REAL-TIME EMERGENCY MANAGEMENT OPERATIONS

HOW TO MODERNIZE YOUR AGENCY FOR A MORE EFFICIENT RESPONSE

esri®

THE SCIENCE OF WHERE®

A Modern Approach to Emergency Management

Many emergency management agencies base preparedness activities on responses to past incidents. Every incident contains lessons that response teams can use to better prepare for the next event. However, relying on past incidents alone to guide planning can leave emergency managers underprepared. Today's hurricanes are more intense, wildfires have become faster moving, and civil disturbances have grown more complex. Emergency managers need to change the approach to planning and preparedness to better respond to these trends. By digitally transforming the emergency management toolkit, managers can better connect to information—and to each other—for faster response.

Digital transformation may seem daunting. Fortunately, a location-based cloud solution for emergency management makes the task of modernizing workflows easier than one might imagine. The Esri Emergency Management Operations solution, built on Esri's ArcGIS platform, jump-starts modernization initiatives. The solution contains data, tools, and apps for intelligent operations management during blue skies and gray. It helps emergency operations centers (EOC) coordinate faster response by rapidly showing information for smart decision-making.

This e-book explores use cases from real emergency management operations. It describes successful deployments from agencies that use location data, the power of maps, and Esri Geospatial Cloud technology to gain better situational awareness.

Esri's Solution for Emergency Management Operations

The Emergency Management Operations solution is a fully integrated geographic information system (GIS). The platform enables teams, agencies, and partners to maintain shared situational awareness at all points during a disaster response. With real-time data feeds continuously updating configurable, cloud-based dashboards and maps, situational information becomes instantly available to inform the public and your mission-critical decisions at the same time. Real-time database integration breaks down information silos, and digital workflows eliminate intensive paper-based systems, which clears the way for agencies to respond faster and for citizens to act.

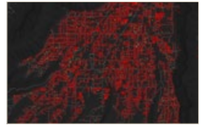
Modern Solutions for Emergency Management Operations: Use Cases

1 Maintaining Real-Time Situational Awareness

2 Briefing Command Staff and Elected Officials

3 Understanding the Potential Impact

4 Conducting Damage Assessments



5 Managing the Flow of Public Information

Maintaining Real-Time Situational Awareness

As an incident unfolds, emergency management staff need immediately accessible and actionable information to make the best decisions at the right time. Seeing what is happening in real time is a critical advantage during a disaster. Esri's Emergency Management Operations solution allows organizations to use live feeds of information to effectively monitor changing conditions. They can see where resources are needed most and anticipate problems before they can occur.

Real-Time Situational Awareness Speeds Tornado Response

Lee County, Alabama

Dozens of tornadoes ripped through southeastern US states in early March 2019. The scale and scope of two tornadoes that hit Lee County, Alabama, surprised many forecasters. The first tornado's winds exceeded 170 miles per hour and left a trail of destruction nearly a mile wide and 24 miles long. The second tornado, though less severe, struck along nearly the same path as the first.

Esri's advanced geospatial platform enabled the operations team to use web services that securely shared data from multiple organizations, including aerial imagery, field-collected data, and basemaps. To communicate situational information in real time to decision-makers and first responders in the field, teams brought data into the online Esri® Story Maps app and Operations Dashboard for ArcGIS.

> "It put the information in front of the people who needed it and gave them an understanding—in great detail—of what was happening in the field without having to go out there," said Ken Busby, GIS coordinator with Lee County. "They saw, from the office, the full picture of the damage—where it was and where they needed to send people."

Mapping tornado paths using before-and-after drone imagery of the area enabled teams to quickly assess the impact of the storms and see where responders needed to go.

"The imagery of where debris had scattered helped us guide rescuers where to look for victims," Busby said.

Equipped with survey-based, needs assessment, mobile apps, firefighters recorded and documented survivors' needs. The apps instantly streamed captured field data to the emergency operations center's (EOC) live dashboard.

