UNITED STATES DEPARTMENT OF AGRICULTURE
Farm Service Agency
Washington, DC 20250

Common Land Unit 8-CM (Revision 1)	Amendment 4

Approved by: Deputy Administrator, Farm Programs

Amendment Transmittal

A Reasons for Amendment

Part 8 has been added to:

- provide instructions for GIS specialists/geospatial officers for emergency preparedness and response
- correspond with 1-SEM, paragraphs 126 through 132.

Page Control Chart		
TC	**Text**	**Exhibit**
3 4 (add)	7-1 8-1 through 8-72 (add) 8-73 (add)	1, page 1 page 2 (add)

Page No.

Page No.

Exhibits

Part 7 Metadata

281 General Information

A Background

Metadata essentially describes the information in a dataset. For GIS data, it answers questions such as:

- what does the dataset describe
- who produced the dataset
- why was the dataset created
- how was the dataset created
- and how reliable are the data.
- who wrote the metadata
- how can someone get a copy of the dataset.

See **http://geology.usgs.gov/tools/metadata/tools/doc/ctc** to see a more detailed explanation of metadata.

Metadata is included when you provide a copy of digital data to someone who requests it. It is also used to describe the datasets that are searchable by using the web. For maps of CLU and related data, it will be necessary to provide metadata that accurately describes the data whenever data is released.

B Metadata Standards

Metadata for Service Center Agency datasets is to conform to FGDC Metadata Content Standards. See **http://www.fgdc.gov/metadata/meta_stand.html** to download the standards.

C Creating Compliant Metadata

FGDC compliant metadata will be available to Service Centers after certified CLU files are sent to APFO at **http://www.apfo.usda.gov/**. Metadata files for certified CLU's already sent to APFO will also be posted to the same web site for Service Centers to download their metadata using FTP.

D Example of CLU Metadata

See Exhibit 22 for an example of FGDC compliant metadata for a CLU file.

282-290 (Reserved)

*--Part 8 GIS in Emergency Preparedness and Response

Section 1 Roles and Responsibilities

291 GIS Specialist Duties for Emergency Management

A Overview

The State Office GIS specialist has critical job functions relevant to both general program administration and emergency events. 1-SEM has established National and State Emergency Response Teams. Unless otherwise designated by SED, GIS specialist shall serve as the geospatial officer as part of the State Emergency Response Team. The geospatial officer provides geospatial support to the State Office, Service Centers, and emergency response teams at the National, State, and local levels for emergency planning, response, and recovery. For the purpose of this Part, the State Office **GIS specialist** and State Office **geospatial officer** are considered the **same resource** and used interchangeably.

The geospatial officer shall work and coordinate efforts with the:

- CEB, as needed
- national geospatial officer
- SEB
- SED
- State Emergency and Homeland Security Offices
- other FSA GIS specialists, as appropriate
- other Federal Agencies supporting a large scale event in the respective State.

The State Office geospatial officer shall use geospatial information and GIS software to support emergency management activities. Responsibilities for emergency management include, but are **not** limited to:

- assessing possible structural impacts or damage for agriculture
- assisting in activities for preparedness, response, recovery, and mitigation efforts
- assisting in coordinating efforts with Field Offices, SEB's, and CEB's in assessing and completing LAR's using GIS
- evaluating the location and spatial extent of damage
- identifying affected areas of damage of CLU.**--***

***--291 GIS Specialist Duties for Emergency Management (Continued)**

B Preparedness

The geospatial officer's responsibilities to emergency management directly concerns GIS operations and should be employed in each State. These operations support day-to-day program activity and are also paramount for data preparation and overall readiness for response and recovery efforts during an emergency. The geospatial officer shall ensure that the data requirements in the following table are met.

Note: Geodata files should be stored in both Statewide and county format. Geospatial officers **must** have access to files if network access is unavailable. A designated laptop and/or external drive are necessary for GIS specialist/geospatial officer job functions.

