State of Louisiana
Hazard Mitigation Plan Update
Volume I

submitted to:

Federal Emergency Management Agency, Region VI

submitted by:

Louisiana Governor's Office of Homeland Security
and Emergency Preparedness

April 14, 2008

This page is intentionally blank.

Table of Contents

	Table of Contents		**I-i**
	Acknowledgements		**I-xiii**
Section One	**Introduction**		**I-1**
	1.1	Context: Louisiana and Hazard Risk	I-1
	1.2	Hazard Mitigation and Emergency Management	I-3
	1.3	State of Louisiana Hazard Mitigation Strategy	I-4
	1.4	Disaster Mitigation Act of 2000 and the Interim Final Rule	I-6
	1.5	Emergency Management Accreditation Program	I-8
	1.6	Comprehensive Hazard Mitigation in Louisiana	I-8
	1.7	State of Louisiana Hazard Mitigation Plan Update	I-9
	1.8	Summary of Goals and Objectives	I-10
Section Two	**Plan Adoption**		**I-11**
	2.1	Interim Final Rule Requirements for Plan Adoption	I-11
	2.2	Plan Adoption by the Governor's Authorized Representative	I-11
Section Three	**Planning Process**		**I-13**
	3.1	Interim Final Rule Requirements for Planning Process	I-13
	3.2	Documentation of the Planning Process	I-13
	3.3	Coordination among Agencies, Stakeholders and Interested Parties	I-18
	3.4	Program Integration	I-20
Section Four	**Hazard Identification and Profiles**		**I-25**
	4.1	Interim Final Rule Requirements for Hazard Identification & Profiles	I-25
	4.2	Environment	I-25
	4.3	Hazard Identification	I-28
	4.4	Hazard Profiles	I-42
	4.5	Hazard Priorities	I-86
Section Five	**Statewide Risk Assessment**		**I-87**
	5.1	Interim Final Rule Requirements for Statewide Risk Assessment	I-87
	5.2	Introduction	I-88
	5.3	Methodology	I-88
	5.4	Flood	I-96
	5.5	High Wind – Hurricane	I-100
	5.6	High Wind – Tornado	I-102
	5.7	Ice Storm	I-104

5.8	Storm Surge	I-106
5.9	Subsidence	I-108
5.10	Wildfire	I-110
5.11	Dam Failure	I-112
5.12	Levee Failure	I-114
5.13	Hazardous Materials Incident	I-116
5.14	Additional Measures of Risk Assessment	I-118
5.15	Assessing Recent and Future Development	I-126
5.16	Notes on Data Limitations	I-132
5.17	Integration of Parish and Municipal Hazard Mitigation Plans	I-133
5.18	Summary	I-138

Section Six **Risk Assessment for State-Owned Assets** **I-139**

6.1	Interim Final Rule Requirement for Risk Assessment for State-Owned Assets	I-139
6.2	Introduction	I-140
6.3	Methodology	I-140
6.4	Flood	I-148
6.5	High Wind (Hurricane)	I-150
6.6	High Wind (Tornado)	I-152
6.7	Ice Storm	I-154
6.8	Storm Surge	I-156
6.9	Subsidence	I-158
6.10	Wildfire	I-160
6.11	Dam Failure	I-162
6.12	Levee Failure	I-164
6.13	Hazardous Materials Incident	I-165
6.14	Summary	I-168
6.15	Critical Infrastructure Risk Assessment	I-173

Section Seven **Capability Assessment** **I-199**

7.1	Interim Final Rule Requirements for Capability Assessments	I-199
7.2	Mitigation Funding Sources	I-199
7.3	State Capability Assessment	I-210
7.4	Regional Capability Assessment	I-225
7.5	Local Capability Assessment	I-229

Section Eight **Mitigation Action Plan** **I-247**

8.1	Interim Final Rule Requirements for Mitigation Action Plan	I-247
8.2	Summary of Risk and Capability Assessments	I-248
8.3	Program Integration	I-251
8.4	Goals and Objectives	I-262
8.5	Identification of Mitigation Actions	I-267
8.6	Evaluation and Prioritization of Mitigation Actions	I-283
8.7	Implementation	I-286
8.8	Funding Sources	I-295

Section Nine **Coordination of Local Mitigation Planning** **I-297**

9.1 Interim Final Rule Requirements for Coordination of Parish and Municipal Mitigation Planning I-297
9.2 Funding and Technical Assistance for Parishes and Municipalities I-297
9.3 Parish and Municipal Plan Integration I-300
9.4 Prioritizing Parish and Municipal Assistance I-301

Section Ten **Plan Maintenance Process** **I-305**

10.1 Interim Final Rule Requirements for Plan Maintenance Process I-305
10.2 Monitoring, Evaluating and Updating the Plan I-305
10.3 Monitoring Implementation of Mitigation Actions I-308
10.4 Reviewing Progress on Achieving Goals I-309
10.5 Reviewing Progress on Activities and Projects I-309
10.6 Plan Maintenance Progress I-310

List of Tables

Number	Title	Page
1-1	Presidential Disaster Declarations in Louisiana, 1995-2007	I-2
1-2	Federal Assistance tied to DMA 2000 Compliance	I-6
3-1	State Hazard Mitigation Team and Planning Committee Meetings (2008 SHMP Update)	I-15
4-1	Disaster History 1965 – 2007	I-28
4-2	Disposition of Hazards Evaluated in Preliminary Investigation	I-30
4-3	Comparison of Hazards Identified in Parish/Municipal HMPs and Plan Update	I-33
4-4	Parish and Municipally Identified Hazards not Addressed in Plan Update	I-34
4-5	Coastal Erosion Mitigation Projects Identified in the CPRA Master Plan	I-37
4-6	Inclusion of Coastal Erosion as a Hazard in Coastal Parishes' Hazard Mitigation Plans	I-38
4-7	Specific Treatment of Coastal Erosion in Coastal Parishes' Hazard Mitigation Plans	I-39
4-8	Updates to Hazard Profiles	I-41
4-9	Hazard Priorities	I-86
5-1	Risk Assessment Results and Methodologies	I-92
5-2	Ranking of Relative Risk for Each Hazard	I-93
5-3	Ten Parishes with Highest Average Annual Flood Losses	I-96
5-4	Ten Parishes with Highest Annual Estimated Losses for Hurricane High Winds	I-100
5-5	Ten Parishes with Highest Annual Estimated Losses for Tornado High Winds	I-102
5-6	Parishes with High Ice Storm Hazard Ranking	I-104
5-7	Category 3 Storm Surge Annual Estimated Losses and Hazard Rankings	I-106
5-8	Subsidence Hazard Ranking	I-108
5-9	Parishes with High Wildfire Hazard Ranking	I-110
5-10	Parishes with One or More High Hazard Dams	I-112
5-11	Ten Parishes with Highest Levee Failure Hazard Ranking	I-114
5-12	Ten Parishes with Highest Hazardous Material Incident Hazard Ranking	I-116
5-13	Hazard Rankings	I-118
5-14	Composite Risk Rankings by Parish	I-119
5-15	Projected Cost and Employment Implications	I-126
5-16	Change in Louisiana's Risk Profile Resulting from New Development, 2005-07	I-127
5-17	Projected Cost and Employment Implications of New Development in Floodplains in South Louisiana in "Louisiana Speaks" 50-Year Scenarios	I-131
6-1	State-Owned Assets Criticality Level Descriptions	I-142
6-2	Number of State-Owned Assets (Critical Facilities) by Criticality Ranking	I-144
6-3	Relationship of Criticality Level to Criticality Factor	I-147
6-4	Updates to Subsections	I-147
6-5	Flood Vulnerability Criteria and Ranking Results	I-148

List of Tables (continued)

Number	Title	Page
6-6	Flood Loss Estimate Ranges and Ranking Results	I-148
6-7	Top Ten Critical Facilities at Risk from Flood Hazard	I-148
6-8	High Winds Vulnerability Criteria and Ranking Results	I-150
6-9	High Winds Loss Estimate Ranges and Ranking Results	I-150
6-10	Top Ten Critical Facilities at Risk from High Winds Hazard	I-150
6-11	High Wind Vulnerability Criteria and Ranking Results	I-152
6-12	High Wind Loss Estimate Ranges and Ranking Results	I-152
6-13	Top Ten Parishes at Risk from Tornado Wind Hazard	I-152
6-14	Ice Storm Vulnerability Criteria and Ranking Results	I-154
6-15	Ice Storm Loss Estimate Ranges and Ranking Results	I-154
6-16	Top Ten Critical Facilities at Risk from Ice Storm Hazard	I-154
6-17	Storm Surge Vulnerability Criteria and Ranking Results	I-156
6-18	Storm Surge Loss Estimate Ranges and Ranking Results	I-156
6-19	Top Ten Critical Facilities at Risk from Storm Surge Hazard	I-156
6-20	Subsidence Vulnerability Criteria and Ranking Results	I-158
6-21	Subsidence Loss Estimate Ranges and Ranking Results	I-158
6-22	Top Ten Critical Facilities at Risk from Subsidence Hazard	I-158
6-23	Wildfire Vulnerability Criteria and Ranking Results	I-160
6-24	Wildfire Loss Estimate Ranges and Ranking Results	I-160
6-25	Top Ten Critical Facilities at Risk from Wildfire Hazard	I-160
6-26	Dam Failure Vulnerability Criteria and Ranking Results	I-162
6-27	Dam Failure Loss Estimate Ranges and Ranking Results	I-162
6-28	Top Ten Critical Facilities at Risk from Dam Failure Hazard	I-162
6-29	Levee Failure Vulnerability Criteria and Ranking Results	I-164
6-30	Levee Failure Loss Estimate Ranges and Ranking Results	I-164
6-31	Top Ten Critical Facilities at Risk from Levee Failure Hazard	I-164
6-32	Hazardous Material Incident Vulnerability Criteria and Ranking Results	I-166
6-33	Hazardous Material Incident Loss Estimate Ranges and Ranking Results	I-166
6-34	Top Ten Critical Facilities at Risk from Hazardous Material Incident Hazard	I-166
6-35	Combined Hazard Loss Estimate ($ millions)	I-168
6-36	Critical Facilities with Highest Vulnerability Rankings per Hazard per State Agency	I-170
6-37	Top Ten Critical Facilities per Hazard per State Agency	I-171
6-38	State-Owned Bridges Criticality Level Descriptions	I-175
6-39	Number of State-Owned Assets (Bridges) by Criticality Ranking	I-175
6-40	Relationship of Criticality Level to Criticality Factor	I-178

List of Tables (continued)

Number	Title	Page
6-41	Flood Vulnerability Criteria and Ranking Results	I-180
6-42	Flood Loss Estimate Ranges and Ranking Results	I-180
6-43	Top Ten Bridges at Risk from Flood Hazard Computed From Loss Estimates	I-180
6-44	High Wind Vulnerability Criteria and Ranking Results	I-182
6-45	High Wind Loss Estimate Ranges and Ranking Results	I-182
6-46	Top Ten Bridges at Risk from Hurricane Wind Hazard Computed From Loss Estimates	I-182
6-47	High Wind Vulnerability Criteria and Ranking Results	I-184
6-48	High Wind Loss Estimate Ranges and Ranking Results	I-184
6-49	Top Ten Parishes at Risk from Tornado Wind Hazard Computed From Loss Estimates	I-184
6-50	Ice Storm Vulnerability Criteria and Ranking Results	I-186
6-51	Ice Storm Loss Estimate Ranges and Ranking Results	I-186
6-52	Top Ten Bridges at Risk from Ice Storm Hazard Computed From Loss Estimates	I-186
6-53	Storm Surge Vulnerability Criteria and Ranking Results	I-188
6-54	Storm Surge Loss Estimate Ranges and Ranking Results	I-188
6-55	Top Ten Bridges at Risk from Storm Surge Hazard Computed from Loss Estimates	I-188
6-56	Subsidence Vulnerability Criteria and Ranking Results	I-190
6-57	Subsidence Loss Estimate Ranges and Ranking Results	I-190
6-58	Top Ten Bridges at Risk from Subsidence Hazard Computed From Loss Estimates	I-190
6-59	Wildfire Vulnerability Criteria and Ranking Results	I-192
6-60	Wildfire Loss Estimate Ranges and Ranking Results	I-192
6-61	Top Ten Bridges at Risk from Wildfire Hazard Computed From Loss Estimates	I-192
6-62	Dam Failure Vulnerability Criteria and Ranking Results	I-194
6-63	Dam Failure Loss Estimate Ranges and Ranking Results	I-194
6-64	Top Ten Bridges at Risk from Dam Failure Hazard Computed From Loss Estimates	I-194
6-65	Levee Failure Vulnerability Criteria and Ranking Results	I-196
6-66	Levee Failure Loss Estimate Ranges and Ranking Results	I-196
6-67	Top Ten Bridges at Risk from Levee Failure Hazard	I-196
7-1	Comparison of Section 404 (HMPG) to Section 406 (PA) Hazard Mitigation Grants	I-201
7-2	Investment by Federal Mitigation Programs 1998–2007	I-206
7-3	Additions to Severe Repetitive Loss List, by Year	I-207
7-4	Mitigated Severe Repetitive Loss Properties Completed and Ongoing	I-207
7-5	Severe Repetitive Loss Property Measures since 2005	I-208
7-6	State Agency Hazard Mitigation Programs and Activities	I-214
7-7	Average Total Staffing of Local Offices (Respondent not Included)	I-231
7-8	Average Hazard Mitigation Staffing in Local Offices (Respondent not Included)	I-232

List of Tables (continued)

Number	Title	Page
7-9	CRS Participation in Louisiana	I-235
8-1	State of Louisiana Hazard Mitigation Plan – Goals and Objectives	I-263
8-2	Identification of Mitigation Actions	I-268
8-3	State of Louisiana Hazard Mitigation Plans of Action Evaluation Results – Environmental Soundness and Technical Feasibility	I-283
8-4	State of Louisiana Hazard Mitigation Plans of Action Evaluation Results – Cost Effectiveness and Prioritization	I-284
8-5	Implementation of Mitigation Plans of Action	I-285
8-6	Implementation of Mitigation Plans of Action	I-287
8-7	Summary Evaluation of Mitigation Plans of Action	I-292
9-1	Funding Sources for Parish and Municipal Hazard Mitigation Planning	I-298

List of Figures

Number	Title	Page
1-1	The Four Phases of Emergency Management	I-4
4-1	Frequency of Hazards Identified in Parish and Municipal HMPs	I-32
4-2	Coastal Louisiana Land Loss and Gain, 1932-2000 and 2000-2050 (Projected)	I-36
4-3	Coastal Erosion as an Element of Coastal Land Loss	I-36
4-4	Flood Damages from Hurricane Katrina, August 2005	I-48
4-5	Flood damages from Hurricane Lili, October 2002	I-49
4-6	High Wind Damages from Hurricane Katrina in Slidell, August 2005	I-58
4-7	High Wind Damages from Hurricane Lili, October 2002	I-58
4-8	Damage in Olla, Louisiana due to November 23, 2004 Tornadoes	I-62
4-9	Damage due to February 23, 2007 Tornadoes	I-62
4-10	Hurricane Katrina Storm Surge Inundation	I-70
4-11	Hurricane Katrina Levee Failure Inundation	I-79
5-1	Future Development and SFHA's	I-130
5-2	Frequency of Hazards Identified in Parish and Municipal HMPs	I-134
5-3	Frequency of Mitigation Goals (by Category) in Municipal HMPs	I-135
5-4	Frequency of Mitigation Actions Identified in Parish and Municipal HMPs	I-136
7-1	Frequency of Local Capability Assessments in Parish/Municipal HMPs	I-230
7-2	GIS Accessibility by Parish/Municipal Offices	I-232
7-3	In-House GIS Maintenance by Parish/Municipal Offices	I-233
7-4	Bureaucratic Home of Parish/Municipal Administration of Floodplain Management	I-236
7-5	Parish/Municipal Land Use Planning and Regulatory Capability-Presence of Selected Tools	I-237
7-6	Local Assessment of Whether Parish/Municipal Comprehensive (Master) Planning Directly Addresses Hazard Mitigation	I-238
7-7	Local Assessment of Whether Parish/Municipal Zoning Directly Addresses Hazard Mitigation	I-238
7-8	Local Assessment of Whether the Parish/Municipal Subdivision Ordinance Directly Addresses Hazard Mitigation	I-239
7-9	Coordination with Neighboring Jurisdictions	I-240
7-10	Coordination with Regional Entities	I-241
7-11	Coordination with State Entities (GOHSEP excluded)	I-242
7-12	Preference for Standardized Hazard Profiles and Definitions	I-243
7-13	Preference for Standardized Risk Assessment Methodologies	I-243
7-14	Preference for Where GIS Data Should be Housed	I-244
7-15	Most Effective Mitigation Activities, Programs, and Projects (2005)	I-245
7-16	Causes Cited for Ineffective Mitigation Programs (2005)	I-245

List of Maps

Number	Title	Page
4-1	Political Divisions and Physical Geography – State of Louisiana	I-27
4-2	Hazard Profile – Drought	I-45
4-3	Hazard Profile – Earthquake – Regional Perspective	I-46
4-4	Hazard Profile-Earthquake	I-47
4-5	Hazard Profile-Flood – Q3 Data	I-51
4-6	Parishes with Advisory Base Flood Elevations (ABFEs)	I-52
4-7	Increased Inundation Areas due to ABFEs	I-52
4-8	Relative Distribution of Repetitive Loss Properties	I-54
4-9	Relative Distribution of Repetitive Loss Properties Per Capita	I-55
4-10	Hazard Profile – Hailstorm	I-57
4-11	Hurricane Katrina Extent of Wind Fields	I-59
4-12	Hurricane Rita Extent of Wind Fields	I-59
4-13	Hazard Profile – High Wind (Hurricane)	I-60
4-14	Hazard Profile – High Wind (Tornado)	I-63
4-15	Hazard Profile – Ice Storm	I-65
4-16	5-year Lightning Flash Density Map – U.S. 1999-2003	I-66
4-17	Hazard Profile – Lightning	I-67
4-18	Annual Mean Daily Average Temperatures in the U.S.	I-68
4-19	Average July Temperatures in Louisiana	I-69
4--20	Average January Temperatures in Louisiana	I-69
4--21	Hazard Profile – Storm Surge	I-71
4-22a	Comparison of Hazard Profiles for Land Loss and Subsidence, Land Loss	I-73
4-22b	Comparison of Hazard Profiles for Land Loss and Subsidence, Subsidence	I-73
4-23	Hazard Profile – Wildfire	I-75
4-24	Hazard Profile – Dam Failure	I-77
4-25	Hazard Profile – Levee Failure	I-80
4-26	Hazard Profile – Hazardous Material Incidents	I-83
4-27	Hazard Profile – Hazardous Material Incidents (Fixed Locations)	I-84
4-28	Hazard Profile – Hazardous Material Incidents (Transportation)	I-85
5-1	Population Change	I-95
5-2a	Flood Hazard Ranking (Average Annual Estimated Losses)	I-97
5-2b	Graphic Representation of Flood Risk by Parish, Based on NFIP Claims	I-98
5-3	Severe Repetitive Loss Properties by Parish	I-99
5-4	Hurricane High Wind Hazard Ranking (Annual Estimated Losses)	I-101
5-5	Tornado High Wind Hazard Ranking (Annual Estimated Losses)	I-103

List of Maps (continued)

Number	Title	Page
5-6	Ice Storm Hazard Ranking (Number of Ice Storms)	I-105
5-7	Category 3 Storm Surge Hazard Ranking (Annual Estimated Losses)	I-107
5-8	Subsidence Hazard Ranking (Land Loss Rates)	I-109
5-9	Wildfire Hazard Ranking (Average Burnt Acreage)	I-111
5-10	Dam Failure Hazard Ranking (Number of High, Medium and Low Hazard Dams)	I-113
5-11	Levee Failure Hazard Ranking (Affected Population)	I-115
5-12	Hazardous Material Incident Hazard Ranking (Affected Population)	I-117
5-13	Composite Risk Rankings	I-121
5-14	Wind Hazard and Critical Economic Sites	I-122
5-15	Surge Hazard and Potential Risks for HAZMAT Release and/or Industrial Accident	I-123
5-16	Wind Hazard and Mobile Home Density including FEMA Temporary Housing	I-124
6-1	State-Owned Assets	I-141
6-2	State-Owned Critical Facilities and Infrastructure	I-143
6-3	State-Owned Critical Facilities and Infrastructure, Ranked	I-145
6-4	Loss Estimate – Flood – Total	I-149
6-5	Loss Estimate – High Winds – Total	I-151
6-6	Loss Estimate – High Winds – Tornado – Total	I-153
6-7	Loss Estimate – Ice Storms – Total	I-155
6-8	Loss Estimate – Storm Surge – Total	I-157
6-9	Loss Estimate – Subsidence – Total	I-159
6-10	Loss Estimate – Wildfire – Total	I-161
6-11	Loss Estimate – Dam Failure – Total	I-163
6-12	Loss Estimate – Levee Failure – Total	I-165
6-13	Loss Estimate – Hazardous Material Incident – Total	I-167
6-14	Loss Estimate – All Hazards – Top Ten	I-169
6-15	Critical Infrastructure - Bridges	I-174
6-16	Critical Infrastructure – Bridges- Criticalit	I-176
6-17	Critical Infrastructure Loss Estimate – Flood	I-181
6-18	Critical Infrastructure Loss Estimate – Hurricane	I-183
6-19	Critical Infrastructure Loss Estimate – Tornado	I-185
6-20	Critical Infrastructure Loss Estimate – Ice Storm	I-187
6-21	Critical Infrastructure Loss Estimate – Storm Surge	I-189
6-22	Critical Infrastructure Loss Estimate – Subsidence	I-191
6-23	Critical Infrastructure Loss Estimate – Wildfire	I-193
6-24	Critical Infrastructure Loss Estimate – Dam Failure	I-195

List of Maps (continued)

Number	Title	Page
6-25	Critical Infrastructure Loss Estimate – Levee Failure	I-197
7-1	Louisiana Emergency Management Regions	I-225
8-1	Regional Risk Assessment Summary	I-249

Volume II – State of Louisiana Hazard Mitigation Plan Update - Appendix

Appendix A **Acronyms and Definitions**
Appendix B **References**
Appendix C **Planning Process**
Appendix D **Hazard Identification and Profiles**
Appendix E **Statewide Risk Assessment**
Appendix F **Risk Assessment for State-Owned Assets**
Appendix G **Capability Assessment**
Appendix H **Best Practices for Mitigation**
Appendix I **Disaster Mitigation Act of 2000**
Appendix J **Interim Final Rule**
Appendix K **Planning Pilot Grant Program**

Acknowledgements

The following individuals made significant contributions to the 2008 update of the State of Louisiana Hazard Mitigation Strategy.

Governor's Office of Homeland Security and Emergency Preparedness

Perry ("Jeff") Smith, Acting Director (through January 11, 2008)

Mark Cooper, Director (January 14, 2008 to present)

Casey Levy, State Hazard Mitigation Officer / Hazard Mitigation Section Chief

Bill Haygood, Acting Assistant Hazard Mitigation Section Chief

Margaret Sanz, Plans Manager (Hazard Mitigation)

Brenda Cooper, Disaster Recovery Specialist Team Leader

Louisiana State Hazard Mitigation Planning Committee

Honora Buras, Coastal Resources Scientist, Department of Natural Resources, Office of Coastal Restoration and Management (*)

Constance Caruso, Department of Education

Bill Feazel, Federal Programs Director, Hurricane Protection and Flood Control, Department of Transportation and Development

James Carter, Captain, Enforcement Division, Department of Wildlife and Fisheries (*)

Bill Haygood, Acting Assistant Hazard Mitigation Section Chief, Governor's Office of Homeland Security and Emergency Preparedness (*)

Richard Hollowell, Security Coordinator, Department of Heath and Hospitals

Keith Horn, Staff Environmental Scientist, Department of Environmental Quality (*)

Jerry Jones, Director, Division of Administration, Office of Facility Planning

Larry LeJeune, Department of Agriculture and Forestry (through March 25, 2008)

Josh Gill, Department of Agriculture and Forestry (March 26, 2008 to present) (*)

Curt McCarty, Administrator, Department of Public Safety, Louisiana State Uniform Construction Code Council

Bill Morrison, Assistant Director, Division of Administration, Office of Facility Planning

Randy Noel, Chair, Department of Public Safety, Louisiana State Uniform Construction Code Council

Cindy O'Neal, Louisiana NFIP State Coordinator, Department of Transportation and Development - Floodplain Management Section (*)

Gary Shotwell, Assistant Warden, Department of Corrections

Note: Members of the SHMPC with (*) following their name are also members of the Louisiana State Hazard Mitigation Team

Louisiana State Hazard Mitigation Planning Advisory Board

Appendix C contains a listing of the members of the State Hazard Mitigation Planning Advisory Board. Members of the Advisory Board provided review and commentary regarding the technical and programmatic aspects of the Plan Update and many will continue to play important roles as partners for GOHSEP in implementing the Plan's recommendations.

Consultants

All of the following are affiliated with James Lee Witt Associates:

Matthew Buddie, Junior Planner

Hal Cohen, Project Planner

Nicolle Dailey, Technical Editor

Susan Healey, Technical Editor

Alessandra Jerolleman, Project Planner

Tom Malmay, GIS Specialist

Meghan McPherson, Junior Planner

Stuart Wallace, Project Manager

This State of Louisiana Hazard Mitigation Strategy Update builds upon previous research, planning, and analysis performed for the State of Louisiana Hazard Mitigation Strategy (2005) and Interim Plan Update (2007) by a team of consultants including:

URS Corporation

PBS&J

Dewberry

Innovative Emergency Management, Inc.

James Lee Witt Associates

Section One
Introduction

Contents of this Section

1.1 Context: Louisiana and Hazard Risk

1.2 Hazard Mitigation and Emergency Management

1.3 State of Louisiana Hazard Mitigation Strategy

1.4 Disaster Mitigation Act of 2000 and the Interim Final Rule

1.5 Emergency Management Accreditation Program

1.6 Comprehensive Emergency Management in Louisiana

1.7 State of Louisiana Hazard Mitigation Plan Update

1.8 Summary of Goals and Objectives

1.1 Context: Louisiana and Hazard Risk

The risks of natural or man-made disasters that could create catastrophic incidents in Louisiana were well known prior to 2005. However, it took the storms of 2005 and their aftermaths to bring about a new level of planning and engagement with disaster response, recovery, and hazard mitigation. The storms of 2005 confirmed Louisiana's extreme exposure to natural disasters and the compounding effect of engineered flood-protection solutions. Hurricanes Katrina and Rita hit three weeks apart and together caused damage estimated from $90 to $140 billion, making them respectively the first and third-costliest natural disasters in American history.[1] Additionally, nearly 1500 Louisianans in and around New Orleans died when the city flooded after its levees and floodwalls failed. On the second anniversary of Katrina, New Orleans's population remained a third lower than before the storm, and more than 200,000 people remained displaced from the 2005 storms.[2] Katrina and Rita were truly catastrophic events, and the disaster in New Orleans is without parallel in recent American history.

Katrina and Rita also had profound impacts on emergency management and hazard mitigation in Louisiana. As detailed later in this document, significant funding is available to the State of Louisiana for hazard mitigation. The storms also raised awareness of the importance of hazard mitigation among decision makers and the general population to a new level. However, to this day, hazard mitigation staff with the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) is almost entirely dedicated to addressing the aftermath of the storms with the result that most of the action items identified in previous planning efforts have not been implemented.

In addition to disasters on Katrina's scale, Louisiana regularly experiences severe weather. Just one year before Katrina, hurricanes Charley, Frances, Ivan and Jeanne hit in quick succession and wreaked havoc on the Gulf Coast and inland states. These non-catastrophic events can still cause massive property damage. For example, in 2004 Hurricane Ivan made landfall in Alabama and Florida yet caused millions of dollars of damage in Louisiana and in 2001 Tropical Storm Allison caused hundreds of millions of dollars in damage in Louisiana.

[1] *The Federal Response to Hurricane Katrina Lessons Learned*, February 2006 and FEMA News Release 1603-414, March 23, 2006.

[2] Louisiana Family Recovery Corps fact sheet, August 28, 2007, citing Federal Emergency Management Agency (FEMA) and Louisiana Recovery Authority (LRA) data.

Between 1996 and 2007, the State of Louisiana experienced 16 presidentially declared disasters[3]. Table 1-1 summarizes the impacts to the State of these events.

Table 1-1: Presidential Disaster Declarations in Louisiana 1997 - 2007

Disaster Event	Date	DR Number[4]	Parishes Affected	Total Federal Assistance [5] ($ Million)
Ice Storm	January 12, 1997	1169	3	$6.1
Hurricane Georges	September 9, 1998	1246	21	$370.0
Ice Storm	December 23, 1998	1264	16	$5.9
Tornadoes	April 3, 1999	1269	5	$11.7
Ice Storm	January 27, 2000	1314	8	$0.5
Ice Storm	December 11, 2000	1357	8	$6.0
Tropical Storm Allison	June 5, 2001	1380	27	$206.4
Tropical Storm Isidore	September 21, 2002	1435	16	$30.7
Hurricane Lili	October 3, 2002	1437	44	$274.7
Flood	May 12, 2004	1521	9	$6.1
Hurricane Ivan	September 13, 2004	1548	26	$20.5
Hurricane Cindy	August 23, 2005	1601	5	$3.6
Hurricane Katrina	August 29, 2005	1603	64	$22,826.0
Hurricane Rita	September 24, 2005	1607	64	$2,358.4
Severe Storms and Flooding	November 11, 2006	1668	19	$44.0
Severe Storms and Flooding	February 23, 2007	1685	3	$2.4
Total Federal Assistance 1997-2007				$26,173.0

Sources: 1997 – 2004 Disaster Declarations: State of Louisiana Governor's Office of Homeland Security and Emergency Preparedness; 2005-2007 Disaster Declarations: Federal Emergency Management Agency / Louisiana Transitional Recovery Office.

Louisiana is located on the coast of the hurricane-prone Gulf of Mexico and at the mouth of the Mississippi watershed, which drains over 40% of the continental U.S. There is no remedy for the natural forces that cause coastal storms and flooding. This threat is compounded by the State's historic reliance on engineered flood-protection measures; particularly systems of levees and floodwalls, as well as systems of canals, pipes and pumps also known as forced drainage systems. These measures provide single lines of defense against hazards and if or when they fail it can result in catastrophe. Meanwhile, manmade and natural hazards are combining to potentially make these events more common and more severe:

- South Louisiana is subsiding at rates fast enough to be observed within decades or even years;
- coastal wetlands are eroding due to the combined effects of subsidence, severe weather, a lack of new alluvial sediments and saltwater intrusion via navigation and oil-and-gas channels; and
- warmer oceans are causing rising sea levels and more extreme weather events.

These factors are narrowing the natural buffers between the Gulf of Mexico and Louisiana's population centers and thus reducing protection from high wind and storm surges.

[3] Definitions for terms like " Presidential Disaster Declarations" are included in Volume II, Appendix A.2.

[4] "DR Number" refers to disaster declaration numbers assigned by the Federal Emergency Management Agency.

[5] "Total Federal Assistance" includes: Individual Assistance, Public Assistance, and Hazard Mitigation Grant Programs administered by the Federal Emergency Management Agency and Small Business Administration loans.

In addition to these natural hazards, Louisiana's large oil-and-gas and petrochemical industries both present significant hazardous materials (HAZMAT) risks. Many of these industries' facilities are clustered around population centers, and they pose risks from both industrial accidents and acts of terrorism, including incidents at a facility and/or involving highway or rail transportation. All of these relatively uncommon natural and manmade risk factors are in addition to the more typical serious risks that Louisiana shares with many other states, including tornadoes, ice storms, drought, wildfire, dam failure, pandemic infectious disease, civil unrest, peacetime nuclear incident, and so on.

In summary, Louisiana is not only particularly prone to natural and manmade hazards, but also a state in which the measures taken to protect against certain hazards have compounded the threats posed by nature. This is particularly true with regards to the state's reliance on levees, floodwalls, and forced drainage systems to protect against flooding. However, knowledge and methods exist to lessen the impacts of many natural and manmade hazards. In particular, techniques exist to mitigate the impacts of alluvial and backwater floods as well as hurricane storm surges and other flood events. Effective floodplain management and better construction techniques, for example, provide means of reducing property damage during floods and storms without the capital or operations-and-maintenance costs implied by the creation of new levees, flood walls, or forced drainage systems.

The State has been working to apply this knowledge for many years to reduce the impacts of hazard events; in 2004, the State embarked on a comprehensive program to markedly improve the results of these efforts, resulting in the *State of Louisiana Hazard Mitigation Strategy*, which was completed in 2005 (see Section 1.3). Following hurricanes Katrina and Rita, Louisiana undertook this update of its *State Hazard Mitigation Plan* (see definition, below) which is a key component of this *Strategy*.

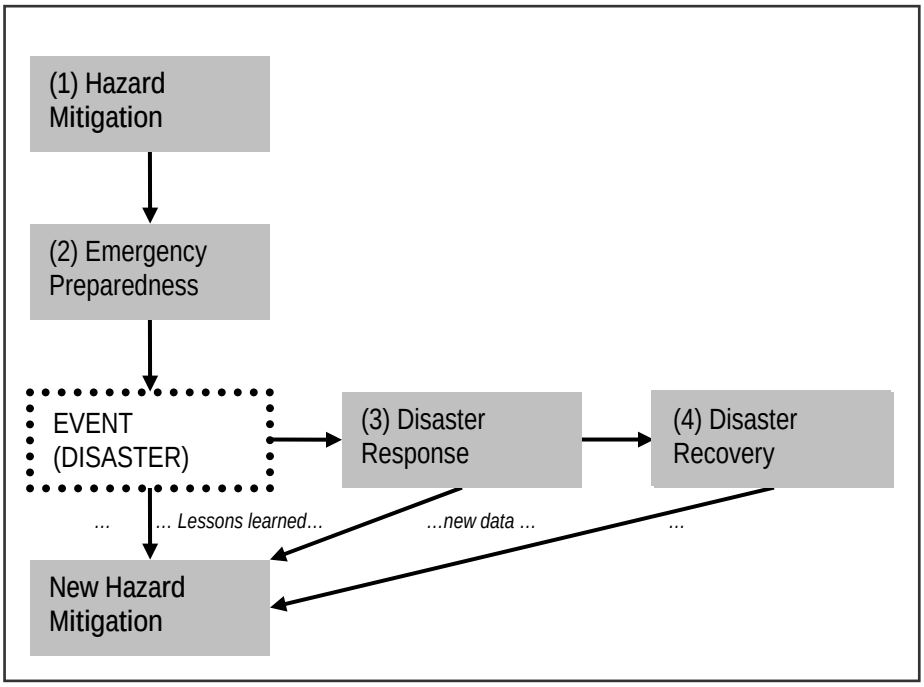
1.2 Hazard Mitigation and Emergency Management

To understand this *Plan* and the overall *Strategy*, it is first necessary to understand how hazard mitigation relates to the broader concept of emergency management. In the early 1980s, the newly-created Federal Emergency Management Agency (FEMA) was charged with developing a structure for how the Federal, State and local governments would respond to disasters. FEMA developed the "four phases of emergency management". This approach can be applied to all disasters.

- Hazard mitigation, also known as prevention, is described by FEMA and the Disaster Mitigation Act of 2000 (DMA 2000) as "any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event." The goal of mitigation is to save lives and reduce property damage. This, in turn, can reduce the enormous cost of disasters to property owners and all levels of government. In addition, mitigation can protect critical community facilities, and minimize community disruption. Examples include a range of activities and actions including; land use planning, adoption and enforcement of building codes, construction projects (e.g., floodproofing homes through elevation, or acquisition or relocation away from floodplains).
- Emergency preparedness includes plans and preparations made to save lives and property and to facilitate response operations in advance of a disaster event.
- Disaster response includes actions taken to provide emergency assistance, save lives, minimize property damage, and speed recovery immediately following a disaster.
- Disaster recovery includes actions taken to return to a normal or improved operating condition following a disaster.

On the following page, Figure 1-1 illustrates the basic relationship between these phases of emergency management. It is important to note that hazard mitigation can occur both before or after a disaster event but it is significantly more effective when implemented prior to an emergency situation. This is one of the key elements of the *Plan* and the overall *Strategy*; working to reduce risk before a disaster strikes to lessen the need for response and recovery.

Figure 1-1: The Four Phases of Emergency Management



1.3 State of Louisiana Hazard Mitigation Strategy

GOHSEP[6], with the assistance and cooperation of the State Hazard Mitigation Planning Committee (SHMPC)[7], developed the comprehensive 2005 *State of Louisiana Hazard Mitigation Strategy.* One of the first steps was to develop the following Mission Statement:

> *Louisiana's Hazard Mitigation Strategy is the demonstration of the State's commitment to reduce risks from hazards, and serves as a guide for State decision makers as they commit resources to reducing the effects of hazards.*

The 2005 *Strategy* was documented in four volumes:

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

To better understand the *Strategy*, it is important to define and review a few terms:

- *Hazard mitigation* is defined as measures undertaken to reduce the effects of hazards on a place and its population. Hazards addressed in this Plan include a range of naturally occurring events, such as floods, high winds and ice storms, and manmade hazards resulting from accidents.

[6] Until its relocation from the Military Department to the Governor's Office in 2006, this office was known as the Louisiana Office of Homeland Security and Emergency Preparedness (variously, LOHSEP or OHSEP). A complete listing of acronyms used in this Plan is included in Volume II, Appendix A.1.
[7] See Section Three for an explanation of roles and responsibilities for GOHSEP and the SHMPC.

- *A Hazard Mitigation Plan* ("Plan") is the result of a process States undertake to identify:
  - risks they face from natural and manmade hazards; and
  - the best ways to reduce or eliminate the potential for loss of life, property damage, and disruption of economic activities.

  Hazard mitigation actions that can be identified through this type of planning process include a wide range of activities and projects, from educating home owners about how to strengthen their homes to resist damage from hurricane force winds, to the construction of public works projects like a drainage improvement that limits the extent of flooding.
- A *Hazard Mitigation Program* ("Program") is the coordinated effort by a state or community to implement actions from the Plan. It also covers an important function of state governments - administering hazard mitigation grant funding to state, parish and municipal agencies.
- *Administrative Guidelines and Procedures* provide the standard operating procedures and supporting materials used to solicit, award and monitor compliance with Federal and state grants.

It is important to note that hurricanes Katrina and Rita happened just as GOHSEP was implementing the April 2005 Plan. Once the hurricanes impacted the state, all hazard mitigation staff and resources were committed to response to the effects of hurricanes Katrina and Rita, and could not implement most of the recommendations in that Plan. By the time GOHSEP was in a position to reinitiate implementation of the April 2005 Plan recommendations, it was time to update the Plan.

As part of updating the Plan and the overall *Strategy* in 2007-8, the SHMPC began a long-term effort to better integrate key components of all plans with hazard mitigation implications in the State of Louisiana to ensure that the programs, policies, recommendations and implementation strategies are internally consistent. As each of these documents has been adopted by different agencies within the State, the SHMPC has been working to incorporate this information into the decision process. As a result, the *Strategy* was broadened to include the following documents by reference:

- *State of Louisiana Emergency Operations Plan* (dated July 1, 2007). The Emergency Operations Plan (EOP) has been updated and revised to include more detailed information about hazard identification and potential impacts. The EOP also includes key measures that can reduce the impact of disasters including establishing hazard warning and communication procedures. The EOP is treated as complementary to the success of this *Strategy*, and in instances in which emergency operations are directly relevant to hazard mitigation, the EOP is directly engaged;
- *State of Louisiana Governor's Office of Homeland Security and Emergency Preparedness Continuity of Operations Plan*. Similar to the EOP, the Continuity of Operations Plan (COOP) has been substantially rewritten in 2007. The updated information includes provisions for redundancy to ensure continuity of key components of State emergency management capabilities including critical systems, equipment, and flow of information, operations and materials. Like the EOP, the COOP is treated as complementary to the success of this *Strategy*, and in instances in which continuity-of-operations is directly relevant to hazard mitigation, the COOP is directly engaged; and
- Regional and community-based long-term recovery plans (various dates from 2005 though 2007). Developed primarily in the wake of hurricanes Katrina and Rita in 2005, these plans are focused on long-term vision and specific projects that will contribute to recovery of the most heavily impacted and at-risk portions of the State from the effects of Katrina and Rita. These plans also put in place the structure to address long-term recovery needs from future disasters. The referenced plans that are incorporated into this *Strategy* include:
  - *Supplement 3 to the EOP: Disaster Recovery Manual* developed by the Louisiana Office of Homeland Security and Emergency Preparedness (revised January 2005);

  - *Louisiana Speaks Regional Plan* for South Louisiana, developed by the Louisiana Recovery Authority (dated May 2007)
  - ESF-14 Plans for Allen, Calcasieu, Cameron, Iberia, Jefferson, Jefferson Davis, Lafayette, Lafourche, Orleans, Plaquemines, St. Bernard, St. Charles, St. Mary, St. Tammany, Vermilion, Vernon, and Washington parishes, developed by the Louisiana Recovery Authority and FEMA.
- *Integrated Ecosystem Restoration and Hurricane Protection: Louisiana's Comprehensive Master Plan for a Sustainable Coast*, developed by the Louisiana Coastal Protection and Restoration Authority (CPRA) and approved by the Legislature June 2007.

As other on-going and future relevant planning efforts are undertaken, the SHMPC is committed to seeking consistency in the recommendations between all documents and programs.

1.4 Disaster Mitigation Act of 2000 and the Interim Final Rule

The impetus for developing and maintaining this *Strategy* comes partly from the long-term commitment of the State of Louisiana to reduce the impact of natural and manmade hazards and partly in response to Federal law. In October 2000, the President signed DMA 2000 into law (see Volume II, Appendix I). Among its many features and supporting regulations, the DMA 2000 requires (44 CFR Part 201.4) all states to have a *Hazard Mitigation Plan* approved by FEMA to remain eligible for many forms of Federal disaster assistance offered under the Stafford Act[8]. Table 1-2 indicates which specific Stafford Act programs will have funding withheld for states without an approved State Hazard Mitigation Plan. DMA 2000 also requires that Hazard Mitigation Plans be revised and updated every three years. This update of the State of Louisiana Hazard Mitigation Plan and Hazard Mitigation Strategy complies with the DMA 2000 update requirement.

Table 1-2: Federal Assistance tied to DMA 2000 Compliance

Status without State Plan Approval[9]	Major Federal Assistance Programs[10]
Funding Withheld	✓ Public Assistance (PA) – Road Systems (Category C) ✓ PA – Water Control Facilities (Category D) ✓ PA – Buildings and Equipment (Category E) ✓ PA – Utilities (Category (F) ✓ PA – Parks, Recreational, and Other (Category G) ✓ Hazard Mitigation Grant Program Project and Planning Grants (HMGP) ✓ Pre-Disaster Mitigation Grant Program Project Grants (PDM-C) ✓ Fire Management Assistance Grant Program (non-emergency provisions only) ✓ National Flood Insurance Program (NFIP) Flood Mitigation Assistance (FMA) ✓ NFIP Repetitive Flood Claims (RFC) ✓ NFIP Severe Repetitive Loss (SRL)
Funding Not Affected	✓ Public Assistance - Debris Removal (Category A) ✓ Public Assistance - Emergency Protective Measures (Category B) ✓ Pre-Disaster Mitigation Grant Program Planning Grants (PDM-C)

Source: FEMA Region VI, Denton, Texas, January 2005; "Mitigation Grant Programs Fact Sheet," www.fema.com.

[8] As defined in more detail in Volume II, Appendix A.2, the Stafford Act is the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and its programs

[9] Assuming parish and/or municipal hazard mitigation plans have been approved by FEMA.

[10] See Section Seven – Capability Assessment for a discussion of Federal assistance programs as they relate to hazard mitigation in Louisiana.

The biggest impact of the State having a Hazard Mitigation Plan is its eligibility for funding by FEMA's HMGP as part of a Presidential Disaster Declaration. Currently, HMGP funding can be set as high as 15% of the total disaster grant funds for a particular disaster. In the past, the HMGP has provided substantial funding to support hazard mitigation in the State. For example, the total of HMGP funds for the 16 disaster declarations between 1997 and 2007 in Table 1-1 was approximately $4.3 billion, an average of more than $390 million per year. HMGP funding for Katrina alone totaled in excess of $1.7 billion.

To guide implementation of DMA 2000, FEMA published an Interim Final Rule (IFR) on February 26, 2002 that was subsequently amended in October 2002 and September of 2004 (see Volume II, Appendix J). The IFR set forth the guidance and regulations under which DMA 2000-compliant State Hazard Mitigation Plans are to be developed. The IFR provides detailed descriptions of the planning process that States and localities are required to observe, as well as descriptions of the contents of the resulting plan.

FEMA has also provided additional guidance for States and local communities to meet the requirements of FEMA's Mitigation Planning Regulations, including:

- Mitigation Planning Guidance "Blue Book"
- Mitigation Planning "How-To" Guides
- Mitigation Planning Frequently Asked Questions (FAQs)

The IFR includes requirements and provisions for two different facets of hazard mitigation at the state level that are mirrored in the State of Louisiana's overall Strategy: a *Standard State Hazard Mitigation Plan* and an *Enhanced State Hazard Mitigation Plan*. The main distinctions between these two sets of requirements and their relation to the components of the Strategy are described in the following paragraphs.

Standard State Hazard Mitigation Plan

The Standard State Hazard Mitigation Plan, or "Standard Plan", is the Federally mandated DMA 2000 planning effort that is required to be approved by FEMA and updated on a three-year cycle to preserve current levels of Federal disaster aid eligibility. In a broad sense, the Standard Plan is intended to identify and support implementation of discrete actions that will reduce the risk of loss of life and property damage and preserve eligibility for existing levels of Federal pre- and post-disaster funding.

More specifically, the section of the IFR regarding the Standard Plan requires:

- *Risk Assessments* identifying the types and impacts of all natural hazards[11];
- *Goals and Objectives* that reflect the hazards that threaten the state and point toward actions that can be taken to minimize or eliminate the damaging impacts of these hazards;
- *Mitigation Action Plan* outlining specific activities and actions with a concrete implementation strategy to reduce risk from the identified hazards; and
- *Plan Maintenance Process* specifying how the Mitigation Action Plan will be kept current and focused on addressing hazards in the most effective manner possible.

The *State of Louisiana Hazard Mitigation Plan Update*, as documented in this first volume of the overall *Strategy*, has been developed in accordance with these specific requirements.

[11] The State of Louisiana Hazard Mitigation Plan Update includes consideration of several manmade hazards although this is not a requirement of the DMA 2000.

Enhanced State Hazard Mitigation Plan

The DMA 2000 requirements for producing a Standard Plan are obligatory for states to maintain current levels of funding eligibility. However, the DMA 2000 also included a significant incentive for states to undertake improvements to the way they administer programs related to hazard mitigation. Specifically, DMA provided for "Enhanced" status for states that meet certain performance criteria about their management and administration efforts to support hazard mitigation at the state and local level.

If a state is designated as having an Enhanced State Hazard Mitigation Plan, the most immediate effect is that the amount of money that can be made available for HMGP funding increases from 15% to 20% of the total disaster grants for a particular disaster.

For a state with a history of natural disasters like Louisiana, this represents a significant amount of money. Therefore, the *State of Louisiana Hazard Mitigation Program,* as documented in Volume III of the *Strategy*, identifies how Louisiana will conduct its hazard mitigation administrative program to meet the DMA 2000 requirements for Enhanced Program status.

1.5 Emergency Management Accreditation Program

The Emergency Management Accreditation Program (EMAP) is a standard-based voluntary assessment and accreditation process for state and local government programs responsible for coordinating prevention, mitigation, preparedness, response, and recovery activities for natural and human-caused disasters. Accreditation is based on compliance with collaboratively developed national standards, the *Emergency Management Standard* by EMAP.

The program is administered by the EMAP Commission, a ten-member governing and decision making body. Its members are appointed (five each) by the International Association of Emergency Managers and National Emergency Management Association, key organizations in the creation of EMAP. It functions independently of those organizations.

The Plan Update has been developed to comply with the 2007 edition of the EMAP Standards.

1.6 Comprehensive Hazard Mitigation in Louisiana

In response to the varied risk factors faced by Louisiana, a wide array of programs, plans, and organizations have been created at the federal, state and local levels that contribute to comprehensive hazard mitigation in Louisiana. This document is one plan that has been developed to address the mitigation of natural and certain technological/manmade hazards in Louisiana. This *Plan* focuses on mitigating the *impacts or effects* of hazards, by using the programs and funding streams available to DMA 2000-compliant states and jurisdictions (see Table 1-2) for hazard mitigation.

The core purpose of this *Plan* is to provide a basic understanding of risks from natural and certain manmade or technological hazards and a consistent framework for assigning resources to projects, programs and policies intended to address those risks. The resources include funding available to DMA 2000-compliant states and jurisdictions (see Table 1-2) for hazard mitigation such as the FEMA HMGP, Pre-Disaster Mitigation (PDM) grant program, Public Assistance (PA) grant program, Flood Mitigation Assistance (FMA) program, or other federal and non-federal sources.

This *Plan* also addresses coordination of state and local hazard mitigation planning, and hazard mitigation capability at local, regional and state levels. In instances where no other program or entity appears in a position to mitigate a given hazard, the *Plan* will propose future actions including, new legislation, changes to administrative rules or definitions, and/or the creation of new decision-making frameworks to help Louisiana manage the risk in question.

The overall *Strategy* acknowledges and defers to other programs or agencies that are already effectively positioned to mitigate a given hazard, especially where effective mitigation is beyond the scale and scope of the available Federal hazard mitigation programs and funds. This *Strategy* supports and leverages other mitigation related efforts; and to the extent possible, does not duplicate them. These comprehensive hazard mitigation related efforts fall into three broad categories that are documented in detail in Section 8.3:

- Decreasing the magnitude of hazards through measures including large scale coastal protection and restoration projects, and regional wildfire mitigation and suppression programs;
- Decreasing exposure to hazards through large-scale state and federally-funded construction projects such as systems of levees and floodwalls and continued support for enforcement of floodplain management and building code ordinances; and
- Improving disaster response through emergency preparedness and response planning and on-going efforts to address biological hazards such as infectious diseases.

1.7 State of Louisiana Hazard Mitigation Plan Update

As noted, GOHSEP developed the original Hazard Mitigation Plan in response to DMA 2000 Standard Plan requirements with the assistance and cooperation of the SHMPC. That document (referred to herein as the "April 2005 Plan"), formally adopted for the State in 2005 (see Section Two), was the result of their efforts during 2004 and 2005. That document was preceded by a "State of Louisiana Hazard Mitigation Plan" which was produced in the 1990s and included an inventory of hazards but primarily focused on administrative procedures for hazard mitigation grant programs.

This updated document ("Plan Update") meets the DMA 2000's requirement for updates every three years, and reflects the best data (as of 2007), knowledge and practices in risk assessment and hazard mitigation in post-Katrina/Rita Louisiana.

The Plan Update maintains the organization of the 2005 Plan, which parallels the structure provided in the IFR and has the following sections:

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

Most of these sections are written in summary form. Appendices related to each section provide full detailed discussions of all aspects of the Plan Update (e.g., methodologies, complete results, etc.).

The Plan Update identifies appropriate hazard mitigation actions focused on two parallel tracks:

- to address the risk from hazard events on a statewide basis to help local communities and parishes set priorities for specific mitigation actions which result in the greatest benefit; and
- to ensure that State-owned assets are adequately protected to reduce losses and preserve the State's capability of providing essential services in the wake of a disaster.

The Plan Update includes a detailed characterization of selected natural and manmade hazards and a risk assessment, for each hazard type, that leads to the determination of relative risk to physical assets, people, and operations. It also includes a set of goals, objectives, and mitigation actions, formulated in direct response to the identified risks. Lastly, it includes a detailed plan for implementing and monitoring the long-term performance of the Plan Update.

1.8 Summary of Goals and Objectives

In response to the contents of the risk and capability assessments, the SHMPC created an overall Mission Statement for the *Strategy* and developed four overarching goals that identified the need to work with Louisiana parishes, communities, and government agencies to reduce the possibility of damage and loss through:

- Goal 1: Improving Outreach and Education;
- Goal 2: Improving Data Collection, Use and Sharing;
- Goal 3: Improving Hazard Mitigation Planning and Implementation Capabilities; and
- Goal 4: Reducing risk via implementing appropriate Mitigation Construction Projects.

In an effort to provide more detailed direction to the citizens of the State and other state agencies, the SHMPC identified objectives and corresponding mitigation actions for each of these goals (see Section Eight of this Plan).

Section Two
Plan Adoption

Contents of this Section

2.1 Interim Final Rule Requirements for Plan Adoption

2.2 Plan Adoption by the Governor of Louisiana

2.1 Interim Final Rule Requirements for Plan Adoption

Disaster Mitigation Act of 2000 compliant Standard State Hazard Mitigation Plans must be formally adopted by the appropriate elected official(s). In the State of Louisiana, the Governor has the authority to act on behalf of the State in this regard.

The Interim Final Rule (IFR) contains three specific requirements relative to the adoption of the Plan by the State of Louisiana:

- Requirement §201.3 (c)(3): "At a minimum, review and, if necessary, update the Standard State Mitigation Plan ... every three years from the date of the approval of the previous plan in order to continue program eligibility."
- Requirement §201.4(c)(6): "The plan must be formally adopted by the State prior to submittal to [FEMA] for final review and approval."
- Requirement §201.4(c)(7): "The plan must include assurances that the State will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, in compliance with 44 CFR 13.11(c). The State will amend its plan whenever necessary to reflect changes in State or Federal laws and statutes as required in 44 CFR 13.11(d)."

2.2 Plan Adoption by the Governor's Authorized Representative

Adoption of the State of Louisiana Hazard Mitigation Plan by the Authorized Representative of the Governor of the State (GAR) affirms the commitment of the State to pursue the activities and actions identified in the Plan.

The 2005 Plan was approved by the Governor of Louisiana on April 26, 2005. An interim plan update was developed by the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) and then reviewed and approved by the State Hazard Mitigation Team on September 14, 2007.

The current update to the plan satisfies IFR requirement §201.3 (c)(3) to update and resubmit the plan every three years for FEMA approval. Following this page is a formal letter of adoption signed by GOHSEP Director Mark A. Cooper, the GAR, on behalf of the State of Louisiana, which incorporates and satisfies both IFR requirements (§201.4(c)(6) and §201.4(c)(7)).

This page is intentionally blank.

State of Louisiana

BOBBY JINDAL
GOVERNOR

**GOVERNOR'S OFFICE OF HOMELAND SECURITY
AND
EMERGENCY PREPAREDNESS**

MARK A. COOPER
DIRECTOR

April 14, 2008

William E. Peterson, Regional Director
Federal Emergency Management Agency, Region VI
Federal Regional Center, Room 206
800 N. Loop 288
Denton, TX 76201-3698

RE: State of Louisiana Standard Hazard Mitigation Plan Update

Dear Mr. Peterson:

I am pleased to submit the State of Louisiana Hazard Mitigation Plan Update for your review and approval. In my capacity as Governor's Authorized Representative, I am authorized to adopt the plan on behalf of the State of Louisiana. This letter represents my formal adoption of this document and is based upon the recommendations of the State Hazard Mitigation Team, the efforts of the State Hazard Mitigation Planning Committee (SHMPC) and the support of the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP). This Plan Update builds on our previously approved Hazard Mitigation Plan and has been prepared in a manner consistent with the requirements of the Disaster Mitigation Act of 2000 (44 CFR 201.4).

The Plan Update will help continue the efforts of the State of Louisiana to reduce the impacts of natural disasters and focuses on the most significant hazards including storm surge, high winds, flooding, levee failure and subsidence. The actions described in the Plan Update address: education and outreach for communities and citizens; improving the quality and quantity of information used to make risk reduction decisions; seeking better coordination between all levels of government; and most importantly, identifying and implementing technically feasible, cost effective, and environmentally sound hazard mitigation projects.

In addition, I certify that the State will continue to comply with all applicable federal statutes and regulations in effect with respect to the periods for which it receives grant funding in compliance with 44 CFR 13.11(c). The State also certifies it will amend the plan whenever necessary to reflect changes in State or federal laws and statutes as required in 44 CFR 13.11(d).

7667 INDEPENDENCE BOULEVARD BATON ROUGE, LA 70806
TELEPHONE (225) 925-7500 FAX (225) 925-7501

I wish to express my gratitude for the efforts of your staff who have been working with GOHSEP and the SHMPC to develop this Plan Update. The successful implementation of the actions in the Plan Update will depend on a continuation of that partnership and we look forward to receiving your approval so the work can begin.

If you or your staff have any comments, please contact D. Casey Levy, State Hazard Mitigation Officer, at clevy@ohsep.louisiana.gov or at 225-267-2673. Thank you for your continued cooperation.

Sincerely,

Mark A. Cooper
Governor's Authorized Representative

Section Three
Planning Process

Contents of this Section

3.1 Interim Final Rule Requirement for Planning Process

3.2 Documentation of the Planning Process

3.3 Coordination among Agencies, Stakeholders and Interested Parties

3.4 Program Integration

3.1 Interim Final Rule Requirements for Planning Process

The Interim Final Rule (IFR) states that "[a]n effective planning process is essential in developing and maintaining a good plan." The IFR backs up this statement with specific requirements for documenting the planning process and indicating to what extent this planning effort is integrated with other plans and programs at the Federal, state and local level. The IFR includes three specific requirements for the process of developing Standard State Hazard Mitigation Plans:

- Documentation of the Planning Process per Requirement §201.4(c)(1): "[The State plan must include a] description of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how other agencies participated."
- Coordination among Agencies per Requirement §201.4(b): "The [State] mitigation planning process should include coordination with other State agencies, appropriate Federal agencies, interested groups,…"
- Program Integration per Requirement §201.4(b): "[The State mitigation planning process should] be integrated to the extent possible with other ongoing State planning efforts as well as other FEMA mitigation programs and initiatives."

3.2 Documentation of the Planning Process

This subsection includes documentation regarding:

- Plan Update;
- Meetings and Workshops;
- Participants; and
- Stakeholders .

Plan Update

As noted in Section 1.5, the Disaster Mitigation Act of 2000 (DMA 2000) provided a strong incentive for the development of a Standard State Hazard Mitigation Plan. As a result, the State of Louisiana, through the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP), began the process to develop a State Hazard Mitigation Plan in 2003.

The planning process began in earnest in May 2004 and led to adoption by the Governor and approval by the Federal Emergency Management Agency (FEMA) on April 26, 2005.

Subsequently, an interim update of the Plan was prepared by GOHSEP in 2007 to comply with Emergency Management Accreditation Program (EMAP) requirements. This Interim Update included improving integration between this Plan and state Emergency Operations Plan (EOP) and Continuity of Operations Plan (COOP) planning. The Interim Update was presented to and approved by the State Hazard Mitigation Team (SHMT) in 2007.

Plan updates and FEMA re-approvals are required every three years. The process used to update this Plan in accordance with this requirement was formally initiated in 2007. The scope of work undertaken by all the participants consisted of updating all sections of the 2005 Plan using the best available data and methodologies[12], hopefully culminating with FEMA approval by the end of April 2008.

The following summary identifies the process used to revise and update each section of the Plan.

- Section One, Introduction: This section was updated with a brief overview of relevant hazard information that has changed since 2005. All Presidential Disaster Declarations, including disaster numbers, parishes affected, and total federal assistance dollar amounts were updated. A definition and subsequent discussion were included to clarify the significant differences between hazard mitigation and emergency preparedness.
- Section Two, Plan Adoption: This section was reorganized to reflect that this is an update of the 2005 Plan and was readopted by the Governor before official submission to FEMA.
- Section Three, Planning Process: This section was edited to explain the process used to update the plan. All meetings and agencies involved in the plan update are listed in this section.
- Section Four, Hazard Identification and Profiles: This section was revised to describe the hazards addressed in the plan based on relevance to hazard mitigation planning and implementation programs. When new information was available, histories for identified hazards were updated.
- Section Five, Statewide Risk Assessment: This section was updated to reflect relative risk between parishes. Information from 64 parish and 11 local approved hazard mitigation plans was also reviewed for new risk data, such as Advisory Base Flood Elevations, damages resulting from hurricanes Katrina and Rita, and the potential impact of levee failures.
- Section Six, Risk Assessment for State-Owned Assets: This section was updated using results from the Hazard Profiles and Statewide Risk Assessment to rank individual State-owned assets. Hazard frequency and past damage data were used to calculate annualized or monetized risk. A list of top-ten facilities was created for each hazard and a top ten list was produced to show State-owned assets at risk from all hazards. A system for conducting detailed site-specific assessments was developed for the assets deemed most at risk.
- Section Seven, Capability Assessment: This section was updated to show changes in state and local capabilities for planning and implementing hazard mitigation. Surveys were developed and administered at state, regional, and local levels to evaluate capabilities throughout the state. This included contacting various state agencies involved in hazard mitigation, nine GOHSEP Regional Coordinators, and local Office of Homeland Security and Emergency Preparedness Directors, Building Code Officials, and Floodplain Managers. The results were compiled, analyzed, noted for trends, and summarized.

[12] The term "best available data and methodologies" as used in this Plan Update is defined in Sections Four, Five and Six.

- Section Eight, Mitigation Action Plan: Updating this section of the Plan focused on a number of key areas:
  - documenting progress towards implementing action items in the April 2005 Plan;
  - improving education and outreach efforts;
  - seeking ways to improve sharing of hazard and risk data;
  - building local, regional and state capabilities;
  - developing region-specific priorities for mitigation projects at the parish and community levels; and
  - identifying pilot projects to implement for State-owned assets.
- Section Nine, Coordination of Local Planning: This section was updated by documenting the substantial gains made regarding parish and local hazard mitigation plan adoption and documenting progress toward development and implementation of the Planning Pilot Grant Program. This section also refined the criteria for prioritizing local assistance.
- Section Ten, Plan Maintenance: The final section was revised to institutionalize monitoring, evaluating, and updating the plan. The plan, in moving forward, reflects the State's commitment to improve the monitoring, evaluating, and updating process and continuing compliance with the DMA 2000 requirements.

Meetings and Workshops

The State Hazard Mitigation Planning Committee (SHMPC) and/or SHMT met on eighteen separate occasions while developing the 2005 Plan, the 2007 Interim Plan Update, and the 2008 Plan Update. Details regarding meetings for the 2005 Plan and 2007 Interim Update can be found in Volume II, Appendix C. Below are details regarding the ten meetings that contributed to the current update of the Plan (2008):

Table 3-1: State Hazard Mitigation Team and Planning Committee Meetings (2008 SHMP Update)

#	Date / Place	Subject	Participants
1	July 12, 2007	SHMT Kickoff / Meeting #1 for SHMPC Selection	GOHSEP, SHMT & Consultants
2	August 7, 2007/Baton Rouge	SHMPC Kickoff / Meeting #1	GOHSEP, SHMPC & Consultants
3	September 14, 2007	EMAP Interim Plan Update review and approval	GOHSEP, SHMT & Consultants
4	October 11-12, 2007 / Covington	SHMPC Meeting #2 - Review work-in-progress	GOHSEP, SHMPC & Consultants
5	November 8, 2007 / Baton Rouge	SHMPC Meeting #3 - Review work-in-progress	GOHSEP, SHMPC & Consultants
6	November 29, 2007 / Baton Rouge	SHMPC Meeting #4 - Review work-in-progress	GOHSEP, SHMPC & Consultants
7	December 18, 2007 / Baton Rouge	SHMPC Meeting #5 - Review and approve 1st Draft Plan Update	GOHSEP, SHMPC & Consultants
8	January 16, 2008 / Baton Rouge	SHMPC Meeting #6 - Review and approve 2nd Draft Plan Update	GOHSEP, SHMPC & Consultants
9	February 28, 2008 / Multiple Locations	Video-teleconference for Public Input	GOHSEP, SHMPC & Consultants
10	April 11, 2008 / Baton Rouge	SHMT Meeting #2 – Recommend adoption of Plan Update to Governor	GOHSEP, SHMT & Consultants

These workshops and meetings were facilitated by GOHSEP and its consultant. Prior to these meetings, the SHMPC received packets of information that were subsequently presented and discussed at the workshops / meetings. After the presentations the SHMPC reviewed modified proposed elements of the Plan Update, and either approved or rejected them. This was usually accomplished through facilitated discussion and consensus. Prior to submitting the Plan Update to the Governor, the SHMT took a formal vote to approve and recommend the Plan Update for adoption.

Participants

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

- The Governor of Louisiana;
- Governor's Office of Homeland Security and Emergency Preparedness;
- State Hazard Mitigation Team;
- State Hazard Mitigation Planning Committee;
- State Hazard Mitigation Planning Advisory Board; ;
- Federal Emergency Management Agency, Region VI; and
- Consultants.

The specific responsibilities of these participants and agencies are as follows:

The Governor of Louisiana

The Governor of Louisiana was responsible for:

- Issuing Executive Order KBB 2004-35, re-establishing the SHMT (see discussion below regarding the SHMT and Volume II, Appendix C.1);
- Authorizing the SHMT to develop the State of Louisiana Hazard Mitigation Plan;
- Reviewing the recommendations of GOHSEP and the SHMT to adopt the Plan on behalf of the State;
- Requesting revisions to the Plan's contents if deemed necessary; and
- Formally adopting the Plan.

Governor's Office of Homeland Security and Emergency Preparedness

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

State Hazard Mitigation Team

The SHMT was responsible for developing, reviewing and approving the 2005 Plan and 2008 Plan Update. The SHMT also reviewed and approved the Interim Plan Update developed by GOHSEP in 2007, The SHMT was designated by the Governor and is comprised of a variety of state agencies. Executive Order No. KBB 2004 – 35, issued on August 20, 2004 (see Volume II, Appendix C.1), identifies the following member agencies:

- The Military Department, Louisiana Office of Homeland Security and Emergency Preparedness, Office of the Governor[13];
- The Department of Transportation and Development;
- The Department of Wildlife and Fisheries;
- The Department of Environmental Quality;
- The Department of Natural Resources, Office of Coastal Restoration and Management; and
- The Department of Agriculture and Forestry.

Section 2 of the Executive Order indicates that the "duties and functions of the Team shall include, but are not limited to, the following:

A. Identifying the State of Louisiana's vulnerability to hazards;
B. Reviewing existing mitigation plans and prioritizing recommendations;
C. Developing or updating Hazard Mitigation Plans required under 44 CFR Subpart M;
D. Developing a comprehensive strategy for the development and implementation of a State Mitigation Program;
E. Reviewing, assigning priority, and recommending mitigation actions for implementation, including measures to be funded under the Hazard Mitigation Grant Program or other Federal grant programs; and
F. Seeking funding for implementation of mitigation measures."

State Hazard Mitigation Planning Committee

To assist the SHMT in developing the Plan, the SHMPC was formed. The Committee consists of the SHMT plus representatives of state agencies with a perceived role in hazard mitigation[14]. The SHMPC was the body that provided the primary direction for the planning process and reviewed all milestone deliverables. In addition to the members of the SHMT (listed above), the SHMPC's members include:

- The Division of Administration, Office of Facility Planning
- The Department of Corrections
- The Department of Education
- The Department of Health and Hospitals
- The Department of Public Safety, Louisiana State Uniform Construction Code Council

State Hazard Mitigation Plan Advisory Board

To assist the SHMT and SHMPC in developing the Plan Update and in ongoing updates of future plans, the State Hazard Mitigation Plan Advisory Board (SHMPAB) was formed. This group includes representation from more than 60 state and federal agencies, professional organizations, trade groups, academic and research groups, and others who can aid in general document review and technical review of data and methodologies in this Plan Update, as well as play a long-term partnership role in outreach and education related to implementing the Plan. A full roster of the SHMPAB is contained in Volume II, Appendix C.

[13] LOHSEP became the Govenor's Office of Homeland Security and Emergency Preparedness after this EO was issued.
[14] A complete listing of the contributors to the Plan is included in the "Acknowledgements".

Federal Emergency Management Agency, Region VI

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

Consultants

The consultant for the Hazard Mitigation Plan Update was James Lee Witt Associates. The consultant assisted in a variety of ways, including:

- Developing an appropriate planning process;
- Providing technical support in performing the risk assessments;
- Developing written materials for meetings and web postings;
- Making presentations at SHMPC meetings and workshops;
- Facilitating SHMPC meetings and workshops, i.e., ensuring that discussions and products from meetings addressed Plan elements;
- Providing support for outreach to interested parties and coordination efforts among Federal and state agencies; and
- Assembling information for inclusion in the Plan.

Stakeholders

The primary audience for the Plan Update was taken into consideration at all stages and their input was solicited at various stages of the process. The term "Stakeholders" as used in the rest of this Plan Update includes the following:

- GOHSEP Regional Coordinators;
- Parish Offices of Homeland Security and Emergency Preparedness;
- Parish and local Floodplain Administrators;
- Parish and local Coastal Zone Administrators;
- Parish and local Building Officials; and
- State agencies with at-risk facilities.

The term "local" as used in this Plan includes municipalities and tribal governments[15]. While federally recognized tribes have specific rights under DMA 2000 to be recognized as the equivalent of a State for planning purposes, all of the federally recognized tribes in Louisiana participating in hazard mitigation planning have done so as participating municipalities under a Parish-level multi-jurisdictional hazard mitigation plan.

3.3 Coordination among Agencies, Stakeholders and Interested Parties

The IFR requires that the State describe how Federal and state agencies were involved in the planning process. The IFR also requires that the State describe how interested groups and individuals were involved in the planning process. For the purposes of this Plan Update, a distinction is made between Stakeholders and interested parties. As noted in Section 3.2, "Stakeholders" for this Plan Update are primarily organizations and agencies that will potentially play a direct role and/or receive a direct benefit in implementing the recommendations in the Mitigation Action Plan (Section Eight).

[15] See definition of "Local Government" in Appendix A.1

Interested parties include anyone else who could potentially benefit either directly or indirectly from the Plan Update recommendations. This primarily refers to residents, property owners and business owners in the State of Louisiana.

This subsection describes:

- the involvement of other Federal and state agencies and stakeholders; and
- the process by which GOHSEP and the SHMPC provided opportunities for interested parties to review and comment on the Plan during its development.

FEMA and the state agencies that are members of the SHMT and SHMPC had regular involvement in developing the Plan Update. GOHSEP and the SHMPC also sought participation from additional Federal and state agencies and the Plan Update Stakeholders (see Section 3.2) while developing the Plan Update. As part of this process, the participation of universities, private citizens, businesses, and non-profit and non-governmental organizations was solicited.

Outreach to Federal and State Agencies

In addition to the involvement of state agencies on the SHMT and SHMPC and the inclusion of federal and state agencies and other organizations on the Advisory Board, contacts were made with Federal and state agencies in February 2008, prior to the Video-teleconference (see below), to make them aware of the on-going planning process and to solicit their immediate involvement as reviewers of the draft Plan. The agencies included:

Federal Agencies

- US Army Corps of Engineers, Department of Defense
- US Environmental Protection Agency
- US Geological Survey, Department of the Interior
- National Oceanic and Atmospheric Administration, Department of Commerce
- Natural Resources Conservation Service, Department of Agriculture

State Agencies

- Division of Administration
- Department of Culture, Recreation and Tourism
- Department of Economic Development
- Department of Insurance
- Department of Justice
- Department of Labor
- Department of Public Safety and Corrections /Office of State Police
- Department of Public Safety and Corrections / Office of Youth Development
- Department of Revenue
- Department of Social Services
- Department of State
- Department of the Treasury
- Department of Veterans Affairs
- Louisiana State University System
- Louisiana Technical College System
- University of Louisiana System
- Louisiana State University Health Sciences Center
- Southern University System

Correspondence to the agencies also indicated the desire of GOHSEP and the SHMPC to establish long-term partnerships as part of implementing the Plan's recommendations. Copies of all relevant correspondence are included in Volume II, Appendix C.

Outreach to Stakeholders

In addition to contacts made with Stakeholders as part of the Capability Assessment (see Section Seven), correspondence similar to that sent to the Federal and state agencies was sent to all 64 parish emergency management agency directors as well as parish and community floodplain administrators, building officials and other stakeholders in January 2008, prior to the Video-teleconference (see below). A copy is included in Volume II, Appendix C.

GOHSEP Website

GOHSEP developed a detailed posting on its web site that described the purpose of the Plan and progress on its development. The web site and posting were linked to various state agency web sites. The posting was updated periodically during development of the Plan to include copies of the draft Plan and all subsequent versions in printable formats. A printed copy of the information posted on the web site is provided in Volume II, Appendix C.3. The postings each provided methods of contacting GOHSEP to ask questions about the Plan, and to provide input.

Video-Teleconference

In addition to the web postings and direct outreach to Federal, state and parish agencies and Stakeholders, GOHSEP and the SHMPC held a video-teleconference in February 2008 to explain the Plan Update to invited representatives, as well as any interested parties, to solicit comments. The video-teleconference included a short presentation on the basic elements of the Plan and then allowed ample time for discussion and comments.

The video-teleconference was staged at ten locations around the State. Sign-up sheets for all ten locations are included in Volume II, Appendix C. A representative of GOHSEP or the SHMPC was present at each of these meetings to facilitate participation and collect any written comments. Participants were given handout materials that included points-of-contact for additional questions about the Plan.

Comments received via the video-teleconference were summarized and responses provided for each comment (see Volume II, Appendix C). Appropriate changes were included in subsequent versions of the Plan. In addition, alternatives and opportunities for further involvement in the development and implementation of the Plan were identified by the SHMPC as a result of comments received during the video-teleconference (see Section Eight).

Briefings with Governor's Authorized Representative

A briefing was held by GOHSEP and the SHMT on April 11, 2008 with the Governor's Authorized Representative and Secretaries of departments that comprise the SHMT. The briefing focused on recommendations included in the Plan Update as a prelude to adoption by the GAR on behalf of the State of Louisiana. Briefing materials are included in Volume II, Appendix C.

3.4 Program Integration

The IFR requires that the State describe how its mitigation planning process is integrated with other ongoing state planning efforts as well as FEMA mitigation programs and initiatives.

This subsection describes:

- State Planning Programs; and
- FEMA Mitigation Programs and Initiatives.

State Planning Programs

A measure of integration and coordination is achieved through the participation on the SHMPC of representatives of state agencies who administer three programs; specifically floodplain management under the National Flood Insurance Program (NFIP), coastal protection and restoration under the provisions Act 8 of the First Extraordinary Session of the 2005, and the State Uniform Construction Code.

Each of these programs, and the interactions with the responsible agencies, are described in more detail in Section Seven – Capability Assessments and Volume II, Appendix G.

National Flood Insurance Program - The Department of Transportation and Development (DOTD) administers the NFIP within the State of Louisiana. The state NFIP Coordinator, who is the DOTD's representative on the SHMPC, and staff provide technical assistance visits to local municipalities to advance hazard mitigation planning concepts and advise communities how to best meet certain Community Rating System requirements. They work directly with local floodplain management officials and planners to emphasize the links among land use, comprehensive planning, and hazard mitigation planning. DOTD is also currently involved in an ongoing planning effort to develop a flood map modernization program for the State.

Coastal Protection and Restoration Authority - In response to the hurricanes of 2005, under Act 8 of the First Extraordinary Session of the 2005 State Legislature, the Louisiana Wetlands Conservation and Restoration Authority was renamed the Louisiana Coastal Protection and Restoration Authority (CPRA) and its authorization was expanded to integrate hurricane protection and coastal restoration. The CPRA is comprised of the Department of Natural Resources (DNR), DOTD, GOHSEP, and the Governor's Advisory Commission on Coastal Protection, Restoration, and Conservation, plus other state agencies, representatives of levee districts in the state's coastal zone, and selected additional parish leaders. The Act along with a subsequent Constitutional amendment also dedicated existing and future state trust fund monies (the Coastal Protection and Restoration Fund) to hurricane protection and coastal restoration. Act 8 also mandated the development of a comprehensive master coastal protection plan along with subsequent annual plans that establish clear priorities for activities and expenditures for coastal restoration and protection. A team led by staff from DNR and DOTD developed the plan, entitled *Integrated Ecosystem Restoration and Hurricane Protection: Louisiana's Comprehensive Master Plan for a Sustainable Coast*, which was approved by the Louisiana legislature in June 2007. This plan recognizes the important role of coastal restoration as an integral strategy in hurricane and flood protection and portrays the State's vision of comprehensive protection that includes structural, management, and institutional components of short- and long-term efforts. It also includes numerous large-scale projects to restore and/or stabilize shorelines, barrier islands, and navigable waterways against erosion.

Uniform Construction Code – In 2005, Louisiana adopted the Uniform Construction Code (UCC) statewide, a recommendation made in the April 2005 Plan. Although administered and enforced at the local level, the UCC is coordinated and given program support by the state Department of Public Safety. The Plan Update incorporates the UCC as a key part of the State of Louisiana Hazard Mitigation Strategy.

Levee District Consolidation – In 2006, Louisiana enacted legislation to consolidate levee boards in St. Bernard Parish, the east banks of Orleans, Jefferson, St. Charles and St. John the Baptist parishes, and the southern portions of St. Tammany and Tangipahoa parishes. A separate board was created to cover areas on the west bank of the Mississippi River. The two levee authorities are overseen by 11-member boards that are appointed by the Governor. Those boards are organized under the CPRA. The legislation called for the CPRA to "serve as the single state entity to act as local sponsor for construction, operation, and maintenance of hurricane, storm damage reduction, flood control, and coastal restoration."

In addition, GOHSEP has undertaken an ambitious Community Education and Outreach (CEO) program based on a recommendation of the April 2005 Plan. Funded under FEMA's Hazard Mitigation Grant Program (HMGP) derived from hurricanes Katrina and Rita, the CEO program includes provisions to create an interactive Hazard Analysis and Risk Assessment to provide useful hazard data and information regarding hazard mitigation planning and implementation to a broad audience including state, parish and local decision makers, business and property owners.

Finally, due largely to the impacts of hurricanes Katrina and Rita on the emergency management community, updates of the State's EOP and substantial revisions to the State's administrative procedures for Federal emergency management funding have been on-going since the approval of the April 2005 Plan. Additional revisions were initiated while this Plan Update was being developed including efforts to continue to coordinate the contents of all these documents.

Emergency Operations Plan - In the April 2005 Plan, care was taken to ensure that coordination was maintained with the parallel development of the EOP. The types of issues included in these coordination efforts ranged from seeking consistency in the way hazards are identified to identifying opportunities to integrate mitigation practices in response and recovery operations. The Interim Plan Update incorporates the entire EOP as a part of the overall State of Louisiana Hazard Mitigation Strategy. Additional on-going efforts by the SHMPC to create a comprehensive updated plan include utilizing materials from EOP Attachment 2- Hazard Identification and Risk Assessment to update and coordinate the Risk Assessments in the State of Louisiana Hazard Mitigation Plan.

Continuity of Operations Plan – The COOP was incorporated into the State of Louisiana Hazard Mitigation Strategy to specifically acknowledge that key provisions of that plan were part of the overall approach to reducing risk and the impacts of hazards. In particular, providing for redundancy of critical systems, equipment, flow of information, operations and materials was considered consistent with the overall goals and objectives of the Plan. On-going efforts by the SHMPC to better integrate these two plans will include incorporating COOP planning from other State agencies that have an influence on hazard mitigation and emergency management.

Regional and Parish-level Long-term Recovery Planning – Long-term recovery plans at the parish and regional levels that were developed in the wake of hurricanes Katrina and Rita under the aegis of FEMA's Emergency Support Function 14 – Long Term Planning and the Louisiana Recovery Authority's "Louisiana Speaks" initiative have been incorporated into the State of Louisiana Hazard Mitigation Strategy as part of this Plan Update. These plans include a number of mitigation related projects that are consistent with Goal 4 of this plan (see Section Eight). In addition, continuing plan update efforts by the SHMPC will be looking at the future redevelopment and growth policies and recommendations of these plans to ensure that future risk factors will be adequately addressed.

The Louisiana Recovery Authority (LRA) is the planning and coordinating body created in the aftermath of hurricanes Katrina and Rita to plan for the recovery and rebuilding of Louisiana. Governor Blanco created the LRA by executive order in October of 2005, and it was put in statute by the Legislature during the First Special Session of 2006. According to its original mission statement, LRA works to plan for Louisiana's future, coordinate across jurisdictions, support community recovery and resurgence, and ensure integrity and effectiveness. Working in collaboration with local, state and federal agencies, the authority is also addressing short-term recovery needs while simultaneously guiding the long-term planning process.

Due to the unprecedented magnitude of the disasters of hurricanes Katrina and Rita and the impact on the state as a whole and on local communities, the Legislature determined that recovery would require the coordination, cooperation, and services of myriad state departments, offices, and agencies, as well as other entities. Additionally, the need for coordination of funding programs was cited. LRA was therefore charged to develop and promote short-term and long-term priorities, plans, and special programs for recovery, using state resources, federal funds or other monies, including innovative financing mechanisms. It was also charged with coordinating recovery planning between state agencies, local jurisdictions, and regional planning entities. The Legislature specifically charged LRA to partner with the Coastal Protection and Restoration Authority on coastal protection and restoration efforts and on long-term planning.

LRA was given authority to establish action plans for the use of Community Development Block Grant allocations for the recovery, eventually totaling $13.4 billion, and to act in place of the SHMT for the purposes of HMGP funding pursuant to disaster declarations 1603 and 1607 (Katrina and Rita). These sources have gone towards programs to rebuild housing, infrastructure and small businesses. In addition, in January 2008, an executive order issued by Governor Bobby Jindal directed the LRA to be responsible for the state's actions with regard to FEMA's Public Assistance and Hazard Mitigation Grant Programs.

Emergency Management Accreditation Program – A number of refinements and changes were made to the State Hazard Mitigation Plan in 2007 in order to achieve EMAP compliance. These interim update changes were submitted to and approved by the State Hazard Mitigation Team in late 2007. They are all integrated in this Plan Update.

Administrative Guidelines and Procedures - A number of improvements have been instituted in the way the State of Louisiana administers important grant programs like HMGP (See Volume IV). These improvements were engineered by GOHSEP and the SHMPC at the same time as the development of the April 2005 Plan to ensure complete integration of relevant issues. Examples of improvements include:

- Establishing parish rankings for each hazard type for use by the SHMT in reviewing project grant applications; and
- Establishing efficient ways for GOSHEP to gather new information during the project application process to improve data available for mitigation planning over the long term.

FEMA Mitigation Programs and Initiatives

The previous discussion identified the integration of programs and initiatives of state agencies charged with administering the following FEMA programs and initiatives:

- National Flood Insurance Program
- Community Rating System
- Map Modernization Program

In addition, there is already a strong connection between the GOHSEP hazard mitigation planning program and the Federal DMA 2000 State and Local Hazard Mitigation Planning initiative. However, Section Eight - Mitigation Action Plan includes recommendations that will better integrate the FEMA mitigation planning initiative with GOHSEP technical support including support for:

- completing and adopting parish and municipal hazard mitigation plans;
- improving the gathering, use and sharing of data and information between the state and local governments; and
- improving local capabilities to plan and implement hazard mitigation projects.

In addition to providing leadership for state and local mitigation planning efforts, GOHSEP administers and oversees FEMA-related mitigation grant programs for the State of Louisiana that are related to hazard mitigation, emergency management and disaster relief. The organization also serves as lead agency for the State in FEMA-related disaster mitigation efforts. Due in part to the agency's dual roles, GOHSEP has the opportunity to integrate mitigation planning and project information with the FEMA grant application process for the following:

- Hazard Mitigation Grant Program
- Pre-Disaster Mitigation Competitive Grant Program
- Flood Mitigation Assistance Program
- Public Assistance Grant Program
- Severe Repetitive Loss Grant Program
- Repetitive Flood Claims Grant Program

Reduction of the state and local cost-share for federal mitigation grants is an important aspect of this Plan Update and of cost-effective floodplain management in the state of Louisiana. The FEMA Flood Mitigation Grants and Hazard Mitigation Planning Interim Final Rule contains the following guidance regarding increasing the federal share of Flood Mitigation Assistance (FMA) or Severe Repetitive Loss (SRL) funding from 75% to 90%:

"A State may request the reduced cost share authorized under § 79.4(c)(2) of this chapter for the FMA and SRL programs, if it has an approved State Mitigation Plan meeting the requirements of this section that also identifies specific actions the State has taken to reduce the number of repetitive loss properties (which must include severe repetitive loss properties), and specifies how the State intends to reduce the number of such repetitive loss properties. In addition, the plan must describe the strategy the State has developed to ensure that local jurisdictions with severe repetitive loss properties take actions to reduce the number of these properties, including the development of local mitigation plans."[16]

The aforementioned required elements for increasing federal matching funds can be found in the Plan Update in the following locations:

- "(S)pecific actions the State has taken to reduce the number of …. severe repetitive loss properties": see Section 4.4 under "Flood" hazard profile information regarding GOHSEP's efforts to provide current repetitive and severe repetitive loss data to parishes and communities; Section 7.2, especially Table 7-4 and accompanying text regarding progress in recent years to mitigate repetitive and severe repetitive loss properties; Section 9.2 under "Technical Assistance for Parish and Municipal Mitigation Planning" regarding the emphasis placed on identifying viable mitigation alternatives for repetitive and severe repetitive loss properties as part of the Planning Pilot Grant Program; Section 9.4 regarding setting priorities for hazard mitigation projects as described under "Jurisdictions with Repetitive and Severe Repetitive Loss Properties; and Section 10.4 regarding tracking progress specifically for mitigation of repetitive and severe repetitive loss properties.
- "Specif(y) how the State intends to reduce the number of such repetitive loss properties": see Section 8.5, Table 8-2, Goal 2.1 (Action C.iii); Goal 2.2 (Action D.iii); Goal 4.1 (Action H.i); and Goal 4.2 (Action I);
- "Describe the strategy the State has to ensure that local jurisdictions with severe repetitive loss properties take actions to reduce the number of these properties, including the development of local mitigation plans": See Section 8.4, Table 8-1, Goal 3.1; Section 8.5, Table 8-2, Goal 3.1 (Action E.iv); Section 9.4 and Section 10.4.

As noted in the previous section on state programs, GOHSEP updated and upgraded administrative procedures in 2005 including improvements to the information available to GOHSEP staff, SHMPC members and potential applicants for these Federal programs (See Volume III – State of Louisiana Hazard Mitigation Program and Volume IV – State of Louisiana Administrative Guidelines and Procedures). Since that time, portions of Volume IV have been updated and a thorough update of the document is anticipated to be undertaken in 2008.

[16] *Federal Register* 72:210 (October 31, 2007), § 201.4(c)(3)(v).

Section Four
Hazard Identification and Profiles

Contents of this Section

4.1 Interim Final Rule Requirements for Hazard Identification and Profiles

4.2 Environment

4.3 Hazard Identification

4.4 Hazard Profiles

4.5 Hazard Priorities

4.1 Interim Final Rule Requirements for Hazard Identification and Profiles

Requirement §201.4(c)(2) of the Interim Final Rule (IFR) states that "[the State plan must include a risk assessment] that provides the factual basis for activities proposed in the strategy portion of the mitigation plan." The IFR includes two specific requirements for identifying and profiling natural hazards:

- Hazard Identification per Requirement §201.4(c)(2)(i): "[The State risk assessment shall include an] overview of the type … of all natural hazards that can affect the State …."
- Hazard Profiles per Requirement §201.4(c)(2)(i): "[The State risk assessment shall include an overview of the] location of all natural hazards that can affect the State, including information on previous occurrences of hazard events, as well as the probability of future hazard events, using maps where appropriate …"

4.2 Environment

Political Divisions

The major political sub-unit in the State for the purposes of emergency management and hazard mitigation is the parish (the equivalent of a county), of which there are 64 (see Map 4-1). Section Seven of this Plan Update includes a discussion of capabilities at the Parish level and how they relate to regional and state resources. The remainder of this subsection describes the physical geography and climate of the State.

Physical Geography

Louisiana is situated entirely within the southern margin of the physiographic region of the United States that is referred to as the Gulf Coastal Plain. Relief is relatively slight across the State. Although the divisions are not always distinct, the State can be described as having three major physiographic regions: hills, terraces, and lowlands.

Louisiana's hill country is located north and west of a line running from Leesville to Jena to Monroe (see Map 4-1). Elevations here are the highest in the state—topping 500 feet—and contain the oldest geology. Roads and settlements are located on the divides between the narrow river valleys, except along the 10- to 15-mile-wide Red River Valley. The lower, shallower terraces sit south of Louisiana's hills, and are more recent formations resulting from glacial-age alluvial deposits. Louisiana has two major terrace zones (orange dotted lines): (1) the Florida parishes and (2) across southwest Louisiana, just inland from the Gulf of Mexico. The lowlands are comprised of river floodplains and marsh lying south of the terraces.

The lowlands include two major components: (1) the Chenier Plain of southwest Louisiana and (2) the Deltaic Plain, which includes the Atchafalaya basin and almost everything south and east of metro Baton Rouge, including metro New Orleans and Houma/Thibodaux. Except along natural or artificial river levees, relief is very slight in the lowlands, and elevation is low, rarely above 20 feet, and in some cases below sea level. Throughout the lowlands, flooding is caused by varying combinations of riverine and coastal effects including overflow or backwater flooding from the Mississippi and Atchafalaya Rivers, their tributaries and other waterways throughout the state, as well as high tides and storm surges from tropical storms in the Gulf of Mexico. As a result, flooding in this part of the State can inundate the entire coastal zone and is difficult to attribute to one specific cause.

Due to the risk of flood from various sources, large-scale development of significant portions of South Louisiana has only been possible through the construction of a combination of levees, flood walls, and forced drainage systems. As a result of levees built along major rivers that cut the rivers off from their distributaries, floods in South Louisiana are now rarely caused by high water on major river systems. Rather, local or regional rainfall events or tidal flooding are more common causes. Subsidence, coastal land loss, and poorly planned development have exacerbated the problems.

Additionally, reliance on levees, flood walls, and forced drainage carries its own set of risks. As hurricanes Katrina and Rita showed, levees and floodwalls can fail. During an extreme rain event, or the failure or overtopping of a levee or flood wall, there is also the subsequent risk of forced drainage system failure. This may result from water volume exceeding pump capacity, or from pump failure due to mechanical failure or power interruption.

Climate

Maritime air masses originating over the Gulf of Mexico, coupled with Louisiana's sub-tropical latitude and minimal elevations, combine to produce the State's characteristic warm and humid climate. Average annual temperatures range from the mid- to upper-60°s Fahrenheit (F) across the State. Louisiana's statewide precipitation average of approximately 58 inches is one of the highest in the country. The highest precipitation totals are in the southeast part of the state. Moreover, annual precipitation has been above normal for the past 15 years.

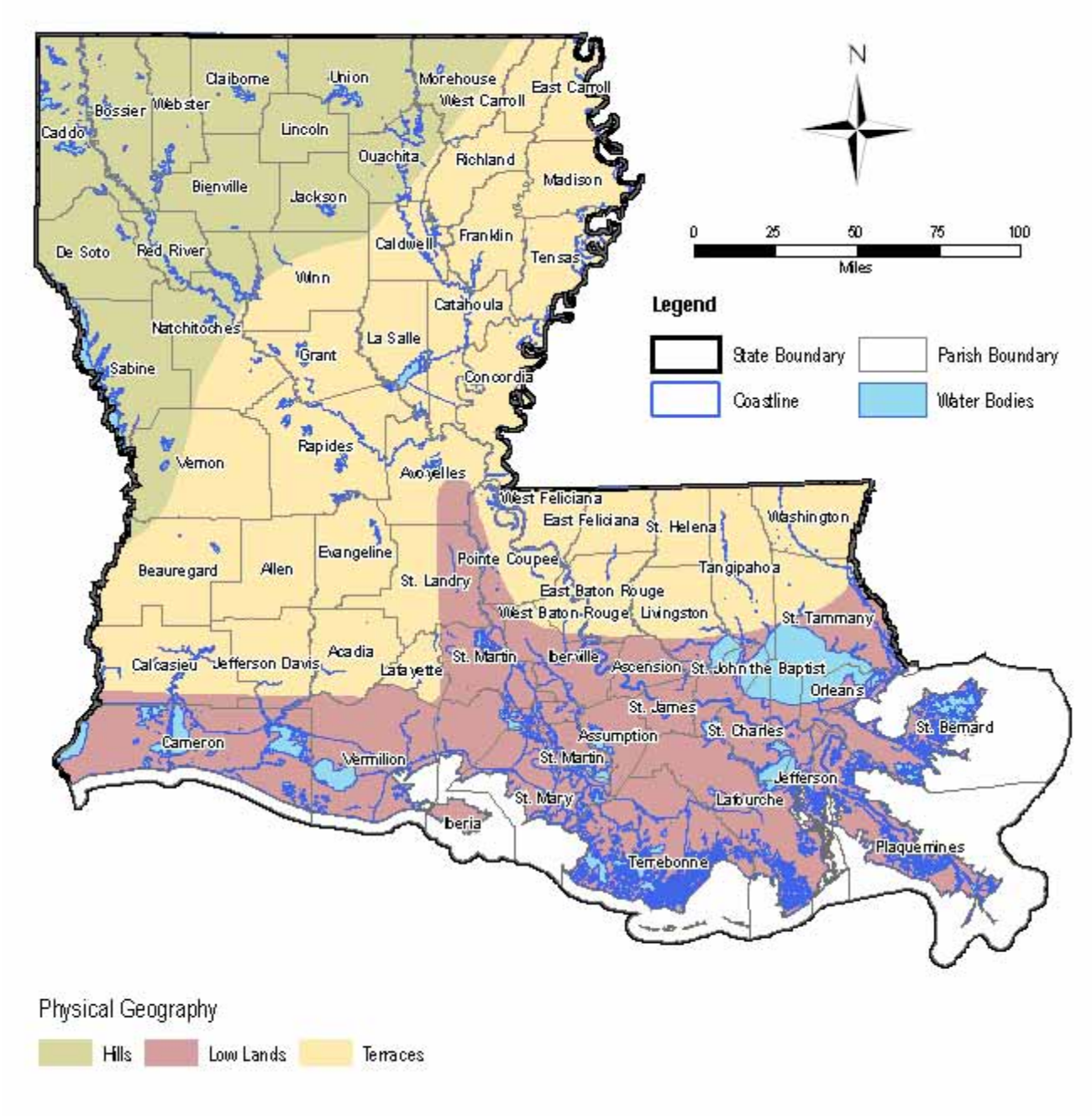
During the spring (March-May) temperatures warm faster over Louisiana than inland areas, creating surface fronts that spawn frequent rain and severe thunderstorms. High winds, large hail, lightning and tornadoes are not uncommon. Rainfall totals can exceed 10 inches over a few days. Soils tend to be near-saturation at this time of year and spring is typically the period of maximum stream-flow. Collectively, these characteristics increase the potential for high water throughout the State, and low-lying, poorly drained areas are particularly subject to flooding during these months.

In summer (June-August), warm and moist air from the Gulf results in a consistent climate regime. Daytime highs generally range from 85° F to 95° F. Frontal systems are infrequent, but the steady inflow of moist, unstable Gulf air masses promotes frequent development of showers and thundershowers, particularly across the southern parishes. Severe weather events tend to be somewhat less frequent and less violent than in spring. Tornadic activity is greatly diminished, particularly over the southern half of the State. Drought is also possible in the summer, as weak high pressure can inhibit the development of convective showers for weeks. Summer also marks the start of the Atlantic tropical cyclone season, and Louisiana is susceptible to systems fueled by the warm waters in the Gulf.

Autumn (September-November) is a period of moderating temperatures. Tropical storm activity reaches its peak at this time of year, but the duration of such events tends to only be a few days. Also, in the periods between tropical storms, daytime humidity tends to be somewhat lower than other times of the year. There is minimal contact between continental and Gulf air masses in the autumn, creating weak frontal activity that produces little or no rainfall. Autumn is the driest season of the year for Louisiana.

Louisiana winters (December-February) are characterized by a strong thermal gradient across the State—northern Louisiana is on average 10 degrees colder than the south. Cold Canadian air can reach into the State, and at least one freeze per season is typical except on the extreme coastal margins. Such freezing events seldom last for longer than a week, even in north Louisiana. Most precipitation arrives as rain, but modest accumulations of snow do occur, particularly in the north. Freezing rain and ice storms can create significant problems across the State.

Map 4-1: Political Divisions and Physical Geography - State of Louisiana



4.3 Hazard Identification

The State of Louisiana has suffered significant loss of life, injury and property damage from natural hazards. The State has the fifth highest number of declared disasters in the United States, with 50 Presidential Disaster Declarations since 1965 (see Table 4-1 below). Hurricanes, floods, and tornadoes, among other hazards, have challenged Louisiana to develop ways to reduce future damages from hazards.

Table 4-1: Disaster History 1965 - 2007

Declaration Details			Type of Assistance (# of Parishes)[17]		
DR Number	Date	Type	Individual (IA)	Public (PA)	Both IA & PA
208	09.10.65	H	-	-	53
272	08.18.69	H	-	-	5
315	10.13.72	H	-	-	21
374	04.27.73	SS, F	-	-	38
418	02.23.74	F	-	-	6
448	09.23.74	H	-	-	10
450	11.01.74	SS	-	-	1
3011	04.09.75	H, R, F	-	-	7
470	05.19.75	H, R, T	-	-	12
3031	01.31.77	D, F	-	-	34
534	05.02.77	SS, F	-	-	8
556	05.09.78	SS, F	-	-	4
565	09.20.78	SS, F	-	-	2
567	12.06.78	SS, T	-	-	2
584	05.02.79	SS, F	-	-	10
604	09.25.79	SS, F	-	-	3
616	04.09.80	SS, F	-	-	12
622	05.21.80	SS, F	-	-	6
675	01.11.83	SS, F	-	-	19
679	04.20.83	SS, F	-	-	12
3090	05.15.84	SS, T	-	-	1
728	10.31.84	SS, F	-	-	4
752	11.01.85	H	-	-	14
804	11.30.87	H, R, T	10	-	-
829	06.16.89	SS, F	18	-	10
833	06.20.89	H, R, T	8	-	-
835	08.28.89	SS, F	12	-	7
849	11.19.89	H, R, F	3	-	-
902	04.15.91	S, F	11	-	3
904	04.29.91	F	9	-	28
956	08.25.92	H	-	-	36
978	02.02.93	SS, F	9	-	-
1012	02.28.94	W	-	-	8
1049	05.08.95	R, F	5	-	7
1169	01.12.97	W	-	-	3
1246	09.09.98	H	3	-	16
1264	12.23.98	W	-	18	-
1269	04.03.99	T	1	-	4
1314	01.27.00	W	-	6	-

[17] Individual Assistance (IA) and Public Assistance (PA) are disaster relief programs administered by the Federal Emergency Management Agency (FEMA) and are defined in more detail in Volume II, Appendix A.2.

Declaration Details			Type of Assistance (# of Parishes)[17]		
DR Number	Date	Type	Individual (IA)	Public (PA)	Both IA & PA
1357	12.11.00	W	-	8	-
1380	06.05.01	F	-	3	21
1435	09.21.02	TS	3	-	13
1437	10.03.02	H	1	7	36
1521	05.12.04	F	9	-	-
1548	09.13.04	H	-	8	18
1601	08.23.05	TS	0	5	0
1603	08.29.05	H	-	33	31
1607	09.24.05	H	-	41	23
1668	11.02.06	SS, F	2	2	15
1685	02.23.07	SS, T	3	-	-

Source: FEMA, 2007

Explanation for Declaration Type				
	D	Drought	SS	Severe Storm
	F	Flood	T	Tornado
	H	Hurricane	TS	Tropical Storm
	R	Rain/Storm	W	Winter Storm

In 2003, with the support of the Federal Emergency Management Agency (FEMA), the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) developed the *State of Louisiana Hazard Profiles* (Profiles). Much of the hazard profile information included in the April 2005 Plan was adapted from that document. Where appropriate, the information from the April 2005 Plan has been revised in this Plan Update (see Section 4.4). Additional material from the Profiles is contained in Volume II, Appendix D and specific references are included in Volume II, Appendix B. The Profiles were an important first step toward developing a comprehensive plan for damage prevention. As required by Federal regulations under the Disaster Mitigation Act of 2000 (DMA 2000), the Profiles contain an overview of the natural hazards that can affect Louisiana.

The Profiles also exceeded the DMA requirements by including a number of manmade hazards. In this report, natural hazards include those caused by naturally occurring climatological, geological, hydrologic, or seismic events, while manmade hazards include those created or heavily influenced by human actions.

The Profiles present information on the likelihood of occurrence, possible magnitude or intensity, areas of the State that can be affected (maps are included where appropriate), and conditions that influence the manifestation of the hazard. This information provided the basis for assessing the State's vulnerability to hazards, in terms of casualties and property damage, and provided direction for setting mitigation priorities in the Plan Update. The hazards contained in the Profiles were selected in part from a comprehensive list of hazards found in the 1997 "*Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy*" by FEMA. The Profiles helped to eliminate from further consideration hazards that are not likely or significant threats to Louisiana (e.g., Landslide, Snow Avalanche, Tsunami and Volcano).

Table 4-2 lists the broad range of hazards identified and evaluated for this Plan Update and describes the results of the preliminary investigation.

Table 4-2: Disposition of Hazards Evaluated in Preliminary Investigation

Identified Hazard (occurred historically in the State)	Comments	Hazards Profiled in Plan Update (1)
Natural Hazards		
Coastal Erosion	Large scale mitigation actions and programs to address this hazard are currently under the auspices of the Coastal Protection and Restoration Authority (see discussion under "Coordination with State Planning and Implementation Efforts regarding Coastal Erosion" on page I-35). The impacts of coastal erosion at the parish and municipal level are addressed under other hazards including storm surge and flooding. (2)	-
Dust Storm	Not considered a significant statewide threat by the State Hazard Mitigation Planning Committee (SHMPC) in comparison to other hazards and therefore is not profiled at this time.	-
Drought	-	Drought (3)
Earthquake	-	Earthquake (3)
Expansive Soil	Not considered a significant statewide threat by the SHMPC in comparison to other hazards and therefore is not profiled at this time.	-
Flood – Coastal	The effects of coastal flooding are considered under Flood and Storm Surge.	-
Flood - Riverine	-	Flood
Fog	Not considered a significant statewide threat by the SHMPC in comparison to other hazards and therefore is not profiled at this time.	-
Hailstorm	-	Hailstorm (3)
High Wind - Hurricane	-	High Wind – Hurricane
High Wind - Tornado	-	High Wind – Tornado
Hurricane / Tropical Cyclone	The effects of Hurricanes and Tropical Cyclones are considered under Flooding, High Wind-Hurricane, and Storm Surge.	-
Ice Storm	-	Ice Storm
Land Loss	Large scale mitigation actions and programs to address this hazard are currently under the auspices of the Coastal Protection and Restoration Authority (see discussion under "Coordination with State Planning and Implementation Efforts regarding Coastal Erosion". (2)	-
Lightning	-	Lightning (3)
Sea Level Rise	This hazard is currently addressed by other agencies (CPRA, USACE). (2)	-
Severe Summer Weather / Extreme Heat	-	Severe Summer Weather / Extreme Heat (3)
Severe Winter Weather / Extreme Cold	-	Severe Winter Weather / Extreme Cold (3)
Storm Surge	-	Storm Surge

Identified Hazard (occurred historically in the State)	Comments	Hazards Profiled in Plan Update (1)
Subsidence	-	Subsidence
Tornado	The effects of Tornadoes are considered under High Wind - Tornado.	-
Wildfire	-	Wildfire
Manmade Hazards (4)		
Dam Failure	-	Dam Failure
Levee Failure	-	Levee Failure
Hazardous Material Incident	-	Hazardous Material Incident
Natural Biohazard Incident	This hazard is currently addressed by other agencies (DEQ, DHH). (2)	-
Nuclear Facility Incident	This hazard is currently addressed by other agencies. (2)	-

Notes re: Table 4-2:

(1) Hazards considered significant enough threats that also lend themselves to attainable mitigation actions.
(2) For more on the integration of hazard mitigation and other emergency-management programs in Louisiana, see Section 8.3.
(3) Based on the results of the Profiles, this hazard is either not considered significant by the State Hazard Mitigation Planning Committee (SHMPC) in comparison to the other profiled hazards or the extent to which the hazard can be mitigated via existing hazard mitigation programs administered by GOHSEP is very small. Therefore, technical risk assessments are not included for these hazards in Sections Five and Six. However, these hazards are referenced in the Mitigation Action Plan (see Section Eight) as part of action items focused on public and state agency awareness as well as recommended practices for mitigation (see Volume II, Appendix H).
(4) Only accidental occurrences of manmade hazards are considered as part of the Plan Update. Although many natural hazards affecting Louisiana are either exacerbated by manmade actions or have manmade components or factors, the hazard effects that must be mitigated present themselves through essentially natural processes. Such human-impacted natural hazards include sea level rise, coastal land loss, subsidence, wildfire, storm surge, and other flood events.

As a result of GOHSEP and SHMPC's consideration of their relative impacts, 10 of the 16 hazards profiled in this document posed a threat that was considered significant enough to warrant formal risk assessments in this Plan Update.

Natural hazards:

- Flood
- High wind – Hurricane
- High wind - Tornado
- Ice storm
- Storm surge
- Subsidence
- Wildfire

Manmade hazards:

- Dam failure
- Levee failure
- Hazardous material incident

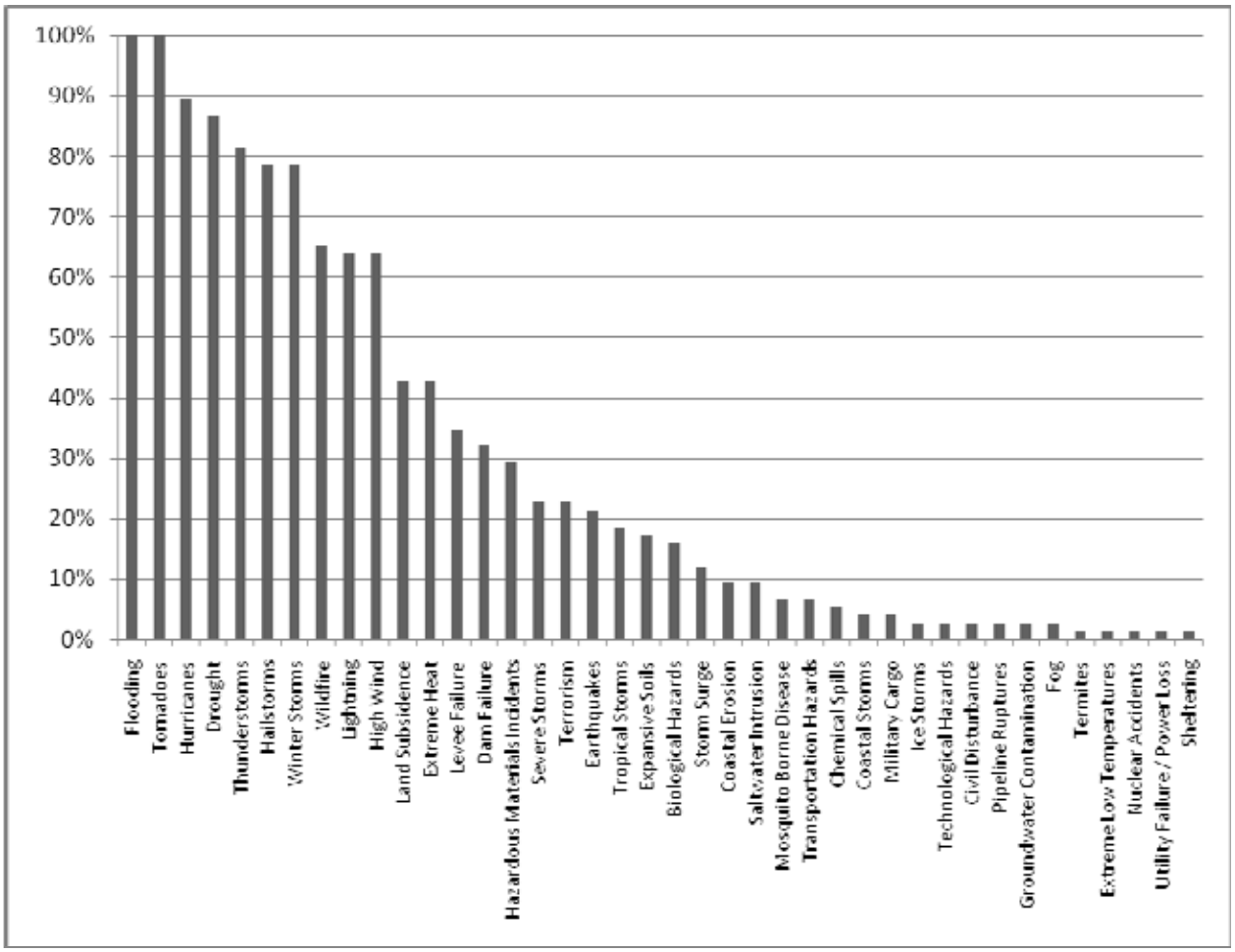
GOHSEP and SHMPC consider these hazards to be the most prevalent in Louisiana, based on recent disaster history in the State and the exposure of its residents, property owners, and State-owned and operated facilities.