"The impetus for this solution goes back to the EF5 tornado that hit Joplin, Missouri, in May of 2011," explained Christopher Vaughan, geospatial information officer at Federal Emergency Management Agency (FEMA). "When 500 federal employees showed up and began asking for data, it was a struggle for the city's GIS person to create maps that showed what got hit and the level of damage. It took a week to update aerial imagery and conduct house-by-house damage assessments."

Connected, automated workflows have sped up the process considerably. Using the apps, field teams conduct damage analysis faster, and command units quickly generate damage assessment reports. GIS analytics generates preliminary damage reviews that support damage declaration decisions for impacted communities. It prioritizes needs, which helps work crews quickly get to work removing debris, reopening roadways, and restoring electrical and communications networks.

> "We have significantly improved the time it takes to gain an awareness and understanding of tornado damage," said Vaughan. "We have reduced a five- to six-day process to less than 24 hours."

An app-based approach empowers first responders to gather reliable information, understand the scale of the event, and share information with others.

Briefing Command Staff and Elected Officials

During an emergency activation, command staff and elected officials are under pressure to make decisions that have potentially life-or-death consequences. They need accurate and comprehensive information about current events and what the operational plan is moving forward. Esri's emergency management tools give decision-makers real-time intelligence that helps them make pivotal decisions that can save lives. This transforms the process from static, out-of-date PowerPoint-based briefings to dynamic, real-time briefings that interactively show the most recent situation and plan.

Use Case: Operational Briefings

Statewide Visibility for Emergency Management

California Governor's Office of Emergency Services

Californians are all too familiar with catastrophes. *US News and World Report* recently rated California as number 1 on its top-10 list of disaster-prone states. The state is susceptible to earthquakes, floods, landslides, significant wildfires, prolonged drought, public health emergencies, cybersecurity attacks, and agricultural and animal disasters.

The California Governor's Office of Emergency Services (Cal OES) oversees and coordinates the state's emergency response operations. Its California Preparedness Platform (Cal PreP) includes Esri technology. The platform's Cal Prep Dashboard brings all emergency information together to show the state's current fires, traffic, Doppler radar, weather, and power outage data on one screen. Depending on the hazard type, operations centers across California access the dashboard to better understand incidents they are managing. The dashboard shows incidents in real time and provides local agencies with critical information for making intelligence-based decisions.

> "You're looking at what's happening now, not what happened 12 hours ago. The dashboard provides that snapshot; it saves time. Instead of someone stopping in the middle of an operation to brief someone, they can just walk in, look at the screen, and see exactly what they want to see."
>
> Duane Valenzuela
> Response Operations, Cal OES

Understanding the Potential Impact

When emergency managers realize that a situation requires monitoring, they need to know the size and scale of the potential impact on the community as quickly as possible. Esri's platform shows emergency operations teams who and what is at risk, which resources they need to deploy, and where to send them. It adds insight to emergency operations that helps managers coordinate an effective response. It also connects emergency personnel to accurate data and vital information.

