Journal of the American Mosquito Control Association, 36(2S):35–40, 2020

FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES MOSQUITO CONTROL INCIDENT RESPONSE TEAM: AN EXERCISE IN USING THE NATIONAL INCIDENT MANAGEMENT SYSTEM'S INCIDENT COMMAND SYSTEM FOR DISASTER RESPONSE

MARAH S. CLARK[1] AND ADRIANE N. ROGERS[2]

ABSTRACT. The Florida Department of Agriculture and Consumer Services (FDACS) uses a Mosquito Control Incident Response Team (MCIRT) to respond to natural disasters and mosquito borne-disease threats. Since 2001, this team has responded to 9 different events and is responsible for organizing treatment to more than 15 million acres in Florida using wide-area adulticide applications. The MCIRT implements the Incident Command Structure (ICS) to coordinate response efforts because it enables FDACS to quickly deploy staff to the devastated areas, conduct necessary mosquito surveillance, communicate with multiple agencies, and direct mosquito control measures. It also allows for easier transfer of leadership, cross-training of employees, and postevent evaluation.

KEY WORDS Communication, hurricane, Incident Command System, mosquito control, response, surveillance, tropical weather

INTRODUCTION

Heavy rain events from tropical weather systems can drastically increase mosquito populations in flood-prone areas of Florida. Such dramatic increases in mosquito populations can pose serious health threats to humans and animals while also becoming intense nuisances that can hamper response and recovery efforts. Following the 2001 detection of West Nile virus in Florida, the Florida Department of Agriculture and Consumer Services (FDACS) created a deployable unit, known as the Mosquito Control Incident Response Team (MCIRT), to provide statewide emergency response for mosquito control efforts throughout the state, providing relief for counties that have limited or no access to mosquito control. This team can be rapidly deployed to respond to natural disasters and mosquito-borne disease outbreaks.

Personnel working in areas adversely affected by a weather event can be consumed with repair and recovery efforts in the wake of such weather systems, often working outside to restore infrastructure. This may expose them to intense mosquito pressure and the threat of mosquito-borne disease transmission. With both endemic and exotic mosquito-borne virus activity commonly found in Florida, coordinated vector control response is critical. The MCIRT provides the opportunity to administer relief from mosquito pressure and disease threats to recovery personnel.

The primary focus of the team is to respond to natural disasters and mosquito-borne disease threats. The MCIRT provides mosquito surveillance and control applications in impacted regions of the state and uses the Incident Command System, a tool that provides a well-trained, rapidly deployed unit. Since its inception, the MCIRT has been activated 9 times, most recently in response to Hurricanes Irma in 2017 and Michael in 2018. Through these activations, it has organized and directed mosquito control applications to more than 15 million acres across Florida.

INCIDENT COMMAND SYSTEM

The Incident Command System (ICS) is a component of the National Response Framework and National Incident Management System (NIMS) (FEMA 2008). The Federal Emergency Management Agency (FEMA) defines ICS as "a standardized approach to the command, control, and coordination of on-scene incident management, providing a common hierarchy within which personnel from multiple organizations can be effective. The ICS is the combination of procedures, personnel, facilities, equipment, and communications operating within a common organizational structure, designed to aid in the management of on-scene resources during incidents" (FEMA 2018a). Many governmental and nongovernmental agencies use ICS not only for response but also in preparing for incidents.

Several ICS components form the MCIRT structure and process and make implementation and response successful. Common terminology provides participating agencies a comprehensive understanding of roles, locations, and involved assets. Effective coordination and communication are critical to an incident response, and Incident Action Plans (IAPs) are one of the primary mechanisms used to keep information concise and coherent for those involved

[1] Florida Department of Agriculture and Consumer Services, Division of Agricultural Environmental Services, 3125 Conner Boulevard, Building 6, Tallahassee, FL 32399.
[2] Pasco County Mosquito Control District, 2308 Marathon Road, Odessa, FL 33556.

(FEMA 2018b). Because of this, FDACS is able to coordinate with federal, state, and local agencies as well as provide assistance with concurrency requirements for counties requesting assistance.

The ICS's modular organization allows for the incident response to either increase or decrease as the incident size, complexity, or hazards change. The ability to expand and contract was quite useful in the MCIRT's response to Hurricane Irma in 2017 because more than two-thirds of Florida was affected by the massive storm. Management by Objectives creates specific, measurable goals to focus response, identify specific strategies, and aid in assigning work, procedures, and protocols (FEMA 2018b).

