Journal of the American Mosquito Control Association, 36(2S):103–105, 2020

OPERATIONAL NOTE

FLORIDA KEYS MOSQUITO CONTROL DISTRICT COMPREHENSIVE HURRICANE PLAN

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ABSTRACT. The hurricane plan developed by the Florida Keys Mosquito Control District and approved by vote of the Board of Commissioners is presented. The plan is intended to facilitate prompt resumption of services after a tropical cyclone (tropical storm or hurricane) and to give direction and instructions to District staff who evacuate before a storm makes landfall. Specific procedures are documented for before and after storms, including communication, preparation of buildings and vehicles, and evacuation. The need for food and water for staff immediately after a storm is specifically mentioned in the plan. The plan is composed of five main sections: general preparedness, Lower Keys procedures, Middle Keys procedures, Upper Keys procedures, and aerial operations procedures. Also included is a section covering satellite telephone operation and a list of telephone contacts for local government and law enforcement agencies. An addendum details the District's policy for compensation for public emergency response work so all employees are aware of how they will be paid during the storm recovery period.

KEY WORDS Disaster, Florida Keys, hurricane, preparedness, plan

Tropical cyclones (tropical storms and hurricanes) are a fact of life in the coastal southern United States. Florida, the only southern state with both an Atlantic coast and a Gulf coast, is more at risk to hurricane damage than are other states. Tropical cyclones are large-scale phenomena that cause landscape-level effects on the environment and human affairs (Michener et al. 1997, Doyle et al. 2009). A hurricane can be expected to make landfall somewhere in Florida every 2 to 3 years with a strong hurricane affecting the state once every 4 years (Gentry 1974, Malmstadt et al. 2009). Of the 10 most expensive hurricanes to make landfall in the USA, 8 have affected Florida in some way (Malmstadt et al. 2009). Wind and storm surge are the 2 most dangerous aspects of tropical cyclones (Keim et al. 2007). Atlantic "hurricane season" extends from June 1 to November 30 with the most active months being September and October (Malmstadt et al. 2009). Although 97% of tropical cyclones occur during these months, occasional off-season storms can develop as early as May or as late as December, and rarely storms have been recorded in January and February (Erdman 2017).

The Florida Keys, in Miami-Dade and Monroe Counties, FL, are an archipelago made up of narrow, nearly flat islands in the Gulf of Mexico curving to the west from the southern mainland Florida for about 120 miles (Dash and Morrow 2001). South Florida from Marco Island on the Gulf Coast to Vero Beach on the Atlantic Coast is 1 of 3 "highly active" areas for hurricane and tropical storm activity; the Florida Keys are within this area and as such are most at risk from tropical cyclones (Keim et al. 2007). In Monroe County there is only 1 road connecting the islands, the Overseas Highway (US 1), passing over numerous bridges (Dash and Morrow 2001). There are 2 roads leading out of the Florida Keys, US 1 (Overseas Highway in Monroe County and South Dixie Highway in Miami-Dade County) and Card Sound Road. Card Sound Road joins US 1 just south of Florida City in Miami-Dade County. There is another mile of highway before the onramp to the Florida Turnpike. The largest population center in the Florida Keys, the city of Key West, is at the westernmost end of this highway, and there are no shelters in Monroe County rated for storms of Category 3 or above (Chen et al. 2006).

Hurricanes can cause catastrophic damage to human habitation and the environment. Sediments may be moved about by wave action, incredible amounts of debris may be generated, trees are often blown down, and swimming pools may become mosquito habitats (Escobedo et al. 2009, Kang and Trefry 2003, Caillouët et al. 2008, Hribar 2018). Mosquito control is one of the most important services required after a hurricane, alongside removal of contaminated food and mitigation of water pollution from sewage treatment facilities (Peavy 1970, Patterson et al. 2007). People often report an increase in mosquito bites after a hurricane (Gotham 1997, Schultz et al. 2005, Harris et al. 2014). After a hurricane, people may be living in substandard housing and, without electricity, they may be leaving windows open at night for temperature regulation (Breidenbaugh et al. 2008). Relief workers from other areas may be present in the hurricane zone, and they may be subject to very high biting pressure while trying to restore services such as electrical power (O'Leary et al. 2002). Although in the USA

increases in mosquito-borne diseases generally have not been noted after hurricanes, the possibility exists, and mosquito control is needed to reduce vector populations (Nasci and Moore 1998, Ahmed and Memish 2017).