Use Case: Impact Analysis

Burn Areas Impact Weakened Hillsides

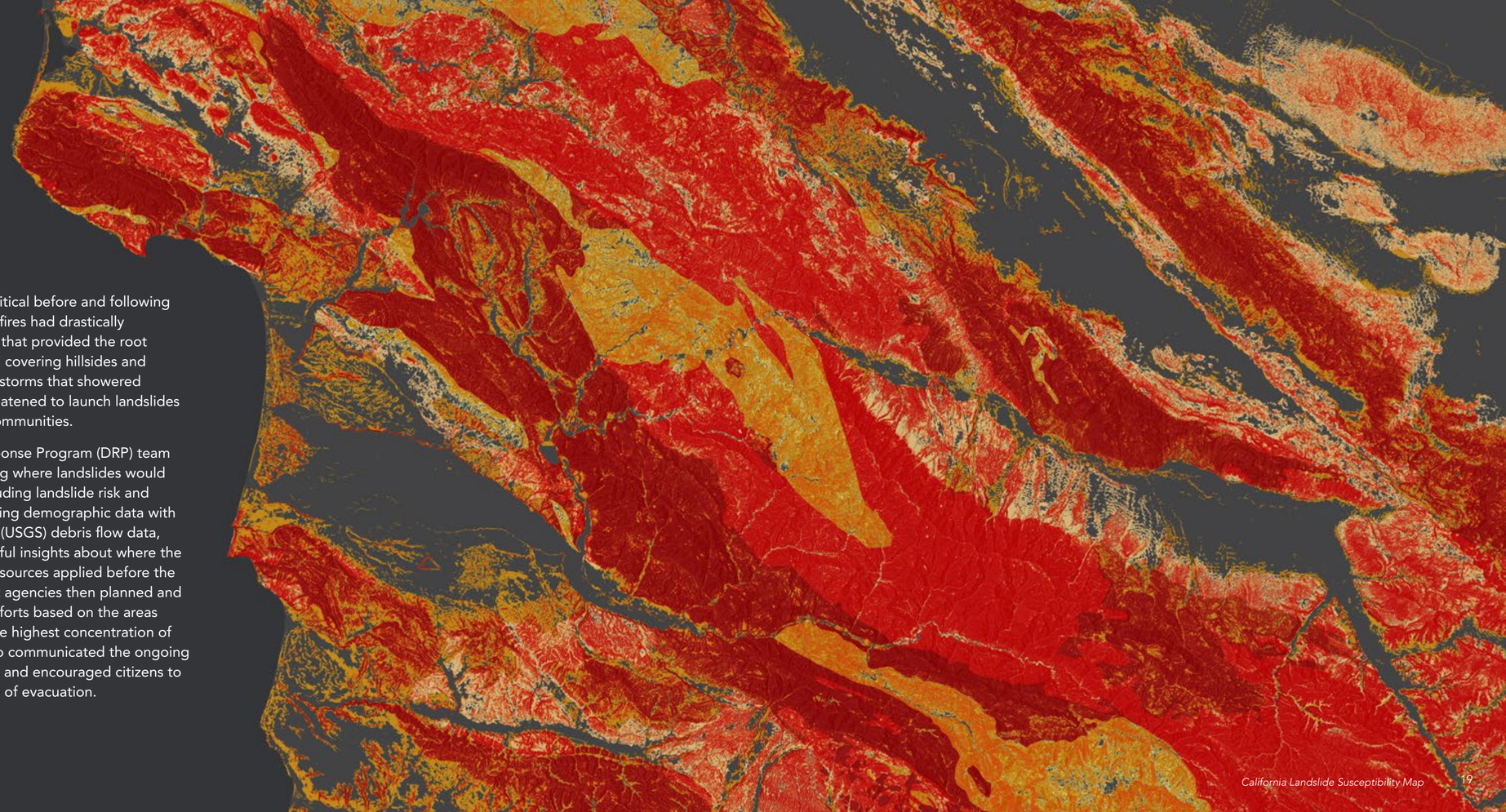
Thomas Fire, CAL FIRE

The Thomas Fire was a devastating wildfire of historic proportions that burned through parts of California's Ventura and Santa Barbara counties. The fire started on December 4, 2017, north of Santa Paula and near the Thomas Aquinas College—the fire's namesake. Driven by strong Santa Ana winds, which persisted for nearly two weeks, and feeding on vast amounts of ground fuel, the fire grew rapidly.

By its official end on January 12, 2018, the fire destroyed more than 1,000 structures and damaged hundreds more. It generated over $2.18 billion in damages, injuring one firefighter and claiming the life of another, along with one resident who died in an auto accident while fleeing the area. The destruction didn't stop with the fire. Rains after the fire created massive mudflows that claimed 21 lives, destroyed 129 residences, and damaged 300 more.