Correlation with Parish and Municipal Hazard Mitigation Planning Efforts

The State is required to incorporate "local" risk assessment and hazard mitigation strategies into this Plan Update.[18] The following is a summary of hazards identified in parish and municipal hazard mitigation plans and a comparison between the parish and municipal findings and the State finding of prevalent hazards as listed above.

Parish and municipal FEMA-approved Hazard Mitigation Plans (HMPs) address 40 identified hazards. These hazards do not necessarily match up with definitions used in the Plan Update, nor do they match up across all parish and municipal hazard mitigation plans. Figure 4-1 shows the hazards identified in parish and municipal plans, and the frequency with which they appear.

Figure 4-1: Frequency of Hazards Identified in Parish and Municipal HMPs



Source: Analysis of Parish and Municipal HMPs, 2007

[18] For the purposes of this Plan Update, the phrase "parish and municipal" are used in place of the word "local".

Most of the prevalent hazards identified in parish and municipal HMPs are addressed directly in the Plan Update, either using the same hazard-identification terminology used in parish and municipal HMPs, or using comparable hazard-identification terminology. Table 4-3 shows which hazards identified in parish and municipal HMPs are addressed directly in the Plan Update, and the relevant hazard identified in the Plan Update. Asterisks (*) mark hazards that appear in 30 or more parish and municipal HMPs.

Table 4-3: Comparison of Hazards Identified in Parish/Municipal HMPs and Plan Update

Hazard Identified in Parish / Municipal HMPs	Relevant Hazard Identified in Plan Update
Flooding*	Flood
Hurricanes*	
Coastal Storms	
Hurricanes*	High wind (Hurricane)
High Wind*	
Coastal Storms	
Tornadoes*	High wind (Tornado)
High Wind*	
Winter Storms*	Ice storm
Ice Storms	
Hurricanes*	Storm surge
Storm Surge	
Coastal Storms	
Land Subsidence*	Subsidence
Wildfire*	Wildfire
Levee Failure	Levee failure
Dam Failure	Dam failure
Hazardous Materials Incidents*	Hazardous Material Incident
Transportation Hazards	
Chemical Spills	
Military Cargo	
Pipeline Ruptures	
Nuclear Accidents	

Source: Analysis of Parish and Municipal HMPs, 2007

Note: Some hazards appear multiple times in the above table. This is because some hazards identified in parish and municipal HMPs (for example, “hurricane”) result in several identified hazards treated in the Plan Update (“flood,” “high wind,” “storm surge”).

Some hazards identified in parish and municipal HMPs are not directly addressed in the Plan Update. Generally, these hazards appear in a small number of parish and municipal plans. There are three basic reasons why the Plan Update does not directly address mitigation for these hazards.

- These hazards may have profiles that lead to similar mitigation measures as hazards that are addressed directly by the Plan Update
- These hazards may be sufficiently addressed by another state or federal agency or entity, or
- These hazards may have been deemed by the SHMPC to not be among the most serious threats to the state.

Table 4-4 shows which parish and municipally identified hazards are not given a full treatment in the Plan Update, and why. Asterisks (*) mark parish and municipally identified hazards that appear in 30 or more local HMPs.

Table 4-4: Parish and Municipally Identified Hazards not Addressed in Plan Update

Parish and Municipally Identified Hazard	Explanation for Lack of Treatment in Plan Update
Thunderstorms*	Hazards have profiles that are similar to hazards addressed in the Plan Update.
Severe Storms	
Tropical Storms	
Terrorism	Hazards are primarily addressed by other state or federal entities (including Louisiana Coastal Protection and Restoration Authority, U.S. Army Corps of Engineers, Louisiana Department of Natural Resources, Louisiana Department of Transportation and Development, GOHSEP, Louisiana National Guard, Louisiana Department of Health and Hospitals, Louisiana Department of Social Services, etc.). In the case of coastal erosion, large scale actions and programs to mitigate this hazard are currently under the auspices of the Coastal Protection and Restoration Authority (see discussion under "Coordination with State Planning and Implementation Efforts regarding Coastal Erosion" on page I-35). However, the Plan Update does include recommendations for small-scale coastal erosion problems that may be identified in parish or municipal hazard mitigation plans in Appendix H.1.
Civil Disturbance	
Sheltering	
Technological Hazards	
Coastal Erosion (large scale impacts and projects)	
Saltwater Intrusion	
Biological Hazards	
Mosquito Borne Disease	
Drought*	Hazards are profiled in Plan Update Hazard Identification (Section 4), but not deemed among the ten most serious threats for consideration in the Statewide Risk Assessment (Section 5) or the State-Owned Facilities Risk Assessment (Section 6).
Hailstorms*	
Lightning*	
Extreme Heat*	
Earthquakes	
Expansive Soils	
Groundwater Contamination	
Fog	
Termites	
Extreme Low Temperatures	
Utility Failure / Power Loss	

Source: Analysis of Parish and Municipal HMPs, 2007

Coordination with State Planning and Implementation Efforts regarding Coastal Erosion

This update to the State Hazard Mitigation Plan does not address coastal erosion per se as a stand-alone hazard. Rather, this Plan Update defers to and specifically supports the integrated, coordinated, ongoing and incrementally funded effort at the State and federal levels to address coastal land loss in south Louisiana through comprehensive coastal protection. This decision reflects the magnitude and complexity of coastal erosion and related coastal land loss issues and is consistent with parish hazard mitigation plans.

Statewide, efforts to stem and reverse land loss are guided by the Coastal Protection and Restoration Authority's *Integrated Ecosystem Restoration and Hurricane Protection: Louisiana's Comprehensive Master Plan for a Sustainable Coast* ("CPRA Master Plan") which was approved by the Legislature in 2007 as the official roadmap for coastal protection and restoration in Louisiana and incorporated into the *State of Louisiana Hazard Mitigation Strategy* in 2007 (see Section 1.3 on page I-6). As a result, the CPRA Master Plan is considered part of the Plan Update to address all issues concerning coastal erosion.

Coastal Erosion and Land Loss in Louisiana

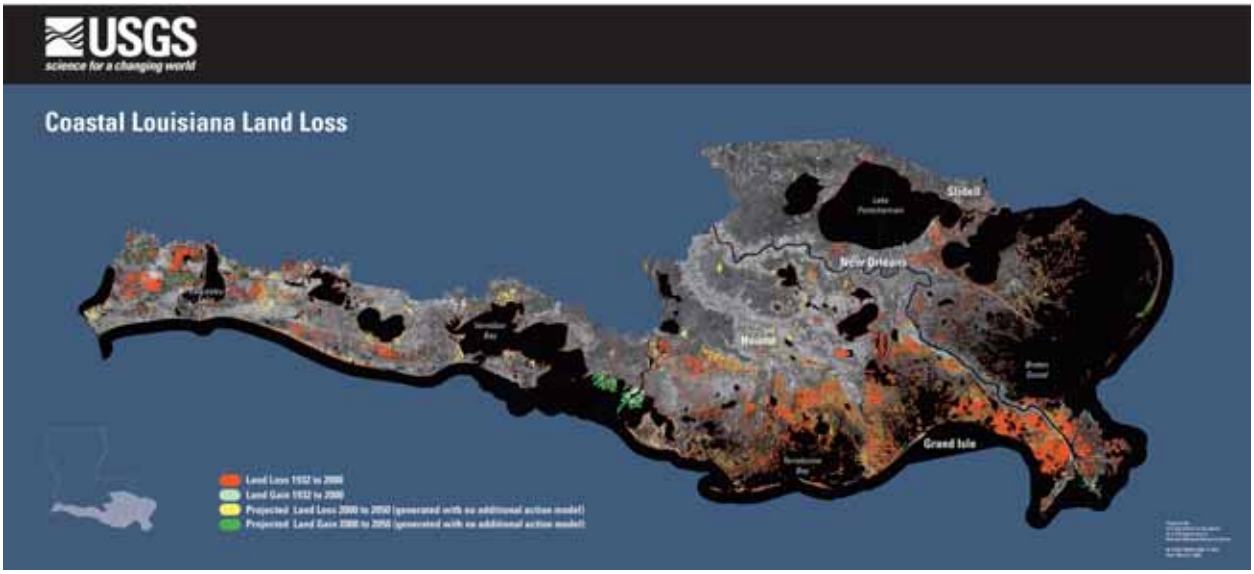
Louisiana's Gulf coast is unlike most coastlines in the United States. Most of Louisiana's coastline lies in the Deltaic Plain east of Vermilion Bay and is comprised of wetland that lacks a distinct coastline, but instead gradually and unevenly transitions from freshwater wetland systems to brackish water wetland, then to saltwater wetland, and eventually to open water. This region is rimmed by a fragile and intermittent necklace of barrier islands. With the single exception of the barrier islands comprising Port Fourchon and Grand Isle (pop. 1,541), Louisiana's southeastern coast is entirely uninhabited.

West of Vermilion Bay lays the Chenier Plain, which exhibits sandy/marshy shores with wetlands to the rear. This geography is similar to shorelines elsewhere in the United States, but unlike many of them, it is very sparsely inhabited. The towns of Cameron (pre-Rita pop. 1,965) and Holly Beach (pre-Rita pop. 300) are among the few year-round communities.

In these areas, as well as in Port Fourchon and Grand Isle, coastal erosion per se does represent a risk, but relatively low population and numbers of built assets make the direct impacts of coastal erosion appear deceptively small. In reality, throughout the coastal region of Louisiana, land loss is a huge and complex problem.

As shown in Figure 4-2, from 1932 to 2000, Louisiana lost approximately 1,900 square miles of coastal land – the equivalent of the state of Delaware. In a no-action scenario, projections indicate that the State would lose 700 additional square miles by 2050 – the equivalent of the entire greater Washington, D.C.-Baltimore metro area.

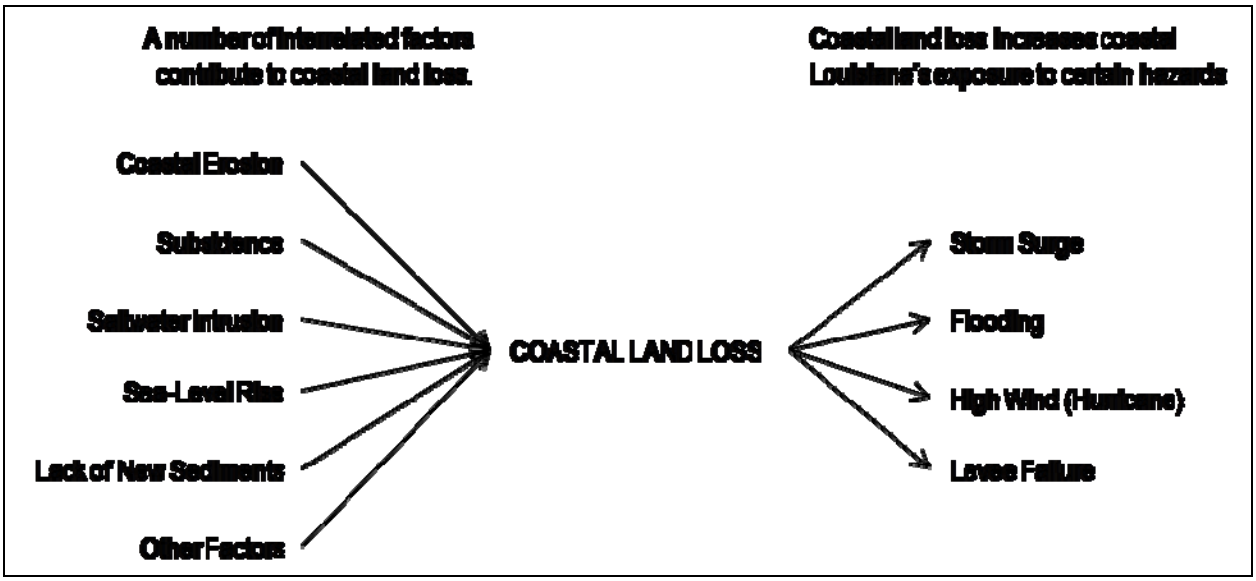
Figure 4-2: Coastal Louisiana Land Loss and Gain, 1932-2000 and 2000-2050 (Projected)



Source: J. Barras et al, "Historical and Projected Coastal Louisiana Land Changes: 1978-2050." USGS Open-File Report 03-334.

Land loss at this scale decreases the distance between open water and major population centers in south Louisiana – including metro New Orleans and the Houma-Thibodaux areas. The removal of land and wetland between the Gulf and these communities increases their exposure to hazards including hurricane-generated winds and storm surge, and also increases the risks of hazards such as flooding and levee failure (see Figure 4-3).

Figure 4-3: Coastal Erosion as an Element of Coastal Land Loss



Source: James Lee Witt Associates

CPRA's Master Plan

The CPRA Master Plan relies on decades of sound scientific analysis and modeling to derive its hazard identification, risk assessment, mitigation program, action plan, and project lists. The document states, "*The Master Plan offers … a snapshot of current thinking about coastal protection and restoration. The planning team based its recommendations on ideas that have been widely circulated and discussed as part of Louisiana Coastal Area activities, previous hurricane protection initiatives, and other efforts. The planning team did not start from scratch, but rather attempted to take well-established ideas about flood control and coastal restoration to a new level*."[19] An extensive source list for the CPRA Master Plan is available on pp. 115-116 of that document.

The CPRA Master Plan is based on an assumption that all the contributing factors to *coastal land loss,* rather than *coastal erosion,* must be mitigated. Given the limited population and assets directly threatened by coastal erosion, erosion mitigation assessed in isolation might not satisfy cost-effectiveness criteria. Some areas that are essential for the protection and restoration of coastal Louisiana – the Chandeleur Islands, for example – are completely uninhabited. The indirect threat from coastal erosion and other contributing factors to land loss is immense. Erosion itself is exacerbated by hurricane storm surge and other severe weather making coastal erosion part of a negative feedback loop that must be engaged in a systematic, integrated manner.

Land loss must be approached in an integrated manner that addresses its various causes simultaneously. This must be done at a scale that is typically beyond the programmatic and funding capacity of the sources primarily addressed in this Plan Update.

For all of the reasons stated above, this Plan Update defers to and supports the CPRA Master Plan as the Plan Update "annex" for coastal erosion. The CPRA Master Plan operates at a large scale, with an integrated program, high levels of inter-agency and intergovernmental coordination, and high levels of expected funding.

Projects identified in the CPRA Master Plan that specifically address coastal erosion are described in Table 4-5.

Table 4-5: Coastal Erosion Mitigation Projects Identified in the CPRA Master Plan

Shoreline Restoration	Shoreline Stabilization	Navigable Waterway Stabilization
▪ Chandeleur Islands	▪ East Orleans land bridge	▪ MRGO
▪ Barataria Basin	▪ Lake Pontchartrain south shore	▪ Gulf-Intracoastal Waterway
▪ Terrebonne Basin	▪ Biloxi land bridge and barrier reefs	▪ Houma Navigation Canal
▪ Point au Fer Island	▪ MRGO-Lake Borgne land bridge	▪ Freshwater Bayou
▪ Freshwater Bayou to South Point/ Marsh Island	▪ Lake Maurepas land bridge	
▪ Sabine River to Calcasieu River	▪ Grand Isle and vicinity	
▪ Calcasieu River to Freshwater Bayou	▪ Southwest Pass	
	▪ Vermilion Bay	
	▪ East and West Cote Blanche bays	
	▪ Grand Lake shoreline	
	▪ White Lake shoreline	
	▪ Calcasieu Lake shoreline	
	▪ Sabine Lake Shoreline	

Source: CPRA Master Plan

[19] CPRA Master Plan, p. 18.

Additionally, Louisiana Department of Natural Resources (DNR) and Louisiana Department of Transportation and Development (DOTD) are now proceeding with a number of coastal protection projects within the framework of the CPRA Master Plan. These projects are consistent with the CPRA Master Plan and thus with the hazard mitigation priorities described in this Plan Update. See Volume II, Appendix D.1 for a list of DNR projects and a letter certifying that all DNR coastal protection projects are consistent with the CPRA Master Plan.

It is a basic assumption in this Plan Update that small-scale mitigation of coastal erosion can only be effective if it is integrated with larger efforts that are focused on mitigating storm surge, flooding, hurricane wind, and levee failure. These hazards are assessed, and mitigation actions for them described, in the remaining sections of this Plan Update. However, this Plan Update does provide recommended practices for the implementation of targeted, small-scale erosion-mitigation projects in Volume II, Appendix H.2.

Coastal Erosion in Parish Hazard Mitigation Plans

This Plan Update's treatment of coastal erosion is consistent with local Hazard Mitigation Plans in Louisiana. Coastal erosion does not consistently appear as a hazard in the Hazard Mitigation Plans of coastal parishes, and when it does, the quality and specificity of that treatment varies widely. Moreover, only one parish identifies what may be described as local mitigation actions in its hazard mitigation plan; due to the scale of the hazard, most parishes' mitigation plans for coastal erosion rely almost entirely on state or federal action.

As Table 4-6 shows, only seven parishes included coastal erosion in their parish Hazard Mitigation Plans, although nine parishes lie along the Gulf of Mexico, and eight have shoreline along flood- and surge-prone lakes Borgne, Pontchartrain, or Maurepas.

Table 4-6: Inclusion of Coastal Erosion as a Hazard in Coastal Parishes' Hazard Mitigation Plans

Parish	On the Gulf of Mexico	On Lakes Borgne, Pontchartrain, and/or Maurepas	Coastal Erosion Addressed in Parish Plan
Cameron	X		X
Iberia	X		X
Jefferson	X	X	
Lafourche	X		X
Livingston		X	
Orleans		X	
Plaquemines	X		X
St. Bernard	X	X	
St. Charles		X	X
St. John the Baptist		X	
St. Mary	X		X
St. Tammany		X	
Tangipahoa		X	
Terrebonne	X		
Vermilion	X		X

Source: Analysis of Parish Hazard Mitigation Plans

A qualitative analysis of the specific treatments of coastal erosion in parish Hazard Mitigation Plans demonstrates that the definition of coastal erosion as a hazard is not consistent, and that the vast majority of parishes deem coastal erosion to be beyond their ability to mitigate (see Table 4-7). Several parishes defined coastal erosion as being coterminous with subsidence and sea-level rise. In many cases proposed mitigation actions aimed at coastal erosion were not specific to erosion per se, instead were generally designed to mitigate the effects of flooding or wetland loss. (For more detail on the treatment of coastal erosion in parish Hazard Mitigation Plans, see Volume II, Appendix D.1).

Table 4-7: Specific Treatment of Coastal Erosion in Coastal Parishes' Hazard Mitigation Plans

Parish	Direct Local Mitigation Actions Proposed	Indirect Local Mitigation Actions Proposed (planning, SRL, wetland restoration, etc.)	Support for and/or Coordination with State/Federal Actions Proposed
Cameron			X
Iberia	X		
Lafourche		X	X
Plaquemines		X	X
St. Charles		X	X
St. Mary			X
Vermilion			

Source: Analysis of Parish Hazard Mitigation Plans

In cases in which mitigation actions specifically aimed at erosion were cited, parishes generally proposed supporting and/or coordinating with efforts at the state and/or federal level, or working with neighboring parishes to provide unified project lists to state and federal agencies. Only one parish (Iberia Parish) specifically cited local projects in their Hazard Mitigation Plan. The projects cited in the Iberia Parish plan are specifically enumerated in the CPRA Master Plan. This State Hazard Mitigation Plan Update's deference to and support for the CPRA Master Plan is therefore completely consistent with local Hazard Mitigation Planning priorities.

In cases where erosion-mitigation projects are not described in the CPRA Master Plan but are deemed appropriate at the local level, recommended practices are addressed in Volume II, Appendix H.2.

Additional Treatment of Coastal Erosion in this Plan Update

Further explanation of this Plan Update's treatment of coastal erosion and further detail regarding Louisiana's efforts to preserve and restore its coastal region, including efforts to stem coastal erosion, may be found as follows:

- Section 3.3 describes the coordination of this Plan Update with the CPRA Master Plan and establishes a framework for placing coastal erosion and other related contributing factors to coastal land loss within the integrated efforts described in the CPRA Master Plan.
- Section 4.3 provides an overview of the identification of hazards, including coastal erosion, in this Plan Update
- Section 4.4 (and corresponding material in Appendix D) includes a hazard profile of subsidence, which like coastal erosion is a contributing factor in coastal land loss and the resulting increased risk of storm surge, hurricane winds, flooding, and levee failure. This profile helps distinguish between subsidence and coastal erosion.

- Section 5.9 (and corresponding material in Appendix E) provides a statewide risk assessment for subsidence, as distinct from coastal erosion.
- Section 6.8 (and corresponding material in Appendix F) provides a risk assessment for state-owned assets from subsidence, as distinct from coastal erosion.
- Section 7.1 describes in detail state and federal funding resources available for and/or dedicated to the CPRA Master Plan for coastal restoration, including coastal erosion.
- Section 8.3 describes in detail efforts under the Department of Natural Resources and other state and federal partners to implement the CPRA Master Plan for coastal restoration, including coastal erosion.
- Section 8.5 for specific mitigation actions focused on supporting the implementation of the CPRA Master Plan.
- Appendix H.2 provides guidance for communities that wish to undertake small-scale coastal erosion mitigation projects using federal resources with local match, or funded solely by local sources.

Coordination with Other State Emergency Management Planning Efforts

As noted in Section Three, coordination with the GOHSEP Planning Division regarding on-going revisions to the State of Louisiana Emergency Operations Plan (EOP) was included as part of the planning process for the April 2005 Plan and continued with the development of this Plan Update. This coordination included making sure that recommendations in the two plans are internally consistent in areas where potential overlaps exist. In addition, it is important to account for hazards listed as areas of concern in the EOP that are different or more extensive from the ones listed here. The hazards listed in the EOP Hazard Identification and Risk Assessment (HIRA) include the following:

Natural Hazards:

- Coastal Erosion[20]
- Drought
- Earthquake
- Flood
- Fog
- Hailstorm
- Hurricane (Tropical Cyclone)
- Ice Storm
- Severe Storms (including lightning and high winds)
- Severe Summer Weather / Extreme Heat
- Storm Surge
- Subsidence
- Tornado
- Wildfire

Technological Hazards:

- Airplane Crash
- Animal Disease
- Civil Disorder
- Cyber Terrorism
- Dam or Levee Failure
- Terrorist/Enemy Attack
- Hazardous Materials Fixed Facility Incident
- Hazardous Materials Transportation Incident
- Nuclear Fixed Facility Incident
- Nuclear Transportation Incident
- Offshore Oil Spill
- Pandemic Infectious Disease
- Utilities Failure

All 16 of the hazards profiled in this Plan Update are also included in the EOP with the exception of Severe Winter Weather. The EOP considers a number of additional hazards. The longer list of hazards addressed in the EOP is due to differences in the basic purpose of the two plans. The EOP is intended to prepare the State to respond under emergency conditions to all manner of hazards while the emphasis in this Plan Update is on identifying pre-disaster mitigation activities and projects. For example, hazards from the EOP list that present a clear need for developing coherent response and recovery strategies but do not lend themselves readily to pre-disaster mitigation include: Airplane Crash and Civil Disorder.

Appendix D.16 includes the full text from the EOP HIRA.

[20] The EOP category "Coastal Erosion" as treated in the EOP would be more accurately described as "Coastal Land Loss." Erosion is only one factor in coastal land loss; see page I-35 et seq. for more on this Plan Update's treatment of coastal erosion.

4.4 Hazard Profiles

The following pages include a brief description of important issues related to the hazards addressed in this Plan Update. These profiles also include the summary mapping for the 16 profiled hazards. Table 4-8 indicates the specific changes that have been made to the profile information for these hazards.

Table 4-8: Updates to Hazard Profiles

Hazard	Comments
Natural Hazards	
Drought	A new data source regarding Drought has been identified since the April 2005 Plan (consistent with the EOP HIRA), so the mapping and related information in this Section and Appendix D have been revised.
Earthquake	The map has been revised since the April 2005 Plan to reflect more recent data.
Flood	No new Digital Quality Level 3 Flood Data (Q3) mapping has been produced since the April 2005 Plan so the map is unchanged in the Plan Update. However, new mapping has been added regarding Advisory Base Flood Elevations and Repetitive Loss Properties.
Hailstorm	The mapping and associated information in this Section and Appendix D has been revised since the April 2005 Plan to reflect more recent data from the National Climatic Data Center (NCDC).
High Wind - Hurricane	The Design Wind Speed map produced by the American Society of Civil Engineers (ASCE) has not changed since the April 2005 Plan. New wind field extent maps for hurricanes Katrina and Rita have been added.
High Wind - Tornado	The Design Wind Speed map produced by ASCE has not changed since the April 2005 Plan.
Ice Storm	No new data regarding Ice Storms has been identified since the April 2005 Plan, so the mapping and related information in this Section and Appendix D have not been revised.
Lightning	Little new relevant data regarding Lightning has been identified since the April 2005 Plan, so the mapping and related information in this Section has not been revised. New data from the National Lightning Safety Institute has been added to Appendix D.
Severe Summer Weather / Extreme Heat	This is a new section in the Plan Update.
Severe Winter Weather / Extreme Cold	This is a new section in the Plan Update.
Storm Surge	No new data regarding Storm Surge, that would be useful for this study, has been identified and therefore, the mapping and associated information in this Section and Appendix D have not been revised in the Plan Update.
Subsidence	The mapping and associated information in this Section and Appendix D has been revised since the April 2005 Plan to reflect more recent Subsidence data.
Wildfire	The tables in Appendix D have been revised since the April 2005 Plan to reflect an additional six months of data, the mapping included in this Section and Appendix D are unchanged.
Manmade Hazards	
Dam Failure	The map has been updated to reflect which dams are currently managed by the State of Louisiana.
Levee Failure	The mapping and associated information in this Section and Appendix D has been revised since the April 2005 Plan to reflect more complete coverage of levees in the State.

Hazard	Comments
Hazardous Material Incident	The mapping and associated information in this Section and Appendix D has been revised since the April 2005 Plan to reflect more recent Hazardous Material Incident data.

Volume II, Appendix D contains the full description of each hazard including the nature of the hazard, disaster history, probability of occurrence and magnitude. These descriptions also include detailed descriptions of the limitations of the data used in this Plan Update.

It is important to note that the information used in these profiles, and the subsequent risk assessment methodologies in Sections Five and Six, has significant limitations. In many cases, better data or methodologies may be available for a portion of the state or a segment of the data, but to make comparisons of risk on a statewide basis, it was necessary to seek data and methodologies that had consistent accuracy across all the parishes.

Drought

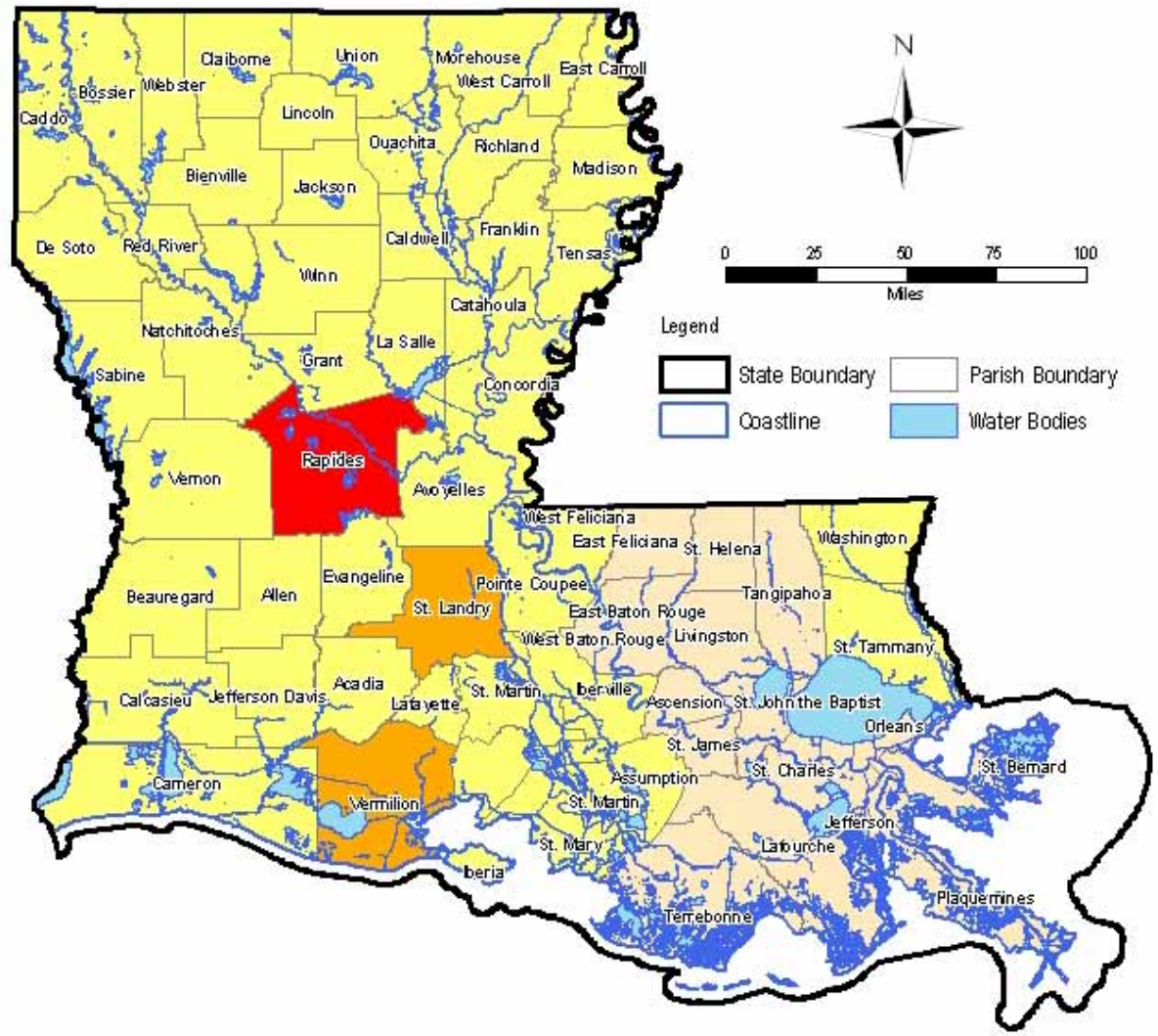
Drought is a normal part of virtually all climatic regimes, including areas with high and low average rainfall. Drought results when the amount of precipitation that is received over an extended period of time (usually a season or more in length) is significantly less than normal amounts for that area.

Louisiana, although featuring several large water bodies, thousands of miles of rivers, streams, and bayous, and thousands of acres of wetlands, has experienced occasional drought conditions. Northern parishes, especially, have experienced agricultural droughts, leading to severe soil-moisture decreases that have had serious consequences for crop production.

Map 4-2 shows the number of recorded impacts on agriculture as reported to the National Drought Mitigation Center. Statistics are also available regarding the effects on water/energy, environmental resources, fire incidents, and social consequences.

While Louisiana has suffered agricultural droughts throughout the State, droughts of such magnitude that require urban and suburban water restrictions are rare. Therefore, based on the results of the hazard profiling for this study, drought is not considered significant by the SHMPC in comparison to the other profiled hazards and the extent to which drought can be mitigated via existing hazard mitigation programs administered by GOHSEP is very small. Therefore, technical risk assessments are not included for drought in Sections Five and Six.

Map 4-2: Hazard Profile-Drought



Drought Impacts to Agriculture January 1997 - January 2008

19 Impacts Reported
21 Impacts Reported
20 Impacts Reported
22 Impacts Reported

Source: National Drought Mitigation Center 2008

Earthquake

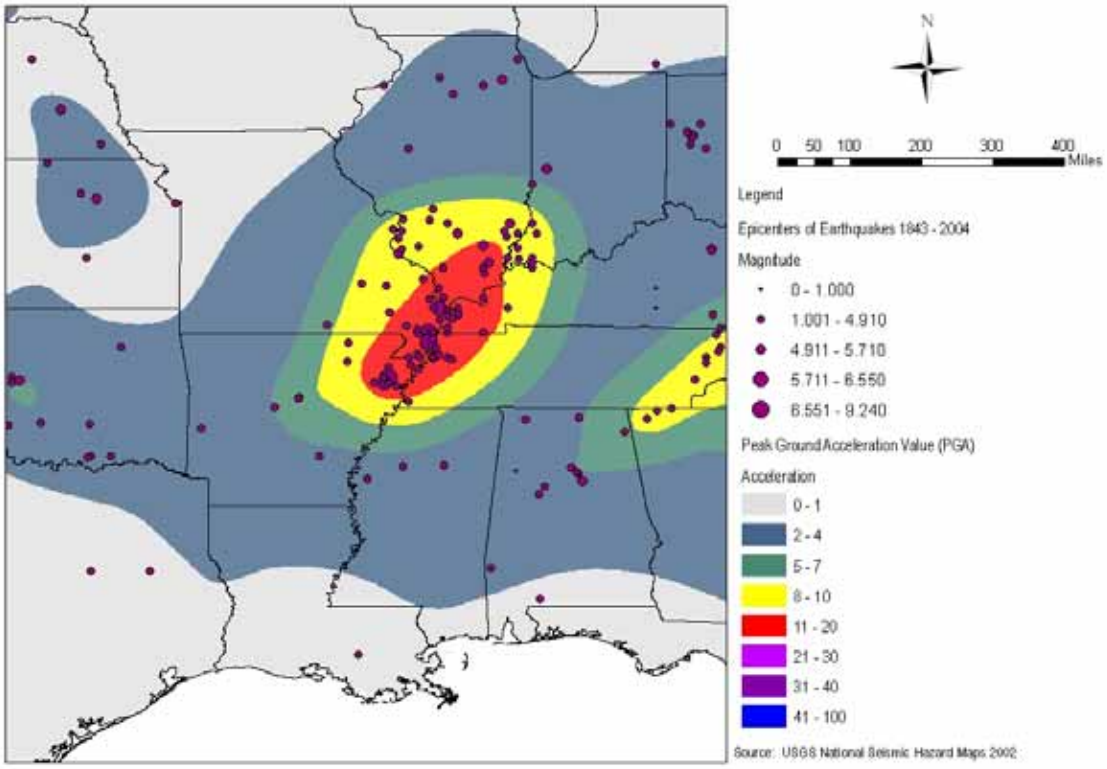
An earthquake is a sudden motion or trembling of the earth caused by an abrupt release of stored energy in the rocks beneath the earth's surface. The energy released results in vibrations known as seismic waves that are responsible for the trembling and shaking of the ground during an earthquake. Ground motion is expressed as peak ground acceleration (PGA).

Although Louisiana is an area of low seismic risk, a number of earthquakes have occurred in the State over the last 200 years. These earthquakes have had two distinct sources: a system of subsidence faults (also known as "growth faults") in southern Louisiana, and the New Madrid seismic zone to the north of Louisiana. Most of these earthquakes were of low magnitude and occurred infrequently.

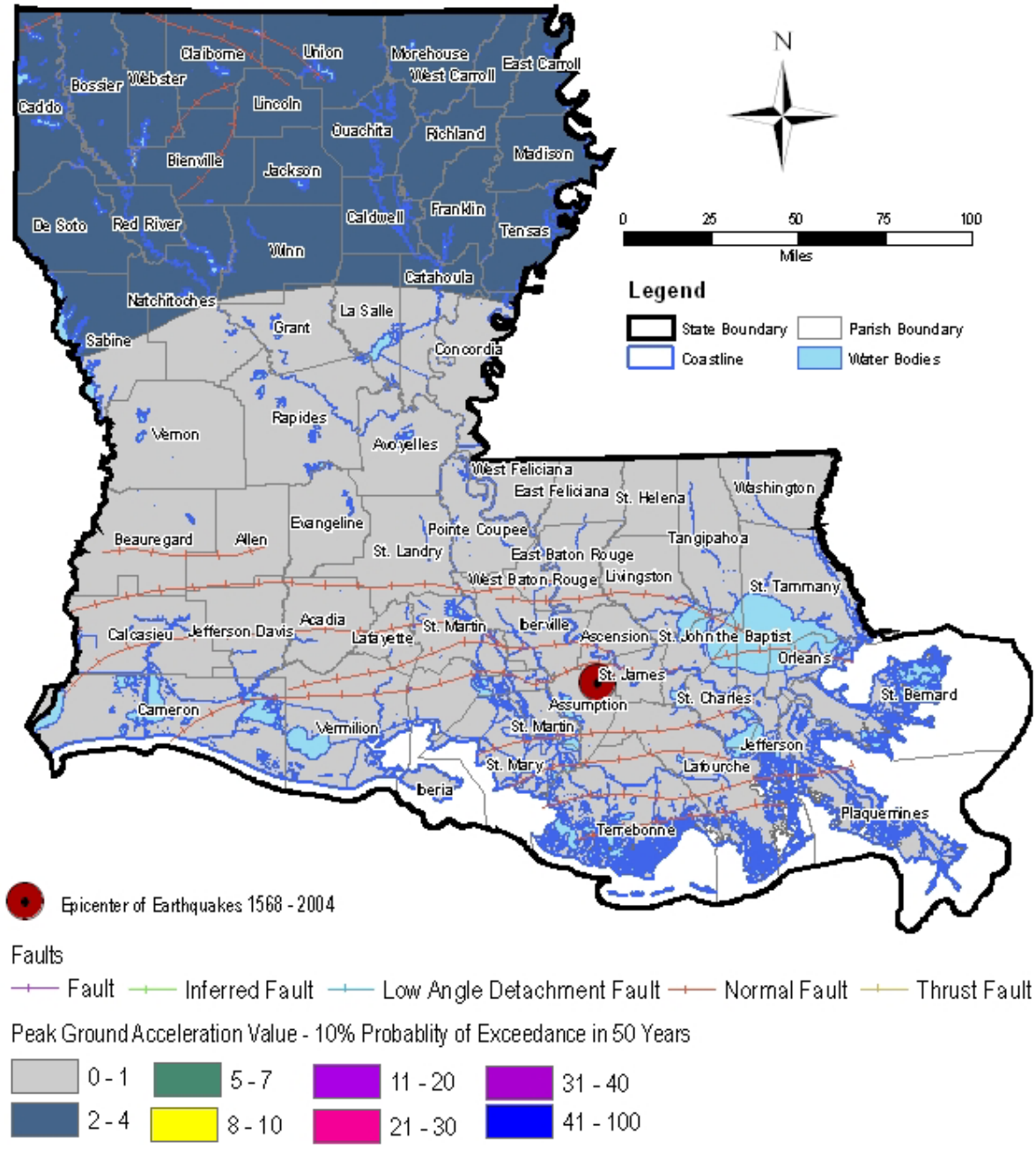
Map 4-3 shows the PGA and the 10% probability of exceeding normal ground motion in 50 years for the south-central region of the United States. This regional perspective is necessary to understand the close proximity of the New Madrid fault. Map 4-4 on the following page shows the PGA and the 10% probability of exceeding normal ground motion in 50 years for the State. This translates to a 1 in 475 chance of normal ground motion being exceeded by the amount shown on the map annually. The southern half of the State has a PGA of 1 percent gravity (1%g) and the northeastern part of the State has a PGA of 3%g; this can be compared to the New Madrid Seismic Zone, which has a PGA as high as 40%. It is important to note that Map 4-4 expresses a 10% probability; there is a 90% percent chance that normal ground motions will not be exceeded. This map has been revised since the April 2005 Plan to reflect more recent data.

Based on the results of the hazard profiling for this study, earthquake is not considered significant by the SHMPC in comparison to the other profiled hazards. Therefore, technical risk assessments are not included for earthquake in Sections Five and Six.

Map 4-3: Hazard Profile – Earthquake – Regional Perspective



Map 4-4: Hazard Profile-Earthquake



Source: USGS National Seismic Hazard Maps 2002

Flood

As defined above, "flood" in this Plan Update refers to riverine flooding; naturally occurring events involving rivers and their tributaries, floodplains, or localized low areas. In a typical flood event in Louisiana, excess water from rainfall accumulates and either overflows onto banks (also referred to as "overbank" flooding) or backs up into adjacent floodplains (also referred to as "backwater" flooding). In Louisiana, flood events also include incidents that may be exacerbated, or even triggered by, manmade flood control interventions including levees, flood walls, and forced drainage systems. The failure of such systems can directly cause flooding, as Hurricane Katrina demonstrated, and levees and other barriers can impound water on their protected side, leading to extended inundation, as happened after both hurricanes Katrina and Rita.

While FEMA's National Flood Insurance Program (NFIP) maps many floodplain boundaries, floods often go beyond the mapped floodplains or change course due to natural processes (e.g., accretion, erosion, sedimentation, etc.) or human interventions (e.g., filling in or otherwise obstructing floodplain or floodway areas, or increased imperviousness within the watershed from new development). Figures 4-4 and 4-5 show the impact of flooding on residential and industrial sites as a result of Hurricane Katrina in August 2005 and Hurricane Lili in October 2002.

Figure 4-4: Flood Damages from Hurricane Katrina, August 2005 (Source: FEMA, 2005)

Most injuries and deaths related to flooding events occur when people are swept away by flood currents, and most property damage results from inundation by sediment and debris-filled water. Hundreds of floods occur each year, making flooding one of the most common hazards.

Flooding is a significant potential threat throughout Louisiana, representing the State's most prevalent and pervasive natural hazard threat. Louisiana is located along the southernmost part of the Mississippi River Basin, which has the largest drainage of any basin in North America. The State's sub-tropical climate has the potential for producing heavy rainfalls at any time of the year.

Over the past century, there has been an apparent increase in large rainstorms and resultant flooding, particularly in the late winter and spring (GOHSEP, 2001). Rainfalls of up to 10 inches in a two-day period are not uncommon and are capable of producing considerable flooding (refer to Section 4.2 – Climate for additional information). Mean annual precipitation decreases to the west and north, with the northwest corner of the State receiving an average of 48 inches annually, in contrast to the delta area in southeastern Louisiana, which receives an average of about 64 inches annually.

Figure 4-5: Flood damages from Hurricane Lili, October 2002 (Source: GOHSEP)

Flooding along the Mississippi and Atchafalaya Rivers more often results from upstream runoff than local rainfall (GOHSEP, 2001). Major flooding on these waterways can seriously affect river and barge traffic, especially along the Mississippi River where cargo handling at the Port of New Orleans is a major industry for Louisiana.

Frequent flooding —whether, overbank, backwater, tidal, or from any other source, is of particular concern in areas of active growth and development. However, the primary focus in Louisiana in terms of flooding impacts is on repetitive loss properties. A repetitive loss property (RL) is defined as any property that is currently insured under the NFIP that has had two or more claims greater than $1,000 paid by the NFIP within any 10-year period since 1978.

Severe repetitive flood loss properties (SRLs) are a subset of repetitive loss properties which have experienced even greater damage: having at least four claims payments of over $5,000 paid by the NFIP with at least two of those occurring within a ten year period and the cumulative amount exceeding $20,000 or at least two separate claims which combined exceed the value of the home.[21]

[21] GOHSEP, Technical Publication 008: Repetitive Flood Loss Data Management, July 24, 2007

Other properties fall under the alternative methodology designation, based upon a pilot program to simplify mitigation efforts at the state level, and therefore have a simplified cost-effectiveness methodology which can be used.

The State of Louisiana has a defined process for maintaining up to date repetitive flood loss data. GOHSEP receives an up to date listing of repetitive flood loss properties, severe repetitive flood loss properties, and alternative methodology properties from FEMA Region VI on a monthly basis. This data is stored following very specific protocols to ensure that the most recent data is consistently available and that Privacy Act regulations are followed.

It is important to note that GOHSEP's focus on progress to mitigate repetitive loss properties and especially severe repetitive loss properties contributes to meeting Louisiana's requirements for increased federal match on Severe Repetitive Loss (SRL) and Flood Mitigation Assistance (FMA) grants under FEMA's Flood Mitigation Grants and Hazard Mitigation Planning Interim Rule, § 201.4(c)(3)(v).

A few facts about repetitive loss properties in Louisiana provide an important perspective:

- According to the Government Accounting Office (GAO), as of 2004, repetitive loss properties receive over 38% of claims dollars paid (approximately $200 million annually) but represent only 1 percent of all NFIP insured properties[22].
- Nationwide, FEMA has identified that as of 2007, about 9,000 severe repetitive loss properties have experienced frequent significant flooding impacts[23].
- Per GOHSEP, of these high priority properties, 4,000, or over 45%, are located in Louisiana, more than twice the number in any other state. Texas, New Jersey and Florida follow with 1,500, 1,000 and 1,000 respectively.

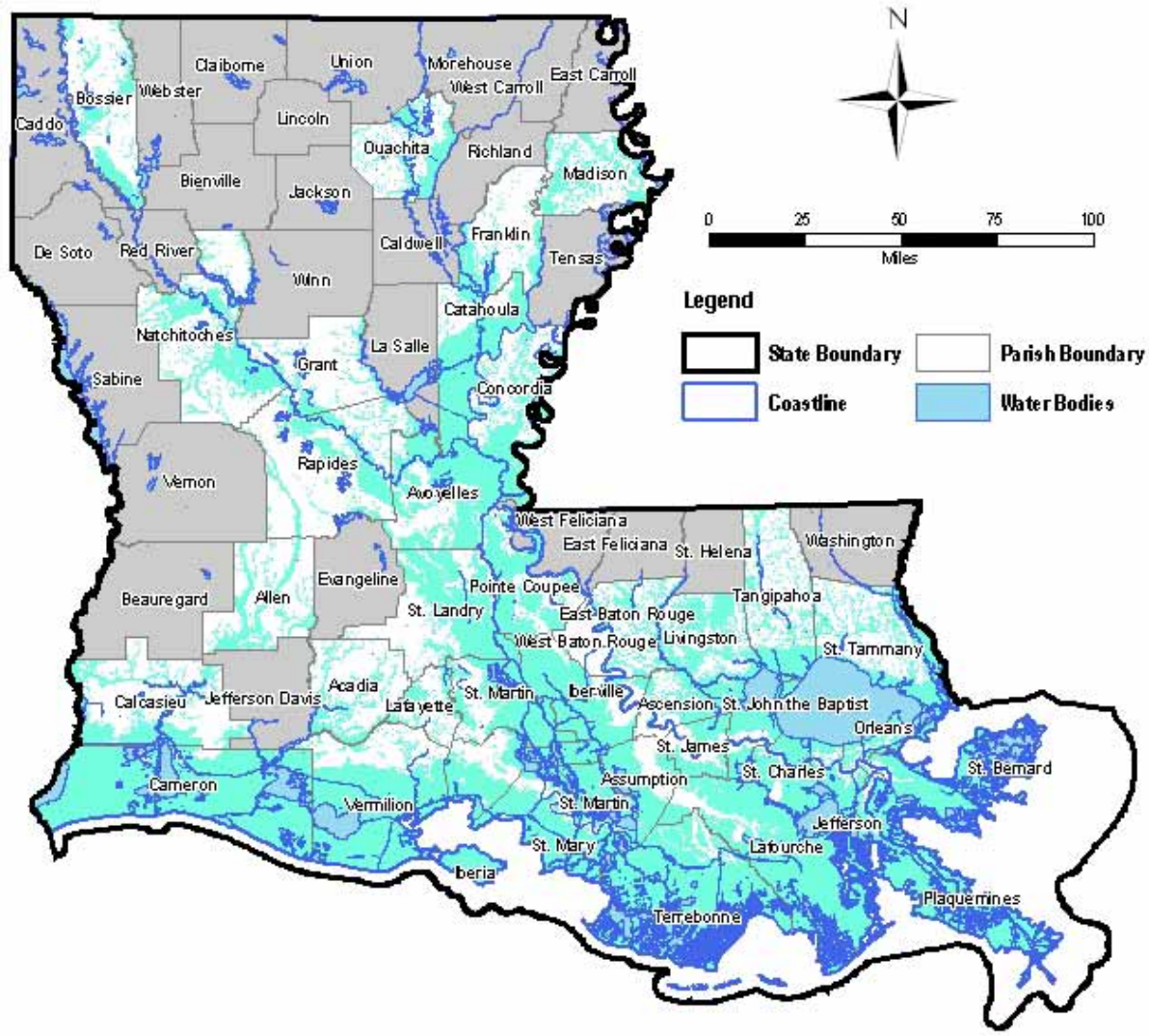
The mapping with this subsection includes the following:

- Map 4-5 shows the extent of 100-year floodplains in Louisiana for the 37 parishes where digital floodplain data (referred to as "Q3 Flood Data") is available. Twenty-seven of the 64 parishes have no Q3 digital floodplain data, and therefore, have no 100-year flood zones depicted. Over 27% of land in Louisiana, particularly the southern parishes, lies within 100-year floodplains; floodplains with a 1% chance on average of being inundated in any given year. No new Q3 mapping has been produced since the April 2005 Plan so this map is unchanged in the Plan Update.
- Map 4-6 indicates which parishes have been given Advisory Base Flood Elevations (ABFEs) following hurricanes Katrina and Rita. ABFEs are updated 100-year flood elevations released by FEMA for affected parishes following hurricanes Katrina and Rita. The extent of the mapped floodplain, as well as the expected level of the base flood, has increased in several areas of these parishes.
- Map 4-7 shows the increase in the areas subject to inundation based on the ABFEs.
- Map 4-8 illustrates the relative distribution of repetitive loss properties across the State and Map 4-9 shows this information normalized using the population of each parish to represent the distribution of RL properties on a per-capita basis.

Due to the extensive history of flooding and the high incidence of repetitive loss properties in the State, flood is one of the hazards included in the risk assessments and addressed in the Mitigation Action Plan.

[22] GAO-04-401T, Federal Flood Insurance: The Repetitive Loss Problem, March 25, 2004.
[23] www.fema.gov, January 31, 2007.

Map 4-5: Hazard Profile-Flood – Q3 Data

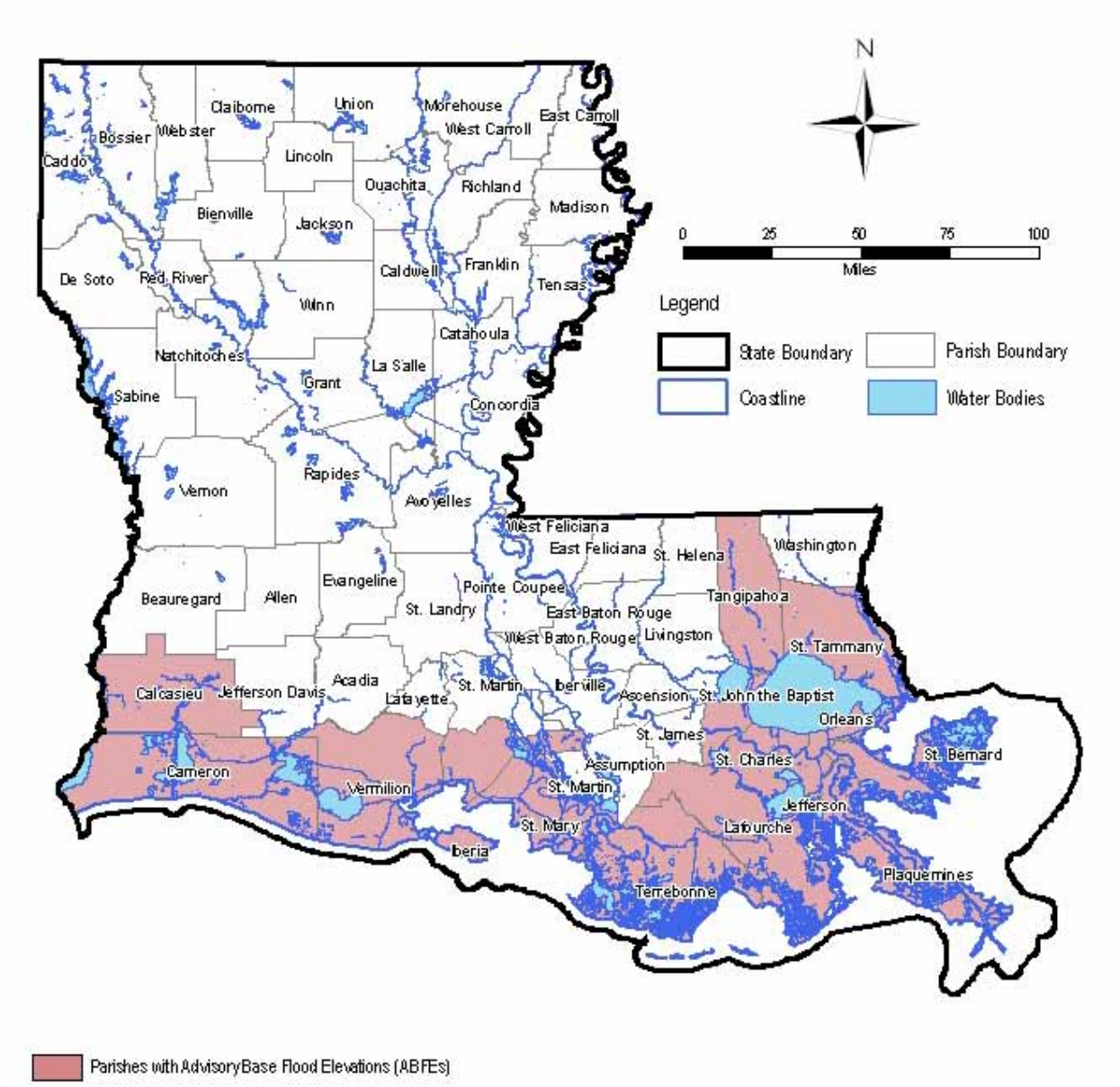


FEMA Q3 Special Flood Hazard Areas (SFHA)

100 Yr Flood Plain Data | No 100 Yr Floodplain Data Available | Outside SFHA

Source: FEMA Q3 Flood Data 2007

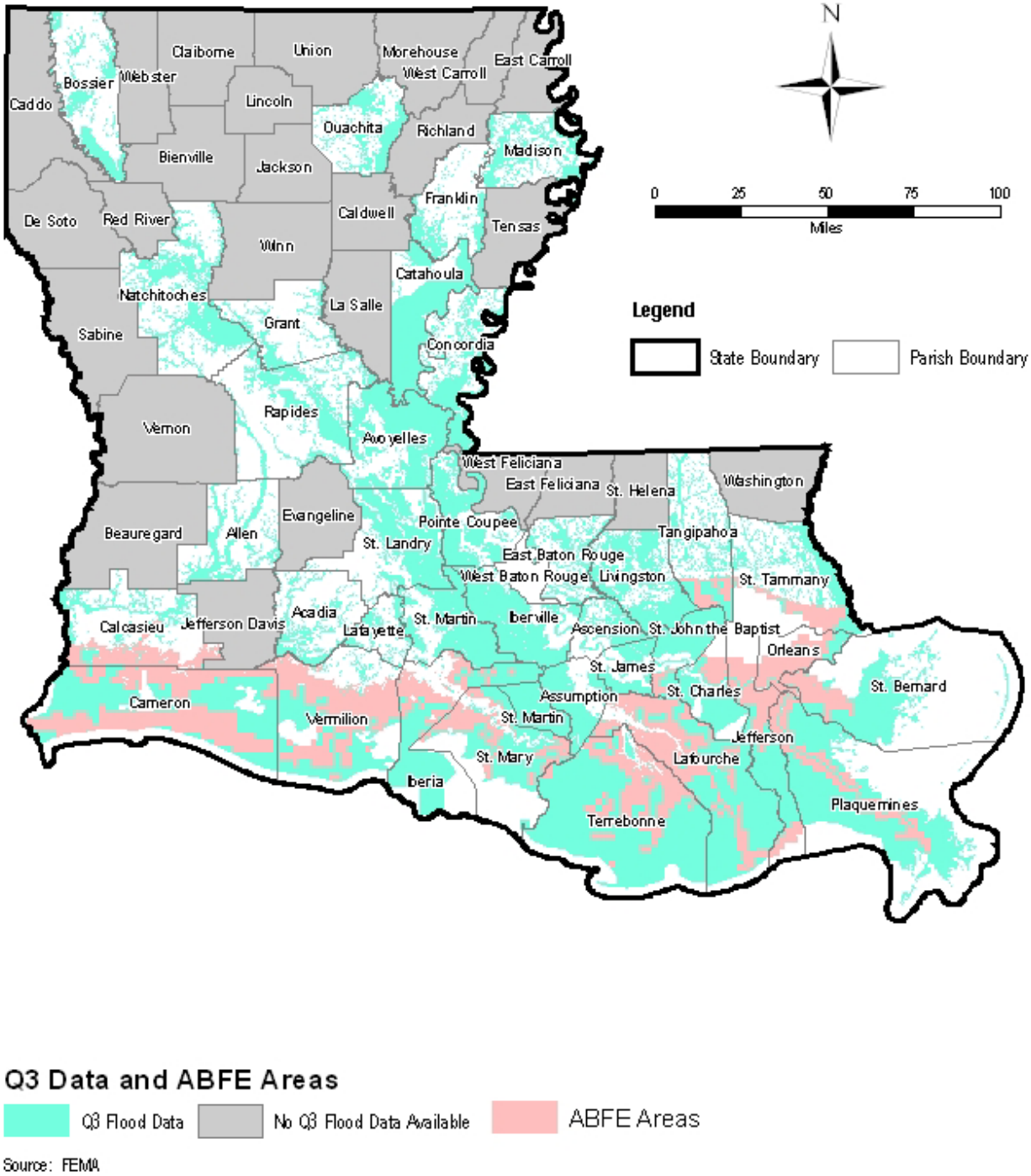
Map 4-6: Parishes with Advisory Base Flood Elevations (ABFEs)



Parishes with Advisory Base Flood Elevations (ABFEs)

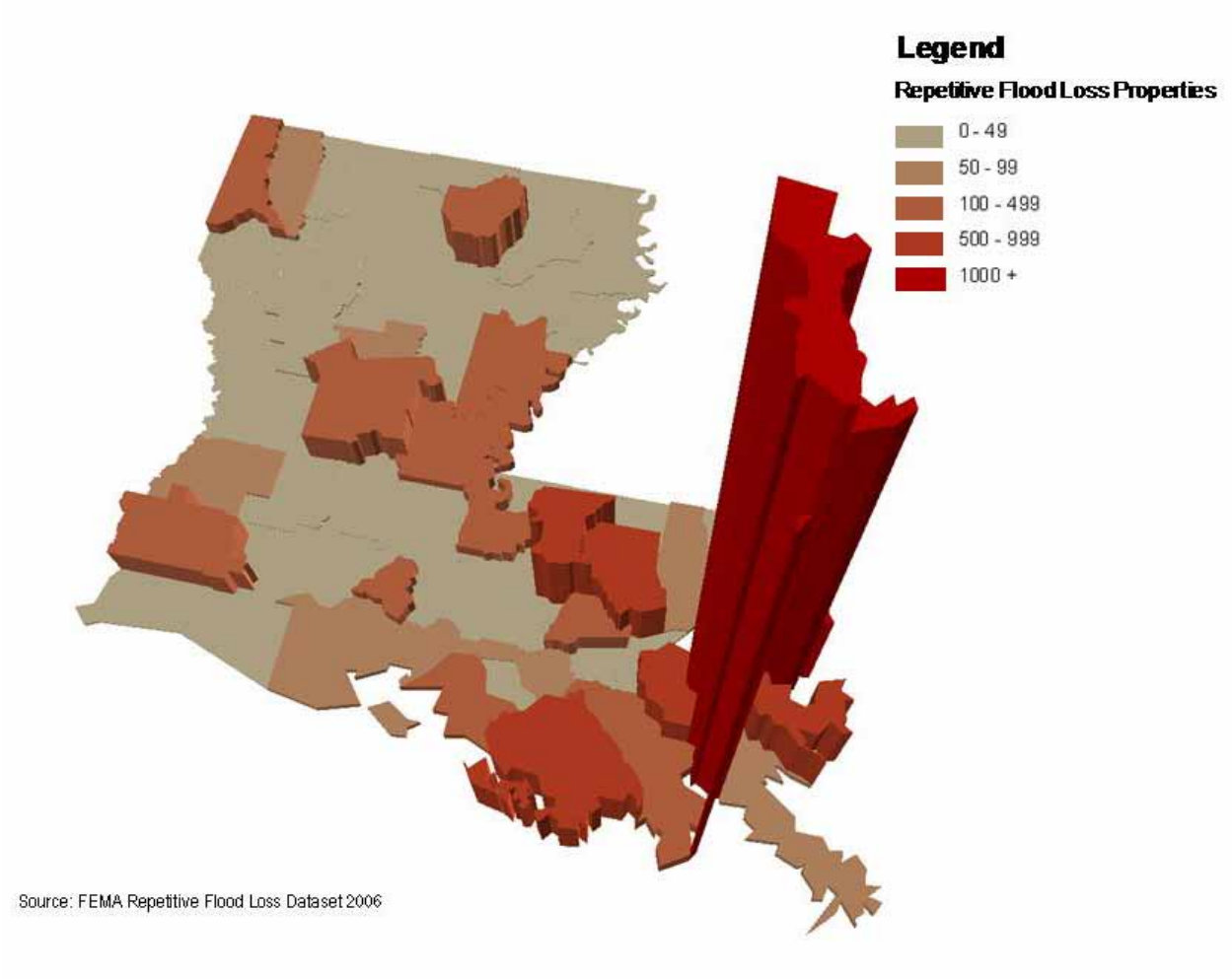
Source: FEMA ABFE Data 2006

Map 4-7: Increased Inundation Areas due to ABFEs

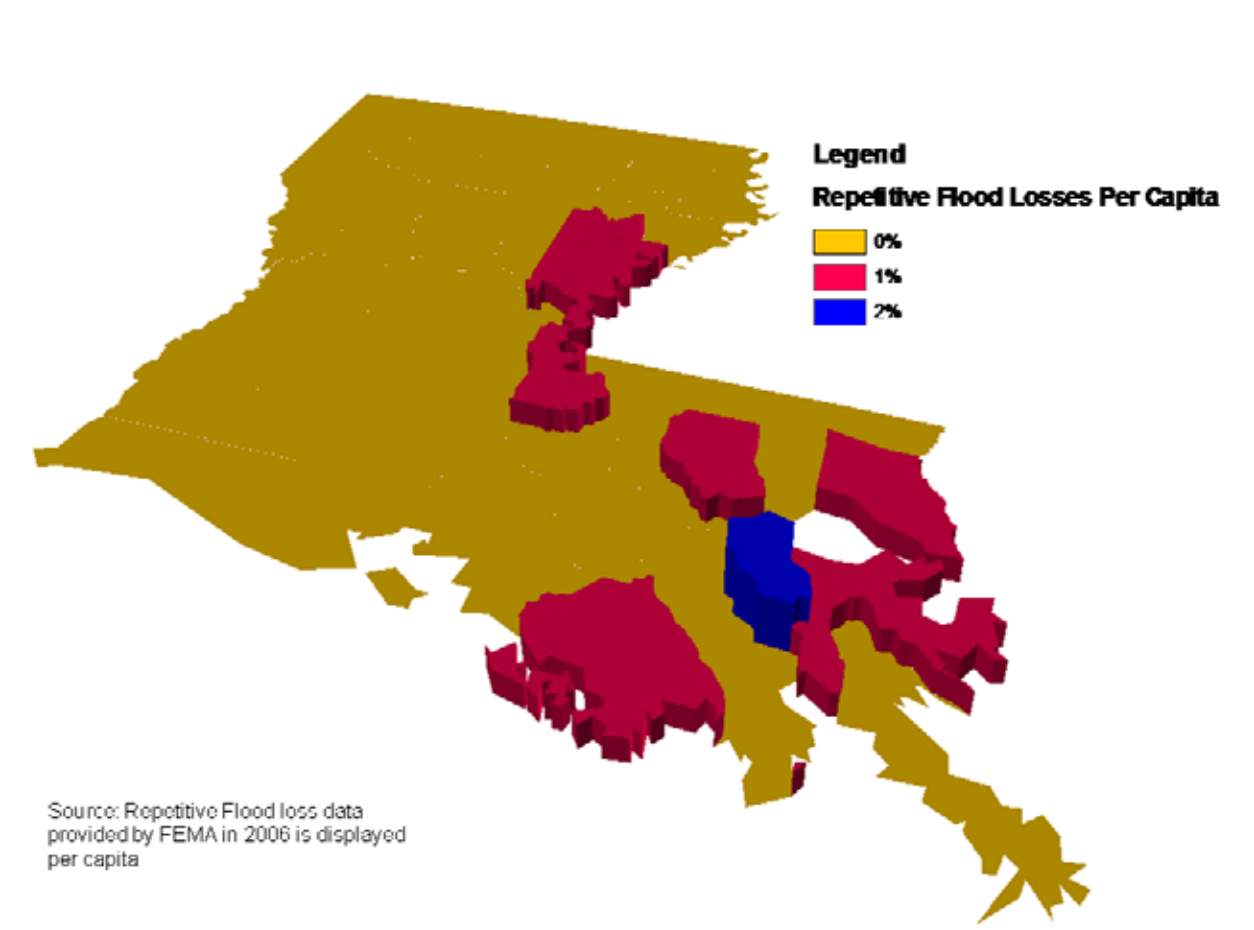


The following two maps (4-8 and 4-9) are intended to depict different ways of sorting repetitive loss data, depending on what the data is being used for. These maps are not intended to directly indicate prioritization for funding purposes.

Map 4-8: Relative Distribution of Repetitive Loss Properties



Map 4-9: Relative Distribution of Repetitive Loss Properties Per Capita



Hailstorm

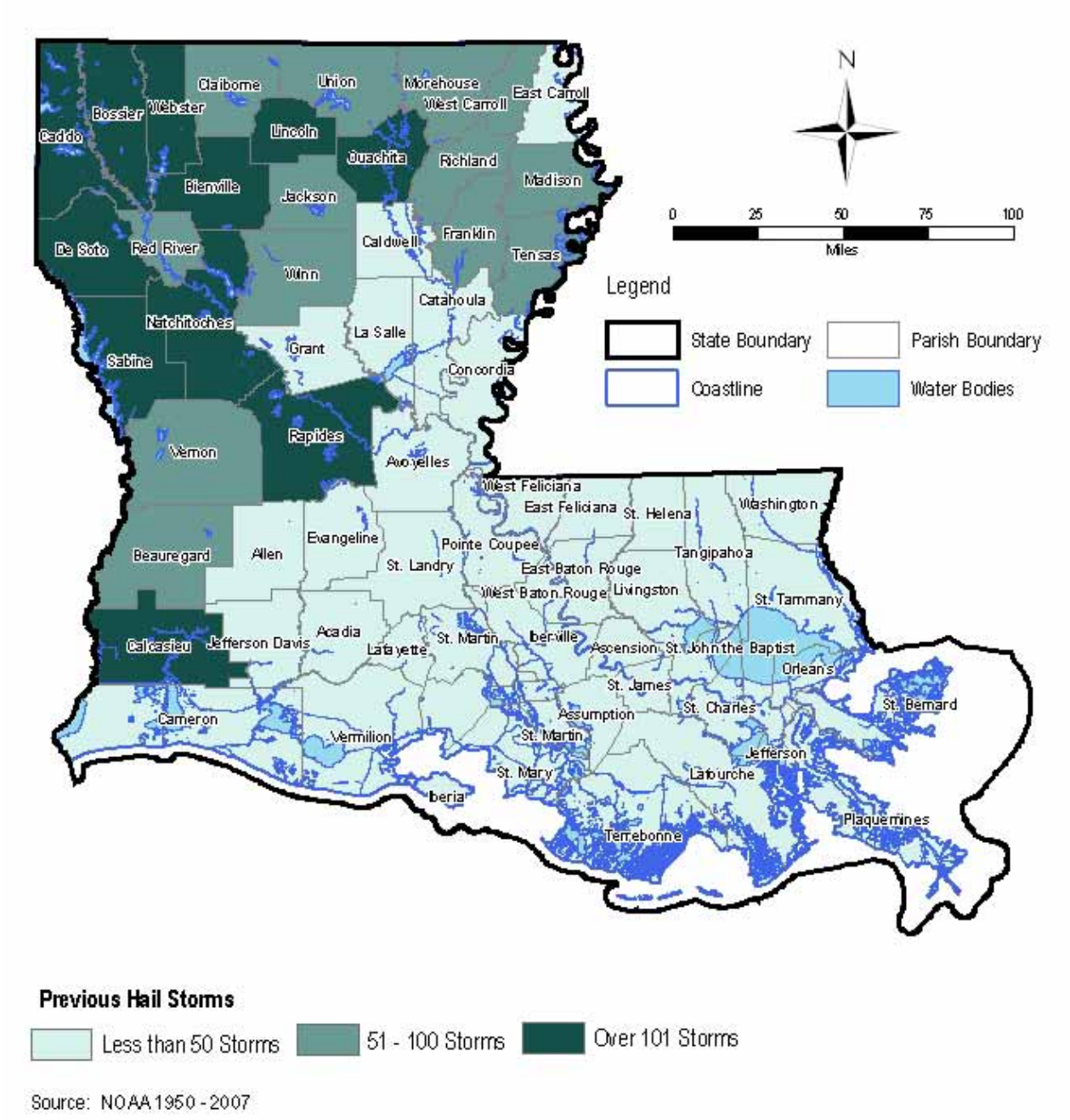
Hailstorms are severe thunderstorms in which chunks of ice fall along with rain. Hail develops in the upper atmosphere as ice crystals that are bounced about by high velocity updraft winds; the ice crystals accumulate frozen droplets and fall after developing enough weight. The size of hailstones varies and is a direct consequence of the severity and size of the thunderstorm; the higher the temperatures at the Earth's surface, the greater the strength of the updrafts and the amount of time hailstones are suspended, the greater the size of the hailstone.

Hailstorms generally occur more frequently during the late spring and early summer, a period of extreme variation between ground surface temperatures and jet stream temperatures that produce the strong updraft winds needed for hail development. Hailstorms can cause widespread damage to homes and other structures, automobiles, and crops. While the damage to individual structures or vehicles is often minor, the cumulative costs to communities, especially across large metropolitan areas, can be quite significant. The severity of hailstorms depends on the size of the hailstones, the length of time the storm lasts, and whether it occurs in developed areas.

Based on recorded data between 1955 and 2002 (which may only represent significant hail storm events), the average size of hailstones in Louisiana is 1.27 inches, and the median size is 1.00 inch. Between 1955 and 2005, Louisiana experienced a total of 3,771 hailstorm events, with a maximum hail size of 4.5 inches. Map 4-10 and associated information in this Section and Appendix D has been revised since the April 2005 Plan to reflect more recent data from the National Climatic Data Center (NCDC).

Based on the results of the hazard profiling for this study, hailstorm is not considered significant by the SHMPC in comparison to the other profiled hazards and the extent to which hailstorm can be mitigated via existing hazard mitigation programs administered by GOHSEP is very small. Therefore, technical risk assessments are not included for hailstorm in Sections Five and Six.

Map 4-10: Hazard Profile-Hailstorm



Previous Hail Storms

Less than 50 Storms | 51 - 100 Storms | Over 101 Storms

Source: NOAA 1950 - 2007

High Wind (Hurricane)

Tropical storms and hurricanes are large-scale systems of severe thunderstorms that develop over tropical or subtropical waters and have a defined, organized circulation. Tropical storms have wind speeds of 39 mph to 74 mph; hurricanes have a maximum sustained (meaning 1-minute average) surface wind speed of at least 74 mph. Hurricanes and tropical cyclones get their energy from warm waters and lose strength as they move over land.

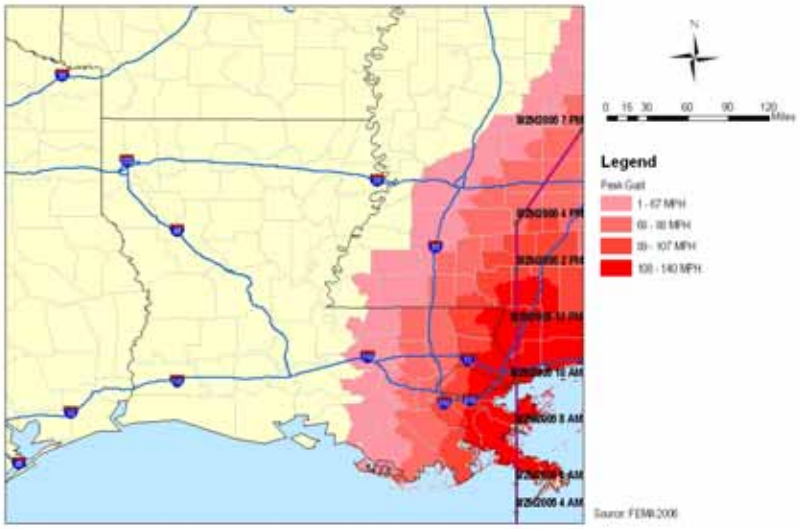
Figure 4-6: High Wind Damages from Hurricane Katrina in Slidell, August 2005 (Source: Times Picayune, 2005)

Hurricanes and tropical storms have proven to be Louisiana's costliest and deadliest natural phenomenon. At least three storms have produced 200 or more deaths, including the storm of 1893, in which roughly 2,000 lives were lost. Hurricanes Betsy in 1969 and Andrew in 1992 both created losses of about $1 billion over the multi-state area that included Louisiana. More recently, Louisiana received presidential disaster declarations for Tropical Storm Allison in June 2001, Tropical Storm Isidore in September 2002, Hurricane Lili in October 2002, Hurricane Ivan in 2004, Hurricane Katrina in 2005, and Hurricane Rita in 2005. Figures 4-6 and 4-7 show examples of the damages that resulted from high winds during Hurricane Katrina and Hurricane Lili.

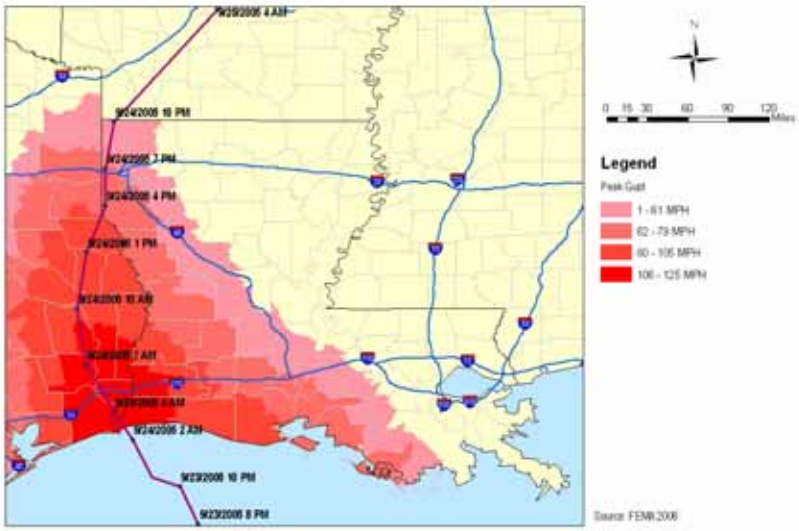
Figure 4-7: High Wind Damages from Hurricane Lili, October 2002 (Source: GOHSEP)

The central Gulf of Mexico coastline is among the most hurricane-prone locations in the U.S. While the Atlantic Basin hurricane season officially extends from June 1 to November 30, Louisiana has experienced storms as early as May and has not experienced a storm during the month of November for more than 100 years. The peak hurricane activity in the State occurs in September. Hurricanes and tropical storms can bring severe winds, storm surge flooding along coastal regions, high waves, coastal erosion, extreme amounts of rainfall, thunderstorms, lightning, inland flooding, and tornadoes. One of the most serious hurricane-related hazards for Louisiana is high wind. Coastal and inland areas are also vulnerable to hurricane-spawned tornadoes (refer to Volume II, Appendix D.6). Some hurricanes and tropical storms have enough rainfall to cause extensive flooding throughout the State, often to the 100- or 500-year flood elevation. Maps 4-11 and 4-12 below show the wind fields resulting from hurricanes Katrina and Rita respectively at landfall. The wind related impacts from these two events were felt well inland. In the following subsection regarding High Wind (Tornado), Map 4-13 illustrates wind speeds recommended for use in designing structures by the American Society of Civil Engineers. Map 4-13 shows that all of Louisiana, including its northern reaches, can experience strong tropical storm- to hurricane-force winds. Due to the recent history and high potential for damage from hurricanes, this hazard was included in risk assessments and the Mitigation Action Plan.

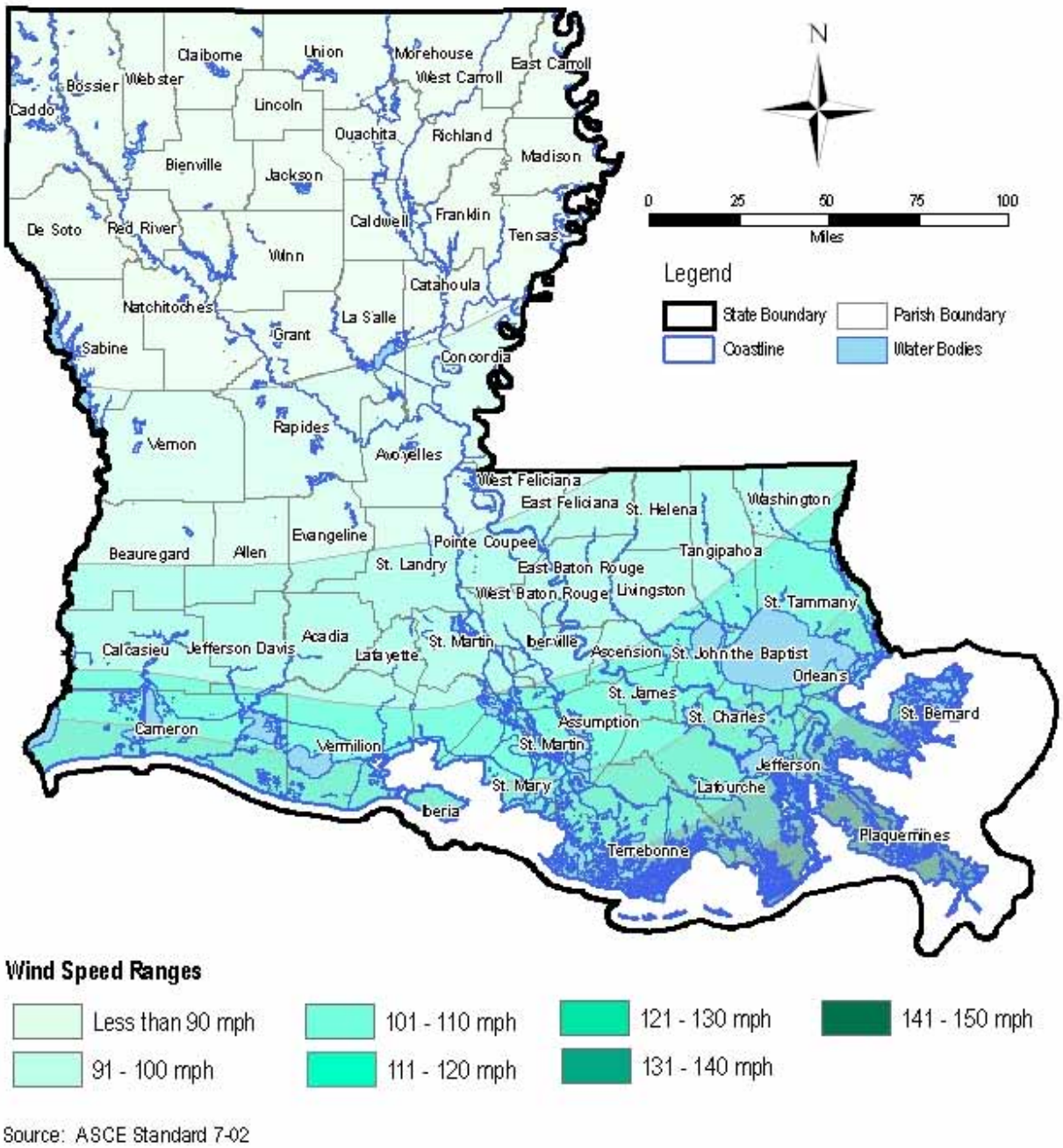
Map 4-11: Hurricane Katrina Extent of Wind Fields (Source: FEMA, 2006)



Map 4-12: Hurricane Rita Extent of Wind Fields (Source: FEMA, 2006)



Map 4-13: Hazard Profile-High Wind (Hurricane)



Wind Speed Ranges

- Less than 90 mph
- 91 - 100 mph
- 101 - 110 mph
- 111 - 120 mph
- 121 - 130 mph
- 131 - 140 mph
- 141 - 150 mph

Source: ASCE Standard 7-02

This page is intentionally blank.

High Wind (Tornado)

Figure 4-8: Damage in Olla, Louisiana due to November 23, 2004 Tornadoes (Source: GOHSEP)

Tornadoes are rapidly rotating funnels of wind extending from storm clouds to the ground. They are created during severe weather events, such as thunderstorms and hurricanes, when cold air overrides a layer of warm air, causing the warm air to rise rapidly.

While the vast majority of tornado events in Louisiana have produced little damage and few injuries, the State has experienced several violent and fatal tornado outbreaks, most recently in November of 2004 (see Figure 4-8), February of 2006 and February of 2007 (see Figure 4-9). The State has had six federal disaster declarations for tornado events since 1965. According to the National Oceanic and Atmospheric Administration (NOAA), one of the deadliest tornado outbreaks in U.S. history occurred in Louisiana and neighboring states during April 24-26, 1908. A number of violent tornadoes moved through parts of Louisiana, Mississippi, and Alabama, killing 324 people and injuring 1,652 others. The worst damage took place in Amite, Louisiana, where 29 people died.

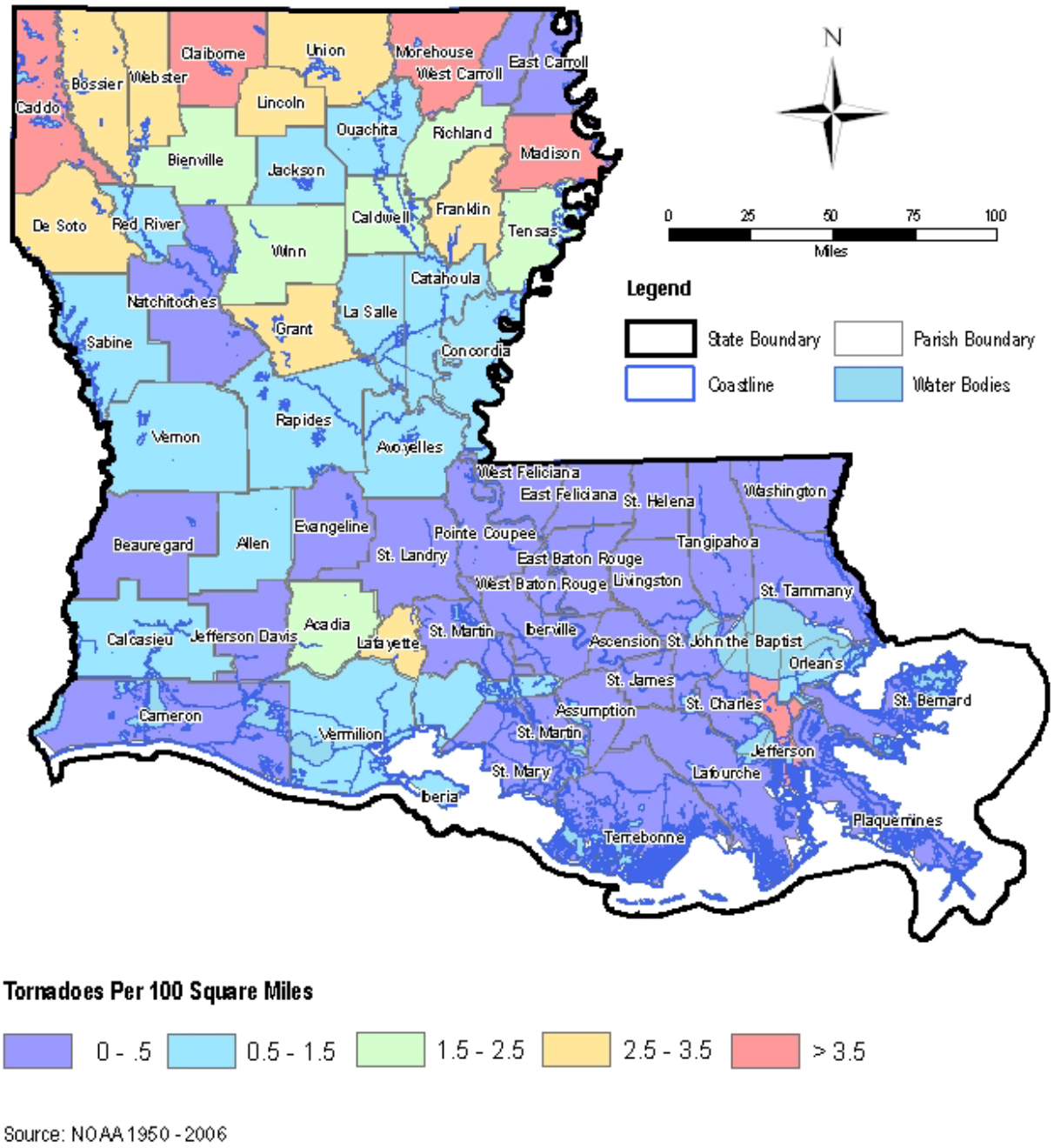
The midsection of the U.S., including Louisiana, experiences a higher rate of tornadoes than other parts of the country because of the recurrent collision of moist, warm air moving north from the Gulf of Mexico with colder fronts moving east from the Rocky Mountains. Among the most unpredictable of weather phenomena, tornadoes can occur at any time of day, in any State, in any season. In Louisiana, tornadoes have a higher frequency in the spring months of March, April, and May.

Map 4-14 is based on a 56 year NOAA data record that includes the historical tracks of 661 tornadoes in Louisiana including tornadoes of all intensities. The data is used in this Plan Update to represent the relative frequency of tornadoes that can be anticipated on an annual basis in each parish, expressed in the number of tornadoes per 100 square miles per year.

Figure 4-9: Damage due to February 23, 2007 Tornadoes (Source: Times-Picayune, 2007)

Due to the recent history and high potential for damage from tornadoes in the State, this hazard was included in the risk assessments and addressed in the Mitigation Action Plan.

Map 4-14: Hazard Profile-High Wind (Tornado)



Tornadoes Per 100 Square Miles

0 - .5 | 0.5 - 1.5 | 1.5 - 2.5 | 2.5 - 3.5 | > 3.5

Source: NOAA 1950 - 2006

Ice Storm

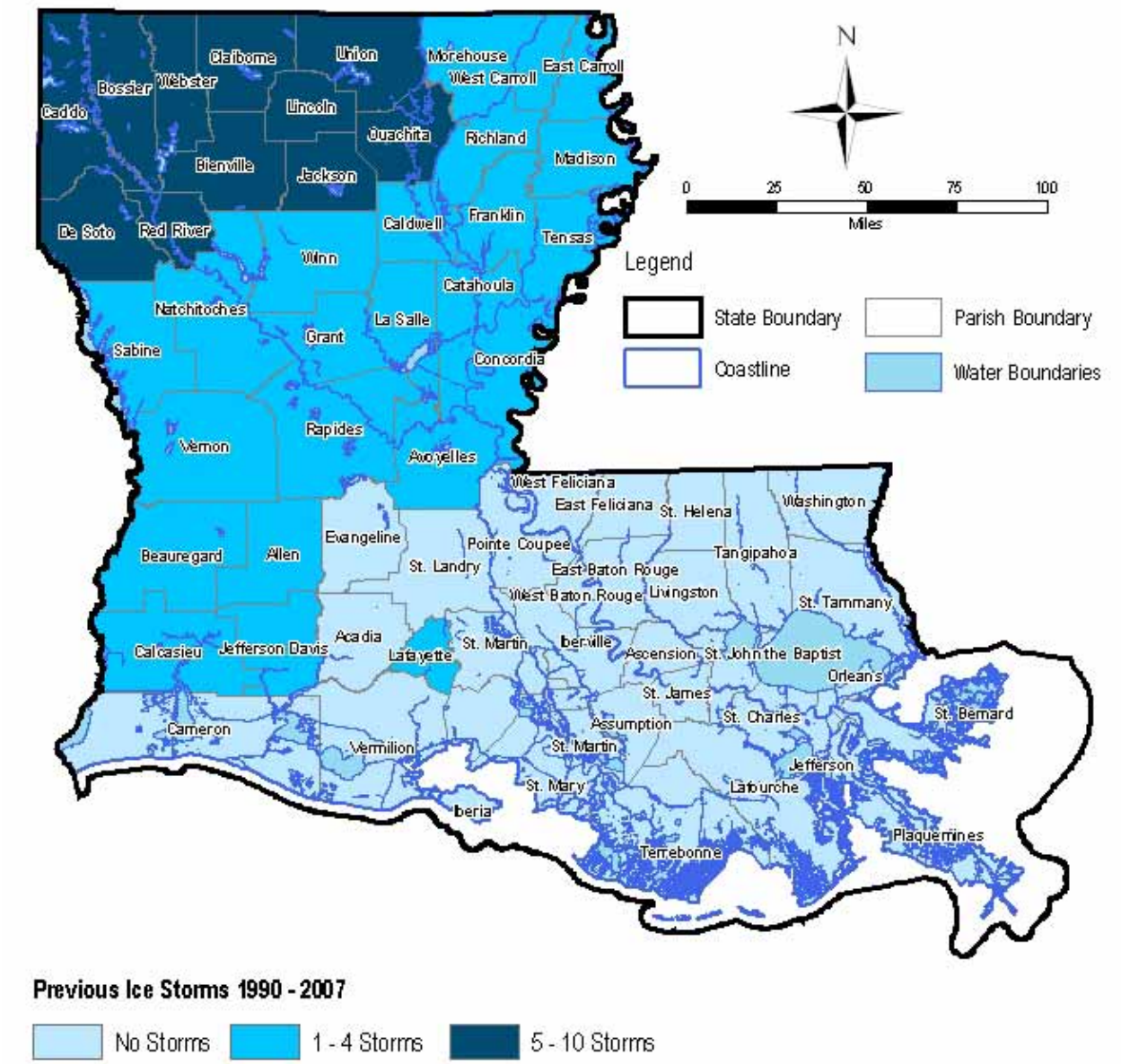
Severe winter weather in Louisiana consists of freezing temperatures and heavy precipitation, usually in the form of rain, freezing rain, or sleet, but sometimes in the form of snow and ice. Temperature extremes are discussed later in this section. This subsection focuses on the most damaging of the other types of severe winter weather in Louisiana; ice storms

Louisiana recently has experienced several occurrences of ice storms. In February 1994, a severe ice storm spread freezing rain across the northern third of the State. Ice accumulations of 2 to 3 inches combined with gusty winds snapped power lines, power poles, and trees. More than 100,000 people were without electric power for several days, and over 256,000 acres of forest were damaged. The State suffered an estimated $13.5 million in damages. Several ice storms within a two-week period in December 2000 resulted in similar damage, causing over 250,000 people to be without power, primarily in northern Louisiana. About 30 transmission lines atop "H"-shaped steel towers snapped due to the weight of the ice and numerous traffic accidents occurred across the State. With millions of dollars in damages and one death attributed to the storms, Louisiana received a presidential disaster declaration.

While Louisiana is far less likely to have heavy snow and ice accumulation than most other states, this type of severe winter weather can be expected to occur at least once each winter. Data from the NCDC shows that the entire State of Louisiana is in the lowest category of probable snow depth — 0 to 25 centimeters of snow depth with a 5% chance of being equaled or exceeded in any given year. Louisiana ice storms that have had severe consequences for the State have generally delivered 1 to 3 inches of ice accumulation. Map 4-15 indicates the number of ice storms per parish over the thirteen-year period between 1994 and 2006. In addition, no new data regarding ice storms have been identified since the April 2005 Plan, so the mapping and related information in this Section and Appendix D have not been revised.

Due to recent history of damaging ice storms in the State, ice storm is one of the hazards included in the risk assessments and addressed in the Mitigation Action Plan.

Map 4-15: Hazard Profile-Ice Storm



Previous Ice Storms 1990 - 2007

No Storms | 1 - 4 Storms | 5 - 10 Storms

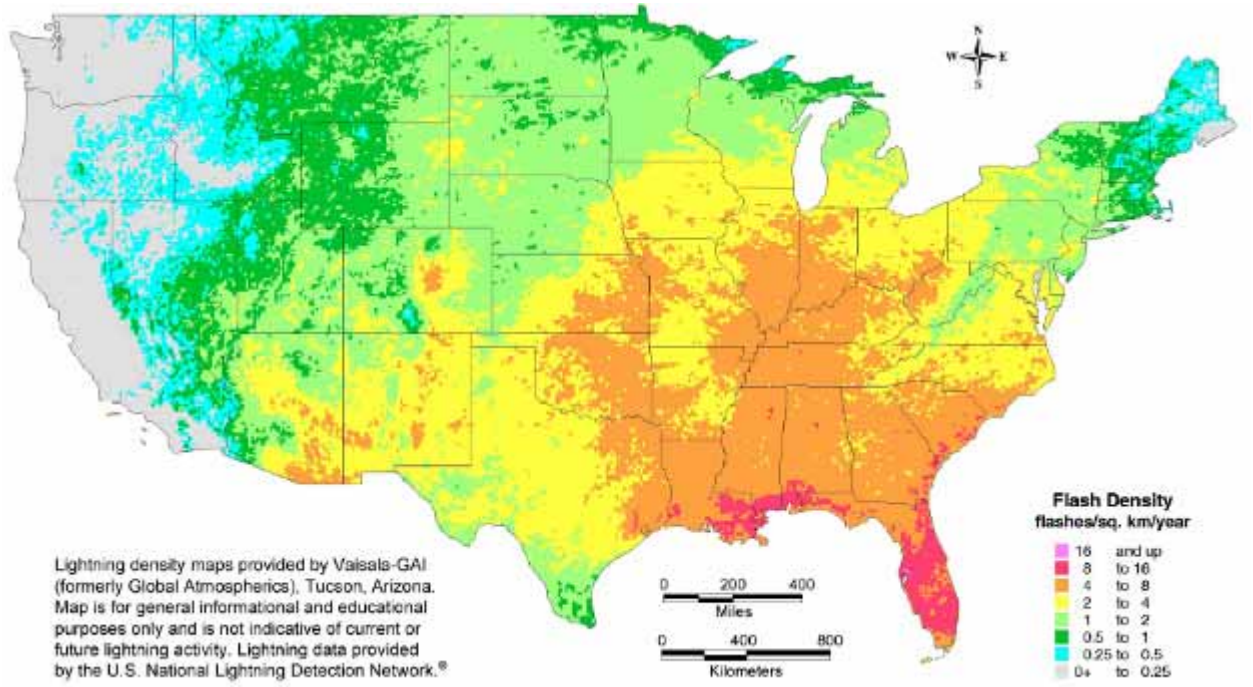
Source: NOAA 1990 - 2007

Lightning

Lightning typically occurs as a by-product of a thunderstorm. The action of rising and descending air in a thunderstorm separates positive and negative charges, with lightning the result of the buildup and discharge of energy between positive and negative charge areas. Water and ice particles may also affect the distribution of the electrical charge. In only a few millionths of a second, the air near a lightning strike is heated to 50,000°F, a temperature hotter than the surface of the sun. Thunder is the result of the very rapid heating and cooling of air near the lightning that causes a shock wave.

On a national scale, the State of Louisiana is second only to Florida in terms of "flash density", i.e., the number of lightning flashes per square kilometer per year (see Map 4-16) and tenth in the nation in terms of lightning fatalities when population is factored in[24]. Map 4-17 also shows the average number of lightning flashes that have been experienced per square mile in Louisiana parishes (based on the period from 1999 to 2003). No new significant data regarding lightning have been identified since the April 2005 Plan, so the mapping and related information in this Section and Appendix D have not been revised although new information has been added to Appendix D.

Map 4-16: 5-Year Lightning Flash Density Map – U.S. (1999 – 2003)

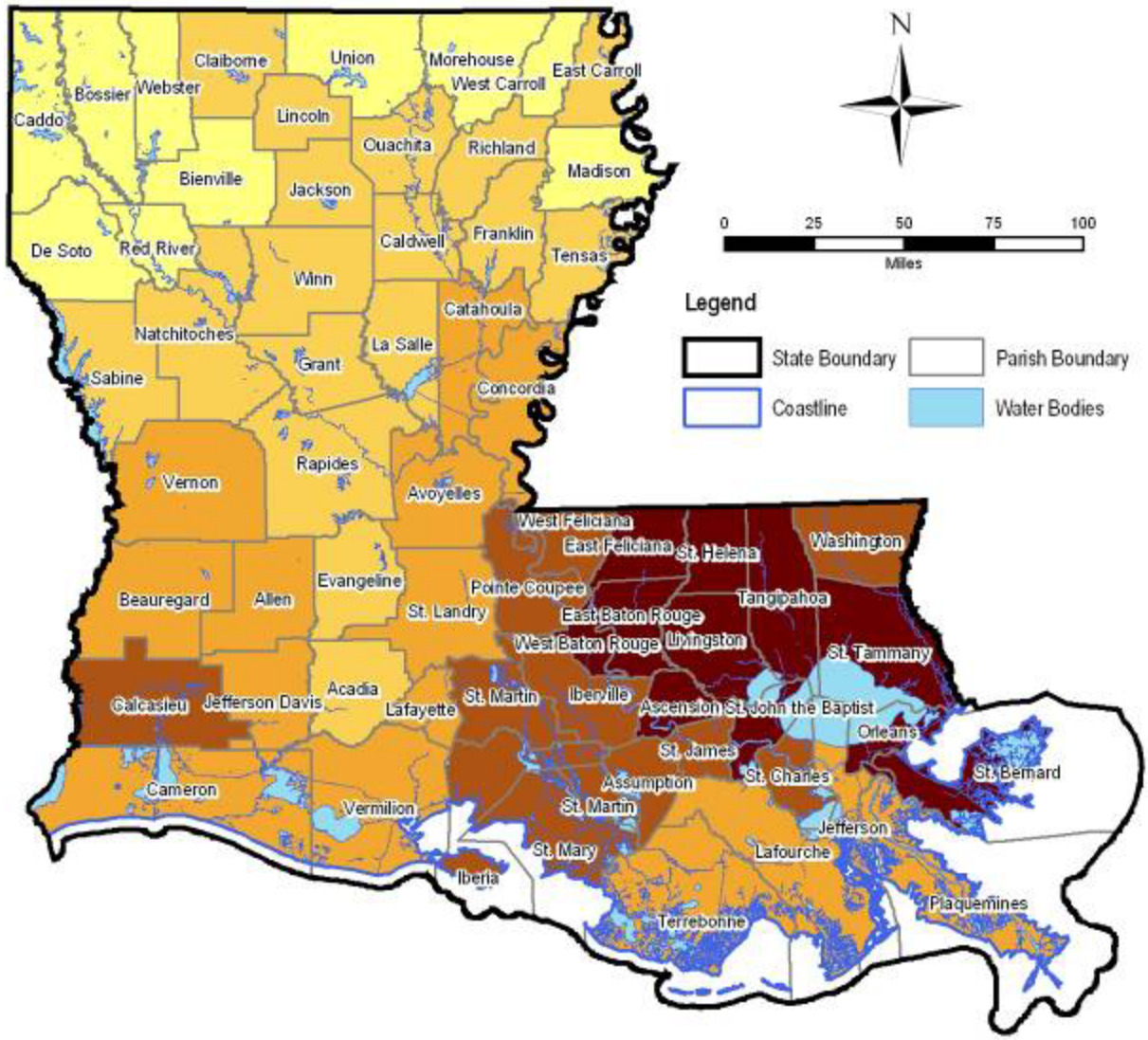


Source: Vaisala's U.S. National Lightning Detection Network®

However, since the extent to which lightning strikes can be predicted at any particular location and the extent to which this hazard can be mitigated via existing hazard mitigation programs administered by GOHSEP is very small, technical risk assessments are not included for lighting in Sections Five and Six.

[24] Per the National Lightning Safety Institute for the period 1990-2003.

Map 4-17: Hazard Profile-Lightning



Average Yearly Lightning Flashes per Square Mile (1999-2003)

11.09 - 12.75 | 12.76 - 15.50 | 15.51 - 18.25 | 18.26 - 21.50 | 21.51 - 27.00

Source: Vaisala's U.S. National Lightning Detection Network®.

Severe Summer and Winter Weather / Extreme Heat and Cold

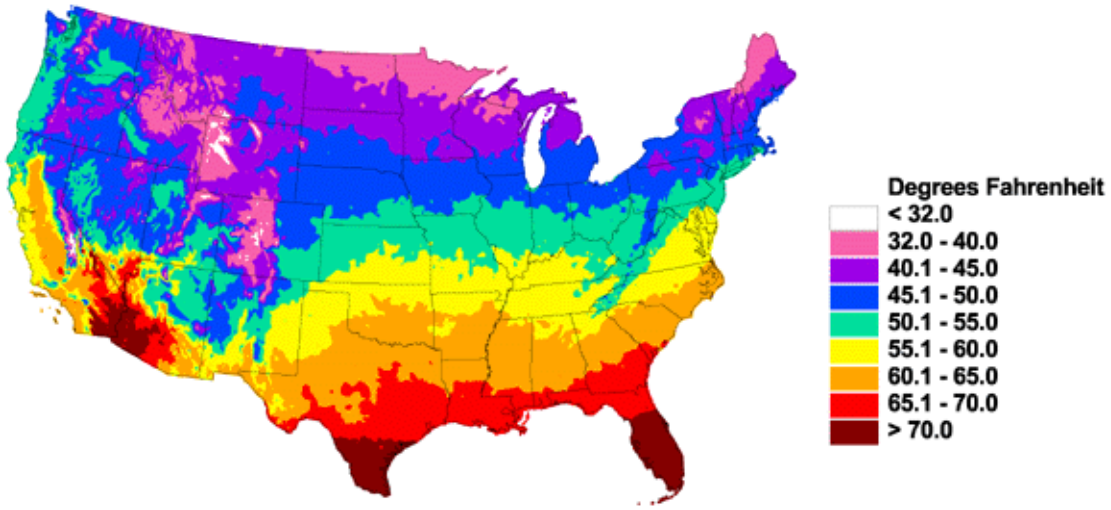
Extreme heat can be described as a prolonged period of excessively high temperatures, which may be accompanied by high humidity. Extreme Heat can cause hardship to agricultural communities and widespread power outages, and in severe cases result in the death of vulnerable populations. The most well known heat related illness is hyperthermia, also known as heat stroke, which occurs during periods of sustained high heat and humidity. Heat stroke affects the body's ability to regulate body temperature. Elderly, young children, and the sick or overweight are most at risk from heat stroke.

In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the disastrous heat wave of 1980, more than 1,250 people died. A normal year, results in approximately 175 deaths nationwide relating to summer heat. According to the NOAA, extreme heat is the number one weather related killer in the U.S.[25]

Heat-related deaths in Louisiana are not common, but they do occur. Between three and 20 deaths occurred in the northwestern part of the State during each of several heat waves occurring in 1995, 1998, and 2000, according to the NCDC. Additional information can be found in Appendix D.

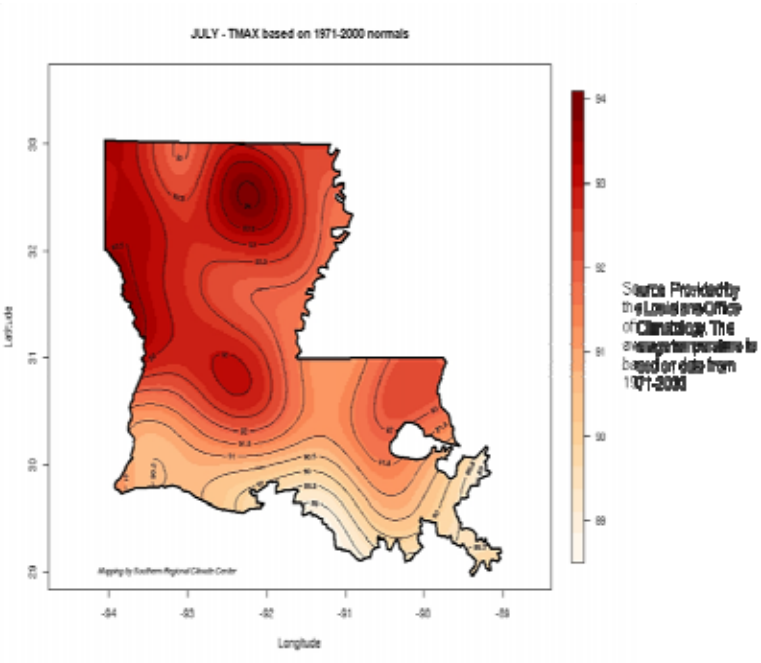
Average temperatures in Louisiana are among the hottest in the U.S., as shown in Map 4-18. The average number of days each year with temperatures above 90°F ranges from 57 days in the southeastern part of the state to more than 102 days in the northwest. The average number of days each year with temperatures below freezing ranges from four to 24. Additional information on high and low temperatures can be found in Appendix D.

Map 4-18: Annual Mean Daily Average Temperatures in the U.S.



[25] NOAA, 2007.

Map 4-19: Average July Temperatures in Louisiana

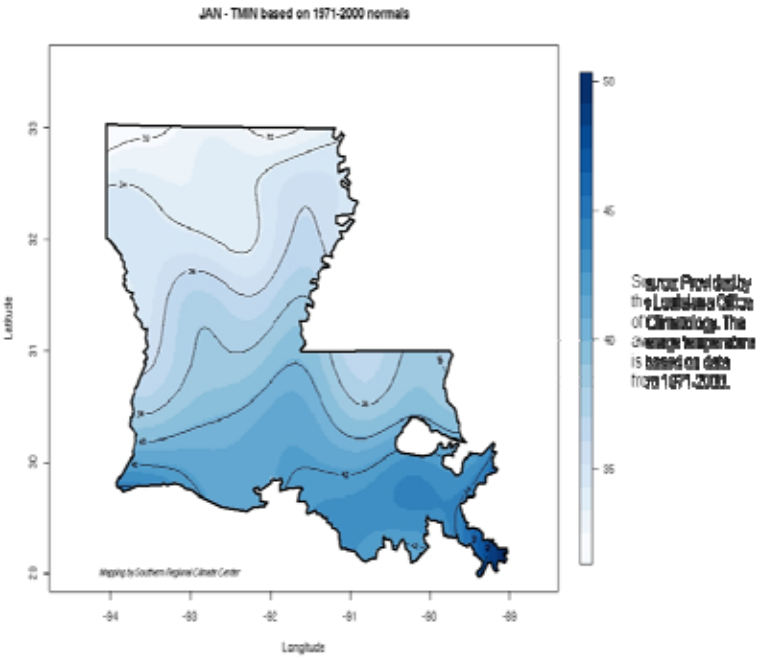


Most of Louisiana has a hot, humid, subtropical climate with very little variation in temperature during the summertime, which lasts from May through September. Average temperatures are more extreme in the western part of the state, and relatively milder in the areas around Baton Rouge and the Northshore of Lake Pontchartrain, as shown in Map 4-19.

The record high, set in 1936, was 114°F in Plain Dealing.

In contrast, Louisiana has short, mild winters that last from December through March. The southeastern area remains the warmest in winter, and temperatures decline steadily to the north, as shown in Map 4-20. The record low, in 1899, was -16°F in Minden.

Map 4-20: Average January Temperatures in Louisiana



Frosts and hard-freezes are common in the northern part of the state and also occur with some regularity in the south, causing some property and particularly crop damage. For example, during a late winter cold-snap in 1996, approximately $20 million in crop damage and $8 million in property damage was recorded by the NCDC.

Extreme cold significantly increases the risks of household fires due to the use of fireplaces and space heaters. The most common cold related illness is hypothermia, which occurs when the body loses heat faster than it can produce heat. Hypothermia affects the brain and can lead to death. Victims are often the elderly or the very young.