The concepts of Chain of Command and Unity of Command allow information to be disseminated effectively within the ranks and clarifies relationships between leadership and responders. It clearly defines each of the roles and reporting requirements and reduces chaos and confusion, especially as the incident expands in size and complexity. Clear and concise communication allows the team to accomplish respective tasks necessary to meet overall objectives (FEMA 2018b).

STANDARD ICS STRUCTURE AND ROLES

Specific roles within ICS help make Chain of Command function correctly. Not all positions are necessary for the system to function, but as the event escalates, more can be added. A fully staffed response team would consist of an Incident Commander, General Staff, and Command Staff (FEMA 2018b). The MCIRT uses positions in all 3 of these areas.

The principal role in every ICS is the Incident Commander (IC). This individual typically oversees both the command and general staff and establishes the Incident Command Post (ICP) and appropriate ICS structure necessary for the response. The IC is responsible for setting priorities and approving IAPs, which is one of the keys to a successful ICS. The IC decides when to expand and demobilize response teams as the event increases, eventually subsides, and ends (FEMA 2018b).

General Staff are personnel responsible for operations, logistics, and planning and report to the IC (FEMA 2018a). This group uses the IAPs to respond to the event by either providing information or taking action depending on job responsibilities. Typical ICS positions include Operations Section Chief, Planning Section Chief, Logistics Section Chief, and Finance/Administration Section Chief (FEMA 2018a). Because ICS is scalable, additional deputies, assistants, managers, and leaders can be added as the incident grows (FEMA 2018b). These position titles are based on the specific organizational element added to expand the staff.

In ICS, the Operations Section Chief carries out the mission of the IAP by using direct tactical response and dedicated resources. The Planning Section Chief, using available situation reports and data, provides needed input to develop the IAPs. The Logistics Section Chief locates needed resources, such as staff, vehicles, equipment, food, and lodging. The Finance/Administration Section Chief is responsible for expenditures, contract negotiation, compensation for the staff, and time cards (FEMA 2018b). To limit burnout and maintain performance and morale, the number of consecutive days that any 1 member will serve on a deployment is commonly 2 wk (14 days).

According to FEMA, Command Staff support the IC. Positions include the Public Information Officer (PIO), Safety Officer, and Liaison Officer. As with the General Staff, these positions are filled depending on the size or complexity of the incident. If a position is not filled, the Incident Commander completes the duties. The PIO, upon confirmation from the IC, releases pertinent information to participating agencies (federal, state, and local), media, and the public through scheduled briefings. The Safety Officer's responsibilities include determining overall safety measures needed during the response period based on identified hazards. Information is imparted through the IAP to the General Staff. Finally, the Liaison Officer is useful when multiple agencies are involved in the response. This individual assists in coordinating communication between federal, state, and local agencies and is the primary point of contact for the agencies involved in the response (FEMA 2018b).

In some incidents, not all positions are used or required, whereas other events may require expanding the operation section staff to include additional branches or sections (FEMA 2018b). In Florida's MCIRT, the characteristic ICS structure includes the IC, all General Staff Section Chiefs, the Public Information Officer, and the Safety Officer, each of whom plays a role in the overall incident response.

TRAINING

It is important that individuals serving in these roles have basic ICS training. Each member of Florida's MCIRT has participated in a minimum of 4 FEMA training classes, which are available online through the agency's training website. These courses review the basic structure of ICS, NIMS, and the National Response Framework. It is encouraged that all MCIRT members also participate in 2 live training courses that review and further expand upon escalating events. FEMA, along with respective state emergency management agencies, teaches these classes. Information on the courses available under ICS can be found on FEMA's Emergency Management Institute's website (FEMA 2019).

There are other opportunities to implement training. Much like many emergency response teams that conduct hazard response drills to provide learning opportunities, the MCIRT also conducts similar tabletop exercises. In recent years, between tropical weather events, FDACS has conducted

