

APPENDIX 1
(SOUTH CAROLINA HURRICANE PLAN)
TO THE SOUTH CAROLINA EMERGENCY OPERATIONS PLAN

I. INTRODUCTION

- A. As required by state and federal law, South Carolina’s policy is to be prepared for any emergency or disaster, including tropical cyclones. Tropical cyclone is a generic term for tropical depressions, tropical storms, and hurricanes.
- B. South Carolina State Regulations 58-1 and 58-101 require contingency plans and implementing procedures for major hazards, such as tropical cyclones, coordinated by the State with Counties that have the a potential of being impacted.
- C. The South Carolina Emergency Operations Plan (SCEOP), augmented by the South Carolina Hurricane Plan and the Emergency Support Functions (ESF) Standard Operating Procedures (SOP), meets the requirements of the State regulations.

II. PURPOSE

- A. Prevent or minimize injury to people, damage to property and the environment resulting from a tropical cyclone.
- B. Plan and coordinate state and local resources for warning, evacuating, and sheltering South Carolina citizens and visitors.

III. SCOPE

- A. Establishes specific tasks and responsibilities for the State and Counties when preparing for and responding to tropical cyclones.
- B. Addresses post-landfall operations in coordination with the SCEOP, Appendix 9 (South Carolina Catastrophic Incident Plan) of the SCEOP, and Appendix 6 (South Carolina Recovery Plan) of the SCEOP.
- C. Covers relevant terminology, the utilization of the Hurricane Evacuation Study, and the evacuation planning timeline.

IV. FACTS AND ASSUMPTIONS

- A. There have been 39 recorded South Carolina tropical cyclone landfalls since 1851. 25 were hurricanes, 9 were tropical/sub-tropical storms, and 5 were tropical depressions. The hurricanes ranged from Category 1 to Category 4. The three strongest were Hazel in 1954, Gracie in 1959, and Hugo in 1989. The State has also been impacted by tropical cyclones that did not make landfall in South Carolina.
- B. Tropical cyclones are a significant threat to South Carolina.

- C. South Carolina has six (6) coastal Counties bordering the Atlantic Ocean with more than 200 miles of general coastline. The SC Coastal Counties are:
- Beaufort
 - Charleston
 - Colleton
 - Georgetown
 - Horry
 - Jasper
- D. South Carolina will generally receive several days' notice of impending tropical cyclone activity through the National Hurricane Center (NHC) and the National Weather Service (NWS).
- E. There is the potential for tropical cyclones to form with much less notice, such as in 2004 when Hurricane Gaston generated 140 miles off the South Carolina coast, growing from a tropical depression to a Category 1 hurricane in 48 hours.
- F. The State and Counties will use all available lead time to prepare plans, protocols, and procedures predefined and coordinated in this and other plans. State agencies, County and municipal governments, and other entities will support preparations for tropical cyclones.
- G. Mutual Aid Compacts and agreements will enable assistance in the areas of personnel, equipment, and logistics; state-to-state, county-to-county, and municipality-to-municipality. Federal support may be available pre-storm and will be available during recovery.
- H. South Carolina will be under a State of Emergency.
- I. A tropical cyclone may result in large numbers of casualties and/or displaced persons that can quickly overwhelm local and state capabilities.
- J. Federal resources may not be available to provide significant lifesaving or life-sustaining capabilities until after the event.
- K. Evacuations may occur based upon forecasted impacts of the tropical cyclone.
- L. Large numbers of people may be left temporarily or permanently homeless and will require long term housing assistance.
- M. The response capabilities of local jurisdictions may be overwhelmed. Local first responders may be among those affected, impacting their ability to perform their duties.

- N. Environmental health conditions may be negatively affected.
- O. Local emergency response, medical, and public health capabilities will be impacted.
- P. A tropical cyclone affecting South Carolina may have significant impacts on evacuations, housing, transit, search and rescue, and law enforcement in other states.
- Q. In a tropical cyclone, the response will follow a prescribed process.
 - 1. The local jurisdiction will establish an initial response utilizing the Incident Command System (ICS) to control and direct the first response.
 - 2. The State will coordinate support for local and regional resources.