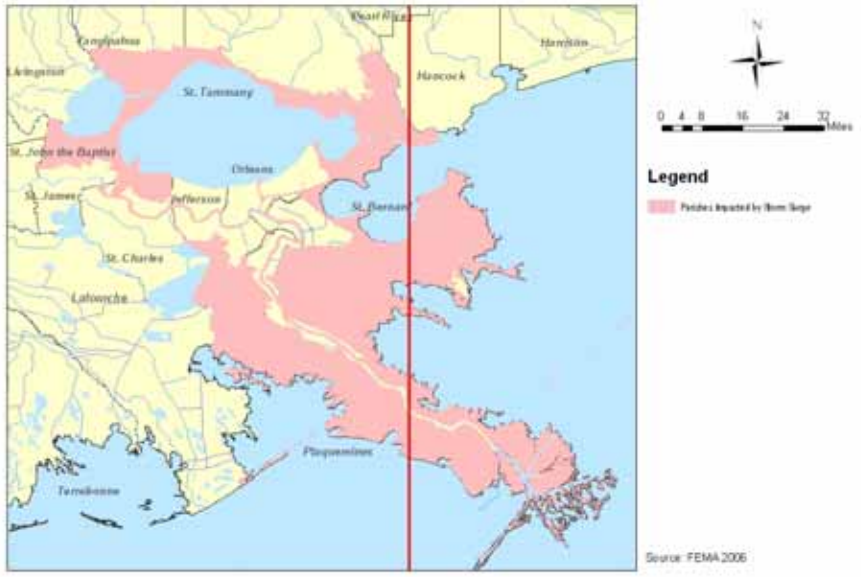
However, the greatest risk of winter-weather damage comes not from extreme cold but from ice storms, which are addressed separately in this Plan Update.

Storm Surge

In Louisiana, storm surges are large waves of Gulf waters that sweep across coastlines where a tropical storm makes landfall. Generally the more intense the storm, the greater the height of the storm surge; the higher the storm surge, the greater the damage to the coastline. Storm surges inundate coastal floodplains, wash out dunes, cause backwater flooding through coastal river mouths, generate large waves that run up and flood coastal beaches, and can flood streets and buildings in coastal communities.

Shallow coastal bathymetry increases the magnitude of a storm surge. The coastal bathymetry of southeastern Louisiana, with its low, flat topography and land surface elevations that in many places dip below sea level, can experience storm surges up to 100 miles inland. Significant hurricanes can produce extremely large storm surges. The official FEMA estimate of Hurricane Katrina's maximum surge height is 30 feet, and Hurricane Rita's is 15 feet. Even more extreme storms could produce surges of up to 36 feet along the Louisiana coast. Figure 4-10 shows areas of the Gulf Coast that were inundated from storm surge as a result of Hurricane Katrina. Furthermore, lakes along the coast, namely Lake Maurepas, Lake Borgne, and Lake Pontchartrain, exacerbate the effects of coastal flooding because of wave effects that can develop over inland lakes. All of these effects were evident during hurricanes Katrina and Rita.

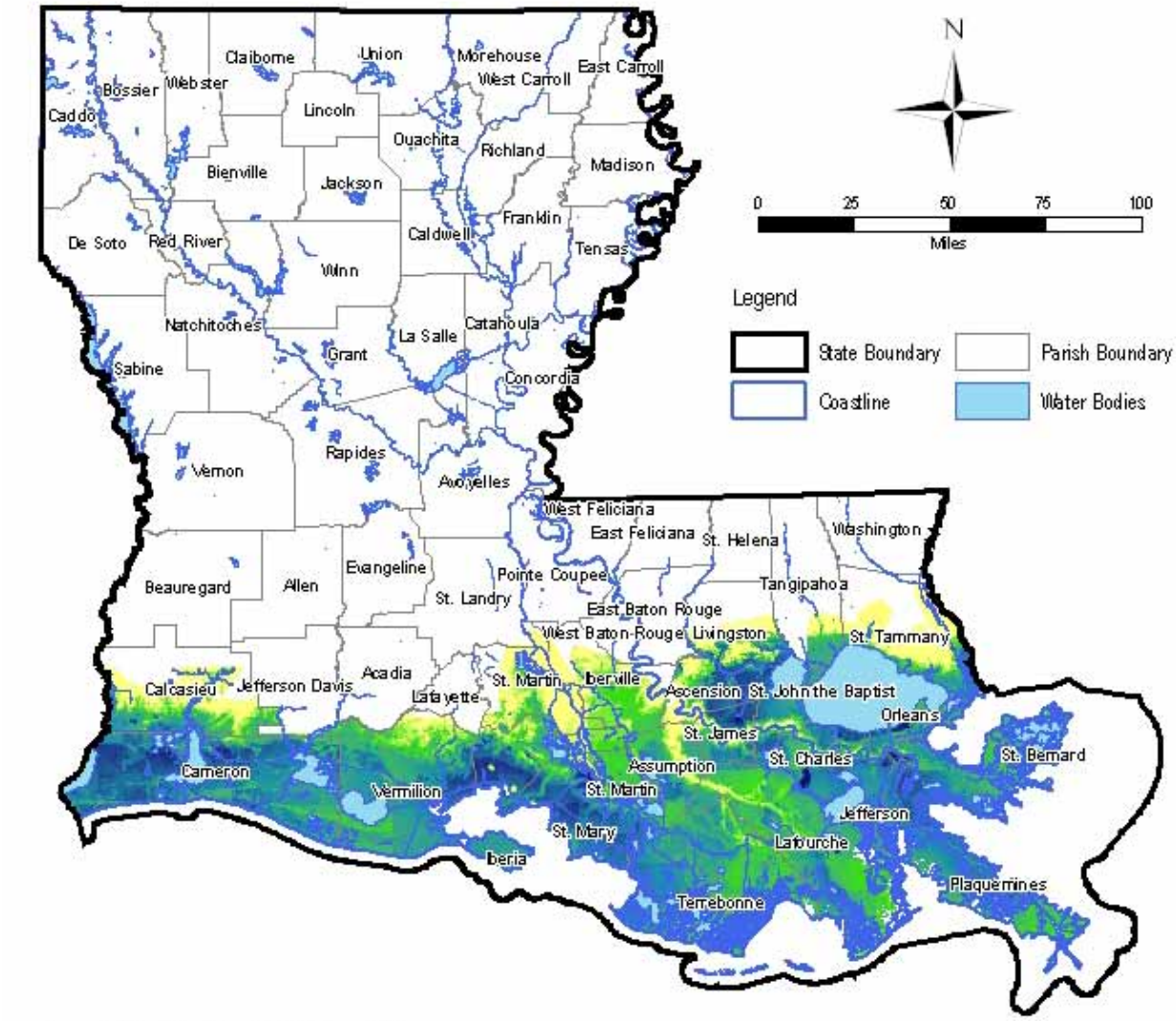
Figure 4-10: Hurricane Katrina Storm Surge Inundation (Source: FEMA, 2006)



Storm surge areas can be mapped by the probability of storm surge occurrences using Sea, Lake and Overland Surges from Hurricanes modeling (referred to as SLOSH modeling). Map 4-21 depicts the most up-to-date SLOSH models available that cover all of southern Louisiana in a consistent manner. This mapping indicated the areas that can be affected by storm surge inundation due to hurricanes. SLOSH models represent the storm surge of hundreds of simulated hurricanes, taking into account storm wind intensities, forward speeds, directions of motion, and radius of maximum winds. The map represents the cumulative storm surges for hundreds of modeled hypothetical hurricane tracks; no single hurricane event would produce the inundation pattern depicted on the map. FEMA has begun using a modeling technique which is based on a more accurate statistical analysis and is run at a higher resolution. The recently released ABFEs for coastal Louisiana are based on this model but the results for storm surge are not publicly available as of the publication date for the Plan Update so the mapping on the facing page has not been updated since the April 2005 Plan.

Due to the high potential for damage from storm surge in the State, this hazard was included in the risk assessments and addressed in the Mitigation Action Plan.

Map 4-21: Hazard Profile-Storm Surge



Inundation Depth - CAT 3 Simulation

High : 25.5 Feet

Low : 0 Feet

Source: SLOSH Data, NOAA, 2005

Subsidence

In Louisiana, two significant processes that are increasing hazard risk are sea-level rise and land subsidence. Subsidence and sea-level rise impact Louisiana in a similar manner, making it difficult to separate impacts.

Sea-level rise is the level that the sea is rising relative to land at the coastline. The most prominent causes of sea-level rise are the melting of the Earth's glacial ice caps and sea floor spreading. The U.S. Geologic Survey (USGS) and the Environmental Protection Agency (EPA) have each developed their own estimates for the rate of sea-level rise. The USGS estimates that the rate of sea-level rise in Louisiana is approximately 3.0 feet/century and the EPA estimates that it is approximately 3.4 feet/century. More recently, estimates of sea level rise have been reduced, with a current EPA estimate of 10-12 inches/century. This hazard has been identified as one that is of such a scale and extent that it is best addressed primarily through the actions of other state agencies such as Department of Transportation and Development, Department of Natural Resources and Coastal Protection and Restoration Authority in the coastal zone and is not addressed in this Plan Update.

Subsidence is a phenomenon that combines soil compaction and geological/tectonic forces. Subsidence results from a number of factors including: compaction/consolidation of shallow strata caused by the weight of delta deposits from the Mississippi River, soil oxidation, and aquifer draw-down (shallow component); consolidation of deeper strata (intermediate components); and tectonic effects (deep component). This last element was only recently quantified, and research indicates that it accounts for 50% or more of subsidence.[26]

Subsidence has not been identified as a significant contributor to direct disaster damages in Louisiana. For example, one of the few hazard events to be documented as a direct result of subsidence is the appearance of sinkholes over a mining operation in Weeks Island. The repeated removal of underground materials (originally salt and later oil) resulted in the formation of a sinkhole in 1992. The Weeks Island facility was decommissioned as a result of this discovery. For the most part, subsidence (along with sea-level rise and land loss) is a slow acting process with effects that are not as evident as sudden-occurrence hazards like earthquakes. Although the effects in the New Orleans metropolitan area and in the coastal zone can be seen over the course of decades or even years, subsidence is a "creeping" hazard event, one with chronic impacts. The highest rate of subsidence is occurring at the Mississippi River delta (estimated at greater than 3.5 feet/century). Subsidence rates generally decrease away from the delta in a northeast, northwest, and western direction. Map 4-22 b shows the relative rates of subsidence for the most affected areas per USGS estimates. The predictive value of these estimates has been called into question as newer techniques of measurement have gained prominence. However, there is no particular accepted estimate for subsidence rates across Louisiana. Future efforts under the Community Education and Outreach will strive to generate more accurate subsidence rate estimates.

Subsidence creates three distinct problems in Louisiana: (1) by lowering elevations in coastal Louisiana, subsidence accelerates the effects of saltwater intrusion and other factors that contribute to land loss; (2) by lowering elevations elsewhere in Louisiana, subsidence may make structures more vulnerable to flooding; and (3) by destabilizing elevations in general, subsidence undermines the accuracy of surveying benchmarks (including those affecting levee heights, coastal restoration programs, surge modeling, BFEs, and other engineering inputs) which can contribute to additional flooding problems if construction occurs at lower elevations than anticipated or planned.

In the April 2005 Plan, subsidence was treated as part of the larger issue of "land loss." This Plan Update recognizes these hazards as two distinct, though interrelated, issues. Land loss is the process by which coastal lands, particularly wetlands, erode or sink into open water as a result of violent storms, coastal erosion, a lack of new sediments, salt water intrusion, and rising sea levels. Land loss can be mitigated through major coastal restoration and protection measures that are beyond the scope of most funding programs associated with DMA 2000 hazard mitigation planning, but which are being planned and implemented by other entities within the state and federal

[26] R. K. Dokka. "Modern-Day Tectonic Subsidence in Coastal Louisiana." (Geology: 34), 2006.

governments (see Section 4.3 and 8.3 for more information). For this reason, this Plan Update does not directly engage coastal erosion or coastal land loss as hazards.

As noted above, subsidence is the process of land decreasing in elevation; in some areas, ground elevations have fallen two to four feet since 1950. On the facing page, Maps 4-22 a and b show the hazard profiles for land loss and subsidence. These issues are related, but not identical.

Maps 4-22 a and b: Comparison of Hazard Profiles for Land Loss and Subsidence

4-22 a - Land Loss

4-22 b - Subsidence

Several efforts are underway to improve the understanding of subsidence. USGS, United States Army Corps of Engineers (USACE), and the University of New Orleans have teamed to develop an objective and reliable scientific database on subsidence and sea-level rise. Also, the Louisiana State University (LSU) Center for Geoinformatics is working with FEMA and NOAA to develop a plan for an accurate and sustainable system of elevations in South Louisiana.

These efforts should result in accurate data on elevation and on rates of subsidence. There are differences in the results of these analyses, in terms of the magnitude of the problem and the extent to which the problem is occurring on a micro level; in some cases differing by an order of magnitude or more. It is also important to acknowledge the complexity of the problem including the fact that subsidence rates are not constant and can vary with time due to transient factors such as the movement of deep faults. However, all studies to date agree that areas can be identified across the southern tier of parishes that are subsiding rapidly enough for the effects to be felt during the useful life of a building. Information of this kind can lead to rational decisions about future mitigation efforts for these areas such as the provision of additional freeboard above BFEs to account for sinking ground elevations.

Due to the long-term implications of subsidence for the State, this hazard was included in the risk assessments and addressed in the Mitigation Action Plan.

Wildfire

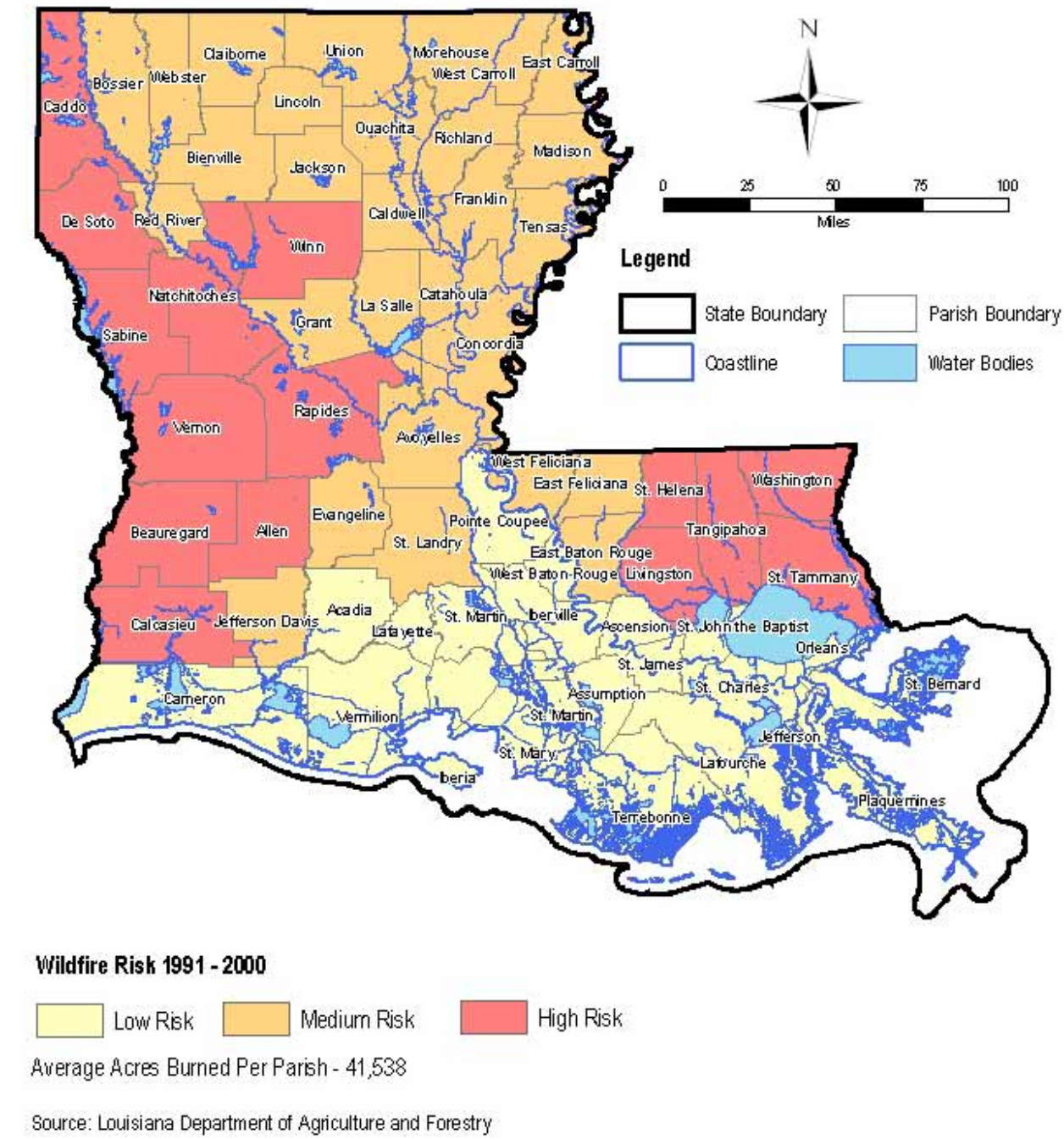
A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed, spread quickly, and are usually signaled by dense smoke that fills the area for miles around. Naturally occurring and non-native species of grasses, brush, and trees fuel wildfires. Wildfires can be caused by human acts, such as arson or careless accidents, or by the natural occurrence of lightning.

From 2000 to 2002, the average number of forest fires was 2,418 per year, and the average number of acres burned was 37,761. According to the State Forestry Division, Louisiana's forestlands cover 48% or 13.8 million acres of the State's area. The urban-wildland interface is the area in which development meets wildland vegetation. Both vegetation and the built environment provide fuel for fires. As development near wildland settings continues, more and more people are being exposed to wildfire danger.

Wildfire danger can vary greatly season to season and is exacerbated by dry weather conditions. In dry and drought conditions, wildfires can become quite intense, burning dead forest debris on forest floors, dried grasses, and brush. Because most fires in Louisiana forests are caused by arson and other careless acts committed by people, the location and severity of fires is largely unpredictable. However, the Louisiana Department of Agriculture and Forestry does provide general assessments of the risk of wildfire based on geographic location in the State (see Map 4-23). Although the tables in Appendix D have been revised since the April 2005 Plan to reflect an additional six months of data, the mapping included in this Section and Appendix D are unchanged.

Due to the relative risk for certain areas of the State and an emphasis on wildfire prevention at the State and Federal level, this hazard was included in the risk assessments and addressed in the Mitigation Action Plan.

Map 4-23: Hazard Profile-Wildfire



Wildfire Risk 1991 - 2000

Low Risk | Medium Risk | High Risk

Average Acres Burned Per Parish - 41,538

Source: Louisiana Department of Agriculture and Forestry

Dam Failure

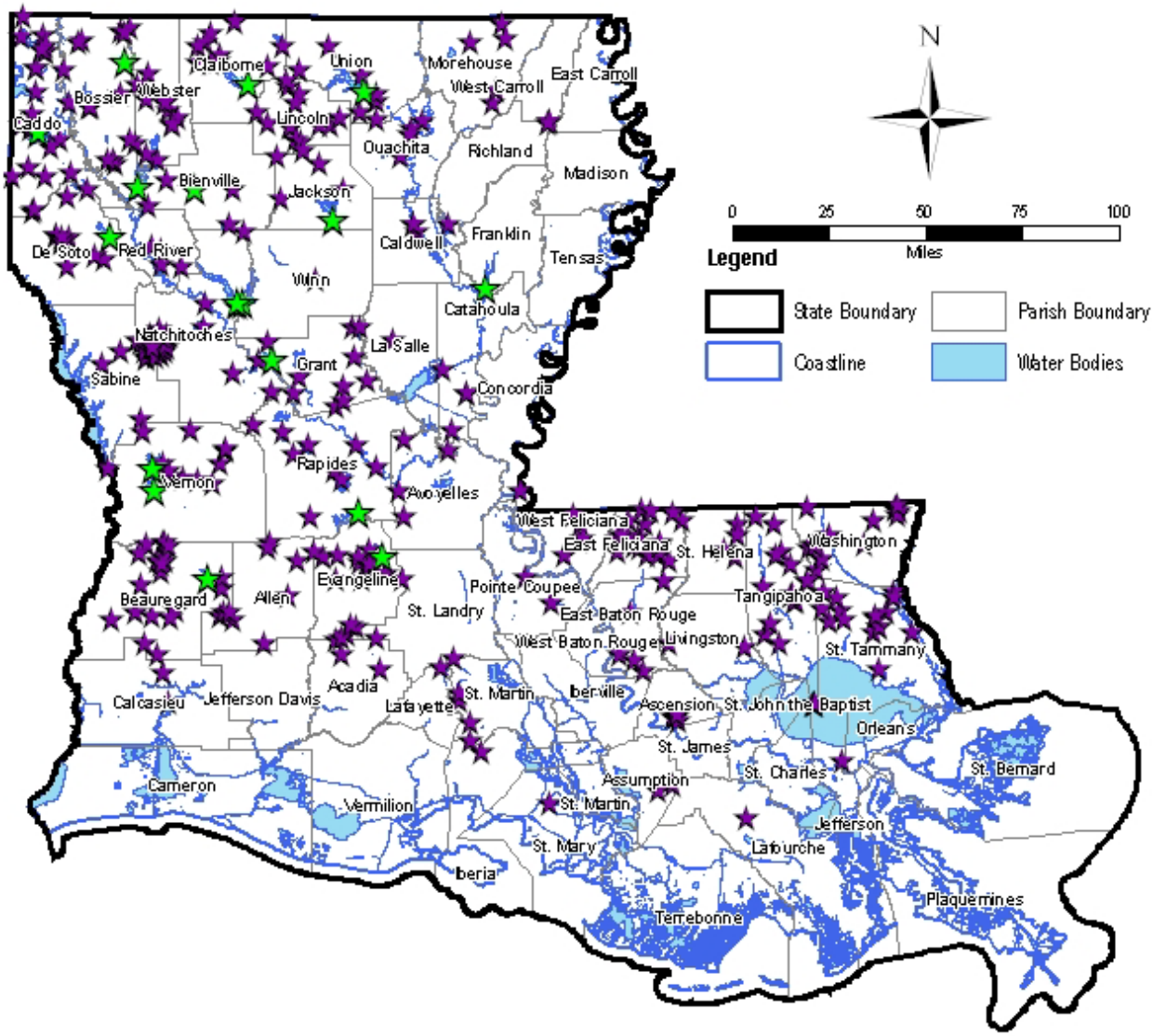
Dams are water storage, control, or diversion barriers that impound water upstream in reservoirs. Dam failure is a collapse or breach in the structure. While most dams have storage volumes small enough that failures have little or no repercussions, dams with large storage volumes can cause significant flooding downstream. In Louisiana there are 365 dams included in the USACE National Inventory of Dams.

While there are no reports of significant dam failures in Louisiana, the National Performance of Dams Program, a database maintained by Stanford University of dam incidents (events that affect the structural and functional integrity of dams, though not necessarily causing failure and not including ordinary maintenance and repair, vandalism, acts of war, recreational accidents, and sabotage), lists one incident from the fall of 1985. Park managers at the Cotile Lake Dam/Reservoir in Rapides Parish reported seepage due to sand and gravel deposits that displaced concrete slabs. There was no dam failure or controlled breach reported in this incident.

The amount of water impounded, and the density, type, and value of development downstream determine the potential severity of dam failure. In Louisiana, there are 15 high hazard potential, 63 significant hazard potential, and 287 low hazard potential dams. Map 4-24 shows the high hazard dam locations per the USACE's inventory. This map has also been updated to reflect which dams are currently managed by the State of Louisiana.

Due to the high potential for significant personal injury and property damage for the State, this hazard was included in the risk assessments and addressed in the Mitigation Action Plan.

Map:4-24: Hazard Profile-Dam Failure



Source: U.S. Army Corp of Engineers National Inventory of Dams

Levee Failure

Levees and flood walls are flood control barriers constructed of earth, concrete, or other materials. For the purposes of this Plan Update, levees are distinguished from other flood barriers such as berms by their size and extent. Berms are barriers that only protect a small number of structures; at times only a single structure. Levees and floodwalls are barriers that protect significant areas of residential, commercial or industrial development; at a minimum a neighborhood or small community. Further distinctions regarding levees and floodwalls are provided in Appendix H but for the purposes of this Plan Update, they function in essentially the same manner, differing only in terms of basic construction materials and are both included in the following references to "levees".

Levee failure involves the overtopping, breach, or collapse of the levee or flood wall. Levee failure is especially destructive to nearby development during flood and hurricane events. The northern half of Louisiana is protected by levees on the Ouachita River under the authority of the Vicksburg District of the USACE. Coastal and southern Louisiana is protected by an extensive levee system under the authority of the New Orleans District of the USACE. The New Orleans District includes 30,000 square miles of Louisiana south of Alexandria, including 961 miles of river levees in the Mississippi River and Tributaries Project, 449 miles of river levees in the Atchafalaya Basin, and 340 miles of hurricane-protection levees. Map 4-25 shows the location of the major levees in Louisiana. Other levees in Louisiana are under the authority of other USACE districts or other, non-USACE jurisdictions.

Levees and flood walls have been overtopped or breached during flood events and non-flood events. A section of levee along the Mississippi River near Marrero failed in a non-flood-related event, and several sections along Lake Pontchartrain and along both navigation and drainage canals failed in New Orleans during Hurricane Katrina. The extent and depth of these levee failures resulting from Hurricane Katrina caused extreme flooding in New Orleans that can be clearly noted in Figure 4-11. The causes of these levees' and flood walls' failures was varied. In some cases, there were problems with the construction and maintenance of levees and floodwalls that led to failure. However, it was clearly determined in studies by (NIST) that overtopping played a role in at least some of the failures associated with these storms.[27]

Failure due to overtopping of levees is relatively "predictable" based on design and performance expectations for individual structures. If properly constructed and maintained, a levee designed to provide protection against a "100 year event" of a definable magnitude would have a 1 percent chance of being overtopped in any particular year.

The concept is simple enough; if you can predict how high the water will rise for different recurrence intervals, you build the levee to the desired level of protection or elevation. Typically, some freeboard is added to the height of the levees to allow for errors or imprecision in the calculations.

Some levees in Louisiana have been designed to this frequency of occurrence criteria; more typically in the northern part of the State along rivers or streams where hydrologic conditions can be more reliably determined. The limits of these predictions include changes over time in the way design events are determined, i.e., what constitutes a 100-year event is revised from time to time as data improves.

In the southern part of the State where levees are intended to provide protection against hurricane wind-induced storm surge, prediction of how often levees and floodwall systems may fail is more complicated. The design process for these levees is based on a hypothetical hurricane that is referred to as the "Standard Project Hurricane" (SPH). On a case by case basis, the engineering of levees in these areas takes into account a number of factors intended to represent the "most severe combination of meteorological conditions considered reasonably characteristic" for a specific geographic area. This has been the prevailing practice since the 1950's.

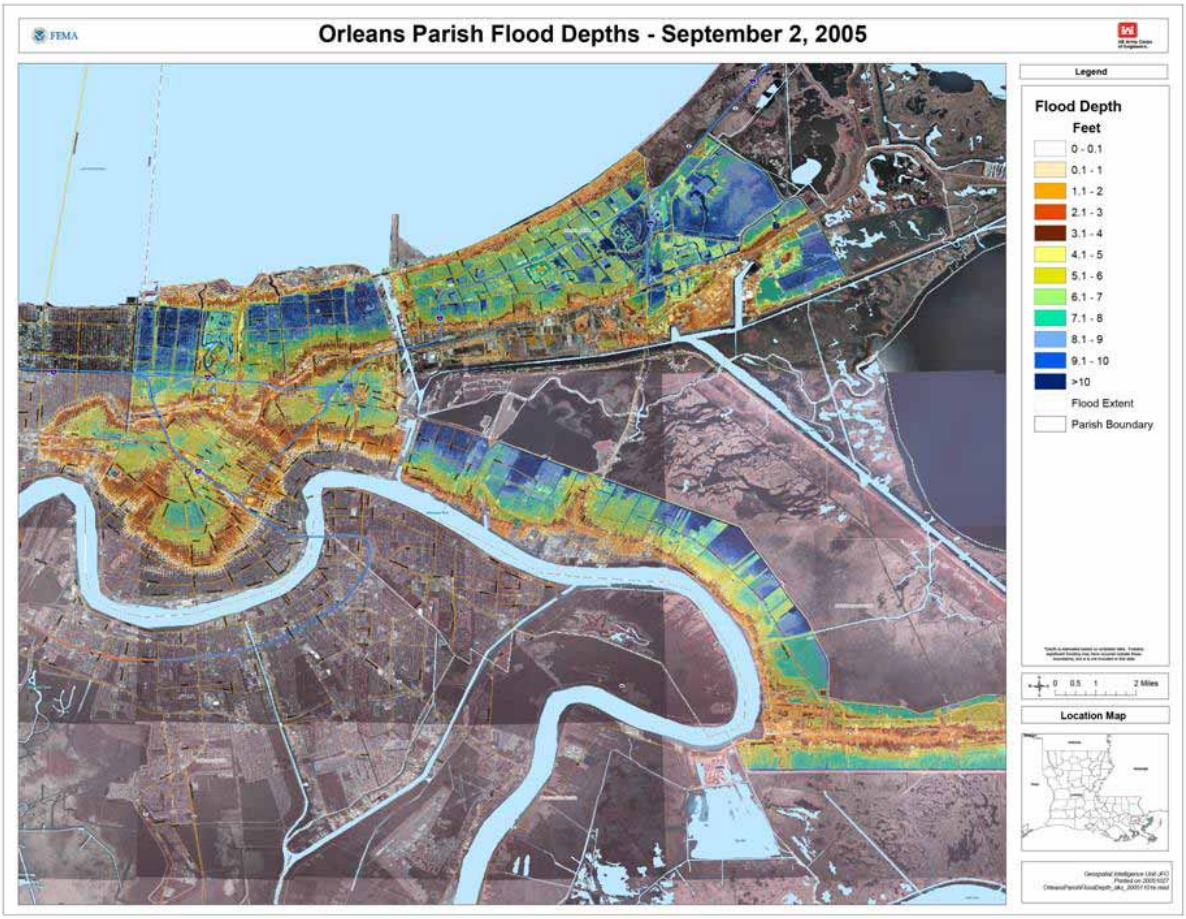
[27] NIST Technical Note 1476: Performance of Physical Structures in Hurricane Katrina and Hurricane Rita: A Reconnaissance Report, *National Institute of Standards and Technology, Gaithersburg, MD 20899,* June 2006

Technology for modeling SPH has improved dramatically since the 1950's but there is still much uncertainty in the process due to the highly variable nature of hurricanes. As a result, there is typically no recurrence interval associated with levee protection in the actual design process. However, it is possible to look at the frequency of occurrence for the types of events that have caused levee failures in recent history. For example, according to studies of historic data, "a hurricane of Katrina's intensity or stronger can be expected to occur, on average, once every 21 years somewhere along the Gulf coast from Texas through Alabama". [28]

Failure due to breach or collapse of levees is not easily predicted on a broad scale even with extensive investigations. Factors such as sub-grade soil conditions, construction practices and maintenance programs must be evaluated. Even with extensive data, the predictive value is limited to areas that are directly examined in detail as specific site conditions can vary widely in just a short distance,

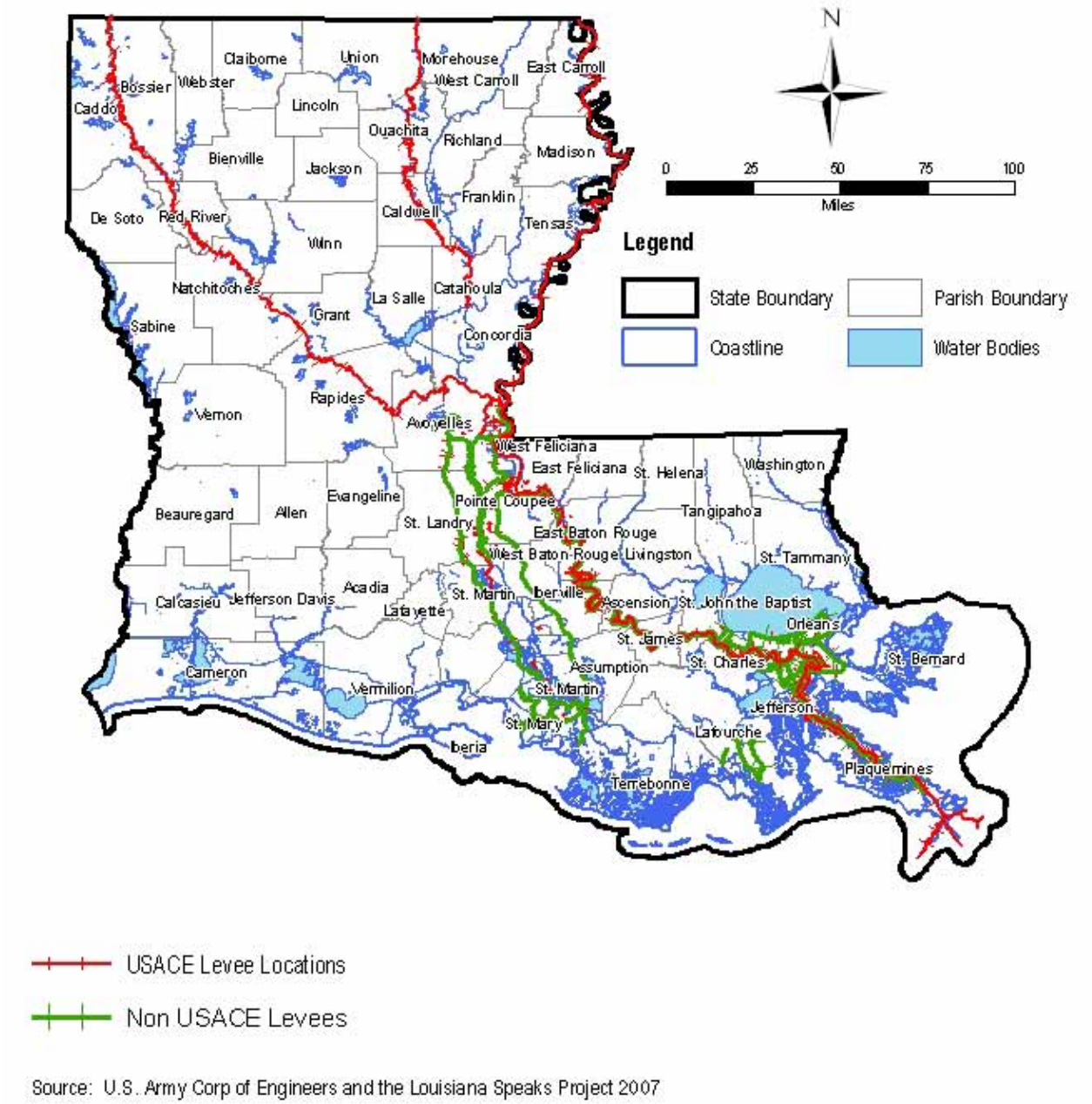
Due to the high potential for significant personal injury and property damage for the State, this hazard was included in the risk assessments and addressed in the Mitigation Action Plan.

Figure 4-11: Hurricane Katrina Levee Failure Inundation (Source: NOAA, 2006)



[28] Estimated return periods for Hurricane Katrina, J. B. Elsner,1 T. H. Jagger,1 and A. A. Tsonis, Geophysical Research Letters, Vol. 33

Map 4-25: Hazard Profile-Levee Failure



USACE Levee Locations

Non USACE Levees

Source: U.S. Army Corp of Engineers and the Louisiana Speaks Project 2007

This page is intentionally blank.

Hazardous Material Incident

Hazardous materials incidents are technological (meaning non-natural hazards created or influenced by humans) events that involve large-scale accidental or intentional releases of chemical, biological, or radiological (nuclear) materials. Hazardous materials incidents (see Map 4-26) generally involve incidents at fixed-site facilities that manufacture, store, process, or otherwise handle hazardous materials (see Map 4-27) or along transportation routes like major highways, railways, navigable waterways, and pipelines (see Map 4-28).

Southern Louisiana between New Orleans and Baton Rouge is commonly known as the "chemical corridor" because of its heavy concentration of petrochemical manufacturing facilities sited along highways, railways, and navigable waterways. Map 4-26, which illustrates the number of hazardous material releases per square mile, reflects that the highest number of releases in the State corresponds to this corridor. As of 2004, the State of Louisiana had 375 fixed-site facilities that filed Toxic Release Inventory reports with the EPA, the agency that monitors the manufacture, disposal, transportation, and releases of hazardous materials. Louisiana ranked 11th in the nation for the number of pounds of on- and off-site releases from these facilities (132,936,323 pounds). This information has been updated since the April 2005 Plan.

While the State has thousands of accidental releases each year, most damaging effects are limited by the insignificant size of the accident and the timeliness of appropriate emergency response. However, some accidental releases have been of a size sufficient enough to present a danger to nearby populations or the environment.

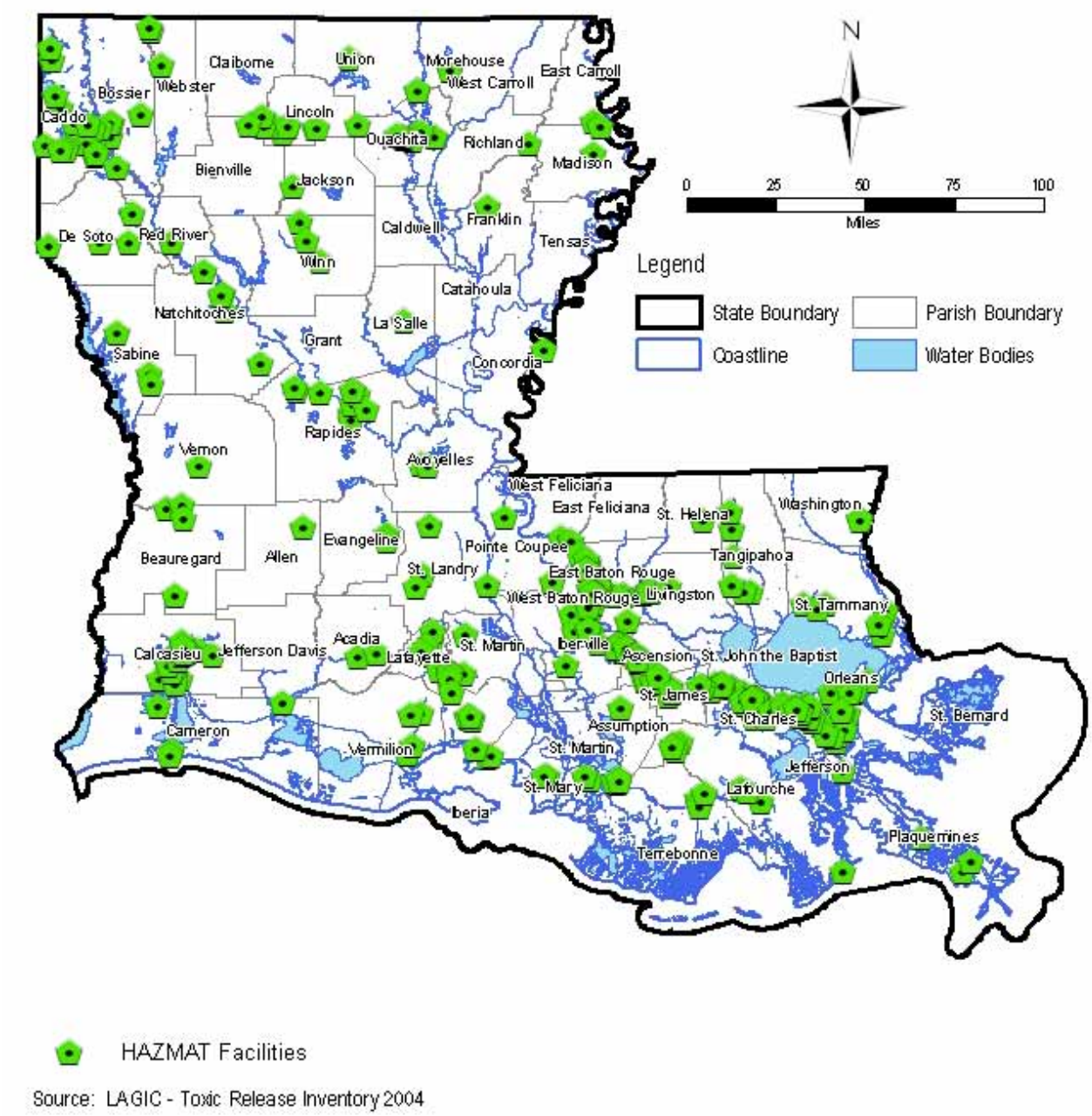
On average, the State of Louisiana receives about 5,000 reports of accidental hazardous materials releases annually. Most accidental releases occur while chemicals are being transported along major highways.

The severity of a hazardous materials release depends upon the type of material released, the amount of the release, and the proximity to populations or sensitive areas like wetlands or waterways. The release of materials can lead to injuries or evacuation of thousands of nearby residents.

Because the State's "chemical corridor" lies along transportation routes between New Orleans and Baton Rouge in southern Louisiana, scientists and other hazard analysts theorize that hurricane winds, storm surge, or flooding could lead to an accidental release of a hazardous material from a fixed-site or from a transport mode on one of the highways, railroads, or waterways. A professor for the Institute for Environmental Studies at LSU theorizes that airborne debris could breach pipes or tanks, floods could break tanks away from facilities, and floating debris could rupture pipelines. Such releases could lead to widespread contamination of Louisiana's coastline and inland areas, explosions and fire, and death or injury to humans, plants, and animals. The Murphy Oil spill in St. Bernard Parish during Hurricane Katrina provides an example of this kind of event actually occurring. The exposure to such "secondary risks" is further explored in Section 5.14.

Due to the high potential for significant personal injury due to hazardous material incidents in the State, this hazard was included in the risk assessments and addressed in the Mitigation Action Plan.

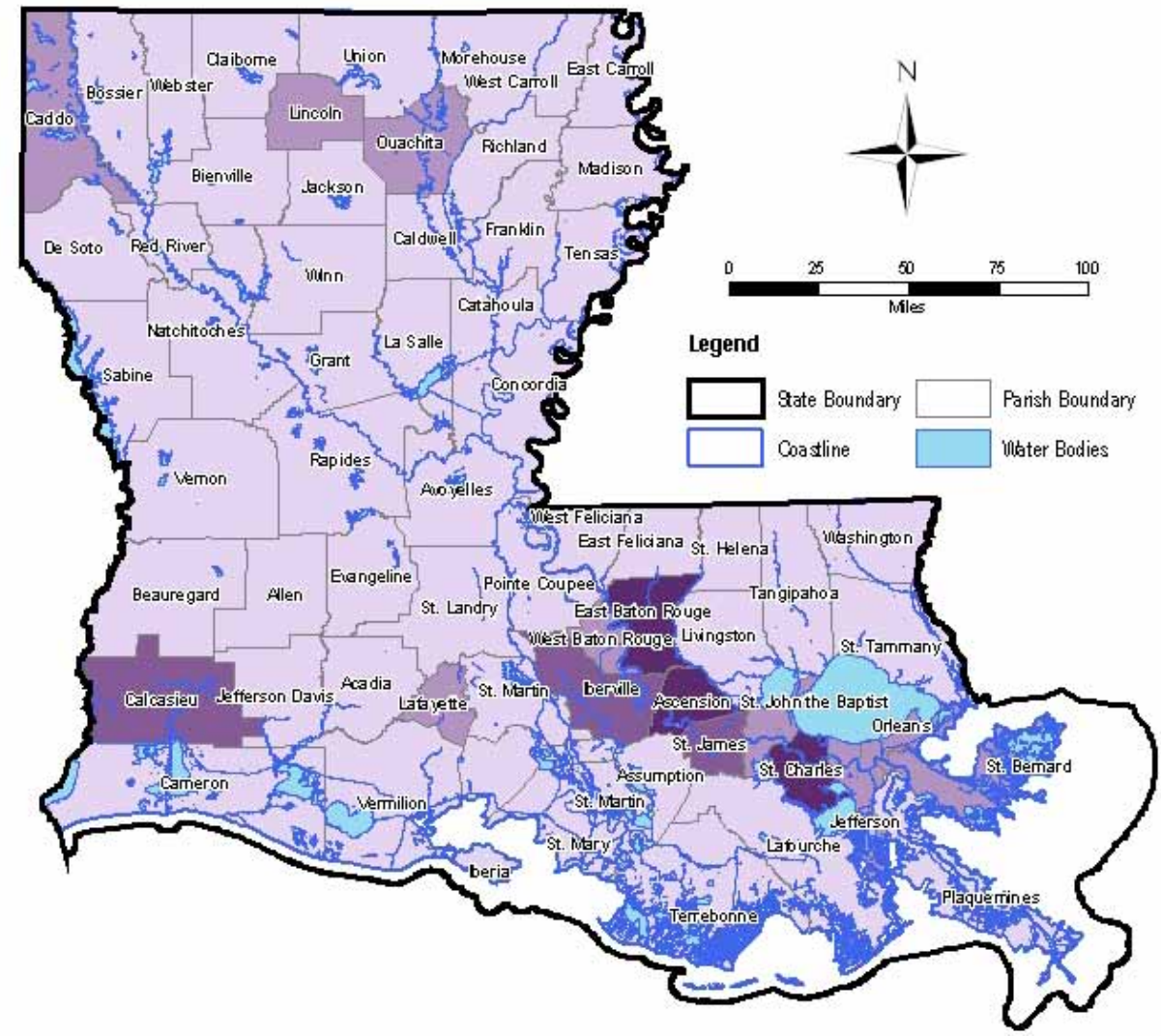
Map 4-26: Hazard Profile-Hazardous Material Incidents



HAZMAT Facilities

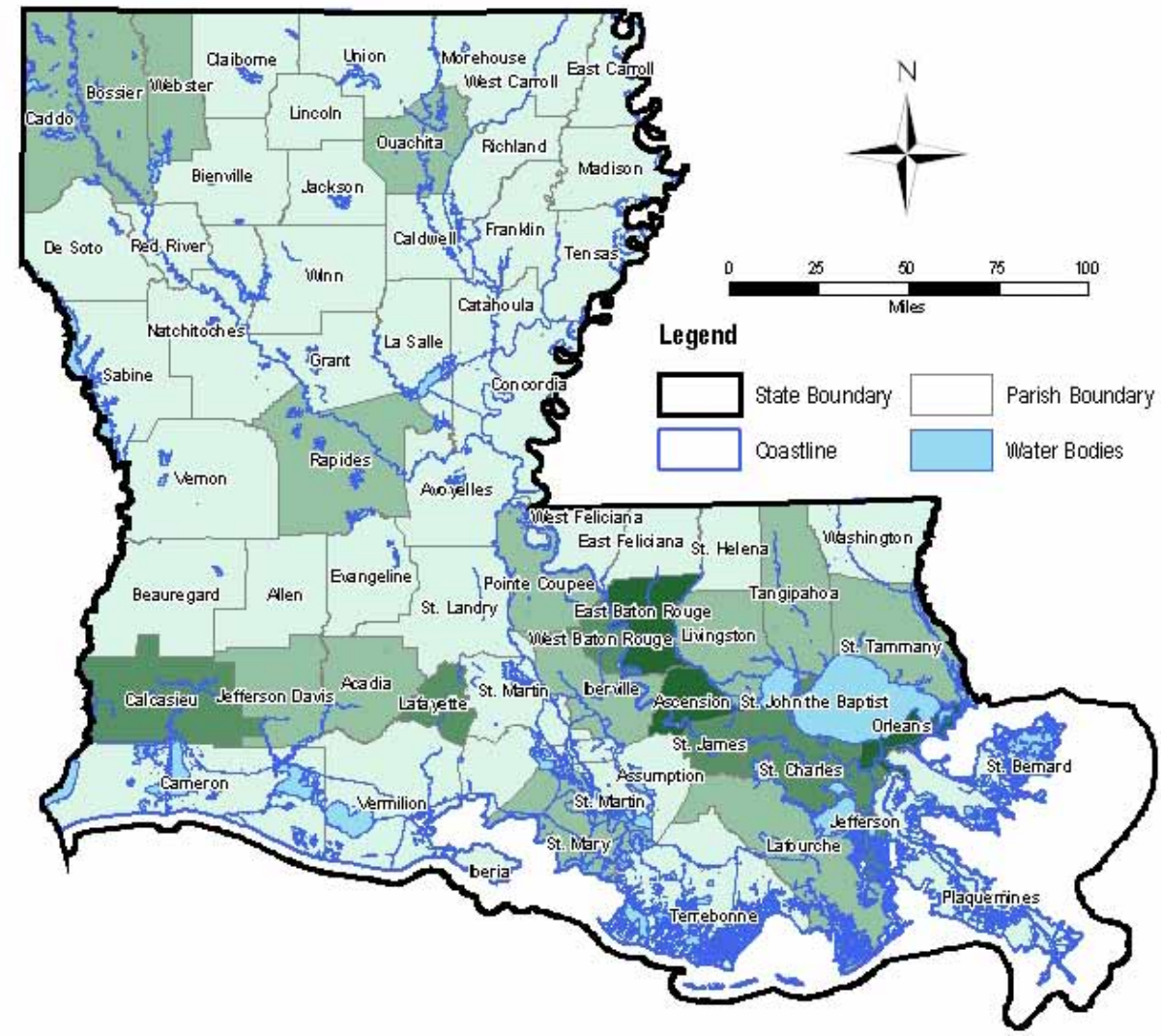
Source: LAGIC - Toxic Release Inventory 2004

Map 4-27: Hazard Profile-Hazardous Material Incidents (Fixed Locations)



Source: Louisiana DEQ 2000 - 2007

Map 4-28: Hazard Profile-Hazardous Material Incidents (Transportation)



Source: Louisiana DEQ 2000 - 2007

4.5 Hazard Priorities

Table 4-9 indicates the relative priority assigned to the 10 prevalent hazards as determined by the SHMPC. These priorities were developed by averaging hazard ranks per each SHMPC member at the November 29, 2007 meeting. These results are not meant to be an indication of how all resources should be prioritized but will be used to develop a combined risk assessment in Section Five for illustrative purposes.

Table 4-9: Hazard Priorities

Ranking	Hazard
1	Storm Surge
2	High Wind – Hurricane / Tropical Storm
3	Flood
4	High Wind – Tornado
5	Levee Failure
6	Subsidence
7	Hazardous Material Incident
8	Ice Storm
9	Wildfire
10	Dam Failure

Only four hazards that were identified in parish and municipal HMPs neither appear on this list nor are otherwise dealt with by this Plan Update. These are: drought, hailstorms, lightning, and extreme heat. Refer to Section 4.3, "Correlation with Parish and Municipal Hazard Mitigation Planning Efforts," for more discussion of how the ten top identified hazards in the Plan Update correlate to the prevalence of hazards identified in parish and municipal HMPs.

Section Five
Statewide Risk Assessment

Contents of this Section

5.1 Interim Final Rule Requirements for Statewide Risk Assessment

5.2 Introduction

5.3 Methodology

5.4 Flood

5.5 High Wind - Hurricane

5.6 High Wind - Tornado

5.7 Ice Storm

5.8 Storm Surge

5.9 Subsidence

5.10 Wildfire

5.11 Dam Failure

5.12 Levee Failure

5.13 Hazardous Materials Incident

5.14 Additional Measures of Risk Assessment

5.15 Assessing Recent and Future Development

5.16 Notes on Data Limitations

5.17 Integration of Parish and Municipal Hazard Mitigation Plans

5.18 Summary and Limitations of Data

5.1 Interim Final Rule Requirements for Statewide Risk Assessment

The Interim Final Rule (IFR) includes two specific requirements regarding statewide risk assessments:

- Vulnerability Assessment per Requirement §201.4(c)(2)(ii): "[The State risk assessment shall include an] overview and analysis of the State's vulnerability to the hazards described in this paragraph (c)(2), based on estimates provided in local risk assessments as well as the State risk assessment. The State shall describe vulnerability in terms of the jurisdictions most threatened by the identified hazards, and most vulnerable to damage and loss associated with hazard events."

- Estimated Losses per Requirement §201.4(c)(2)(iii): "[The State risk assessment shall include an] overview and analysis of potential losses to the identified vulnerable structures, based on estimates provided in local risk assessments as well as the State risk assessment."

5.2 Introduction

A statewide risk assessment was prepared for the hazards identified in Section Four:

- Flood
- High Wind – Hurricane
- High Wind – Tornado
- Ice Storm
- Storm Surge
- Subsidence
- Wildfire
- Dam Failure
- Levee Failure
- Hazardous Materials Incident

Map 4-1 (see page I-27) shows the State of Louisiana and the political boundaries for the individual parishes and serves as a reference for this section. A general overview of the risk assessment methodologies and summary results for these hazards are presented in the subsections that follow. Detailed discussions of risk assessment methodologies for each of these hazards, along with related maps and tables, are presented in Volume II, Appendix E.

This section concludes with a summary that includes a discussion of the limitations regarding use of these results.

5.3 Methodology

Overview

The statewide risk assessment was focused on determining the relative risk of the 64 parishes in the State to the ten hazards identified in Section Four. Specifically, the risk assessment examines risk to citizens, communities, businesses, and industries, with the intent of prioritizing mitigation activities to address that risk. The State Hazard Mitigation Planning Committee (SHMPC) determined that parishes were the appropriate political unit for this part of the study for the following reasons:

- The majority of local hazard mitigation plans are being developed at the parish level. These plans, as multi-jurisdictional plans under the Disaster Mitigation Act of 2000 (DMA 2000) requirements, account for the planning needs of all participating jurisdictions within each parish. As a result, municipalities, tribes, and parishes can all be effectively "covered" by this approach.
- Similarly, early in the planning process SHMPC decided that future interactions between The Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP), the State Hazard Mitigation Team (SHMT) and local communities would primarily use established communications channels through the parish emergency management agencies.
- Finally, in many cases, as documented below and in Volume II, Appendix E, there were limited data available for analysis and therefore detailed analyses below the parish level would not yield any increased accuracy in the results.

The relative risk for each parish was determined using the best available data that could be used consistently on a statewide basis. The end result was a high / medium / low hazard ranking for each hazard for each parish. In some cases, numerical rankings (from 1 to 64) were determined which represent the relative risk for all the parishes. However, since the quality and availability of data vary considerably, the specific methodologies for determining the hazard rankings differ between hazards.

Local Risk Assessments

Section §201.4(c)(2)(ii) of the IFR makes specific reference to using the results of local risk assessments as a component of the statewide risk assessment. At the time the risk assessment was developed for this Plan Update, every parish in Louisiana was covered by a Federal Emergency Management Agency (FEMA)-approved Hazard Mitigation Plan, as were a number of municipalities and some other government subdivisions. However, as described below (see subsection 5.13), the parish and municipal plans vary widely in key characteristics, including hazard identification definitions, risk assessment data and methodologies, cost estimation, and more. This makes cumulative analysis of parish and municipal plans difficult. Nevertheless, every effort was made to incorporate the results of parish and municipal Hazard Mitigation Plans into the Plan Update. This is explained in detail in Section 5.17.

The difficultly of meaningfully incorporating the results of parish and municipal Hazard Mitigation Plans into the state Plan is addressed by capability assessment research described in Section Seven and a number of action items in Sections Eight and Nine of this Plan Update. Assuming these action items are put into practice, state-parish coordination on hazard mitigation should improve markedly during future updates of parish and state hazard mitigation plans.

Although the parish, municipal and state planning efforts are still not fully synchronized during this round of state planning, the results of the statewide risk assessment will be useful to:

- Provide a basis for improving consistency, data-sharing, communication, and other coordination issues between parish EMAs and state-level hazard mitigation planning.
- Provide a basis to review results of parish and municipal hazard mitigation plans.
- Provide a frame of reference for parishes and municipalities for future updates of their risk assessments and plans.
- Form the basis for comparing the relative risk of parishes as part of evaluating future hazard mitigation grant applications. As explained in Volumes III and IV, GOHSEP and the SHMT will be able to refer to these results as they:
    - Develop specific Implementation Strategies for FEMA's Hazard Mitigation Grant Program (HMGP) funding on a disaster by disaster basis; and
    - Decide how to award pre- and post-disaster mitigation grant funds to competing grant applications.

Definitions

To better understand the methodology for this study, it is necessary to define the following key terms: risk, vulnerability, value, and probability.

Risk represents the impacts that disasters could inflict on a community. A "community" can include everything from a small village to a state or even a whole country. As noted above, the community level that is being studied in this section of the Plan is the parish.

Risk can be described qualitatively, using terms like high, medium or low. When there are sufficient data, risk can also be described quantitatively by estimating the losses that may be expected from a specific hazard event (e.g., a "100-year" flood) or more broadly from a type of hazard (e.g., flooding). Loss estimates are often expressed in dollars of future expected losses. When possible, it is calculated this way so that potential losses from different kinds of hazards can be compared. In addition, it is possible to take the results of a quantitative risk assessment and produce a qualitative ranking. For example, the communities with the highest estimated losses would be assigned the highest relative hazard ranking.

Risk is a product of several factors including vulnerability, value and probability.

Vulnerability is the extent to which something can be damaged by a hazard. Vulnerability is based on the severity of the identified hazard, what type of assets are exposed to the hazard including physical (such as buildings and infrastructure, both public and private property) and functional (such as government or business operations), and the characteristics of those assets.

- Severity is the measure of "how bad" a particular hazard event is. The severity of different hazards is measured in different ways. For example, as discussed in Section Four (and Volume II, Appendix D), floods can be measured in terms of depth, velocity, duration, contamination potential, debris flow, etc., and tornadoes are measured primarily in terms of wind speed. Related terms include magnitude and intensity.
- Magnitude represents severity in terms of a physical measurement such as wind speed.
- Intensity focuses on the related effects of the hazard, like the expected damage levels due to tornadoes of different magnitudes.
- Exposure refers to the number of people or structures at risk for loss of life, property damage and economic impact due to a particular hazard.
- Asset characteristics that are important in a vulnerability assessment differ depending on the type of hazard. For example, a public or private building that is located in an area subject to high winds will be more or less vulnerable to high wind depending on how substantially the walls and roof are constructed and connected to each other. In this example, the weaker the structure, the higher the vulnerability to the effects of a high wind.

Value is how much something is worth. When performing risk assessments, a monetary value is assigned to community assets (both physical and functional, including public and private property), and in some cases, citizen injuries and casualties. For instance, if a structure is substantially or partially damaged, the building's replacement value serves as the basis for quantifying the loss. Vulnerability assessments for a specific hazard event result in a percent of estimated damage to an asset. This percent can then be multiplied by the value of the asset. The result is an estimate of the losses that would be anticipated under those specific hazard conditions for that particular asset.

For example, researchers have determined that different types of buildings respond in reasonably predictable ways to winds of different speeds This research has resulted in "damage curves" that indicate the percentage of the total value of a building that will be damaged for a range of wind speeds. To predict the damage (or lost value) that would result to a particular building from high wind of a certain magnitude or speed, the damage curves are used to determine the expected losses for that specific event. For the Plan, which covers broad geographic areas, average property values were derived from sources like the United States 2000 Census (2000 Census).

Probability is the likelihood that an event of a particular severity will occur. The most commonly known example is the "100-year flood". As defined in Section Four, the "100-year flood" is the flood event that has a 1 percent change of occurring in any given year.

Probability is a key element of risk assessment because it determines how often an event is likely to happen. Probability allows a calculation of total Annual Estimated Losses (AEL) associated with all high wind events, as opposed to a calculation of anticipated losses from a single high wind event. By factoring in the probability of different wind hazard events that may occur in any given year (for example, a wind event with winds ranging from x to x has an x% chance of occurring on an annual basis), along with their associated loss estimates, it is possible to get a true assessment of the total risk faced by a particular building or asset to a type of hazard. The resulting AELs are then long-term weighted averages of lost value in a single year.

The ability to accurately determine probability depends on the type of hazard. For instance, flood studies can provide reasonably accurate estimates of how often water will reach particular places and elevations. On the other hand, the occurrence of tornadoes and earthquakes are difficult to predict. Tornadoes do not have an easily definable specific location like floods, and earthquakes can occur in a broad range of locations and severities.

Hazard Rankings

The preceding definitions indicate that data are needed at several points in the process to produce a true risk assessment yielding AELs. Most states and communities do not have all the required data, and Louisiana is no exception. Although much is known about the history of hazards and disasters in the State, a number of specific data points do not yet exist. For example, much more detail about historical occurrence of hazards in the State is needed to determine the probabilities of most of the possible hazard events. In addition, as detailed in Section 5.17, attempts to mine detailed information from the existing parish and municipal hazard mitigation plans was largely unsuccessful for the purposes of this Plan Update.

Therefore, the hazard rankings developed in this risk assessment are based on different kinds of analyses and vary from hazard to hazard in terms of level of detail and reliability. The different analyses can be categorized as follows:

- Hazard Profiles – The information presented here restates the results of the hazard identification and profiling. The profile information is needed to determine relative risk based on where hazard events have happened the most in the past. This is useful to the extent that the data record is lengthy enough to provide a representation of which parishes are more at risk than others.
- Exposure – Exposure information quantifies exposure of assets to provide a way to compare potential losses between parishes. Exposure data typically overstate anticipated losses because they include the total value of assets that are in harm's way and do not account for the more likely occurrence of only partial damage to an asset. Nevertheless, exposure information is useful for comparing parishes for a given type of hazard. Geographic Information System (GIS) - based hazard profile information is layered over readily available information about assets within the parishes. For example, data about building types, critical facilities[29], infrastructure and demographics (see Volume II, Appendices E.1 – E.3) from the 2000 Census can be laid over locations of hazards with predictable extents (such as the 100-year floodplain for the 100-year flood event) to determine the total exposure of buildings and people to the effects of the hazard.
- Annual Estimated Losses – Estimating expected annual losses is done for single hazard events based on generalized data regarding building types. This information is used to make determinations about relative risk among assets. This type of result is a step above only using exposure as a proxy for vulnerability since it provides a more accurate assessment of actual anticipated losses. While this technique is used for a number of hazards in this study, the accuracy of the results is still hampered by the coarseness of the data used to make the determinations. Estimated losses were calculated from historic data records regarding severity, losses and probability and were then overlaid with data inventory files containing the number and characteristics of built assets. These calculations were made manually or in some cases were modeled by computer programs such as Hazards U.S. – Multi Hazard (HAZUS-MH).

  HAZUS-MH is a hazard loss estimation model developed by FEMA for use by states and communities nationwide. HAZUS-MH includes default data from the 2000 Census and a host of other available data sources and includes algorithms that can mathematically model hazard events to calculate estimated losses for earthquakes, floods and high winds due to hurricanes.[30] See Volume II, Appendix E.16 for information about the types of data inventories used to develop HAZUS-MH. The basic steps in the process of estimating losses include:

  - Compile data regarding historic hazard events from national and local sources;
  - Conduct statistical analysis of hazard data to relate historical patterns within data to existing loss estimation models (i.e., maximum, minimum, average and standard deviation of historic loss data);

[29] Critical Facilities as used in Section Five refer to local community or parish medical care facilities, police stations, fire stations, emergency operations centers and schools. These are facilities deemed critical in responding to and recovering from a hazard event or facilities (like schools) that contain sensitive populations and/or may be used as shelters in an emergency.

[30] Information about HAZUS – MH is readily available online at http://www.fema.gov.hazus/.

- Prepare data for input to models and/or calculation procedures based on statistical analysis, requirements of the models / procedures and risk engineering judgment;
- Apply the hazard model or undertake the calculations to develop severity and probability tables and curves;
- Model or calculate simple damage function to related hazard severity to a level of damage;
- Determine the threshold level of damage for each hazard that relates to an annual probability of occurrence; and
- Develop AELs.

Table 5-1 provides an overview of the types of results (i.e., hazard profile, exposure or annual loss estimate) and basic data inputs and methodologies for each hazard. A detailed account of the hazard methodologies is presented in Volume II, Appendix E.

Table 5-1: Risk Assessment Results and Methodologies

Hazard	Type of Results	Data Inputs / Methodology	Comments
Flood	Hazard Profile	Annual Average Losses per NFIP (1978-2007)	This section has been updated to reflect more recent data.
High Wind (Hurricane)	Annual Estimated Loss	National Weather Service (2005) / HAZUS-MH (2004)	This section has not been updated due to a lack of more recent data.
High Wind (Tornado)	Annual Estimated Loss	Statistical Analysis (1950-2005)	This section has been updated to reflect more recent data.
Ice Storm	Exposure	National Climatic Data Center (2007)	This section has not been updated due to a lack of more recent data.
Storm Surge	Annual Estimated Loss	National Weather Service (2005)/ HAZUS-MH (2004)	This section has not been updated due to a lack of more recent data.
Subsidence	Exposure	U.S. Census (2000) and U.S. Geologic Survey (USGS) National Land Cover Data (2000)	This section has been updated to reflect more recent data.
Wildfire	Exposure	U.S. Census (2000) and USGS National Land Cover Data (2000)	This section has not been updated due to a lack of more recent data.
Dam Failure	Hazard Profile	Dam Classifications (2005)/ HAZUS (2004)	This section has not been updated due to a lack of more recent data.
Levee Failure	Hazard Profile	U.S. Census (2000)	This section has been updated to reflect more recent data.
Hazardous Material Incident	Exposure	US Census (2000) / ALOHA (2004)	This section has not been updated due to a lack of more recent data.

From these results, low, medium and high hazard rankings were determined in several ways, depending on the available output for each hazard including:

- The tabulated results were examined for “natural breaks” in the data for hazards where loss results could be generated: i.e., for flood, high wind, storm surge;
- The hazard ranking for ice-storm was determined by the number of recorded historical incidents;
- The hazard ranking for wildfire was based on “natural breaks” of the acreage burnt during an average ten-year period;

- The hazard ranking for dam failure was based on whether a parish had one or more high, significant or low hazard dam within the parish boundary;
- The hazard ranking for levee failure was based on "natural breaks" of the concentration of population located within one-half mile from all levees in the parish; and
- The hazard ranking for hazardous materials incident was based on "natural breaks" of the potentially affected populations within a one-mile radius from each hazardous materials facility in the parish.

Table 5-2 identifies the criteria used for assigning relative risk rankings for each hazard. For more information, refer to the ranking section of the methodologies for each hazard in Volume II, Appendix E.

Table 5-2: Ranking of Relative Risk for Each Hazard

Hazard	Relative Risk		
	High	Medium	Low
Flood	Average Annual Loss >/= $1M	$1M> Average Annual Loss >/= $100K	Average Annual Loss< $100K
High Wind (Hurricane)	Annual Estimated Loss >/= $5M	$5M> Annual Estimated Loss >/= $400K	Annual Estimated Loss <$400K
High Wind (Tornado)	Annual Estimated Loss >/= $200K	$200K>Annual Estimated Loss >/= $75K	Annual Estimated Loss <$75
Ice Storm	> 4 recorded ice storms	1 – 4 recorded ice storms	No recorded ice storms
Storm Surge	Annual Estimated Loss >/= $15 B	$15 B >Annual Estimated Loss >=$250M	Annual Estimated Loss <$250M[31]
Subsidence	Rates > 0.08 cm yr	Rates between 0.02 and 0.08 cm yr	Rates < 0.02 cm yr
Wildfire	>/= 1,000 Acre (10-year average recorded burnt area)	> 0 Acre < 1,000 Acre	0 (No record)
Dam Failure	High Hazard Dam in Parish	Significant Hazard Dam in Parish	Low Hazard Dam in Parish
Levee Failure	High concentrations of population within ½ mile	Moderate concentrations of population within ½ mile	Low concentrations of population within ½ mile
Hazardous Material Incident	Affected population >= 1K	1K>Affected population>=90	Affected population<90

Following a brief discussion of how demographic changes in the wake of hurricanes Katrina and Rita have introduced significant uncertainty into some of the risk assessment methodologies, the remainder of Section Five contains a summary of the hazard rankings for each hazard. In addition, Volume II, Appendix E contains more detail regarding methodologies and results for these hazards.

[31] This footnote covers issues related to Storm Surge, Subsidence and Levee Failure in particular that to a lesser degree may relate to all hazards (see footnotes in each subsection). In each case, there are fundamental limitations to the methodology that was employed. While the results are defensible, they are not necessarily the most useful or representative for long term planning purposes. For example, the rates used for Subsidence have recently been called in question as newer measurement techniques have gained prominence. However, there is currently no accepted yearly subsidence rate estimate. Future efforts under the Community Education and Outreach Program (CEO) will strive to generate more accurate and representative estimates for all the hazards (see Section Eight).

Demographics, the 2005 Storms, and Data Limitations

Parts of Louisiana have been in a state of radical demographic flux and unpredictability since the hurricanes of 2005. Hurricane Katrina resulted in the deaths of nearly 1500 people in and around New Orleans, which flooded catastrophically after its levees failed. On the second anniversary of Katrina, New Orleans's population remained a third lower than before the storm. From across southeast Louisiana, including Orleans, Jefferson, St. Bernard, Plaquemines, and St. Tammany parishes, at least 200,000 people remained displaced[32]. Significant populations were also displaced by Hurricane Rita, particularly from Cameron and Vermilion parishes, where whole towns were destroyed.

Meanwhile, many communities in Louisiana have experienced unusually rapid growth as a result of the two storms, particularly the Baton Rouge area and the north shore of Lake Pontchartrain[33]. Map 5-1 illustrates the results of an interim census taken after hurricanes Katrina and Rita and shows the net increase or decrease in population for each parish in Louisiana since the year 2005. It is assumed that most of this change occurred as a result of hurricanes Katrina and Rita. How much of this growth will be permanent remains to be seen. Because reliable demographic data are an essential part of risk analysis, demographic instability presents a challenge to effective decision-making regarding the deployment of resources for hazard mitigation.

Within those areas that did see massive population dislocation, assessing risk to populations presents methodological and philosophical challenges. Estimating how many people will be threatened by a given hazard is difficult to meaningfully project in areas where it remains unknown whether populations will return. The greater the geographical specificity (that is, the smaller the unit of analysis), the more unreliable the estimations become. Planning to mitigate risk for populations that may not return may not be an effective use of resources; however, not mitigating those risks may effectively prevent the repopulation of such areas.

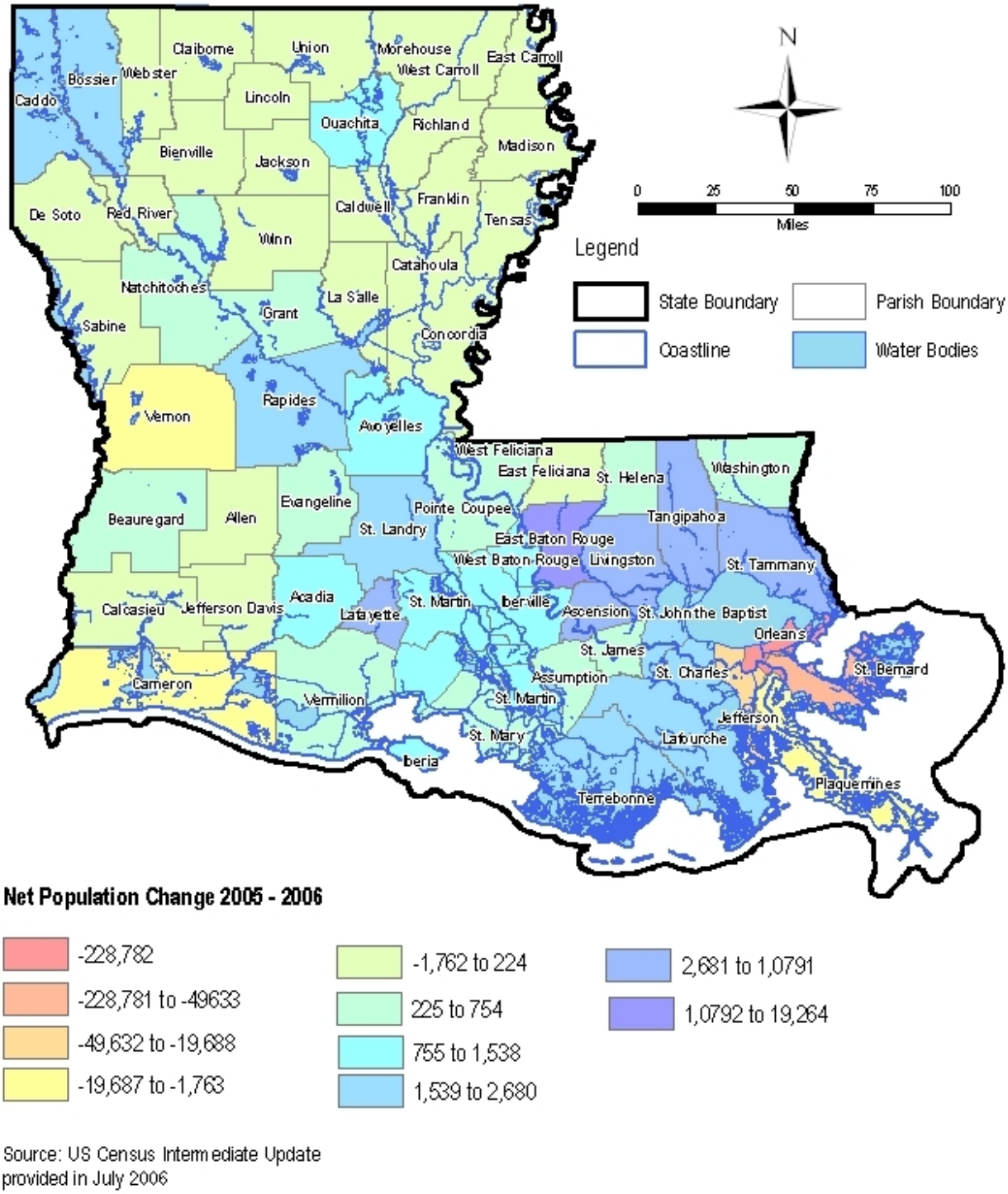
Concerns about the reliability of demographic data, particularly spatial demographic data at a small unit of analysis, are compounded by the increasing age of the most recent data, the 2000 Census. The decennial census provides the only statewide assessment of population characteristics at a geographical unit as small as the block group or census tract. Between censuses, data is almost always aggregated to the parish. This means that fine-grained geographic analysis of population distribution is now at least eight years old even in the most stable communities. The increasing age of such fine-grained data casts some uncertainty on any risk assessment that evaluates population within a certain buffer-area from a spatially defined hazard, such as a dam, levee, or hazardous materials site. Obviously, such uncertainties are radically heightened in areas that experienced sharp population drops, gains, or shifts post hurricanes Katrina and Rita.

Updated population data at a unit of analysis finer than the parish are not likely to be available until the results of the 2010 Census become available, beginning in 2011. This data will not likely be available in time to incorporate into the next triennial State of Louisiana Hazard Mitigation Plan, which must be in the FEMA approval process by the time the new data will be available. Once the 2010 Census results are published, a robust and full update of all hazard analyses in the State will be possible for the first time since the storms of 2005.

The state will be assessed for exposure to hazards using existing data. Parts of the state in which risk assessments based upon spatial analysis of the population will be the least accurate are those areas that saw damage severe enough to remove people from their homes for long periods of time. Elsewhere in the state, margins of error and variations from pre-storm trends may be larger, especially in areas that have seen rapid growth since Katrina and Rita. The 2000 Census remains the only available demographic data source at a sufficiently fine level of resolution for the methodologies used in the Plan Update.

[32] Louisiana Family Recovery Corps fact sheet, August 28, 2007, citing FEMA and LRA data.
[33] LRA/DHH (2006), "Louisiana Health and Population Survey."

Map 5-1: Population Change



Net Population Change 2005 - 2006

- -228,782
- -228,781 to -49633
- -49,632 to -19,688
- -19,687 to -1,763
- -1,762 to 224
- 225 to 754
- 755 to 1,538
- 1,539 to 2,680
- 2,681 to 1,0791
- 1,0792 to 19,264

Source: US Census Intermediate Update provided in July 2006

5.4 Flood

The flood hazard ranking was based on the Average Annual Losses as determined from FEMA's National Flood Insurance Program (NFIP) records. The Average Annual Losses as compiled by NFIP represent the total NFIP claims payments for each parish for the years 1978 through 2007 divided by the number of years the parish has participated in the NFIP during that same period. The total of the Average Annual Losses for all the parishes is $531,404,895. The Average Annual Loss figures were used because NFIP loss data provided the best relative measure for all the parishes in Louisiana. Other candidate sources of information did not provide uniform coverage throughout the State (e.g., digital floodplain mapping that would lend itself to this type of analysis is only available for 37 out of the 64 parishes) or were not considered as reliable in SHMPC's opinion;

The high / medium / low rankings for each parish were developed by:

- Obtaining the NFIP Average Annual Loss data;
- Sorting the list by parish from highest to lowest losses;
- Assigning the high rank to parishes with losses greater than or equal to $1 million;
- Assigning the medium rank to parishes where losses are less than $1 million but greater than or equal to $100 thousand; and
- Assigning the low rank to parishes with losses less than $100 thousand.

The resulting ranked parishes from the existing methodology are shown in Table 5-3. Map 5-1a presents the ranking of all the parishes with high, medium and low risk to floods; Map 5-1b shows the same data with a third dimension to give a sense of the extreme range within the "high" risk category.

Table 5-3: Ten Parishes with Highest Average Annual Flood Losses

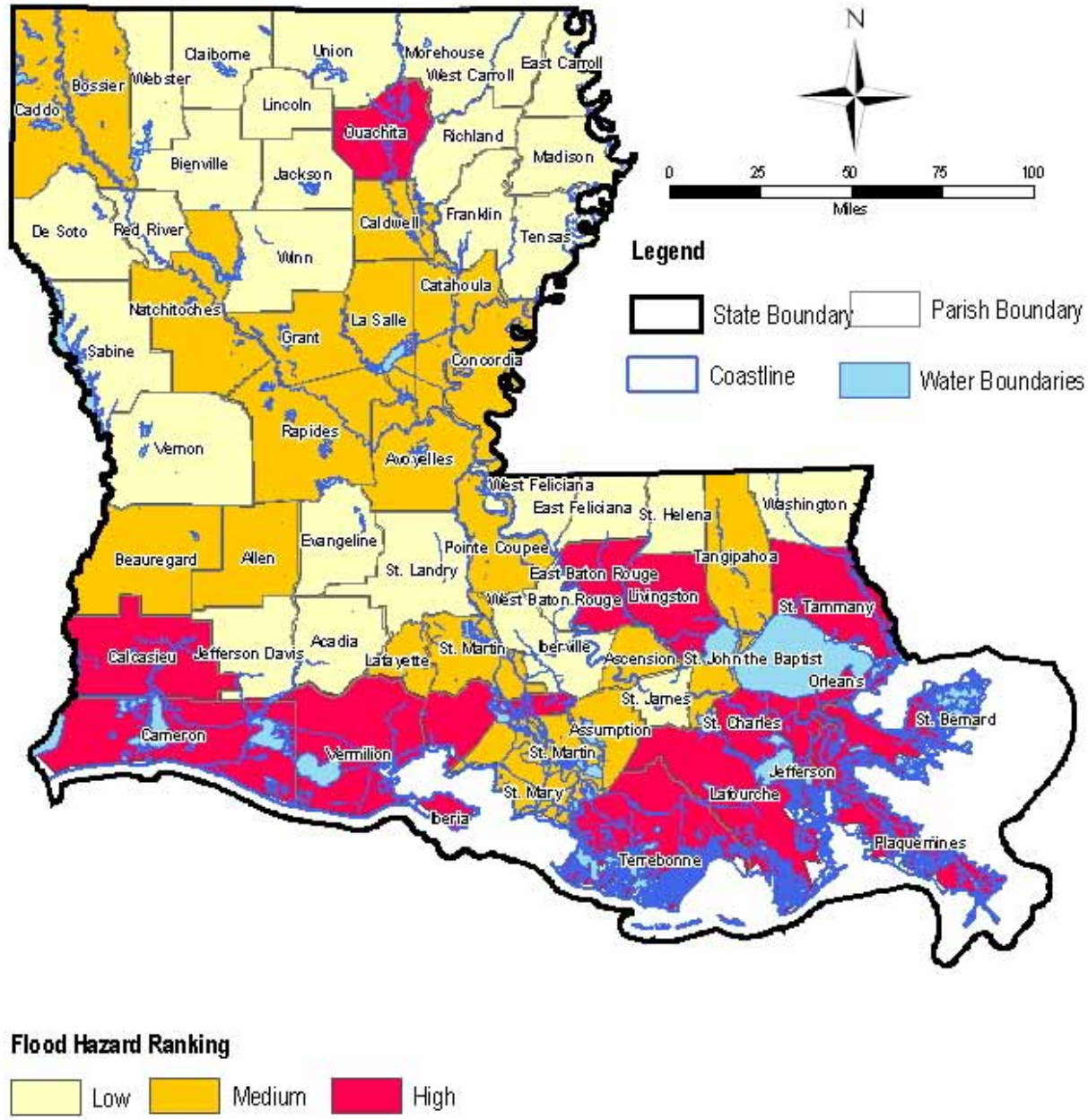
Ranking	Parish	Average Annual Losses (NFIP)	Hazard Ranking
1	Orleans	$244,657,555	High
2	Jefferson	$112,308,974	High
3	St. Bernard	$76,707,660	High
4	St. Tammany	$52,314,087	High
5	Plaquemines	$9,076,164	High
6	Terrebonne	$7,003,797	High
7	Cameron	$3,730,658	High
8	St. Charles	$3,281,302	High
9	East Baton Rouge	$3,143,092	High
10	Vermilion	$2,613,492	High

Source: NFIP, 2007

Volume II, Appendix E-4 explains the methodology used to derive these rankings in more detail. Appendix E-4 also shows the results of additional analyses of the past and potential effects of flooding in Louisiana including:

- the number of NFIP claims (losses) and the number of repetitive losses;
- population exposure based on 2000 Census and Digital Quality Level 3 Flood Data (Q3); and
- general building stock, critical facilities and transportation exposure based on HAZUS-MH and Q3 flood data.

Map 5-2a: Flood Hazard Ranking (Average Annual Estimated Losses)

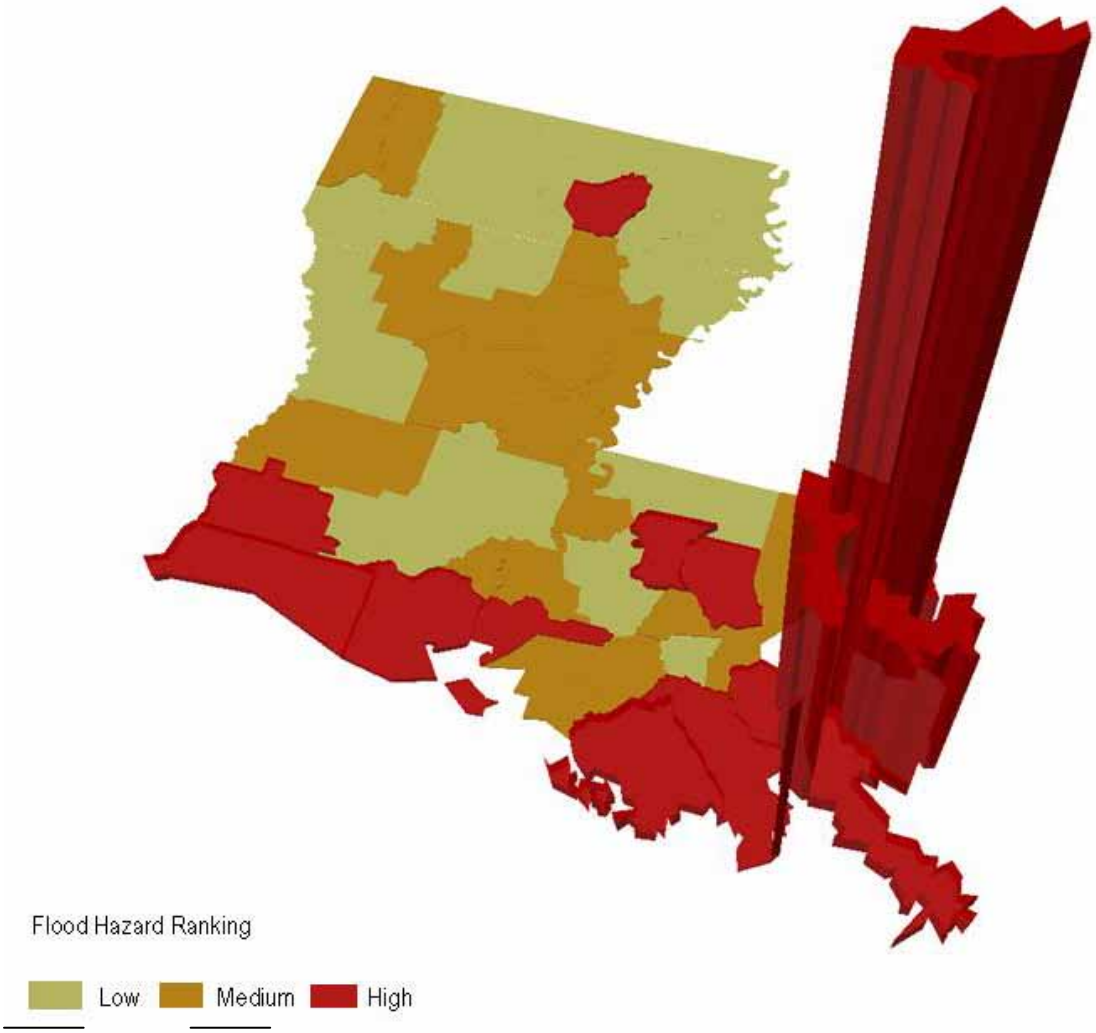


Flood Hazard Ranking

Low Medium High

Source: FEMA NFIP 1978 - 2007

Map 5-2b: Graphic Representation of Flood Risk by Parish, Based on NFIP Claims

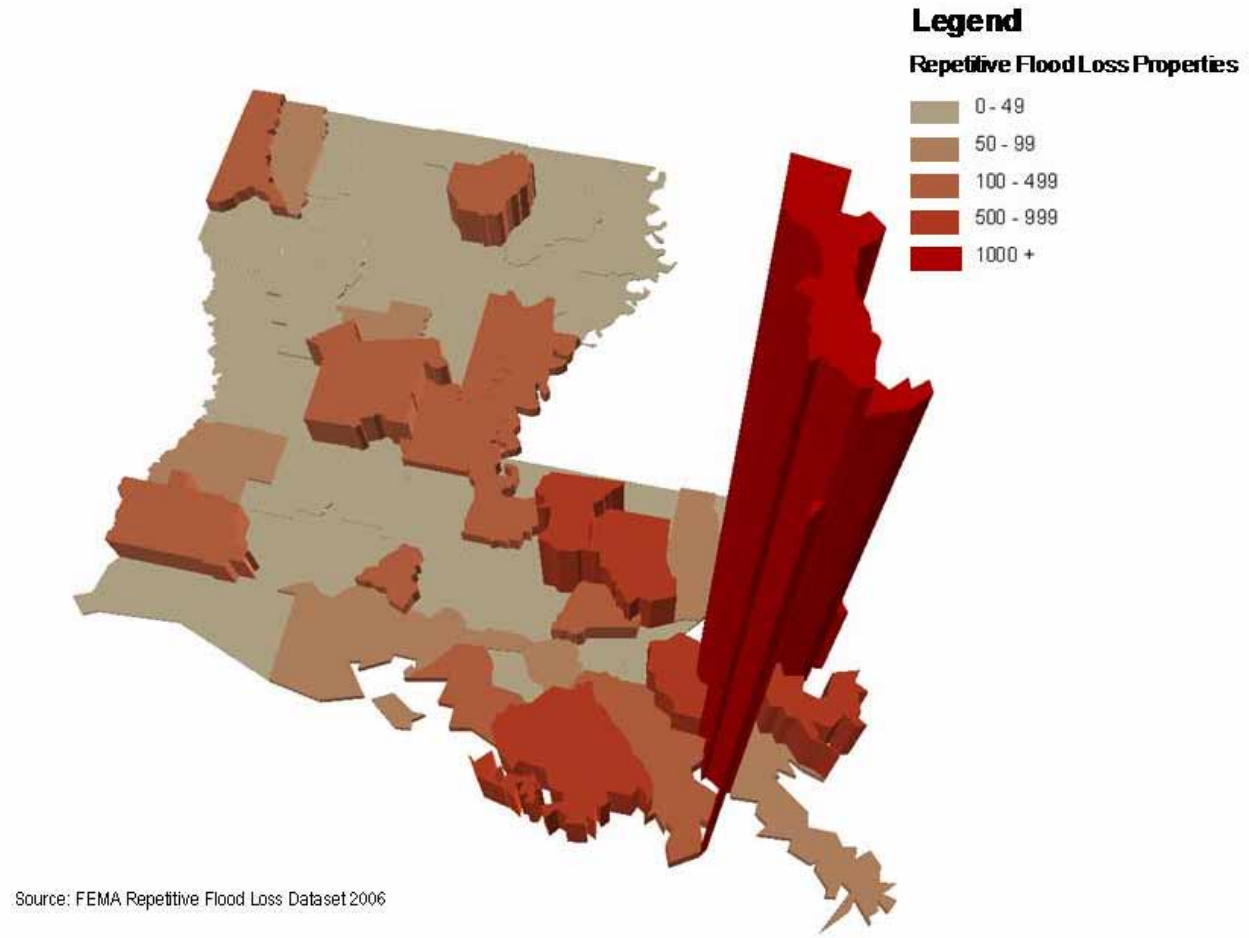


Source: NFIP, 1978-2007

The "height" of each parish in this representation shows its AEL from floods (post-Katrina and Rita). Note that although much of Southeast and Southwest Louisiana are in the "high" category, Orleans and Jefferson parishes are significantly higher.

This assessment has been revised for this Plan Update using current NFIP claims data. However, this does not adequately account for risk in terms of planning and identifying hazard mitigation projects at the parish or municipal level. For future updates to this Plan, improved results from parish and municipal hazard mitigation plans, and updated Flood Insurance Rate Maps (FIRMs) coupled with updated benchmark data that account for subsidence rates, could provide a superior basis for determining flood risk. The updated FIRMs will also fully incorporate U.S. Army Corps of Engineers (USACE) research and modeling regarding surge events, thus making it possible to consider folding all flood events (riverine, backwater, and surge), into one identified hazard with coherent parameters and characteristics. These NFIP maps, combined with GIS-based Benefit Cost Analysis Tool (BCAT) cost analysis, also currently under development (see subsection 5.15), would allow a much finer-grained risk analysis than is possible using the current parish-level methodology. Using the new maps and analyses could represent a significant improvement in Louisiana's ability to accurately assess flood risk, and will improve with each update of the Plan.

Map 5-3: Severe Repetitive Loss Properties by Parish



Source: FEMA, 2007

An additional factor to consider in assessing flood risk is the presence of severe repetitive loss properties. FEMA defines severe repetitive loss properties as those covered under a contract for flood insurance that have incurred flood-related damage (i) for which 4 or more separate claims payments have been made under flood insurance coverage, with the amount of each such claim exceeding $5,000, and with the cumulative amount exceeding $20,000; or (ii) for which at least 2 separate claims payments have been made under such coverage, with the cumulative amount exceeding the value of the property. These properties are candidates for mitigation. As shown in Map 5-3 (which is the same as Map 4-8), mapping these properties by parish produces a result similar to AEL for flood damages, but not identical to it.

5.5 High Wind (Hurricane)

The hurricane hazard ranking was based on the AEL as determined from National Oceanographic and Atmospheric Administration (NOAA) historical hurricane events data (for the years 1900 through 2003 and HAZUS-MH general building stock data. Based on the windspeed, recurrence interval and building characteristics, damage functions for general building stock were used to determine the AELs.

The high / medium / low rankings for each parish were developed by:

- Obtaining the AEL data;
- Sorting the list by parish from highest to lowest losses;
- Assigning the high rank to parishes with losses greater than or equal to $5 million;
- Assigning the medium rank to parishes where losses are less than $5 million but greater than or equal to $400 thousand; and
- Assigning the low rank to parishes with losses less than $400 thousand.

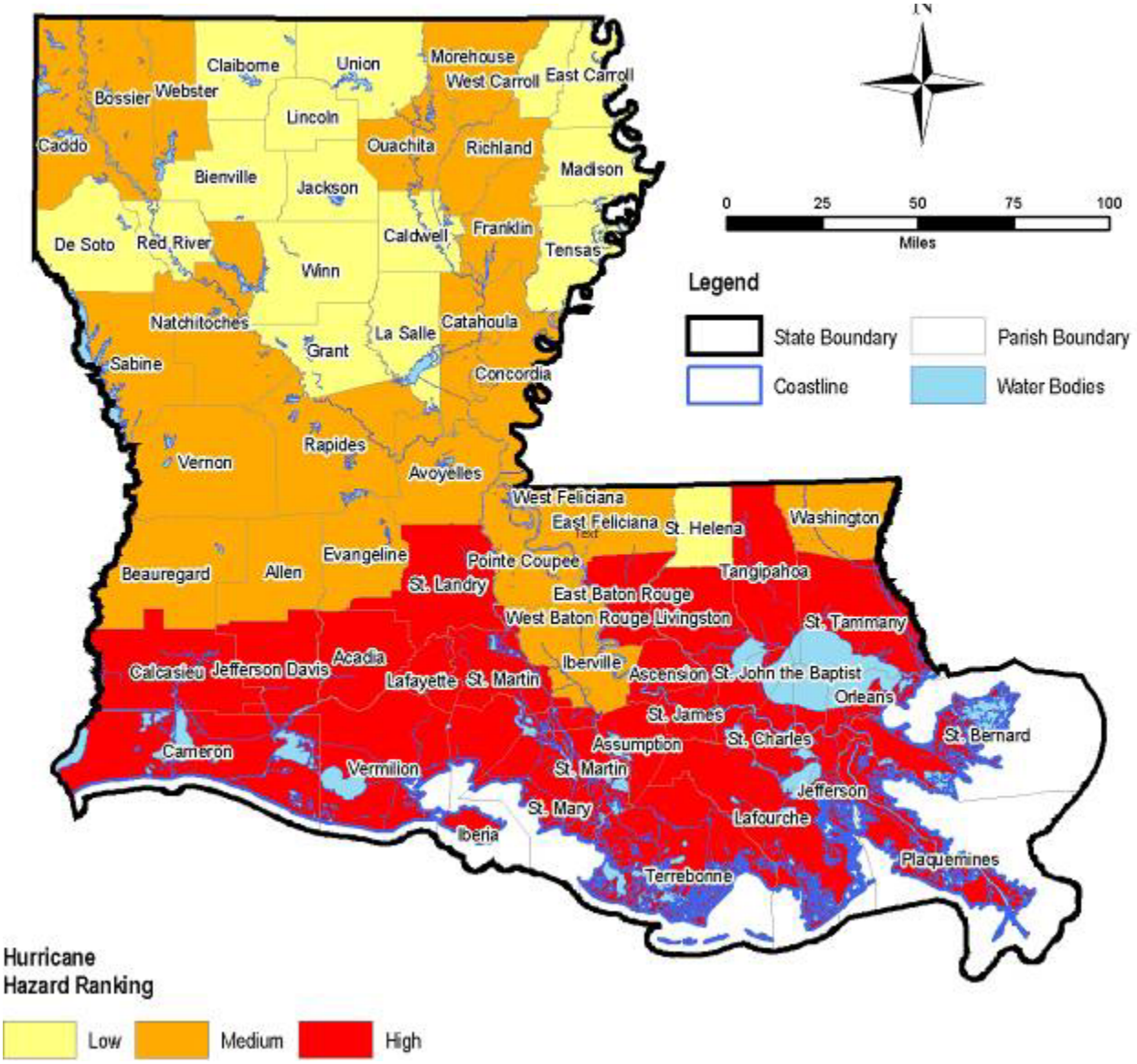
The resulting ranked parishes are shown in Table 5-4. Map 5-4 presents the ranking of all the parishes with high, medium and low risk to hurricanes.

Table 5-4: Ten Parishes with Highest Annual Estimated Losses for Hurricane High Winds

Ranking	Parish	Hurricane AEL ($)	Risk Zone
1	Jefferson	161,599,591	High
2	Orleans	154,930,281	High
3	Terrebonne	52,031,364	High
4	St. Tammany	51,423,712	High
5	Lafayette	45,016,111	High
6	Lafourche	42,934,840	High
7	East Baton Rouge	35,809,790	High
8	Calcasieu	35,179,561	High
9	St. Bernard	22,006,253	High
10	Vermilion	20,722,955	High

This analysis has not been revised since the April 2005 Plan. There have been a number of “high wind” events since the April 2005 Plan. However, key relevant data, i.e., general building stock data from HAZUS-MH, which are based on the 2000 Census, has not changed.

Map 5-4: Hurricane High Wind Hazard Ranking (Annual Estimated Losses)



5.6 High Wind (Tornado)

The tornado hazard ranking was based on the AEL as determined from NOAA historical tornado incidents data (for the years 1950 through 2005). The AELs are calculated by analyzing the number of historical incidents and losses.

The high / medium / low rankings for each parish were developed by:

- Obtaining the AEL data;
- Sorting the list by parish from highest to lowest losses;
- Assigning the high rank to parishes with losses greater than or equal to $200 thousand;
- Assigning the medium rank to parishes where losses are less than $200 thousand but greater than or equal to $75 thousand; and
- Assigning the low rank to parishes with losses less than $75 thousand.

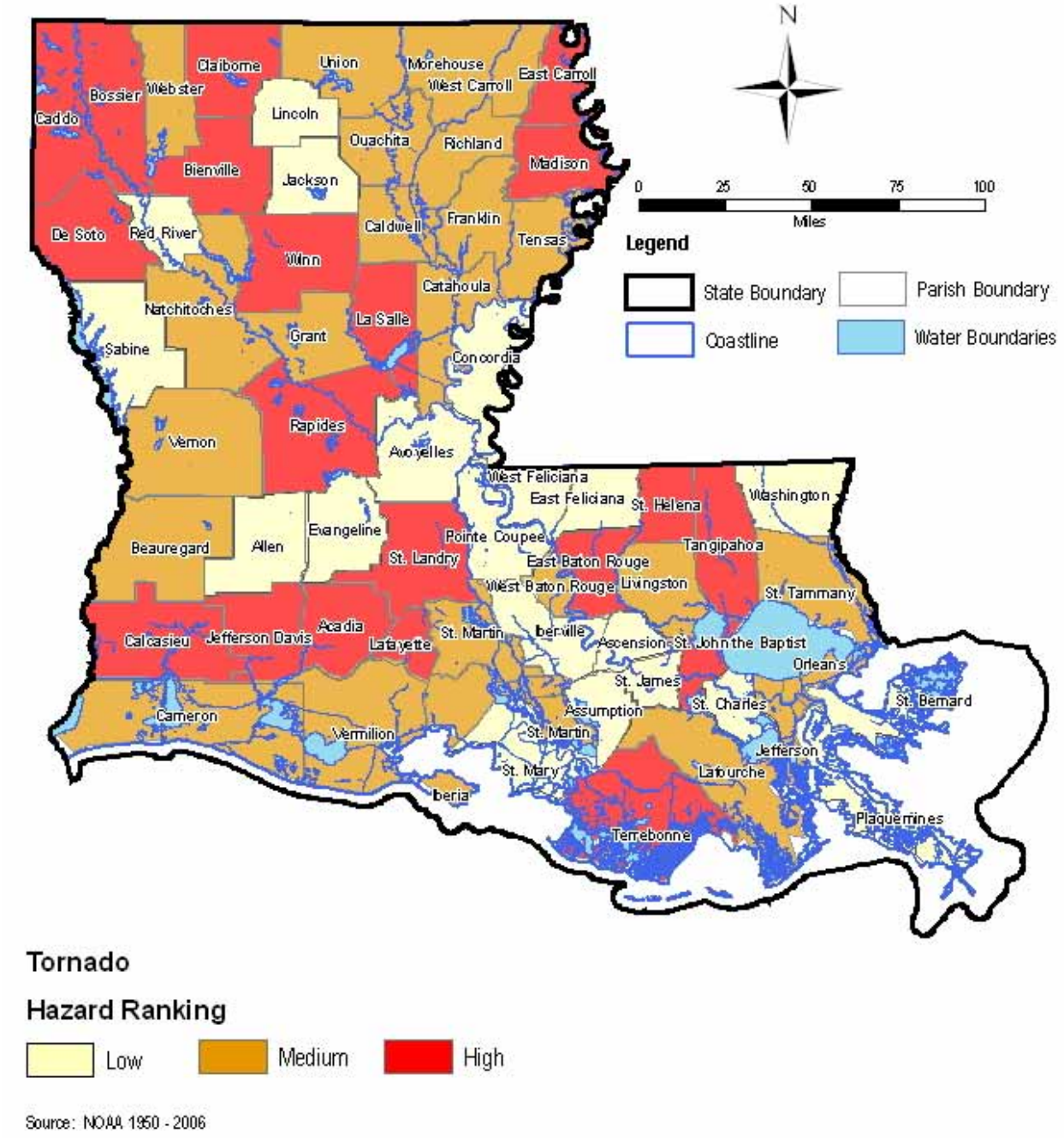
The resulting ranked parishes are shown in Table 5-5. Map 5-5 presents the ranking of all the parishes with high, medium and low risk to tornadoes.

Table 5-5: Ten Parishes with Highest Annual Estimated Losses for Tornado High Winds

Rank	Parish	Tornado AEL ($)	Risk Zone
1	Bossier	$5,123,017	High
2	Caddo	$1,449,982	High
3	De Soto	$950,614	High
4	St. John the Baptist	$918,087	High
5	Bienville	$897,491	High
6	Acadia	$682,859	High
7	Lafayette	$638,456	High
8	La Salle	$589,473	High
9	Winn	$503,052	High
10	Jefferson Davis	$456,719	High

This section was revised as part of the Plan Update to reflect more recent NOAA data.

Map 5-5: Tornado Hazard Ranking (Annual Estimated Losses)



5.7 Ice Storm

The ice storm hazard ranking was based on parish-wide vulnerability. The level of vulnerability was based on the total number of historical incidents reported in the NOAA data by parish (for the years 1950 through 2007. In establishing the hazards ranking, all incidents were assumed to have equal impacts, since the level of severity could not be determined from the existing data.

The high / medium / low rankings for each parish were developed by:

- Obtaining the NOAA data by parish;
- Sorting the list by parish from highest to lowest losses;
- Establishing breaks to rank each parish with a high, medium or low classification;
- Assigning the high rank to parishes with more than four historical incidents;
- Assigning the medium rank to parishes where historical incidents are equal to four but greater than or equal to one; and
- Assigning the low rank to parishes with no historical incidents.

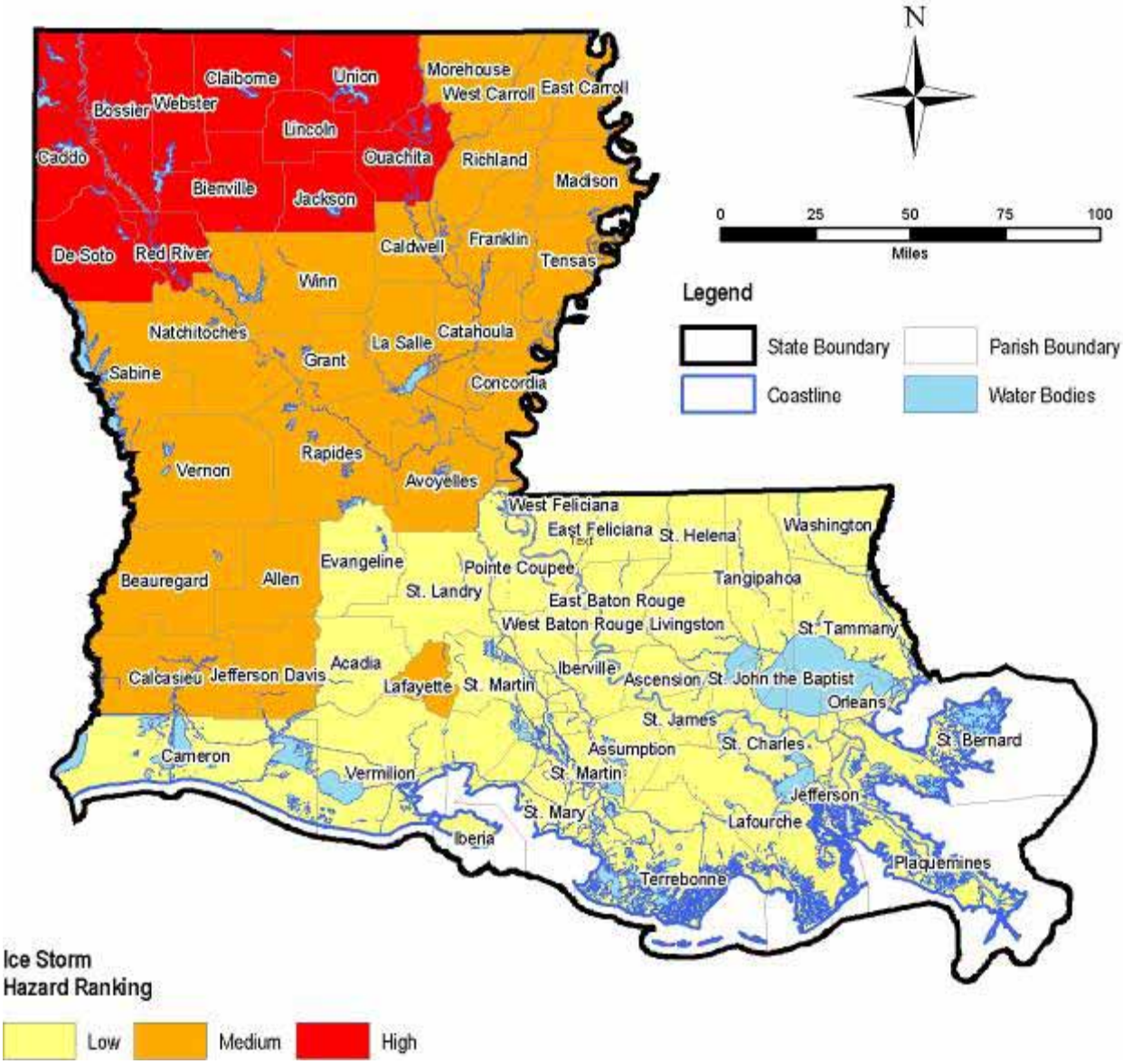
The parishes with "high" hazard rankings are shown in Table 5-6. Map 5-6 presents the ranking of all the parishes with high, medium and low risk to ice storms.

Table 5-6: Parishes with High Ice Storm Hazard Ranking

Parishes	Number of Incidents	Hazard Rankings
Caddo	10	High
Bienville	8	High
Bossier	8	High
Claiborne	8	High
Lincoln	8	High
Ouachita	8	High
Union	8	High
Webster	8	High
Desoto	7	High
Red River	7	High
Jackson	6	High

As noted in Section Four, no new ice storm events were recorded since the April 2005 Plan Update so the results of this analysis is unchanged.

Map 5-6: Ice Storm Hazard Ranking (Number of Ice Storms)



5.8 Storm Surge

The storm surge hazard ranking was based on the AEL as determined from HAZUS-MH general building stock data. Based on the flood depth and building characteristics, the damage functions for the general building stock were used to determine the AEL for each parish. The resulting ranked parishes are shown in Table 5-7 and Map 5-7. [34]

The high / medium / low rankings for each parish were developed by:

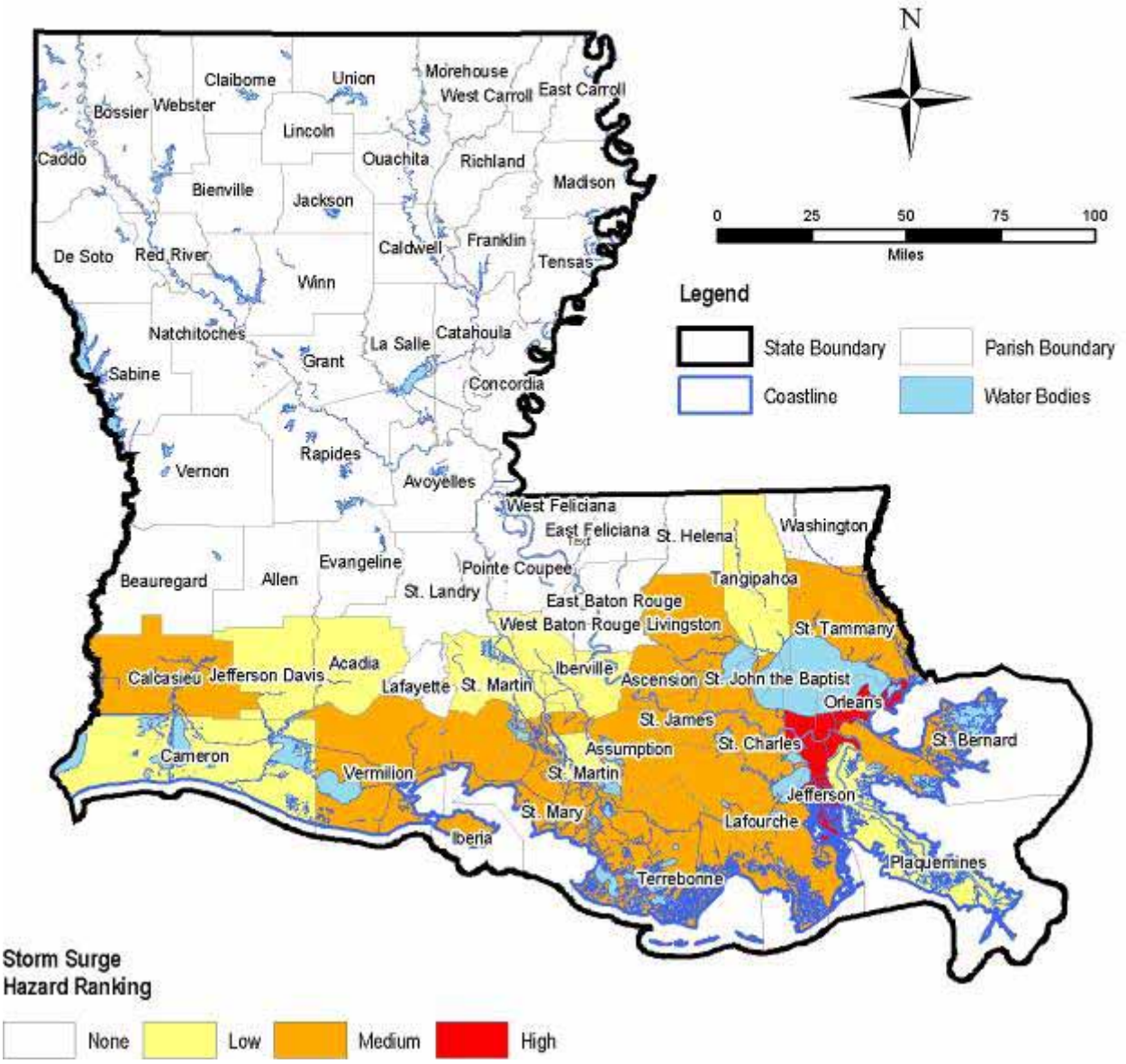
- Obtaining the AEL data;
- Sorting the list by parish from highest to lowest losses;
- Assigning the high rank to parishes with losses greater than or equal to $15 billion;
- Assigning the medium rank to parishes where losses are less than $15 billion but greater than or equal to $250 million; and
- Assigning the low rank to parishes with losses less than $250 million.

