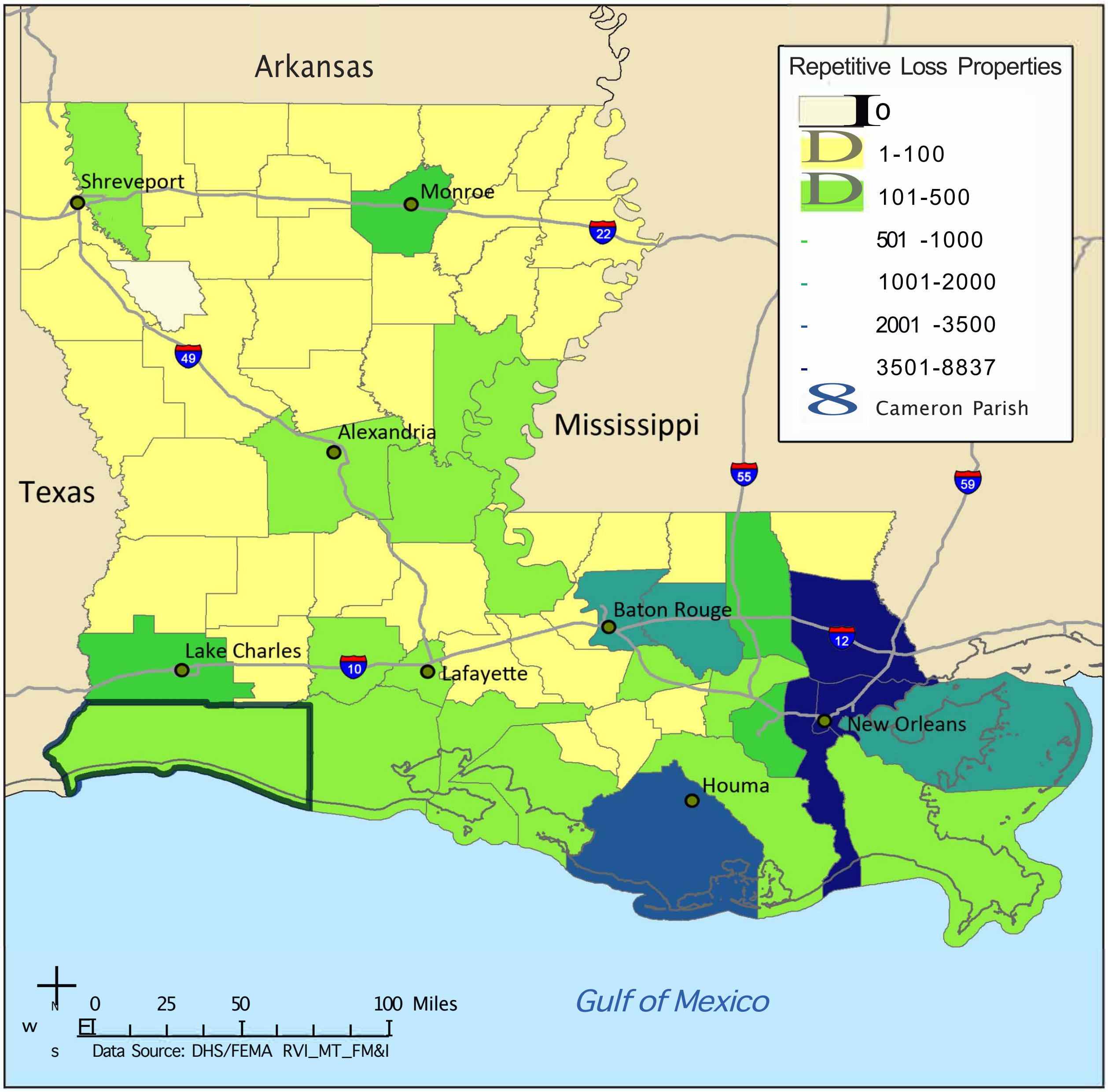
*NOTE: EMG is before Initial FIRM Identified





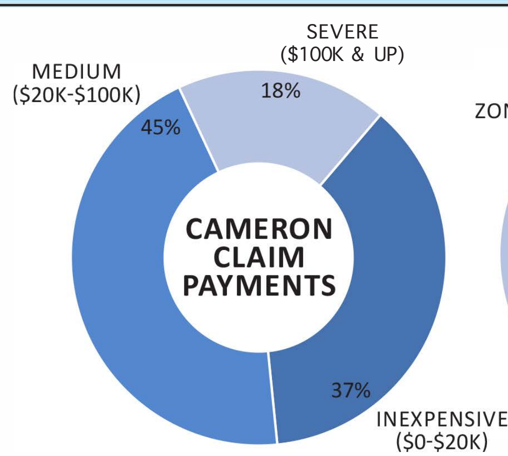
B-25

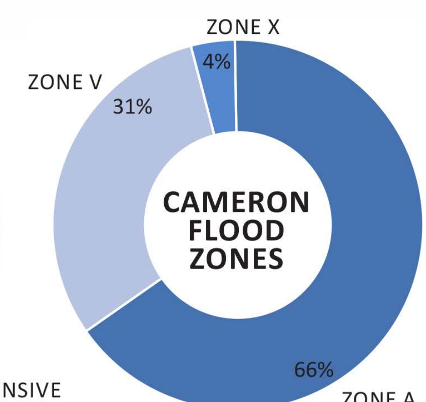
Attachment B



CAMERON PARISH	COUNT
RL PROPERTIES	444
INEXPENSIVE ($0–$20K)	359
MEDIUM $20K–$100K)	431
SEVERE ($100K & UP)	176
FLOOD ZONE A	291
FLOOD ZONE X (B,C)	17
FLOOD ZONE V	136
FLOOD ZONED	0
EMG*	0

*NOTE: EMG is before Initial FIRM Identified





B-26

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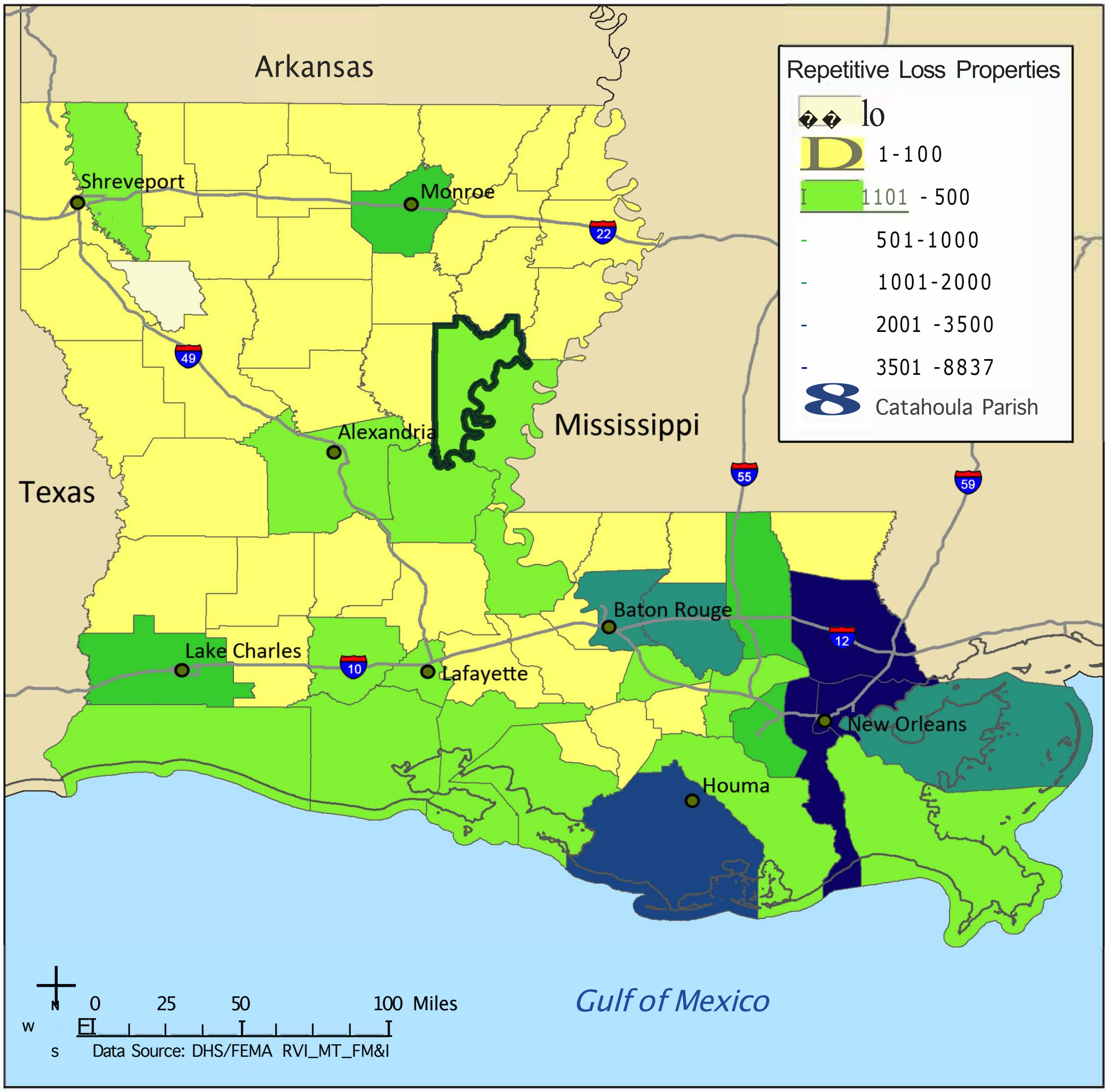
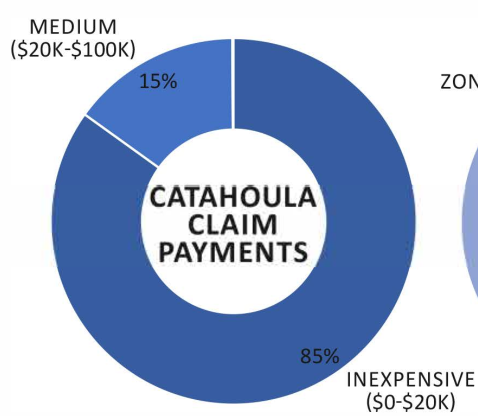
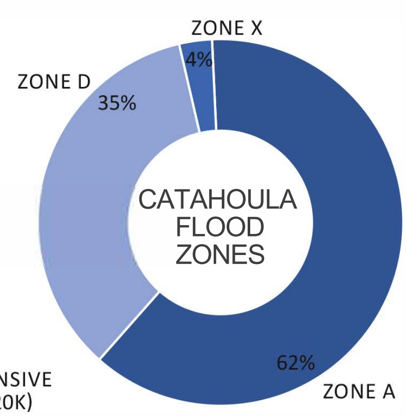


CATAHOULA PARISH	COUNT
RL PROPERTIES	312
INEXPENSIVE ($0–$20K)	946
MEDIUM $20K–$100K)	167
SEVERE ($100K & UP)	1
FLOOD ZONE A	193
FLOOD ZONE X (B,C)	9
FLOOD ZONE V	0
FLOOD ZONED	108
EMG*	0

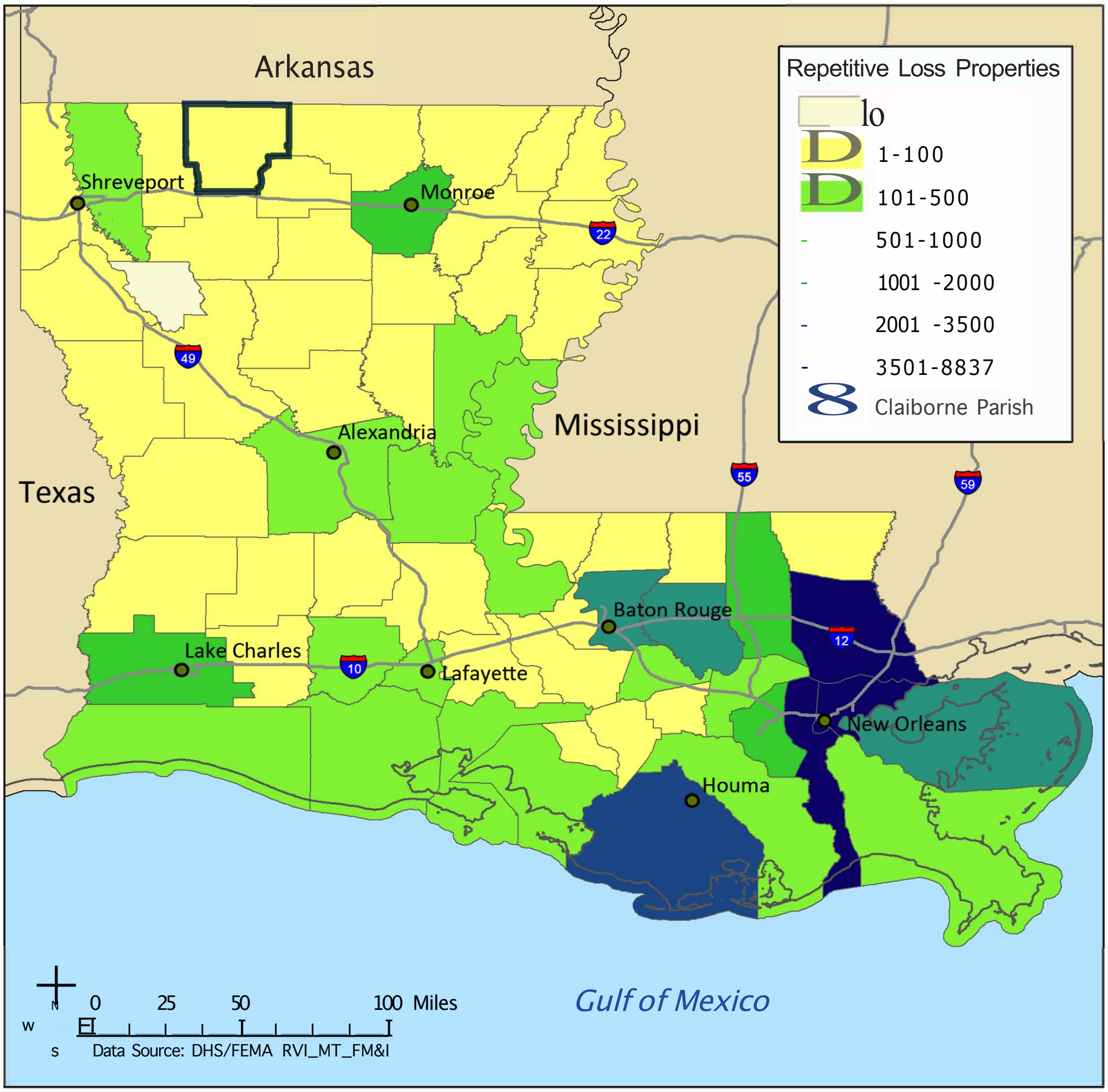
*NOTE: EMG is before Initial FIRM Identified





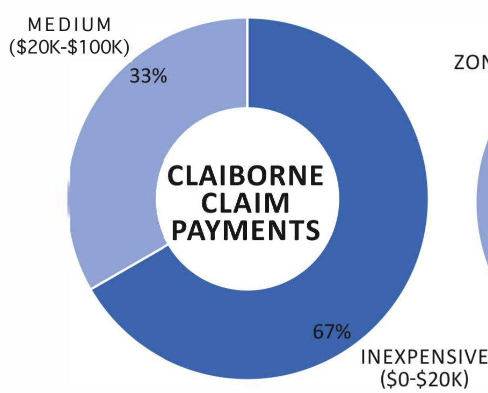
B-27

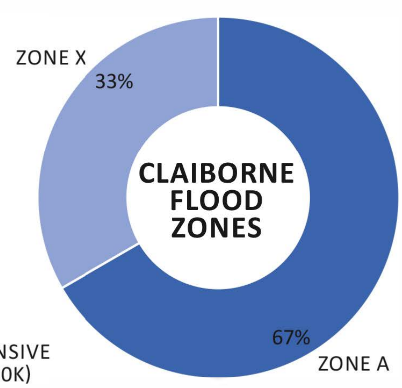
Attachment B



CLAIBORNE PARISH	COUNT
RL PROPERTIES	3
INEXPENSIVE ($0–$20K)	4
MEDIUM $20K–$100K)	2
SEVERE ($100K & UP)	0
FLOOD ZONE A	2
FLOOD ZONE X (B,C)	1
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	0

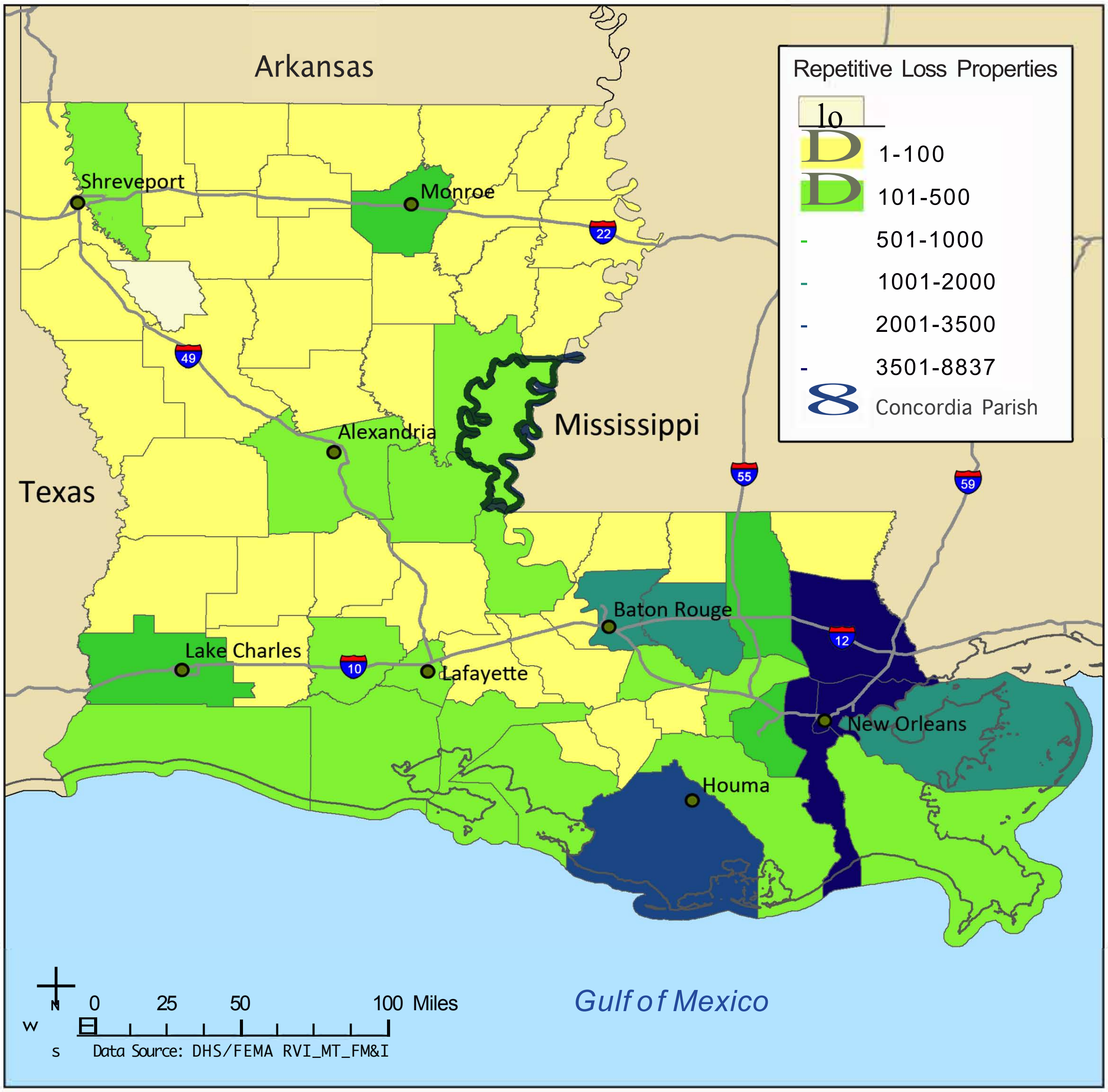
*NOTE: EMG is before Initial FIRM Identified





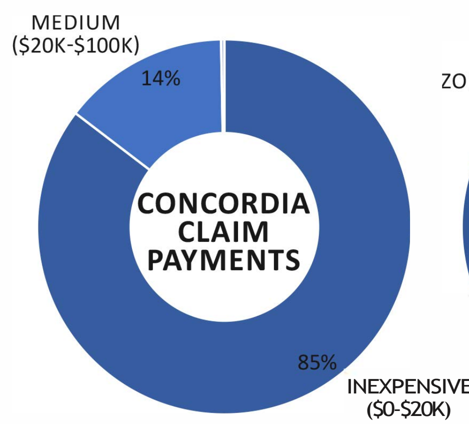
B-28

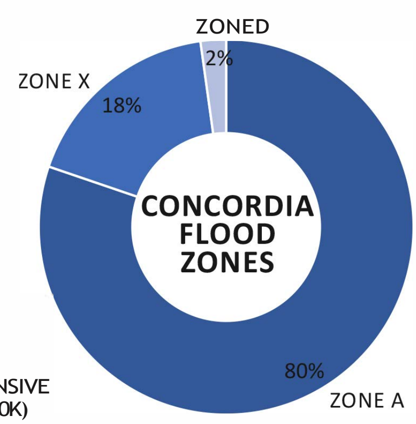
Attachment B



CONCORDIA PARISH	COUNT
RL PROPERTIES	182
INEXPENSIVE ($0-$20K)	601
MEDIUM $20K-$100K)	101
SEVERE ($100K & UP)	2
FLOOD ZONE A	146
FLOOD ZONE X (B,C)	32
FLOOD ZONE V	0
FLOOD ZONE D	4
EMG*	0

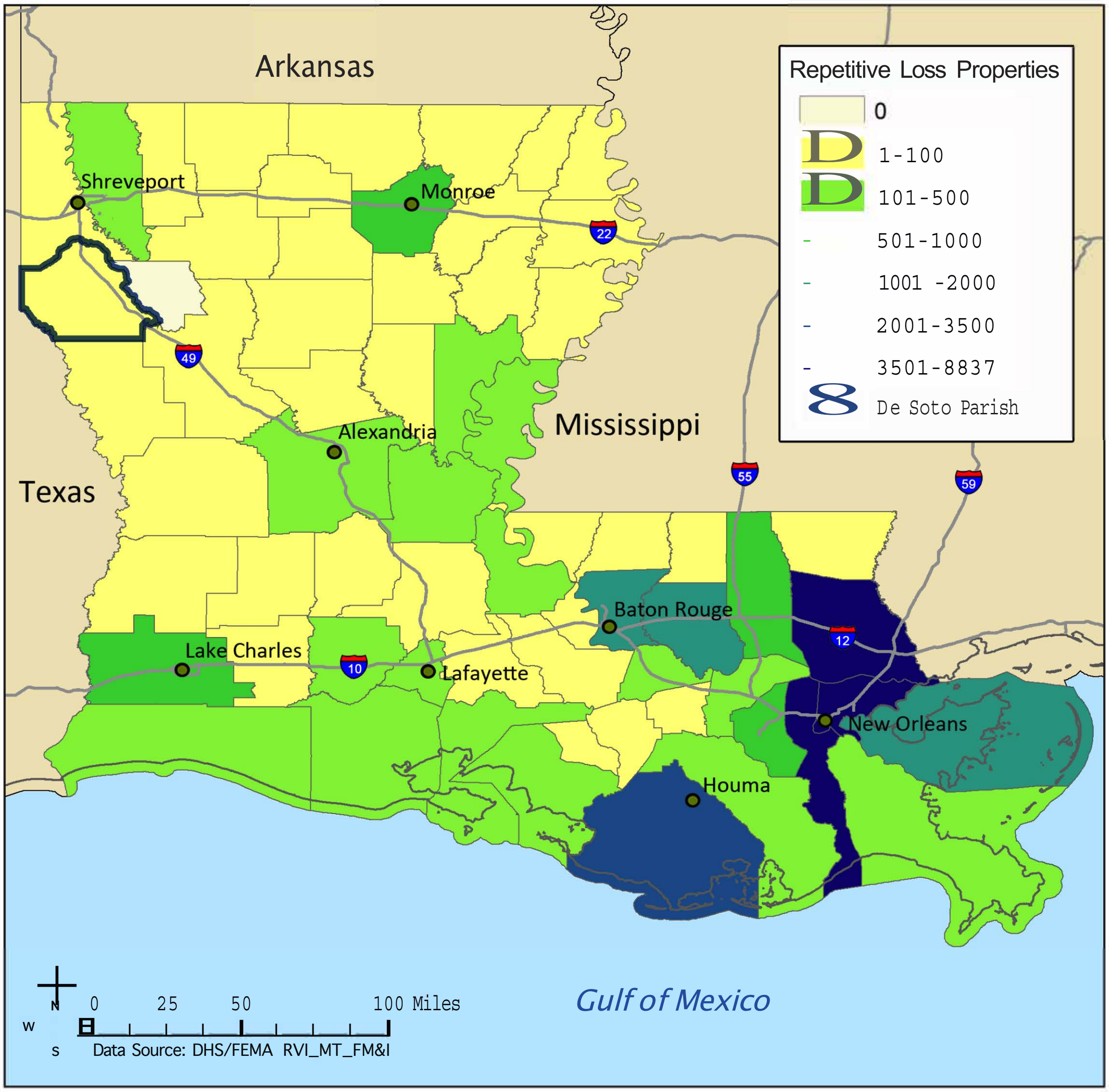
*NOTE: EMG is before Initial FIRM Identified





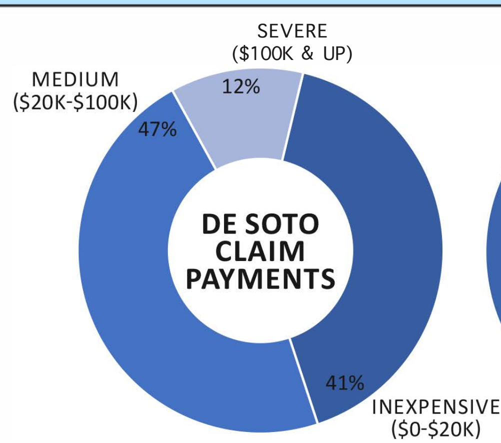
B-29

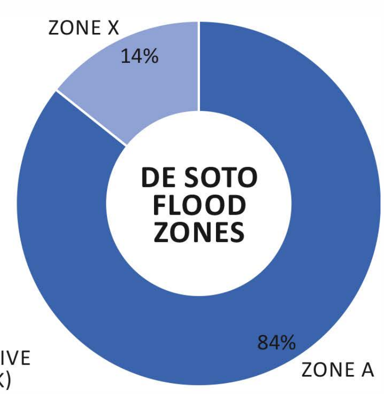
Attachment B



DE SOTO PARISH	COUNT
RL PROPERTIES	7
INEXPENSIVE ($0–$20K)	7
MEDIUM $20K–$100K)	8
SEVERE ($100K & UP)	2
FLOOD ZONE A	6
FLOOD ZONE X (B,C)	1
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	0

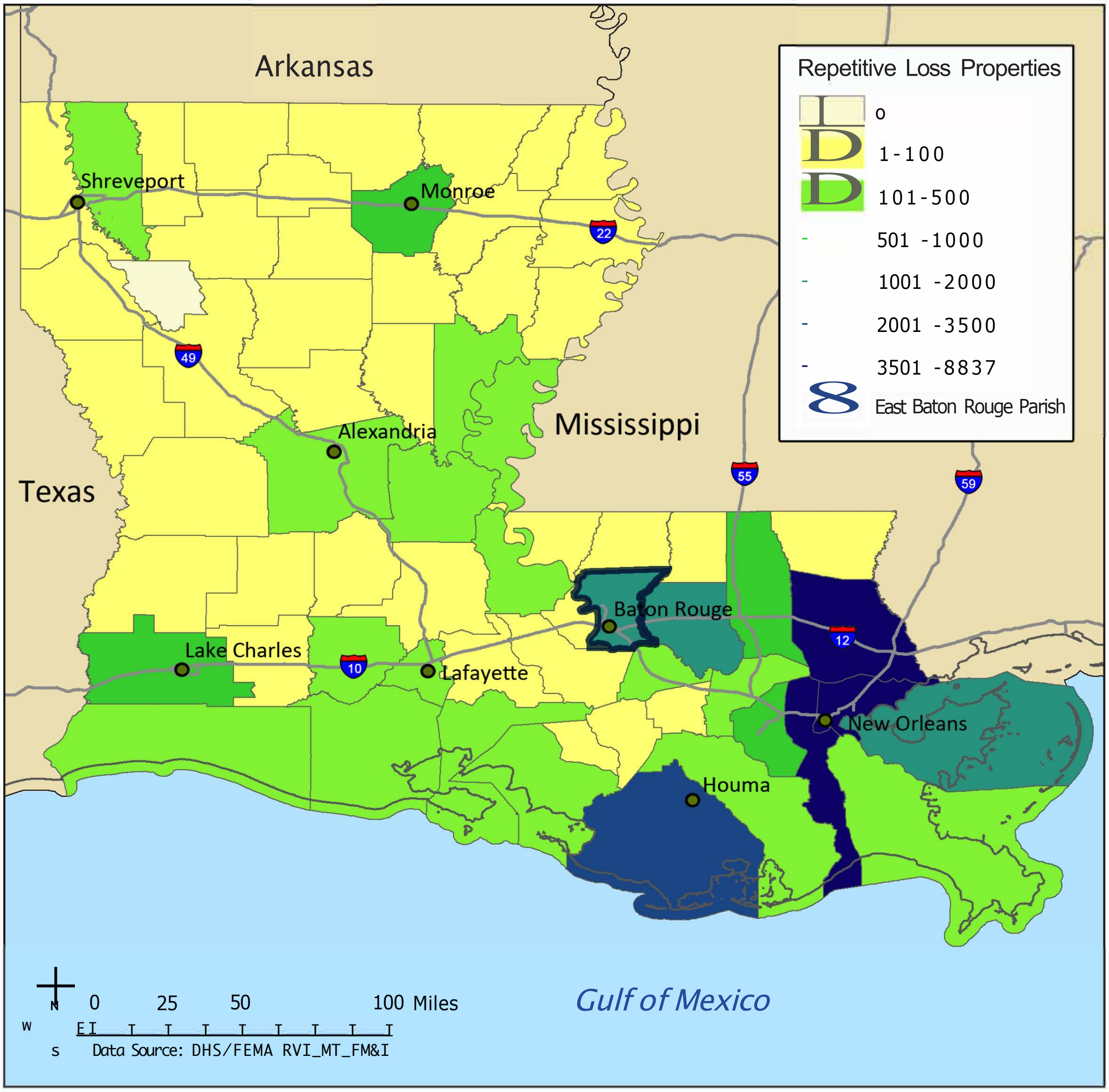
*NOTE: EMG is before Initial FIRM Identified





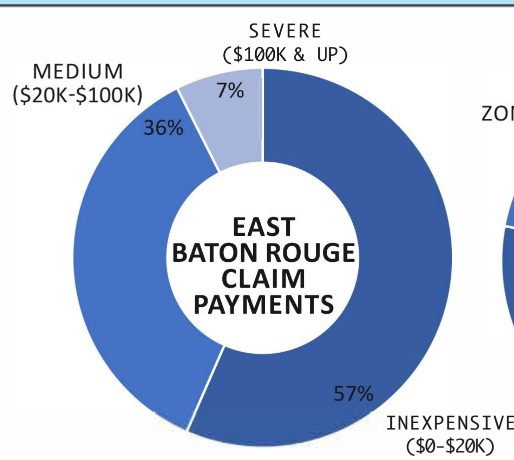
B-30

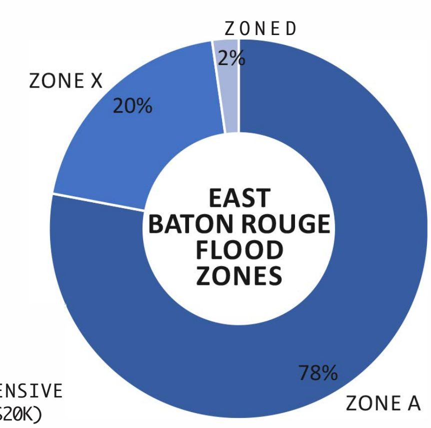
Attachment B



E. BATON ROUGE PARISH	COUNT
RL PROPERTIES	1,068
INEXPENSIVE ($0-$20K)	2,256
MEDIUM $20K-$100K)	1,437
SEVERE ($100K & UP)	296
FLOOD ZONE A	831
FLOOD ZONE X (B,C)	211
FLOOD ZONE V	0
FLOOD ZONED	24
EMG*	0

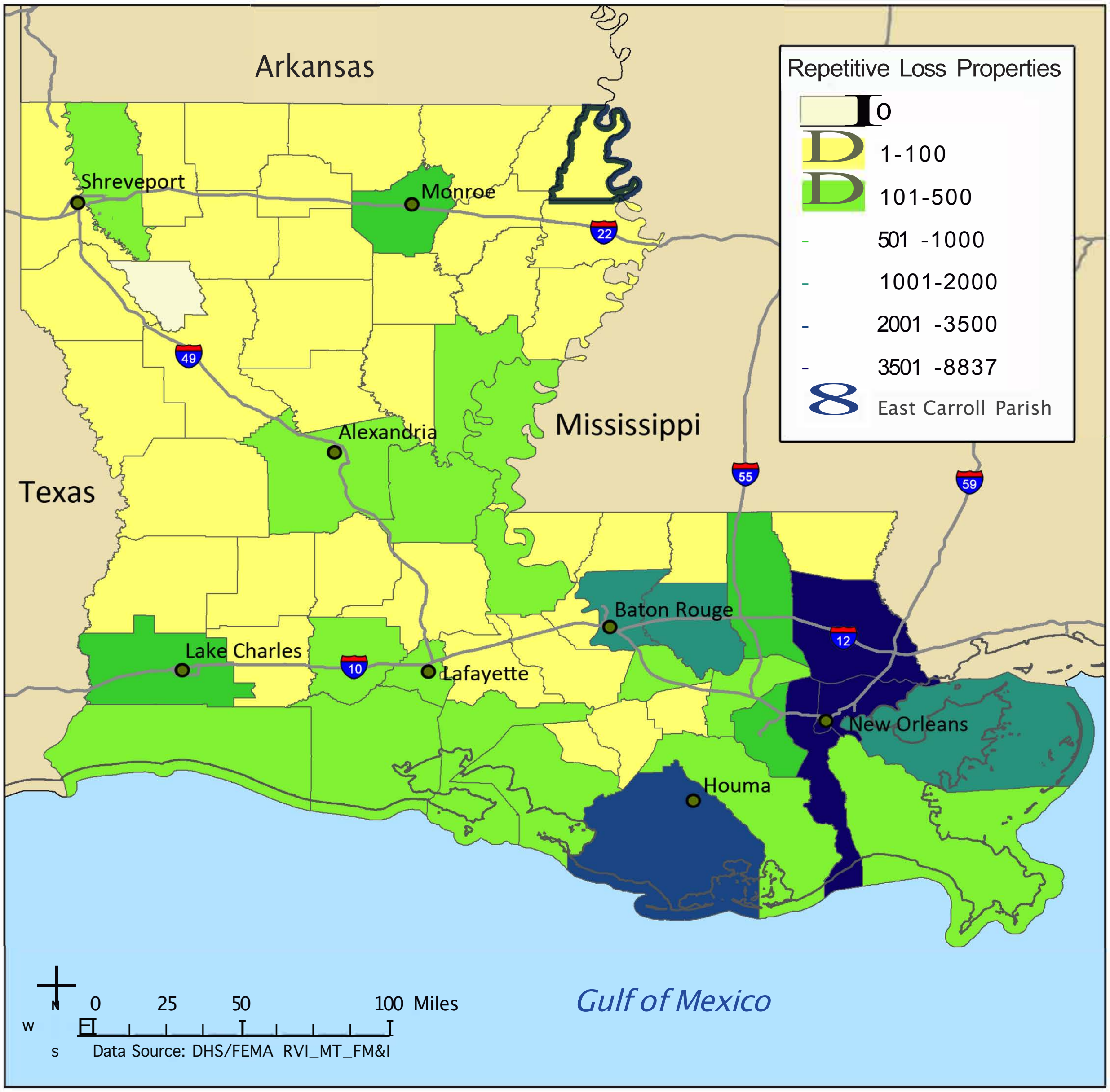
*NOTE: EMG is before Initial FIRM Identified





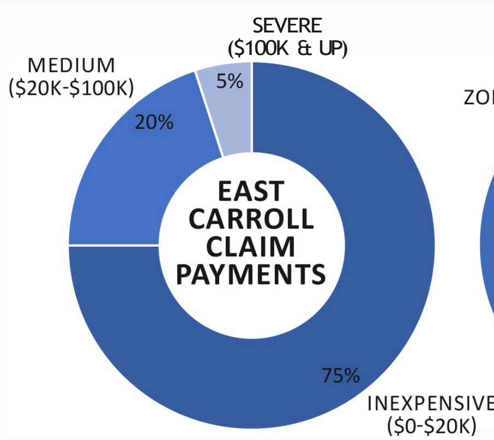
B-31

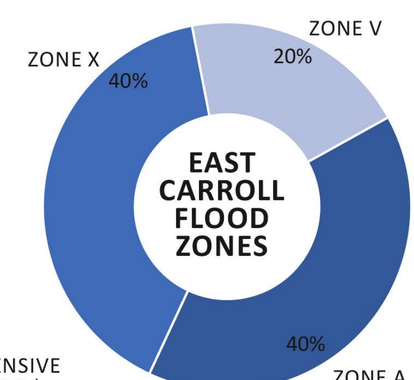
Attachment B



EAST CARROLL PARISH	COUNT
RL PROPERTIES	15
INEXPENSIVE ($0–$20K)	30
MEDIUM $20K–$100K)	8
SEVERE ($100K & UP)	2
FLOOD ZONE A	6
FLOOD ZONE X (B,C)	6
FLOOD ZONE V	0
FLOOD ZONED	3
EMG*	0

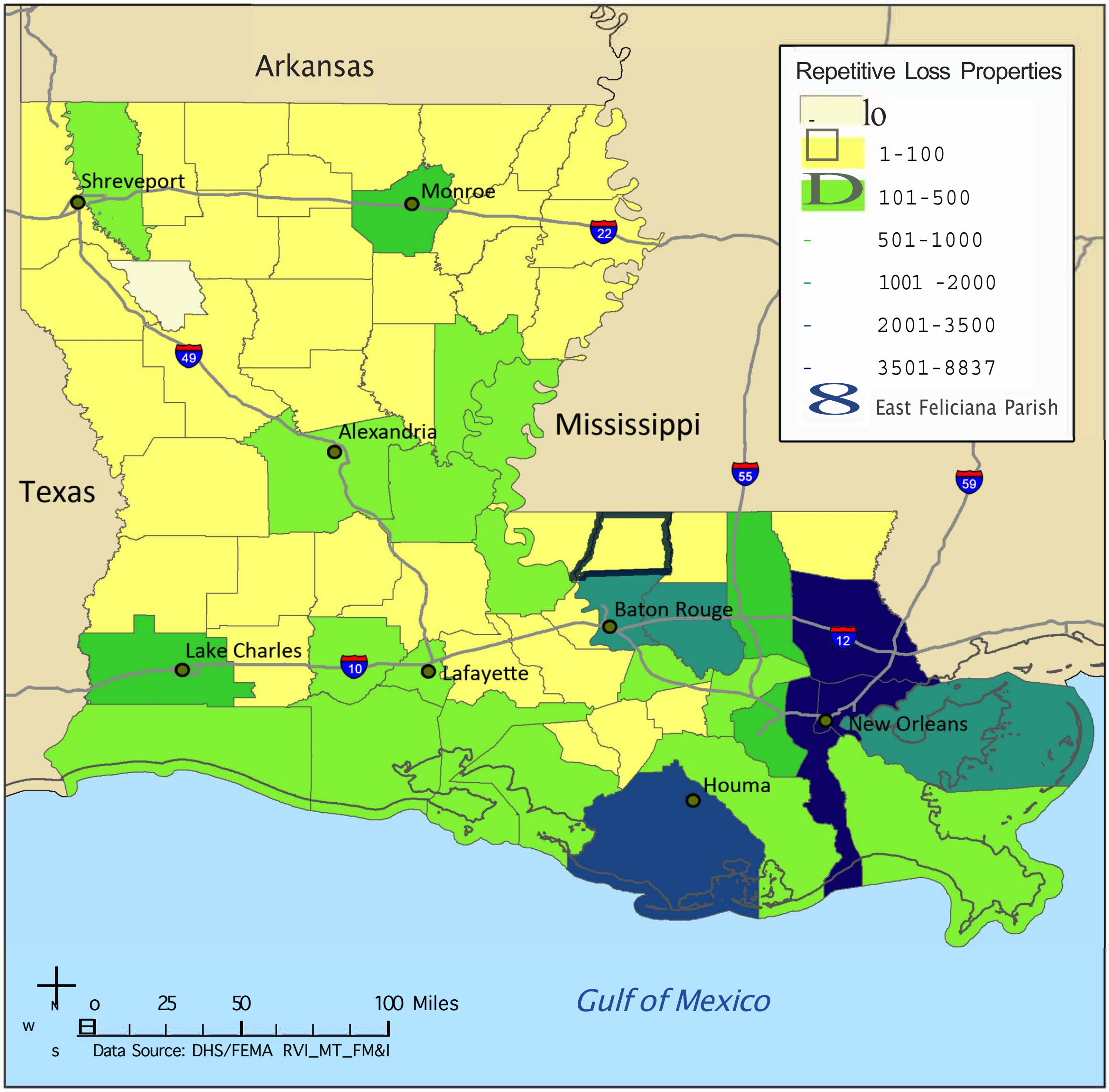
*NOTE: EMG is before Initial FIRM Identified





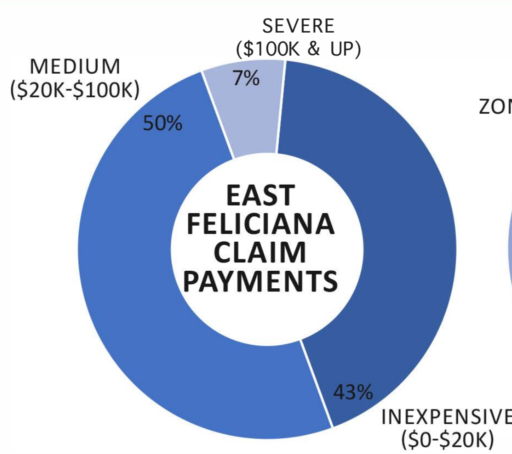
B-32

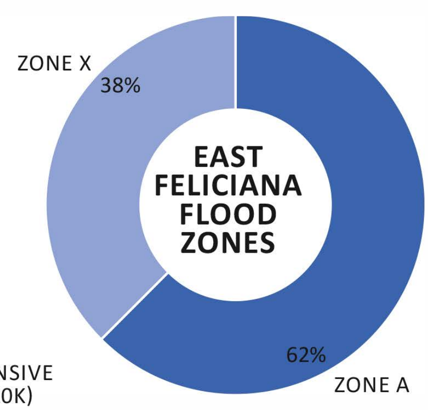
Attachment B



EAST FELICIANA PARISH	COUNT
RL PROPERTIES	8
INEXPENSIVE ($0-$20K)	12
MEDIUM $20K-$100K)	14
SEVERE ($100K & UP)	2
FLOOD ZONE A	5
FLOOD ZONE X (B,C)	3
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	0

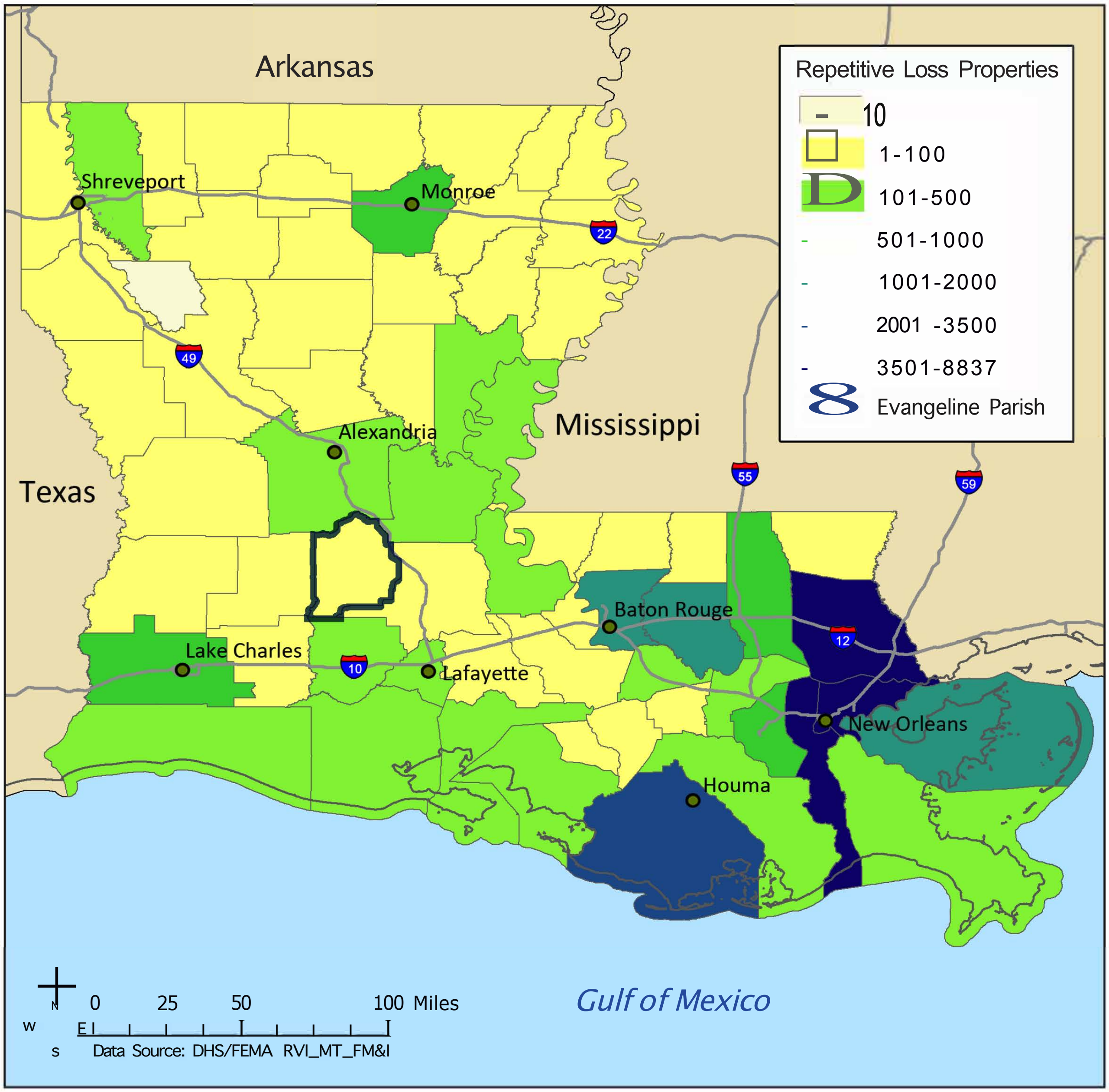
*NOTE: EMG is before Initial FIRM Identified





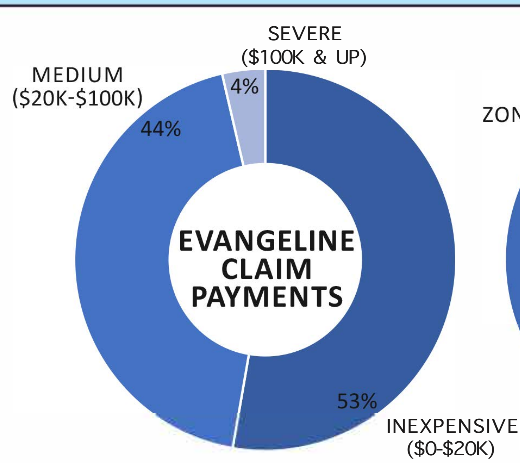
B-33

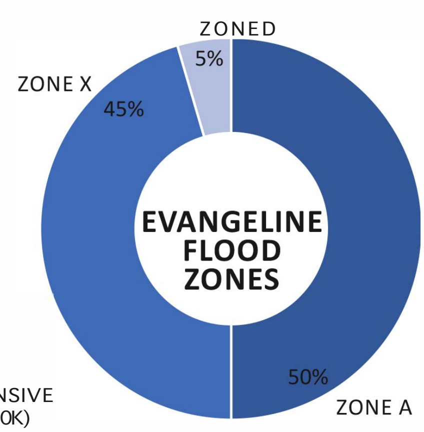
Attachment B



EVANGELINE PARISH	COUNT
RL PROPERTIES	22
INEXPENSIVE ($0-$20K)	29
MEDIUM $20K-$100K)	24
SEVERE ($100K & UP)	2
FLOOD ZONE A	11
FLOOD ZONE X (B,C)	10
FLOOD ZONE V	0
FLOOD ZONED	1
EMG*	0