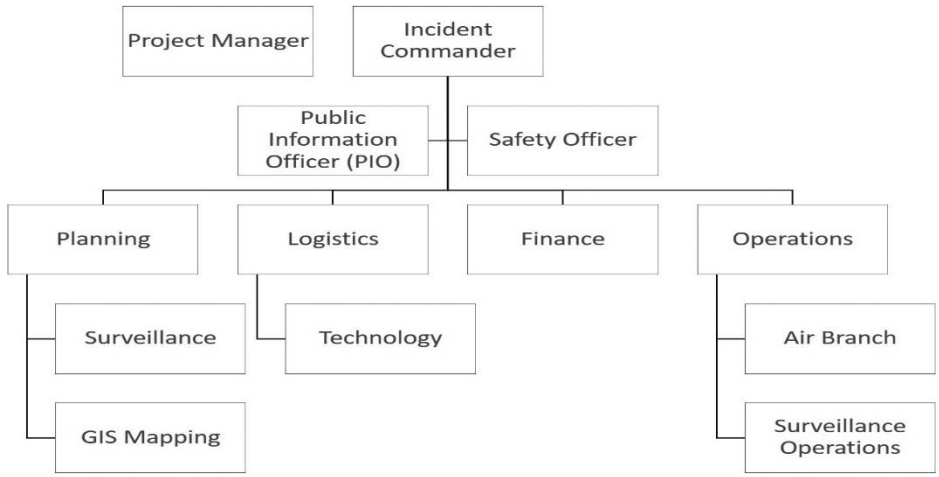

Fig. 1. Mosquito Control Incidence Response Team: organizational structure and elements.

several practice sessions in efforts to determine any potential communication failures, maintain ICS awareness, and train new personnel.

MCIRT ROLES AND STRUCTURE

Because ICS is scalable, the MCIRT easily falls within the larger emergency response, whether it is for a natural disaster or for a public health threat. It also allows for ease of transition between teams through transfer of command (FEMA 2018b). Documented IAPs, objectives, and current operations provide incoming leadership and staff the ability to easily determine the current situation as well as the ability to inform remaining staff of the changes.

Overall, the roles used by MCIRT are identical for ICS. The typical MCIRT ICS structure is shown in Fig. 1. One difference in Florida's structure is the presence of a Project Manager. This individual serves by communicating information to and from the FDACS Commissioner's Office as well as providing support in management decisions and obtaining necessary funding. He or she has the ability to step in to make difficult decisions as necessary, such as the need for expansion.

Under the Operations Section, the MCIRT response includes an aerial component and, depending on requests received, a ground component. It is important to note that all mosquito control operations are contracted services, and the MCIRT team provides support through surveillance activities, communication, and coordination of applications.

Performing adult mosquito surveillance is the key to determining if a response is needed in an area once requested. In the MCIRT, surveillance falls under both the Planning and Operations Sections. In the Planning Section, surveillance personnel are responsible for reaching out to mosquito control programs (MCPs) and counties to obtain any available mosquito surveillance data that would have been conducted during 3 nonevent years. Nonevent years can be defined as years in which mosquito surveillance was conducted to represent typical, baseline mosquito population levels, accounting for normal seasonal variations. Additional information collected includes determining if a mosquito control program exists within the area addressed in the disaster declaration and if the program is still operational. If a local program exists and is capable of performing their own surveillance activities, the program will be asked to share baseline, pretreatment, and posttreatment surveillance data with the MCIRT.

If an existing mosquito control program is incapable of performing their own surveillance or if a program does not exist within the impacted region, FDACS operational surveillance staff will work to conduct all necessary surveillance activities. The MCIRT requires a minimum of 5 Centers for Disease Control and Prevention (CDC)-style light traps baited with dry ice to be deployed within each region. The MCIRT operational surveillance staff will deploy and retrieve traps prior to mosquito control applications to justify the need for control measures. Entomologists and biologists within this section count and identify mosquitoes to species, which helps to further justify the need for applications.

MCIRT PROCESS

Several events must occur for the MCIRT to be activated. First, a Presidential Disaster Declaration and Florida Executive Order must be issued that provides for funding at the national and state levels. Second, a county EOC must enter a request for mosquito abatement assistance into the state's Emergency Management's WebEOC, an online monitoring system for all local assistance and support requests. Finally, FDACS elects to deploy the MCIRT, if warranted. Figure 2 is a brief overview of the steps required for MCIRT activation.

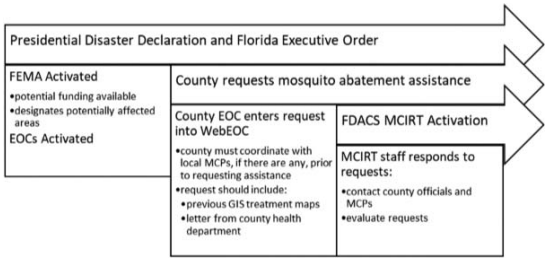

Fig. 2. Mosquito Control Incidence Response Team: activation overview.

All requests for assistance are managed through the Florida Department of Emergency Management (FDEM). A county EOC, after input from the local MCP, can make requests for mosquito control applications based on their individual needs. The requests that are entered into WebEOC include GIS maps of possible areas requiring control operations and a letter from the local health department expressing the need for treatment because of a possible public health threat of mosquito-borne disease transmission. Prior to MCIRT activation, FDEM staff filter local assistance WebEOC requests and contact appropriate FDACS staff. Upon MCIRT activation, the MCIRT Planning Section Chief remains in contact with the FDEM about the status of WebEOC mosquito abatement requests. Counties without a mosquito control program are also eligible to receive assistance from the MCIRT. In this case, other county officials will fill this capacity.