Table 5-7: Category 3 Storm Surge Annual Estimated Losses and Hazard Ranking

Rank	Parish	Surge AEL ($1,000)	Hazard Ranking
1	Orleans	16,382,746	High
2	Jefferson	15,978,467	High
3	Terrebonne	2,106,954	Medium
4	St. Bernard	1,840,364	Medium
5	Iberia	1,423,129	Medium
6	St. Mary	1,398,657	Medium
7	Ascension	1,362,926	Medium
8	Lafourche	1,282,189	Medium
9	St. Tammany	1,139,500	Medium
10	St. Charles	918,117	Medium
11	Vermilion	888,637	Medium
12	Calcasieu	668,918	Medium
13	St. John the Baptist	578,880	Medium
14	Livingston	371,485	Medium
15	St. James	352,528	Medium
16	Assumption	319,941	Medium
17	Cameron	239,099	Low
18	Plaquemines	140,309	Low
19	St. Martin	136,884	Low
20	Jefferson Davis	67,019	Low
21	Iberville	55,898	Low
22	Tangipahoa	36,671	Low
23	Acadia	24,756	Low
	Total	47,714,074	

[34] Per telephone interview with Dr. Suhayda of the Louisiana State University Coastal Louisiana Ecosystem Assessment and Restoration (CLEAR) and Coastal Emergency Risk Assessment Team (CERA), it is important to note that this type of analysis does not consider risk on a per capita basis. As a result, areas like Plaquemines Parish show a relatively low AEL based on building stock but are vulnerable to catastrophic damage from storm surge that could affect most if not all of their population. It is also important to note that this analysis does not include potential losses for coastal erosion, just the effects of coastal flooding. Appendix H includes recommendations for mitigation for small scale coastal erosion issues but future efforts under the Community Education and Outreach Program (CEO) will strive to generate more representative estimates (see Section Eight).

Map 5-7: Category 3 Storm Surge Hazard Ranking (Annual Estimated Losses)



Up-to-date storm surge data were not available for this Plan Update but is expected to be available in early 2008 via runs of the Advanced Circulation Model. Additionally, the risk assessment methodology depends on default data for building stock in HAZUS-MH which is based on the 2000 Census and has not been updated. The new FIRMs and BCAT cost-analysis mentioned in Section 5.15 are expected to be complete by early 2008 at the latest, which will enable an improved analysis of the effects of storm surge.

5.9 Subsidence

The subsidence hazard ranking was developed based upon average subsidence rates. Subsidence varies in space and time and these rates represent averages over 10,000 years. As such they do not serve as accurate predictors of future subsidence rates, but can be used to conceptualize the relative difference in subsidence among the various coastal parishes[35]. The resulting ranked parishes are shown in Table 5-8 and Map 5-8

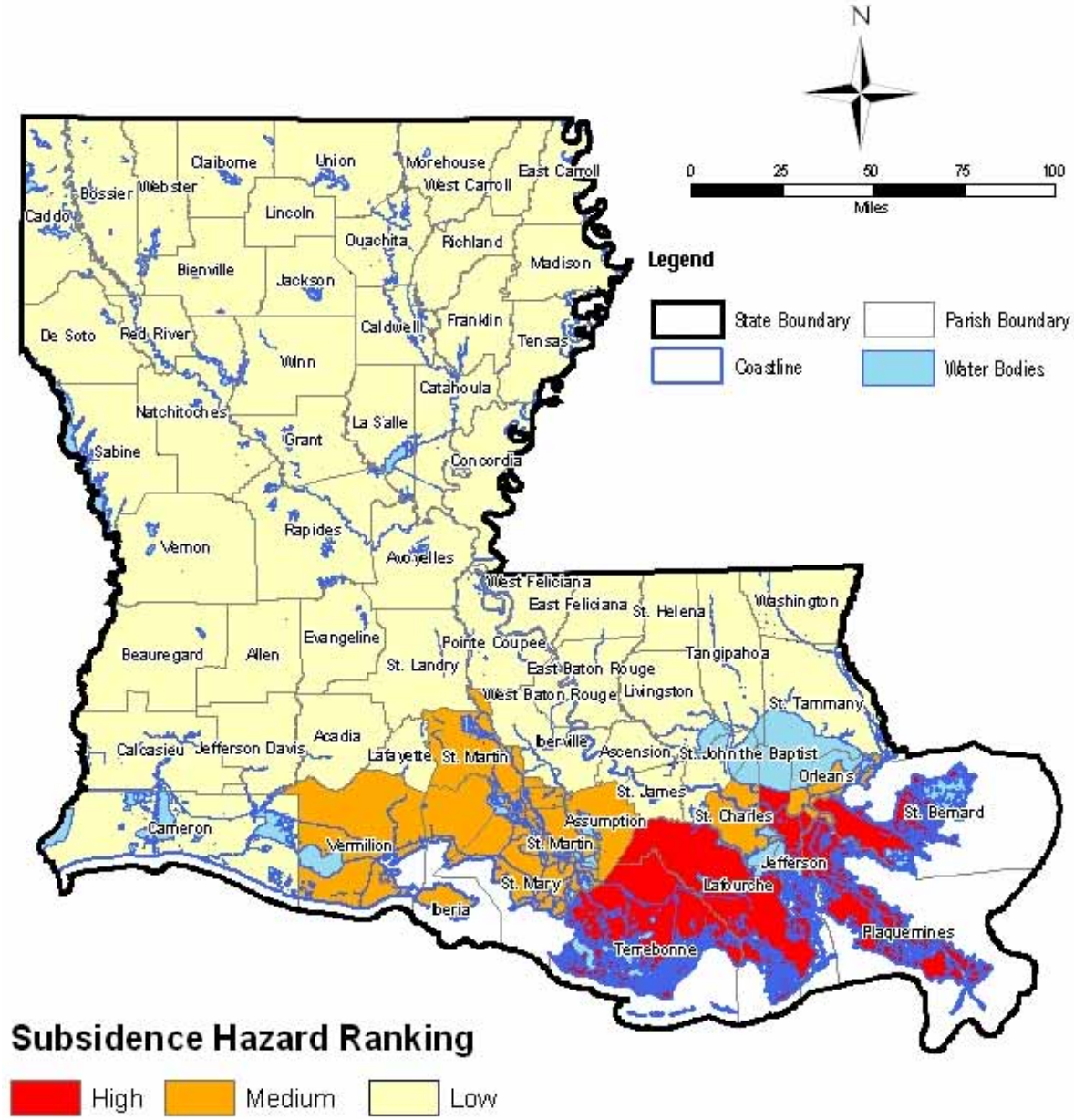
Table 5-8: Subsidence Hazard Ranking

Rank	Parish	Hazard Ranking
1	Jefferson	High
2	Terrebonne	High
3	Lafourche	High
4	Plaquemines	High
5	St. Bernard	High
6	Orleans	Medium
7	Iberia	Medium
8	Vermilion	Medium
9	St. Charles	Medium
10	St. Mary	Medium
11	St. Martin	Medium
12	Assumption	Medium

As discussed in Section 4-3, the Plan Update treats coastal erosion and land loss as issues that are distinct from subsidence, though recognizing that they are interrelated.

[35] As noted previously, the rates used for Subsidence have recently been called in question as newer measurement techniques have gained prominence. However, there is currently no accepted yearly subsidence rate estimate. One of the challenges for the CEO program (see Section Eight) will be to determine the best information and methodology for parishes, municipalities and property owners.

Map 5-8: Subsidence Hazard Ranking



Source: University of Kentucky

Original Citation: The GIS data shapefile represents average subsidence contour intervals (0.02 cm/year over 10,000 years) for Coastal LA derived from the following: Kulp, M.A., 2000, Holocene stratigraphy, history, and subsidence: Mississippi River delta region, north-central Gulf of Mexico [Ph.D. thesis]: Lexington Kentucky, University of Kentucky

5.10 Wildfire

The wildfire hazard rankings were based on a compilation of USGS National Land Cover data (for the years 1991 through 2000), since they were available for all 64 parishes. Information on the acres burned for the same time period, i.e., 1991-2000, was analyzed to determine the average acreage per parish burned over the past ten years. The assumption was made that this time period is representative of wildfire risk.

The high / medium / low rankings for each parish were developed by:

- Obtaining the USGS National Land Cover data;
- Sorting the list by parish from highest to lowest losses;
- Assigning the high rank to parishes with greater than or equal to 1000 acres burned;
- Assigning the medium rank to parishes where the number of acres burned are less than 1000 but greater than zero; and
- Assigning the low rank to parishes with no acres burned.

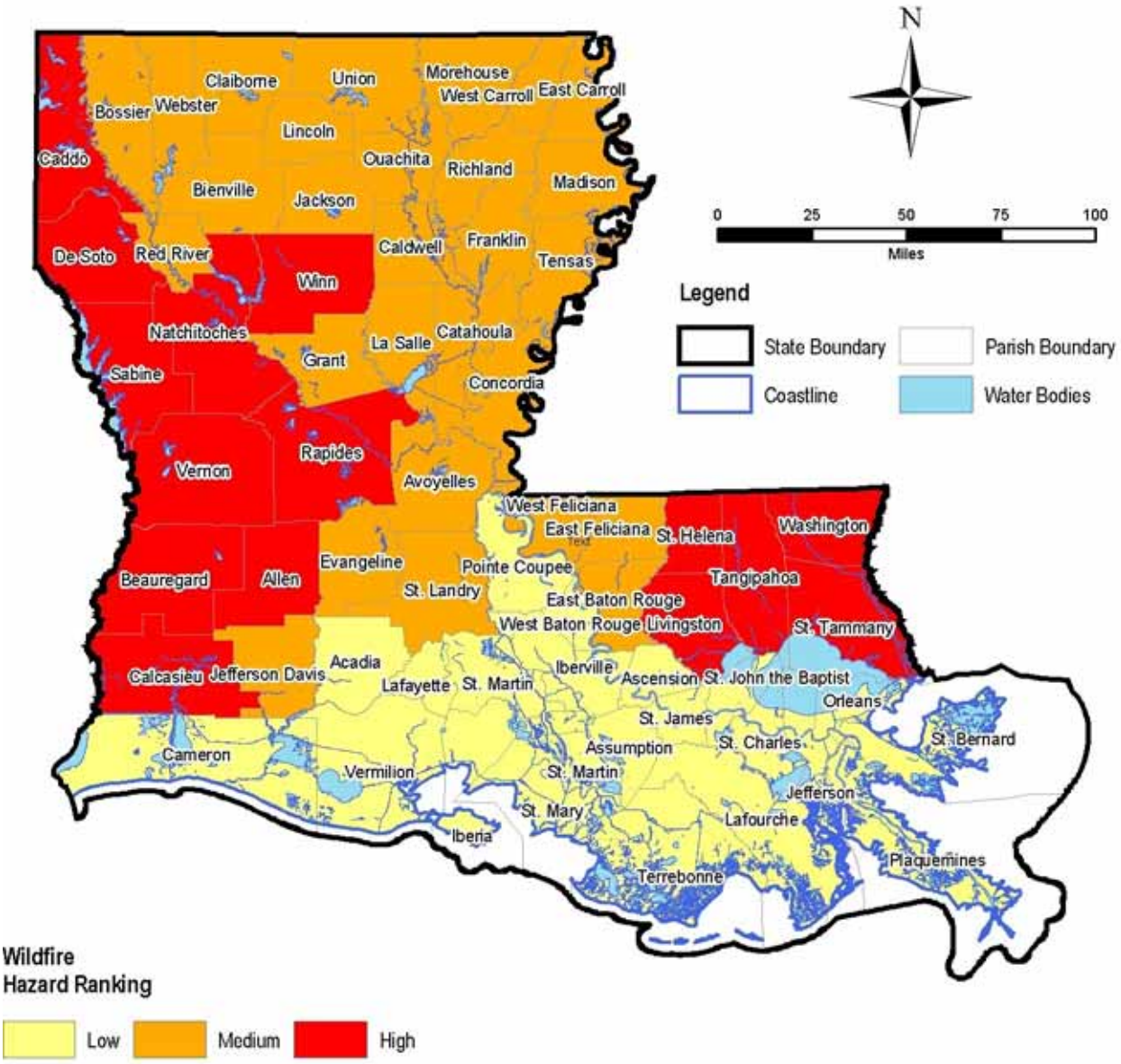
The parishes with "high" hazard rankings are shown in Table 5-9, listed in order according to the average number of acres burned. Map 5-9 presents the ranking of all the parishes with high, medium and low risk to wildfire.

Table 5-9: Parishes with High Wildfire Hazard Ranking

Rank	Parishes	Hazard Ranking
1	Beauregard	High
2	Allen	High
3	Vernon	High
4	St. Tammany	High
5	Rapides	High
6	Tangipahoa	High
7	Winn	High
8	Calcasieu	High
9	St. Helena	High
10	Natchitoches	High
11	Livingston	High
12	De Soto	High
13	Washington	High
14	Caddo	High
15	Sabine	High

As noted in Section Four, no new wildfire data were available since the April 2005 Plan so this analysis is unchanged.

Map 5-9: Wildfire Hazard Ranking (Average Burnt Acreage)



5.11 Dam Failure

The dam hazard ranking was based on the National Inventory of Dams (NID) classification of dams located in each parish. The NID ranks dams according to the potential for loss of life as well as the potential impacts on economic, environmental and important community lifelines.

The analysis below uses data from the 2000 Census, the most recent data available that presents population data at the Census-tract or Census-block level. Although newer population data and estimates exist, including post-Katrina/Rita surveys, these are only at the parish level. The analysis to update the dam failure risk assessment, however, requires an assessment of the spatial relationship between population and point-hazards (in this case, dams). Parish-level data is not useful for this type of analysis. Therefore, an update to this risk assessment is not possible using this methodology until the 2010 Census or another source make available tract- or block-level population data.

The high / medium / low rankings for each parish were developed by:

- Obtaining the National Inventory of Dams data;
- Sorting the list by parish by high to low dam classification;
- Assigning the high rank to parishes with one or more high hazard dams;
- Assigning the medium rank to parishes with one or more significant hazard dams;
- Assigning the low rank to parishes with one or more low hazard dams; and
- Assigning no rank to parishes with no dams with a high, significant or low classification.

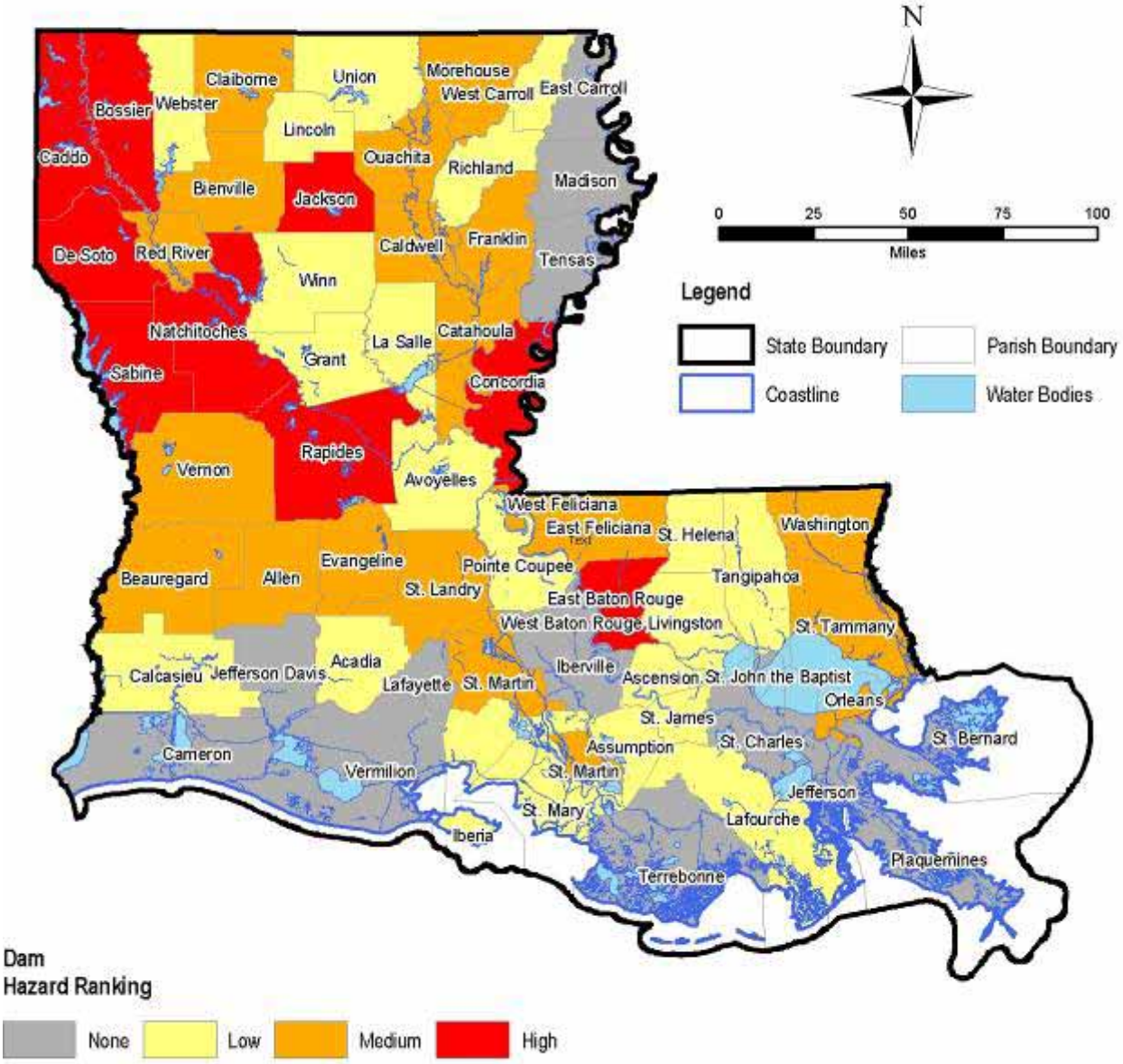
The resulting ranked parishes are shown in Table 5-10. Map 5-10 presents the ranking of all the parishes with high, medium, low and no risk to dams[36].

Table 5-10: Parishes with One or More High Hazard Dams

Parishes (listed alphabetically)	Dam Failure Hazard Level
Bossier	High
Caddo	High
Concordia	High
Desoto	High
East Baton Rouge	High
Jackson	High
Natchitoches	High
Rapides	High
Sabine	High

[36] It should be noted that some parishes have taken exception to the relative rankings as a result of topography or dam maintenance concerns (see Appendix E). The results of this methodology, which cannot account for certain land use patterns or other local factors which affect the risk posed by a particular dam, will require ground-truthing at a later date (see Section Eight).

Map 5-10: Dam Failure Hazard Ranking (Number of High, Medium and Low Hazard Dams)



Source: USACE

5.12 Levee Failure

The levee hazard ranking was based on the parishes that have the highest population exposure to levee failure. For the levee analysis, it was assumed that any area adjacent to the levee could be flooded, since inundation maps were not provided for this analysis. The analysis involved estimating the population with a ½ mile buffer of all levees in all parishes based on Census 2000 population figures. [37]

This analysis was performed in the April 2005 Plan with USACE levees in the central and southern areas of the State as information was not available at that time for USACE levees in the north part of the State or non-USACE levees. The analysis for the Plan Update has incorporated levees in the northern part of the State and non-USACE levees throughout the State.

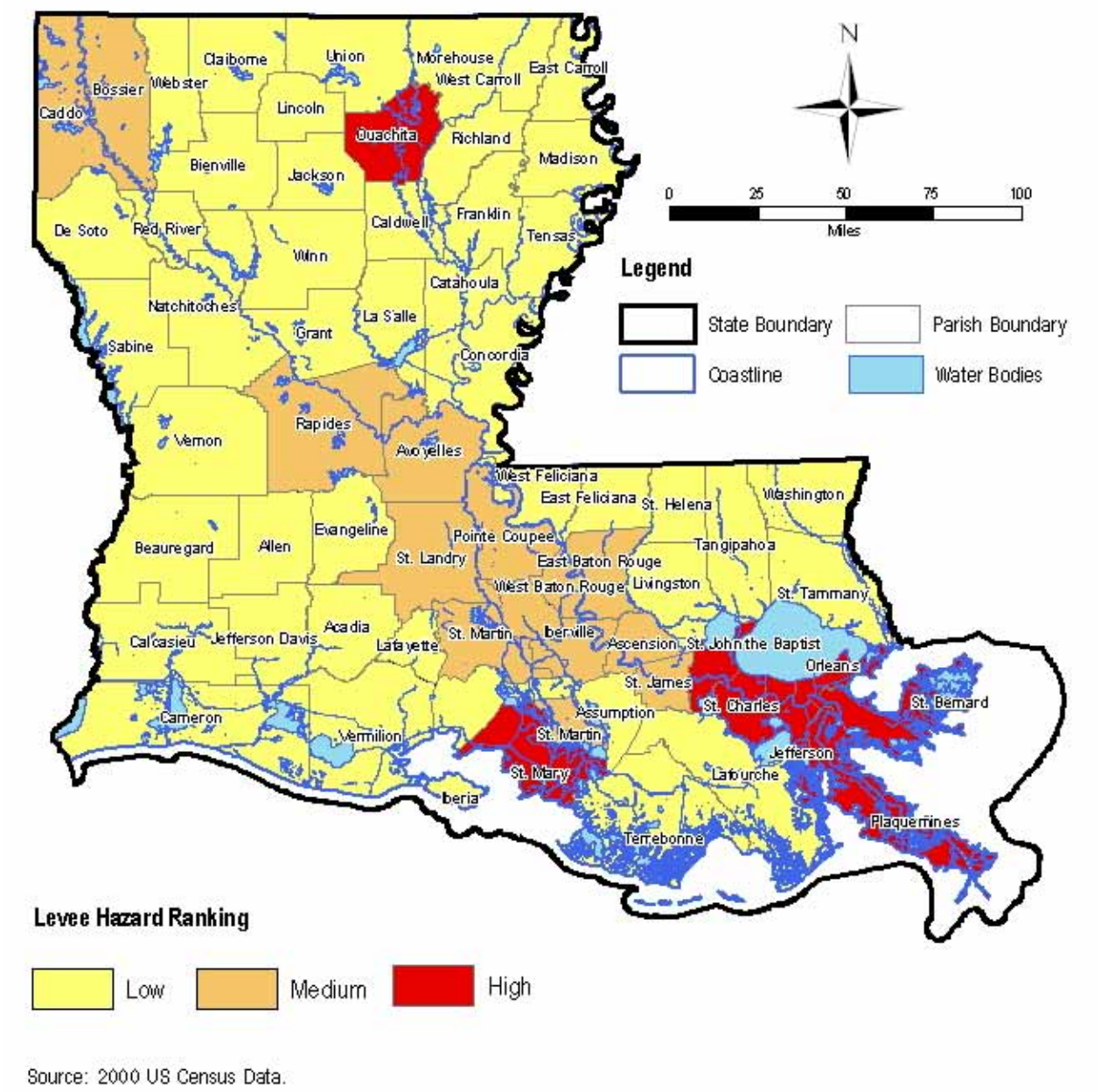
The parishes ranked according to population exposure are reported in Table 5-11 and Map 5-11.

Table 5-11: Ten Parishes with Highest Levee Failure Hazard Ranking

Rank	Parish	Population
1	Orleans	113,143
2	Jefferson	102,902
3	St. Bernard	22,711
4	Plaquemines	22,657
5	St. Charles	20,339
6	St. Mary	17,595
7	Ouachita	15,945
8	St. John the Baptist	11,309
9	Iberville	8,793
10	Bossier	8,054

[37] This type of analysis does not consider risk on a per capita basis for areas which have smaller populations but large areas at risk from levee failure. For example, Tensas Parish does not have a large population and therefore does not show as a high risk parish in this analysis. However, if the analysis were done in terms of the percentage of the population that is at risk, it is believed that parishes like Tensas would be much higher rated. This is another task to be resolved as part of the CEO and other follow-on efforts described in Section Eight as part of the Mitigation Action Plan.

Map 5-11: Levee Failure Hazard Ranking (Affected Population)



Source: 2000 US Census Data.

5.13 Hazardous Materials Incident

The hazardous materials incident hazard ranking was developed by sorting the general population exposure results from highest to lowest vulnerability (proximity to hazardous materials facility). Populations were counted more than once where radii that surround a hazardous materials facility overlap, indicating that these populations are exposed to more than one facility.

The high / medium / low rankings for each parish were developed by:

- Obtaining population exposure data within one mile radius of hazardous materials facilities;
- Sorting the list by parish from highest to lowest number of affected population;
- Assigning the high rank to parishes with affected population of greater than or equal to 1000;
- Assigning the medium rank to parishes where the affected population is less than 1000 but greater than or equal to 90; and
- Assigning the low rank to parishes with losses less than 90.

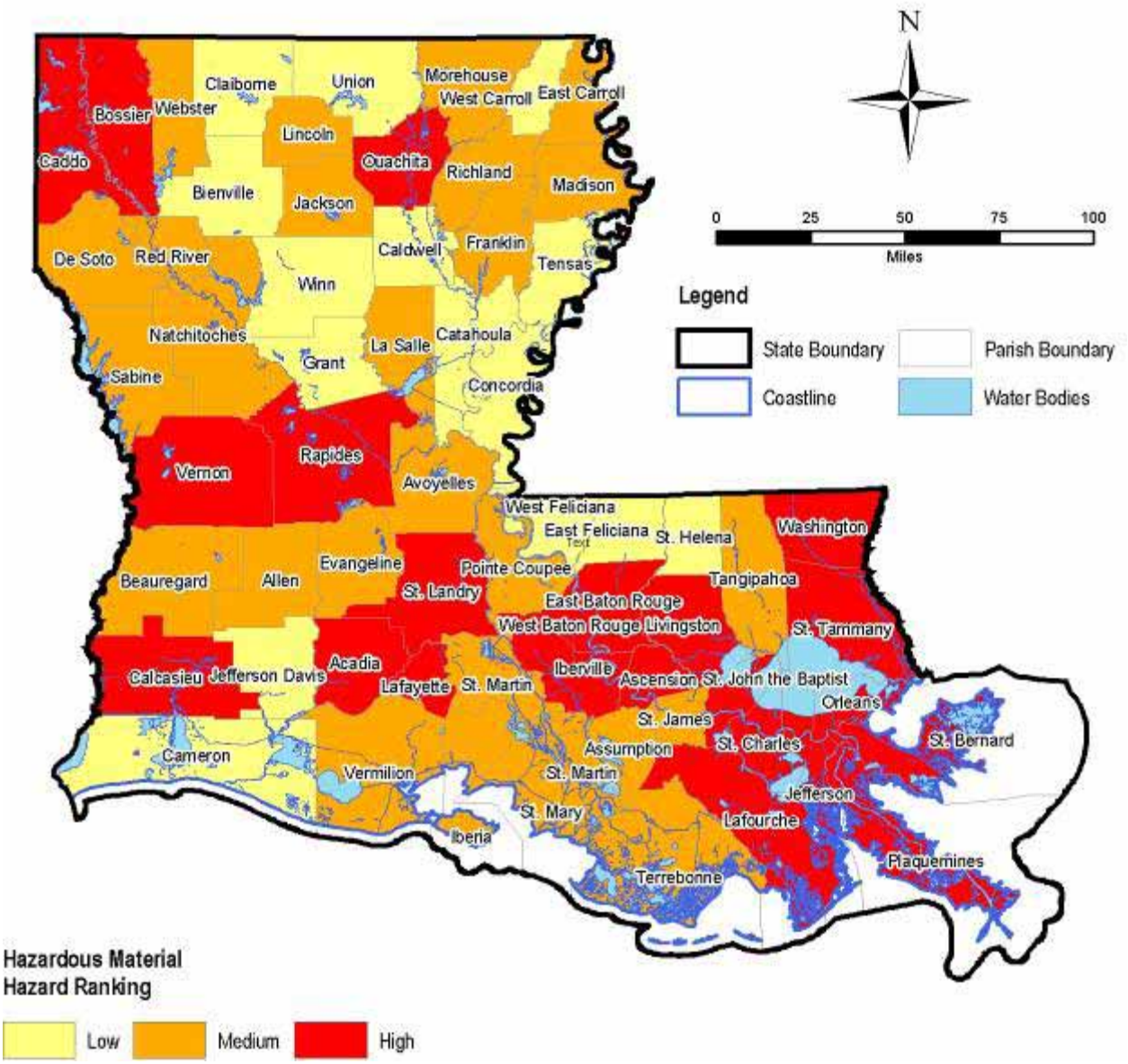
The analysis below uses data from the 2000 Census, the most recent data available that presents population data at the Census-tract or Census-block level. Although newer population data and estimates exist, including post-hurricanes Katrina and Rita surveys, these are only available at the parish level of resolution. An updated Toxic Release Inventory report from the US Environmental Protection Agency was gathered as part of this Plan Update and can be seen in Section Four. However, since the analysis relies on population figures from the US Census that have not been updated, an updated listing of all SARA Title III hazardous materials facilities was not obtained and this analysis has not been changed.

The resulting ranked parishes are shown in Table 5-12. Map 5-12 presents the ranking of all the parishes with high, medium and low risk to hazardous materials incidents.

Table 5-12: Ten Parishes with Highest Hazardous Materials Incident Hazard Ranking

Rank	Parish	Population Within 1 Mile Radius (High)
1	Jefferson	21,712
2	Caddo	12,274
3	East Baton Rouge	9,450
4	St. Charles	6,442
5	Ouachita	4,412
6	Orleans	4,073
7	Lafayette	3,788
8	Calcasieu	3,649
9	St. Tammany	3,634
10	Rapides	3,567

Map 5-12: Hazardous Material Incidents Hazard Ranking (Affected Population)



5.14 Additional Measures of Risk Assessment

In addition to the hazard-specific risk assessments noted above in Sections 5.4 through 5.13, this section of the Plan Update presents additional criteria and measures that can be considered by the SHMT as means to more fully and accurately assess statewide risk by parish and at a facility-specific level, including key private facilities as well as the public facilities considered in Section Six.

The intent is to demonstrate that information available to the State of Louisiana can be recombined as situations arise. For example, in the wake of a disaster, when funds become available for HMGP, the specific areas and conditions of the disaster may lead the SHMT to seek specific comparisons to help them decide how to allocate resources. Current and future improvements in data in Louisiana make the information more accessible and flexible for decision making.

The following topics treat risk by five different classes of exposure:

- Composite Risk Assessments
- Key Economic Drivers
- Secondary Hazard Sites
- Mobile Homes
- Critical Infrastructure

These exposure types are examples of means of enriching the Plan's risk assessment, particularly as data, methodologies, and local/state integration are improved in coming years and over the course of parish Hazard Mitigation Plan (HMP) and future Plan Updates.

Composite Risk Assessments

Composite risk assessments are one means of determining the overall relative risk faced by the various parishes. There are several methods by which this could be accomplished including the one outlined in the example below. It should be noted, however, that composite risk is not necessarily a primary determinant that will be used by the SHMT in allocating future hazard mitigation resources. A parish may be at the highest risk for one particular hazard while facing very little risk from the remaining hazards. In this scenario, that parish will not have a high composite risk figure but should still be a mitigation priority; particularly when there may be funding available for that particular hazard or it may be a hazard with high risk to life and property.

One method by which a composite risk assessment can be developed is to rank the various hazards outlined in the Plan Update and apply an inverse multiplier. The rankings, as described in Section Four, and the resulting multipliers are shown below in Table 5.13

Table 5.13: Hazard Rankings

Ranking	Hazard	Multiplier
1	Storm Surge	10
2	High Wind – Hurricane / Tropical Storm	9
3	Flood	8
4	High Wind – Tornado	7
5	Levee Failure	6
6	Subsidence	5
7	Hazardous Material Incident	4
8	Ice Storm	3
9	Wildfire	2
10	Dam Failure	1

This multiplier can then be applied to each Parish on a hazard by hazard basis using the following methodology:

- Assign a score of 3 to high vulnerability, 2 to medium vulnerability, and 1 to low vulnerability.
- Apply the multiplier to the score for each hazard for each parish.
- Add the scores for all hazards for each parish to develop a composite risk score.

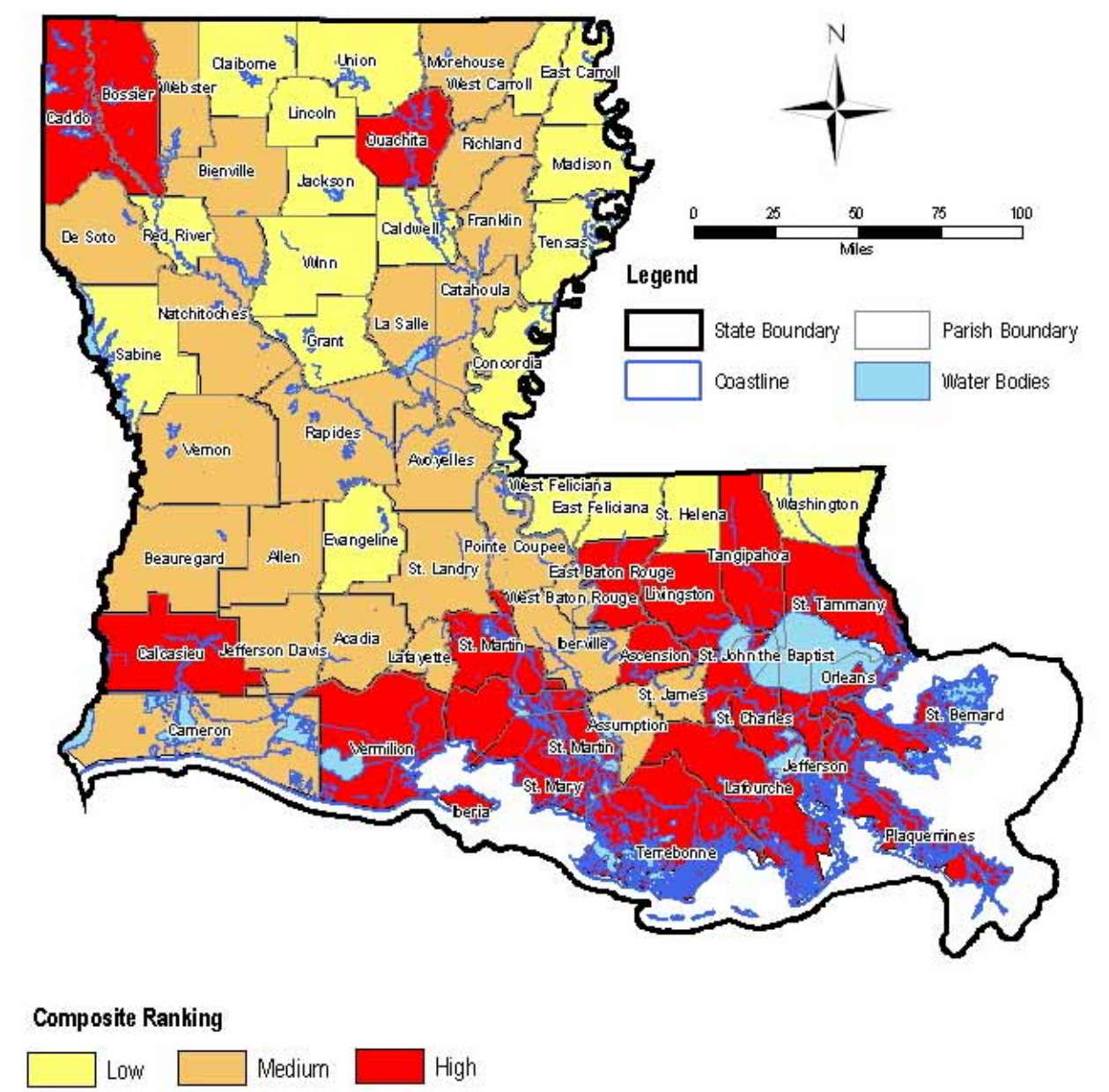
Composite risk scores for all Parishes are shown in Table 5.14 ranked from highest to lowest, and in Map 5.13 by vulnerability rating.

Table 5.14 Composite Risk Rankings by Parish

Ranking	Parish	Score	Vulnerability
1	Jefferson	145	High
2	Orleans	142	High
3	Calcasieu	128	High
4	St. Bernard	128	High
5	Terrebonne	126	High
6	Lafourche	124	High
7	St. John the Baptist	124	High
8	St. Charles	123	High
9	St. Tammany	119	High
10	Plaquemines	118	High
11	Iberia	115	High
12	Vermilion	114	High
13	St. Mary	112	High
14	East Baton Rouge	111	High
15	Livingston	108	High
16	Ouachita	106	High
17	Ascension	105	High
18	St. Martin	104	High
19	Tangipahoa	103	High
20	Caddo	102	High
21	Bossier	100	High
22	Rapides	99	Medium
23	Lafayette	96	Medium
24	Acadia	95	Medium
25	Cameron	95	Medium
26	St. Landry	94	Medium
27	Jefferson Davis	91	Medium
28	Assumption	90	Medium
29	St. James	83	Medium

Ranking	Parish	Score	Vulnerability
30	Natchitoches	82	Medium
31	Beauregard	81	Medium
32	Avoyelles	77	Medium
33	Iberville	77	Medium
34	Vernon	77	Medium
35	Catahoula	75	Medium
36	De Soto	75	Medium
37	La Salle	75	Medium
38	Allen	74	Medium
39	West Baton Rouge	74	Medium
40	Webster	73	Medium
41	Bienville	72	Medium
42	Pointe Coupee	72	Medium
43	Franklin	71	Low
44	Morehouse	71	Low
45	Richland	70	Low
46	Concordia	69	Low
47	Claiborne	68	Low
48	East Carroll	67	Low
49	Madison	67	Low
50	Sabine	67	Low
51	Washington	67	Low
52	Caldwell	66	Low
53	Winn	66	Low
54	Grant	65	Low
55	St. Helena	63	Low
56	Evangeline	61	Low
57	Union	60	Low
58	Jackson	59	Low
59	Red River	58	Low
60	East Feliciana	57	Low
61	Lincoln	57	Low
62	West Carroll	57	Low
63	West Feliciana	57	Low
64	Tensas	56	Low

Map 5-13: Composite Risk Rankings



Composite Ranking

Low Medium High

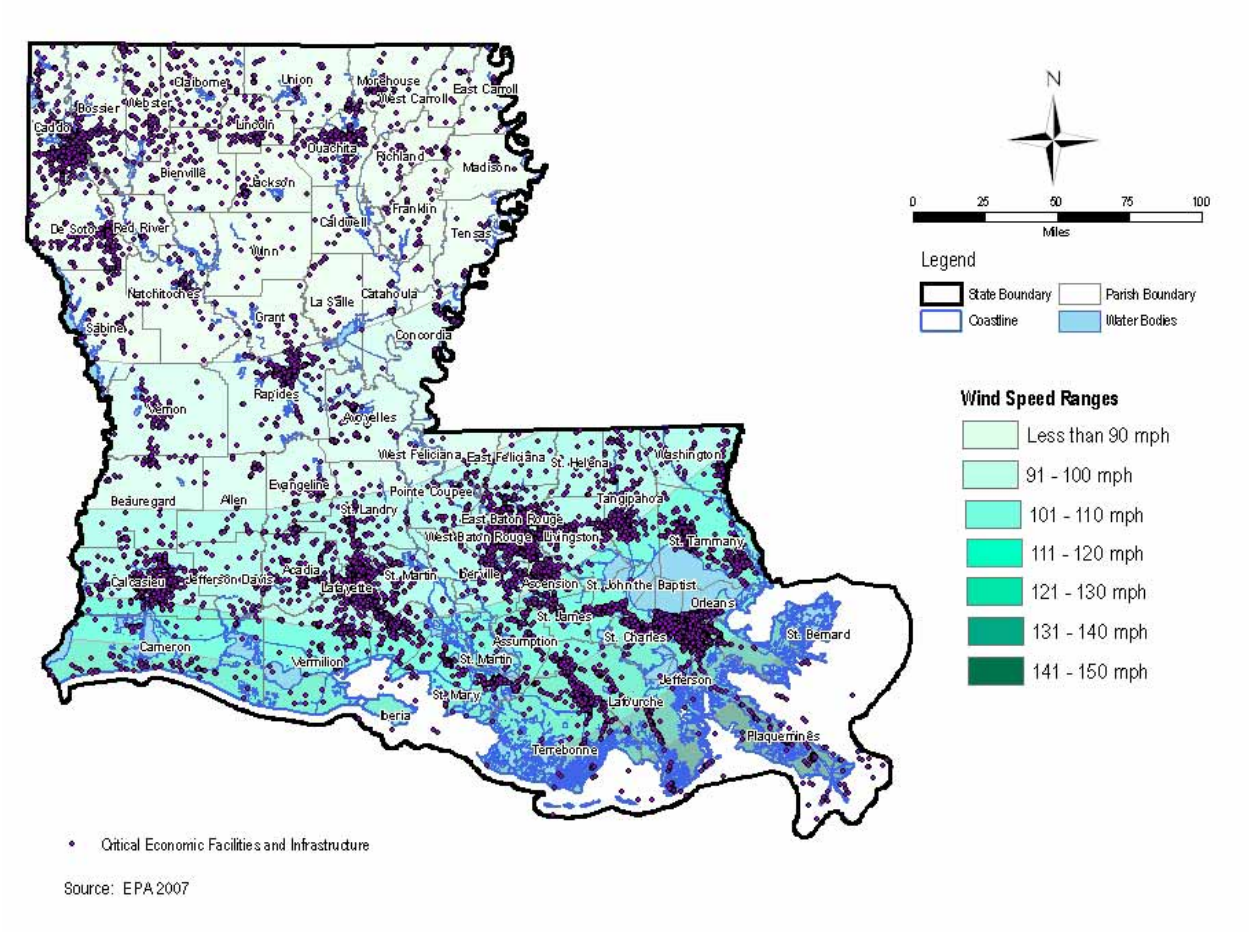
Assessing Risk to Key Economic Drivers

Economic impacts are a major risk category that should be considered, separate and apart from simple considerations of risk. Disaster impacts to major employers and/or facilities that are key to economic sectors can have negative ripple effects far beyond damage to their own facilities. For example, damage to ice houses during hurricanes Katrina and Rita caused lasting problems for the seafood industry in South Louisiana.

For this analysis, a dataset provided by the U.S. Environmental Protection Agency (EPA) represents the majority of medium and large employers in Louisiana. (The data include all facilities that must comply with any EPA regulation; large retailer facilities, healthcare facilities, industrial facilities, and others.) Finer-grained data that include additional measures such as economic sector and number of employees is also available, but in many cases is proprietary. In the future, a project could be scoped and executed to assess the impact of identified hazards on key economic drivers with economic sector and number of employees being considered.

Map 5-14 shows the relative risk from high wind (hurricane) hazard to significant employers in Louisiana. Similar analyses could be run for any other hazard identified in this Plan Update.

Map 5-14: Wind Hazard and Critical Economic Sites (Source: EPA)



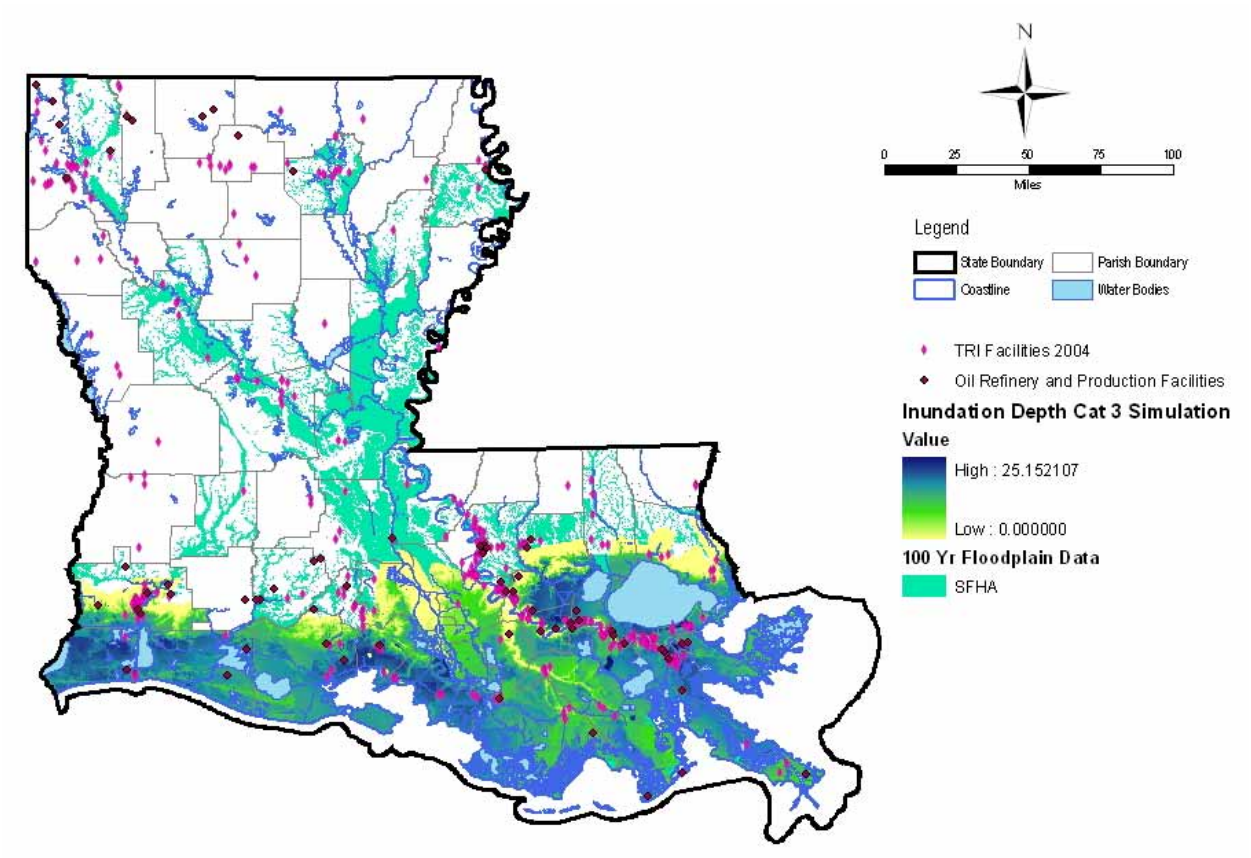
Assessing Risk to Sites with Secondary Hazard Potential

Another topic that deserves special consideration, separate and apart from simple considerations of risk, are sites that pose their own risk of becoming "secondary hazards" in a disaster situation, creating their own additional disasters. For example, Hurricane Katrina's storm surge caused a series of chemical and oil spills in Plaquemines and St. Bernard parishes, most notably a large spill at Murphy Oil in Chalmette. Included in this secondary hazard category are sites with HAZMAT potential that lie in areas identified as high-risk for naturally occurring hazards.

For this analysis, secondary impacts from identified hazards to citizens were considered. Industrial facility data from HAZUS, U.S. Department of Transportation (DOT) and the U.S. EPA were combined with hazard data to provide a snapshot of potential secondary risk of release stemming from industrial accidents, including chemical, oil-and-gas, and nuclear accidents.

Map 5-15 shows the relative risk from storm surge hazard to potential HAZMAT sites in Louisiana. Similar analyses could be run for any other hazard identified in this Plan.

Map 5-15: Surge Hazard and Potential Risks for HAZMAT Release and/or Industrial Accident



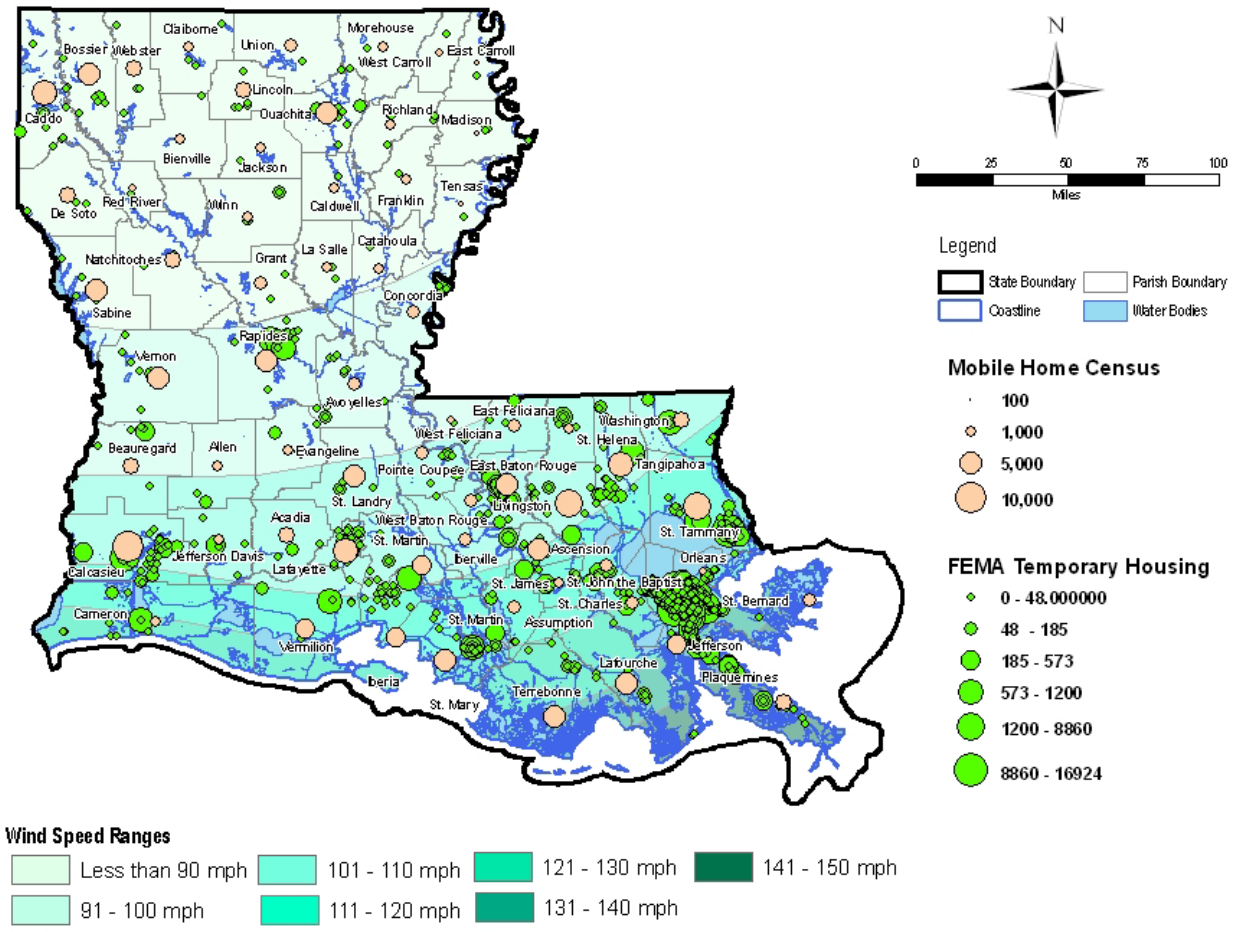
Source: EPA, 2004; HAZUS, 2003; SLOSH Data, NOAA, 2005; FEMA Q3 Data 2007

Assessing Risk to Mobile Homes

Separate from the issue of population exposure and residential density, special consideration in risk assessment should also be given to populations in mobile homes. Mobile homes are especially vulnerable to almost all hazards, particularly wind and flood. This issue is of particular concern in Louisiana, which has a high proportion of the population housed in mobile homes relative to other states, and which, post-Katrina and Rita, now has a new population housed temporarily in mobile homes (either FEMA- or privately-provided mobile homes adjacent to structures under repair, or FEMA mobile homes located in FEMA mobile home parks).

Map 5-16 shows the relative risk from high wind (hurricane) hazard to mobile home populations in Louisiana. This depiction includes recent U.S. Census data on mobile homes as well as FEMA-provided mobile homes on single lots and FEMA mobile home parks reflecting displacement due to hurricanes Katrina and Rita. Similar analyses could be run for any other hazard identified in this Plan Update.

Map 5-16: Wind Hazard and Mobile Home Density including FEMA Temporary Housing



Source: ASCE Standard 7-02; HAZUS, 2003

Note: US Census data on mobile homes (the red dots, above) depict density by parish; the dots do not actually reflect actual geographical location of mobile homes within parishes.

Assessing Risk to Critical Infrastructure

Finally, special consideration in risk assessment should be given to critical infrastructure. Like key economic drivers, critical infrastructure sites and systems are items that, if damaged or taken off-line, cause ripple-effects that might affect Louisiana's or the nation's economic stability, healthcare system, evacuation capacity, etc. Such infrastructure might include major transportation links such as ports, airports highways, bridges, or rail links; oil-and-gas facilities including production, transportation, and refining capacity; etc.

For a risk assessment aimed at mitigating risk posed by hazards to critical infrastructure in Louisiana, the best data set would be the critical infrastructure inventory that GOHSEP has developed consistent with U.S. Department of Homeland Security (DHS) directives under policies described in "The Physical Protection of Critical Infrastructures and Key Assets" (February, 2003) and "The National Strategy for Homeland Security" (July, 2002). GOHSEP's critical infrastructure survey considers all key sites, facilities, and systems, by categorizing them consistent with DHS as follows:

- Agriculture
- Food
- Water
- Public Health
- Emergency Services
- Government
- Defense Industrial Base
- Information and Telecommunications
- Energy
- Transportation
- Banking and Finance
- Chemical Industry
- Postal and Shipping

Developed in the wake of the attacks of September 11, 2001, the National Strategy and DHS's overriding concern in assembling such a prioritization and listing was emergency preparedness and response concerning terrorism and especially chemical/biological/radiological attacks. But the damage or loss of the same critical infrastructure due to natural disaster should be of equal concern.

However, this information is classified as secret. Although individual pieces of data pose minimum security risk, collectively the critical infrastructure list represents a snap-shot of state and federal vulnerabilities.

In the future, a project could be scoped and executed to examine these data in coordination with GOHSEP to derive appropriate protocols for accessing these data to apply appropriate hazard mitigation strategies to these critical infrastructures to reduce risk, while still meeting GOHSEP's and DHS's security requirements.

5.15 Assessing Recent and Future Development

One of the requirements of the IFR is to reflect the impacts of changes in development patterns in hazard-prone areas. This can be accomplished first by analyzing development since the April 2005 Plan, and then by examining likely future development trends.

Assessing Recent Development

An examination of residential building permitting data from 2005 to 2007 (see Table 5-15) reveals that the parishes with the most active residential construction sectors also tend to be relatively high hazard areas, according to the parish composite risk ranking established in Section 5.14. This is not surprising, considering that for the large majority of hazards, risk increases as a direct function of population increase.

This data represents the most robust data source that is available statewide, on an annual basis, and that uses consistent data reporting across jurisdictions.

Table 5-15: New Residential Development and Composite Hazard in the 20 Fastest-Building Parishes

Parish	Total permits issued, 2005-07*	Change in permits issued, 2005-06*	Parish composite risk rank**
St. Tammany	6,878	9%	high
East Baton Rouge	5,755	2%	high
Lafayette	4,523	12%	medium
Ascension	4,461	14%	high
Livingston	4,331	52%	high
Tangipahoa	4,155	84%	high
Bossier	2,917	0%	high
Jefferson	2,442	-23%	high
Orleans	2,310	20%	high
Caddo	2,046	-19%	high
Rapides	1,915	42%	medium
Ouachita	1,556	-12%	high
Terrebonne	1,491	14%	high
Calcasieu	1,488	-29%	high
Lafourche	1,224	41%	high
St. Charles	1,018	84%	low
Washington	1,000	310%	low
St. Landry	981	37%	medium
Vermilion	726	19%	high
St. James*	716	8%	medium

Source: Louisiana Economic Development, derived from monthly US Census reporting
*Residential permits only; estimates with imputation. Cumulative figures shown are derived mathematically from monthly data and may differ from source-published year-to-date figures, which sometimes reflect revisions to monthly data. The column representing "changes in permits issued" uses 2006 data because some data for 2007 were not complete as of this analysis.
** see *State Hazard Mitigation Plan*, Table 5.14

However, a closer look at these data reveal a mixed-to-positive statewide trajectory of reduction of risk, both due to ongoing and post-Katrina/Rita population shifts and to more effective mitigation in areas that are identified as having high exposure to hazards.

The fastest-permitting parishes since 2005 tend to be north of I-10, including on the Northshore of Lake Pontchartrain (Tangipahoa, St. Tammany, and Washington parishes), in metro Baton Rouge (including East Baton Rouge, Ascension, and Livingston parishes), metro Lafayette (Lafayette Parish), metro Alexandria (Rapides Parish), and metro Shreveport (Bossier Parish). The rate of new construction has declined in some relatively high-exposure parishes, including Jefferson and Calcasieu. The long-term trajectory of Orleans remains unknown.

Table 5-16 demonstrates this trend towards overall stability in statewide risk resulting from new development. The top 20 parishes in terms of building permits 2005-07 are analyzed according to their relative risk from the hazards examined in this Plan (1=low risk, 2=moderate risk, 3=high risk, 0=no risk) using both an average risk for each hazard and weighted composite scores for each parish and for the whole state. Weighted scores are generated using hazard weighting values per Table 5.13. In this analysis, a Composite Risk score of >2.0 indicates increasing exposure to hazard; a score of <2.0 indicates reduced exposure to hazard. Overall, in the state's 20 fastest-permitting parishes, the weighted average is exactly 2.0, indicating neutral new exposure to risk.

Table 5-16: Change in Louisiana's Risk Profile Resulting from New Development, 2005-07

Parish	Flood	Hurricane	Tornado	Ice Storm	Storm Surge	Subsidence	Wildfire	Dam Failure	Levee Failure	HAZMAT	Weighted Composite Risk*
St. Tammany	3	3	2	1	2	3	3	2	1	3	2.4
East Baton Rouge	3	3	3	1	0	1	2	3	2	3	2.0
Lafayette	2	3	3	1	0	1	1	0	1	3	1.7
Ascension	2	3	1	1	2	2	1	1	2	3	2.0
Livingston	3	3	2	1	2	2	3	1	1	3	2.2
Tangipahoa	2	3	3	1	1	2	3	1	1	2	2.0
Bossier	2	2	3	3	0	1	2	3	1	3	1.7
Jefferson	3	3	2	1	3	3	1	0	3	3	2.6
Orleans	3	3	2	1	3	3	1	2	3	3	2.7
Caddo	2	2	3	3	0	1	3	3	1	3	1.8
Rapides	2	2	3	2	0	1	3	3	1	3	1.7
Ouachita	3	2	2	3	0	1	2	2	1	3	1.7
Terrebonne	3	3	3	1	2	3	1	0	1	2	2.3
Calcasieu	3	3	3	2	2	1	3	1	1	3	2.3
Lafourche	3	3	2	1	2	3	1	1	1	3	2.3
St. Charles	3	3	1	1	2	3	1	0	3	3	2.3
Washington	1	2	1	1	0	1	3	2	1	3	1.2
St. Landry	1	3	3	1	0	1	2	2	2	3	1.7
Vermilion	3	3	2	1	2	2	1	0	1	2	2.1
St. James*	1	3	1	1	2	2	1	1	2	2	1.8
Average	2.4	2.8	2.3	1.4	1.3	1.9	1.9	1.4	1.5	2.8	2.0

Moreover, this "neutral" 2.0 score does not take into account enhanced building codes and floodplain management. New development in Louisiana more effectively mitigates hazards due to more stringent regulations. For example, the enforcement of the Uniform Construction Code (UCC) in Louisiana means that every structure that is covered by the UCC and built after the UCC's effective date of January 2007 has a beneficial net effect on Louisiana's exposure to certain hazards, including those related to high wind. (See Section 8.5, Action J.ii for notes regarding needs for tightened regulatory coverage under the UCC.)

Similarly, every new structure constructed in Louisiana within a community that participates in the NFIP does so under a floodplain management regulatory system that should further reduce Louisiana's overall exposure to certain hazards, particularly flood and storm surge. This reduction should be even more pronounced in communities that are CRS-rated (see Table 7-9 and preceeding).

When these regulatory improvements are figured into overall risk calculations, the net effect of new development will be expected to *decrease* risk from potential hazard events. Decreased risk translates into decreased estimated losses. Therefore, Louisiana expects no increase in estimated losses as a result of new development, and when accounting for regulatory enhancements, the state can expect an overall reduction in estimated losses.

Finer-grained loss estimations are not possible at this time due to the nature of the permitting data, which is the best available that describes new development statewide, on an annual basis, using consistent data across jurisdictions. This data is only available at the parish level. Decennial US Census data makes such information available at the tract and block level. US Census data from 2000 were used to generate the loss estimations contained in the risk assessments in this Plan Update. New Census data will allow a much more robust analysis of changes to loss estimations resulting from new development since 2000. Such data will be available in 2011.

With the exception of Orleans Parish, where virtually all of the permitting activity since 2005 has been post-Katrina reconstruction, the fastest-permitting parishes on average show relatively lower risk from storm surge, levee failure, subsidence, ice storm, wildfire, and dam failure, which the SHMPC ranked as the first, fifth, sixth, eighth, ninth, and tenth most severe hazards in Louisiana (see Table 5-13 for relative hazard rankings; maps 5-7, 5-11, 5-8, 5-6, 5-9, and 5-10 for individual risk profiles).

With regard to other hazards, development trends since 2005 range between neutral and slightly positive increased exposure to hazard. On average the fastest-permitting parishes exhibit above-moderate exposure to hurricane winds, flood, tornado winds, and HAZMAT releases, or the second, third, fourth, and seventh most severe hazards according to the SHMPC (see Table 5-13 for relative hazard rankings; maps 5-4, 5-5, 5-12, and for individual risk profiles).

Assessing Future Development Scenarios

Ideally, an analysis of future development scenarios would be accomplished by overlaying existing local comprehensive plans against current development trends (as described above), and then comparing that result to alterative development scenarios. Unfortunately, very few localities in Louisiana currently have comprehensive plans.

However, one of the products of the Louisiana Recovery Authority (LRA)'s Louisiana Speaks Regional Plan was a series of possible development scenarios for South Louisiana that are useful for demonstrating divergent possible development patterns. Moreover, the Louisiana Speaks plan itself identifies the need for a cost/fiscal impact analysis of plan outcomes. Analysis of the impacts of these scenarios also represents a means of integrating this Plan Update with the Louisiana Speaks Regional Plan, as called for in the Emergency Management Accreditation Program Interim Update. Additionally, local planning analyses modeled on the one described below would be a valuable tool in analyzing the cost impacts of local planning decisions.

Following is a cost analysis of three future land-use scenarios that were generated as part of the Louisiana Speaks Regional Plan process. These 50-year scenarios are based on regional demographic projections and local stakeholder input, and are categorized as "trend-based growth" (Scenario A), "modified development" (Scenario B), and "compact development" (Scenario C). Each scenario allocated the same number of jobs and population to each metropolitan area of South Louisiana, but land-use patterns in Scenarios B and C favored higher residential density, increased reliance on transit, more redevelopment, and less development of new land, including in floodplains.

Public response to these scenarios during the Louisiana Speaks process strongly favored a moderately aggressive approach to land-use reform, and as a result the final Louisiana Speaks Regional Plan's preferred scenario lies between Scenario B and Scenario C. Additionally, large majorities of respondents favored significant mitigation measures for existing and new structures located within hazard areas; this response was consistent across demographic groups and geographical areas.[38]

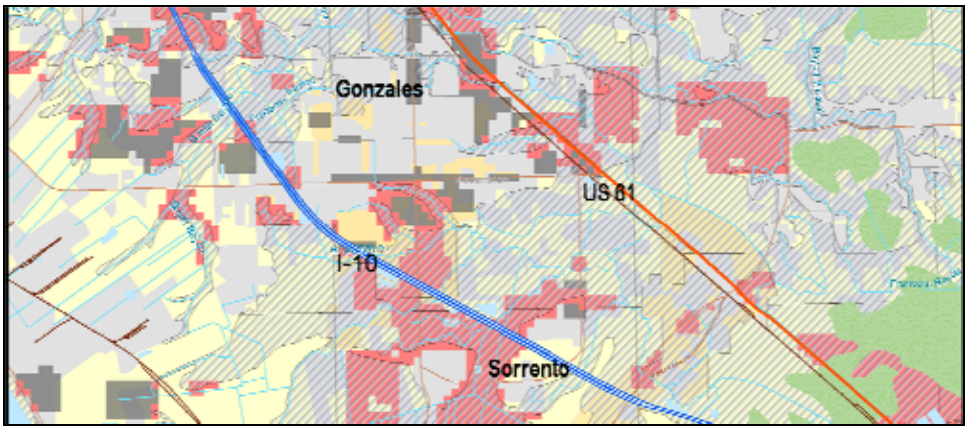
The analysis presented on the facing page takes a case-study approach to examining the cost implications of different development patterns in response to hazard. This case-study examines potential future development patterns in fast-growing Ascension Parish, and their relationship to flood hazards. The area pictured in the map lies between Baton Rouge and New Orleans, along I-10. Similar analysis could be run using similar data for other geographies and hazards.[39]

Areas shown in dark gray represent new future development, and areas shown in pink represent *new* future exposure to flood hazard. As Figure 5-1 demonstrates, changes to land-use and development patterns over time can have a significant impact on exposure of new development to flood hazard, and thus to the costs of flood events.

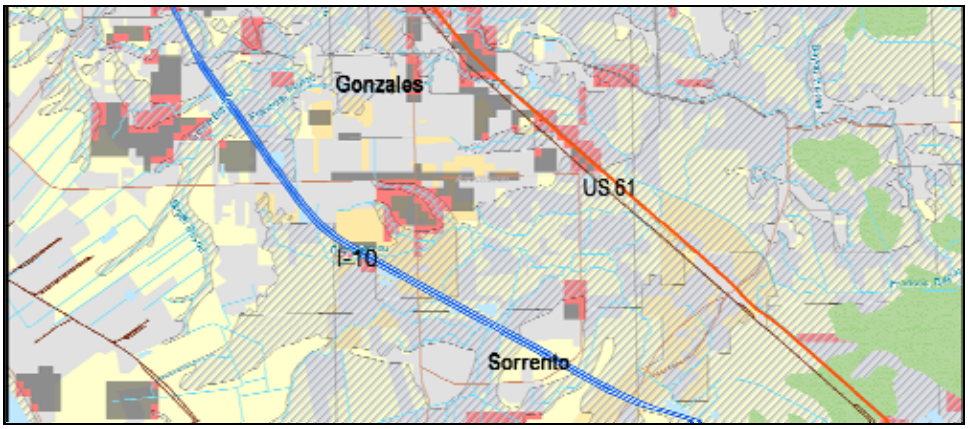
[38] For more information on the Louisiana Speaks Regional Plan process, and the data, modeling, and assumptions it employed, refer to the plan document, Appendix A of the Regional Plan (Public Outreach) and Appendix B of the Regional Plan (Modeling and Methodology), all available at www.louisianaspeaks.org.

[39] The Louisiana Speaks data set covers the southern 35 parishes of Louisiana; for more information on how the Louisiana Speaks data was prepared for this analysis, consult Volume II, Appendix E.20.

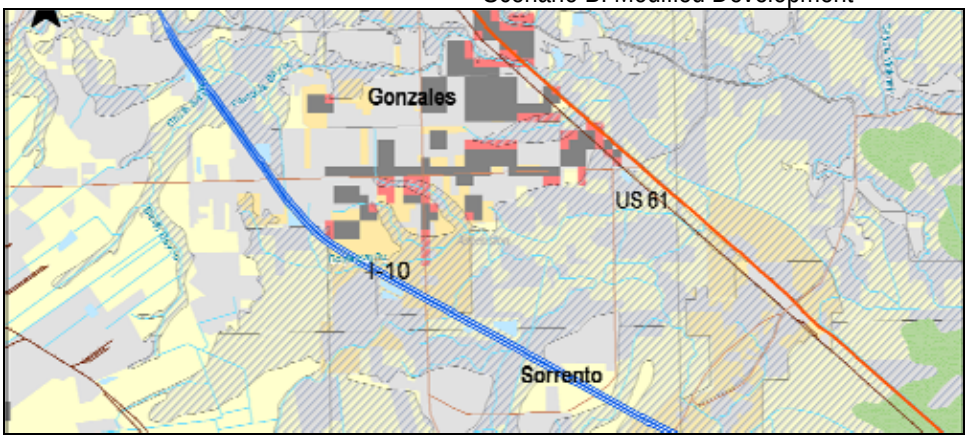
Figure 5-1: Future Development and SFHAs in "Louisiana Speaks" 50-Year Scenarios, Ascension Parish Case Study



Scenario A: Trend Growth



Scenario B: Modified Development



Scenario C: Compact Development

Legend

- Special Flood Hazard Area (SFHA)
- Future Developed Land Outside of SFHA
- Existing Land Developed (2005)
- Future Developed Land in SFHA
- Wetlands

Table 5-17 analyzes the new development scenarios for their potential exposure of jobs and housing units to flood hazard. As the table shows, changes in development patterns, including avoidance of locating new development in SFHAs in Scenarios B and C, can have a significant impact in terms of reducing exposure of property value and employment to hazard. To achieve these ends, the requisite actions include enforcement of floodplain management, pro-active land-use planning that allows for higher density, and mechanisms to implement planning such as zoning and subdivision review. All of these are primarily local functions and powers.

Table 5-17: Projected Cost and Employment Implications of New Development in Floodplains in South Louisiana in "Louisiana Speaks" 50-Year Scenarios

Scenario	New Development in Floodplain (acres)	New Housing Value in Floodplain(x$1000)**	New Population in Floodplain	New Jobs in Floodplain
Scenario A (Trend Growth)	84,000	$15,456,000	447,000	322,000
Scenario B (Modified Growth)	31,000	$6,972,000	201,000	126,000
Scenario C (Compact Growth)	9,000	$2,520,000	72,000	59,000

Source: James Lee Witt Associates, Louisiana Speaks, Calthorpe Associates, and US Census

* Analysis includes the 35 parishes of South Louisiana analyzed in the Louisiana Speaks Regional Plan.

** Housing cost-impact estimates reflect the total housing value exposed to all 100-year floods; no single flood event would be expected to produce these results. This analysis assumes all housing units to be worth the median for Louisiana, $85,000 (US Census, 2000).

The analysis assesses flood hazard only in terms of whether or not a structure is within a floodplain. However, a much more sophisticated GIS tool for "batch" inundation analysis is under development by GOHSEP and FEMA. This (BCAT) was developed to produce batch BCAs for the state's Road Home housing assistance program.

The BCAT is well suited to conduct analysis on the community growth scenarios developed in the Louisiana Speaks Program. The tool will be available in 2008. When it becomes available, it is recommended that the BCAT be utilized to conduct flood analysis. This, in conjunction with FEMA depth-damage estimators, will produce a much more robust cost/fiscal impact analysis of the different future development scenarios from Louisiana Speaks, including the preferred scenario (B).

Similar analysis to the one demonstrated above will be useful in parish and municipal HMPs in the future, and GOHSEP will make the data available to parishes and municipalities doing HMP updates.

Other Issues Related to Future Development Patterns

An issue that was not directly addressed in the Louisiana Speaks scenarios is the degree to which large-scale coastal restoration and flood protection measures may impact development patterns. New levees and other protection measures have historically been seen as opportunities to open new land for development in Louisiana.

Major new protection systems are already approved or are proposed in the *CPRA Master Plan*, including the Morganza to the Gulf levee near Houma, and other systems across the coast. Development of newly protected land behind this added infrastructure is a serious policy concern for the State of Louisiana and for localities, as development of such areas could put significant new populations at risk from floods from surge, levee overtopping or failure, and potentially from water being trapped inland of levees during or after major flood events. Additionally, levee infrastructure located near or within wetlands may be at risk for destabilization if the portions of those wetland systems are altered or drained for development.

5.16 Notes on Data Limitations

As has been noted in several instances in this section and in Section 4, many of the hazard identifications and risk assessments that the state has performed at this time cannot be as robust as hoped, due to limitations on the data. In many cases, newer and much improved data will be available soon. In other cases, this Plan Update's action plan (see Section Eight) will describe methods for improving data collection, maintenance, and distribution, as well as creating consistent hazard mitigation goals, hazard definitions, risk assessment methodologies, and loss estimation methodologies.

Significant forthcoming data improvements include, but are not limited to:

- New FIRMs reflecting final post-Katrina/Rita BFEs, including new storm surge modeling from USACE
- New data on subsidence and statewide elevation benchmarks from USGS, FEMA, and various university partners
- 2010 Census data that will allow detailed spatial analysis of post-Katrina/Rita demographics for the first time since 2005
- The GIS-based BCAT batch cost-analysis tool for assessing potential flood impacts

By the next FEMA-required SHMP update (2011), the situation regarding many of these data should be markedly improved, and demographic instability resulting from Katrina and Rita should be lessened. However, the lack of up-to-date data from the U.S. Census will continue to create challenges into the next scheduled Plan Update.

Updated population data are not likely to be available until the results of the 2010 Census become available, beginning in 2011. These data will likely not be available in time to incorporate into the next triennial State of Louisiana Hazard Mitigation Plan, which must be in the FEMA approval process by the time the new data will be available. Once the 2010 Census results are published, a robust and full update of all hazard analyses in the State will be possible for the first time since the storms of 2005.

Additionally, more complete risk assessments could be accomplished if this Plan Update were to acquire access to some of the following data, as well as other sources:

- GOHSEP critical infrastructure assessments
- More sophisticated data on state economic drivers

Using the best data and tools available, all future efforts will concentrate on producing risk assessment results that can be expressed in terms of *monetized, annualized risk*, which is an *absolute* metric. Currently, the Plan Update uses a variety of *relative* metrics to express risk. This means comparisons cannot easily made between hazards.

An absolute metric also has the advantage of providing a meaningful framework for integrating local and state HMPs, because if the state and parishes run their risk assessments using consistent data and methodologies, the outcomes should be consistent. If local and state calculations were to produce different results, both sides' data and methodologies could be examined for errors and/or different interpretations, and the variance corrected. This would be a major improvement over the current system, in which, for example, a parish's "high" risk assessment and the state's "low" risk assessment for the same hazard may both be defensible.

Producing agreed-upon definitions, data, methodologies and metrics cannot be rushed. Whereas the data and methodologies employed in this process will directly affect mitigation funding, the more defensible the process is and the more buy-in it has, the greater efficacy it will have upon implementation.

Building good data and methodology will require technical review from experts in various risk-related fields, as well as consensus-building with GOHSEP, state agencies, and local jurisdictions. The SHMPC has therefore designated certain members of the SHMP Advisory Board as technical reviewers. These are mainly academics and scientists, both in the public and private sectors. In an ongoing capacity, they will be examining the data and methodologies the SHMP has thus far used for risk assessment, and proposing improvements.

5.17 Integration of Parish and Municipal Hazard Mitigation Plans

As mentioned in Section 5.3 under "Local Risk Assessments", and consistent with the IFR, this Plan Update surveyed parish and municipal Hazard Mitigation Plans completed through 2007. Additionally, data reported from FEMA Planning Pilot Grant Program PPGP[40] grant-funded parishes that are currently engaged in HMP updates were also reviewed and analyzed. All HMPs and PPGP reporting were reviewed in the following areas:

- Hazards addressed,
- Hazard mitigation goals,
- Project types addressed,
- Data inputs and risk assessment methodologies,
- Loss estimation, and
- Critical facility listings.

The resulting data gathered from the parish and municipal HMPs and PPGP reporting were compiled into one spreadsheet (see Volume II, Appendix E). The findings are summarized in the text and charts in this section.

In general terms, the results of these analyses were integrated as part of the Plan Update risk assessment and planning process as follows:

- The frequency of hazards addressed in parish and municipal plans was determined (see Figure 4-1 and 5-2). The most commonly cited hazards in the HMPs were addressed in risk assessment processes conducted in the Plan Update (Table 4-3) or an explanation for not including the hazard was developed (see Table 4-4). The SHMT's prioritization of hazards was confirmed as similar to relative frequencies of hazards cited in HMPs. This was considered a general validation that the remaining steps of the risk assessment process were consistent with results in parish and municipal hazard mitigation plans even if specific risk assessment methodologies and results could not be directly incorporated.
- Results of the 2005 Plan Update relative risk assessments were reviewed with Planning Pilot Grant Program participants who are updating their HMPs to determine if results were consistent with parish and municipal risk assessments. At the time of these comparisons, most PPGP participants had not progressed far in their risk assessment processes so results of these comparisons did not reveal substantive changes in the relative risk assessments. However, one example of parish and municipal risk assessments differing from the 2005 Plan was in the assessment for Dam Failure.
- Repetitive Loss Property listings and Critical Facilities listings in parish and municipal plans were reviewed and correlated with the most current listings in the Plan Update to make sure the best available data was used as part of the relative risk assessments.

Due to specific incongruities and inconsistencies in data inputs and methodologies described below, it was not possible to directly incorporate the results from parish and municipal hazard mitigation plans and still yield the desired consistent risk assessment methodology that would allow for comparison of risk from hazards between parishes. At the same time, this careful examination of the parish and municipal HMPs identified several specific recommendations that have been incorporated into the Mitigation Action Plan (Section Eight) that can dramatically improve the quality of parish and municipal HMPs and the ability to integrate these into future Plan Updates.

[40] The Planning Pilot Grant Program (PPGP) is a program currently being administered by GOHSEP. PPGP is used to update parish and municipal hazard mitigation planning efforts by focusing on identifying projects that address the prevalent hazards from the Statewide Risk Assessment and the risk assessment results of the parish and municipal planning efforts. For more on PPGP, see Section Nine.

Additionally, the HMPs and PPGP reporting was reviewed for:

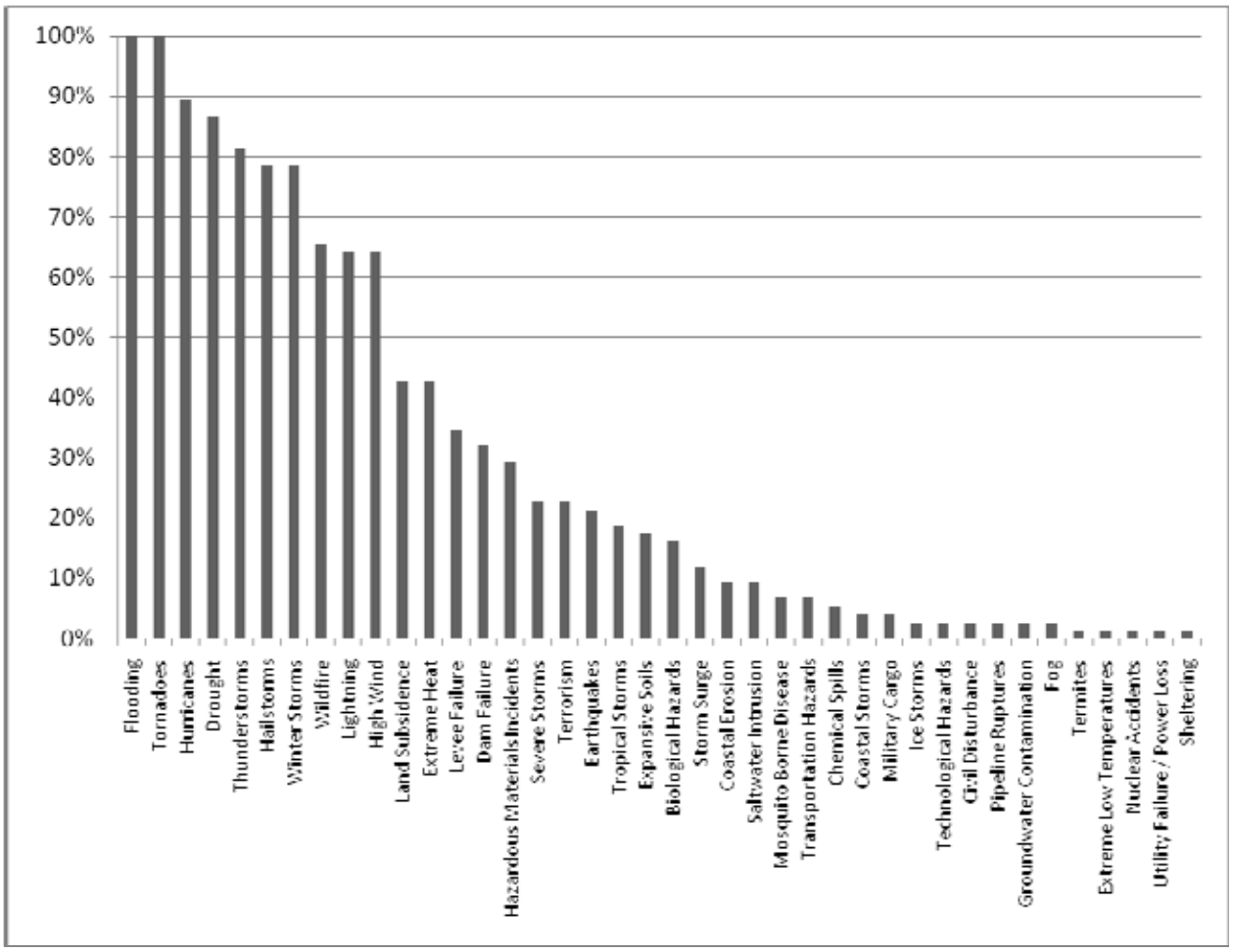
- Capability assessment, and
- GIS capabilities.

The results of these last two reviews are addressed in Section Seven of this Plan.

Hazards Addressed

A survey of parish and municipal HMPs and PPGP plan updates found that the parish and municipal plans used 40 different names for hazards (see Figure 5-2). All parish and municipal hazard mitigation plans surveyed were drafted before hurricanes Katrina and Rita. The descriptions of the various hazards, along with their definitions, vary widely. Several distinct hazard titles appear to describe the same hazard (such as "ice storms" and "severe winter storms"), or clusters of issues that are not mutually exclusive (such as "hurricane," "storm surge," and "high wind"). In addition, some plans consider categories of hazards, such as "severe storms," which include several hazards such as "ice storms," "thunderstorms," and "high wind events." Other hazards, such as "hazardous materials incidents," are rarely addressed by parish and municipal plans, even in areas identified as high risk by the State. Some of the identified hazards could be more accurately described as consequences of other hazards (such as "power loss") or as recovery functions (such as "sheltering").

Figure 5-2: Frequency of Hazards Identified in Parish and Municipal HMPs



Source: Analysis of (pre-Katrina/Rita) Parish and Municipal HMPs and PPGP Plan Updates, 2007

The disparity in definitions, causality, categorization, and nomenclature makes it very difficult to compare the various hazards in any rigorous, data-driven manner. (Although it is possible to combine and sift these categories, as was done in Section 4.3.) Nevertheless, a rough analysis of the frequency of identified hazards, as shown in Figure 5-2, is revealing in the parish and municipal estimation of the prevalence of different categories of hazard in Louisiana.

It is clear from the chart that certain hazards are more prevalent than others. This information should be generally useful to the SHMT in determining which mitigation measures should be given greater weight when making awards for HMGP and other funding programs. It is also generally consistent with the SHMPC's ranking of the relative threat posed by different hazards (see Section 4.5.)

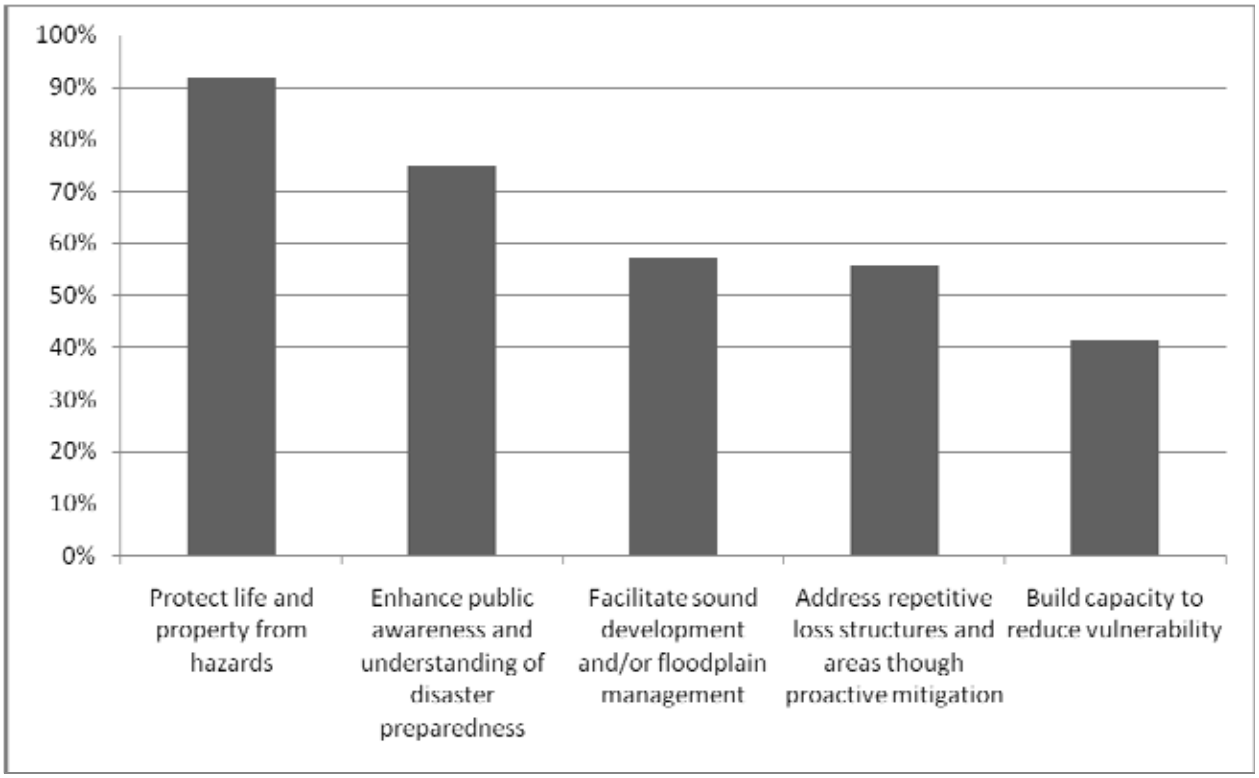
Hazard Mitigation Goals

The parish and municipal HMPs reviewed listed a wide range of hazard mitigation goals. To compare and assess the various plans, the list was organized into five broad categories:

- Protect life and property;
- Enhance public awareness;
- Build capacity to reduce vulnerability;
- Address repetitive loss structures and areas through a comprehensive mitigation strategy; and
- Sound development and floodplain management.

Almost all parish and municipal goals fit into these categories (see Figure 5-3). The few that did not dealt primarily with recovery activities and not mitigation. The actual goals given by the Parishes were often very vague and did not necessarily relate to the projects cited.

Figure 5-3: Frequency of Mitigation Goals (by Category) Identified in Parish and Municipal HMPs



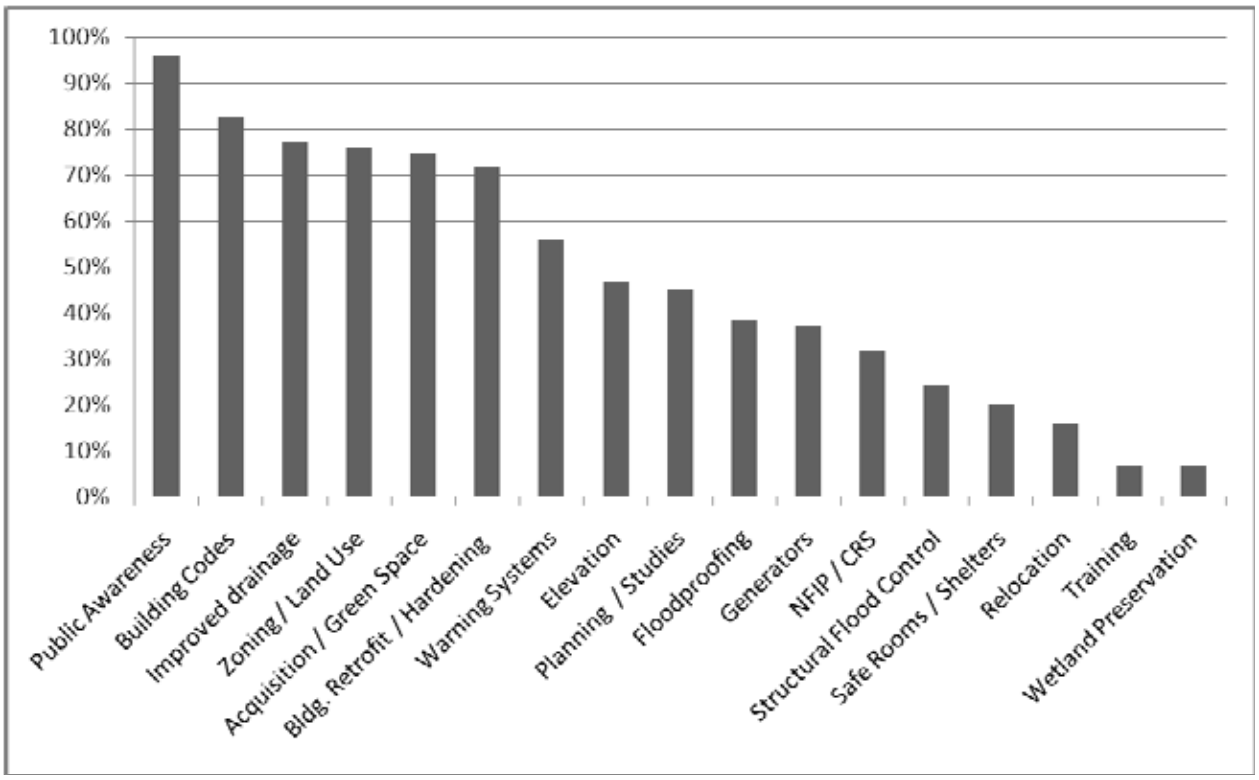
Source: Analysis of (pre-Katrina/Rita) Parish and Municipal HMPs and PPGP Plan Updates

This analysis of parish and municipal HMPs mitigation goal-setting can provide a basis for establishing future strategic goals and project-selection criteria at the state level.

Project Types Addressed

The plans reviewed included many different projects presented for future scoping, benefit-cost analysis, and funding. To compare the various parish and municipal HMP lists, the data was divided into 18 project categories (including floodproofing, public awareness, drainage, etc.) (see Figure 5-4). The parish and municipal project lists cover a wide range of potentially useful projects; however, it was noted that several plans (in particular those prepared by the same consultant) listed the exact same projects.

Figure 5-4: Frequency of Mitigation Actions Identified in Parish and Municipal HMPs



Source: Analysis of (pre-Katrina/Rita) Parish and Municipal HMPs and PPGP Plan Updates

This analysis of mitigation actions provides a baseline assessment of parish and municipal priorities. It also demonstrates gaps in parish and municipal awareness of mitigation strategies and actions. For example, the relatively low level of parish and municipal recognition of the value of building elevation and floodplain management via NFIP participation raises the possibility that education and outreach may be required on this issue in some areas of the state.

Risk Assessment Data Inputs and Methodologies

The data inputs and risk assessment methodologies used in the parish and municipal plans were inconsistent, at best. Not all parish and municipal planning efforts use GIS, and those that do often are not familiar with the potential of the technology (for more on this, see Section Seven). There are a number of plans that consulted with parish and municipal officials and checked historical records for trends in hazards. There are also a number of plans that used the FEMA "how-to" guides, pulling information from parish and municipal Planning Committees and climate data from the national government. Finally, there are plans that did not list any risk assessment methodology at all. A similar range of methodologies appears in how hazards are ranked and divided in parish and municipal plans. For example, some of the plans prioritize hazards, while others merely list them.

Loss Estimation

There are varying degrees to which the different parish and municipal HMPs present loss estimation analysis, or even discuss their methodology and data for doing so. In a number of the plans, loss estimation is presented in a very general sense, addressing what each hazard might cause. This approach is based on the four components of: structure loss, contents loss, structure use loss, and function loss. These four categories are then generally summarized to determine the total loss for each of the hazards that the plans examined. FEMA "How-to Guides" were used to determine the generalized loss estimations for those parishes.

A few parishes, went into more depth in their methodology of loss estimation as well as their execution of that methodology. In those cases, multiple data sets were used to arrive at loss estimations, including data from HAZUS, FEMA, and local historical hazard data. This provided the basis for an analysis resulting in specific monetary outcomes.

However this more detailed approach was unusual among the parish and municipal HMPs. Approximately one quarter of parish and municipal HMPs attempted any specific monetary estimates of loss, and fewer used sound methodologies. Instead, the generalized methodology cited above is how most of the loss estimations are structured. This low number of parish and municipal HMPs presenting rigorous loss estimation makes it difficult to comprehensively incorporate local loss estimation into the SHMP.

Critical Facility Listings

The various parish and municipal HMPs contain listings of critical facilities which do not necessarily match with the corresponding lists in Appendix E.17 which is a compilation of lists generated by HAZUS-MH. For the most part, the critical facility listings within the parish and municipal HMPs are far more inclusive than those used in the SHMP and have often been groundtruthed.

The critical facilities list for Acadia Parish, included in Appendix E.17, has been updated to illustrate the types of changes that can be made based upon the local data. An in depth revision of the data in Appendix E.17 to reflect the local data would lead to greater accuracy in risk assessment for future updates.

Conclusions and Summary of Parish and Municipal HMP Integration

Consistent with the IFR, this State Hazard Mitigation Plan is required to integrate hazard identification, risk assessment, and cost estimation from parish and municipal Hazard Mitigation Plans. As noted above, this is only possible in a limited way at present, due to limitations inherent in the parish and municipal HMPs. Currently, it is possible to:

- Help the SHMT to generally prioritize grant awards based on type of mitigation proposed when considered in relation to the frequency of hazard identification in parish and municipal HMPs, and
- Begin to establish project-selection criteria and goals based upon compiled parish and municipal mitigation goals.

In the future, as noted above, opportunities to improve integration of parish and municipal HMPs into the State Hazard Mitigation Plan present themselves in several areas;

- Establishing consistent mitigation criteria and goals
- Establishing consistent hazard-identification definitions
- Establishing a system for creating and maintaining consistent data/GIS inputs related to hazards and demographics
- Establishing consistent risk assessment methodologies
- Establishing consistent loss estimation methodologies
- Establishing consistent listings of critical facilities

These opportunities are discussed in more detail in Sections Seven and Eight of this Plan.

5.18 Summary

Risk and vulnerability assessments are best conducted on an asset-specific basis, something that is not possible given the scope of the Plan Update. Due to this, the results of the risk assessments should be considered general in nature, and accurate primarily by parish, relative to assessments of risk within the same hazard category, and secondarily between different hazards, according to the frequency with which hazards are treated in parish and municipal HMPs.

The preceding general discussion and the more detailed treatments in Volume II, Appendix E indicate common limitations in this study due to the quality and availability of data, noted in Section 5.16.

The various hazard analyses that comprise this risk assessment used different bases and focused on available information to try to draw useful conclusions. The main consequence of these limitations is the inability to compare the impact of different hazards on the parishes of Louisiana. Section Eight includes programs of improving coordination, methodologies, and data creation/management at the local and State level that over time can provide results that are more comparable hazard to hazard and better integrate local and state efforts

For the immediate future though, there is an important point to emphasize. The major hazards in the State, in the opinion and experience of GOHSEP and the SHMPC are flooding and high winds (usually due to hurricanes and tropical storms). While the results of these analyses provide useful insights into the potential for damages due to the other hazards, nothing in the results changes the standing priority of the State to address the numbers of repetitive loss properties and to limit the damaging affects of tropical storm events.

Section Six
Risk Assessment for State-Owned Assets

Contents of this Section

6.1 Interim Final Rule Requirement for Risk Assessment for State-Owned Assets

6.2 Introduction

6.3 Methodology

6.4 Flood

6.5 High Wind (Hurricane)

6.6 High Wind (Tornado)

6.7 Ice Storm

6.8 Storm Surge

6.9 Subsidence

6.10 Wildfire

6.11 Dam Failure

6.12 Levee Failure

6.13 Hazardous Materials Incident

6.14 Summary

6.15 Critical Infrastructure Risk Assessment

6.1 Interim Final Rule Requirement for Risk Assessment for State-Owned Assets

The Interim Final Rule (IFR) includes two specific requirements regarding risk assessments for State-owned assets:

- Vulnerability Assessment per Requirement §201.4(c)(2)(ii): "[The State risk assessment shall include an] overview and analysis of the State's vulnerability to the hazards described in this paragraph (c)(2), …State-owned critical or operated facilities located in the identified hazard areas shall … be addressed."
- Estimated Losses per Requirement §201.4(c)(2)(iii): "[The State risk assessment shall] estimate the potential dollar losses to State-owned or operated buildings, infrastructure and critical facilities located in the identified hazard areas."

Note: Portions of these same provisions were also cited in Section Five as the IFR Requirements for the Statewide Risk Assessment.

6.2 Introduction

Hazard vulnerability assessments and loss estimates for State-owned buildings and critical facilities in Louisiana were prepared for the hazards listed below.

- Flood
- High Wind (Hurricane)
- High Wind (Tornado)
- Ice Storm
- Storm Surge
- Subsidence
- Wildfire
- Dam Failure
- Levee Failure
- Hazardous Materials Incident

Introductory maps (Maps 4-1 and 6-1 thru 6-3) are provided as a reference for the analysis of these hazards. Map 4-1 (see page I-27) shows the State of Louisiana and the political boundaries for the individual parishes. The locations of State-owned assets and critical facilities in the State of Louisiana are presented in Maps 6-1 and 6-2 respectively. Finally, Map 6-3 reflects the ranking of State-owned critical facilities in the State of Louisiana.

A general overview of the hazard vulnerability assessment and loss estimation methodologies, combined loss estimate results for all ten hazards, and hazard vulnerability assessment and loss estimate results for each hazard, are presented in the sections that follow. Detailed hazard vulnerability assessments and loss estimates for each of the ten hazards, along with related maps and tables, are presented in Volume II, Appendix F.

This section concludes with a summary that includes combined loss estimates for State-owned facilities and limitations regarding use of these results.

6.3 Methodology

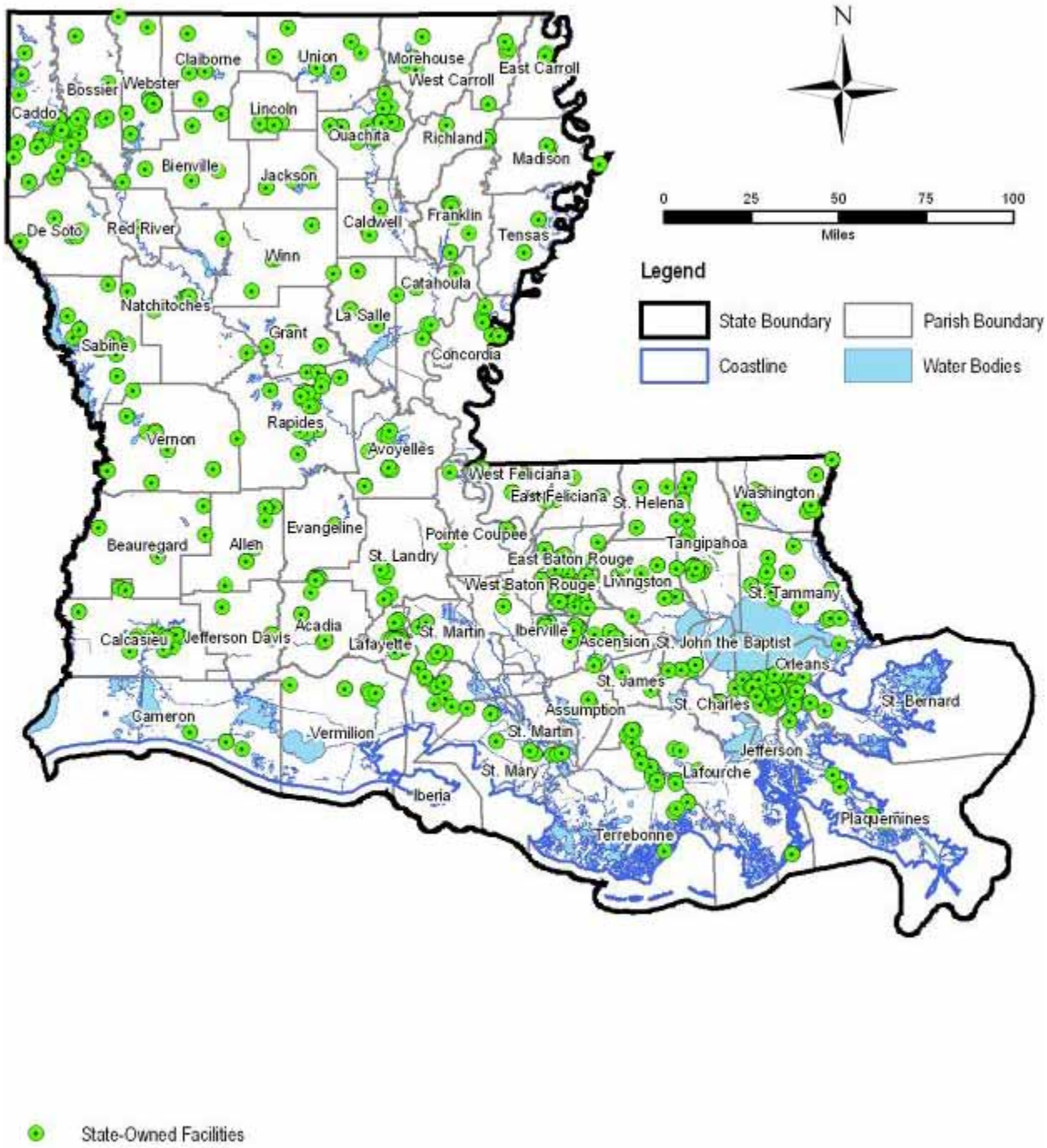
The Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) and the State Hazard Mitigation Planning Committee (SHMPC) undertook the risk assessment for State-owned assets in three stages:

- Identification of Critical Facilities;
- Vulnerability Assessment; and
- Loss Estimation.

Identification of Critical Facilities

The State of Louisiana maintains a database of State-owned assets (buildings, infrastructure, and critical facilities) ranging from structures as large as the Superdome in New Orleans to individual shelters in state parks. The attributes in the database include the move-in date, size, value and location of the assets and the responsible state agency. The total number of assets included in the database is 9,325. The general locations of these assets are shown in Map 6-1.

Map 6-1: State Owned Assets



State-Owned Facilities

Source: Louisiana Facility Management Database, 2007

GOHSEP and the SHMPC determined that it was impractical to perform a risk assessment for the entire list for two reasons:

1. The list includes a large number of assets that do not play a critical role in the operation of the State. It was assumed that damage or loss of use for these assets would not endanger the citizens of Louisiana or adversely affect the economic stability of the State; and
2. There is only so much that can be done in any set amount of time. For State Hazard Mitigation Plans, the relevant planning horizon is three years; the time interval between updates required by the Disaster Mitigation Act of 2000 (DMA 2000). In any three-year period, GOHSEP and other state agencies will only reasonably be able to address hazard mitigation issues for a fraction of the total number of assets.

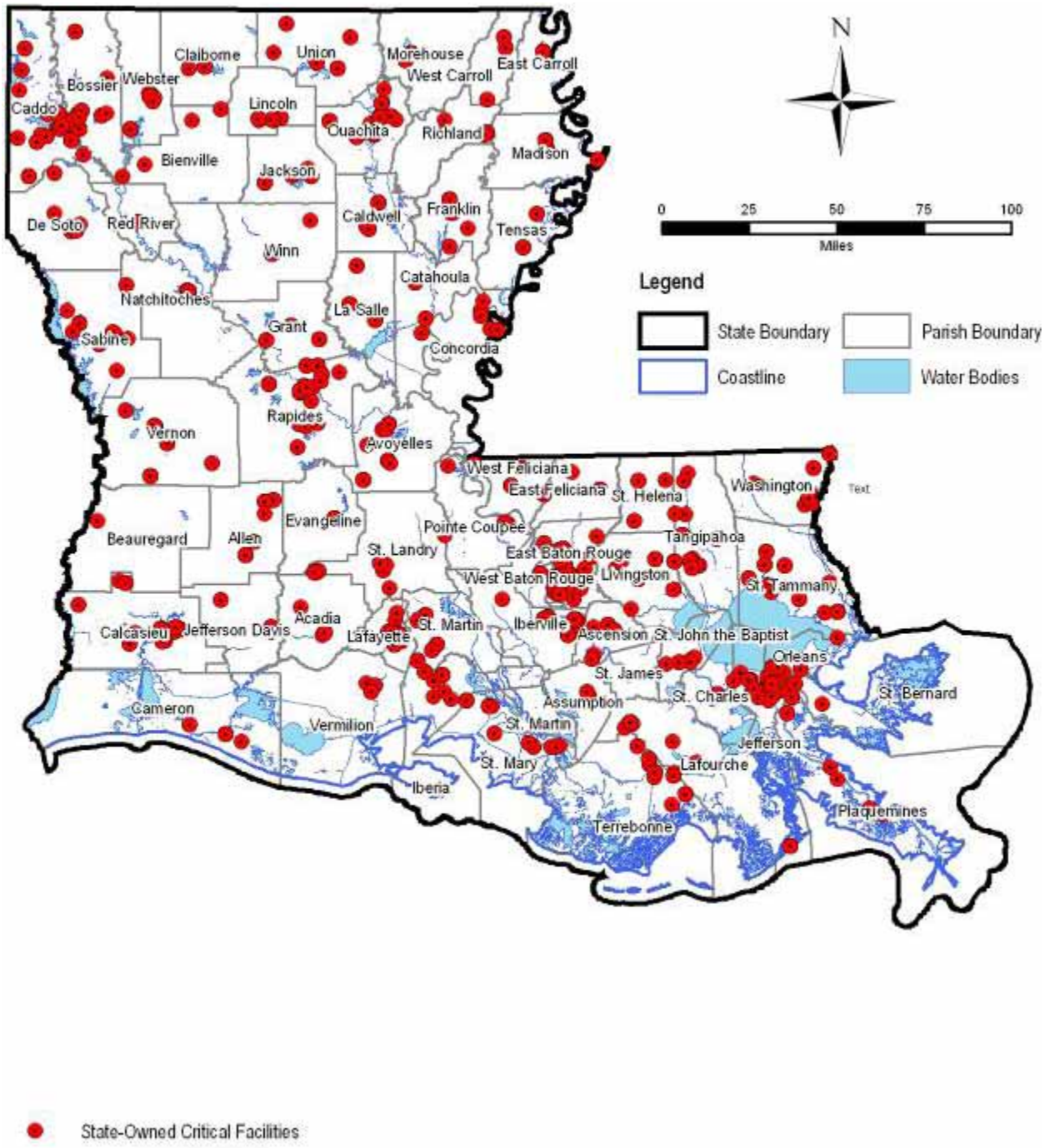
Therefore, GOHSEP and the SHMPC decided to use the *building use* information in the database to identify the State-owned assets that are "critical facilities". The process by which GOHSEP and the SHMPC identified these critical facilities started before the planning process described in Section Three. In 2003, GOHSEP received assistance from the Federal Emergency Management Agency (FEMA) via the federal Hazard Mitigation Technical Assistance Program to develop and apply definitions of "criticality". This work, referred to as the "Task Order 208 Study", provided definitions that became the basis for a ranking system for State-owned assets that placed the highest priority on facilities such as emergency services serving large population centers. The different levels that were developed by GOHSEP under this study are shown in Table 6-1.