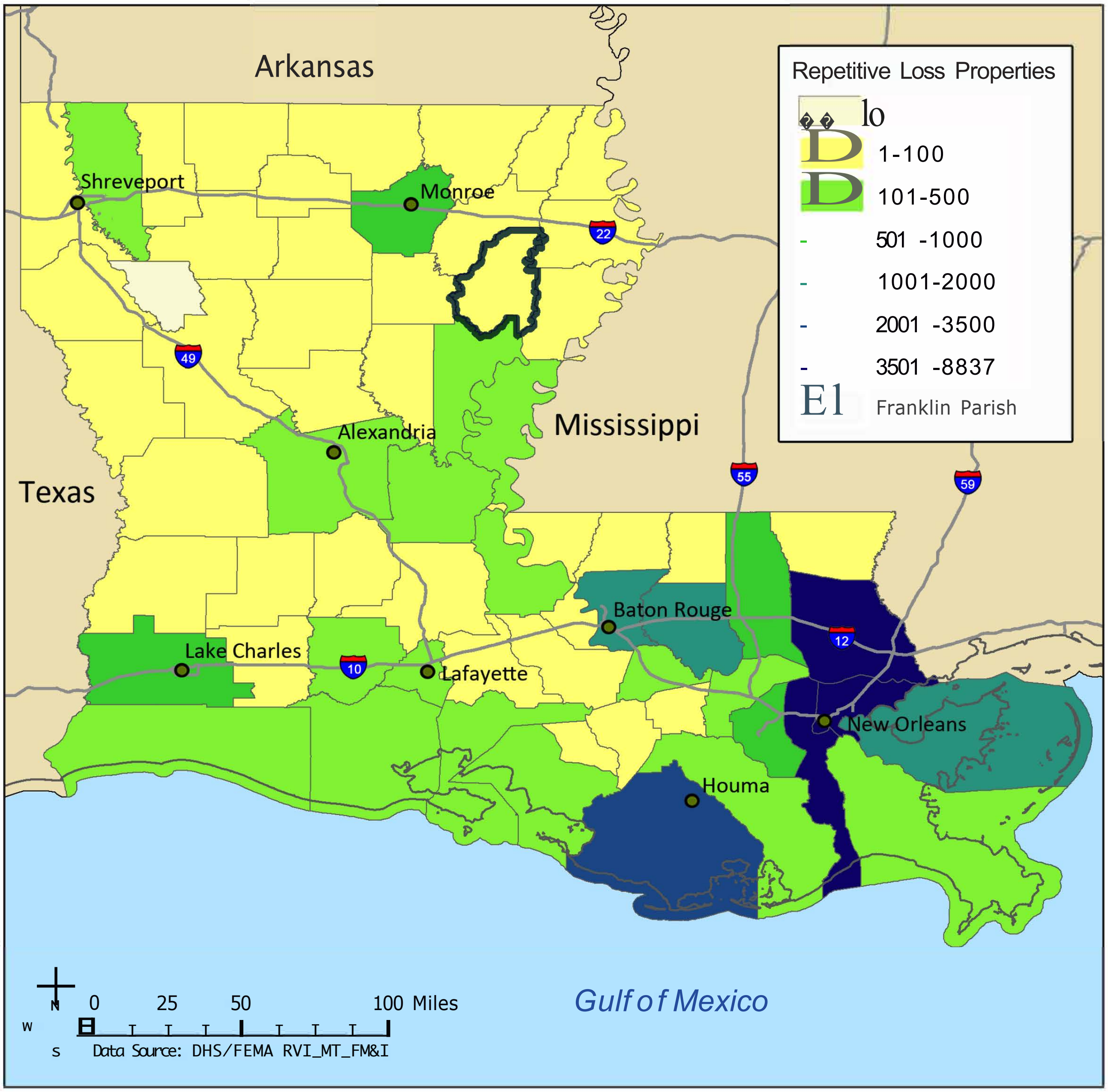
*NOTE: EMG is before Initial FIRM Identified





B-34

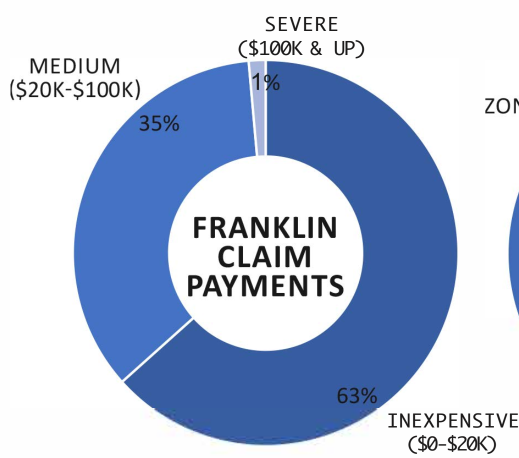
Attachment B

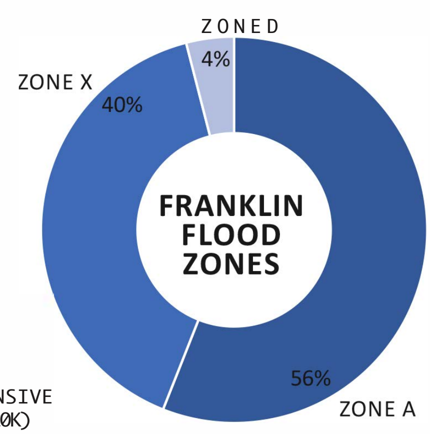


FRANKLIN PARISH	COUNT
RL PROPERTIES	25
INEXPENSIVE ($0-$20K)	45
MEDIUM $20K-$100K)	25
SEVERE ($100K & UP)	1
FLOOD ZONE A	14
FLOOD ZONE X (B,C)	10
FLOOD ZONE V	0
FLOOD ZONED	1
EMG*	0

*NOTE: EMG is before Initial FIRM Identified

B-35





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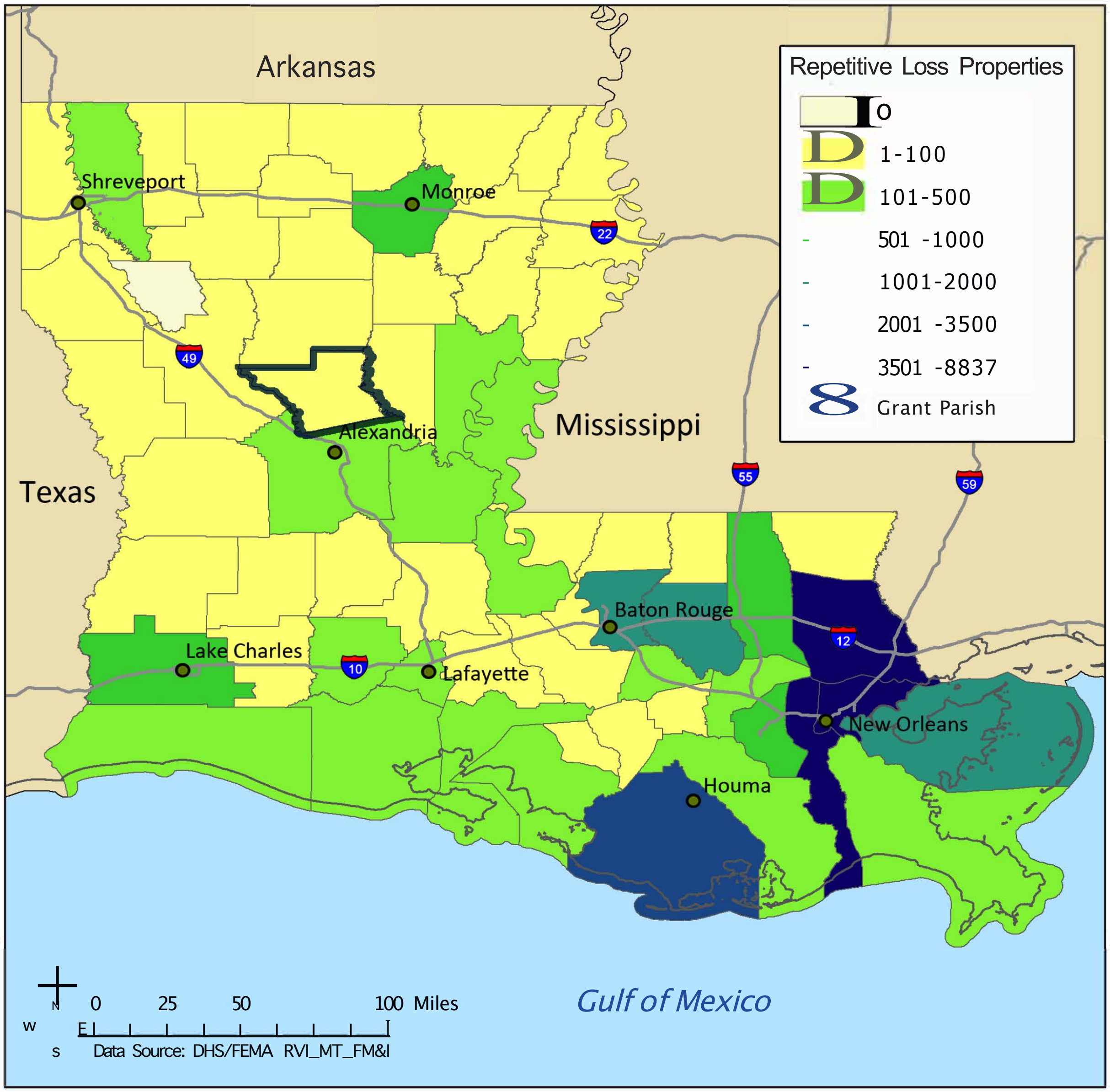
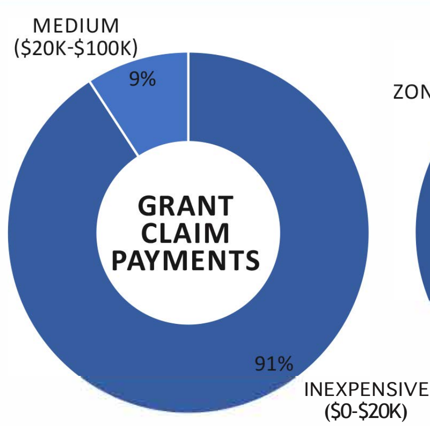
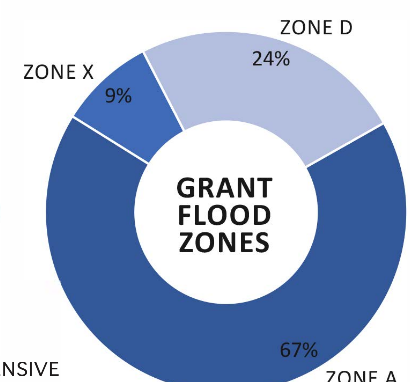


GRANT PARISH	COUNT
RL PROPERTIES	82
INEXPENSIVE ($0–$20K)	247
MEDIUM $20K–$100K)	25
SEVERE ($100K & UP)	0
FLOOD ZONE A	55
FLOOD ZONE X (B,C)	7
FLOOD ZONE V	0
FLOOD ZONED	20
EMG*	0

*NOTE: EMG is before Initial FIRM Identified





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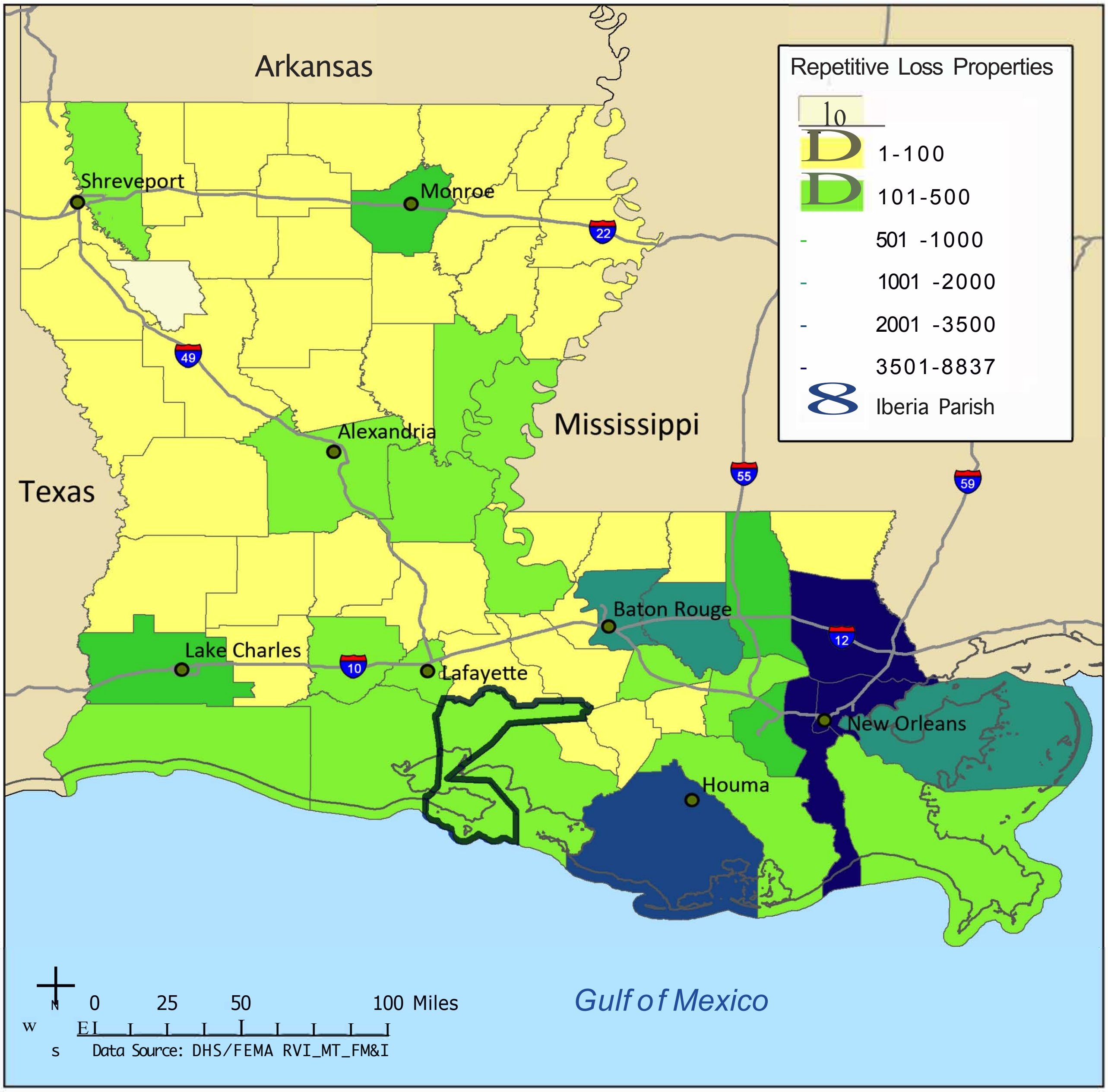
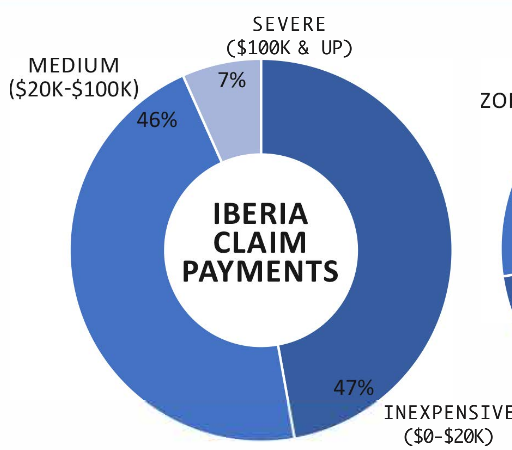
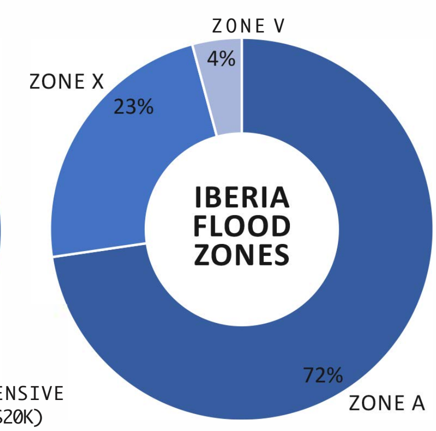
Attachment B



IBERIA PARISH	COUNT
RL PROPERTIES	435
INEXPENSIVE ($0-$20K)	487
MEDIUM $20K-$100K)	476
SEVERE ($100K & UP)	69
FLOOD ZONE A	314
FLOOD ZONE X (B,C)	100
FLOOD ZONE V	18
FLOOD ZONED	2
EMG*	0

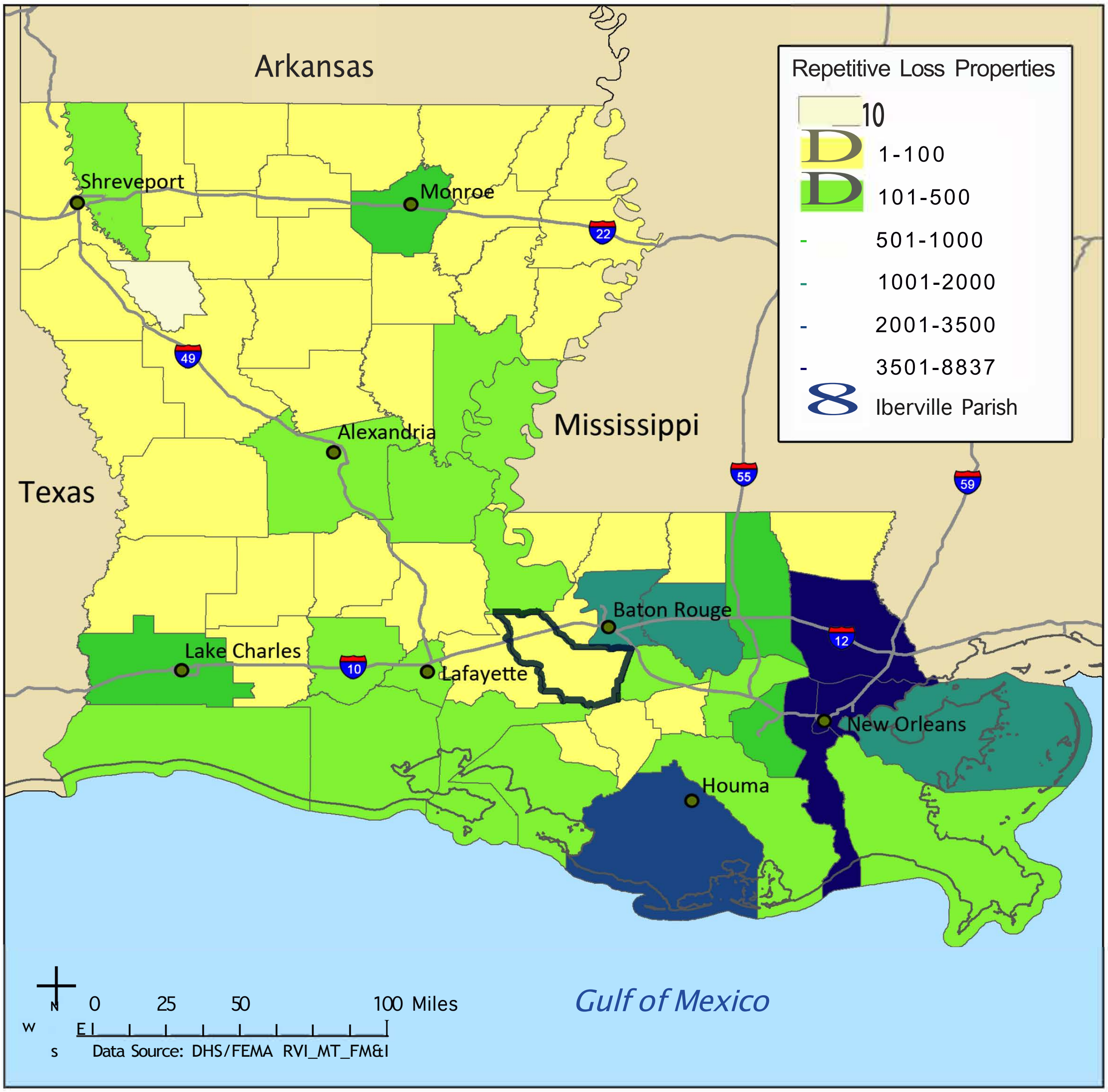
*NOTE: EMG is before Initial FIRM Identified





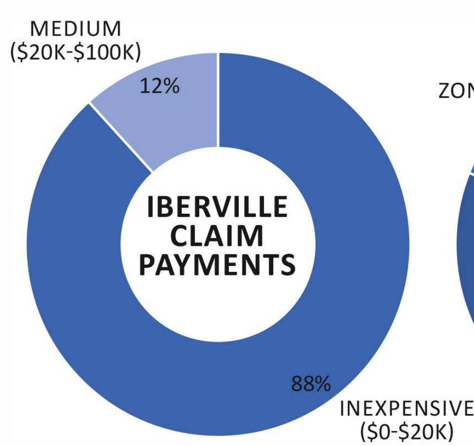
B-37

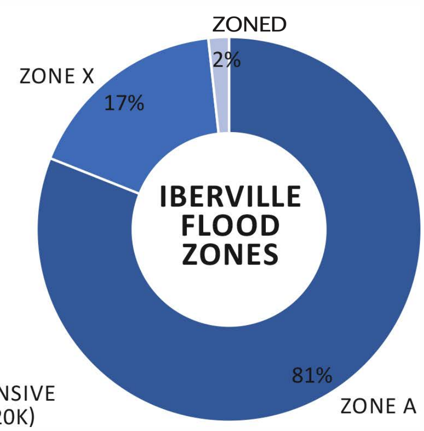
Attachment B



IBERVILLE PARISH	COUNT
RL PROPERTIES	58
INEXPENSIVE ($0-$20K)	143
MEDIUM $20K-$100K)	19
SEVERE ($100K & UP)	1
FLOOD ZONE A	47
FLOOD ZONE X (B,C)	10
FLOOD ZONE V	0
FLOOD ZONED	1
EMG*	0

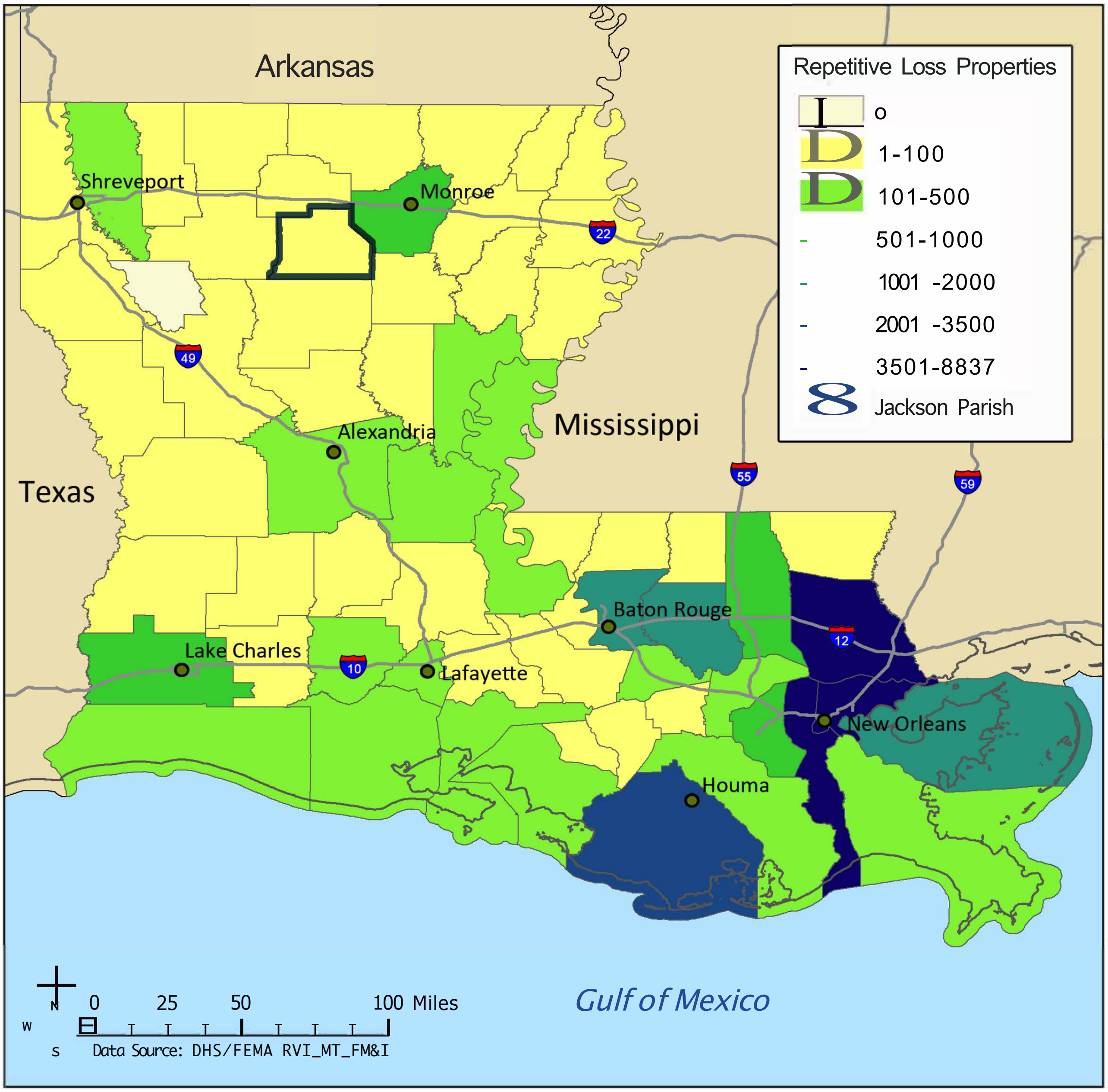
*NOTE: EMG is before Initial FIRM Identified





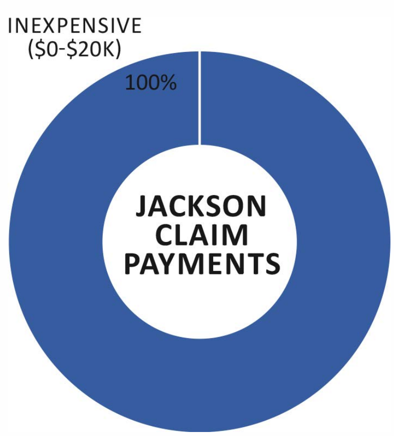
B-38

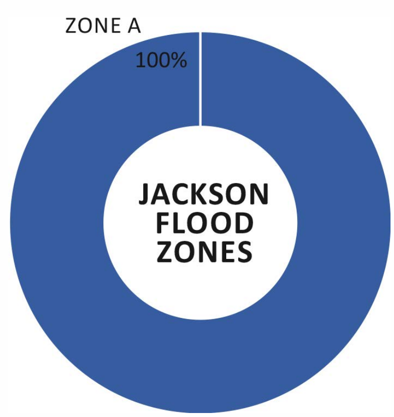
Attachment B



JACKSON PARISH	COUNT
RL PROPERTIES	1
INEXPENSIVE ($0-$20K)	3
MEDIUM $20K-$100K)	0
SEVERE ($100K & UP)	0
FLOOD ZONE A	1
FLOOD ZONE X (B,C)	0
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	0

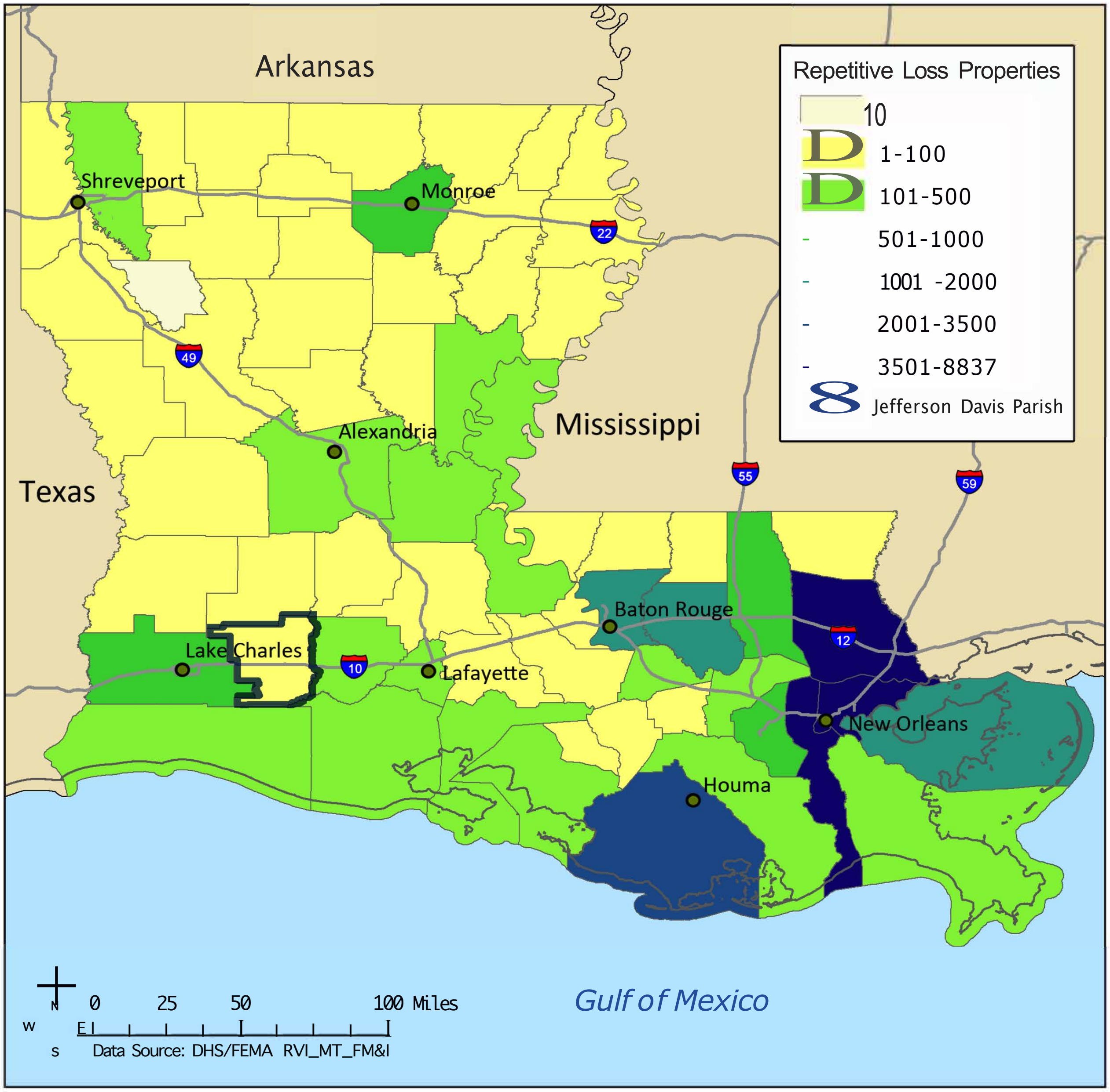
*NOTE: EMG is before Initial FIRM Identified





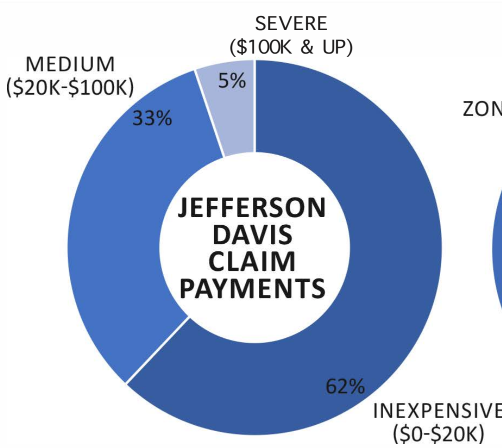
B-39

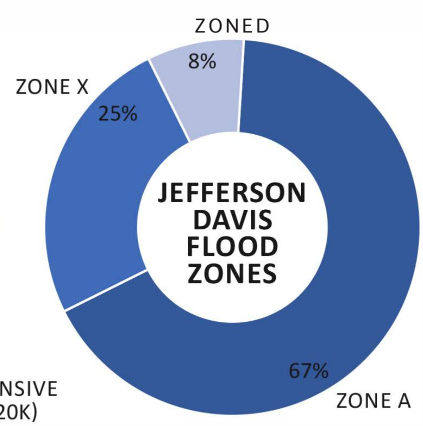
Attachment B



JEFFERSON DAVIS PARISH	COUNT
RL PROPERTIES	24
INEXPENSIVE ($0-$20K)	36
MEDIUM $20K-$100K)	19
SEVERE ($100K & UP)	3
FLOOD ZONE A	16
FLOOD ZONE X (B,C)	6
FLOOD ZONE V	0
FLOOD ZONED	2
EMG*	0

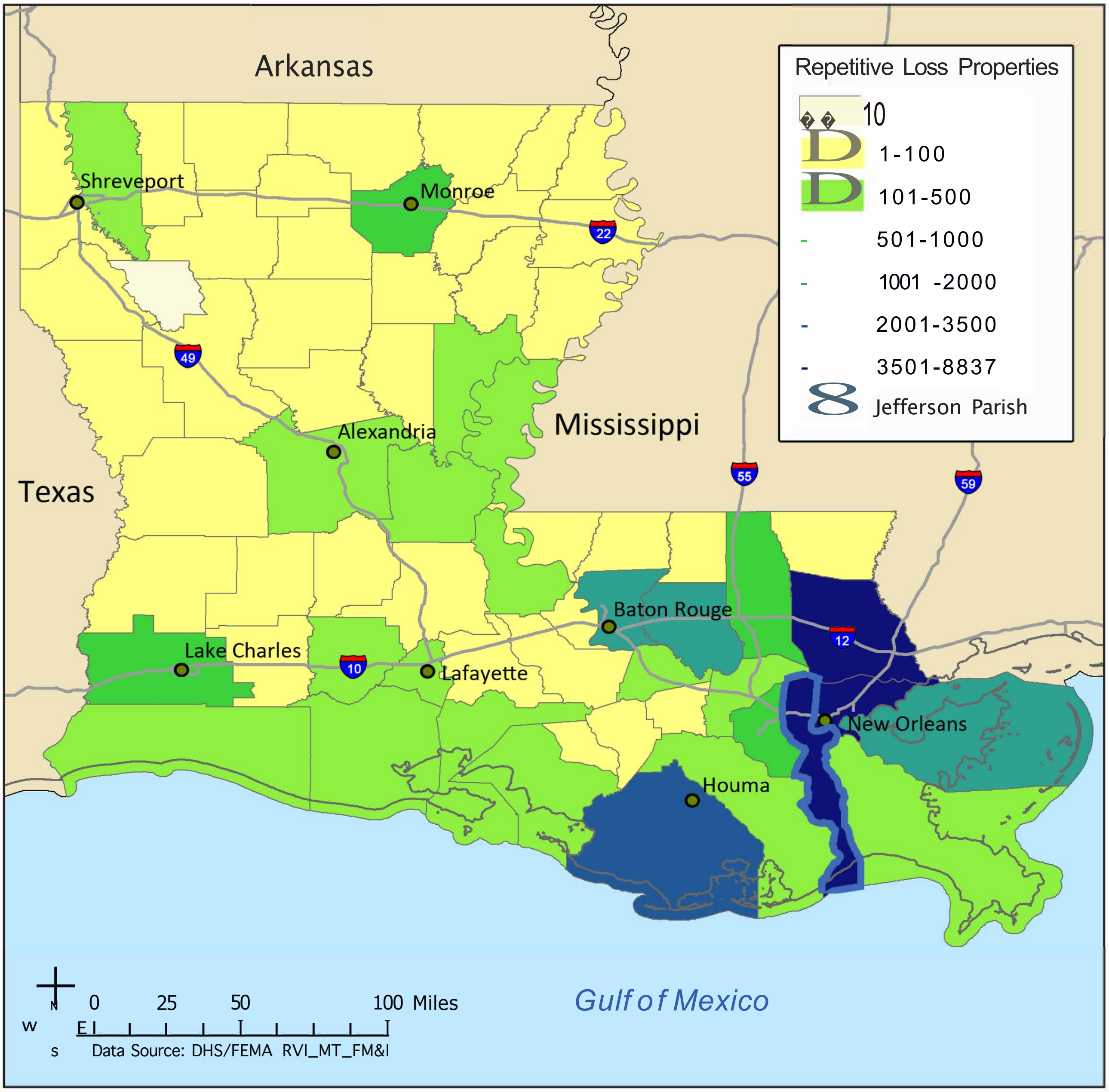
*NOTE: EMG is before Initial FIRM Identified





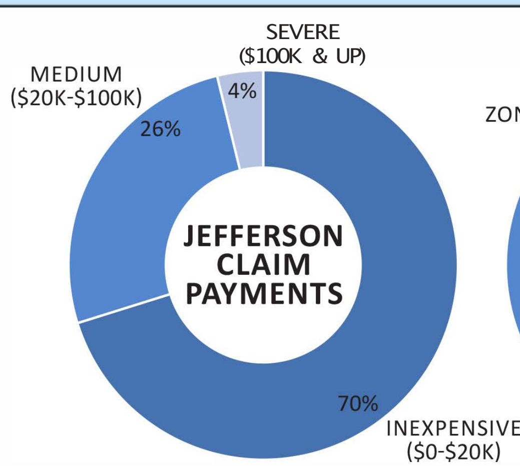
B-40

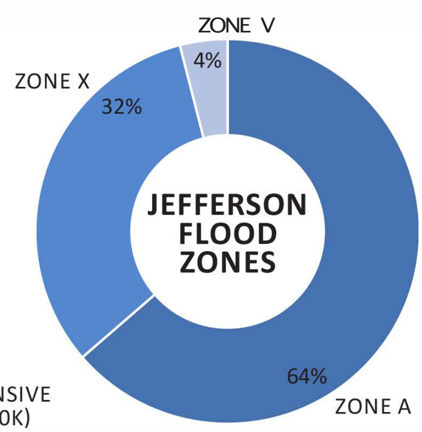
Attachment B



JEFFERSON PARISH	COUNT
RL PROPERTIES	8,837
INEXPENSIVE ($0-$20K)	21,633
MEDIUM $20K-$100K)	8,020
SEVERE ($100K & UP)	1,175
FLOOD ZONE A	5,601
FLOOD ZONE X (B,C)	2,848
FLOOD ZONE V	352
FLOOD ZONED	3
EMG*	0

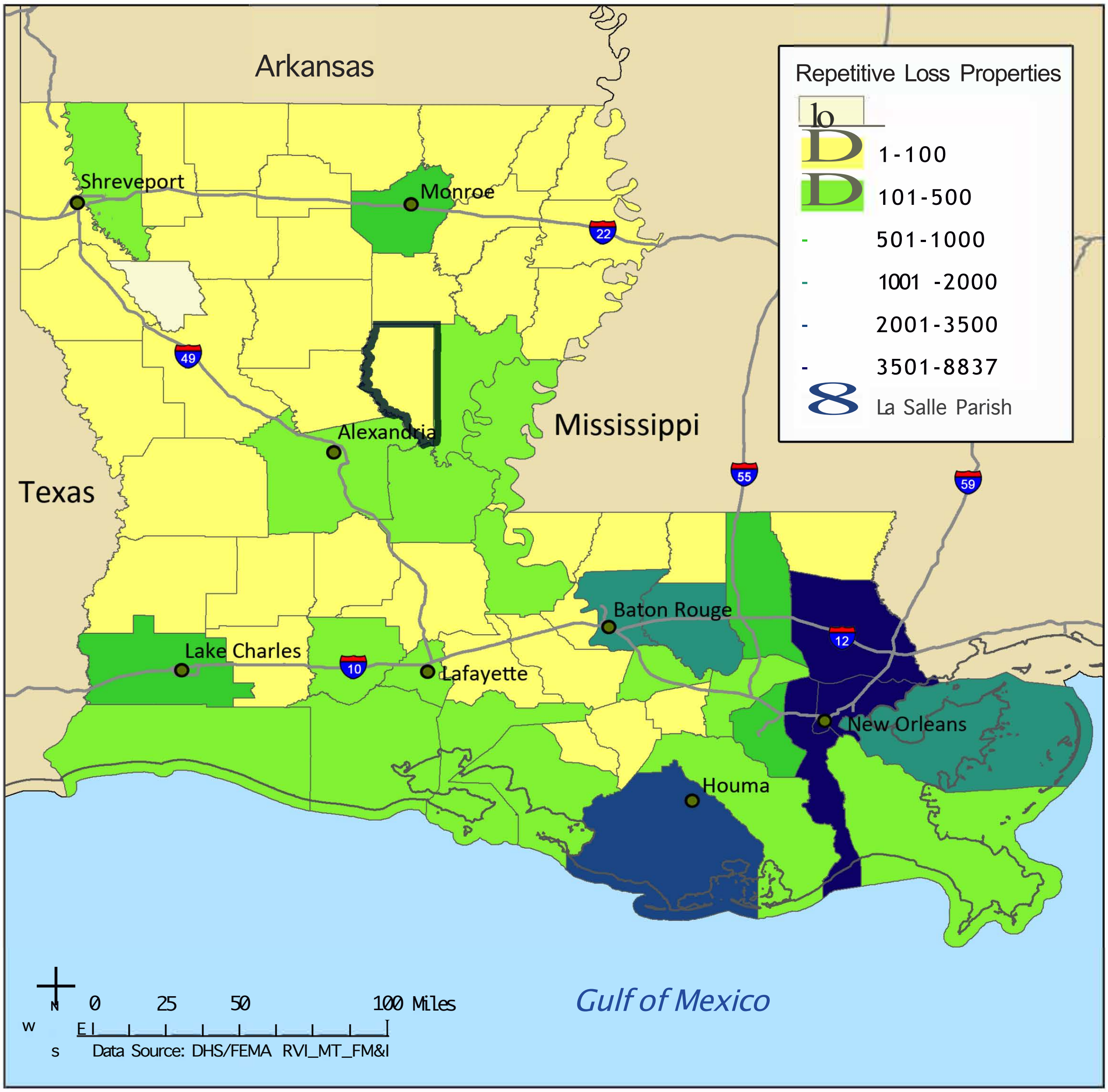
*NOTE: EMG is before Initial FIRM Identified





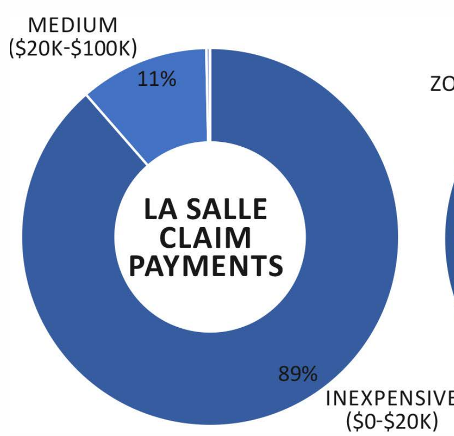
B-41

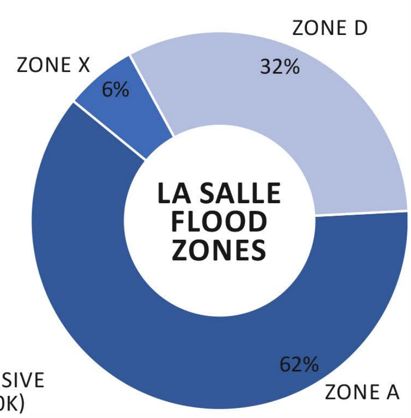
Attachment B



LA SALLE PARISH	COUNT
RL PROPERTIES	81
INEXPENSIVE ($0-$20K)	272
MEDIUM $20K-$100K)	34
SEVERE ($100K & UP)	1
FLOOD ZONE A	50
FLOOD ZONE X (B,C)	5
FLOOD ZONE V	0
FLOOD ZONED	26
EMG*	0

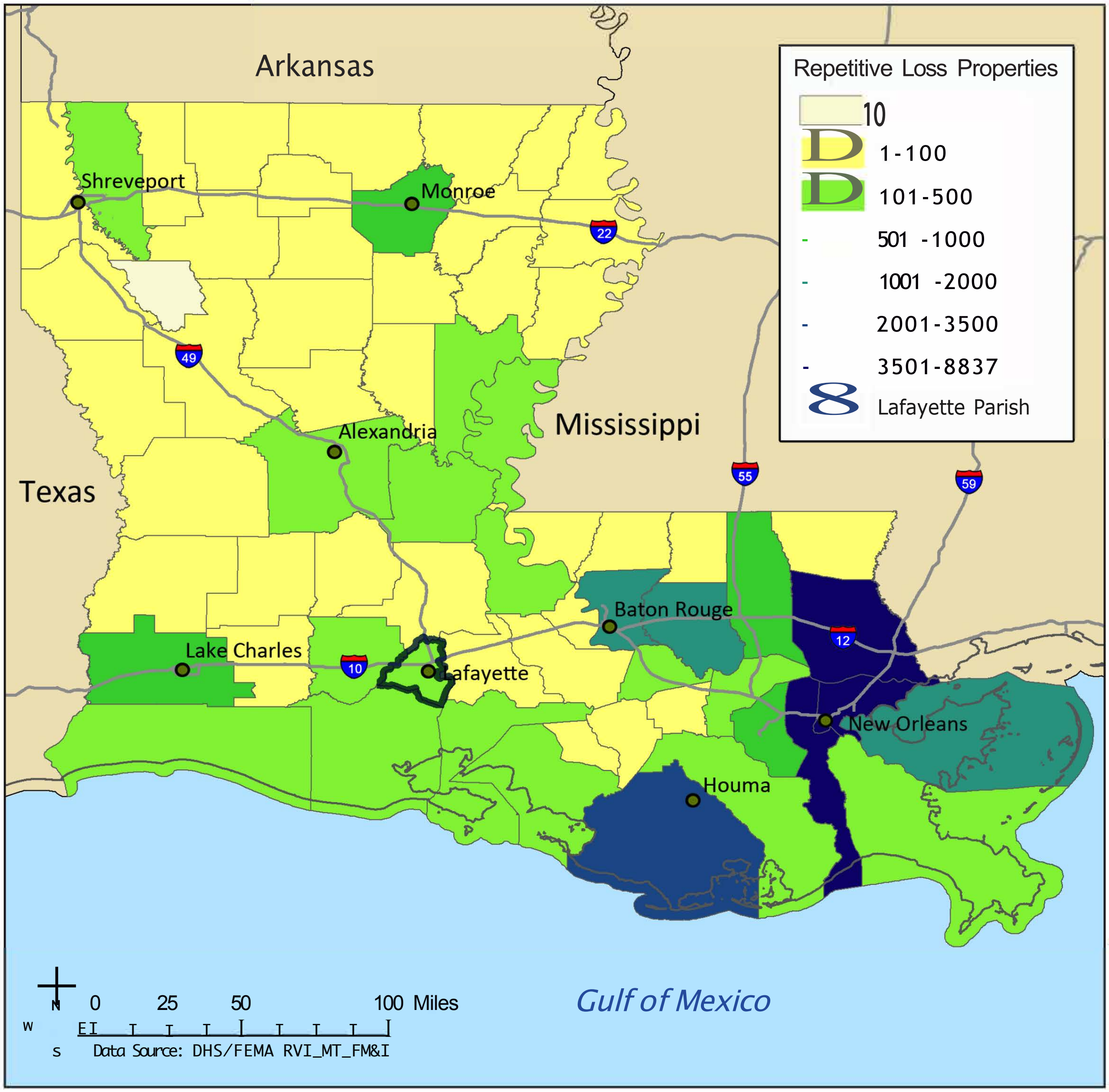
*NOTE: EMG is before Initial FIRM Identified





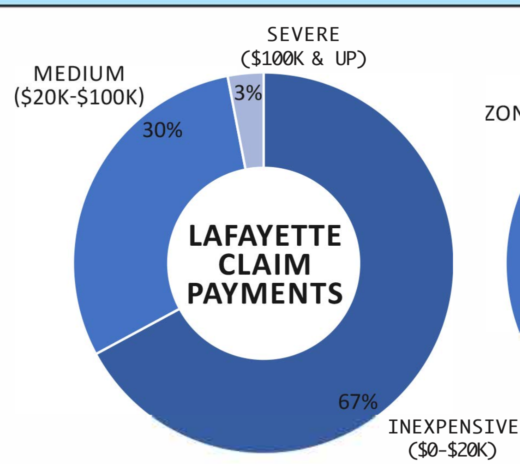
B-42

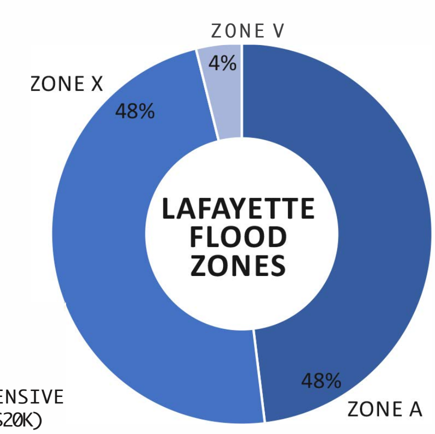
Attachment B



LAFAYETTE PARISH	COUNT
RL PROPERTIES	364
INEXPENSIVE ($0-$20K)	796
MEDIUM $20K-$100K)	354
SEVERE ($100K & UP)	36
FLOOD ZONE A	174
FLOOD ZONE X (B,C)	174
FLOOD ZONE V	2
FLOOD ZONE D	0
EMG*	12