V. SITUATION

- A. Hurricane Vulnerability Analysis
 - 1. The State of South Carolina completed a hazard vulnerability analysis in 2017 using computer modeling, population data, and historical weather records, and determined there is “Medium” to “High” probability of tropical cyclone activity impacting South Carolina.
 - 2. The entire state is vulnerable to the effects of tropical cyclones.
 - 3. The National Hurricane Center uses the Saffir-Simpson Hurricane Wind Scale to categorize hurricane intensity based on sustained wind speed. The categories are
 - Category 1: Very Dangerous, Winds: 74-95 mph
 - Category 2: Extremely Dangerous, Winds: 96-110 mph
 - Category 3: Devastating Damage, Winds: 111-129 mph
 - Category 4: Catastrophic Damage, Winds: 130-156 mph
 - Category 5: Catastrophic Damage, Winds: Greater than 157 mph
 - 4. Storm surge inundation, rainfall, and barometric pressure are not associated with the Saffir-Simpson Scale.
 - 5. Tropical cyclones produce four (4) major hazards:
 - a. Storm Surge

- (1) Historically, storm surge is the greatest threat to life and property in a tropical cyclone.
- (2) Storm surge inundation is the total water level that occurs on normally dry ground and is expressed in terms of height of water above ground.
- (3) Storm surge is defined as the abnormal rise of water generated by a storm, over and above the normal astronomical tide, and is expressed in terms of height above predicted or expected tide levels.
- (4) Storm tide is defined as the water level due to the combination of storm surge and astronomical tide, and is expressed in terms of height above a vertical or tidal datum.
- (5) Storm surge inundation for a particular location depends on a number of different factors. These factors include tropical cyclone intensity, forward speed, radius of winds, angle of approach to the coast, central pressure, rainfall, and the shape and characteristics of the coastline. Other factors include width and slope of the continental shelf.

b. Rainfall Induced Flooding

- (1) Widespread heavy rain can produce destructive and deadly flooding. According to NOAA, the combination of storm surge inundation and inland flooding accounts for 88% of all fatalities associated with tropical cyclones in the US.
- (2) Tropical cyclones can generate significant rainfall leading to flash flooding and river flooding.
 - (a) Reference Appendix 19 of the SCEOP (South Carolina Flood Response Plan).

c. High Winds

- (1) High winds can damage or destroy buildings, mobile homes, and other property. Highs wind can also result in injury and/or death.
- (2) More than 17% of the State's population, significantly higher than the national average, reside in mobile homes. In many counties this percentage is higher. Residents in mobile homes are more vulnerable to high winds than those in permanent structures.

d. Tornadoes

- (1) Tornadoes occur primarily in the northeast quadrant tropical cyclones.
- (2) Tornadoes can damage or destroy buildings, mobile homes, and other property. Tornadoes can also result in injury and/or death.

B. Hazard Summary

1. The State is a “Medium” to “High” risk from tropical cyclones.
2. Inland counties may be affected by hazards such as high winds, flooding, and tornadoes.
3. A densely populated coastal region, especially during peak tourist seasons, coupled with generally low coastal elevations, significantly increases the State's vulnerability.
4. Storm surge inundation is greatest threat to life and property in the coastal counties.
 - a. Two (2) inland counties, Dorchester and Berkeley, are also vulnerable to storm surge around the Ashley and Cooper Rivers.

VI. HURRICANE EVACUATION STUDY

- A. The 2014 South Carolina Hurricane Evacuation Study (HES) was prepared by the U.S. Army Corps of Engineers (USACE) in conjunction with the Federal Emergency Management Agency (FEMA). The HES is the principle reference tool/study used by state agencies and policy makers within the State and by other hurricane threatened states. It includes five components:
1. Hurricane hazard analysis
 2. Vulnerability of the population
 3. Expected public response to evacuation
 4. Transportation analysis
 5. Shelter assessments and projected sheltering requirements
- B. The USACE managed the project with input and coordination from federal, state, and local agencies. This analysis is used to develop and update the South Carolina Hurricane Plan.