Table 6-1: State-Owned Assets Criticality Level Descriptions

Criticality Level	Description
Level 1 - High importance/Most critical	emergency medical services, fire, police and Emergency Operations Centers (EOC)s serving large population centers (Metropolitan)
Level 2 - Medium-high importance	emergency medical services, fire, police and EOCs serving small to medium population centers (Micro); shelters serving large populations (Metropolitan)
Level 3 - Medium importance	shelters serving small to medium populations (Micro), essential government services (i.e., public works departments, schools) serving large population centers (Metropolitan)
Level 4 - Medium-low importance	essential government services (i.e., public works departments, schools) serving small to medium population centers (Micro), non-essential government service buildings (i.e., museums, parks and recreation) serving large population centers (Metropolitan)
Level 5 - Low importance	non-essential government service buildings (i.e., museums, parks and recreation) serving small to medium population centers (Micro)

Applying the ranking system to the Facilities Management database resulted in the identification of 8,004 State-owned assets that met one of these five descriptions. The general locations of these facilities are shown on Map 6-2.

Map 6-2: State Owned Critical Facilities and Infrastructure



State-Owned Critical Facilities

Source: Louisiana Facility Management Database, 2007

Table 6-2 shows the numbers of State-owned critical facilities per criticality ranking; this information is also illustrated in Map 6-3.

Table 6-2: Number of State-Owned Assets (Critical Facilities) by Criticality Ranking

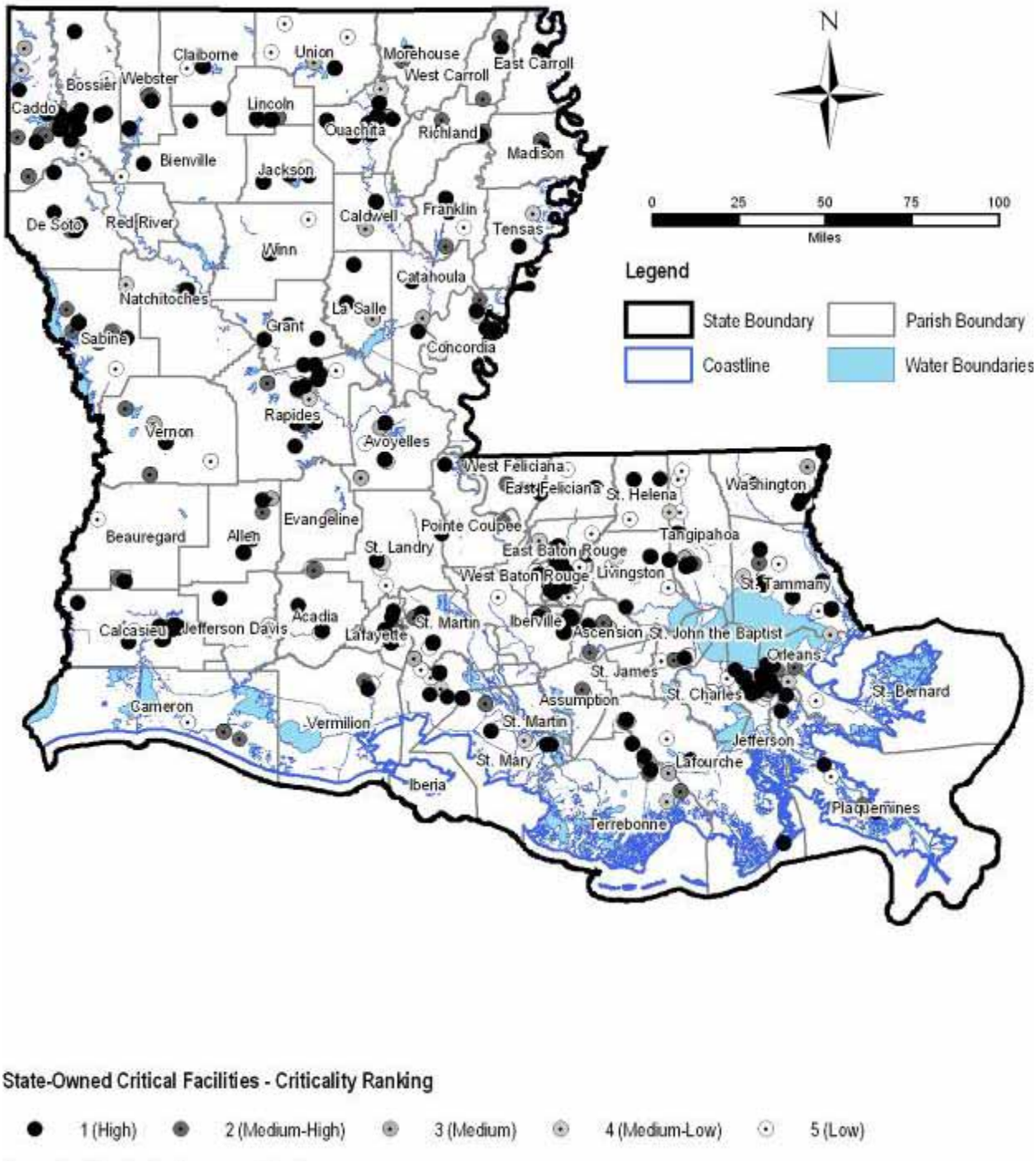
Criticality Level	Number of Assets (Critical Facilities)
1 – High	1,173
2 – Medium High	192
3 – Medium	4,155
4 – Medium Low	2,110
5 - Low	374
Total	8,004

Vulnerability Assessment Methodology for State-owned Critical Facilities

Hazard vulnerability assessments provide a means of indicating whether a given building or facility in Louisiana is at a low, medium or high vulnerability to damage from a given hazard. Although there are a variety of potential hazards, the hazard vulnerability assessments for State-owned buildings and critical facilities in Louisiana adopted the same general approach for all hazards. This general approach is outlined by the three-step methodology listed below:

- Step 1 – Review Hazard Profile Maps: The first step in the hazard vulnerability assessments was to review the hazard profile map for the hazard under consideration. The hazard profile maps helped identify and establish which parishes or areas in the State of Louisiana have historically been the most prone to a given hazard, and provided a useful means of establishing hazard vulnerability levels (Step 2). The hazard profile maps for each hazard may be found in Section Four of this Plan.
- Step 2 – Establish Hazard Vulnerability Levels by Location: Using information from Step 1, two or more hazard vulnerability levels were established for State-owned critical facilities based on location. In general, structures located outside established hazard zones were designated as having a low hazard vulnerability level, while structures located within the established hazard zones were designated with a medium or high hazard vulnerability level. The basis for the medium and high distinctions is described for each hazard in the materials starting with Subsection 6.4.
- Step 3 – Establish Hazard Vulnerability Levels using Additional Parameters if Needed: In some cases, the location of a building or facility is not sufficient to specify a low, medium or high vulnerability level. For example, most of the State can experience hurricane force winds from time to time. For these hazards, physical location is not as important in determining vulnerability as the condition of the structure. In these situations, the next step was to establish additional parameters to make a more specific determination. Examples of parameters used to establish hazard vulnerability levels include the age of the structure relative to the adoption of an established building code or floodplain ordinance. The assumption is that in general terms, buildings constructed after the establishment of a building code or an ordinance is designated have a lower hazard vulnerability level than those that were constructed before it was established, since the code or ordinance would require construction that is more resistant to these hazards.

Map 6-3: State Owned Critical Facilities and Infrastructure, Ranked



State-Owned Critical Facilities - Criticality Ranking

● 1 (High) ● 2 (Medium-High) ● 3 (Medium) ● 4 (Medium-Low) ● 5 (Low)

Louisiana Facility Management Database, 2007

Loss Estimation Methodology for State-owned Critical Facilities

Loss estimations are intended to provide a means of quantifying the potential dollar losses from a given hazard in terms of combined physical (building) damage, contents damage, and loss of function (LOF) costs. As described for the vulnerability assessment methodology above, although there are a variety of potential hazards, the loss estimations for State-owned critical facilities in Louisiana adopted the same general approach for all hazards. This general approach is outlined by the three-step methodology listed below.

- Step 1 – Estimate Damage Levels by Hazard Vulnerability Level: The first step in preparing loss estimates for individual structures was to establish a magnitude or level of damage from a given hazard. The three hazard vulnerability levels established by the hazard vulnerability assessment for each facility provided a useful indication of the potential levels of damage that may occur from a given hazard. In general, structures with a low hazard vulnerability level are expected to experience a low level of damage or no damage, structures with a medium hazard vulnerability level are subject to a moderate level of damage, and structures with a high hazard vulnerability level will likely experience a high level of damage. In addition, for some hazards, data provided in the hazard profiles (Section Four) was used to estimate potential design wind speeds or flood depths associated with a given hazard vulnerability level to estimate damage levels with greater accuracy.

- Step 2 – Assume an Average Building Type: Once the three damage levels were established, the next step was to assume an average building type to use as a basis for uniformly applying damage functions (Step 3) to individual State-owned critical facilities. An average building type was typically assumed based on engineering judgment and experience with basic building types in various parts of Louisiana. Examples of average building types assumed for various loss estimates include using a single story structure without a basement for water-related hazards and using a lightly engineered building type for wind-related hazards.

- Step 3 – Establish Damage Functions: The final step in preparing loss estimates was to establish a series of damage functions to estimate physical damage, contents damage, and LOF costs associated with a given hazard. The damage functions allowed damages to be estimated for the three potential damage levels established in Step 1 using the average building type assumed in Step 2. The damage functions were applied to individual structures based on the Building Replacement Value (BRV) and the square footage of the building. The BRV and square footage values were taken directly from the information in the Facilities Management database.

  In general, physical and contents damage functions are expressed as a percentage of the BRV, while LOF costs were determined as a function of the number of days a facility would be out of use. Therefore, physical and contents damages were estimated by multiplying the BRV by the corresponding physical and contents damage functions, while LOF costs were estimated as a proportion of the annual operating budget for each structure.

  The annual operating budgets for each facility were determined as a proportion of the current annual operating budget for the State of Louisiana. This annual operating budget, currently estimated at approximately $23.0 billion, is distributed to individual State-owned buildings and critical facilities based on the factored square footage of each structure.

  The factored square footage for each structure was determined by multiplying the actual square footage by a Criticality Factor (CF) based on the criticality level assigned to each structure; the relationship of the criticality level to the CF is shown in Table 6-3.

Table 6-3: Relationship of Criticality Level to Criticality Factor

Criticality Level	Criticality Factor (CF)
1 – High	10
2 – Medium High	8
3 – Medium	6
4 – Medium Low	4
5 - Low	2
All Others	1

Note that applying the CF to the square footage of each structure allows higher criticality facilities such as fire stations to obtain a larger proportion of the statewide annual budget, thereby increasing their annual budget values and LOF costs to reflect their importance.

Once the annual operating budget was obtained for each structure, the LOF costs were computed by dividing the annual operating budget by 365 (to convert the annual budget to a daily budget) and multiplying by the corresponding damage function for LOF (measured in days).

For each structure, the physical damage, contents damage and LOF costs were added together to produce a combined loss estimate per structure for each hazard.

The subsections that follow provide a summary of information about the risk assessment for State-owned assets for each hazard type. Each subsection has been changed to reflect more recent State Facility data. Some subsections also include updated hazard data, while others continue to use the previous hazard data. Table 6-4 lists changes made as part of the Plan Update to hazard data. More detailed discussions of the methodologies and the results for each hazard are contained in Volume II, Appendix F.

Table 6-4: Updates to Subsections

Hazard	Comments
Natural Hazards	
Flood	No new Digital Quality Level 3 Flood Data (Q3) mapping has been produced since the April 2005 Plan.
High Wind - Hurricane	The Design Wind Speed map produced by the American Society of Civil Engineers (ASCE) has not changed since the April 2005 Plan.
Ice Storm	No new data regarding Ice Storms has been identified since the April 2005 Plan.
Storm Surge	No new data regarding Storm Surge, that would be useful for this study, has been identified.
Subsidence	The mapping and associated information in this Section has been revised since the April 2005 Plan to reflect more recent Subsidence data.
Wildfire	No new data has been used.
Manmade Hazards	
Dam Failure	No new data has been used.
Levee Failure	The mapping and associated information in this Section has been revised since the April 2005 Plan to reflect more complete coverage of levees in the State.
Hazardous Material Incident	The mapping and associated information in this Section has been revised since the April 2005 Plan to reflect more recent Hazardous Material Incident data.

6.4 Flood

The flood hazard vulnerability assessment of State-owned critical facilities was based on: 1) location of the facility within the 100-year floodplain; and 2) the move-in date[41] of the facility relative to the issuance of Flood Insurance Rate Maps (FIRMs) in Louisiana. The criteria used to determine specific vulnerability rankings for each facility and the results of applying this ranking to the State-owned critical facilities are shown in Table 6-5. These results are shown on Map F-2.

Table 6-5: Flood Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Critical Facilities
High	Structure within floodplain / pre-FIRM construction date	905
Medium	Structure within floodplain / post-FIRM construction date	486
Low	Structure not within floodplain	5,392
None	Insufficient data	1,237

The flood loss estimate of State-owned critical facilities in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.1).

- Flood Hazard Vulnerability Ranking
- Average Flood Depth
- Average Building Type
- Depth-Damage Functions

Table 6-6: Flood Loss Estimate Ranges and Ranking Results

Ranking	Total Loss Estimate Ranges	Number of Critical Facilities
High	$20,001 - $150,000,000	1,052
Medium	$251 - $20,000	341
Low	$0 -$250	5,374

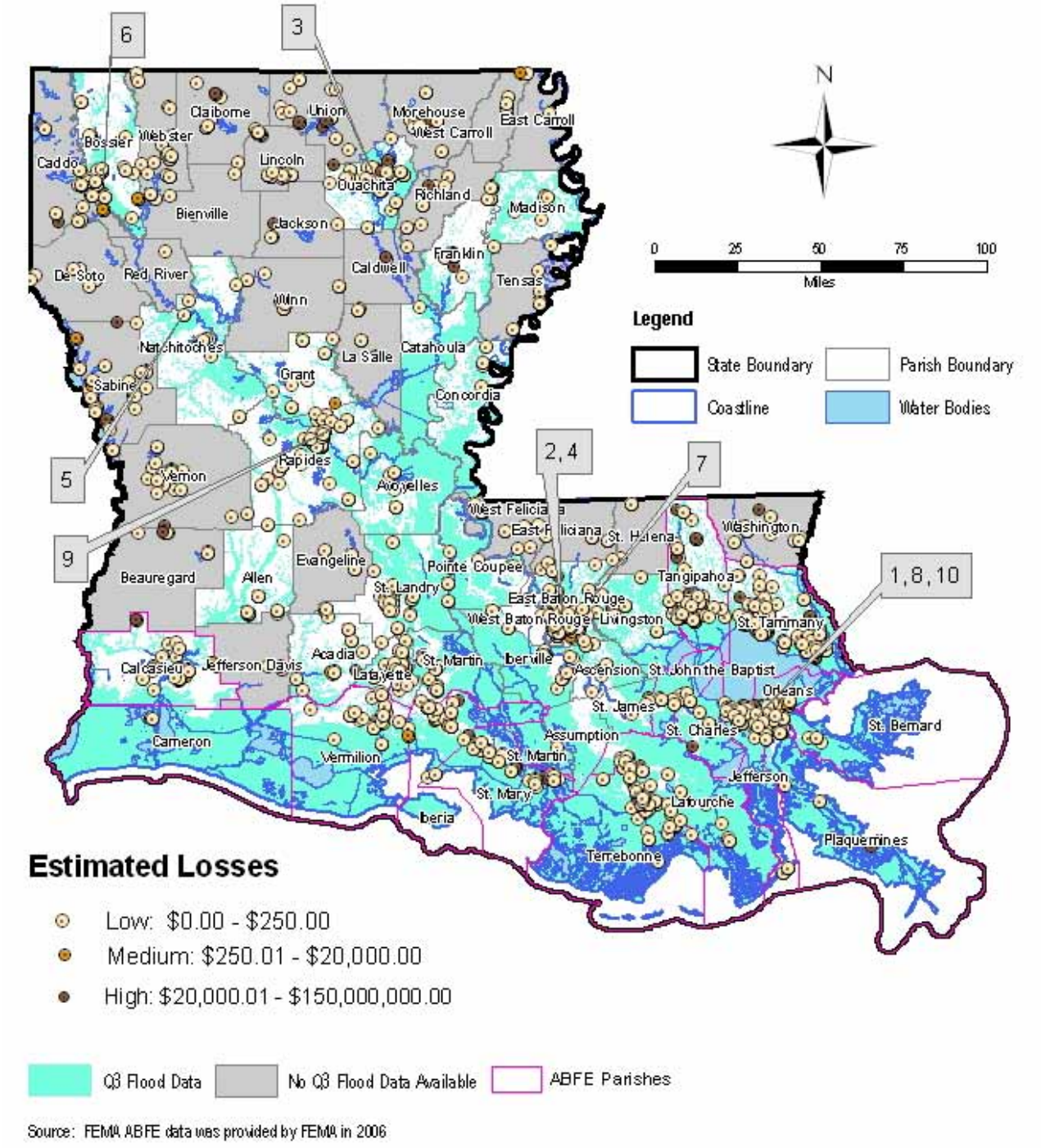
Table 6-7: Top Ten Critical Facilities at Risk from Flood Hazard Computed From Loss Estimates

Flood Loss Ranking	Building Name	Parish	Physical Damage	Contents Damage	LOF Damage	Combined Loss
1	Louisiana Superdome	Orleans	$77,600,859	$29,459,585	$3,301,738	$110,362,183
2	State Capitol	E Baton Rouge	$21,113,852	$8,015,444	$513,356	$29,642,652
3	Offices, Classrooms, Cafeteria	Ouachita	$1,109,201	$421,086	$16,032,481	$17,562,768
4	Life Science Bldg	East Baton Rouge	$8,056,579	$3,058,516	$998,436	$12,113,532
5	Armory Bldg #001	Red River	$404,091	$153,405	$11,238,670	$11,796,167
6	Armory Bldg #001	Bossier	$370,685	$140,723	$11,238,670	$11,750,079
7	Main/Hospital (North/South)	East Baton Rouge	$3,789,484	$1,438,601	$6,096,645	$11,324,731
8	LSU Clinical Science Building	Orleans	$8,020,191	$3,044,702	$161,820	$11,226,714
9	Combined Maint. Facility #6050	Rapides	$2,417,632	$940,190	$7,816,639	$11,174,462
10	UNO Earl K Long Library	Orleans	$6,535,650	$2,481,127	$1,145,746	$10,162,523

Map 6-4: Loss Estimate – Flood – Total; shows the area of the 100-year floodplain in the State of Louisiana based on Digital Quality Level 3 Flood Data (Q3) (same as Map 4-5); flood loss estimate rankings according to high / medium / low ranges of estimated losses (per Table 6-5); and the locations of the ten highest ranked facilities per Table 6-7.

[41] Actual construction dates of facilities were not available but the "move-in" date was provided and used.

Map 6-4: Loss Estimate – Flood – Total



6.5 High Wind (Hurricane)

The hurricane wind hazard vulnerability assessment of State-owned critical facilities was based on: 1) the design wind speed zone; and 2) the move-in date of the facility relative to the assumed enactment of building codes in Louisiana. The criteria used to determine specific vulnerability rankings for each facility and the results of applying this ranking to the State-owned critical facilities are shown in Table 6-8. These results are shown on Map F-6.

Table 6-8: High Wind Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Critical Facilities
High	Design wind = ≥ 110 mph & pre-adoption of building (wind) code	2,167
Medium	Design wind = ≥ 110 mph & post-adoption of building (wind) or Design wind = 91 – 110 mph; pre- code	3,131
Low	Design wind = 91 – 110 mph; post- code or Design wind = < 90 mph	2,618
None	Insufficient Data	48

The high wind loss estimate of State-owned critical facilities in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.2).

- Hurricane Wind Hazard Vulnerability
- Average Building Type
- Hurricane Wind Damage Functions

Table 6-9: High Wind Loss Estimate Ranges and Ranking Results

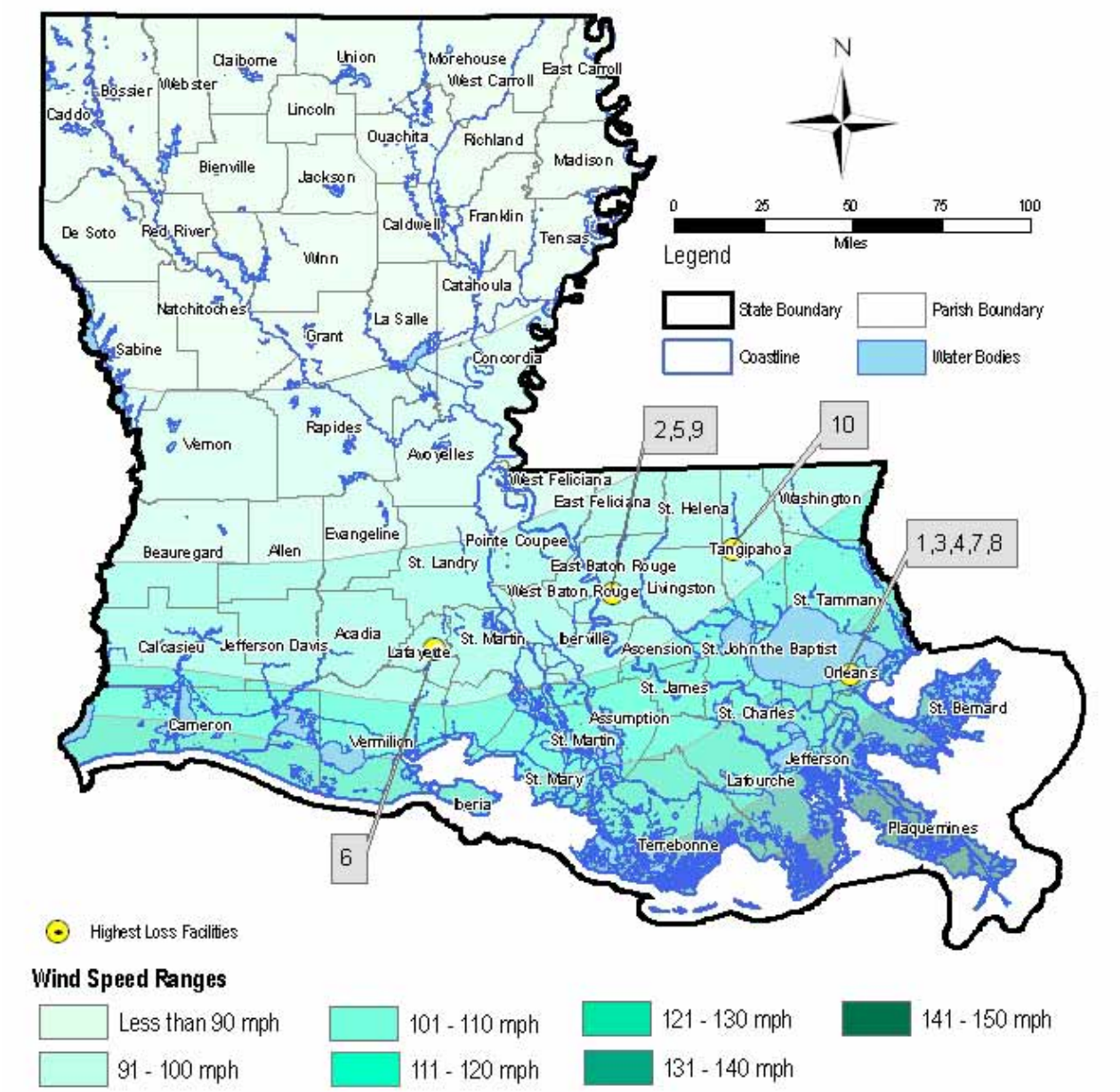
Ranking	Total Loss Estimate Ranges	Number of Critical Facilities
High	$30,001 to $150,000,000	4,743
Medium	$4,001 to $30,000	2,061
Low	$0 to $4,000	1,104

Table 6-10: Top Ten Critical Facilities at Risk from Hurricane Wind Hazard Computed From Loss Estimates

High Wind Loss Ranking	Building Name	Parish	Physical Damage	Contents Damage	LOF Damage	Combined Loss
1	Louisiana Superdome	Orleans	$86,223,177	$28,741,059	$3,668,598	$118,632,834
2	State Capitol	East Baton Rouge	$23,459,836	$7,819,945	$570,396	$31,850,176
3	Main Hospital	Orleans	$9,733,895	$3,244,632	$16,805,849	$29,784,376
4	Kieffer Lakefront Arena	Orleans	$20,533,017	$6,844,339	$1,545,848	$28,923,204
5	Veterinary Medicine	East Baton Rouge	$16,022,880	$5,340,960	$1,691,339	$23,055,180
6	Hospital	Lafayette	$8,245,862	$2,061,466	$12,281,197	$22,588,525
7	New Orleans Sports Arena	Orleans	$16,127,563	$5,375,854	$417,960	$21,921,377
8	State Supreme Court Building	Orleans	$15,063,416	$5,021,139	$390,716	$20,475,270
9	Assembly Center (Deaf Dome)	Baton Rouge	$12,283,292	$4,094,431	$1,163,932	$17,541,655
10	Main Hospital	Independence	$511,422	$127,855	$16,805,849	$17,445,126

Map 6-5: Loss Estimate – High Wind – Total; shows the design wind speed zones from American Society of Civil Engineers 7-02 (same as Map 4-13) for Louisiana, high wind loss estimate rankings according to high / medium / low ranges of estimated losses (per Table 6-9); and the locations of the ten highest ranked facilities from Table 6-10.

Map 6-5: Loss Estimate – High Winds – Total



Source: ASCE Standard 7-02; Facility Data, Louisiana Office of Risk Management 2007

6.6 High Wind (Tornado)

The tornado wind hazard vulnerability assessment of State-owned critical facilities was based on: 1) the average number of tornadoes per 100 square miles within each parish; 2) the percentage of each parish previously impacted by tornadoes; and 3) total value of critical facilities within each parish. The criteria used to determine specific vulnerability rankings for each parish are shown in Table 6-11. These results are shown on Map 6-6.

Table 6-11: High Wind Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Parishes
5	< .5 tornadoes per 100 square miles	6
4	.5 to 1.5 tornadoes per 100 square miles	8
3	1.5 to 2.5 tornadoes per 100 square miles	8
2	2.5 to 3.5 tornadoes per 100 square miles	25
1	> 3.5 tornadoes per 100 square miles	17

The high wind loss estimate of State-owned critical facilities in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.3).

- Tornado Wind Hazard Vulnerability
- Percentage of Parish Land Impacted by Tornadoes
- Total Value of State-Owned Critical Facilities Per Parish

Losses were calculated for four different "levels of risk" and displayed in Table 6-13. The different levels of risk assumed that 25, 50, 75 and 100 percent damages to state-owned structures from tornado high winds, respectively.

Table 6-12: High Wind Loss Estimate Ranges and Ranking Results

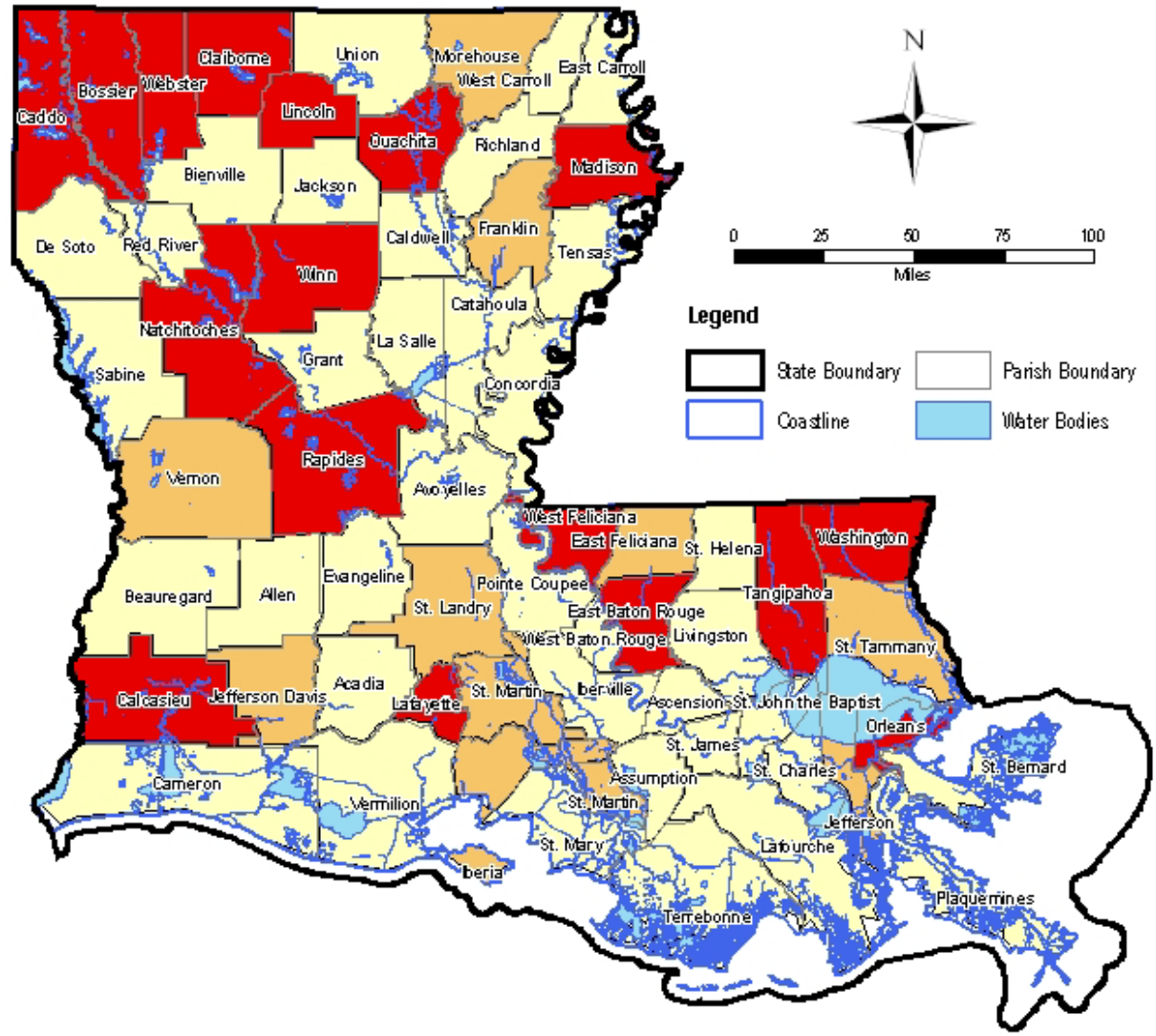
Ranking	Total Loss Estimate Ranges	Number of Parishes
High	$5,000,001 to $150,000,000	12
Medium	$1,000,001 to $5,000,000	12
Low	$0 to $1,000,000	40

Table 6-13: Top Ten Parishes at Risk from Tornado Wind Hazard Computed From Loss Estimates

High Wind Loss Ranking	Parish	Percentage of Critical Facilities Impacted	25%	50%	75%	100%
1	Caddo	3.58%	$25,901,891	$51,803,783	$77,705,674	$103,607,565
2	Lafayette	2.6%	$19,755,879	$39,511,758	$59,267,636	$79,023,515
3	East Baton Rouge	.52%	$16,410,421	$32,820,842	$49,231,262	$65,641,683
4	Lincoln	2.43%	$14,444,916	$28,889,833	$43,334,749	$57,779,665
5	Orleans	.44%	$12,516,262	$25,032,523	$37,548,785	$50,065,046
6	Ouachita	.97%	$5,868,796	$11,737,592	$17,606,388	$23,475,184
7	Rapides	1.03%	$5,382,673	$10,765,345	$16,148,018	$21,530,690
8	Natchitoches	1.26%	$3,457,034	$6,914,067	$10,371,101	$13,828,135
9	Washington	1.17%	$3,390,635	$6,781,270	$10,171,904	$13,562,539
10	Webster	2.57%	$2,976,875	$5,953,749	$8,930,624	$11,907,499

Map 6-6: Loss Estimate – High Wind – Tornado - Total; shows the loss estimate rankings of all Parishes.

Map 6-6: Loss Estimate – High Wind – Tornado - Total



Estimated Losses

< $1,000,000 Low | $1,000,000 - $5,000,000 Medium | > $5,000,000 High

Source: NOAA 1950 - 2006

6.7 Ice Storm

The ice storm hazard vulnerability assessment of State-owned critical facilities was based on the number of recorded ice storms within each parish based on data provided by the National Climatic Data Center (NCDC). The criteria used to determine specific vulnerability rankings for each facility and the results of applying this ranking to the State-owned critical facilities are shown in Table 6-14. These results are shown on Map F-12.

Table 6-14: Ice Storm Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Critical Facilities
High	Structures in parishes with > 4 recorded ice storms	1,532
Medium	Structures in parishes with from 1 to 4 recorded ice storms	2,348
Low	Structures in parishes with no recorded ice storm	4,124

The ice storm loss estimate of State-owned critical facilities in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.4).

- Ice Storm Hazard Vulnerability
- Average Building Type
- Ice Storm Damage Functions

Table 6-15: Ice Storm Loss Estimate Ranges and Ranking Results

Ranking	Total Loss Estimate Ranges	Number of Critical Facilities
High	$1,501 to $3,000,000	2,624
Medium	$1 to $1,500	1,147
Low	$0	4,233

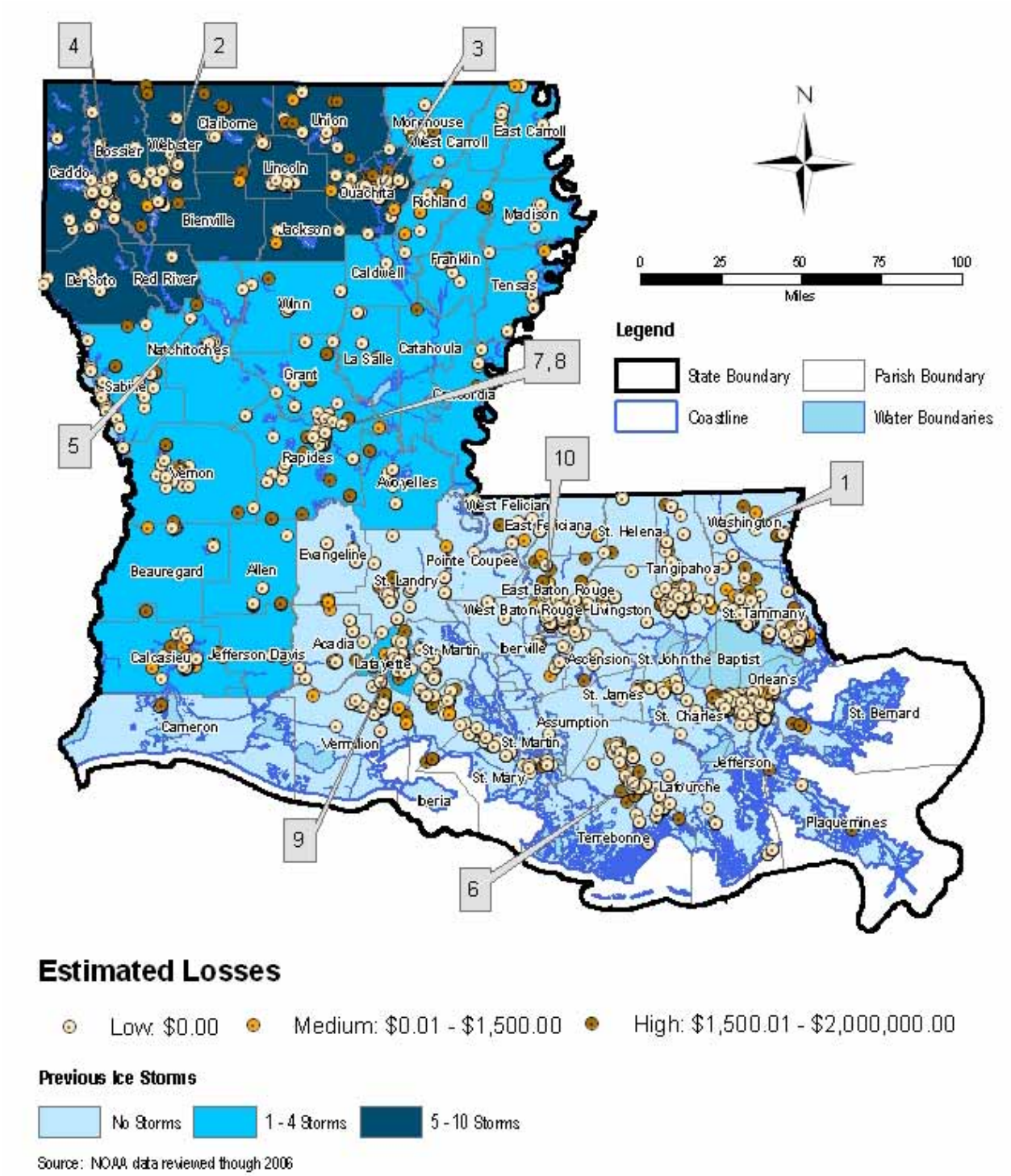
Table 6-16: Top Ten Critical Facilities at Risk from Ice Storm Hazard Computed From Loss Estimates

Ice Storm Loss Ranking	Building Name	Parish	Physical Damage	Contents Damage	LOF Damage	Combined Loss
1	Main Hospital Building	Ouachita	$8,038	$0	$2,978,514	$2,986,552
2	Metal Parts Manufacturing 2600	Webster	$22,855	$0	$2,839,685	$2,862,540
3	Offices, Classrooms, Cafeteria	Ouachita	$8,973	$0	$1,781,387	$1,790,360
4	Armory Bldg #001	Bossier	$5,929	$0	$1,248,741	$1,254,670
5	Armory Bldg #001	Red River	$5,106	$0	$1,248,741	$1,253,847
6	Armory Bldg #001	Caddo	$4,350	$0	$1,248,721	$1,253,071
7	Main Hospital Building A	Rapides	$5,272	$0	$992,838	$998,110
8	Combined Maint. Facility #6050	Rapides	$13,401	$0	$868,515	$881,916
9	Hospital	Lafayette	$10,832	$0	$818,746	$829,578
10	Headquarters Building	Bossier	$12,681	$0	$779,664	$792,345

Map 6-7: Loss Estimate – Ice Storm – Total; shows the number of recorded ice storms for each parish in the State of Louisiana based on NCDC data (same as Map 4-15); ice storm loss estimate rankings according to high / medium / low ranges of estimated losses (per Table 6-15) for Option A (LOF, not including physical damage)[42]; and the locations of the ten highest ranked facilities from Table 6-16.

[42] For results of Option B (i.e., LOF including physical damage), see Volume II, Appendix F.3.

Map 6-7: Loss Estimate – Ice Storms – Total



Estimated Losses

Low: $0.00 · Medium: $0.01 - $1,500.00 · High: $1,500.01 - $2,000,000.00

Previous Ice Storms

No Storms · 1 - 4 Storms · 5 - 10 Storms

Source: NOAA data reviewed though 2006

6.8 Storm Surge

The storm surge hazard vulnerability assessment of State-owned critical facilities was based on sea, lake, and overland surges from hurricanes (SLOSH) models for category 1-5 hurricanes in Louisiana. The criteria used to determine specific vulnerability rankings for each facility and the results of applying this ranking to the State-owned critical facilities are shown in Table 6-17. These results are shown on Map F-16.

Table 6-17: Storm Surge Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Critical Facilities
High	Structures within hazard zone with inundation depths > 12 feet	424
Medium	Structures within hazard zone with inundation depths < 12 feet	549
Low (or None)	Structures outside the hazard zone	7,031

The storm surge loss estimate of State-owned critical facilities in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.5).

- Storm Surge Hazard Vulnerability
- Average Surge Depth
- Average Building Type
- Storm Surge Damage Functions

Table 6-18: Storm Surge Loss Estimate Ranges and Ranking Results

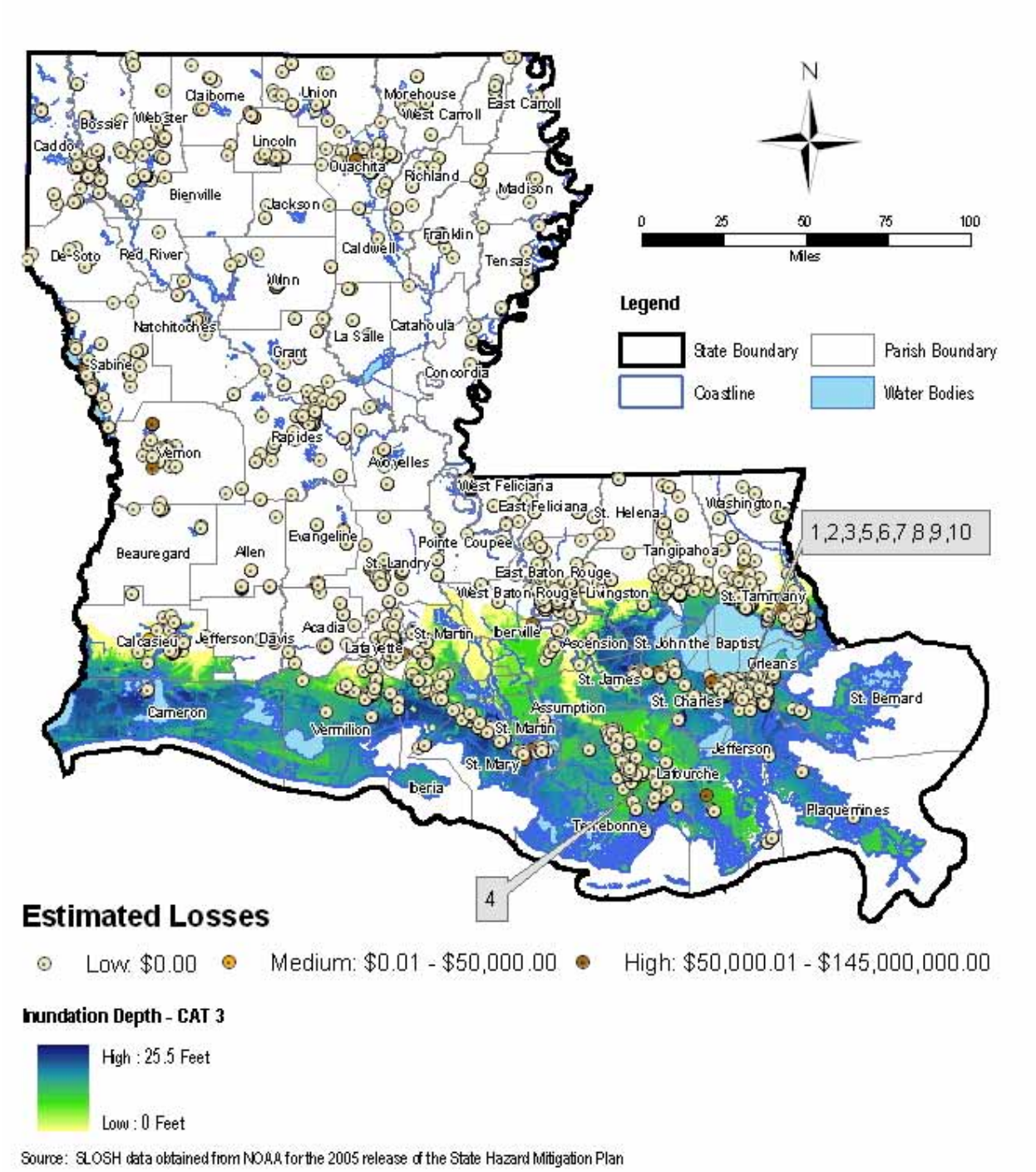
Ranking	Total Loss Estimate Ranges	Number of Critical Facilities
High	$100,001 to $402,000,000	793
Medium	$1 to $100,000	178
Low	$0	7,032

Table 6-19: Top Ten Critical Facilities at Risk from Storm Surge Hazard Computed from Loss Estimates

Storm Surge Loss Ranking	Building Name	Parish	Physical Damage	Contents Damage	LOF	Combined Loss
1	Louisiana Superdome	Orleans	$218,432,048	$109,216,024	$3,668,598	$331,316,670
2	Main Hospital	Orleans	$49,318,400	$24,659,200	$33,611,698	$107,589,299
3	Kieffer Lakefront Arena	Orleans	$39,697,166	$19,848,583	$1,545,848	$61,091,597
4	Leonard J. Chabert Medical Center	Terrebonne	$27,292,515	$13,646,258	$15,668,222	$56,606,995
5	Medical Education Building	Orleans	$29,738,501	$14,869,251	$326,493	$44,934,245
6	State Supreme Court Building	Orleans	$29,122,604	$14,561,302	$390,716	$44,074,622
7	Lions-LSU Clinics Bld-Eye Cent	Orleans	$25,417,071	$12,708,535	$1,837,953	$39,963,559
8	Main Hospital	Lafourche	$24,120,064	$12,060,032	$127,858	$36,307,953
9	LSU Clinical Sciences Building	Orleans	$22,575,355	$11,287,677	$179,800	$34,042,832
10	Medical School	Orleans	$18,493,738	$9,246,869	$272,268	$28,012,875

Map 6-8: Loss Estimate –Storm Surge – Total; shows the storm surge hazard zones and potential surge inundation depths throughout the State (same as Map 4-21); storm surge loss estimate rankings according to high / medium / low ranges of estimated losses (per Table 6-18); and the locations of the ten highest ranked facilities from Table 6-19.

Map 6-8: Loss Estimate – Storm Surge - Total



Source: SLOSH data obtained from NOAA for the 2005 release of the State Hazard Mitigation Plan

6.9 Subsidence

The subsidence hazard vulnerability assessment of State-owned critical facilities was based on subsidence rate studies from the Louisiana Speaks report prepared by the Louisiana Recovery Authority in the wake of hurricanes Katrina and Rita. The criteria used to determine specific vulnerability rankings for each facility and the results of applying this ranking to the State-owned critical facilities are shown in Table 6-20. These results are shown on Map F-20.

Table 6-20: Subsidence Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Critical Facilities
High	Structures located in the identified basins with highest projected rates	454
Medium	Structures located in the identified basins with lowest projected rates	2,150
Low (or None)	Structures outside the identified basins	5,400

The subsidence loss estimate of State-owned critical facilities in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.6).

- Subsidence Hazard Vulnerability
- Average Subsidence
- Average Building Type
- Subsidence Damage Functions

Table 6-21: Subsidence Loss Estimate Ranges and Ranking Results

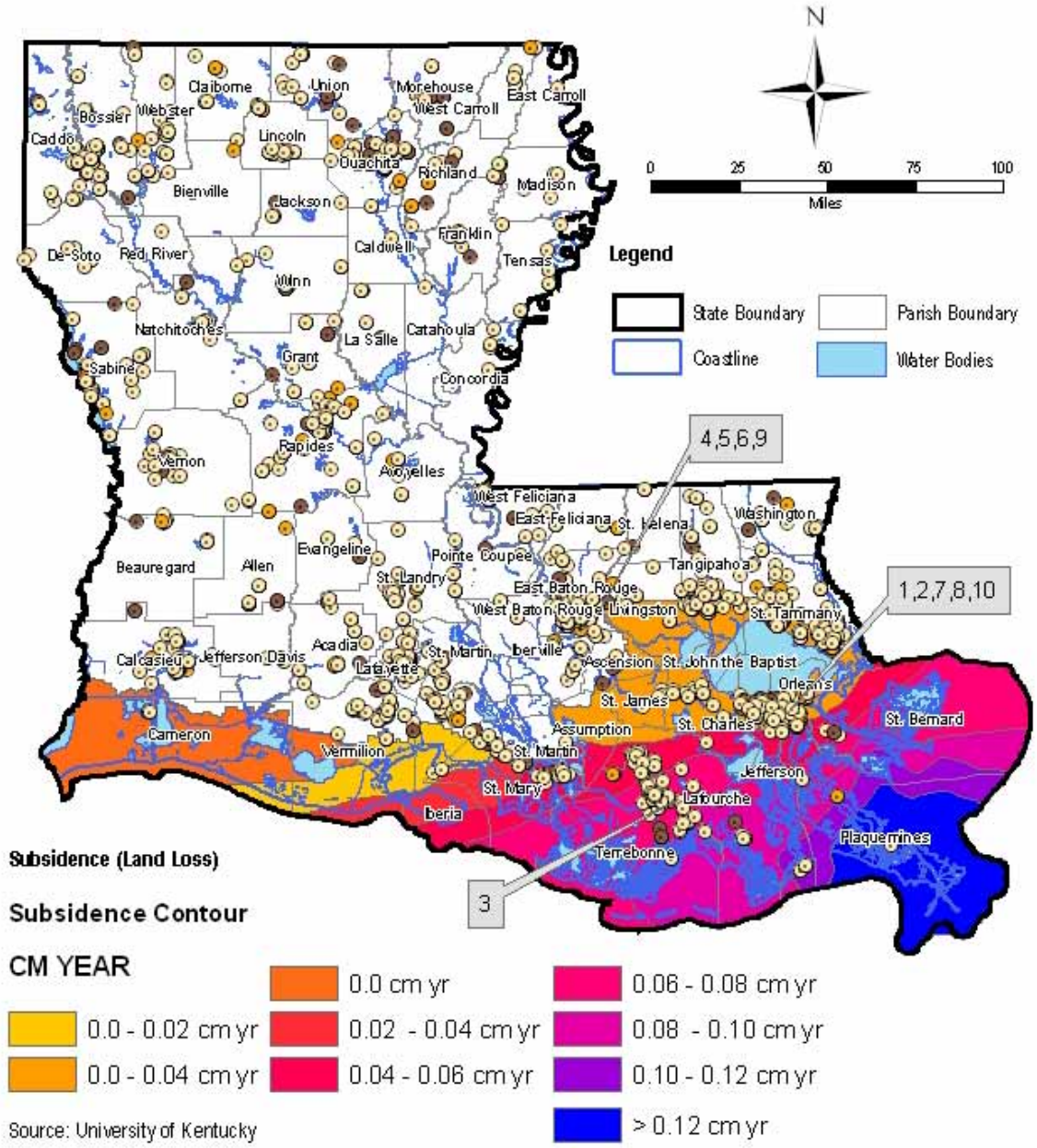
Ranking	Total Loss Estimate Ranges	Number of Critical Facilities
High	$50,001 to $145,000,000	1,658
Medium	$1 to $50,000	934
Low	$0	5,412

Table 6-22: Top Ten Critical Facilities at Risk from Subsidence Hazard Computed From Loss Estimates

Subsidence Loss Ranking	Building Name	Parish	Physical Damage	Contents Damage	LOF Damage	Combined Loss
1	Louisiana Superdome	Orleans	$143,705,295	$0	$0	$143,705,295
2	New Orleans Sports Arena	Orleans	$107,517,087	$0	$835,919	$108,353,006
3	Leonard J. Chabert Medical Center	Terrebonne	$47,056,061	$0	$15,668,222	$62,724,283
4	Camille Shade Dormitory	East Baton Rouge	$44,500,423	$0	$0	$44,500,423
5	Assembly Center (Deaf Dome)	East Baton Rouge	$40,944,306	$0	$1,163,932	$42,108,238
6	Shaw Center	East Baton Rouge	$39,579,606	$0	$240,402	$39,820,008
7	Kieffer Lakefront Arena	Orleans	$34,221,695	$0	$0	$34,221,695
8	Main Hospital	Orleans	$32,446,316	$0	$0	$32,446,316
9	Veterinary Medicine	East Baton Rouge	$26,704,801	$0	$0	$26,704,801
10	State Supreme Court Building	Orleans	$25,105,693	$0	$0	$25,105,693

Map 6-9: Loss Estimate –Subsidence– Total; shows the subsidence hazard zones and the extent of potential subsidence throughout the State (same as Map 4-22b); subsidence loss estimate rankings according to high / medium / low ranges of estimated losses (per Table 6-21); and the locations of the ten highest ranked facilities from Table 6-22.

Map 6-9: Loss Estimate – Subsidence - Total



6.10 Wildfire

The wildfire hazard vulnerability assessment of State-owned critical facilities was based on the number of recorded wildfires and the number of acres burned by wildfires within each parish based on data provided by the State of Louisiana. The criteria used to determine specific vulnerability rankings for each facility and the results of applying this ranking to the State-owned critical facilities are shown in Table 6-23. These results are shown on Map F-24.

Table 6-23: Wildfire Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Critical Facilities
High	Structures in parishes with > average burned area	2,312
Medium	Structures in parishes with < average burned area	3,546
Low (or None)	Structures in parishes with no recorded wildfires	2,146

The wildfire loss estimate of State-owned critical facilities in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.7).

- Wildfire Hazard Vulnerability
- Average Building Type
- Wildfire Suppression Cost Functions

Table 6-24: Wildfire Loss Estimate Ranges and Ranking Results

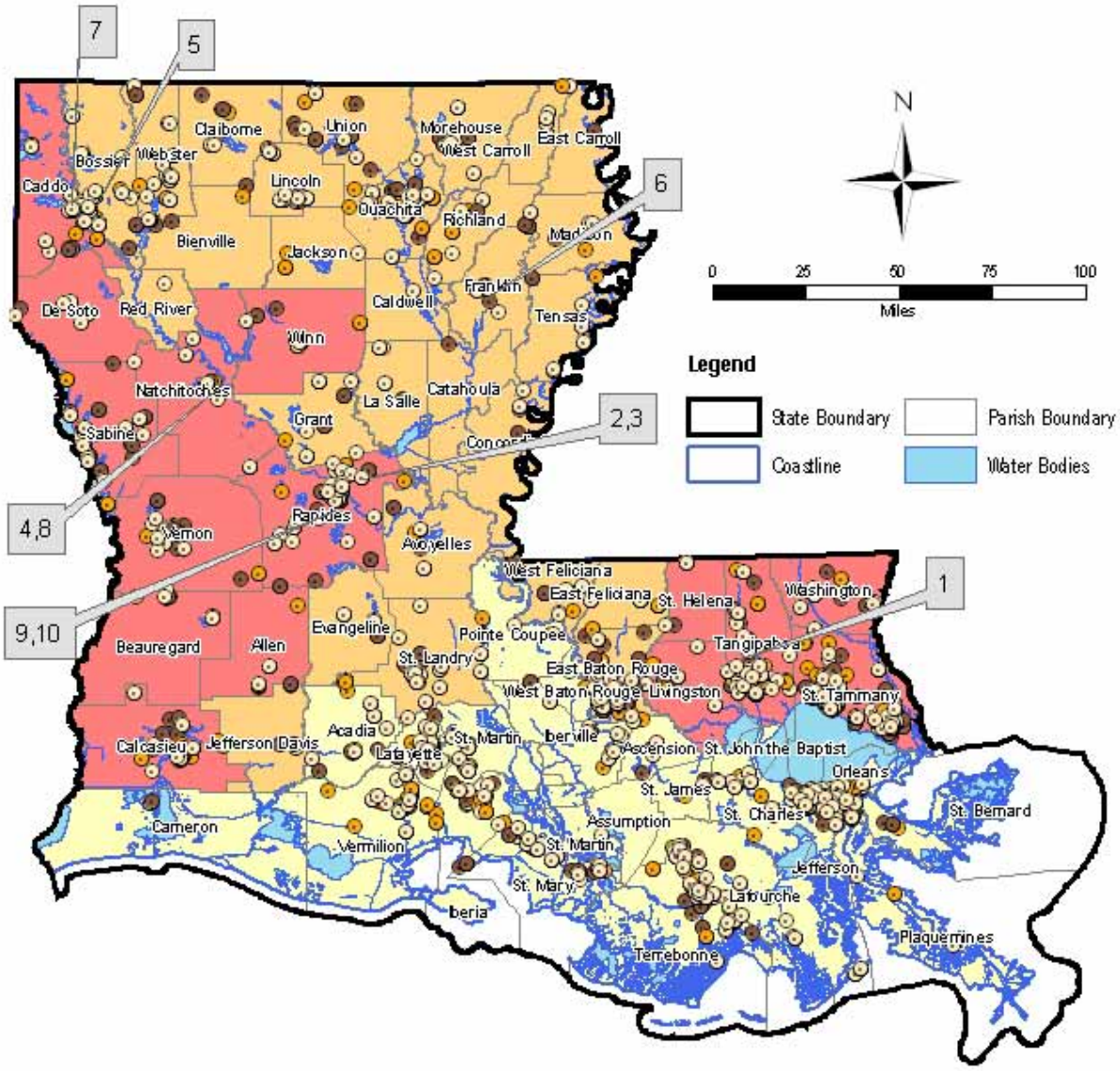
Ranking	Total Loss Estimate Ranges	Number of Critical Facilities
High	$1,501 to $$3,400,000	3,359
Medium	$1 to $1,500	2,351
Low	$0	2,294

Table 6-25: Top Ten Critical Facilities at Risk from Wildfire Hazard Computed From Loss Estimates

Wildfire Loss Ranking	Building Name	Parish	Physical Damage	Contents Damage	LOF Damage	Combined Loss
1	Main Hospital	Tangipahoa	$1,523	$0	$3,361,170	$3,362,693
2	Main Hospital Building A	Rapides	$2,636	$0	$2,978,514	$2,981,150
3	Combined Maint. Facility #6050	Rapides	$6,700	$0	$2,605,546	$2,612,247
4	Classrooms/Labs/Administration	Natchitoches	$2,520	$0	$1,500,315	$1,502,835
5	Armory Bldg #001	Bossier	$1,482	$0	$1,248,741	$1,259,223
6	Armory Bldg #001	Franklin	$1,199	$0	$1,248,741	$1,249,940
7	Armory Bldg #001	Sabine	$1,189	$0	$1,248,741	$1,249,930
8	Caddo Hall	Natchitoches	$2,184	$0	$1,124,287	$1,126,471
9	Transitional Family Life Training	Rapides	$1,392	$0	$1,067,313	$1,068,705
10	Transitional Family Life Training	Rapides	$1,039	$0	$1,067,313	$1,068,352

Map 6-10: Loss Estimate –Wildfire – Total; shows the average number of acres burned by wildfires for each parish in the State of Louisiana based on State data (same as Map 4-23); wildfire loss estimate rankings according to high / medium / low ranges of estimated losses (per Table 6-24); and the locations of the ten highest ranked facilities from Table 6-25.

Map 6-10: Loss Estimate – Wildfire – Total



6.11 Dam Failure

The dam failure hazard vulnerability assessment of State-owned critical facilities was based on the potential inundation areas in proximity to low, significant and high hazard dams statewide. The criteria used to determine specific vulnerability rankings for each facility and the results of applying this ranking to the State-owned critical facilities are shown in Table 6-26. These results are shown on Map F-28.

Table 6-26: Dam Failure Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Critical Facilities
High	Structures within 50% of dam failure hazard radius	77
Medium	Structures in area 50% to 100% of dam failure hazard radius	630
Low (or None)	Structures outside dam failure hazard radius	7,297

The dam failure loss estimate of State-owned critical facilities in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.8).

- Dam Failure Hazard Vulnerability
- Average Inundation Depth
- Average Building Type
- Inundation Depth-Damage Functions

Table 6-27: Dam Failure Loss Estimate Ranges and Ranking Results

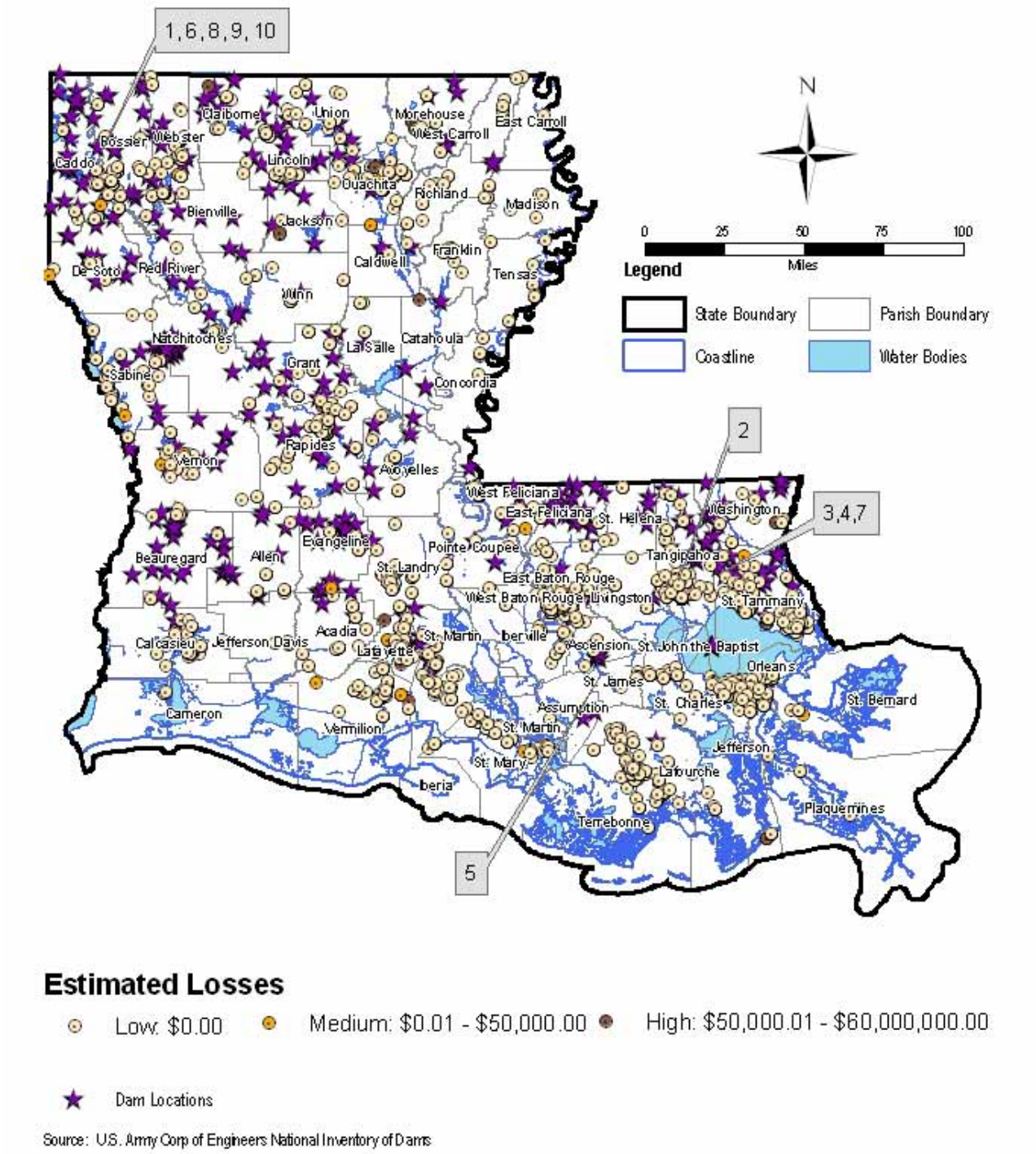
Ranking	Total Loss Estimate Ranges	Number of Critical Facilities
High	$50,001 to $60,000,000	444
Medium	$1 to $50,000	263
Low	$0	7,297

Table 6-28: Top Ten Critical Facilities at Risk from Dam Failure Hazard Computed From Loss Estimates

Dam Failure Loss Ranking	Building Name	Parish	Physical Damage	Contents Damage	LOF Damage	Combined Loss
1	Mary Allen Office Building	Caddo	$12,444,389	$6,222,194	$360,852	$19,027,435
2	University Center	Tangipahoa	$7,496,319	$5,691,649	$720,183	$13,908,151
3	Wards B,C,G,& Treatment Bldg	St. Tammany	$2,330,836	$1,769,709	$4,840,085	$8,940,630
4	Wards A, D & E Hall	St. Tammany	$2,330,836	$1,769,709	$4,840,085	$8,940,630
5	War Veterans Home	St. John the Baptist	$4,686,991	$3,558,641	$531,058	$8,776,690
6	Noel Library	Caddo	$4,524,117	$3,434,978	$572,873	$8,531,968
7	Wards L,M,N,O,P & Q	St. Tammany	$1,907,550	$1,448,325	$4,700,467	$8,056,342
8	Bronson Hall-Liberal Arts	Caddo	$4,234,577	$3,215,141	$523,770	$7,973,488
9	Nursing Education Center	Caddo	$4,149,646	$2,074,823	$345,542	$6,570,011
10	Second Circuit Court of Appeals	Caddo	$3,352,355	$1,676,177	$1,395,059	$6,423,590

Map 6-11: Loss Estimate –Dam Failure – Total; shows the locations of various dams in parishes throughout the State of Louisiana (same as Map 4-24); dam failure loss estimate rankings according to high / medium / low ranges of estimated losses (per Table 6-27); and the locations of the ten highest ranked facilities from Table 6-28.

Map 6-11: Loss Estimate – Dam Failure – Total



Estimated Losses

Low: $0.00 Medium: $0.01 - $50,000.00 High: $50,000.01 - $60,000,000.00

Dam Locations

Source: U.S. Army Corp of Engineers National Inventory of Dams

6.12 Levee Failure

As noted previously, the levee failure hazard vulnerability assessment of State-owned critical facilities was limited to the potential inundation areas from levees under the jurisdiction of the New Orleans District of the U.S. Army Corps of Engineers (USACE). The criteria used to determine specific vulnerability rankings for each facility and the results of applying this ranking to the State-owned critical facilities are shown in Table 6-29. These results are shown on Map F-34.

Table 6-29: Levee Failure Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Critical Facilities
High	Structures within ½ mile of levee	942
Medium	Structures from ½ to 2 miles from levee	2,142
Low (or None)	Structures > 2 miles from levee	4,920

The levee failure loss estimate of State-owned critical facilities in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.9).

- Levee Failure Hazard Vulnerability
- Average Inundation Depth
- Average Building Type
- Inundation Depth-Damage Functions

Table 6-30: Levee Failure Loss Estimate Ranges and Ranking Results

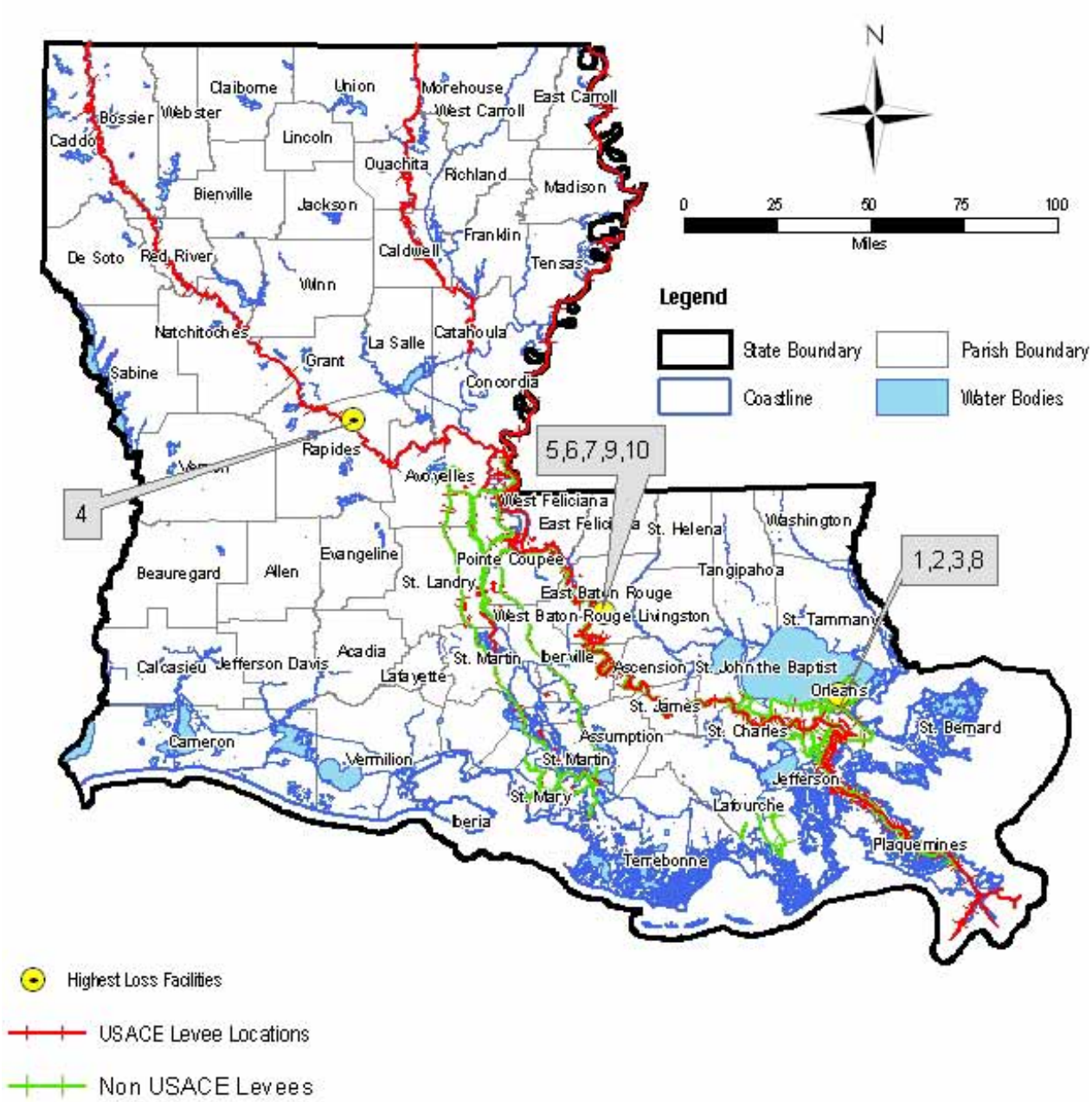
Ranking	Total Loss Estimate Ranges	Number of Critical Facilities
High	$50,001 to $215,000,000	2,222
Medium	$1 to $50,000	854
Low	$0	4,928

Table 6-31: Top Ten Critical Facilities at Risk from Levee Failure Hazard

Levee Failure Loss Ranking	Building Name	Parish	Physical Damage	Contents Damage	LOF Damage	Combined Loss
1	Louisiana Superdome	Orleans	$77,600,859	$29,459,585	$3,301,738	$110,362,183
2	Main Hospital	Orleans	$32,446,316	$8,111,579	$33,611,698	$74,169,593
3	State Supreme Court Building	Orleans	$25,105,693	$6,276,423	$390,716	$31,772,832
4	Main Hospital Building A	Rapides	$2,645,499	$1,004,310	$26,806,622	$30,456,431
5	Claiborne Building	East Baton Rouge	$21,869,423	$5,467,356	$876,938	$28,213,717
6	Administration – Bldg F	East Baton Rouge	$1,948,746	$739,802	$20,066,239	$22,754,787
7	DOTD Headquarters Bldg	East Baton Rouge	$10,810,770	$4,104,089	$5,192,073	$20,106,931
8	Seton Professional Building	Orleans	$2,710,298	$1,028,909	$14,566,793	$18,306,000
9	Vocational Ed.-Bldg #2	East Baton Rouge	$1,505,115	$571,386	$15,928,928	$18,006,429
10	Middle School – Bldg E	Baton Rouge	$1,508,610	$572,713	$15,588,084	$17,669,406

Map 6-12: Loss Estimate – Levee Failure – Total; shows the location of State-owned critical facilities in the State in relation to the levee locations (same as Map 4-25) ; levee failure loss estimate rankings according to high / medium / low ranges of estimated losses (per Table 6-30); and the locations of the ten highest ranked facilities from Table 6-31.

Map 6-12: Loss Estimate – Levee Failure – Total



Source: U.S. Army Corp of Engineers and the Louisiana Speaks Project 2007; Facility Data Louisiana Office of Risk Management 2007

6.13 Hazardous Material Incident

The hazardous material incident hazard vulnerability assessment of State-owned critical facilities was based on potential impact areas from a hazardous materials (HAZMAT) release from a fixed site. The criteria used to determine specific vulnerability rankings for each facility and the results of applying this ranking to the State-owned critical facilities are shown in Table 6-32. These results are shown on Map F-38.

Table 6-32: Hazardous Material Incident Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Critical Facilities
High	Structures located within 1 mile of a HAZMAT site	2,481
Medium	Structures located between 1 and 2 mile radius of a HAZMAT site	3,682
Low	Structures located > 2 miles from a HAZMAT site	1,461
None	Insufficient data	205

The hazardous material incident loss estimate of State-owned critical facilities in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.10).

- Hazardous Material Incident Hazard Vulnerability
- Average Building Type
- Hazardous Material Incident Damage Functions

Table 6-33: Hazardous Material Incident Loss Estimate Ranges and Ranking Results

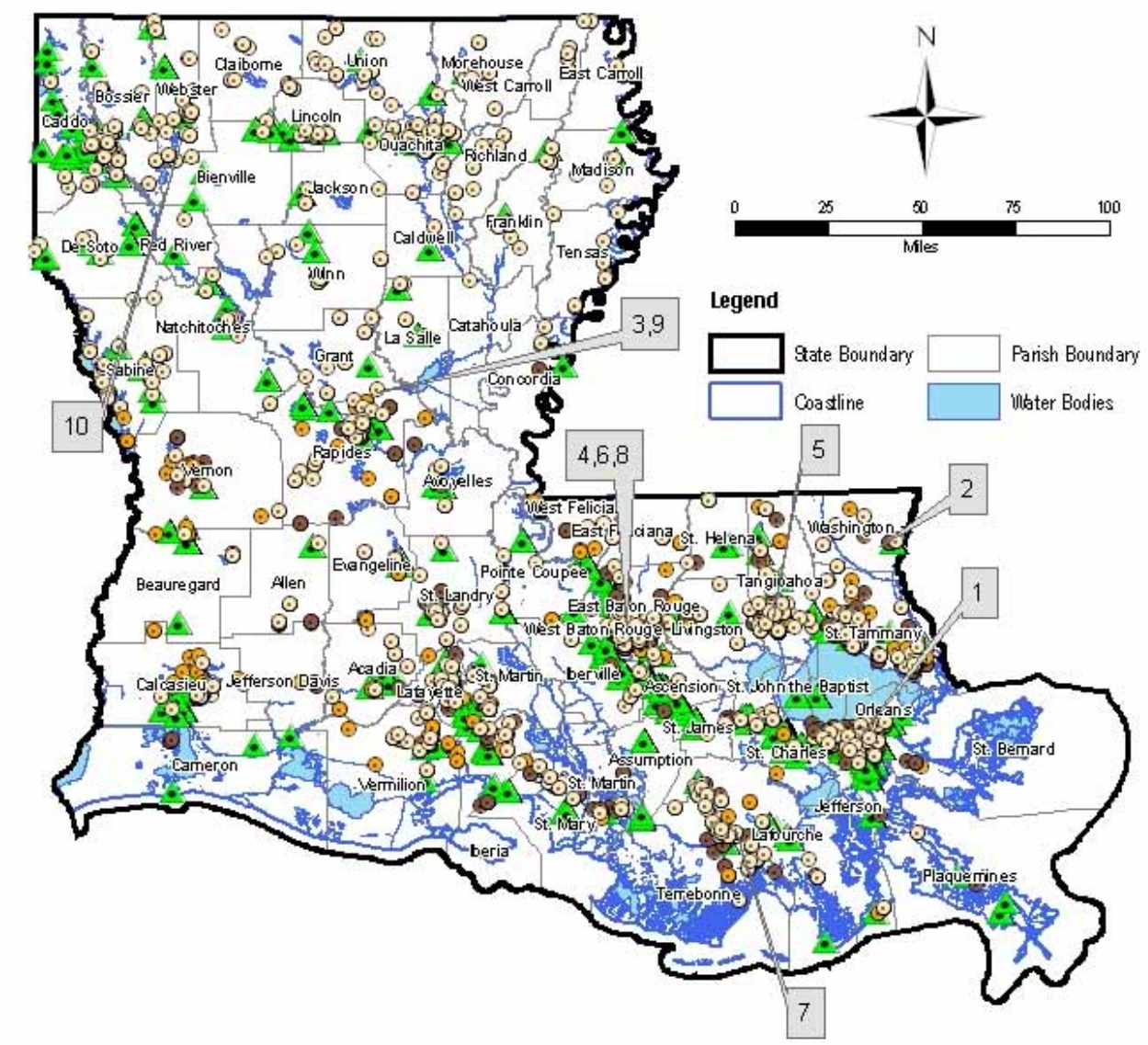
Ranking	Total Loss Estimate Ranges	Number of Critical Facilities
High	$2,501 to $3,000,000	2,553
Medium	$1 to $2,500	1,971
Low	$0	4,554

Table 6-34: Top Ten Critical Facilities at Risk from Hazardous Materials Incident Computed from Loss Estimates

HAZMAT Incident Loss Ranking	Building Name	Parish	Physical Damage	Contents Damage	LOF	Combined Loss
1	Main Hospital	Orleans	$224,078	$0	$2,240,780	$2,464,858
2	Main Hospital Building	Ouachita	$1,985,568	$0	$198,568	$2,184,243
3	Combined Maint. Facility #6050	Rapides	$173,703	$0	$1,737,031	$1,910,734
4	Telecommunications Center	East Baton Rouge	$141,801	$0	$1,418,019	$1,559,821
5	Main Hospital	Tangipahoa	$56,020	$0	$1,120,390	$1,176,409
6	High School-Bldg. #1	East Baton Rouge	$106,605	$0	$1,066,047	$1,172,651
7	Leonard J. Chabert Medical Center	Terrebonne	$104,455	$0	$1,044,548	$1,149,003
8	Hospital Building	East Baton Rouge	$97,905	$0	$979,048	$1,076,953
9	Main Hospital Building A	Rapides	$49,642	$0	$992,838	$1,042,480
10	Metal Parts Manufacturing	Webster	$47,328	$0	$946,562	$993,890

Map 6-13: Loss Estimate – Hazardous Material Incident – Total; shows the location of State-owned critical facilities in Louisiana in relation to HAZMAT sites (same as Map 4-26); hazardous material incident loss estimate rankings according to high / medium / low ranges of estimated losses (per Table 6-33); and the locations of the ten highest ranked facilities from Table 6-34.

Map 6-13: Loss Estimate – Hazardous Materials Incidents - Total



Estimated Losses

$0.00 $0.01 - $2,500.00 $2,500.01 - $3,000,000.00

Source: Louisiana Office of Risk Management 2007

HAZMAT Locations

Source: EPA Toxic Release Inventory 2002

6.14 Summary

The ten critical facilities in Louisiana with the highest total combined loss estimates for all hazards; flood, high wind (hurricane), ice storm, storm surge, subsidence, wildfire, dam and levee failure, and hazardous materials incident, are shown in Table 6-35 and displayed on the following page on Map 6-14.

It is important to note that this is a "one of a kind" analysis that does not fully account for probability, discounting of value over time or the real potential for any particular structure to get damaged. The real intent is to narrow the focus to buildings that may have a higher likelihood of experiencing damage per the methodology so that mitigation efforts can be focused on these properties.

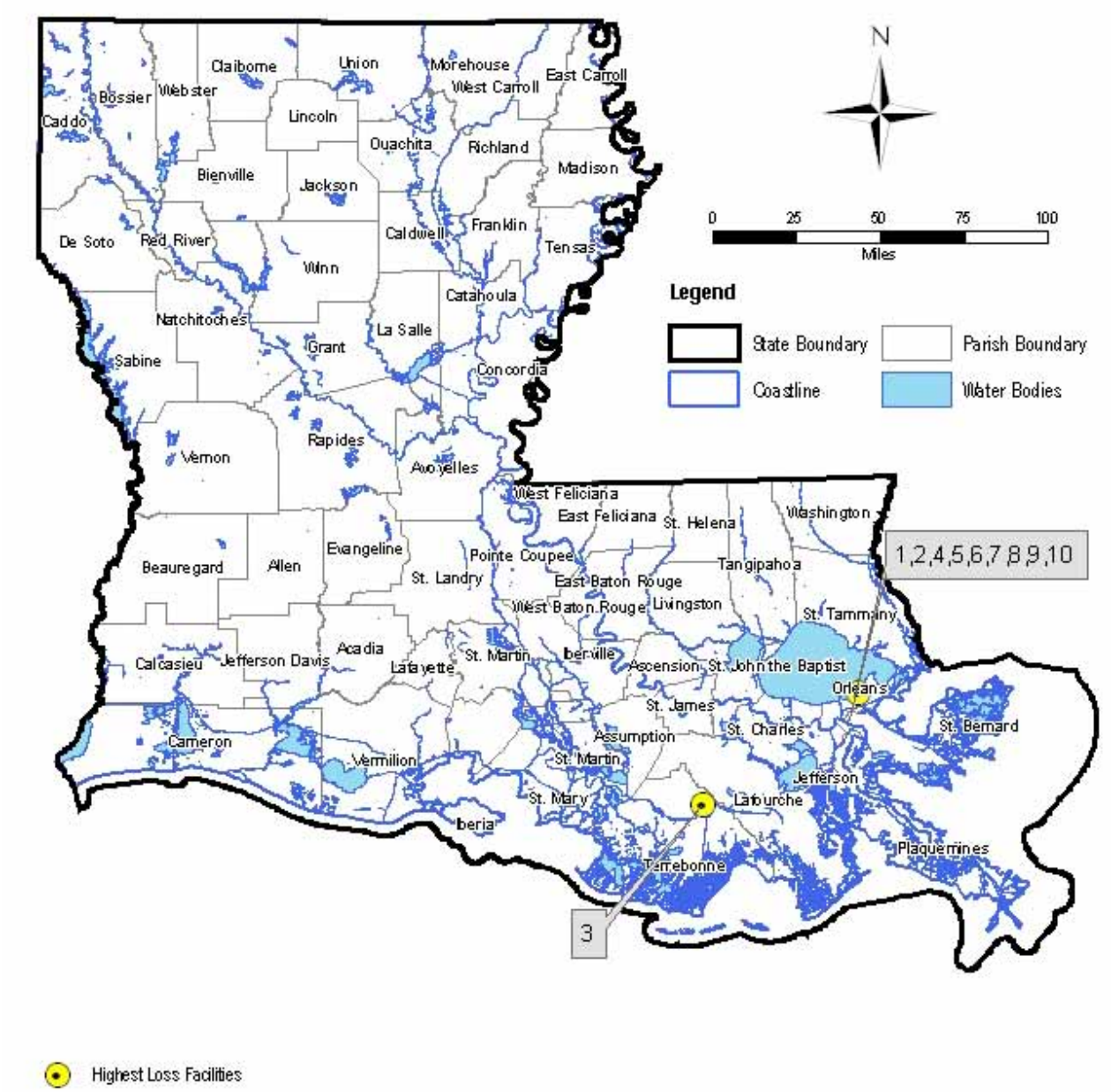
The data set utilized for this analysis contains a number of facilities which have not yet been repaired or are currently not in use, as a result of the 2005 hurricanes Katrina and Rita. These buildings remain the property of the state and are still able to incur damages to the physical property, although loss of function costs and contents damage are not of concern. As buildings owned by the State, they remain on the list used in the analysis for Section Six. However, mitigation measures cannot be considered for these buildings until a decision is made regarding their future use or demolition. Considering the stated goal of identifying buildings where viable mitigation projects can be implemented it was decided that those facilities showing up in the top-ten lists which the State has already decided to demolish would be stricken from the lists at the present time.

The only such facility to appear within the top ten lists was Charity Hospital, located in Orleans Parish, which the State has determined to demolish and rebuild in the future. Removing this facility from the top ten lists in which it appeared created the positive impact of allowing an additional facility, with more immediate needs, to move up and be identified as a potential mitigation candidate. The lists in which Charity Hospital appeared but was removed include: Flood, High Wind-Hurricane, Subsidence, Levee Failure, and Hazardous Materials Incident.

Table 6-35: Combined Hazard Loss Estimate ($millions)

Total Loss Ranking	Building Name	Parish	Flood	High Wind (Hurricane)	Ice Storm	Storm Surge	Subsidence	Wildfire	Dam Failure	Levee Failure	Hazardous Materials	Totals
1	Louisiana Superdome	Orleans	110.4	118.6	0	331.3	143.7	0	0	110.4	0	814.4
2	Main Hospital	Orleans	0	29.8	0	107.6	32.4	0	0	74.2	2.5	246.5
3	Leonard J. Chabert Medical Center	Terrebonne	0	17.2	0	56.7	62.7	0	0	0	1.1	137.7
4	Kieffer Lakefront Arena	Orleans	9	28.9	0	61.1	34.2	0	0	0	.5	133.3
5	New Orleans Sports Arena	Orleans	0	21.9	0	0	108.3	0	0	0	0	130.3
6	State Supreme Court Building	Orleans	0	20.5	0	44.1	25.1	0	0	31.8	.3	121.5
7	Medical Education Building	Orleans	5	16	0	44.9	20	0	0	14.9	0.2	100.4
8	Lions-LSU Clinics Bld-Eye Cent	Orleans	4.7	15.2	0	40	16.7	0	0	14.1	0	90.7
9	LSU Clinical Sciences Building	Orleans	11	12	0	34	14.8	0	0	14.9	.1	83.4
10	Medical School	Orleans	9.3	10	0	28	0	0	0	12.2	.1	68.8

Map 6-14: Loss Estimate – All Hazards – Top Ten



Highest Loss Facilities

Source: Facility Data, Louisiana Office of Risk Management 2007

The number of State-owned critical facilities with the highest hazard vulnerability rankings for each hazard; flood, high wind (hurricane), ice storm, storm surge, subsidence, wildfire, dam and levee failure, and hazardous materials incident, is identified by agency (as listed in the Facilities Management database[43]) in Table 6-36.

Table 6-36: Critical Facilities with Highest Vulnerability Rankings per Hazard per State Agency

Agency	Flood	High Wind	Ice Storm	Storm Surge	Subsidence	Wildfire	Dam Failure	Levee Failure	Hazardous Materials	Totals
Department of Agriculture and Forestry	47	60	38	0	24	138	0	17	68	392
Department of Culture, Recreation and Tourism	31	85	163	5	37	144	0	47	213	725
Department of Elementary/Secondary Education	9	259	10	199	10	42	2	73	123	727
Governor's Executive Department	24	337	315	38	62	239	9	332	342	1698
Department of Health and Hospitals	61	59	20	22	12	233	3	10	146	566
Department of Higher Education	332	735	453	57	144	539	29	154	757	3200
Judiciary	0	2	1	0	1	2	1	1	0	8
Department of Labor	1	1	1	0	0	1	0	0	6	10
Department of Natural Resources	10	19	11	0	12	25	0	9	25	111
Department of Public Safety and Corrections	65	165	177	9	11	251	1	98	256	1033
Secretary of State	6	10	17	1	6	22	6	9	24	101
Department of Social Services	166	178	113	69	90	323	1	122	168	1230
Department of Transportation	111	178	133	10	36	152	21	39	193	773
Department of Veterans Affairs	0	1	3	0	0	0	0	3	3	10
Department of Wildlife and Fisheries	26	47	29	3	9	51	4	16	107	292
Other	16	30	48	13	0	50	0	11	50	218
Total	905	2166	1532	424	454	2312	77	941	2481	11292

[43] Agencies are identified per information contained in the Facilities Management Database. No attempt was made to validate these designations as part of this study. It is expected that some of the designations may be in error. Therefore, these results should be considered as tentative until GOHSEP and the identified agencies can review the detailed results and determine which agencies are responsible for which facilities.

For each hazard, a "top ten" list was developed that indicated the ten State-owned critical facilities with the highest estimated losses. Table 6-37 indicates which agencies have critical facilities that are considered among the top ten on a hazard-by-hazard basis.

Table 6-37: Top Ten Critical Facilities per Hazard per State Agency

Agency	Flood	High Wind	Ice Storm	Storm Surge	Subsidence	Wildfire	Dam Failure	Levee Failure	Hazardous Materials	Totals
Department of Agriculture and Forestry	0	0	0	0	0	0	0	0	0	0
Department of Culture, Recreation and Tourism	1	2	0	1	2	0	0	1	0	7
Department of Elementary/Secondary Education	1	01	1	0	0	4	0	3	2	11
Governor's Executive Department	3	0	5	0	0	4	0	0	2	14
Department of Health and Hospitals	1	3	3	2	2	2	3	3	6	26
Department of Higher Education	2	3	0	1	4	0	4	0	0	13
Judiciary	0	0	0	0	0	0	1	0	0	1
Department of Labor	0	0	1	0	0	0	0	0	0	1
Department of Natural Resources	0	0	0	0	0	0	0	0	0	0
Department Of Public Safety and Corrections	0	0	0	0	0	0	0	0	0	0
Secretary of State	1	2	0	1	2	0	1	1	0	8
Department of Social Services	0	0	0	0	0	0	0	0	0	0
Department of Transportation	0	0	0	0	0	0	0	1	0	1
Department of Veterans Affairs	0	0	0	0	0	0	1	0	0	1
Department of Wildlife and Fisheries	0	0	0	0	0	0	0	0	0	0
Other	1	0	0	5	0	0	0	1	0	7
Total	10	10	10	10	10	10	10	10	10	90

More detailed tabulations for State-owned critical facilities for each agency in Louisiana with the highest combined loss estimates for the nine combined hazards are presented in Volume II, Appendix F. Mapping of the top ten facilities for combined estimated losses are included as Map F-40

This page is intentionally blank.

6.15 Critical Infrastructure Risk Assessment

Hazard vulnerability assessments and loss estimates for State-owned bridges in Louisiana were prepared for the hazards listed below.

- Flood
- High Wind (Hurricane)
- High Wind (Tornado)
- Ice Storm
- Storm Surge
- Subsidence
- Wildfire
- Dam Failure
- Levee Failure

Introductory maps (Maps 4-1 and 6-1 thru 6-3) are provided as a reference for the analysis of these hazards. Map 4-1 (see page I-27) shows the State of Louisiana and the political boundaries for the individual parishes. The locations of State-owned bridges in the State of Louisiana are overlaid on that base map information in Map 6-15.

A general overview of the hazard vulnerability assessment and loss estimation methodologies, combined loss estimate results for the indicated hazards, and hazard vulnerability assessment and loss estimate results for each hazard, are presented in the sections that follow. Detailed hazard vulnerability assessments and loss estimates for each of the nine hazards, along with related maps and tables, are presented in Volume II, Appendix F.12.

Introduction

The Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) and the State Hazard Mitigation Planning Committee (SHMPC) undertook the risk assessment for State-owned bridges in three stages:

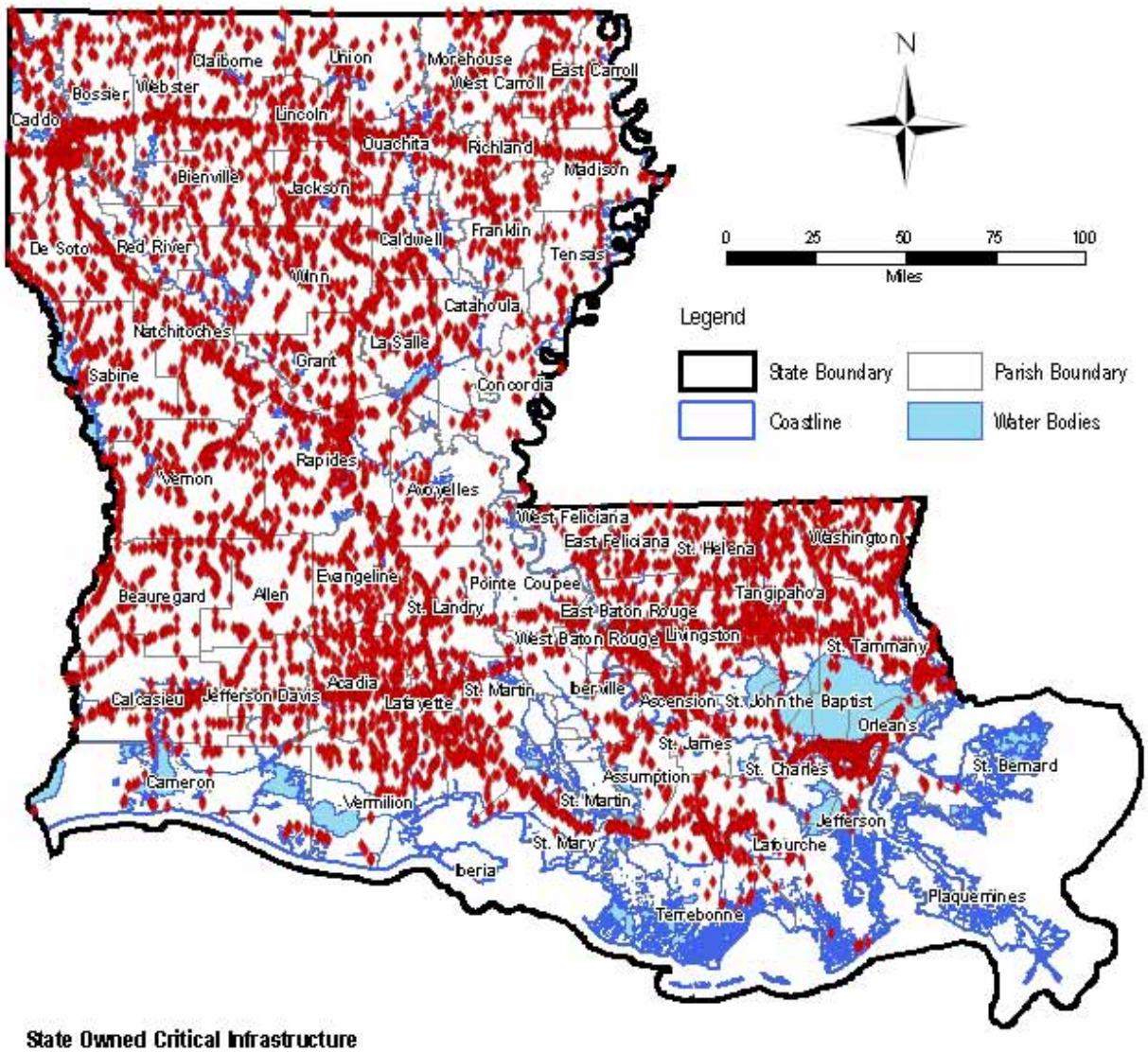
- Identification of State-owned bridges;
- Vulnerability Assessment; and
- Loss Estimation.

Identification of Critical Infrastructure

The Infrastructure Protection Branch of GOHSEP develops and maintains a classified listing of critical infrastructure and key resources in the State of Louisiana. However, GOHSEP is still in the process of gathering information from several parishes and the listing is currently only reflective of 16 parishes. As a result, for the Plan Update, default database listings of state-owned highway bridges included in HAZUS was used as the best available source of information regarding state-owned critical infrastructure.

Attributes in the database for these bridges include the location, age, and traffic counts of the bridges. The total number of assets included in the database is 7,584. The general locations of these assets are shown in Map 6-15.

Map 6-15: Critical Infrastructure - Bridges



State Owned Critical Infrastructure

- State Owned Bridges

Source: HAZUS, 2003

GOHSEP and the SHMPC decided to assign "criticality" levels based upon traffic count. The different levels that were developed by GOHSEP are shown in Table 6-38.

Table 6-38: State-Owned Bridges Criticality Level Descriptions

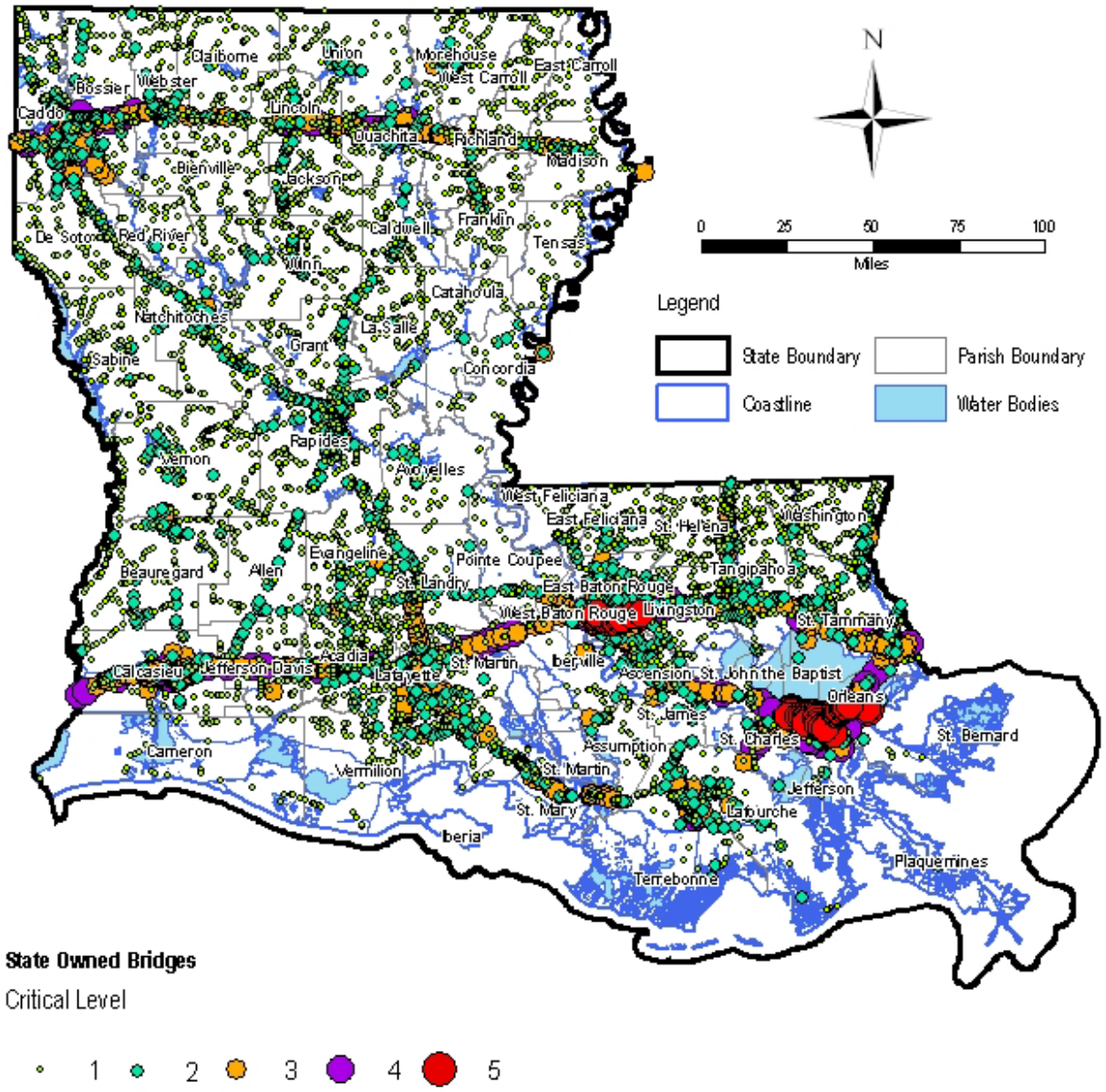
Criticality Level	Description
Level 1 - High importance/Most critical	Traffic Count > 55,750
Level 2 - Medium-high importance	Traffic Count >29,000 and < 55,750
Level 3 - Medium importance	Traffic Count >14,000 and <29,000
Level 4 - Medium-low importance	Traffic Count > 4,500 and < 14,000
Level 5 - Low importance	Traffic Count < 4,500

Table 6-39 shows the numbers of State-owned bridges per criticality ranking; this information is also illustrated in Map 6-16.

Table 6-39: Number of State-Owned Assets (Bridges) by Criticality Ranking

Criticality Level	Number of Assets (Critical Facilities)
1 – High	79
2 – Medium High	300
3 – Medium	886
4 – Medium Low	1,838
5 – Low	4,481
Total	7,584

Map 6-16: Critical Infrastructure – Bridges- Criticality



Source: HAZUS, 2003

Vulnerability Assessment Methodology for State-owned Bridges

Hazard vulnerability assessments provide a means of indicating whether a given bridge in Louisiana is at a low, medium or high vulnerability to damage from a given hazard. Although there are a variety of potential hazards, the hazard vulnerability assessments for State-owned bridges in Louisiana adopted the same general approach for all hazards. This general approach is outlined by the three-step methodology listed below:

- Step 1 – Review Hazard Profile Maps: The first step in the hazard vulnerability assessments was to review the hazard profile map for the hazard under consideration. The hazard profile maps helped identify and establish which parishes or areas in the State of Louisiana have historically been the most prone to a given hazard, and provided a useful means of establishing hazard vulnerability levels (Step 2). The hazard profile maps for each hazard may be found in Section Four of this Plan Update.
- Step 2 – Establish Hazard Vulnerability Levels by Location: Using information from Step 1, hazard vulnerability levels were established for State-owned bridges based on location. In general, bridges located outside established hazard zones were designated as having a low hazard vulnerability level, while bridges located within the established hazard zones were designated with a medium or high hazard vulnerability level. The basis for the medium and high distinctions is described for each hazard in the materials starting on page I-180.
- Step 3 – Establish Hazard Vulnerability Levels using Additional Parameters if Needed: In some cases, the location of a bridge is not sufficient to specify a low, medium or high vulnerability level. In these situations, the next step was to establish additional parameters to make a more specific determination. Examples of parameters used to establish hazard vulnerability levels include the age of the bridge relative to the adoption of a floodplain ordinance. The assumption is that in general terms, bridges constructed after the establishment of an ordinance are designated to have a lower hazard vulnerability level than those that were constructed before it was established, since the ordinance would theoretically require construction that is more resistant to these hazards.

Loss Estimation Methodology for State-owned Critical Facilities

Loss estimations are intended to provide a means of quantifying the potential dollar losses from a given hazard in terms of combined physical (building) damage, contents damage, and loss of function (LOF) costs. Due to limitations inherent in the data, loss estimations for bridges consider only loss of function. As described for the vulnerability assessment methodology above, although there are a variety of potential hazards, the loss estimations for State-owned bridges in Louisiana adopted the same general approach for all hazards. This general approach is outlined by the two-step methodology listed below.

- Step 1 – Estimate Damage Levels by Hazard Vulnerability Level: The first step in preparing loss estimates for individual bridges was to establish a loss of function designation from a given hazard. The three hazard vulnerability levels established by the hazard vulnerability assessment for each facility provided a useful indication of the potential levels of damage that may occur from a given hazard. In general, structures with a low hazard vulnerability level are expected to experience a shorter loss of function, structures with a medium hazard vulnerability level are subject to a moderate loss of function, and structures with a high hazard vulnerability level will likely experience a longer term loss of function.
- Step 2 – Establish Damage Functions: The final step in preparing loss estimates was to establish a series of damage functions to estimate LOF costs associated with a given hazard. The damage functions allowed damages to be estimated for the three potential damage levels established in Step 1. The damage functions were applied to individual bridges based on the factored traffic count. The traffic count values were taken directly from the information in the HAZUS database.

The factored traffic count for each bridge was determined by multiplying the actual traffic count by a Criticality Factor (CF) based on the criticality level assigned to each structure; the relationship of the criticality level to the CF is shown in Table 6-40.

Table 6-40: Relationship of Criticality Level to Criticality Factor

Criticality Level	Criticality Factor (CF)
1 – High	5
2 – Medium High	4
3 – Medium	3
4 – Medium Low	2
5 - Low	1

Once the factored traffic count was obtained for each bridge, the LOF costs were computed by using a formula derived from the FEMA Benefit Cost Toolkit 3.0. The formula is:

Traffic count (per hour) x Detour Time (in hours) x LOF (in hours) x $25

A detour time of one hour was assumed for all bridges.

The value of $25 dollars per person-hour is derived from FEMA's "What is a Benefit?" Guidance and the Benefit Cost Toolkit. In these references, a value of $21 is provided but the guidance dates from 2002 so the value was adjusted upward to represent present value.

The subsections that follow provide a summary of information about the risk assessment for State-owned bridges for each hazard type. Some subsections also include updated hazard data, while others continue to use the previous hazard data. More detailed discussions of the methodologies and the results for each hazard are contained in Volume II, Appendix F.12.

This page is intentionally blank.

Flood

The flood hazard vulnerability assessment of State-owned bridges was based on: 1) location of the facility within the 100-year floodplain; and 2) the construction date of the bridge relative to the issuance of Flood Insurance Rate Maps (FIRMs) in Louisiana. The criteria used to determine specific vulnerability rankings for each bridge and the results of applying this ranking to the State-owned bridges are shown in Table 6-41.

Table 6-41: Flood Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Bridges
High	Bridges within floodplain / pre-FIRM construction date	3,603
Medium	Bridges within floodplain / post-FIRM construction date	875
Low	Bridges not within floodplain	3,112

The flood loss estimate of State-owned bridges facilities in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.12).

- Flood Hazard Vulnerability Ranking
- Factored Traffic Count

Table 6-42: Flood Loss Estimate Ranges and Ranking Results

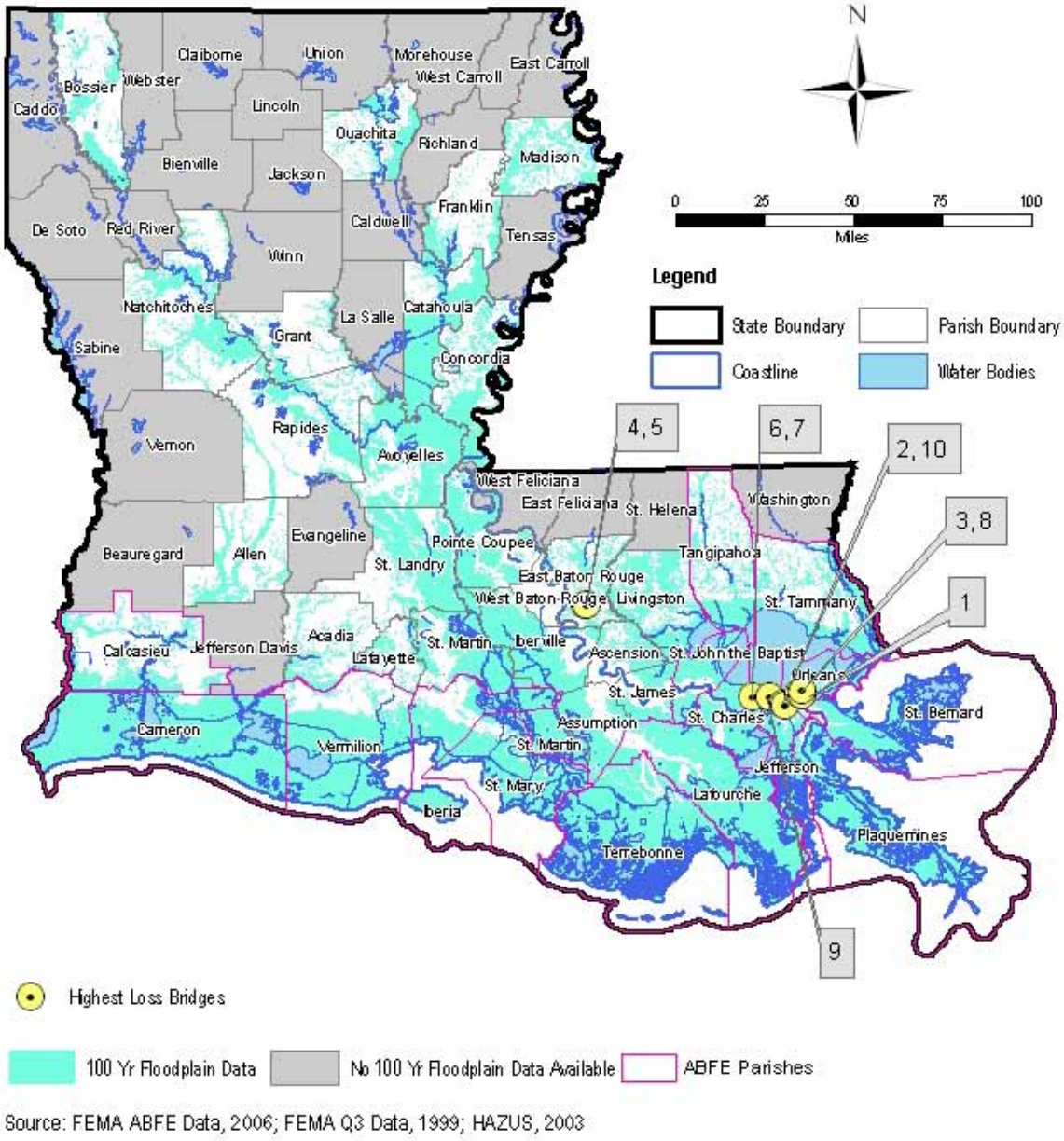
Ranking	Total Loss Estimate Ranges	Number of Bridges
High	$10,000,001 - $450,000,000	1,535
Medium	$10,001 - $10,000,000	2,812
Low	$0 -$10,000	3,237

Table 6-43: Top Ten Bridges at Risk from Flood Hazard Computed From Loss Estimates

Flood Loss Ranking	Bridge Location	Parish	Loss Estimate
1	I-10 at New Orleans East	Orleans	$442,371,375
2	I-10 at Airline Highway	Orleans	$377,500,500
3	LA 3021 at I-10	Orleans	$351,327,375
4	I-12 at LA 3064	East Baton Rouge	$294,357,375
5	I-12 at LA 61	East Baton Rouge	$294,357,375
6	I-10 at Canal Boulevard and Lakeport (1)	Orleans	$286,810,875
7	I-10 at Canal Boulevard and Lakeport (2)	Orleans	$286,810,875
8	I-10 at Chef Menteur Highway	Orleans	$281,691,000
9	I-10 at Canal Street and Bainbridge	Orleans	$274,353,750
10	I-10 at South Broad Street	Orleans	$268,447,500

Map 6-17: Critical Infrastructure Loss Estimate – Flood – Total; shows the area of the 100-year floodplain in the State of Louisiana based on Digital Quality Level 3 Flood Data (Q3) (same as Map 4-5) and the locations of the ten highest ranked bridges per Table 6-43.

