

CRENSHAW COUNTY, ALABAMA



NATURAL HAZARDS MITIGATION PLAN

July 2013

Prepared under the direction of the:

Crenshaw County Hazard Mitigation Planning Committee

Crenshaw County, Alabama Natural Hazards Mitigation Plan

The plan update was prepared under the direction of the Crenshaw County Hazard Mitigation Planning Committee. For additional information, please contact the EMA or the consultant, as follows:

Jessica Tomlin, Director
Crenshaw County EMA
P. O. Box 222
118 E. 3rd Street
Luverne, AL 36049
Phone: 334-335-4538
E-mail: ccema@troycable.net

ACKNOWLEDGMENTS

Crenshaw County Hazard Mitigation Planning Committee

Jessica Tomlin- EMA Director
Benjamin Sanders - Crenshaw County Engineer
Morris Tate – City Engineer, City of Luverne
Dan Jackson - Mayor, Town of Glenwood
Bernie Sullivan - Mayor, Town of Brantley
Charles Swidell - Mayor, Town of Petrey
Joe Dexter Flynn - Mayor, Town of Rutledge
Carlos Dean - Mayor, Town of Dozier
Troy Hudson – Board Member, Crenshaw Co. Dept. of Education

Crenshaw County Emergency Management Agency

Jessica Tomlin, Director

Table of Contents

Chapter 1 Background and Purposes of the Plan

- 1.1 About the Plan
- 1.2 Scope
- 1.3 Authority
- 1.4 Funding
- 1.5 Purposes

Chapter 2 County Profile

- 2.1 Geographic Setting and History
- 2.2 Government
- 2.3 Demographics
- 2.4 Economy
- 2.5 Climate
- 2.6 Physical Features
- 2.7 Transportation
- 2.8 Utilities

Chapter 3 Planning Process

- 3.1 A Multi-Jurisdictional Planning Process
- 3.2 Hazard Mitigation Planning Committee
- 3.3 Public Involvement
- 3.4 Interagency and Intergovernmental Coordination
- 3.5 Participating Jurisdictions
- 3.6 Integration with Existing Plans
- 3.7 Professional Planning Guidance

Table of Contents (continued)

Chapter 4 Risk Assessment

- 4.1 The Risk Assessment Process
- 4.2 Identification of Natural Hazards
- 4.3 Significant Natural Hazard Events
- 4.4 Tornadoes
- 4.5 Severe Thunderstorms
- 4.6 Floods
- 4.7 Droughts/Heat Waves
- 4.8 Hurricanes
- 4.9 Winter Storms/Freezes
- 4.10 Wildfires
- 4.11 Dam/Levee Failures
- 4.12 Earthquakes
- 4.13 Landslides
- 4.14 Vulnerability Assessment: Identification of Assets
- 4.15 Vulnerability Assessment: Impacts on Population, Buildings, Critical Facilities; Estimated Losses
- 4.16 Vulnerability Assessment: Analysis of Development Trends
- 4.17 Multi-Jurisdictional Risk Assessment

Chapter 5 Mitigation Strategies

- 5.1 Purpose of the Mitigation Strategies
- 5.2 Steps in Developing the Strategies
- 5.3 The Planning Approach
- 5.4 Mitigation Issues and Opportunities
- 5.5 Existing Natural Hazard Mitigation Activities
- 5.6 Vision Statement
- 5.7 Comprehensive Mitigation Strategies

Chapter 6 Community Mitigation Action Programs

- 6.1 Purpose of the Community Mitigation Action Programs
- 6.2 Prioritization of Mitigation Actions
- 6.3 Available Mitigation Measures
- 6.4 Mitigation Action Programs

Table of Contents (continued)

Chapter 7 Plan Maintenance

- 7.1 The Planning Cycle
- 7.2 Plan Maintenance Procedures
- 7.3 Implementation through Existing Programs
- 7.4 Continued Public Involvement
- 7.5 Ongoing Planning Needs

- Charts**
- 2-1 Municipal Populations, Crenshaw County, Alabama
 - 4-1 Annual Distribution by Month
 - 4-2 Annual Distribution by Intensity

- Figures**
- 5-1 Steps in the Development of the Mitigation Strategies and Action Programs

- Maps**
- 2-1 Location Map, Crenshaw County
 - 2-2 Population Density, Crenshaw County
 - 2-3 Topographic Map, Crenshaw County
 - 2-4 Transportation System, Crenshaw County
 - 4-1 Tornado Paths since 1950, Crenshaw County
 - 4-2 Tornado Threat Probabilities
 - 4-3 High Hazard Dams, Crenshaw County
 - 4-4 Earthquakes in Alabama since 1916
 - 4-5 Earthquake Hazard Areas
 - 4-6 Landslide Hazard Areas, State of Alabama
 - 4-7 Communication Facilities
 - 4-8 Emergency Response Facilities
 - 4-9 Hazardous Materials
 - 4-10 Medical Care Facilities
 - 4-11 Schools
 - 4-12 Land Use and Land Cover

Table of Contents (continued)

Tables	2-1	General Demographic Characteristics, Crenshaw County, Alabama
	2-2	General Economic Characteristics, Crenshaw County, Alabama
	2-3	Largest Employers, Crenshaw County, Alabama
	2-4	Climate Information, Crenshaw County, Alabama
	2-5	Electronic Communication Providers, Crenshaw County, Alabama
	3-1	Hazard Mitigation Planning Committee Members
	4-1	Natural Hazard Identification/Risk Assessment Exercise
	4-2	Summary of Federally-Declared Disasters, 1973-2003, Crenshaw County
	4-3	Tornadoes since 1957, Crenshaw County
	4-4	Fujita Tornado Damage Scale
	4-5	Thunderstorm and High Wind Events 1996-2003
	4-6	Hail Events, 1995-2003
	4-7	Flood Events, Crenshaw County
	4-8	Flood Events Provided by the HMPC
	4-9	Heat Index / Heat Disorders
	4-10	Hurricane/Tropical Storms since 1995, Crenshaw County
	4-11	Winter Storm Events, Crenshaw County
	4-12	Wildfires in Crenshaw County
	4-13	Total County Building Inventory
	4-14	Value of Buildings in County
	4-15	Population Vulnerable to Natural Hazards
	4-16	Buildings Exposed to Natural Hazards
	4-17	Value of Buildings Exposed to Natural Hazards
	4-18	Annual Property Damage Estimates
	4-19	Historical and Projected Population Growth Trends 1980-2025
	4-20	Population Growth Trends
	4-21	Multi-Jurisdictional Risk Assessment
	5-1	National Flood Insurance Program Participants
	5-2	Planning and Regulatory Tools by Jurisdiction
	6-1	Mitigation Measures
	6-2	Crenshaw County Mitigation Action Program
	6-3	Brantley Mitigation Action Program
	6-4	Dozier Mitigation Action Program
	6-5	Glenwood Mitigation Action Program
	6-6	Luverne Mitigation Action Program
	6-7	Petrey Mitigation Action Program
	6-8	Rutledge Mitigation Action Program
	6-9	Priority Projects for FEMA Funding

Background and Purposes of the Plan

1.1 About the Plan

The Crenshaw County, Alabama, Natural Hazards Mitigation Plan is a multi-jurisdictional guide for all communities that have participated in the preparation of this plan through the Hazard Mitigation Planning Committee (HMPC). The jurisdictions that participated in the development of this plan include Crenshaw County, the City of Luverne, and the Towns of Brantley, Rutledge, Dozier, Glenwood, and Petrey. It fulfills the requirements of the Federal Disaster Mitigation Act of 2000 (DMA 2000) as administered by the Alabama Emergency Management Agency (AEMA) and the Federal Emergency Management Agency (FEMA) Region IV.

This plan complies with all of the eligibility requirements for FEMA grant assistance to participating localities, including the Hazard Mitigation Grant Program (HMGP), the National Flood Insurance Program's Community Rating System (CRS), the Flood Mitigation Assistance Program (FMA), and other Federal funding programs.

The planning process to revise the current Natural Hazards Mitigation Plan began in January 2013 with the appointment of the Hazard Mitigation Planning Committee by the Local Emergency Planning Committee of the Crenshaw County Emergency Management Agency (EMA). Each section of the plan was reviewed and updated by the planning committee as warranted.

1.2 Scope

The scope of the Crenshaw County, Alabama, Natural Hazards Mitigation Plan is the unincorporated and incorporated areas within the county. The plan addresses all natural hazards deemed to threaten property and persons within Crenshaw County. Both short-range and long-range hazard mitigation strategies are addressed, implementation tasks assigned, and funding alternatives identified.

In addition to this chapter, the plan contains the following elements:

1. A profile of the county's geography, history, physical features, and socioeconomic characteristics (Chapter 2 - County Profile).
2. A description of the planning process that opens participation to all local governments, the public, academia, businesses, non-profit agencies, and regional, state and federal governments (Chapter 3 - Planning Process).
3. A general assessment of the county's past and predicted future exposure to natural hazards and the risks that it faces, including impacts on buildings, critical facilities and infrastructure, and loss estimates (Chapter 4 - Risk Assessment).

4. An assessment of local governments' capabilities to implement hazard mitigation measures, and the goals, objectives, policies and action items intended to effectively mitigate the county's natural hazard risks (Chapter 5 - Mitigation Strategies).
5. The short-range (5-year) mitigation action programs for each participating jurisdiction (Chapter 6 - Community Mitigation Action Programs).
6. Procedures for maintaining an active and effective long-range hazard mitigation planning and implementation program (Chapter 7 - Plan Maintenance).

1.3 Authority

Section 409 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, as amended), Title 44 CFR, as amended by Section 102 of the Disaster Mitigation Act of 2000, provides the framework for state and local governments to evaluate and mitigate all natural hazards as a condition for receiving federal disaster assistance. A major requirement of the law is the development of a local hazard mitigation plan.

1.4 Funding

Crenshaw County EMA and the HMPC updated this Mitigation Plan without funding.

1.5 Purposes

Hazard mitigation is any action taken to permanently reduce or eliminate long-range risk to people and their property from the effects of hazards. These natural hazards can be of any type - tornadoes, floods, hurricanes, severe storms, winter freezes, droughts, landslides, or dam failures – resulting from natural disaster crises. Communities within the county can take steps to prepare and implement mitigation measures for almost any type of hazard that may threaten its citizens, businesses and institutions.

Hazard mitigation plans can identify a range of structural approaches to lower the costs of future disasters by meeting the unique needs of the community. For example, structural mitigation projects for flooding could involve modifying a stream channel to increase the conveyance of floodwaters or retarding the flow rate by the construction of detention facilities.

Mitigation strategies can also involve non-structural initiatives, such as educational programs to inform the community about the risks the public and its property face in order to encourage them to purchase insurance or retrofit their homes. Non-structural programs can also include developing and enforcing regulations to prevent construction in natural hazard areas or to ensure development that does occur will be resistant to the natural hazards threatening the area.

Mitigation programs and projects serve to lessen a community's vulnerability to the hardships and costs of disasters. The implementation of mitigation programs is a key component to achieving a sustainable community, one in which the economic and social needs of people, businesses, and institutions coexist with natural environmental constraints and are protected from the disruptions and impacts of emergencies and disasters. Hazard mitigation planning must be closely coordinated with a community's overall planning and development efforts. The most effective way for a community to initiate this objective is through a comprehensive local mitigation planning program. Comprehensive planning can provide Crenshaw County citizens a safe, healthy and prosperous place to live and work.

The purpose of the Crenshaw County, Alabama, 2013 Natural Hazards Mitigation Plan is to develop a unified approach among its local governments for dealing with identified natural hazards and natural hazard management problems. This plan serves as a guide for local governments in their ongoing efforts to reduce vulnerability to the impacts produced by natural hazards.

Furthermore, the plan seeks to accomplish the following additional purposes:

- Establish an ongoing natural hazard mitigation planning program
- Identify and assess the natural hazards that pose a threat to life and property
- Evaluate additional mitigation measures that should be undertaken
- Outline procedures for monitoring the implementation of mitigation strategies

This plan provides guidance for local mitigation activities over the next five-year planning cycle. It encourages activities that are most effective and appropriate for mitigating the effects of all known natural hazards.

Chapter 2 County Profile

2.1. Geographic Setting and History

Crenshaw County, population 13,906 (Census 2010), is located in rural southeast Alabama as shown on Map 2-1. Containing approximately 611 square miles, it is not a part of any surrounding metropolitan area. The county is bordered on the north by Lowndes and Montgomery Counties, on the east by Butler County, on the south by Covington and Coffee Counties and on the west by Pike County. Created by act of the Alabama Legislature on November 24, 1866, it was named after Andrew Crenshaw, a prominent South Carolinian who settled in neighboring Butler County. The county seat was originally in the Town of Rutledge, but it moved to Luverne in 1893. The county also contains, in decreasing order of population, the City of Luverne (2,635), and the Towns of Brantley (920), Rutledge (476), Dozier (391), Glenwood (191), and Petrey (63).



Map 2-1
Location Map, Crenshaw County

2.2 Government

County government is in the form of a representative five-member commission presided over by the commission-appointed chairman. All of the municipalities have a mayor/city council form of government.

2.3 Demographics

General demographic information for Crenshaw County from Census 2010 is shown in Table 2-1. Crenshaw County's population, Census 2010, was 13,906. The City of Luverne's population was 2,635. The Town of Brantley was second largest with 920 people and third was Rutledge with 476. The population consists of 51.7% female and 48.3% male. The median age was 38.8 years. In 2010, 73.8% of the people were white and 24.8% were black. Of the houses in the county, 76.7% were owner occupied. The populations of each municipality and a population density map are depicted in Chart 2-1 and Map 2-2, respectively.

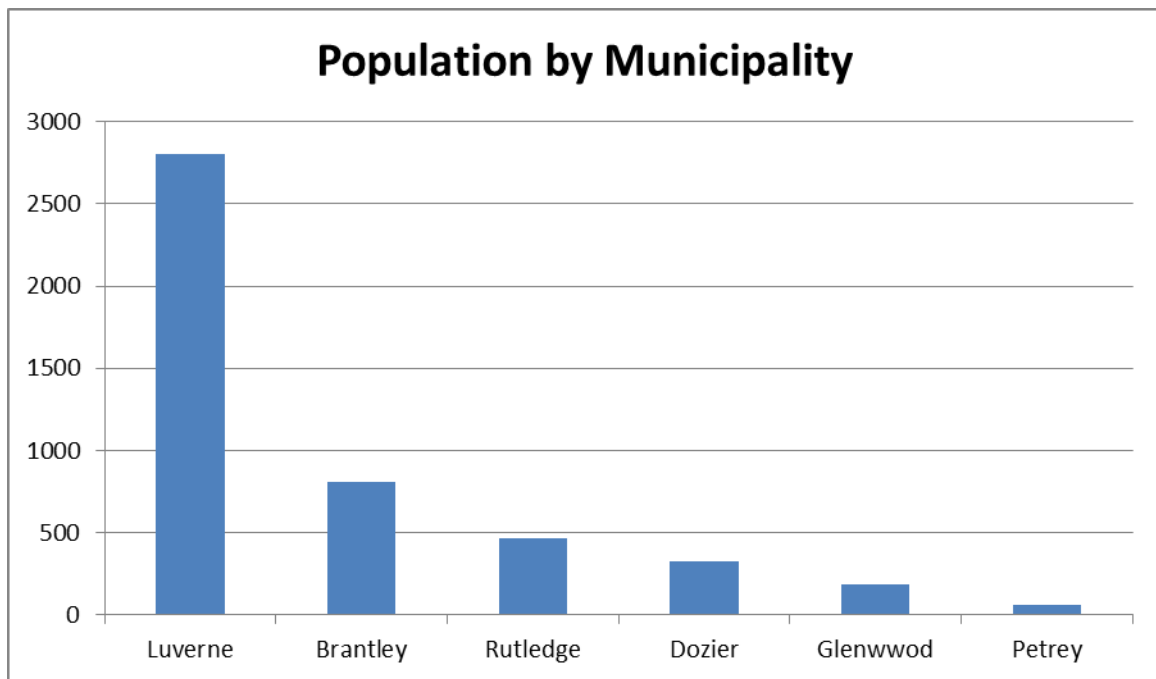
Table 2-1. General Demographic Characteristics, Crenshaw County, Alabama

Subject	Number	Percent
Total Population	13,906	100.0
Sex and Age		
Male	6,714	48.3%
Female	7,192	51.7%
Under 5 years	829	6.0%
5 to 9 years	943	6.8%
10 to 14 years	924	6.6%
15 to 19 years	989	7.1%
20 to 24 years	734	5.3%
25 to 34 years	719	5.2%
35 to 44 years	776	5.6%
45 to 54 years	927	6.7%
55 to 59 years	934	6.7%
60 to 64 years	939	6.8%
65 to 74 years	1,189	7.7%
75 to 84 years	702	6.7%
85 years and over	310	2.2%
Median age (years)	40.7	(X)
Race		
One race	13,704	98.5%
White	10,097	72.6%
Black or African American	3,254	23.4%
American Indian and Alaska Native	57	0.4%
Asian	189	1.4%
Some other race	99	0.7%
Two or more races	202	1.5%
Households		
Total households	5,652	100.0%
Average household size	2.44	(X)

Table 2-1. General Demographic Characteristics, Crenshaw County, Alabama

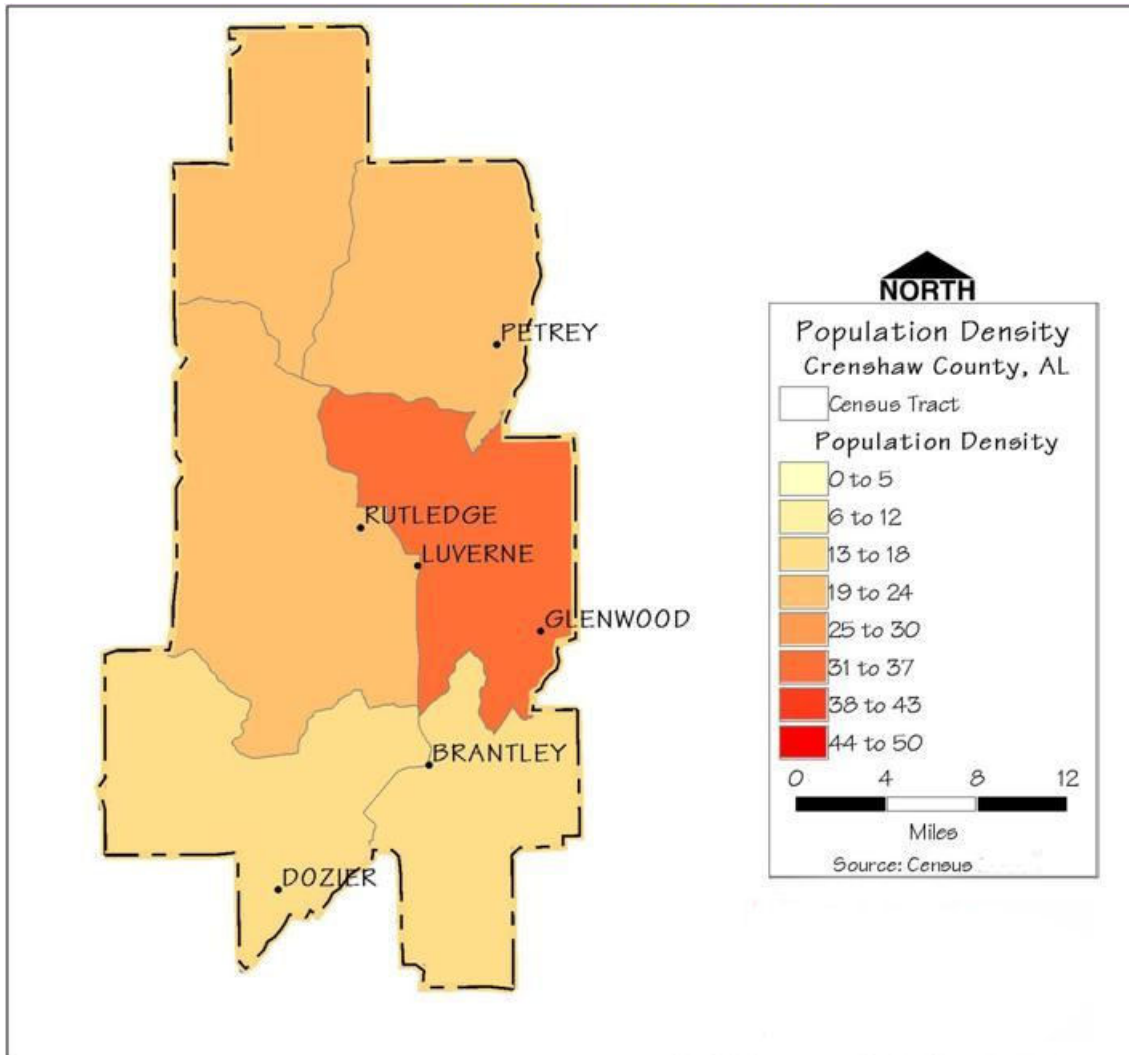
Subject	Number	Percent
Housing Occupancy		
Total housing units	6,735	100.0%
Occupied housing units	5,652	83.9%
Vacant housing units	1,083	16.1%
Housing Tenure		
Occupied housing units	5,577	100.0
Owner-occupied housing units	4,277	76.7
Renter-occupied housing units	1,300	23.3

Source: General Demographic Characteristics, Census 2010



Source: General Census 2010

Chart 2-1. Municipal Populations, Crenshaw County



Map 2-2. Population Density, Crenshaw County

2.4 Economy

General economic information for Crenshaw County from Census 2010 is shown in Table 2-2. Table 2-3 lists the county's largest employers. Census 2010 reported that 54.1% of the population over 16-years-old was employed. The main occupation group was production, transportation, and material moving occupations with 24.3% of the workforce in that occupation, followed by management/professional with 22.4%, and followed by sales/office at 21.7% and service occupations at 14.2%. The main industry was education/health/social services - 18.1%, manufacturing was second with 16% of the working population employed in that industry, and third was retail at 10.4%. Families living below poverty were recorded at 18.6%.