- C. The HES provides tools for use by Emergency Managers in preparing for and initiating hurricane evacuation operations. Two key components are the hurricane evacuation zones and estimated evacuation clearance times.
1. Hurricane Evacuation Zones
 - a. These are areas vulnerable to storm surge inundation.
 - b. These Zones are a product of the HES and developed in conjunction with local Emergency Management. In most instances, the zones meet all of the following objectives:
 - Describable over radio/TV to the public
 - Based upon easily identifiable roads or natural features for boundary identification
 - Allows residents to determine if their home is in an evacuation area
 - Useable for the HES transportation modeling
 - Related to traffic analysis, population and dwelling unit tabulations and calculation of vulnerable populations
 - c. Detailed descriptions of the hurricane evacuation zones are located Annex C (Evacuation Zones and Clearance Timing).
 2. Estimated Evacuation Clearance Times are located in Annex C (Evacuation Zones and Clearance Timing)
- D. The major topics in the HES are: Hazard Analysis, Vulnerability Analysis, Behavioral Analysis, and Transportation Analysis.
1. Hazard Analysis
 - a. Hazard analysis determines the timing and magnitude of wind and storm surge hazards that can be expected from hurricanes of various categories, tracks and forward speeds.
 - b. The Sea, Lake and Overland Surges from Hurricanes (SLOSH) numerical models were used to compute storm surge inundation.
 2. Vulnerability Analysis.
 - a. Using the results of the hazards analysis, the vulnerability analysis identified areas, populations, and facilities vulnerable to specific hurricane hazards.

- b. The evacuation scenarios are based on the category of storm and associated storm surge threat.
- c. The analysis determined the vulnerable population within each evacuation zone. The analysis also identified critical facilities in storm surge inundation areas.

3. Behavioral Analysis

- a. In 2011, the Hazards and Vulnerability Research Institute of the University of South Carolina (HVRI) conducted a behavioral analysis to quantify data on behavior during hurricanes.
- b. In 2016, SocResearch Miami contracted with Dewberry to conduct a behavioral survey in support of the South Carolina Evacuation Study Critical Transportation Needs (CTN) program.
- c. The studies gathered and analyzed information from South Carolina coastal residents on their past and potential evacuation behavior in response to a hurricane.
- d. Key Findings:
 - (1) 35% of the vulnerable population does not know if they live in an evacuation zone.
 - (2) 42% of the vulnerable population indicated that they would evacuate for a Category 1 or 2 hurricane. 83% indicated that they would evacuate for a Category 3, 4, or 5 hurricane.
 - (3) 11% of those surveyed in 2016 indicated that they plan to go to a shelter during an evacuation.
 - (a) 15% of those who plan to go to a shelter also indicated that they would need some kind of special equipment or services at a shelter.
 - (b) 39% indicated that they plan to take pets to shelters. 77% of them had crates for their pets.
 - (4) Shadow evacuations (people who evacuate, but do not live in evacuation zones) may increase traffic congestion and shelter occupancy.
 - (5) Citizens focus most heavily on hurricane category (wind speed) when deciding whether or not to evacuate. Fewer focus on the effects of storm surge, which is the primary reason for evacuations.

- (6) When making evacuation decisions, expectations on ability to return home play a major role. Statewide, 74% of citizens will evacuate if they believe they will be able to return to their homes within 3 days according to the HVRI survey. This falls dramatically to 55% if expected return is one week; and drops even further to 45% if the expected return is two weeks.
4. Transportation Analysis. See Annex B (Critical Transportation Needs) and C (Evacuation Timing) for transportation needs, evacuation analysis, and clearance times.

VII. STATE HURRICANE OPERATIONS

A. General

1. Hurricane preparedness and mitigation efforts occur on a year-round basis.
2. SCEMD is the primary agency for coordination during tropical cyclones.