Map 6-17: Critical Infrastructure Loss Estimate – Flood



Source: FEMA ABFE Data, 2006; FEMA Q3 Data, 1999; HAZUS, 2003

High Wind (Hurricane)

The hurricane wind hazard vulnerability assessment of State-owned bridges was based on the design wind speed zone. The criteria used to determine specific vulnerability rankings for each bridge and the results of applying this ranking to the State-owned bridges are shown in Table 6-44.

Table 6-44: High Wind Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Bridges
High	Design wind = ≥ 110 mph	1,004
Medium	Design wind = 91 – 110 mph; pre- code	3,290
Low	Design wind = < 90 mph	2,858

The high wind loss estimate of State-owned bridges in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.12).

- Hurricane Wind Hazard Vulnerability
- Factored Traffic Count

Table 6-45: High Wind Loss Estimate Ranges and Ranking Results

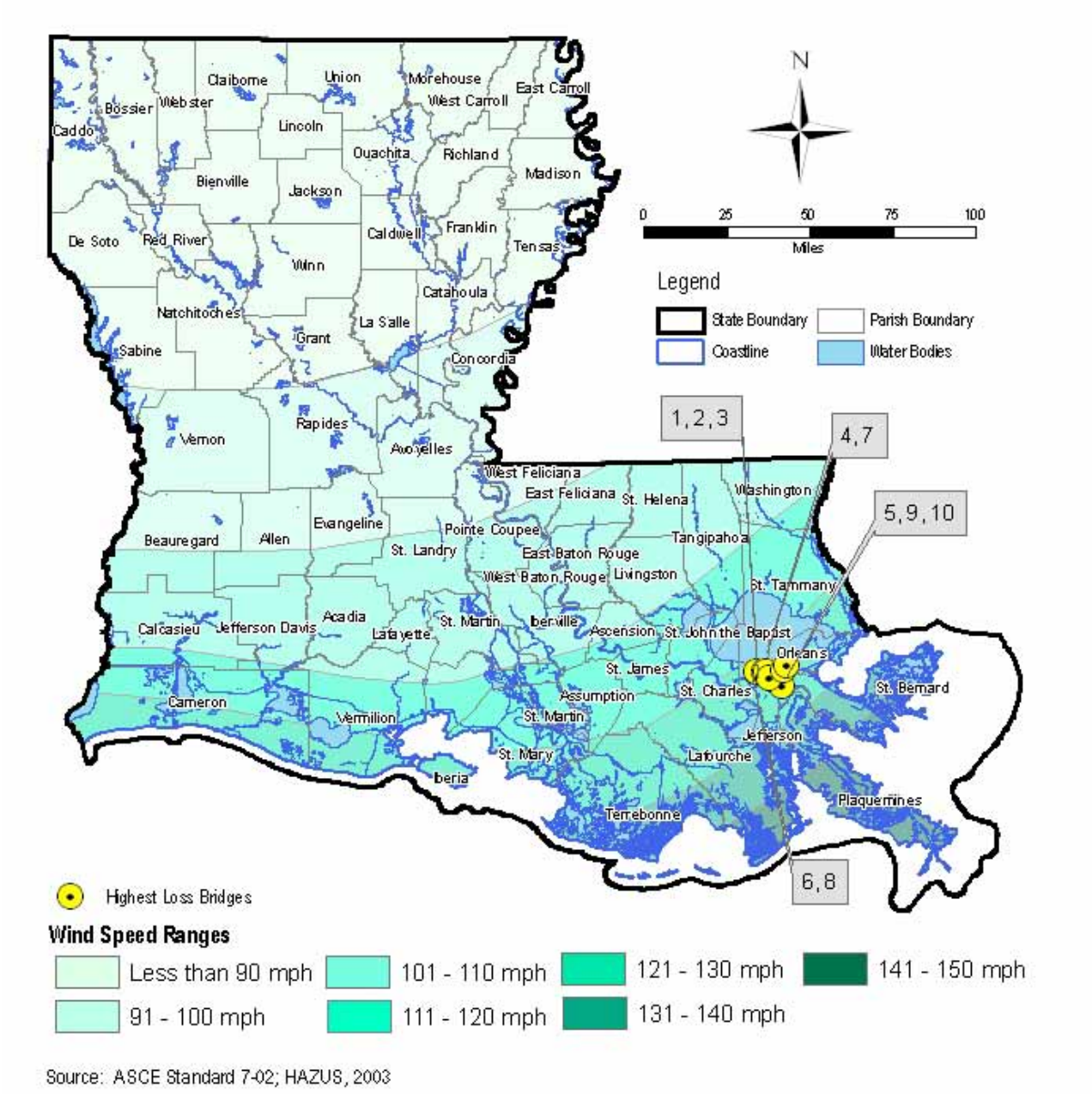
Ranking	Total Loss Estimate Ranges	Number of Bridges
High	$10,000,001 to $350,000,000	886
Medium	$250,001 to $10,000,000	3,779
Low	$0 to $250,000	3,919

Table 6-46: Top Ten Bridges at Risk from Hurricane Wind Hazard Computed From Loss Estimates

High Wind Loss Ranking	Bridge Name	Parish	Loss Estimate
1	I-10 at Pontchartrain Boulevard	Orleans	$301,312,500
2	I-610 at I-10	Orleans	$270,000,000
3	I-10 over Canal	Orleans	$245,761,875
4	I-10 at Airline Highway	Orleans	$209,722,500
5	LA 3021 at I-10	Orleans	$195,181,875
6	I-10 at Canal Street (1)	Orleans	$180,787,500
7	I-10 at Canal Street (2)	Orleans	$180,787,500
8	US 90 at General DeGaul	Orleans	$160,485,000
9	I-10 at Clearview Road (1)	Orleans	$159,339,375
10	I-10 at Clearview Road (2)	Orleans	$159,339,375

Map 6-18: Critical Infrastructure Loss Estimate – High Wind – Total; shows the design wind speed zones from American Society of Civil Engineers 7-02 (same as Map 4-13) for Louisiana, and the locations of the ten highest ranked bridges from Table 6-46.

Map 6-18: Critical Infrastructure Loss Estimate – Hurricane



Source: ASCE Standard 7-02; HAZUS, 2003

High Wind (Tornado)

The tornado wind hazard vulnerability assessment of State-owned bridges was based on the average number of tornadoes per 100 square miles within each parish. The criteria used to determine specific vulnerability rankings for each bridge and the results of applying this ranking to the State-owned bridges are shown in Table 6-47.

Table 6-47: High Wind Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Parishes
5	> 3.5 tornadoes per 100 square miles	6
4	2.5 - 3.5 tornadoes per 100 square miles	8
3	1.5 – 2.5 tornadoes per 100 square miles	8
2	.5 – 1.5 tornadoes per 100 square miles	25
1	< .5 tornadoes per 100 square miles	17

The high wind loss estimate of State-owned bridges in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.12).

- Tornado Wind Hazard Vulnerability
- Percentage of Parish Land Impacted by Tornadoes
- Factored Traffic Count per Parish

Table 6-48: High Wind Loss Estimate Ranges and Ranking Results

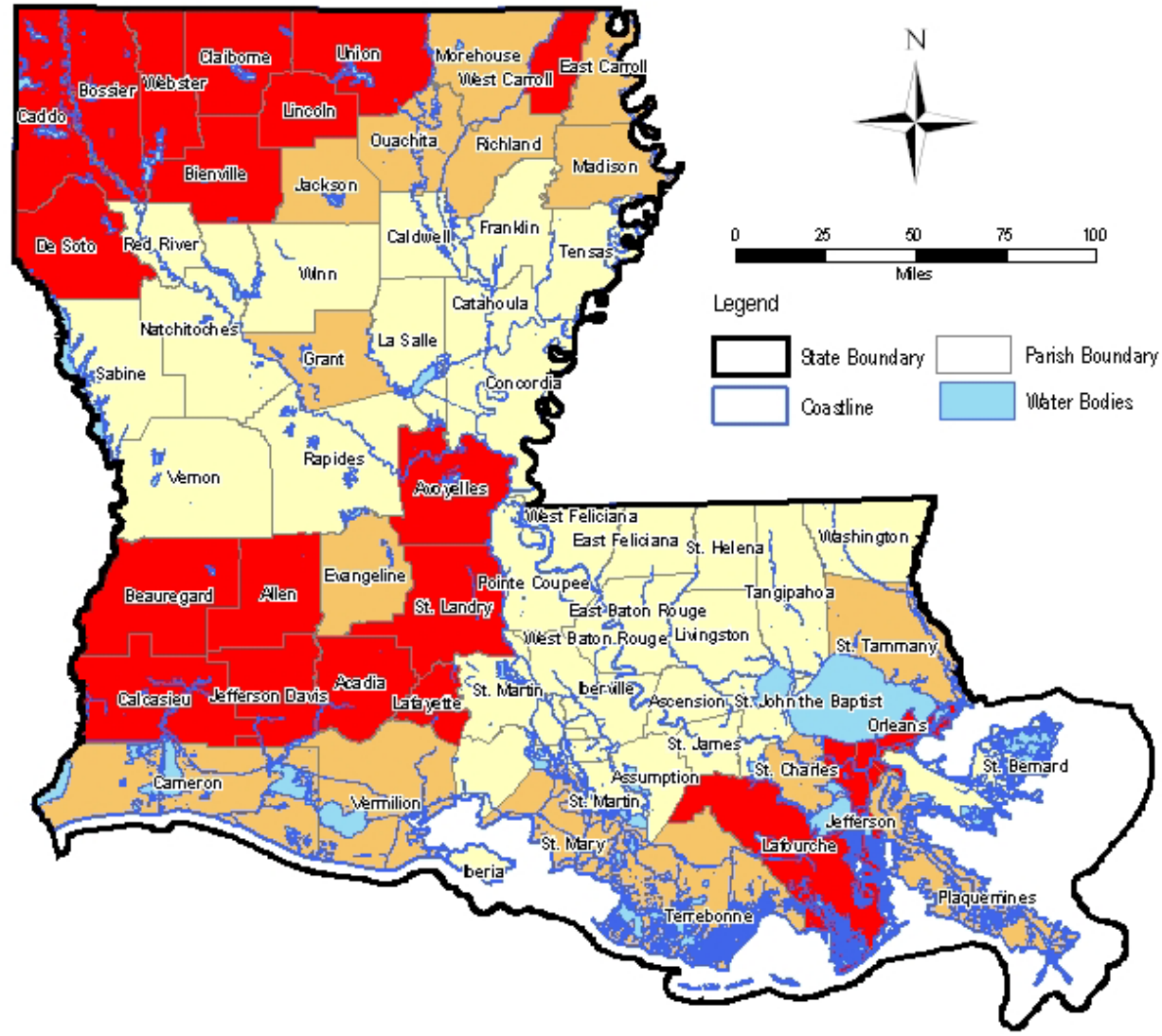
Ranking	Total Loss Estimate Ranges	Number of Parishes
High	$100,000,001 to $900,000,000	20
Medium	$10,000,01 to $100,000,000	15
Low	$0 to $10,000,000	29

Table 6-49: Top Ten Parishes at Risk from Tornado Wind Hazard Computed From Loss Estimates

High Wind Loss Ranking	Parish	Loss Estimate
1	Jefferson Davis	$896,693,000
2	Acadia	$674,258,250
3	Bossier	$657,575,800
4	Caddo	$614,979,750
5	St. Landry	$436,881,800
6	Claiborne	$373,615,500
7	Lafayette	$319,081,700
8	Orleans	$297,504,900
9	Jefferson	$291,020,675
10	West Carrol1	$267,824,875

Map 6-19: Critical Infrastructure Loss Estimate – High Wind – Total; shows the loss estimate ranking of all Parishes.

Map 6-19: Critical Infrastructure Loss Estimate – Tornado



Critical Infrastructure Estimated Losses

< $10,000,000 | $10,000,000 to $100,000,000 | >$100,000,000

Source: HAZUS, 2003

Ice Storm

The ice storm hazard vulnerability assessment of State-owned bridges was based on the number of recorded ice storms within each parish based on data provided by the National Climatic Data Center (NCDC). The criteria used to determine specific vulnerability rankings for each bridge and the results of applying this ranking to the State-owned bridges are shown in Table 6-50.

Table 6-50: Ice Storm Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Bridges
High	Bridges in parishes with > 4 recorded ice storms	1,575
Medium	Bridges in parishes with from 1 to 4 recorded ice storms	2,657
Low	Bridges in parishes with no recorded ice storm	3,350

The ice storm loss estimate of State-owned bridges in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.12).

- Ice Storm Hazard Vulnerability
- Factored Traffic Count

Table 6-51: Ice Storm Loss Estimate Ranges and Ranking Results

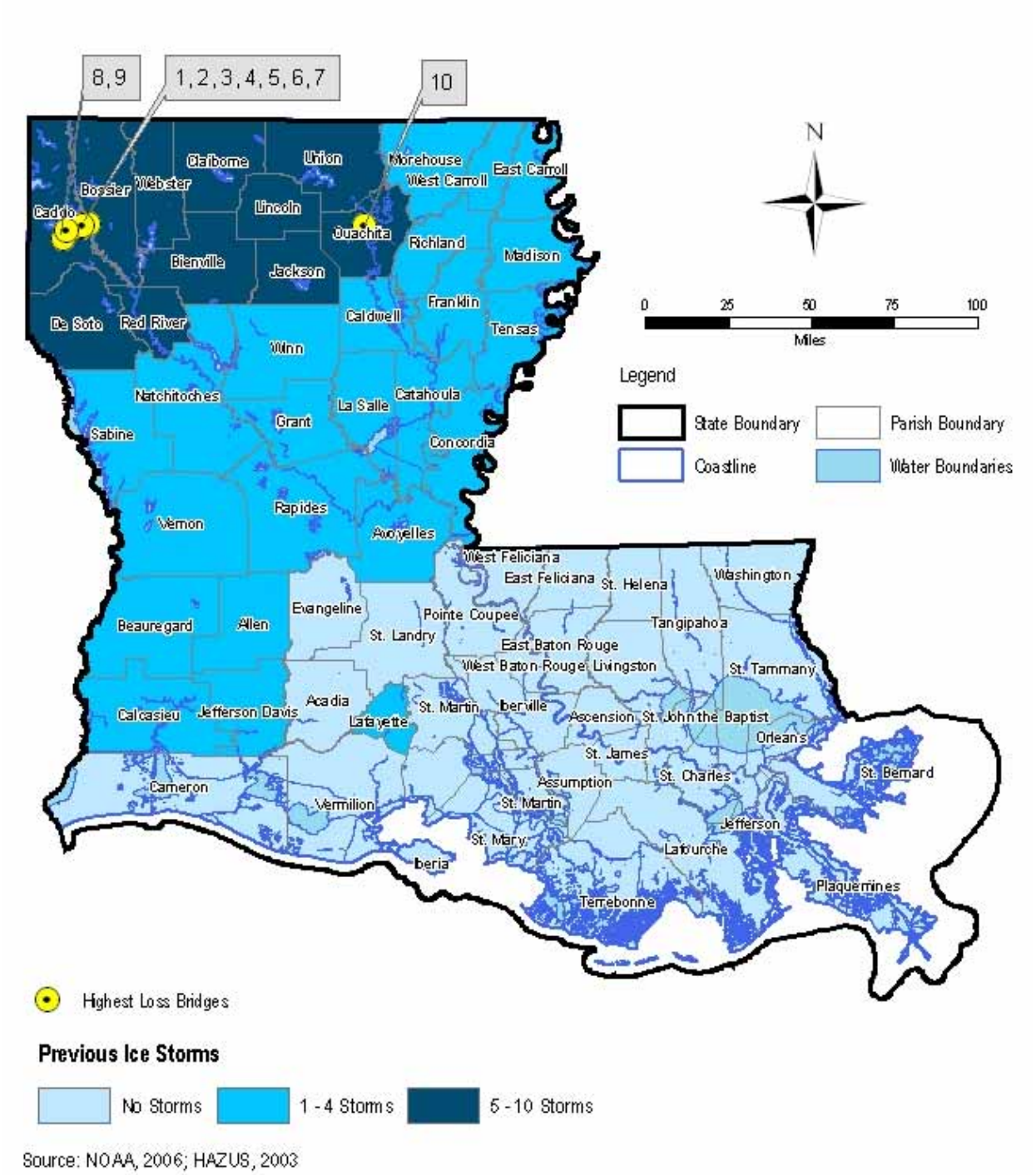
Ranking	Total Loss Estimate Ranges	Number of Critical Facilities
High	$1,000,000 to $17,000,000	731
Medium	$50,000 to $1,000,000	1,887
Low	$0 to $50,000	4,966

Table 6-52: Top Ten Bridges at Risk from Ice Storm Hazard Computed From Loss Estimates

Ice Storm Loss Ranking	Building Name	Parish	Loss Estimate
1	LA 617 at I-20	Ouachita	$16,746,000
2	I-20 Inner Loop Expressway	Caddo	$16,216,800
3	I-20 at Caddo Lake	Caddo	$16,049,100
4	I-20 at Red River	Bossier	$16,049,100
5	I-20 at Traffic Street	Bossier	$16,049,100
6	I-20 at Commerce Street	Caddo	$16,049,100
7	I-20 at Industrial Drive	Bossier	$15,380,100
8	I-20 at Louisiana Avenue (1)	Caddo	$14,580,300
9	I-20 at Louisiana Avenue (2)	Caddo	$14,580,300
10	I-20 at LA 71	Caddo	$14,580,300

Map 6-20: Critical Infrastructure Loss Estimate – Ice Storm – Total; shows the number of recorded ice storms for each parish in the State of Louisiana based on NCDC data (same as Map 4-15); and the locations of the ten highest ranked bridges from Table 6-52.

Map 6-20: Critical Infrastructure Loss Estimate – Ice Storm



Source: NOAA, 2006; HAZUS, 2003

Storm Surge

The storm surge hazard vulnerability assessment of State-owned bridges was based on sea, lake, and overland surges from hurricanes (SLOSH) models for category 1-5 hurricanes in Louisiana. The criteria used to determine specific vulnerability rankings for each bridge and the results of applying this ranking to the State-owned bridges are shown in Table 6-53.

Table 6-53: Storm Surge Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Bridges
High	Bridges within hazard zone with inundation depths > 12 feet	757
Medium	Bridges within hazard zone with inundation depths < 12 feet	785
Low (or None)	Bridges outside the hazard zone	6,042

The storm surge loss estimate of State-owned bridges in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.12).

- Storm Surge Hazard Vulnerability
- Factored Traffic Count

Table 6-54: Storm Surge Loss Estimate Ranges and Ranking Results

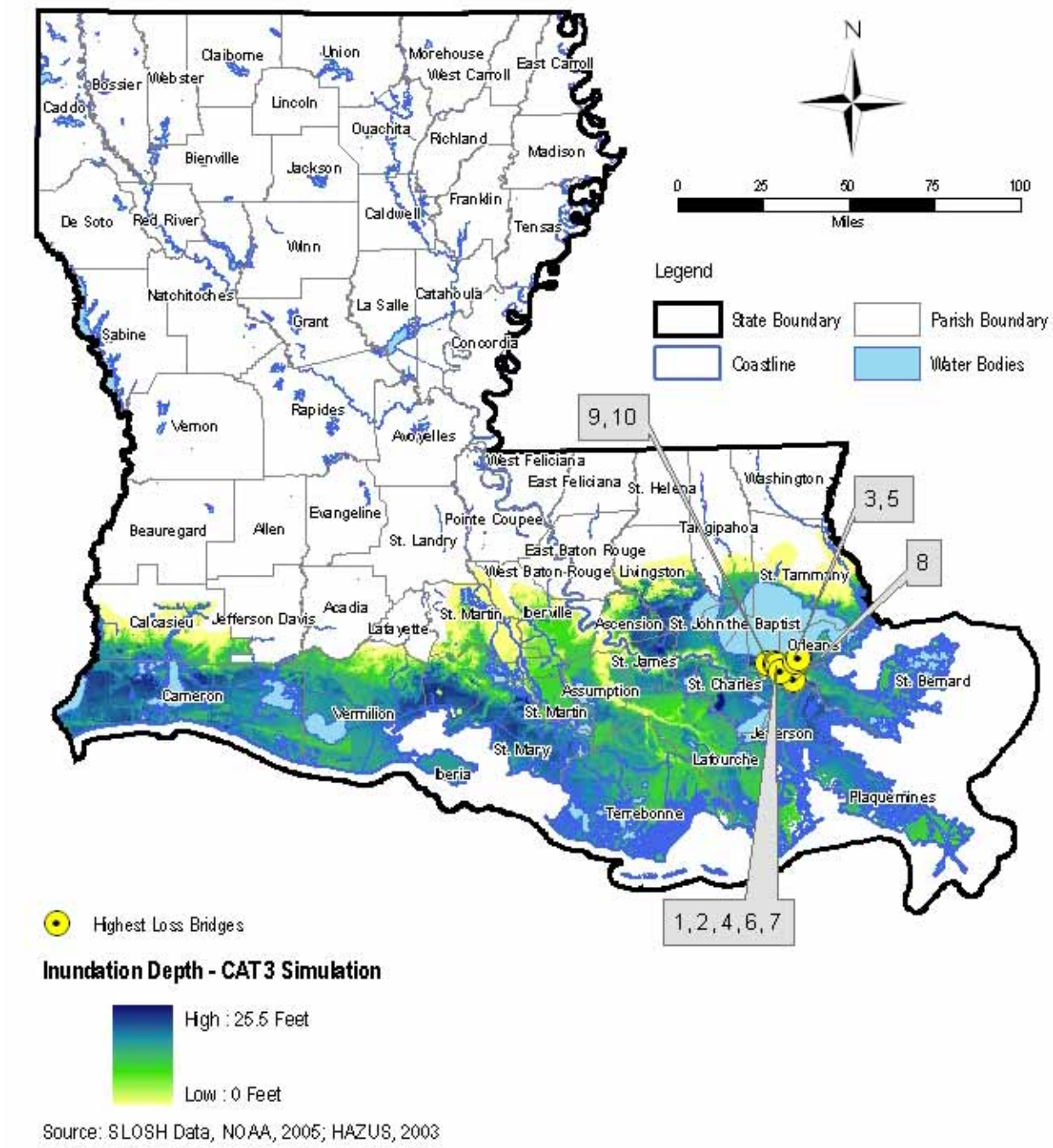
Ranking	Total Loss Estimate Ranges	Number of Bridges
High	$50,000,001 to $650,000,000	255
Medium	$1,000,001 to $50,000,000	1,090
Low	$0 to $1,000,000	6,239

Table 6-55: Top Ten Bridges at Risk from Storm Surge Hazard Computed from Loss Estimates

Storm Surge Loss Ranking	Bridge Name	Parish	Loss Estimates
1	I-10 at Pontchartrain Expressway	Orleans	$602,625,000
2	I-610 at Pontchartrain Expressway	Orleans	$540,000,000
3	I-10 in New Orleans East	Orleans	$491,523,750
4	I-10 at Airline Highway	Orleans	$419,445,000
5	LA 3021 at I-10	Orleans	$390,363,750
6	I-10 at Canal Street (1)	Orleans	$361,575,000
7	I-10 at Canal Street (2)	Orleans	$361,575,000
8	US 90 at General DeGaul	Orleans	$320,970,000
9	I-10 at Lakeport (1)	Orleans	$318,678,750
10	I-10 at Lakeport (2)	Orleans	$318,678,750

Map 6-21: Critical Infrastructure Loss Estimate –Storm Surge – Total; shows the storm surge hazard zones and potential surge inundation depths throughout the State (same as Map 4-21) and the locations of the ten highest ranked facilities from Table 6-55.

Map 6-21: Critical Infrastructure Loss Estimate – Storm Surge



Source: SLOSH Data, NOAA, 2005; HAZUS, 2003

Subsidence

The subsidence hazard vulnerability assessment of State-owned bridges was based on subsidence rate studies from the Louisiana Speaks report prepared by the Louisiana Recovery Authority in the wake of hurricanes Katrina and Rita. The criteria used to determine specific vulnerability rankings for each bridge and the results of applying this ranking to the State-owned bridges are shown in Table 6-56.

Table 6-56: Subsidence Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Bridges
High	Bridges located in the identified basins with rates > .08	150
Medium	Bridges located in the identified basins with rates between .02 and .08	993
Low (or None)	Bridges located in the identified basins with rates < .02	6,441

The subsidence loss estimate of State-owned bridges in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.12).

- Subsidence Hazard Vulnerability
- Factored Traffic Count

Table 6-57: Subsidence Loss Estimate Ranges and Ranking Results

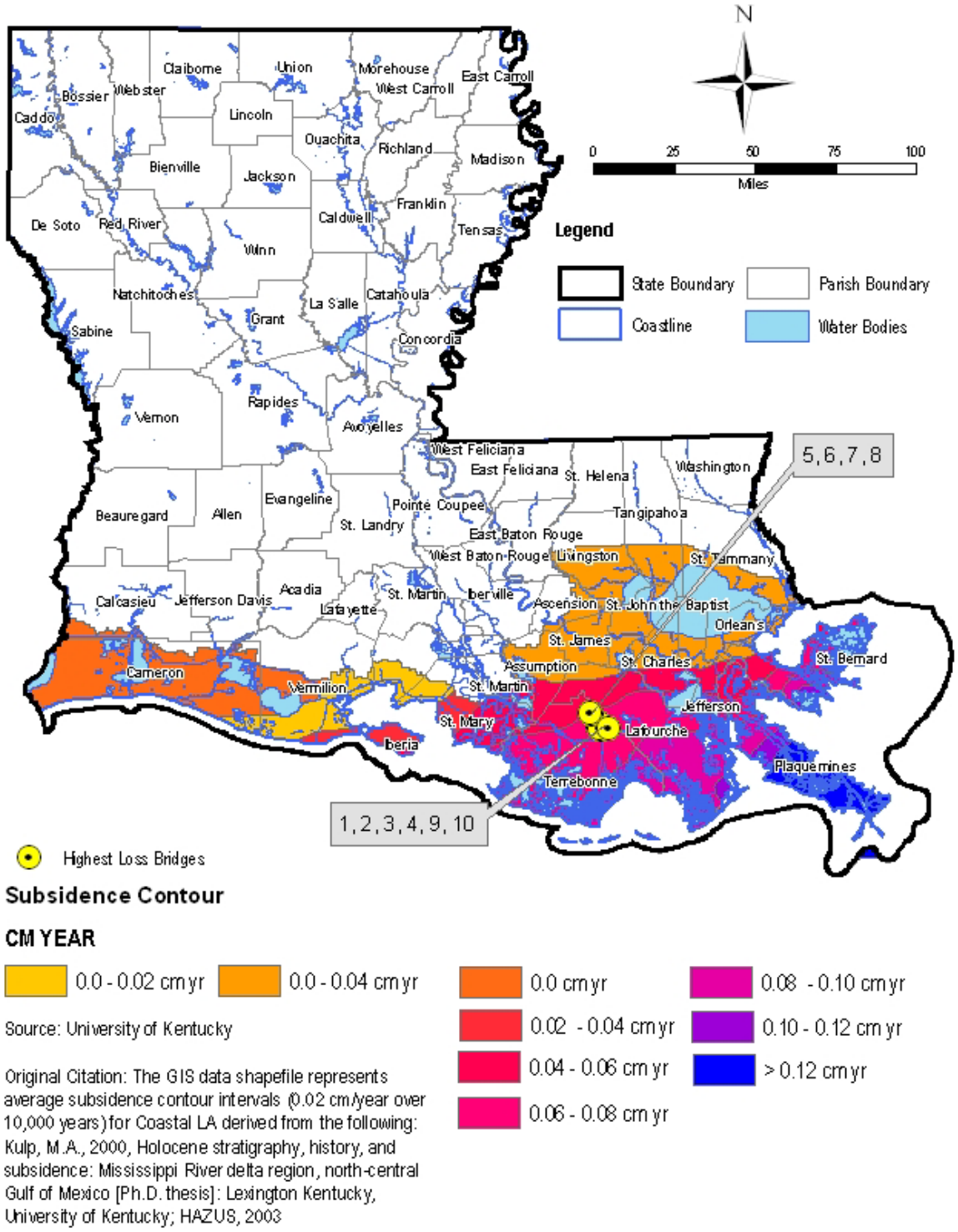
Ranking	Total Loss Estimate Ranges	Number of Bridges
High	$2,000,001 to $110,000,000	88
Medium	$1 to $2,000,000	62
Low	$0	7,434

Table 6-58: Top Ten Bridges at Risk from Subsidence Hazard Computed From Loss Estimates

Subsidence Loss Ranking	Bridge Name	Parish	Loss Estimate
1	LA 3040 at Borrow and LA 182	Terrebonne	$102,687,000
2	LA 3040 over Intercoastal Waterway	Terrebonne	$102,687,000
3	LA 659 at Darlene Street	Terrebonne	$55,532,250
4	LA 659 at Sugarland Street	Terrebonne	$53,228,250
5	LA 24 at Hackberry Avenue	Terrebonne	$53,228,250
6	LA 659 at Evergreen Drive	Terrebonne	$52,616,250
7	LA 659 at Charlette Street	Terrebonne	$52,616,250
8	LA 3087 at Main Street	Terrebonne	$45,191,250
9	LA 3087 at Intercoastal Waterway	Terrebonne	$45,191,250
10	LA 182 at Hollywood Road	Terrebonne	$38,391,750

Map 6-22: Critical Infrastructure Loss Estimate –Subsidence– Total; shows the subsidence hazard zones and the extent of potential subsidence throughout the State (same as Map 4-22b) and the locations of the ten highest ranked bridges from Table 6-58.

Map 6-22: Critical Infrastructure Loss Estimate – Subsidence



Wildfire

The wildfire hazard vulnerability assessment of State-owned bridges was based on the number of recorded wildfires and the number of acres burned by wildfires within each parish based on data provided by the State of Louisiana. The criteria used to determine specific vulnerability rankings for each bridge and the results of applying this ranking to the State-owned bridges are shown in Table 6-59.

Table 6-59: Wildfire Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Bridges
High	Bridges in parishes with > average burned area	3,019
Medium	Bridges in parishes with < average burned area	2,786
Low (or None)	Bridges in parishes with no recorded wildfires	1,779

The wildfire loss estimate of State-owned bridges in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.12).

- Wildfire Hazard Vulnerability
- Factored Traffic Count

Table 6-60: Wildfire Loss Estimate Ranges and Ranking Results

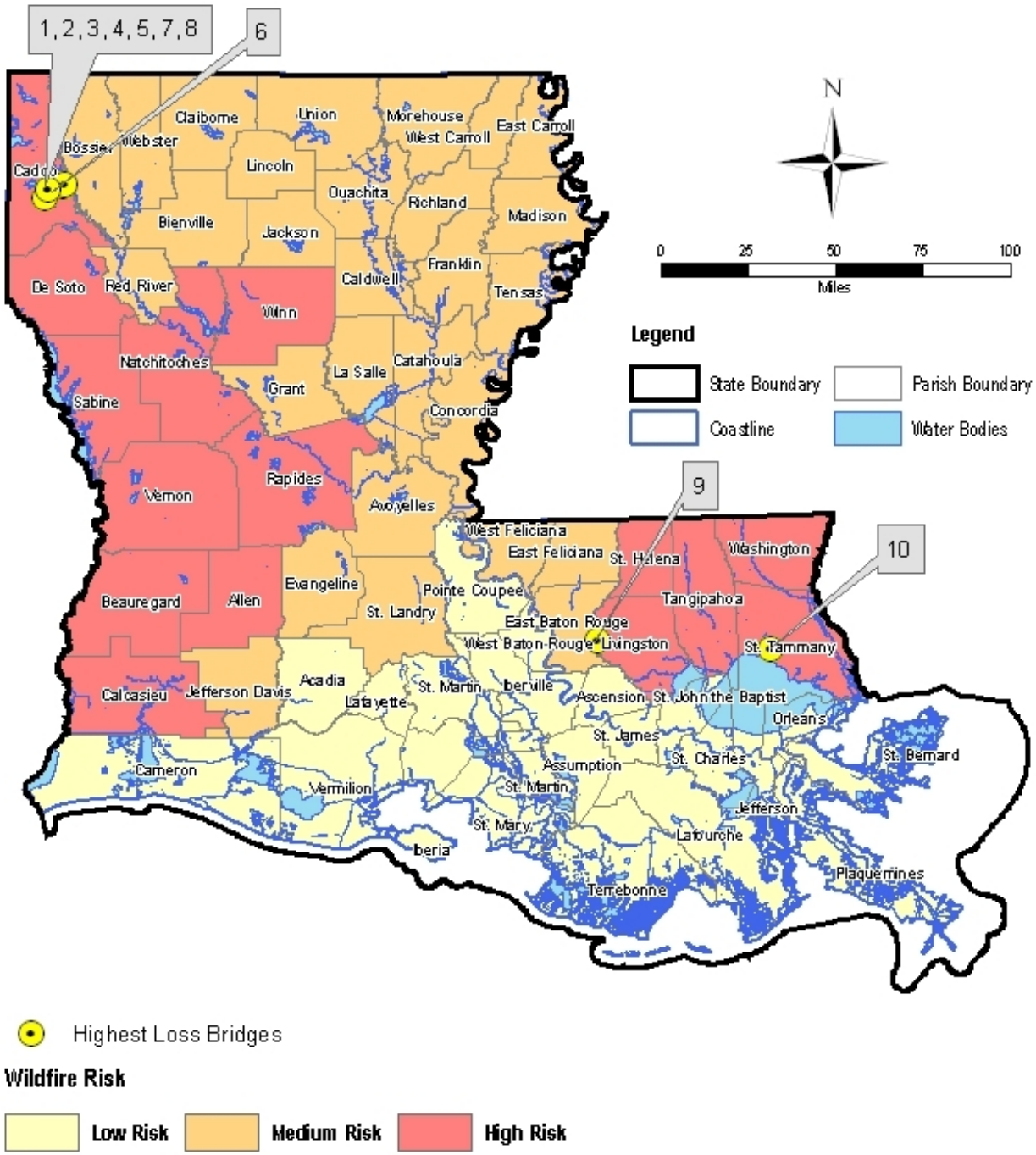
Ranking	Total Loss Estimate Ranges	Number of Bridges
High	$1,000,001 to $25,000,000	1,174
Medium	$50,001 to $1,000,000	2,887
Low	$0 to $50,000	2,523

Table 6-61: Top Ten Bridges at Risk from Wildfire Hazard Computed From Loss Estimates

Wildfire Loss Ranking	Building Name	Parish	Loss Estimate
1	I-12 at South Range Avenue	Livingston	$24,140,625
2	I-20 at LA 3132	Caddo	$16,216,800
3	I-20 at Commerce	Caddo	$16,049,100
4	I-20 at Red River	Caddo	$16,049,100
5	I-20 over Caddo Lake	Caddo	$16,049,100
6	US 190 at Fairway Drive	St.Tammany	$15,970,800
7	I-20 at Louisiana Avenue (1)	Caddo	$15,580,300
8	I-20 at Louisiana Avenue (2)	Natchitoches	$15,580,300
9	I-20 at LA 71 (1)	Rapides	$15,580,300
10	I-20 at LA 71 (2)	Rapides	$15,580,300

Map 6-23: Critical Infrastructure Loss Estimate –Wildfire – Total; shows the average number of acres burned by wildfires for each parish in the State of Louisiana based on State data (same as Map 4-23); and the locations of the ten highest ranked bridges from Table 6-61.

Map 6-23: Critical Infrastructure Loss Estimate – Wildfire



Source: Louisiana Department of Agriculture and Forestry, 2003; HAZUS, 2003

Dam Failure

The dam failure hazard vulnerability assessment of State-owned bridges was based on the potential inundation areas in proximity to low, significant and high hazard dams statewide. The criteria used to determine specific vulnerability rankings for each facility and the results of applying this ranking to the State-owned critical facilities are shown in Table 6-62.

Table 6-62: Dam Failure Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Bridges
High	Bridges within 50% of dam failure hazard radius	465
Medium	Bridges in area 50% to 100% of dam failure hazard radius	968
Low (or None)	Bridges outside dam failure hazard radius	6,151

The dam failure loss estimate of State-owned bridges in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.12).

- Dam Failure Hazard Vulnerability
- Factored Traffic Count

Table 6-63: Dam Failure Loss Estimate Ranges and Ranking Results

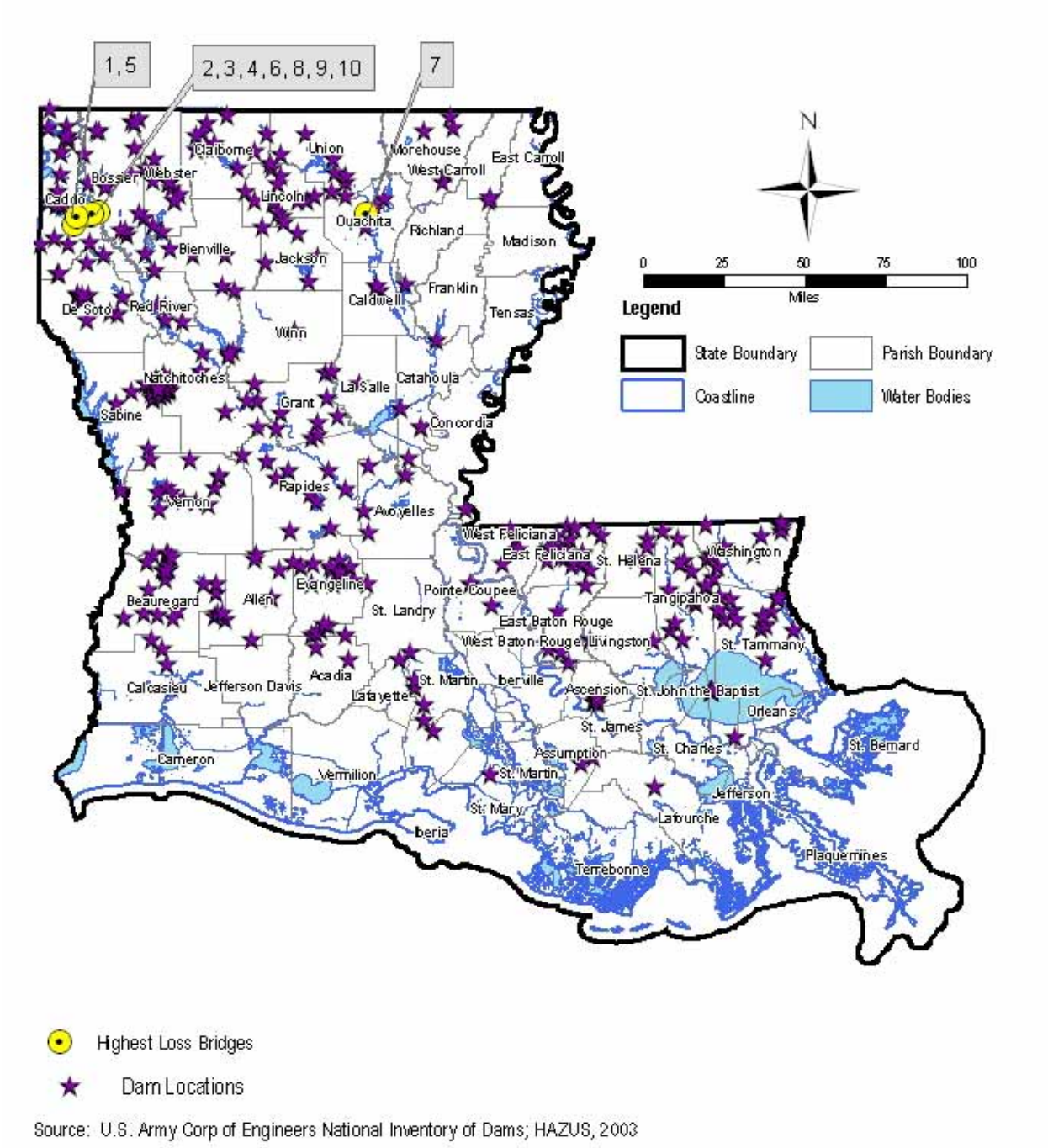
Ranking	Total Loss Estimate Ranges	Number of Bridges
High	$1,000,001 to $165,000,000	953
Medium	$1 to $1,000,000	478
Low	$0	6,153

Table 6-64: Top Ten Bridges at Risk from Dam Failure Hazard Computed From Loss Estimates

Dam Failure Loss Ranking	Building Name	Parish	Loss Estimate
1	I-220 at LA 3132	Caddo	$162,168,000
2	I-20 over Red River	Caddo	$160,491,00
3	I-20 at Traffic Street	Bossier	$160,491,00
4	I-20 at Commerce Street	Caddo	$160,491,00
5	I-220 over Caddo Lake	Caddo	$160,491,00
6	I-20 at Old Minden Highway	Bossier	$153,801,000
7	LA 617 at I-20	Ouachita	$150,714,000
8	I-20 at Louisiana Avenue (1)	Caddo	$145,803,000
9	I-20 at Louisiana Avenue (2)	Caddo	$145,803,000
10	I-20 at US 71	Caddo	$145,803,000

Map 6-24: Critical Infrastructure Loss Estimate –Dam Failure – Total; shows the locations of various dams in parishes throughout the State of Louisiana (same as Map 4-24); and the locations of the ten highest ranked bridges from Table 6-64.

Map 6-24: Critical Infrastructure Loss Estimate – Dam Failure



Source: U.S. Army Corp of Engineers National Inventory of Dams; HAZUS, 2003

Levee Failure

As noted previously, the levee failure hazard vulnerability assessment of State-owned bridges was limited to the potential inundation areas from levees under the jurisdiction of the New Orleans District of the U.S. Army Corps of Engineers (USACE). The criteria used to determine specific vulnerability rankings for each bridge and the results of applying this ranking to the State-owned bridges are shown in Table 6-65.

Table 6-65: Levee Failure Vulnerability Criteria and Ranking Results

Ranking	Criteria	Number of Bridges
High	Bridges within ½ mile of levee	161
Medium	Bridges from ½ to 2 miles from levee	571
Low (or None)	Bridges > 2 miles from levee	6,952

The levee failure loss estimate of State-owned bridges in Louisiana involved an analysis of the following parameters (that are described in more detail in Volume II, Appendix F.12).

- Levee Failure Hazard Vulnerability
- Factored Traffic Count

Table 6-66: Levee Failure Loss Estimate Ranges and Ranking Results

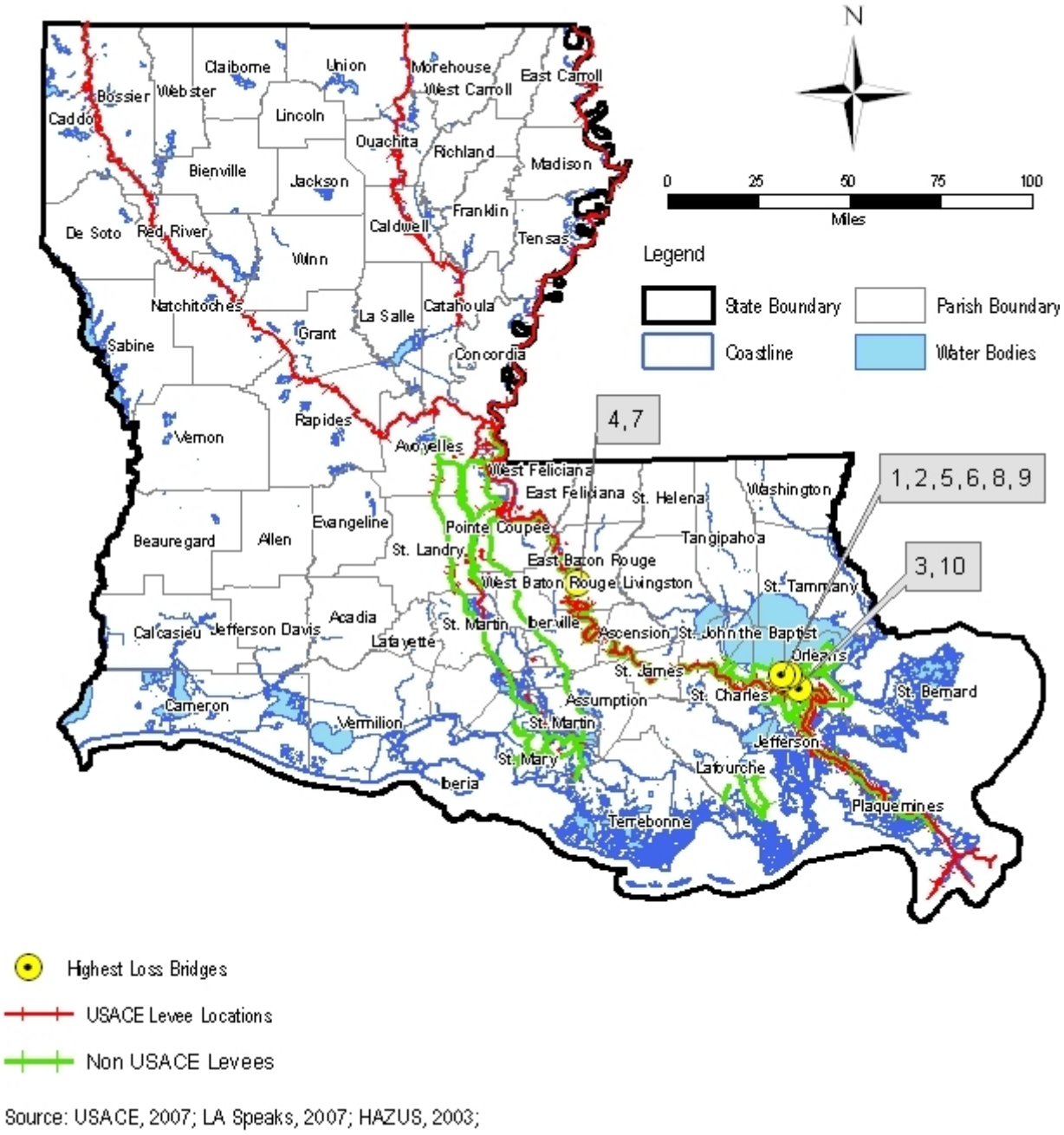
Ranking	Total Loss Estimate Ranges	Number of Bridges
High	$10,000,001 to $550,000,000	391
Medium	$1 to $10,000,000	337
Low	$0	6,856

Table 6-67: Top Ten Bridges at Risk from Levee Failure Hazard

Levee Failure Loss Ranking	Building Name	Parish	Loss Estimate
1	I-10 at West Pontchartrain	Orleans	$542,362,500
2	I-610 at Pontchartrain Expressway	Orleans	$388,800,000
3	US 90 at General DeGaul	Orleans	$231,098,400
4	I-10 over Mississippi River	East Baton Rouge	$230,361,000
5	I-610 at City Park	Orleans	$225,321,000
6	I-610 City Park Drainage	Orleans	$225,321,000
7	I-10 at Nicolson Drive	East Baton Rouge	$218,352,000
8	I-610 at City Park East	Orleans	$202,788,900
9	I-610 at St. Bernard Avenue	Orleans	$202,788,900
10	US 90 over Mississippi River	Orleans	$197,796,000

Map 6-25: Critical Infrastructure Loss Estimate – Levee Failure – Total; shows the location of State-owned bridges in the State in relation to the levee locations (same as Map 4-25); and the locations of the ten highest ranked bridges from Table 6-67.

Map 6-25: Critical Infrastructure Loss Estimate – Levee Failure



Source: USACE, 2007; LA Speaks, 2007; HAZUS, 2003;

This page is intentionally blank.

Section Seven
Capability Assessment

Contents of this Section

7.1 Interim Final Rule Requirements for Capability Assessments

7.2 Mitigation Funding Sources

7.3 State Capability Assessment

7.4 Regional Capability Assessment

7.5 Local Capability Assessment

7.1 Interim Final Rule Requirements for Capability Assessments

This capability assessment contains an analysis of state funding opportunities to directly support hazard mitigation, along with the missions, programs, and policies of state agencies that directly or indirectly support hazard mitigation. Also included in this assessment are analyses of agency capacities to initiate, support, and/or implement mitigation programs and activities. This section also contains analysis of capability at the regional and local levels, as well as consideration of the status of contractor capability for hazard mitigation in Louisiana.

Finally, this capability assessment considers the existing versus desired location and availability of staffing, technological, and data resources for mitigation. This section then integrates the aforementioned findings and offers an analysis and recommendations intended to streamline coordination of state and local hazard mitigation goal- and priority-setting, strategic and activity planning, and project implementation.

The Interim Final Rule (IFR) includes two specific requirements for conducting capability assessments as part of the Standard State Hazard Mitigation Plans:

- State Capability Assessment per Requirement §201.4(c)(3)(ii): "[The State mitigation strategy shall include a] discussion of the State's pre-and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including: an evaluation of State laws, regulations, policies, and programs related to hazard mitigation as well as to development in hazard-prone areas [and] a discussion of State funding capabilities for hazard mitigation projects …."
- Local Capability Assessment per Requirement §201.4(c)(3)(ii): "[The State mitigation strategy shall include] a general description and analysis of the effectiveness of local mitigation policies, programs, and capabilities".

7.2 Mitigation Funding Sources

Federal Funding Sources

For the purposes of the Plan Update, the following description of Federal funding sources was limited to programs with direct relationships to hazard mitigation. Through the Federal Emergency Management Agency (FEMA), the Federal government has several programs to support hazard mitigation. These programs are federally-funded but typically administered by the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP).

- FEMA Pre-Disaster Mitigation Program: The Pre-Disaster Mitigation (PDM) program is designed to implement cost-effective hazard mitigation activities that complement a comprehensive mitigation program. These include planning, acquisition, retrofitting, flood control projects, generators, and other projects. All applicants must participate in the National Flood Insurance Program (NFIP) if they have been identified through the NFIP as having a Special Flood Hazard Area. Only governments are eligible. PDM covers up to 75% of costs.[44]
- FEMA Hazard Mitigation Grant Program: Authorized under Section 404 of the Stafford Act, the Hazard Mitigation Grant Program (HMGP) is administered by FEMA and provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Eligible projects include drainage systems, structure elevation, landscape alteration, floodwalls, road elevation, property acquisition, development of mitigation plans, development of land-use regulations, and more. Governments and selected non-profits are eligible. HMGP covers up to 75% of costs.[1] The majority of hurricanes Katrina- and Rita-related funds came through FEMA's Public Assistance (PA) and HMGP. Table 7-1 compares HMGP (Section 404) hazard mitigation to Public Assistance (Section 406).
- FEMA Public Assistance: The PA Program provides supplemental Federal disaster grant assistance under Section 406 of the Stafford Act for the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain private, non-profit organizations. Eligible projects include: debris removal, emergency protective measures, repair to transportation infrastructure, repair to utility infrastructure, and more. PA covers up to 75% of costs.[1] The majority of hurricane Katrina- and Rita-related funds came through PA and HMGP. Table 7-1 compares PA (Section 406) hazard mitigation to HMPG (Section 404).
- FEMA Flood Mitigation Assistance Program: The Flood Mitigation Assistance (FMA) program's goal is to reduce or eliminate claims under the NFIP. FMA provides funding to assist States and NFIP-participating communities in implementing plans, projects, and programs to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. This includes acquisition, elevation, flood mitigation, and more. FMA covers up to 75% of costs.
- FEMA Repetitive Flood Claims Program: This program provides funding to reduce or eliminate the long-term risk of flood damage to structures insured under the NFIP that have had one or more claim payment(s) for flood damages. Repetitive Flood Claims (RFC) funds may only be used for structures in NFIP-participating communities that cannot meet the requirements of the FMA program due to lack of cost share funds or capacity to manage the activities. RFC grants provide up to 100% of state/local match for FMA property acquisitions, as well as other flood-related mitigation measures.
- FEMA Severe Repetitive Loss Program: Severe Repetitive Loss (SRL) grants target acquisition funds to NFIP-insured properties that have either had four or more claims of $5,000; two or more claims with a cumulative value of $20,000; or two or more claims whose net value exceeds the property's value. SRL typically requires a 25% state/local match; the state/local match can be decreased to as low as 10% in cases in which a FEMA-approved Standard or Enhanced Hazard Mitigation Plan exists, and includes a strategy for mitigating existing and future SRL properties.

[44] The cost share can be adjusted on a disaster by disaster basis by an Act of Congress. For example, in the wake of hurricanes Katrina and Rita, the federal share of PA was increased to 90%, and later waived entirely.

- FEMA Map Modernization: FEMA's flood hazard maps are one of the essential tools for flood hazard mitigation in the United States. FEMA's Flood Map Modernization is a federal program to increase the reliability of flood maps. This program requires the cooperation and input of State and local agencies and jurisdictions to collect and update flood data.
- FEMA Unmet Needs: FEMA's Unmet Needs program is authorized by Congress for specific major disaster-related events where the needs of the citizens are not met through existing services. The Unmet Needs program is implemented only when deemed appropriate by Congress. Project eligibility is also determined by Congress, but will usually conform to the existing criteria under the HMGP unless specifically waived.

Table 7-1: Comparison of Section 404 (HMPG) to Section 406 (PA) Hazard Mitigation Grants

	Section 404	Section 406
Administration	State	FEMA
Funding source	Hazard Mitigation Grant Program (HMGP)	Public Assistance (PA) grant program
Application process	Application must go through HMGP review process	Application is part of PA review process
Funding uses	Usable on any facility	Limited to damaged facilities
	Usable for structural and non-structural measures	Limited to structural measures
	Usable for any mitigation purpose	Usable only for repair of immediate damages to a facility or element
	Usable anywhere in the State	Limited to declared disaster areas
Benefit Cost Analysis (BCA) criteria	Entire project must be cost-effective per FEMA BCA module	If <15% of the total project cost are mitigation measures under PA, a project may be given administrative approval by the FEMA project officer
Linkage to hazard mitigation benefits	Cost-effectiveness can be linked to any hazard mitigation benefit	Cost effectiveness (if mitigation is >15% of project cost) must be linked to mitigating the damages actually being repaired
Total award	Total award limited by a formula based on total eligible disaster-related Public Assistance (PA) and Individual Assistance (IA) grant programs	No limit to total award

Source: FEMA, James Lee Witt Associates

For many of these federal grants, the "non-federal" share can be borne by the State as "grantee", the recipient community as "Subgrantee" or in some cases, the property owner who benefits from the project. In Louisiana, typically the non-federal share is borne by the community or the property owner and not the State.

In acquisitions to remove properties that experience repetitive flood losses, the non-federal share is typically covered by the property owner accepting the federal share of 75% and documenting the lost equity as the non-federal share. This can serve as a disincentive in many cases.

Furthermore, other Federal agencies provide mitigation assistance through various programs that conduct studies, develop, and fund projects for ecosystem restoration, flood control and hurricane protection as well as indirectly provide mitigation assistance through disaster recovery:

- U.S. Army Corps of Engineers Post-Katrina Supplemental Appropriations: Following Hurricane Katrina, the Third (December 2005) and Fourth (June 2006) Supplemental Appropriations authorized $1.9 billion and $3.7 billion, respectively, to the U.S. Army Corps of Engineers (USACE) New Orleans District for repairs and certain upgrades to levees and related protection systems in and around metro New Orleans and elsewhere in Southeast Louisiana. Included in these funds is funding for USACE's Louisiana Coastal Protection and Restoration plan, which is being conducted in cooperation with Louisiana's Coastal Protection and Restoration Authority (CPRA) and will result in a plan for a full range of protection measures across coastal Louisiana.
- USACE General Investigations: USACE, operating under Congressional authority, periodically investigates the feasibility of providing flood damage reduction measures under General Investigations. This funding supported the *Lower Atchafalaya* and *Morganza to the Gulf* studies.
- USACE Continuing Authorities: USACE administers its Continuing Authorities program under a blanket congressional authority that allows USACE to respond more quickly to water resource development needs. USACE may take direct action under this program provided that the specific project is under a specific cost limit.
- USACE Floodplain Management Systems: USACE also administers a floodplain management program to encourage and guide State and local governments towards prudent use of the nation's floodplain for the benefit of the national economy and welfare. USACE has the capability to provide a full range of technical services and planning guidance on floods and floodplains.
- USACE Flood Control Act funds: The Flood Control Act, renewed periodically, is federal appropriation in support of flood control infrastructure projects.
- USACE Water Resources Development Act: Water Resources Development Act (WRDA), renewed periodically, is federal authorization in support of water resources planning and projects, including flood control and coastal restoration projects. Funds for implementation are provided through separate appropriations and typically require a local or state cost-share. Louisiana Department of Natural Resources (DNR) usually partners 50:50 with the USACE in developing feasibility studies for coastal restoration projects to be authorized under WRDA and is the implementation cost-share partner (typically 35%). The 2007 WRDA (HR 1495) authorized the Louisiana Coastal Area (LCA) Ecosystem Restoration Study and the Morganza to the Gulf of Mexico Hurricane Protection Project.
- USACE Beneficial Use of Dredged Material Program governed by Sections 204 and 1135 of the Water Resources Development Acts (of 1986, 1992, and 1996): These projects originate from operation and maintenance of existing USACE dredging projects for navigable waterways. Through cooperation between the state and federal governments, some of the material dredged during regularly scheduled maintenance is utilized for the creation of wetlands, improvement of wetland habitat, or the protection of eroding shorelines. DNR is a local cost share partner for many of these projects.
- U.S. Small Business Administration Disaster Assistance Program: The Small Business Administration (SBA) offers a variety of loan programs to assist businesses and others impacted by a disaster, including loans to homeowners and renters for personal or real property, and loans to qualified small businesses. The SBA also offers a Pre-Disaster Mitigation Loan Program.
- U.S. Department of Housing and Urban Development: Community Development Block Grants: Subject to availability of supplemental appropriations, the Department of Housing and Urban Development provides flexible Community Development Block Grants (CDBG) to help cities, counties, and States recover from Presidentially declared disasters, especially in low-income areas. CDBG funds provided a significant portion of supplemental recovery funding following hurricanes Katrina and Rita.

- Natural Resources Conservation Service Emergency Watershed Program – Floodplain Easement: Natural Resources Conservation Service (NRCS) purchases floodplain easements on lands that qualify for Emergency Watershed Program assistance, including those that have repeat flood hazards. Floodplain easements restore, protect, maintain, and enhance the functions of the floodplain, plus other benefits.
- Coastal Wetlands Planning, Protection and Restoration Act funds: Also known as the "Breaux Act," Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) has provided the only annually recurring federal funding for Louisiana's coastal restoration projects. Enacted in 1990, and renewed through 2019, CWPPRA provides about $60 million per year through the Louisiana Coastal Wetlands Conservation and Restoration Task Force, with representatives from the Environmental Protection Agency (EPA), NRCS, U.S. Fish and Wildlife Service (USFWS), USACE, National Marine Fisheries Service of NOAA, and the Louisiana Governor's Office of Coastal Activities. DNR administers the program for the state and contributes 15 percent of total project costs.
- Coastal Zone Management Grants: DNR's Coastal Management Division (CMD) is charged with implementing the Louisiana Coastal Resources Program (LCRP) under authority of the State and Local Coastal Resources Management Act. In a 50:50 cost share with National Oceanic and Atmospheric Administration (NOAA), this law seeks to protect, develop, and, restore or enhance the resources of the State's coastal zone where feasible. The CMD also oversees the Coastal Zone Management (CZM) Grants program in a 75:25 cost share with NOAA. The State cost share is provided through self-generated funds from Coastal Use Permits and the Coastal Protection and Restoration Fund.
- Coastal Impact Assistance Program: The Coastal Impact Assistance Program (CIAP) is a revenue-sharing program authorized by Section 384 of the Energy Policy Act of 2005 to assist coastal states and their subdivisions (parishes) in mitigating the impacts from Outer Continental Shelf (OCS) oil and gas production. Louisiana is one of the 7 states that will receive funds for four years (FY 2007-10), disbursed through the Department of the Interior's Minerals Management Service. Thirty-five percent of the funds go to 19 coastal parishes. DNR administers the state's portion of the funds.
- Outer Continental Shelf revenues: Recent federal legislation dedicated a portion of Outer Continental Shelf OCS lease revenues to coastal states. Louisiana is expected to receive $200 million per year through year 10; after year 10 this funding is expected to increase to $400 million. Eighty percent of these revenues go to the state for support of the Coastal Protection and Restoration Fund; the remainder goes to parishes.
- Additionally, the proposed U.S. Safe Building Codes Act of 2007 would make states that have and enforce mandatory statewide building codes eligible for an additional 4% of post-disaster relief funds. FEMA would make determinations of which states are in compliance.

See Volume II, Appendix G.1 for complete descriptions of these funding programs.

State Funding Sources

In addition to federal funds that are administered by state agencies (noted above), Louisiana state government also has several programs or entities that have funded mitigation activities:

- GOHSEP Community Education and Outreach program: The Community Education and Outreach (CEO) program is a $25 million public education and outreach program intended to educate and coordinate activities around hazard mitigation.
- Department of Transportation and Development Floodplain Management Program/ National Flood Insurance Program: The Department of Transportation and Development (DOTD) is the state coordinating agency for the NFIP. This program promotes local government compliance with NFIP regulations to ensure the availability of low-cost flood insurance to minimize loss of life and property due to catastrophic flooding. This is accomplished through on-site assessments, distribution of a quarterly newsletter, conducting workshops, providing technical assistance on local government ordinance development, and participation in post-disaster flood hazard mitigation activities. The program is jointly funded by FEMA and DOTD on a 75:25 cost share.
- DOTD Statewide Flood Control Program: The Statewide Flood Control Program provides an average of $10 million annually to parish and municipal governments, levee boards, and drainage districts to support projects that reduce existing flood damages, do not encourage additional development in flood-prone areas, do not increase upstream or downstream flooding and have a total construction cost of $100,000 or more. Eligible projects include: channel enlargement, levees, pump stations, relocation of dwellings and business structures, reservoirs, and other flood damage reduction measures.
- Division of Administration Louisiana Community Development Block Grants: The mission of this program is to provide assistance to local governmental entities for developing viable communities. The Louisiana Community Development Block Grants program is principally designed to assist persons of low- to moderate-income by providing decent housing, a suitable living environment, and expanded economic opportunities.
- Division of Administration Capital Outlay: Capital outlays are expenditures for acquiring lands, buildings, equipment or other properties, or for their preservation or development or permanent improvement. Capital outlay planning and budgeting are directed toward the acquisition or renovation of fixed assets.
- Division of Administration Governor's Office of Rural Development: The Governor's Office of Rural Development (GORD) mission is to reach all of Louisiana's rural communities with resources to help them grow and benefit the lives of their citizens. The organization serves as the single point of contact for rural government service providers, State and Federal agencies, and individuals interested in rural policies and programs of the State.
- Louisiana Department of Environmental Quality Municipal Facilities Revolving Loan Fund Program: The Municipal Facilities Revolving Loan Fund Program provides below market rate loans to communities for construction or upgrade of wastewater treatment works and other water quality improvement projects.
- Louisiana Department of Environmental Quality Drinking Water Revolving Loan Fund Program: The Drinking Water Revolving Loan Fund Program provides assistance to public water systems to construct or upgrade drinking water systems to meet Federal and State standards. Department of Environmental Quality (DEQ) and the Louisiana Office of Public Health, Department of Health and Hospitals (DHH) are cooperating to implement this program in Louisiana.
- DEQ Hardship Grants Program: The Hardship Grants Program provides assistance to small, rural communities to construct wastewater treatment projects. A limited amount of Federal grant funds to the GORD is available to assist eligible communities that could not otherwise afford the project costs. DEQ and GORD are cooperating to implement this program.

- Coastal Protection and Restoration Authority Coastal Protection and Restoration Fund: This fund (originally called the Louisiana Wetlands Conservation and Restoration Fund) was established in 1989 by the Louisiana Legislature to provide a dedicated source of funding for coastal restoration. Income for the fund is a dedication of a percentage of the State's mineral income and severance taxes from oil and gas production on State lands. In 2003, constitutional amendments dedicated a portion of mineral settlements or judgments to the fund as well as allowing the deposit of non-recurring revenues. In 2005, legislation and constitutional amendments added hurricane protection as an allowable expenditure from the fund and dedicated future OCS mineral revenues to the fund. The fund will include monies from the OCS revenues under the U.S. Gulf of Mexico Energy Security Act of 2006. In 2006, another amendment provided the fund with a portion of any tobacco settlement funds, The Coastal Protection and Restoration Authority (CPRA) determines priorities and develops an annual plan for expenditures from the fund. DNR manages and administers the fund and is responsible for implementation of coastal restoration and management activities. DOTD handles aspects of the plan related to hurricane protection.
- Department of Natural Resources Barrier Island Preservation and Stabilization Fund: This fund supports shoreline stabilization and other preservation projects for barrier islands. An annual list of priority projects is developed and submitted to the House and Senate Committees on Natural Resources.
- Department of Natural Resources Parish Coastal Wetlands Restoration Program: This program utilizes recycled Christmas trees placed in enclosures for shoreline protection. The program partners with the local governments of the coastal zone parishes.
- DNR/NRCS/Soil and Water Conservation Committee Vegetation Planting Program: Through this program native marsh vegetation is planted and monitored throughout the coastal zone of Louisiana. DNR enters into annual cooperative agreements with the Louisiana Department of Agriculture and Forestry (DAF). It is through the DAF and the Soil and Water Conservation Committee, Soil and Water Conservation Districts (SWCD) that the planting tasks are selected, planned, evaluated, planted, and monitored. Each NRCS District Conservationist provides technical assistance to their respective SWCD throughout the planting task process.
- DNR Dedicated Dredging Program: This program is a marsh creation and nourishment program to assist private landowners and other entities in restoring critical wetlands. Projects are typically less than 40 acres. Funds are requested from the Coastal Protection and Restoration Trust Fund as projects are developed.
- DNR Coastal Wetland Reserve Program: The purpose of the State's Coastal Wetland Reserve Program (CWRP) is to restore coastal wetlands on lands that have been converted to agriculture. Louisiana has pledged to make available over $200,000 each year to accomplish more of this vital coastal restoration work. The State is working with the Conservation Plan federal oversight agencies to obtain formal approval for shifting the funds for this program to focus on conservation of coastal forest through conservation easements purchased from willing landowners.

More detailed descriptions of the state programs that fund mitigation projects are included in Volume II, Appendix G.1.

PDM, FMA, and HMGP Projects, 1998-2007

To fully assess the State of Louisiana capabilities to support hazard mitigation, GOHSEP completed a history of the last ten years of mitigation activities. These data were broken out to document mitigation activities since the April 2005 Plan. All mitigation activities funded by the HMGP, FMA, and PDM programs were reviewed. Additionally, a separate assessment of mitigation of severe repetitive loss properties since 2005 is presented, consistent with the requirements for reduced state/local match for FEMA's SRL grant program.

The process for identifying the history of mitigation projects in Louisiana over the last ten years involved a review of GOHSEP databases for each funding type, from 1998-2007. Databases were gathered, then analyzed geographically and by funding type, type of mitigation action, structures affected (if applicable), and total project cost. A master database was compiled for all FMA, HMGP, and PDM projects from 1998-2007; the information from this summary is compiled in Table 7-2. , and severe repetitive loss properties mitigated since 2005 appear in Tables 7-3 and 7-4.

Additional results of the mitigation history assessment are listed in Volume II, Appendix G.1, including data regarding:

- Mitigation Projects by Grant Type, 1998-2007
- Federal and Non-Federal Share of HMGP-Funded Projects, 1998-2007
- Number of HMGP-Funded Projects by Year, 1998-2007
- Severe Repetitive Loss Property Mitigation Measures since 2005
- Mitigated Severe Repetitive Loss Properties since 2005, by Parish

Table 7-2: Investment by Federal Mitigation Programs *, 1998-2007

Grant Type	1998-2004	2005-2007	TOTAL**
HMGP	$40,151,355	$168,264,251	$208,415,606
FMA	$3,676,143	$1,833,102	$5,509,245
PDM	$555,363	$722,376	$1,277,739
TOTAL**	$44,382,861	$170,819,730	$215,202,591

Source: GOHSEP, 2008

* Figures reflect approved projects
** Amounts reported are subject to underreporting/undercounting, and Unmet Needs grants are not included

As Table 7-2 shows, since the April 2005 Plan, more than $170 million in federal mitigation grants have been approved for Louisiana projects, and additional projects have yet to be approved stemming from hurricanes Katrina and Rita. This amount has been matched on the state's side – to date – by $49 million in "global match" funds.

Global match refers to local and state match for HMGP funds that do not go directly to the project being funded. Instead, global match is provided by applying the value of other projects or investments made on HMGP-eligible activities (subsequent to the disaster declaration) using non-federal sources.

In Louisiana, the eventual total global match amount is estimated to be just under $500 million. Global match is being provided by "overmatch" by homeowners who are elevating or reconstructing their homes in the Road Home (i.e., homeowners who are spending more than their grant on eligible expenses), plus $200 million in State funding being used for coastal restoration projects.

Severe Repetitive Loss Mitigation Efforts

Louisiana has also been enhancing its efforts to mitigate severe repetitive loss properties, both adding properties to the targeted SRL list, and by stepping up efforts to mitigate them. Table 7-3 shows additions of properties to the severe repetitive loss list; Table 7-4 shows severe repetitive loss properties that have been or are currently being mitigated, and Table 7-5 shows the mitigation measures applied to completed mitigation projects. Additional results of this severe repetitive loss mitigation analysis are listed in Volume II, Appendix G.1.

These documented efforts to identify and mitigate severe repetitive loss properties contributes to meeting Louisiana's requirements for increased federal match on SRL and FMA grants under FEMA's Flood Mitigation Grants and Hazard Mitigation Planning Interim Rule, § 201.4(c)(3)(v).

Table 7-3: Additions to Severe Repetitive Loss List, by Year

Year added	Number of Properties
Unknown	317
2003-04	1542
2005	753
2006	1274
2007	264
TOTAL: SRL Properties Listed	4020

Source: GOHSEP, 2008

Table 7-4: Mitigated Severe Repetitive Loss Properties, Completed and Ongoing

Date Mitigated	Number of Properties
Completion Date not Specified	241
Completed 2005	19
Completed 2006	160
Completed 2007	167
SUBTOTAL: SRL Properties, Mitigation Complete	587
Mitigation Ongoing*	325
TOTAL: SRL Properties Mitigation Complete or Ongoing*	912

Source: GOHSEP, 2008
* Ongoing projects include only those funded under HMGP for disaster declarations 1603 and 1607

Table 7-5: Severe Repetitive Loss Property Mitigation Measures since 2005*

Mitigation Measure	Number of Properties
Elevation	127
Demolition	293
No Longer Insured	113
Condemned	22
Other/ Not Specified	32
TOTAL: Completed SRL Projects	587

Source: GOHSEP, 2008
* Completed mitigation projects only

Other Uses of Federal Funds for Mitigation Actions Since 2005

In addition to the efforts described above, in the wake of hurricanes Katrina and Rita the State of Louisiana took the unprecedented step of establishing the Louisiana Recovery Authority (LRA) to coordinate recovery and rebuilding efforts. On top of being empowered to assume the function of the State Hazard Mitigation Team for those two disasters, LRA was also given authority to establish action plans for the use of CDBG allocations for the recovery, eventually totaling $13.4 billion. These sources have gone towards programs to rebuild housing, infrastructure and small businesses, always with mitigation measures and criteria as pre-conditions for project funding.

Also since 2005, the State successfully applied for and secured $25 million, including the grant amount plus a 25% match, to support the CEO program via GOHSEP. This application was a response to the Goals laid out in the April 2005 Plan. This Plan Update helps frame the CEO's scope.

Finally, since 2005 the State secured PDM grant funds and established the Planning Pilot Grant Program (PPGP) program to assist parishes in updating and enhancing their Hazard Mitigation Plans. This Plan Update employs data and inputs from PPGP plans, and offers specific recommendations for further enhancements to and integration of local planning. This effort is also a direct product of the Goals described in the April 2005 Plan.

Summary

Following are some key conclusions regarding funding for hazard mitigation programs and activities in Louisiana:

- Mitigation projects in Louisiana administered by GOHSEP have been historically funded through Federal programs. HMGP has been the most successful funding program in Louisiana. From 1998-2007, a total of over $208 million in federal funds was invested in HMGP projects in Louisiana.
- Louisiana has been successful at acquiring FMA and Unmet Needs funds. These programs have historically provided funds in Louisiana for mitigation purposes.
- GOHSEP also administers a variety of flood-related programs that apply to Louisiana, including RFC and SRL grants.
- Since 2002, Louisiana has received $2.8 million in PDM grants for planning purposes, which have leveraged local matches amounting to another $850,000. State-level funding programs that directly support hazard mitigation include a wide array of programs and funding sources located in the Department of Transportation and Development, the Department of Natural Resources, the Department of Administration, the Department of Environmental Quality, and in other departments.
- Key mitigation programs are often under-funded, as reported by both state agencies and local officials. This is particularly true of acquisition for repetitive loss properties. Meanwhile, state, parish and municipal resources are rarely applied to repetitive loss buy-outs, thus placing the non-federal share burden on the homeowner, which creates a disincentive to accept the mitigation measure.

Other funding projects as described in Volume II, Appendix G.1 indirectly provide mitigation funds.

7.3 State Capability Assessment

Introduction

This capability assessment contains an analysis of state funding opportunities to directly support hazard mitigation, along with the policies, programs, and activities of agencies participating on the State Hazard Mitigation Planning Committee (SHMPC) and other agencies that potentially contribute to hazard mitigation in the State of Louisiana. Also included in this assessment are analyses of these agencies' capacities to initiate, support, and/or implement mitigation programs and activities.

The principal state agencies analyzed for this assessment have representatives on the SHMPC. As identified in Section Three, the SHMPC is comprised of representatives of the following state agencies that also serve on the State Hazard Mitigation Team (SHMT):

- The Governor's Office of Homeland Security and Emergency Preparedness
- The Department of Transportation and Development;
- The Department of Wildlife and Fisheries;
- The Department of Environmental Quality;
- The Department of Natural Resources, Office of Coastal Restoration and Management; and
- The Department of Agriculture and Forestry.

The role of the SHMT is to provide technical assistance to GOHSEP. One specific SHMT task is to review, prioritize, and recommend funding levels for selected HMGP project applications. The SHMT also participates in mitigation planning, program development, and implementation. As a group, the SHMT has the most direct influence on how hazard mitigation is pursued in the State of Louisiana, outside of GOHSEP.

In addition, the SHMPC includes representatives from the following state agencies and organizations that have historically played a role in hazard mitigation in Louisiana:

- The Division of Administration, Office of Facilities Planning;
- The Department of Corrections;
- The Department of Education;
- The Department of Health and Hospitals; and
- The Department of Public Safety, Louisiana State Uniform Construction Code Council.

Finally, other agencies that potentially contribute to hazard mitigation in the State of Louisiana that are covered in this assessment include:

- The Division of Administration, Office of Community Development;
- The Division of Administration, Office of Risk Management;
- The Department of Culture, Recreation, and Tourism;
- The Department of Insurance;
- Louisiana Economic Development;
- The Department of Public Safety;
- The Department of Social Services;
- The Louisiana Recovery Authority;
- The Louisiana Floodplain Management Association;
- The Louisiana National Guard;
- The Louisiana State University Hurricane Center;
- The Louisiana State University AgCenter; and
- Many others.

Each of these entities, and many others, were invited to participate in the development of this Plan Update via the State Hazard Mitigation Plan Advisory Board. For more on the Advisory Board, see Section 3.2.

Section 7.3 also includes a description of the methods used to complete the analysis of state capabilities to support hazard mitigation; a summary of SHMPC and other state agency policies, programs, and activities; an analysis of the effectiveness of the policies, programs, and activities; and a brief description of Federal and state mitigation funding programs.

Volume II, Appendices G.2-3 provide greater detail for the State Capabilities Assessment. The Louisiana State Mitigation Capabilities Survey instrument is presented in Volume II, Appendix G.2. Volume II, Appendix G.3 is a report of state capabilities by agency, focusing mainly on SHMPC agencies but also providing information for state agencies that support hazard mitigation. Federal and state hazard mitigation funding programs are presented in detail in Volume II, Appendix G.1. Furthermore, Appendix G.1 describes HMGP, FMA, and Unmet Needs Projects completed in Louisiana from 1998-2007.

Methodology

The process for identifying and assessing the State capabilities to support hazard mitigation was a multi-phase process involving interviews and surveys, SHMPC meetings, thorough review of public information for each agency, and a review of the current State Hazard Mitigation Plan, which was adopted and approved in 2005. Specific steps included:

- An updated Louisiana State Mitigation Capabilities Survey was generated, based mainly on the previous survey, which was administered as part of the April 2005 Plan.
- The updated survey was presented to the SHMPC on November 8, 2007. Following their review and subsequent comments, the formal survey was improved and delivered to the SHMPC members via hard copy and email. The survey is included in Volume II, Appendix G.2.
- The survey results were compiled and summarized, and updates made to the existing state agency capability assessment. The SHMPC reviewed the agency summaries at the SHMPC meeting on December 18, 2007. At this time, the members edited their agency sections, and assisted in ranking their mitigation-related policies, programs, and activities.
- Concurrently, a thorough review of public information was conducted for each agency not involved in the SHMPC, including websites, annual reports, and strategic plans.
- Finally, an assessment of past Federal and state mitigation funding programs was conducted, using review of relevant documentation, including the current State Hazard Mitigation Plan.

State Agency Hazard Mitigation Policies, Programs, and Activities

This subsection summarizes the results of SHMPC and other state agency efforts to develop policies, programs, and activities that directly or indirectly support hazard mitigation. The complete results for each agency, including a review of the agencies' missions, personnel, activities, programs, limitations, and resources are listed in Volume II, Appendix G.3. A summary of identified pre-disaster, post-disaster, and development regulating programs, activities, and policies for each SHMPC agency and other state agencies are provided in Table 7-6. Some information regarding emergency preparedness, response, and recovery was included for various agencies if the program or activity also had a direct tie to mitigation. However, activities specifically from other realms of emergency management were not included or analyzed in this capability assessment. Information and analyses of individual agencies were provided by representatives of these agencies. For further discussion of complementary hazard mitigation and emergency management programs, see Section 8.3.

The following definitions are used:

- Policies: Statements included in the State's plans or legislation that express the intent of the Louisiana State government.
- Programs: Formal related, coordinated activities by one or more agency that have a distinct mitigation focus.
- Activities: Informal actions, or actions taken on the part of an agency, to indirectly support mitigation.
- Pre-Disaster: Plans, programs, or activities that have been completed in advance of a disaster or hazard event.
- Post-Disaster: Plans, programs, or activities that have been completed following a disaster or hazard event.
- Development Regulations: Laws, codes, or ordinances that control development in hazard-prone areas.

Policies

Louisiana has a number of plans and legislation that lay out specific goals, objectives and policy statements that already do or potentially could support pre- and post-disaster hazard mitigation. Examples of existing documents include:

- Louisiana State Hazard Mitigation Plan;
- Louisiana State Emergency Operations Plan;
- Louisiana State Continuity of Operations Plan;
- *Integrated Ecosystem Restoration and Hurricane Protection: Louisiana's Comprehensive Master Plan for a Sustainable Coast* (CPRA);
- *Louisiana Speaks Regional Plan* (LRA);
- Louisiana State Public Assistance Administrative Plan;
- Louisiana Administrative Code: Title 33 – Environmental Regulatory Code;
- Louisiana Administrative Code: Title 43 – Coastal Management; and
- Louisiana Administrative Code: Title 70 – Transportation.

In addition, the Louisiana Emergency Assistance and Disaster Act (LEADA) of 1993, revised in 2000, is the main legislation affecting mitigation programs in the State. Among various preparedness, response, and recovery operations, the LEADA purposes related to mitigation are as follows:

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

Furthermore, Executive Orders KBB 2004-34 and KBB 2004-35 are directly related to mitigation activities in Louisiana. KBB 2004-34 establishes the Louisiana Emergency Response Commission. This 20-member committee is comprised of representatives from the following agencies or entities:

- The Department of Public Safety;
- The Department of Environmental Quality;
- The Department of Agriculture and Forestry;
- The Governor's Office of Homeland Security and Emergency Preparedness;
- The Louisiana Emergency Preparedness Association; and
- The Louisiana State University Firearm Training Program.

Additionally, ten at-large members and representatives of environmental interests and the chemical industry serve on the commission.

Executive Order KBB 2004-35 reestablishes the SHMT, and clarifies its duties and functions. The members and duties are described in Section Three and also in the Introduction of Section 7.3.

Finally, Executive Order KBB 2007-14 establishes the Homeland Security and Emergency Preparedness Advisory Council to support homeland security and emergency preparedness initiatives by linking state and local government efforts, and leveraging education, industry, and private sector initiatives, among other goals. The Council's work is related to and potentially supports hazard mitigation activities in Louisiana. The Council's ten members include representatives of:

- The Governor's Office of Homeland Security and Emergency Preparedness;
- The Louisiana National Guard;
- The Senate Select Committee on Homeland Security;
- The House Special Committee on Louisiana Homeland Security;
- The Department of Health and Hospitals;
- The Louisiana State Police;
- The Department of Social Services;
- The Department of Transportation and Development;
- The Department of Wildlife and Fisheries; and
- The Department of Justice.

Many of these plans and policies hold significant promise for hazard mitigation, particularly as they are ongoing in nature and take an integrated, strategic look at the whole hazard-mitigation landscape in Louisiana and propose ways to continually improve hazard mitigation.

Programs and Activities

Table 7-6 summarizes relevant hazard mitigation and hazard mitigation-related state policies, programs, and activities at the pre- and post-disaster phase, as well as those policies that relate directly to development regulation. Data listed below is derived either from the current Plan or from updated state agency capability survey. Most SHMPC agencies completed the new survey, as did other agencies (see Volume II, Appendix G.3 for the full content of completed surveys). For more on integration of hazard mitigation functions and other emergency response and coordination functions, see Section 8.3.

Table 7-6: State Agency Hazard Mitigation Programs and Activities

Agency	Pre-Disaster	Post-Disaster	Regulation of Development
Coastal Protection and Restoration Authority	▪ Planning and prioritization of protection infrastructure and coastal restoration projects ▪ Public outreach and education	▪ None	▪ None
Governor's Office of Homeland Security and Emergency Preparedness	▪ State Administration of Federal Grant Programs o PDM o Fire Management Assistance o Flood Mitigation Assistance o Severe Repetitive Loss (SRL) program o Repetitive Flood Claims (RFC) Program ▪ Coordination of State and local mitigation planning ▪ Community Education and Outreach program (CEO) ▪ Representation on SHMPC and SHMT ▪ Training Programs	▪ State Administration of Federal Grant Programs o HMGP o Individual Assistance (IA) o Public Assistance (PA) o Unmet Needs	▪ None
Department of Agriculture and Forestry	▪ Fire weather forecasting ▪ Representation on SHMPC ▪ Soil and Water Conservation ▪ Animal Health Services ▪ Formosan Termite Initiative	▪ Production of reforestation seedlings	▪ Enforcement of Timber Laws
Department of Corrections	▪ Representation on SHMPC ▪ Mass care and evacuation support for municipal and parish correctional facilities.	▪ General Support ▪ Continued mass care and evacuation support for municipal and parish correctional facilities	▪ None
Louisiana Economic Development	▪ Pre-Disaster Economic Impact Analysis	▪ Distribution of satellite imagery following a disaster ▪ Post-Disaster Economic Impact Analysis ▪ Small Business Administration (SBA) Small Business Assistance (see LRA)	▪ None
Department of Education	▪ Participation on SHMPC	▪ Facility mitigation in the replacement and renovation of schools	▪ None
Department of Environmental Quality	▪ Representation on the SHMPC and SHMT ▪ Nuclear Power Plant Off-site Emergency Preparedness Program ▪ Remediation program ▪ OzoneAction!	▪ Remediation Services Division	▪ Permitting Programs (Air, Water, Waste)

Table 7-6: State Agency Hazard Mitigation Programs and Activities (continued)

Agency	Pre-Disaster	Post-Disaster	Regulation of Development
Department of Environmental Quality (cont.)	▪ Drinking Water Well Protection Program		
Department of Health and Hospitals	▪ Fight the Bite Program (West Nile Virus) ▪ Bioterrorism Unit (training) ▪ Representation on the SHMPC ▪ Pandemic program	▪ Regional Response Team ▪ Mobile Field Units ▪ Immunization Teams ▪ Evacuation Planning Requirement for Licensing Nursing Homes and Home Health Agencies ▪ Special needs shelters	▪ None
Department of Insurance	▪ Consumer 101 public education	▪ None	▪ None
Department of Natural Resources	▪ Representation on SHMPC and SHMT ▪ Plans, develops, constructs and monitors coastal restoration projects. ▪ State-funded coastal restoration projects (e.g., vegetative plantings, Christmas Tree recycling) ▪ Obtains Federal cost-share funding for and implements coastal restoration programs, feasibility studies, projects. ▪ Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) ▪ Water Resources Development Act (WRDA) - Louisiana Coastal Area (LCA) ▪ Performs routine operation, maintenance and rehabilitation on constructed coastal restoration projects. ▪ Coastwide Reference Monitoring Systems (CRMS) ▪ Digital Mapping (Geographic Information System (GIS)) ▪ Distributes information on causes of coastal and wetland erosion and methodologies to restore coastal and wetland areas. ▪ Coastal Zone Management program and grants ▪ Coastal Impact Assistance Program (CIAP)	▪ Surveys coastal restoration projects for damages and seeks FEMA funding as appropriate for needed repairs. ▪ Digital Mapping (GIS)	▪ Performs regulatory permit functions and mitigation activities related to the State's coastal zone; issues Coastal Use permits.

Table 7-6: State Agency Hazard Mitigation Programs and Activities (continued)

Agency	Pre-Disaster	Post-Disaster	Regulation of Development
Department of Natural Resources (continued)	▪ Coastal Wetlands Reserve Program ▪ Parish Coastal Wetlands Restoration program ▪ Barrier Island Restoration and Stabilization program ▪ Dedicated Dredging program		
Department of Public Safety	▪ Coordinates the Louisiana State Uniform Construction Code Council (LSUCCC) ▪ Coordinates and supports local education and training of the UCC ▪ Representation on the SHMPC	▪ None	▪ None
Department of Transportation and Development	▪ State management of NFIP ▪ Statewide Flood Control Program ▪ Ports Construction and Development Program ▪ Dam Safety Program ▪ Floodplain Management Program ▪ Representation on SHMPC and SHMT ▪ Educates and assists communities with CRS participation ▪ Educates and encourages working relationships between community NFIP staff and local HMGP POCs ▪ Plans and conducts educational workshops for local officials ▪ Produces and distributes a quarterly NFIP newsletter ▪ Levee inspection ▪ LA. Emergency Evacuation Plan, including highway contra-flow and evacuation of persons without access to transportation	▪ Floodplain Management Staff contact each community within the declared disaster area to discuss the rules and regulations of the NFIP with a special emphasis on the community's post-disaster responsibilities ▪ Ports Construction and Development Program ▪ Post-disaster damage assessments	▪ None
Department of Wildlife and Fisheries	▪ Public information library ▪ Representation on SHMPC	▪ None	▪ Land Acquisition for Wildlife Management Program ▪ Scenic Rivers Program
Division of Administration	▪ Construction of state-owned structures via Facility Planning and Control (FPC)	▪ Disaster Recovery projects for state facilities (FPC)	▪ FPC is the Building Code authority for all State owned buildings.

Table 7-6: State Agency Hazard Mitigation Programs and Activities (continued)

Agency	Pre-Disaster	Post-Disaster	Regulation of Development
Division of Administration (continued)	▪ Maintenance of Facilities Management database ▪ Representation on the SHMPC (Office of Facilities Planning)	▪ Designated applicant for public assistance to FEMA for all permanent repairs for Katrina and Rita (FPC) ▪ Administers Road Home housing assistance through the Office of Community Development (see LRA) ▪ Administers CDBG infrastructure grants through the Office of Community Development (see LRA)	▪ With limited exceptions (see Appendix G.3) FPC regulates development of all non-DOTD State owned property through administration of the capital outlay bill. ▪ FPC is the central leasing authority for all State agencies.
Louisiana Recovery Authority*	▪ None	▪ Road Home housing assistance (mitigation component)* ▪ CDBG infrastructure grants* ▪ SBA Small Business Assistance*	▪ Road Home housing assistance (mitigation component)*
LSU AgCenter	▪ Hazard mitigation information for homeowners and professionals ▪ Website resources for specific flood and wind mitigation activities, mitigation legislation and development regulations ▪ Stewardship Programs for Louisiana's Coastal Landowners ▪ Louisiana House Project ▪ Master Farmer Program ▪ Family Resource Management	▪ Provides general information and website support regarding post-disaster recovery and related mitigation activities	▪ None

* LRA sets policy and oversees administration of recovery funding specific *only* to Disaster Declarations 1603 and 1607—hurricanes Katrina and Rita, respectively. In January 2008, LRA began administrative oversight of the funds in its programs; prior to this date, LRA only set policy for the funds.

Analysis and Evaluation of the Effectiveness of Mitigation Programs and Activities

Many of the policies, programs, and activities undertaken by Louisiana State agencies in the mitigation arena occur within GOHSEP, whose programs, as well as the Federal programs it manages, serve to actively reduce disaster-related losses in Louisiana.

Additionally, the Departments of Transportation and Development, Natural Resources, and Environmental Quality, the Coastal Protection and Restoration Authority, the Division of Administration, the Louisiana Recovery Authority and the Louisiana Floodplain Management Association all have policies, programs, and activities specific to mitigation or that actively support hazard mitigation.

The Department of Wildlife and Fisheries, Department of Corrections, Department of Health and Hospitals, Department of Social Services, Department of Agriculture and Forestry, Department of Insurance, Department of Public Safety, Louisiana National Guard, Louisiana State University (LSU) AgCenter and LSU Hurricane Center all have programs that provide support to hazard mitigation activities in the State.

Louisiana has a number of successful or promising hazard mitigation programs and activities. These include programs targeted to mitigating flood risk from riverine, backwater, and surge sources, as well as programs aimed to mitigate risks posed by high winds and other identified hazards.

But in many cases, these programs' full potential for effective mitigation is unrealized. The most often cited cause of this is a shortage of funding, staff and/ or technical support. It may also be due to a failure to adequately inform or educate the public, stakeholders, or other program participants. Organizational challenges are also often cited, including duplication of efforts, lack of clear lines of authority, excessive concern with "audit-proofing" grants, less than optimal coordination or integration of efforts, or a lack of commitment to a given program or policy. Programs or policies may also have loopholes, structural disincentives, or funding shortfalls. Some programs and policies that use complementary tools to achieve a common end fail to coordinate with or support each other.

Evaluation of State Policies and Programs that Affect Land Use in Hazard Areas

Following is an evaluation of the effectiveness of state policies and programs in Louisiana that affect or regulate land use and/or land development in hazard areas.

This analysis examines State programs and policies one-by-one. As noted in more detail below, the recommendations of this Plan Update call for a systematic and comprehensive examination of hazard mitigation activities at both the State and local levels, looking especially for opportunities to: remove duplication of efforts and overlap of authority; address staffing, funding, and/or technical gaps; remove policy/ program loopholes; remove structural disincentives; and promote cross-program coordination.

Education Regarding Best Management Practices and Enforcement of Timber Laws (DAF)

DAF's Office of Forestry effectively contributes to mitigation of hazard via programs intended to improve land management practices on private timber lands. The office provides technical assistance for private forestland owners to encourage sound forestry practices. The Office works to place as many of the small timber tracks and farm woodlots in the state under improved forest practices and increase the use of best management practices (BMPs) on private timber land.

The Office also oversees the network of statewide programs that enforce timber laws, including the investigation of timber theft. The Office is also responsible for suppressing forest fires, and for protecting, conserving and replenishing forest resources, including those on private land.

Regulation of State-Owned Property (DOA)

The FPC within DOA is an effective mechanism for regulating development of state-owned facilities within hazard areas. The DOA regulation of state-owned property via capital outlay is effective because the funds are appropriated to FPC, and the design of the buildings is under that office's direction. As the building code authority for state owned property, FPC also enforces the International Building Code for all state buildings, whether or not they are funded through capital outlay. As the central leasing authority for all state-owned property, FPC enforces standards in the procurement of leases and has the authority to set the geographic limits for the bidding of leases (FPC does not make the lease payments).

FPC has less control over siting decisions related to construction of state-owned facilities, because most such construction takes place on existing state-owned sites, and sitting decisions for such facilities is largely driven by adjacency to existing facilities, and similar functional concerns.

The authorities described above are general and may include consideration of hazard areas. However, these authorities are not specifically intended to regulate development in hazard areas.

National Flood Insurance Program/ Community Rating System (DOTD)

FEMA's National Flood Insurance Program (NFIP) is an extremely effective tool in regulating development in hazard areas. Every parish in Louisiana participates in NFIP. Additionally, 37 Louisiana communities, accounting for approximately 80% of NFIP policies in the State of Louisiana, participate in the Community Rating System (CRS). The CRS is an NFIP program that allows communities to lower the premiums charged to their citizens by going above minimum NFIP requirements via public education, additional freeboard requirements, and so on. According to the state program administrator, this translates into approximately $20 million in savings in policyholder premiums.

NFIP participation also qualifies communities for grant funding through FEMA sources including FMA, SRL, and RFC (these funds are administered by GOHSEP; see Section 7.2 for more detail on these programs). These sources have been used effectively to mitigate risk of flood by affecting land use and development within hazard areas.

Permitting Programs, Including Those for Air, Water, and Waste (DEQ)

Most point sources, including temporary sources, which emit or have the potential to emit any air contaminant (defined as particulate matter, dust, fumes, gas, mist, smoke, or vapor, or any combination thereof produced by process other than natural) require an air permit from DEQ's Air Permits Division.

Louisiana's water quality regulations require permits for the discharge of pollutants from any point source into waters of the state of Louisiana. DEQ's Water Permits Division administers these permits, under the Louisiana Pollutant Discharge Elimination System (LPDES) program.

The Waste Permits Division of DEQ regulates the permitting and operations related to the disposal of solid waste, hazardous waste, and exploration and production (E&P) waste.

These regulation and permitting activities affect land use in hazard areas and mitigates certain hazards, especially those associated with secondary risk related to hazardous materials release.

The Uniform Construction Code (DPS)

Although the Louisiana Uniform Construction Code (UCC) is neither enforced nor administered at the State level, local education regarding the UCC is coordinated and supported by DPS, through the Louisiana Uniform Construction Code Council (LSUCCC). Since it went into effect in 2007, the UCC has had a significant impact on lowering risk by reducing exposure to wind- and flood-related hazards in hazard areas through the direct regulation of land use and development.

Land Acquisition Program (DWF)

The permanent protection of wildlife habitat through cash sale acquisitions, donations or conservation easements is a way to help accomplish the DWF's mission and to advance hazard mitigation goals. Since its inception, DWF's land acquisition program has acquired almost 610,000 acres of wildlife habitat through fee title acquisitions, donations or land transfers. An additional 516,167 acres are under variable-length, lease agreements between DWF and private corporations, governmental agencies, and non-governmental organizations. The leased properties represent unprotected fish and wildlife habitat. The owned and leased properties collectively make up the 61 Wildlife Management Areas and Refuges managed by DWF. The WMAs and refuges provide a wide variety of habitats that help fulfill DWF's mission.

The success of the land acquisition programs depends upon several factors. Funding is the primary limiting factor and therefore, it is extremely important to have a sufficient and sustained funding source. Land prices continue to escalate, particularly within the past few years as competing interest from land development, alternative fuels, and environmental projects such as carbon sequestration have emerged. Unfortunately, DWF's funding source has been static; thereby severely limiting its ability to acquire habitat from willing sellers.

Scenic Rivers Program (DWF)

The Scenic Rivers Program at DWF is responsible for preserving, protecting, developing, reclaiming, and enhancing the wilderness qualities, scenic beauties, and ecological regimes of certain free-flowing Louisiana streams as detailed in Louisiana RS 56:1840-1856 and Title 76, Part IX, Chapter 1. The Department identifies projects requiring Scenic River Permits, or other appropriate regulation, by conducting routine surveillance of these streams, responding to information provided by the public and local governing authorities, and reviewing notices published by those seeking other state and federal permits for potential impacts to these streams. Channelization, clearing and snagging, channel realignment, reservoir construction, and commercial clear cutting of trees within 100 feet of the ordinary low water mark are prohibited on designated Scenic Rivers in Louisiana. By imposing restrictive permit conditions, modifying proposed activities in ways that minimize or eliminate impacts, and enforcing the provisions of the Scenic Rivers Act to insure compliance, DWF has been very effective in preserving vegetated stream buffers, protecting water quality, preventing the encroachment of development and protecting the natural character and flood-mitigation capacity of these streams. There are currently approximately 80 streams, rivers and bayous in Louisiana's Natural and Scenic Rivers System totaling approximately 3000 linear stream miles.

Louisiana Coastal Resources Program and Coastal Use Permitting (DNR)

The Louisiana Coastal Resources Program (LCRP) was established in 1980, and the LCRP has a permitting requirement for activities which have direct and significant impacts on coastal waters. Coastal Use Permit (CUP) applications are processed with respect to the consistency of the proposed use with the LCRP. Impacts to wetlands and coastal protective features, as well as hazard potentials, are elements which are evaluated during the CUP review process.

DNR developed a strategic plan pursuant to state law and the strategic plan requires the creation of performance measures. The LCRP's major performance measure is wetland mitigation. The goal is for the LCRP to obtain 100% mitigation for permitted wetland impacts. The performance measure is reported to the Legislature on a quarterly basis, is subject to auditing (was the subject of a performance audit in 2004), and is available to the public. The LCRP mitigation performance measure has never been less than 100% and is usually greater than 100%.

Further, the Louisiana Coastal Wetland Conservation Plan also provides documentation of the state's mitigation requirements through the CUP process. The documentation takes the form of a biannual report to Congress composed by the U.S. Fish and Wildlife Service, EPA, and USACE.

Repetitive Loss and Severe Repetitive Loss Mitigation (GOHSEP)

State and local governments currently have the capability to implement mitigation of severe repetitive loss properties within the larger framework of State and local mitigation efforts. GOHSEP is able to provide up-to-date information regarding severe repetitive loss properties for use in local mitigation efforts, and the mechanism to apply for SRL funds are already extant within the administration of the NFIP program and within GOHSEP's own staff. Additionally, GOHSEP is currently developing the capability to track and administer this program.

As noted in Section 7.2, existing efforts have resulted in expanding the list of severe repetitive loss properties to 4020; more than half of these properties have been added since 2005. Additionally, the State of Louisiana and local partners have to date completed mitigation of 587 of these properties; almost 60% of these have been since 2005, using FMA, HMGP, and other funding sources. Another 325 severe repetitive loss mitigation projects are currently underway using HMGP funds from disaster declarations related to hurricanes Katrina and Rita.

Additional Programs Under Consideration

SCR 95 of the 2007 Legislative Session requests that DNR study the establishment of a state coastal land trust to acquire, accept, and manage coastal lands, consistent with the CPRA Master Plan. Such a fund would have a positive impact on reducing development in hazard areas.

Recommendations for Further Analysis

The recommendations of this Plan Update include efforts to more thoroughly and comprehensively assess and coordinate hazard mitigation activities at both the State and local levels. At this time, such thorough and systematic policy/ program evaluation(s) and organizational review(s) of hazard mitigation efforts both within the State and including Federal partners would also be appropriate. Such evaluations should target issues including:

- Identification and removal of duplication of efforts and overlap of authority,
- Identification and remedy of failure of authority or of program ownership/ stewardship,
- Analysis and description of staff and technical gaps,
- Identification and removal of policy/ program loopholes,
- Analysis and quantification of program funding gaps,
- Identification and removal of internal or external structural disincentives or failures of incentive inherent to programs and policies, and
- Identification and promotion of opportunities for policies and programs to support and/or leverage each other.

These efforts are beyond the scope of this Plan Update. However, some of them could be launched or supported under GOHSEP's Community Education and Outreach program.

Staffing

GOHSEP, DNR, and DOTD have the most staff with responsibilities that are either specific to or actively support hazard mitigation. GOHSEP, DNR, and DOTD have the most staff with responsibilities that are either specific to or actively support hazard mitigation. GOHSEP has 273 positions in the Disaster Recovery Division, of which 89 are in Hazard Mitigation (for more detail on GOHSEP staffing levels, see Volume II, Appendix G.3). DNR has 145 staff whose responsibilities are specific to or actively support hazard mitigation, all in the Office of Coastal Restoration and Management. DOTD has approximately 30 staff persons with mitigation-related duties, but not all have full-time mitigation-related job functions. Within DEQ, the Accident Prevention Program, Remediation Services Division, and Emergency Response Section (including Radiation Emergency Preparedness and Response) also have staff devoted to mitigation on a full-time basis.

Much of the implementation capacity for programs coordinated at the State level lies at the local level. This is particularly true of floodplain management, Uniform Construction Code (UCC) enforcement, and Coastal Zone Management. However, well more than 200 state employees have job duties that are at least indirectly related to hazard mitigation.

GOHSEP is tasked with coordinating State hazard mitigation planning and policy, in large part through the creation, maintenance, and implementation of this Plan Update. GOHSEP currently has 89 Hazard Mitigation positions (permanent and temporary) authorized, of which 62 are filled (for more detail on GOHSEP staffing levels, see Volume II, Appendix G.3). However, although GOHSEP is now a larger agency than it was when the previous April 2005 Plan was drafted, much of this capability-building has been in homeland security, emergency preparedness, and disaster recovery. GOHSEP is developing the capability to consistently maintain the level of accounting and documentation required to support the labor-intensive HMGP processes. Furthermore, maintenance of the current level of service and any potential expansion of support from GOHSEP to other state agencies, and local communities is hampered by a lack of staff continuity and depth of hazard-mitigation training and expertise. This issue is accentuated by the fact that GOHSEP personnel also often serve in the Louisiana National Guard, and fulfilling those responsibilities creates discontinuities in GOHSEP staffing and institutional knowledge. Specific staff shortfalls are apparent regarding issues of technical capability (e.g., evaluating benefit-cost analysis for hazard mitigation projects) and Geographical Information Systems (GIS)/data management for hazard mitigation (for more on this, see the following section).

Most GOHSEP staff assigned to hazard mitigation are relatively new in their posts, and had little, if any, background in mitigation prior to working in their current positions. Therefore, most staff members assigned to hazard mitigation have little background in issues of hazard mitigation, floodplain management, GIS, or integrated land-use planning. New GOHSEP hazard mitigation staff must spend a significant amount of time learning what is involved in hazard mitigation.

Additionally, salary levels at GOHSEP are not generally competitive with salaries in the private sector or at FEMA. As a result, once GOHSEP's hazard mitigation staff have been trained sufficiently regarding the issues and technical capacity involved in hazard mitigation planning, support, and implementation, they may leave the agency for higher salaries. Since August, 2005, 30 out of 43 GOHSEP Disaster Recovery employees who were on staff before hurricanes Katrina and Rita have departed, although only four of them retired. GOHSEP reports that the annual turnover rate is approximately 50% in the Disaster Recovery Division. Most of these employees have received positions in related fields for greater pay. Partly as a result of all of these factors, much of GOHSEP's current hazard mitigation capability is contracted through private firms. As of February, 2008, 53% of GOHSEP's staff (157 out of 295) was comprised of temporary hires. These firms are providing formal and on-the-job training opportunities for GOHSEP personnel, but unless structural issues are addressed within the agency, it is likely that many of the personnel being trained may leave the agency for other positions with more competitive pay.

Technical Capability and GIS/Data Management for Hazard Mitigation

Currently, there is no integrated system for data-collection and/or management related to hazard (or other topics) in Louisiana. Several agencies and regional entities, as well as a number of localities and universities, maintain excellent GIS and other data bases on a number of topics. At the state level, DOTD, DOA, DNR, DEQ, and others maintain valuable GIS data. But these databases, at the state and other levels, are neither interoperable, nor specifically tailored to hazard mitigation needs.

Even departments with very high GIS capabilities report that their base geospatial data (and paper maps) are often extremely outdated, particularly following the hurricanes of 2005. This makes accurate assessment of planning for risk very difficult. Additionally, limited opportunities for GIS training through the state, and "turf" battles over the creation and maintenance of GIS data repositories are cited as concerns.

The management of data regarding risk and hazard mitigation will be an important aspect of this Plan Update. This includes establishing the infrastructure and methods for ongoing data transfers between state and local governments. This information sharing would create a system in which readily available and up-to-date hazard data can be gathered or developed using compatible methodologies and consistent formats to provide the basis for effective state and local risk assessments, hazard mitigation planning and project implementation.

Part of the process of updating the Plan is developing and evaluating options for the future structure and role of GOHSEP regarding all aspects of hazard mitigation planning and project implementation.

Potential future options lie along a spectrum, as detailed below:

- GOHSEP as the "sole source" of hazard mitigation data: GOHSEP would need to establish and maintain capabilities to manage all hazard data needs related to plan updates and project development for state agencies and parishes. In this scenario, state agencies, regional entities, municipalities/parishes, universities, and non-profits would be sources of information and would not have any distinct responsibilities for managing data on behalf of GOHSEP or parishes. Local communities would have a client relationship to GOHSEP regarding data.

  → *Given the current lack of technical and staff capacity devoted to GIS at GOHSEP, this scenario is not considered viable at present.*

- GOHSEP regional offices as the leads in coordinating hazard mitigation data: GOHSEP would establish consistency and interoperability guidelines and frameworks for all hazard data needs related to plan updates and project development for state agencies and parishes. GOHSEP's role would be as administrator of hazard mitigation grants. Local communities would have a client relationship to the GOHSEP regional offices regarding data.

  → *Given the current lack of technical and staff capacity at the regional level, this scenario is not considered viable at present.*

- Parishes as the leads in coordinating hazard mitigation data: GOHSEP would establish (or facilitate the creation of) consistency and interoperability guidelines and frameworks for parish offices for all hazard data needs related to plan updates and project development for state agencies, and local communities. GOHSEP's role would be as administrator of hazard mitigation grants, and it would have a client relationship to the parishes regarding data.

  → *Given the diffusion of authority and difficult coordination that this scenario would imply, coupled with the lack of technical and staff capacity in many parishes, this scenario is not considered viable.*

- Third party lead (or leads) on coordination of hazard mitigation data: One or more organizations and agencies would have varying responsibilities for data management and planning. GOHSEP would likely retain responsibility for hazard mitigation plan reviews for consistency with the requirements of the Disaster Mitigation Act of 2000, but technical support and data management would be provided by others including, but not limited to: Louisiana universities or other state agencies. GOHSEP's role would be as administrator of hazard mitigation grants. Local communities and GOHSEP would have a client relationship to the third-party provider regarding data.

  → *This scenario is plausible, although it would distance all end-users of hazard mitigation data, including local communities and GOHSEP, from the management of that data, and therefore may not be a preferred option.*

- Some combination of the above options: Data collection might take place at the state, regional and local levels, and data coordination, management, and distribution might take place at a state level; for example, a partnership between a consortium of Louisiana universities, GOHSEP, and other relevant state agencies. This scenario would involve developing the mechanisms for ongoing collection, storage, and local access to risk assessment data from municipalities, parishes, and other sources. It would also be necessary to determine the capabilities and interest of local Universities to fully draft such an alternative

  → *This is the most viable option; the challenge at this point is to determine the right combination of organizations and roles to gain the most efficient long-term delivery of the information and technical support.*

Assuming that this final option is the preferred alternative, it would then become necessary to determine the aforementioned roles and relationships. This is something that can potentially be coordinated with GOHSEP's CEO program. In these discussions, it will be important to consider the following factors:

- GOHSEP is in the process of enhancing its regional-based capabilities for coordination of emergency management related issues, and the regional coordinators have expressed interest in a greater hazard mitigation role. Therefore, the GOHSEP regional coordinators could play a role in this process.