Table 2-2. General Economic Characteristics, Crenshaw County, Alabama

Subject	Number	Percent
Employment Status		
Population 16 years and over	10,717	100.0
In labor force	5,795	54.1
Civilian labor force	5,773	53.9
Employed	5,463	51.0
Unemployed	310	2.9
Percent of civilian labor force	5.4	(X)
Armed Forces	22	0.2
Not in labor force	4,922	45.9
Occupation		
Management, professional, and related occupations	1,224	22.4
Service occupations	778	14.2
Sales and office occupations	1,185	21.7
Farming, fishing, and forestry occupations	215	3.9
Construction, extraction, and maintenance occupations	734	13.4
Production, transportation, and material moving occupations	1,327	24.3
Industry		
Agriculture, forestry, fishing and hunting, and mining	496	9.1
Construction	485	8.9
Manufacturing	873	16.0
Wholesale trade	402	7.4
Retail trade	566	10.4
Transportation and warehousing, and utilities	348	6.4
Information	26	0.5
Finance, insurance, real estate, and rental and leasing	274	5.0
Professional, scientific, management, administrative, waste management	237	4.3
Educational, health and social services	989	18.1
Arts, entertainment, recreation, accommodation and food services	184	3.4
Other services (except public administration)	257	4.7
Public administration	326	6.0
Poverty Status in 1999 (below poverty level)		
Families	729	(X)
Percent below poverty level	(X)	18.6

Source: General Economic Characteristics, Census 2010

The SMART Alabama, LLC is the major employer in the county. The business enterprises involve varied products and services. Table 2-3 lists the ten largest employers in the county at this time.

Table 2-3. Largest Employers, Crenshaw County

Company	Location	Product/Service	# of Employees
SMART Alabama, LLC	Luverne	Automobile Industry	756
Crenshaw County Board of Education	Crenshaw County	Educational Service	301
Sister Schubert's	Luverne	Yeast Rolls	275
Crenshaw County Hospital	Luverne	Health Care/Emergency Services	175
Dongwon	Crenshaw County	Door Frame - Automobile	184
Luverne Nursing Home	Luverne	Elderly Care	163
Browder Veneer	Crenshaw County	Veneer Manufacturer	85
Petrey Wholesale	Petrey	Wholesale Goods	75
Hick's Inc.	Luverne	Wholesale Sporting Goods Distributor	75
Pepsi	Luverne	Bottling Company & Distributor	70

Source: Crenshaw County Economic and Development Authority

2.5 Climate

Crenshaw County's climate is typical of most Gulf Coast States. Annual precipitation is fairly heavy. Summers are long and hot with moist tropical air from the Gulf of Mexico dominating the area. Afternoon thunderstorms during the summer are common. Winters are generally moderate. Winter weather is the product of successive cold fronts moving across the area bringing heavy rains and cold temperatures which generally moderate in a couple of days. Tropical storms or hurricanes occasionally move across the county producing heavy rains and damaging winds. Table 2-4 provides average and extreme weather observations.

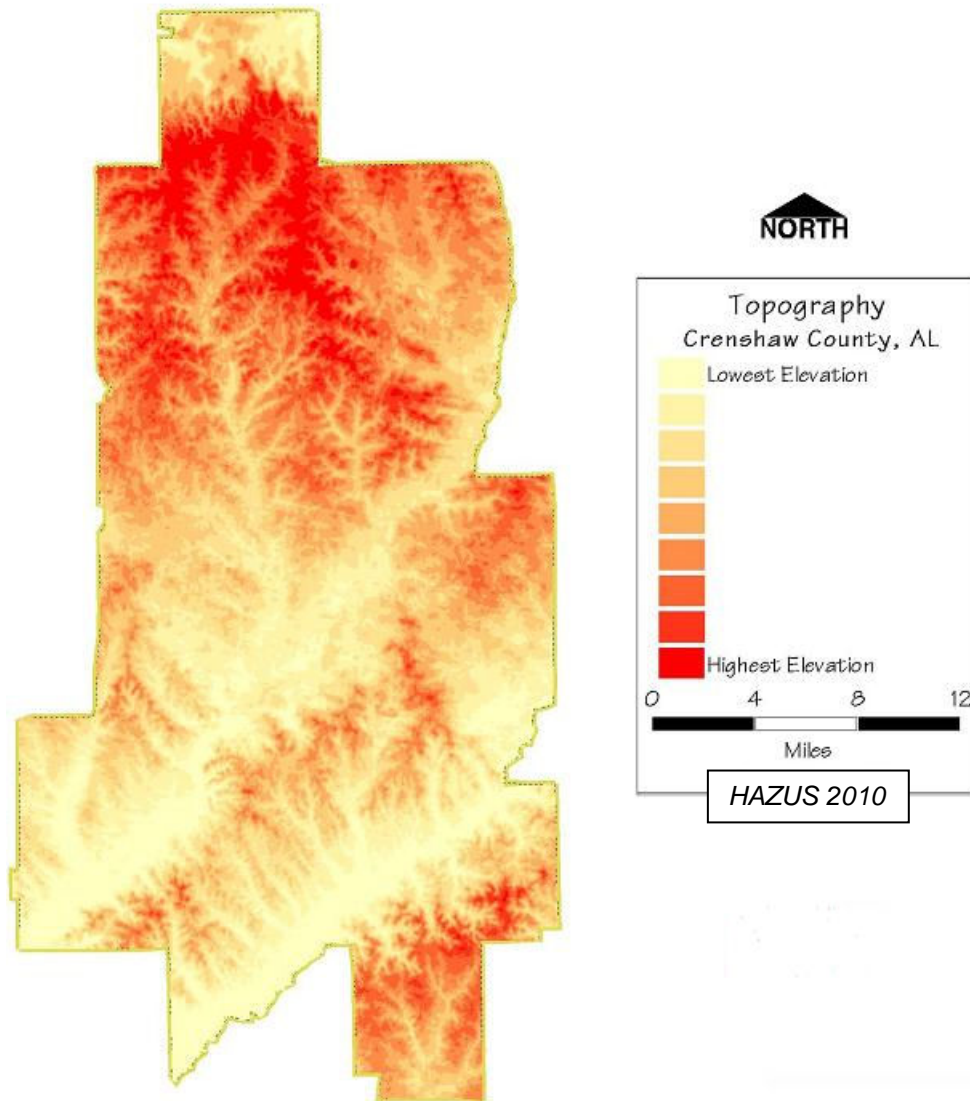
Table 2-4. Weather Observations, Crenshaw County

Item	Observation
Average Winter Temperature	50° F
Average Winter Minimum Temperature	38° F
Lowest Recorded Temperature (January 21, 1985)	-3° F
Average Summer Temperature	79° F
Average Summer Maximum Temperature	89° F
Highest Recorded Temperature (July 15, 1980)	105° F
Total Annual Precipitation	65 inches
Heaviest Recorded One-Day Rainfall (March 13, 1960)	8.13 inches
Average Seasonal Snowfall	0.7 inches
Heaviest Recorded Snowfall	15.8 inches
Prevailing Wind	North
Highest Average Windspeed	6 mph

Source: <http://www.amea.com/comms/luverneprof.html>

2.6 Physical Features

Crenshaw County is located in the Southern Coastal Plain physiographic region. The topography is primarily gently rolling. Soils located in alluvial and floodplain areas are very fertile, and the best for agriculture. The county's drainage systems generally run in a north to south direction. Crenshaw County's topography is depicted in Map 2-3.



Map 2-3. Topographic Map, Crenshaw County

2.7 Transportation

As depicted on Map 2-4, U.S. Highways 331 and 29 run through Crenshaw County. These highways intersect in Luverne, located in the center of the county. There are numerous county roads serving the rural areas. The Southern Alabama Railroad cuts through the southeastern portion of the county. The Frank Sikes Airport provides air transportation.

2.8 Utilities

Electricity Providers - Covington Electric, Pioneer Electric, Alabama Power and South Alabama Electric Cooperative.

Gas Providers - Southeast Alabama Gas District.

Water Service - Water systems are shown in Table 2-5. The City of Luverne is not interconnected to the other water systems.

Table 2-5. Water Service Providers

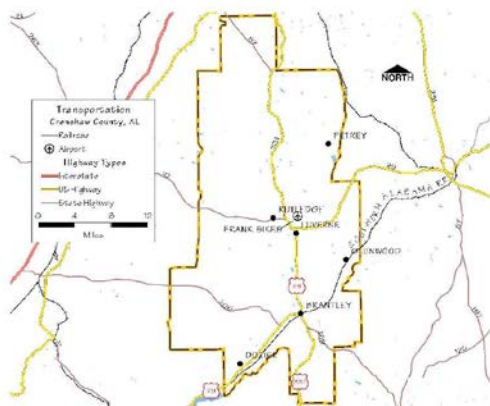
System	Location	Number of Customers
Quint-Mar Water Authority	Highland Home	2,405
South Crenshaw County Water Authority	Brantley	1,820
Luverne Water Works and Sewer Board	Luverne	1,200
Brantley Water Works	Brantley	415
Rutledge Water Works	Rutledge	280
Dozier Water Works	Dozier	200
Glenwood Water Works	Glenwood	141

Sanitary Sewer - Provided by municipalities. The Town of Petrey has septic tanks only.

Telephone Communications. BellSouth, Centurytel, Mon-Cre and Goshen.

Cable TV - Troy Cablevision, Mallard Cablevision

Print. *The Luverne Journal*



Map 2-4. Transportation System, Crenshaw County

Source: HAZUS 2010

The Planning Process

3.1 A Multi-Jurisdictional Planning Process

Formatted: Bullets and Numbering

The Hazard Mitigation Committee represents all incorporated cities and towns and all unincorporated communities and areas of Crenshaw County. The Committee seeks a coordinated and active mitigation planning process among all jurisdictions with their full participation in plan development and implementation. This integrated planning process combines the risks, issues, goals, and mitigation measures of each community into a consolidated plan whereby all jurisdictions have equal opportunity for participation and full representation in the planning process. This process, therefore, satisfies the requirements of CFR Section 201.6(a) (3) of the DMA 2000 in which “multi-jurisdictional plans may be accepted, as appropriate, as long as each jurisdiction has participated in the process.”

Representatives from all jurisdictions have participated in the planning process by attending Committee meetings, completing Committee assignments and exercises, attending the public meeting, and completing other planning activities during the drafting phase of this Plan. In addition to Committee representation, each jurisdiction conducted an independent public hearing to receive public comments prior to final action by each governing body to adopt the plan. The minimum level of Committee participation for each jurisdiction was achieved by one or more representatives that were actively involved in one or more planning activities conducted in the drafting phase of the plan. Authorized representatives for any given jurisdiction are shown in Table 3-1.

3.2 Hazard Mitigation Planning Committee

The Hazard Mitigation Planning Committee is a special planning committee containing representatives of organizations in Crenshaw County concerned with natural disasters who guided the development of this natural hazards mitigation plan. The members of the planning committee and the organizations or jurisdiction they represent are as shown in Table 3-1.

Table 3-1. Hazard Mitigation Planning Committee Members

Name	Agency	Representing
Benjamin Sanders	Crenshaw Co. - Engineer	Crenshaw County and Municipalities
Jessica Tomlin	Crenshaw County-EMA	Crenshaw County and Municipalities
Mayor Bernie Sullivan	Town of Brantley-Office of the Mayor	Town of Brantley
Mayor Charles Swindell	Town of Petrey-Office of the Mayor	Town of Petrey
Mayor Dan Jackson	Town of Glenwood-	Town of Glenwood

Table 3-1. Hazard Mitigation Planning Committee Members

Name	Agency	Representing
	Office of the Mayor	
Mayor Joe Dexter Flynn	Town of Rutledge- Office of the Mayor	Town of Rutledge
Mayor Carlos Dean	Town of Dozier- Office of the Mayor	Town of Dozier
Morris Tate	City of Luverne- Engineer	City of Luverne
Troy Hudson	Board Member, Crenshaw County Department of Education	Superintendent, Crenshaw County Department of Education

Over the course of the Committee meetings during the drafting phase, each Committee member was asked to participate in five exercises designed by the Committee to solicit input into the planning process by each member. (Section 5.2 in Chapter 5 presents complete descriptions of the exercises and their application in the planning process). Representatives from all jurisdictions completed all of the exercises. In Committee Exercise #1 - Mission/Vision Statements - the members created a mission statement for the Committee and a vision statement for a disaster-resistant community. Committee Exercise #2 - Hazard Identification - was used to identify the natural hazards members believe were possible risks/threats to their jurisdiction and rank those hazards according to those risks/threats. Committee Exercise #3 - Hazard Profiles - required members to provide information on natural hazards that occurred in their jurisdiction. Committee Exercise #4 - Capabilities Assessment for Hazard Mitigation - surveyed members to identify regulatory tools, i.e. codes, ordinances; what their personnel resources are, i.e. city engineer; and what financial resources are available, i.e. CDBG, taxes, within their jurisdictions. Committee Exercise #5 - Alternative Mitigation Measures - asked the participants to describe the most critical natural hazard issues and opportunities and make recommendations for mitigation measures and projects. The information provided from the members' participation in Committee meetings and in Committee exercises form the basis for this Plan. Results of all exercises are maintained in the EMA offices.

Members were recommended by Jessica Tomlin, Director of the Crenshaw County EMA, and then appointed by the Local Emergency Planning Committee for the entire five-year cycle of this mitigation plan. Senior elected officials represented their respective municipalities. Each represented member of the committee was able to attend one or more of the meetings held. Unincorporated areas were represented by the county engineer and EMA Director. The staff of the Crenshaw County EMA serves the committee in a support role as facilitator with the participating municipalities and the County Commission. The mission statement of the committee is as follows:

- To oversee and establish a comprehensive hazard mitigation planning process that:*
- *Engages public participation and support;*

- *Facilitates federal, state, regional and local agencies' coordination;*
- *Constantly monitors and evaluates the potential risks of natural hazards to life and property;*
- *Actively mobilizes all available community resources and measures to mitigate the threats of natural hazards; and,*
- *Results in programmed actions with specific results.*

During the planning process, the committee held meetings in January and May 2013. Documentation of these meetings in the form of sign-in sheets and meeting agendas are on file in the EMA office.

3.23.3 Public Involvement

Formatted: Bullets and Numbering

The Hazard Mitigation Planning Committee solicited public input into the mitigation plan through two community meetings and an internet Web site. They were also invited to attend committee meetings and provide their comments and concerns. The HMPC sponsored a special community meeting for additional public input into the planning process during the drafting stage of the plan. At that meeting, the plan, hazards, and mitigation measures were discussed among participants. Displays and handouts regarding various hazards were made available to the public. The public was encouraged to fill out a public survey about the risks and threats of hazards. A public hearing to receive comments was held by each jurisdiction prior to adopting the plan by resolution, as required by State law. The original resolutions and public hearing minutes are kept on file at the administrative offices of each jurisdiction and the Crenshaw County EMA office

Public meetings were held on January 14, 2013 and May 3, 2013 to obtain input into this plan.

A public hearing to receive comments was held by each jurisdiction prior to adopting this Plan by resolution, as required by state law.

3.4 Interagency and Intergovernmental Coordination

The committee members recommended which organizations and agencies in the area were to be contacted in regard to the plan. Agencies were chosen based on their relation to hazard mitigation; their interest in those areas affected by hazards, i.e. businesses; and the impact hazards in Crenshaw County could have on surrounding counties. In addition, the following agencies were contacted in regard to this plan requesting their input and cooperation. The National Weather Service provided data on hazard events and a representative of the Geological Survey of Alabama submitted comments on the plan. There was no input from the agencies listed below.

Federal Agencies

- National Weather Service – Mobile Office
- Natural Resources Conservation Service – Alabama District

- U.S. Army Corps of Engineers – Mobile District

State Agencies

- Alabama Emergency Management Agency (AEMA)
- Alabama Department of Economic and Community Affairs (ADECA)
- Alabama Department of Environmental Management (ADEM)
- Alabama Department of Transportation (ALDOT)
- Alabama Department of Natural Resources (ANDR)
- Alabama Forestry Commission - Crenshaw County Office
- Geological Survey of Alabama

Regional Agencies

- South-Central Alabama Development Commission

Businesses, Academia, Non-Profits & Regional Agencies

- American Red Cross -Montgomery Area Chapter
- Luverne Chamber of Commerce

Adjacent Counties

- Butler County, Alabama
- Coffee County, Alabama
- Covington County, Alabama
- Lowndes County, Alabama
- Montgomery County, Alabama
- Pike County, Alabama

The notice on the following page was sent via e-mail or fax to agencies having an interest in the hazard mitigation plan.

July 8, 2013

NOTICE OF DRAFT PLAN AND REQUEST FOR COMMENTS

Crenshaw County, Alabama, 2013 Updated Natural Hazard Mitigation Plan

Crenshaw County is currently updating their Natural Hazards Mitigation Plan for municipalities and unincorporated areas. The plan will serve as a strategic planning guide in fulfillment of requirements of the Federal Disaster Mitigation Act of 2000 (DMA 2000), as administered by the Federal Emergency Management Agency (FEMA). DMA 2000 provides the framework for state and local governments to evaluate and mitigate all hazards as a condition to receiving federal disaster assistance.

A major requirement of the federal law is to update the local hazard mitigation plan. Among other DMA 2000 planning criteria, an “open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: **An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process.**”

To meet the coordination requirements, the County’s Hazard Mitigation Planning Committee requests your organization’s involvement in the planning process. You may view the draft plan in the EMA office. Contact information for the EMA Director may be found in the draft plan. This site is maintained to inform the general public and interested parties of the planning process and to allow a convenient means to comment on the plan as it is drafted. You may forward this message to any agency or individual that might have an interest in the mitigation plan. On behalf of the Hazard Mitigation Planning Committee, your participation is appreciated.

3.5 Participating Jurisdictions

All jurisdictions within Crenshaw County have participated in the planning process by direct representation on the planning committee and have committed to adopting the final plan by formal resolution. All members were required to participate. Individuals whose schedule did not permit their presence at the meetings received the questionnaires through the mail or via fax. They did reply by fax, email, postal mail or phone if they were unable to attend the meeting. These jurisdictions include the city of Luverne, the Municipalities of Brantley, Petrey, Glenwood, Rutledge, Dozier, and the Crenshaw County Commission. The Town of Highland Home, under the process of incorporation during this plan, also participated. The unincorporated areas of the county were represented by the county engineer, fire association, and EMA Coordinator.

All municipalities participated through one or more of the following means:

- Responding to questionnaires and Committee exercises
- Attending one or more Committee meetings
- Attending public meetings
- Reviewing draft plan sections
- Offering comments on the draft plan
- Adopting the plan through formal resolution (Prior to adoption, the municipalities reviewed the resolution and conducted a public hearing.)

3.6 Integration with Existing Plans

The information in this plan was derived from input from the committee members and the agencies listed in section 3.4, National Flood Insurance Program, and various public and private websites, as well as, HAZUS 2007 software as noted throughout the study. The websites included NOAA, University of Alabama, USGS, US Census, FEMA and the Department of Natural Resources. This document will be incorporated into the Crenshaw County Comprehensive Emergency Operations Plan administered through the Emergency Management Agency. No comprehensive or capital improvement plans are currently in effect for the county, but the requirements of this mitigation plan will be integrated into any future planning documents at the appropriate time.

Incorporated into this plan is information from the following plans, studies and reports, among other resources:

- Alabama Data Center Demographic and Economic Reports
- FEMA and Local Disasters Reports
- Flood Insurance Studies and Flood Insurance Rate Maps
- NOAA and NWS Records
- US Census

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Chapter 4 Risk Assessment

4.1 The Risk Assessment Process

This risk assessment identifies all natural hazards affecting Crenshaw County. It provides information on the history and extents of hazards, evaluates the possible effects, identifies vulnerable populations and assets (buildings, critical facilities, and essential infrastructure), and estimates potential losses that might occur. The risk assessment process identifies the most critical problems and issues that require mitigation actions.

4.2 Identification of Natural Hazards

The Planning Committee completed *Committee Exercise #2 - Hazard Identification* in which they reviewed a list of all potential natural hazards and identified those that might occur in their jurisdiction. Next, members ranked the risk or probability of the hazard occurring and the threat of damage that might be incurred should the event take place. The results are presented in Table 4-1.

Table 4-1. Natural Hazard Identification/Risk Assessment Exercise				
Hazard	Exp*	Risk**	Threat***	Jurisdiction Affected
Tornadoes	Yes	Very Severe	Very Severe	Dozier, Brantley, Glenwood, Luverne, Rutledge, Petrey
Severe storms	Yes	Very Severe	Very Severe	Dozier, Brantley, Glenwood, Luverne, Rutledge, Petrey
Floods	Yes	Very Severe	Moderate	Dozier, Brantley, Glenwood, Luverne, Rutledge, Petrey
Droughts/Heat Waves	Yes	Very Severe	Very Severe	Dozier, Brantley, Glenwood, Luverne, Rutledge, Petrey
Hurricanes	Yes	Severe	Very Severe	Dozier, Brantley, Glenwood, Luverne, Rutledge, Petrey
Winter storms/Freezes	Yes	Moderate	Severe	Dozier, Brantley, Glenwood, Luverne, Rutledge, Petrey
Dam/Levee Failure	Yes	Moderate	Severe	Dozier, Brantley, Glenwood, Luverne, Rutledge, Petrey
Wildfire	Yes	Slight Risk	Slight Risk	Dozier, Brantley, Glenwood, Luverne, Rutledge, Petrey
Earthquakes	Yes	Minimal Risk	Slight Risk	Dozier, Brantley, Glenwood, Luverne, Rutledge, Petrey
Landslides	Yes	Minimal Risk	Minimal Risk	Dozier, Brantley, Glenwood, Luverne, Rutledge, Petrey

***EXP** is the exposure to hazard

****Risk** is the probability of the hazard event occurring within the county

****Threat* is the impact of the hazard on property damage, injury and loss of life should the event occur

4.3 Significant Natural Hazard Events

In *Committee Exercise #3 - Hazard Profiles*, [the Committee profiled past hazards](#). All jurisdictions [responded to the exercise](#) and hazards are listed in Table 4-2. Numerous sources have been utilized to profile significant hazards, including: the Storm Events Database of the National Climatic Data Center (NCDC); FEMA Region IV –Presidential Declarations; the National Weather Service; the Crenshaw County EMA; the Alabama Geological Survey and the HMPC Members. The Storm Events Database may be searched at the following link: <http://www4.ncdc.noaa.gov/cgiwin/wwcgi.dll?wwevent~storms>.