Impact analysis was critical before and following the Thomas Fire. Wildfires had drastically weakened vegetation that provided the root foundation for the soil covering hillsides and mountain slopes. Rainstorms that showered scorched hillsides threatened to launch landslides and endanger local communities.

The Esri Disaster Response Program (DRP) team created a map showing where landslides would most likely occur, including landslide risk and evacuation zones. Fusing demographic data with US Geological Survey (USGS) debris flow data, the map provided useful insights about where the community needed resources applied before the rains fell. Government agencies then planned and prioritized recovery efforts based on the areas of greatest risk and the highest concentration of people. The maps also communicated the ongoing threat to communities and encouraged citizens to remain vigilant in case of evacuation.

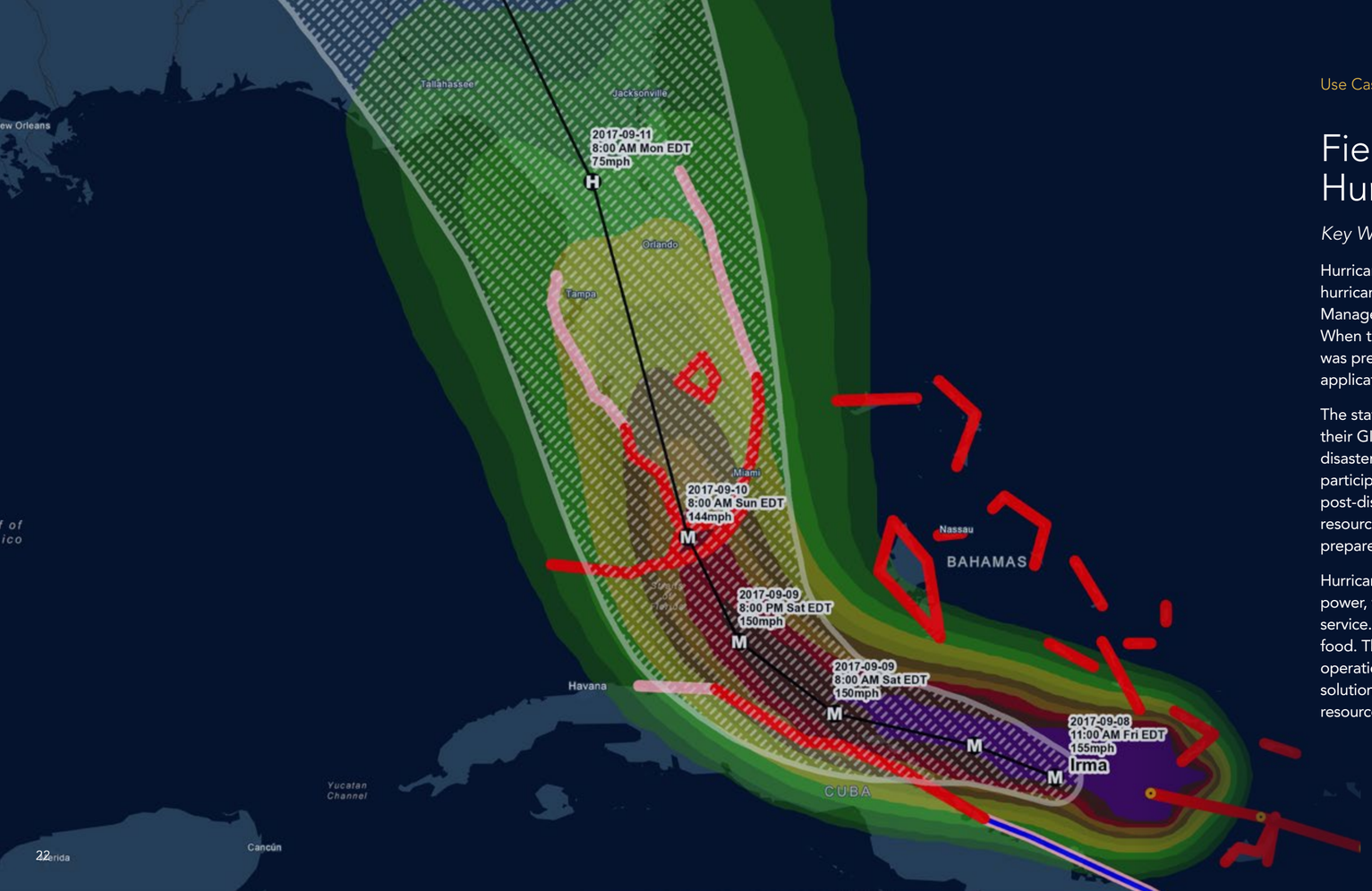


California Landslide Susceptibility Map

Conducting Damage Assessments

Documenting postdisaster damage must be done quickly so that emergency operators can decide where and when to deploy recovery resources. Damage assessment reports are also needed to apply for recovery funds for the community. GIS analytics quickly performs population analysis and shows demographic characteristics of affected neighborhoods.

Emergency managers use GIS to deploy disaster response teams faster and provide them with reliable intelligence—with or without a cellular network. In disconnected areas, inspectors access maps on their phones as they conduct damage assessments and document the process. These maps update immediately when users enter connected service areas.