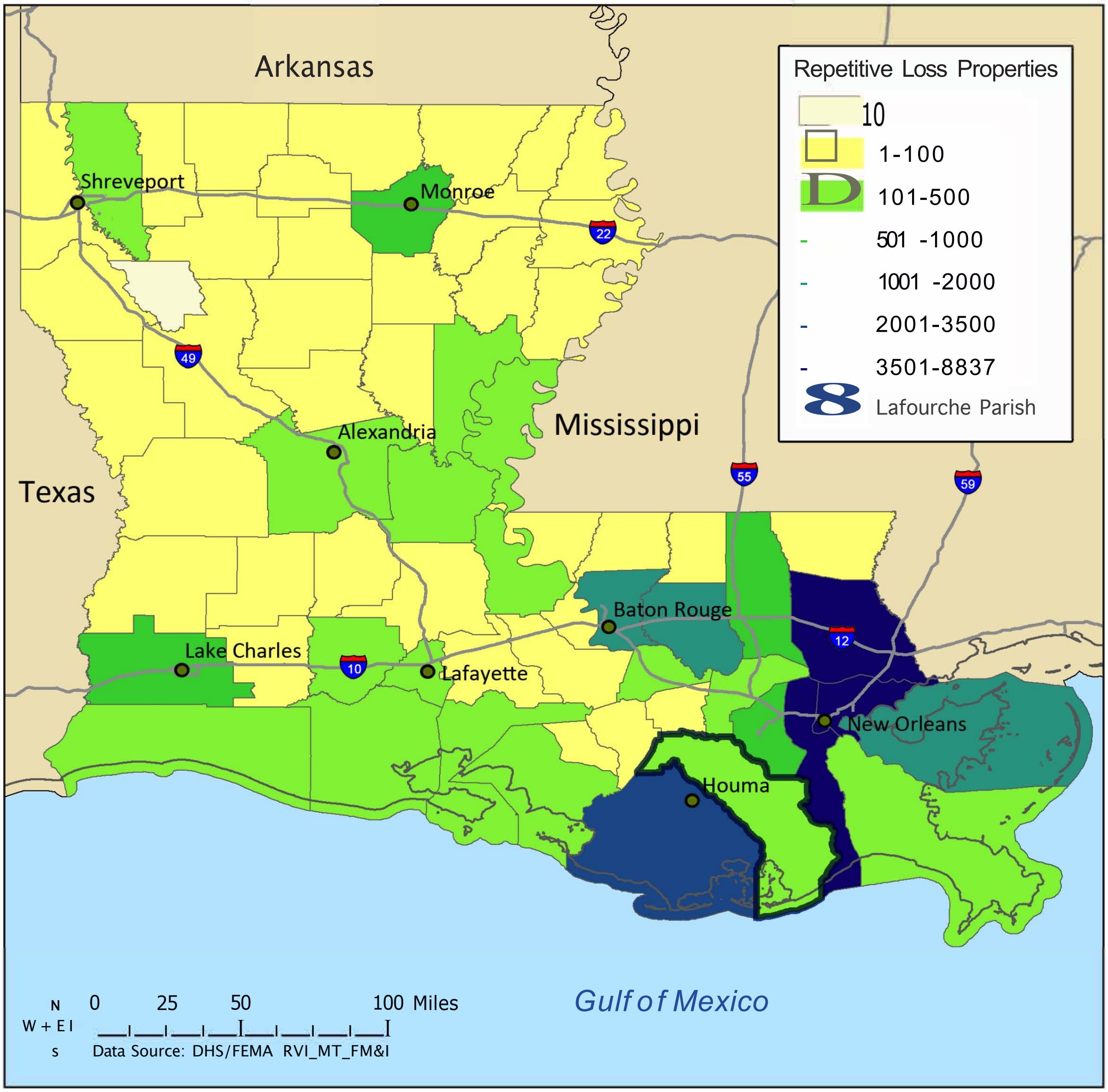
*NOTE: EMG is before Initial FIRM Identified





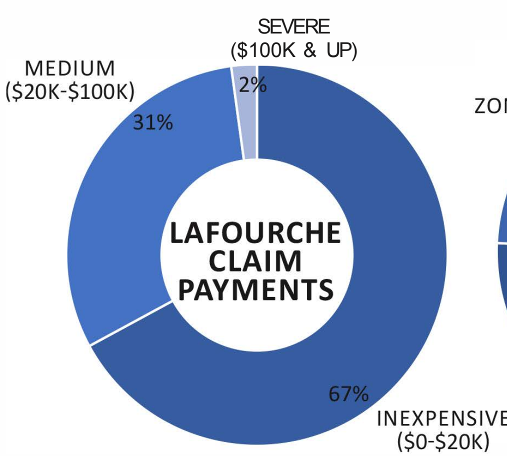
B-43

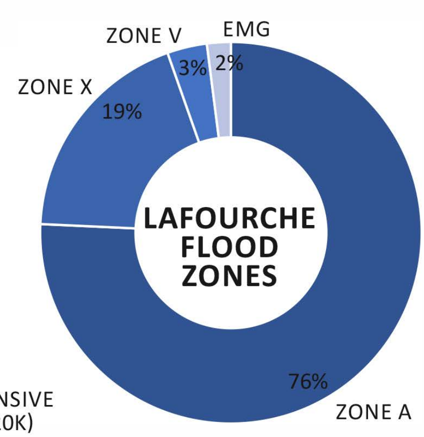
Attachment B



LAFOURCHE PARISH	COUNT
RL PROPERTIES	449
INEXPENSIVE ($0-$20K)	899
MEDIUM $20K-$100K)	412
SEVERE ($100K & UP)	29
FLOOD ZONE A	337
FLOOD ZONE X (B,C)	84
FLOOD ZONE V	15
FLOOD ZONED	0
EMG*	9

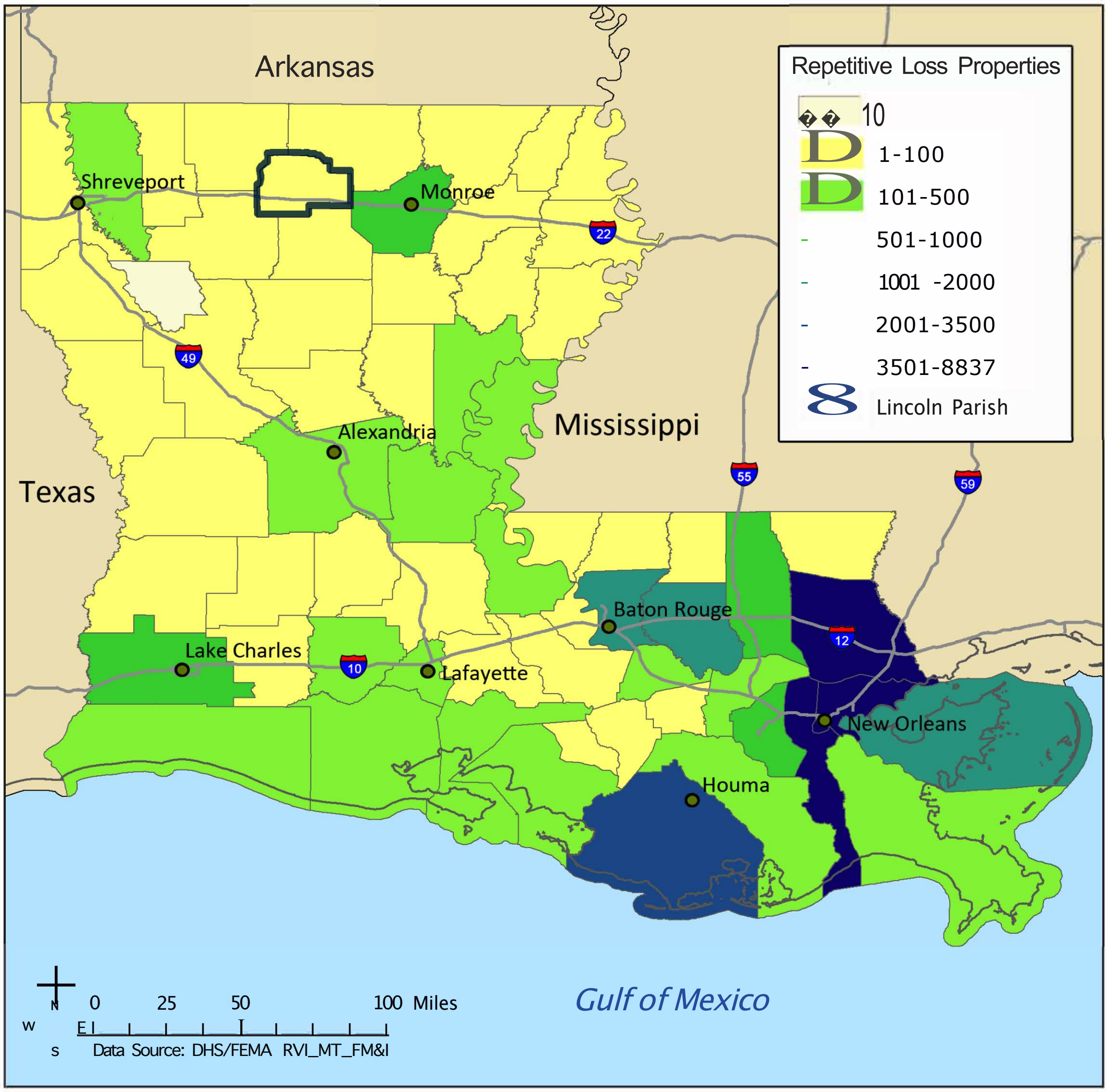
*NOTE: EMG is before Initial FIRM Identified





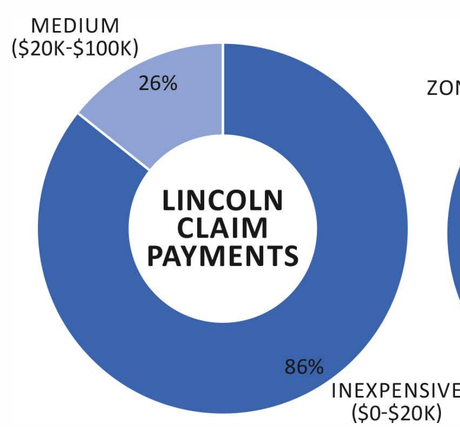
B-44

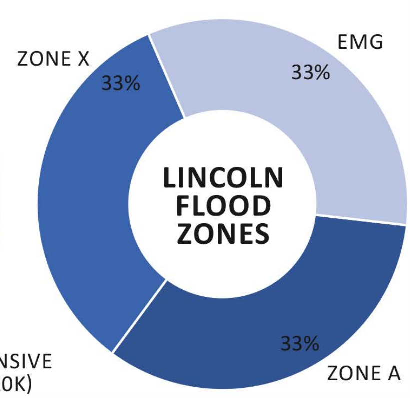
Attachment B



LINCOLN PARISH	COUNT
IRL PROPERTIES	3
INEXPENSIVE ($0–$20K)	6
MEDIUM $20K–$100K)	1
SEVERE ($100K & UP)	0
FLOOD ZONE A	1
FLOOD ZONE X (B,C)	1
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	1

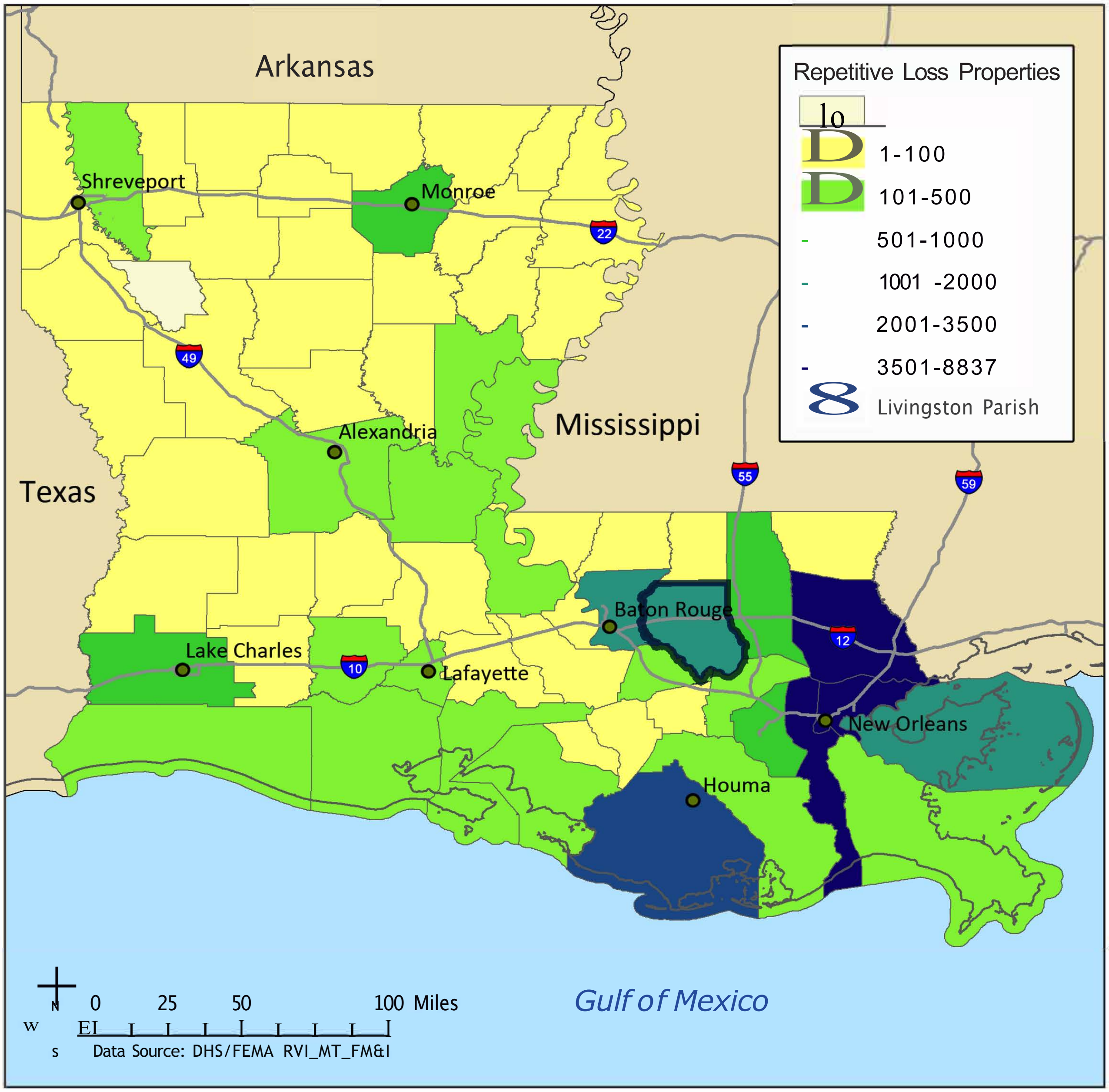
*NOTE: EMG is before Initial FIRM Identified





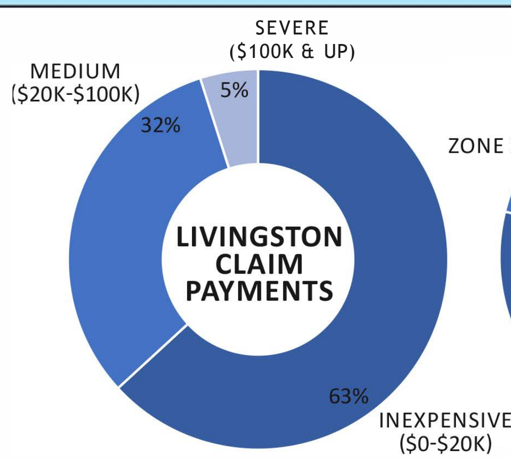
B-45

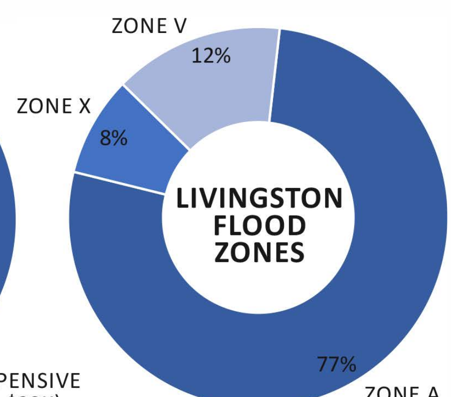
Attachment B



LIVINGSTON PARISH	COUNT
RL PROPERTIES	1,270
INEXPENSIVE ($0-$20K)	2,621
MEDIUM $20K-$100K)	1,324
SEVERE ($100K & UP)	204
FLOOD ZONE A	970
FLOOD ZONE X (B,C)	107
FLOOD ZONE V	1
FLOOD ZONE D	0
EMG*	182

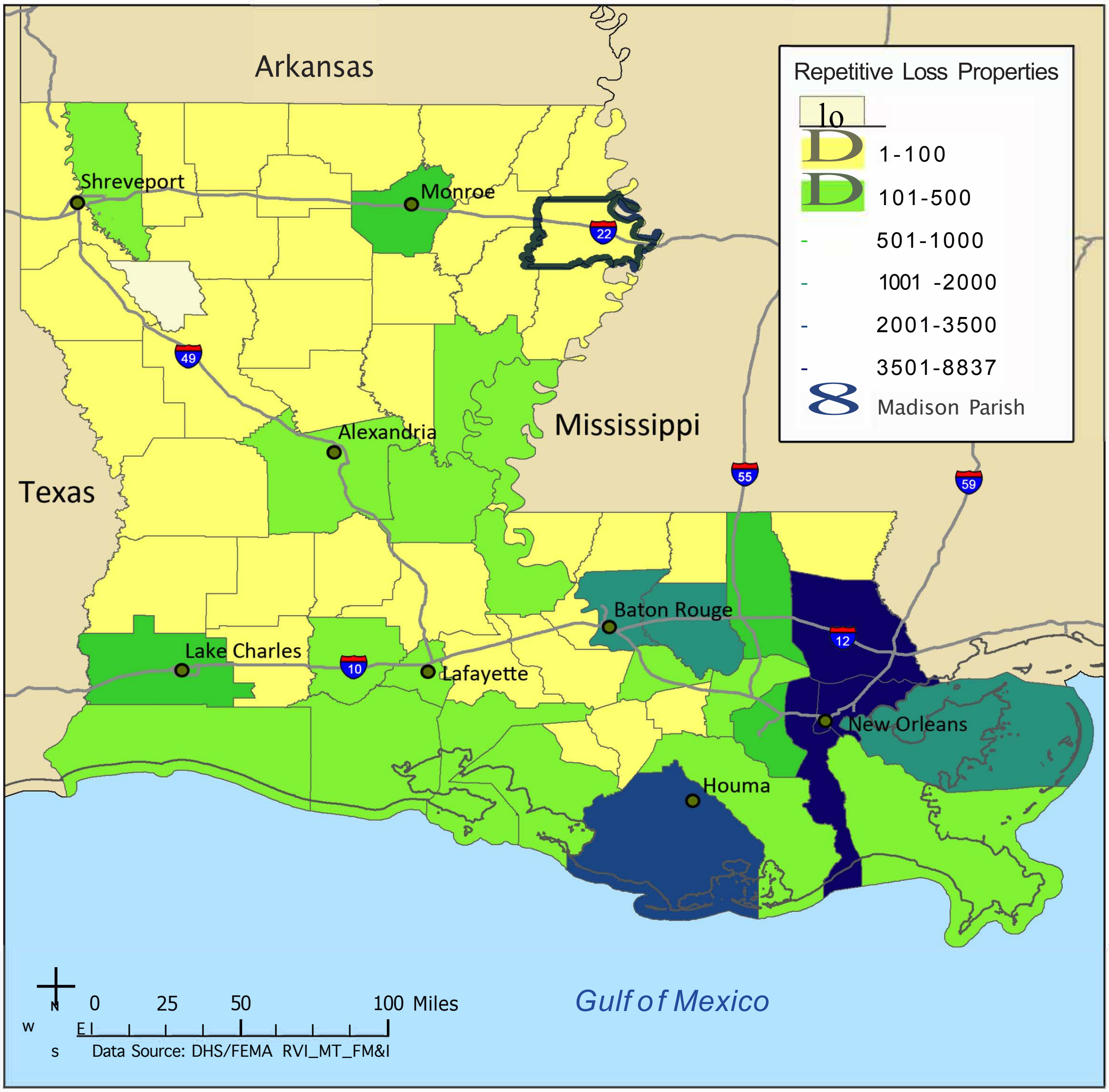
*NOTE: EMG is before Initial FIRM Identified





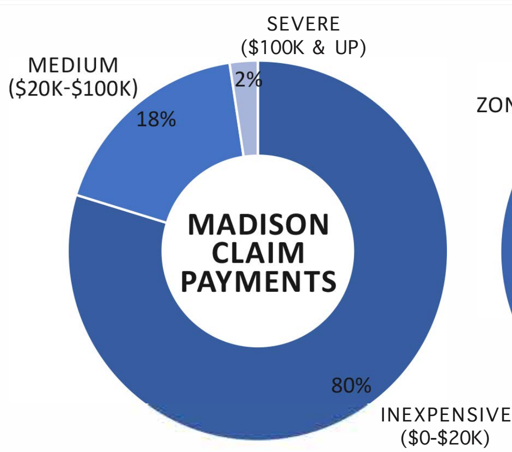
B-46

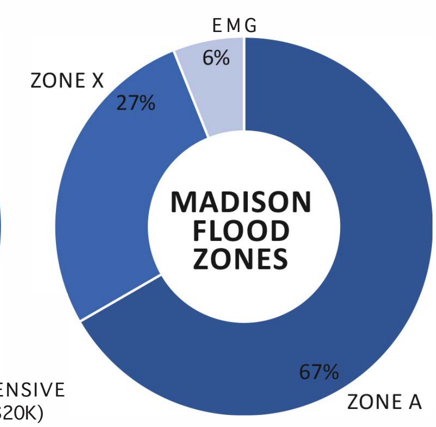
Attachment B



MADISON PARISH	COUNT
RL PROPERTIES	33
INEXPENSIVE ($0-$20K)	67
MEDIUM $20K-$100K)	15
SEVERE ($100K & UP)	2
FLOOD ZONE A	22
FLOOD ZONE X (B,C)	9
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	2

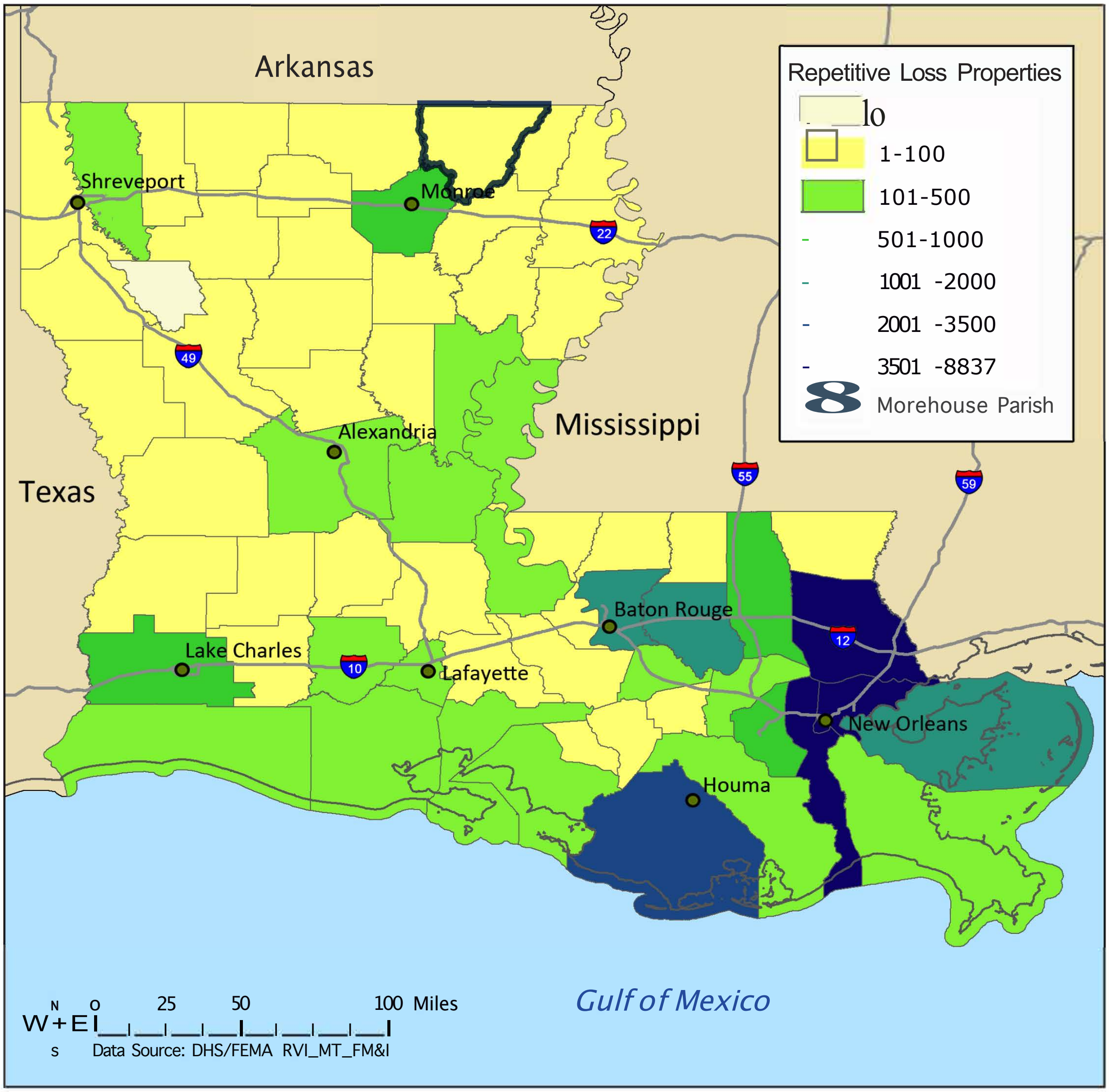
*NOTE: EMG is before Initial FIRM Identified





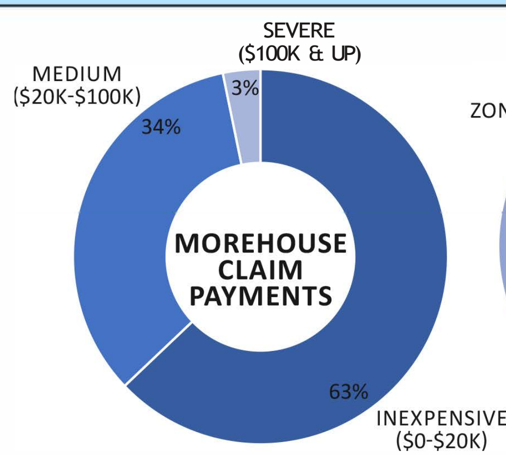
B-47

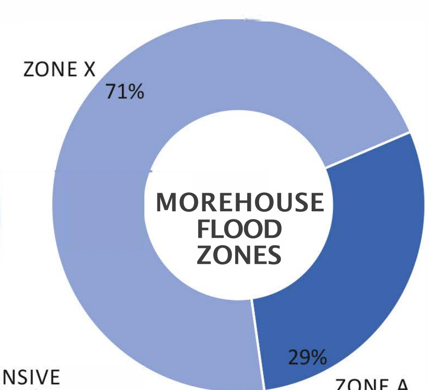
Attachment B



MOREHOUSE PARISH	COUNT
RL PROPERTIES	24
INEXPENSIVE ($0–$20K)	39
MEDIUM $20K–$100K)	21
SEVERE ($100K & UP)	2
FLOOD ZONE A	7
FLOOD ZONE X (B,C)	17
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	0

*NOTE: EMG is before Initial FIRM Identified





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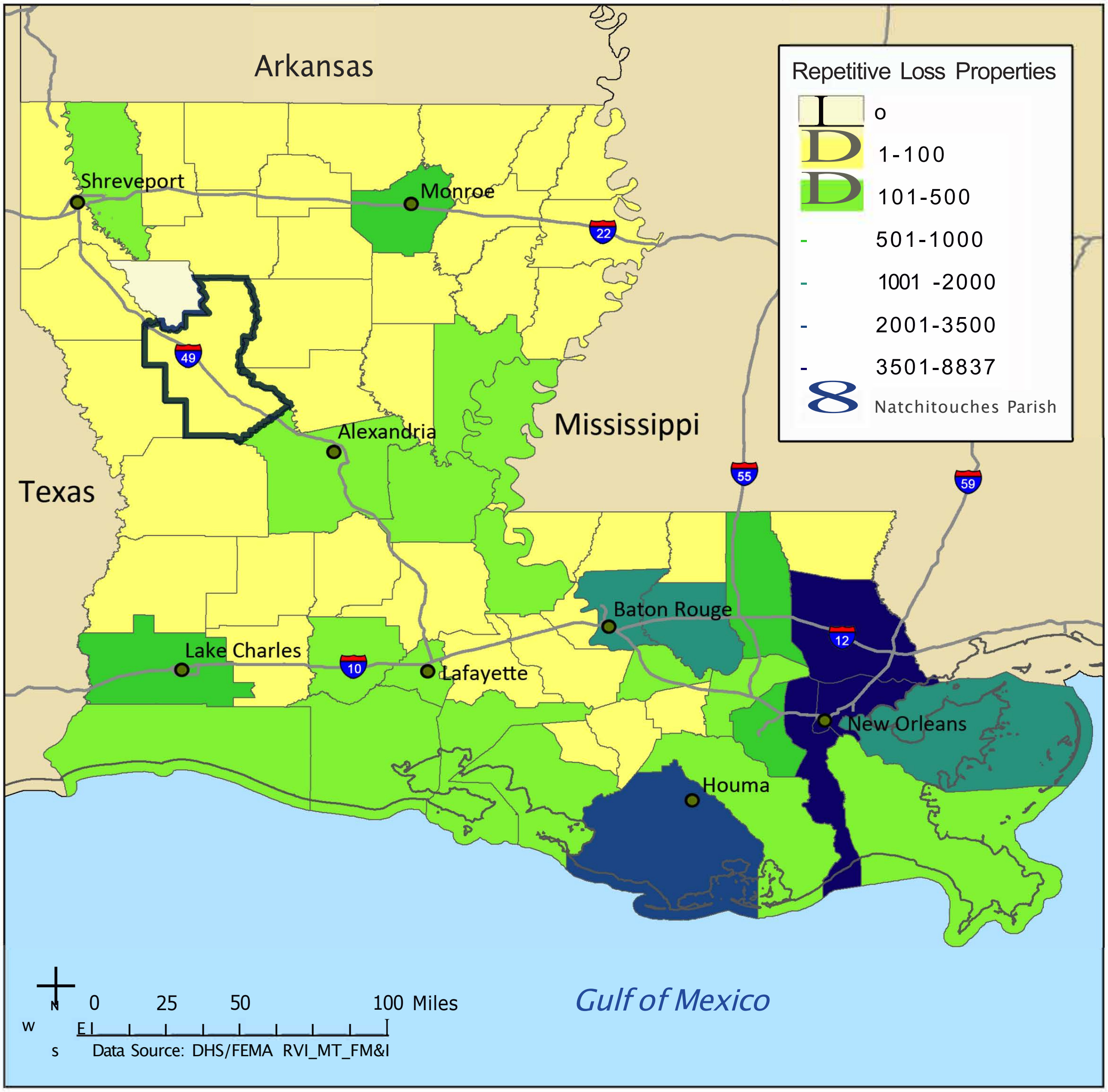
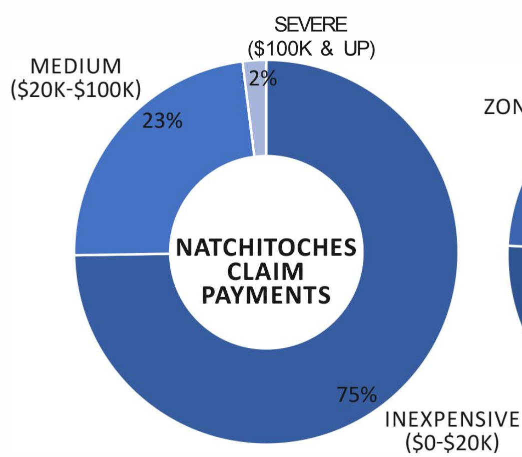
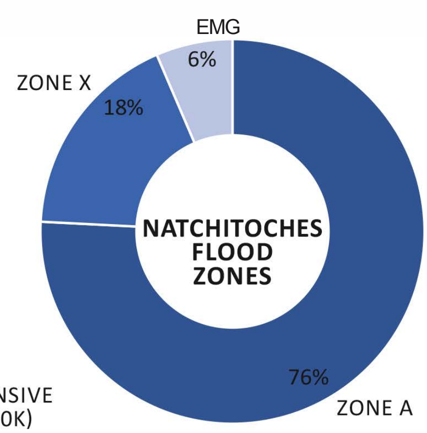
Attachment B



NATCHITOCHES PARISH	COUNT
RL PROPERTIES	62
INEXPENSIVE ($0-$20K)	151
MEDIUM $20K-$100K)	47
SEVERE ($100K & UP)	4
FLOOD ZONE A	47
FLOOD ZONE X (B,C)	11
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	4

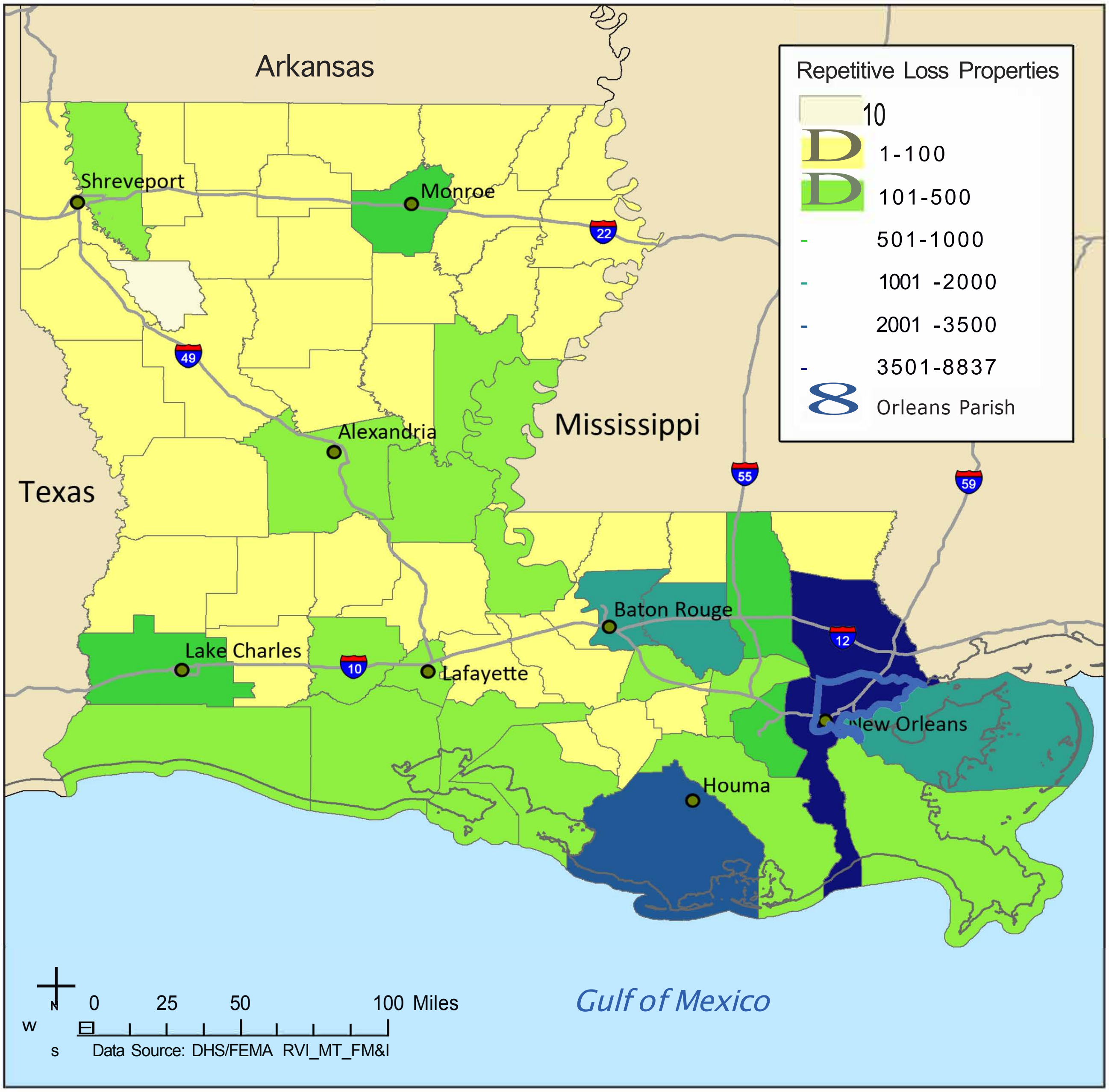
*NOTE: EMG is before Initial FIRM Identified





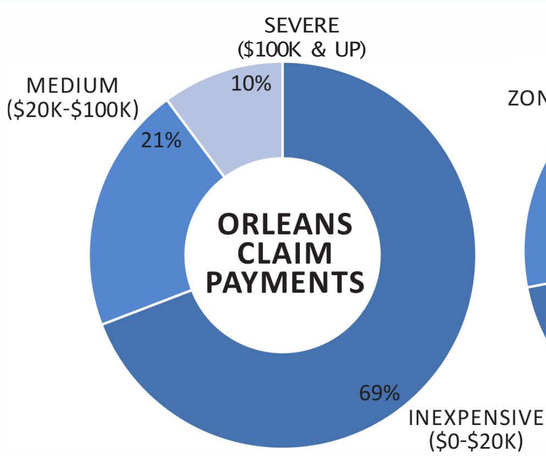
B-49

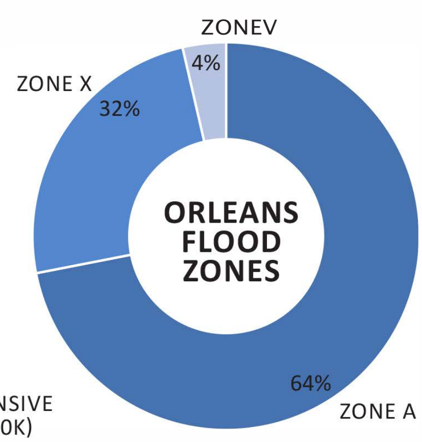
Attachment B



ORLEANS PARISH	COUNT
RL PROPERTIES	6,534
INEXPENSIVE ($0-$20K)	16,521
MEDIUM $20K-$100K)	4,936
SEVERE ($100K & UP)	2,431
FLOOD ZONE A	4,670
FLOOD ZONE X (B,C)	1,587
FLOOD ZONE V	235
FLOOD ZONED	0
EMG*	0

*NOTE: EMG is before Initial FIRM Identified





B-50

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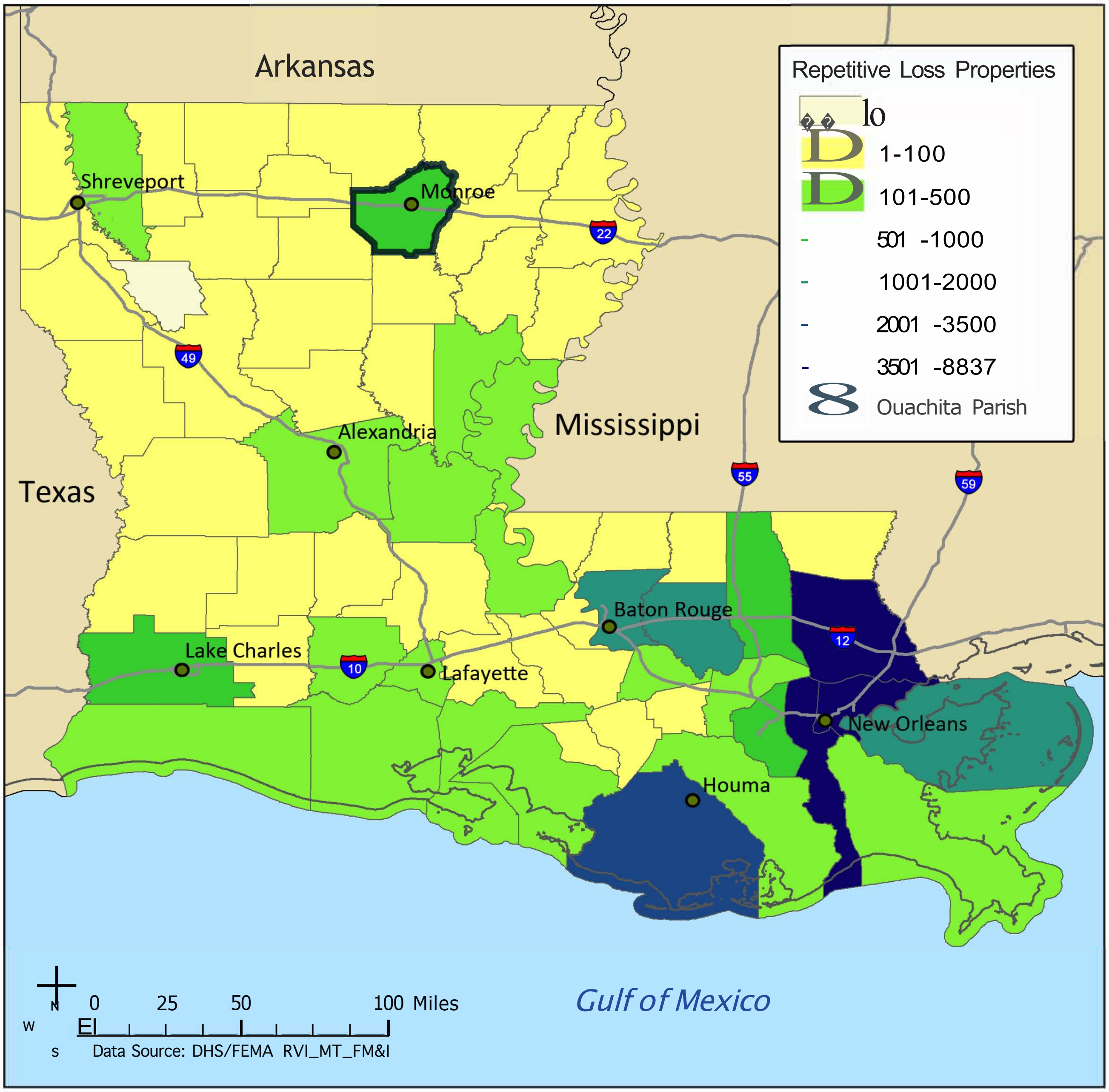
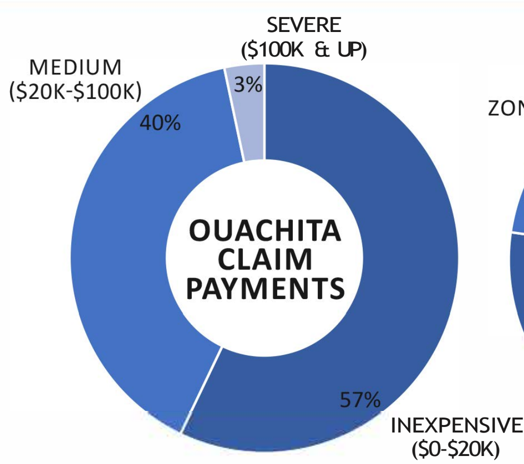
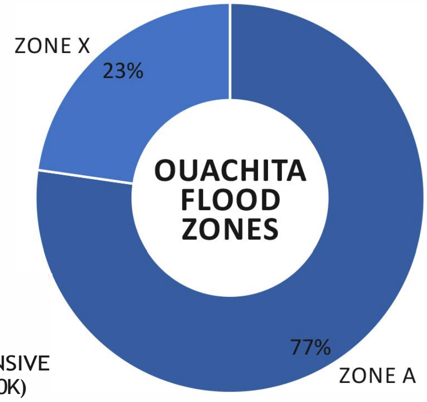


OUACHITA PARISH	COUNT
RL PROPERTIES	823
INEXPENSIVE ($0-$20K)	1,484
MEDIUM $20K-$100K)	1,029
SEVERE ($100K & UP)	86
FLOOD ZONE A	629
FLOOD ZONE X (B,C)	185
FLOOD ZONE V	1
FLOOD ZONED	0
EMG*	4

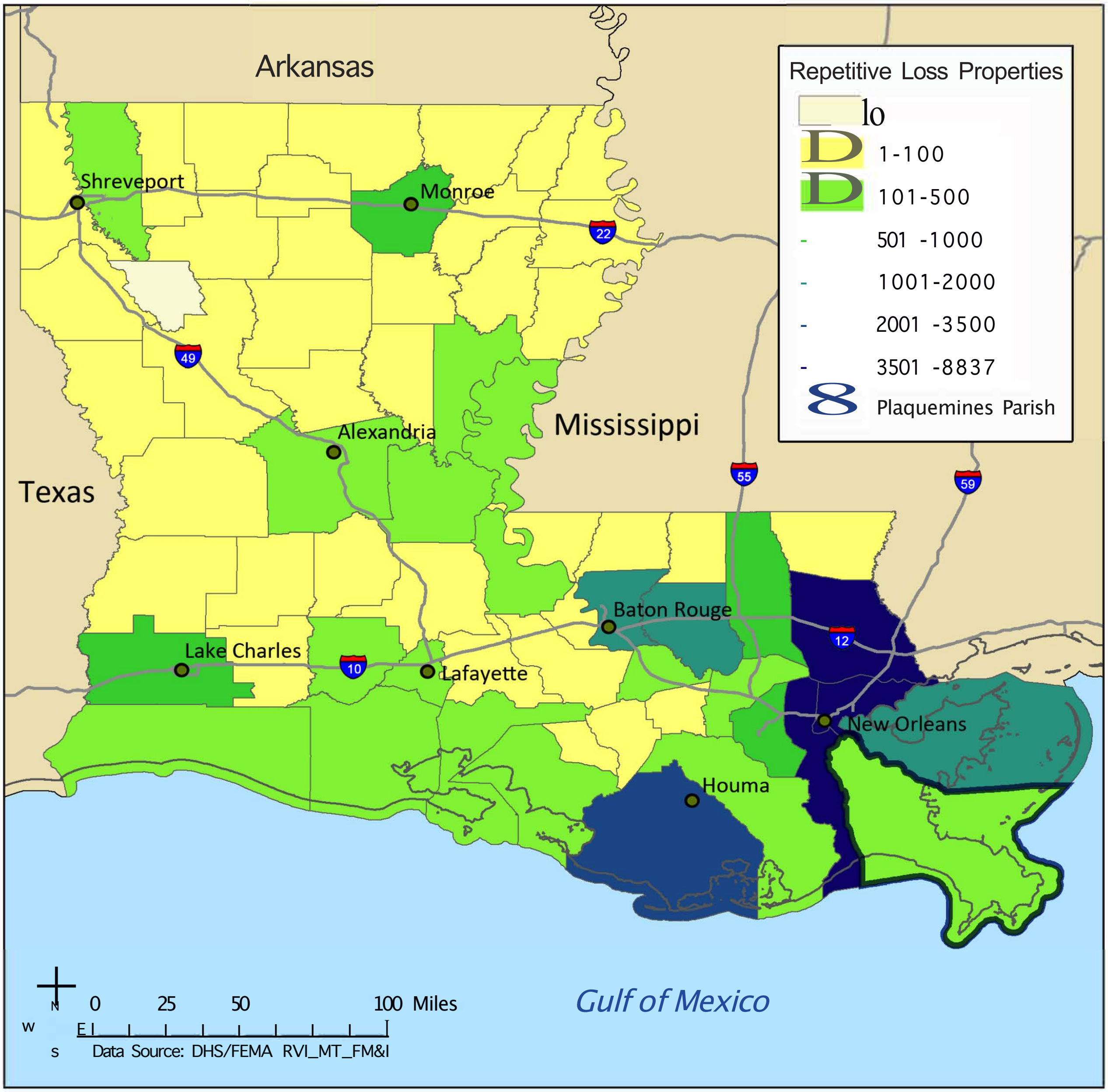
*NOTE: EMG is before Initial FIRM Identified





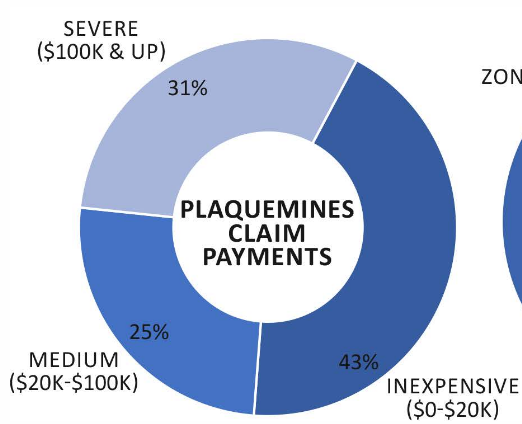
B-51

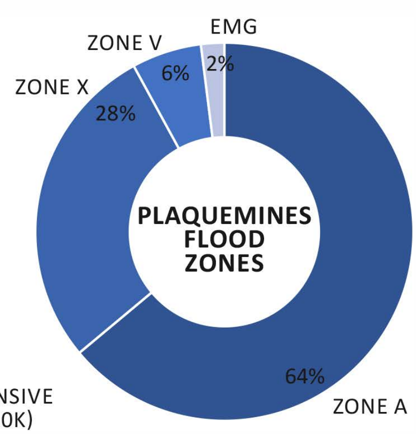
Attachment B



PLAQUEMINES PARISH	COUNT
RL PROPERTIES	409
INEXPENSIVE ($0–$20K)	452
MEDIUM $20K–$100K)	265
SEVERE ($100K & UP)	324
FLOOD ZONE A	257
FLOOD ZONE X (B,C)	113
FLOOD ZONE V	24
FLOOD ZONED	0
EMG*	8