Crenshaw County has been included in a total of sixteen federal disaster declarations from 1975 to 2008. These declarations are listed in Table 4-2 as provide by FEMA, Region IV. All of these events did not necessarily occur within the boundaries of Crenshaw County. When major damage from a natural disaster occurs, FEMA, as a matter of practice, includes a "buffer" area of adjoining counties in the event it is later determined the damage was more widespread. Specific instances of this practice are discussed as they are encountered in the following hazard profiles.

Table 4-2. Summary of Federally-Declared Disasters 1973-2013, Crenshaw County

Disaster No.	Disaster Type	Date	Declaration Type*
458	Flood	03-14-1975	IA, PA-ABCDEFGF, DH, DUA, IFG
	Hurricane Eloise	09-(13-27)-1975	
488	Severe Storm	10-10-1975	IA, PA-ABCDEFGF, DH, DUH, IFG
3045	Drought	08-08-1977	PA-AB
598	Hurricane Frederick	09-13-1979	
742	Hurricane Elena	09-07-1985	
861	Severe Storm	03-23-1990	IA, PA-ABCDEFGF, DH, DUA, IFG
3096	Snow Storm	03-15-1993	PA-AB
1070	Hurricane Opal	10-10-1995	IA, PA-ABCDEFGF, DH, DUA, IFG
1208	Severe Storm	03-17-1998	IA, PA-ABCDEFGF, DH DUA, IFG
3133	Hurricane George	09-29-1998	PA-AB
1250	Hurricane George	10-06-1998	IA, PA-ABCDEFGF, GH, DUA, IFG
1549	Hurricane Ivan	09-15-2004	IA,PA-ABCDEFGF,GH,DUA,IFG
1593	Hurricane Dennis	07-10-2005	PA-ABCDEFGF,GH,DUA,IFG
3237	Hurricane Katrina*	09-10-2005	IA, PA-AB
3292	Hurricane Gustav*	08-30-2008	PA-AB

1835	Flooding	04-28-2009	PA-ABCDEFGF
1870	Flooding	12-31-2009	PA-ABCDEFGF
* Crenshaw County was listed under the Emergency Declarations for these disasters; however, were not designated counties under the Major Disaster Declaration.			
* Declaration Type Key			
IA – Individual assistance		A – Debris removal	
PA – Public assistance		B – Protective measures	
DH – Disaster housing		C – Roads and bridges	
CC – Crisis counseling		D – Water control facilities	
DFA – Direct federal assistance		E – Public buildings	
DUA – Disaster unemployment assistance		F – Public utilities	
HM – Hazard mitigation		G – Recreation	
IFG – Individual and family grant		SA – Stafford Act	
SBA – Small Business Administration		403C – Department of Defense	

4.4 Tornadoes

Hazard Description. A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. It is spawned by a thunderstorm or hurricane and produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. Tornado season is generally March through August, although tornadoes can occur at any time of year. They tend to occur in the afternoons and evenings. Over 80 percent of all tornadoes strike between noon and midnight.

Hazard Profile. Table 4-3 lists the tornado events for Crenshaw County contained in the Storm Events Database for which there are reported damages. The earliest damage-causing event on record occurred in 1957 with the most recent in 2013. Tornado magnitudes are measured on the Fujita Scale, shown in Table 4-4. Other tornadoes with a magnitude of F0 are listed in the database but were not damage causing.

Since 1950, a total of 16 tornado events and one funnel cloud have caused no deaths, 30 injuries and approximately \$3.455 million in property damage in the county since 1957. According to NCDC data Crenshaw County’s worst tornado was an F1 in January 1990 that caused 28 injuries and \$2.5 million in damages. It cut a path of destruction 73 yards wide and 8 miles long, beginning at LAT/LONG 31.783333/86.35 and ending at LAT/LONG 31.883333/86.2.

Table 4-3. Tornadoes Since 1957, Crenshaw County

Location	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Crenshaw – Began at Lat 31.7 Long 86.3 and Ended at unknown	6/28/1957	11:50 a.m.	Tornado	F0	0	0	\$ -	\$ -
Crenshaw Began at Lat 31.7 Long 86.216667 and Ended at unknown	9/29/1965	9:30 p.m.	Tornado	F2	0	2	\$25,000.00	\$ -
Crenshaw - Began at Lat 31.933333 Long 86.4531 and Ended at Lat 31.216667 and Long 86	4/18/1969	2:30 a.m.	Tornado	F4	0	0	\$250,000.00	\$ -
Crenshaw - Began at Lat 31.55 Long 86.233333 and Ended at Lat 31.583333 and Long 86.133333	5/18/1969	7:30 a.m.	Tornado	F2	0	0	\$25,000.00	\$ -
Crenshaw - Began at Lat 31.716667 Long 86.266667 and Ended at unknown	11/20/1973	3:00 p.m.	Tornado	F2	0	0	\$25,000.00	\$ -
Crenshaw - Began at Lat 31.5 Long 86.35 and Ended at Lat 31.516667 and Long 86.333333	5/20/1980	1:45 a.m.	Tornado	F1	0	0	\$25,000.00	\$ -
Crenshaw - Began at Lat 31.783333 Long 86.35 and Ended at Lat 31.883333 and Long 86.2	1/25/1990	5:50 a.m.	Tornado	F1	0	28	\$2,500,000.00	\$ -
Brantley	10/4/1995	7:30 p.m.	Tornado	F0	0	0	\$10,000.00	\$ -
Saville	10/4/1995	8:00 p.m.	Tornado	F0	0	0	\$10,000.00	\$ -
Highland Home	11/7/1996	9:15 p.m.	Tornado	F1	0	0	\$70,000.00	\$ -
Glenwood	9/28/1998	1:03 p.m.	Tornado	F1	0	0	\$50,000.00	\$ -
Patsburg	9/28/1998	1:05 p.m.	Tornado	F1	0	0	\$100,000.00	\$ -
Luverne	9/28/1998	1:10 p.m.	Tornado	F1	0	0	\$50,000.00	\$ -
Petrey	9/28/1998	1:10 p.m.	Tornado	F1	0	0	\$50,000.00	\$ -
Bradleyton	4/30/2005	6:20 a.m.	Tornado	F0	0	0	\$150,000.00	\$ -
Dozier	5/31/2005	5:30 p.m.	Tornado	F0	0	0	\$15,000.00	\$ -
Saville	4/14/2007	3:00 p.m.	Tornado	F0	0	0	\$100,000.00	\$ -
Luverne	12/26/2012	3:29 p.m.	Tornado	EF1	00	10	\$300,000.00	\$4,142
Patsburg	12/26/2012	3:35 p.m.	Tornado	EF1	0	0	\$300,000.00	\$3,000
TOTALS					\$ -	\$ -	\$3,455,000.00	\$ -

Source: NOAA; <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

Community Impacts. The damage from a tornado is the result of the high wind velocity and wind-blown debris. Tornado winds can approach speeds as high as 300 miles per hour, travel distances over 100 miles and reach heights over 60,000 feet above ground. The potential damage resulting from a tornado is directly correlated to the strength of the particular tornado and is quantified utilizing the Fujita Tornado Scale, shown in Table 4-4.

Table 4-4. Fujita Tornado Damage Scale

Scale	Wind Estimate (mph)	Typical Damage
F0	< 73	<u>Light damage.</u> Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	<u>Moderate damage.</u> Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	<u>Considerable damage.</u> Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	<u>Severe damage.</u> Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	<u>Devastating damage.</u> Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	<u>Incredible damage.</u> Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

Source: <http://www.spc.noaa.gov/faq/tornado/f-scale.html>

Charts 4-1 and 4-2 show the characteristics of tornadoes since 1950 within a 20-mile radius of the center of Crenshaw County. (Source: VorTek, LLC. SATT 3.0 Site Assessment of Tornado Threat software)

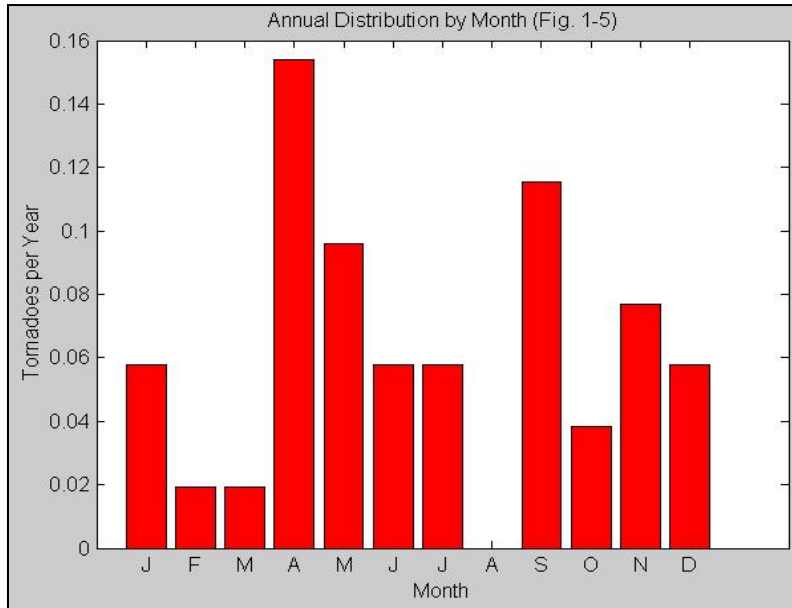


Chart 4-1. Annual Distribution by Month

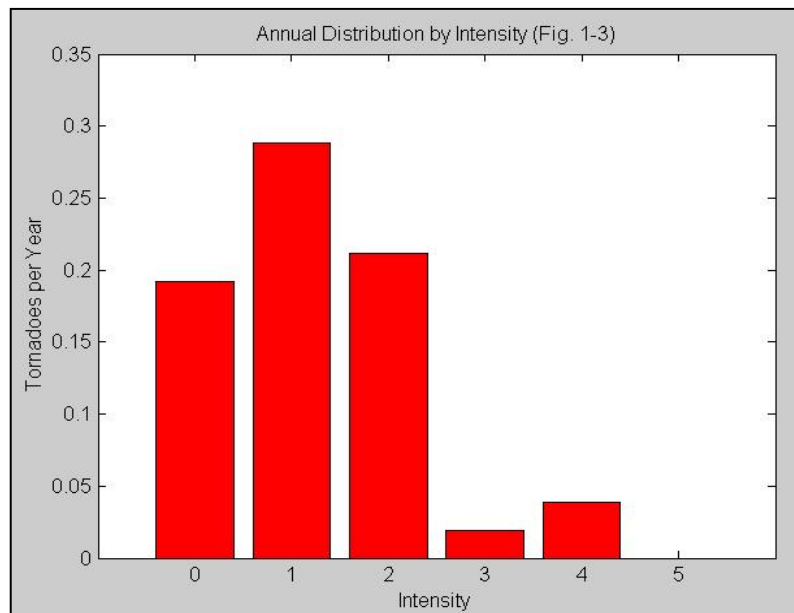
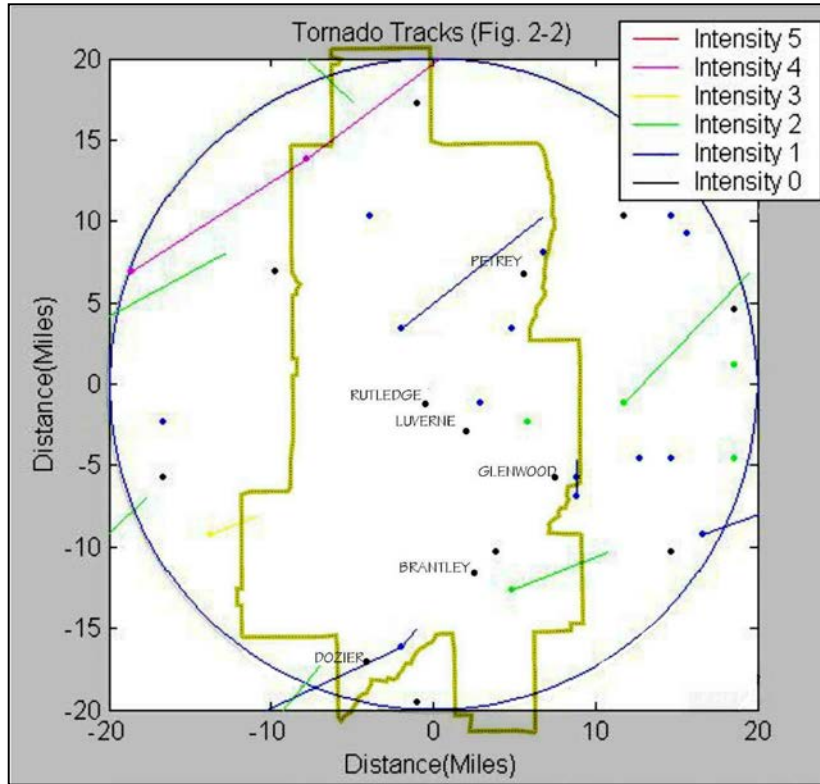


Chart 4-2. Annual Distribution by Intensity

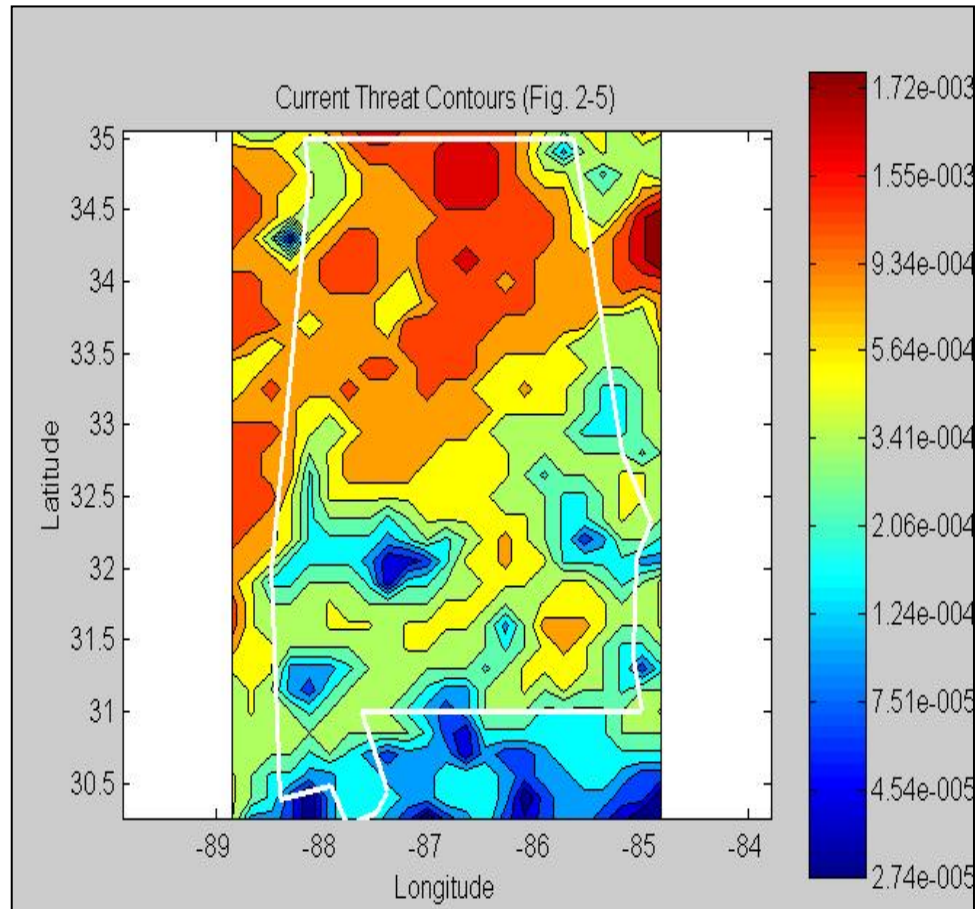
Location and Intensity. Paths of tornadoes within Crenshaw County since 1950 are shown on Map 4-1. All parts of the county are equally susceptible to damage from tornadoes. Therefore, all Crenshaw County residents are at risk of tornadoes.



Map 4-1. Tornado Paths since 1950, Crenshaw County

Probability of Future Occurrences. Map 4-2 depicts the relative probability of tornado occurrences, based on historical data since 1950. Crenshaw County has a relatively moderate probability of risk. The potential for hurricanes or remnants of hurricanes and the number of thunderstorms Crenshaw County experiences per year increases the likelihood of tornadoes.

Based on the information available from the Storm Events Database, it appears the county may expect a damage-causing tornado once every three years. A death- or injury-causing tornado has occurred, on average, once every 21 years. Average annual damages are estimated at \$73,000 per year. Although we can extract data and probability of occurrence from historical information, the risk of a tornado occurring and the location of damage appear to be a random event.



Source: VorTek, LLC, generated by SATT 3.0 Tornado Threat Assessment Software.

Map 4-2. Tornado Threat Probabilities

4.5 Severe Thunderstorms

Hazard Description. A severe thunderstorm is a storm containing damaging winds of at least 58 miles per hour or hail that measures a minimum of three-fourths of an inch in diameter. All severe thunderstorms contain intense lightning and straight-line or downburst winds that can be extremely strong and concentrated. Falling rain and sinking air create these winds that can reach speeds as high as 125 mph.

Hazard Profile. The Storm Events Database contains 61 reports of damage from severe thunderstorms in Crenshaw County since 1957. These storms have caused a total of \$688,000 in damages. A listing of these events is presented in Table 4-5.

Table 4-5. Thunderstorm and High Wind Events, 1957-2013

Location	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Crenshaw	06/28/1957	1010	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	08/18/1969	1300	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	04/07/1973	1035	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	04/25/1973	1145	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	05/08/1973	0830	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	03/30/1981	0345	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	05/07/1982	2000	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	11/20/1986	1010	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	11/20/1986	1115	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	02/16/1990	1001	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	04/01/1990	1650	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	08/19/1990	1600	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	08/22/1990	1430	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	12/03/1990	1010	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	03/29/1991	1130	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	01/13/1992	1540	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	07/09/1992	1830	Tstm Wind	0 kts.	0	0	0	0
Crenshaw	08/27/1992	1310	Tstm Wind	0 kts.	0	0	0	0
Luverne	6/7/1996	5:00 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$1,000	\$0
Highland Home	9/16/1996	7:10 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$2,000	\$0
Highland Home	11/7/1996	9:20 p.m.	Thunderstorm/ Wind	90 kts.	0	0	\$250,000	\$0
Luverne	12/16/1996	8:35 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$2,000	\$0
Glenwood	1/24/1997	8:30 a.m.	Thunderstorm/ Wind	50 kts.	0	0	\$2,000	\$0
Luverne	4/22/1997	7:30 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$60,000	\$0
Dozier	4/22/1997	9:50 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$2,000	\$0
Luverne	4/22/1997	9:50 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$2,000	\$0

Table 4-5. Thunderstorm and High Wind Events, 1957-2013

Location	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Petrey	3/8/1998	4:00 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$5,000	\$0
Luverne	5/3/1998	8:25 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$3,000	\$0
Luverne	6/6/1998	1:00 a.m.	Thunderstorm/ Wind	50 kts.	0	0	\$3,000	\$0
Highland Home	6/19/1998	4:55 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$5,000	\$0
Highland Home	8/20/1999	2:15 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$5,000	\$0
Luverne	7/20/2000	5:25 p.m.	Thunderstorm/ Wind	55 kts.	0	0	\$5,000	\$0
Glenwood	8/9/2000	8:25 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$8,000	\$0
Honoraville	1/19/2001	9:55 p.m.	Thunderstorm/ Wind	55 kts.	0	0	\$5,000	\$0
Dozier	3/12/2001	1:10 p.m.	Thunderstorm/ Wind	75 kts.	0	0	\$15,000	\$0
Dozier	10/13/2001	8:25 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$10,000	\$0
Luverne	10/13/2001	8:45 p.m.	Thunderstorm/ Wind	55 kts.	0	0	\$15,000	\$0
Patsburg	1/19/2002	2:00 p.m.	Thunderstorm/ Wind	55 kts.	0	0	\$10,000	\$0
Highland Home	3/12/2002	12:10 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$10,000	\$0
Luverne	7/7/2002	6:30 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$10,000	\$0
Luverne	7/20/2002	3:50 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$10,000	\$0
Brantley	7/20/2002	4:15 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$10,000	\$0
Highland Home	12/19/2002	7:05 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$5,000	\$0
Highland Home	2/22/2003	3:25 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$25,000	\$0
Rutledge	6/11/2003	1:15 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$5,000	\$0
Brantley	6/26/2004	4:15 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$5,000	\$0
Bullock	7/15/2004	6:10 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$8,000	\$0
Highland Home	4/22/2005	7:55 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$15,000	\$0
Luverne	4/22/2005	8:10 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$10,000	\$0
Brantley	5/7/2006	9:30 a.m.	Thunderstorm/ Wind	50 kts.	0	0	\$15,000	\$0