The Florida Keys Mosquito Control District (FKMCD) serves that portion of the island chain that lies within Monroe County, Florida, from Broad Creek in the northeast to Key West and Sunset Key in the west. Due to the length of the area served, the District maintains 3 facilities to better serve the population. The District's headquarters is located on Big Coppitt Key, about 5 miles east of Key West. The Aerial Operations unit is located adjacent to the Marathon Airport, roughly at the halfway point of the District. The Key Largo Substation is located about midway the length of Key Largo. A hurricane plan was developed for the District to facilitate prompt resumption of services after a hurricane and to give direction and instructions to District staff who evacuate before a storm makes landfall. The overall plan was generated from a number of separate plans developed at each work site and by different work groups at each site. The unified plan ensures that all staff are aware of all prestorm and poststorm needs and procedures. Not only are evacuation and return procedures documented, but the need for food and water for staff immediately after a storm is specifically mentioned in the plan.

The plan mentions procedures specific for Upper Keys, Middle Keys, and Lower Keys. These distinctions are essentially terms of convenience and are borrowed from the real estate industry. For operational purposes, the Florida Keys Mosquito Control District defines the Upper Keys as those islands between Broad Creek and Indian Key Channel (Broad Key and Palo Alto Key to Upper Matecumbe Key); the Middle Keys as those islands between Channel 2 and the Seven Mile Bridge (Craig Key to Knight's Key); and the Lower Keys as those islands from the Seven Mile Bridge to Key West and Sunset Key. Those desiring to know exact locations of islands relative to one another should consult the map published by Hribar et al. (2004).

The District's Hurricane Preparedness Plan is provided to every employee, and every employee must become familiar with the plan, particularly procedures applicable to the employee's job title and workstation, prior to storm season. Within the plan various employee classifications are used. Specifically, "Tier II employees" are mentioned. This terminology was borrowed from the Monroe County Board of County Commissioners' Emergency Management Preparedness Plan. That plan designated 3 tiers of employees differentiated by their responsibilities during and after a disaster. Tier I employees remain in-county during a disaster and "ride it out." Tier II employees must report to work no later than 48 hours postdisaster. Tier III employees report back to work when summoned (M. Luttazi-Alary, personal communication). The FKMCD has no Tier I employees; all staff are free to evacuate in case of a tropical cyclone. "Level One" employees as mentioned in the plan are those FKMCD employees critical to aerial operations. This includes the Directors of Aerial Operations and Aircraft Maintenance, aircraft maintenance personnel, and pilots. These persons must report as soon as possible to conduct surveillance and reconnaissance flights and to prepare for aerial control operations. "Nonessential" employees are Tier III employees. Finally, the terms "exempt" and "nonexempt" are terms defined in Federal labor law and pertain to employees who must or may not be paid overtime (USDOL 2016).

The plan is divided into 5 main sections: general preparedness, Lower Keys procedures, Middle Keys procedures, Upper Keys procedures, and Aerial Operations procedures. Two smaller sections follow, one on satellite telephone operation and the other containing telephone contacts for local government and law enforcement agencies. An addendum details the District's policy for compensation for public emergency response work.

The District's Hurricane Preparedness Plan is written to allow everyone to have sufficient time to take care of their personal family needs and to secure assigned areas on District property in the event of a hurricane or tropical storm. Employees are advised that they may be required to work on a weekend or at night to prepare for the storm. All personnel are instructed to comply with Monroe County Emergency Management evacuation orders. Employees are required to travel with a usable uniform and FKMCD Identification Badge for reentry into Monroe County. Employees are required to check a call-in number every day for instructions regarding when and where to report. Due to the physical geography of the District, separate procedures for each station (Key West, Marathon, Key Largo) are established.

Staff responsibilities are specified by location and by job title. Instructions are presented for preparation of vehicles, buildings, and other District property. Storage of equipment, records, and chemicals is explained, as well as the securing and complete backups of computers. All employees are directed to have correct and current contact information on file in the event of an evacuation. The procedure for evacuation of District aircraft is explained.

After a storm, all employees are required to contact their supervisor, Director of Operations, or Executive Director within 24 hours following the "all clear" from the Monroe County Emergency Management Service to learn when to report back to work. Details for use of the District's satellite phones are provided; these can be critical communication resources if land and cell telephone services are disrupted. Telephone contact information is provided for the following external agencies: Florida Highway Patrol, Key West Airport Manager, Marathon Airport Manager, Monroe County Sheriff, and Monroe County Emergency Management.

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