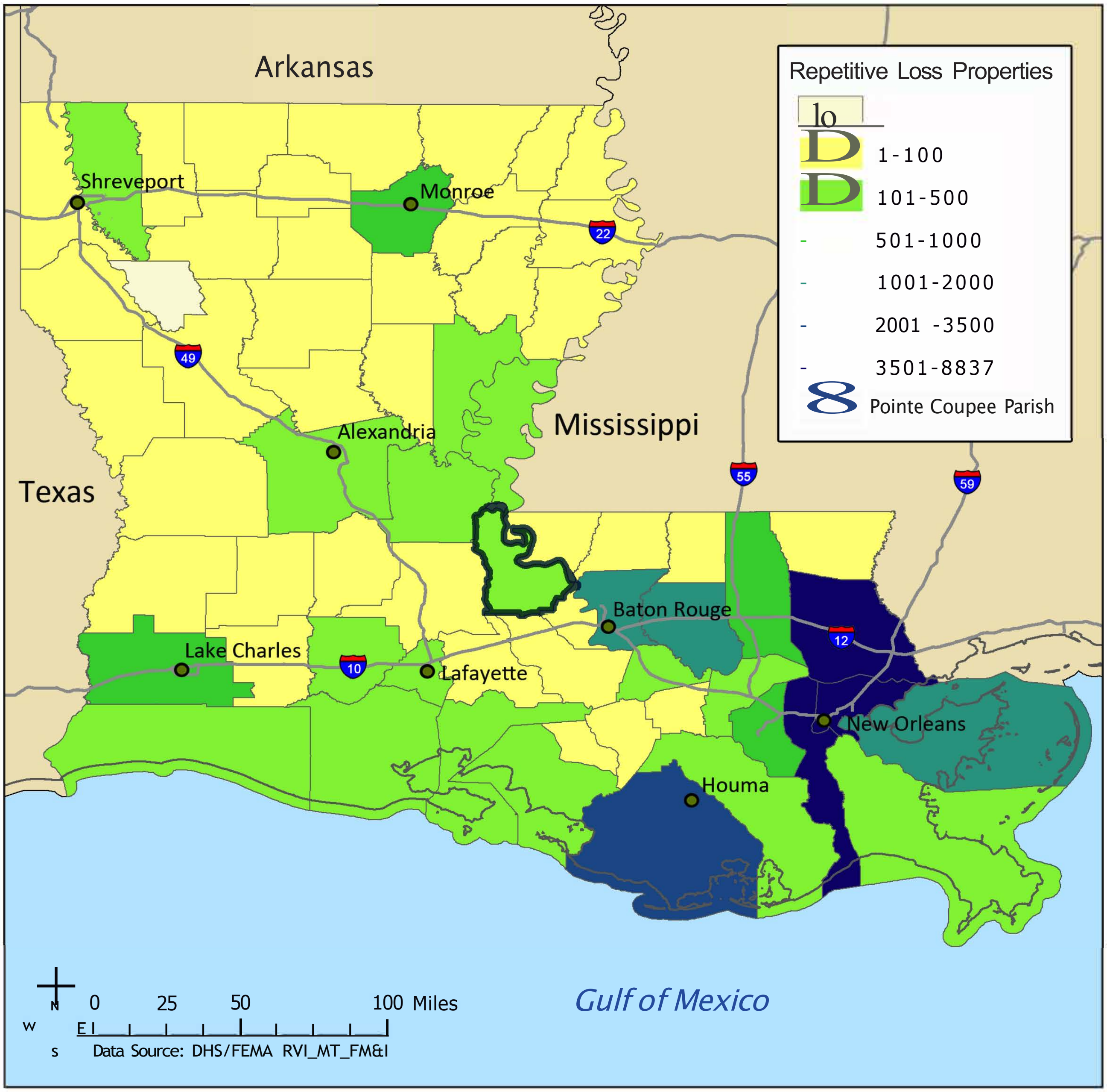
*NOTE: EMG is before Initial FIRM Identified





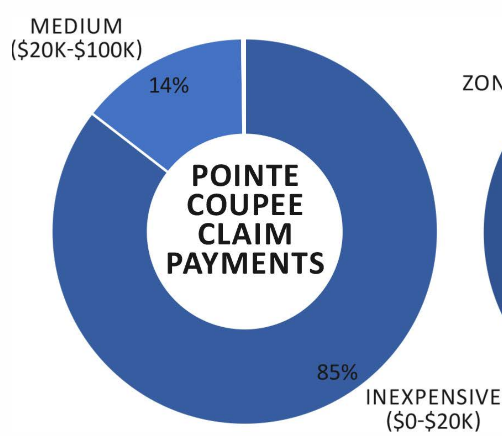
B-52

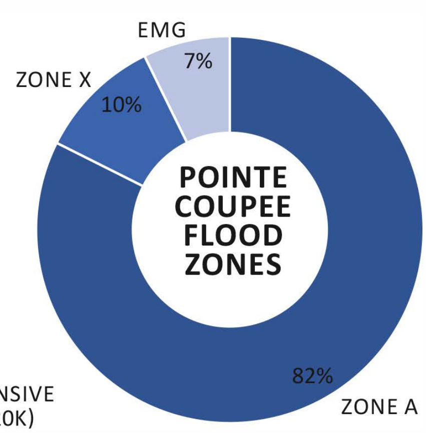
Attachment B



POINTE COUPEE PARISH	COUNT
RL PROPERTIES	364
INEXPENSIVE ($0-$20K)	1242
MEDIUM $20K-$100K)	208
SEVERE ($100K & UP)	3
FLOOD ZONE A	295
FLOOD ZONE X (B,C)	37
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	26

*NOTE: EMG is before Initial FIRM Identified





B-53

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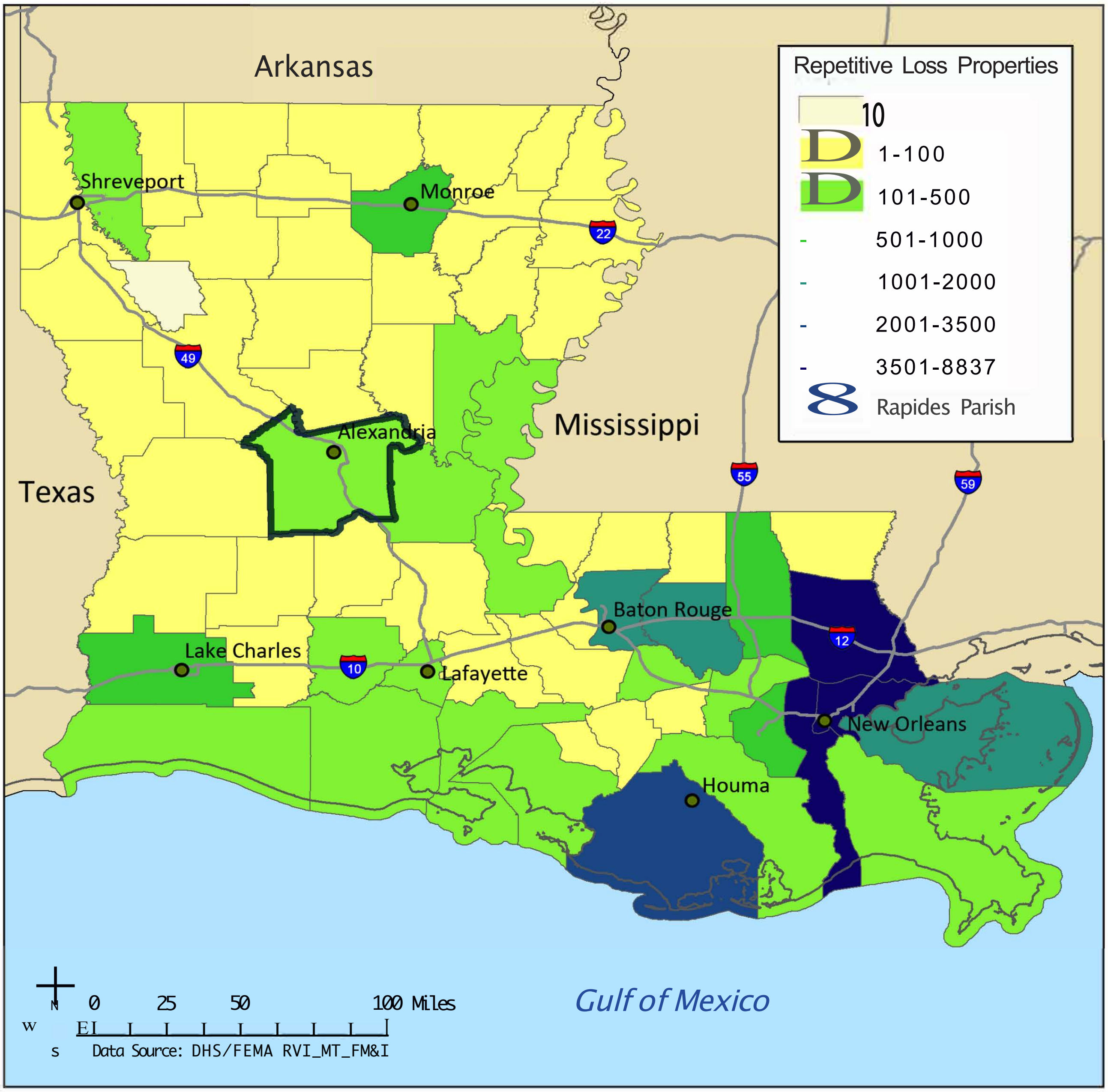
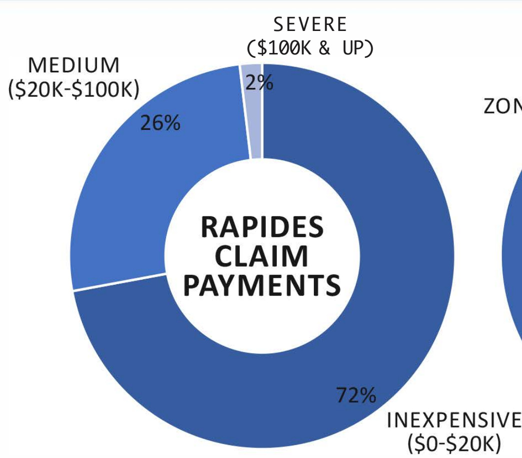
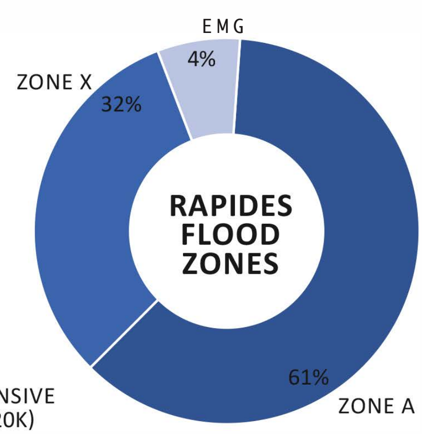


RAPIDES PARISH	COUNT
RL PROPERTIES	405
INEXPENSIVE ($0-$20K)	927
MEDIUM $20K-$100K)	335
SEVERE ($100K & UP)	24
FLOOD ZONE A	248
FLOOD ZONE X (B,C)	128
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	28

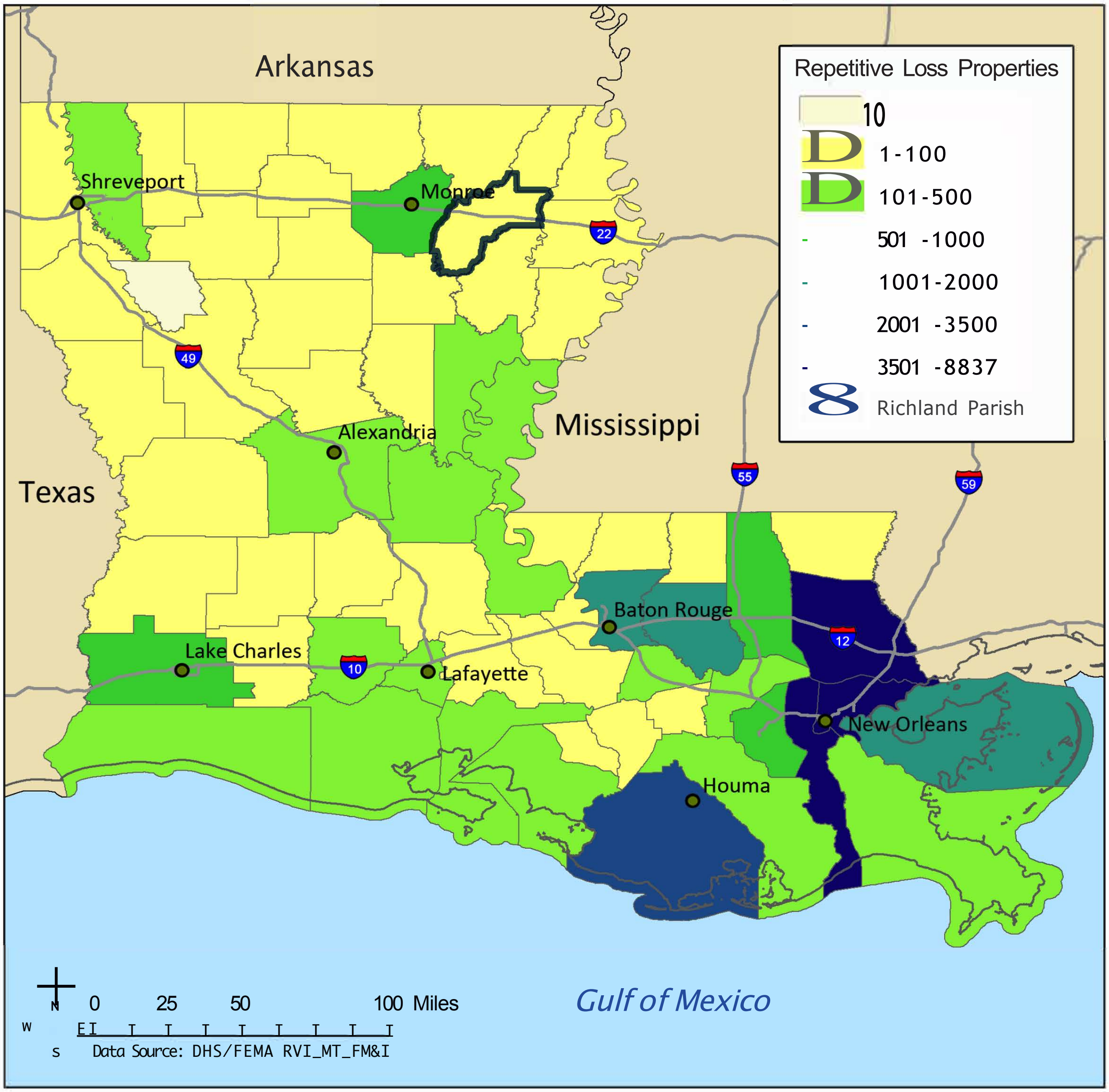
*NOTE: EMG isbefore Initial FIRM Identified





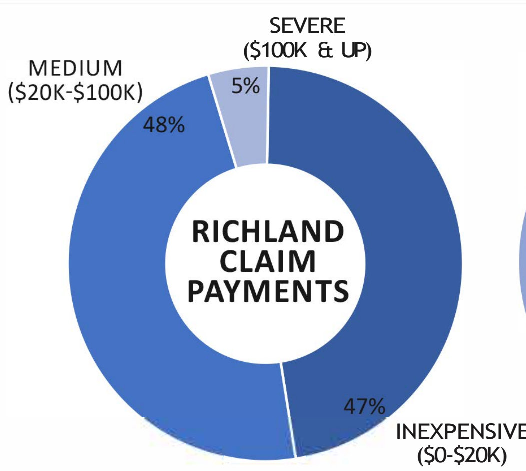
B-54

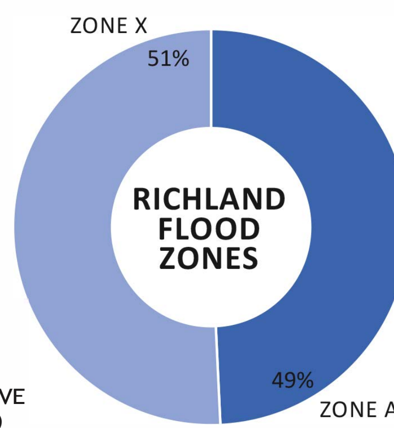
Attachment B



RICHLAND PARISH	COUNT
RL PROPERTIES	67
INEXPENSIVE ($0-$20K)	86
MEDIUM $20K-$100K)	87
SEVERE ($100K & UP)	9
FLOOD ZONE A	33
FLOOD ZONE X (B,C)	34
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	0

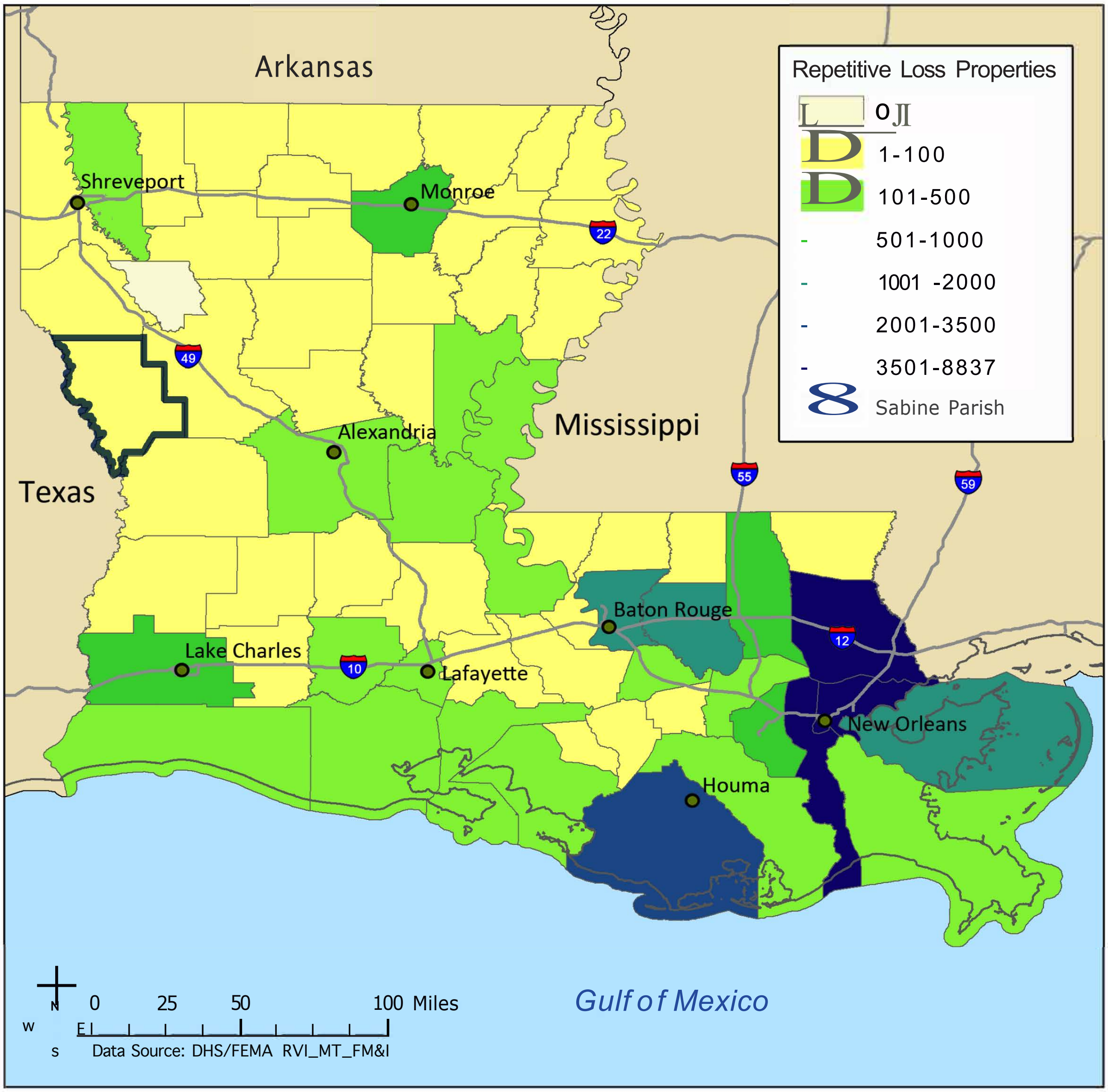
*NOTE: EMG is before Initial FIRM Identified





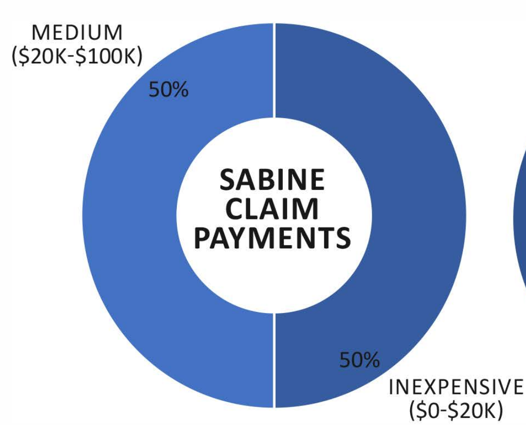
B-55

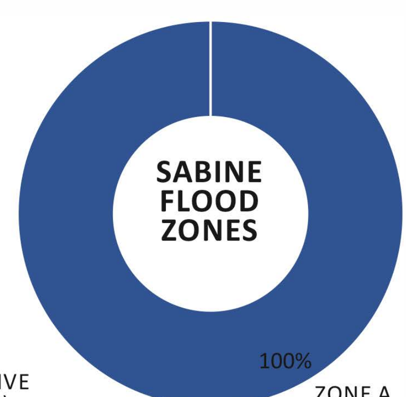
Attachment B



SABINE PARISH	COUNT
RL PROPERTIES	3
INEXPENSIVE ($0-$20K)	3
MEDIUM $20K-$100K)	3
SEVERE ($100K & UP)	0
FLOOD ZONE A	3
FLOOD ZONE X (B,C)	0
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	0

*NOTE: EMG is before Initial FIRM Identified





B-56

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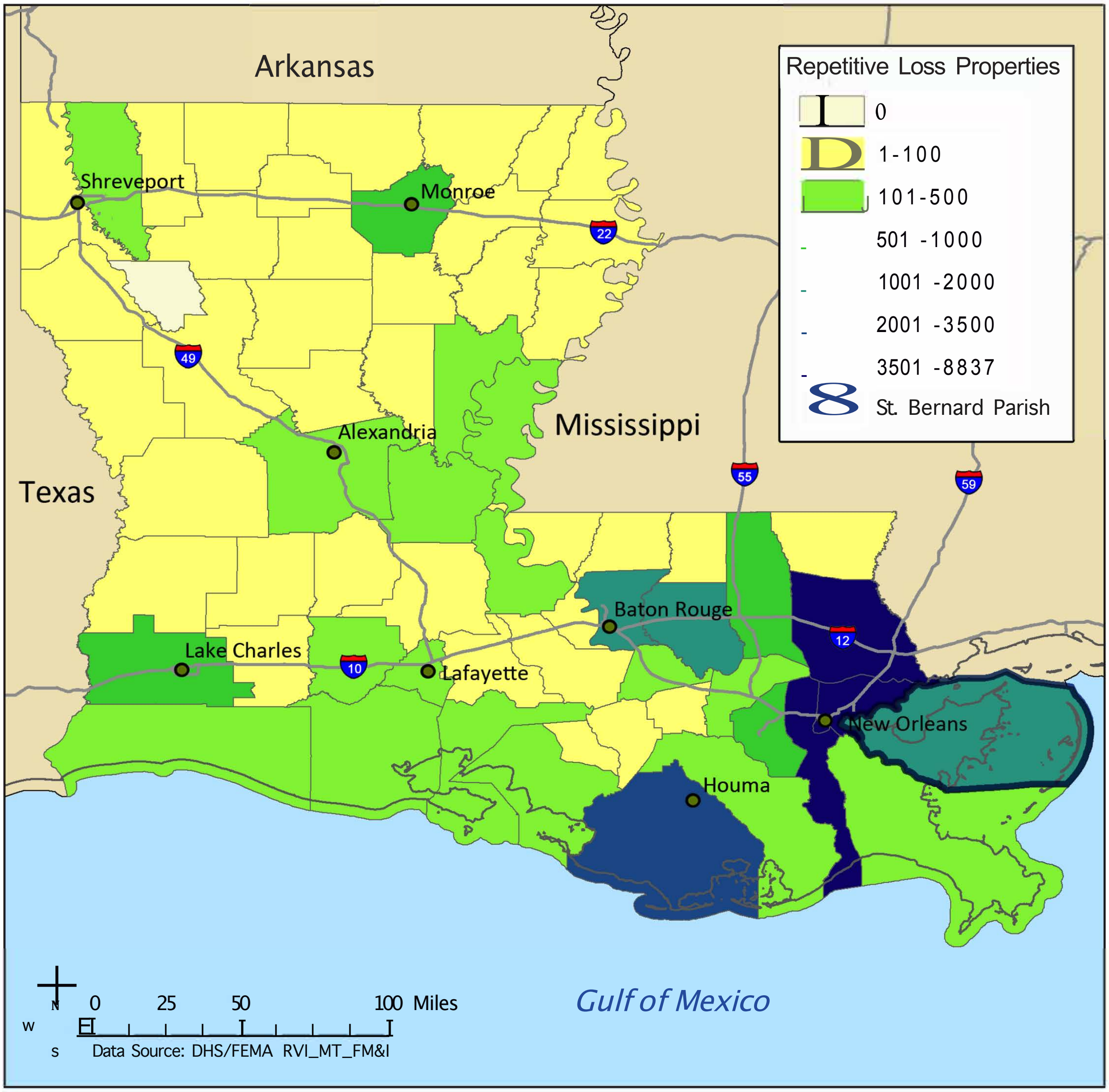
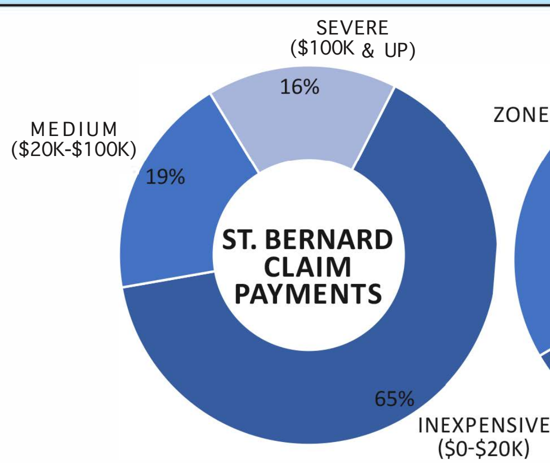
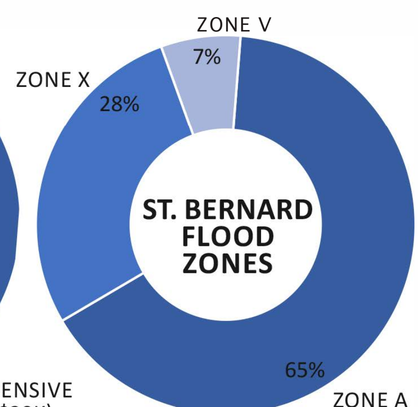


ST. BERNARD PARISH	COUNT
RL PROPERTIES	1,207
INEXPENSIVE ($0–$2DK)	2,649
MEDIUM $20K–$100K)	779
SEVERE ($100K & UP)	663
FLOOD ZONE A	781
FLOOD ZONE X (B,C)	334
FLOOD ZONE V	81
FLOOD ZONED	0
EMG*	0

*NOTE: EMG is before Initial FIRM Identified





B-57

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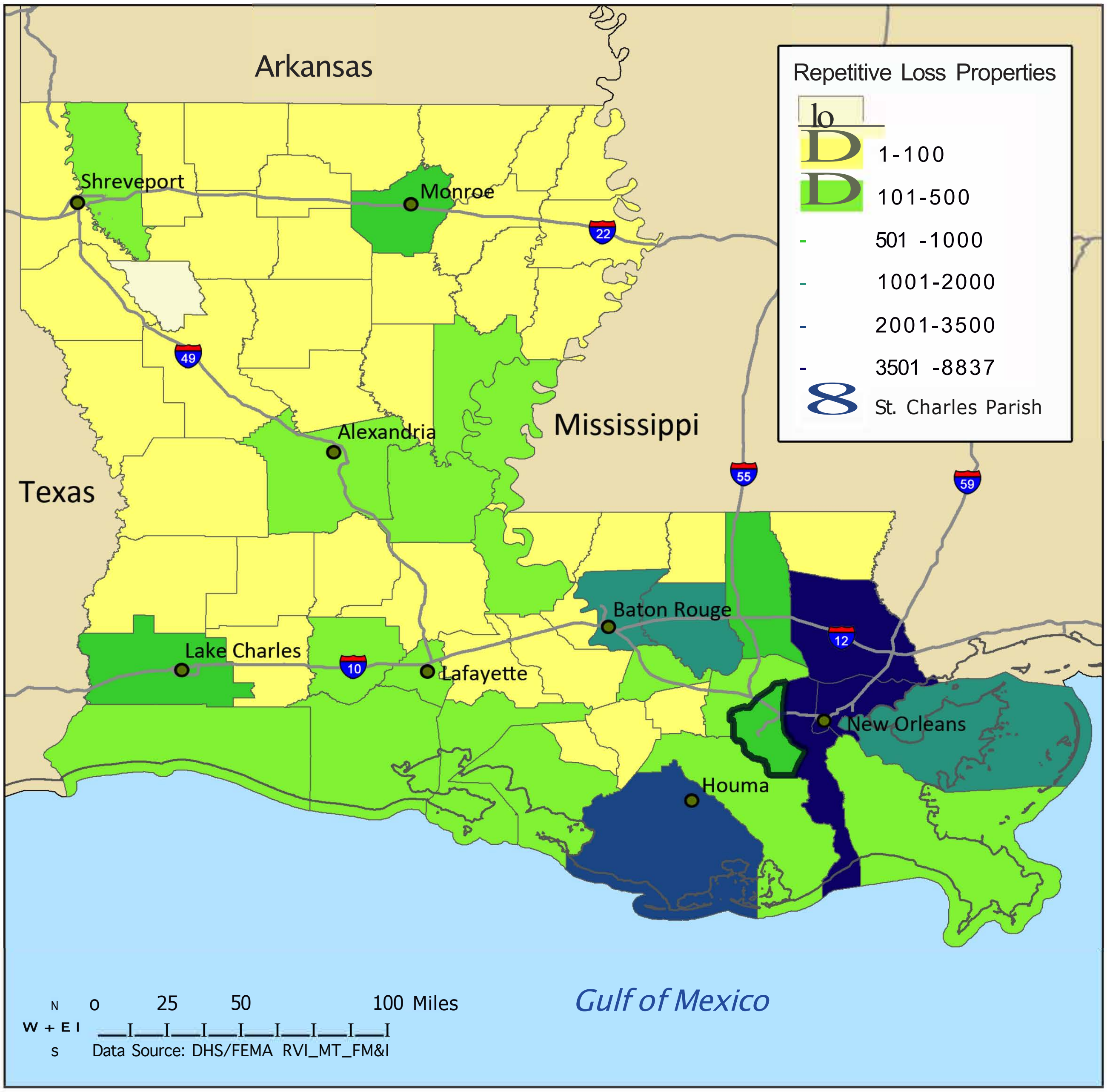
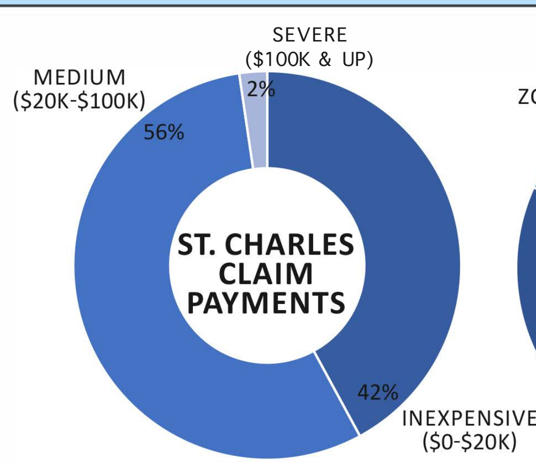
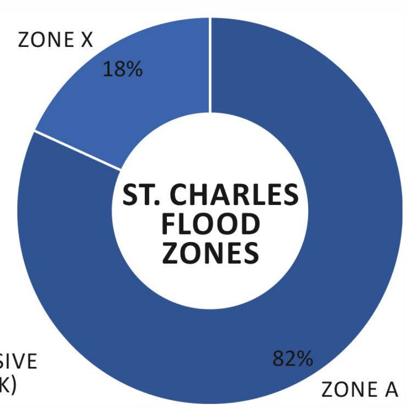


ST. CHARLES PARISH	COUNT
RL PROPERTIES	643
INEXPENSIVE ($0-$20K)	690
MEDIUM $20K-$100K)	912
SEVERE ($100K & UP)	38
FLOOD ZONE A	526
FLOOD ZONE X (B,C)	117
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	1

*NOTE: EMG is before Initial FIRM Identified





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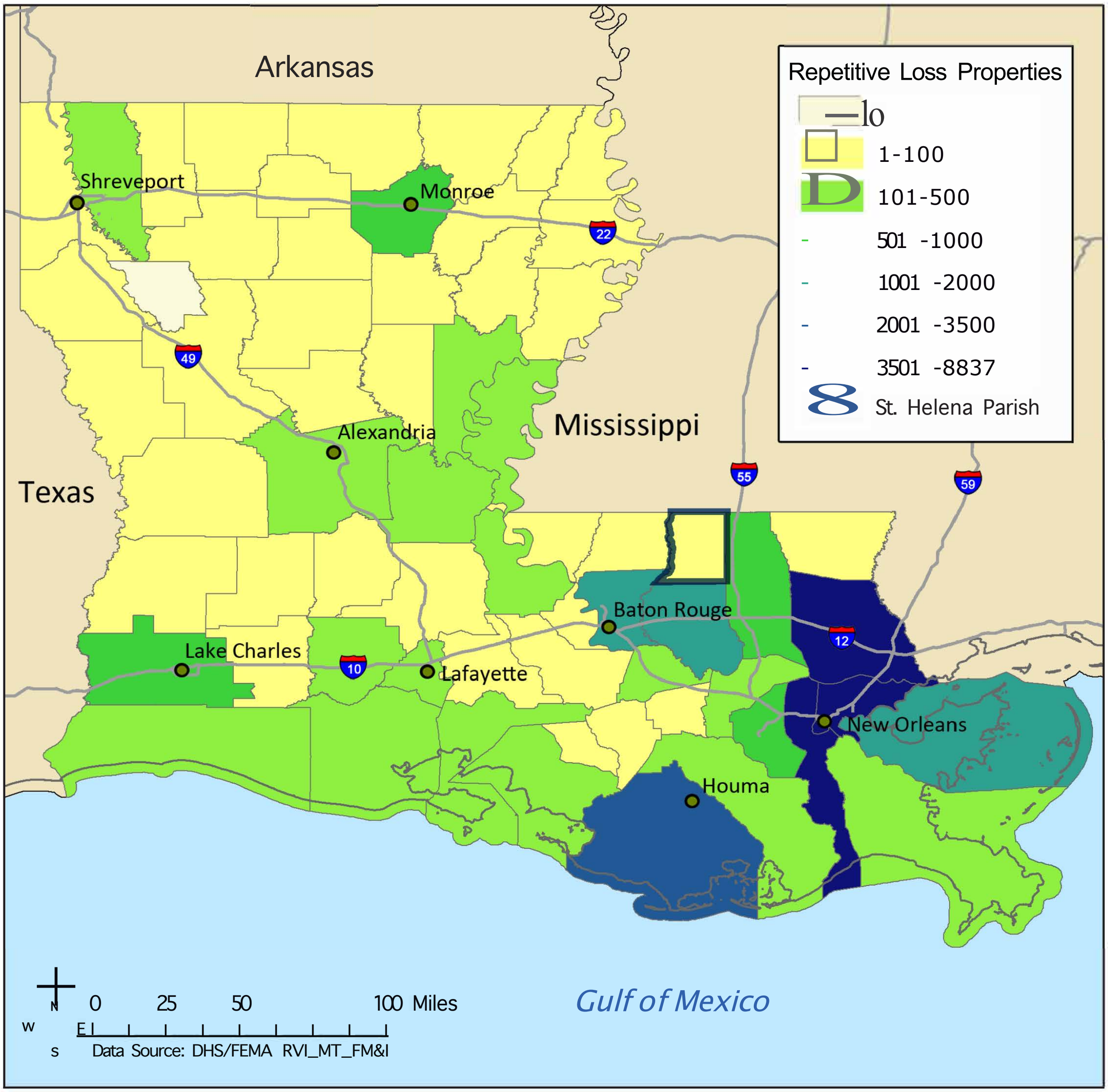
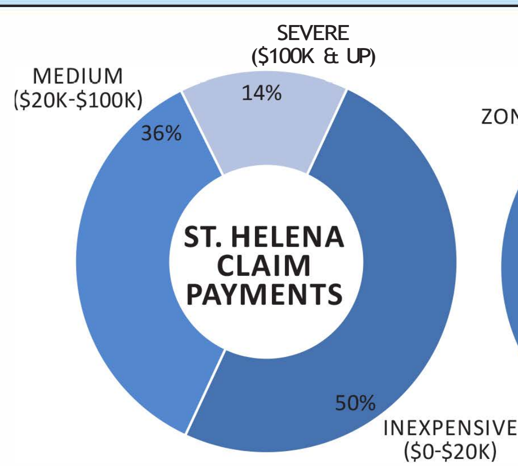
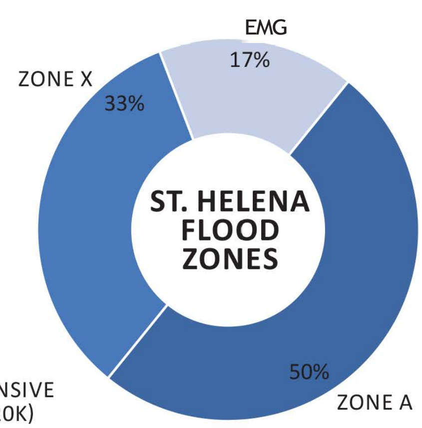


ST. HELENA PARISH	COUNT
RL PROPERTIES	6
INEXPENSIVE ($0–$20K)	7
MEDIUM $20K–$100K)	5
SEVERE ($100K & UP)	2
FLOOD ZONE A	3
FLOOD ZONE X (B,C)	2
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	1

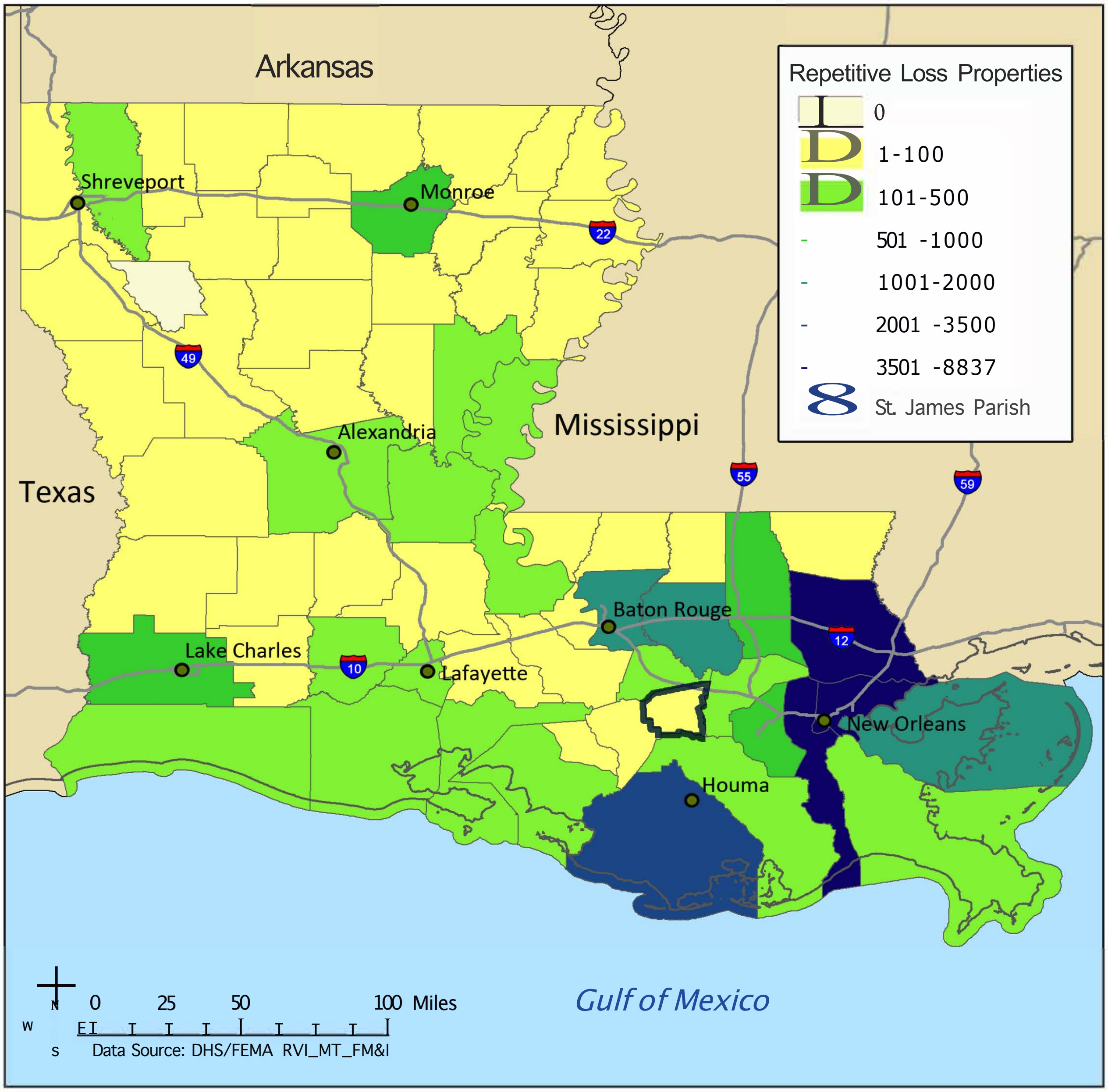
*NOTE: EMG is before Initial FIRM Identified





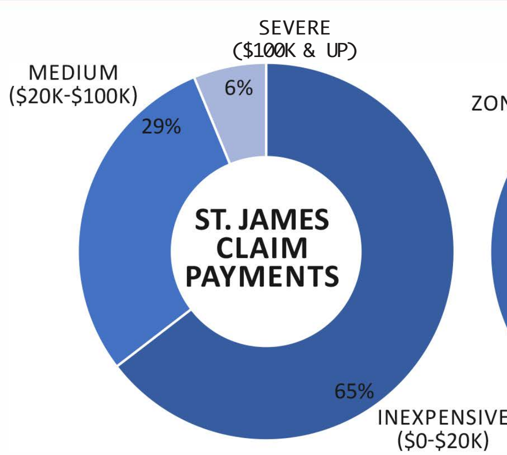
B-59

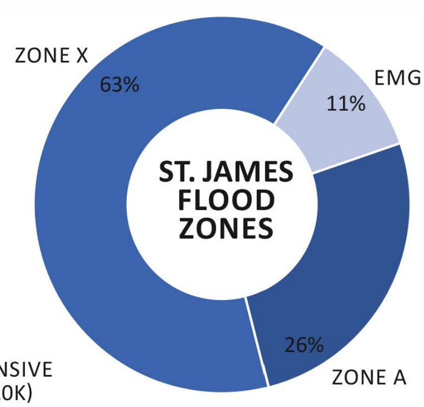
Attachment B



ST. JAMES PARISH	COUNT
RL PROPERTIES	19
INEXPENSIVE ($0–$20K)	31
MEDIUM $20K–$100K)	14
SEVERE ($100K & UP)	3
FLOOD ZONE A	5
FLOOD ZONE X (B,C)	12
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	2

*NOTE: EMG is before Initial FIRM Identified





B-60

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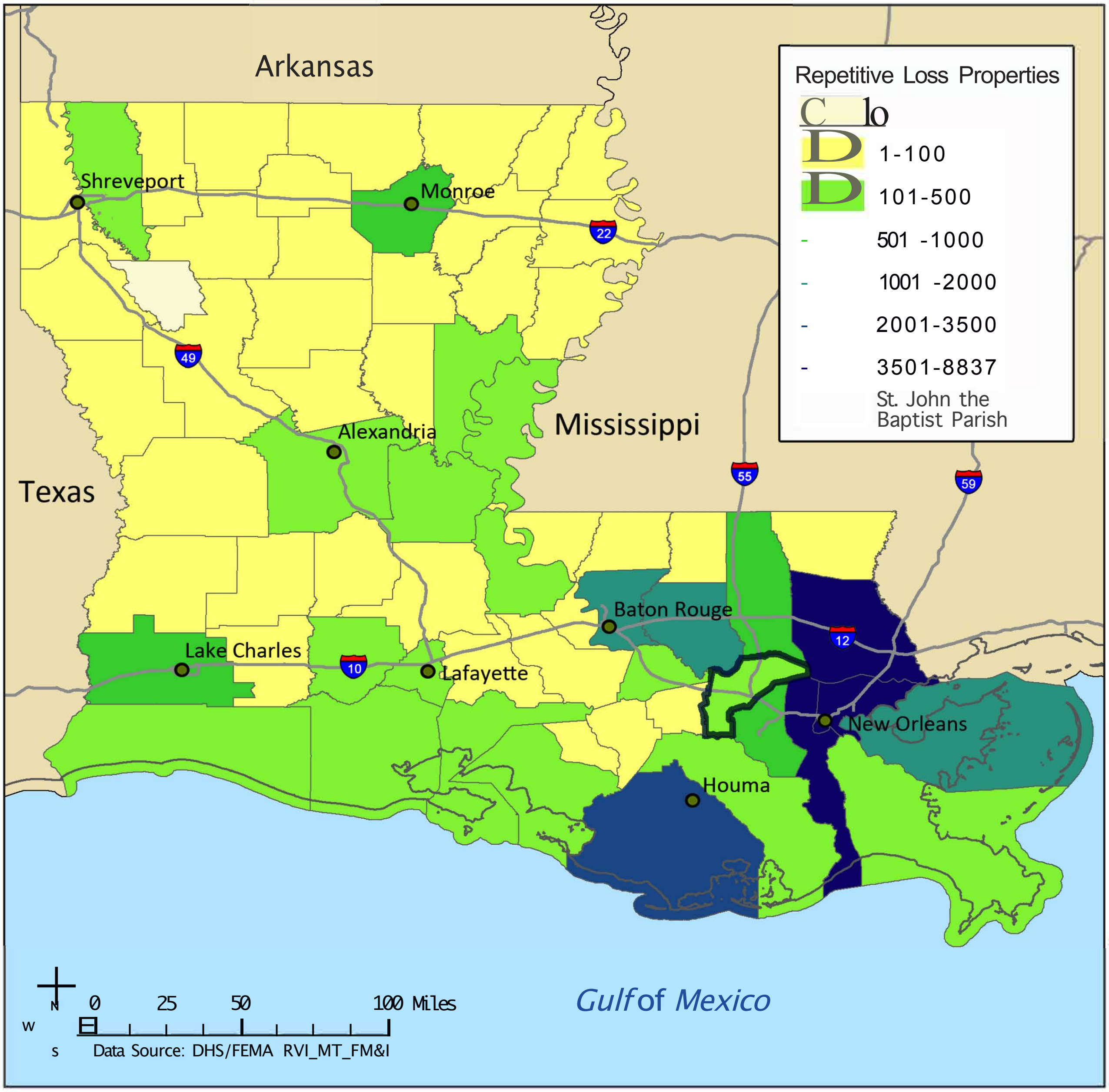
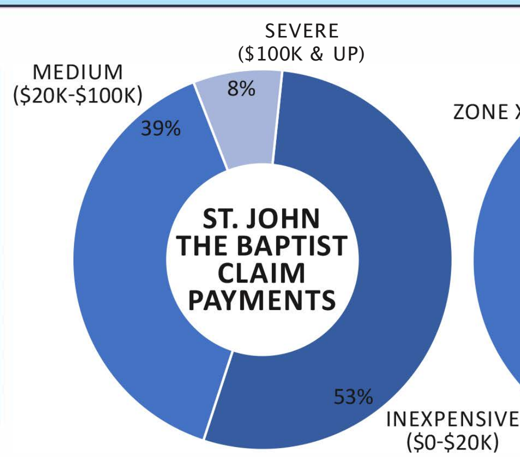
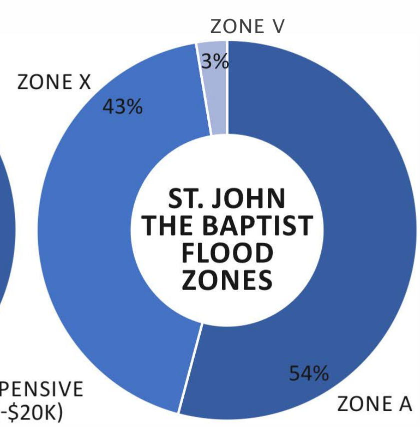