Use Case: Damage Assessments

Field Connectivity Supports Hurricane Irma

Key West, Florida

Hurricane Irma was the first category 5 hurricane of the 2017 hurricane season. The Florida Department of Emergency Management (FDEM) had its location strategy in place. When the hurricane was on the horizon, the department was prepared to rapidly launch more than 60 mission-critical applications.

The state agency, regional agencies, and counties lent their GIS managers, analysts, and technicians to help with disaster management. Under the FDEM's leadership, they participated in daily GIS coordination calls, managed post-disaster remote-sensing requirements, shared data and resources, and improved outcomes during Hurricane Irma preparedness, response, and recovery operations.

Hurricane Irma left citizens in Key West, Florida, with no power, water, Internet connection, gasoline, or cell phone service. Resources were scarce, and residents had very little food. They desperately needed help. The city's emergency operations center (EOC) used Esri's emergency management solutions to conduct the initial damage assessments to get resources where they were needed.

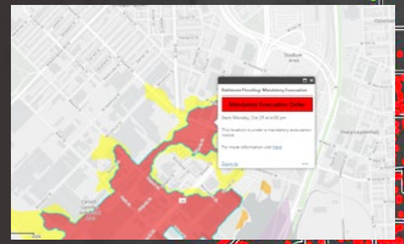
Responders used Esri's Damage Assessment configuration application on their phones to collect data. The app showed them a map of the immediate area and provided tools for workers to select the location, detail the damage, and add photos to supplement the information for verification.