B. National Incident Management System

The operations for the response and management of the catastrophic effects resulting from a hurricane impacting South Carolina as outlined in the SCEOP and described in this Appendix conform to the National Incident Management System (NIMS) and the Incident Command System (ICS).

C. Plan Activation

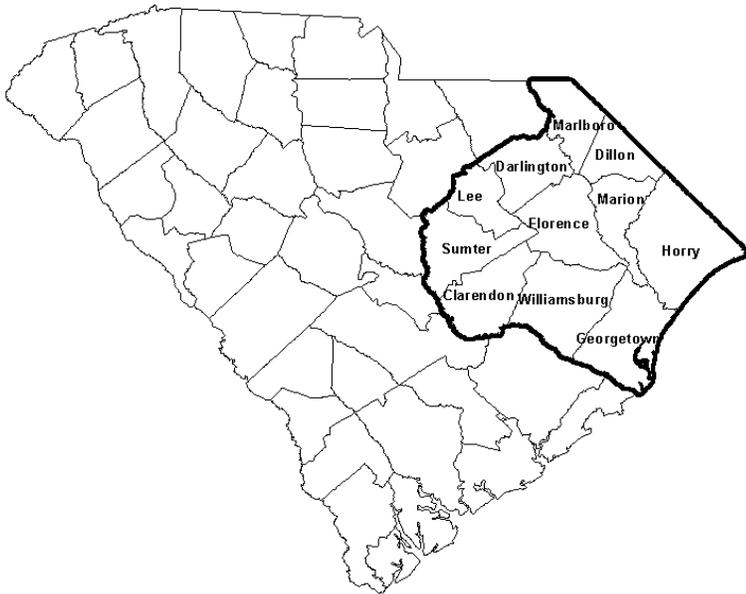
1. Activation of this Appendix is tied to the OPCON level of the State Emergency Operations Center (SEOC).
2. The SCEOP, along with this Appendix, will be activated when SCEMD moves to OPCON 2.

D. Hurricane Region Concept

1. The State and Counties adopted a unified approach in order to better prepare for, respond to, and recover from tropical cyclones.
2. This approach divides the State into four (4) Hurricane Regions - Northern, Central, Southern, and Western. Each County within a Hurricane Region relies on the other Counties in the Hurricane Region to assist in protecting, evacuating, sheltering, and returning its citizens from hurricane evacuations.
3. Hurricane Region Lead Counties

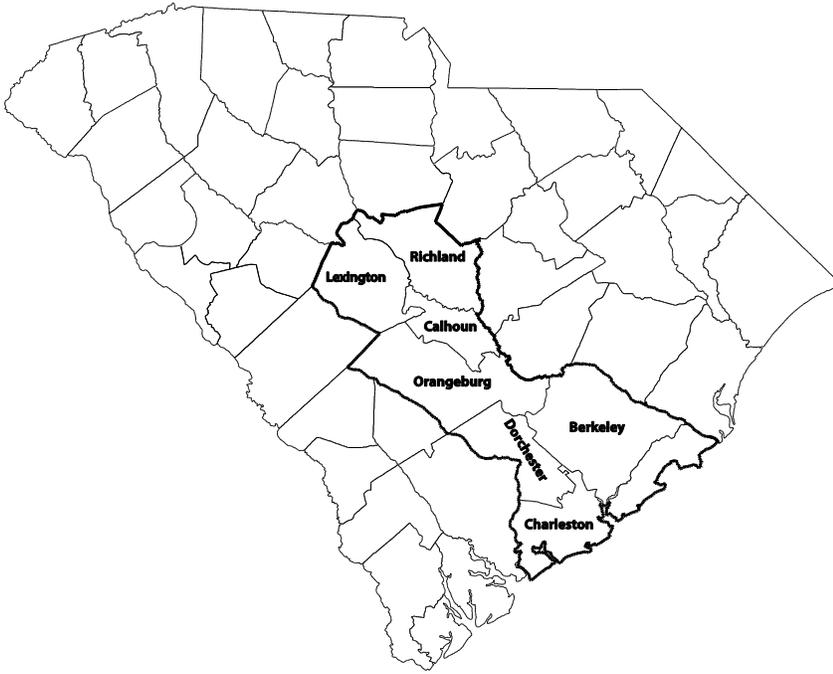
- a. Within each coastal Hurricane Region, one County has been designated as the Lead County. This designation is based on the County with the longest evacuation time within each Hurricane Region.
- b. The SEOC may provide a Regional Emergency Manager (REM) to each Hurricane Region Lead County EOC to assist in disseminating information among the Hurricane Region Counties and to serve as a Hurricane Region point of contact to the SEOC