ST. JOHN THE BAPTIST PARISH	COUNT
RL PROPERTIES	229
INEXPENSIVE ($0-$20K)	317
MEDIUM $20K-$100K)	232
SEVERE ($100K & UP)	45
FLOOD ZONE A	124
FLOOD ZONE X (B,C)	99
FLOOD ZONE V	6
FLOOD ZONED	0
EMG*	0

*NOTE: EMG is before Initial FIRM Identified

B-61





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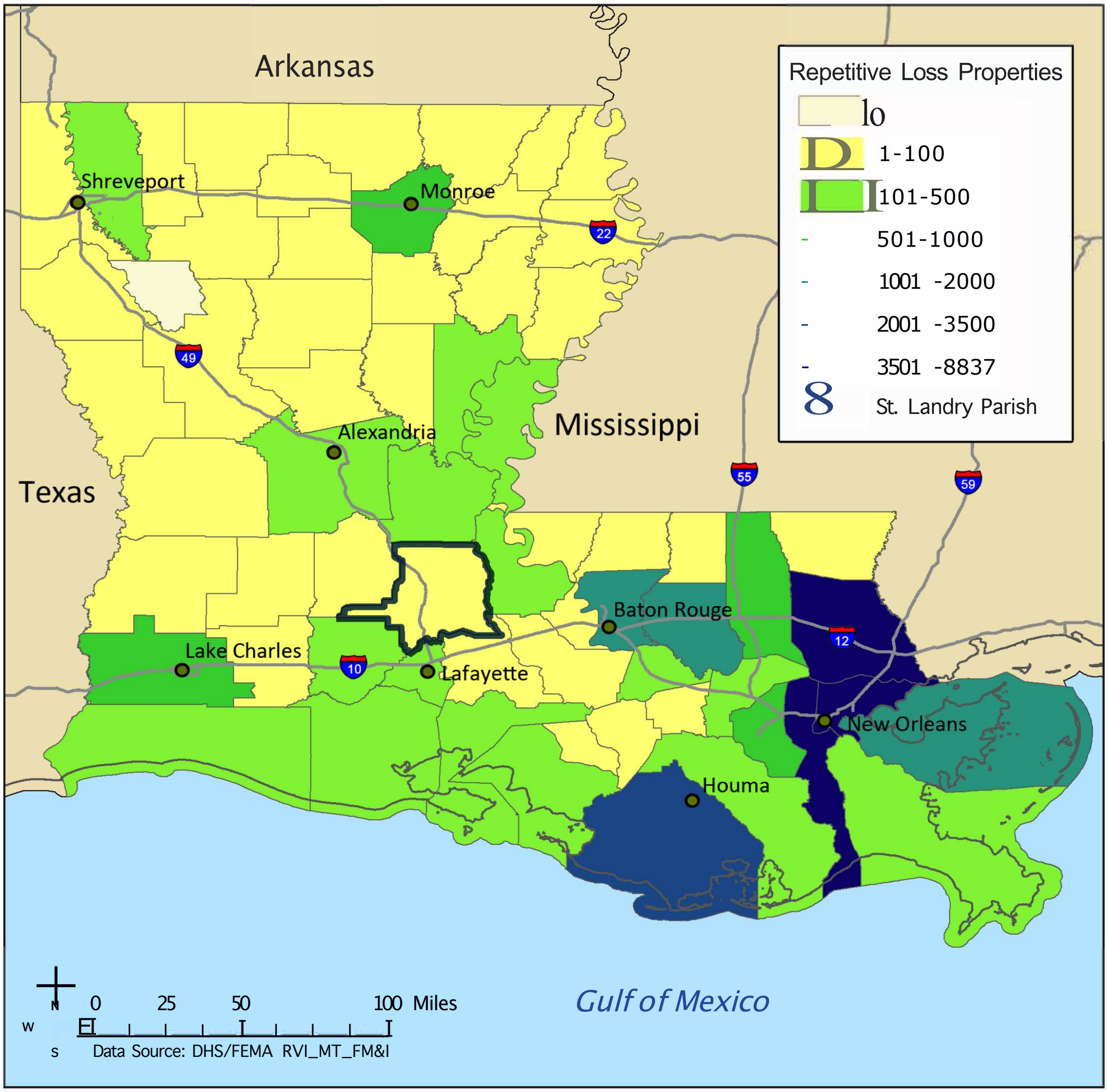
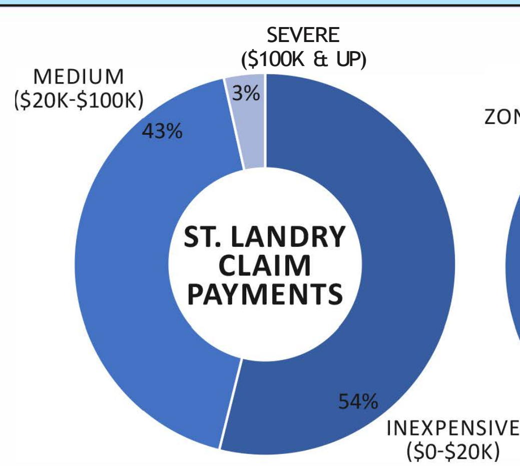
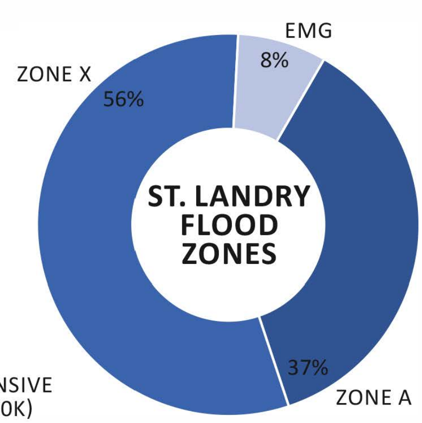


ST. LANDRY PARISH	COUNT
RL PROPERTIES	93
INEXPENSIVE ($0–$20K)	139
MEDIUM $20K–$100K)	110
SEVERE ($100K & UP)	9
FLOOD ZONE A	34
FLOOD ZONE X (B,C)	52
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	7

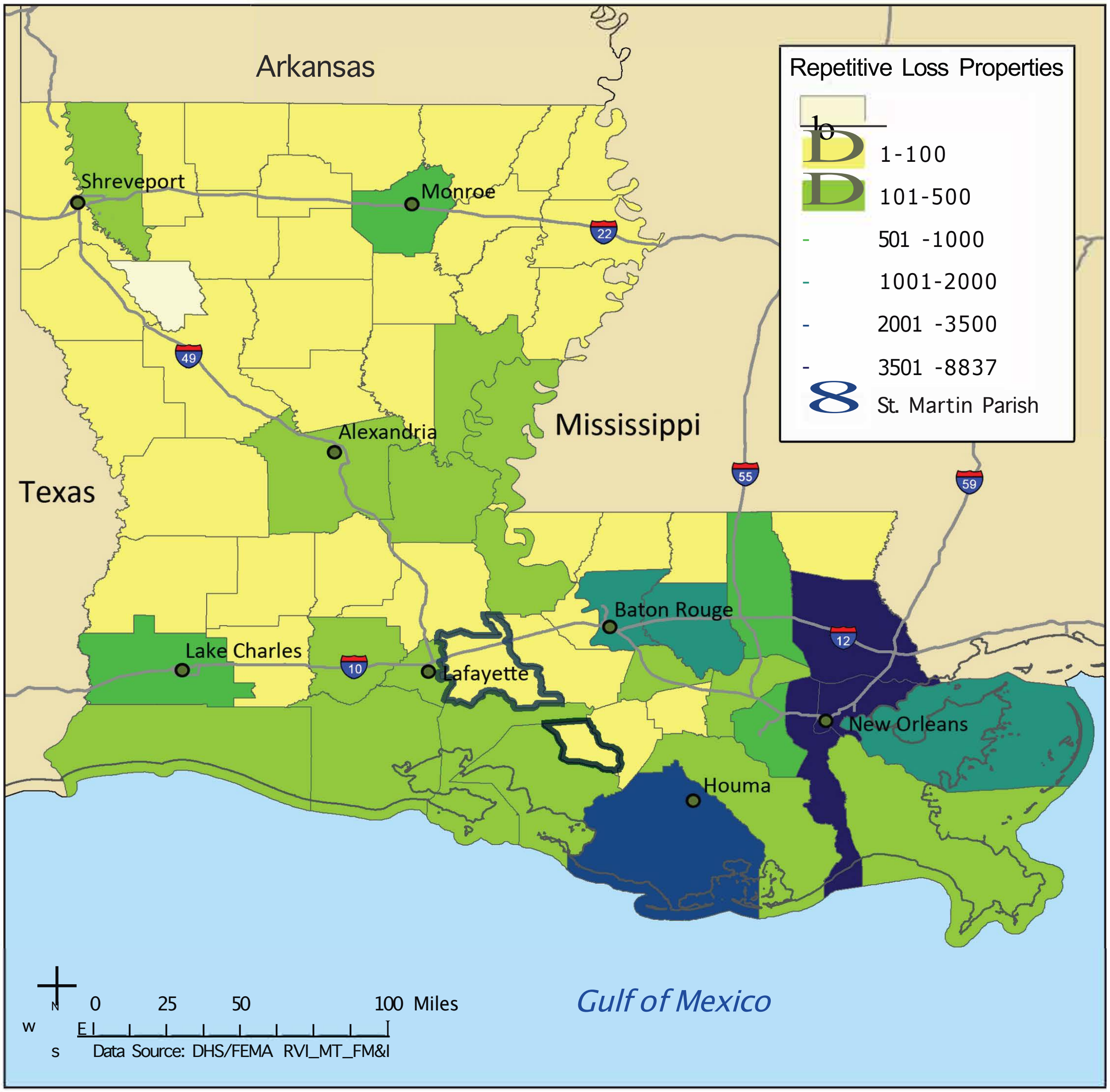
*NOTE: EMG is before Initial FIRM Identified





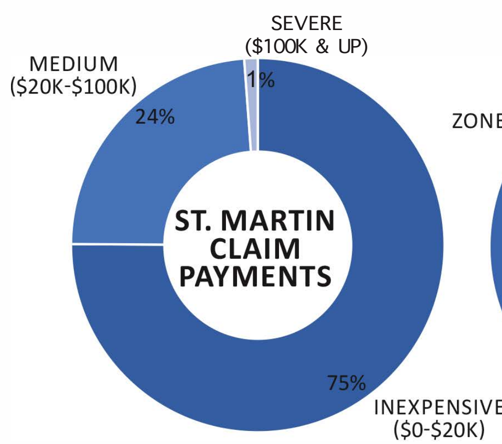
B-62

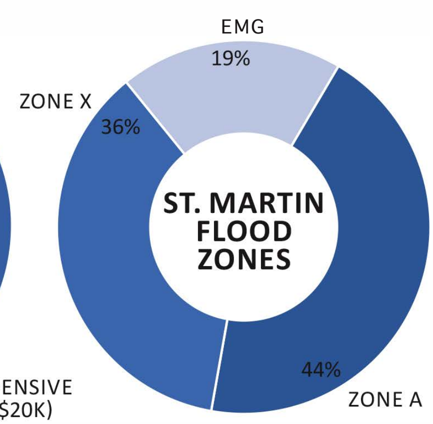
Attachment B



ST. MARTIN PARISH	COUNT
RL PROPERTIES	88
INEXPENSIVE ($0–$20K)	193
MEDIUM $20K–$100K)	61
SEVERE ($100K & UP)	3
FLOOD ZONE A	39
FLOOD ZONE X (B,C)	32
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	17

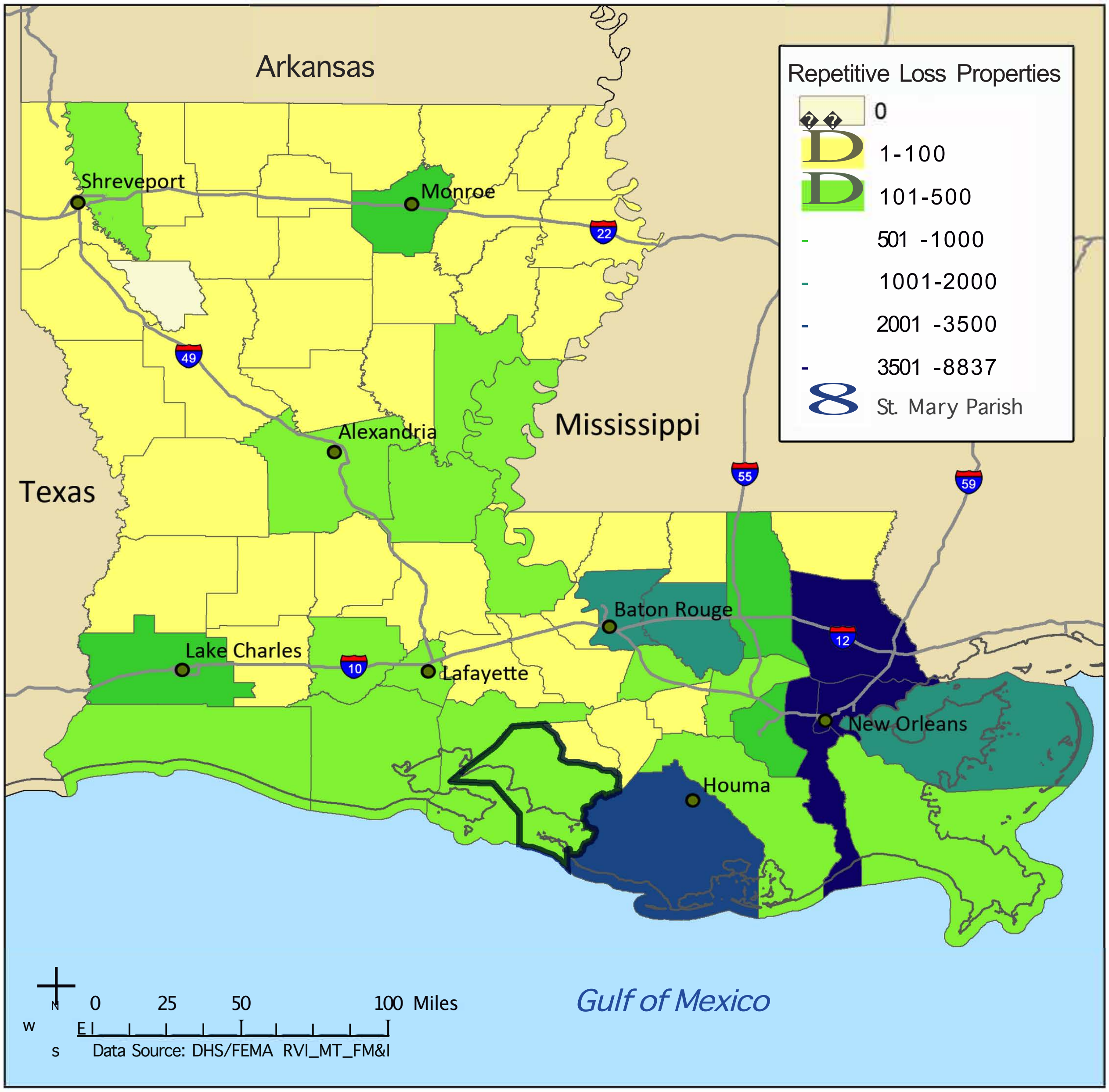
*NOTE: EMG is before Initial FIRM Identified





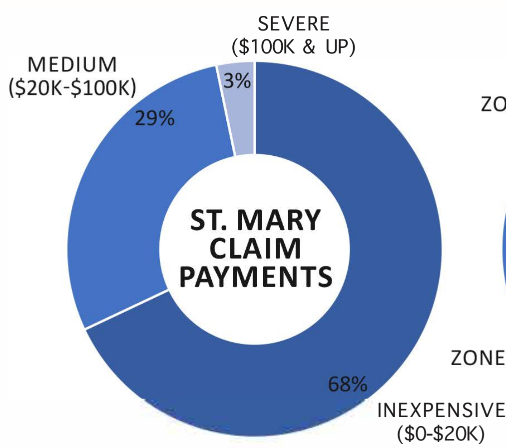
B-63

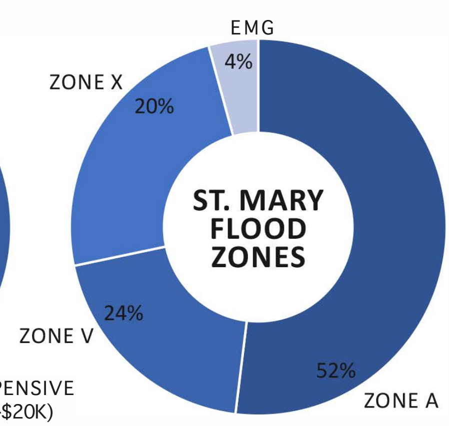
Attachment B



ST. MARY PARISH	COUNT
RL PROPERTIES	259
INEXPENSIVE ($0–$20K)	478
MEDIUM $20K–$100K)	202
SEVERE ($100K & UP)	23
FLOOD ZONE A	134
FLOOD ZONE X (B,C)	51
FLOOD ZONE V	62
FLOOD ZONED	0
EMG*	11

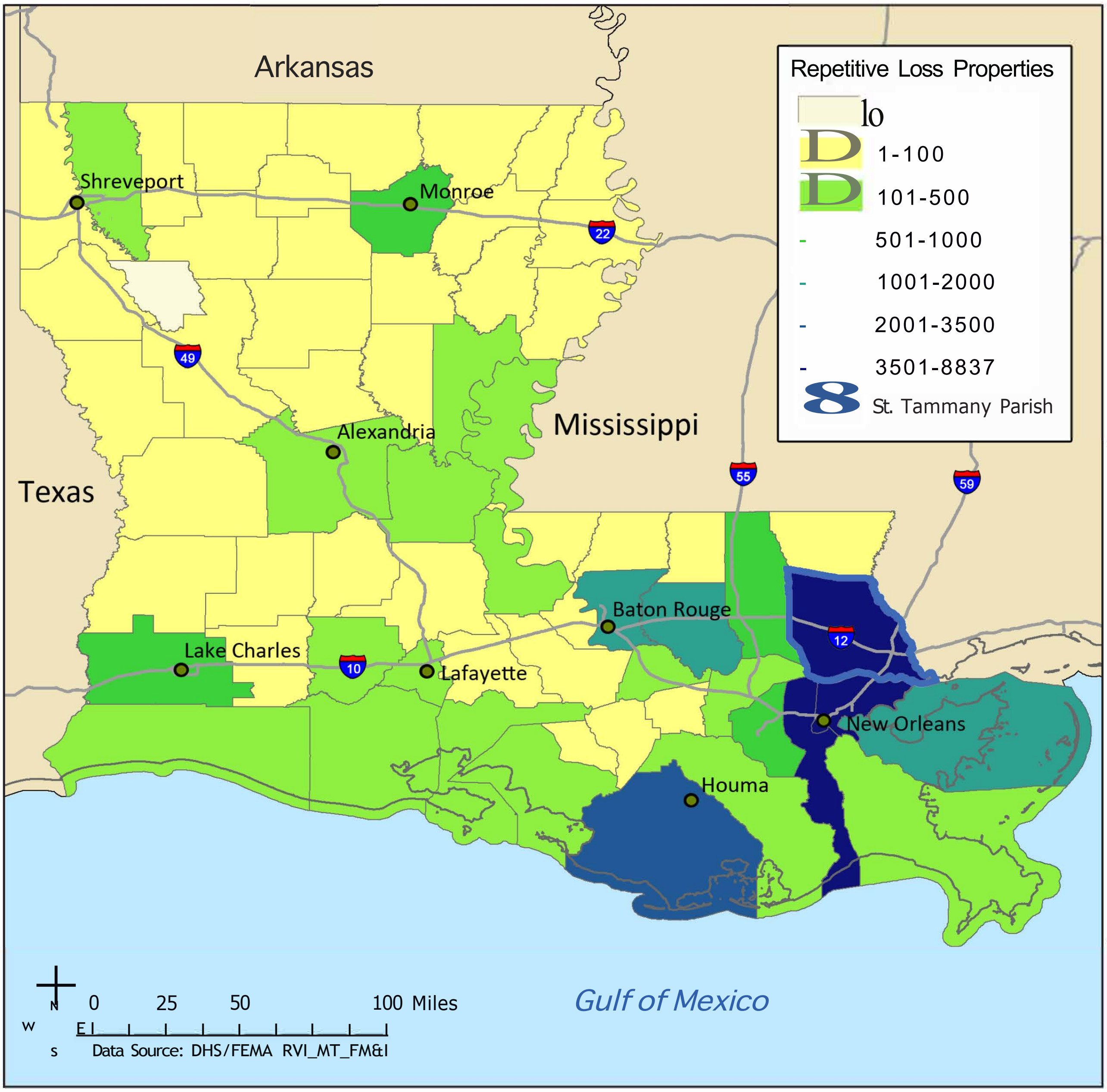
*NOTE: EMG is before Initial FIRM Identified





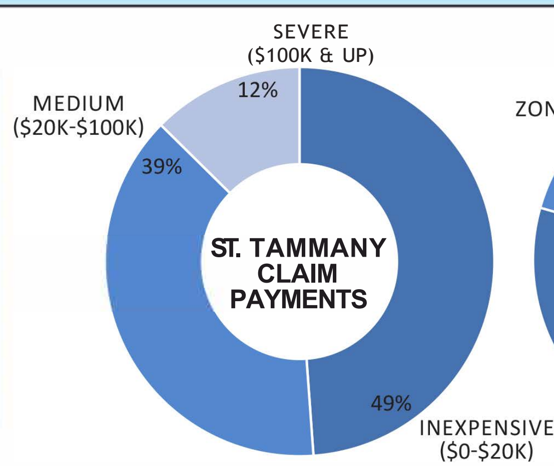
B-64

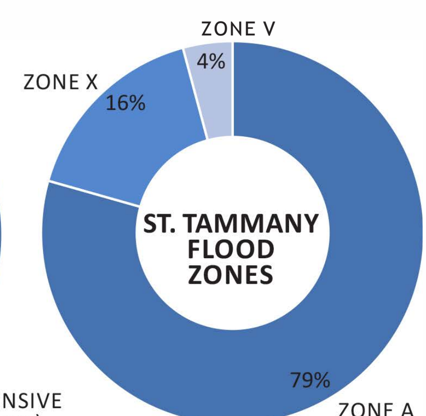
Attachment B



ST. TAMMANY PARISH	COUNT
RL PROPERTIES	3,501
INEXPENSIVE ($0-$20K)	5,093
MEDIUM $20K-$100K)	4,017
SEVERE ($100K & UP)	1,314
FLOOD ZONE A	2,773
FLOOD ZONE X (B,C)	574
FLOOD ZONE V	146
FLOOD ZONED	3
EMG*	1

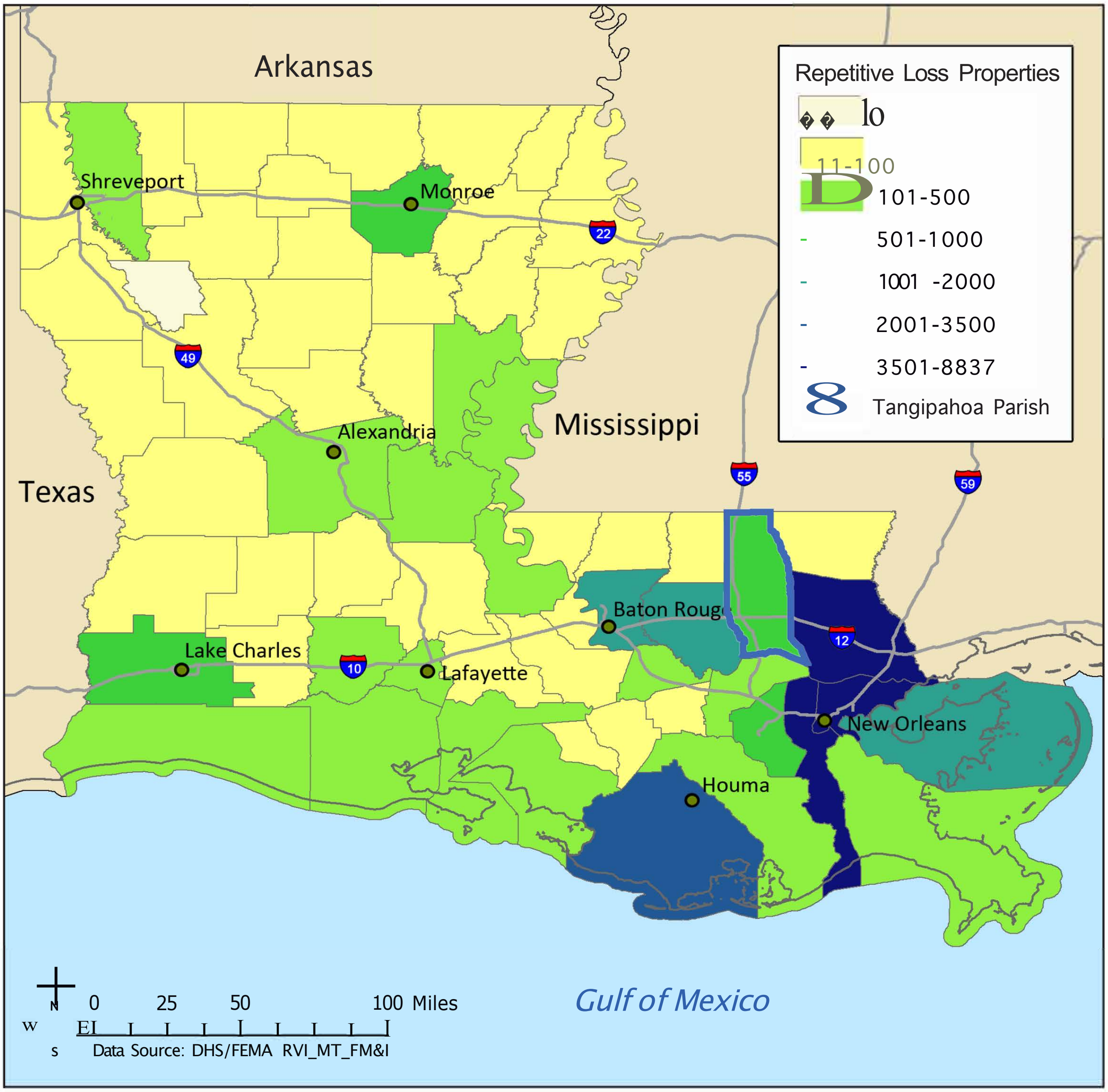
*NOTE: EMG is before Initial FIRM Identified





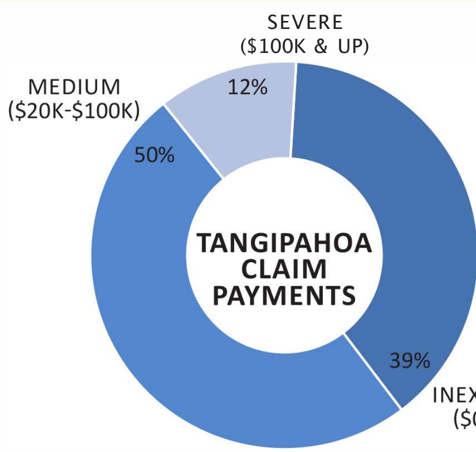
B-65

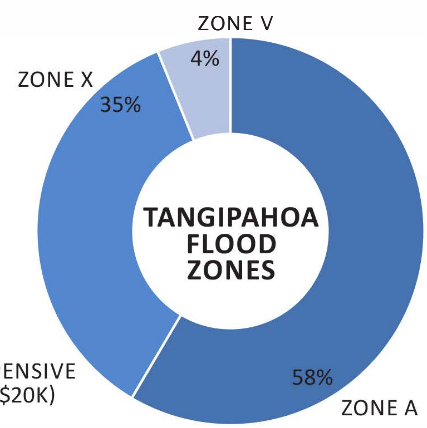
Attachment B



TANGIPAHOA PARISH	COUNT
RL PROPERTIES	507
INEXPENSIVE ($0-$20K)	504
MEDIUM $20K-$100K)	646
SEVERE ($100K & UP)	152
FLOOD ZONE A	296
FLOOD ZONE X (B,C)	179
FLOOD ZONE V	31
FLOOD ZONED	0
EMG*	0

*NOTE: EMG is before Initial FIRM Identified





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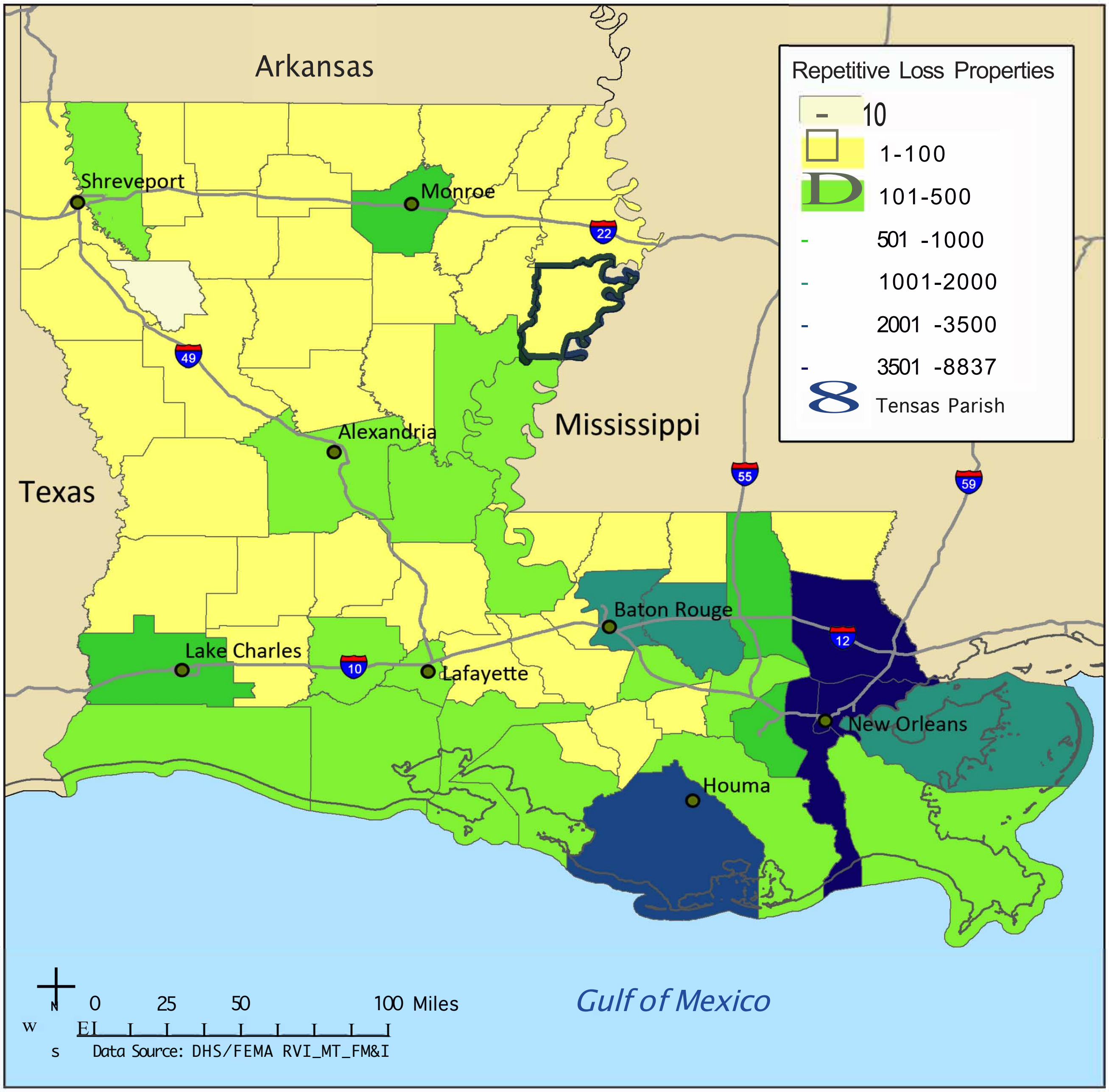
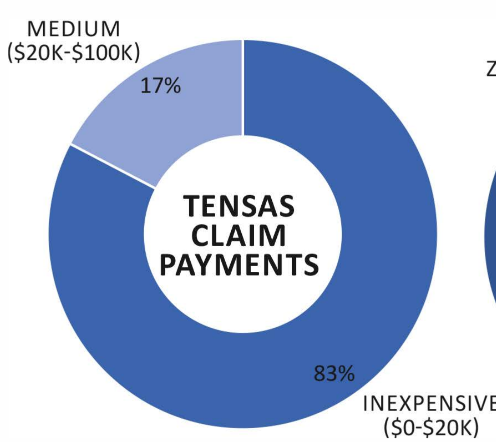
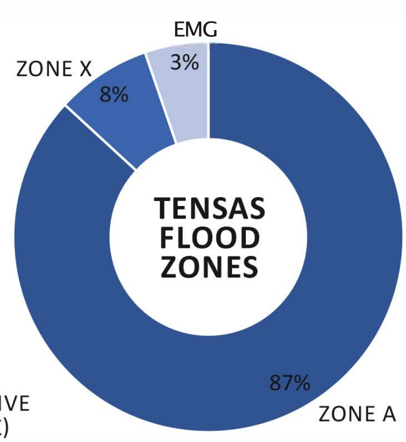
Attachment B



TENSAS PARISH	COUNT
RL PROPERTIES	38
INEXPENSIVE ($0-$20K)	105
MEDIUM $20K-$100K)	22
SEVERE ($100K & UP)	0
FLOOD ZONE A	33
FLOOD ZONE X (B,C)	3
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	2

*NOTE: EMG is before Initial FIRM Identified





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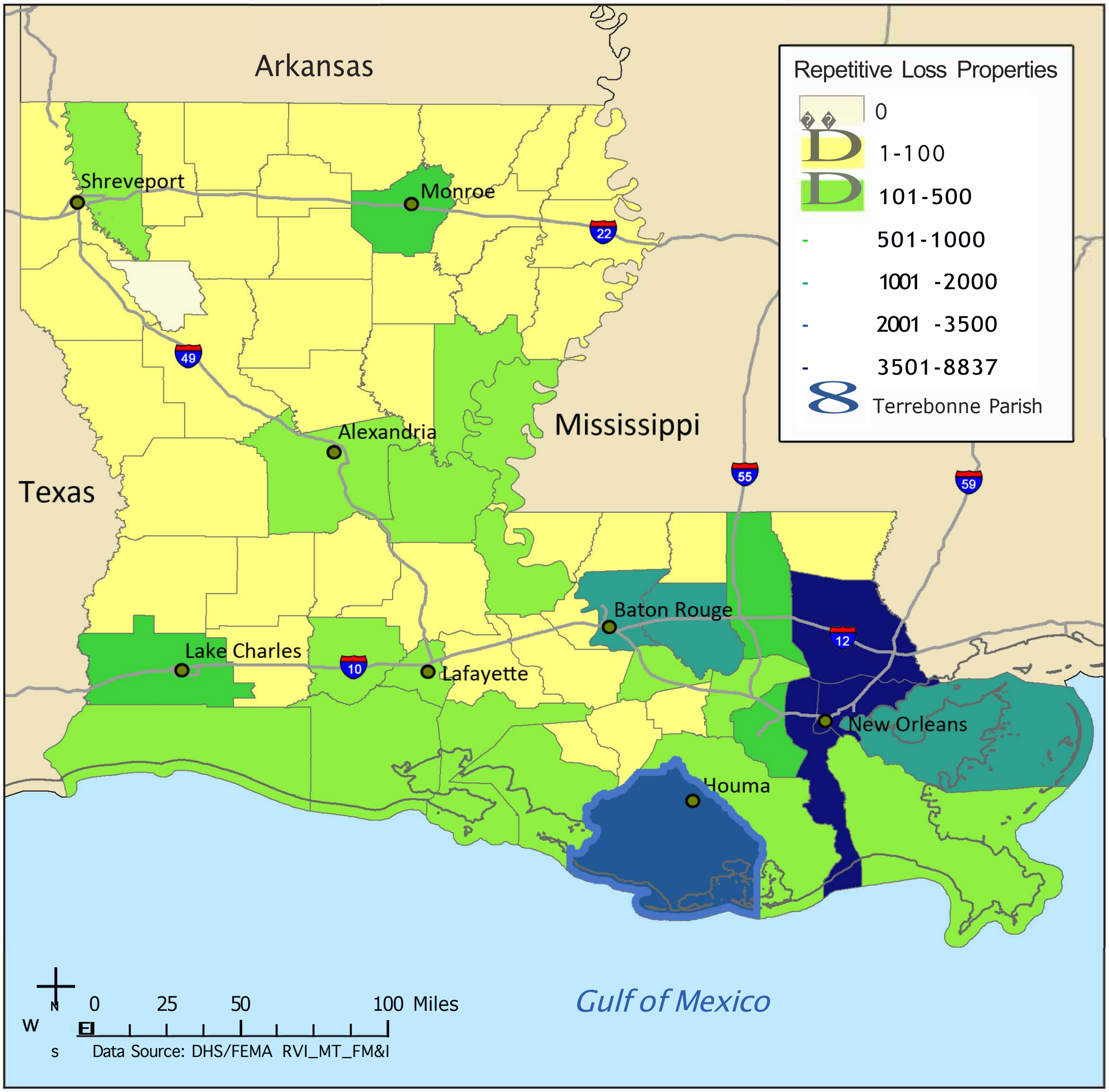
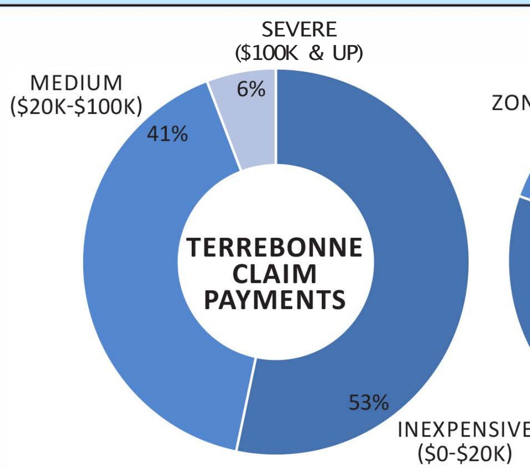
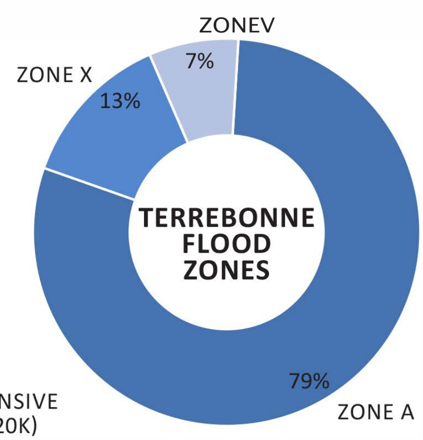
Attachment B



TERREBONNE PARISH	COUNT
RL PROPERTIES	2,001
INEXPENSIVE ($0-$20K)	2,854
MEDIUM $20K-$100K)	2,192
SEVERE ($100K & UP)	310
FLOOD ZONE A	1,582
FLOOD ZONE X (B,C)	261
FLOOD ZONE V	149
FLOOD ZONED	0
EMG*	0

*NOTE: EMG is before Initial FIRM Identified





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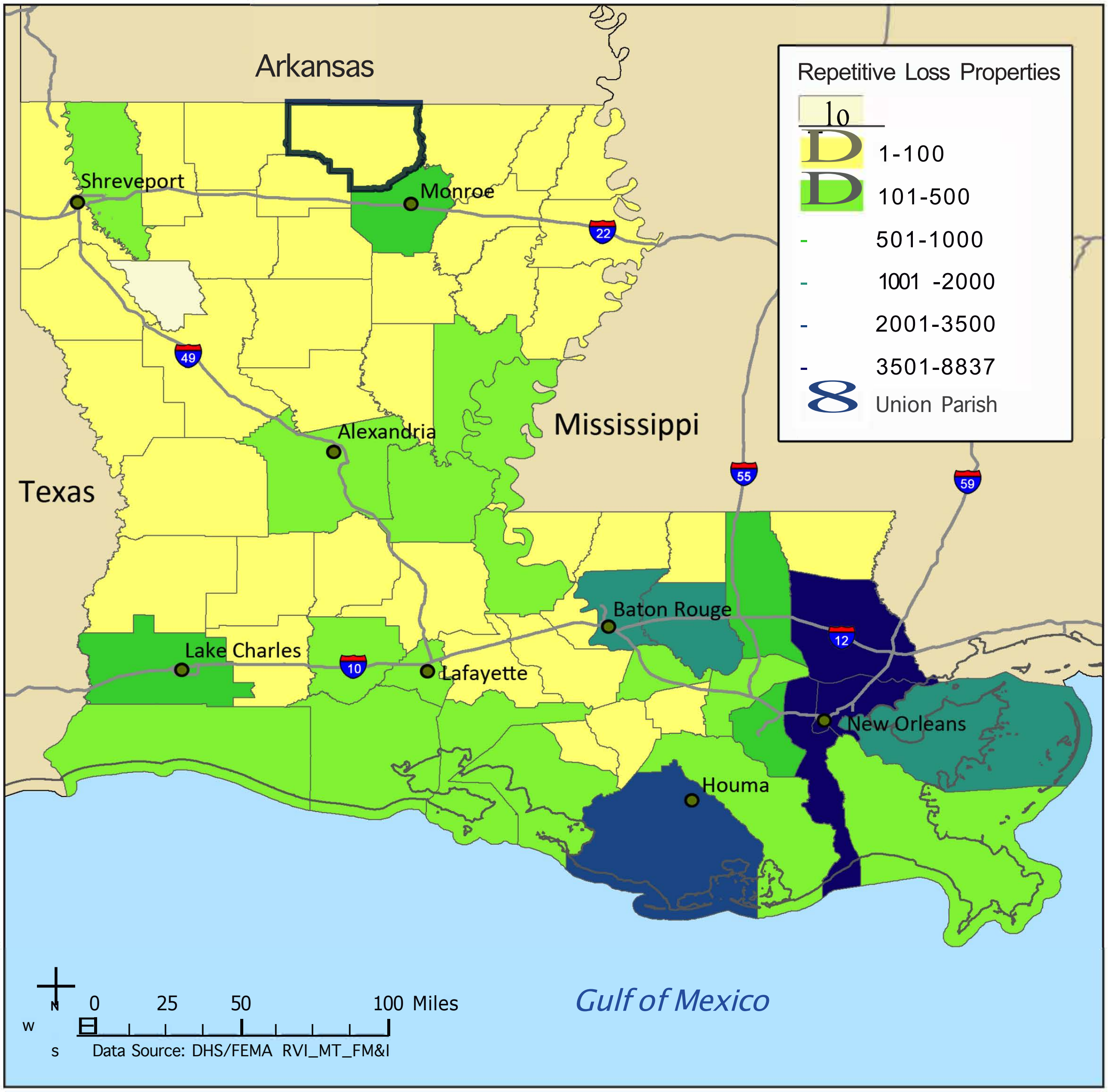
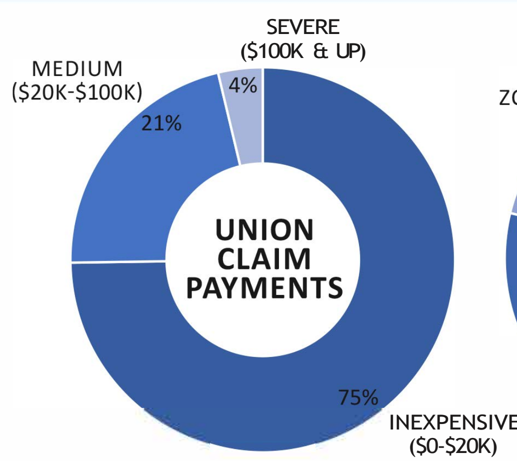
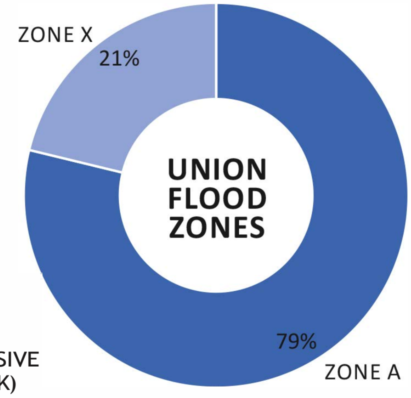
Attachment B



UNION PARISH	COUNT
RL PROPERTIES	33
INEXPENSIVE ($0-$20K)	80
MEDIUM $20K-$100K)	23
SEVERE ($100K & UP)	4
FLOOD ZONE A	26
FLOOD ZONE X (B,C)	7
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	0

*NOTE: EMG is before Initial FIRM Identified





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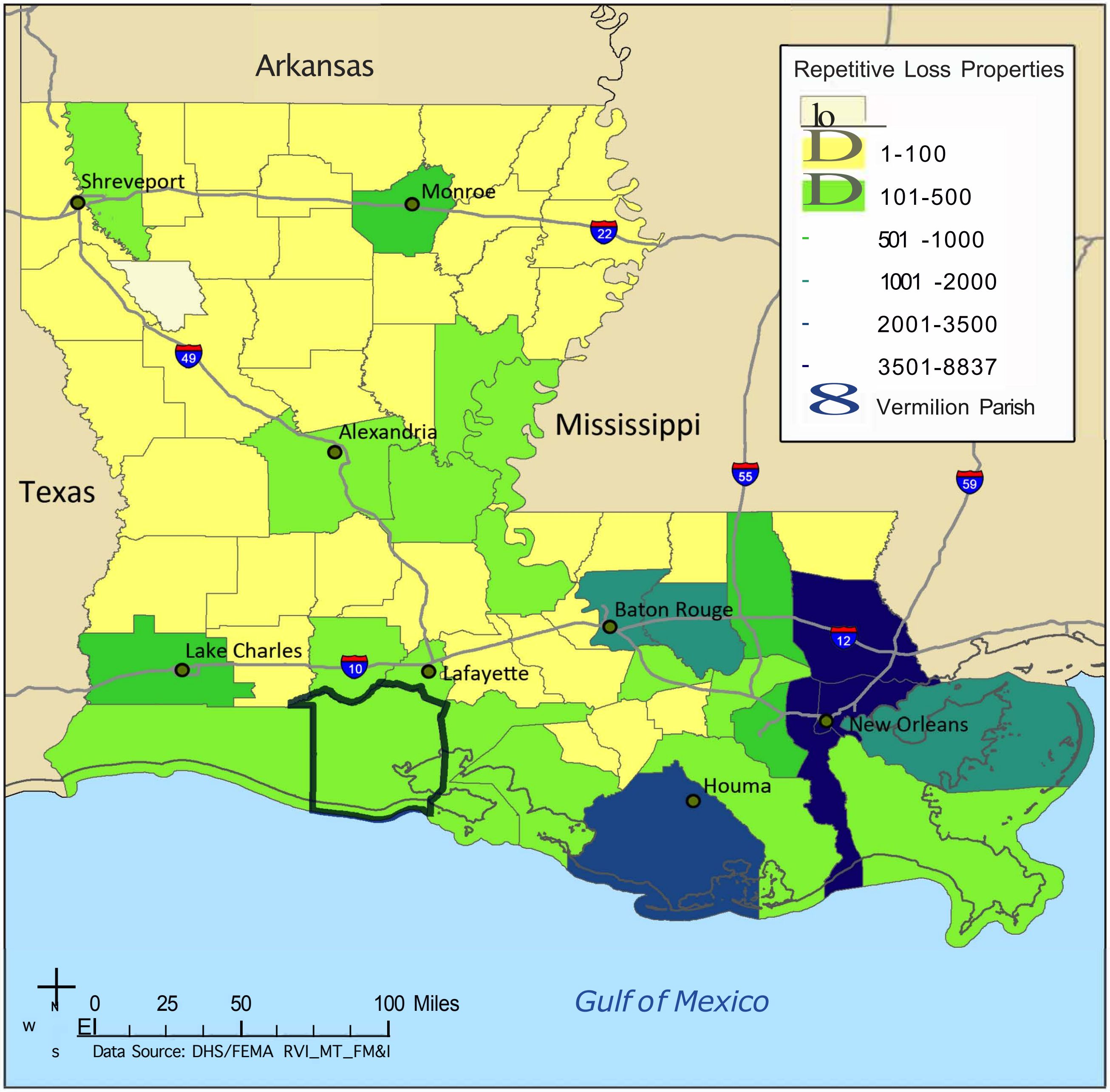
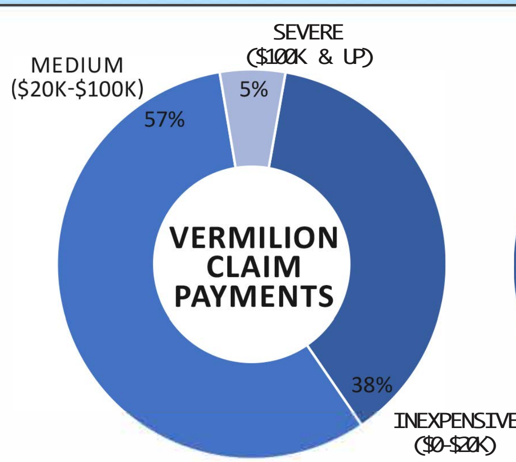
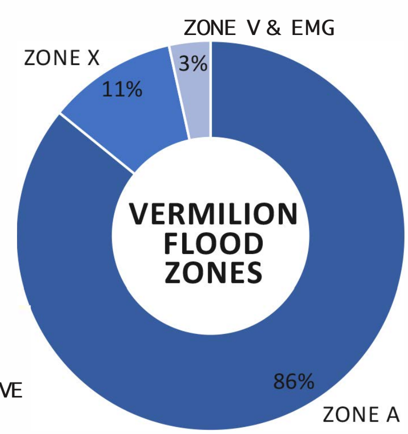
Attachment B



