San Diego GIS Response
During the 2007 Firestorm

Paul Hardwick
Regional GIS Project Manager
SDSU Research Foundation
Regional Technology Center for Homeland Security
Center for Homeland Security

- Interoperable GIS
- Interoperable Communications
- Technology Clearinghouse

Regional Technology Center
SDSU Research Foundation
And
SDSU Center for Homeland Security
Technology Assessment
Geospatial technology allows for multiple sets of information to be analyzed, modeled, and correlated in order to find patterns that can lead to improved strategies for prevention, response, and mitigation.
2003 Lessons Learned

- Established GIS positions within the County Office of Emergency Services for day to day operations and EOC response during an incident
- Maintain a local geospatial data instance
- Identified key on-line mapping resources from various State and Federal agencies that could provide key information during an incident
- Created mapping templates
- Trained County GIS Analyst as a Geographic Information System Specialist for incident response
GIS SOP

- National Wildfire Coordination Group
  www.nwcg.gov
- Geographic Information Systems Emergency Standards of Operation
- Damage Assessment Standard Operating Procedures

EMERGENCY RESPONSE & DAMAGE/SAFETY ASSESSMENT
STANDARD OPERATING PROCEDURES

BACKGROUND
The unincorporated area of San Diego County is subject to catastrophic events such as wildfires, earthquakes, and floods. Following such events, it is an important function of the Building Division to assess the structural stability of private structures damaged in a disaster in order to determine whether structures are safe for occupancy. It is also important to maintain a written record of the damage sustained in order to provide the information to the media, Board of Supervisors, DCAO’s Office, County Assessor’s Office (property tax purposes) and insurance companies (assist in settlement claims). Depending upon the type of disaster, the department’s responsibilities will differ slightly, but the basic damage/safety assessment procedures will be essentially the same.

PURPOSE
The purpose of the Standard Operating Procedures (SOP) is to ensure public safety, health, and welfare during a declared emergency by receiving, assessing, and recording damage information on private structures resulting from a disaster or other emergency incident in the County of San Diego. This document expands upon the roles and responsibilities assigned to the Department of Planning and Land Use (DPLU), as outlined in the Unified San Diego County Emergency Services Organization’s Operational Area Emergency Plan, Annex N and are intended to provide guidance for the Building Division and GIS staff during these disasters.

PROGRAM ORGANIZATION
The organizational chart for the Building Division Damage/Safety Assessment Response procedures is outlined in attached Exhibit A. At the top of the organization are various positions who are assigned specific responsibilities that must be implemented in response to a catastrophic event. The chart below identifies the program title, the Building Division position tasked to fill the title and a listing of general responsibilities (for specific responsibilities, refer to the section entitled “Duties and Responsibilities”.

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<td>7. County OES Documents</td>
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<tr>
<td>8. Incident Data</td>
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<td>11. WebEOC Images</td>
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[1] Hypothetical links or references.
2007 Fires

Harris Fire
Fire Perimeter
1700 Hours
October 21, 2007

Legend

- origin
- ICP Location
- Schools
- Roads
- Approx. Evacuation Area
- Approx. Fire Perimeter

Data Source: Sea GIS

This map is provided without warranty of any kind, either expressed or implied, including but not limited to, the implied warranties of merchantability and fitness for particular purposes. This product map is a derivative work in the SanGis Enhanced Geospatial Dataset, which is embedded within this document. Any further reproduction, distribution, or modification of these derived works must contain a notice of copyright or other proprietary rights of the SanGis Enhanced Geospatial Dataset. All rights reserved.
2007 Fires
2003 Fires
2007 Fires
MODIS Data

- Moderate Resolution Imaging Spectroradiometer
- Terra & Aqua
- 36 Spectral Bands
- 1KM Resolution
San Diego County
1100 Hrs UPDATE
October 31, 2007

Perimeters from:
CAL Fire
MODIS Satellite Data
Web/EOC information, City of San Diego Fire.

*Cleveland National Forest and BLM lands remain closed
Staffing

- GIS Unit Leader
- GIS Logistics/Policy
- 2-3 Analyst/Technician
- GIS Communications Specialist
- Off-Site Analyst
- Field Analyst/Observer

12 hour shifts
1. **FALLBROOK**  
   Fallbrook Community Center  
   341 Heald Lane  
   Fallbrook, CA 92028

2. **RANCHO BERNARDO**  
   Rancho Bernardo - Glassman Recreation Center  
   18448 West Bernardo Drive  
   San Diego, CA 92127

3. **RAMONA**  
   Ramona Community Center  
   1710 Montecito Road  
   Ramona, CA 92065

4. **RANCHO SAN DIEGO**  
   Cuyamaca College  
   900 Rancho San Diego Pkwy  
   El Cajon, CA 92019

Data Source: Damage Assessment provided by OPRU as of 10/25/07. Zip Codes: top left - D.S. = Damaged/Destroyed; bottom right = estimated affected population based on SANDAG 2000 Persons Per Household estimates.
Population

Population

Population and Housing Estimates (2007)
2007 Wildfire Evacuation Areas

The following population and housing data are based on preliminary housing counts from the San Diego County, Census Bureau, and SANDAG’s Regional Information System.