Table 4-5. Thunderstorm and High Wind Events, 1957-2013 Continued

Location	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Patsburg	7/20/2006	2:47 p.m.	Thunderstorm/ Wind	50 kts.	0	0	\$8,000	\$0
Rutledge	4/26/2007	11:11 a.m.	Thunderstorm/ Wind	0	0	0	\$7,000	\$0
Brantley	6/9/2007	4:15 p.m.	Thunderstorm/ Wind	0	0	0	\$8,000	\$0
Brantley	7/10/2007	4:40 p.m.	Thunderstorm/ Wind	0	0	0	\$25,000	\$0
Brantley	10/23/2007	2:40 a.m.	Thunderstorm/ Wind	0	0	0	\$30,000	\$0
Highland Home	1/10/2008	7:55 p.m.	Thunderstorm/ Wind	0	0	0	\$8,000	\$0
Dozier	2/17/2008	1:58 p.m.	Thunderstorm/ Wind	0	0	0	\$12,000	\$0
Highland Home	2/17/2008	3:04 p.m.	Thunderstorm/ Wind	0	0	0	\$30,000	\$0
Highland Home	2/26/2008	7:00 a.m.	Thunderstorm/ Wind	0	0	0	\$12,000	\$0
Brantley	2/26/2008	7:45 a.m.	Thunderstorm/ Wind	0	0	0	\$12,000	\$0
Crenshaw	3/26/2009	12:06 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	3/26/2009	12:56 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	3/31/2009	6:42 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	4/06/2009	1:28 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	4/11/2009	3:51 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	4/13/2009	7:15am	Thunderstorm/ Wind	50 kts.				
Crenshaw	5/03/2009	7:51 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	5/04/2009	2:13 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	5/06/2009	8:33 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	5/06/2009	9:58 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	5/07/2009	11:21 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	5/07/2009	11:58 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	6/24/2009	7:10 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	7/16/2009	9:00 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	8/12/2009	2:21 am	Thunderstorm/ Wind	50 kts.	0	0	0	\$0

Crenshaw	9/16/2009	1:15 am	Thunderstorm/ Wind	50 kts.	0	0	0	\$0
Crenshaw	9/16/2009	1:51 am	Thunderstorm/ Wind	50 kts.	0	0	\$0	\$0
Crenshaw	9/16/2009	2:25 am	Thunderstorm/ Wind	50 kts.	0	0	\$0	\$0
Crenshaw	9/20/2009	11:05 am	Thunderstorm/ Wind	50 kts.	0	0	0	\$0
Crenshaw	12/02/2009	11:05 am	Thunderstorm/ Wind	50 kts.	0	0	0	\$0
Crenshaw	3/11/2010	3:02 am	Thunderstorm/ Wind	50 kts.	0	0	\$0	\$0
Crenshaw	3/11/2010	3:35 am	Thunderstorm/ Wind	50 kts.	0	0	\$0	\$0
Crenshaw	4/24/2010	6:21 am	Thunderstorm/ Wind	50 kts.	0	0	0	\$0
Crenshaw	4/24/2010	6:17 am	Thunderstorm/ Wind	50 kts.	0	0	0	\$0
Crenshaw	4/25/2010	9:00 am	Thunderstorm/ Wind	50 kts.	0	0	\$0	\$0
Crenshaw	6/01/2010	7:54 pm	Thunderstorm/ Wind	50 kts.	0	0	\$0	\$0
Crenshaw	10/25/2010	1:18 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	3/09/2011	2:50 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	3/09/2011	3:10 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	3/27/2011	5:51 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	4/05/2011	2:41 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	4/16/2011	4:33 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	4/16/2011	5:00 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	4/16/2011	5:11 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	5/13/2001	7:24 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	5/26/2011	6:29 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	5/26/2011	6:34 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	6/11/2011	1:57 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	6/11/2011	9:17 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	6/17/2011	7:29 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	8/11/2011	11:26 pm	Thunderstorm/ Wind	50 kts.	0	0	0	\$0
Crenshaw	9/27/2011	1:39 pm	Thunderstorm/ Wind	50 kts.	0	0	0	\$0
Crenshaw	9/28/2011	12:27 am	Thunderstorm/ Wind	50 kts.	0	0	\$0	\$0
Crenshaw	11/16/2011	4:35 pm	Thunderstorm/ Wind	50 kts.	0	0	\$0	\$0

Crenshaw	9/22/2011	11:46 pm	Thunderstorm/ Wind	50 kts.	0	0	0	\$0
Crenshaw	1/21/2012	8:12 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	2/18/2012	10:38 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	2/24/2012	3:52 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	3/30/2012	8:13 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	5/21/2012	8:36 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	6/03/2012	9:43 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	6/03/2012	10:14 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	6/03/2012	11:27 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	6/31/2012	9:33 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	6/31/2012	12:54 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	8/19/2012	12:21 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	12/26/2012	3:35 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	12/26/2012	4:15am	Thunderstorm/ Wind	50 kts.				
Crenshaw	2/11/2013	12:33 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	2/11/2013	1:37 am	Thunderstorm/ Wind	50 kts.				
Crenshaw	6/24/2013	9:19 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	6/28/2013	6:56 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	7/12/2013	9:32 pm	Thunderstorm/ Wind	50 kts.				
Crenshaw	7/15/2013	12:10 am	Thunderstorm/ Wind	50 kts.				
			TOTALS	0	0	0	\$690,000	\$0

Source: NOAA; <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

Community Impacts. In addition to tornadoes, flooding, and straight-line winds, thunderstorms can cause considerable damage from lightning. Since 1975 Crenshaw County has experienced 132 severe thunderstorms. Large hail, though very rare, can cause injury or loss of life. Normally it only causes damage to automobiles, trees and crops. Both lightning and high winds frequently cause loss of life and considerable property damage. The power of lightning's electrical charge and intense heat can electrocute on contact, split trees, ignite fires, and cause electrical failures. No lightning events have been reported for Crenshaw County.

Location All areas of Crenshaw County have equal exposure to severe storms. Unlike flooding and tornadoes, severe storms lack geographic centers and boundaries and therefore cannot be substantively mapped.

Extent The extent of severe storms depends on severity and duration. A storm's severity is a combination of rainfall, wind-speed, the size of any accompanying hail and the scope of any flooding that a severe storm may induce. The exact extent of severe storms is not predictable. Severe storms can also result in flooding due to heavy precipitation and wildfires due to lightning and will accompany hurricanes and tornadoes. Large hail, though very rare, can cause injury or loss of life and major property damages, including crop damages. Normally, however, hail is more likely to damage cars and windows than to damage farmland. Lightning can electrocute persons and cause wildfires in forests and pastures by striking trees and dry grass. The most typical threat posed by high winds is power outage, which usually occurs when trees fall onto power lines.

Probability of Future Occurrences. The probability of a severe thunderstorm occurring depends on certain atmospheric and climatic conditions. The National Weather Service has data comparing the number of events per year with other regions of the country.

Based on historical information, Crenshaw County can expect approximately 5.5 instances of straight-line wind- or hail-induced damage per year. Average annual damages from severe thunderstorm events are estimated at \$60,875. Although we can extract data and probability of occurrence from historical information, the risk of a thunderstorm occurring and the location of damage appear to be a random event.

4.6 Floods

Hazard Description. Flooding is defined as the accumulation of water within a water body and the overflow of excess water onto adjacent floodplain lands. The floodplain is the land adjoining the channel, river, stream, ocean, lake, or other water body that is susceptible to flooding.

Hazard Profile. The list of federally-declared disasters, input from the planning committee, and the Storm Events Database were utilized to profile the history of flood events in Crenshaw County. Most of the flooding in the Crenshaw County occurs countywide. The Conecuh River and Patsaliga Creek flow through the county. They and their tributaries are subject to flooding.

The Storm Events Database contains damage-causing flood events from 1998. Since that time, seven different flood events have resulted in \$324 thousand in property damages. A summary of flood events is shown in Table 4-7. Crenshaw County has experienced some flood damages over the past 25 years but, due to the rural nature of the county, flooding is not a major problem. Most flooding is of a flash type, along streams and tributaries. Flooding and heavy rain both have also been known to cause major road damage. Floodwaters that cover the surface of the road often causes the base of the road to wash away and the surface asphalt to crack or fail. This failure of the roads can lead to utility damages. A summary of flood events as recorded in the Storm Events Database

is shown in Table 4-7. Additional flood events provided by the HMPC are listed in Table 4-8.

Table 4-7. Flood Events, Crenshaw County								
Location	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Countywide	3/8/1998	6:00 a.m.	Flood	0	0	0	\$300,000	\$0
Countywide	9/29/1998	8:30 a.m.	Flood	0	0	0	\$0	\$0
Countywide	5/6/1999	12:00 p.m.	Flash Flood	0	0	0	\$10,000	\$0
Central Portion of Crenshaw	6/27/1999	5:50 p.m.	Flash Flood	0	0	0	\$4,000	\$0
Countywide	3/3/2001	12:00 p.m.	Flash Flood	0	0	0	\$10,000	\$0
Luverne	6/11/2001	9:20 p.m.	Flash Flood	0	0	0	\$0	\$0
Luverne	12/24/2002	8:15 a.m.	Flash Flood	0	0	0	\$0	\$0
Western Portion of Crenshaw	7/10/2005	8:00 p.m.	Flash Flood	0	0	0	\$0	\$0
Countywide	3/31/2009	3:59 pm	Flood	0	0	0	\$0	0
Countywide	4/01/2009	11:10 am	Flood	0	0	0	\$0	\$0
Countywide	4/1/2009	5:11 pm	Flood	0	0	0	\$0	\$0
Countywide	9/16/2009	1:25 am	Flash Flood	0	0	0	\$0	0
Countywide	12/14/2009	10:59 pm	Flash Flood	0	0	0	\$0	\$0
Countywide	12/15/2009	1:58 am	Flash Flood	0	0	0	\$0	\$0
Countywide	12/15/2009	5:43 am	Flood	0	0	0	\$0	0
Countywide	12/18/2009	2:57 am	Flood	0	0	0	\$0	\$0
Countywide	3/11/2010	5:45 am	Flash Flood	0	0	0	\$0	\$0
Countywide	2/12/2012	11:13 pm	Flash Flood	0	0	0	\$0	0
Countywide	9/04/2012	12:30 pm	Flash Flood	0	0	0	\$0	\$0
Countywide	9/04/2012	1:26 pm	Flash Flood	0	0	0	\$0	\$0
					0	0	\$324,000	\$0

There were no deaths from flooding reported in the database. The flooding wipes out most of the secondary roads in the county. In terms of property damage, the worst flood in recent history for which there is complete damage estimates, occurred in 1998.

During this flood, a dam was broken near Dozier. The Storm Events Database contained the following report about this event:

A slow moving complex weather system moved through southwest Alabama on March 8, bringing with it copious amounts of rainfall. The Mobile WSR-88D estimated rainfall totals of six to ten inches across the area on March 8 with Brewton recording 9.54 inches. Some areas in north Baldwin County estimated up to fifteen inches of rain with Covington county estimating up to twelve inches of rain. The heavy rains began on the evening of March 7 and continued through the night before tapering off on the afternoon of March 8. The heaviest rainfall fell from midnight until around noon on March 8. The heavy rainfall caused widespread flooding across the area. The flooding began in Mobile county and then spread east across Baldwin, Escambia, Conecuh, Covington, Crenshaw and Butler Counties. Most secondary roads were completely washed out in these counties.....Crenshaw...Most of the dirt roads in the county were washed out. Many of the primary roads also suffered major damage. U S Highway 29 near Dozier was closed on Sunday morning as a dam broke on a pond and caused part of the highway to be washed away. Schools across the county were closed on Monday because of the many dirt roads that were washed out....

Table 4-8. Flood Events Provided by the HMPC

Location	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Countywide	1990	Unknown	Flood	N/A	0	0	Unknown	Unknown
Countywide	1993	Unknown	Flood	N/A	0	0	Unknown	Unknown
Countywide	1995	Unknown	Flood	N/A	0	0	Unknown	Unknown

Community Impacts. Floods are capable of undermining buildings and bridges, eroding shorelines and riverbanks, tearing out trees, washing out access routes, and causing loss of life and injuries. Floods occur in all 50 states and FEMA estimates that 9 million households and \$390 billion in property are at risk from flooding.

The measurement used to determine the limits of the floodplain was developed with the enactment of the National Flood Insurance Program of 1968 (NFIP). Under the NFIP it was determined that the base standard was the 100-year or “base flood”. This means that the limits of the flood plain are set by the limits of a rain event that has a 1% annual chance of occurrence. There are established techniques for determining the base flood limits. These techniques have been used to develop Flood Insurance Rate Maps or FIRMs. FIRMs illustrate elevation of the base flood and the 500-year event (0.2% annual chance of occurrence) in areas where a model has been developed.

Location The Flood Insurance Rate Maps for Crenshaw County are available for review in the EMA office. In the past, flooding problems have occurred in Dozier, as described above, and in Highland Home and Luverne, where roads flooded in 2001 and 2002. Other communities subject to flooding events within the county are the communities of Mulberry and Holiday and the Town of Glenwood. The Conecuh River and Patsaliga Creek, the major drainage systems for the county, occasionally flood in rural areas.

Extent Crenshaw County experiences moderate flooding. The extent of each flood varies according to rainfall, the flow of storm water and the capacity of the receiving channel to discharge.

Repetitive Flood Insurance Losses. A repetitive loss property is one that has two or more flood insurance claims with the NFIP. Crenshaw County has no repetitive loss properties to date.

Probability of Future Occurrences. Based on the flood events since 1990 contained in the Storm Events Database, Crenshaw County may expect about 1.75 flash or riverine floods per year. Average annual damages are estimated at \$81,000. Although we can extract data and probability of occurrence from historical information, they do not necessarily predict future occurrences.

4.7 Droughts/Heat Waves

Hazard Description. Temperatures that hover ten degrees or more above the average high for the region and last for several weeks are defined as extreme heat. Humid or muggy conditions occur when a “dome” of high atmospheric pressure traps hazy, damp air near the ground. The combination of high temperatures and humid conditions increase the level of discomfort and the potential for danger to humans. Droughts occur when a long period passes without any substantial rainfall. A heat wave combined with a drought is a very dangerous situation.

Hazard Profile. Crenshaw County experienced a heat wave in July 2000. The Storm Events Database reports that in the community of Highland Home the temperature was 100 degrees or higher five days during the month. The highest temperature recorded during this period was 103 degrees. Although no damage estimates are available, several wildfires were reported and some crops affected.

Location	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Countywide	7/1/2000	12:01 a.m.	Excessive Heat	0	0	0	\$0	\$0
Countywide	8/8/2007	8:00 a.m.	Heat	0	0	0	\$0	\$0
TOTALS					0	0	\$0	\$0

Source: NOAA; <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

Community Impacts. The human risks associated with extreme heat include heatstroke, heat exhaustion, and heat syncope, heat cramps. A description of each of these conditions follows:

- Heatstroke is considered a medical emergency and is often fatal. It exists when rectal temperature rises above 105°F as a result of environmental temperatures. Patients may be delirious, stuporous, or comatose. The death-to-care ratio in reported cases averages about 15%.
- Heat Exhaustion is much less severe than heatstroke. The body temperature may be normal or slightly elevated. A person suffering from heat exhaustion may complain of dizziness, weakness or fatigue. The primary cause of heat exhaustion is fluid and electrolyte imbalance. The normalization of fluids will typically alleviate the situation.
- Heat Syncope is typically associated with exercise by people who are not acclimated to exercise. The symptom is a sudden loss of consciousness. Consciousness returns promptly when the person lies down. The cause is primarily associated with circulatory instability as a result of heat. The condition typically causes little or no harm to the individual.
- Heat Cramps are typically a problem for individuals who exercise outdoors but are unaccustomed to heat. Similar to heat exhaustion it is thought to be a result of a mild imbalance of fluids and electrolytes.

In 1979 R. G. Steadman, a meteorologist, developed the heat index, which is a relationship between dry bulb temperatures at different humidities and the skin's resistance to heat and moisture transfer. Utilizing Steadman's heat index Table 4-9 was developed to show the risk associated with different temperatures.

Table 4-9. Heat Index/Heat Disorders

Danger Category	Heat Disorder	Apparent Temp. (°F)
IV Extreme Danger	Heatstroke or sunstroke imminent.	>130
III Danger	Sunstroke, heat cramps, or heat exhaustion likely; heat stroke possible with prolonged exposure and physical activity.	105-130
II Extreme Caution	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and physical activity.	90-105
I Caution	Fatigue possible with prolonged exposure and physical activity.	80-90

Source: National Weather Service, 2008

Extreme heat often brings about drought. Risks associated with drought include, effects to the water supply, impact on agriculture, increase in wildfires, negative impact on hydroelectric power and other activities dependent upon water such as recreation and navigation.

Location Droughts and heat waves have a county-wide impact.

Extent The duration, the size and location of the affected area, and the degree of moisture insufficiency are the depending factors on the severity of a drought. Droughts cause the most damage in wooded rural and agricultural areas, where droughts raise the risk and severity of wildfires. Rural communities whose water supplies depend on subsurface aquifer systems suffer reduced water resources during droughts; these communities should have plans to ration water or seek alternative sources.

Probability of Future Occurrences. Due to a lack of data, average annual occurrences and damage estimates cannot be determined. Crenshaw County falls in an area that may experience humid, short droughts and extreme summer heat. Though historically not a major problem, the region is susceptible to extreme drought conditions.

4.8 Hurricanes

Hazard Description. A “tropical cyclone” is a generic term for a cyclonic, low-pressure system over tropical or sub-tropical waters. Tropical cyclones with maximum sustained winds of 38 mph or less are called tropical depressions. A tropical storm is a cyclone with maximum sustained winds at or greater than 39 mph but at or less than 74 mph, and a tropical storm with winds that have reached a constant speed of 74 miles per hour or more is a hurricane.

Hazard Profile. Though the center of Crenshaw County is located approximately 152.3 miles from the Gulf of Mexico, hurricanes and tropical storms sometimes bring high winds and heavy rains to the area as they move north. Table 4-10 lists the major hurricanes/tropical storms that have impacted Crenshaw County and Southwest Alabama over the last eight years. Damage estimates are for the entire region.

Crenshaw County has received periodic, scattered damage from hurricanes and tropical storms for many years. The three events shown in the table below caused flash flooding of low-lying areas and damage to trees and power lines. By far the worst of these was Hurricane Georges in 1998 that devastated Mobile and Baldwin Counties. However, it was still a powerful storm when it reached Crenshaw County. Crenshaw County experienced Hurricane Ivan in 2004 and they also experienced the minimal impact of Hurricane Katrina in 2005.

Table 4-10. Hurricanes/Tropical Storms Since 1995, Crenshaw County

Location	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Countywide	10/03/1995	1200	Hurricane Opal	N/A	0	0	48.0M	4.0M
Countywide	09/25/1998	09:00 AM	Hurricane Georges	N/A	1	0	174.2M	5.0M
Countywide	08/06/2001	04:00 AM	Tropical Storm Barry	N/A	0	0	200K	0
Countywide	09/13/2004	09:00 PM	Hurricane/ Ivan	N/A	0	0	2.5B	25.0M
TOTALS:					1	0	2.722B	34.0M

Community Impacts. Risks associated with coastal storms include storm tide, inland flooding, water force, wind velocity and coastal erosion. A tropical storm can also produce numerous thunderstorms and tornadoes.

Because of its proximity to the Gulf Coast, Crenshaw County is susceptible to the effects of hurricanes and tropical storms. The primary risks are damaging straight-line winds, formation of tornadoes and flooding. Ten percent of deaths in the United States that are associated with hurricanes are due to tornadoes.

Location Hurricanes and tropical storms have a multi-county impact; all of Crenshaw County is susceptible.

Extent Hurricanes pose the greatest threat to life and property, but tropical depressions and storms can also cause extensive damage and loss of life. On average, Dale County experiences a hurricane event once every year to every other year, with severe damage. Hurricanes can be accompanied by tropical storms, tropical depressions, severe storms, high winds, floods, and even tornadoes. The last recorded hurricane event for Dale County was a tropical storm in 2005. Tropical storms and depressions often bring torrential rains and flooding, that may outlive the storm itself by several days. A relatively weak tropical storm or depression may cause more damage than a high-intensity, fast-moving hurricane if the storm lingers long enough to saturate flood plains. Tornadoes may also form as a by-product of hurricanes, but not always. The threat of tornadoes expands the geographic scope of risk, because tornadoes can cause severe damage inland. Half of all hurricanes produce at least one tornado—typically within 12 hours of landfall and during daylight hours.

Probability of Future Occurrences. Based on limited historical information from the Storm Events Database, a hurricane or tropical storm impacts the county every couple of years. Average annual damages for Crenshaw County are unavailable due to the fact that county by county damage estimates are not available. Although one can extract data and probability of occurrence from historical information, the risk of a

hurricane or tropical storm and the location of damage are random. The new hurricane and tropical storm occurrences were reviewed but did not add enough information to the Storm Events Database to change the probability of future occurrences. Therefore, no changes have been made to the probability of future hurricane and tropical storm occurrences for Crenshaw County since the previous plan.

4.9 Winter Storms/Freezes

Hazard Description. Winter storms and blizzards originate as mid-latitude depressions or cyclonic weather systems, sometimes following the meandering path of the jet stream. A blizzard combines heavy snowfall, high winds, extreme cold, and ice storms. The origins of the weather patterns that cause severe winter storms are primarily from four sources in the continental United States. Winter storms in the southeast region are usually a result of Canadian and Arctic cold fronts from the north and mid-western states combining with tropical cyclonic weather systems in the Gulf of Mexico.

Hazard Profile. Crenshaw County infrequently experiences winter storms and extreme cold periods, although crop damage has occurred from these events. Table 4-11 lists one such event dating from 2002. A snowstorm in March 2003 affected the entire state of Alabama but was not listed in the database for Crenshaw County

Location	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Countywide	01/02/2002	12:00 AM	Winter Storm	N/A	0	0	\$0	\$0
TOTALS:					0	0	\$0	\$0

Community Impacts. Risks associated with winter storms are a direct correlation to the strength of the storm and the region’s ability to handle a storm. The risks include loss of life due to cold and disruption of transportation routes, loss of electricity for extended periods, and impact on agriculture.

Location The entire county is equally at risk for winter storms and freezes.