- The *Louisiana Speaks Regional Plan* proposes a number of measures that could address part of the needs for planning and data management, including: establishing an Office of State Planning that might maintain a GIS data clearinghouse or portal; developing a user-friendly "Louisiana Location Index" GIS interface that would categorize land in Louisiana based on its suitability for different kinds of development; and establishing a conditional comprehensive planning requirement for Louisiana parishes and communities. Any efforts to coordinate hazard mitigation data should closely monitor and coordinate with these efforts as appropriate.

- The Louisiana GIS Council (LGISC) has been tasked by the Legislature with coordinating GIS data for the State through the LaGIC (Louisiana Geographic Information Center). Any efforts to coordinate hazard mitigation data should leverage ongoing efforts at LaGIC.

Summary

A number of mitigation-specific Acts, plans, Executive Orders and policies exist in the State. Among them are several targeted planning and policy documents, and several multi-agency attempts at integrating the various hazard mitigation activities in the State. Many of these plans and policies hold significant promise for hazard mitigation, particularly because they are ongoing and take an integrated, strategic look at the whole hazard-mitigation landscape in Louisiana and propose ways to continually improve hazard mitigation.

The largest number of the mitigation policies, programs, and activities undertaken by Louisiana State agencies occur within GOHSEP. However, DOTD, DNR, DEQ, CPRA, the Division of Administration, LRA, and the Louisiana Floodplain Management Association all have policies, programs, and activities specific to mitigation or that actively support hazard mitigation. Additional agencies and entities have programs that further support hazard mitigation activities in the State.

In many cases, these programs' full potential for effective mitigation is unrealized. Thorough and systematic policy/ program evaluation(s) and organizational review(s) of hazard mitigation efforts both within the State and including Federal partners are therefore now indicated.

GOHSEP, DNR, and DOTD all have significant numbers of staff devoted specifically to hazard mitigation or whose activities actively support hazard mitigation. GOHSEP is the programmatic lead on hazard mitigation activities, but currently lacks sufficient personnel and subject-area expertise and experience to effectively support the hazard mitigation activities in the State at the level at which they should be supported, particularly given the relatively low understanding and application of mitigation throughout the Louisiana parishes.

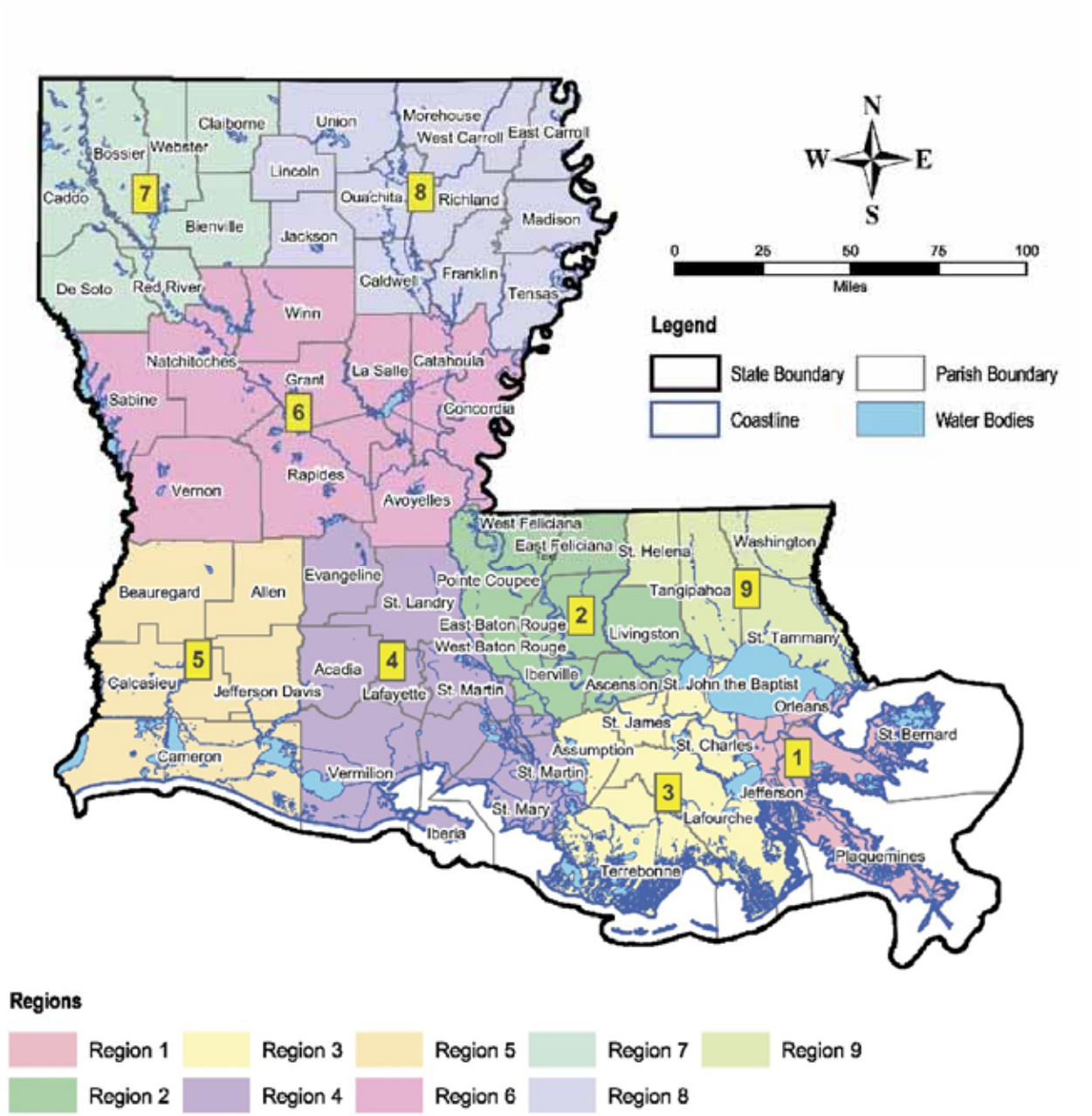
Finally, to provide a sound basis for ongoing and future hazard mitigation planning, and to integrate local and state planning, a better system of GIS and other data creation, consistency, management, and distribution is needed. The most viable option is likely one that involves partnerships between GOHSEP, Louisiana universities, and other state agencies, as well as local and regional entities.

7.4 Regional Capability Assessment

Introduction

In an effort to support and coordinate local emergency preparedness and response efforts, GOHSEP has established the regional coordinator position. Louisiana has nine regional coordinators, each working directly with both GOHSEP and the four-to-twelve parishes that make up each of the Louisiana Emergency Management Regions (see Map 7-1).

Map 7-1: Louisiana Emergency Management Regions



Source: GOHSEP, 2005

As a matter of statewide policy, the GOHSEP regional coordinator position has not been used for hazard mitigation purposes. But, as GOHSEP and the SHMT consider ways to improve hazard mitigation planning and implementation in Louisiana, and especially as they continue to look for ways to improve coordination between the state and parishes and municipalities and between the Plan Update and local Hazard Mitigation Plans (HMPs), a clear understanding of the regional layer of GOHSEP organization is essential.

Methodology and Survey Response Characteristics

Unlike the local capability assessment survey and the state agency capability assessment survey for the update of Section Seven of the Plan Update, the regional coordinator capability assessment survey had no antecedent in the April 2005 Plan. Therefore, a new survey was created by GOHSEP's consultant. This survey follows the basic outline of existing surveys. The survey instrument was presented to the SHMPC for comment and review at its meeting on October 8-9, 2007.

Some questions in the regional coordinator capability assessment survey intend to document the capabilities of the regional coordinator office itself; others asked the regional coordinators to assess the capabilities of the local Office of Homeland Security/Emergency Preparedness (OHS/EP) offices with whom they work. Responses to the former are described in this Section of the Plan Update; responses to the latter are included in Section 7.5, the Local Capability Assessment discussion. Questions included, but were not limited to, the following topics:

- Tenure and relevant education and experience
- Job responsibilities
- Staff capability
- Hazard mitigation capability
- GIS capability
- Interest in a greater hazard mitigation role
- Liaison role between local OHS/EPs and GOHSEP and other intergovernmental coordination issues
- Assessment of local hazard mitigation capability, including planning and administration of Hazard Mitigation Plans, floodplain management, the UCC, and land-use planning and regulation
- Familiarity with hazard mitigation funding sources

During the remainder of October 2007 and into early November, the capability assessment survey was administered by telephone to participating GOHSEP regional coordinators, and the answers recorded manually on word processing software. The responses were then consolidated into a spreadsheet for analysis. (See Volume II, Appendix G.4 for the survey instrument and Appendix G.5 for a spreadsheet of the results.)

Of the nine GOHSEP regional coordinators, seven participated in this survey. Of the two regions not represented, one has a vacancy. The response rate was therefore 88%, indicating a potentially high level of interest in hazard mitigation among regional coordinators, and at the very least a generally high level of responsiveness in that group.

The Role of Regional Coordinators

GOHSEP regional coordinators concentrate mainly on building relationships with local OHS/EP offices to improve emergency response and preparedness by enhancing coordination, communication, and grant-management. Specifically, respondents reported their core missions to include:

- assisting local OHS/EP offices in emergency preparedness and grant-writing/-administration;
- serving as liaison between the state GOHSEP and local OHS/EP offices; and,
- coordinating local efforts, including meetings, training, planning and emergency operations reviews.

Liaison and Coordination Evaluation

Regarding their working relationships with parish OHS/EP directors, most regional coordinators reported an overall healthy situation. Local distrust of GOHSEP made a few situations tense. One regional coordinator noted that the coordinator's office is tasked with coordination but not given sufficient authority, and that the office "takes heat" for the state's policies. Another coordinator described their relationship with the locals as, "We usually agree to disagree."

The regional coordinators reported good communication with other regional partners. They all reported excellent coordination among themselves. All responding regional coordinators also reported that they regularly coordinate and communicate with DHH/ Office of Public Health regional offices. Several also reported working with DHH, DEQ, the State Police, and regional planning commissions/ planning and development districts. At the state level, the Louisiana Department of Social Services was also mentioned several times, although more than one coordinator cited problems in working with that agency. DOTD, DWF, the Louisiana National Guard, the Red Cross, and others were also cited. No partnerships specifically targeted to hazard mitigation were noted.

The regional subdivisions created in Louisiana by various state agencies and local partnerships do not always match up well geographically, especially in Southeast Louisiana. This makes a high level of inter-entity coordination at the regional level difficult.

Regional coordinators most often cited the Office of Public Health or their local partners as their most valuable relationships.

For the future, regional coordinators indicated a desire for greater coordination with the U.S. Coast Guard, FEMA, or GOHSEP hazard mitigation capacity. Several also cited opportunities for improved regional coordination via regional hazard mitigation planning, risk assessment, and/or data management, particularly concerning flood-hazard issues. The high level of inter-agency coordination reported by regional coordinators could make them valuable assets in future efforts to reorganize or streamline hazard mitigation resources.

Regional Coordinators and Hazard Mitigation

Generally, hazard mitigation is not currently part of regional coordinators' roles. Only two regional coordinators (Regions 2 and 5—metro Baton Rouge and Southwest Louisiana, respectively) reported a coordination role for hazard mitigation planning and/or project implementation. More than half of responding regional coordinators reported familiarity with floodplain management and local hazard mitigation planning; few reported any familiarity with the UCC or with land-use planning as a mitigation strategy.

Almost all respondents reported basic familiarity with FEMA PA and HMGP grant programs; most reported no familiarity at all with the FEMA PDM grant program.

Most respondents were interested in expanding their purview over hazard mitigation. In fact, of all the respondents interviewed, only one regional coordinator stated that they would *not* want a greater role in hazard mitigation planning and implementation.

Several regional coordinators cited concerns with taking on a greater hazard mitigation role in the absence of commensurate funding and staff support. (This concern was offered as an explanation by the coordinator who responded "no" to be interested in a larger hazard mitigation role.) All but one regional coordinator agreed to serve on the SHMP Advisory Board.

Personnel and Technical Capability

Regional coordinators, generally, are well-trained but have not been in their posts very long. The average tenure of responding GOHSEP regional coordinators was just 1 year, and the longest-serving regional coordinator has only been on the job for 14 months. One regional coordinator has held their position for just three months, and one position is currently vacant. Regional coordinators reported having no staff support. Meanwhile, regional coordinators are asked to build relationships with local OHS/EP offices.

Taken together, the short tenure/ high turn-over of regional coordinators, the lack of staff support, and the high value placed upon interpersonal/ liaison relationships, leaves little opportunity to build institutional memory or capability at the GOHSEP regional level. Individuals may excel at their jobs once they have learned the terrain and the special characteristics of the partnerships they manage, but it would be unlikely that their work would result in an institutional foundation that could outlast their own tenure.

The regional coordinators generally have backgrounds in emergency management, law enforcement/ criminal justice, and/or the military. Experience levels range from a few years to more than 20. Several reported numerous Local Emergency Manager (LEM), Incident Command System (ICS) and National Incident Management System (NIMS) certifications. Some were outside hires, others were career GOHSEP employees. Only one reported having a hazard mitigation background, based upon that individual's previous experience in a local OHS/EP office.

Regional coordinators' offices do not have a great deal of technical capability. Less than half of the responding regional coordinators reported using GIS. They reported using it mainly for emergency-response purposes, especially for real-time events. The regional offices used GIS accessed it through state-maintained resources. Only Region 5 (Southwest Louisiana) reported using GIS for any hazard-mitigation-related purposes, in that case, evaluating wind and flood hazard patterns to help plan for hurricanes.

Many regional coordinators reported a low estimation of the effectiveness of local floodplain management and UCC enforcement as mitigation measures. This indicates a need for education on mitigation issues among this group.

Summary

Following is a summary of the key findings of the Regional Capability Survey:

- Regional coordinators reported that their core roles include: assisting local OHS/EP offices in emergency preparedness and grant-writing/-administration; serving as liaison between the state GOHSEP and local OHS/EP offices; and coordinating local efforts, including meetings, training, planning and emergency operations reviews. In their liaison function, the regional coordinators reported a high level of interaction with parish officials, GOHSEP, and numerous regional and state-agency partners.
- The longest-tenured regional coordinator has only been in their post for 14 months, and no regional coordinator has any staff support. The short tenure/ high turn-over of regional coordinators, the lack of staff support, and the high value placed upon interpersonal/ liaison relationships leaves little opportunity to build institutional memory or capability at the GOHSEP regional level.
- Generally, hazard mitigation is not currently part of regional coordinators' roles, though many reported some knowledge of basic concepts and funding programs. Similarly, regional coordinators tend to have high levels of emergency management experience, but little depth in hazard mitigation. Finally, regional coordinators' offices do not have a great deal of technical capability, and they typically do not use the technology they have for hazard mitigation purposes.
- Most regional coordinators reported an interest in a greater hazard mitigation role, as long as adequate staff, technical, and budget support accompanied that increased role. However, the SHMPC noted that regional coordinators' low estimation of the value of floodplain management and UCC enforcement indicates the need for outreach and education prior to these offices being given a greater mitigation role.

7.5 Local Capability Assessment

Introduction

This capability assessment contains an analysis of local capability to plan for and implement hazard mitigation strategies, programs, projects and activities. This local capability is extremely important, because the local officials know their own landscape best. Additionally, many of the most critical and effective hazard mitigation strategies and programs, including enforcement of floodplain management, building codes, and land-use planning, require a strong local role to achieve effective implementation.

Therefore, this assessment of local capability is crucial to help the State determine where staff and technical capability exists and can be leveraged and where it is lacking, in which case it must be augmented at the local level or provided via a support mechanism from the State or regional levels, or from other sources.

In addition, this assessment will be useful in gauging whether the current local organizational structures and inter-jurisdictional coordination mechanisms for hazard mitigation could be improved, and how.

Methodology and Survey Response Characteristics

Section 7.5, the Local Capability Assessment, is derived from four sources:

- The Local Capability Assessment Survey, the methodology of which is discussed in detail below.
- The Regional Coordinator Capability Survey asked the GOHSEP regional coordinators to assess the capability of the local OHS/EP offices with whom they work. These results also inform this Local Capability Assessment. The methodology for this survey was discussed in Section 7.4, Regional Capability Assessment.
- A complete survey and analysis of approved local Hazard Mitigation Plans, including those currently being updated under FEMA PPGP grants, contributed some data to the following analysis. Further discussion regarding the methodology of and findings from this research can be found in Section 5.17, Integration of Local Hazard Mitigation Plans.
- Selected academic research regarding local planning capacity in Louisiana was used, as well as interviews with key state officials.

The local capability assessment survey had an antecedent in the previous FEMA-approved April 2005 Plan, and wherever applicable, the updated survey replicated the previous survey's questions, to enable a longitudinal analysis of the data. One major component of the 2005 survey that was not replicated in the new survey was local hazard identification; this issue was instead addressed via a survey of local Hazard Mitigation Plans and HMP updates under the PPGP program (see Section 5.17 for more on this).

The new local capability assessment survey instrument was presented to the SHMPC for comment and review at its meeting on October 8-9, 2007. All questions in the survey intended to document local hazard mitigation capabilities. Questions included, but were not limited to, the following topics. Brackets indicate corresponding question from 2005 survey. (See Volume II, Appendix G.6 for the complete Local Capability Survey text.)

- Respondents' tenure in current post and experience or qualifications
- Number of staff overseen, and who work in and/or have expertise in hazard mitigation *[Q2, Q3]*
- Access to and location of GIS data *[Q4]*
- Coordination with other parish and local offices/agencies, neighboring jurisdictions, regional entities, or state agencies
- Preferences regarding standard hazard definitions and risk assessment methodologies
- Local enforcement of the Uniform Construction Code *[Q7]*

- Local administration of floodplain management *[Q7]*
- Local comprehensive planning, zoning, subdivision regulation, and other development regulations *[Q7]*
- Most effective mitigation activities *[Q8]*
- Least effective mitigation activities *[Q9]*
- Lessons learned from mitigation activities *[Q11]*
- Promising future mitigation activities *[Q12]*

During the remainder of October 2007 and throughout November, the capability assessment survey was administered by telephone to three groups of local/parish hazard mitigation offices:

- parish OHS/EP directors' offices,
- selected floodplain managers' offices, and
- selected building code officials' offices.

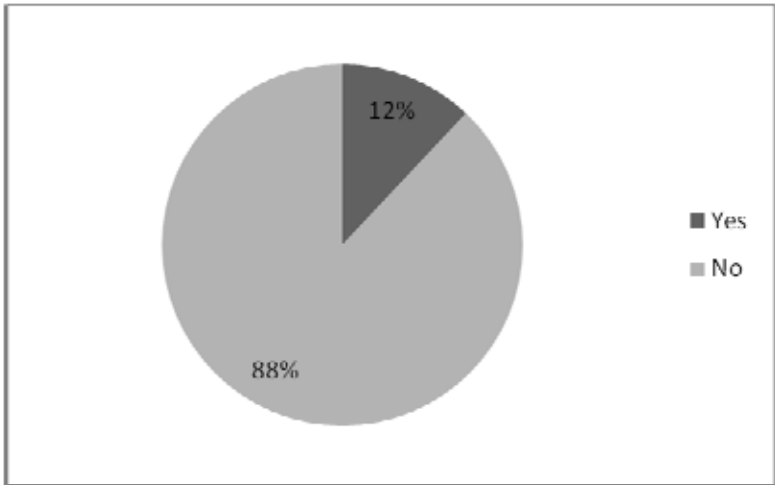
All OHS/EP offices were contacted, and these surveys were administered either by GOHSEP's consultant or the GOHSEP regional coordinator for that parish. Local floodplain managers were selected to be interviewed by the DOTD representative to the SHMPC, and local building officials to be interviewed were selected by the Louisiana State Uniform Construction Code Council (LSUCCC) representative to the SHMPC. These surveys were administered by GOHSEP's consultant. Respondents' answers to the survey were recorded manually on word processing software. The responses were then consolidated into a spreadsheet for analysis. (See Volume II, Appendix G.7 for a spreadsheet of the results.)

Less than 30% (18 of 63) OHS/EP directors or their offices participated in the survey. The response rate was significantly enhanced in GOHSEP regions in which the regional coordinators conducted outreach and administered the surveys, rather than GOHSEP's consultant. There were no responses at all from OHS/EP offices in Regions 1 and 2, (metro New Orleans and metro Baton Rouge); the remaining regions had between 17% and 100% response rates.

Four floodplain managers and five code officers also participated in the local capability assessment survey. In a few instances, floodplain managers or code officers also served as OHS/EP directors, in which case they were categorized with the latter. No attempt to contact all floodplain managers or code officers was made, so no response rate can be generated.

Additionally, an attempt was made to integrate the results of local capability analysis from local HMPs. However, of the 75 plans reviewed, only nine included capability assessments, making such integration impossible (see Figure 7-1).

Figure 7-1: Frequency of Local Capability Assessments Appearing in Parish/Municipal HMPs



Source: Survey of Parish and Municipal HMP and PPGP participants, 2007

Furthermore, the local assessments varied in length and composition, ranging from chapters to under one page. The State may wish to consider focusing technical support to include such assessments in future plan updates.

Personnel Capability

On average, respondents of all types had a significant amount of experience in their current posts. Respondents reported having been in their current positions anywhere from a few months to 20 years, and the average tenure for local OHS/EP directors, floodplain managers, and building officials was approximately eight years.

Most OHS/EP respondents had significant experience relevant to emergency response and management, but not in hazard mitigation. They often reported experience in law enforcement, fire service, homeland security, or military service. Certifications typically included NIMS, Emergency Management Institute (EMI), and other emergency management courses. In several cases, respondents had college degrees in business or communications. Some indicated "hands on experience" as being the most relevant to their work. No OHS/EP respondent cited experience or education pertaining to any aspect of hazard mitigation as being relevant to their work.

Floodplain managers almost all reported being certified FPMs, and several reported having taken additional NFIP courses. One floodplain manager who was located in a planning department had a planning degree.

Building officials typically have an engineering and/or contracting background; most reported being International Code Council (ICC)-certified building inspectors or were working on certification.

It is worth noting that respondents were only asked what education and certifications they found most relevant to their work; failure to report a given degree or certification does not necessarily indicate that the respondent did not possess the degree or certification.

Some offices charged with hazard mitigation are thinly staffed (see Table 7-7).

Table 7-7: Average Total Staffing of Local Offices (Respondent not Included)

	Full-time	Part-time	Contractors or Third-Party Providers	Volunteer
OHS/EPs	1.3	0.2	0.3	3.4
FPMs	2.4	0.0	1.3	0.0
Building Officials	23.2	2.0	1.0	0.0

Source: Local Capability Assessment Survey, 2007

Moreover, respondents reported that the average proportion of staff in their offices who worked directly in a hazard mitigation-related capacity was one-third or less, and in several cases this role was filled by contractor capacity (see Table 7-8). Floodplain managers' reporting regarding "contracted" staff refers to support functions; the floodplain management role itself is not contracted anywhere in Louisiana. UCC-enforcement, on the other hand, is often contracted to a third-party provider.

In addition, as reported by GOHSEP staff and consultants, for specific tasks such as development of hazard mitigation plans and plan updates and documenting hazard mitigation projects for funding applications, some parishes have dedicated staff that can adequately handle these tasks, but many parishes and municipalities rely heavily on consultant support. GOHSEP also observed that in some cases, consultants are not well versed in relevant programmatic and technical aspects due to the specialized nature of the work and the sporadic instances when this expertise is required, i.e., it is difficult for communities and consultants alike to obtain and maintain expertise in an area that is not consistently and regularly required.

Table 7-8: Average Hazard Mitigation Staffing in Local Offices (Respondent not Included)

	Full-time	Part-time	Contractors or Third Party Providers	Volunteer
OHS/EPs	0.2	0.2	0.0	0.2
FPMs	0.2	0.0	1.2	0.0
Building Officials	6.3	0.0	0.5	0.0

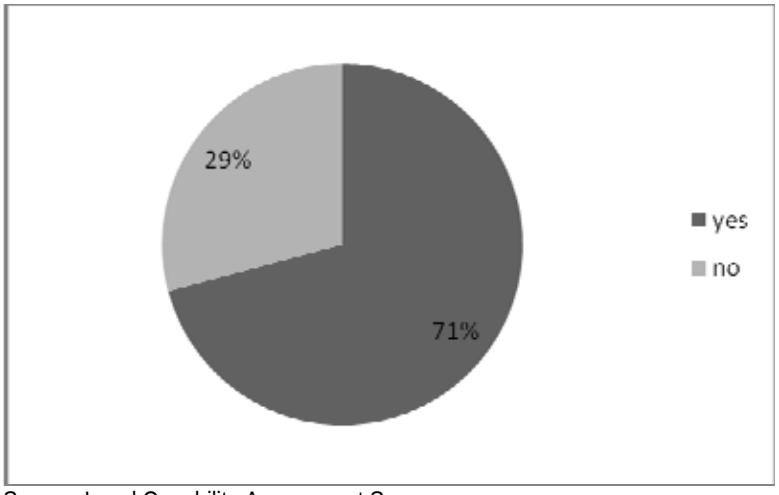
Source: Local Capability Assessment Survey, 2007

These findings were all roughly consistent with those of the 2005 local capability assessment survey, indicating little has changed regarding funding and salary support for hazard mitigation in Louisiana since then.

Technical and Technological Capability

GIS data was reported to be widely accessible by local survey respondents, but capability to analyze, process, create, and maintain such data was low. Nearly three-quarters of respondents stated that they or their offices had access to GIS (see Figure 7-2). In 2005, a similar survey found that 30% of OHS/EP offices had anyone on staff with GIS capabilities.

Figure 7-2: GIS Accessibility by Parish/Municipal Offices



Source: Local Capability Assessment Survey

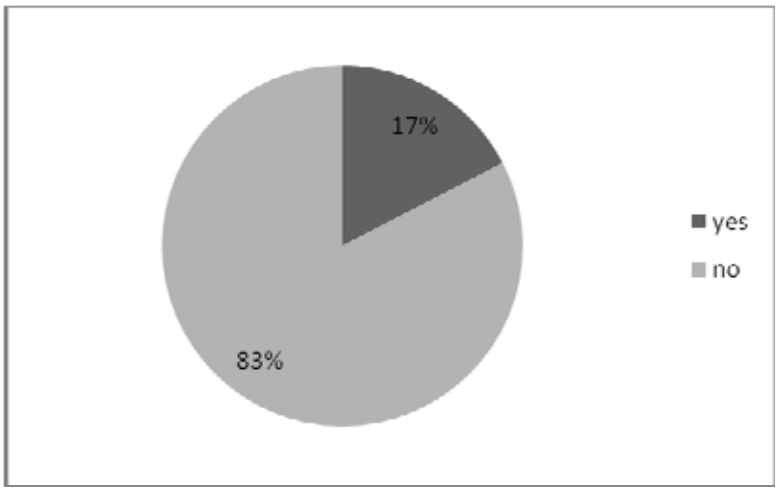
But in only a few cases the respondents' follow-up statements indicated that they had an appreciable understanding of what GIS systems and data are capable of, or what GIS actually is. When asked what data sets and layers their offices were using, a few gave very sophisticated answers ("flood hydrology layers, topography layers, Digital Flood Insurance Rate Maps (DFIRM), critical and government facilities layers"; "floodplain/ flood zones, land use, aerial, street/address, structural, water and gas lines, parcel layers"), while others gave responses, including "Google Earth," that indicated minimal depth of understanding regarding GIS capabilities. Floodplain managers, in particular, tended to be better-versed in GIS capabilities, although a few OHS/EP offices were also GIS-savvy.

Most respondents who said they use GIS did so in an emergency response context. Only about half of respondents said they were using GIS for any hazard-mitigation purposes; they used GIS primarily for floodplain management. Only two respondents indicated that their GIS data was coordinated or integrated with any other GIS databases.

An attempt was also made to assess GIS capability based upon parish/municipal Hazard Mitigation Plans and PPGP-funded HMP updates. However, this effort did not generate any revealing results. The plan documents themselves very rarely disclosed GIS data or sources, and calls with PPGP parishes revealed that most of their knowledge does not go beyond the fact that they use or have access to the technology.

Although the majority of respondents to the Local Capability Survey stated that they use or have access to GIS, less than one fifth reported that their offices maintained their own GIS data (see Figure 7-3). Those respondents who maintained their own GIS data stated that they devoted an average of 2.2 employees on an annual basis, supported by an average GIS-budget of $156,000.

Figure 7-3: In-House GIS Maintenance by Parish/Municipal Offices



Source: Survey of Parish and Municipal HMP and PPGP participants, 2007

Those departments that reported coordinating with or accessing off-site GIS indicated a variety of locations where this data was housed. In some cases (for example, Jefferson Parish), the parish maintains GIS data; in others (for example, South Central Planning Development Commission or Northwest Louisiana Council of Governments), a regional entity coordinates and houses data; in others (for example, Louisiana Tech or UNO), a university is the repository of important GIS data.

Planning and Regulatory Capability

Parishes and communities in Louisiana vary widely in their capacity for planning and regulation relevant to hazard mitigation. Some communities have a full range of implementation tools; others have none. Tools considered included:

- local Hazard Mitigation Plans,
- floodplain management,
- the Uniform Construction Code, and
- land-use planning and regulations.

Hazard Mitigation Plans

All parishes in Louisiana are covered by FEMA-approved Hazard Mitigation Plans. Of the 64 Parish Hazard Mitigation Plans in Louisiana, 58 were approved by FEMA in 2006; five were approved prior to 2006, and one since. All parishes must update their HMPs every five years. Currently, 20 parishes are updating their HMPs under the FEMA PPGP program. Additionally, 11 municipalities, two universities, and Louisiana Nursing Homes have FEMA-approved HMPs.

Several regional coordinators indicated that the part-time status of some OHS/EP directors was a potential hinderance of effective hazard planning. This, coupled with the lack of hazard mitigation staff capability and expertise in OHS/EP offices raised some regional coordinators' concerns about whether these offices should be in the lead or sole oversight role in the development and implementation of parish HMPs. In the future, the State may want to encourage parishes to broaden their hazard mitigation planning and implementation teams to include a broader cross-section of parish and municipal agencies.

Floodplain Management

Another key tool in local mitigation of hazards is floodplain management. Floods, whether riverine, backwater, or surge-related, present the most costly and pervasive hazard in Louisiana. Floodplain management is the most comprehensive, relevant, and practical mitigation tool, with many funding options available through typical hazard mitigation sources.

One measure of the effectiveness of floodplain management is participation in FEMA's National Flood Insurance Program (NFIP). Statewide, all parishes participate in NFIP, and all affected jurisdictions adopted post-Katrina/Rita Advisory Base Flood Elevations (ABFEs) except St. John the Baptist Parish, and the incorporated municipalities of Gueydan and Erath (however, Vermilion Parish, within which both of these municipalities are located, did adopt ABFEs).

Additionally, 37 Louisiana communities, accounting for approximately 80% of NFIP policies in the State of Louisiana, participate in the Community Rating System (CRS). The CRS is an NFIP program that allows communities to lower the premiums charged to their citizens by going above minimum NFIP requirements via public education, additional freeboard requirements, and so on. According to the state program administrator, this translates into approximately $20 million in savings in policyholder premiums. Table 7-9 shows the communities in Louisiana that participate in CRS.

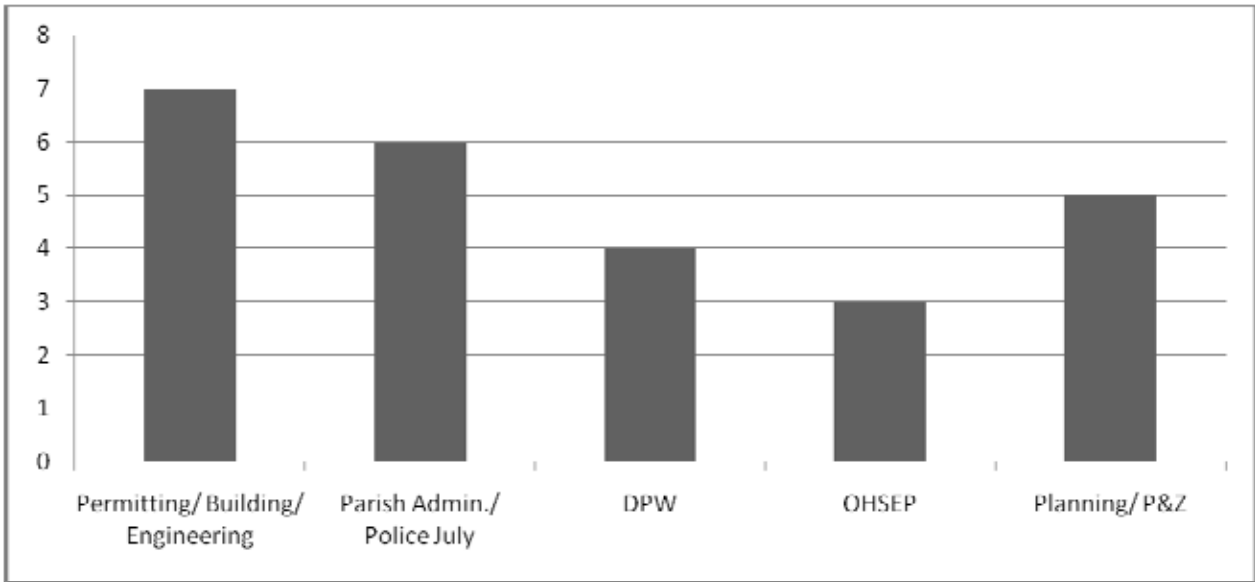
Table 7-9: CRS Participation in Louisiana

Parish	CRS-Participating Jurisdiction
Acadia	Rayne
Ascension	Ascension Parish
	French Settlement
	Gonzales
	Sorrento
Beauregard	DeRidder
Bossier	Bossier City
Caddo	Caddo Parish
	Shreveport
Calcasieu	Calcasieu Parish
	Lake Charles
East Baton Rouge	East Baton Rouge City/ Parish
	Baker
	Zachary
Jefferson	Jefferson Parish
	Gretna
	Kenner
	Westwego
Lincoln	Ruston
Livingston	Livingston Parish
	Denham Springs
	Walker
Orleans	New Orleans/Orleans Parish
Ouachita	Ouachita Parish
	Monroe
St. Charles	St. Charles Parish
St. James	St. James Parish
	Lutcher
St. John the Baptist	St. John Parish
St. Mary	Morgan City
St. Tammany	St. Tammany Parish
	Mandeville
	Slidell
Tangipahoa	Tangipahoa Parish
Terrebonne	Houma
	Terrebonne Parish
West Baton Rouge	West Baton Rouge Parish

Source: Cindy O'Neal, National Flood Insurance Program State Coordinator, DOTD, 2007

The local capability assessment survey revealed that floodplain management is carried out by a variety of parish and municipal agencies and offices (see Figure 7-4). Most often, especially in small parishes, this function is in a building department or resides within the parish adminstration itself.

Figure 7-4: Bureaucratic Home of Parish/Municipal Administration of Floodplain Management



Source: Local Capability Assessment Survey, 2007

This local capabilty analysis has insufficient data to draw conclusions about the effectiveness of floodplain management relative to its bureacratic home, but anecdotal feedback indicates that floodplain management is most effective when administered via a permitting agency, office, or commission, especially entities that issue building permits or zoning approvals. In these cases, floodplain issues are linked directly to construction or site-plan approval and less likely to be overridden or otherwise undermined by other entities' priorities.

The Uniform Construction Code

A new tool in parish and municipal mitigation of hazard is the UCC, which must be enforced in all Louisiana jurisdictions. The UCC requires buildings to be constructed to better withstand high wind and flood, consistent with In ICC specifications. Although all parishes are now required to enforce the UCC, a small percentage of respondents reported that their parishes are not yet doing so. However, some respondents had little knowledge of building code enforcement, and their responses may therefore be in error, reflecting their own lack of information. The SHMPC noted that if some local officials are not aware of UCC-enforcement, better education of local officials is needed.

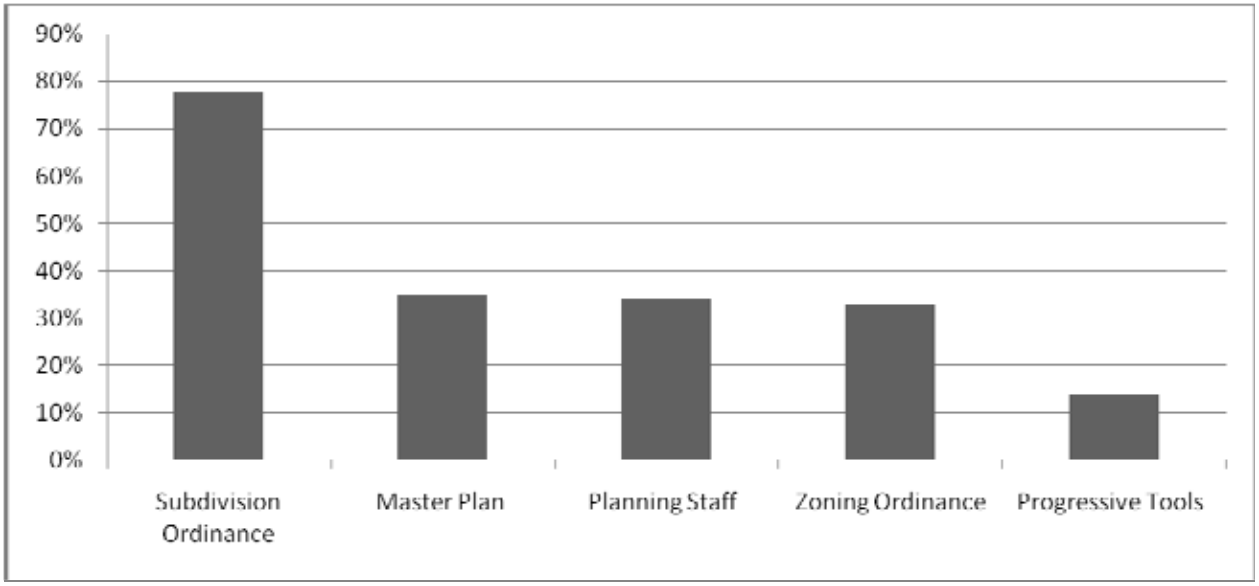
Of local survey respondents who were familiar with enforcement of the UCC in their jurisdictions, more than half reported that enforcement was being contracted out, and a few reported sharing code officers with neighboring jurisdictions.

Land-Use Planning and Regulation

There is a final set of tools that can be effective for mitigating hazards, but they remain underutilized in Louisiana. These land-use tools include comprehensive planning (known as "master planning" under Louisiana Revised Statutes), zoning, and subdivision regulation.

Most parishes in Louisiana conduct subdivision review, but only about one third administer a zoning ordinance or have (or are developing) comprehensive plans (see Figure 7-5).

Figure 7-5: Parish/Municipal Land Use Planning and Regulatory Capability—Presence of Selected Tools



Source: Lynn Maloney-Mújica, 2007. "Factors Associated with the Adoption of Land-Use Planning in Louisiana Parishes." MA Thesis, LSU.

Of the 21 parishes (35% of all parishes) that currently have or are developing comprehensive plans, only 10 have plans that are both completed and up-to-date (less than 10 years old). Comprehensive planning is most common in metropolitan areas, although some smaller parishes also have plans. Also, only about one third of parishes have any planning staff, including part-time staff and contractors. Just 12 parishes have all three basic components of land-use planning: a comprehensive plan to guide the jurisdiction, a zoning ordinance to implement the plan, and a planning staff to administer both.

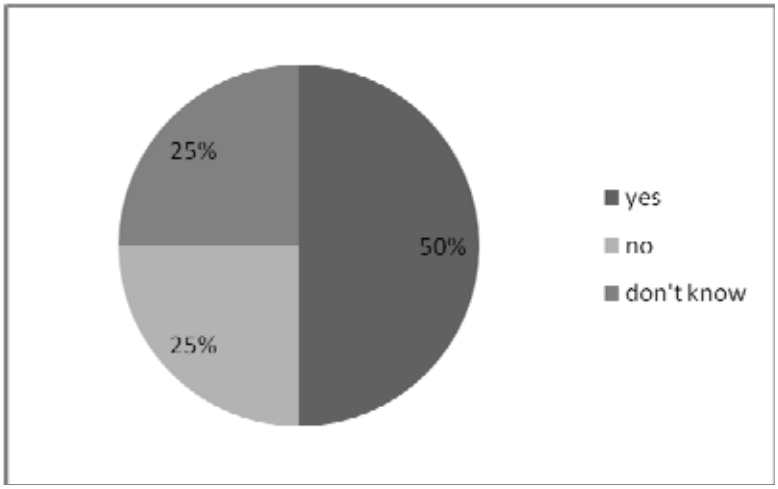
Louisiana lacks any effective requirement for comprehensive plans, something approximately half of all U.S. states now have.[45] Comprehensive plans ("Master Plans") are theoretically required under Louisiana Revised Statutes (RS 33:109) for any jurisdiction that regulates land use through zoning or other land-use controls, but there is no recourse if this requirement is not met, except for civil litigation, and Louisiana courts have been extremely forgiving to violators. Moreover, the statute regarding Master Plans is boiler-plate enabling legislation dating to the 1920s. It provides no guidelines or criteria for plan development or content, except for some extremely general suggestions for topical elements.

Only 9 parishes (14% of all parishes) have any "progressive" planning tools, including techniques such as clustered development, planned urban development/ planned unit development, or traditional neighborhood development. Progressive planning tools make it easier for developers to increase concentrate density on a site and thus decrease the developed footprint of a project, leaving more land undisturbed. These tools are particularly useful in mitigating hazard in developments in or near wetlands and floodplains.

Among respondents to the local capability assessment survey whose parishes had comprehensive plans, only half stated that their parish plans addressed hazard mitigation (see Figure 7-6).

[45] Twenty-five states have either conditional or fully mandatory requirements for local comprehensive plans. Institute for Business and Home Safety, 2005. *Survey of State Land-Use and Natural Hazards Planning Laws*.

Figure 7-6: Local Assessment of Whether Parish/Municipal Comprehensive (Master) Planning Directly Addresses Hazard Mitigation

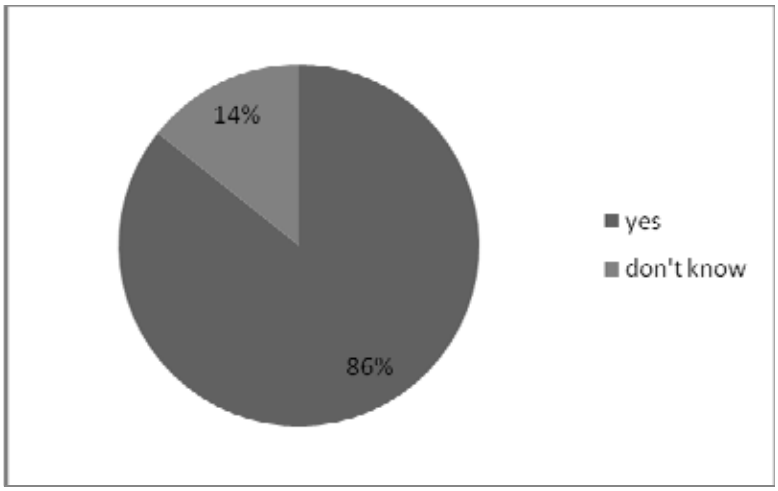


Source: Local Capability Assessment Survey, 2007

Of those comprehensive plans that engaged hazard mitigation issues, they did so either by merely mentioning or discussing it, or by dealing with it through zoning regulations.

Among respondents to the local capability assessment survey whose parishes had zoning ordinances, a large majority stated that their parish zoning addressed hazard mitigation (see Figure 7-7).

Figure 7-7: Local Assessment of Whether Parish/Municipal Zoning Directly Addresses Hazard Mitigation

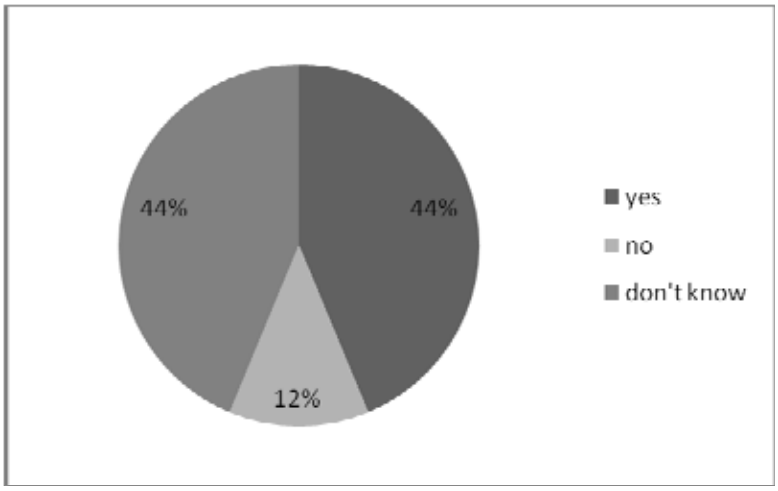


Source: Local Capability Assessment Survey, 2007

Of those zoning ordinances that engaged in hazard mitigation issues, they did so either by directly linking permitting to floodplain-management regulations and Base Flood Elevation (BFE) and/or freeboard rules.

Finally, among respondents to the local capability assessment survey whose parishes had subdivision ordinances, nearly half stated that their parish subdivision ordinance addressed hazard mitigation (see Figure 7-8).

Figure 7-8: Local Assessment of Whether the Parish/Municipal Subdivision Ordinance Directly Addresses Hazard Mitigation



Source: Local Capability Assessment Survey, 2007

Subdivision ordinances that were reported to engage hazard mitigation typically did so by directly linking permitting to floodplain-management regulations and BFE and/or freeboard rules.

It is worth noting that only two responding parishes (Caddo and Tangipahoa) reported both zoning and subdivision regulations linked to floodplain management. No pattern emerges in the survey results regarding the administrative home of floodplain management and the linkage, or lack thereof, floodplain management and planning, zoning, subdivision regulation.

Finally, within the designated Coastal Zone, parishes or the Louisiana DNR impose an additional layer of permitting for certain projects through the Coastal Zone Management (CZM) program. CZM permitting was not part of this capability survey. Future updates to the Plan Update should include an analysis of the effectiveness of the CZM program. Forthcoming research by the LSU Sea Grant program will also provide data and analysis of the effectiveness of planning and land-use controls in coastal areas.

Intra- and Inter-Governmental Coordination

The most significant hazards faced in Louisiana have regional impacts, and lend themselves to regionally coordinated responses. All responding regional coordinators recognized that the parishes in their regions faced hazards that crossed parish lines. Yet the respondents to the local capability assessment survey reported that inter-jurisdictional coordination, and even inter-agency coordination within jurisdictions, was often not strongly emphasized.

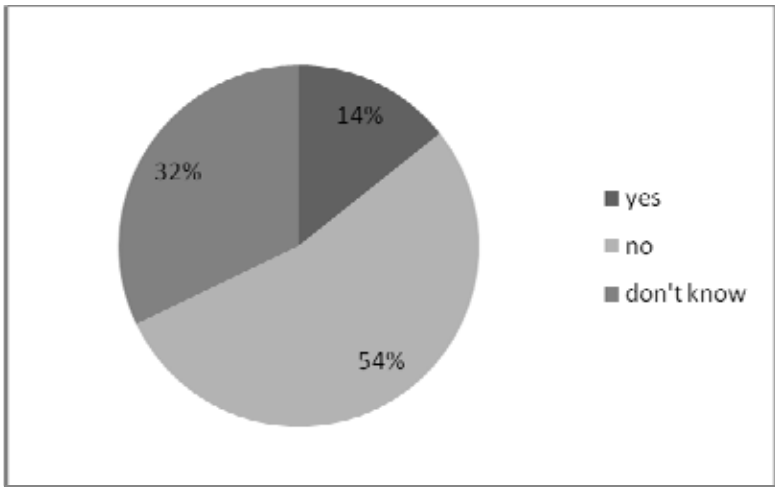
Intra-Jurisdictional Coordination

Only about 50% of local respondents who reported having hazard mitigation responsibilities centered in more than one office stated that they had any formal coordination or communication between those offices. In more than one instance, regional coordinators also noted internal "friction" between sheriffs and OHS/EPs as a result of local and state electoral politics.

Inter-Jurisdictional Coordination

Additionally, 84% of respondents reported either no formal inter-jurisdictional coordination, or no knowledge of any such coordination (see Figure 7-9). Among those jurisdictions surveyed, coordination appears strongest in the Lafourche-Terrebonne, Calcasieu, and Caddo-Bossier areas. Caddo and Bossier are the only parishes that share emergency management and hazard mitigation operations.

Figure 7-9: Coordination with Neighboring Jurisdictions



Source: Local Capability Assessment Survey, 2007

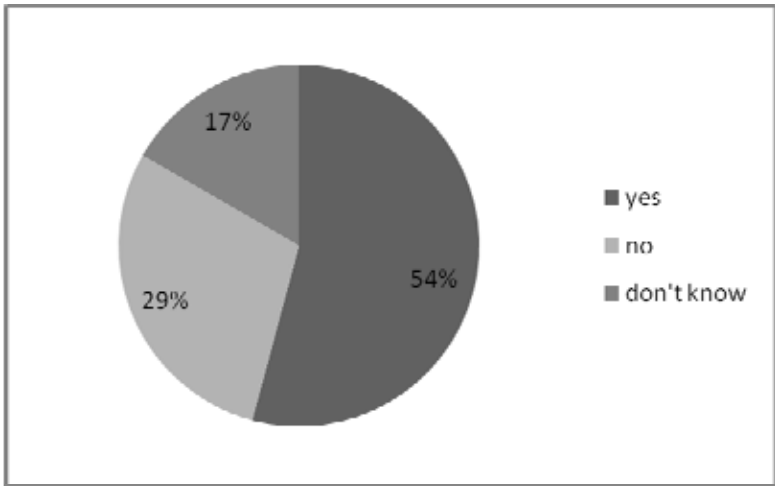
Most local capability assessment survey respondents did, however, state that their offices maintained a level of informal communication with offices in neighboring jurisdictions for purposes of hazard mitigation. Commonly cited examples were departments of public works, building and inspection departments, Emergency Planners and other emergency responders, police juries, and planning and zoning departments. Less common were levee districts and drainage boards, health departments, non-profits, and various parish/municipal departments. A few respondents reported no coordination at all.

The regional coordinators also pointed to inter-jurisdictional and regional mutual aid agreements for emergency response as examples of coordination, though admittedly not for hazard mitigation. They also acknowledged that coordination was smoothest between comparable operational entities across jurisdictions. As one noted, "Right now, [it's] much more between fire [department] to fire [department] than parish to parish."

Regional Coordination

More than half of local respondents also reported participating in regional coordination (see Figure 7-10).

Figure 7-10: Coordination with Regional Entities



Source: Local Capability Assessment Survey, 2007

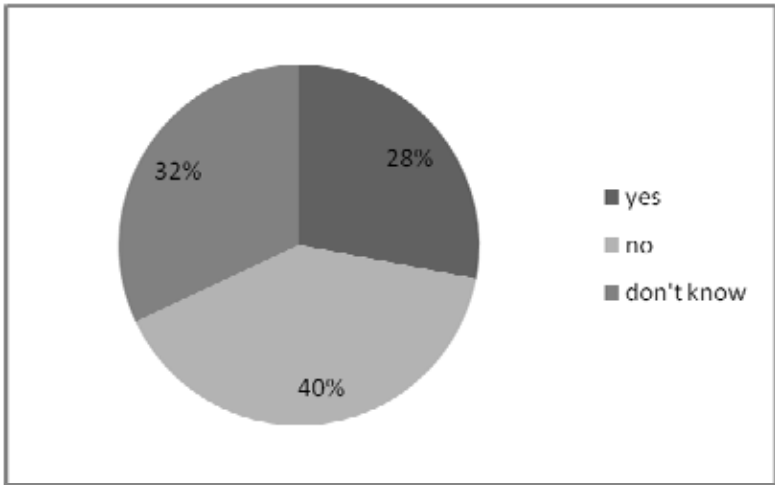
Most local OHS/EP offices reported working with GOHSEP regional coordinators, and several local respondents also reported interactions with regional planning commissions/ planning and development districts, in particular the South Central Planning Development Commission (metro Houma-Thibodaux), Acadiana Regional Development District (metro Lafayette), Imperial-Calcasieu Regional Planning and Development Commission (metro Lake Charles), and Northwest Louisiana Council of Governments (metro Shreveport-Bossier).

Coordination with State Agencies

Regarding relationships between the parish OHS/EP offices and GOHSEP, most regional coordinators reported a level of discord, often related to past experiences working with the Agency. Others cited general parish dissatisfaction with state priorities, a feeling that local officials are treated as "outsiders" to state emergency operations, a "disconnect" regarding communications, and local disinterest. The poor response rate from local OHS/EP offices, particularly from metro New Orleans (Region 1) would appear to support these observations.

Local coordination with other state agencies was less common than with GOHSEP, but also less fraught. About one-third of respondents reported coordinating directly with any state agencies or offices, other than GOHSEP (see Figure 7-11).

Figure 7-11: Coordination with State Entities (GOHSEP excluded)



Source: Local Capability Assessment Survey, 2007

Second to GOSHEP, the state agency that parishes most commonly coordinate with was DOTD, which administers floodplain management. Other responses included DAF, DEQ, DNR, DHH's Office of Public Health, the State Police, and the Department of Culture, Recreation and Tourism's State Historic Preservation Office. These responses came from all three types of local offices: OHS/EP, floodplain management, and code offices.

Key Partnerships

When asked which partnership was the most important for hazard mitigation, some parish respondents cited offices within their own jurisdictions, while others cited state agencies or offices, particularly GOHSEP and DOTD. None indicated a neighboring jurisdiction or a regional entity.

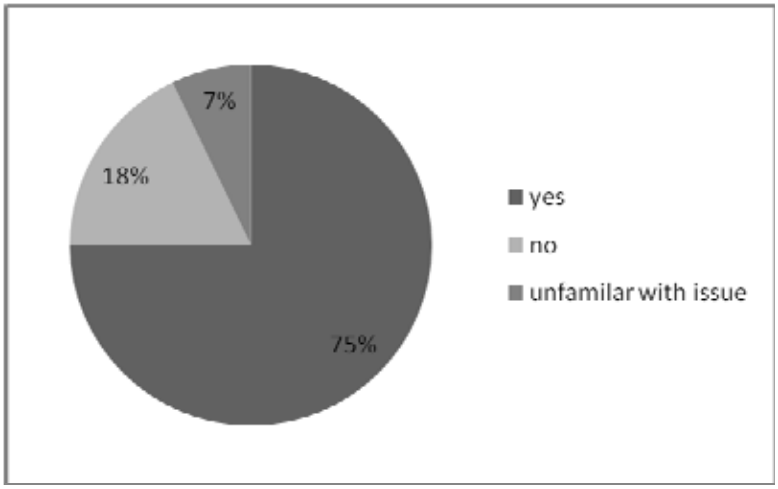
When asked to identify an entity that they do not currently work with that could be of benefit for hazard mitigation, most parishes gave no response. Those who responded rarely concurred on which entity. USACE was the only entity cited more than once. Other responses included FEMA, a future Office of State Planning, private industry, LSU AgCenter, neighboring parishes, various internal parish/municipal departments, and "community members."

The sample size in the local capability assessment survey was not large enough to draw out trends connecting population size or region and key existing or desired partnerships.

Local/ State Consistency Issues in Hazard Mitigation Planning

Among the challenges in integrating local HMPs and the Plan Update is the lack of common terminologies, data sets, and methodologies. Part of the local capability assessment survey examined local willingness to have these things standardized. Overwhelmingly, local officials favored allowing the State to standardize hazard definitions and profiles (see Figure 7-12), particularly if these were assured to be consistent with FEMA definitions.

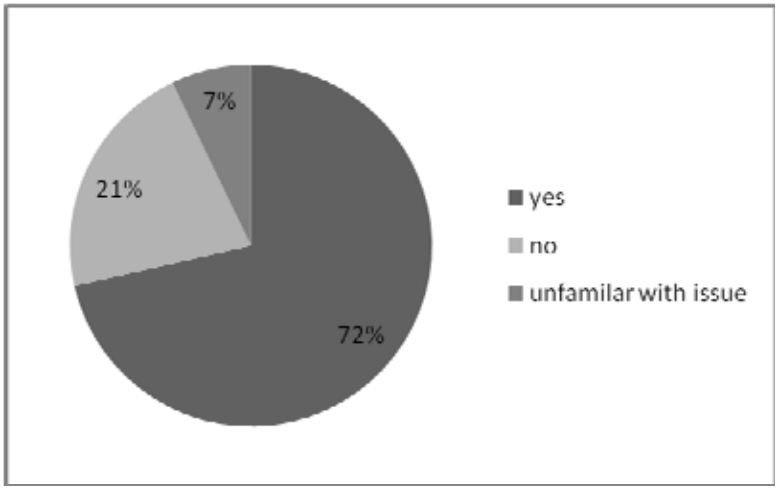
Figure 7-12: Preference for Standardized Hazard Profiles and Definitions



Source: Local Capability Assessment Survey, 2007

Additionally, respondents were broadly in favor of State-standardized methodologies for risk assessment and loss estimation (see Figure 7-13), especially if these were assured to be consistent with FEMA methodologies.

Figure 7-13: Preference for Standardized Risk Assessment Methodologies

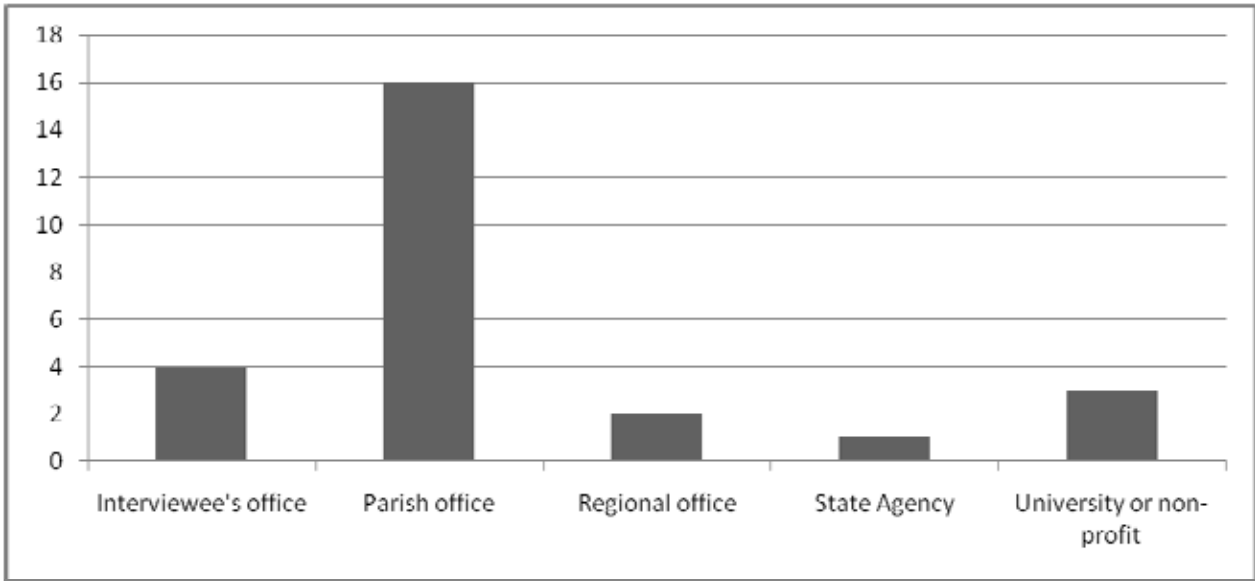


Source: Local Capability Assessment Survey, 2007

In both cases, most of those answering "no" to wanting standardized definitions and methogologies were local OHS/EP directors.

When asked where GIS data should ideally be created, housed, and maintained, a clear majority favored a parish office or clearinghouse (see Figure 7-14). The ramifications of this preference are open to some interpretation, especially in light of the low GIS-efficacy demonstrated by many of the respondents. The preference for a local source may reflect a suspicion of regional- or state-level partners, or may be a symptom off past turf battles with them. The option of "state office" in particular received a very low response.

Figure 7-14: Preference for Where GIS Data Should be Housed



Source: Local Capability Assessment Survey, 2007

The preference for a local source, however, appears to underestimate the regional- or state-level nature of many of the mitigation-relevant data sets, the difficulty of maintaining such data, and the challenges implied by creating numerous local GIS data sets that probably would not be compatible and would not be easy to aggregate for state hazard mitigation planning.

The low preference for the option of "interviewee's office" indicates that respondents recognize the cost and effort necessary to house and maintain GIS. But, the preference for a "parish office" does not seem to recognize that such an office might not be eager or able to take on those costs and efforts.

In any case, this local preference for locally housed data resources must be taken into account if and when an attempt is made to update, streamline, and/or consolidate GIS data for hazard mitigation or any other purpose.

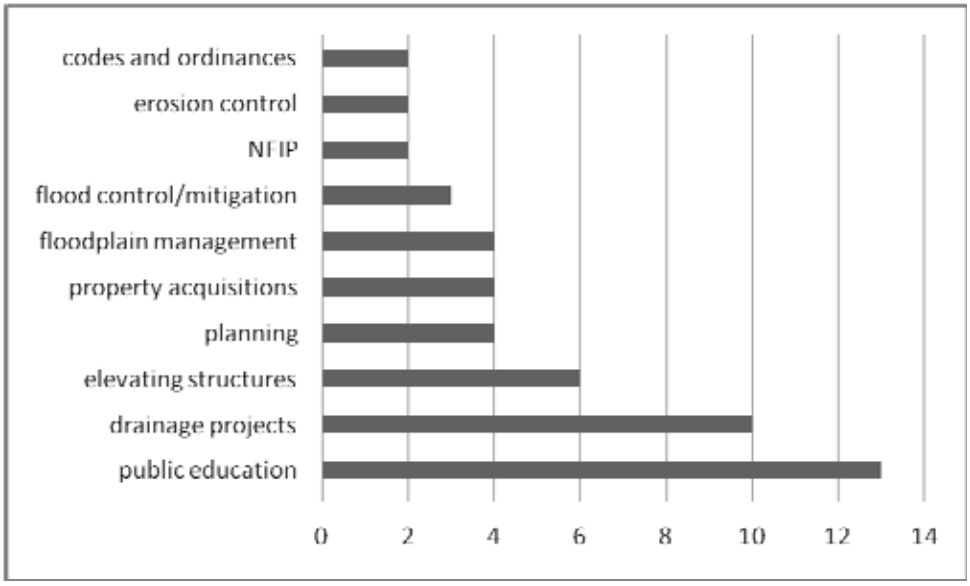
Evaluation of Existing Hazard Mitigation Planning and Programs, and Lessons Learned

Respondents to the local capability assessment survey invariably indicated that the most effective local programs were flood-related, citing some combination of:

- floodplain management,
- flood management,
- drainage projects,
- participation in the Community Rating System, and
- repetitive loss property mitigation.

Regional coordinators voiced similar assessments of relative local program effectiveness. These findings are largely consistent with those of the 2005 local capability assessment survey of the 63 OHS/EP directors (see Figure 7-15), with one major exception: public education, which had been considered by respondents to be the most effective tool, was not cited at all in the new local capability assessment survey.

Figure 7-15: Most Effective Mitigation Activities, Programs, and Projects (2005)

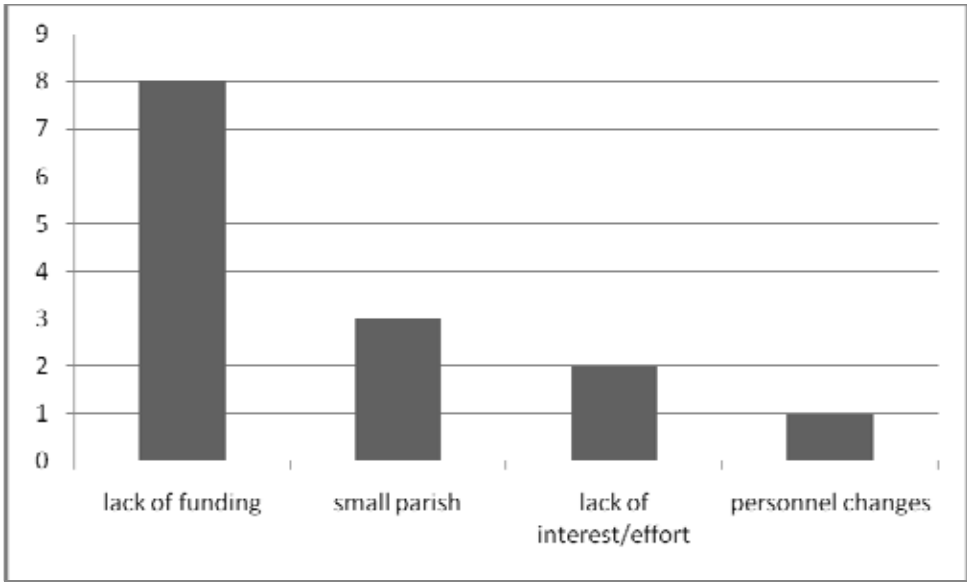


Source: State Hazard Mitigation Plan, 2005

Few local respondents to the new survey noted any less-than-effective mitigation programs, but those that did pointed to the UCC, maintenance dredging, and community education. They cited cost and lack of community feedback as the reasons for these programs' ineffectiveness.

In 2005, respondents to the comparable questions cited property acquisition as the least effective mitigation measure, but the response rate to the question was extremely low. Lack of funding was the most frequently cited reason for lack of success with mitigation programs (see Figure 7-16), although in 2005 there was, and has recently been, a large amount of Federal funding available to the State and the local communities.

Figure 7-16: Causes Cited for Ineffective Mitigation Programs (2005)



Source: State Hazard Mitigation Plan, 2005

GOHSEP is increasing public outreach in response to this discrepancy (see Section Eight). It is unclear from the new local capability assessment survey results whether GOHSEP's efforts were successful, whether the influx of funds following Katrina and Rita assuaged this particular concern, or whether the new survey merely failed to capture this data.

Respondents to the new survey stated that the following programs and policies would also be useful to implement or expand: FEMA Severe Repetitive Loss Program, public education and awareness, increased elevation or freeboard requirements, zoning, and hardening critical infrastructure. Only the first two were cited more than once.

Finally, respondents to the new survey reported having learned numerous lessons from their hazard mitigation planning experiences. One lesson was to keep a close working relationship with GOHSEP. Another was that if a contractor is selected, being sure the firm is familiar with the local terrain and involves sufficient local stakeholder input. Finally, several respondents advised ensuring that the staff tasked with hazard mitigation have sufficient time and expertise to do the job well.

Summary

Following are the main findings of the Local Capability Assessment:

- The OHS/EP, floodplain management, and building code officials interviewed typically had appropriate levels of experience and background to their posts, and on average had been in their current jobs for seven years. However, some of these offices were thinly staffed, and many responsibilities, especially in code enforcement, are being filled by contractors or third-party providers.
- A high level of GIS-access was reported, but relatively few offices maintain their own data or demonstrated a clear understanding of the potential of GIS. Most offices interviewed used GIS for emergency management. Full understanding of GIS and use of it for hazard mitigation was most common in floodplain management offices.
- All Louisiana parishes have HMPs, participate in NFIP, and are required to enforce the UCC. Most Louisiana parishes have subdivision ordinances, but only about one third of these address hazard mitigation. Meanwhile, less than one third of all parishes practice effective land-use planning and zoning, but those with zoning report that it almost always directly addresses hazard mitigation. Offices reported some level of coordination within their own governments, as well as with neighboring jurisdictions, regional entities, and state agencies. However, formal coordination between municipal/parish agencies and between neighboring jurisdictions was often reported to be weak.
- Local respondents recognized that coordinating local HMPs and the State Hazard Mitigation Plan requires standardized hazard identification categories and standardized risk assessment and loss estimation methodologies. Large majorities supported State-led standardization of these. Local respondents were wary of State management of GIS data, preferring it housed at the parish level. It is not clear from the survey whether respondents had a full appreciation for the reliability or resource issues implied by having numerous local data-clearinghouses.
- Finally, local survey respondents invariably indicated that the most effective local programs were flood-related, citing some combination of floodplain management, flood management, drainage projects, participation in the CRS, and repetitive loss property mitigation. They also called for the expansion of these programs and the addition of other flood-related mitigation measures.

Section Eight
Mitigation Action Plan

Contents of this Section

8.1 Interim Final Rule Requirement for Mitigation Action Plan

8.2 Summary of Risk and Capability Assessments

8.3 Program Integration

8.4 Goals and Objectives

8.5 Identification of Mitigation Actions

8.6 Evaluation and Prioritization of Mitigation Actions

8.7 Implementation

8.8 Funding Sources

8.1 Interim Final Rule Requirements for Mitigation Action Plan

Section §201.4(c)(3) of the Interim Final Rule (IFR) states that "[to be effective, the plan must include] the State's blueprint for reducing the losses identified in the risk assessment."

Note: The IFR refers to this "blueprint" as a "Mitigation Strategy". However, as described in Section One, the State of Louisiana uses that phrase to encompass a comprehensive array of hazard mitigation, emergency management and long term recovery planning activities and programs. The State refers to this part of the documentation as the "Mitigation Action Plan".

The IFR includes three specific requirements that relate to the development of a Mitigation Action Plan for the State of Louisiana:

- Hazard Mitigation Goals per Requirement §201.4(c)(3)(i): "[The State shall include a] description of State goals to guide the selection of activities to mitigate and reduce potential losses."
- Mitigation Actions per Requirement §201.4(c)(3)(iii): "[State plans shall include an] identification, evaluation, and prioritization of cost-effective, environmentally sound, and technically feasible mitigation actions and activities the State is considering and an explanation of how each activity contributes to the overall mitigation strategy."
- Funding Sources per Requirement §201.4(c)(3)(iv): "[The State mitigation strategy shall include an] identification of current and potential sources of Federal, State, local, or private funding to implement mitigation activities."

The Mitigation Action Plan goes beyond the minimum IFR requirements by developing a tentative timeframe for implementing these actions and determining the responsible parties for the individual actions listed below. While the Mitigation Action Plan identifies actions to be taken primarily by the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) and the State Hazard Mitigation Planning Committee (SHMPC) over time, interactions and participation by other state agencies is also considered an important part of the program.

8.2 Summary of Risk and Capability Assessments

Sections Four, Five, Six and Seven of the Plan Update indicate current conditions regarding risk and capabilities in the State of Louisiana per the best available information. The following summary is intended to help turn the results of these analyses into actions.

Summary of Risk Assessments

On a statewide basis, per the results in Section Four and Five, risk factors for some hazards are essentially equal throughout the State. For example, the risk due to lightning strikes or severe summer weather (i.e., high heat) is basically the same throughout the State. However, for many of the more significant hazards, potential effects vary in different parts of the State. This discussion divides the State into four simplified regions for purposes of summarizing key sources of risk from natural hazards (see Map 8-1):

- Coastal Parishes
- Inland Southern Parishes
- Central Parishes
- Northern Parishes

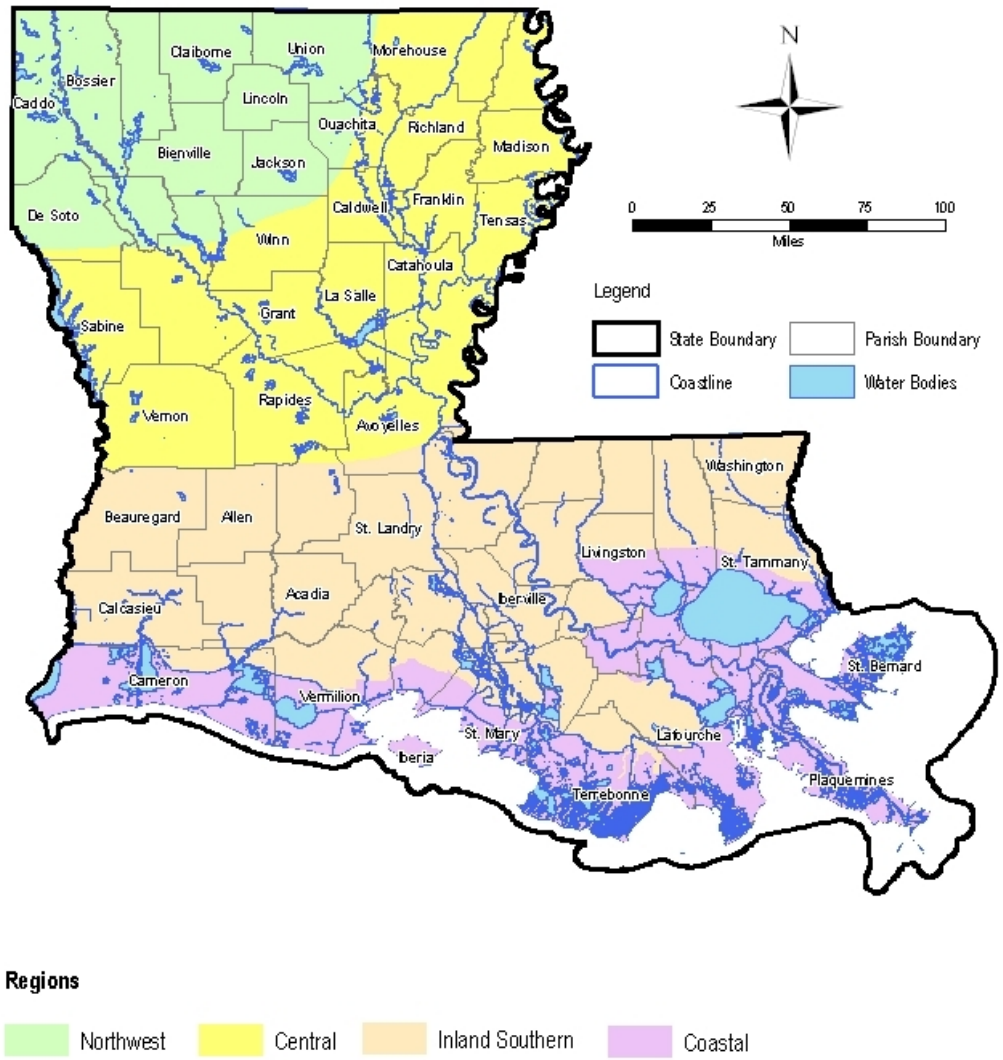
Coastal Parishes

- High risk of loss of life, injury and property damage due to inundation and wave action from storm surge caused by tropical storms and hurricanes. The largest concentrations of repetitive and severe repetitive loss properties in the State occur in the heavily populated areas in this region. Due to a variety of factors, including salt water intrusions, diversion of natural seasonal flooding, coastal erosion, subsidence and sea level rise, the extent and effectiveness of land and wetland buffers are decreasing. As a result, risk due to storm surge in existing urban areas is expected to increase.
- High risk of damage due to inundation directly from riverine and backwater flooding and failure of levees, floodwalls and forced drainage systems along the major rivers and drainage systems. Subsidence in much of this area is a significant contributing factor to an anticipated increase in exposure and risk to existing and future structures.
- High risk of direct wind damage and damage from wind borne debris in existing pre-Uniform Construction Code (UCC) structures caused by tropical storms, hurricanes and tornadoes spawned by these major storm events.
- Low risk of drought, hailstorms, ice storms, earthquakes, and wildfires.

Inland Southern Parishes

- High risk of damage due to inundation directly from riverine and backwater flooding and failure of levees, floodwalls and forced drainage systems along the major rivers and drainage systems. In some areas, subsidence is a contributing factor to an anticipated increase in exposure to existing and future structures. Future development is likely to occur in this region associated with existing urban areas and corridors between existing urban centers.
- Moderate to high risk of direct wind damage and low to moderate risk of damage from wind-borne debris in existing pre-UCC structures caused by tropical storms, hurricanes and tornadoes.
- Low to moderate risk due to drought and wildfires.
- Low risk due to hailstorms, ice storms and earthquakes.

Map 8-1: Regional Risk Assessment Summary



Central Parishes

- Moderate risk of damage due to inundation directly from riverine and backwater flooding and failure of levees, floodwalls and forced drainage systems along the major rivers and drainage systems. Urban centers have concentrations of repetitive and severe repetitive loss properties. Rural parishes in this area have relatively low concentrations of repetitive and severe repetitive loss properties. Subsidence is not considered a significant contributing factor to increased future exposure.
- Moderate risk of direct wind damage from tropical storms, hurricanes and tornadoes in existing pre-UCC structures. Risk of damage from wind borne debris due to tropical storms and hurricanes is not considered as significant in these areas, compared to coastal and inland southern parishes.
- Moderate risk due to drought and wildfires relative to other areas of state.
- Low to moderate risk due to hailstorms.
- Low risk due to earthquakes and ice storms.

Northwest Parishes

- Highest relative risk of drought, hailstorms, ice storms, severe temperatures, and wildfire.
- Low to moderate risk of damage due to inundation directly from riverine and backwater flooding and failure of levees, floodwalls and forced drainage systems along the major rivers and drainage systems. Similar to the Central Parishes, urban centers have concentrations of repetitive and severe repetitive loss properties. However, rural parishes in this region have lowest concentrations of repetitive and severe repetitive loss properties in the State.
- Low risk of direct wind damage from tropical storms and moderate risk of direct wind damage from tornadoes in existing pre-UCC structures.
- Low risk due to earthquakes.

In addition, part of the risk assessment process per the Disaster Mitigation Act of 2000 (DMA 2000) is the incorporation of information from parish and municipal hazard mitigation plans. Section Five includes summaries of relevant information from these plans but also identified a number of problems inherent in the plans that prevented full integration of hazard and risk information including a lack of consistency in:

- hazard terminology and definitions;
- data and methodologies for vulnerability assessment including identification and definitions for critical facilities;
- data and methodologies for loss estimation and risk assessment;
- goals and objectives; and
- detailed development of hazard mitigation projects.

Summary of Capability Assessments

In very general terms, emergency management officials, floodplain administrators, building officials and other stakeholders in municipalities and parishes have increasing demands placed on their time and resources due to competing initiatives from the U.S. Department of Homeland Security (DHS), GOHSEP and their own constituents. At the same time, the interest from the federal government and the State in increasing the level of effort to identify and implement meaningful hazard mitigation projects is keen. However, notwithstanding the huge spike in hazard mitigation project applications attributable to hurricanes Katrina and Rita in the last two years, the long-term support the State is currently able to provide is not sufficient to sustain the development of a large number of hazard mitigation projects to be implemented at the parish and municipal level. Regional Coordinators have been added since the April 2005 Plan approval but these positions are focused on supporting emergency response and recovery operations at the parishes. State facility managers do not have a direct connection to hazard mitigation resources within GOHSEP. When departments undertake mitigation projects, it is based on individual facility needs and budget limitations.

8.3 Program Integration

As noted in Section 1.3, the response to these varied risk factors has been development of a wide array of programs, plans, and organizations at the federal, state and local levels. Mitigation of natural and certain technological/manmade hazards as addressed in this Plan Update is one such response. As also noted in Section 1.3, the core function of this Plan Update is to provide a basic understanding of risks from natural and certain manmade or technological hazards and a consistent framework for assigning resources; through the Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grant program, Public Assistance (PA) grant program, Flood Mitigation Assistance (FMA) program, or other federal and non-federal sources, to projects, programs and policies intended to address those risks. This Plan Update concentrates on mitigating *impacts or effects* of hazards. That is to say, it mitigates the direct effects of flooding and high wind, rather than of "hurricanes."

In instances where other programs or agencies are already effectively positioned to mitigate a given hazard, especially where effective mitigation is beyond the scope of the programs and funding streams available for hazard mitigation to DMA 2000-compliant states and jurisdictions, this Plan Update acknowledges and defers to those efforts. However, in some cases, especially mitigation of coastal land loss, the scale of mitigation projects is a key consideration; small-scale measures may still be covered within this Plan Update, even if large-scale projects fall outside its scope. These related efforts fall into three broad categories:

- Decreasing the magnitude of hazards;
- Decreasing exposure to hazards; and
- Improving disaster response.

Decreasing the Magnitude or Severity of Hazards

These programs and strategies reduce the likelihood of a hazard event occurring, or reduce the severity of a hazard event such that it poses a less significant risk to public safety and property.

Coastal Protection and Restoration

The risks posed by coastal flooding and particularly storm surge hazards increase as a function of exposure. In Louisiana, exposure of population centers to these hazards is typically mitigated through planning and implementation of large-scale, physical coastal protection and restoration strategies and projects, including a combination of structural protection measures (for example, levees, floodwalls, and floodgates), and coastal restoration measures (for example, barrier island restoration, coastal stabilization, wetland protection, and wetland restoration). This Plan Update addresses mitigation of flooding from riverine or surge sources, but it does not directly address coastal protection and restoration per se. This is because (a) projects of the scale required are typically beyond the funding capacity of the hazard mitigation resources accessible as a result of DMA 2000 planning, and (b) other state and federal entities have already been tasked with the integrated planning and implementation effort required to engage these challenges.

The Office of Coastal Restoration and Management (OCRM) in the Louisiana Department of Natural Resources (DNR) currently administers most of the programs designed to conserve, restore, enhance, and manage Louisiana's coastal wetlands and other coastal resources. These activities reduce the impact of hurricane winds and surge by sustaining the health of coastal wetlands and associated habitats. Within OCRM, the Coastal Management Division (CMD) is charged with implementing the U.S. National Oceanic and Atmospheric Administration (NOAA)-funded Coastal Zone Management program in Louisiana, including issuance of Coastal Use Permits and the mitigation of unavoidable losses of wetland function and value due to permitted activities in the Coastal Zone, as well as other

support and coordination functions. OCRM's Coastal Restoration and Coastal Engineering Divisions are responsible for the construction of projects aimed at creating, protecting and restoring the state's wetlands. OCRM also oversees the beneficial use of the dredged material program, the dedicated dredging program (a marsh creation and nourishment program to assist private individuals and other agencies in restoring critical wetlands), and the Barrier Island Stabilization and Preservation Fund.

In 1989, the State Legislature established the Wetlands Conservation and Restoration Authority under Act 6. The Authority included top officials from the Division of Administration, DNR, and four other state agencies. Then, in response to the hurricanes of 2005, Act 8 of the First Extraordinary Session of the 2005 State Legislature expanded the Wetland Conservation and Restoration Authority into the Coastal Protection and Restoration Authority (CPRA) and authorized it to integrate hurricane protection and coastal restoration. The CPRA is comprised of DNR, the Department of Transportation and Development (DOTD), GOHSEP, the Governor's Office of Coastal Activities, the Division of Administration, and five other state agencies, in addition to representatives of levee districts and selected parish leaders. Act 8 also mandated the development of a comprehensive master coastal protection plan along with subsequent annual plans that establish clear priorities for activities and expenditures for coastal restoration and protection.

CPRA developed *Integrated Ecosystem Restoration and Hurricane Protection: Louisiana's Comprehensive Master Plan for a Sustainable Coast* (the "Master Plan"), which was approved by the Louisiana legislature in June 2007. The Master Plan recognizes the important role of coastal restoration as an integral strategy in hurricane and flood protection and portrays the State's vision of comprehensive protection that includes structural, management, and institutional components of short- and long-term efforts. The Master Plan is coordinated with the development of the U.S. Army Corps of Engineers (USACE)'s Louisiana Coastal Protection and Restoration plan. CPRA's Master Plan will be partially funded through three funding streams: the federal Coastal Impact Assistance Program and Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA), as well as future revenues from Outer Continental Shelf leases and other congressional appropriations.

Wildfire Mitigation and Suppression

The Plan Update includes actions to address mitigation of wildfire risk with the understanding that mitigation of wildfire hazard is an area over which an existing state agency's programs are already in place. The Plan Update intends to coordinate with these existing efforts. The Department of Agriculture and Forestry (DAF) Forest Protection Division oversees the detection and fighting of forest fires, helping to prevent property damage and loss of life, and the destruction of timber. The Forest Protection Branch administers the Federal Excess Property Program which provides trucks and other machinery at no cost to rural Louisiana fire departments. The Volunteer Fire Assistance Program provides federal cost-share funding to aid in the training and equipping of rural volunteer departments.

On the mitigation side, the Forest Protection Division also maintains the Certified Prescribed Burn Manager Program, which is designed to promote the safe and effective use of prescribed fire in the management of natural resources. Additionally, DAF regularly maintains records of fire lines plowed throughout the state. After hurricanes Katrina and Rita, with additional fuel on the ground in many areas, additional mitigation lines were installed in some areas using the resources assigned to the fire incidents. DAF's prevention personnel also work to inform landowners about maintaining defensible space around structures and are working with communities to complete Community Wildfire Protection Plans (CWPPs). Grant monies will be available for CWPP communities to contract for fuel reduction. Educating the public about mitigating dangers from wildfire is also accomplished through the Firewise program and other prevention activities.

Public, Transportation, and Environmental Safety

A range of hazards exist in the form of ambient threats to public safety, transportation, and environmental or health safety; the Plan Update does not directly address these.

- Public safety: local jurisdictions and fire districts provide day-to-day basic public-safety services, in coordination, as appropriate, with state and federal agencies, including state and federal law enforcement and the Louisiana National Guard.
- Transportation safety: the Highway Safety Commission of the Department of Public Safety (DPS) maintains transportation-safety data, works to mitigate construction, rail-crossing and other physical roadway and pedestrian hazards, and engages in public education and policy aimed at reducing drunk driving, encouraging seatbelt use, and similar risk-reduction programs. The Louisiana State Police in DPS enforce traffic laws and engage in public-safety campaigns aimed at mitigating roadway hazards.
- Environmental and food safety: Various divisions within the Department of Environmental Quality (DEQ) mitigate environmental and/or public health hazards by assessment, permitting, and remediation for factors that impact air quality, water quality, waste disposal, brownfields, and more. Additionally, various programs within DAF mitigate environmental and/or food safety hazards by inspection, prevention and/or regulation of livestock disease, food safety, pesticides, nuisance animals, and more.

Decreasing Exposure and Vulnerability to Hazards

These programs and strategies do not directly engage the hazard itself, but instead intend to reduce risk by decreasing the impact a hazard or disaster event has on public safety and property.

Critical Facilities and Infrastructure

The Infrastructure Protection Branch of GOHSEP develops and maintains a classified listing of critical infrastructure and key resources in the State of Louisiana consistent with seventeen (17) sectors defined by the US Department of Homeland Security:

- Agriculture and Food
- Defense Industrial base
- Energy
- Public Health and Healthcare
- National Monuments and Icons
- Banking and Finance
- Drinking Water and Waste Treatment Facilities
- Chemical
- Commercial Facilities
- Dams
- Emergency Services
- Commercial Nuclear Reactors, Materials and Waste
- Information Technology
- Telecommunications
- Postal and Shipping
- Transportation Systems
- Government Facilities

The Infrastructure Protection Branch provides technical assistance for preparedness, response and recovery regarding these key resources. As part of this Plan Update, it is recommended that the Branch incorporate technical support for hazard mitigation to reduce the risk of damage or loss of function to these resources in the event of a natural disaster.

Dams and Levees

Dam Safety[46]

DOTD is responsible for dam safety in Louisiana. DOTD's Public Works and Flood Control Directorate maintains Louisiana's Dam Safety Program, under which DOTD defines the minimum standards for the design, construction, operation, and maintenance of dams in the state of Louisiana. DOTD has statutory responsibility and the authority to enforce the standards of the program.

Under the program, "dam" is defined to include any embankments, impoundment structures, spillways, outlet works, and other attendant parts which impound or divert water. DOTD has authority over dams as low as six feet high, depending on the volume of water impounded.

A permit from the DOTD is required prior to construction or structural modifications of any dam. All dams permitted by DOTD must be designed by state-certified civil engineers, and the designs must conform to nationally recognized engineering standards. Once in service, the integrity of the dam must be sustained by regular maintenance, in accordance with the approved operations and maintenance document provided by the designer, which must include forms and schedules for records and documentation of inspections, maintenance procedures, and repairs. The dam's owner is responsible for certifying to DOTD that the required periodic inspections have been made and for correcting

[46] DOTD, "Dam Safety Rules and Regulations."

any deficiencies revealed during such inspections. The dam's owner must also maintain an approved Emergency Preparedness Plan, and is responsible for executing it in an emergency.

Levee and flood wall certification[47]

The planning, construction, and maintenance of structural flood-protection measures such as levees, floodwalls, and floodgates is the purview of the USACE, in cooperation with state agencies and entities including CPRA and DOTD, as well as levee districts. USACE has responsibility for certification of levees and floodwalls, though both USACE and other entities may construct such infrastructure. In order for FEMA's National Flood Insurance Program (NFIP) to recognize the protection offered by a levee and/or floodwall, the structure must be certified by USACE.

A newly-issued USACE draft Engineer Technical Letter (ETL 1110-2-570) provides a consolidated document of USACE procedures for levee/floodwall systems certification determinations in support of the NFIP. The ETL updates methods and references to current USACE practices and criteria. FEMA fully participated in the development and review of this document.

USACE and FEMA agree that the local sponsor seeking recognition of the levee system for NFIP purposes is responsible for providing certification documentation. USACE will continue to certify levees it operates and maintains. For all other levees within the USACE program, funding for operations and maintenance must be provided by the local sponsor.

Among the requirements for USACE certification:

- Levees and flood walls must meet USACE engineering specifications.
- Levees and flood walls must offer protection at the 100-year flood level.
- No certification of individual components of the system is allowed. A levee system includes all components that are interconnected and necessary to insure flood and storm damage reduction for the associated floodplain, including levee/floodwall sections, closure structures, pumping stations, culverts, interior drainage works, and system operation and maintenance.
- Emergency operations and flood warning plans are required for systems under evaluation.
- The maximum period of validity for USACE certification will be 10 years and consistent with the cycle of inspection and assessment provisions.

In the wake of the levee and flood wall failures during Hurricane Katrina, USACE began reassessing its own federal program levee systems, under the National Levee Safety Program. Since 2006, USACE has developed a national inventory database to capture information about each levee, including the location and last recorded inspection rating. Now, USACE will be assessing all of the levees in the inventory. The levees included in this initial survey will include levees that are:

- federally owned and maintained;
- federally built and locally maintained; and
- locally built and maintained and meet specified USACE standards.

The assessment is expected to take five years to complete and will begin in 2008, if funds are appropriated.

In 2006, a state Constitutional amendment phased out the old parish levee board system in Southeast Louisiana in favor of two regional boards: the Southeast Louisiana Flood Protection Authority-East, and Southeast Louisiana Flood Protection Authority-West. The regional authorities are responsible for levee construction and maintenance, levee drainage, flood protection and hurricane flood protection. The new boards must have both geographical representation and, for the first time, members with technical specialties, including hydrology, civil engineering, and geology. They also require training for members.

[47] USACE Corps Points (July 25, 2007), "Certification of Levee Systems for the National Flood Insurance Program (NFIP)"; USACE Corps Points (April 12, 2006), "Flood Data and Cost Estimates Announced for New Orleans Area Protection System"; USACE "National Levee Safety Program Fact Sheet" (2007).

Floodplain Management

The Plan Update addresses floodplain management, particularly in terms of local capability assessment, but it does so by supporting and enhancing the pre-existing framework of flood-hazard mitigation, which is built around the financial incentive of the NFIP. Local jurisdictions that participate in the NFIP must administer and enforce floodplain management, including primarily the requirement that new structures be elevated above the 100-year floodplain, or Base Flood Elevation (BFE).

Additionally, parishes wishing to be eligible to receive HMGP funds related to hurricanes Katrina and Rita were required to adopt new, post-Katrina/Rita Advisory Base Flood Elevations (ABFE) by the Louisiana Recovery Authority (LRA)[48]. The ABFEs reflected new, and typically higher, elevations for 100-year flood risk. NFIP is coordinated at the state level by the Floodplain Management Program of the DOTD Public Works and Water Resources Division, with funding from FEMA and DOTD. Statewide, all parishes participate in NFIP, and all affected jurisdictions adopted ABFEs with the exception of St. John the Baptist Parish and the incorporated municipalities of Gueydan and Erath within Vermilion Parish (Vermillion Parish adopted ABFEs).

Additionally, 37 Louisiana communities, accounting for approximately 80% of NFIP policies in the State of Louisiana, participate in the Community Rating System (CRS); an NFIP program that allows communities to lower the premiums charged to their citizens by going above minimum NFIP requirements via efforts such as public education and additional freeboard requirements. According to the program administrator, this translates into approximately $20 million in savings in policyholder premiums.[49]

Administration of BFE regulations varies by locality in quality, consistency, and enforcement mechanism/structure. Meanwhile, enforcement, capacity, and public education remain challenges for the program, and accordingly these are addressed in this Plan Update.

Building Codes

Construction codes are addressed in this Plan Update, particularly in terms of local capability assessment. The existing framework policy and regulations will be supported and enhanced. Local jurisdictions are currently charged with administration and enforcement of the State UCC, a building code adopted state-wide by the Legislature in 2005 that is consistent with the International Building Code (IBC) and International Residential Code (IRC), both developed by the International Code Council (ICC). The UCC results in structures that can withstand high winds and floods with exceptions made for certain industrial structures as well as farm and private recreational structures. UCC requirements went into effect on January 1, 2007, although the 2007 Legislature relaxed code requirements regarding work on existing one- and two-family dwellings.

This program is coordinated at the state level by the Louisiana State Uniform Construction Code Council (LSUCCC) within DPS. LSUCCC has promulgation authority for the UCC with the exception of the Plumbing Code that is enforced by Department of Health and Hospitals (DHH). Review and enforcement powers for all aspects of the UCC for private property reside at the local level. (The Office of the State Fire Marshal has no enforcement authority relative to the UCC, although it is allowed to provide plan review services at the request of local jurisdictions; the Fire Marshal does have review and construction enforcement powers related to the Life Safety Code, Americans with Disability Act accessibility guidelines, and Energy Conservation for commercial structures only, among others; it has no authority over one- or two-family dwellings or townhouses that are regulated by the UCC.) LSUCCC can initiate civil litigation for non-compliance.

LSUCCC is currently in the process of establishing intensive 30-day regional training seminars, each for 40 code officers, across the state. This training may potentially be recorded and converted into an interactive, on-line

[48] The Louisiana Recovery Authority (LRA) was created following hurricanes Katrina and Rita to manage and coordinate state mitigation, recovery, and long-term planning functions for Disaster Declarations 1603 and 1607, hurricanes Katrina and Rita, respectively. For more information on the LRA, see Section 3—Planning Process and Section 7—Capability Assessment.
[49] Cindy O'Neal, Louisiana NFIP State Coordinator, Louisiana DOTD. This figure is accurate as of December 18, 2007.

certification program. Certification and continuing education criteria under the state code officer program will be consistent with ICC guidelines.

DPS is also administering a $14 million HMGP-funded program to provide training, education and grants to communities for purchasing hardware and software in support of code implementation (potentially including e-permitting), and DPS is providing direct salary support to regional code officers who work across a number of parishes that would not otherwise be able to support a salaried building inspector position.[50]

It is important to note that construction of State or Federal owned facilities is not subject to local permitting requirements. State facilities adhere to the Louisiana Building Code which is administered by the Department of Facility Planning and Control within the Division of Administration. However, State owned facilities are required to comply with local floodplain management ordinances including adhering to BFE and freeboard requirements set by parishes and municipalities.

Insurance

Mitigation of financial losses to individuals, firms, and institutions is the role of the Louisiana Department of Insurance, which engages in public education and works directly with insurers to ensure that commercial insurance is available and affordable.

The State, though the Department of Insurance, also oversees the Louisiana Citizens Property Insurance Corporation. Louisiana Citizens Property Insurance Corporation is a non-profit, legislatively created public corporation charged to provide a residual market for residential and commercial property applicants who are in good faith entitled, but unable, to procure insurance through the voluntary insurance marketplace. Its board consists of elected officials or their designees and appointments made by the governor. It operates pursuant to a plan of operation approved by the Senate and House Committees on Insurance, and it is subject to oversight by the Commissioner of Insurance.

All parishes and many communities in Louisiana also participate in the FEMA NFIP.

Post-Katrina and Rita, limited homeowner's insurance availability and affordability have threatened to become a crisis for many individuals and firms in Louisiana, particularly in South Louisiana. This threatens to undermine South Louisiana's recovery and the whole State's economic health.

This Plan Update does not directly engage personal and business financial loss as a mitigation issue per se, but it does assess the fiscal impacts of certain mitigation measures. Moreover, while no particular portion of this Plan Update targets insurance, taken as a whole this Plan Update itself represents a mitigation measure that will directly affect insurance risk. Because actuarial insurance premiums are essentially a monetized expression of risk, the overall reduction of hazard and hazard exposure advanced in this Plan Update, through better construction techniques, sound floodplain management, participation in the NFIP CRS, mitigation of repetitive loss structures, land use reform, public education, better data management, inter-agency and intergovernmental coordination, and more, will serve to reduce risk, and hopefully increase the availability and affordability of insurance.

Long-Term Recovery Planning

Following hurricanes Katrina and Rita, the State of Louisiana, in partnership with municipalities, parishes, FEMA and a number of non-profit and philanthropic partners, launched several long-term recovery planning initiatives which typically included projects and programs with hazard-mitigation components. Recovery planning efforts included FEMA Emergency Support Function – 14 (ESF-14) long-term parish recovery planning, the Unified New Orleans Plan and City of New Orleans Recovery Plan, the LRA Louisiana Speaks Regional Plan and demonstration charrettes, and other local recovery planning initiatives. The outcomes of these efforts are integrated into this Plan Update, especially insofar as recovery projects, programs, and strategies directly engage hazard mitigation.

[50] Curt McCarty, LSUCCC Administrator

GOHSEP is managing a program called the Planning Pilot Grant Program (PPGP) that is also seeking to incorporate relevant parts of the ESF-14 recommendations. The PPGP is explained in detail in Section Nine but basically is intended to help parishes identify and document viable mitigation projects for future funding. One of the requirements of the PPGP is that parishes consider any recommendations from the ESF-14 plans that may have a mitigation component as part of the project lists.

Land Use/ Development Planning and Hazard Mitigation

This Plan Update addresses specific issues of risk assessment and hazard mitigation, and provides a framework for the application of funds to effective projects and programs. This Strategy's focused approach would benefit greatly from being integrated into a broadly coordinated framework for hazard mitigation and land-use/comprehensive planning. Such a system has been proposed as part of the LRA's Louisiana Speaks Regional Plan and the CPRA Master Plan.

Key relevant recommendations of this plan include:

- Creating an Office of State Planning that would coordinate closely with GOHSEP, CPRA, and other agencies and offices to provide technical, personnel and direct assistance to local efforts concerning zoning, comprehensive planning and hazard mitigation. (HCR 229 of the 2007 Legislative Session established a study group to recommend future action on creation of an Office of State Planning. The study group's February 2008 report recommended establishing such an office within LRA in the near term and then establishing it as an independent office in the future);[51]
- Creating Model Development Ordinances, including model regulations related to hazard mitigation, that local jurisdictions could voluntarily adopt "cafeteria"-style or as a complete Unified Development Code;
- Creating a State Conservation and Mitigation Trust Fund that would purchase development rights to environmentally sensitive and/or high-risk lands;
- Working with existing Geographic Information System (GIS) and mapping resources to create a coordinated, Internet-accessible "Louisiana Location Index" that would categorize land according to development suitability, accounting for, among other factors, hazard levels. State agencies would be able to link public investments, incentives and other programs to this Index, and local jurisdictions would be able to use it as a framework for comprehensive planning and hazard mitigation planning; and
- Requiring the development of Comprehensive Plans for parishes and municipalities above a benchmark population and/or growth rate (to be determined), including a mandatory hazard-mitigation element.

Similar to the note under "Long-Term Recovery Planning" above, the PPGP also requires that participants in the grant program seek out and include local planners in the project development process. This is intended to help integrate and coordinate planning efforts that may not have common roots but should have common goals.

[51] The Division of Administration currently has an Office of Planning and Budget (OPB), but it does not serve the purpose of the proposed Office of State Planning. The OPB has responsibility for performance-based budgeting for Louisiana's executive branch, as well as and policy development, planning, accountability, and other management services. The State Economist and State Demographer are housed in this office.

Enhancing the Response to Hazards

These programs and strategies neither reduce hazard magnitudes nor reduce exposure of public safety and property to hazards but instead aim to reduce incident severity and duration by effectively managing the disaster response.

Emergency Preparedness and Response

Emergency response is a separate phase of emergency preparedness and is distinctly different from hazard mitigation in many respects, and as such is treated as complementary to the *State Hazard Mitigation Strategy.* GOHSEP oversees emergency response plans and execution. GOHSEP's Emergency Operations Plan (EOP) and Continuity of Operations Plan (COOP) for Louisiana were revised in 2007. These plans govern all aspects of emergency preparedness and response, as well as continuity of operations and other emergency-related issues. They were developed in coordination with the Strategy, which GOHSEP also developed, ensuring internal consistency between the two plans. The EOP is consistent with the National Incident Management System (NIMS) and Incident Command System (ICS). The EOP also coordinates the activities of all state agencies and executive offices during emergency response. This also includes coordination for several highly specialized offices including, for example, the Radiological Emergency Preparedness and Response program in DEQ and the Oil Spill Coordinator's Office in the Office of the Governor.

GOHSEP also separately maintains additional topic-specific emergency-response and recovery plans, often in coordination with other agencies:

- Louisiana Shelter Operations Plan
- Peacetime Radiological Response Plan
- Disaster Recovery Manual
- State of Louisiana Terrorist Incident Plan
- Emergency Support Functions Support Plans

Additionally, GOHSEP coordinates state evacuation planning in coordination with the Office of the Governor and the Louisiana State Police in DPS. Finally, GOHSEP administers a series of preparedness grant programs through the DHS Office of Domestic Preparedness and disaster-recovery grants through the FEMA PA program, and it provides state-level oversight for DHS preparedness initiatives such as the Critical Infrastructure and Key Resources program.

Infectious Disease and Bio-Hazard Planning

Hazards of this nature were directly addressed in the April 2005 Plan. But whereas they are effectively managed and mitigated elsewhere within the state's emergency preparedness and response framework, they will not be addressed in this Plan Update.

The DHH Office of Public Health administers a wide array of emergency management planning to address infectious diseases and other heath risks. This includes public education, preparedness, response and mitigation for pandemic influenza, avian influenza (bird flu), West Nile Virus, meningitis, and other communicable diseases. The Office also addresses risks posed by food and water, including food-borne illnesses, mercury, and water quality; and it works toward the reduction of non-infectious public health threats related to behavioral or environmental factors, such as lung disease, asthma, heart disease, stroke, and diabetes. DHH also coordinates with DAF on mosquito and other disease-vector control programs, and it coordinates health-care resources in coordination with GOHSEP during emergency response.

DHH has been educating, training, and drilling employees in preparation for a potential pandemic influenza event. Continuity of Operations Plans have been written to address the assumptions that 20% to 40% of the workforce may be ill and not available to report for duty. A number of employees have been trained to assist with receiving, storing, and distributing medication and medical supplies which Louisiana will receive from the federal government. DHH has drilled with hospitals to test its plans to save as many lives as possible during the increased demand for medical services. In addition to these departmental activities, DHH continues to help plan with other state agencies and communities in its role as the state's lead agency for emergency preparedness activities regarding pandemic flu.

Catastrophic Events and Hazard Mitigation

In the aftermath of hurricanes Katrina and Rita, a special note is warranted about the catastrophic nature of some hazards faced by Louisiana. In Louisiana, some threats have the potential to cause casualties and property destruction on a truly epic scale. Although it is tempting to rush to mitigate all effects of such catastrophes, the state's responses must be measured and rational. Removing all risk posed by these hazards would be prohibitively expensive and could consume resources that might be more effectively used to mitigate other hazards, including those that are more common but less monumental.

Some of Louisiana's catastrophic hazards can simply be treated as "normal" risks. These include storm surges that overtop levees or affect areas without levee protection, such as was the case in Plaquemines, St. Bernard, Orleans, Jefferson and other parishes during Hurricane Katrina (except those places affected by levee breaches), and in Cameron, Vermilion, and other parishes during Hurricane Rita. They also include the "slow-motion" catastrophe in coastal Louisiana posed by the increased exposure of South Louisiana's population centers to hazard as the result of the combined effects of subsidence, coastal land loss, and rising global sea levels. In these cases, there is a hazard that can be identified, there is a statistical likelihood of that hazard occurring, and there is a measurable vulnerability posed by exposure of population and property to the hazard. All of this can be quantified, allowing the State to create policies and prioritize mitigation measures in the same way it acts to mitigate the effects of ice storms, riverine flooding, tornadoes, or any other normal hazard.

On the other hand, there are catastrophes in which the impact of a natural hazard is compounded by a man-made failure, making their likelihood impossible to quantify. Such events include the breaches of the levee system in and around Orleans and St. Bernard parishes during Katrina, and it would also include potential catastrophic levee or dam failures throughout the state, particularly along the Mississippi, Red, Atchafalaya, or Ouachita rivers. In these cases, a meaningful statistical likelihood of occurrence is not possible, because every event is unique, and historical occurrences have been extremely infrequent.

Reducing the risks posed by such events can be partially accomplished by use of some of the same mitigation measures as other hazards, such as buy-outs, elevation, or policies to limit development in areas deemed to be at risk. *However, decisions regarding how to allocate resources to such measures cannot be made using the standard set of rational tools, including risk assessment and benefit-cost analysis.* Meanwhile, other measures to reduce these risks require outside implementation mechanisms that are beyond the scope of the FEMA Hazard Mitigation Grant Program and similar FEMA hazard mitigation funding mechanisms which are being addressed by other hazard mitigation efforts. These include large-scale coastal protection and restoration efforts, regional watershed management efforts, and levee and dam maintenance programs. Small-scale coastal protection and restoration efforts are within the scope of HMGP funding and thus are addressed in this Plan Update.

As explained in Section One, the State has been working for more than four years to implement a Hazard Mitigation Strategy of which this Plan Update is a key part. The integrated programs and activities in Section 8.3 already have and will continue to contribute to reducing risk for the State of Louisiana. However, there is much that these programs do not address. The remaining parts of Section Eight of this Plan Update are intended to meet these needs.

8.4 Goals and Objectives

The *State of Louisiana's Hazard Mitigation Strategy* has a common guiding principle as expressed through the mission statement:

> *Louisiana's Hazard Mitigation Strategy is the demonstration of the State's commitment to reduce risks from hazards, and serves as a guide for State decision makers as they commit resources to reducing the effects of hazards.*

To help implement this Strategy and adhere to this mission statement, preceding sections of the Plan Update have been focused on identifying and quantifying the risks faced by the residents and property owners in the State of Louisiana from natural and manmade hazards. By articulating goals and objectives based on, and intended to address the risk assessment results, the Plan Update sets the stage for identifying, evaluating and prioritizing feasible, cost effective and environmentally sound actions to be promoted at the parish and municipal level and to be undertaken by the State for its own property and assets. By doing so, progress toward reducing the identified risks will be realized. For the purposes of this Plan Update, goals, objectives and action items are defined as follows:

- Goals are general guidelines that explain what the State wants to achieve. Goals are expressed as broad policy statements representing desired long-term results.
- Objectives describe strategies to attain the identified goals. Objectives are more specific statements than goals; the strategies are usually measurable and can have a defined completion date.
- Action Items are the specific steps (projects, policies, and programs) that advance a given Objective. They are highly focused, specific and measurable.

The goals and objectives were based on the findings of the Statewide Risk Assessment (Section Five), the Risk Assessment for State-Owned Assets (Section Six) and the Capability Assessment (Section Seven). The risk and capability assessments were considered together to develop a plan for risk reduction that accurately reflects available resources and abilities. The goals and objectives were also based on consideration of the relative costs and benefits to the State of Louisiana of implementing this action plan.

These goals and objectives are largely unchanged from the April 2005 Plan. In 2004 and 2005, the SHMPC identified these four goals and related objectives based on a risk assessment that has not changed dramatically in the ensuing three years. Therefore, it was not considered necessary to develop wholly new or different statements. The main difference in the current Plan Update is in Goal #3 where the emphasis has shifted to more directly address issues related to the Capability Assessment results in Section Seven. Table 8-1 (beginning on the following page) lists the goals and objectives developed by the SHMPC.

The relationship between each set of goals and objectives and the risk and capability assessments results is explained as part of Table 8-1 including a brief discussion of how these actions will contribute to overall risk reduction. Also, the cost and benefit considerations are articulated for each goal and objective.

In addition, the goals and objectives developed by the SHMPC all represent long-term commitments by the State of Louisiana. However, the implementation strategies for the various resulting mitigation actions discussed later in this section of the plan include short, intermediate and long term timeframes (see Tables 8.3 and 8.4) for implementation.

