

# FEMA Mapping and Analysis Center

## How FEMA Uses GIS In Disaster Response

Our primary mission remains the dissemination of geographic information to the EST/ESF#5 (*Information and Planning*), and the rest of the Agency during disaster operations, and the enhancement of information services. Our current concept of operations is expanding to include providing a full range of GIS services to all FEMA program offices. In addition, the MAC has become the cornerstone for developing and implementing an integrated, state-of-the-art enterprise GIS (E-GIS) for the Agency.

The MAC maintains an extensive array of data sets to ensure our ability to provide our customers with the information they need. (*See Index of Available Data*). The MAC can also produce maps from important model output, damage assessment data, as well as, maps and/or tables from FEMA Human Services, National Emergency Training Center (NETC), National Processing Service Center (NPSC), and Disaster Finance Center (DFC) statistics in federally-declared counties.

In addition to providing GIS maps, tables and analyses during disasters and emergencies, the E-GIS Team supports planning exercises, the Federal Insurance and Mitigation Administration, the Office of National Preparedness, the Office of Homeland Security, the Administration and Resource Planning Directorate, as well as, the Agency's ad-hoc GIS requirements.

For emergency managers, a GIS can facilitate critical decision-making before a disaster impacts an area. In the early, crucial stages of a disaster or emergency and throughout the disaster process, managers use GIS products because they provide important information, such as described above, quickly and in easy-to-understand formats.

The specific products the MAC typically generates in a disaster or an emergency varies with the nature and scope of the situation and the needs of our customers.

Some of our most frequently requested maps include: storm track and damage prediction maps, remote sensing maps, maps of federally-declared counties in an affected state, basic census demographics about an affected area by county and census block, street locations, and summaries of teleregistered and service center applicants, housing inspection numbers, Helpline calls, disaster unemployment claims, Small Business Administration (SBA) applicants, etc.

Prior to making landfall, MAC staff can generate maps that depict the track of a hurricane or tropical storm. The E-GIS Team uses a hurricane wind model to develop estimates for projected damages in affected states or areas. The staff then maps these results. Typical model output maps include estimated wind damage to mobile homes, single family homes, and multi-family homes in affected areas along the track of the storm.

If the intensity of the storm is severe, MAC staff will produce wind damage estimates for other structures and infrastructure, such as: sewage treatment plants, nursing homes, schools, hospitals, etc.

In addition to mapping wind damage estimates to different structure types, MAC staff can perform various demographic analyses that estimate the population and housing units in affected counties or blockgroups. The E-GIS Team generates maps of median housing values, median income and persons on public assistance by county and/or blockgroup. MAC GIS analysts can produce maps and tables with demographic data provided by the U.S. Census.

Similarly, the E-GIS Team can run an earthquake model to estimate damages in an affected area. In addition, Team staff are continually working with FIMA to upgrade and expand FEMA's use of models in disasters.

Soon after the disaster event, FEMA managers and staff use GIS to visualize actual damages by analyzing collected aerial reconnaissance and ground truth data. Using GIS, MAC customers (*i.e. Disaster Field Office (DFO), Emergency Support Team (EST) personnel, etc.*) can see the spatial extent of damage, learn who was affected by the disaster and which resources were affected. Management and staff can then use this data to distribute resources and coordinate with other federal and state agencies and organizations. Staff from the

Federal Insurance and Mitigation Administration (FIMA) and other offices often use GIS produced *EPA Super Fund Site* and *Repetitive Loss Claim Maps* for information and planning purposes.

The E-GIS Team often receives requests for maps of congressional districts for federally designated counties in an area. Other common requests of GIS products include: maps of repetitive damages, river gauge data, or locations of Federal Disaster Recovery Centers. In addition, the MAC can map a wide range of facilities such as schools, hospitals, power plants, etc., in an affected area. MAC staff can also produce maps of toxic release inventory sites, bridges, dams, and other public safety locations.

Emergency managers and staff also use GIS maps and tables to perform or initiate a variety of other analyses, both general and specific, and for displays. In addition, FEMA staff uses GIS maps in training and exercise programs.

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