Extent When winter storms/freezes due occur, they tend to be mild and brief. The average snowfall is 0.1 inches yearly and winter temperatures on average are above freezing. The Hazard Mitigation Planning Committee (HMPC) rated the extent of winter storms/freezes as a low threat among the natural hazards.

Probability of Future Occurrences. Due to a lack of data, average annual occurrences and damage estimates cannot be made. However, Crenshaw County does not have a considerable risk of a winter storm occurring, but it has a high threat of a winter storm adversely affecting the area. This is a direct result to the area’s ability to handle a severe winter storm. Although they are rare, Crenshaw County is susceptible to winter storms.

4.10 Wildfires

Hazard Description. There are four categories of wildfires that are experienced throughout the United States:

- Wild land fires, including brush fires
- Interface or intermix fires
- Firestorms
- Prescribed fires and prescribed natural fires

The two primary categories experienced in Crenshaw County are wild land fires and interface or intermix. Wild land fires are fueled exclusively by natural vegetation. Interface or intermix fires are fueled by both vegetation and the built up environment.

Three factors have a direct impact on wildfire formation: topography, fuel, and weather. Topography can have a powerful influence on wildfire behavior; slope, canyons, gulches. Hollows can greatly increase the rate of spread.

Hazard Profile. Table 4-12 shows the number of fires responded to and suppressed by the Crenshaw County forester's office and volunteer fire departments from 1995 to 2008. The fires listed are the number that required assistance by the Forestry Commission to control the blaze. The five year average is 28.8 fires, with a five year average of 4.5 acres burned per fire.

Table 4-12. Wildfires in Crenshaw County

Year	# of Fires	Acres Burned
1995	22	17.8
1996	53	169.5
1997	28	65.0
1998	30	154.4
1999	15	88.1
2000	63	263.7
2001	27	158.5
2002	33	125.6
2003	6	5.6

Source: Alabama Forestry Commission, Crenshaw County Office

Community Impacts. Wildfires can cause considerable damage and loss of life especially in areas where there is an interface between wild land and urban development. Crenshaw County has multiple fuel sources and is prone to drought and thunderstorms; therefore, wildfires are a significant risk. Furthermore, rural fire departments are almost exclusively made up of volunteers and usually have limited resources that are stretched during periods when numerous fires occur.

Location Primarily rural areas of the county are susceptible.

Extent The extent of wildfires depends on human development patterns, weather, and firefighting resources in the affected area. Dense clusters of wooden homes and other structures located near woodlands have the greatest potential for property damages and threats to life. These areas are prone to interface fires. Weather is the most important natural variable in wildfire formation. Droughts increase the inflammability of vegetation and make suppressing fires more difficult. The Alabama Forestry Commission monitors weather and issues alerts when conditions are ripe for wildfires. Firefighting resources can affect the severity of wildfires. Rural fire departments are almost exclusively made up of volunteers and usually have limited firefighting resources that are stretched during periods when numerous fires occur. These limited firefighting resources can compound the risk and extent of wildfire damages.

Probability of Future Occurrences. Based on historical information, Crenshaw County can expect an average of 30.9 significant wildfires per year that damage or destroy an average of 116.5 acres. The average area burned being approximately 3.7 acres. Current fire threats can be found on the Wildland Fire Assessment System website www.wfas.net. This website shows fire potential and provides a thirty day forecast. Although one can extract data and probability of occurrence from historical information, the risk of a wild fire occurring and the location of damage appear to be random.

4.11 Dam/Levee Failures

Hazard Description. Dam failures are potentially the worst flood events. A dam failure is usually the result of neglect, poor design, or structural damage caused by a major event such as an earthquake.

Hazard Profile. A dam on a pond near Dozier broke during a severe flood event in 1998. It resulted in the closing of U S Highway 29 near Dozier due to part of the highway being washed away. This is the only reported dam failure known in Crenshaw County.

Community Impacts. When a dam fails, a large quantity of water is suddenly released downstream, destroying anything in its path. The area impacted by the water emitted by dam failure would encounter the same risks as those in a flood zone during

periods of flooding. The area directly affected by the water released during a dam failure is not county wide.

Location According to HAZUS, there are 17 identified dams in Crenshaw County; the Crenshaw County Lake Dam has a “high” hazard classification, the other dams include the B.C. Massey Dam, Bailey Dam, Bozeman Pond Dam, Bradleton Lake Dam, Bryce Smith Dam, Clark Lake Dam, E.S. Stewart Dam, Keelough Pond Dam, L.D. Thaggard Dam, L.E. Skipper Pond Dam, Magnolia Shores Lake Dam, Moody Lake Dam, R.D. Beasley Dam, R. Killough Dam, Rays Pond Dam, and Sluggs Dam. These classifications are assigned to a dam depending upon the urban development directly downstream of the dam and whether or not failure would result in serious economic loss. The classification is not an indication of the quality of the dam’s construction.

Extent with dam/levee failures are minimal, although if there was a dam failure, it would cause severe damage.

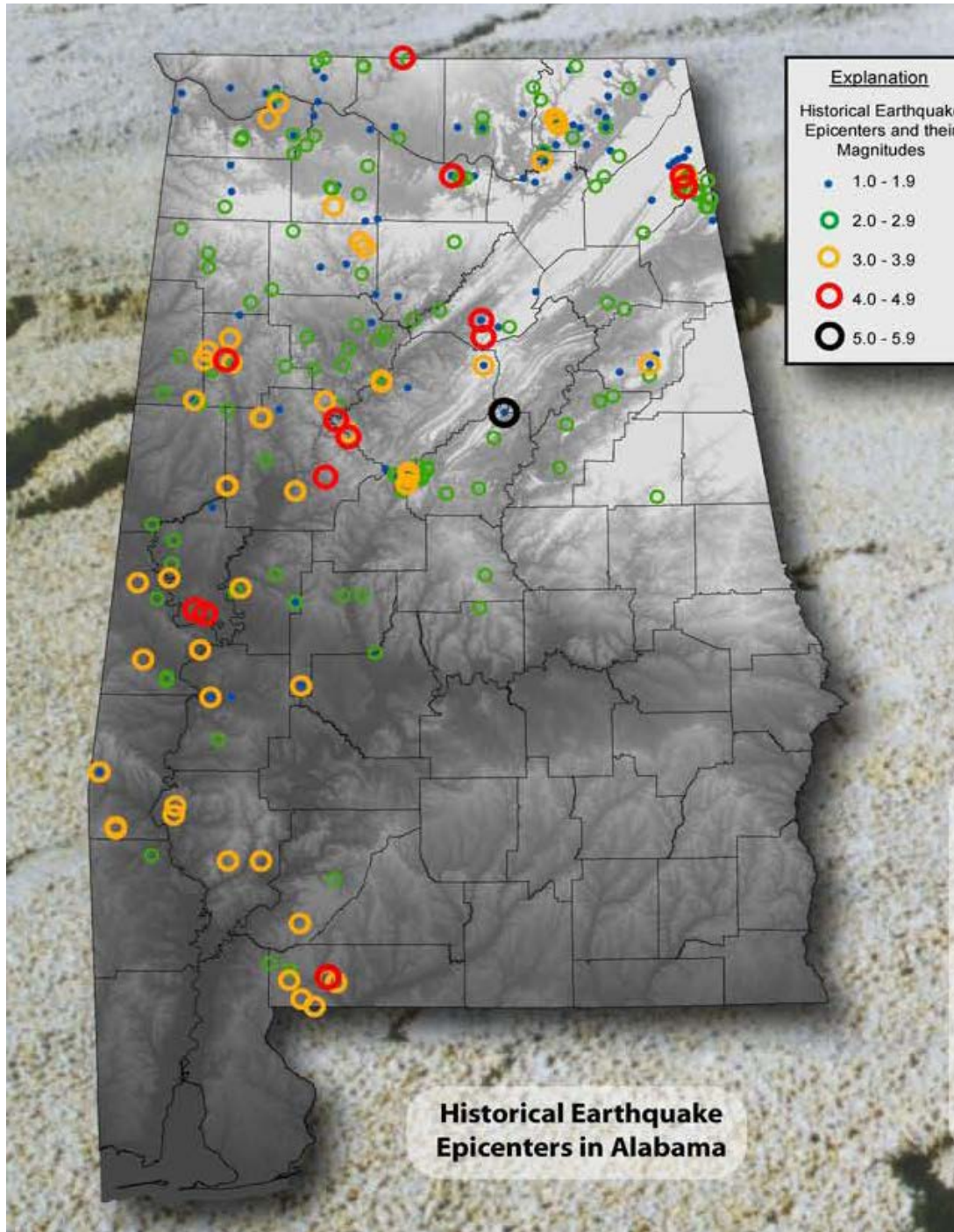
Probability of Future Occurrences. The risks associated with dam–levee failures to Crenshaw County are minimal

4.12 Earthquakes

Hazard Description. An earthquake is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth’s surface.

Hazard Profile. According to the Alabama Geological Survey, no earthquakes have been located in Crenshaw County in the 20th Century, as shown in Map 4-4.

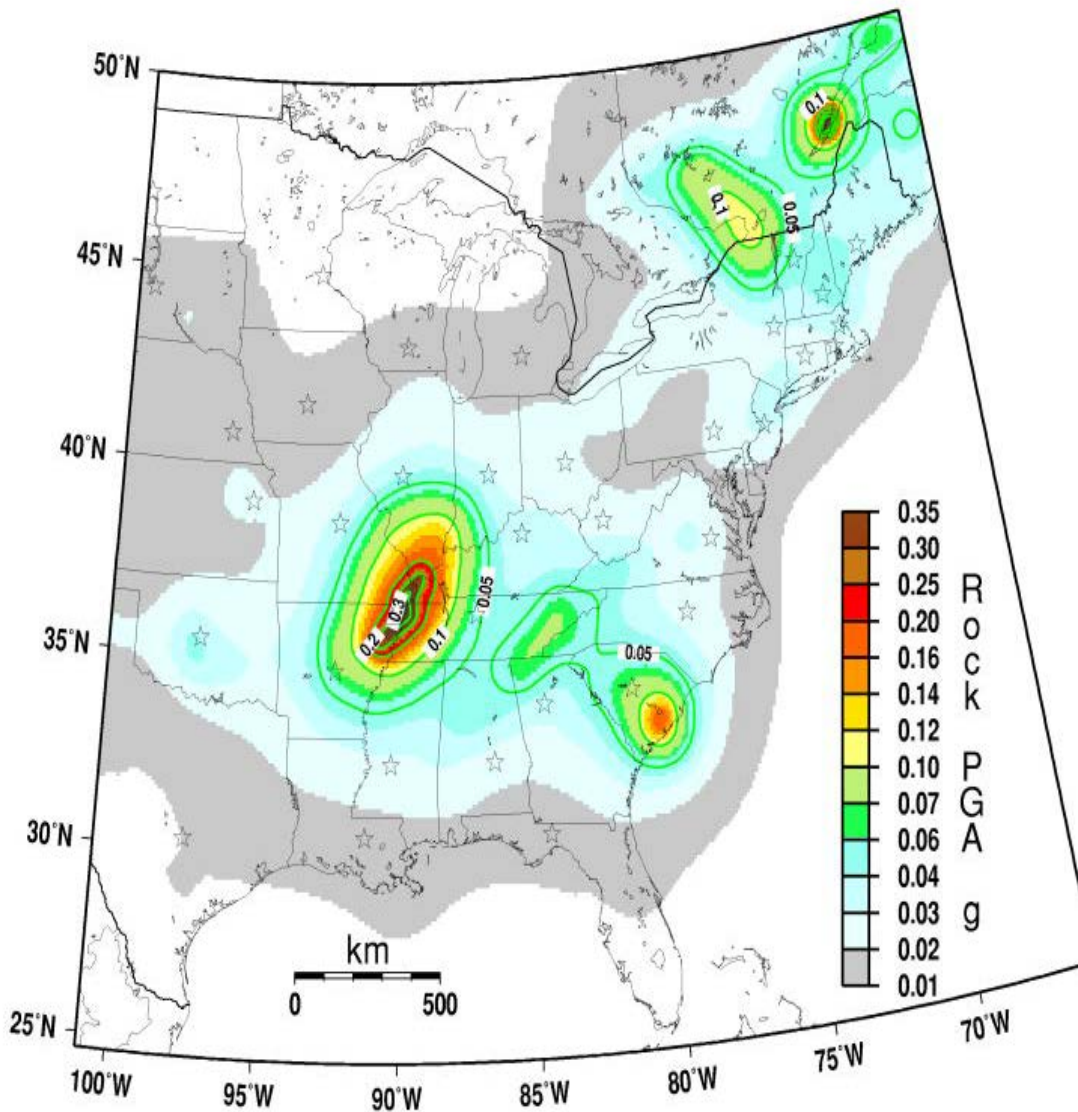
Information provided by the USGS indicates a significant earthquake occurred on October 18, 1916, and was felt in five states. Although it was a large regional earthquake, there are no records of damage in Crenshaw County. Based on available information, other quakes felt in the county since 1916 have not caused any damages. See Map 4-4. Earthquakes in Alabama Since 1916 on the next page.



Map 4-4. Earthquakes in Alabama Since 1916
(Source: Geological Survey of Alabama)

Community Impacts. The USGS has developed a methodology for identifying an area's vulnerability to the occurrence of an earthquake. Areas are identified by their relative seismic risk. Crenshaw County is located in an area with peak acceleration between 5% and 6% with 10% probability of exceedance in 50 years. This is an area of slight risk as illustrated in Map 4-5.

CEUS PGA 10%/50 years, 2008



GMT May 2 10:59 PGA 10%50yr PE using half-wt on NMSZ cluster models. Stars: state capitals.

Map 4-5. Earthquake Hazard Areas

In accordance with FEMA guidelines, an area with 3% or greater probability of exceedance in 50 years should be further assessed for vulnerability. In the case of Crenshaw County the risk is slight and falls short of the 3% threshold.

Location Although the risk of a significant earthquake occurring in Crenshaw County is small; the impact of a large regional earthquake could be significant. The entire county is equally at risk

Extent According to the Geological Survey of Alabama (GSA), recent seismograph records indicate that earthquakes in Alabama are frequent but not strong enough to be felt on the land surface. Earthquakes can occur anywhere at any time in Alabama, but most are likely to do little or no damage.

Probability of Future Occurrences. Although insufficient data exists to predict the future probability of an earthquake occurring in Crenshaw County, the risk of a significant, damage-causing earthquake in the county is minimal.

4.13 Landslides

Hazard Description. A “landslide” is the downward and outward movement of slope-forming materials acting under the force of gravity. The term covers a broad category of events, including mudflows, mudslides, debris flows, rock falls, rockslides, debris avalanches, debris slides and earth flows. Landslides may consist of natural rock, soil, artificial fill, or combinations of these materials. Landslides are classified by type of movement, including; slides, flows, lateral spreads, falls and topples.

Hazard Profile. Crenshaw County has had one human-induced landslide near Highway 97 in the northern part of the county. No defined area of the county has demonstrated susceptibility to landslides.

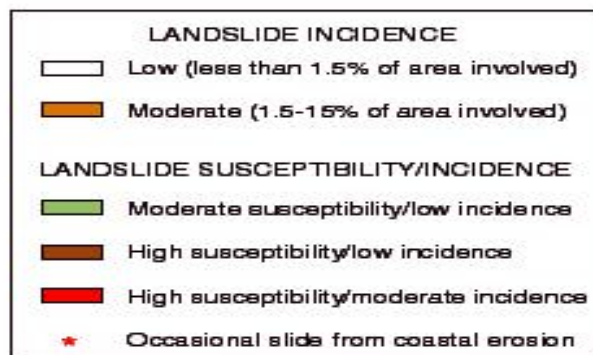
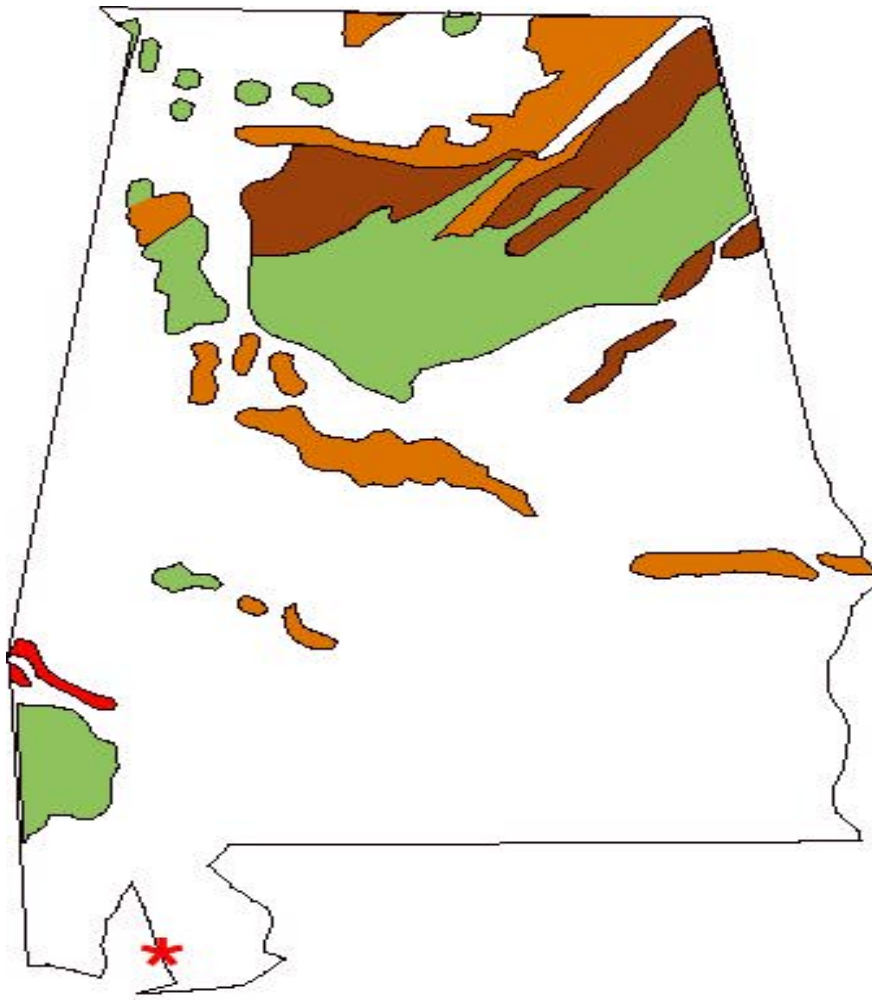
Community Impacts. The effects of landslides are often misrepresented as being the result of the landslide’s trigger event, such as a flood, earthquake, volcanic eruption, hurricane, or coastal storm. The impact from a landslide can include loss of life, damage to buildings, lost productivity, disruption in utilities and transportation systems, and reduced property values. According to FEMA 25 – 50 people die annually from landslides in the United States.

Location Crenshaw County is not susceptible to landslides caused by topography or geology. However, areas experiencing new development may become prone to landslides. In these cases, slope failures primarily occur due to improper excavation and failure to protect recently excavated slopes.

Extent Slope failures primarily occur due to improper excavation and failure to protect recently excavated slopes. Proper soil management and careful construction can be sharply mitigate the extent of potential landslides and prevent their occurrence

altogether in most cases. Heavy rainfall and flooding can precipitate and exacerbate landslides, making the extent of potential damage from landslides in an area difficult to predict.

Probability of Future Occurrences. The topography and geology of Crenshaw County are not susceptible to the effects of landslides. Typical slope failures may still occur but are primarily the result of development. Crenshaw County is not located in an area susceptible to landslides, as illustrated in Map 4-6. Landslide Hazard Areas, State of Alabama on the next page.



Source: U.S. Geological Survey

Map 4-6. Landslide Hazard Areas, State of Alabama

4.14 Vulnerability Assessment: Identification of Assets

This section assesses vulnerability of types and numbers of existing buildings and critical facilities (including infrastructure) located within each identified hazard area. The only identified hazard, which is area specific within the county, is flooding. Consequently, all buildings and critical facilities are exposed to all remaining hazards. The vulnerability assessment has not changed since the last mitigation plan, therefore no changes were made.

The building counts and values are taken from the HAZUS 2007 databases, as data availability is limited.

Designation of a facility as critical is based on the HAZUS definitions, as follows:

- Essential Facilities. These facilities are critical to the health and welfare of the entire county population and are essential following hazard events, including emergency response facilities (police, fire, and emergency management), medical care facilities (hospitals and other care facilities), schools, and shelters for evacuation.
- Lifeline Utility Systems. These facilities are essential lifelines that include potable water, wastewater, natural gas, electric, and communications systems. HAZUS data is not available for this county.
- Transportation Systems. These facilities include highways, bridges, railways, and waterways.
- High Potential Loss Facilities. These facilities include military installations and high potential loss dams.
- Hazardous Materials Facilities. These facilities may pose a threat if disrupted by natural hazards and include hazardous industrial chemicals, explosives, flammables, toxins, and radioactive materials.

Building Assets.

The county has over 8,000 buildings valued at over \$600 million. All of the buildings are at risk for natural hazards damages.

Table 4-13. Total County Building Inventory

Number of Buildings by Type							
Residential	Commercial	Industrial	Agriculture	Religious	Government	Education	Total
7,629	262	82	46	39	21	8	8,087
Source: HAZUS 2007							

**Table 4-14. Value of Buildings in County
(\$ Building Value in \$1,000's)**

Value by Type of Building							
Residential	Commercial	Industrial	Agriculture	Religious	Government	Education	Total
516,290	75,689	37,121	7,124	18,540	5,640	4,612	665,016
Source: HAZUS 2007							

Critical Facilities

The maps on the following pages show the distribution of critical facilities throughout the county including communication, medical care, police and fire, hazardous material and school facilities. These facilities are shown in relation to the flood boundaries where applicable. The facilities shown are those provided from the HAZUS 2007 database and may not be representative of all stations in the county. Shelter data is not available through HAZUS 2007.