VERMILION PARISH	COUNT
RL PROPERTIES	496
INEXPENSIVE ($0–$20K)	466
MEDIUM $20K–$100K)	704
SEVERE ($100K & UP)	67
FLOOD ZONE A	425
FLOOD ZONE X (B,C)	53
FLOOD ZONE V	7
FLOOD ZONED	0
EMG*	10

*NOTE: EMG is before Initial FIRM Identified





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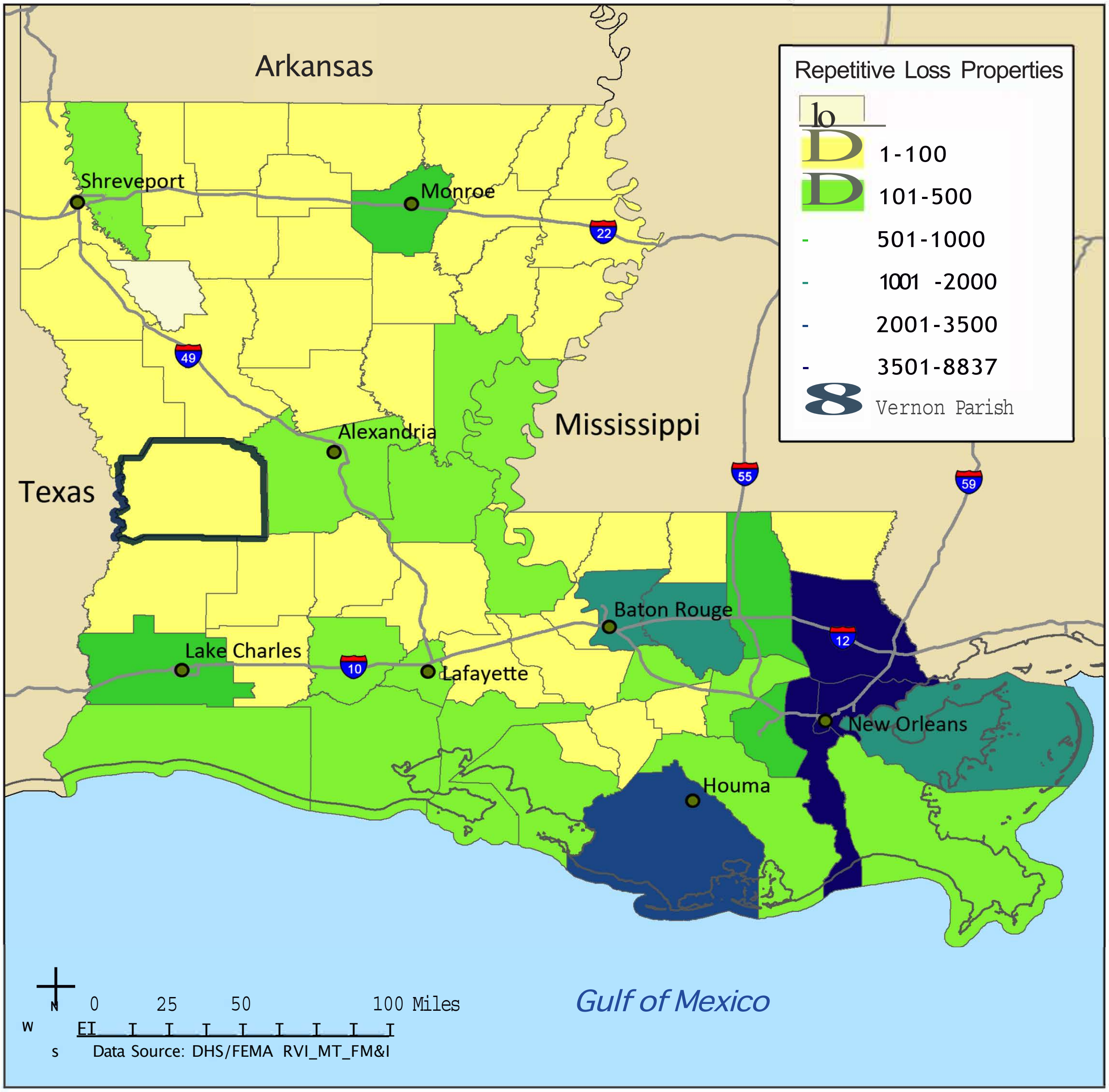
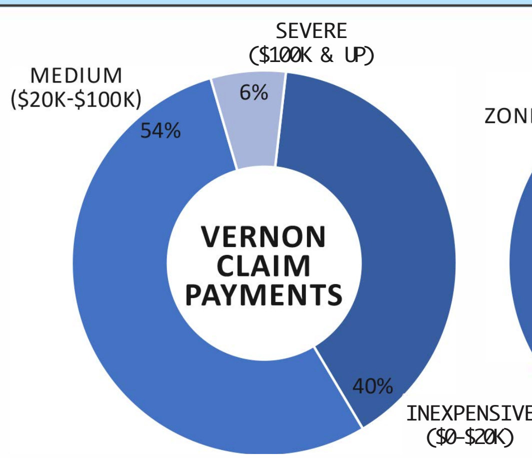
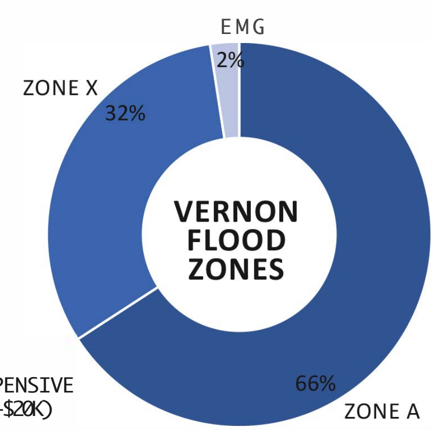
Attachment B



VERNON PARISH	COUNT
RL PROPERTIES	41
INEXPENSIVE ($0-$20K)	44
MEDIUM $20K-$100K)	60
SEVERE ($100K & UP)	7
FLOOD ZONE A	27
FLOOD ZONE X (B,C)	13
FLOOD ZONE V	0
FLOOD ZONE D	0
EMG*	1

*NOTE: EMG is before Initial FIRM Identified





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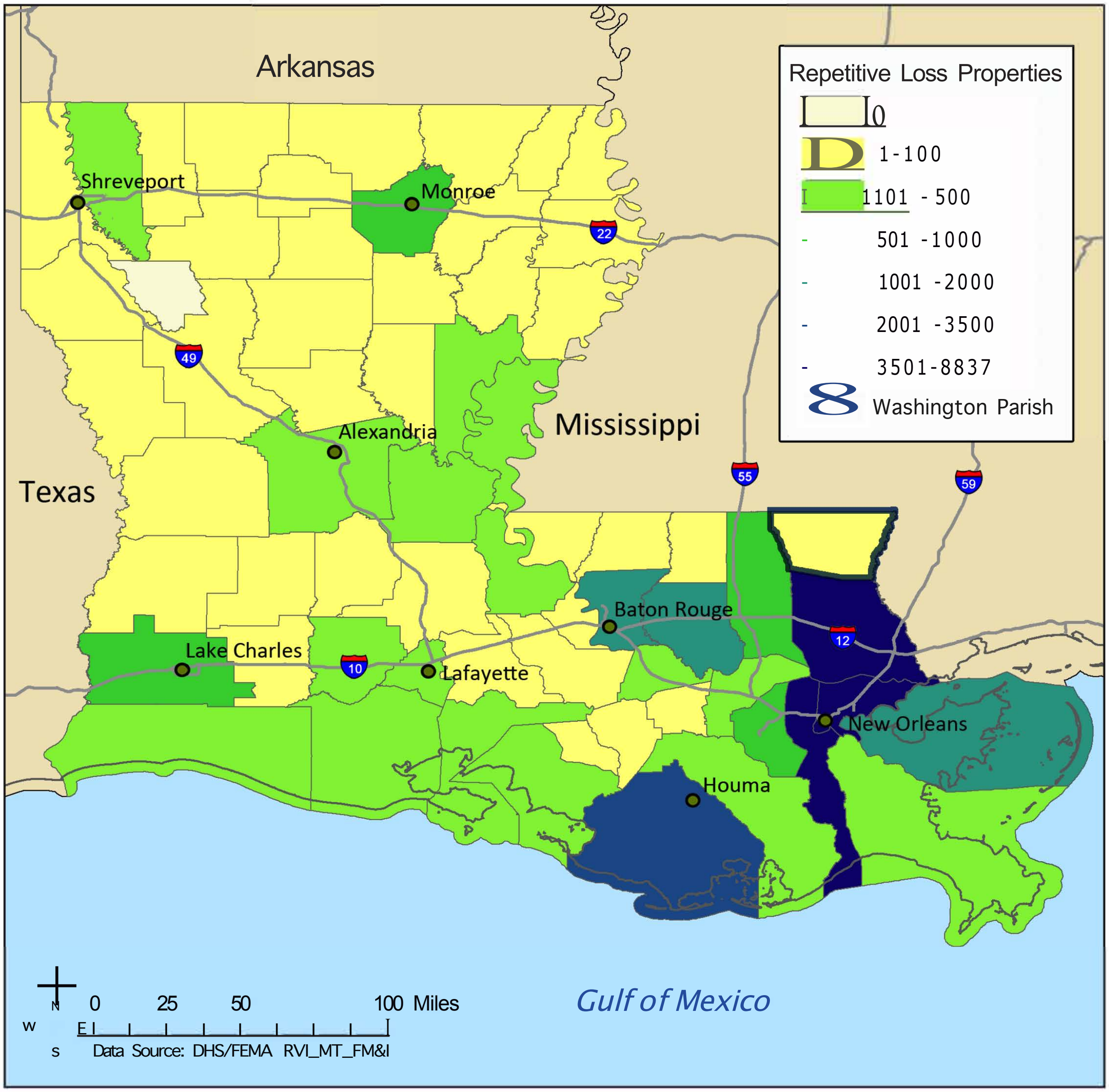
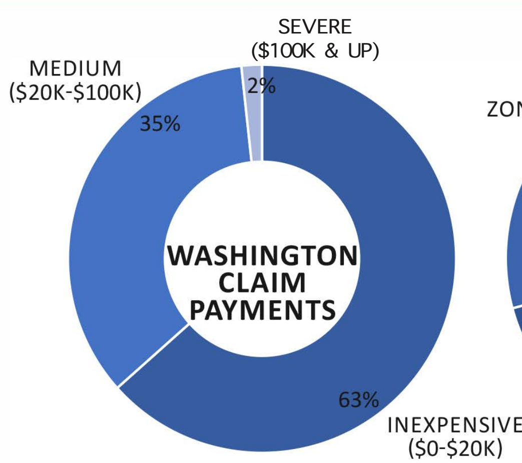
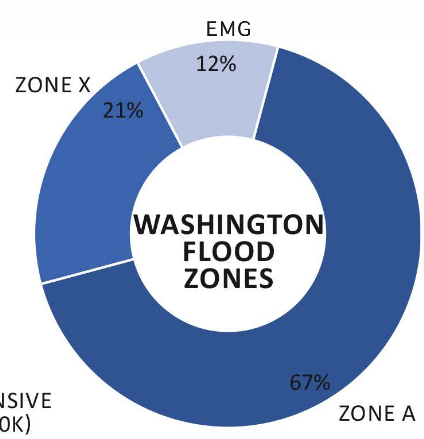
Attachment B



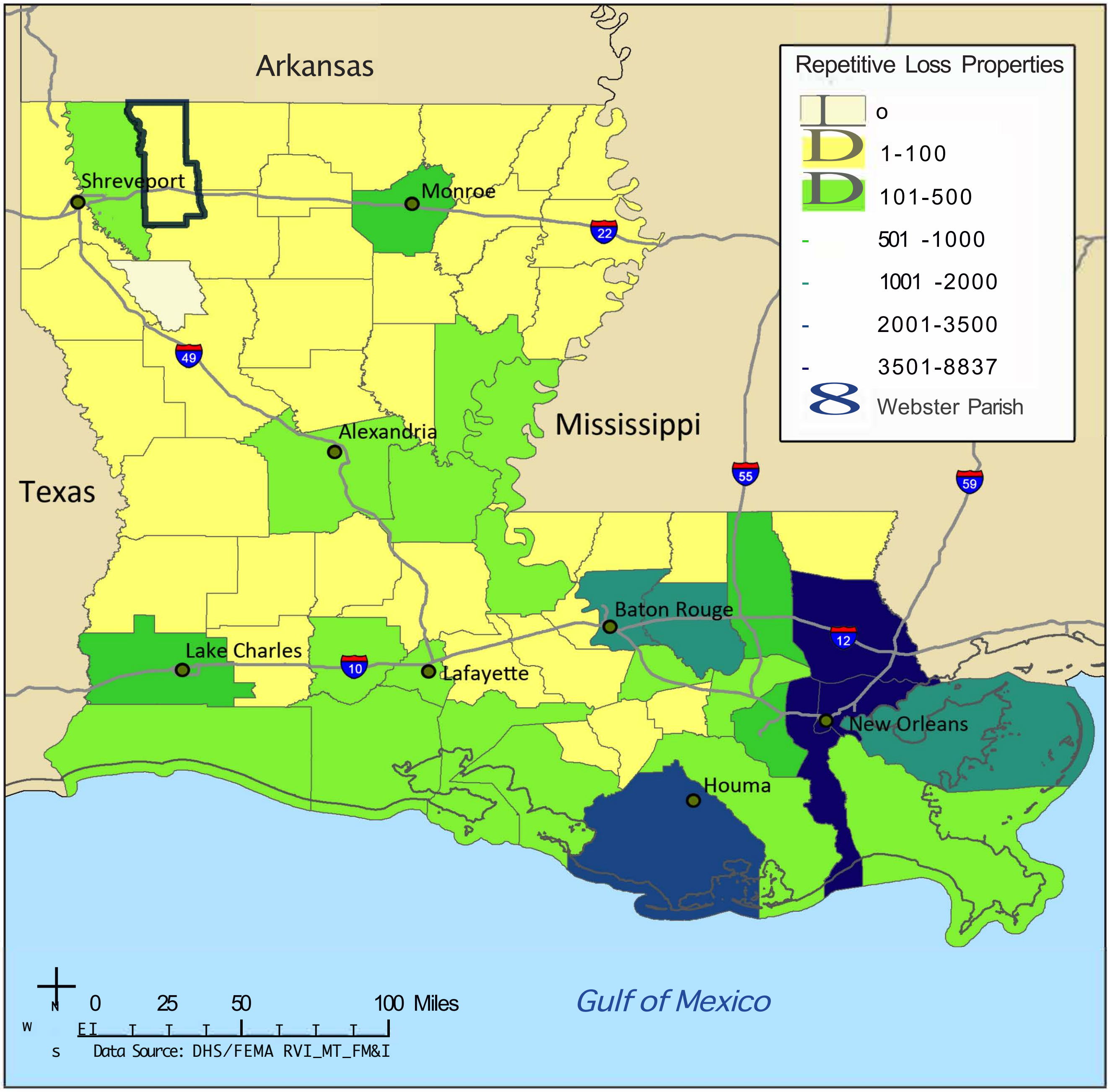
WASHINGTON PARISH	COUNT
RL PROPERTIES	86
INEXPENSIVE ($0-$20K)	149
MEDIUM $20K-$100K)	82
SEVERE ($100K & UP)	4
FLOOD ZONE A	56
FLOOD ZONE X (B,C)	18
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	10

*NOTE: EMG is before Initial FIRM Identified



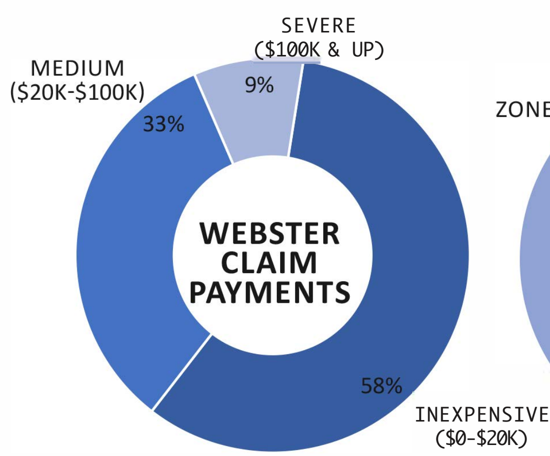


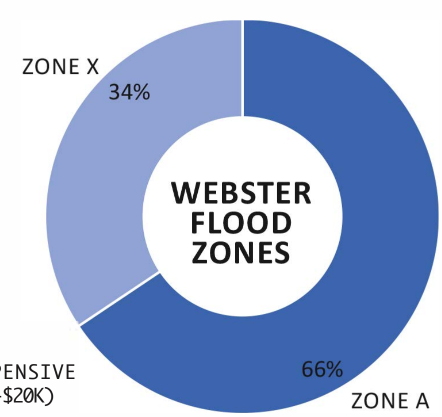
Attachment B



WEBSTER PARISH	COUNT
RL PROPERTIES	33
INEXPENSIVE ($0-$20K)	58
MEDIUM $20K-$100K)	33
SEVERE ($100K & UP)	9
FLOOD ZONE A	21
FLOOD ZONE X (B,C)	11
FLOOD ZONE V	0
FLOOD ZONE D	0
EMG*	0

*NOTE: EMG is before Initial FIRM Identified





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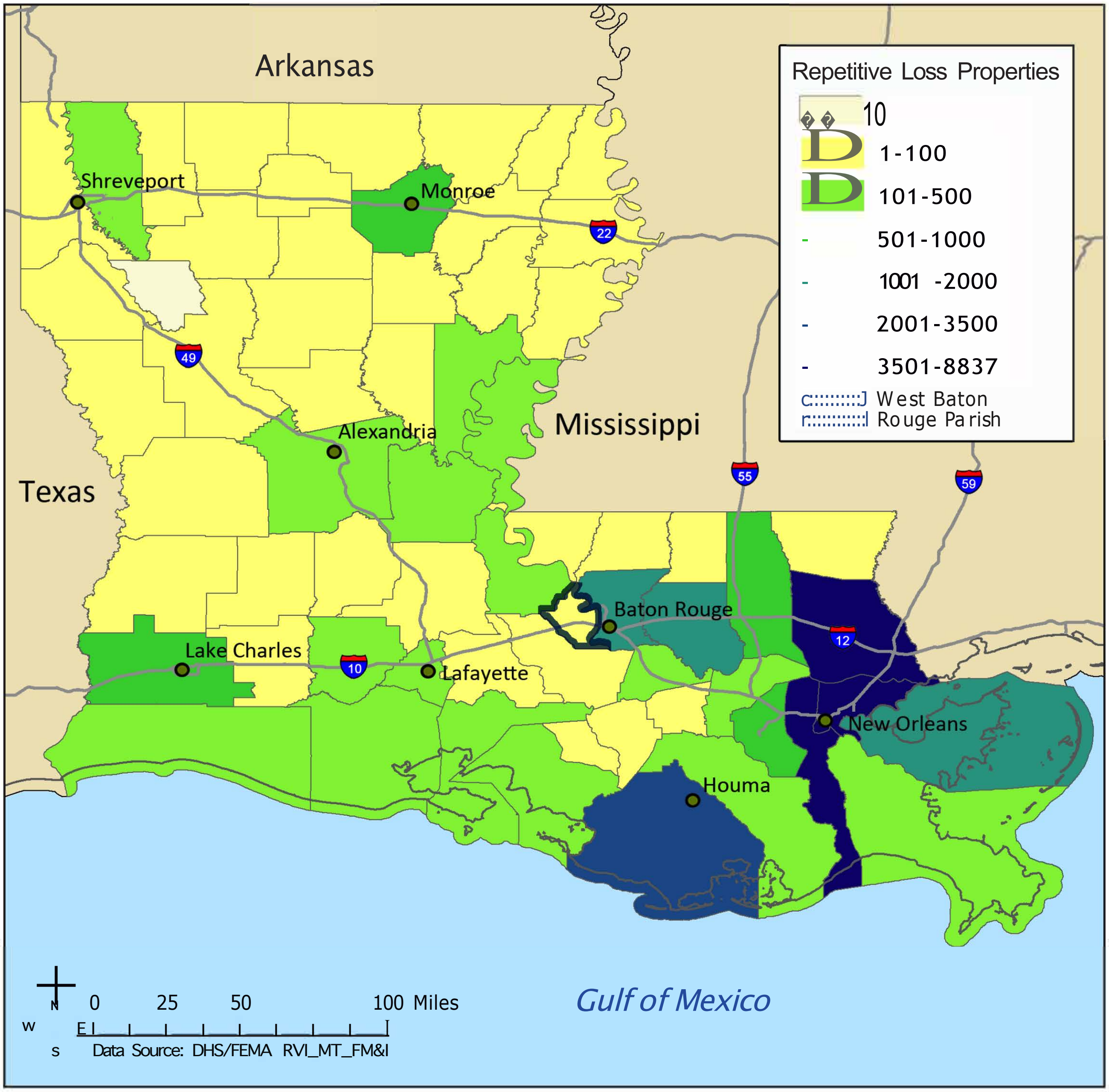
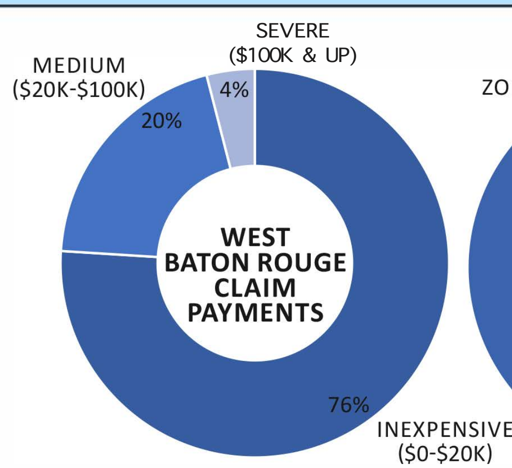
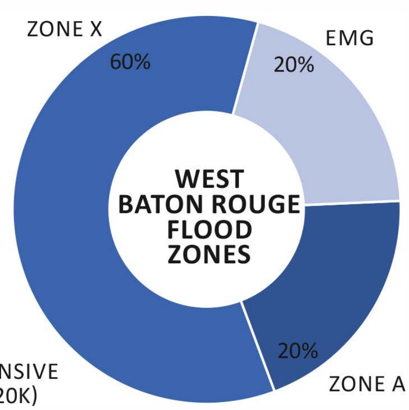
Attachment B



WEST BATON ROUGE PARISH	COUNT
RL PROPERTIES	20
INEXPENSIVE ($0-$20K)	38
MEDIUM $20K-$100K)	10
SEVERE ($100K & UP)	2
FLOOD ZONE A	4
FLOOD ZONE X (B,C)	12
FLOOD ZONE V	0
FLOOD ZONE D	0
EMG*	4

*NOTE: EMG is before Initial FIRM Identified





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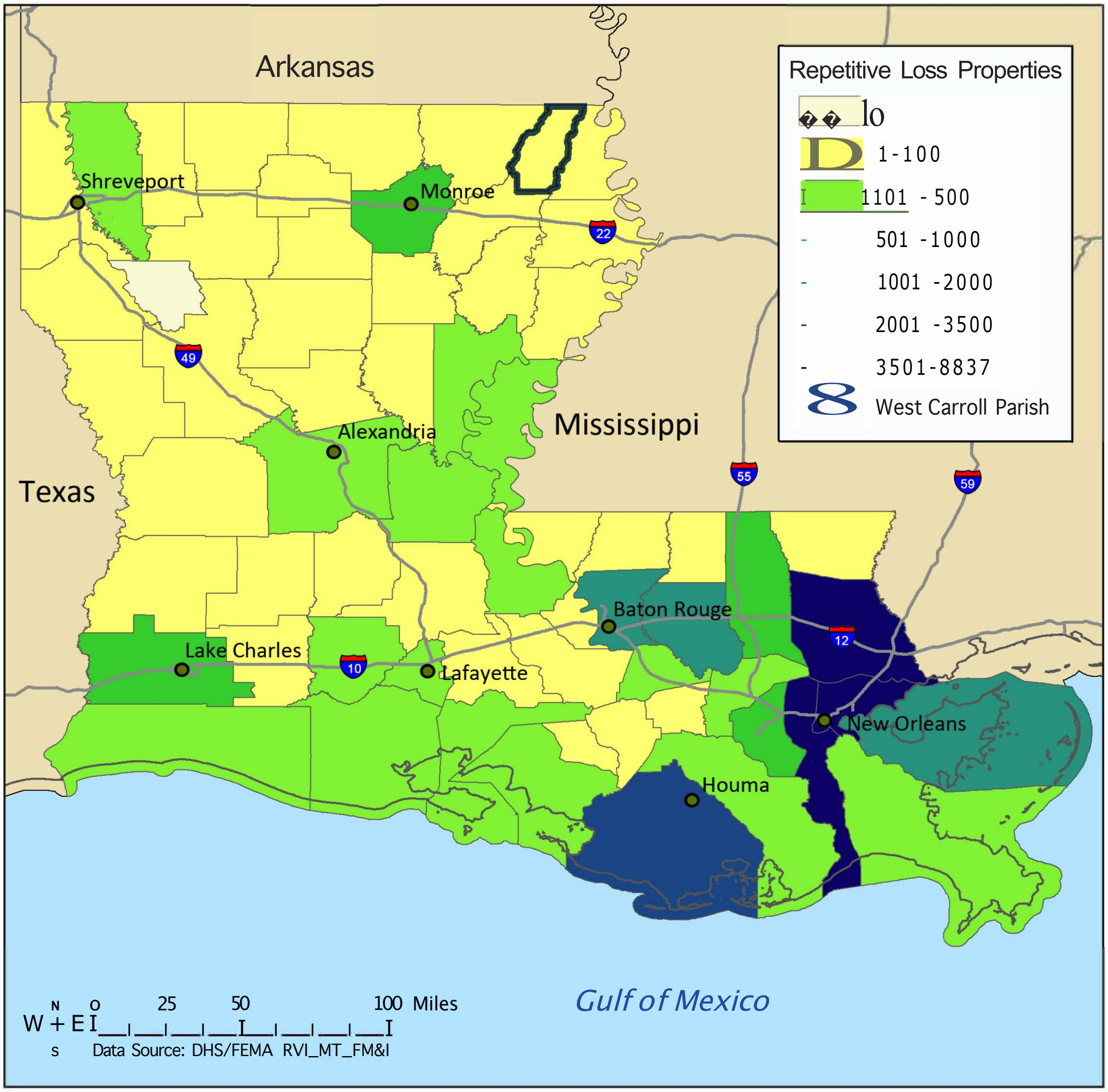
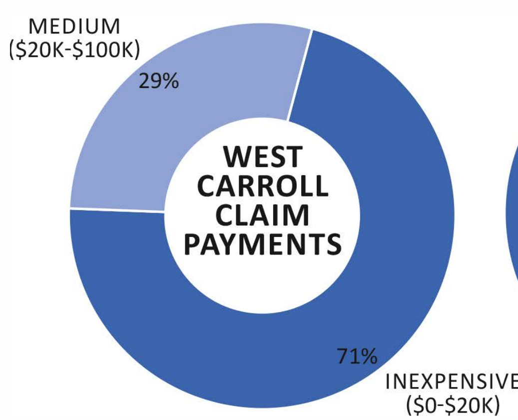
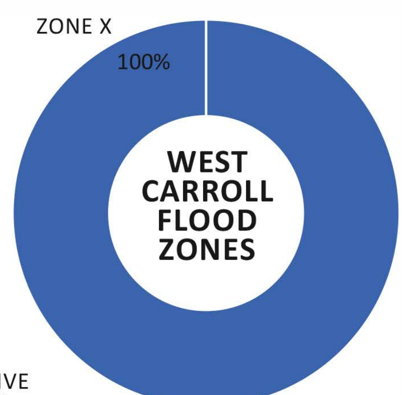
Attachment B



WEST CARROLL PARISH	COUNT
RL PROPERTIES	2
INEXPENSIVE ($0–$20K)	5
MEDIUM $20K–$100K)	2
SEVERE ($100K & UP)	0
FLOOD ZONE A	0
FLOOD ZONE X (B,C)	2
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	0

*NOTE: EMG is before Initial FIRM Identified





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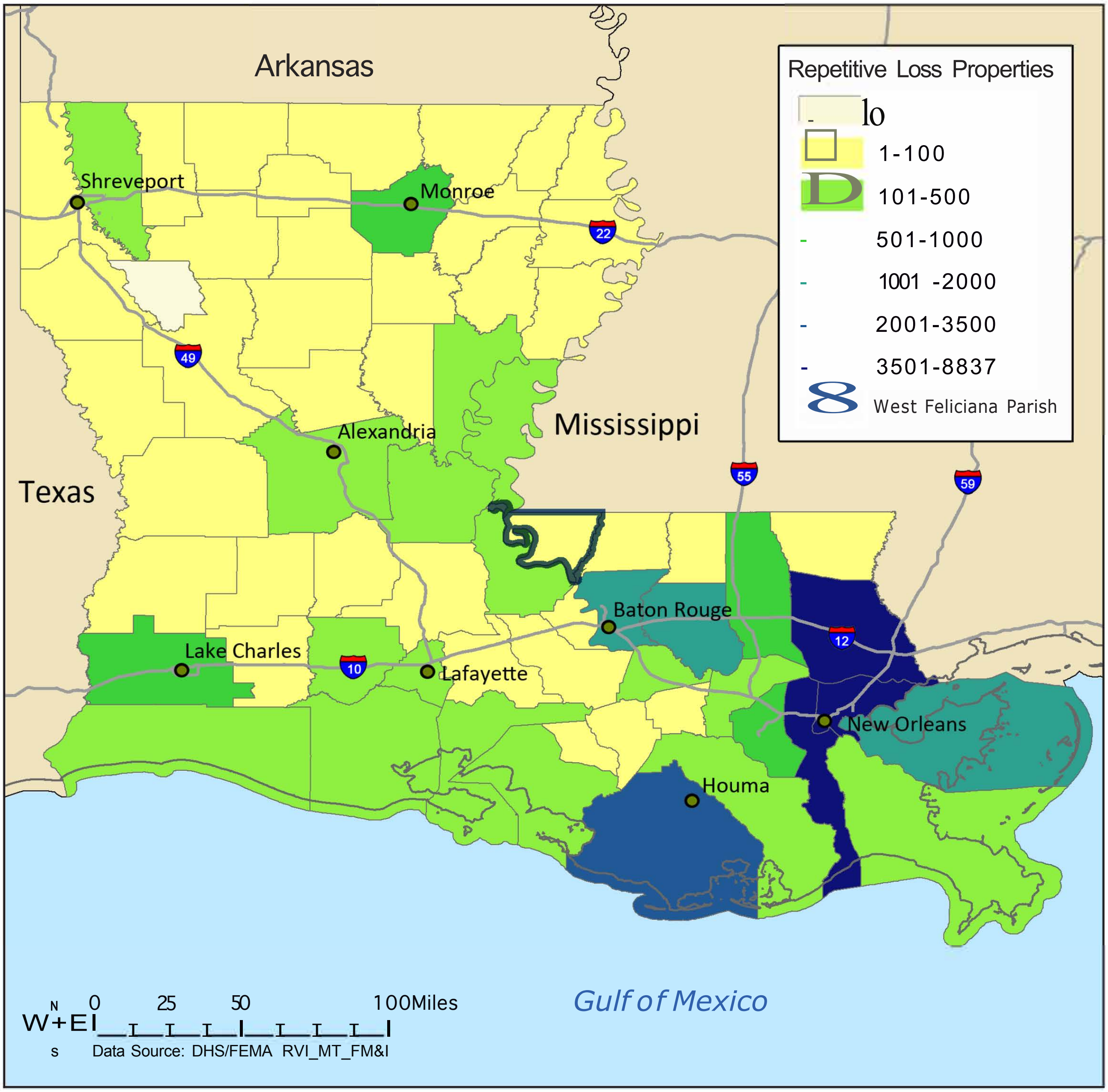
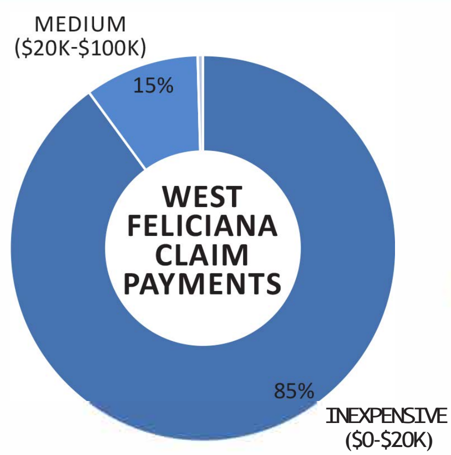
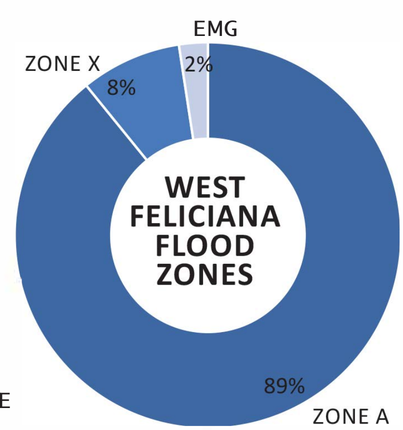
Attachment B



WEST FELICIANA PARISH	COUNT
RL PROPERTIES	83
INEXPENSIVE ($0-$20K)	216
MEDIUM $20K-$100K)	38
SEVERE ($100K & UP)	1
FLOOD ZONE A	74
FLOOD ZONE X (B,C)	7
FLOOD ZONE V	0
FLOOD ZONED	0
EMG*	2

*NOTE: EMG is before Initial FIRM Identified





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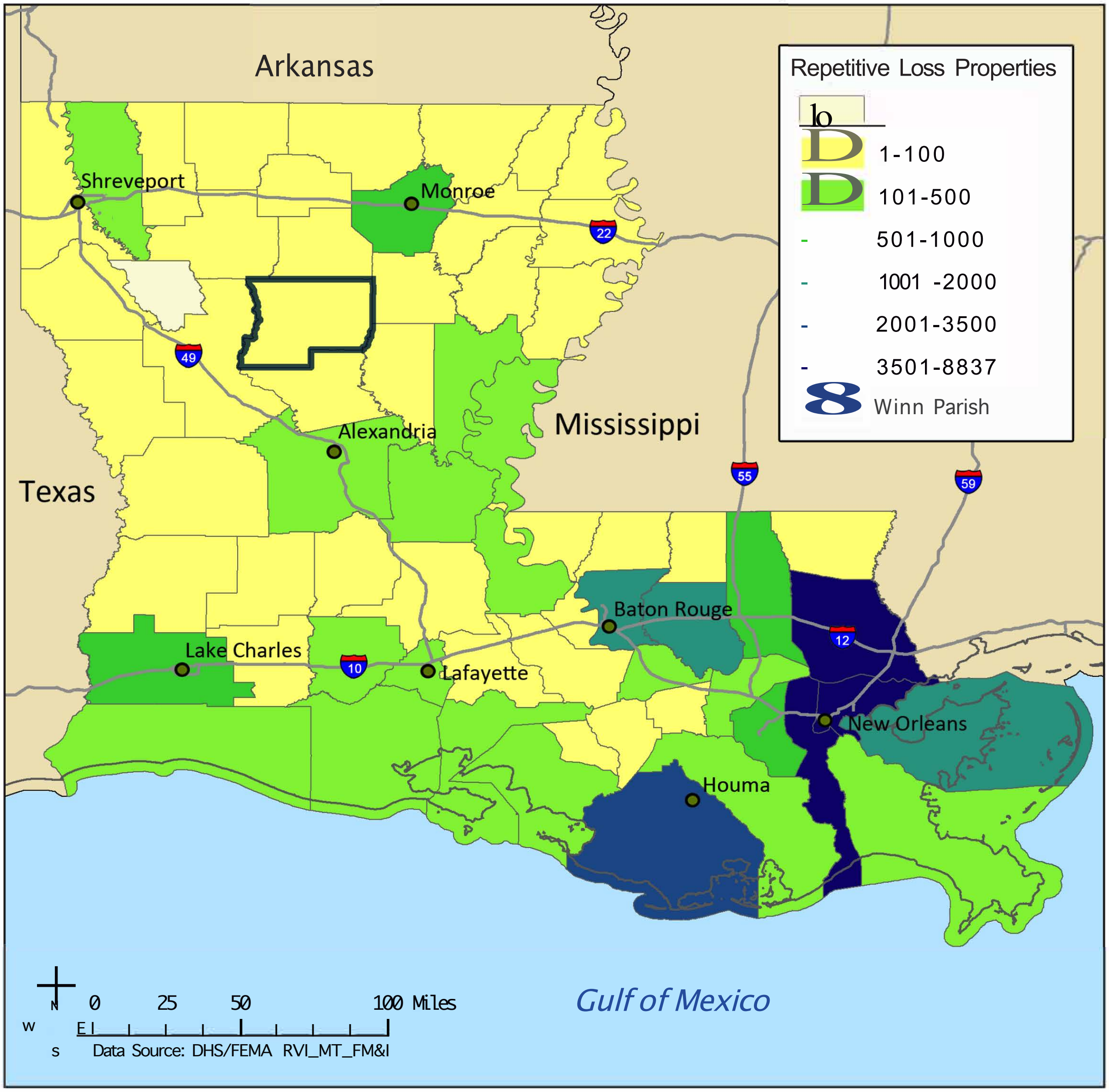
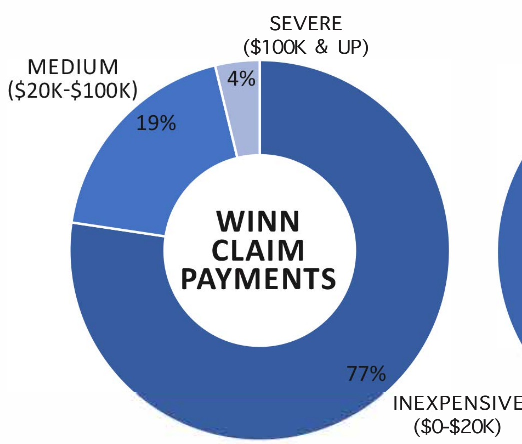
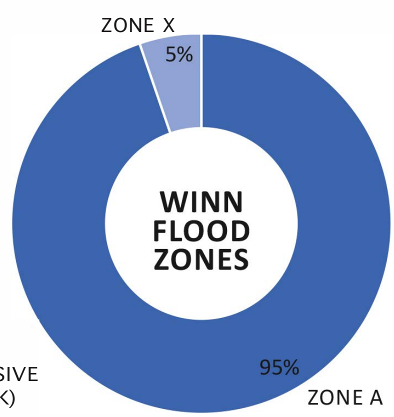
Attachment B



WINN PARISH	COUNT
RL PROPERTIES	19
INEXPENSIVE ($0-$20K)	41
MEDIUM $20K-$100K)	10
SEVERE ($100K & UP)	2
FLOOD ZONE A	18
FLOOD ZONE X (B,C)	1
FLOOD ZONE V	0
FLOOD ZONE D	0
EMG*	0

*NOTE: EMG is before Initial FIRM Identified





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Parish and Action Items	Mitigation Methods								Funding Source																			Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
Acadia Parish																																																															
A9: Repetitive Loss Structure Improvement	X	X	X	X			X		X																	X	X	X	X								X	X	X																	X							
A3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X	X	X						X	X	X																X	X								X	X																									X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X	X	X						X	X	X																X	X							X	X	X						X																			X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X	X	X						X	X	X																X	X							X	X	X						X																			X
E3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																X	X							X	X	X																									X
I3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																X	X							X	X	X																									X
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																X	X							X	X	X																									X
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
A2: Drainage Improvement					X					X	X	X																	X								X	X						X																			X
A5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X																	X
A10: Promote Flood Insurance								X		X	X	X																	X								X	X																									X
C2: Drainage Improvement					X					X	X	X																X	X								X	X						X																			X
C5: Education and Outreach								X		X	X	X																X	X								X	X	X	X					X	X																	X
C10: Promote Flood Insurance										X	X	X																X	X								X	X																									X
C2: Drainage Improvement					X					X	X	X																X	X								X	X						X																			X
C5: Education and Outreach								X		X	X	X																X	X								X	X	X	X					X	X																	X
C10: Promote Flood Insurance								X		X	X	X																X	X								X	X																									X
E2: Drainage Improvement					X					X	X	X																X	X								X	X						X																			X
E5: Education and Outreach								X		X	X	X																X	X								X	X	X	X					X	X																	X
E10: Promote Flood Insurance								X		X	X	X																X	X								X	X																									X
I2: Drainage Improvement					X					X	X	X																X	X								X	X						X																			X
I5: Education and Outreach								X		X	X	X																X	X								X	X	X	X					X	X																	X
I10: Promote Flood Insurance								X		X	X	X																X	X								X	X																									X
M2: Drainage Improvement										X	X	X																X	X								X	X						X																			X
M5: Education and Outreach								X		X	X	X																X	X								X	X	X	X					X	X																	X
M10: Promote Flood Insurance								X		X	X	X																X	X								X	X																									X
M2: Drainage Improvement					X					X	X	X																	X							X	X	X						X																			X
M5: Education and Outreach								X		X	X	X																	X							X	X	X	X	X					X	X																	X
M10: Promote Flood Insurance								X		X	X	X																	X							X	X	X																									X
R2: Drainage Improvement					X					X	X	X																	X							X	X	X						X																			X
R5: Education and Outreach								X		X	X	X																	X							X	X	X	X	X					X	X																	X
R10: Promote Flood Insurance								X		X	X	X																	X							X	X	X																									X
A10: Repetitive Loss Structure List (Allen Parish Unincorporated)						X																															X																					X					
A10: Repetitive Loss Structure List (Town of Elizabeth)						X																															X																					X					
A10: Repetitive Loss Structure List (Town of Kinder)						X																															X																					X					
A10: Repetitive Loss Structure List (Town of Oakdale)						X																															X																					X					
A10: Repetitive Loss Structure List (Town of Oberlin)						X																															X																					X					
A10: Repetitive Loss Structure List (Village of Reeves)						X																															X																					X					
A3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures (Allen Unincorporated)	X	X		X						X	X	X																	X								X	X																									X
E3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
K3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
O3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
O3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
Ascension Parish																																																															

Parish and Action Items	Mitigation Methods								Funding Source																			Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
S2: Sewer System; Drainage Project					X					X																											X	X																										X
A17: Elevate or acquire RL and SRL structures in flood zones and/or potential levee failure areas	X	X								X						X				X									X								X	X												X													X
D11: Elevate or acquire RL and SRL structures in flood zones and/or in potential levee failure areas	X	X								X						X				X									X							X	X	X												X							X						
G7: Elevate or acquire RL and SRL structures in flood zones and/or in potential levee failure areas	X	X								X						X				X									X							X	X	X												X													X
S6: Elevate or acquire RL and SRL structures in flood zones and/or potential levee failure areas	X	X								X						X				X									X							X	X	X												X													X
A3: Inter-Jurisdictional Flood Risk Assessments								X		X																			X								X	X																									X
A4: Storm Surge and Inundation Modeling								X		X		X																	X									X																									X
A9: Improve Stormwater Management Planning					X					X		X				X				X									X								X	X												X	X													X
A11: Water Works Generators								X		X																			X									X	X																								X
A12: Sewer Auxiliary Power								X		X																			X									X	X						X																			X
A13: General Population Shelter Auxiliary Power								X		X																			X									X		X					X																			X
A14: Retrofit Public Buildings								X																					X									X	X						X																			X
D8: Flood Risk – Infrastructure Improvements					X					X		X				X				X																X	X	X	X											X													X
D9: Bayou Stormwater Management								X		X		X				X				X																X	X	X																									X
D10: Pumping Stations at Lafourche Street and Railroad Tracks								X		X		X				X				X																X	X	X																									X
G3: Sandbagging Location Covers (Gonzales)								X		X		X																								X	X	X																									X
G4: Sewer Lift Station Generators								X		X																										X		X	X																								X
G5: Drainage System					X					X																										X	X																										X
S3: Drainage System					X					X																										X	X	X																									X
Assumption Parish																																																														
A13: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X					X																				X								X	X																									X
N6: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X					X																				X								X	X																									X
Beauregard Parish																																																														
No Action Items																																																														
B1: Drainage retrofit					X						X	X																				X		X			X	X	X																							X		
B2: Road improvements, including debris removal								X			X	X																				X		X			X	X	X						X																	X		
B3: Acquisition Projects		X																						X						X								X	X																					X					
B4: Elevation Projects	X										X	X																		X			X					X	X																									X		
B5: Relocation Projects		X									X	X																		X			X					X	X																									X		
B7: Implementation of public programs and initiatives								X			X	X																				X					X	X	X						X	X	X	X				X										X		
B12: Capital improvement projects - drainage improvement					X						X	X													X							X					X	X	X																								X		
D2: Drainage retrofit											X	X																				X				X	X	X	X																								X		
D4: Acquisition Projects		X									X	X																		X							X	X	X																									X		
D5: Elevation Projects	X										X	X																		X			X				X	X	X																									X		
D6: Relocation projects		X									X	X																									X	X	X																									X		
D7: Implementation of public programs and initiatives								X			X	X																				X					X	X	X					X	X	X	X	X				X										X		
D10: Capital improvments projects - drainage improvement					X						X	X													X							X				X	X	X	X																								X		
M2: Drainage retrofit											X	X																				X				X	X	X	X																								X		
M4: Acquisition Projects		X									X	X																		X							X	X	X																									X		
M5: Elevation Projects	X										X	X																		X			X				X	X	X																									X		
M6:Relocation projects											X	X																		X			X				X	X	X																									X		
M12: Capital improvement projects - drainage improvement					X						X	X																				X				X	X	X	X																								X		
Bienville Parish																																																														
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
A3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X

Appendix E Attachment A-3

Parish and Action Items	Mitigation Methods									Funding Source																		Responsible Party										Hazard																			Status							
	Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X								X	X																									X
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X								X	X																									X
J3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X								X	X																									X
L3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X								X	X																									X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X								X	X																									X
Bossier Parish																																																																
B6: Remove Repetitive Loss Structures			X							X		X																				X			X			X																						X				
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X								X	X											X	X													X
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X								X	X											X	X													X
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X								X	X											X	X													X
H3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X								X	X											X	X													X
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X								X	X											X	X													X
Caddo Parish																																																																
C6: Acquire Structures			X							X														X											X			X																						X				
B2: Removing Flood Prone Properties			X																					X					X			X						X																						X				
S5: Repetitive Loss Properties			X																					X			X		X			X			X			X																						X				
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structure		X	X		X						X	X	X																	X								X	X											X	X													X
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X							X	X	X											X	X													X
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X							X	X	X											X	X													X
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X							X	X	X											X	X													X
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X							X	X	X											X	X													X
H3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X							X	X	X											X	X													X
I3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X							X	X	X											X	X													X
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X							X	X	X											X	X													X
O3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X							X	X	X											X	X													X
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structure		X	X		X						X	X	X																	X							X	X	X											X	X													X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X							X	X	X											X	X													X
V3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structure		X	X		X						X	X	X																	X							X	X	X											X	X													X
Calcasieu Parish																																																																
6: City of Westlake - Rep loss Acquisition		X	X								X	X	X																	X								X																				X	X						
8: City of Lake Charles - Flood Damage, Acquisitions, Elevations, Relocations		X	X														X				X	X	X		X										X																							X						
CP3 Flood Mitigation of Severe Repetitive Loss and Repetitive Loss Properties and Other Hazard Prone Structures		X	X		X							X	X																							X		X	X				X																					X

