South Carolina Floods of 2015

Mario Formisano, Director
Dorchester County
Emergency Management Department
South Carolina 101

Nickname: The Palmetto State
State Capital: Columbia
Motto: “Dum Spiro Spero” – “While I breathe, I hope”
Adopted in 1776.

Time Zone: Eastern
Coastline: 187 miles
Population: 4,723,723 as of July 2012

Geography:
South Carolina is bordered to the north by North Carolina, to the south and west by Georgia, and to the east by the Atlantic Ocean.

Size: 32,020 square miles
Number of Counties: 46
SC Natural Disaster History

- 1959 Hurricane Gracie
- 1989 Hurricane Hugo
- 1999 Hurricane Floyd
- 2014 Severe Winter Storm
- 2016 Severe Storms & Flooding

* Earthquake of 1886
Key Discussion Areas

• Situation and Overall Impact
• State perspective (part 1)
  – Response
  – Factors Contributing to Success
  – Where to Improve
• Local perspective (part 2)
  – Response Mission
  – Lessons Learned
  – Recovery Process
Deep Low Pressure System over SE U.S., and “Joaquin” Moving North from Bahamas

Deep Tropical Moisture Over South Carolina
Weather Factors Contributing to Heavy Rainfall

A. Nearly Stationary
   Upper Level Low →
   Provided Lift Across SC

B. Surface Coastal
   Front and Low - Level
   Jet Provided Moisture

C. Additional Moisture from
   Outer Fringes of Hurricane
   Joaquin

D. Sea Surface Temperatures
   Much Above Normal (3-4.5 Deg. F)

Illustration by C.E. Konrad
SST Data From NOAA/ NESDIS
Regional Rainfall Totals Oct. 1 – 4

Storm Total Rainfall
~8 am 10/1/15 through ~8 am 10/5/15

Precipitation in Inches
- 20.00" or >
- 18.00" - 19.99"
- 16.00" - 17.99"
- 14.00" - 15.99"
- 12.00" - 13.99"
- 10.00" - 11.99"
- 8.00" - 9.99"
- 6.00" - 7.99"
- 4.00" - 5.99"
- 2.00" - 3.99"
- 0.00" - 1.99"

Data Sources
NWS / USGS / RAWS / Other Sites
ASOS / AWOS Sites
CoCoRaHS Sites

Data analytic and graphic created by Blair Holloway - NWS Charleston, SC
http://www.weather.gov/cha

This map is an interpolation of reported values and should only be considered an estimation. Not all reports used in the analysis will be displayed due to space constraints. Reports are storm total rainfall amounts.
Prelim 96 Hour Average “Recurrence”
created by MetStorm 10-09-15

Large Area Indicating Rainfall Values of 500-1000+ Year Values!
Heavy Rainfall: How Extreme?

From Carolinas Integrated Science & Assessment (CISA) report
http://www.cisa.sc.edu/PDFs/October%202015%20Flood%20Event%204%20Pager.pdf
Note: USGS Provided Rapid Deployment Gages on the Ashley and Edisto Rivers Several Days After the Rain Ended
What is a 100, 1000 Year Flood?

• 100 and 1,000 Year Flood Does NOT = Amount of Years between Floods

• 100 Year Flood Has 1% Chance of Occurring ANY Year

• 1,000 Year Flood Has 0.1% Chance of Occurring ANY Year

• Probabilities Only as Good as Past Data. More Data → Better Statistics!

• Note: This was NOT a 1,000 Year Event for most Rivers
Mitigating Factors for Flooding

Dry Conditions Prior to Event – Especially Interior Areas

Dams Provide Flood control – Largely rivers flowing from central SC
Need a Better Knowledge of ALL Flood Prone Areas in our Region
South Carolina Precipitation Storm Total Ending at 7 AM Oct. 5th, 2015

Precipitation In Inches

20.00" or >
18.00" - 19.99"
16.00" - 17.99"
14.00" - 15.99"
12.00" - 13.99"
10.00" - 11.99"
8.00" - 9.99"
6.00" - 7.99"
4.00" - 5.99"
2.00" - 3.99"
0.00"

This map is an interpolation of actual reported values, but should be considered an estimation only. Not all reports used in the analysis will be displayed due to space constraints. Reports are precipitation through the above mentioned period.