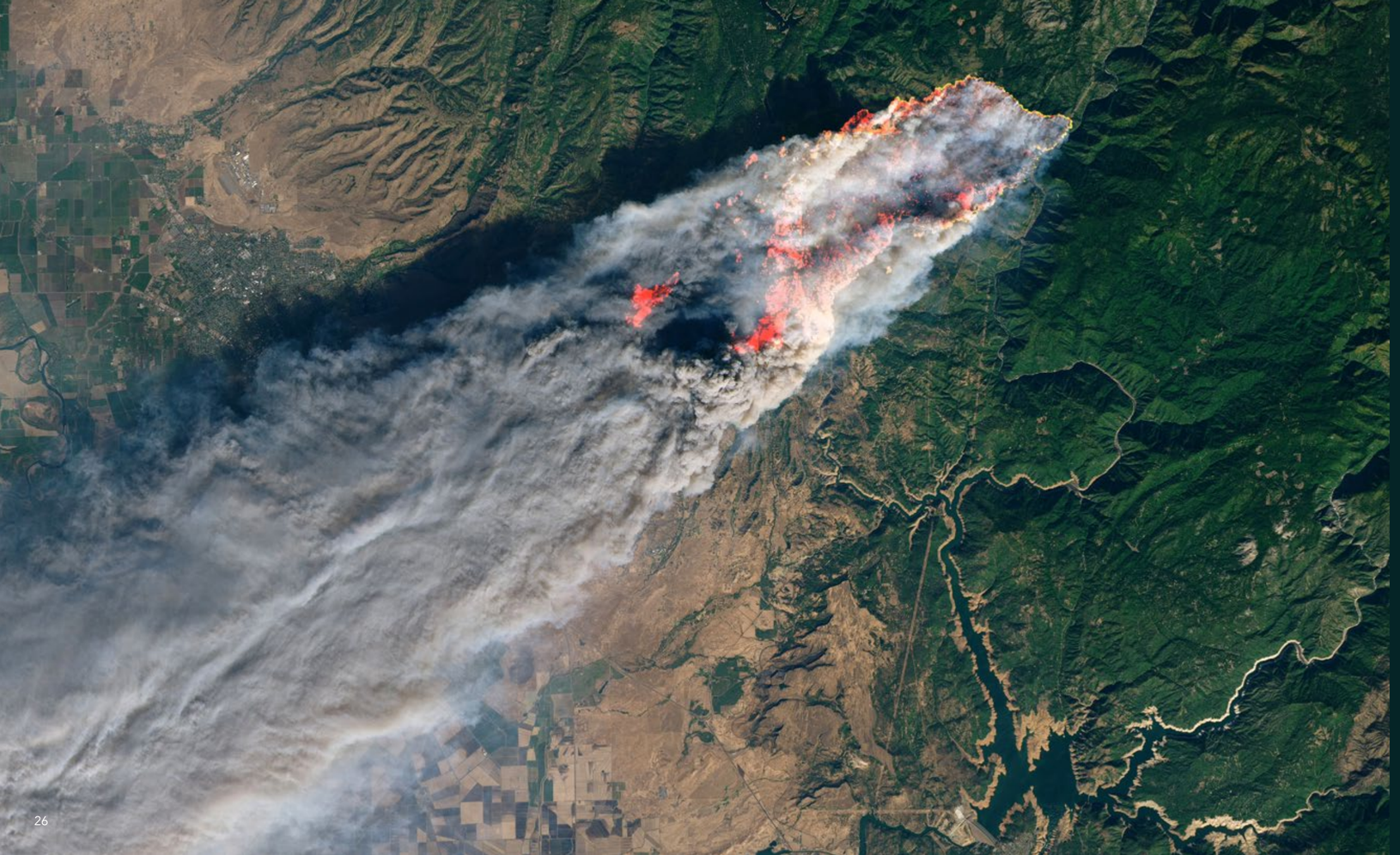
In areas where communications and power were down, the data collection app switched to offline mode. Responders could still see maps and enter survey data. Anytime they entered an area with service, the devices would automatically upload all their collected data to the EOC. If service was unavailable, all their data would be uploaded as soon as they returned to the office and synced their devices with the EOC's operations dashboard. With each addition, the dashboard showed an updated common operational picture for both the EOC and on every device in the field.

Key West's damage report met the Federal Emergency Management Agency (FEMA) requirements and proved that a federal disaster declaration was warranted. FEMA had enough detailed damage documentation to declare a major disaster for Key West and provide federal funds for the community and its citizens. The city used the same damage assessment to prioritize and complete recovery work.

Managing the Flow of Public Information

In times of crisis, the swift dissemination of accurate information to individuals at risk is crucial to minimize injury and loss of life. Esri's applications make it easy for emergency managers to quickly stand up a real-time, public-facing map that clearly communicates to the public where hazards are located, when it is time to evacuate, where to go once evacuated, and the status of their property.