4. The four (4) Hurricane Regions are:



Northern Hurricane Region
Horry (Lead County)
Georgetown
Williamsburg
Marion
Florence
Dillon
Clarendon
Sumter
Darlington
Lee
Marlboro

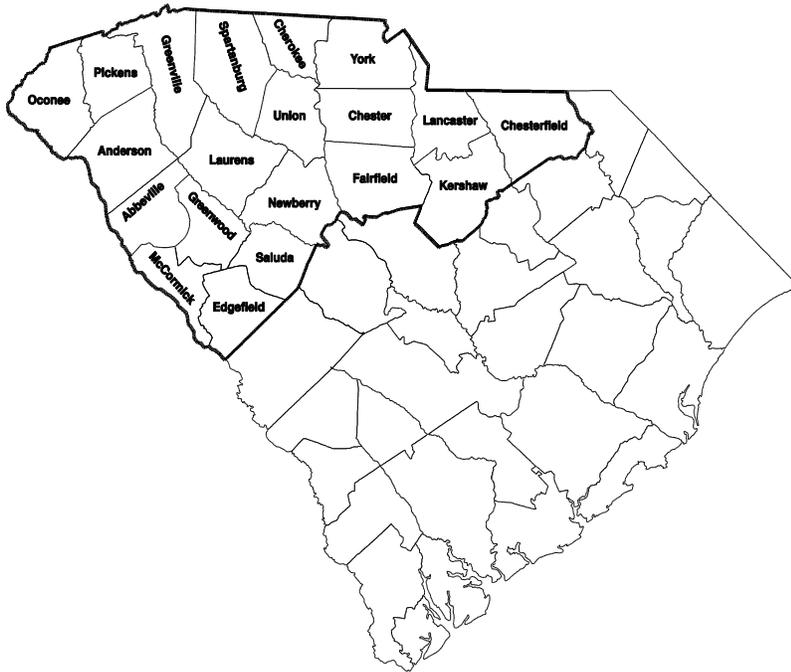
Central Hurricane Region



- Charleston (Lead County)
- Berkeley
- Dorchester
- Orangeburg
- Calhoun
- Richland
- Lexington



- | Southern Hurricane Region |
|----------------------------------|
| Beaufort (Lead County) |
| Jasper |
| Colleton |
| Hampton |
| Allendale |
| Bamberg |
| Barnwell |
| Aiken |



Western Hurricane Region
Abbeville
Anderson
Cherokee
Chester
Chesterfield
Edgefield
Fairfield
Greenwood
Greenville
Kershaw
Lancaster
Laurens
McCormick
Newberry
Oconee
Pickens
Saluda
Spartanburg
Union
York