Upon activation and notification of assistance requests, MCIRT staff contacts responsible county officials and mosquito control programs to obtain required baseline mosquito surveillance data, if available. During this communication, the team also determines if the local MCP is able to conduct ongoing pretreatment and posttreatment surveillance. If assistance is needed, the surveillance operations staff begins deploying and retrieving mosquito light traps to conduct surveillance to support decision making on the need for control. A team of trained mosquito identification specialists count and identify collections and submit data to the Planning Section. The Planning Section works closely with county EOCs and MCPs to create maps of treatment areas.

The MCIRT Planning Section Surveillance Coordinator determines the appropriate mosquito adulticide to be used during the response. Due to localized populations of mosquitoes developing resistance to pyrethroids, the primary mosquito adulticide active ingredient that FDACS has used for MCIRT response have been the organophosphates, naled by air and malathion by ground. Based on type of mosquito adulticide and accessibility to response area, the Finance/Administration Section Chief begins emergency purchase order administration to procure required application services. The IC coordinates with federal partners from the CDC, FEMA, and US Fish and Wildlife Service (USFWS) as well as state partners such as the Florida Department of Environmental Protection (FDEP) and Florida Fish and Wildlife Conservation Commission (FWCC). For FEMA reimbursement, an increase in baseline mosquito populations must be achieved as a result of the event. The IC forwards surveillance data to contacts at the CDC to justify the need for treatment and, upon CDC approval, updates FEMA. The IC then provides proposed treatment maps to the USFWS, FDEP, and FWCC to ensure there are no species or habitats of concern located within the treatment zones. Treatment maps are modified based on information provided.

If the MCIRT receives a high volume of mosquito abatement support requests, specific criteria are used to create a hierarchy of prioritization for mosquito control applications. Multiple factors can influence whether the county will receive assistance from the MCIRT, and this allows the team to prioritize applications using a scorecard system. Ongoing weather systems, mosquito-borne virus activity, the degree of flooding, structural damage, and loss of utilities, and finally adult mosquito surveillance data are used to prioritize the requests. Timing of mosquito abatement applications is critical for successful control, and this system allows for efficient and effective use of resources.

Once a treatment map is created and the application scheduled, the PIO, working with appropriate county employees, begins notifying local beekeepers, aquaculture facilities, and the media of the upcoming adulticide applications. If needed, the PIO will field calls from media and residents and answer questions about the MCIRT response in the area.

In Florida, each county serves as a separate region whose needs will be addressed. A county may have multiple spray zones, but the MCIRT will coordinate with contractors in attempts to have them treat, either aerially or by ground applications in a one- or two-night operation. The number of nights a county is sprayed is dependent upon the contractor's resources, availability of ultra-low-volume insecticide-equipped trucks or planes, and the weather.

Upon completion of the contracted applications, treatment information and accompanying GIS maps are relayed to the Planning Section, and posttreatment surveillance is conducted to evaluate the effectiveness of the treatment. To complete the contracted work, an 80% reduction in mosquito populations from the pretreatment surveillance is required. If an 80% reduction in the mosquito population is not demonstrated, the Surveillance Coordinator will individually evaluate each situation to determine if unanticipated outside influences contributed, such as a migration of mosquitoes from surrounding untreated resting or emergence habitats. If there were no outside factors and requisite mosquito suppression was not achieved, a second treatment may be scheduled. This treatment is

performed at the contractor's expense and not be reimbursed.

RECENT MCIRT ACTIVATION EVENTS

The 2 most recent activations for the MCIRT have been in the wake of hurricanes Irma and Michael. In September 2017, Hurricane Irma traveled through a large part of the Florida peninsula, leaving a wide path of damage and flooding. All 67 counties within Florida were listed under the Emergency Declaration following the storm and 31 of the 67 counties requested FDACS vector control support and assistance. The MCIRT originally started with a single ICP in Alachua, Florida, but quickly expanded to include 2 additional command posts located in central and south Florida because of the increased requests for support and the need for more efficient mosquito surveillance deployment. One region experienced heavy emergence of *Psorophora columbiae* (Dyar and Knab), which could have caused unfavorable consequences for the cattle industry in the region.

During the 40-day activation in 2017, the MCIRT provided support and coordinated control applications in 25 of the 31 requesting counties, totaling 3,036,092 acres by air and 3,648 square miles by truck in response to conditions created by Hurricane Irma. Fifty-one FDACS employees were activated through the 4-wk deployment period. To prevent overload and burnout, 2 teams, using transfer of command procedures, transitioned between the command centers.