3

Parish and Action Items	Mitigation Methods									Funding Source																			Responsible Party									Hazard																			Status							
	Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
D3 Flood mitigation of severe repetitive loss and repetitive loss properties and other hazard prone structures		X	X		X							X	X																	X							X	X	X																										X
S3 Flood mitigation of severe repetitive loss and repetitive loss properties and other hazard prone structures		X	X		X							X	X																	X							X	X	X				X																						X
V3 Flood mitigation of severe repetitive loss and repetitive loss properties and other hazard prone structures		X	X		X							X	X																	X							X	X	X				X																						X
W3 Flood mitigation of severe repetitive loss and repetitive loss properties and other hazard prone structures		X	X		X							X	X																	X							X	X	X				X																						X
W3 Flood mitigation of severe repetitive loss and repetitive loss properties and other hazard prone structures		X	X		X							X	X																	X							X	X	X																										X
LC4 Residential elevations and acquisitions for repetitive loss properties and severe repetitive loss properties		X	X		X						X																										X	X	X				X																						X
Caldwell Parish																																																																
C7: Elevation, Acquisition, and Flood Proofing of Loss Structure		X	X	X				X		X																							X						X																					X					
C8: Interior Drainage Project						X					X		X			X	X	X	X	X									X				X	X					X																						X				
C26: Flood Proofing Projects		X	X	X		X		X			X		X			X	X	X	X	X												X						X	X	X										X	X									X				
C27: Interior Drainage Project						X					X		X			X	X	X	X	X																		X	X	X										X	X									X				
C28: Flood Proofing		X	X	X				X			X		X			X	X	X	X	X												X						X	X	X										X	X								X					
C29: Interior Drainage						X					X		X			X	X	X	X	X												X	X					X	X	X						X				X	X								X					
G23: Flood Solution Projects		X	X	X				X			X		X			X	X	X	X	X												X						X	X	X										X	X								X					
G24: Interior Drainage Project						X					X		X			X	X	X	X	X												X	X					X	X	X						X				X	X													X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X							X	X																										X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X							X	X																										X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X		X						X	X	X																	X							X	X																										X
C2: Drainage Improvement						X					X	X	X																	X							X	X																										X
C5: Education and Outreach									X		X	X	X																	X							X	X	X	X					X	X			X	X		X												X
C10: Promote Flood Insurance									X		X	X	X																	X							X	X											X															X
C11: Dam Failure Working Group									X		X	X	X																X	X								X												X															X
C2: Drainage Improvement						X					X	X	X																	X							X	X	X																										X
C5: Education and Outreach									X		X	X	X																	X							X	X	X	X					X	X			X	X		X												X
C10: Promote Flood Insurance									X		X	X	X																	X							X	X											X															X
C11: Dam Failure Working Group									X		X	X	X																X	X								X												X															X
C2: Drainage Improvement						X					X	X	X																	X							X	X	X																										X
C5: Educationand Outreach									X		X	X	X																	X							X	X	X	X					X	X			X	X		X												X
C10: Promote Flood Insurance									X		X	X	X																	X							X	X											X															X
C11: Dam Failure Working Group									X		X	X	X																X	X								X												X															X
G2: Drainage Improvement						X					X	X	X																	X							X	X	X																										X
G5: Education and Outreach									X		X	X	X																	X							X	X	X	X					X	X			X	X		X												X
G10: Promote Flood Insurance									X		X	X	X																	X							X	X											X															X
G11: Dam Failure Working Group									X		X	X	X																X	X								X												X															X
Cameron Parish																																																																
Action 4 - Elevation of Severe Repetitive Loss Properties		X										X	X																	X			X					X	X			X																							X
Action 2 - Drainage Improvements						X						X	X																				X					X	X			X																							X
Action 3 - Acquisitions			X									X	X																	X								X	X			X																							X
Acquisitions												X																					X					X	X			X															X							
Elevation of properties		X										X	X																				X					X	X			X															X							
Reduce future development									X			X	X																	X								X	X			X															X							
Catahoula Parish																																																																
C1: Drainage Projects						X					X		X			X	X	X	X	X												X	X					X	X																										X
C2: Flood Proofing Projects		X	X	X						X																		X			X					X				X	X																										X
C9: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures		X	X		X					X																		X						X			X		X	X																										X
H1: Drainage Projects						X					X		X			X	X	X	X	X												X	X					X	X																										X
H2: Flood Proofing Projects		X	X	X						X															X			X			X				X				X	X																										X
H9: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structure		X	X		X					X															X			X						X			X		X	X																										X
J1: Drainage Projects						X					X		X			X	X	X	X	X												X	X					X	X																										X
J2: Flood Proofing Projects		X	X	X						X															X			X			X				X				X	X																										X
J9: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures		X	X		X					X															X			X						X			X		X	X																										X

4

Appendix E

Attachment A-5

Parish and Action Items	Mitigation Methods								Funding Source																		Responsible Party										Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
S1: Drainage Projects					X					X		X			X	X	X	X	X													X			X		X	X																										X
S2: Flood Proofing Projects	X	X	X						X														X			X			X				X				X	X																										X
S9: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X					X														X			X						X			X		X	X																										X
C3: Master Drainage Plan					X				X																	X			X				X				X	X																										X
H3: Master Drainage Plan					X				X																	X						X					X	X																										X
J3: Master Drainage Plan					X				X																	X						X					X	X																										X
S3: Master Drainage Plan					X				X																	X						X					X	X																										X
Claiborne Parish																																																															
C8: Property Acquisition		X								X						X				X	X	X							X	X							X	X	X										X	X							X						
A7: Property Acquisition		X								X						X				X	X	X							X	X						X	X	X	X										X	X							X						
H8: Property Acquisition		X								X						X				X	X	X							X	X						X	X	X	X										X	X							X						
H7: Property Acquisition		X								X						X				X	X	X							X	X						X	X	X	X										X	X							X						
L7: Property Acquisition		X								X						X				X	X	X							X	X						X	X	X	X										X	X							X						
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structure	X	X		X						X	X	X																	X								X	X																										X
A3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X																												X
H3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																										X
H3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structure	X	X		X						X	X	X																	X							X	X	X																										X
L3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																										X
C18: Structure and Infrastructure Elevation	X									X						X				X	X	X							X	X							X	X	X										X	X							X						
C24: Relocate Flood Prone Properties		X								X						X				X	X	X							X	X							X	X	X										X	X							X						
A17: Structure and Infrastructure Elevation	X									X						X				X	X	X							X	X						X	X	X	X										X	X							X						
A17: Structure and Infrastructure Elevation		X								X						X				X	X	X							X	X						X	X	X	X										X	X							X						
H18: Structure and Infrastructure Elevation	X									X						X				X	X	X							X	X							X	X	X										X	X							X						
H24: Relocate Flood Prone Properties		X								X						X				X	X	X							X	X							X	X	X										X	X							X						
H17: Structure and Infrastructure Elevation	X									X						X				X	X	X							X	X						X	X	X	X										X	X							X						
H22: Relocate Flood Prone Properties		X								X						X				X	X	X							X	X							X	X	X										X	X							X						
L17: Structure and Infrastructure Elevation	X									X						X				X	X	X							X	X							X	X	X										X	X							X						
L23: Relocate Flood Prone Properties		X								X						X				X	X	X							X	X							X	X	X										X	X							X						
Concordia Plan																																																															
C14: Feasibility Study	X	X	X																										X																																X			
C35: Drainage Project Study					x																								X																													X					
C42: Flood Mitigation Priority System	X	X		X						X	X	X																	X								X	X																										X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
F3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
V3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
Desoto Parish																																																															
D10: Elevate Repetitive Loss Home	X									X						X				X	X	X								X							X												X								X						
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
K3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
L3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X

5

Parish and Action Items	Mitigation Methods								Funding Source																			Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
L3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
East Carroll Plan																																																														
E14: Community Program for Repetitive Loss Structures	X	X		X						X						X												X	X								X																							X			
E3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X																		X								X	X											X														X
L3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X																	X	X								X	X											X														X
East Feliciana Parish																																																														
E3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
J3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
N3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
East Baton Rouge Parish																																																														
E10: New Initiatives				X																			X						X								X	X	X						X														X				
E13: Repetitive Loss Reconstruction Projects	X	X	X	X			X		X														X						X		X						X	X	X																		X						
B6: New Initiatives				X																			X						X								X	X	X						X												X						
B10: Repetitive Loss Reconstruction Projects	X	X	X	X			X					X											X						X		X						X	X	X																			X					
C6: New Initiatives				X																			X						X								X	X	X						X														X				
C10: Repetitive Loss Reconstruction Projects	X	X	X	X			X					X											X						X		X						X	X	X																				X				
B6: New Initiatives				X																			X						X								X	X	X						X														X				
B10: Repetitive Loss Reconstruction Projects	X	X	X	X			X					X											X						X		X						X	X	X																		X						
Z6: New Initiatives				X																			X						X								X	X	X						X												X						
Z10: Repetitive Loss Reconstruction Projects	X	X	X	X			X					X											X						X		X						X	X	X																		X						
E3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X											X	X													X
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X											X	X													X
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X											X	X													X
Z3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X											X	X													X
Evangeline Parish																																																														
E9: Pursue Flood Mitigation of Repetitive Loss Property	X	X		X					X														X						X								X		X																				X				
E3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X

Parish and Action Items

Mitigation Methods

Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
T3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
V3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
Franklin Parish								
F5: Implementing New Initiatives				X				
F10: Flood Preparation	X	X	X	X			X	
F3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
Grant Parish								
G1: Flood Proofing	X	X	X				X	
G15: Interior Drainage Projects					X			
C1: Drainage Way Improvement					X			
C3: Repetitive Loss Structures	X	X	X					
C1: Drainage Way Improvement					X			
C3: Repetitive Loss Structures	X	X	X					
D1: Drainage Way Improvement					X			
D3: Repetitive Loss Structures	X	X	X					
G3: Repetitive Loss Structures	X	X	X					
M1: Drainage Way Improvement					X			
M3: Repetitive Loss Structures	X	X	X					
P1: Drainage Way Improvement					X			
P3: Repetitive Loss Structures	X	X	X					
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
Iberia Parish								
I9: Acquisition/Reconstruction of Repetitive Loss Properties		X		X				
I10: Elevation of Repetitive Loss Structures	X							
D5: Acquisition/Reconstruction of Repetitive Loss Properties	X			X				
D6: Elevation of Repetitive Loss Structures	X							
D9: Relocation of Town of Delcambre Fire Department		X						

Funding Source

Action Items	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
T3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
V3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
Franklin Parish																			
F5: Implementing New Initiatives															X				
F10: Flood Preparation	X	X																	
F3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
Grant Parish																			
G1: Flood Proofing	X																		
G15: Interior Drainage Projects		X		X			X	X	X	X	X								
C1: Drainage Way Improvement															X			X	
C3: Repetitive Loss Structures		X					X								X				
C1: Drainage Way Improvement															X			X	
C3: Repetitive Loss Structures		X					X								X				
D1: Drainage Way Improvement															X			X	
D3: Repetitive Loss Structures		X					X								X				
G3: Repetitive Loss Structures		X					X								X				
M1: Drainage Way Improvement															X			X	
M3: Repetitive Loss Structures		X					X								X				
P1: Drainage Way Improvement															X			X	
P3: Repetitive Loss Structures		X					X								X				
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X					X								X				
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
Iberia Parish																			
I9: Acquisition/Reconstruction of Repetitive Loss Properties		X															X		
I10: Elevation of Repetitive Loss Structures		X																	
D5: Acquisition/Reconstruction of Repetitive Loss Properties		X															X		
D6: Elevation of Repetitive Loss Structures		X																	
D9: Relocation of Town of Delcambre Fire Department		X																	

Responsible Party

Action Items	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
T3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
V3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
Franklin Parish									
F5: Implementing New Initiatives		X							
F10: Flood Preparation				X					
F3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X							
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X							
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X							
Grant Parish									
G1: Flood Proofing				X					
G15: Interior Drainage Projects				X	X				
C1: Drainage Way Improvement					X				
C3: Repetitive Loss Structures	X	X							
C1: Drainage Way Improvement	X				X				
C3: Repetitive Loss Structures	X	X							
D1: Drainage Way Improvement	X				X				
D3: Repetitive Loss Structures	X	X							
G3: Repetitive Loss Structures	X	X							
M1: Drainage Way Improvement	X				X				
M3: Repetitive Loss Structures	X	X							
P1: Drainage Way Improvement	X				X				
P3: Repetitive Loss Structures	X	X							
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
Iberia Parish									
I9: Acquisition/Reconstruction of Repetitive Loss Properties								X	
I10: Elevation of Repetitive Loss Structures								X	
D5: Acquisition/Reconstruction of Repetitive Loss Properties								X	X
D6: Elevation of Repetitive Loss Structures								X	X
D9: Relocation of Town of Delcambre Fire Department									X

Hazard

Action Items	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X																	
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X																	
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X																	
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X																	
T3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X																	
V3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X																	
Franklin Parish																			
F5: Implementing New Initiatives	X	X	X						X										
F10: Flood Preparation	X	X	X																
F3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X											X	X					
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X											X	X					
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X											X	X					
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X											X	X					
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X											X	X					
Grant Parish																			
G1: Flood Proofing	X	X	X																
G15: Interior Drainage Projects																			
C1: Drainage Way Improvement																			
C3: Repetitive Loss Structures	X	X	X																
C1: Drainage Way Improvement	X	X	X																
C3: Repetitive Loss Structures	X	X	X																
D1: Drainage Way Improvement	X	X	X																
D3: Repetitive Loss Structures	X	X	X																
G3: Repetitive Loss Structures	X	X	X																
M1: Drainage Way Improvement	X	X	X																
M3: Repetitive Loss Structures	X	X	X																
P1: Drainage Way Improvement	X	X	X																
P3: Repetitive Loss Structures	X	X	X																
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X																	
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X																	
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X																	
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X																	
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X																	
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X																	
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X																	
Iberia Parish																			
I9: Acquisition/Reconstruction of Repetitive Loss Properties	X																		
I10: Elevation of Repetitive Loss Structures	X	X			X									X					
D5: Acquisition/Reconstruction of Repetitive Loss Properties	X	X			X									X					
D6: Elevation of Repetitive Loss Structures	X	X																	
D9: Relocation of Town of Delcambre Fire Department	X	X			X									X					

Status

Action Items	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
T3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
V3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
Franklin Parish								
F5: Implementing New Initiatives		X						
F10: Flood Preparation	X							
F3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
Grant Parish								
G1: Flood Proofing				X				
G15: Interior Drainage Projects				X				
C1: Drainage Way Improvement				X				
C3: Repetitive Loss Structures				X				
C1: Drainage Way Improvement				X				
C3: Repetitive Loss Structures				X				
D1: Drainage Way Improvement				X				
D3: Repetitive Loss Structures				X				
G3: Repetitive Loss Structures				X				
M1: Drainage Way Improvement				X				
M3: Repetitive Loss Structures				X				
P1: Drainage Way Improvement				X				
P3: Repetitive Loss Structures				X				
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
Iberia Parish								
I9: Acquisition/Reconstruction of Repetitive Loss Properties							X	
I10: Elevation of Repetitive Loss Structures							X	
D5: Acquisition/Reconstruction of Repetitive Loss Properties							X	
D6: Elevation of Repetitive Loss Structures							X	
D9: Relocation of Town of Delcambre Fire Department							X	

Parish and Action Items	Mitigation Methods								Funding Source																			Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
J2: Acquisition/Reconstruction of Repetitive Loss Properties		X		X						X															X											X		X	X												X													X	
J3: Elevation of Repetitive Loss Structures	X									X																									X		X	X																									X	
L2: Acquisition/Reconstructio n of Repetitive Loss Properties		X		X						X															X											X		X	X			X								X	X												X	
L3: Elevation of Repetitive Loss Structures	X									X																									X		X	X			X								X	X												X	
N2: Acquisition/Reconstructio n of Repetitive Loss Properties		X		X						X															X											X	X	X	X			X								X	X												X	
N3: Elevation of Repetitive Loss Structures	X									X																									X	X	X	X																									X	
NI-2.18: Acquisition of Repetitive Loss Structures		X								X		X				X				X	X	X															X	X	X			X									X												X	
NI-2.15: Elevation of Flood	X									X		X				X				X	X	X															X	X	X																									X	
Iberville Parish																																																															
I6: Repetitive Loss Structures	X	X		X						X																									X	X																					X						
P5: Repetitive Loss Structures	X	X		X						X																									X	X																				X							
I3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X									X	X											X		X														X
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X									X	X											X		X														X
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X									X	X											X		X														X
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X									X	X											X		X														X
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X									X	X											X		X														X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X									X	X											X		X														X
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X									X	X											X		X														X
Jefferson Davis Parish																																																															
J8: Repetitive Loss Acquisition		X								X																			X						X	X	X												X										X				
J3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X									X	X																											X
E3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X									X	X																											X
F3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X									X	X																											X
J3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X									X	X																											X
L3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X									X	X																											X
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X									X	X																											X
Jefferson Parish																																																															
F-1 G1 Jefferson Parish	X	X	X								X													X											X																													
F-2 G3 Jefferson Parish								X		X	X							X	X					X											X																													
F-3 G2 Jefferson Parish								X			X													X																																							
F-4 G1 Jefferson Parish					X						X								X					X																																							
F-5 G4 Jefferson Parish								X																											X																													
F-6 G2 Jefferson Parish								X																										X	X																						X						
F-7 G1 Jefferson Parish					X																			X											X																													
F-8 G2, G4 Jefferson Parish								X																X											X																													
F-9 G4 Jefferson Parish								X																											X																						X						
F-10 G1 Jefferson Parish								X											X					X											X																													
F-1 G1 Gretna	X	X	X								X													X											X																													
F-2 G3 Gretna								X		X	X							X	X					X											X																													
F-3 G2 Gretna								X			X													X																																							
F-4 G1 Gretna					X						X								X					X											X																													
F-5 G4 Gretna								X																											X																													
F-6 G2 Gretna								X																										X	X																						X						
F-7 G1 Gretna					X																			X											X																													
F-8 G2, G4 Gretna								X																X											X																													
F-1 G1 Harahan	X	X	X								X													X											X																													
F-2 G3 Harahan								X		X	X							X	X					X											X																													
F-3 G2 Harahan								X			X													X																																							
F-4 G1 Harahan					X						X								X					X											X																													

Parish and Action Items	Mitigation Methods								Funding Source																			Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
F-5 G4 Harahan								X																											X																													
F-6 G2 Harahan								X																										X	X																						X						
F-7 G1 Harahan					X																			X											X																													
F-1 G1 City of Kenner	X	X	X								X													X											X																													
F-2 G3 City of Kenner								X		X	X							X	X					X											X																													
F-3 G2 City of Kenner								X			X													X																																								
F-4 G1 City of Kenner					X						X								X					X																																								
F-5 G4 City of Kenner								X																											X																													
F-6 G2 City of Kenner								X																										X	X																						X						
F-7 G1 City of Kenner					X																			X											X																													
F-8 G2, G4 City of Kenner								X																											X																						X						
F-1 G1 Westwego	X	X	X								X													X											X																													
F-2 G3 Westwego								X		X	X							X	X					X											X																													
F-3 G2 Westwego								X			X													X																																								
F-4 G1 Westwego					X						X								X					X											X																													
F-5 G4 Westwego								X																											X																													
F-6 G2 Westwego								X																										X	X																						X						
F-7 G1 Westwego					X																			X											X																													
F-1 G1 Grand Isle	X	X	X								X													X											X																													
F-2 G3 Grand Isle								X		X	X							X	X					X											X																													
F-3 G2 Grand Isle								X			X													X																																								
F-4 G1 Grand Isle					X						X								X					X											X																													
F-5 G4 Grand Isle								X																											X																													
F-6 G2 Grand Isle								X																										X	X																						X						
F-1 G1 Jean Lafitte	X	X	X								X													X											X																													
F-2 G3 Jean Lafitte								X		X	X							X	X					X											X																													
F-3 G2 Jean Lafitte								X			X													X																																								
F-4 G1 Jean Lafitte					X						X								X					X											X																													
F-5 G4 Jean Lafitte								X																											X																													
F-6 G2 Jean Lafitte								X																										X	X																						X						
F-7 G1 Jean Lafitte					X																			X											X																													
Lafayette Parish																																																																
L25: Repetitive Loss Area Drainage					X																										X	X		X			X	X																				X	X					
L26: Repetitive Loss Structure Improvements																												X	X		X						X	X																				X	X					
L3: Residential elevations and acquisitions for repetitive loss and severe repetitive loss properties	X	X							X	X																									X		X	X																										X
B3: Residential elevations and acquisitions for repetitive loss and severe repetitive loss properties	X	X							X	X																		X							X	X	X	X																										X
C3: Residential elevations and acquisitions for repetitive loss and severe repetitive loss properties	X	X							X	X																		X							X	X	X	X																										X
D3: Residential elevations and acquisitions for repetitive loss and severe repetitive loss properties	X	X							X	X																		X							X	X	X	X																										X
LA3: Residential elevations and acquisitions for repetitive loss and severe repetitive loss properties	X	X							X	X																		X							X	X	X	X																										X
S3: Residential elevations and acquisitions for repetitive loss and severe repetitive loss properties	X	X							X	X																		X							X	X	X	X																										X
Y3: Residential elevations and acquisitions for repetitive loss and severe repetitive loss properties	X	X							X	X																		X							X	X	X	X																										X
L2: Drainage Projects					X				X	X																									X		X	X						X																				X
B2: Drainage Projects					X				X	X																		X							X	X	X	X						X																				X
C2: Drainage Projects					X				X	X																		X							X	X	X	X						X																				X
D2: Drainage Projects					X				X	X																		X							X	X	X	X						X																				X
LA2: Drainage Projects					X				X	X																		X							X	X	X	X						X																				X
S2: Drainage Projects					X				X	X																		X							X	X	X	X						X																				X
Y2: Drainage Projects					X				X	X																		X							X	X	X	X						X																				X
Lafourche Parish																																																																
City Repetitive Loss Properties																																				X																								X			
LP4: Drainage improvement projects					X					X	X	X	X																			X			X		X	X																										X
LP5: Pump station improvements								X		X		X	X																			X			X		X	X																										X
LP6: Elevation projects	X	X		X						X		X	X																						X		X	X																										X
LP15: Participate in Community Rating System (CRS)								X																											X		X	X																										X
LP16: Lafourche Parish Capital Outlay Projects					X			X			X	X																							X		X	X			X				X			X											X					
T1: Drainage improvement projects					X					X		X	X																						X	X	X	X																										X
T7: Elevation projects	X	X		X						X																									X	X	X	X																										X
T8: Participate in Community Rating System (CRS)								X																											X	X	X	X																										X
T9: Lafourche Parish Capital Outlay Projects								X			X	X																							X	X	X	X			X				X			X											X					
L1: Drainage improvement projects					X					X		X	X																						X	X	X	X																										X
L7: Elevation projects	X	X		X						X																									X	X	X	X																										X
L8: Participate in Community Rating System (CRS)								X																											X	X	X	X																										X

Appendix E   Attachment A-10

Parish and Action Items	Mitigation Methods								Funding Source																			Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
L9: Lafourche Parish Capital Outlay Projects								X			X	X																							X	X	X	X			X				X			X										X					
GM1: Drainage improvement projects					X					X		X	X																							X	X	X	X																										X
GM2: Elevation projects	X	X		X						X																										X	X	X	X																										X
GM8: Participate in Community Rating System (CRS)								X																												X	X	X	X																										X
GM9: Lafourche Parish Capital Outlay Projects								X			X	X																							X	X	X	X			X				X			X										X					
Lasalle Parish																																																														
Flood Preparation	X	X	X	X			X																							X						X	X	X	X																							X			
Drainage Project					X																									X						X	X	X	X	X																						X			
L9: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X					X																										X		X	X																										X
J7: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X					X																										X	X	X	X																										X
O7: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X					X																										X	X	X	X																										X
U7: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X					X																										X	X	X	X																										X
T7: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X					X																										X	X	X	X																										X
JB7: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X					X																										X	X	X	X																										X
L1: Drainage Improvement Projects					X				X																							X			X		X	X																										X
J1: Drainage Improvement Projects					X				X																							X			X	X	X	X																										X
O1: Drainage Improvement Projects					X				X																							X			X	X	X	X																										X
U1: Drainage Improvement Projects					X				X																							X			X	X	X	X																										X
T1: Drainage Improvement Projects					X				X																							X			X	X	X	X																										X
JB1: Drainage Improvement Projects					X				X																							X			X	X	X	X																										X
Lincoln Parish																																																														
L88: Repetitive Loss Structure Goals	X	X	X				X		X	X						X										X					X				X		X																						X				
L3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
V3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																										X
Livingston Parish																																																														
I2: Elevate, acquire or pilot reconstruct all Repetitive Loss and Severe Repetitive Loss structures	X	X								X		X	X	X																					X	X	X	X			X																		X						
Madison Parish																																																														
M15: Drainage Projects					X					X																									X																						X						
M15: Drainage Projects (Village of Delta)					X					X																									X																						X						
M15: Drainage Projects (Village of Mound)					X					X																									X																						X						
M15: Drainage Projects (Village of Richmond)					X					X																									X																						X						
M15: Drainage Projects (City of Tallulah)					X					X																									X																						X						
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X													X														X
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X													X														X

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Parish and Action Items	Mitigation Methods								Funding Source																			Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X												X														X
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X												X														X
T3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X												X														X
M1: Building Retrofits				X						X	X	X																	X									X						X	X									X									X
M2: Drainage Improvements					X					X	X	X																	X								X	X												X														X
M5: Education & Outreach								X		X	X	X																	X								X	X	X	X					X			X		X														X
M8: Warning Systems								X		X	X	X																	X									X		X					X			X																X
M10: Promote Flood Insurance								X		X	X	X																	X									X	X						X					X														X
M11: Levee Failure Working Group								X		X	X	X																X	X								X													X														X
D1: Building Retrofits (Village of Delta)				X						X	X	X																	X									X							X									X									X
D2: Drainage Improvement					X					X	X	X																	X								X	X												X														X
D5: Education & Outreach								X		X	X	X																	X								X	X	X	X					X			X		X														X
D8: Warning Systems								X		X	X	X																	X									X		X					X			X																X
D10: Promote Flood Insurance								X		X	X	X																	X									X	X						X					X														X
D11: Levee Failure Working Group								X		X	X	X																X	X								X													X														X
M1: Building Retrofits (Village of Mound)				X						X	X	X																	X										X						X									X									X
M2: Drainage Improvements					X					X	X	X																	X								X	X												X														X
M5: Education & Outreach								X		X	X	X																	X								X		X						X			X		X														X
M8: Warning Systems								X		X	X	X																	X									X		X					X			X																X
M10: Promote Flood Insurance								X		X	X	X																	X									X	X						X					X														X
M11: Levee Failure Working Group								X		X	X	X																X	X								X													X														X
R1: Building Retrofits (Village of Richmond)				X						X	X	X																	X									X						X	X									X									X
R2: Drainage Improvement					X					X	X	X																	X								X	X												X														X
R5: Education & Outreach								X		X	X	X																	X								X	X	X	X								X		X														X
R8: Warning Systems								X		X	X	X																	X									X		X					X			X																X
R10: Promote Flood Insurance								X		X	X	X																	X									X	X						X					X														X
R11: Levee Failure Working Group								X		X	X	X																X	X								X													X														X
T1: Building Retrofits (City of Tallulah)				X						X	X	X																	X									X						X	X									X									X
T2: Drainage Improvement					X					X	X	X																	X								X	X												X														X
T5: Education & Outreach								X		X	X	X																	X								X	X	X	X								X		X														X
T8: Warning Systems								X		X	X	X																	X									X	X	X								X																X
T10: Promote Flood Insurance								X		X	X	X																	X									X	X						X					X														X
T11: Levee Failure Working Group								X		X	X	X																X	X								X													X														X
Morehouse Parish																																																															
M1: Pursuing Elevation, Acquisition, Flood proofing Projects	X	X	X																																		X																						X				
M2: Review Repetitive Loss List							X																														X																				X						
M3: Localized Interior Drainage Project					X																																X																						X				
M4: Safe Room Projects								X		X	X	X																	X									X						X	X																			X
M5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X	X		X	X		X								X				X
M6: Generators for continuity of operations and government								X		X	X	X																	X									X	X	X							X																	X
M7: Lightning Mitigation								X		X	X	X																	X																								X										X
M8: Warning Systems								X		X	X	X																	X									X		X					X							X											X
M9: Potable Water								X		X	X	X																	X									X	X						X																		X
M10: Promote Flood Insurance								X		X	X	X																	X								X	X											X	X													X
M11: Wildfires Ordinance								X		X	X	X																	X																							X											X
M12: Dam and Levee Failure Working Group								X		X	X	X																	X								X												X	X													X
M13: Water Conservtion Measures								X		X	X	X																	X																	X																	X
M25: Data Improvement																																																							X				X				
M1: Building Retrofits (Morehouse Unincorprated)				X						X	X	X																	X									X						X	X									X									X
M2: Drainage Improvement					X					X	X	X																	X									X						X	X									X									
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X											X	X													X
B1: Building Retrofits (City of Bastrops)				X						X	X	X																	X									X						X	X									X									X
B2: Drainage Improvement					X					X	X	X																	X								X	X																										X
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X											X	X													X
B4: Safe Room Pojects								X		X	X	X																	X								X	X	X						X	X			X	X		X												X
B5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X	X		X	X														X
B6: Generatos for continuity of operations								X		X	X	X																	X									X	X	X					X		X																	X
B7: Lightning Mitigation								X		X	X	X																	X																								X										X
B8: Warning Systems								X		X	X	X																	X									X		X					X							X											X
B9: Potable Water								X		X	X	X																	X									X	X						X																		X
B10: Promote Flood Insurance								X		X	X	X																	X								X	X											X	X													X
B11: Wildfires Ordinance								X		X	X	X																	X																							X											X

Appendix E Attachment A-12

Parish and Action Items	Mitigation Methods								Funding Source																		
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry
B12: Dam and Levee Failure Working Group								X		X	X	X															
B13: Water Conservtion Measures								X		X	X	X															
B1: Building Retrofits (Village of Bonita)				X						X	X	X															
B2: Drainage Improvement					X					X	X	X															
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
B4: Safe Room Pojects								X		X	X	X															
B5: Education and Outreach								X		X	X	X															
B6: Generatos for continuity of operations								X		X	X	X															
B7: Lightning Mitigation								X		X	X	X															
B8: Warning Systems								X		X	X	X															
B9: Potable Water								X		X	X	X															
B10: Promote Flood Insurance								X		X	X	X															
B11: Wildfires Ordinance								X		X	X	X															
B12: Dam and Levee Failure Working Group								X		X	X	X															
B13: Water Conservtion Measures								X		X	X	X															
C1: Building Retrofits (Village of Collinston)				X						X	X	X															
C2: Drainage Improvement					X					X	X	X															
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
C4: Safe Room Projects								X		X	X	X															
C5: Education and Outreach								X		X	X	X															
C6: Generators for continuity of operations and government								X		X	X	X															
C7: Lightning Mitigation								X		X	X	X															
C8: Warning Systems								X		X	X	X															
C9: Potable Water								X		X	X	X															
C10: Promote Flood Insurance								X		X	X	X															
C11: Wildfires Ordinance								X		X	X	X															
C12: Dam and Levee Failure Working Group								X		X	X	X															
C13: Water Conservation Measures								X		X	X	X															
M1: Building Retrofits (Village of Mer Rouge)				X						X	X	X															
M2: Drainage Improvement					X					X	X	X															
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
M4: Safe Room Projects								X		X	X	X															
M5: Education and Outreach								X		X	X	X															
M6: Generators for continuity of operations and government								X		X	X	X															
M7: Lightning Mitigation								X		X	X	X															
M8: Warning Systems								X		X	X	X															
M9: Potable Water								X		X	X	X															
M10: Promote Flood Insurance								X		X	X	X															
M11: Wildfires Ordinance								X		X	X	X															
M12: Dam and Levee Failure Working Group								X		X	X	X															
M13: Water Conservtion Measures								X		X	X	X															
O1: Building Retrofits (Village of Oak Ridge)				X						X	X	X															
O2: Drainage Improvement					X					X	X	X															
O3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
O4: Safe Room Projects								X		X	X	X															
O5: Education and Outreach								X		X	X	X															
O6: Generators for continuity of operations and government								X		X	X	X															
O7: Lightning Mitigation								X		X	X	X															
O8: Warning Systems								X		X	X	X															
O9: Potable Water																											
O10: Promote Flood Insurance								X		X	X	X															
O11: Wildfires Ordinance								X		X	X	X															
O12: Dam and Levee Failure Working Group								X		X	X	X															
O13: Water Conservtion Measures								X		X	X	X															
Natchitoches Parish																											
A6: New Initiatives (Unincorporated Natchitoches Parish)								X															X				
A6: New Initiatives (Village of Ashland)								X															X				
C6: New Initiatives (Town of Campti)								X															X				
C6: New Initiatives (Village of Clarence)								X															X				
G6: New Initiatives (Village of Goldonna)								X															X				

Parish and Action Items	Responsible Party									Hazard																			Status							
Action Items	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
B12: Dam and Levee Failure Working Group		X								X												X	X													X
B13: Water Conservtion Measures		X																	X																	X
B1: Building Retrofits (Village of Bonita)		X									X						X	X									X									X
B2: Drainage Improvement		X								X	X																									X
B3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X											X	X													X
B4: Safe Room Pojects		X								X	X	X						X	X			X	X		X											X
B5: Education and Outreach		X								X	X	X	X					X	X	X		X	X													X
B6: Generatos for continuity of operations		X									X	X	X					X		X																X
B7: Lightning Mitigation		X																								X										X
B8: Warning Systems		X									X		X					X							X											X
B9: Potable Water		X									X	X						X																		X
B10: Promote Flood Insurance		X								X	X											X	X													X
B11: Wildfires Ordinance		X																							X											X
B12: Dam and Levee Failure Working Group		X								X												X	X													X
B13: Water Conservtion Measures		X																	X																	X
C1: Building Retrofits (Village of Collinston)		X									X						X	X									X									X
C2: Drainage Improvement		X								X	X																									X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X											X	X													X
C4: Safe Room Projects		X								⍰	X						X	X							X											X
C5: Education and Outreach		X								X	X	X	X						X	X		X	X		X											X
C6: Generators for continuity of operations and government		X									X	X						X		X																X
C7: Lightning Mitigation		X										X														X										X
C8: Warning Systems		X									X	X						X							X											X
C9: Potable Water		X									X	X						X																		X
C10: Promote Flood Insurance		X								X	X											X	X													X
C11: Wildfires Ordinance		X																							X											X
C12: Dam and Levee Failure Working Group		X								X												X	X													X
C13: Water Conservation Measures		X																	X																	X
M1: Building Retrofits (Village of Mer Rouge)		X									X						X	X									X									X
M2: Drainage Improvement		X								X	X																									X
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X											X	X													X
M4: Safe Room Projects		X									X						X	X							X											X
M5: Education and Outreach		X								X	X	X	X					X	X	X		X	X		X											X
M6: Generators for continuity of operations and government		X									X	X	X					X		X																X
M7: Lightning Mitigation		X										X														X										X
M8: Warning Systems		X									X		X					X							X											X
M9: Potable Water		X									X	X							X																	X
M10: Promote Flood Insurance		X								X	X											X	X													X
M11: Wildfires Ordinance		X																							X											X
M12: Dam and Levee Failure Working Group		X								X													X	X												X
M13: Water Conservtion Measures		X																	X																	X
O1: Building Retrofits (Village of Oak Ridge)		X									X						X	X									X									X
O2: Drainage Improvement		X								X	X																									X
O3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X											X	X													X
O4: Safe Room Projects		X									X						X	X							X											X
O5: Education and Outreach		X								X	X	X	X					X	X	X		X	X		X											X
O6: Generators for continuity of operations and government		X									X	X	X					X		X																X
O7: Lightning Mitigation		X										X														X										X
O8: Warning Systems		X									X		X					X							X											X
O9: Potable Water																																				
O10: Promote Flood Insurance		X								X	X											X	X													X
O11: Wildfires Ordinance		X																							X											X
O12: Dam and Levee Failure Working Group		X								X													X	X												X
O13: Water Conservtion Measures		X																	X																	X
Natchitoches Parish																																			
A6: New Initiatives (Unincorporated Natchitoches Parish)		X								X	X	X						X	X													X				
A6: New Initiatives (Village of Ashland)		X								X	X	X						X	X													X				
C6: New Initiatives (Town of Campti)		X								X	X	X						X	X													X				
C6: New Initiatives (Village of Clarence)		X								X	X	X						X	X													X				
G6: New Initiatives (Village of Goldonna)		X								X	X	X						X	X													X				

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| Parish and Action Items | Mitigation Methods | | | | | | | | Funding Source | | | | | | | | | | | | | | | | | | | Responsible Party | | | | | | | | | Hazard | | | | | | | | | | | | | | | | | | | Status | | | | | | | |
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
N6: New Initiatives (Village of Natchez)								X															X						X								X	X	X						X	X													X				
N5: New Initiatives (City of Natchitoches)								X															X						X								X	X	X						X	X													X				
P6: New Initiatives (Village of Powhatan)								X															X						X								X	X	X						X	X													X				
R6: New Initiatives								X															X						X								X	X	X						X	X													X				
R6: New Initiatives								X															X						X								X	X	X						X	X													X				
N2: Drainage Improvements (Unincorporated Natchitoches Parish)					X					X	X	X																	X								X	X																									X
N3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structure	X	X		X						X	X	X																	X								X	X																									X
N5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
N10: Promote Flood Insurane								X		X	X	X																	X								X	X																									X
A2: Drainage Improvements (Village of Ashland)					X					X	X	X																	X								X	X																									X
A3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
A5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
A10: Promote Flood Insurance								X		X	X	X																	X								X	X																									X
C2: Drainage Improvements (Town of Campti)					X					X	X	X																	X								X	X																									X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
C5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
C10: Promote Flood Insurance								X		X	X	X																	X								X	X																									X
C2: Drainage Improvements (Villae of Clarence)					X					X	X	X																	X								X	X																									X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
C5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
C10: Promote Flood Insurance								X		X	X	X																	X								X	X																									X
G2: Drainage Improvements (Village of Goldonna)					X					X	X	X																	X								X	X																									X
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
G5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X																	X
G10: Promote Flood Insurance								X		X	X	X																	X								X	X																									X
N2: Drainage Improvements (Village of Natchez)					X					X	X	X																	X								X	X																									X
N3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
N5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
N10: Promote Flood Insurane								X		X	X	X																	X								X	X																									X
Natchitoches)					X					X	X	X																	X								X	X																									X
severe repetitive loss properties and	X	X		X						X	X	X																	X								X	X																									X
N5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
N10: Promote Flood Insurane								X		X	X	X																	X								X	X																									X
P2: Drainage Improvements (Village of Powhatan)					X					X	X	X																	X								X	X																									X
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures.	X	X		X						X	X	X																	X								X	X																									X
P5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X																	X
P10: Promote Flood Insurance								X		X	X	X																	X								X	X																									X
P2: Drainage Improvements (Village of Provencal)								X		X	X	X																	X								X	X																									X
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
P5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X																	X
P10: Promote Flood Insurance								X		X	X	X																	X								X	X																									X
R2: Drainage Improvements (Village of Robeline)					X					X	X	X																	X								X	X																									X
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
R5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
R10: Promote Flood Insurance								X		X	X	X																	X								X	X																									X
Orleans Parish																																																																
21: Support efforts to raise ICC funding cap above $30K or expand the availability of ICC to Repetitive Loss properties.																																																												X				

Parish and Action Items	Mitigation Methods								Funding Source																			Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
severe and repetitive loss structures, as well as substantially damaged structures to seek funding to support and enforce building requirements to reduce future flood losses through the implementation of mitigation actions to include elevation, relocation, demolition/-rebuild, retrofitting or flood proofing. Encourage and promote mitigation actions when building requirements cannot be enforced.	X	X	X	X																																																						X				
6: St. Roch Streetscape Improvements by the Sewerage and Water Board. The primary problem this activity will address is repetitive flooding. Approximately 540 properties in the area suffer repetitive damage. It will also improve the water quality of Lake Pontchartrain. The project will upgrade drainage ditches as well as provide green infrastructure enhancements to better manage groundwater. There is also a subsidence monitoring component. This project will reduce pressure on the existing piping system. Benefits of this project will include beautification, improved recreational areas, flood mitigation, and social cohesion.					X					X	X					X		X		X				X										X		X	X	X			X	X	X																					X
7: Mirabeau Water Park. The project will daylight 1/3 flow of neighborhood trunk line into the water park to store/cleanse/alleviate pressure on Pump Station #14 during peak flow periods. This project will address repetitive flood and sending untreated polluted water to Lake Pontchartrain. This project will provide benefits to over 3,000 acres, 3717 homes and businesses. It will provide improved water quality, habitat creation, recreation, and serve as an economic development opportunity. This project will support nearby streetscape enhancements.					X					X	X					X				X				X		X								X		X																												X
19: Strengthen existing programs for severe and repetitive loss structures, as well as substantially damaged structures. This includes mitigation actions such as elevation, relocation, retrofitting or flood proofing.	X	X	X																							X										X	X	X			X	X	X							X													X
5: Support efforts to raise ICC funding cap above $30k or expand the availability of ICC to Repetitive Loss Properties								X																		X										X	X	X					X		X																			X
Ouachita Parish																																																															
O22: Update NFIP Repetitive Loss List							X			X		X								X									X		X						X	X	X											X	X								X					
O28: Acquire Flood Prone Properties		X								X						X				X	X	X							X	X							X	X	X											X	X									X				
M27: Elevation/acquisition/flood proofing projects for new and existing repetitive loss structures	X	X	X																																	X	X													X	X									X				
R13: Update NFIP Repetitive Loss List							X			X		X								X									X		X					X	X	X	X											X	X								X					
R16: Acquire Flood Prone Properties		X								X						X				X	X	X							X							X	X	X	X											X	X									X				
WM17: Repetitive Floodloss Structures/Buyouts							X			X														X										X			X																							X					
O3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X												X	X														X
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X												X	X														X
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X												X	X														X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X												X	X														X

Parish and Action Items	Mitigation Methods							Funding Source																				Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
WM3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X											X	X													X
Plaquemines Parish																																																															
Action 1.1.2											X	X	X																					X		X						X							X							X						
Pointe Coupee Parish																																																															
P16: Repetitive Flood Loss Property List											X																						X			X																				X						
P17: Repetitive Loss Property Acquisition	X	X										X																						X			X																				X						
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X											X	X													X
F3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X											X	X													X
L3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X											X	X													X
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X											X	X													X
N3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X											X	X													X
Rapides Parish																																																															
R10: Penny Acres Subdivision Acquisition		X								X																				X						X																					X		X				
R2: Drainage Projects				X				X	X																				X				X			X	X	X																								X
severe repetitive loss properties and	X	X								X																				X				X			X																										X
R5: Mitigation Public Outreach							X	X	X																				X				X			X	X	X	X					X	X	X					X											X
A2: Drainage Projects (City of Alexandria)				X				X	X																										X	X	X	X																								X
severe repetitive loss properties and	X	X								X																										X	X																										X
A5: Mitigation Public Outreach							X	X	X																										X	X	X	X	X					X	X	X					X											X
B2: Drainage Projects (Town of Ball)				X				X	X																										X		X	X						X																		X
B3: Residential elevations and acquisitions for severe repetitive loss and repetitive properties	X	X								X																										X	X																										X
B5: Mitigation Public Outreach							X	X	X																										X	X	X	X	X					X	X																	X
B2: Drainage Projects (Town of Boyce)				X				X	X																										X	X	X	X																								X
B3: Residential elevations and acquisitions for severe repetitive loss and repetitive properties	X	X								X																										X	X																										X
B5: Mitigation Public Outreach							X	X	X																										X	X	X	X	X					X	X	X					X											X
C2: Drainage Projects (Town of Cheneyville)				X				X	X																										X	X	X	X																								X
C3: Residential elevations and acquisitions for severe repetitive loss and repetitive properties	X	X								X																										X	X																										X
C5: Mitigation Public Outreach (Village of Forest Hill)							X	X	X																										X	X	X	X	X					X	X	X					X											X
F2: Drainage Projects				X				X	X																										X	X	X	X																								X
F3: Residential elevations and acquisitions for severe repetitive loss and repetitive properties	X	X								X																										X	X																										X
F5: Mitigation Public Outreach							X	X	X																										X	X	X	X	X					X	X	X					X											X
G2: Drainage Projects (Town of Glenmora)				X				X	X																										X	X	X	X																								X
G3: Residential elevations and acquisitions for severe repetitive loss and repetitive properties	X	X								X																										X	X																										X
G5: Mitigation Public Outreach							X	X	X																										X	X	X	X	X					X	X	X					X											X
L2: Drainage Projects (Town of Lacompte)				X				X	X																																																					
L3: Residential elevations and	X	X								X																										X	X																										X
L5: Mitigation Public Outreach							X	X	X																										X	X	X	X	X					X	X	X					X											X
McNary)				X				X	X																										X	X	X	X																								X
acquisitions for severe repetitive loss	X	X								X																										X	X																										X
M5: Mitigation Public Outreach							X	X	X																										X	X	X	X	X					X	X	X					X											X
P2: Drainage Projects				X				X	X																										X	X	X	X																								X
P3: Residential elevations and acquisitions for severe repetitive loss and repetitive properties	X	X								X																										X	X																										X
P5: Mitigation Public Outreach							X	X	X																										X	X	X	X	X					X	X	X					X											X
W2: Drainage Projects (Town of Woodworth)				X				X	X																										X	X	X	X																								X
acquisitions for severe repetitive loss	X	X								X																										X	X																										X

Parish and Action Items	Mitigation Methods								Funding Source																		
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry
W5: Mitigation Public Outreach								X	X	X																	
Red River Parish																											
R6: Flood Prone Property		X								X						X				X	X	X					
C4: Flood Prone Property		X								X						X				X	X	X					
E4: Flood Prone Property		X								X						X				X	X	X					
H4: Flood Prone Property		X								X						X				X	X	X					
M4: Flood Prone Property		X								X						X				X	X	X					
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
H3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
Richland Parish																											
R7: Pursue elevation / acquisition / flood-proofing projects for Repetitive Loss structures and Pilot Reconstruction.	X	X	X							X						X							X				
R11: Investigate and implement localized interior drainage projects, especially along U.S. Highway 80 near Delhi and Rayville, Carson Drive, Greer Road and Rosa Street, which are Repetitive Loss areas.					X					X		X											X				
R2: Drainage Improvement					X					X	X	X															
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
R5: Education and Outreach								X		X	X	X															
R8: Warning Systems								X		X	X	X															
R10: Promote Flood Insurance								X		X	X	X															
R11: Dam and Levee Failure Working Group								X		X	X	X															
D2: Drainage Improvement (Town of Delhi)					X					X	X	X															
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
D5: Education and Outreach								X		X	X	X															
D8: Warning Systems								X		X	X	X															
D10: Promote Flood Insurance								X		X	X	X															
D11: Dam and Levee Failure Working Group								X		X	X	X															
M2: Drainage Improvement (Town of Mangham)					X					X	X	X															
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
M5: Education and Outreach								X		X	X	X															
M8: Warning Systems								X		X	X	X															
M10: Promote Flood Insurance								X		X	X	X															
M11: Dam and Levee Failure Working Group								X		X	X	X															
R2: Drainage Improvement (Town of Rayville)					X					X	X	X															
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
R5: Education and Outreach								X		X	X	X															
R8: Warning Systems								X		X	X	X															
R10: Promote Flood Insurance								X		X	X	X															
R11: Dam and Levee Failure Working Group								X		X	X	X															
Sabine Parish																											
M4: Acquisition and Elevation of Repetitive Loss Structures	X	X														X								X			
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															

Parish and Action Items	Responsible Party									Hazard																			Status							
Action Items	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
W5: Mitigation Public Outreach									X	X	X	X	X					X	X	X					X											X
Red River Parish																																				
R6: Flood Prone Property		X	X						X	X	X	X										X	X							X						
C4: Flood Prone Property		X	X						X	X	X	X										X	X							X						
E4: Flood Prone Property		X	X						X	X	X	X										X	X							X						
H4: Flood Prone Property		X	X						X	X	X	X										X	X							X						
M4: Flood Prone Property		X	X						X	X	X	X										X	X							X						
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X											X	X													X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X											X	X													X
H3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X											X	X													X
Richland Parish																																				
R7: Pursue elevation / acquisition / flood-proofing projects for Repetitive Loss structures and Pilot Reconstruction.			X							X												X	X									X				
R11: Investigate and implement localized interior drainage projects, especially along U.S. Highway 80 near Delhi and Rayville, Carson Drive, Greer Road and Rosa Street, which are Repetitive Loss areas.					X					X												X	X									X				
R2: Drainage Improvement		X								X	X																									X
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X											X	X													X
R5: Education and Outreach		X								X	X	X	X					X				X	X													X
R8: Warning Systems		X									X		X					X				X	X													X
R10: Promote Flood Insurance		X								X	X											X	X													X
R11: Dam and Levee Failure Working Group	X	X								X												X	X													X
D2: Drainage Improvement (Town of Delhi)		X								X	X											X	X													X
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X											X	X													X
D5: Education and Outreach		X								X	X	X	X					X	X			X	X													X
D8: Warning Systems		X									X		X									X	X													X
D10: Promote Flood Insurance		X								X	X											X	X													X
D11: Dam and Levee Failure Working Group	X	X								X												X	X													X
M2: Drainage Improvement (Town of Mangham)		X								X	X																									X
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X											X	X													X
M5: Education and Outreach		X								X	X	X	X						X			X	X													X
M8: Warning Systems		X									X	X	X					X				X	X													X
M10: Promote Flood Insurance		X								X	X											X	X													X
M11: Dam and Levee Failure Working Group		X																				X	X													X
R2: Drainage Improvement (Town of Rayville)		X								X	X																									X
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X											X	X													X
R5: Education and Outreach		X								X	X	X	X					X	X			X	X													X
R8: Warning Systems		X									X		X									X	X													X
R10: Promote Flood Insurance		X								X	X											X	X													X
R11: Dam and Levee Failure Working Group	X	X								X												X	X													X
Sabine Parish																																				
M4: Acquisition and Elevation of Repetitive Loss Structures	X								X	X																				X						
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X																									X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X																									X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X																									X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X								X	X																									X