Data Sources:
NWS Cooperative Observers
ASOS/AWOS
CoCoRaHS
Supplementary

Maps created by the National Weather Service Forecast Office in Greenville/Spartanburg and in cooperation with the NWS Forecast Offices in Columbia and Charleston South Carolina as well as Wilmington North Carolina.
Storm Numbers

- Storm related fatalities: 19
- Displaced citizens: Over 20,000
- Shelters:
  - 32 (includes standby locations)
  - 26 counties with shelters
  - 941 citizens sheltered
- Emergency meals served: More than 2.7 million
- Citizens without water: 40,000
Storm Numbers (con’t)

• Highway Patrol calls: 8,407
• Collisions during the event: 3,521
• Dam failures: 36
• Dams under emergency orders: 75
• Roads and bridges closed: 500+
• Water rescues: Over 1,500
• Calls taken by the Public Information Phone System: 12,900+
Storm Numbers (con’t)

- State logistics requests: Over 900
- EMAC
  - 42 requests
  - 10 states
- SC National Guard: 4,100 personnel
Dam Failure, Richland County.
• The Columbia Canal washout left the City of Columbia without drinking water until it could be repaired.

• USACE provided UAV (drone) flights of the canal and of several dam breaches.
Wise Ferry Road, Lexington
Gibson Pond, Lexington
Old Black Oak Road, Moncks Corner
Glenhaven Drive, Columbia
Timberlane Road, Lexington
Rescue Operations, Georgetown County
Garner’s Ferry Road, Columbia
Donated Goods
National Guard Water Operations, Columbia
National Guard Temporary Road Repair
National Guard Air Operations
National Guard Air Operations
National Guard High Water Assistance
National Guard Evacuation Assistance
# Federal Recovery Assistance

<table>
<thead>
<tr>
<th>Category</th>
<th>State</th>
<th>Federal</th>
<th>Loans</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FEMA Individual Assistance (IA)</strong></td>
<td>$ 2,906,556</td>
<td>$ 83,995,023</td>
<td></td>
<td>$ 86,901,579</td>
</tr>
<tr>
<td>Housing Assistance</td>
<td>$ 75,275,356</td>
<td></td>
<td></td>
<td>$ 75,275,356</td>
</tr>
<tr>
<td>ONA</td>
<td>$ 2,906,556</td>
<td>$ 8,719,667</td>
<td></td>
<td>$ 11,626,223</td>
</tr>
<tr>
<td><strong>FEMA Public Assistance (PA)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Total Estimate</td>
<td>$ 66,071,057</td>
<td>$ 198,213,171</td>
<td></td>
<td>$ 264,284,228</td>
</tr>
<tr>
<td>State Agency Estimate</td>
<td>$ 21,196,915</td>
<td>$ 63,590,745</td>
<td></td>
<td>$ 84,787,660</td>
</tr>
<tr>
<td>Local Govt. Estimate</td>
<td>$ 44,874,142</td>
<td>$ 134,622,426</td>
<td></td>
<td>$ 179,496,568</td>
</tr>
<tr>
<td><strong>FEMA National Flood Insurance Program</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Claims Paid to Date</td>
<td>$ 129,663,721</td>
<td></td>
<td></td>
<td>$ 129,663,721</td>
</tr>
<tr>
<td><strong>SBA Loans</strong></td>
<td></td>
<td></td>
<td></td>
<td>$ 151,431,400</td>
</tr>
<tr>
<td><strong>Non-Federal Share</strong></td>
<td>$ 69,146,057</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Factors Contributing to Success

- Advance notice
- Early decision making at all levels
- State agency heads directly involved
- Pre-staging of emergency assets
- EMD and NG liaisons deployed forward
Factors Contributing to Success (con’t)

- Mutual Aid
  - Counties provided assistance to other counties and the State
  - EMAC

- Extensive planning, training and exercising at all levels of government

- National Guard capabilities

- Emergency management profession in SC is mature and experienced
Where to Improve

- Initial findings
  - Validating information
  - Managing information expectations
  - Flood and inundation modeling
  - Enhance state regulated dam program
  - Enhance mosquito abatement programs
  - Shelter staffing
  - Staff augmentation for EOCs at all levels
  - Meeting unmet needs beyond FEMA assistance
October 2015 Flood Response & Recovery

Dorchester County, SC
Dorchester County 101

- County Seat: Saint George
- 575 sq mi
- Pop: 148,468 (2014)
- Form of Gov’t: Council/Administrator
- 757 employees
- Median HH income: $54,452
Org Chart & Staff

Jason Ward
County Administrator

Charlie Potts
Deputy County Administrator

Mario Formisano
Director

Theresa McKnight
Administrative Assistant III

Matt McNamara
Preparedness & Recovery Specialist

Roger Dangerfield
Communications & Logistics Manager

John Place
Communications Technician

Justin West
GIS Analyst (911)
Divisions

• Emergency Preparedness
  – Coordinates disaster planning, training and exercises; Public Education; CERT