In October 2018, Hurricane Michael made landfall as a category 5 hurricane at Mexico Beach and devasted Florida's Gulf coast region. Damage was due to high tides and high winds across the area that destroyed homes, infrastructure, and businesses and devastated the timber industry in Florida's panhandle. This event also coincided with increased mosquito-borne viral activity, necessitating the need for immediate aerial control measures. In response to Hurricane Michael, 7 counties requested assistance, and 786,483 acres were treated aerially.

One of the primary issues the MCIRT team experienced in both events included the availability of resources. In response to Hurricane Irma, contractors were not immediately obtainable due to their obligations conducting hurricane recovery efforts and mosquito control activities following another large incident, Hurricane Harvey, that affected regions of Texas and other states bordering the Gulf of Mexico. The widespread devastation from Hurricane Michael presented challenges for the MCIRT. Limited gasoline supplies, unavailable locations for incident command posts, and lack of available lodging for MCIRT staff made the initial deployment difficult. Additionally, much of the area roadways were unnavigable, creating issues for surveillance activities and ground applications. In both activations, the MCIRT experienced external process communication barriers. Examples include MCPs being overly proactive by requesting assistance and support through WebEOC prior to hurricane landfall and the EOC being unaware of the MCP functionality and capacity directly following the event.

Following the major deployments from Hurricanes Irma and Michael, steps have been implemented to educate and foster improved communication between partnering agencies, MCPs, and county EOCs through annual roundtable meetings providing the opportunity to clearly delineate the required information and channels needed to request assistance and carry out surveillance and control operations. These meetings have also provided the opportunity to offer information on available resources that are beneficial during event recovery.

These experiences provided opportunities for the FDACS MCIRT to learn from past events and make improvements to internal processes and achieve successful ICS implementation. Such improvements have been training of specialized staff under the NIMS/ICS framework, and operational teams have been cross-trained to improve response capabilities and performance. Additionally, the MCIRT now has a team of 3 GIS trained mappers enabling rapid creation of surveillance and treatment maps.

SUMMARY

Using a response structure based on the Incident Command System to provide mosquito control activities following natural disasters and major public health threats has many benefits and has been an asset to the Florida Department of Agriculture and Consumer Services since its initial implementation in 2001. With recent tropical weather events and change of FDACS staff, the ICS provides team members a consistent structure for response and clearly defined positions and roles with respect to the responsibilities required to accomplish successful wide-area mosquito control applications. The ICS implementation improves communication through the ranks. With clearly defined objectives and incident action plans, each MCIRT member knows what the overall goal of the team is as well as their individual roles and to whom they report. This eliminates confusion and unclear operational instructions. End of activation review also provides opportunities to learn from the experience and look for potential improvements that need to be implemented based on response documentation.

Overall, since FDACS's ICS implementation in 2001, fewer critical issues have occurred during deployments, making MCIRT response timely and effective. With each activation, the team is able to learn valuable lessons used to improve issues, such as those with communication and process knowledge. During recent events, any issues that were encountered were quickly overcome and used to improve the process.

For more information on ICS, see the FEMA NIMS website at www.FEMA.gov/NIMS-Frequently-Asked-Questions. For resources used by the FDACS MCIRT and programs requesting support, refer to Florida's State Agricultural Response Team (FLSART) Vector Control Resource website at http://flsart.org/resource/vectorcontrol.jsp.

REFERENCES CITED

FEMA [Federal Emergency Management Agency]. 2008. *Homeland Security NIMS: frequently asked questions* [Internet]. Washington, DC: FEMA [accessed March 31, 2020]. Available from: http://www.fema.gov/pdf/emergency/nims/NIMSFAQs.pdf.

FEMA [Federal Emergency Agency]. 2018a. *Glossary of related terms* [Internet]. Washington, DC: FEMA [accessed March 31, 2020]. Available from: http://training.fema.gov/emiweb/is/icsresource/assets/glossary%20of%20related%20terms.pdf.

FEMA [Federal Emergency Management Agency]. 2018b. *ICS review document* [Internet]. Washington, DC: FEMA [accessed March 31, 2020]. Available from: http://training.fema.gov/emiweb/is/icsresource/assets/ics%20review%20document.pdf.

FEMA [Federal Emergency Management Agency]. 2019. *Emergency Management Institute Independent Study Program (IS)* [Internet]. Emmitsburg, MD: FEMA [accessed March 31, 2020]. Available from: http://training.fema.gov/is.