Communication facilities are important resources for a community to have available. It allows administrators direct access to the public for announcements, education and alerts regarding hazards. Crenshaw County has two broadcasting towers. The county has one FM and one television tower located in the southern portion of the county.

The county has an emergency response system. These facilities are located throughout the county. Some of the volunteer stations have medical rescue capability.

Hazardous material facilities contain substances that can pose significant hazards because of their toxicity, radioactivity, flammability, explosiveness and/or reactivity. Significant casualties and/or property damage could occur from a single hazardous materials release induced by a flood, earthquake or other unforeseen hazard. Map 4-9 depicts that location of hazardous sites in 2007. A current listing of hazardous materials and their locations are on file at the EMA.

Crenshaw County has three medical facilities, including one hospital and two medical centers. The Crenshaw Baptist Hospital is classified as a medium hospital by HAZUS 2007 and has approximately 52 beds. The other two facilities do not have listings regarding size. .

Crenshaw County has school systems located in all parts of the county around urbanized areas. The locations of the schools are an important resource for the public as they are often used as shelters during times of disasters.

4.15 Vulnerability Assessment: Impacts on Population, Buildings, Critical Facilities; Estimated Losses

Tables 4-15, 4-16 and 4-17 depict populations and buildings in Crenshaw County that is vulnerable to each natural hazard. It is estimated that the entire population is vulnerable to tornadoes, drought, hail, wildfire, lightning, hurricanes, thunderstorms, winter storms, and earthquakes. It is estimated that 2% of the population and buildings are vulnerable to flooding and an undetermined amount are susceptible to dam failure, landslides, and sinkholes.

Impact on Population.

Table 4-15. Population Vulnerable to Natural Hazards		
Hazard	Population	Households
Flood	273	112
Tornado	13, 665	5,577
Drought	13, 665	5,577
Hail	13, 665	5,577
Wildfire	13, 665	5,577
Lightning	13, 665	5,577
Hurricane	13, 665	5,577
Thunderstorm	13, 665	5,577
Landslide	0	0
Winter storm	13, 665	5,577
Earthquake	13, 665	5,577
Dam Failure	Data not available	Data not available

Source: Census 2000 (Flood estimates based on 2% of total)

Impact on Buildings.

Table 4-16. Number of Buildings Exposed to Hazards

Hazard	Type of Building							Total
	Residential	Commercial	Industrial	Agriculture	Religious	Gov't	Education	
Flood	111	2	1	1	1	1	1	118
Tornado	7,629	262	82	46	39	21	8	8,087
Drought	7,629	262	82	46	39	21	8	8,087
Hail	7,629	262	82	46	39	21	8	8,087
Wildfire	7,629	262	82	46	39	21	8	8,087
Lightning	7,629	262	82	46	39	21	8	8,087

Table 4-16. Number of Buildings Exposed to Hazards

Hazard	Type of Building							
	Residential	Commercial	Industrial	Agriculture	Religious	Gov't	Education	Total
Hurricane	7,629	262	82	46	39	21	8	8,087
Thunderstorm	7,629	262	82	46	39	21	8	8,087
Landslide	0	0	0	0	0	0	0	0
Winter storm	7,629	262	82	46	39	21	8	8,087
Earthquake	7,629	262	82	46	39	21	8	8,087

Source: HAZUS 2007 (Flood estimates based on 2% of total and rounded)

Table 4-17. Value of Buildings Exposed to Hazards
(\$ Building Value in \$1,000's)

Hazard	Type of Building							
	Residential	Commercial	Industrial	Agriculture	Religious	Gov't	Education	Total
Flood	8,372	1,683	826	25	1,075	240	306	12,527
Tornado	671,393	74,711	37,121	7,124	18,540	5,640	4,612	819,141
Drought	671,393	74,711	37,121	7,124	18,540	5,640	4,612	819,141
Hail	671,393	74,711	37,121	7,124	18,540	5,640	4,612	819,141
Wildfire	671,393	74,711	37,121	7,124	18,540	5,640	4,612	819,141
Lightning	671,393	74,711	37,121	7,124	18,540	5,640	4,612	819,141
Hurricane	671,393	74,711	37,121	7,124	18,540	5,640	4,612	819,141
Thunderstorm	671,393	74,711	37,121	7,124	18,540	5,640	4,612	819,141
Landslide	0	0	0	0	0	0	0	0
Winter storm	671,393	74,711	37,121	7,124	18,540	5,640	4,612	819,141

Source: HAZUS 2007 (Flood estimates based on 2% of total)

Impact on Critical Facilities. Critical facilities subject to flooding are shown on the maps in the previous section. All critical facilities are subject to all other natural hazard disasters.

Estimated Losses. Table 4-18 provides general estimates of property damage that might result from each of the identified hazards. These are very gross estimates of property damages and should only be interpreted as indicators of the degree of damage possible. The figures are based solely on past occurrences, as described in the hazard identification section of this chapter. More accurate methods are available to assess damages, particularly the Corps of Engineers Flood Damage Assessment (HEC-FDA) model, FEMA's Benefit-Cost Modules, and the HAZUS loss estimation software. As a follow up to this plan, the County intends to conduct more detailed loss estimates, applying the latest version of HAZUS-MH for multi-hazard assessments as was done with this revised plan.

Hazard	Low	Expected	High
Tornado	\$0	\$73, 000	\$2.5 Million
Severe Storm	\$0	\$60,875	\$250,000
Flood	\$0	\$81,000	\$300,000
Winter Storm/Freeze	\$0	N/A	N/A
Hurricane	\$0	N/A	N/A
Drought/Heat Wave	\$0	N/A	N/A
Wildfire	\$0	N/A	N/A
Dam/Levee Failure	\$0	N/A	N/A
Landslide	\$0	N/A	N/A
Earthquake	\$0	N/A	N/A

Source: NOAA Property Damage Estimates at <http://www4.ncdc.noaa.gov/cgi-win/wwwcgi.dll?wwevent~storms>

4.16 Vulnerability Assessment: Analysis of Development Trends

As shown in Tables 4-19 and 4-20, Crenshaw County’s population increased 0.2% during the decade 1990-2000. The City of Luverne and Town of Rutledge showed positive growth in population. In 2003, a Tier 1 auto parts manufacturer signed a contract to open a facility in Luverne. The company, Shin Young Metals, supplies parts for the new Hyundai Plant in nearby Hope Hull, Alabama.

	Crenshaw County	State of Alabama
	Historical	
1980 Population	14,110	3,893,888
1990 Population	13,635	4,047,587
Percent Change 1980-1990	-3.4	3.8
Number Change 1980-1990	-475	146,699
2000 Population	13,665	4,447,100
Percent Change 1990-2000	0.2	10.1
Number Change 1990-2000	30	406,513
	Projected	
2005 Population	13,676	4,644,503
2015 Population	13,738	5,028,045
2025 Population	13,714	5,385,997
Percent Change 2000-2025	0.4	21.1
Number Change 2000-2025	49	938,897

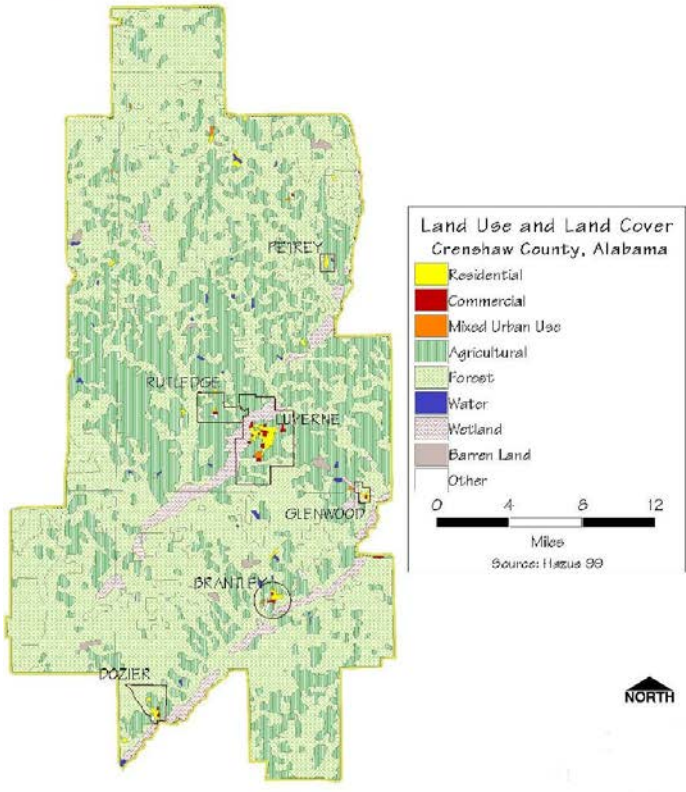
Source: Alabama State Data Center, the University of Alabama

Table 4-20. Population Growth Trends

Jurisdiction	2000 Population	2010 Population	Number Change	Percent Change
Crenshaw Co.	13,635	13,906	30	0.2%
Luverne	2,635	2800	117	4.63%
Brantley	920	809	-111	12.07%
Dozier	391	329	-62	15.86%
Rutledge	476	467	39	7.71%
Glenwood	191	187	-4	2.09%
Petrey	63	58	-5	7.94%

Source: Census 2010

Little population change is forecast for Crenshaw County to the year 2025. There has been speculation of incorporating the Highland Home Community. In the future, Crenshaw County should attract more industry supplying the nearby Hyundai plant. Map 4-12 on the next page shows the land use in the county from 2010.



HAZUS 2010

Map 4-12. Land Use and Land Cover, Crenshaw County

4.17 Multi-Jurisdictional Risk Assessment

In Table 4-21 the jurisdictions are ranked in terms of risk of natural hazards. All jurisdictions are equally at risk for tornadoes, severe storms, earthquakes, wildfires, extreme cold, winter storms, drought and extreme heat. The jurisdictions have varying degrees of risk pertaining to flooding and landslides. The Towns of Dozier, Glenwood and the Mulberry Community and Holiday Settlement are most at risk for flooding. The risk associated with each hazard depends upon topography, geology and density of development. Table 4-21 shows the risk by jurisdiction with 1=highest risk and 10=lowest risk.

Table 4-21. Multi-Jurisdictional Risk Assessment

Jurisdiction	Crensh. Co.	Luverne	Brantley	Dozier	Rutledge	Glenwood	Petrey
Tornado	1	2	1	2	1	2	1
Severe Storm	2	3	2	3	2	3	2
Flood	3	1	3	1	3	1	3
Drought/Heat	4	6	6	6	6	6	6
Hurricanes	5	4	4	4	4	4	4
Winter/Freeze	6	5	5	5	5	5	5
Wildfire	7	7	7	7	7	7	7
Dam Failure	8	8	8	8	8	8	8
Earthquake	9	9	9	9	9	9	9
Landslide	10	10	10	10	10	10	10

Chapter 5 Mitigation Strategies

5.1 Purpose of the Mitigation Strategies

The mitigation strategies presented in this chapter provide a long-range blueprint for all participating communities within Crenshaw County to consolidate their resources and efforts to cooperatively reduce the potential losses identified in the risk assessment. Additional mitigation strategies have been included in this plan, including those on community shelters and generators with protective covering. This chapter presents a shared vision and comprehensive, long-range plan of goals, objectives, and available mitigation measures for all participants in the planning process. Those short-range mitigation measures supported by each community over the next five-year planning cycle are presented in Chapter 6 - Community Action Programs.

5.2 Steps in Developing the Strategies

At its organizational meeting, the Hazard Mitigation Planning Committee (HMPC) adopted a mission statement and a shared vision for disaster resistance among all communities within the county. These statements were prepared with *Committee Exercise #1 - Mission/Vision Statements*. Refer to Section 3.2, Hazard Mitigation Planning Committee, for the Mission Statement. Section 5.6 presents the Vision Statement for the committee.

At subsequent committee meetings, each jurisdiction completed risk and capabilities assessments. *Committee Exercise #2 - Hazard Identification* was used to generally identify the natural hazard threats to each community and the probability or risks of future occurrences. More detailed research and analyses of the risks supplemented the committee exercise, and the committee reviewed the results. The next exercise, *Committee Exercise #3 - Hazard Profiles*, compiled the records of past natural hazard events. This exercise was completed through evaluation of available data, such as local damage reports, news accounts, and FEMA disaster declaration records, as well as committee members' recollections of past events. *Committee Exercise #4 - Capabilities Assessment for Hazard Mitigation* was completed by each jurisdiction to determine existing capabilities to implement mitigation measures. The committee representatives examined the regulatory tools, staff resources, funding, and other capabilities of each jurisdiction.

The "Issues and Opportunities" – major problems and opportunities facing each community's mitigation efforts – were derived from the risk and capability assessments, committee discussions, public participation, and interagency coordination activities. The statements of issues and opportunities form the basis for determining appropriate mitigation measures for each community, given their particular risks and capabilities.

Committee Exercise #5 - Alternative Mitigation Measures, was used by the committee to select among the broad range of alternatives that might be available to each community. Through this exercise, goals were established for high-risk natural hazards and each of the

six categories of mitigation activities. Mitigation program objectives define achievable targets that are consistent with goals. The committee evaluated the alternative mitigation measures that would advance the goal and selected the preferred measures that would best address each issue. The committee also identified the most critical natural hazard issues in each jurisdiction and recommended mitigation projects for potential FEMA funding.

Finally, the committee completed the Mitigation Action Program that schedules the implementation of mitigation measures. The action program for each participating community assigns implementation responsibility, sets a timeline, identifies funding needs, and establishes the priority for implementation (See chapter 6). Figure 5.1 illustrates the process and components that lead to the Mitigation Strategies and Mitigation Action Program.

The HMPC sought participation from the public and coordinated its efforts with other agencies. This was accomplished through open committee meetings, access to the project surveys, public meetings, media announcements and public hearings prior to the plan's adoption. Results of the exercises and sign-in sheets and minutes from meetings are | available in the EMA office.

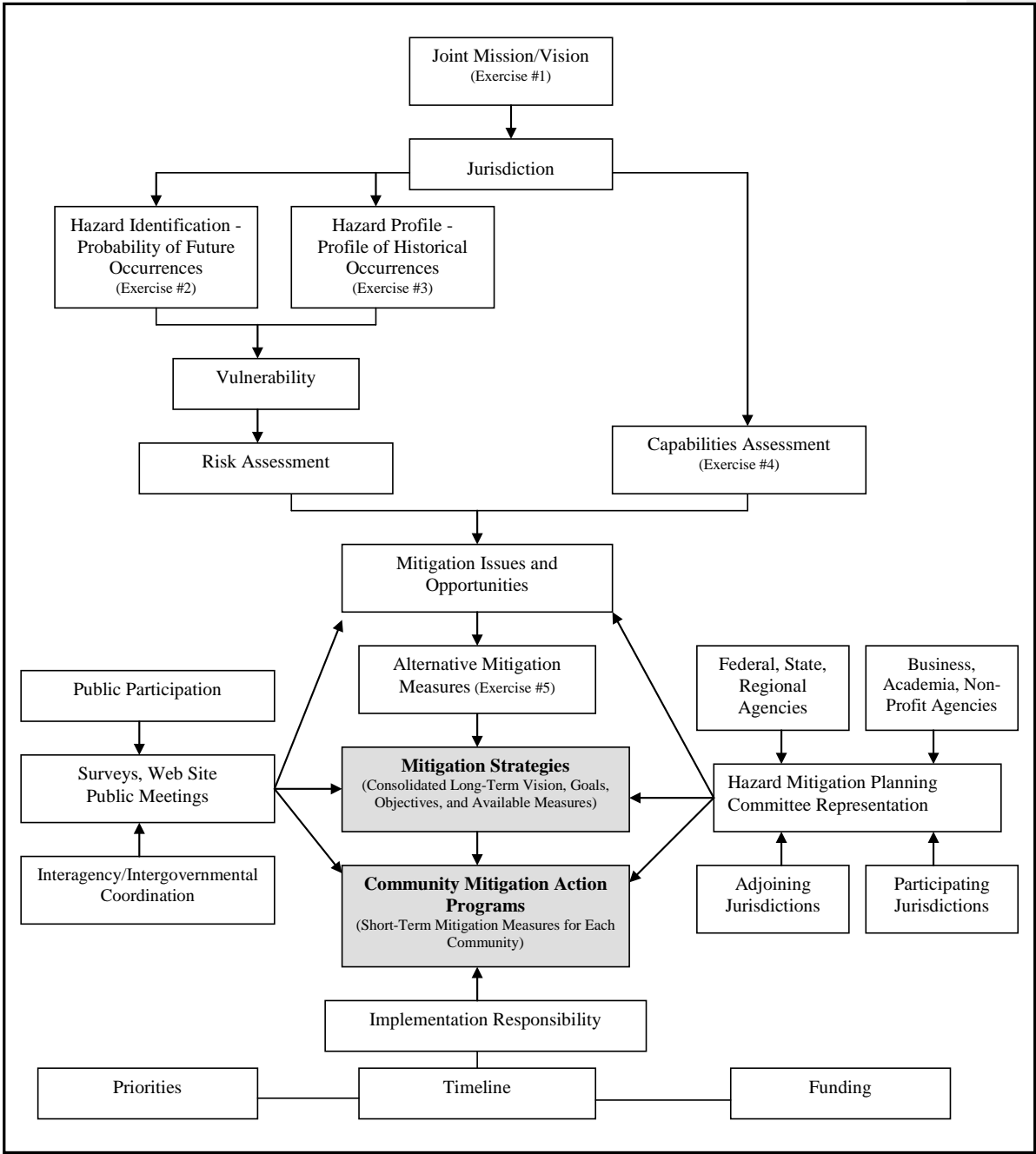


Figure 5-1. Steps in the Development of the Mitigation Strategies and Action Programs

5.3 The Planning Approach

The planning approach presented here follows the six categories of a comprehensive hazard mitigation program. These program categories have been developed by FEMA for managing a successful mitigation program and are used here as guidelines for identifying and selecting among alternative mitigation measures.

- 1. Prevention.** Adopting and administering ordinances, regulations, and programs that manage the development of land and buildings to minimize risks of loss due to natural hazards.
- 2. Property Protection.** Protecting structures and their occupants and contents from the damaging effects of natural hazard occurrences, including retrofitting existing structures to increase their resistance to damage and exposure of occupants to harm; relocating vulnerable structures and occupants from natural hazard locations; and conversion of developed land to permanent open space through acquisition and demolition of existing structures.
- 3. Public Education and Outreach.** Educating and informing the public about the risks of natural hazards and the techniques available to reduce threats to life and property.
- 4. Natural Resources Protection.** Preserving and restoring the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.
- 5. Emergency Services.** Responding to and recovering from a natural hazard disaster.

Structural Projects. Engineering structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of a natural hazard on a community.

Formatted: Bullets and Numbering

5. Mitigation Issues and Opportunities

The mitigation measures of this plan respond to the issues and opportunities listed in this section. These statements summarize the principal natural hazard issues and mitigation opportunities and are based upon the findings of the risk assessment and capability assessment, participation by members of the HMPC at committee meetings and through planning exercises, the results of the public survey, public participation at community meetings, and coordination among interested agencies.

Prevention

- Tornadoes, severe storms and floods are the most threatening hazards to Crenshaw County communities.

- No Crenshaw County municipalities practice comprehensive planning.
- The county expects a slight population increase of 0.2%.
- A large number of areas depicted on the Flood Insurance Rate Maps are designated “Approximate” zones where no detailed studies and flood elevation data exist.
- Unincorporated Crenshaw County, Luverne, Brantley, Glenwood, and Dozier are the only jurisdictions that participate in the NFIP.
- The Town of Petrey has special flood hazard areas identified but do not participate in the NFIP.
- Rutledge does not have any special flood hazard areas identified.

Property Protection

- Standard homeowner and business insurance policies do not cover flood damages.
- Many older homes and buildings located in flood plains are not protected from flooding.

Public Education and Outreach

- Real estate agents and property owners have a continuing need for flood map information.
- The public is generally unaware of risks associated with hazards and the mitigation measures available for property protection.
- Local libraries are available to serve as repositories for information on hazards and methods of protection.
- Technical assistance materials are available through FEMA to assist property owners on alternative property protection measures.
- School environmental education programs provide excellent opportunities for public education on hazard mitigation alternatives.
- A multitude of public outreach opportunities and resources are available.
- Public information activities are among the least expensive mitigation measures and often the most effective.

Natural Resources Protection

- Stream and river banks and riparian zones help manage floods and filter runoff.
- Accidental or intentional dumping of household and commercial items, such as household garbage, tires, shopping carts, and landscape debris, can obstruct flows.
- Storm-damaged trees - resulting from hurricanes, tornadoes, severe thunderstorms, and wind storms - can clog streets and access routes during periods of disaster response, obstruct the natural discharge of flood waters, disrupt utility services, increase debris removal, damage property, and increase disaster recovery costs.

Emergency Services

- Weather radios in homes and businesses provide inexpensive means for advance warning.
- Generators to critical facilities provide uninterrupted service to the public.

Structural Projects

- Regular maintenance of streams and drainage ways is critical to their effective operation for storm water discharge.

5.5 Existing Natural Hazard Mitigation Activities

This plan expands upon and improves existing local mitigation activities as described in this section.

NFIP Participation

Crenshaw [County](#), the City of Luverne, Town of Brantley, Town of Glenwood, and the Town of Dozier participate in the [National Flood Insurance Program \(NFIP\)](#). [Table 5-1 lists their date of entry into the program.](#)

Table 5-1. National Flood Insurance Program Participants

Community Name	Date of Entry into the NFIP
Crenshaw County (Unincorporated Areas)	07/17/86
City of Luverne	06/24/77
Town of Dozier	03/01/95
Town of Brantley	07/05/05
Town of Glenwood	12/30/03
Town of Petery	10/162009

The Town of Petrey has special flood hazard areas identified but do not participate in the NFIP. Rutledge does not have flood hazard areas identified nor does it participate in the NFIP.

Existing Capabilities

In response to *Committee Exercise #4, Capability Assessment for Mitigation Plan Implementation*, jurisdictions noted regulatory tools, staff/personnel resources, and available funding sources. The results are maintained in the EMA office, and a summary of regulatory tools is presented in Table 5-2.