• Communications Support
  – Radio equip/system diagnostics, 800 MHz, VHF, Amateur program administration

• E-911 Services
  – GIS, Equipment maintenance and service, 911 fund administration
Primary EOC

Carl Knight Law Enforcement Complex
212 Deming Way, Suite 3, Summerville, SC
Operating Conditions (OPCON)

- **OPCON 5**: Most day-to-day operations. Pre-disaster prep activities that do not yet warrant EOC activation.
- **OPCON 4**: Possibility of an emergency or disaster that may require emergency operations. EM staff closely monitoring.
- **OPCON 3**: Disaster or emergency situation likely. EOP and other emergency plans activated. Limited EOC staffing.
- **OPCON 2**: Disaster or emergency situation is imminent or in effect. Full EOC staffing to meet the needs of the response.
- **OPCON 1**: Major disaster or emergency situation in effect; highest state of emergency operations.
Emergency Council

• County Council Chairman serves as Chair;
• Executive Advisory Group comprised of Mayors and Public/Special Service District Chairpersons;
• Operations Group comprised of the Administrator and staff, EMD, EMS, Fire, Police, ARC, DSS, PWD, and others.
Emergency Measures & Decisions

- Declare “State of Emergency”;
- Property access for debris removal;
- Private roads and ditches access;
- Water usage limitation;
- Alcohol and firearm sale limitations;
- Establish curfew;
- Prohibit price gouging;
- Business license issue moratorium;
- Zoning and building permit moratorium;
- Regulating outdoor burning;
- Others as required.
2015 October Flood Event

DCEOC OPCON Sequence

4: 10/1 – 10/2 (Preparations)
   – County government/schools, early dismissal on 10/2

1: 10/3 – 10/7 (Response, Short-term Recovery)
   – 24 hour staffing until 10/6, CCC activated

3: 10/8 – 10/11 (Transition into Recovery)
   – County government reopened

4: 10/12 – 10/15
   – FEMA DRC opened 10/16
Response Facts

- Afternoon of 10/3 State of Emergency Declaration and Curfew
- 10/3 – 10/5, 140+ water rescues
- EMAC/Mutual Aid: ICW SEOC, TN Water Rescue; Type II USAR (Fairfax, VA)
- SCNG assist w/ sandbags & other logistics
- 1 unsolicited truck of donations
Mass Care

• Summerville High School Shelter
  – Peaked at 97 evacuees
  – Open for 8 days
  – Relocated on Day 8
• Salvation Army and Red Cross Canteens
• Tyson Foods
Vector data represents Preliminary Flood Zone from 2015 that is currently unpublished.

Published Flood Zone data is from 1994 and is available as raster data only.
2011 SLOSH Model

Dorchester County 2011 Surge Areas
Council approves “hazardous pay” for flood workers
Waste Water Facilities
Animal Rescue
Casket Retrieval
Response Lessons Learned

Challenges
• Water rescue resources
• Movement of supplies
• Roads/bridges closures
• Public obedience
• Limited flood forecast capabilities after rain

Keys to Success
• Situation reports and information sharing
• Leadership involvement
• Dedicated public info team
• Social media
• Next day planning
• Cooperation
IA Stats

Registrations - 4,085

Total awarded through the Individuals and Households Program (IHP) $4,156,187.94

Housing Assistance (HA) $3,545,738.57

Other Needs Assistance (ONA) $610,449.37
IA Stats Cont.

Over **40%** of Applicants Failed the Income Test for loan repayment (**FIT**)

Unmet Need

FEMA Verified Loss – FEMA Grant = Unmet Need

~ $2,000,000.00
PA Stats

• Preliminary DA w/ FEMA = $3.5M
• Latest figures for county = $3M
• Challenges w/ Cat B worksheets
• Minimal Cat A expenditures
• Vector Control Issues
Short-term Recovery

- Driven by response/rescue data
- VOAD needs assessment
- Local Gov’t damage assessment
- FEMA support (DRCs, DSATs)
- County Council Town Hall Meeting
Intermediate

- Minimal impacts to business community
- FEMA assisted w/ temp housing solutions
- FEMA DSAT teams were critical
- Initial DRC issues (from mobile to fixed)
- Substantial Damage Estimates
Long-term

- Regional LTRG formed w/ committees
- State case management contract
- HMGP projects
- EMs have to be patient..
Feel Good Story
2016 SCEMA Volunteer of the Year
QUESTIONS?

Mario Formisano
Dorchester County, SC
843-832-0341
mformisano@dorchestercounty.net