Table 8-1: State of Louisiana Hazard Mitigation Plan - Goals and Objectives

Goal 1:	The State of Louisiana will improve education and outreach efforts regarding potential impacts of hazards and the identification of specific measures that can be taken to reduce their impact.
1.1	Objectives for Statewide education and outreach efforts:
▪	Increase awareness of risks and understanding of the advantages of mitigation by the general public and local government officials.
▪	Provide information to municipalities and parishes regarding best practices for hazard mitigation project identification and implementation.
▪	Increase local government official awareness about funding opportunities for mitigation.
1.2	Objectives for education and outreach efforts for State agencies:
▪	Increase awareness of risks and understanding of the advantages of mitigation by State agency heads.

Linkage to the Statewide Risk Assessment, Risk Assessment for State-Owned Assets and Capability Assessment – Goal 1

The Risk Assessments in Sections Five and Six demonstrate that all areas of the State are vulnerable to a wide range of hazards potentially affecting all sectors of the population and economy and a long list of State-owned assets. The most potentially devastating hazards include flooding and high winds due to severe natural hazard events such as tropical storms, hurricanes and tornadoes for which there are several options available for feasible, cost effective and environmentally sound mitigation measures (see Appendix H in Volume II).

It is assumed that most parishes and State agencies comprehend the level of risk faced by the State in general terms but the Capability Assessment results in Section Seven indicate that many do not have sufficient background or experience in hazard mitigation to effectively translate that information to their own communities and identify potentially cost-effective projects. In particular, the Capability Assessment indicated that improvements could be realized in integrating hazard mitigation and land use planning, especially in areas of floodplain management and flood mitigation. The first step in this process is helping municipal officials understand this connection.

Goal 1 is intended to increase community and State agency awareness regarding the most effective mitigation measures (such as elevation, acquisition and development regulations in floodplains) that are relevant for the prevalent hazards in Louisiana. Goal 1 is also intended to bring together different groups within the community that have common interests that may not be immediately apparent.

Cost, Benefit and Risk Reduction Considerations – Goal 1

The SHMPC agreed with results in the Capability Assessment in Section Seven that indicates public education is one of the most effective actions that can be taken for all hazards prevalent in Louisiana. As detailed in Table 8-3, the costs include development, production and distribution of information and educational materials and the dedication of staff resources within relevant State departments to conduct outreach and education efforts. In many cases, such as the Plans Coordinator within GOHSEP, State Floodplain Coordinator within DOTD and the Louisiana State University (LSU) Ag Center, staff with these responsibilities already exist. There are existing State staff that have public education and outreach as part of their work tasking, so the cost has already been assumed in part by the State.

The SHMPC determined that the benefits of a comprehensive outreach and education effort will far outstrip the costs. By helping communities to better understand their risks and what they can do about them, future state and federal hazard mitigation funds can be targeted to projects that are the most cost effective and result in the highest degree of risk reduction. This determination was indirectly endorsed by FEMA in 2007 with the approval of an HMGP grant for GOHSEP for the Community, Education and Outreach Program (CEO) in the amount of $25M. The CEO was proposed in direct response to the April 2005 Plan and much of the action items related to Goal #1 will be funded by this initiative for the next three years.

Table 8-1: State of Louisiana Hazard Mitigation Plan - Goals and Objectives (continued)

Goal 2:	The State of Louisiana will improve data collection, use and sharing to reduce the impacts of hazards.
2.1	Objectives for statewide data-related efforts:
▪	Improve data available to parishes and communities for use in future planning efforts.
▪	Provide parish and municipal officials and local practitioners with educational opportunities and information regarding available tools to effectively use risk and related data.
▪	Improve integration of parish and municipal mitigation plans into the *State of Louisiana Hazard Mitigation Plan* as part of periodic monitoring, evaluating and updating of the Plan.
2.2	Objectives for data related efforts for State agencies:
▪	Improve data available to State agencies for use in future planning efforts.
▪	Improve communication of updated data and information from State agencies to GOHSEP and the SHMPC.

Linkage to the Statewide Risk Assessment, Risk Assessment for State-Owned Assets and Capability Assessment – Goal 2

The Risk Assessments in Sections Six and Seven of the April 2005 Plan and this Plan Update incorporated the best available data. However, both then and now, the SHMPC recognized that there were a number of limitations due to the quantity and/or quality of that data. For example, in Volume II, Appendix E-4: Floods, the following "data limitation" is cited regarding the Statewide Risk Assessment results for Floods:

> *"The calculation is based on a database of insurance claims, not flood losses to the community. In many communities, uninsured homes, businesses, and infrastructure are damaged in floods and the damage is not reflected in the NFIP data because no claims are made. Therefore, actual flood losses for some parishes may be higher than indicated by the NFIP claim data."*

These limitations were considered an important aspect to acknowledge and address, especially for the types of hazards prevalent in Louisiana. Per the flood risk assessment example cited above, not fully accounting for potentially hazard prone properties does not yield complete results for future decision making. In addition, at the time the April 2005 State Plan was developed, virtually no parish or municipal hazard mitigation plans were completed and no State agencies had undertaken formal hazard mitigation plans on either a department or facility specific level. As a result, there was not an opportunity for the State to gather any useful detailed information from municipal, parish or agency level plans to augment the risk assessment results or to make sure that the results of the State Risk Assessments were consistent with the experiences and information to be found at the local government level and within the various affected State agencies. As noted in Section Five, there are now approved parish level hazard mitigation plans in-place for the whole state but differences in terminology, data and methodologies used by the parishes has made it difficult to incorporate this information for this Plan Update as well. As a result, there was and still is a desire to make sure that parish and municipal officials with responsibility for developing hazard mitigation plans have access to the most effective methods for determining potential losses and risk and can do so in a way that both the State and parish officials can agree on the accuracy and utility of the results. Goal 2 is intended to address these data limitations in the risk assessment for all of the identified hazards in the State.

Cost, Benefit and Risk Reduction Considerations – Goal 2

DMA 2000 incorporates specific hazard mitigation planning requirements for municipalities and State governments. This recognizes that careful, systematic planning is a cost effective way to identify mitigation actions and projects to reduce risk; a position endorsed by the SHMPC through the development of this goal and related objectives. Similar to Goal 1, the cost of action items related to this goal and objectives over the next three years can be accomplished under the CEO program. The SHMPC concluded that the benefits from future planning efforts to update hazard mitigation plans at the State, parish and municipal levels were worth the cost and will include availability of better risk information, which will result in more effective risk reduction; FEMA's approval of the CEO application is again considered to be implied endorsement of this conclusion.

Table 8-1: State of Louisiana Hazard Mitigation Plan - Goals and Objectives (continued)

Goal 3:	The State of Louisiana will improve capabilities and coordination at the municipal, parish, regional and state level to plan and implement hazard mitigation projects.
3.1	Objectives for supporting local hazard mitigation planning and implementation of projects:
▪	Support hazard mitigation planning and project implementation at the municipal and parish level.
▪	Support increased NFIP / CRS participation.
▪	Support full and effective UCC enforcement.
▪	Support increased integration of municipal/parish floodplain management and Coastal Zone Management with effective municipal/parish zoning regulation, subdivision regulation, and comprehensive planning.
3.2	Objective for supporting state agency hazard mitigation planning:
▪	Provide information regarding techniques for state agencies to undertake detailed vulnerability and risk assessments for their own planning efforts and prioritize funding for project implementation.
3.3	Objective for integrating policies and plans:
▪	Evaluate all plans included in the *State of Louisiana Hazard Mitigation Strategy* to ensure consistency between risk assessments, policies and recommendations.
▪	Continue involvement by members of the SHMPC and the State Hazard Mitigation Planning Advisory Board.

Linkage to the Statewide Risk Assessment, Risk Assessment for State-Owned Assets and Capability Assessment – Goal 3

The substantial risk faced by the State documented in the Risk Assessments, requires a comprehensive response by all relevant and affected government agencies in planning and implementing emergency management measures and hazard mitigation projects. The results of the Capability Assessment indicated that there are limits to the capabilities of state, regional and local staff due to shortfalls in both available resources and the backgrounds and training of existing staff members. In addition, as was identified in the April 2005 Plan, multiple agencies have existing programs with hazard mitigation related components but little if any coordination occurs outside the State Hazard Mitigation Team (SHMT) and SHMPC.

The following are specific relationships between Goal 3 objectives and these assessments:

- Objective 3.1 is related to the identified flood risk and the large numbers of repetitive loss and severe repetitive loss properties in the State of Louisiana. (This strategy to mitigate repetitive loss properties and especially severe repetitive loss properties contributes to meeting Louisiana's requirements for increased federal match on Severe Repetitive Loss (SRL) and FMA grants under FEMA's Flood Mitigation Grants and Hazard Mitigation Planning Interim Rule, § 201.4(c)(3)(v).) This objective also responds to the need to improve coordination between emergency managers, floodplain coordinators, building code officials and other stakeholders to provide more efficient identification and implementation of projects. It also recognizes the need to effectively enforce and close loopholes as necessary, in programs such as floodplain management and the UCC. Finally, this objective recognizes that zoning and subdivision ordinances can be effective hazard mitigation tools, if they are meaningfully integrated with existing mitigation programs and expertise.
- Objective 3.2 is related to the extensive potential losses identified in Section Six and the need for mitigation planning efforts at those agencies.
- Objective 3.3 supports the on-going process of fully integrating the plans and documents added to the State of Louisiana Hazard Mitigation Strategy. This includes the EOP, COOP, long-term recovery plans and the CPRA (see Section 1.4) to ensure that all aspects of the hazard mitigation program benefit from broad participation by interested and affected parties.

Table 8-1: State of Louisiana Hazard Mitigation Plan - Goals and Objectives (continued)

Cost, Benefit and Risk Reduction Considerations – Goal 3

A common theme in Goals 1 through 3 is improving the ability of State and local government agencies to identify and implement feasible, cost effective and environmentally sound projects in the face of the substantial risk identified in Sections Five and Six. This requires a broad spectrum of technical support and assistance. The investment by the State or "cost" is considered relatively minimal and in most cases, consists of existing dedicated staff resources. The SHMPC believed that the benefit is the same as the DMA 2000 emphasis on planning as a cost effective method to enable risk reduction and cost effective project implementation.

Goal 4:	The State of Louisiana will continue to pursue opportunities to reduce impacts to the State's manmade and natural environment through mitigation of repetitive and severe repetitive loss properties and other appropriate construction projects and related activities.
4.1	Objective for identifying cost effective, environmentally sound and technically feasible projects:
▪	Facilitate development and administration of project applications that will meet state and Federal guidelines for funding for repetitive and severe repetitive loss properties and other appropriate construction projects.
▪	Establish mitigation project priorities on a regional, hazard specific basis.
4.2	Objectives for State-owned assets:
▪	Harden and retrofit infrastructure and critical facilities with highest vulnerability rankings.
4.3	Objectives for enhancing regulatory requirements and establishing and pursuing a legislative and regulatory reform agenda:
▪	Maintain and enhance local regulatory standards.
▪	Elicit and support efforts by federal and state legislatures to address shortcomings in existing laws, programs and administrative rules related to hazard mitigation.

Linkage to the Statewide Risk Assessment, Risk Assessment for State-Owned Assets and Capability Assessment – Goal 4

The emphasis for hazard mitigation planning is to identify hazard mitigation projects to implement. The risk assessments in Sections Five and Six identify a significant risk for all parishes in the State for the range of identified hazards. In addition, Appendix H in Volume II identifies what the SHMPC recommends as the best practices for mitigating these specific identified hazards. For projects to be implemented at the municipal and parish level, the State of Louisiana's role, beyond the technical support related to Goals 1 through 3, is largely administrative. Helping communities identify projects and develop applications that can be approved for funding are key parts of those duties. The State can provide leadership and guidance by identifying priority projects based on the types of exposure and risk that exist in different parts of the State and by using these priorities in allocating resources when they become available. GOHSEP is currently administering the Planning Pilot Grant Program that is a direct result of following through on this goal and objectives. The program is focused on identifying projects that address the prevalent hazards from the Statewide Risk Assessment and the risk assessment results of the local planning efforts. In addition, as part of the overall State of Louisiana Hazard Mitigation Strategy, GOHSEP developed *Volume IV - Administrative Guidelines and Procedures.* In Section Eight: Project Eligibility of Volume IV, GOHSEP has identified the criteria it will use in evaluating projects including Subsection 8.1 – Federal Criteria wherein the selection criteria for projects is grounded in federal regulations including the requirement to meet benefit-cost criteria.

Also, Objective 4.2 was developed in response to the need to address mitigation of critical facilities and infrastructure at risk in the State – per Section Six and Volume II, Appendix F.

Table 8-1: State of Louisiana Hazard Mitigation Plan - Goals and Objectives (continued)

Finally, Objective 4.3 reflects refinements in the Plan where it was identified that more effective mitigation would only be possible with changes to current rules, regulations and laws at the State and federal levels.

Cost, Benefit and Risk Reduction Considerations – Goal 4

The SHMPC considered that the marginal cost of GOHSEP staff providing technical and administrative support for the identification and implementation of projects will be a cost effective approach.

8.5 Identification of Mitigation Actions

As identified in Section 8.1, the Mitigation Action Plan focuses on actions to be taken by GOHSEP and the SHMT. While other agencies and organizations are referenced in the discussion that follows, specific commitments by agencies other than GOHSEP must be secured as part of the process of implementing the Plan Update. It is also important to note that many of the mitigation actions identified below are activities (education, training, facilitating, etc.) as opposed to "bricks and mortar" projects. As such, demonstrating cost effectiveness is difficult. The costs can be quantified but the specific benefits are more ephemeral. In addition, while Goal #4 is clearly focused on supporting the development and implementation of cost effective projects, the Plan does not identify projects to implement in specific locations or situations. However, all of the activities in this Mitigation Action Plan will be focused on helping municipalities, parishes and State agencies in developing and funding projects that are not only cost effective but also meet the other DMA 2000 criteria of environmental compatibility and technical feasibility.

Goals and objectives from Section 8.4 are repeated below and a Plan of Action is described for each objective. It is also important to note that the actions listed below are considered by GOHSEP and the SHMT as the appropriate steps to meet their goals and objectives. However, it will clearly take more than three years, the planning horizon identified in DMA 2000, to implement the listed actions even under the best of conditions. Therefore, the SHMPC undertook a process to prioritize and schedule these actions by defining a logical sequence and identifying realistic expectations of what will be possible in the next three years. As a result, the entire list is established and recorded for future reference as the Plan is updated and refined over time.

It is important to note that many references are made in Section 8.5 to "parishes", "municipalities" and "state agencies". As noted earlier in this document, these are terms of convenience in writing this type of document and are not meant to exclude any eligible parties.

For example:

- Federally recognized tribes have clear rights to receive direct assistance for planning and implementation of projects. However, since tribes in Louisiana have typically participated in parish hazard mitigation planning efforts in a manner similar to municipalities, they are not explicitly mentioned each time; and
- Public universities and other higher educational institutions in the State of Louisiana are considered as state agencies for the purposes of this plan and will be eligible and encouraged to participate in all relevant facets of the implementation of the Plan Update.

Table 8-2: Identification of Mitigation Actions

Goal 1:	The State of Louisiana will improve education and outreach efforts regarding potential impacts of hazards and the identification of specific measures that can be taken to reduce their impact.
1.1	Objectives for Statewide education and outreach efforts:
▪	Increase awareness of risks and understanding of the advantages of mitigation by the general public and local government officials.
▪	Provide information to municipalities and parishes regarding best practices for hazard mitigation project identification and implementation.
▪	Increase local government official awareness about funding opportunities for mitigation.

Plan of Action to address Objective 1.1:

A. Support start-up and implementation of the CEO program and institutionalize practices for after the completion of CEO. The CEO is a three-year project intended to provide information to a broad audience that may include residents, business owners, potential property buyers, visitors and government officials about hazards, hazardous areas and mitigation techniques they can use to protect themselves and their property.

Specific action items include:

i. Continue efforts started under Capability Assessments for the Plan Update to define the audience and its needs regarding increased awareness and the definition of preferred methodologies for risk assessment and mitigation planning.

For example, one specific issue that needs to be addressed by either CEO or long-term GOHSEP outreach efforts based on the Capability Assessment is facilitating a connection between local land-use/community planning offices, parish and local Office of Homeland Security/Emergency Preparedness (OHS/EP) directors, and other Stakeholders. Once the Louisiana Office of State Planning (OSP) is stood up within LRA per the recommendations of the February 2008 recommendations of the Office of State Planning Task Force, and eventually as an independent agency, it will be important to include OSP staff in CEO efforts to make sure that at a minimum, any technical support provided by an OSP includes appropriate treatment for hazard mitigation considerations both in terms of mitigating existing critical and essential functions and for avoiding future risk. (See Section 8.3 for more information on the status of the Office of State Planning.) Eventually, if there is a statewide requirement for land-use planning, it is recommended that hazard mitigation be considered as an integral and required element of those plans.

ii. Develop and implement a staffing plan for GOHSEP that would support continuing statewide education and outreach efforts. Per the summary analysis in Section Seven, current staffing levels at GOHSEP would not be able to meet time commitments for an increased public education and outreach effort without additional staff positions. In addition, GOHSEP will determine and periodically refine funding needs to address statewide education and outreach efforts.

iii. Identify existing public information resources and programs conducted by other state agencies related to hazard mitigation. By doing this, GOHSEP and the CEO would be able to ensure that all relevant aspects of hazard mitigation are covered in a statewide public information program, capitalize on efforts that have already been initiated, and avoid duplication of efforts. Examples of on-going efforts for specific hazards include:

- For Flood – the *Louisiana Floodplain Management Desk Reference* developed by DOTD in cooperation with FEMA, and the LouisianaFloods.org website hosted by the LSU AgCenter; and

- For Coastal Issues – DNR and allied efforts to develop public awareness regarding this issue via the America's Wetlands campaign, outreach efforts through CWPPRA, the Louisiana Sea Grant Program, and DNR's Coastal Management Division, and USACE Louisiana Coastal Area *Ecosystem Restoration Study*.

iv. Explore options and create tools to use in education and outreach efforts including:

- Existing state websites, toll-free "hot-line" information services, Public Service Announcements, speaker series, demonstration events, insurance and real estate disclosures, and training;
- Presentations at regularly scheduled events that attract target audiences (e.g., the annual conference of local EMA directors, the Louisiana Association of Floodplain Managers, etc.);
- Periodic video tele-conferences to provide updates and general training for broad audiences;
- Identifying mitigation options for flood insurance policyholders as part of notification requirements under the Flood Insurance Reform Act of 2004; and
- Facilitating the connection between OHS/EPs both between and within parishes and other Stakeholders to foster the sharing of information. For example, there are typically different agencies within each parish that have responsibilities for floodplain management, building code enforcement, local land use planning, etc.

v. Identify and solicit support and participation by other state agencies and parties that may have an interest in public education and outreach efforts for selected hazards and/or an established method for communicating this type of information to address other gaps in the program. Examples of non-state agencies with access to parishes and communities throughout the state include the Louisiana Association of Planning and Development Districts, the Police Jury Association, the Louisiana Municipal Association.

vi. Work with Public Information Officer(s) within GOHSEP and other state and local agencies to develop and distribute a common message to accompany public education and outreach efforts related to hazard mitigation. The basic theme of this message would be to develop public awareness of a full range of hazards, to identify common resources and methods to address these hazards, and to provide state agency and interested party contacts for further information. The intent is to take advantage of as many avenues as possible to impart useful information to the public and to make sure the efforts of state agencies are as coordinated as possible. The intent is not to develop a "one size fits all" information program that all state agencies would have to use and apply in all situations. One "kick-off" possibility would be to sponsor a contest among school age groups and/or interested parties to develop a "catch phrase" to use in hazard mitigation outreach efforts. The contest could include development of a poster or web posting that would show how the phrase could be used as a backdrop for different mitigation-related messages.

vii. Develop and distribute materials to partner agencies and interested parties to support delivery of the message including website postings, presentations, brochures, posters, etc.

viii. Periodically seek feedback from partner agencies and interested parties to determine needs for additional information, and alternative methods to reach additional audiences (e.g., school programs, university degree programs in planning, etc.). Note: This will be most effective if a baseline level of understanding of basic mitigation concepts and available resources is determined at the outset of the education and outreach efforts.

1.2 Objectives for education and outreach efforts for state agencies:

- Increase the awareness of risks and understanding of the advantages by mitigation of state agency heads.

Plan of Action to address 1.2 Objectives for education and outreach efforts for state agencies:

B. Develop and implement an "internal" state agency mitigation education and outreach program (parallel to the public education and outreach program under Plan of Action A.). The first step will likely need to include outreach to state agency heads as identified in Objective 1.2, as well as the development of a financial incentive for the participation of State agencies and facility managers in taking on what may be perceived as an additional burden in terms of planning and reporting (see related objectives and action items under Goals #3 and #4). This coordination effort may also eventually include identifying means to address information related to hazard mitigation within existing state agency programs. Currently, there is no consistent statewide effort focused on hazard mitigation, but it will be possible to augment existing internal departmental communications to include this information. Potential examples of this include:

i. Develop and implement a staffing plan for education and outreach efforts with state agencies.[52] Part of the staffing plan for GOHSEP (as identified under Plan of Action A) should include ongoing training to increase capabilities of individual staff and to stay abreast of current programs and policies. These training sessions should also be available to members of the SHMPC.

ii. Conduct follow-up interviews of State Agencies that were contacted as part of the Section Seven Capability Assessment to determine interest and specific needs for continuing education and outreach efforts.

iii. Solicit and secure participation by state agencies that are not already member agencies on the SHMT or represented on the SHMPC (especially those identified in the Plan as having critical facilities at risk), including establishing points-of-contact and preferred methods for future exchanges of information.[53]

iv. Establish a mechanism to provide the results of the Risk Assessment for State-Owned Assets (per Section Six and Volume II, Appendix F) in a "real-time" format to reflect continuing data updates.

v. Develop and conduct training with state facility managers regarding recommended procedures for "ground-truthing" information (see related information under the Plan of Action D under Goal 2) to participating state agencies. Procedures should be supported by "job-aids" that could include reference materials, assessment criteria, and checklists for buildings and State-owned assets.

vi. Work with State agencies to identify existing plans and planning efforts that could be enhanced through integration with the State Hazard Mitigation Planning updates.

vii. Develop and implement an internal training program within GOHSEP for the Infrastructure Protection Branch to facilitate integration of hazard mitigation into existing technical assistance offered by that Branch to owners and operations of identified critical infrastructure and key resources.

[52] As part of the same effort identified under Action Item A.ii., et al.

[53] This process has already been initiated as described in Section 3.3 - Coordination among Agencies and Interested Parties.

Goal 2:	The State of Louisiana will improve data collection, use and sharing to reduce the impacts of hazards.
2.1	Objectives for statewide data-related efforts:
▪	Improve data available to parishes and communities for use in future planning efforts.
▪	Provide parish and municipal officials and local practitioners with educational opportunities and information regarding available tools to effectively use risk and related data.
▪	Improve integration of parish and local mitigation plans into the *State of Louisiana Hazard Mitigation Plan* as part of periodic monitoring, evaluating and updating of the Plan.

Plan of Action to address 2.1 Objectives for statewide data enhancement efforts:

C. Define and implement appropriate institutional arrangements for collection, use and sharing data for parishes and municipalities. One of the basic concepts behind DMA 2000 requirements is the sharing of data between states and local governments to enrich planning at both levels. Although much has been accomplished, there are still a number of data deficiencies indicated in the Plan that limit the utility of parish and state planning efforts. To address these limitations in the most cost effective way, this plan of action builds on previous efforts as much as possible and looks for opportunities for gathering data that will prove useful to a wide range of users.

Section 7.3 identifies different institutional arrangements under the heading "Technical Capability and GIS/Data Management for Hazard Mitigation" and provides an initial evaluation of these alternatives. As noted in Section Seven, the challenge at this point is to determine the right combination of organizations and roles to gain the most efficient long-term delivery of the information and technical support. It is crucial that this combination ensure consistency in results among the various parishes and municipalities.

However, it is unlikely that we will be able to determine with absolute certainty the best way to proceed without discussions with potential partners including the intended audience (responding to sensitivities identified among the parishes about third party "control of data"). For the purposes of the Plan Update, it will be sufficient to identify these options (assuming that these outcomes are all acceptable to GOHSEP and the SHMPC) and lay out the course by which GOHSEP and participants in the CEO will help define what might make sense for the next three years (while the CEO is funded) and after.

Specific action items include:

i. Develop and implement a staffing plan for statewide data improvement efforts.[54] In addition, as part of subsequent steps in this plan of action, determine and periodically refine funding needs to address specific data deficiencies.

ii. Provide common definitions and preferred methodologies for use by State, regional, parish and municipal officials regarding hazards, assets (e.g., critical facilities), risk assessments, loss estimations, goals and objectives and projects types. This is seen as an important first step as it is difficult to communicate effectively about complex data issues without a common vocabulary and will be used in subsequent action items iv., v., and vi.

It should be noted that some of the assumptions that underpin some risk assessment methodologies employed in this Plan Update may need to be revisited. In previous sections, differences in opinion regarding specific interpretations of data have been identified. For example, there is not clear agreement yet on rates to use for actual design purposes related to subsidence. In addition, members of the State Hazard Mitigation Planning Advisory Board (SHMPAB) and SHMPC noted that, for

[54] As part of the same effort identified under Action Item A.ii. et al.

example, the relative risk assessments for some parishes for surge or levee failure hazards may not fairly capture the risk faced by those places. Because the risk assessment in this Plan relied on estimated losses, parishes with relatively lower total property values by definition rank lower.

This means that a parish such as Plaquemines, which has relatively little total property value compared with other parishes and thus less *exposure*, ranks lower for risk from storm surge, despite the fact that the absolute risk of surge to Plaquemines Parish is extreme. Similar issues were identified by participants in the capability assessments in Section Seven for some parishes along the Mississippi River levees that have low total property values, but could be at extreme risk from a levee failure. As risk assessment methodologies are further refined and developed in consultation with other stakeholders, these issues must be explored and resolved.

iii. Work with parish and municipal officials to make sure that all parties understand what data already exists or will be available for their use within reasonable timeframes. One example of flood-related data that will be available soon is work by the University of New Orleans that was on-going as this Plan Update was developed. This work, funded by FEMA, is intended to create a comprehensive GIS and database of repetitive loss properties in the State of Louisiana.

As part of this effort, it will be important to explain what can and cannot be done with specific data. For example, parish officials already have access to some lists of repetitive loss properties within their jurisdictions. This includes information about property owners that is considered confidential under the Privacy Act. If municipal officials do not place the proper restrictions on access to certain parts of this information, they can seriously diminish the effectiveness of future efforts to acquire or pursue mitigation for these properties.

(This action to mitigate repetitive loss properties and especially severe repetitive loss properties contributes to meeting Louisiana's requirements for increased federal match on SRL and FMA grants under FEMA's Flood Mitigation Grants and Hazard Mitigation Planning Interim Rule, § 201.4(c)(3)(v).)

iv. Encourage parish and municipal officials to continue the process of validating or "ground-truthing" components of the Plan Update, including its data, methodologies, and results. For example, efforts were made to correlate lists of critical facilities between the April 2005 Plan and parish plans currently being updated as part of the Planning Pilot Grant Program. However, difference in definitions and terminology made that process difficult (see item C.ii. above). The process could be conducted by the appropriate public entity, private sector, or academia, or a combination of all three.

The planning process to date has used existing information effectively. However, to provide the best results for reducing the impact of natural and manmade hazards over time, it is important to enlist the help of municipal officials to:

- Validate and improve wherever possible on the study methodology;
- Disseminate and collect information from municipal governments and other State agencies; and
- Support the process of identifying appropriate eligible mitigation projects at the parish level and within other State agencies.

For example, per Section Five (and Volume II, Appendix E), the Hazards U.S. – Multi Hazard (HAZUS-MH) local critical facilities inventory was currently the best data available to the State to conduct a statewide risk assessment of the potential impacts on these facilities. However, this data was assembled "second hand" from available data listings that can quickly become outdated. To attain more useful results for future assessments, it is recommended that the data be reviewed and verified by local governments as they undertake plan updates in the future to ensure that the information used in this and subsequent Plan Updates reflects:

- whether critical facilities that are in the HAZUS-MH data base still exist;

- the existence of facilities that have been recently constructed (that may not show up in records used to compile the HAZUS-MH database);
- accurate georeferenced locations (i.e., latitude and longitude) of critical facilities if available; and
- other relevant attributes (e.g., first floor elevations of structures that are prone to flooding).

At the same time, it would be possible to encourage local governments to collect additional information in a uniform and consistent manner, because collection of data via local planning processes should be a key source for statewide databases. The "ground-truthing" efforts could entail site visits, or if the local governments already had an up-to-date list of facilities with the address and cost (hopefully as part of their parish or municipal level mitigation planning efforts), their mapping software could be used to determine a geographic location without the need of re-collecting the data. Similar to Action Item B.iii, GOHSEP could support the process by providing templates of data-collection forms that include guidance for issues to look for based on the types of hazards.

Potential means of coordinating statewide "ground-truthing" efforts could include the following:

- Web site portal – Encourage Louisiana state agencies with responsibility for data management to develop a data portal for entering and exchanging data about critical facilities. This would result in the dynamic population of data that could be used in risk assessment models without the need for significant manipulation and/or reformatting of the data.

  GOHSEP could send correspondence to the local governments to explain the purpose and intended outcomes, the process for downloading existing data for their parish, preferred means to ground-truth the data, and the process to upload/enter the data into the portal. The web site would include helpful information about the overall process and existing data (e.g., year collected/updated, projection, etc.). This could also be part of a system whereby the municipalities access data from the state. The highest degree of success might be achieved by introducing the web site and its operation by conducting a workshop with local governments to explain the process. To hold down costs and use resources most efficiently, this could be done at a routinely scheduled state workshop or a series of area coordinator meetings.
- Written correspondence – Send a letter and CD-ROM with existing critical facilities data to each parish with an explanation of the process. Request that each parish ground-truth their data and e-mail it to a central point of contact at the State who would have responsibility for compiling all of the data into a State-owned or maintained database.

v. Provide and support data management training for parish and municipal officials in concert with general education and outreach efforts under Plan of Action A. For example, FEMA has recently developed a Risk Assessment Workshop that is targeted to municipalities that desire useful risk assessment results but that do not have high capabilities or extensive data sets. GOHSEP should work with FEMA Region VI to have the workshop delivered for targeted municipalities and to seek training for GOHSEP staff and other interested parties (such as local planning and engineering firms) to conduct subsequent trainings.

vi. Integrate data from local risk assessments into future updates of the Plan. Sections 9.3 and 10.2 of the Plan include specific steps that the GOHSEP and SHMT will undertake in working with parishes and municipalities to evaluate and integrate information from municipal plans into the Plan Update to be in compliance with DMA 2000 requirements.

viii. Continue efforts to obtain improved data for use in future updates of the State Hazard Mitigation Plan.

Consistent with this Action Plan, GOHSEP's CEO project is currently finalizing a scope of work for data management and interface with the National Incident Management Systems and Advanced Technologies (NIMSAT) at the University of Louisiana at Lafayette (ULL). The ULL project would use surveys and interviews with stakeholders to develop:

- A validated database of historical disasters, indexed by address, zip code, and/or census tract.

- A statewide "Risk Index" based upon the above data and valid, uniform risk assessment methodologies
- A web portal offering general public and business access,
- A secure-access web portal for governmental stakeholders (development version), and
- Ongoing support including communications, data management, tutorials, and web-hosting.

2.2 Objectives for data related efforts for state agencies:

- Improve data available to state agencies for use in future planning efforts.
- Improve communication of updated data and information from state agencies to GOHSEP and the SHMPC.

Plan of Action to address 2.2 Objectives for data related efforts for State agencies:

D. Support implementation of a coordinated approach to data collection, use and sharing for State agencies to validate and disseminate results of the Risk Assessment for State-owned Buildings, Critical Facilities and Infrastructure. This effort would parallel efforts to validate and disseminate the Statewide Risk Assessment results, described in Plan of Action C. For example, the critical facilities in Louisiana with the ten highest combined loss estimates for each hazard as summarized in Section Six (and detailed in Volume II, Appendix F) should be ground-truthed to determine if the loss-estimate methodologies are reasonable and to gather more detailed information to help facility managers and the State of Louisiana determine what the best course of action will be in terms of mitigation (and to support development and delivery of training under Plan of Action item B.v, above).

i. Develop and implement a staffing and funding plan for data improvement efforts with State agencies.[55]

ii. Encourage State agency heads and facility managers to "ground-truth" data and results from the Plan. The processes and methodology for identifying and profiling hazards and determining the loss of function for State-owned facilities has been detailed in Section Six and Volume II, Appendix F. The methodology provided the State with a ranking for all facilities that had previously been identified as critical in the State's Facility Management database. Using the criticality for each structure, along with vulnerability to a particular hazard, loss of function, physical damage, and content damage, the SHMPC determined the facilities with the highest loss estimates for each hazard and the combined loss estimates for all hazards. Once determined, a list was generated that will allow the State to not only identify individual facilities at risk, but assign priorities for future mitigation actions. This list will give the State a defined agenda on which structures should be investigated to see if the overall process and methodologies are sound.

Better data will improve the process. "Data" can include many things in this case, such as:

- An updated Facility Management database with accurate information that has been verified by the State, including confirmation of actual ownership and/or responsibility for each facility;
- Improved information about a given hazard, such as accurate flood data for the State that will help determine the base flood elevation for a given structure;
- Base map data, such as contours and soils;
- Hazard histories for individual facilities;
- First floor elevations (for flood-prone properties);
- Physical location (i.e., to position the structure or asset relative to known hazard boundaries, latitude and longitude data are preferable to street addresses);
- Number of stories;
- Roofing material;
- Exterior façade;

[55] As part of the same effort identified under Action Item A.ii. et al.

- Building use and function; and
- Digital photos of structure and surroundings.

Once this information is collected for each facility, and stored in a database such as the Facilities Management database, the SHMT and/or the facility staff can use this information to validate the original risk assessment results and identify and prioritize possible mitigation actions for facilities clearly at risk.

Note: It may not be practical due to resource limits to secure all the desired data in one step. It may prove more effective to add a few data fields each year for each facility, starting with the more important aspects like physical location and gradually build up an improved data record. As mentioned in preceding plans of action, GOHSEP can provide effective technical support via "job-aids" to help capture the right information and enable consistent data entry.

iii. Support a centralized data repository accessible to state and local agencies as well as interested parties. The Louisiana Geographic Information System Council (LGISC) has been working toward a similar end for all data related issues in the State. GOHSEP, as a voting member of LGISC, can request that LGISC establish regular procedures for receiving more detailed information from State agencies that can be used in required regular updates to the Plan (see Section Ten).

However, much like the proposed work with municipalities and parishes, the desired long-term result is to help position individual state agencies and facility managers to maintain their own information and plans regarding their own facilities. Since GOHSEP and the SHMT have some responsibility for oversight and coordination of these data collection efforts (per the requirements of DMA 2000) to maintain eligibility as a "Standard" program and to attain and maintain "Enhanced" status, they can help to identify desired types of information to LGISC so that provisions can be made in terms of database development and maintenance by the appropriate State agency.

This effort should also include ensuring that the definitions used for various data are as consistent as possible. For example, in determining the physical locations of State-owned structures, it may be most effective to use the same procedures for determining longitude and latitude as the work at the University of New Orleans to develop its repetitive loss property database.

Key types of information that have already been identified include:

- Records of disaster damages;
- Spatial locations for specific facilities;
- Status and details regarding mitigation projects (this is related to on-going efforts by GOHSEP to establish a database to track progress and status of Federally funded mitigation grants – see Administrative Guidelines and Procedures in Volume IV).

(This action to mitigate repetitive loss properties and especially severe repetitive loss properties contributes to meeting Louisiana's requirements for increased federal match on SRL and FMA grants under FEMA's Flood Mitigation Grants and Hazard Mitigation Planning Interim Rule, § 201.4(c)(3)(v).)

Goal 3:	The State of Louisiana will improve capabilities and coordination at the municipal, parish, regional and state level to plan and implement hazard mitigation projects.
3.1	Objectives for supporting local hazard mitigation planning and implementation of projects:
▪	Support hazard mitigation planning and project implementation at the municipal, parish, and multi-parish level.
▪	Support increased NFIP / CRS participation.
▪	Support full and effective UCC enforcement.
▪	Support increased integration of local/parish floodplain management and Coastal Zone Management with effective municipal/parish zoning regulation, subdivision regulation, and comprehensive planning.

Plan of Action to address 3.1 Objectives for supporting parish and municipal mitigation planning:

E. Provide technical support to municipalities, parishes, or groups of parishes for on-going and continuing municipal hazard mitigation planning efforts. All Louisiana parishes have completed the first round of DMA 2000 compliant multi-jurisdictional and municipal hazard mitigation plans, and a significant number are engaged in the PPGP developing updated plans and enhanced mitigation strategies.

As noted, the current plans have a number of areas in which improvements can be made. GOHSEP and the SHMT will need to keep the municipalities and parishes focused on improving any deficiencies in their plans and on implementing the appropriate recommendations in a manner consistent with related aspects under Action Items A and C, as well as the implementation of the CEO.

Note: Technical support should identify issues that cross local planning responsibilities and ensure that all training and technical support is done in ways that do not create conflicts, but rather that cover and integrate as many exigencies as possible. For example, municipal and parish efforts during "normal" hazard mitigation planning to account for assets that are at-risk would be of benefit in the wake of disaster; these assets could then be adequately repaired or replaced (with adequate mitigation) in the event of damage from a disaster. Long-term recovery planning is another area with potential overlaps with both hazard mitigation planning and land use planning, and it should therefore be included in future plan updates.

Specific action items include:

i. Develop a staffing plan that maintains adequate levels of GOHSEP support for planning-related technical support and training activities.

ii. Work with municipalities and parishes that have received FEMA approval for their plans to diligently monitor, evaluate and update their mitigation plans over the next five-year cycle[56].

GOHSEP should pursue municipal plan updates on a rotating basis (e.g., 10-to-15 parish or multi-parish plans would come up for review and formal update each year). This will allow the State to spread funding and resource demands out over time, but it would also require that some parishes undertake an update and review of their plan before the five year "expiration date" of their approval from FEMA.

Technical assistance should be provided to any jurisdiction that could be an eligible Subgrantee for federal grant programs, but the State should only support funding applications for planning support at the parish level or above (regional or state agency funding).

[56] Although DMA 2000 requires the State Plan to be updated and reapproved every three years, municipal and/or parish plans are only required to be updated and reapproved every five years.

Protections will need to be instituted in the planning process to protect interests of both the parishes and individual municipalities, including requiring that funding applications be accompanied by a letter from the Parish Hazard Mitigation Planning Committee and guidance regarding the acceptable membership on such a committee.

That is to say, hazard mitigation planning should not be done by and for the parish as a *political unit*, but rather by and for the parish as a *geographical unit comprised of a number of political entities*.

iii. Identify and encourage parishes and municipalities that would benefit most from increased participation in the NFIP to do so. For example, the results of the Statewide Risk Assessment in Section Five and Volume II, Appendix E can be used to identify parishes at relatively high risk to floods that are either non-participants in CRS or have low CRS rankings.

iv. Continue to encourage parishes to prioritize mitigation of repetitive loss properties and especially severe repetitive loss properties, making use of existing and new data sources described elsewhere in this document (see Plan of Action D, above). (This action to mitigate repetitive loss properties and especially severe repetitive loss properties contributes to meeting Louisiana's requirements for increased federal match on SRL and FMA grants under FEMA's Flood Mitigation Grants and Hazard Mitigation Planning Interim Rule, § 201.4(c)(3)(v).)

v. Encourage parishes to expand their hazard mitigation planning and implementation efforts to include all relevant local parties, including OHS/EP offices, floodplain managers, building offices, Coastal Zone Management offices, land-use/community planning offices, and others; as well as partnering with neighboring jurisdictions.

vi. Encourage and support parishes to increase preparations to effectuate compliance with NFIP requirements concerning substantial damage during disaster recovery situations including making grants available to fund parish and municipal efforts in this regard.

Eligible activities could include: research of construction costs and market values, initial set-up of estimating software, site inspections of damages, notifications to property owners about permitting requirements, processing substantial damage determinations and notifying property owners, processing appeals of such determinations, issuing permits to rebuild and/or demolish, site inspections for compliance, record keeping; or hiring a contractor to do the same activities.

As part of the support activities, GOHSEP will prepare template applications for HMGP funding and work with the NFIP State Coordinator to make sure parish and local floodplain administrators are adequately prepared for future disaster recovery.

3.2 Objective for supporting State agency hazard mitigation planning:

- Provide information regarding techniques for State agencies to undertake detailed vulnerability and risk assessments for their own planning efforts and prioritization of funding for project implementation.

Plan of Action to address 3.2 Objective for supporting State agency hazard mitigation planning:

F. Provide technical support to state agencies for on-going and continuing mitigation planning. State agencies can be subgrantees under hazard mitigation grant programs such as HMGP and Pre-Disaster Mitigation Competitive Grant Program (PDM-C), and they can develop their own agency-specific DMA 2000 compliant plans that can be treated as annexes to this Plan Update. To require this of all State agencies would place an unjustifiable demand on time for both the agencies and GOHSEP. However, for the larger institutions and/or agencies with multiple facilities at risk, this may be an efficient way to address their specific needs.

i. In addition to improving the flow of data as described in Plan of Action D., additional follow-up training and technical support should be provided to interested State agencies to help them develop, maintain and implement hazard mitigation plans for their facilities. This support can take the form of:
   - helping State agencies prepare HMGP and PDM planning grant applications (see Volume IV of the State of Louisiana Hazard Mitigation Strategy, the Administrative Guidelines and Procedures);
   - sharing existing data and methodologies; and
   - providing plan reviews at key milestones in the process.

ii. Pursue the designation of 5% Initiative funds as part of Implementation Strategies for post-disaster HMGP funding (see Administrative Guidelines and Procedures in Volume IV). 5% Initiative funds would be used for an established list of funding needs (e.g., efforts identified in Plan of Action E.vi. to effectuate compliance with NFIP requirements concerning substantial damage during disaster recovery situations or for presentation materials for public outreach efforts per Plan of Action A) that could be met by relatively small set-asides in the total hazard mitigation funding.

3.3 Objective for integrating policies and plans:

- Evaluate all plans included in the *State of Louisiana Hazard Mitigation Strategy* to ensure consistency between risk assessments, policies and recommendations.
- Continue involvement by members of the SHMPC and the SHMPAB.

Plan of Action to address 3.3 Objective for integrating policies and plans:

G. Conduct follow-up activities to engage members of the SHMPC and the SHMPAB in a review of planning and implementation activities under their jurisdictions and responsibility. These activities would include interviews, focus group meetings and/or video tele-conferences to review identified overlapping areas of concern and to review all documents to confirm consistency in hazard identification, profiling, risk assessment methodologies and results, policies and key recommendations.

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

4.1 Objective for identifying cost effective, environmentally sound and technically feasible projects:

- Facilitate development and administration of project applications that will meet State and federal guidelines for funding for repetitive and severe repetitive loss properties and other appropriate construction projects.
- Establish mitigation project priorities on a regional, hazard specific basis.

Plan of Action to address 4.1 Objective for identifying cost effective projects and prioritizing (or ranking) them according to cost-effectiveness:

H. Work with municipalities, parishes and State agencies to identify, fund and implement cost effective projects to mitigation repetitive and severe repetitive loss properties and other appropriate risks, and to prioritize (or rank) them according to cost-effectiveness. One of the main purposes of the DMA 2000 was to improve the quality of hazard mitigation projects funded by the federal government. In this context, "quality" is virtually synonymous with "cost effectiveness."

i. In addition to mitigation of repetitive and severe repetitive loss properties, indicate preferred regional (based on discussion in Section 8.2) and specific project types that address hazards identified in the Plan.

Volume II, Appendix H (Recommended Practices for Mitigation in the State of Louisiana) provides detailed descriptions of recommended mitigation actions that parishes and municipalities should undertake to work with the State in achieving the goals and objectives in general terms. Further distinctions between regions are needed and will be developed as part of this task.

Current top priorities include, but are not limited to:

- Repetitive and severe repetitive loss properties from both Coastal and Riverine Flood studies including prioritizing parishes with highest bulk numbers or highest ratios per preferred criteria (e.g., repetitive losses per capita in a parish). It is important to note that establishing the mitigation of repetitive and severe loss properties as a top priority is consistent with the goals of FEMA's SRL, FMA, and Repetitive Flood Claim programs and continues progress made to date in mitigating these issues. (This action to mitigate repetitive loss properties and especially severe repetitive loss properties contributes to meeting Louisiana's requirements for increased federal match on SRL and FMA grants under FEMA's Flood Mitigation Grants and Hazard Mitigation Planning Interim Rule, § 201.4(c)(3)(v).)
- Limiting forced drainage solutions to areas where levees or floodwalls are already in place and supporting planning and non-structural solutions in areas where engineered systems have been relied on heavily in the past.
- Hardening critical facilities (as determined by municipal and parish governments but using common definitions to be developed in cooperation with GOHSEP and possibly via the CEO) to withstand rated wind speeds per the UCC.
- Parishes and municipalities may also be encouraged to develop programs and projects that may *not* qualify for HMPG or satisfy federal Benefit Cost Analysis (BCA) criteria, but that serve a compelling community interest; funding for such programs and projects must also be sought out.

In this compendium of successful techniques, there are alternatives for mitigation actions that must be evaluated by each community for each situation to determine the best choice. However, the listing and background information indicate to the communities what the State perceives as choices that are most likely to be successful.

ii. Provide education at the local level regarding project application "best practices" (which correlates with action items already described for Goals 1 and 2). Education and training should reflect on-going improvements by GOHSEP to the mitigation grant project application review and approval processes (which are documented in Volume IV) including project review criteria that respond to the results of the Plan Update for pre-disaster funding and as developed at the time for post-disaster funding as part of disaster specific implementation strategies. Consistent with the desire for increased quality, the education efforts at the local level should be centered on:

- how to prepare HMGP and PDM-C grant applications (including development of standard definitions and more consistency in the information required for applications per comments made by parish and municipal officials during the Capability Assessments); and
- how to determine a benefit-cost ratio consistent with FEMA guidance. Over time, this will provide communities with a better pre-application assessment of how likely projects are to be funded, and it will result in improved success rates for Louisiana communities when competing nationally for pre-disaster mitigation funding.
- establishing education and outreach on improved cost-estimation data and methodologies;
- on-line training, including (but not limited to): hazard mitigation grant programs' funding availability, project eligibility and application procedures; building code enforcement information regarding UCC provisions and specifications.

- direct technical support and outreach to improve coordination of emergency management and regulatory officials (including floodplain coordinators, building officials, and planning-and-zoning staffs and commissions).

4.2 Objectives for State-owned assets:

- Harden and retrofit infrastructure and critical facilities with highest vulnerability rankings.

Plan of Action to address 4.2 Objective for identifying cost effective projects for State-owned assets and prioritizing (or ranking) them according to cost-effectiveness:

I. Support efforts by State agencies to identify and pursue hazard mitigation projects for at-risk State-owned assets and critical infrastructure, and prioritize (or rank) them according to cost-effectiveness (see related item under State Legislative Agenda items below). Plan of Action D includes encouraging State agencies to ground-truth the list of ranked critical facilities identified in Section Six of the Plan Update. Part of the purpose is to lead to good candidate sites for hazard mitigation projects. GOHSEP will also work with these agencies to encourage them to set priorities for hazard mitigation actions, beyond simply identifying the sites with the highest potential losses per the Plan Update methodology. These priorities would include:

- Using the University of New Orleans' results combined with the State building data per the Facilities Management database to determine where State buildings occur within clusters of repetitive loss properties. (This action to mitigate repetitive loss properties and especially severe repetitive loss properties contributes to meeting Louisiana's requirements for increased federal match on SRL and FMA grants under FEMA's Flood Mitigation Grants and Hazard Mitigation Planning Interim Rule, § 201.4(c)(3)(v).)
- Pursue wind-load hardening and retrofitting of critical facilities south of Interstate I-10 as the highest priority.

Other related work efforts by GOHSEP that should be considered as part of this Plan of Action include:

- Continue work to coordinate this Plan Update's recommendations with future Emergency Management Accreditation Program updates;
- Pursue cross-training arrangements and Memoranda of Understanding with other agencies and/or states to provide assistance in the wake of disasters.
- Use of the best possible cost-estimation data and methodologies;
- Help State agencies prepare HMGP and PDM planning grant applications.

As part of the process of working with State agencies, the following methodology is proposed to identify hazard mitigation projects for State-owned at risk facilities (in addition to ground-truthing per Plan of Action D):

Facility managers of top ten facilities as identified in Section Six will be asked to complete the following:

1. A worksheet requesting facility specific data which can either be completed online via a web portal, or printed out with the data later entered into the portal. This worksheet should require no more than two (2) hours to complete.
2. A hazard specific worksheet requesting additional information (e.g., past damages for hazard events) which can either be completed online via a web portal, or printed out with the data later entered into the portal. Facilities which appear on multiple lists may be required to complete more than one worksheet. However, there may be significant overlap regarding the data needs and the overall time requirement should not be excessive. These worksheets should require no more than four hours to complete assuming that accurate records have been kept.

3. Photographs of certain building components and equipment. A list will be provided and photographs can be uploaded onto the web portal. These photographs should require no more than three hours.
4. Photographs of previous damages, if available, may also be uploaded onto the web portal.
5. Additional information may be provided by facilities managers at their discretion, also via the online portal.

Facility managers may be requested to provide additional information. The worksheets will be designed to gather relevant information necessary to support applications to seek federal hazard mitigation funding for identified mitigation measures and decide which measures are appropriate.

In addition, GOHSEP will develop and conduct training for facility managers which will assist them in the identification of potential hazard mitigation activities and projects. This will be offered across the state, and will not focus solely on facilities identified within the top ten lists. Measures highlighted will range from those which carry a low cost and can be easily completed, to those which may require state or federal funding. Training materials will include a power point presentation, worksheets, and additional reference materials. The course will be offered in Baton Rouge, but will also be available in an online format via the web portal.

4.3 Objectives for enhancing regulatory requirements and establishing and pursuing a legislative agenda:

- Maintain and enhance local regulatory standards.
- Elicit and support efforts by federal and State legislatures to address shortcomings in existing laws and programs related to hazard mitigation.

Plan of Action to address 4.3 Objective for enhancing regulatory requirements and establishing a legislative agenda:

J. Support and pursue legislative agendas at all levels of government:

i. Support adoption, implementation and enforcement of higher regulatory standards at the municipal and parish level by developing and delivering technical assistance focused on improving the way municipalities and parishes approach hazard mitigation. Municipalities have multiple potential points of contact with hazard mitigation in their communities. Other objectives under this goal address how communities pursue hazard mitigation directly through their own construction projects. This objective and plan of action address the ways communities can improve the manner in which future development occurs including:

- Promote adoption and enforcement of comprehensive planning, zoning (i.e., land development regulations at the municipal/parish level), sensitive area protection ordinances (e.g., for wetlands) and floodplain ordinances, including integration of municipal/parish Hazard Mitigation Plans as required elements.
- Establish local requirements for development permitting-review processes for wetlands (similar to requirements for Coastal Zone, but for all wetlands).
- Establish local freeboard requirements for construction in areas with significant (to be defined) subsidence rates, such that during the useful life of a building (e.g., as defined by FEMA BCA standards) no increased risk should be encountered.

ii. State legislative agenda items including:

- Provide funding for non-federal share of projects; Educate the State Legislature to establish a State Hazard Mitigation Fund that would provide a state source of pre-disaster hazard mitigation funding to supplement Federal and local sources. Louisiana statutes prohibit State funding for certain

types of projects on private property, unless there is an overriding public interest[57]. However, there are myriad needs for funding public entities' hazard mitigation needs that such a fund would help satisfy.

- Establish incentives for participation by State facility managers in risk assessment and hazard mitigation planning and project implementation in the form of rebates on insurance premiums from the Office of Risk Management.
- Address the need for refinements or corrections in the UCC legislation (Act 12) including:
  - Regulation of additions and improvements to existing structures;
  - Regulation of appurtenances not in the original footprint associated with mobile homes;
  - Refining the definition of "recreational structures" to exclude habitable year-round dwellings;
  - Refining the definition of "work area" such that extensive alterations, renovations, and repairs are covered, even if less than 50% of the total area is involved in the projects (See Appendix J of the IRC); and
  - Resolving confusion in wording that implies that commercial properties under the NFIP are not covered by the UCC.
- Establish a state freeboard requirement for construction in areas with significant (to be defined) subsidence rates, such that during the useful life of a building (e.g., as defined by FEMA BCA standards) no increased risk should be encountered.
- Establish a state requirement for a development permitting-review process for wetlands (similar to requirements for Coastal Zone, but for all wetlands).
- Establish incentives for parishes and municipalities to use accurate benchmark data and/or surveying procedures for elevation certificates, especially in areas that are subject to subsidence.

iii. Support the following federal legislative agenda items:

- Require flood insurance policies for properties protected, and thereby removed from the regulatory floodplain, by levees and floodwalls or forced drainage systems.
- Enforce flood insurance rate increases for property owners that refuse mitigation funding.
- Develop and enforce actuarial-based flood insurance rates for non-primary residential structures.

[57] Article VII, Section 14 of the Louisiana Constitution of 1974.

8.6 Evaluation and Prioritization of Mitigation Actions

DMA 2000 requires an evaluation of cost effectiveness, environmental soundness and technical feasibility and designation of priorities for implementation. This is not entirely practical for a "strategic plan" like this one, but these aspects of these actions were nevertheless considered for this Plan Update. As explained in Section 8.2 and Table 8.1, the SHMPC developed all of the goals, objectives and resulting plans of action in direct response to results of the risk and capability assessments. Generally, the approach that resulted from the identified goals and objectives is applicable to any particular hazard and the recommended practices identified in Appendix H of Volume II are all hazard-specific. However, for the purposes of DMA 2000, the Consultant Team evaluated the environmental soundness and technical feasibility of the Plans of Action. The results are show in Table 8-3.

Table 8-3: State of Louisiana Hazard Mitigation Plans of Action Evaluation Results – Environmental Soundness and Technical Feasibility

Plan of Action Item	Description	Goal / Objective	Environmental Soundness	Technical Feasibility
A.	Statewide Education and Outreach.	1 / 1.1	N/A	N/A
B.	Education and Outreach for State Agencies.	1 / 1.2	N/A	N/A
C.	Statewide Data-Related Efforts.	2 / 2.1	N/A	Y (2)
D.	Data-related Efforts for State Agencies.	2 / 2.2	N/A	Y (2)
E.	Technical Support for Parish and Municipal Hazard Mitigation Planning.	3 / 3.1	N/A	Y (2)
F.	Technical Support for State Agencies Hazard Mitigation Planning.	3 / 3.2	N/A	Y (2)
G.	Plan Integration.	3 / 3.3	N/A	N/A
H.	Identifying Cost Effective Projects with Parishes and Municipalities.	4 / 4.1	Y (1)	Y (3)
I.	Identifying Cost Effective Projects with State Agencies.	4 / 4.2	Y (1)	Y (3)
J.	Legislative and Regulatory Enhancements.	4 / 4.3	N/A	N/A

The opportunity for loss reduction considerations in Table 8-3 include three designations:

- "Y" which indicates the Consultant Team considered the Plan of Action to be environmentally sound or technically feasible. Note: these designations were made with additional notations as follows:
  1. The Plan of Action involves supporting development of project applications by Parishes and Municipalities or State Agencies. That activity is considered "not applicable" but technical assistance will stress the need for identifying projects that are environmentally sound.
  2. The technical capability exists within the state agencies involved to carry out this activity.
  3. The Plan of Action involves supporting development of project applications by Parishes and Municipalities or State Agencies. That activity is considered "not applicable" but the technical assistance provided will stress the need for identifying projects that are technically feasible.
- "N" which indicates the Consultant Team considered the Plan of Action to be unsound from an environmental perspective or technically infeasible. Note: The Mitigation Action Plan did not include a Plan of Action that was considered by the Consultant Team to be either unsound from an environmental perspective or technically infeasible.
- "N/A" which indicates that the Consultant Team considered the criteria did not apply due to the nature of these activities.

In addition, the opportunity for loss reduction as an expression of cost-effectiveness on a relative basis was assessed by the SHMPC (see Table 8-4 below) .The SHMPC also identified priorities for implementation based on an examination of the available resources or "costs" to the State and the agency versus the urgency and potential contribution of each plan of action to risk reduction or "benefits" to the residents, property owners and business community in the State.

Table 8-4: State of Louisiana Hazard Mitigation Plans of Action Evaluation Results – Cost Effectiveness and Prioritization.

Plan of Action Item	Description	Goal / Objective	Opportunity for Loss Reduction	Priority
A.	Statewide Education and Outreach.	1 / 1.1	H	2
B.	Education and Outreach for State Agencies.	1 / 1.2	M	7
C.	Statewide Data-Related Efforts.	2 / 2.1	H	3
D.	Data-related Efforts for State Agencies.	2 / 2.2	M	8
E.	Technical Support for Parish and Municipal Hazard Mitigation Planning.	3 / 3.1	H	5
F.	Technical Support for State Agencies Hazard Mitigation Planning.	3 / 3.2	M	9
G.	Plan Integration.	3 / 3.3	M	10
H.	Identifying Cost Effective Projects with Parishes and Municipalities.	4 / 4.1	H	1
I.	Identifying Cost Effective Projects with State Agencies.	4 / 4.2	H	6
J.	Legislative and Regulatory Enhancements.	4 / 4.3	H	3

The opportunity for loss reduction considerations in Table 8-4 include three designations:

- "H" which represents the highest relative potential for loss reduction;
- "M" which represents moderate relative potential for loss reduction; and
- "L" representing the lowest relative potential for loss reduction.

The Mitigation Action Plan did not include a Plan of Action that was considered by the SHMPC to have a low potential for risk reduction.

The ranking of the Plans of Action according to priority were as follows:

Table 8-5: State of Louisiana Hazard Mitigation Plans of Action – Ranked by Priority

Plan of Action Item	Description	Priority
H.	Identifying Cost Effective Projects with Parishes and Municipalities.	1
A.	Statewide Education and Outreach.	2
C.	Statewide Data-Related Efforts.	3
J.	Legislative and Regulatory Enhancements.	3
E.	Technical Support for Parish and Municipal Hazard Mitigation Planning.	5
I.	Identifying Cost Effective Projects with State Agencies.	6
B.	Education and Outreach for State Agencies.	7
D.	Data-related Efforts for State agencies.	8
F.	Technical Support for State Agencies Hazard Mitigation Planning.	9
G.	Plan Integration.	10

8.7 Implementation

This Section includes:

- Implementation of Mitigation Plans of Action. Table 8-6 includes entries for:
  - ✓ Goal / Objective Addressed
  - ✓ Summary Description
  - ✓ Hazard(s) Addressed (in response to the hazards identified in Sections Five and Six)
  - ✓ Responsible Organization / Staff
  - ✓ Supporting Organizations
  - ✓ Staffing Requirements
  - ✓ Estimated Costs
  - ✓ Funding Source
  - ✓ Timeframe / Loss Reduction Potential
  - ✓ Priority Ranking
- Table 8-7: Summary of Mitigation Plans of Action
- Tentative Timetable. This timetable makes a distinction between Plans of Action work efforts that are "Initial / Concentrated Efforts" such as developing and implementing staffing plans and "Sustained / Intermittent Efforts" that will be carried out over a long time frame as needed and appropriate. In very general terms, the priorities for the Plan Update are based on first addressing mitigation actions related to the non-construction (or programmatic) aspects of the Plan Update and then focus attention increasingly on construction activities which have the highest potential for risk reduction.

Table 8-6: Implementation of Mitigation Plans of Action

Plan of Action A: Statewide Education and Outreach

Goal / Objective addressed	Goal 1. / Objective 1.1
Summary Description	Support start-up and implementation of CEO Program
Hazard(s) addressed	All
Responsible Organization / Staff	GOHSEP / State Hazard Mitigation Officer (SHMO)
Supporting Organization(s)[58]	SHMT, SHMPC, Governor's Office, partner agencies and organizations already in place and to be identified as part of initial phases of CEO program
Staffing Requirements per year (average over the life of the Plan)[59]	1.50 Full Time Employees (FTE)
	Are staff available at present: ❑ Yes ☑ No[60]
Estimated Cost (if applicable)	No capital costs are anticipated (that are not already funded as part of CEO; only identified staff requirements are needed
Funding Source[61]	CEO initiative has been funded by HMGP.
	Is funding in place: ☑ Yes ❑ No
Timeframe / Loss Reduction Potential	Long term (Note: CEO was funded for a three (3) year duration) / High
Priority Ranking	2

Plan of Action B: Education and Outreach for State Agencies

Goal / Objective addressed	Goal 1. / Objective 1.2
Summary Description	Develop and implement State agency education and outreach program
Hazard(s) addressed	All
Responsible Organization / Staff	GOHSEP / SHMO
Supporting Organization(s)	SHMT, SHMPC, Governor's Office
Staffing Requirements per year (average over the life of the Plan)	0.50 FTE
	Are staff available at present: ❑ Yes ☑ No
Estimated Cost (if applicable)	Graphic production services $ 5,000.
Funding Source	Expenses for graphic production of education and outreach materials will be funded by a / general operating funds / and HMGP 5% Initiative.
	Is funding in place: ❑ Yes ☑ No Funding to be identified in operating budgets and/or disaster declarations.
Timeframe / Loss Reduction Potential	Long term / Moderate
Priority Ranking	7

[58] Designations of supporting organizations other than SHMT and the SHMPC for all Plans of Action should be considered tentative pending confirmation of available staff and level of interest among indicated agencies.

[59] See "Summary Evaluation of Mitigation Action Plans" at the end of Table 8-5 for a summary of staffing requirements for Plan Update implementation.

[60] See "Summary Evaluation of Mitigation Action Plans" at the end of Table 8-5 for a discussion of current and proposed GOHSEP planning staff levels.

[61] "Funding Source" refers to "Estimated Cost" only. "Staffing Requirements" are funded by combination of State Management Costs from federal mitigation grants (75% federal) and general operating funds for GOHSEP (25% non-federal).

Table 8-6: Implementation of Mitigation Plans of Action (continued)

Plan of Action C: Statewide Data-Related Efforts

Goal / Objective addressed	Goal 2. / Objective 2.1
Summary Description	Develop and implement hazard data management program for parishes and municipalities
Hazard(s) addressed	All
Responsible Organization / Staff	GOHSEP / SHMO
Supporting Organization(s)	SHMT, SHMPC, Parish and municipal OHSEPs and Stakeholders, other potential end users
Staffing Requirements per year (average over the life of the Plan)	0.50 FTE
	Are staff available at present: ❑ Yes ☑ No
Estimated Cost (if applicable)	No capital costs are anticipated; only identified staff requirements are needed
Funding Source	Not applicable
	Is funding in place: ❑ Yes ❑ No ☑ N/A
Timeframe / Loss Reduction Potential	Intermediate / High
Priority Ranking	3

Plan of Action D: Data-Related Efforts for State Agencies

Goal / Objective addressed	Goal 2. / Objective 2.2
Summary Description	Develop and implement hazard data management program for State agencies
Hazard(s) addressed	All
Responsible Organization / Staff	GOHSEP / SHMO
Supporting Organization(s)	SHMT, SHMPC, Department of Administration, LAGISC, DOTD, State Agencies, other potential end users
Staffing Requirements per year (average over the life of the Plan)	0.50 FTE
	Are staff available at present: ❑ Yes ☑ No
Estimated Cost (if applicable)	No capital costs are anticipated; only identified staff requirements are needed
Funding Source	Not applicable
	Is funding in place: ❑ Yes ❑ No ☑ N/A
Timeframe / Loss Reduction Potential	Intermediate / Moderate
Priority Ranking	8

Table 8-6: Implementation of Mitigation Plans of Action (continued)

Plan of Action E: Technical Support for Parish and Municipal Hazard Mitigation Planning

Goal / Objective addressed	Goal 3. / Objective 3.1
Summary Description	Increase hazard mitigation planning and implementation capability for parishes and municipalities
Hazard(s) addressed	All
Responsible Organization / Staff	GOHSEP / SHMO
Supporting Organization(s)	SHMT, SHMPC, Parish and municipal OHSEPs, Stakeholders
Staffing Requirements per year (average over the life of the Plan)	1.50 FTE
	Are staff available at present: ❑ Yes ☑ No
Estimated Cost (if applicable)	No capital costs are anticipated; only identified staff requirements are needed
Funding Source	Not applicable
	Is funding in place: ❑ Yes ❑ No ☑ N/A
Timeframe / Loss Reduction Potential	Long term / High
Priority Ranking	5

Plan of Action F: Technical Support for State Agencies Hazard Mitigation Planning

Goal / Objective addressed	Goal 3. / Objective 3.2
Summary Description	Increase hazard mitigation planning and implementation capability for State agencies
Hazard(s) addressed	All
Responsible Organization / Staff	GOHSEP / SHMO
Supporting Organization(s)	SHMT, SHMPC, State Agencies
Staffing Requirements per year (average over the life of the Plan)	0.50 FTE
	Are staff available at present: ❑ Yes ☑ No
Estimated Cost (if applicable)	No capital costs are anticipated; only identified staff requirements are needed
Funding Source	Not applicable
	Is funding in place: ❑ Yes ❑ No ☑ N/A
Timeframe / Loss Reduction Potential	Long term / Moderate
Priority Ranking	9

Table 8-6: Implementation of Mitigation Plans of Action (continued)

Plan of Action G: Plan Integration

Goal / Objective addressed	Goal 3. / Objective 3.3
Summary Description	Improve integration of hazard mitigation related aspects of State policies and plans
Hazard(s) addressed	All
Responsible Organization / Staff	GOHSEP / SHMO
Supporting Organization(s)	SHMT, SHMPC, DNR, DOTD, CRPA, LRA, and other agencies identified during implementation
Staffing Requirements per year (average over the life of the Plan)	0.50 FTE
	Are staff available at present: ❑ Yes ☑ No
Estimated Cost (if applicable)	No capital costs are anticipated; only identified staff requirements are needed
Funding Source	Not applicable
	Is funding in place: ❑ Yes ❑ No ☑ N/A
Timeframe / Loss Reduction Potential	Long Term / Moderate
Priority Ranking	10

Plan of Action H: Identifying Cost Effective Projects with Parishes and Municipalities

Goal / Objective addressed	Goal 4. / Objective 4.1
Summary Description	Identify, fund and implement repetitive and severe repetitive loss property and other appropriate hazard mitigation projects with parishes and municipalities
Hazard(s) addressed	All, with priority for Flood (Repetitive and Severe Repetitive Loss Properties) and High Wind (Critical Facilities and Infrastructure)
Responsible Organization / Staff	GOHSEP / SHMO
Supporting Organization(s)	SHMT, SHMPC, Parish and municipal OHSEPs, Stakeholders
Staffing Requirements per year (average over the life of the Plan)	1.00 FTE
	Are staff available at present: ❑ Yes ☑ No
Estimated Cost (if applicable)	No capital costs are anticipated; only identified staff requirements are needed
Funding Source	Not applicable
	Is funding in place: ❑ Yes ❑ No ☑ N/A
Timeframe / Loss Reduction Potential	Long term / High
Priority Ranking	1

Table 8-6: Implementation of Mitigation Plans of Action (continued)

Plan of Action I: Identifying Cost Effective Projects with State Agencies

Goal / Objective addressed	Goal 4. / Objective 4.2
Summary Description	Identify, fund and implement hazard mitigation projects with State agencies
Hazard(s) addressed	All, with priority for Flood (Repetitive and Severe Repetitive Loss Properties) and High Wind (Critical Facilities and Infrastructure)
Responsible Organization / Staff	GOHSEP / SHMO
Supporting Organization(s)	SHMT, SHMPC, State Agencies
Staffing Requirements per year (average over the life of the Plan)	0.25 FTE
	Are staff available at present: ❑ Yes ☑ No
Estimated Cost (if applicable)	No capital costs are anticipated; only identified staff requirements are needed
Funding Source	Not applicable
	Is funding in place: ❑ Yes ❑ No ☑ N/A
Timeframe / Loss Reduction Potential	Long Term / High
Priority Ranking	6

Plan of Action J: Legislative and Regulatory Enhancements

Goal / Objective addressed	Goal 4. / Objective 4.3
Summary Description	Support and pursue legislative agendas at municipal, parish, State and federal levels
Hazard(s) addressed	All
Responsible Organization / Staff	GOHSEP / SHMO
Supporting Organization(s)	SHMT, SHMPC
Staffing Requirements per year (average over the life of the Plan)	0.25 FTE
	Are staff available at present: ❑ Yes ☑ No
Estimated Cost (if applicable)	No capital costs are anticipated; only identified staff requirements are needed
Funding Source	Not applicable
	Is funding in place: ❑ Yes ❑ No ☑ N/A
Timeframe / Loss Reduction Potential	Long term / High
Priority Ranking	3

Table 8-6 includes designations of "Staffing Requirements per year", averaged over the life of the implementation of the Plan Update. These designations are all referring to GOHSEP staff. The total commitment represented in Table 8-6 is 7.00 FTE or the equivalent of seven (7) full time positions per year. This is based on the following staffing plan:

- (1) Plans Coordinator / Manager
- (1) Senior Planner
- (4) Planner
- (1) CEO Coordinator.

Job descriptions for all seven positions are provided as part of the State of Louisiana Administrative Plan (Volume IV of the State of Louisiana Hazard Mitigation Strategy). These staffing projections do not include contracted services that are currently being provided by James Lee Witt Associates as those services are specifically related to the development and implementation of the PPGP.

As of the date of the Plan Update, two (2) of these positions are filled; the Plans Coordinator / Manager and the CEO Coordinator. GOHSEP is anticipating that the other five positions will be filled within six months.

Table 8-7: Summary Evaluation of Mitigation Plans of Action

Action Items	Staffing in place?	Funding in place?
A. Statewide Education and Outreach	No	Yes
B. Education and Outreach for State Agencies	No	No
C. Statewide Data-Related Efforts	No	N/A
D. Data-related Efforts for State Agencies	No	N/A
E. Technical Support for Parish and Municipal Hazard Mitigation Planning	No	N/A
F. Technical Support for State Agencies Hazard Mitigation Planning	No	N/A
G. Plan Integration	No	N/A
H. Identifying Cost Effective Projects with Parishes and Municipalities	No	N/A
I. Identifying Cost Effective Projects with State Agencies	No	N/A
J. Legislative and Regulatory Enhancements	No	N/A

Tentative Timetable

The specific order and sequencing of action items to be implemented as a result of this Plan Update over the next three years are identified in the following tentative timetable.

	Plan Year One				Plan Year Two				Plan Year Three			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
A. Statewide Education and Outreach												
A.i. Define audience												
A.ii. Staffing plan												
A.iii. Identify existing resources/programs												
A.iv. Create tools												
A.v. Identify / solicit support												
A.vi. Work with PIO's												
A.vii. Develop / distribute materials												
A.viii. Feedback												
B. Education and Outreach for State Agencies												
B.i. Staffing plan												
B.ii. Follow-up interviews												
B.iii. Identify / solicit support												
B.iv. Data management mechanism												
B.v. Develop / conduct training												
B.vi. Plan integration efforts												
B.vii. Infrastructure Protection Branch												
C. Statewide Data-related Efforts												
C.i. Staffing plan												
C.ii. Definitions and methodologies												
C.iii. Identify available data												
C.iv. Validate Plan Update results												
C.v. Develop / conduct training												
C.vi. Integrate data w/ 2011 Plan Update												
C.vii. Continue data gathering												
D. Data-related Efforts for State Agencies												
D.i. Staffing plan												
D.ii. Contact agency heads / managers												
D.iii. Centralized data repository												

	Plan Year One				Plan Year Two				Plan Year Three			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
E. Technical Support for Parish and Municipal HMPs												
E.i. Staffing plan												
E.ii. Support parish plan maintenance												
E.iii. Support NFIP participation												
E.iv. Support repetitive loss mitigation												
E.v. Support plan integration												
E.vi. Support NFIP substantial damage permitting preparations												
F. Technical Support for State Agencies' HMPs												
F.i. Training and technical support												
F.ii. Reserve Fund												
G. Plan Integration												
G. Plan Integration												
H. Identifying Cost Effective Projects with Parishes and Municipalities												
H.i. Preferred regional project types												
H.ii. Project application training												
I. Identifying Cost Effective Projects with State Agencies												
I. Technical support												
J. Legislative and Regulatory Enhancements												
J.i. Municipal												
J.ii. State												
J.iii. Federal												

Legend

Initial / Concentrated Efforts

Sustained / Intermittent Efforts

8.8 Funding Sources

As noted above, the Mitigation Action Plan is focused on the efforts to be undertaken by the Disaster Recovery Division of GOHSEP. Most of the funding commitment needed is for staffing positions and the full complement of the GOHSEP staffing plan has been authorized. Funding for the staff commitments will come from the general operating funds of GOHSEP.

Currently, GOHSEP has an overall annual operating budget of approximately $3,000,000. Of this total, $2,100,000 comes from federal grant programs (as technical assistance, management and administrative costs) and $900,000 comes from State funding.

All capital costs or outside consulting services to support the implementation of the Plan Update will be derived from federal funding. This includes set-asides of HMGP funding as it becomes available as part of the "Reserve Fund" (see Action Item F.iii. on page I-156). Volumes III and IV of the State of Louisiana Hazard Mitigation Strategy, i.e., the Program and Administrative Guidelines and Procedures respectively, describe the process the SHMT will use to develop an implementation strategy for each notification of available funds under HMGP. As part of these implementation strategies, the SHMT can elect to set aside, or reserve, a portion of the available funds to support the specific recommendations in the Plan (within the project eligibility guidelines for HMGP and subject to the approval by FEMA Region VI on a case-by-case basis). These reserved funds would not be available for project applications and therefore, it is envisioned that the Reserve Fund set-asides will be limited to larger disaster declarations and notifications of available HMGP funding.

This page is intentionally blank.

Section Nine
Coordination of Parish and Municipal Mitigation Planning

Contents of this Section

9.1 Interim Final Rule Requirement for Coordination of Parish and Municipal Mitigation Planning

9.2 Funding and Technical Assistance for Parishes and Municipalities

9.3 Parish and Municipal Plan Integration

9.4 Prioritizing Parish and Municipal Assistance

9.1 Interim Final Rule Requirements for Coordination of Parish and Municipal Mitigation Planning

A key element of the Disaster Mitigation Act of 2000 (DMA 2000) is the emphasis placed on strengthening the interactions between the State, parishes and municipalities regarding hazard mitigation planning and implementation. Most significant mitigation occurs at the "local" level so it is beneficial to all concerned to make sure that parish and municipal plans are as effective as possible in identifying hazards and developing action plans.

The Interim Final Rule (IFR) includes three specific requirements for the manner in which the State needs to coordinate with parishes and municipalities for planning efforts:

- Local Funding and Technical Assistance per Requirement §201.4(c)(4)(i): "[The section on the Coordination of Local Mitigation Planning must include a] description of the State process to support, through funding and technical assistance, the development of local mitigation plans..."
- Local Plan Integration per Requirement §201.4(c)(4)(ii): "[The section on the Coordination of Local Mitigation Planning must include a] description of the State process and timeframe by which the local plans will be reviewed, coordinated, and linked to the State Mitigation Plan."
- Prioritizing Local Assistance per Requirement §201.4(c)(4)(iii): "[The section on the Coordination of Local Mitigation Planning must include] criteria for prioritizing communities and local jurisdictions that would receive planning and project grants under available funding programs, which should include consideration for communities with the highest risks, repetitive loss properties, and most intense development pressures. Further, that for non-planning grants, a principal criterion for prioritizing grants shall be the extent to which benefits are maximized according to a cost benefit review of proposed projects and their associated costs."

9.2 Funding and Technical Assistance for Parishes and Municipalities

As described in Section Eight, the Plan Update emphasizes the need for the State to provide continuing funding and technical assistance to support mitigation planning at the parish and municipal level. To gain perspective on what needs to be done in the future, it is important to also understand what has been accomplished to date.

The State of Louisiana, through the Governor's Office of Homeland Security and Emergency Preparedness (GOSHEP), has made a concerted effort to assist with the parish and municipal plan development process by providing:

- Support to obtain federal funding for parish and municipal level plan development;
- Technical assistance to plan preparers at the parish and municipal level;
- Plan reviews at draft and final stages of completion; and
- Coordination with Federal Emergency Management Agency (FEMA) Region VI on parish and municipal plan development and review issues.

Current Status of Parish and Municipal Mitigation Planning in Louisiana

As of January 17, 2008, 64 parish level, 11 local community and 3 private non-profit organization plans have been approved in the State of Louisiana. Of these plans, 63 are currently engaged in the Planning Pilot Grant Program (PPGP) with 22 parishes undertaking Plan Updates and project scoping, another 37 parishes doing plan amendments and project scoping, and 4 parishes doing entirely new plans. Appendix K contains documentation regarding how the PPGP is administered in the State of Louisiana.

GOHSEP is also considering applying for a Pre-Disaster Mitigation 2009 grant to update an additional 20 to 25 parish hazard mitigation plans, as part of implementing a staggered update-and-review process.

Current Funding

To date, a total of $16,608,144 has been dedicated to developing parish and municipal plans, including local match. Table 9-1 includes a summary of the funding sources for these plans:

Table 9-1: Funding for Parish and Municipal Hazard Mitigation Planning

Funding Sources	Federal Share	Non-Federal Share	Project Totals
Hazard Mitigation Grant Program (HMGP)	$9,482,587	$3,160,863	$12,643,450
Pre-Disaster Mitigation Grant Program (PDM)	$2,367,673	$851,095	3,050,826
Flood Mitigation Assistance Grant Program(FMA)	$685,401	$228,467	$913,868
Totals	$12,535,661	$4,240,425	$16,608,144

Source: GOSHEP, 2007-8

Technical Assistance for Parish and Municipal Mitigation Planning

GOSHEP, with funding provided by FEMA through the Hazard Mitigation Technical Assistance Program (HMTAP), conducted a series of local hazard mitigation planning workshops in 2002 to familiarize parish officials with the requirements of DMA 2000 and to offer training regarding hazard mitigation planning techniques per FEMA guidance. Five separate workshops were held and 56 of the 64 parishes participated in at least one workshop; a rate of 87%. Since that time, GOHSEP has provided technical assistance for the completion of all parish hazard mitigation plans, as well as the 11 municipal and 3 private, non-profit plans approved in the State. In addition, the State has used HMGP funding related to hurricanes Katrina and Rita to implement the PPGP and has provided extensive technical support and training to all participants.

To date, technical assistance has included guidance and training regarding:

- Application and Scope of Work Development
- Consultant Procurement Procedures
- Project Identification
- Project Scoping including benefit-cost analysis
- Plan Updates including risk assessment procedures for using Advisory Base Flood Elevations (ABFE)s and for levee failures

One requirement of the PPGP is focused specifically on repetitive loss (RL) and severe repetitive loss (SRL) properties. As part of project scoping activities, parishes and municipalities are required to analyze RL and SRL properties within their jurisdiction to determine what, if any, mitigation actions are feasible, environmentally sound and cost effective. The intent is to prompt parishes and municipalities to identify the options that exist for mitigation of these properties once funding becomes available through Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA) or PDM grant programs. This will lead to improvements in the rate at which these properties are mitigated in the State of Louisiana.

This focus on progress to mitigate repetitive loss properties and especially severe repetitive loss properties contributes to meeting Louisiana's requirements for increased federal match on Severe Repetitive Loss (SRL) and Flood Mitigation Assistance (FMA) grants under FEMA's Flood Mitigation Grants and Hazard Mitigation Planning Interim Rule, § 201.4(c)(3)(v).

Continuing Technical Assistance

Per Section Eight, GOSHEP intends to provide continued technical assistance to parishes and municipalities in the State to develop and maintain comprehensive parish and municipal mitigation plans and to pursue cost effective mitigation projects. For example, Plan of Action 'E' in Section Eight identifies specific steps GOSHEP will take to support parish and municipal hazard mitigation planning. Other action items include providing training and guidance for improving risk assessments and plan implementation that are important aspects of the overall process.

Plan Reviews

The overview of GOHSEP's Mitigation Planning capability should be presented in the context of the significant accomplishments attained since Hurricane Katrina (August 29, 2005). The disaster provided GOHSEP with the impetus for expanding the role of pre-disaster planning to improve GOHSEP's internal capabilities, as well as its ability to build mitigation capacity and relationships at parish and municipal levels. As evidence, prior to Hurricane Katrina only 3 jurisdictions had FEMA-approved hazard mitigation plans. However, as of December 18, 2007, 78 parish, municipal and private / non-profit organization hazard mitigation plans have been approved by FEMA. In fact, all parishes in the state now have approved hazard mitigation plans. Finally, beyond the plan development and review process, GOSHEP Mitigation Planning continues to improve its delivery of services as liaison between FEMA Region VI and the parishes and municipalities.

The GOSHEP Planning Team was trained by James Lee Witt Associates in concert with FEMA Mitigation Planning staff to build State-parish/municipal relationships, and assess parish/municipal hazard risks, structural vulnerabilities, and mitigation capabilities, to develop a multi-hazard hazard mitigation plan for addressing each of these factors. In turn, GOHSEP staff coordinated with FEMA Mitigation Planning staff to build internal plan review capabilities in accordance with established FEMA (44 CFR) guidelines and processes for conducting plan reviews, working with parish/municipal officials to revise draft versions of mitigation plans, and working with FEMA staff to establish a

corpus of FEMA-approved multi-hazard mitigation plans. The step-by-step plan review process GOSHEP employs is as follows:

Step 1: The initial draft of a parish or municipal plan is sent to GOSHEP for review. GOHSEP staff develops and provides parish or municipal officials with comprehensive guidance for improving the format and content of the plan.

Step 2: Parish or municipal officials revise the plan in accordance with GOHSEP guidance, and re-submit the plan for GOHSEP review. With satisfactory revisions, the plan is forwarded with GOSHEP comments to FEMA Region VI.

Step 3: FEMA Region VI reviews the plan and forwards their comments to GOSHEP who then relays new comments back to the parish or municipality. GOHSEP continues to interface with parish or municipal officials to discuss and clarify all review comments on a point-by-point basis.

Step 4: The parish or municipality addresses both GOSHEP and FEMA Region VI comments and revises the plan.

Step 5: A revised draft is submitted to GOSHEP for review. GOHSEP staff evaluate revisions and forward to FEMA Region VI.

Step 6: FEMA Region VI reviews the revised plan, and if all comments were satisfactorily addressed, a letter stating that the plan is "approvable pending adoption" is mailed to GOSHEP and the parish or municipality. In cases where comments have not been addressed satisfactorily, the parish or municipality again addresses the comments and repeats the process.

Step 6: The plan is then formally adopted by all participating jurisdictions through a Resolution.

Step 7: The plan is officially approved by the Regional Director of FEMA Region VI.

The timeframe for this review process is approximately six months, not including the time spent by parishes or municipalities to revise their plans in response to GOHSEP and FEMA comments and is based on the following assumptions:

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

9.3 Parish and Municipal Plan Integration

As described in Subsection 9.1, the IFR requirements pertaining to this Section, 201.4(c)(4)(ii) states that "[The section on the Coordination of Local Mitigation Planning must include a] description of the State process and timeframe by which the local plans will be reviewed, coordinated, and linked to the State Mitigation Plan." In developing the Plan Update, GOSHEP was aware of the importance of ongoing parish and municipal planning efforts and did so to the extent possible as indicated in Section Five. Ideally, the process for developing the Plan Update would have used parish and municipal risk assessments, goals, strategies and actions to a greater extent to help characterize the range of hazards, mitigation strategies and actions identified across the State.

However, as noted in previous sections, problems with inconsistencies (terminology, data, methodology, goals, project types, etc.) made direct incorporation into the Plan Update analyses impractical. Several aspects of the Mitigation Action Plan are intended to address these problems and an overarching goal of GOHSEP's Community Education and Outreach (CEO) project is to improve the "data connection" between the State, parishes and

municipalities. It is anticipated that by the time of the next plan update, there will be more consistent and relevant data that can be directly integrated and used in risk assessments.

Therefore, most of the parish and municipal plan integration into this Plan Update must still be performed by GOSHEP and the State Hazard Mitigation Planning Committee (SHMPC) as described below.

As part of integrating parish and municipal plans with this Plan Update and the CEO program, GOSHEP will undertake a review process to identify and compile key elements for further analysis (as outlined in Section Ten). The intent is to identify any additional common characteristics in the parish and municipal plans and analyses to incorporate into the State Plan. For example, data about parish and municipal risk will be extracted and compared with the results of other parish and municipal plans regarding:

- breadth of hazard coverage;
- level of detail in data and analyses; and
- file formats for digital information.

In addition, GOSHEP will consider non-technical aspects for incorporation into the Plan Update including standardized goals and objectives and a requirement for capability assessments for parishes and municipalities.

It is clear that parish and municipal conditions and priorities will change over time. To account for this, in addition to progress anticipated under the CEO as well as assembling and reviewing the approved parish and municipal plans, GOSHEP will correspond with parish and municipal Emergency Management Agency (EMA) directors and other Stakeholders on an annual basis, requesting them to advise GOSHEP of any significant changes in parish and municipal vulnerability and risk, mitigation activities that have been completed or initiated, and changes in a community's mitigation goals, strategies or priorities. GOSHEP will review the responses, prepare a report and recommendations, and present these to the SHMPC for its consideration. The Mitigation Action Plan's goal is to provide updated and current data and hazard information on a continuing basis for municipal, parish and State agencies alike. The exchange of information between State, parish and municipal plans will thus gradually improve the level of integration.

9.4 Prioritizing Parish and Municipal Assistance

IFR subsection 201.4(c)(4)(iii) states that the State Hazard Mitigation Plan must include "[c]riteria for prioritizing communities and local jurisdictions that would receive planning and project grants under available funding programs, which should include consideration for communities with:

- highest risk,
- repetitive loss properties, and
- most intense development pressures.

Further, that for non-planning grants, a principal criterion for prioritizing grants shall be the extent to which benefits are maximized according to a cost benefit review of proposed projects and their associated costs."

The sub-sections below discuss these four criteria. Following these subsections is additional discussion of how the State intends to prioritize applications for funding future planning efforts.

In all cases applicants must demonstrate that their risk is sufficient to merit grant funds, particularly when compared to the project cost, but there is often considerable uncertainty in risk determinations. For this and other reasons, the State considers a variety of factors in addition to risk and benefit-cost analysis in determining its priorities for mitigation grants.

In addition, as identified above, GOHSEP has established a policy of prioritizing funding for hazard mitigation planning efforts at the parish level in the future. This policy includes making sure that the interests of municipalities are protected and acknowledged as part of the process but GOHSEP will not be supporting applications for funding of hazard mitigation planning at the municipal level as part of the next round of parish hazard mitigation plan updates.

Jurisdictions With Highest Risk

One of the primary purposes of this Plan Update is to identify the areas in Louisiana with the highest risk from natural and manmade hazards. As described in Section Five, the parishes in Louisiana have different levels of exposure and risk. Although the State does not have a formal system established to evaluate and prioritize potential mitigation projects on the basis of risk, this Plan Update is partly intended to introduce such a structure to the process. In general, the State will direct mitigation grant funds to the areas with the highest risk. However, in many cases, more localized risk assessments (possibly produced in the parish and municipal mitigation planning process), as well as risk assessments and benefit-cost analyses done in support of applications, may indicate areas with high risk outside the highest-risk parishes identified in this Plan Update.

The most worthwhile mitigation projects are a product of both the risk in a particular place and the effectiveness of a project. Although risk is clearly a good initial indicator of mitigation potential, the State will also carefully consider the effectiveness and cost of mitigation projects in determining funding priorities.

Jurisdictions With Repetitive Loss Properties

There is currently no formal requirement that grants made through either the HMGP or Pre-Disaster Mitigation Competitive Grant Program (PDM-C) emphasize repetitive loss properties. However, in response to the Federal emphasis on reducing the burden that repetitive losses place on the National Flood Insurance Program (NFIP), the State presently considers the repetitive loss status of properties in determining the grants it will support (i.e., forward to FEMA for consideration and funding), and will continue to do so as additional grant funds are available.

The FMA program mandates that grant funds are directed to NFIP repetitive loss properties, and the State will continue to comply with this requirement as it has since its inception. The Flood Insurance Reform Act of 2004, which was signed into law by the President on June 30, 2004, requires the NFIP to provide a disincentive to property owners to live in repetitively flooded areas. Rather than continue to rebuild, the program would provide repeatedly flooded homeowners assistance in either elevating or moving their homes away from floodwaters. Those who refuse mitigation assistance would pay premiums that will progressively approach the full actuarial costs for choosing to live in a risky area.

(This strategy to mitigate repetitive loss properties and especially severe repetitive loss properties contributes to meeting Louisiana's requirements for increased federal match on SRL and FMA grants under FEMA's Flood Mitigation Grants and Hazard Mitigation Planning Interim Rule, § 201.4(c)(3)(v).)

Jurisdictions With Most Intense Development Pressure

At the time this Plan Update was developed Louisiana had no formal process for evaluating potential mitigation grants relative to future development. As it develops a more rigorous review and recommendation process, the State will include development pressure as a potential review criterion. It is assumed that parish and municipal plans will provide some indication of the implications of future development per DMA 2000 requirements for local plans. The degree to which this information is included in the parish and municipal plans will determine to a large extent the ability of GOSHEP and the SHMPC to make decisions based on these criteria.

Although development pressure is clearly a potential factor in any risk determination, development that is undertaken in accordance with adequate building codes, land planning and floodplain management principles should in many cases be less risky than development that pre-dates these codes and principles. However, the State is aware that increased development does cause related increases in population, infrastructure, etc., and may in some cases have adverse impacts on existing areas. These factors will be carefully considered in additional reviews.

Maximizing Benefits According to Benefit-Cost Review of Local Projects

Regulations for FEMA's mitigation grant programs (HMGP, PDM-C, and FMA) state that proposed mitigation projects must be cost effective. Under some pre-established conditions, certain projects may be exempt from this regulation, but in most cases a benefit-cost analysis is undertaken for projects either prior to being submitted to GOSHEP and FEMA for funding consideration, or during the grant evaluation process.

The PDM-C program, which was instituted in 2003/04, further emphasizes the role of cost-effectiveness by making the benefit-cost ratio the single most important criterion in project rating and evaluation. For the HMGP and FMA programs, the regulations require only that proposed mitigation projects are cost-effective, *not* that they are the *most* cost-effective projects that the State or FEMA is considering. However, the State generally believes that projects with high benefit cost ratios should get preference, all other aspects being equal.

In most cases, grant applications are either accompanied by a benefit-cost analysis, or GOSHEP or FEMA performs one in accordance with FEMA and the Louisiana Office of Management and Budgets regulations. Projects that do not achieve the required 1.0 benefit-cost ratio, and are not exempted from benefit-cost analysis, are rejected from funding consideration. This is the case for all three FEMA mitigation grant programs (HMGP, PDM-C, and FMA).

Prioritization of Parishes to Receive Planning Grants

In determining priorities for which parishes will receive mitigation planning grants, GOSHEP will consider several criteria:

- Quality and completeness of the parish's existing mitigation plan.
- The degree of risk in the parish, as determined by the potential effects of natural hazards on population, infrastructure and operations per the results of this Plan Update.
- Existing capability, i.e., if the parish already has the resources to create or update its plan and do they have the administrative infrastructure in place to implement actions.
- Potential for the plan to support or enhance parish mitigation efforts.

These criteria are intended to blend objective and subjective considerations to determine the best way to spend limited funds to help parishes improve their mitigation plans.

Although the preceding subsections discuss specific criteria required by the IFR, the State considers other factors in determining how to prioritize mitigation grant proposals. Among these other factors are:

- The extent to which the project identified by the community has been identified or developed through the local hazard mitigation process;
- Local needs, (i.e., which grants would help communities most);
- The hazard or hazards that the project is mitigating;
- The criticality of the facility/ies that the project is protecting;
- The status of a community with respect to the NFIP / Community Rating System; and
- The community's adoption and enforcement of building codes.

This is not intended as a comprehensive list of factors, only as a general indication of the areas that the State will contemplate in reviewing project proposals.

This page is intentionally blank.

Section Ten
Plan Maintenance Process

Contents of this Section

10.1 Interim Final Rule Requirements for Plan Maintenance Process

10.2 Monitoring, Evaluating and Updating the Plan

10.3 Monitoring Implementation of Mitigation Actions

10.4 Reviewing Progress on Achieving Goals

10.5 Reviewing Progress on Activities and Projects

10.6 Plan Maintenance Progress

10.1 Interim Final Rule Requirements for Plan Maintenance Process

The Interim Final Rule (IFR) requires State Standard Hazard Mitigation Plans to include a section describing the plan maintenance process the State will use to ensure the Plan remains current (§201.4(c)(5)(i-iii)). The IFR requirements cover three areas regarding the process of maintaining the Plan once it is approved:

- Monitoring, Evaluating and Updating the Plan per Requirement §201.4(c)(5)(i): "[The Standard State Plan Maintenance Process must include an] established method and schedule for monitoring, evaluating, and updating the plan";
- Monitoring Implementation of Mitigation Measures and Project Closeouts per Requirement §201.4(c)(5)(ii): "[The Standard State Plan Maintenance Process must include a] system for monitoring implementation of mitigation measures and project closeouts"; and
- Reviewing Progress on Goals, Activities and Projects per Requirement §201.4(c)(5)(iii): "[The Standard State Plan Maintenance Process must include a] system for reviewing progress on achieving goals as well as activities and projects in the Mitigation Strategy."

It is important to note the differences between the first requirement and the other two. §201.4(c)(5)(i) focuses on the maintenance of the Plan itself while §201.4(c)(5)(ii) and §201.4(c)(5)(iii) are both concerned with progress made in implementing the Plan's recommendations.

10.2 Monitoring, Evaluating and Updating the Plan

By law, the Plan must be updated every three years prior to re-submittal to the Federal Emergency Management Agency (FEMA) for re-approval[62]. However, it is anticipated that over the next three years, there will be a need and a desire to update all or part of the Plan on a more frequent basis. Therefore, the first part of this subsection describes the whole update process, including:

- responsible parties
- methods to be used,

[62] As noted previously, the State Plan must be updated and reapproved every three years but parish and municipal plans only need to be updated and reapproved by FEMA every five years.

- evaluation criteria to be applied, and
- scheduling for monitoring, and evaluating the Plan.

These descriptions are followed by an explanation of how and when the Plan will be periodically updated.

Responsible Parties

The Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) is the State agency directly responsible for maintaining the Plan. Within that agency, the State Hazard Mitigation Officer (SHMO) is the individual responsible for assuring that monitoring and evaluating the Plan are done in accordance with the following procedures. The State Hazard Mitigation Planning Committee (SHMPC) is responsible for developing periodic updates to the Plan.

Methods for Monitoring and Evaluating the Plan

On a quarterly basis (and as warranted by circumstances such as a major disaster declaration) GOHSEP will monitor the Plan to assess the degree to which assumptions and underlying information for the Plan may have changed. For example, GOHSEP will look for:

- Changes in the information available to perform vulnerability assessments and loss estimates. For example, as discussed in Section Nine, as parish and municipal risk assessments and plans are integrated into this Plan Update, GOHSEP will be soliciting feedback from parish and municipal Emergency Management Agency directors about any changes in their real or perceived risks.
- Changes in laws, policies and regulations. For example, FEMA has discussed developing a Final Rule to refine the requirements for implementing the Disaster Mitigation Act of 2000 (DMA 2000).
- Changes in State agencies and/or their procedures, including GOHSEP and the administration of grant programs.

The results of these monitoring efforts will be made available to the SHMPC as they are produced.

Using the compiled results of on-going monitoring efforts, the Plan will be evaluated annually, generally starting in the month of January (unless circumstances indicate otherwise). GOHSEP will initiate the evaluations by contacting state agencies identified as responsible parties in the Mitigation Action Plan (see Section Eight), as well as other agencies and organizations that have been involved in developing the Plan.

GOHSEP and the SHMPC have the prerogative to determine if other organizations should also be involved. The SHMPC will be encouraged to recommend other agencies or organizations that should be included in the evaluation, for example those with specific technical knowledge about risks.

The initial contacts will be made no later than December of each year for the first two years and in September in the third year (in anticipation of the required Plan Update for FEMA re-approval). The initial contact will advise the appropriate organizations that the Plan will be re-evaluated in the coming months, and request their participation.

GOHSEP also has the prerogative to evaluate and update the Plan at times other than those identified in this section, under the following general conditions:

1. After a major disaster declaration.
2. At the request of the Governor.
3. When significant new information regarding risks or vulnerabilities is identified (per processes identified in Section Eight).

Plan Evaluation Criteria

The evaluations will consider several basic factors, similar to the issues covered in the monitoring process, and any additional review indicated by GOHSEP or the SHMPC. The factors that will be taken into consideration during these periodic evaluations of the Plan include:

1. Changes in vulnerability assessments and loss estimations. The evaluation will include an examination of the analyses conducted for hazards identified in the Plan and determine if there have been changes in the level of risk to the State and its citizens to the extent that the Plan (in particular the strategies and prioritized actions the State is considering) should be modified.

   "Changes" in this context could result simply from the development of better data than was used in the original study and the incorporation of information from parish and municipal plans consistent with the action items in Section Eight. It is anticipated that GOHSEP's Community Education and Outreach (CEO) program and the results of other Plans of Action included in Section Eight will result in improvements in these analyses before the next three-year update cycle is completed.

2. Changes in laws, policies, or regulations. The evaluation will include an assessment of the impact of changes in relevant laws, policies and regulations on the basic assumptions included in the Plan.
3. Changes in state agencies or their procedures (in particular GOHSEP, which is responsible for maintaining the Plan) that will affect how mitigation programs or funds are administered.
4. Significant changes in funding sources or capabilities.
5. Progress on mitigation actions (including project closeouts) or new mitigation actions that the State is considering.

Updating the Plan

Updates will follow the original planning process outlined in Section Three of the Plan Update. The update process will entail a detailed and structured re-examination of all aspects of the original Plan, followed by recommended updates. The update process will be undertaken by the SHMPC and supported by GOHSEP. The recommendations will be presented to the State Hazard Mitigation Team for consideration and approval. It is expected that the Governor will issue a letter of adoption for each update of the Plan.

At a minimum, the Plan will be updated and re-submitted to FEMA for re-approval every three years, as required by law. The three-year update for FEMA re-approval will require that all the original steps outlined in Section Three be revisited to make sure the Plan assumptions and results are still valid as a basis for further decision making and priority setting.

The Plan will also be subject to interim updates as significant changes or new information is identified in the periodic evaluations described above. The degree to which the whole process is repeated will depend on the circumstances that precipitated the update. For example, the introduction of new data regarding vulnerability to one of the identified hazards might create the need for an update to the portion of the Plan that relates to that hazard but not much else.

GOHSEP will initiate, coordinate and lead all Plan updates in conjunction with the SHMPC. The next two paragraphs describe the procedures for interim and three-year updates, respectively.

Updates Resulting from Interim Evaluations

The nature of Plan updates will be determined by the evaluation process described above. In general, GOHSEP will notify the SHMPC that the agency is initiating an interim Plan update, and describe the circumstances that created the need for the update (per the list in the Plan Evaluation Criteria section above). GOHSEP will determine if the SHMPC should be consulted regarding potential changes. If it is determined that the SHMPC should be involved, the nature of the involvement will be at the discretion of GOHSEP.

When interim updates are completed, if the SHMPC was not involved, GOHSEP will advise all SHMPC members via email that the Plan has been updated, and describe the nature of the update. In addition, GOHSEP will provide FEMA Region VI with a copy (although there is no requirement to have the Plan re-approved by FEMA for interim updates).

Updates Related to the Required Three-year Plan Review

As required by the DMA 2000, the Plan will be updated every three years and re-submitted to FEMA for re-approval. In those years, the evaluation process will be more rigorous, and will examine all aspects of the Plan in detail. It is anticipated that several meetings of the SHMPC will be required and that the Governor will formally re-approve the Plan prior to its submission to FEMA.

Based on the three-year renewal requirements for Plan Updates, GOHSEP anticipates that the submission date for the required update will be approximately April 2011. Prior to that time, GOHSEP will contact SHMPC members and other appropriate agencies and organizations to confirm a schedule for the Plan update.

Scheduling Issues

The following basic schedule will be undertaken for monitoring, evaluating and updating the Plan:

- Monitoring activities by the GOHSEP should be done on a quarterly basis at a minimum;
- Notices regarding annual evaluations should be sent by GOHSEP to the SHMPC in December of the first two years of the Plan and in September of the third year.
- The timetable for evaluations and updates for the first two years is expected to last up to four months (January – April) and up to six months for the update in the third year for re-submittal to FEMA (November – April).

Note: The "Plan year" runs from May 1 to April 30 based on the original approval date of the Plan. This could be shifted in the next round of approvals to a more convenient or intuitive date (i.e., December 31), but that would require initiating the third year process four months earlier to allow adequate time for the full Plan update.

10.3 Monitoring Implementation of Mitigation Actions

Each mitigation project or activity (such as planning) has an established period of performance that GOHSEP and FEMA monitor throughout the development and execution of the activity. As described in the *State of Louisiana Administrative Guidelines and Procedures* (see Volume IV of the State of Louisiana Hazard Mitigation Strategy), GOHSEP uses the following system for monitoring mitigation projects and project closeouts.

Monitoring Mitigation Projects

Mitigation projects are generally monitored as follows:

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

Monitoring Project Closeouts

Mitigation project closeouts generally occur in the following sequence. These procedures are established in the *State of Louisiana Administrative Guidelines and Procedures* - Volume IV of the State of Louisiana Hazard Mitigation Strategy in accordance with FEMA requirements for State Administrative Plans and Hazard Mitigation Grant Program (HMGP) guidelines as set out in the HMGP Desk Reference.

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

10.4 Reviewing Progress on Achieving Goals

Subsection 201.4 (c)(5(ii) of the IFR states that the State Hazard Mitigation Plan must include a system for reviewing progress on goals that are included in the Mitigation Action Plan (Section Eight).

GOHSEP will ensure that both the annual and three-year Plan evaluations include a detailed examination and analysis of the goals and the various actions that are intended to achieve them. Section Eight of the Plan Update describes four major hazard mitigation goals and describes various strategies and actions that the State is undertaking, or considering undertaking, to address the identified goals. In future versions of the Plan, GOHSEP will indicate the status of the various actions, and a general indication of progress.

(GOHSEP will focus on progress to mitigate repetitive loss properties and especially severe repetitive loss properties as a priority, contributing to meeting Louisiana's requirements for increased federal match on Severe Repetitive Loss (SRL) and Flood Mitigation Assistance (FMA) grants under FEMA's Flood Mitigation Grants and Hazard Mitigation Planning Interim Rule, § 201.4(c)(3)(v).)

10.5 Reviewing Progress on Activities and Projects

Subsection 201.4 (c)(5)(iii) of the IFR states that the Plan must include a system for reviewing progress on activities and projects that are included in the Mitigation Action Plan.

As part of the yearly and three-year evaluations and updates to this Plan, GOHSEP will initiate a review of all activities and projects noted in the Mitigation Action Plan. The review will take place in stages:

1. In cooperation with the SHMPC, GOHSEP will assemble a working group from within the Committee to undertake a preliminary review and analysis of progress on activities and projects that are listed in Section Eight.
2. GOHSEP and the working group will prepare a draft report that describes progress, remaining tasks and projected time to complete the tasks.
3. The draft report will be presented to the SHMPC during the meeting(s) related to the yearly (and three-year) updates.
4. After SHMPC review, comment and approval, results of the progress review will be included as a new or updated column in the tabulation of mitigation goals and actions in Section Eight.
5. If requested by FEMA, GOHSEP will prepare a summary report describing the results of the review.

10.6 Plan Maintenance Progress

As noted in Section 1.1, the April 2005 Plan was adopted and approved a few months before hurricanes Katrina and Rita. During those months, GOHSEP was laying the groundwork for implementation through hiring additional staff and applying a number of organizational changes. Due to the disruption and scale of hurricanes Katrina and Rita, most of these preparations were either preempted by the disasters or inadequate to deal with the aftermath in terms of the numbers and complexity of issues. Obviously, none of this could have been foreseen with any degree of certainty. The result is that the monitoring and evaluation process described in the April 2005 Plan was never initiated, only one interim plan update was developed (see Section 3.2 on page I-14 regarding the 2007 Interim Plan Update for EMAP certification) and very little of the recommendations in the April 2005 Plan were implemented in the ensuing years until this update process was begun in late 2007.

The following represents progress directly related to the recommendations in the April 2005 Plan:

- In order to implement Goals 1 and 2 of the April 2005 Plan, "The State of Louisiana will improve outreach and educational efforts regarding potential impacts of hazards and the identification of specific measures that can be taken to reduce their impact," and "The State of Louisiana will improve data collection, use and sharing to reduce the impacts of hazards," the State successfully applied for and secured a $25 million grant to support the CEO program. This Plan Update helps frame the CEO's scope.
- In order to implement Goal 3 of the April 2005 Plan, "The State of Louisiana will improve the level of interagency coordination to develop coherent policies and plans and pursue funding sources to reduce the impacts of hazards" (which included providing support and technical assistance for local planning), the State secured Pre-Disaster Mitigation grant funds and established the Planning Pilot Grant Program (PPGP) program to assist parishes in updating and enhancing their Hazard Mitigation Plans. This Plan Update employs data and inputs from PPGP plans, and offers specific recommendations for further enhancements to and integration of local planning.
- Additionally, Goals 2 and 3 of the April 2005 Plan both reference severe repetitive loss properties, and the State has mitigated nearly 600 of these, many of them following the hurricanes of 2005 (see Table 7-4). This is an ongoing priority for Louisiana, as noted repeatedly in this Plan. (This strategy to mitigate repetitive loss properties and especially severe repetitive loss properties contributes to meeting Louisiana's requirements for increased federal match on SRL and FMA grants under FEMA's Flood Mitigation Grants and Hazard Mitigation Planning Interim Rule, § 201.4(c)(3)(v).)

In the absence of any experience with the monitoring and evaluation process to determine aspects that may or may not be effective, no changes in these procedures have been proposed in this Plan Update.

Monitoring the implementation of mitigation activities, reviewing the progress toward attaining the goals of the April 2005 Plan, and reviewing progress on implementing activities and projects are similar. Since none of the activities or projects proposed in the 2005 Plan were pursued until very recently due to the disruption of hurricanes Katrina and Rita, there was no progress to review. Due to the inexperience with the effectiveness of any previous procedures, there is no justification for making substantive adjustments to the process.

One perceived shortcoming identified in the April 2005 Plan will be addressed in this Plan Update, That is to clearly define the responsible parties within GOHSEP for follow through on these activities and the continuing role of the SHMT and SHMPC. In general terms, the SHMO is ultimately responsible for maintaining the Plan but GOHSEP will be developing specific amendments to existing job descriptions for GOHSEP staff and administrative guidance. This administrative guidance will determine when to involve the SHMT and SHMPC to ensure clear lines of Plan Maintenance responsibilities and to ensure that periodic reviews and evaluations are performed in a timely manner.

The recent implementation of coordinated procedures for grant administration within GOHSEP will provide tracking of the location, progress and completion of individual subgrants and allow GOHSEP to determine losses avoided for future disaster events. These procedures will be further refined in a scheduled revision to the *State of Louisiana Administrative Guidelines and Procedures* (identified as Volume IV of the State of Louisiana Hazard Mitigation Strategy in Section 1.3). These new procedures support the Plan Maintenance process.

Sea Grant's Recommendations Regarding this Plan

The Louisiana Sea Grant program at Louisiana State University recently released a study regarding hazard mitigation and land use in coastal Louisiana.[63] Specific to the State Hazard Mitigation Plan, the Sea Grant study calls for upgrading it so as to:

- "give a clearer vision and purpose
- require more definitive land use controls focused on reducing damage from natural hazards in the parish and local hazard mitigation plans,
- present specific mitigation measures beyond what is required by federal regulations,
- direct parishes and communities to use all mitigation measures available," and
- undertake thorough data updates.

Sea Grant's comments were made in direct reference to the April 2005 Plan, and while much progress has been made in preparing this Plan Update, GOHSEP and the SHMPC recognize that much work remains to be done; in fact, many of these same goals are laid out in this Plan's Mitigation Action Plan (Section Eight), and will become the charge of the CEO project.

Additionally, the Sea Grant study recommends requiring coastal parishes and municipalities to create comprehensive plans with hazard mitigation elements. It also calls for floodplain standards that exceed NFIP by requiring setbacks and extra freeboard to account for land loss, subsidence, and sea-level rise. Both of these recommendations are echoed by those contained in this Plan.

[63] Rod Emmer, Jim Wilkins, et al, 2008. "Hazard Mitigation and Land Use Planning in Coastal Louisiana: The Future" (Louisiana Sea Grant)

This page is intentionally blank.