Use Case: Public Information

Damage Maps Assist Public with Recovery

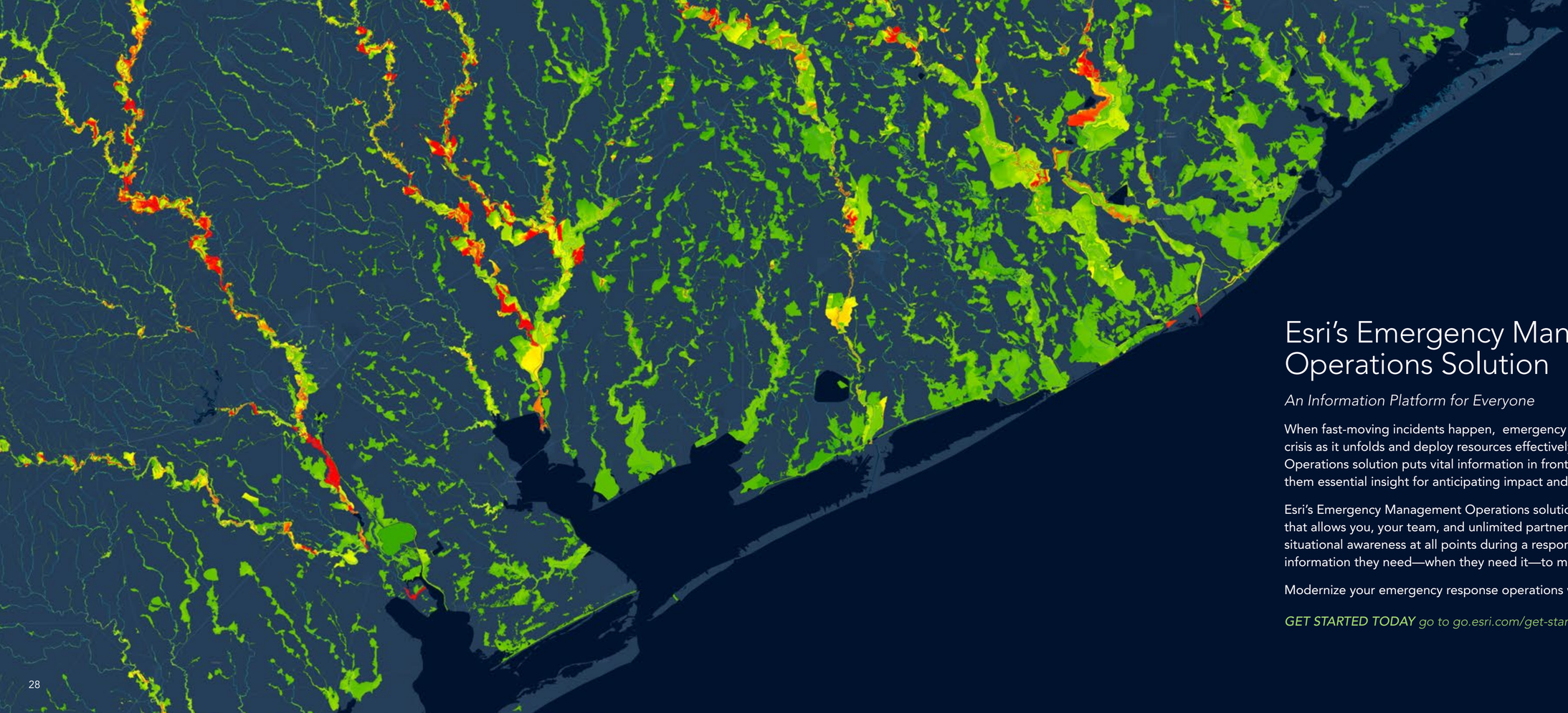
Camp Fire, Butte County, California

The Camp Fire in Northern California was the deadliest and most destructive fire in the state's history. It consumed more than 150,000 acres and claimed nearly 19,000 structures and 85 lives. During the fire, command posts and response teams pressed the county's GIS team for maps. In some areas, the fire downed cell networks, so GIS team members drove to different emergency operations centers to hand-deliver maps for morning briefings. In desperate need of help, Butte County called Esri for assistance through its Disaster Response Program (DRP).