Table 5-2. Planning and Regulatory Tools by Jurisdiction

Jurisdiction	Comprehensive Plan ¹	Capital Improvement Plan ²	Zoning Ordinance	Building Codes	Flood Plain Regulations
Crenshaw County	-	-	-	-	X
City of Luverne	-	-	X	X	X
Town of Brantley	-	-	X	-	-
Town of Rutledge	-	-	X	-	-
Town of Dozier	-	-	-	-	X
Town of Glenwood	-	-	-	-	-
Town of Petrey	-	-	-	-	-

Notes:

1. A *Comprehensive Plan* is a current and active plan for managing existing and future growth and development throughout the jurisdiction.
2. A *Capital Improvement Plan* is a five- to six-year plan for capital facilities improvements tied directly to the comprehensive plan.

5.64 Vision Statement

A Vision for Disaster Resistance

Crenshaw County and its municipalities envision active resistance to the threats of nature to human life and property through publicly supported mitigation measures with proven results. The communities within Crenshaw County commit to reduce the exposure and risk of natural hazards by activating all available resources through cooperative intergovernmental and private sector initiatives and augmenting public knowledge and awareness.

5.7 Comprehensive Mitigation Strategies

This section presents the long-term strategies for mitigation of natural hazards. Each locality within Crenshaw County derives its five-year mitigation action program (see Chapter 6 - Community Mitigation Action Programs) from the program goals, objectives, and available long-term mitigation measures presented here.

1 Goal for Prevention. Manage the development of land and buildings to minimize risks of loss due to natural hazards.

- 1.1 Flood Plain Management Regulations. Effectively administer and enforce local floodplain management regulations.

Mitigation Measures:

- 1.1.1 *For the Town of Petrey which has had special flood hazard areas identified but are not members of the NFIP, enact flood hazard prevention ordinances and establish them as regular members of the NFIP. Participation in the NFIP by the Town of Rutledge is encouraged.*
- 1.1.2 *Train local flood plain managers through programs offered through the State Flood Plain Manager.*
- 1.1.3 *Maintain a library of technical assistance and guidance materials to support the local flood plain manager.*

- 1.2 Building and Technical Codes. Review local codes for effectiveness of standards to protect buildings and infrastructure from hazard damages.

Mitigation Measure:

- 1.2.1 *Promote good construction practices and proper code enforcement to eliminate most structural problems during natural hazard events.*

- 1.3 Community Shelters and Safe Rooms. Ensure the protection of communities from tornadoes and severe storms.

Mitigation Measures:

- 1.3.1 *Encourage the construction of safe rooms within new public buildings, such as new schools, libraries, community centers, and other public buildings where feasible.*
- 1.3.2 *Retrofit public schools with community shelters.*
- 1.3.3 *Encourage the construction of safe rooms in new and existing construction.*
- 1.3.4 *Distribute FEMA Publication 320 - Taking Shelter from the Storm: Building a Safe Room in Your House – to local homebuilders.*

1.3.5 *Encourage the utilization of a generator with a protective cover meeting FEMA 361 Guidelines with all community shelters.*

- 1.4 Detailed Plans and Targeted Studies. Conduct special studies, as needed, to identify hazard risks and mitigation measures.

Mitigation Measure:

1.4.1 *Seek a countywide update of all FIRMs in digital format, with an emphasis on detailed studies of developed and developing areas with elevations provided and floodways delineated.*

- 2 Goal for Property Protection.** Protect structures and their occupants and contents from the damaging effects of natural hazards.

- 2.1 Building Retrofits. Encourage retrofitting of older homes constructed before the enactment of flood plain regulations (pre-FIRM buildings) to safeguard against damages.

Mitigation Measure:

2.1.1 *Seek funding sources, such as Community Development Block Grant funds, to assist low income home owners with building retrofits to protect against flood damage.*

- 2.2 Insurance. Maintain insurance riders for flood damages.

Mitigation Measure:

2.2.1 *Promote the purchase of flood insurance coverage by property owners and renters in high-risk flooding areas.*

- 3 Goal for Public Education and Outreach.** Educate and inform the public about the risks of hazards and the techniques available to reduce threats to life and property.

- 3.1 Map Information. Increase public access to Flood Insurance Rate Map (FIRM) information.

Mitigation Measure:

3.1.1 *Publicize the availability of FIRM information to real estate agents, builders, developers, and homeowners through local trade publications and newspaper announcements.*

- 3.2 Outreach Projects. Conduct regular public events to inform the public of hazards and mitigation measures.

Mitigation Measure:

- 3.2.1 *Promote mitigation and severe weather awareness, through an annual severe weather awareness event.*

- 3.3 Library. Use local library resources to educate the public on hazard risks and mitigation alternatives.

Mitigation Measure:

- 3.3.1 *Obtain free publications from FEMA, NWS, USGS, and other federal and state agencies and place these materials in local libraries.*

- 3.4 Environmental Education. Use school resources for public education on hazards and mitigation measures.

Mitigation Measure:

- 3.4.1 *Distribute hazard mitigation brochures to area schools for distribution to students.*

- 4 Goal for Natural Resources Protection.** Preserve and restore the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.

- 4.1 Urban Forestry Programs. Maintain a healthy forest that can help mitigate the damaging impacts of flooding, erosion, landslides, and wild fires within urban areas.

Mitigation Measure:

- 4.1.1 *Seek technical assistance through the Alabama Cooperative Extension System and/or the Alabama Forestry Commission with Best Management Practices (BMPs) for channel and drainage system maintenance.*

5 Goal for Emergency Services. Improve the efficiency, timing, and effectiveness of response and recovery efforts for natural hazard disasters.

5.1 Disaster Warning. Improve public warning systems.

Mitigation Measure:

5.1.1 *Upgrade the county's siren system.*

5.2 Weather Radios. Improve public access to weather alerts.

Mitigation Measures:

5.2.1 *Support the Alabama Skywarn Foundation's efforts to distribute weather radios to low-income households, especially in rural areas outside of siren coverage areas.*

5.2.2 *Promote the use of weather radios in households and businesses.*

5.3 Generators to Critical Facilities. Improve uninterrupted service to the public through critical facilities.

Mitigation Measure:

5.3.1 *Promote the addition of a generator to all critical facilities.*

5.3.2 *Seek funding for generators to all critical facilities.*

6 Goal for Structural Projects. Apply engineered structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of hazards, where feasible, cost effective, and environmentally suitable.

6.1 Drainage System Maintenance. Improve maintenance programs for streams and drainage ways.

Mitigation Measure:

6.1.1 *Prepare and implement standard operating procedures for drainage system maintenance.*

Chapter 6

Community Mitigation Action Programs

6.1 Purpose of the Community Mitigation Action Programs

This chapter presents the five-year mitigation action programs for each participating community and a listing of proposed priority projects to be considered for funding over the five-year planning cycle by FEMA grant programs. The mitigation action program of each jurisdiction assigns priority for implementation of each measure, lead responsibility for implementation, and the time frame for implementation. For each mitigation measure, the program goal, program objectives, hazard(s) addressed, and the possible funding sources for all measures are also noted in the tables. The overall intent of these mitigation action programs and priority projects is to reduce the effects of each hazard, with a special emphasis on new and existing buildings and infrastructure. The key to abbreviations used in the tables may be found at the end of this chapter.

6.2 Prioritization of Mitigation Actions

The Hazard Mitigation Planning Committee established the process described in this section to guide its selection and prioritization of available mitigation measures to be included within each community's mitigation action program.

Plan consistency

In selecting among available mitigation measures, the Planning Committee evaluated the consistency of each available mitigation measure with the long-term mitigation strategy - the vision, goals, and objectives presented in this plan. Each of the prioritized measures are intended to advance the shared vision, goals, and objectives and respond to the issues and opportunities set forth in this plan by all of the participating localities. Further, the Committee has determined that all of the mitigation measures selected for each jurisdiction's community action program are fully consistent with established community goals and plans currently in force and with comments and concerns presented through public participation and interagency coordination efforts of the planning process.

Prioritization criteria

The Planning Committee prioritized the available mitigation measures and projects according to the following principal criteria:

1. Economic Considerations.

- a. *Availability of funds.* Will the measure require Federal or other outside funding sources? Are local funds available? Can in-kind services reduce local obligations? What is the projected availability of required funds during the timeframe for implementation? Where funding is not

apparently available, should the project still be considered but at a lower priority?

- b. *Benefits to be derived from the proposed measure.* Will the measure likely reduce dollar losses from property damages in the event of a hazard? To what degree?
- c. *Costs.* Are the costs reasonable in relation to the likely benefits? Do economic benefits to the community outweigh estimated project costs? What cost reduction alternatives might be available?
- d. *Economic feasibility.* Have the costs and benefits of the preferred measure been compared against other alternatives? What is the economic impact of the no-action alternative? Is this the most economically effective solution?
- e. *Impact on local economy.* Will the proposed measure improve local economic activities? What impact might the measure have on the tax base?
- f. *Economic development goals.* Will the proposal advance the overall economic goals and objectives of the community?

2. Social Considerations.

- a. *Environmental justice.* Will the proposed measure be socially equitable to minority, disadvantaged, and special needs populations, such as the elderly and handicapped?
- b. *Neighborhood impact.* Will the measure disrupt established neighborhoods or improve quality of life for affected neighborhoods?
- c. *Community support.* Is the measure consistent with community values? Will the affected community support the measure?
- d. *Impact on social and cultural resources.* Does the measure adversely affect valued local resources or enhance those resources?

3. Environmental Considerations.

- a. *National Environmental Policy Act (NEPA).* Will the measure be consistent with Federal NEPA criteria? How will the measure affect environmental resources, such as land, water, air, wildlife, vegetation, historic properties, archaeological sites, etc.? Can potentially adverse impacts be sufficiently mitigated through reasonable methods?
- b. *State and local environmental regulations.* Will the measure be in compliance with State and local environmental laws, such as flood plain management regulations, water quality standards, and wetlands protection criteria?
- c. *Environmental conservation goals.* Will the proposal advance the overall environmental goals and objectives of the community?

4.

Administrative, Legal, and Political Considerations.

- a. *Staffing.* Does the jurisdiction have adequate staff resources and expertise to implement the measure? Will additional staff, training, or consultants be necessary? Can local funds support staffing demands? Will the measure overburden existing staff loads?
 - b. *Maintenance.* Does the jurisdiction have the capabilities to maintain the proposed project once it is completed? Are staff, funds, and facilities available for long-term project maintenance?
 - c. *Timing.* Can the measure be implemented in a timely manner? Are the timeframes for implementation reasonable?
 - d. *Legal authority.* Does the jurisdiction have the legal authority to implement the measure? What are the legal consequences of taking action to implement the measure as opposed to an alternative action or taking no action? Will new legislation be required?
 - e. *Political support.* Does the local governing body support the proposed measure? Does the public support the measure? Do stakeholders support the measure? What advocates might facilitate implementation of the proposal?
5. Technical Considerations.

Technical feasibility. Is the proposal technically possible? Are there technical issues that remain? Does the measure effectively solve the problem or create new problems? Are there secondary impacts that might be considered? Have professional experts been consulted?

Cost-Benefit Review

Priority mitigation projects will only be implemented if the benefits are maximized and outweigh the associated costs of the proposed projects. The Planning Committee performed a general evaluation of each mitigation measure, which might require FEMA funds. The Committee weighed the estimated costs for each mitigation measure against the projected benefits to be derived. For example, a project to acquire properties within the flood plain would provide the following benefits: (1) the project eliminates flood damages to of acquired properties, (2) the project reduces flood response costs, (3) the project reduces flood insurance claims, and (4) the project could increase the Community Rating System (CRS). A more detailed benefit-cost analysis will be required for each priority project to determine economic feasibility during the project planning phase. Projects will also require a more detailed evaluation for eligibility and feasibility including social impact, environmental impact, technical feasibility and other criteria that measure project effectiveness. This detailed evaluation of projects will be performed in the pre-application phase of a grant request. Further, project implementation will be subject to the availability of FEMA grants and other sources of funds from year-to-year.

6.3 Available Mitigation Measures

The Mitigation Action Program tables for each community reference “Mitigation Measures” by number to the comprehensive mitigation strategies contained in section 5.7 of chapter 5. All of the available mitigation measures presented in chapter 5 are again listed in this section for ease of reference. Each Community Mitigation Action Program lists only those mitigation measures endorsed by that particular jurisdiction. There are no changes to the mitigation measures. Crenshaw County has placed weather sirens throughout the county as well as 5 community safe rooms. These measures were left in the property list by the planning committee because there is a continued need for more of them. All other measures not implemented were due to a lack of funding.

Table 6-1. Mitigation Measures

Mitigation Measure #	Goal	Program Objective	Mitigation Measure
1.1.1	Prevention	Flood Plain Management Regulations	<i>For the Towns of Petrey and Brantley which have had special flood hazard areas identified but are not members of the NFIP, enact flood hazard prevention ordinances and establish them as regular members of the NFIP. Participation in the NFIP by the Town of Rutledge is encouraged.</i>
1.1.2	Prevention	Flood Plain Management Regulations	<i>Train local flood plain managers through programs offered through the State Flood Plain Manager.</i>
1.1.3	Prevention	Flood Plain Management Regulations	<i>Maintain a library of technical assistance and guidance materials to support the local flood plain manager.</i>
1.2.1	Prevention	Building and Technical Codes	<i>Promote good construction practices and proper code enforcement to eliminate most structural problems during natural hazard events.</i>
1.3.1	Prevention	Community Shelters and Safe Rooms	<i>Encourage the construction of safe rooms within new public buildings, such as new schools, libraries, community centers, and other public buildings where feasible.</i>
1.3.2	Prevention	Community Shelters and Safe Rooms	<i>Retrofit public schools with community shelters.</i>
1.3.3	Prevention	Community Shelters and Safe Rooms	<i>Encourage the construction of safe rooms in new and existing construction.</i>

Mitigation Measure #	Goal	Program Objective	Mitigation Measure
1.3.4	Prevention	Community Shelters and Safe Rooms	<i>Distribute FEMA Publication 320 - <u>Taking Shelter From the Storm: Building a Safe Room in Your House</u> – to local homebuilders.</i>
1.3.5	Prevention	Community Shelters and Safe Rooms	<i>Encourage the utilization of a generator with a protective cover meeting FEMA 361 Guidelines with all community shelters.</i>
1.4.1	Prevention	Detailed Plans and Targeted Studies	<i>Seek a countywide update of all FIRMs in digital format, with an emphasis on detailed studies of developed and developing areas with elevations provided and floodways delineated.</i>
2.1.1	Property Protection	Building Retrofits	<i>Seek funding sources, such as Community Development Block Grant funds, to assist low income home owners with building retrofits to protect against flood damage.</i>
2.2.1	Property Protection	Insurance	<i>Promote the purchase of flood insurance coverage by property owners and renters in high-risk flooding areas.</i>
3.1.1	Public Education and Outreach	Map Information	<i>Publicize the availability of FIRM information to real estate agents, builders, developers, and homeowners through local trade publications and newspaper announcements.</i>
3.2.1	Public Education and Outreach	Outreach Projects	<i>Promote mitigation and severe weather awareness, through an annual severe weather awareness event.</i>
3.3.1	Public Education and Outreach	Library	<i>Obtain free publications from FEMA, NWS, USGS, and other federal and state agencies and deposit these materials with local libraries.</i>
3.4.1	Public Education and Outreach	Environmental Education	<i>Distribute hazard mitigation brochures to area schools for distribution to students.</i>
4.1.1	Natural Resource Protection	Urban Forestry Programs	<i>Seek technical assistance through the Alabama Cooperative Extension System and/or the Alabama Forestry Commission with Best Management Practices (BMPs) for channel and drainage system maintenance.</i>

Mitigation Measure #	Goal	Program Objective	Mitigation Measure
5.1.1	Emergency Services	Disaster Warning	<i>Upgrade the county's siren system.</i>
5.2.1	Emergency Services	Weather Radios	<i>Support the Alabama Skywarn Foundation's efforts to distribute weather radios to low-income households, especially in rural areas outside of siren coverage areas.</i>
5.2.2	Emergency Services	Weather Radios	<i>Promote the use of weather radios in households and businesses.</i>
5.3.1	Emergency Services	Generators	<i>Promote the addition of a generator to all critical facilities.</i>
5.3.2	Emergency Services	Generators	<i>Seek funding for generators to all critical facilities.</i>
6.1.1	Structural Projects	Structural Projects	<i>Prepare and implement standard operating procedures for drainage system maintenance.</i>

6.4 Mitigation Action Programs

Table 6-2. Crenshaw County Mitigation Action Program

Note: *Mitigation Measures shown in italics are countywide actions that apply to all jurisdictions and are coordinated through the EMA.*

CRENSHAW COUNTY MITIGATION ACTION PROGRAM							
Mitigation Measure #	Goal	Program Objective	Priority	Lead Responsibility	Hazard(s)	Timeline	Possible Funding Source
<i>1.1.2</i>	<i>Prevention</i>	<i>Flood Plain Management Regulations</i>	<i>High</i>	<i>FPM</i>	<i>FL</i>	<i>2017</i>	<i>EXIST</i>
<i>1.1.3</i>	<i>Prevention</i>	<i>Flood Plain Management Regulations</i>	<i>High</i>	<i>FPM</i>	<i>FL</i>	<i>2017</i>	<i>EXIST</i>
<i>1.3.1</i>	<i>Prevention</i>	<i>Community Shelters and Safe Rooms</i>	<i>High</i>	<i>GOV</i>	<i>TO, SS, HU</i>	<i>2017</i>	<i>TBD</i>
<i>1.3.2</i>	<i>Prevention</i>	<i>Community Shelters and Safe Room</i>	<i>Low</i>	<i>School Board, GOV</i>	<i>TO, SS, HU</i>	<i>2015</i>	<i>TBD</i>
<i>1.3.3</i>	<i>Prevention</i>	<i>Community Shelters and Safe Room</i>	<i>High</i>	<i>EMA, BO</i>	<i>TO, SS, HU</i>	<i>2017</i>	<i>TBD</i>
<i>1.3.4</i>	<i>Prevention</i>	<i>Community Shelters and Safe Room</i>	<i>High</i>	<i>EMA, BO</i>	<i>TO, SS, HU</i>	<i>2017</i>	<i>EXIST</i>
<i>1.3.5</i>	<i>Prevention</i>	<i>Community Shelters and Safe Rooms</i>	<i>High</i>	<i>EMA, BO</i>	<i>TO, SS, HU</i>	<i>2017</i>	<i>TBD</i>
<i>1.4.1</i>	<i>Prevention</i>	<i>Detailed Plans and Targeted Studies</i>	<i>Low</i>	<i>CE, FPM, EMA</i>	<i>FL</i>	<i>2017</i>	<i>FEMA Map Update Program</i>
<i>2.1.1</i>	<i>Property Protection</i>	<i>Building Retrofits</i>	<i>Low</i>	<i>FPM, EMA</i>	<i>FL</i>	<i>2017</i>	<i>CDBG, HMGP/PDM (Countywide)</i>
<i>2.2.1</i>	<i>Property Protection</i>	<i>Insurance</i>	<i>High</i>	<i>FPM, EMA</i>	<i>FL</i>	<i>2017</i>	<i>EXIST</i>
<i>3.1.1</i>	<i>Public Education and Outreach</i>	<i>Map Information</i>	<i>Low</i>	<i>FPM, EMA</i>	<i>FL</i>	<i>2017</i>	<i>EXIST</i>
<i>3.2.1</i>	<i>Public Education and Outreach</i>	<i>Outreach Projects</i>	<i>High</i>	<i>EMA</i>	<i>All</i>	<i>2017</i>	<i>TBD</i>

CRENSHAW COUNTY MITIGATION ACTION PROGRAM

Mitigation Measure #	Goal	Program Objective	Priority	Lead Responsibility	Hazard(s)	Timeline	Possible Funding Source
3.3.1	<i>Public Education and Outreach</i>	<i>Library</i>	<i>High</i>	<i>EMA</i>	<i>All</i>	2017	<i>EXIST</i>
3.4.1	<i>Public Education and Outreach</i>	<i>Environmental Education</i>	<i>High</i>	<i>EMA</i>	<i>All</i>	2017	<i>EXIST</i>
4.1.1	<i>Natural Resource Protection</i>	<i>Urban Forestry Programs</i>	<i>Low</i>	<i>CE, FPM</i>	<i>FL</i>	2017	<i>TBD</i>
5.1.1	<i>Emergency Services</i>	<i>Disaster Warning</i>	<i>High</i>	<i>EMA</i>	<i>All</i>	2017	<i>\$150,000 HMGP/AEMA funds (Countywide)</i>
5.2.1	<i>Emergency Services</i>	<i>Weather Radios</i>	<i>High</i>	<i>EMA</i>	<i>All</i>	2017	<i>\$10,000 HMGP/PDM (Countywide)</i>
5.2.2	<i>Emergency Services</i>	<i>Weather Radios</i>	<i>High</i>	<i>EMA</i>	<i>All</i>	2017	<i>TBD</i>
5.3.1	<i>Emergency Services</i>	<i>Generators</i>	<i>High</i>	<i>EMA</i>	<i>All</i>	2017	<i>HMGP/PDM, TBD</i>
5.3.2	<i>Emergency Services</i>	<i>Generators</i>	<i>High</i>	<i>EMA</i>	<i>All</i>	2017	<i>HMGP/PDM, TBD</i>
6.1.1	<i>Structural Projects</i>	<i>Structural Projects</i>	<i>Low</i>	<i>GOV, FPM</i>	<i>FL</i>	2017	<i>EXIST</i>

Table 6-3. Brantley Mitigation Action Program

Note: *Mitigation Measures shown in italics are countywide actions that apply to all jurisdictions and are coordinated through the EMA*