5. Hurricane Region Evacuations
 - a. If the Governor determines the situation requires an evacuation, the SCEMD Director will recommend the order be based on Hurricane Region, not on individual Counties. The SCEMD Director will recommend that the Governor order the evacuation of one, two or all Coastal Hurricane Regions.
 - b. All Hurricane Region Counties agree to participate in their Hurricane Region evacuation if it is ordered. This agreement is critical to the successful development and implementation of the South Carolina Hurricane Plan.
6. Regional Coordination
 - a. SCEMD will coordinate with neighboring states to include Georgia, Florida, and North Carolina.
 - b. During a multi-state evacuation, the FEMA Evacuation Liaison Team (ELT) will coordinate evacuation conference calls. The ELT supports regional hurricane evacuation efforts by facilitating coordination among the impacted states.
 - c. The FEMA Hurricane Liaison Team (HLT) will deploy to the National Hurricane Center. The HLT provides information to SCEMD directly from the National Hurricane Center.
 - d. SEOC Operations will collect traffic and evacuation related information from ESF-16 (Emergency Traffic Management) and ESF-1 (Transportation)
 - e. Evacuation
 - (1) In conjunction with the Counties and SERT, an evacuation may be recommended to the Governor.
 - (a) An evacuation may be conducted with or without a lane reversal along specified evacuation routes.
 - (2) Evacuation activities will be a joint effort of state and local agencies. ESF-16 (Emergency Traffic Management) will coordinate the evacuation, monitor evacuation status, and recommend actions regarding evacuation.

VIII. DISASTER INTELLIGENCE AND COMMUNICATIONS

- A. See the SCEOP, Section VIII (Disaster Intelligence and Communications) which describes the processes the State uses to acquire, coordinate, and disseminate disaster information.
- B. See Annex D (Public Information) for the process that the State uses to plan for, collect, coordinate, and disseminate hurricane specific information.
- C. See Attachment E of the SCEOP for information regarding the Joint Disaster Intelligence and Assessment Cell (JDIAC).
- D. Conference Calls and Briefings
 - 1. The SEOC will schedule conference calls with the Counties and SERT as early as E-120. Conference calls will continue as needed.
 - a. Format for calls:
 - (1) Opening comments from the SCEMD Director.
 - (2) National Weather Service Columbia (other local NWS offices as necessary) will brief the latest forecast and current conditions. NHC may also be on the call.
 - (3) SCEMD Joint Disaster Intelligence and Assessment Cell (JDIAC) products will be briefed. These products include, but are not limited to, planning scenarios, evacuation timelines, and wind timing reports.
 - (4) SCEMD Chiefs will brief key section actions.
 - (5) SERT will brief key agency actions.
 - (6) County Directors will report local operational status, anticipated resource requests, potential shortfalls, and transportation compliance spreadsheets (if required).
 - (7) The SCEMD Director will discuss evacuation decision or re-entry status.
 - b. If required, there will be a conference call with the affected counties to discuss specific evacuation operations once the evacuation zones are determined.
 - 2. Executive-Level Decision Briefings and Conference Calls will be held as requested by the Governor.
 - a. The formal briefing and conference call format is:

- (1) The local NWS offices will brief the latest forecast and current conditions. NHC may also be on the call.
- (2) SCEMD Joint-Disaster Intelligence Cell (JDIAC) products will be briefed. These products include, but are not limited to, planning scenarios, evacuation timelines, and wind timing reports.
- (3) The State Agency Directors will provide status of agency operations.
- (4) The SCEMD Director will make recommendations to the Governor.
- (5) The SEOC will coordinate with County EOCs prior to press conferences or press releases.

IX. ORGANIZATION AND ASSIGNMENT OF RESPONSIBILITIES

- A. See the SCEOP, Section IX (Organization and Assignment of Responsibilities) for the general roles and responsibilities of County, State, and Federal agencies in preparation, response, and recovery from a disaster impacting the State.
- B. General
 1. SCEMD is the primary agency for the coordination of all tropical cyclone response efforts.
 2. The Hurricane Plan is updated annually by SCEMD.
 3. The primary pre-landfall responsibility of all levels of government will be to minimize the loss of life and property.
 4. The primary post-landfall responsibilities include ensuring the safety of citizens, recovery efforts, and restoration of damaged infrastructure.
 5. Return evacuees to their homes and businesses as soon as possible.
- C. State
 1. Preparedness
 - a. Develop plans to prepare for, respond to, and recover from tropical cyclones.
 - b. The State Emergency Response Team (SERT) will support preparedness, response, and recovery activities.
 - c. Prepare to assist the Counties through state support, mutual aid, and assistance from FEMA.