Butte County's GIS team lead, Jim Erenger, explained, "The Disaster Response Program supplemented our GIS shop virtually and in person. We received all the on-site licensing and services that we needed to manage the event. Esri also provided a wildland fire solution specialist to manage our GIS efforts."

DRP staff connected the county's GIS to ArcGIS Online so that the GIS team could post fire maps to the cloud-base platform and make vital information immediately accessible. Throughout the event, the GIS generated emergency operations maps. Drone imagery maps aided firefighters' suppression efforts. Real-time maps showed evacuation area status updates. DRP staff and county staff created dashboards and web apps that effectively communicated fire status, informed operation briefings, and supported recovery activities. Postfire, the team used ArcGIS StoryMaps™ to describe the entire event from response efforts through recovery activities.

Eager to know the status of their homes, residents turned to CAL FIRE's web map. Using a slider, they compared before-and-after drone imagery of fire-ravaged communities. They also typed in their addresses to see their homes' condition. The web map provided the information they needed to take steps toward recovery.



Esri's Emergency Management Operations Solution

An Information Platform for Everyone

When fast-moving incidents happen, emergency managers must monitor the crisis as it unfolds and deploy resources effectively. The Emergency Management Operations solution puts vital information in front of decision-makers and gives them essential insight for anticipating impact and orchestrating response.

Esri's Emergency Management Operations solution is a fully integrated system that allows you, your team, and unlimited partner agencies to maintain shared situational awareness at all points during a response, connecting everyone to the information they need—when they need it—to make mission-critical decisions.

Modernize your emergency response operations with ArcGIS.

GET STARTED TODAY go to go.esri.com/get-started.

The Esri Disaster Response Program

Help When you Need it Most

Since 1969, Esri has developed technologies that have helped people solve some of the world's most difficult problems, including those that can be life threatening. When the Northridge fault in California unleashed a 6.7 magnitude earthquake in 1994, it took 57 lives and injured 8,500 people. The epicenter was just 80 miles from Esri headquarters, and everyone at the company wanted to help their fellow Californians get back on their feet. A team of GIS experts stepped up to assist local agencies responding to the disaster with GIS technology and technical expertise that helped responders understand the situation and coordinate response operations. From this effort, the Esri Disaster Response Program (DRP) began to take shape.

Over the past 25 years, the DRP has responded to thousands of requests for assistance worldwide for incidents of all types and sizes. The DRP was formalized to aid emergency response operations by supplying GIS technology, setting up essential workflows, and processing vital data. Tech support experts also provide help to ensure that mission-critical apps are stable and working when they are needed the most.

By supporting these organizations and documenting lessons learned, best practices, and common challenges from the last 25 years, Esri has been able to develop a solution that helps emergency management agencies address the most common operational needs during a response.

Resources

- Esri's Disaster Response Program, *go.esri.com/emops-DRP*
- Esri's ArcGIS Living Atlas of the World, Weather Data Live Feeds, *go.esri.com/live-weather-data*
- Esri's Emergency Management Operations Solution, *go.esri.com/emops*

About Esri

Esri, the global market leader in geographic information system (GIS) software, offers the most powerful mapping and spatial analytics technology available.

Since 1969, Esri has helped customers unlock the full potential of data to improve operational and business results. Today, Esri software is deployed in more than 350,000 organizations including the world's largest cities, most national governments, 75 percent of Fortune 500 companies, and more than 7,000 colleges and universities. Esri engineers the most advanced solutions for digital transformation, the Internet of Things (IoT), and location analytics to inform the most authoritative maps in the world.

Visit us at esri.com.

Contact Esri

380 New York Street
Redlands, California 92373-8100 USA

1 800 447 9778
T 909 793 2853
F 909 793 5953
info@esri.com
esri.com

Offices worldwide
esri.com/locations

go.esri.com/emops

G672275