BRANTLEY MITIGATION ACTION PROGRAM							
Mitigation Measure #	Goal	Program Objective	Priority	Lead Responsibility	Hazard(s)	Timeline	Possible Funding Source
1.1.1	Prevention	Flood Plain Management Regulations	High	GOV	FL	2017	EXIST
1.3.1	Prevention	Community Shelters and Safe Rooms	High	GOV	TO, SS, HU	2017	TBD
1.3.2	Prevention	Community Shelters and Safe Room	Low	School Board, GOV	TO, SS, HU	2015	TBD
1.3.3	Prevention	Community Shelters and Safe Room	High	EMA, BO	TO, SS, HU	2017	TBD
1.3.4	Prevention	Community Shelters and Safe Room	High	EMA, BO	TO, SS, HU	2017	EXIST
1.3.5	Prevention	Community Shelters and Safe Rooms	High	EMA, BO	TO, SS, HU	2017	TBD
1.4.1	Prevention	Detailed Plans and Targeted Studies	Low	CE, FPM, EMA	FL	2017	FEMA Map Update Program
3.2.1	Public Education and Outreach	Outreach Projects	High	EMA	All	2017	TBD
3.3.1	Public Education and Outreach	Library	High	EMA	All	2017	EXIST
3.4.1	Public Education and Outreach	Environmental Education	High	EMA	All	2017	EXIST

BRANTLEY MITIGATION ACTION PROGRAM

Mitigation Measure #	Goal	Program Objective	Priority	Lead Responsibility	Hazard(s)	Timeline	Possible Funding Source
5.1.1	Emergency Services	Disaster Warning	High	EMA	All	2017	\$150,000 HMGP/AEMA funds (Countywide)
5.2.1	Emergency Services	Weather Radios	High	EMA	All	2017	\$10,000 HMGP/PDM (Countywide)
5.2.2	Emergency Services	Weather Radios	High	EMA	All	2017	TBD
5.3.1	Emergency Services	Generators	High	EMA	All	2017	HMGP/PDM, TBD
5.3.2	Emergency Services	Generators	High	EMA	All	2017	HMGP/PDM, TBD

Table 6-4. Dozier Mitigation Action Program

Note: *Mitigation Measures shown in italics are countywide actions that apply to all jurisdictions and are coordinated through the EMA*

DOZIER MITIGATION ACTION PROGRAM							
Mitigation Measure #	Goal	Program Objective	Priority	Lead Responsibility	Hazard(s)	Timeline	Possible Funding Source
1.1.2	Prevention	Flood Plain Management Regulations	High	FPM	FL	2017	EXIST
1.1.3	Prevention	Flood Plain Management Regulations	High	FPM	FL	2017	EXIST
1.3.1	Prevention	Community Shelters and Safe Rooms	High	GOV	TO, SS, HU	2017	TBD
1.3.2	Prevention	Community Shelters and Safe Room	Low	School Board, GOV	TO, SS, HU	2017	TBD
1.3.3	Prevention	Community Shelters and Safe Room	High	EMA, BO	TO, SS, HU	2017	TBD
1.3.4	Prevention	Community Shelters and Safe Room	High	EMA, BO	TO, SS, HU	2017	EXIST
1.3.5	Prevention	Community Shelters and Safe Rooms	High	EMA, BO	TO, SS, HU	2017	TBD
1.4.1	Prevention	Detailed Plans and Targeted Studies	Low	CE, FPM, EMA	FL	2017	FEMA Map Update Program
2.1.1	Property Protection	Building Retrofits	Low	FPM, EMA	FL	2017	CDBG, HMGP/PDM (Countywide)
2.2.1	Property Protection	Insurance	High	FPM, EMA	FL	2017	EXIST
3.1.1	Public Education and Outreach	Map Information	Low	FPM, EMA	FL	2017	EXIST

DOZIER MITIGATION ACTION PROGRAM

Mitigation Measure #	Goal	Program Objective	Priority	Lead Responsibility	Hazard(s)	Timeline	Possible Funding Source
3.2.1	Public Education and Outreach	Outreach Projects	High	EMA	All	2017	TBD
3.3.1	Public Education and Outreach	Library	High	EMA	All	2017	EXIST
3.4.1	Public Education and Outreach	Environmental Education	High	EMA	All	2017	EXIST
4.1.1	Natural Resource Protection	Urban Forestry Programs	Low	CE, FPM	FL	2017	TBD
5.1.1	Emergency Services	Disaster Warning	High	EMA	All	2017	\$150,000 HMGP/AEMA funds (Countywide)
5.2.1	Emergency Services	Weather Radios	High	EMA	All	2017	\$10,000 HMGP/PDM (Countywide)
5.2.2	Emergency Services	Weather Radios	High	EMA	All	2017	TBD
5.3.1	Emergency Services	Generators	High	EMA	All	2017	HMGP/PDM, TBD
5.3.2	Emergency Services	Generators	High	EMA	All	2017	HMGP/PDM, TBD
6.1.1	Structural Projects	Structural Projects	Low	GOV, FPM	FL	2017	EXIST

Table 6-5. Glenwood Mitigation Action Program

Note: *Mitigation Measures shown in italics are countywide actions that apply to all jurisdictions and are coordinated through the EMA*

GLENWOOD MITIGATION ACTION PROGRAM							
Mitigation Measure #	Goal	Program Objective	Priority	Lead Responsibility	Hazard(s)	Timeline	Possible Funding Source
1.1.2	Prevention	Flood Plain Management Regulations	High	FPM	FL	2017	EXIST
1.1.3	Prevention	Flood Plain Management Regulations	High	FPM	FL	2017	EXIST
1.3.1	Prevention	Community Shelters and Safe Rooms	High	GOV	TO, SS, HU	2017	TBD
1.3.2	Prevention	Community Shelters and Safe Room	Low	School Board, GOV	TO, SS, HU	2017	TBD
1.3.3	Prevention	Community Shelters and Safe Room	High	EMA, BO	TO, SS, HU	2017	TBD
1.3.4	Prevention	Community Shelters and Safe Room	High	EMA, BO	TO, SS, HU	2017	EXIST
1.3.5	Prevention	Community Shelters and Safe Rooms	High	EMA, BO	TO, SS, HU	2017	TBD
1.4.1	Prevention	Detailed Plans and Targeted Studies	Low	CE, FPM, EMA	FL	2017	FEMA Map Update Program
2.1.1	Property Protection	Building Retrofits	Low	FPM, EMA	FL	2017	CDBG, HMGP/PDM (Countywide)
2.2.1	Property Protection	Insurance	High	FPM, EMA	FL	2017	EXIST
3.1.1	Public Education and Outreach	Map Information	Low	FPM, EMA	FL	2017	EXIST

GLENWOOD MITIGATION ACTION PROGRAM

Mitigation Measure #	Goal	Program Objective	Priority	Lead Responsibility	Hazard(s)	Timeline	Possible Funding Source
3.2.1	Public Education and Outreach	Outreach Projects	High	EMA	All	2017	TBD
3.3.1	Public Education and Outreach	Library	High	EMA	All	2017	EXIST
3.4.1	Public Education and Outreach	Environmental Education	High	EMA	All	2017	EXIST
4.1.1	Natural Resource Protection	Urban Forestry Programs	Low	CE, FPM	FL	2017	TBD
5.1.1	Emergency Services	Disaster Warning	High	EMA	All	2017	\$150,000 HMGP/AEMA funds (Countywide)
5.2.1	Emergency Services	Weather Radios	High	EMA	All	2017	\$10,000 HMGP/PDM (Countywide)
5.2.2	Emergency Services	Weather Radios	High	EMA	All	2017	TBD
5.3.1	Emergency Services	Generators	High	EMA	All	2017	HMGP/PDM, TBD
5.3.2	Emergency Services	Generators	High	EMA	All	2017	HMGP/PDM, TBD
6.1.1	Structural Projects	Structural Projects	Low	GOV, FPM	FL	2017	EXIST

Table 6-6. Luverne Mitigation Action Program

Note: *Mitigation Measures shown in italics are countywide actions that apply to all jurisdictions and are coordinated through the EMA.*

LUVERNE MITIGATION ACTION PROGRAM							
Mitigation Measure #	Goal	Program Objective	Priority	Lead Responsibility	Hazard(s)	Timeline	Possible Funding Source
1.1.2	Prevention	Flood Plain Management Regulations	High	FPM	FL	2017	EXIST
1.1.3	Prevention	Flood Plain Management Regulations	High	FPM	FL	2017	EXIST
1.2.1	Prevention	Building and Technical Codes	High	BO	All	2017	EXIST
1.3.1	Prevention	Community Shelters and Safe Rooms	High	GOV	TO, SS, HU	2017	TBD
1.3.2	Prevention	Community Shelters and Safe Room	Low	School Board, GOV	TO, SS, HU	2015	TBD
1.3.3	Prevention	Community Shelters and Safe Room	High	EMA, BO	TO, SS, HU	2017	TBD
1.3.4	Prevention	Community Shelters and Safe Room	High	EMA, BO	TO, SS, HU	2017	EXIST
1.3.5	Prevention	Community Shelters and Safe Rooms	High	EMA, BO	TO, SS, HU	2017	TBD
1.4.1	Prevention	Detailed Plans and Targeted Studies	Low	CE, FPM, EMA	FL	2017	FEMA Map Update Program
2.1.1	Property Protection	Building Retrofits	Low	FPM, EMA	FL	2017	CDBG, HMGP/PDM (Countywide)
2.2.1	Property Protection	Insurance	High	FPM, EMA	FL	2017	EXIST
3.1.1	Public Education and Outreach	Map Information	Low	FPM, EMA	FL	2017	EXIST

LUVERNE MITIGATION ACTION PROGRAM

Mitigation Measure #	Goal	Program Objective	Priority	Lead Responsibility	Hazard(s)	Timeline	Possible Funding Source
3.2.1	Public Education and Outreach	Outreach Projects	High	EMA	All	2017	TBD
3.3.1	Public Education and Outreach	Library	High	EMA	All	2017	EXIST
3.4.1	Public Education and Outreach	Environmental Education	High	EMA	All	2017	EXIST
4.1.1	Natural Resource Protection	Urban Forestry Programs	Low	CE, FPM	FL	2017	TBD
5.1.1	Emergency Services	Disaster Warning	High	EMA	All	2017	\$150,000 HMGP/AEMA funds (Countywide)
5.2.1	Emergency Services	Weather Radios	High	EMA	All	2017	\$10,000 HMGP/PDM (Countywide)
5.2.2	Emergency Services	Weather Radios	High	EMA	All	2017	TBD
5.3.1	Emergency Services	Generators	High	EMA	All	2017	HMGP/PDM, TBD
5.3.2	Emergency Services	Generators	High	EMA	All	2017	HMGP/PDM, TBD
6.1.1	Structural Projects	Structural Projects	Low	GOV, FPM	FL	2017	EXIST

Table 6-7. Petrey Mitigation Action Program

Note: *Mitigation Measures shown in italics are countywide actions that apply to all jurisdictions and are coordinated through the EMA*

PETREY MITIGATION ACTION PROGRAM							
Mitigation Measure #	Goal	Program Objective	Priority	Lead Responsibility	Hazard(s)	Timeline	Possible Funding Source
1.1.1	Prevention	Flood Plain Management Regulations	High	GOV	FL	2017	EXIST
1.3.1	Prevention	Community Shelters and Safe Rooms	High	GOV	TO, SS, HU	2017	TBD
1.3.2	Prevention	Community Shelters and Safe Room	Low	School Board, GOV	TO, SS, HU	2015	TBD
1.3.3	Prevention	Community Shelters and Safe Room	High	EMA, BO	TO, SS, HU	2015	TBD
1.3.4	Prevention	Community Shelters and Safe Room	High	EMA, BO	TO, SS, HU	2015	EXIST
1.3.5	Prevention	Community Shelters and Safe Rooms	High	EMA, BO	TO, SS, HU	2015	TBD
1.4.1	Prevention	Detailed Plans and Targeted Studies	Low	CE, FPM, EMA	FL	2017	FEMA Map Update Program
3.2.1	Public Education and Outreach	Outreach Projects	High	EMA	All	2017	TBD
3.3.1	Public Education and Outreach	Library	High	EMA	All	2017	EXIST
3.4.1	Public Education and Outreach	Environmental Education	High	EMA	All	2017	EXIST
5.1.1	Emergency Services	Disaster Warning	High	EMA	All	2017	\$150,000 HMGP/AEMA funds (Countywide)

PETREY MITIGATION ACTION PROGRAM

Mitigation Measure #	Goal	Program Objective	Priority	Lead Responsibility	Hazard(s)	Timeline	Possible Funding Source
5.2.1	Emergency Services	Weather Radios	High	EMA	All	Ongoing	\$10,000 HMGP/PDM (Countywide)
5.2.2	Emergency Services	Weather Radios	High	EMA	All	2017	TBD
5.3.1	Emergency Services	Generators	High	EMA	All	2015	HMGP/PDM, TBD
5.3.2	Emergency Services	Generators	High	EMA	All	2015	HMGP/PDM, TBD

Table 6-8. Rutledge Mitigation Action Program

Note: *Mitigation Measures shown in italics are countywide actions that apply to all jurisdictions and are coordinated through the EMA*

RUTLEDGE MITIGATION ACTION PROGRAM							
Mitigation Measure #	Goal	Program Objective	Priority	Lead Responsibility	Hazard(s)	Timeline	Possible Funding Source
1.1.1	Prevention	Flood Plain Management Regulations	High	GOV	FL	2005	EXIST
1.3.1	Prevention	Community Shelters and Safe Rooms	High	GOV	TO, SS, HU	Ongoing	TBD
1.3.2	Prevention	Community Shelters and Safe Room	Low	School Board, GOV	TO, SS, HU	Ongoing	TBD
1.3.3	Prevention	Community Shelters and Safe Room	High	EMA, BO	TO, SS, HU	Ongoing	TBD
1.3.4	Prevention	Community Shelters and Safe Room	High	EMA, BO	TO, SS, HU	Ongoing	EXIST
1.3.5	Prevention	Community Shelters and Safe Rooms	High	EMA, BO	TO, SS, HU	Ongoing	TBD
1.4.1	Prevention	Detailed Plans and Targeted Studies	Low	CE, FPM, EMA	FL	Ongoing	FEMA Map Update Program
3.2.1	Public Education and Outreach	Outreach Projects	High	EMA	All	Ongoing	TBD
3.3.1	Public Education and Outreach	Library	High	EMA	All	2004	EXIST
3.4.1	Public Education and Outreach	Environmental Education	High	EMA	All	Ongoing	EXIST
5.1.1	Emergency Services	Disaster Warning	High	EMA	All	2006	\$150,000 HMGP/AEMA funds (Countywide)

RUTLEDGE MITIGATION ACTION PROGRAM

Mitigation Measure #	Goal	Program Objective	Priority	Lead Responsibility	Hazard(s)	Timeline	Possible Funding Source
5.2.1	Emergency Services	Weather Radios	High	EMA	All	Ongoing	\$10,000 HMGP/PDM (Countywide)
5.2.2	Emergency Services	Weather Radios	High	EMA	All	Ongoing	TBD
5.3.1	Emergency Services	Generators	High	EMA	All	Ongoing	HMGP/PDM, TBD
5.3.2	Emergency Services	Generators	High	EMA	All	Ongoing	HMGP/PDM, TBD

Table 6-9. Priority Projects for FEMA Funding

Mitigation Measure #	Project Description	Hazard(s) Addressed	Jurisdiction(s)	Responsibility	Funding
1.4.1	Seek a countywide update of all FIRMs in digital format, with an emphasis on detailed studies of developed and developing areas with elevations provided and floodways delineated.	FL	Crenshaw County, Dozier, Luverne, Glenwood	CE, FPM	FEMA Map Update Program
2.1.1	Seek funding sources, such as Community Development Block Grant funds, to assist low income home owners with building retrofits to protect against flood damage.	FL	All	FPM, EMA	CDBG, HMGP/PDM (Countywide)
5.1.1	Upgrade the county's siren system.	EMA	All	EMA	\$150,000 HMGP/AEMA funds (Countywide)
5.2.1	Support the Alabama Skywarn Foundation's efforts to distribute weather radios to low-income households, especially in rural areas outside of siren coverage areas.	EMA	All	EMA	\$10,000 HMGP/PDM (Countywide)
5.3.1	Promote the addition of a generator to all critical facilities.	EMA	All	EMA	HMGP/PDM/TBD
5.3.2	Seek funding for generators to all critical facilities.	EMA	All	EMA	HMGP/PDM/TBD

Key to Abbreviations Used in Tables 6-1 through 6-9

Hazards

<i>ALL</i>	All Hazards
<i>DF</i>	Dam Failure
<i>DH</i>	Drought/Heat Wave/Extreme Heat
<i>EQ</i>	Earthquake
<i>FL</i>	Flood
<i>H</i>	Hurricane
<i>L</i>	Landslide
<i>LS</i>	Land Subsidence/Sinkhole
<i>SS</i>	Severe Storm
<i>TO</i>	Tornado
<i>WC</i>	Winter Storm/Extreme Cold
<i>WF</i>	Wildfire

Responsible Party

<i>BO</i>	Local Building Official
<i>EMA</i>	Crenshaw County EMA
<i>FPM</i>	Local Flood Plain Manager
<i>CE</i>	County, City, or Town Engineer
<i>GOV</i>	Governing Body
<i>TBD</i>	Responsible Party To Be Determined

Timeline

<i>200x</i>	Target Year for Implementation
<i>TBD</i>	Timeline TBD

Funding

<i>AEMA</i>	Alabama Emergency Management Agency
<i>CDBG</i>	Community Development Block Grant
<i>EXIST</i>	Existing Local Funds
<i>HMGP</i>	FEMA Hazard Mitigation Grant Program
<i>PDM</i>	FEMA Pre-Disaster Mitigation Program
<i>TBD</i>	Funding To Be Determined

Chapter 7

Plan Maintenance

7.1 The Planning Cycle

This chapter presents a continuous cycle for monitoring, evaluating and updating the plan; the process for incorporating mitigation strategies into other, ongoing planning activities; and methods for continuing public involvement. Continual plan maintenance ensures an active and relevant hazard mitigation planning process.

7.2 Plan Maintenance Procedures

The Hazard Mitigation Planning Committee (HMPC) will oversee plan maintenance during the five-year framework of the Action Plan. The Crenshaw County EMA staff will continue to serve as the committee's facilitator, responsible for holding regularly-scheduled meetings, assigning specific tasks necessary to monitor and update the plan to committee members, and serving as the committee's liaison with those assigned implementation responsibilities in the Action Plan. The facilitator will also serve as the committee's liaison with participating municipalities and the Crenshaw County Commission. Any resident may request appointment to the committee through the EMA office or a committee member. New members may be nominated by any committee member and then approved by the committee.

After the revised plan is finalized and adopted, the committee will meet once per year to perform the following activities:

- Evaluate the effectiveness of previously-implemented mitigation actions
- Explain why any actions are not completed or behind schedule
- Address changing land use patterns and new developments
- Identify any changes in risk assessment and/or risk vulnerability

The facilitator will schedule the annual meeting at a time and location convenient to all committee members. All annual meetings will be advertised in the local newspaper and open to the public.

In the event modifications to the plan are warranted as a result of the annual review or other conditions, the committee will oversee and approve all revisions to the plan. Conditions warranting revisions to this plan include, but are not limited to, special opportunities for funding and/or response to a natural disaster. Before any revisions are submitted to the jurisdictions for adoption, a notice will be placed in the local newspaper, allowing an opportunity for the public to review the proposed amendments at the EMA offices, submit written comments, and present comments at a public meeting. The committee will then submit all revisions for adoption by jurisdictions affected by the changes. Those jurisdictions will hold a public hearing before adoption of the amendments. A copy of the plan's revisions will be submitted to all holders of the original plan in a timely manner.

At the end of the five-year cycle of the Action Program, the committee will oversee a major update to the plan that follows the federal planning criteria in effect at the time of the update. The updated plan will again be submitted to the AEMA and FEMA for approval.

7.3 Implementation through Existing Programs

This plan is adopted as a part of the Crenshaw County Emergency Operations Plan, which is administered through the EMA office. If any of the jurisdictions develop future plans that may have an affect on natural hazard planning, the findings of this plan would likewise need to be incorporated into that community's plan.

7.4 Continued Public Involvement

A critical part of maintaining an effective and relevant natural hazards mitigation plan is ongoing public review and comment. Consequently, the HMPC is dedicated to direct involvement of its citizens in providing feedback and comments on the plan throughout the five-year implementation cycle.

To this end, a hard copy of the plan will be available for viewing at all appropriate agencies throughout the county; including, at a minimum, the Crenshaw County EMA Office, the office of the Crenshaw County Commission, the offices of the mayors, and the main public library. After adoption, a public information notice in the local newspaper will inform the public that the plan may be viewed at these locations.

Public meetings will be held when significant modifications to the plan are required or when otherwise deemed necessary by the HMPC. The public will be able to express their concerns, ideas and opinions about the plan at the meetings. At a minimum, public hearings will be held during the drafting stage of the five-year plan update and to present the final plan to the public before adoption.

7.5 Ongoing Planning Needs

This 2013 Crenshaw County, Alabama, Natural Hazards Mitigation Plan establishes a new planning program for the county and its participating municipalities. However, planning does not end with the adoption of this initial plan. This planning program is a continuous process of profiling new natural hazard events; assessing vulnerabilities as new information arises and conditions change; monitoring changing assets and affected populations; and keeping current on evolving mitigation measures.

Moreover, the hazard profiles, vulnerability assessments, population characteristics, and inventories of critical facilities of this current plan were based on "best available data." "Best available data" is data that is readily available within the very brief plan development time period. This plan recognizes the limitations of such an approach to risk assessment and strategic planning. Improvements to the "best available data" can be made to better assess the risks and target mitigation strategies that best respond to the natural hazard issues within the county.

Therefore, it is the intent of the HMPC to establish an ongoing planning program, one that will strengthen the risk assessment process as better and more complete information is developed and revise the mitigation strategies as more effective measures might evolve.

Population by Municipality