Population (January 1, 2007)
- Total Population: 5,125,617
- Household Population: 1,477,975
- Group Quarter Population: 7,161

Housing (January 1, 2007)
- Housing Units: 127,886
- Single Family - Detached: 77,121
- Single Family - Multi Unit: 14,340
- Multiple Family: 34,471
- Mobile Home and Other: 6,972

It is not possible to readily estimate detailed demographic characteristics for this area. The following information provides the characteristics of the target geographic area that includes the study area. While not a precise representation of the study area, it does provide an indication of its general demographic and economic characteristics.

Housing (January 1, 2007)
- Occupied Units: 107,719
- Vacant Units: 5,565
- Persons per Household: 2.16

Gender and Age (January 1, 2007)
- Male: 51%
- Female: 49%
- Ages 0-17: 12%
- Ages 18-24: 11%
- Ages 25-34: 11%
- Ages 35-44: 11%
- Ages 45-54: 10%
- Ages 55-64: 8%
- Ages 65 and Older: 6%
- Total Population: 50%

Race and Ethnicity (January 1, 2007)
- White: 67%
- Black: 3%
- Asian: 3%
- Native American: 1%
- Other: 3%

Household Income Distribution (real 1999 dollars, adjusted for inflation)

- Less than $10,000: 6%
- $10,000-$19,999: 13%
- $20,000-$29,999: 22%
- $30,000-$39,999: 22%
- $40,000-$49,999: 10%
- $50,000-$99,999: 16%
- $100,000 and over: 16%

Pre-Event/Baseline Data Loaded

Public Access Data
- Landsat 5
- USDA NAIP
- High-Resolution Urban Area Aerial Data

Restricted Access Data
- Ikonos and QuickBird from NGA/WARP
- ALOS AVNIR and PALSAR (JAXA via IC)
- ResourceSAT AWIFS (ISRO Via IC)
Post-Event Data Loaded

Public Access Data

Restricted Access Data
Remote Sensing and GIS Operations

**FEMA/JFO (RS/GIS Lead)**
- Operational Priorities
- Requests for Information (RFIs)
- Adhoc Support
- Air Coordination

**Southern California Geographic Area Coordination Center (GACC)**
- Information Requests
- **CAL FIRE Sit Stat Cell**
  - Assignment of Direct Support
  - Capability Assessment
  - Situational Awareness
- Information Requests

**State Agencies**
- CalFire
- Resources

**State Operations Center**
- Request for Federal Assistance
- Request for Guard Support

**Co-located GIS**
- CALFIRE
- OES
- Resources

**Incident Teams**
Tasks

- Prioritize and coordinate Remote Sensing and GIS support
  - Prioritize requirements based on incident operations, intelligence and fire weather
  - Consolidate information needs across geographic area
  - Translate information needs into requirements

RFI-5 Additional Details

1. Issues:
   - Request 1 look digital imagery collection of critical infrastructure within and near fire close out
   - Low priority requirement for collection from incident to incident
   - Request employment of CAP assets previously collected U-2/GH data

2. Status:
   - Initial target deck attached. Request assessment efforts by NGA/DHS/FEMA prioritize for submission to CAP as:

Aerial Imaging Support

1. FMV:
   - Retain RC-26 support through
   - Release P-3 and request reassessment
   - G-130 ScaletView from NAF
   - GH-S8 support on hold pending

2. GH/U-2:
   - Anticipate GH requirement for incident. Expect release of a
   - Request FEMA determine/evaluate assets (commercial, etc) for D

3. Civil Air Patrol:
   - Request employment of CAP aircraft (and Archer sensor) as Air Force Auxiliary support for Critical Infrastructure and Damage Assessment.
Post Fire Data

- Fire Progression Maps
- Public Land Ownership
- Damage Assessment
  - Structures
  - Agriculture
  - Habitat
- Burned Area Emergency Recovery
  - Soil Erosion
  - Increased Runoff
  - Flooding
- Fuels and Fire Risk
2007 Successes

• Quick release of maps and imagery to the press and public
• Mapping of evacuation areas
• Use of the Thomas Brothers map overlays enhanced the ability to interpret and locate the information portrayed
• Draft GIS SOP implemented and tested during the fires
• Outstanding cooperation between EOC GIS staff, State, and Federal agencies facilitated the use of technologies normally reserved for the military or intelligence communities
• Availability of off-site GIS analysts to conduct geospatial analysis away from the flurry of activity within the EOC
• Damage assessment teams ability to collect information on GPS and transfer directly into County GIS
• Pre-mapping of special needs facilities allowed for the evacuation of 2100 medically fragile individuals
2007 Lessons Learned

- GIS staff from jurisdictions, agencies, and utilities that had not been trained in WebEOC and were not aware of information sharing protocols.
- Some jurisdictions performed GIS mapping on stand alone computer systems without access to the internet, which resulted in delayed dissemination of data between agencies.
- Continue to track incident information if it moves beyond the boundaries of San Diego County.
- Standardize terminology among response organizations for geographic locations.
- Reverse 911 data is currently not in a GIS compatible format, resulting in longer mapping times of evacuation areas.
- Damage assessment was conducted independently by each jurisdiction; It is unclear if they were using the same criteria for the assessment and the resulting geospatial data sets could not be integrated due to attributes and spatial geometry differences.
Thank You

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