Parish and Action Items	Mitigation Methods								Funding Source																			Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
St. Mary Parish																																																															
Objective 3.1: Mitigate all repetitive losses in St. Mary Parish	X	X		X						X																									X																												
Objective 3.2: Initiate drainage and/or surge flooding studies					X							X	X	X																																																	
2: Initiate problem solving initiative focusing on backflow surge up the Charenton Canal and the Franklin Canal affecting Bayou Teche west of Wax Lake Outlet (Calumet Cut) as well as the Franklin repetitive loss area								X																										X																							X						
6: Mitigation of Repetitive Losses Parishwide								X																										X																							X						
11: Mitigation of Repetitive Losses -- Elevation (1 remaining)	X																																	X																							X						
21: Mitigation of Repetitive Losses -- Mitigation Reconstruction (1)				X																																																				X							
St Charles Parish																																																															
PI-1: Provide brochures and other publications through media, mail, libraries, Post Offices, and/or the Internet that explain (1) the definition of "repetitive loss structure" and (2) the options available to owners of repetitive loss structures.								X				X																						X			X																			X						
PP-1: At the discretion of the property owners, either acquire or elevate repetitive loss structures throughout the Parish, giving priority to "target" repetitive loss structures.	X	X							X														X											X			X																			X						
PP-21: Elevation of 27 Repetitive Loss Structures	X								X														X											X			X																				X					
PP-22: Elevation of 4 Severe Repetitive Loss Structures	X								X														X											X			X																				X					
PP-3: Develop a new, homeowner assistance program whereby the Parish, rather than the individual homeowner, would cover the non-federal, 25% funding portion for the elevation of repetitive loss structures.								X																X										X			X																							X			
St Martin Parish																																																															
23: Address all other Repetitive Loss Structures																																																									X						
Action 1.1.1: Upgrade St. Martinville Sewer Pond Berm					X					X																						X					X	X												X													
Action 1.2.1: Upgrade current drainage infrastructure in Arnaudville, Broussard, Parks, St. Martinville, Henderson, Breaux Bridge, and the unincorporated areas of St. Martin Parish					X					X																						X					X	X												X													
Action 1.2.2: Construct new flood control structures												X	X	X																					X		Z	X												X													
Action 1.2.3: Elevate, acquire, or pilot reconstruct all RL and SRL structures in St. Martin Parish	X	X		X						X																									X		X	X												X													
Action 1.2.4: Elevate equipment that is vulnerable to flood damage	X									X																									X		X	X												X													

Parish and Action Items	Mitigation Methods							Funding Source																				Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
Action 1.2.5: Flood proof all public buildings vulnerable to flood damage (see Attachment c3-1 for locations) in Arnaudville, Broussard, Parks, St. Martinville, Henderson, Breaux Bridge, and the unincorporated areas of St. Martin Parish			X							X																									X		X	X												X													
Action 1.2.6: Install warning siren to indicate imminent levee breach								X		X																									X		X	X												X													
Action 1.3.1: Ensure levees are properly maintained								X																X										X			X	X												X							X						
Action 1.3.2: Maintain constant working relationship with the USACE to ensure proper maintenance procedures are in place and followed								X																X											X		X	X												X							X						
St Bernard Parish																																																														
SB3: Flood Proof Existing and New Public Buildings			X						X	X						X				X												X					X	X																									X
SB4: Flood Proof Existing and New Critical Infrastructure			X						X	X						X				X												X					X	X																									X
SB5: Drainage Upgrade Projects					X				X	X						X				X												X					X	X																					X					
SB8: Pursue Elevation Projects for Repetitive Loss Structures	X									X						X				X		X												X			X	X																					X					
SB9: Pursue Acquisition Projects for Repetitive Loss Structures		X								X						X				X		X												X			X	X																					X					
SB10: Amend the Floodplain Ordinance and Adopt Updated Flood Insurance Rating Map for New Structures Upon Their Issuance by FEMA								X	X																									X			X	X																				X						
Upgrade the culverts: replace with larger pipes and box culverts; provide floodgates.								X	X	X						X				X												X					X	X																			X							
Drainage upgrade projets					X				X	X						X				X												X					X	X																					X					
St. Helena Parish																																																													
SH2: Drainage Projects					X				X														X						X									X	X						X													X						
SH6: Elevation Projects	X								X														X						X		X						X	X																									X
SH7: Acquisition Projects		X							X														X						X		X						X	X																									X
SH8: Floodproofing Projects			X	X			X		X														X						X		X						X	X																									X
SH11: CRS Participation								X	X														X								X						X	X																									X
SH12: Flood regulation of future development								X																X										X			X	X																					X					
G3: CRS Participation								X	X														X								X						X	X																									X
G4: Flood regulation of future development								X																X										X			X	X																					X					
G5: Drainage Projects					X				X														X									X					X	X																					X					
G6: Elevation Projects	X								X														X						X		X					X	X	X																									X
G7: Acquisition Projects		X							X														X						X		X					X	X	X																									X
M3: CRS Participation								X	X														X								X						X	X																									X
M4: Flood regulation of future development								X																X										X			X	X																					X					
M5: Drainage Projects					X				X														X									X					X	X																					X					
M6: Elevation Projects	X								X														X						X		X					X	X	X																									X
M7: Acquisition Projects		X							X														X						X		X					X	X	X																									X
St. John The Baptist Parish																																																													
SJB4: Implementation of new mitigation initiatives				X																			X						X								X	X																									X
SJB5: Improvement of public notification system									X														X						X																X																		X
SJB8: Elevation and acquisition projects	X	X	X	X			X		X																				X				X				X	X																									X
Elevation and acquisition projects	X	X	X	X			X		X																				X				X				X	X																			X							
St. Landry Parish																																																													
S19: New Initiatives				X					X														X						X								X	X	X						X														X				
S24: Fixing Repetitive Loss Structures	X	X	X	X			X		X														X								X						X	X	X																				X				
C11: Fixing Repetitive Loss Structures	X	X	X	X			X					X											X													X	X	X	X																				X				
E11: Fixing Repetitive Loss Structures	X	X	X	X			X					X											X													X	X	X	X																				X				
G11: Fixing Repetitive Loss Structures	X	X	X	X			X					X											X													X	X	X	X																				X				
K11: Fixing Repetitive Loss Structures	X	X	X	X			X					X											X													X	X	X	X																				X				
L11: Fixing Repetitive Loss Structures	X	X	X	X			X					X											X													X	X	X	X																				X				
M11: Fixing Repetitive Loss Structures	X	X	X	X			X					X											X													X	X	X	X																				X				
O9: Pilot Planning Grant Program				X																			X													X	X	X	X	X					X	X													X				
O29: Fixing Repetitive Loss Structures	X	X	X	X			X					X											X													X	X	X	X																				X				
P11: Fixing Repetitive Loss Structures	X	X	X	X			X					X											X													X	X	X	X																				X				
P11: Fixing Repetitive Loss Structures	X	X	X	X			X					X											X													X	X	X	X																				X				
S11: Fixing Repetitive Loss Structures	X	X	X	X			X					X											X													X	X	X	X																				X				

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Parish and Action Items	Mitigation Methods								Funding Source																			Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
W11: Fixing Repetitive Loss Structures	X	X	X	X			X					X											X													X	X	X	X																				X				
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X								X	X																									X
S5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
S10: Promote Flood Insurnce								X		X	X	X																	X								X	X																									
A3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
A5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
A10: Promote Flood Insurnce								X		X	X	X																	X								X	X																									
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
C5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
C10: Promote Flood Insurnce								X		X	X	X																	X								X	X																									
E3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
E5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
E10: Promote Flood Insurnce								X		X	X	X																	X								X	X																									
G3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
G5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
G10: Promote Flood Insurnce								X		X	X	X																	X								X	X																									
K3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
K5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
K10: Promote Flood Insurnce								X		X	X	X																	X								X	X																									
L3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
L5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
L10: Promote Flood Insurnce								X		X	X	X																	X								X	X																									
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
M5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
M10: Promote Flood Insurnce								X		X	X	X																	X								X	X																									
L3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
L5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
L10: Promote Flood Insurnce								X		X	X	X																	X								X	X																									
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
P5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
P10: Promote Flood Insurnce								X		X	X	X																	X								X	X																									
P3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
P5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
P10: Promote Flood Insurnce								X		X	X	X																	X								X	X																									
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
S5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
S10: Promote Flood Insurnce								X		X	X	X																	X								X	X																									
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
W5: Education and Outreach								X		X	X	X																	X								X	X	X	X					X	X						X											X
W10: Promote Flood Insurnce								X		X	X	X																	X								X	X																									
St. James Parish																																																															
Repetitive Loss Structures	X	X	X				X			X		X			X	X	X	X	X												X						X	X	X				X																X				
SJ2: Drainage Improvement (Unincorporated St. James)					X						X	X																	X			X					X	X	X																								X
SJ3: Mitigation of Repetitive Loss and Severe Repetitive Loss Properties and Other Hazard Prone Structures	X	X		X							X	X																	X		X						X	X				X																					X
SJ5: Education and Outreach								X			X	X																	X					X			X	X	X	X		X			X	X		X															X
SJ8: Pumping Station Projects	X		X								X	X																	X			X					X	X				X																					X
SJ11: Storm Surge Protection								X			X	X																	X			X					X	X																									X
SJ12:Backwater Protection Structure			X								X	X																	X			X					X	X																									X
SJ13: Adding Protective Structures								X			X	X																	X			X					X	X	X						X																		X
SJ14: Promote Flood Insurance								X		X		X			X	X	X		X					X							X						X	X																									X
SJ16: Bank Stabilization and Culvert Improvements								X	X																				X			X					X	X	X																								X
SJ17: Community Rating System								X	X																							X					X	X	X																								X

Parish and Action Items	Mitigation Methods								Funding Source																			Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/ relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
SJ18: Building Regulations			X					X	X																						X			X			X	X	X	X					X																			X
SJ19: Subdivision Regulations								X	X																						X	X		X			X	X	X						X																			X
G2: Drainage Improvement (Town of Gramercy)					X						X	X																	X			X					X	X	X																									X
G3: Mitigation of Repetitive Loss and Severe Repetitive Loss Properties and Other Hazard Prone Structures	X	X		X							X	X																	X								X	X	X				X																					X
G5: Education and Outreach								X			X	X																	X					X			X	X	X	X		X			X	X		X																X
G8: Pumping Station Projects	X		X								X	X																	X			X					X	X				X																						X
G11:Backwater Protection Structure			X								X	X																	X			X					X	X																										X
G12: Promote Flood Insurance								X		X		X			X	X	X		X					X							X						X	X																										X
G13: Bank Stabilization and Culvert Improvements								X	X																				X			X					X	X	X																									X
G14: Community Rating System								X	X																							X					X	X	X																									X
L2: Drainage Improvement (Town of Lutcher)					X						X	X																	X			X					X	X	X																									X
L3:Mitigation of Repetitive Loss and Severe Repetitive Loss Properties and Other Hazard Prone Structures	X	X		X							X	X																	X								X	X	X				X																					X
L5: Education and Outreach								X			X	X																	X					X			X	X	X	X		X			X	X		X																X
L8: Pumping Station Projects	X		X								X	X																	X			X					X	X				X																						X
L11:Backwater Protection Structure			X								X	X																	X			X					X	X																										X
L12: Promote Flood Insurance								X		X		X			X	X	X		X					X							X						X	X																										X
L13: Bank Stabilization and Culvert Improvements								X	X																				X			X					X	X	X																									X
L14: Community Rating System								X	X																							X					X	X	X																									X
St. Tammany Parish																																																															
STP1: Eddins Canal				X						X	X																					X					X	X																										X
STP2: Cloverland Drainage		X			X					X	X																					X					X	X																										X
STP5: Elevation of Severe Repetitive Loss and Repetitive Loss Structures	X									X	X																									X	X	X																										X
STP6-17: South Slidell Levee System Projects		X										X		X					X																X		X	X												X														X
STP18: Schnieder Canal - SE1LA			X								X	X						X	X													X			X		X	X												X														X
STP21: W-14 Canal - SELA								X			X	X						X	X													X			X		X	X												X														X
STP23: Acquisition		X								X	X																								X		X	X			X								X	X	X	X												X
STP28: Lower W15 Area Drainage				X						X	X																					X			X		X																											X
STP38: Reconstruct Fire Station #16	X									X	X																								X		X	X																										X
AS2: Elevation of Severe Repetitive Loss and Repetitive Loss Structures (Town of Abita Springs)	X									X	X																								X	X	X	X																										X
AS5: Acquisition		X								X	X																								X	X	X	X			X								X	X	X	X												X
PR2: Elevation of Severe Repetitive Loss and Repetitive Loss Structures (Pearl River)	X									X	X																								X	X	X	X																										X
PR5: Acquisition		X								X	X																								X	X	X	X			X								X	X		X												X
F2: Elevation of Severe Repetitive Loss and Repetitive Loss Structures (Folsom)	X									X	X																								X		X	X																										X
F5: Acquisition		X								X	X																								X		X	X			X								X	X		X												X
SU2: Elevation of Severe Repetitive Loss and Repetitive Loss Structures (Village of Sun)	X									X	X																								X		X	X																										X
SU5: Acquisition		X								X	X																								X		X	X			X								X	X		X												X
Investigate and implement a localized interior drainage projects in repetitive loss areas to reduce damages from flooding.										X				X		X	X		X												X	X					X	X																					X					
Pursue elevation/ Acquisition /flood proofing/Pilot Reconstruction projects and structural solutions to flooding by pursuing funding opportunities for the repetitive loss structures.										X													X			X			X				X		X		X	X																					X					
MAD2: Elevation of Severe Repetitive Loss and Repetitive Loss Structures	X									X	X																								X	X	X	X																										X
MAD5: Acquisition		X								X	X																								X	X	X	X			X								X	X		X												X
MAN1: Elevation of Severe Repetitive Loss and Repetitive Loss Structures	X									X	X																									X	X	X																				X						X
SL3: Levee Protection Project (City of Slidell)								X				X		X					X																	X	X	X												X														X
SL5: Elevation of Severe Repetitive Loss and Repetitive Loss Structures	X													X																						X	X	X																										X
SL6: Pontchartrain Drive Drainage Improvements					X							X		X					X																	X	X	X																										X
SL7: Audubon Ditch Drainage Improvements					X							X		X					X																	X	X	X																										X
SL8: Breckenridge Ditch Improvements					X							X		X					X																	X	X	X																										X
SL9: Carollo Drive Drainage Improvements					X							X		X					X																	X	X	X																										X

Parish and Action Items		Mitigation Methods								Funding Source																			Responsible Party									Hazard																			Status							
	Action Items	Elevation	Acquisition-demolition/ relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
SL10: Rue Miramon Dainage Improvements						X							X		X					X																	X	X	X																									X
SL11: Lindeberg Drive Drainage Improvements						X							X		X					X																	X	X	X																									X
SL12: W-14/W-15 Detention Pond									X				X		X					X																	X	X	X																									X
Tangipahoa Parish																																																																
1.2 Drainage - flood relief projects (Unincorporated Tangipahoa)						X				X	X													X												X		X	X	X																								X
1.3 Residential elevations and acquisitions for repetitive loss properties		X	X								X																									X		X																										X
4.1 Mitigation Public Outreach									X	X	X																									X		X	X	X						X							X												X
1.2 Drainage - flood relief projects (Town of Amite)						X				X	X													X												X		X	X	X																								X
1.3 Residential elevations and acquisitions for repetitive loss properties		X	X								X																									X		X																										X
4.1 Mitigation Public Outreach									X	X	X																									X		X	X	X						X							X												X
1.3 Residential elevations and acquisitions for repetitive loss properties (City of Hammond)		X	X								X													X												X		X																										X
1.7 Hardening of Critical Facilities									X		X																										X		X	X						X																			X
1.8 Hardening of Critical Facilities									X		X																										X		X	X						X																			X
1.9 Hardening of Critical Facilities									X		X																										X		X	X						X															X				X
1.10 Backup generators for critical facilities (sewer lift stations)									X		X																										X		X	X						X																			X
1.11 Backup generators for critial facilities (Michael J Kennedy Center)									X		X																										X		X	X						X																			X
1.12 Backup generators for critial facilities (Police Training Center)									X		X																										X		X	X						X																			X
1.2 Drainage - flood relief projects						X				X	X													X													X	X	X	X																								X
4.1 Mitigation Public Outreach									X	X	X																									X		X	X	X						X							X												X
1.2 Drainage - flood relief projects (City of Pontchatoula)						X				X	X													X												X	X	X	X	X																								X
1.3 Residential elevations and acquisitions for repetitive loss properties		X	X								X													X												X	X	X																										X
4.1 Mitigation Public Outreach									X	X	X																									X	X	X	X	X						X							X												X
1.2 Drainage - flood relief projects (Town of Kentwood)						X				X	X													X												X	X	X	X	X																								X
acquisitions for repetitive loss		X	X								X													X												X	X	X																										X
4.1 Mitigation Public Outreach									X	X	X																									X	X	X	X	X						X							X												X
1.2 Drainage - flood relief projects (Town of Independence)						X				X	X													X												X	X	X	X	X																								X
1.3 Residential elevations and acquisitions for repetitive loss properties		X	X								X													X												X	X	X																										X
4.1 Mitigation Public Outreach									X	X	X																									X	X	X	X	X						X							X												X
1.2 Drainage - flood relief projects (Town of Roseland)						X				X	X													X												X	X	X	X	X																								X
1.3 Residential elevations and acquisitions for repetitive loss properties		X	X								X													X												X	X	X																										X
4.1 Mitigation Public Outreach									X	X	X																									X	X	X	X	X						X							X												X
1.2 Drainage - flood relief projects (Village of Tickfaw)						X				X	X													X												X	X	X	X	X																								X
1.3 Residential elevations and acquisitions for repetitive loss properties		X	X								X													X												X	X	X																										X
4.1 Mitigation Public Outreach									X	X	X																									X	X	X	X	X						X							X												X
1.2 Drainage - flood relief projects (Village of Tangipahoa)						X				X	X													X												X	X	X	X	X																								X
1.3 Residential elevations and acquisitions for repetitive loss properties		X	X								X													X												X	X	X																										X
4.1 Mitigation Public Outreach									X	X	X																									X	X	X	X	X						X							X												X
21: Investigate and implement a localized interior drainage project along Hwy 51 and in each repetitive loss area to reduce its flood potential.						X																														X		X																							X			
21 (Town of Amite): Investigate and implement a localized interior drainage project along Hwy 51 and in each repetitive loss area to reduce its flood potential.						X																														X		X																									
21 (City of Hammond): Investigate and implement a localized interior drainage project along Hwy 51 and in each repetitive loss area to reduce its flood potential.						X																														X		X																									

Parish and Action Items	Mitigation Methods								Funding Source																			Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
21 (City of Ponchatoula): Investigate and implement a localized interior drainage project along Hwy 51 and in each repetitive loss area to reduce its flood potential.					X																														X		X																										
21 (Kentwood): Investigate and implement a localized interior drainage project along Hwy 51 and in each repetitive loss area to reduce its flood potential.					X																														X		X																										
21 (Independence): Investigate and implement a localized interior drainage project along Hwy 51 and in each repetitive loss area to reduce its flood potential.					X																														X		X																										
21 (Roseland) Investigate and implement a localized interior drainage project along Hwy 51 and in each repetitive loss area to reduce its flood potential.					X																														X		X																										
21 (Tickfaw): Investigate and implement a localized interior drainage project along Hwy 51 and in each repetitive loss area to reduce its flood potential.					X																														X		X																										
21 (Village of Tangipahoa): Investigate and implement a localized interior drainage project along Hwy 51 and in each repetitive loss area to reduce its flood potential.					X																														X		X																										
22: Pursue elevation/ acquisition/flood proofing projects and structural solutions to flooding by pursuing funding opportunities for the 34 repetitive loss structures.	X	X	X																																X		X																				X						
22 (Town of Amite): Pursue elevation/ acquisition/flood proofing projects and structural solutions to flooding by pursuing funding opportunities for the 34 repetitive loss structures.	X	X	X																																X		X																				X						
22 (City of Hammond): Pursue elevation/ acquisition/flood proofing projects and structural solutions to flooding by pursuing funding opportunities for the 34 repetitive loss structures.	X	X	X																																X		X																				X						
22 (City of Ponchatoula): Pursue elevation/ acquisition/flood proofing projects and structural solutions to flooding by pursuing funding opportunities for the 34 repetitive loss structures.	X	X	X																																X		X																				X						
22 (Kentwood): Pursue elevation/ acquisition/flood proofing projects and structural solutions to flooding by pursuing funding opportunities for the 34 repetitive loss structures.	X	X	X																																X		X																				X						
22 (Independence): Pursue elevation/ acquisition/flood proofing projects and structural solutions to flooding by pursuing funding opportunities for the 34 repetitive loss structures.	X	X	X																																X		X																				X						
22 (Roseland): Pursue elevation/ acquisition/flood proofing projects and structural solutions to flooding by pursuing funding opportunities for the 34 repetitive loss structures.	X	X	X																																X		X																				X						
22 (Tickfaw): Pursue elevation/ acquisition/flood proofing projects and structural solutions to flooding by pursuing funding opportunities for the 34 repetitive loss structures.	X	X	X																																X		X																				X						
22 (Village of Tangipahoa): Pursue elevation/ acquisition/flood proofing projects and structural solutions to flooding by pursuing funding opportunities for the 34 repetitive loss structures.	X	X	X																																X		X																				X						X

Parish and Action Items	Mitigation Methods								Funding Source																		
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry
1.3 Residential elevations and acquisitions for repetitive loss properties	X	X								X																	
1.3 Residential elevations and acquisitions for repetitive loss properties	X	X								X																	
1.3 Residential elevations and acquisitions for repetitive loss properties	X	X								X																	
1.3 Residential elevations and acquisitions for repetitive loss properties	X	X								X																	
1.3 Residential elevations and acquisitions for repetitive loss properties	X	X								X																	
1.3 Residential elevations and acquisitions for repetitive loss properties	X	X								X																	
1.3 Residential elevations and acquisitions for repetitive loss properties	X	X								X																	
1.3 Residential elevations and acquisitions for repetitive loss properties	X	X								X																	
1.3 Residential elevations and acquisitions for repetitive loss properties	X	X								X																	
Tensas Parish																											
T40: Relocation Incentives		X																									
T47: Relocation Incentives		X																									
T1: Building Retrofits (Tensas Unincorporated)				X						X	X	X															
T2: Drainage Improvement					X					X	X	X															
T3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
T4: Safe Room Projects								X		X	X	X															
T5: Education and Outreach								X		X	X	X															
T6: Generators for continuity of operations and government								X		X	X	X															
T7: Lightning Mitigation								X		X	X	X															
T8: Warning Systems								X		X	X	X															
T9: Potable Water								X		X	X	X															
T10: Relocation Incentives								X		X	X	X															
T11: Levee Failure Working Group/Grant Funding Opportunities								X		X	X	X															
T12: Promote Flood Insurance								X		X	X	X															
T15: Cooling Shelter Construction								X		X	X	X															
N1: Building Retrofits (Town of Newellton)				X						X	X	X															
N2: Drainage Improvement					X					X	X	X															
N3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
N4: Safe Room Projects								X		X	X	X															
N5: Education and Outreach								X		X	X	X															
N6: Generators for continuity of operations and government								X		X	X	X															
N7: Lightning Mitigation								X		X	X	X															
N8: Warning Systems								X		X	X	X															
N9: Potable Water								X		X	X	X															
N10: Relocation Incentives								X		X	X	X															
N11: Levee Failure Working Group/Grant Funding Opportunities								X		X	X	X															
N12: Promote Flood Insurance								X		X	X	X															
N15: Cooling Shelter Construction								X		X	X	X															
S1: Building Retrofits (Town of St. Joseph)				X						X	X	X															
S2: Drainage Improvement					X					X	X	X															
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X															
S4: Safe Room Projects								X		X	X	X															
S5: Education and Outreach								X		X	X	X															
S6: Generators for continuity of operations and government								X		X	X	X															
S7: Lightning Mitigation								X		X	X	X															
S8: Warning Systems								X		X	X	X															
S9: Potable Water								X		X	X	X															
S10: Relocation Incentives								X		X	X	X															
S11: Levee Failure Working Group/Grant Funding Opportunities								X		X	X	X															
S12: Promote Flood Insurance								X		X	X	X															

Parish and Action Items	Responsible Party								
Action Items	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City
1.3 Residential elevations and acquisitions for repetitive loss properties								X	
1.3 Residential elevations and acquisitions for repetitive loss properties								X	X
1.3 Residential elevations and acquisitions for repetitive loss properties								X	X
1.3 Residential elevations and acquisitions for repetitive loss properties								X	X
1.3 Residential elevations and acquisitions for repetitive loss properties								X	X
1.3 Residential elevations and acquisitions for repetitive loss properties								X	X
1.3 Residential elevations and acquisitions for repetitive loss properties								X	X
1.3 Residential elevations and acquisitions for repetitive loss properties								X	X
1.3 Residential elevations and acquisitions for repetitive loss properties								X	X
Tensas Parish									
T40: Relocation Incentives	X	X							
T47: Relocation Incentives	X	X							
T1: Building Retrofits (Tensas Unincorporated)		X							
T2: Drainage Improvement		X							
T3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
T4: Safe Room Projects		X							
T5: Education and Outreach		X							
T6: Generators for continuity of operations and government		X							
T7: Lightning Mitigation		X							
T8: Warning Systems		X							
T9: Potable Water		X							
T10: Relocation Incentives		X							
T11: Levee Failure Working Group/Grant Funding Opportunities		X							
T12: Promote Flood Insurance		X							
T15: Cooling Shelter Construction		X							
N1: Building Retrofits (Town of Newellton)	X	X							
N2: Drainage Improvement	X	X							
N3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X							
N4: Safe Room Projects	X	X							
N5: Education and Outreach	X	X							
N6: Generators for continuity of operations and government	X	X							
N7: Lightning Mitigation	X	X							
N8: Warning Systems	X	X							
N9: Potable Water	X	X							
N10: Relocation Incentives	X	X							
N11: Levee Failure Working Group/Grant Funding Opportunities	X	X							
N12: Promote Flood Insurance	X	X							
N15: Cooling Shelter Construction		X							
S1: Building Retrofits (Town of St. Joseph)	X	X							
S2: Drainage Improvement	X	X							
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
S4: Safe Room Projects	X	X							
S5: Education and Outreach	X	X							
S6: Generators for continuity of operations and government	X	X							
S7: Lightning Mitigation	X	X							
S8: Warning Systems	X	X							
S9: Potable Water	X	X							
S10: Relocation Incentives	X	X							
S11: Levee Failure Working Group/Grant Funding Opportunities	X	X							
S12: Promote Flood Insurance	X	X							

Parish and Action Items	Hazard																			Status							
Action Items	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
1.3 Residential elevations and acquisitions for repetitive loss properties	X																										X
1.3 Residential elevations and acquisitions for repetitive loss properties	X																										X
1.3 Residential elevations and acquisitions for repetitive loss properties	X																										X
1.3 Residential elevations and acquisitions for repetitive loss properties	X																										X
1.3 Residential elevations and acquisitions for repetitive loss properties	X																										X
1.3 Residential elevations and acquisitions for repetitive loss properties	X																										X
1.3 Residential elevations and acquisitions for repetitive loss properties	X																										X
1.3 Residential elevations and acquisitions for repetitive loss properties	X																										X
1.3 Residential elevations and acquisitions for repetitive loss properties	X																										
Tensas Parish																											
T40: Relocation Incentives	X												X	X						X							
T47: Relocation Incentives	X												X	X						X							
T1: Building Retrofits (Tensas Unincorporated)		X						X	X																		X
T2: Drainage Improvement	X	X																									X
T3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X												X													X
T4: Safe Room Projects		X							X							X											X
T5: Education and Outreach	X	X	X	X					X	X	X	X		X		X											X
T6: Generators for continuity of operations and government		X	X	X					X		X																X
T7: Lightning Mitigation		X	X	X					X		X																X
T8: Warning Systems		X	X						X																		X
T9: Potable Water		X	X						X																		X
T10: Relocation Incentives	X	X										X		X													X
T11: Levee Failure Working Group/Grant Funding Opportunities	X	X												X													X
T12: Promote Flood Insurance	X	X												X													X
T15: Cooling Shelter Construction											X																X
N1: Building Retrofits (Town of Newellton)		X						X	X																		X
N2: Drainage Improvement	X	X																									X
N3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X												X													X
N4: Safe Room Projects		X							X							X											X
N5: Education and Outreach	X	X	X	X					X	X	X	X		X		X											X
N6: Generators for continuity of operations and government		X	X	X					X		X																X
N7: Lightning Mitigation		X	X	X					X		X																X
N8: Warning Systems		X	X						X																		X
N9: Potable Water		X	X						X																		X
N10: Relocation Incentives	X	X										X		X													X
N11: Levee Failure Working Group/Grant Funding Opportunities	X	X												X													X
N12: Promote Flood Insurance	X	X												X													X
N15: Cooling Shelter Construction											X																X
S1: Building Retrofits (Town of St. Joseph)		X						X	X																		X
S2: Drainage Improvement	X	X																									X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X												X													X
S4: Safe Room Projects		X						X	X							X											X
S5: Education and Outreach	X	X	X	X					X	X	X			X		X											X
S6: Generators for continuity of operations and government		X		X					X					X													X
S7: Lightning Mitigation																	X										X
S8: Warning Systems		X		X					X					X													X
S9: Potable Water		X	X						X																		X
S10: Relocation Incentives	X	X												X													X
S11: Levee Failure Working Group/Grant Funding Opportunities	X	X												X													X
S12: Promote Flood Insurance	X	X												X													X

Appendix E

Attachment A-24

Parish and Action Items — Mitigation Methods

Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review
S15: Cooling Shelter Construction							
W1: Building Retrofits (Town of Waterproof)				X			
W2: Drainage Improvement					X		
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X			
W4: Safe Room Projects							
W5: Education and Outreach							
W6: Generators for continuity of operations and government							
W7: Lightning Mitigation							
W8: Warning Systems							
W9: Potable Water							
W10: Relocation Incentives							
W11: Levee Failure Working Group/Grant Funding Opportunities							
W12: Promote Flood Insurance							
W15: Cooling Shelter Construction							
Terrebone Parish							
Objective 3.1.: Eliminate threat of flood damage to structures in Terrebonne Parish including storm surge and levee failure; Action 3.1.1: Upgrade current drainage infrastructure					X		
Objective 3.1.: Eliminate threat of flood damage to structures in Terrebonne Parish including storm surge and levee failure; Action 3.1.2: Construct new flood control structures and levees				X			
Objective 3.1.: Eliminate threat of flood damage to structures in Terrebonne Parish including storm surge and levee failure; Action 3.1.3: Elevate all RL and SRL structures in Terrebonne Parish	X						
Objective 3.1.: Eliminate threat of flood damage to structures in Terrebonne Parish including storm surge and levee failure; Action 3.1.4: Acquire all RL and SRL structures in Terrebonne Parish		X					
Objective 3.1.: Eliminate threat of flood damage to structures in Terrebonne Parish including storm surge and levee failure; Action 3.1.5: Elevate equipment that is vulnerable to flood damage	X						
Objective 3.1.: Eliminate threat of flood damage to structures in Terrebonne Parish including storm surge and levee failure; Action 3.1.6: Flood proof all public buildings vulnerable to flood damage			X				
Objective 3.1.: Eliminate threat of flood damage to structures in Terrebonne Parish including storm surge and levee failure; Action 3.1.7: Construct Morganza to the Gulf Hurricane Protection Levee which would protect both new and current developments				X			
Objective 3.1.: Eliminate threat of flood damage to structures in Terrebonne Parish including storm surge and levee failure; Action 3.1.8: Collaborate with communities to design, evaluate, and implement Relocation Strategies for communities located outside the levee systems							

Funding Source

Action Items	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry
S15	X		X	X	X															
W1			X	X	X															
W2			X	X	X															
W3			X	X	X															
W4	X		X	X	X															
W5	X		X	X	X															
W6	X		X	X	X															
W7	X		X	X	X															
W8	X		X	X	X															
W9	X		X	X	X															
W10	X		X	X	X															
W11	X		X	X	X															
W12	X		X	X	X															
W15	X		X	X	X															
Action 3.1.1			X																	
Action 3.1.2					X	X	X													
Action 3.1.3			X						X				X							
Action 3.1.4								X	X				X							
Action 3.1.5			X																	
Action 3.1.6			X																	
Action 3.1.7					X	X	X													
Action 3.1.8	X				X	X	X													

Responsible Party

Action Items	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City
S15		X							
W1	X	X							
W2	X	X							
W3		X							
W4	X	X							
W5	X	X							
W6	X	X							
W7	X	X							
W8	X	X							
W9	X	X							
W10	X	X							
W11	X	X							
W12	X	X							
W15		X							
Action 3.1.1					X		X		
Action 3.1.2					X		X		
Action 3.1.3							X		
Action 3.1.4							X		
Action 3.1.5					X				
Action 3.1.6					X		X		
Action 3.1.7					X		X		
Action 3.1.8							X		

Hazard

Action Items	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards
S15											X								
W1		X						X	X										
W2	X	X																	
W3	X	X												X					
W4		X						X	X							X			
W5	X	X	X	X					X	X	X			X		X			
W6		X	X	X					X		X								
W7																	X		
W8		X		X					X					X					
W9		X	X						X										
W10	X	X												X					
W11	X	X												X					
W12	X	X												X					
W15											X								
Action 3.1.1	X	X												X					
Action 3.1.2	X	X			X									X					
Action 3.1.3	X	X												X					
Action 3.1.4	X	X												X					
Action 3.1.5	X	X												X					
Action 3.1.6	X	X												X					
Action 3.1.7	X	X												X					
Action 3.1.8	X	X												X					

Status

Action Items	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
S15								X
W1								X
W2								X
W3								X
W4								X
W5								X
W6								X
W7								X
W8								X
W9								X
W10								X
W11								X
W12								X
W15								X
Action 3.1.1								
Action 3.1.2								
Action 3.1.3								
Action 3.1.4								
Action 3.1.5								
Action 3.1.6								
Action 3.1.7								
Action 3.1.8								

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Parish and Action Items	Mitigation Methods								Funding Source																			Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/ relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
Objective 3.1.: Eliminate threat of flood damage to structures in Terrebonne Parish including storm surge and levee failure; Action 3.1.9: Ensure that current and future building elevations take the needs of those individuals with access and functional needs into account. This includes the incorporation of lifts	X											X	X	X																				X		X			X	X												X														
Objective 3.1.: Eliminate threat of flood damage to structures in Terrebonne Parish including storm surge and levee failure; Action 3.1.10: Identify mechanisms to protect the Island Road from surge and tidal impacts. This might include engineered solutions to decrease wave impacts and/or erosion control mechanisms along the edges of the road.								X				X	X	X																				X		X			X	X												X														
Vermilion Parish																																																															
D6: Repetitive loss ongoing projects	X	X	X							X			X																							X	X	X																					X						
V1: Drainage improvements					X					X			X	X																			X				X	X																					X						
V2: Pump station improvements								X		X			X	X																			X					X																					X						
V5: Elevation projects	X									X			X	X																						X	X	X	X																				X						
V10: Floodproof critical facilities			X							X																										X	X	X																					X						
V15: Severe Repetitive Loss structures	X	X		X						X																										X	X	X																					X						
V16: Future development								X																X												X	X	X	X			X							X											X						
V17: Education and awareness for future development projects								X																X												X	X	X	X			X				X			X											X						
V20: Improvements to flood awareness within community								X																X												X	X	X																					X						
V21: Community flood protection			X																					X												X	X	X																					X						
V22: Homeowner education								X																X												X	X	X																					X						
V25: Coulee Kinney flood protection project			X							X																										X		X																												X
V27: Flood protection of parish prison			X							X																										X		X																										X		
V30: Drainage Pump Generator installation			X							X			X		X																					X																														X
V42: Subdivision drainage improvements					X					X																										X		X																												X
V45: Water system elevation	X									X			X		X																					X		X	X																											X
G7: Repetitive loss ongoing project Town of Gueydan)	X	X	X							X			X																							X	X	X																					X						
G10: Future development								X																X												X	X	X	X			X							X											X						
K6: Repetitive loss ongoing project (City of Kaplan)	X	X	X							X			X																							X	X	X																					X						
K7: Sewage pump project										X			X																							X	X	X																					X						
K9: Future development								X																X												X	X	X	X			X				X			X											X						
A4: Drainage Improvement Projects (City of Abbeville)					X					X			X																							X	X	X				X																									X
A5: Flood protection projects	X									X																										X	X	X				X																									X
A7: Hospital relocation project								X																												X	X	X																										X		
A8: Repetitive loss ongoing project	X	X	X							X			X																							X	X	X																					X						
A9: Street elevation project	X									X			X																							X	X	X																												X
A12: Future development								X																X												X	X	X	X			X				X			X											X						
M5: Drainage Improvement Projects (Village of Maurice)										X			X																							X	X	X																					X						
M7: Repetitive loss ongoing project	X	X	X							X			X																							X	X	X																					X						
K9: Future development								X																X												X	X	X	X			X				X			X											X						
E4: Drainage Improvement Projects (Town of Earth)					X					X			X																							X	X	X																												X
E5: Repetitive loss ongoing projects	X	X	X							X			X																							X	X	X																					X						
E9: Future development								X																X												X	X	X	X			X				X			X											X						
D4: Delcambre Town Hall hardening project (Town of Delcambre)			X																																	X	X		X							X																					X
D5: Pump station upgrade					X					X			X																							X	X	X																												X
D7: Sewage System Hardening					X					X			X																							X	X	X																												X
D10: Future development																								X													X	X	X			X				X			X											X						
Vernon Parish																																																															
V3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																		X								X	X	X																												X
A3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																		X								X	X	X																												X

Parish and Action Items	Mitigation Methods							Funding Source																				Responsible Party									Hazard																			Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
H3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
L3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
NL3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
R3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X	X																									X
Washington Parish																																																															
Elevations	X									X																									X																						X							
Elevations	X									X																									X																						X							
W1: Hardening Buildings								X	X	X																									X			X							X																			X
W2: Drainage - flood relief projects					X				X	X																									X		X	X																											X
W3: Residential elevations and acquisitions for repetitive loss and severe repetitive loss properties	X	X								X																									X		X																												X
W4: Safe Room Projects	X	X								X																									X		X																												X
W5: Mitigation Public Outreach								X	X	X																									X			X							X							X												X
W6: Emergency Shelters								X	X	X																									X			X							X																			X
W7: Emergency Generators for Critical Facilities								X	X	X																									X			X							X							X												X
W8: Wildlife mitigation								X	X	X																									X																	X												X
B1:Hardening of Buildings (City of Bogalusa)								X	X	X																			X						X			X							X																			X
B2: Drainage - flood relief projects					X				X	X																			X							X	X	X																									X
B3: Residential elevations and acquisitions for repetitive loss and severe repetitive loss properties	X	X								X																			X							X	X																										X
B4: Safe Room Projects								X	X	X																			X							X		X							X																			X
B5: Mitigation Public Outreach								X	X	X																			X							X																											X
B6: Emergency Shelters								X	X	X																			X							X		X							X																			X
B7: Emergency Generators for Critical Facilities								X	X	X																			X							X		X							X							X												X
B8: Wildlife mitigation								X	X	X																			X							X																X												X
F1: Hardening of Buildings								X	X	X																			X							X		X							X																			X
F2: Drainage - flood relief projects (Town of Franklinton)					X				X	X																			X							X	X	X																									X
F3: Residential elevations and acquisitions for repetitive loss and severe repetitive loss properties	X	X								X																			X							X	X																										X
F4: Safe Room Projects								X	X	X																			X							X		X							X																			X
F5: Mitigation Public Outreach								X	X	X																			X							X	X	X							X							X												X
F6: Emergency Shelters								X	X	X																			X							X		X							X																			X
F7: Emergency Generators for Critical Facilities								X	X	X																			X							X		X							X							X												X
F8: Wildlife mitigation								X	X	X																			X							X																X												X
V1: Hardening of Buildings								X	X	X																			X							X		X							X																			X
V2: Drainage - flood relief projects					X				X	X																			X							X	X	X																									X
V3: Residential elevations and acquisitions for repetitive loss and severe repetitive loss propertie	X	X								X																			X							X	X																										X
V4: Safe Room Projects								X	X	X																			X							X		X							X																			X
V5: Mitigation Public Outreach								X	X	X																			X							X	X	X							X							X												X
V6: Emergency Shelters								X	X	X																			X							X		X							X																			X
V7: Emergency Generators for Critical Facilities								X	X	X																			X							X		X							X							X												X
V8: Wildlife mitigation								X	X	X																			X							X																X												X
A1: Hardening of Buildings (Village of Angie)									X	X																			X							X		X																											X
A2: Drainage - flood relief projects					X				X	X																			X							X	X	X							X																			X
A3: Residential elevations and acquisitions for repetitive loss and severe repetitive loss propertie	X	X								X																			X							X																											X
A4: Safe Room Projects								X	X	X																			X							X		X							X																			X
A5: Mitigation Public Outreach								X		X																			X							X																											X
A6: Emergency Shelters								X	X	X																			X							X		X							X																			X
A7: Emergency Generators for Critical Facilities								X	X	X																			X							X		X							X							X												X
A8: Wildlife mitigation								X	X	X																			X							X																X												X
West Baton Rouge Parish																																																														
Repetitive Loss Protection					X																														X																								X					
WBR6: Flood Mitigation of Severe Repetitive Loss and Repetitive Loss Properties and Other Hazard Prone Structures	X	X		X							X	X																	X								X	X																									X

Parish and Action Items	Mitigation Methods								Funding Source																				Responsible Party								Hazard																				Status							
Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
PA6: Flood Mitigation of Severe Repetitive Loss and Repetitive Loss Properties and Other Hazard Prone Structures	X	X		X							X	X																X																																			X
B6: Flood Mitigation of Severe Repetitive Loss and Repetitive Loss Properties and Other Hazard Prone Structures	X	X		X							X	X																X							X																											X
A6: Flood Mitigation of Severe Repetitive Loss and Repetitive Loss Properties and Other Hazard Prone Structures	X	X		X							X	X																X							X																											X
Webster Parish																																																															
W1: Elevate Structures	X										X						X				X	X	X								X						X												X	X					X							
W27: Pilot Reconstruction				X						X						X				X										X						X												X	X												
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X							X	X											X												X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X						X	X	X											X												X
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X						X	X	X											X												X
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X						X	X	X											X												X
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X						X	X	X											X												X
H3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X						X	X	X											X												X
M3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X						X	X	X											X												X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X						X	X	X											X												X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X						X	X	X											X												X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X						X	X	X											X												X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X						X	X	X																	X						X	X	X											X												X
West Carroll Parish																																																															
W9: Flood Mitigation	X	X	X				X		X																				X					X		X																X							
WC2: Drainge Improvement					X							X	X																X							X	X																								X
WC3: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X							X	X																X							X	X																								X
WC5: Education and Outreach								X			X	X																X							X	X	X	X					X	X																	X
WC6: Generators for Continuity of Operations and Government								X			X	X																X								X		X					X																			X
E2: Drainage Improvement					X							X	X																							X	X	X																								X
E3: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X							X	X																							X	X	X																								X
E5: Education and Outreach								X			X	X																							X	X	X	X	X					X	X																	X
E6: Generators for Continuity of Opertions and Government											X	X																							X		X		X				X	X								X											X
F2: Drainage Improvement (Village of Forest)					X							X	X																							X	X	X																								X
F3: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X							X	X																							X	X	X																								X
F5: Education and Outreach								X			X	X																							X	X	X	X	X					X	X																	X
F6: Generators for Continuity of Opertions and Government											X	X																							X		X		X				X	X								X											X
K2: Drainage Improvement (Village of Kilbourne)					X							X	X																							X	X	X																								X
K3: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X							X	X																							X	X	X																								X
K5: Education and Outreach								X			X	X																							X	X	X	X	X					X	X																	X
K6: Generators for Continuity of Opertions and Government											X	X																							X		X		X				X	X								X											X

Mitigation Methods

Parish and Action Items: Action Items	Elevation	Acquisition-demolition/relocation	Floodproofing	Reconstruction	Drainage Project	Maintain List of RL Structures	Annual review	Other
OG2: Drainage Improvement (Town of Oak Grove)				X				
OG3: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X				
OG5: Education and Outreach								X
OG6: Generators for Continuty of Opertions and Government								
P2: Drainage Improvement (Village of Pioneer)					X			
P3: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X		X				
P5: Education and Outreach								X
P6: Generators for Continuty of Opertions and Government								
Winn Parish								
W1: Elevation and Acquisition of (NFIP) Repetitive Loss Structures	X	X						
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
A3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X		X				
Total	414	416	90	305	176	6	35	384
1108								

Funding Source

Parish and Action Items: Action Items	Parish Budget	HMGP	FEMA	Local	Regional	Federal	CDBG	FMA	SBA	USACE	State Capital Outlay	PDM	RFC	SRL	Misc. Grants	Other	Trusts	Town/City Budget	Business & Industry
OG2: Drainage Improvement (Town of Oak Grove)			X	X															
OG3: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures			X	X															
OG5: Education and Outreach			X	X															
OG6: Generators for Continuty of Opertions and Government			X	X															
P2: Drainage Improvement (Village of Pioneer)			X	X															
P3: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures			X	X															
P5: Education and Outreach			X	X															
P6: Generators for Continuty of Opertions and Government			X	X															
Winn Parish																			
W1: Elevation and Acquisition of (NFIP) Repetitive Loss Structures		X																	
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
A3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X	X	X															
Total	##	##	##	##	18	22	24	68	17	23	43	49	27	29	95	64	5	24	2
1108																			

Responsible Party

Parish and Action Items: Action Items	Mayor/Mayor's Office	Emergency Manager/ OHSEP	PPJ	Floodplain Manager	Public Works Director/Engineer	Building Permits Director	Other	Parish	Town/Village/City
OG2: Drainage Improvement (Town of Oak Grove)									X
OG3: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures									X
OG5: Education and Outreach									X
OG6: Generators for Continuty of Opertions and Government									X
P2: Drainage Improvement (Village of Pioneer)									X
P3: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures									X
P5: Education and Outreach									X
P6: Generators for Continuty of Opertions and Government									X
Winn Parish									
W1: Elevation and Acquisition of (NFIP) Repetitive Loss Structures	X							X	
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							
A3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							X
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							X
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures		X							X
Total	101	635	32	46	90	7	52	##	##
1108			20	38	29	6	37	##	##

Hazard

Parish and Action Items: Action Items	Flooding	Hurricanes/Tropical Cyclones	Thunderstorms and/or severe storms	Winter Storms	Coastal Land Loss/Erosion	Subsidence	Storm Surge	High Winds	Tornadoes	Droughts	Extreme/Excessive Heat	Sinkholes	Dam Failure	Levee Failure	Termites	Wildfire	Lightning	Hail	All Hazards
OG2: Drainage Improvement (Town of Oak Grove)	X	X																	
OG3: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X																	
OG5: Education and Outreach	X	X	X	X					X	X									
OG6: Generators for Continuty of Opertions and Government		X		X				X	X								X		
P2: Drainage Improvement (Village of Pioneer)	X	X																	
P3: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures	X	X																	
P5: Education and Outreach	X	X	X	X					X	X									
P6: Generators for Continuty of Opertions and Government		X		X				X	X								X		
Winn Parish																			
W1: Elevation and Acquisition of (NFIP) Repetitive Loss Structures	X																		
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X										X							
A3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures	X	X																	
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures																			
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures																			
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures																			
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures																			
Total	##	839	254	##	37	16	5	43	##	90	37	39	##	##	4	93	13	12	1
1108	##	414	88	11	18	10	5	10	33	19		8	98	##	2	6			1

Status

Parish and Action Items: Action Items	Completed	Ongoing	In Progress	Carried Over	Delete (d)	Not Started	Existing	New
OG2: Drainage Improvement (Town of Oak Grove)								X
OG3: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures								X
OG5: Education and Outreach								X
OG6: Generators for Continuty of Opertions and Government								X
P2: Drainage Improvement (Village of Pioneer)								X
P3: Flood Mitigation of Repetitive Loss Properties and Other Flood Prone Structures								X
P5: Education and Outreach								X
P6: Generators for Continuty of Opertions and Government								X
Winn Parish								
W1: Elevation and Acquisition of (NFIP) Repetitive Loss Structures		X						
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
A3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
C3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
D3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
S3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
W3: Mitigation of repetitive loss and severe repetitive loss properties and other hazard prone structures								X
Total	16	99	36	65	7	19	13	##
1108	12	67	24	63	7		12	##