- d. Develop and implement programs or initiatives designed to mitigate the effects of hazards through the development of plans, policies, standards, and regulations.
- e. Promote awareness, education, and preparedness programs designed to reach all citizens through outreach, public information and training.
- f. Maintain mutual aid agreements at SCEMD. State Agencies will maintain a listing of resources available for response.

2. Response

- a. Respond to the effects of a hurricane by implementing plans and procedures to provide assistance to the Counties through coordination, information flow and resource allocation.
- b. Manage the State's response effort through the SERT. SERT members operating in the SEOC are expected to follow ICS protocol.
- c. Coordinate with Federal authorities and adjoining States for support.

3. Recovery

- a. Facilitate the recovery process from the impact of a tropical cyclone by requesting joint Preliminary Damage Assessments (PDA) after impact.
- b. Request a Presidential Disaster Declaration, if required.
- c. Integrate efforts with FEMA's Joint Field Office (JFO) after a Presidential Disaster Declaration.
- d. Conduct applicants' briefings in all affected Counties to inform potential applicants of available Federal funding.
- e. Provide technical assistance with Individual and Public Assistance programs.

4. Mitigation

Develop a mitigation strategy comprised of goals, objectives, and actions that focus on loss prevention, property protection, natural resource protection, structural projects, emergency services, and public information.

D. Federal

1. Preparedness

Develop plans and procedures detailing how the Federal Government will assist States in response to tropical cyclones.

2. Response

- a. Provide Federal assistance through FEMA and DHS in accordance with federal emergency plans.
- b. Identify and coordinate assistance under other Federal statutory authorities.

3. Recovery

- a. Conduct joint PDA with the State.
- b. When the results of the PDA meet or exceed the State's Individual and Public Assistance thresholds, assist the State in developing the Governor's request for a Presidential Disaster declaration.
- c. Facilitate the process of presenting the Governor's request to the President along with their recommendation, and, following a decision, communicate the decision to the State.
- d. Coordinate the selection, set up, and management of the JFO.

4. Mitigation

- a. Assist the State in developing a FEMA-approved Hazard Mitigation Plan to mitigate the effects of tropical cyclones.
- b. Provide grant funding in the form of the Pre-Disaster Mitigation (PDM) Grant Program, Flood Mitigation Assistance (FMA) Program, Repetitive Flood Claims (RFC) Program, and the Severe Repetitive Loss (SRL) Program.
- c. Provide post-disaster mitigation funding in the form of the Hazard Mitigation Grant Program (HMGP), which enables mitigation measures to be implemented during the Recovery phase of a disaster.

X. CONTINUITY OF GOVERNMENT (COG)

See the SCEOP Basic Plan, Section VII, paragraph K (Continuity of Government).

XI. CONTINUITY OF OPERATIONS (COOP)

See the SCEOP Basic Plan, Section VII, paragraph L (Continuity of Operations).

XII. PLAN DEVELOPMENT AND MAINTENANCE

- A. This Plan is the principal source of documentation concerning the State's tropical cyclone activities.
- B. The SERT assisted in the development of this plan.
- C. The State Emergency Response Team (SERT) will review this Plan prior to the start of each hurricane season (1 June) and forward recommended changes to the SCEMD Hurricane Program Manager.
- D. The SCEMD Hurricane Program Manager will coordinate the efforts of all responsible departments and agencies for plan revisions and updates.
- E. At a minimum, SCEMD will review this plan on an annual basis and update/revise the plan as necessary throughout the period. SCEMD will complete the annual review prior to 1 June each year.

XIII. ADMINISTRATION, LOGISTICS AND FINANCE

- A. See the SCEOP Basic Plan, Section X (Administration, Logistics and Finance).
- B. See SCEOP Basic Plan, Attachment A (SC Logistics Plan).

XIV. AUTHORITIES AND REFERENCES

See the SCEOP Basic Plan, Attachment C (Authorities and References).

XV. ACRONYMS AND GLOSSARY

See SCEOP Base Plan, Attachment B (Acronyms and Glossary).