Activity	Program Area	Timeframe to Complete	Notes
Bookmark Geodata and Disaster Resources	Security and Emergency Management	Update as needed.	Takes time to enter sites and bookmark references.
C:\geodata replicated to local drive and external drive	Geodata Management	Update monthly.	Redundant backups are critical for FSA readiness.
Create County Emergency Management Map Template	Security and Emergency Management	Update yearly.	Prepare a county template with basic legend, disclaimers, title, and logos that is ready to use.
Create State CLU	Common Programs	Create monthly.	Create and archive State CLU by month.
Create State CRP Layer	Conservation	Create monthly.	
Create State Emergency Management Map Template [Cannot use EM because already in 1-CM.]	Security and Emergency Management	Update yearly.	Prepare a State template with basic legend, disclaimers, title, and logos that is ready to use.
Create State FFSF Point Layer	Security and Emergency Management	Create and update yearly.	DR 1800 requirement.
Create State Service Center Point Layer	Geodata Management	Update as needed.	Maintain locations of all Service Centers.
Create Statewide Grain Storage Bin Point Layer	Facility Loans	Create monthly.	Updated as sites are added using the ArcGIS Grain Storage Bin Tool.

--*

***--291 GIS Specialist Duties for Emergency Management (Continued)**

B Preparedness (Continued)

Activity	Program Area	Timeframe to Complete	Notes
Create Tract Emergency Management Map Template	Security and Emergency Management	Update yearly.	1-SEM, paragraph 127 provides map standards. Prepare a tract template with basic legend, disclaimers, title, and logos that is ready to use.
F:\geodata\Cadastral Folder Maintenance	Geodata Management	Check yearly.	Ensure that PLSS and national grid are available on F drives and on an external hard drive in the State Office.
F:\geodata\Disaster_events\Storm_summaries Folder Maintenance	Geodata Management	Check yearly.	Ensure that year folders are created and subfolders are added for each date_event.
F:\geodata\Disaster_events\USDM Folder Maintenance	Common Programs, Security and Emergency Management, and Disaster Programs	Update weekly during drought events.	Ensure that year folders are created.
F:\geodata\geology Folder Maintenance	Geodata Management	Check yearly.	Ensure that seismic zones are ready to use.
F:\geodata\government_units Folder Maintenance	Geodata Management	Check yearly.	Ensure that county boundaries, city boundaries, and townships are ready to use.
F:\geodata\Hazard_site Folder Maintenance	Geodata Management	Check yearly.	Ensure that FEMA floodplains, sink holes, and other hazard sites are ready to use.
F:\geodata\Hydrography Folder Maintenance	Geodata Management	Check yearly.	Ensure that streams and lakes are ready to use.
F:\geodata\hydrologic_units Folder Maintenance	Geodata Management	Check yearly.	Ensure that hydrologic unit codes are ready to use.

--*

***--291 GIS Specialist Duties for Emergency Management (Continued)**

B Preparedness (Continued)

Activity	Program Area	Timeframe to Complete	Notes
F:\geodata\ortho_imagery Folder Maintenance	Geodata Management	Check yearly.	Ensure that current NAIP is available and ready to use.
F:\geodata\soils Folder Maintenance	Geodata Management	Check yearly.	Ensure that Soil Survey Geographic Soils are ready use.
F:\geodata\topographic_images Folder Maintenance	Geodata Management	Check yearly.	Ensure that 1:24000 topographic images are ready to use by county.
F:\geodata\transportation Folder Maintenance	Geodata Management	Check yearly.	Ensure that roads, rail, and airports files are ready to use.
Geocode FSA Employee Home Locations	Security and Emergency Management	Update quarterly.	Used for identification of impacted employees.
Install and Prepare HAZUS-MH Software	Security and Emergency Management	Update as needed.	OCIO, TSD distributes. Also load State-level data.
Install FSA Map Series	Security and Emergency Management	Update as needed.	OCIO, TSD distributes.
Install HURREVAC Software	Security and Emergency Management	Update yearly before hurricane season.	OCIO, TSD distributes. Not required in all States.
Maintain External Geodata Access Login Accounts	Security and Emergency Management	Update as needed.	Ensure that data access accounts and passwords are current for external emergency data sites.
Setup and Bookmark NCDC Weather and Climate Toolkit	Security and Emergency Management	Update as needed.	No OCIO, Technical Support Division permissions required. Ensure that bookmark is available.

--*

***--291 GIS Specialist Duties for Emergency Management (Continued)**

C Response

The geospatial officer must be able to quickly respond to an event, using data and resources either already staged or available through outside sources at the time of the event. Successful response during disaster events is directly linked to effective preparation. The following table identifies general tasks the geospatial officer is responsible for during an emergency event.

Activity	Knowledge Areas	Timetable	Notes
Create Maps and Reports	Apply MXT files, spatial statistics, and tabular reports.	Updated throughout the event.	Numerous map types may be required for each event that include State, county, and tract level maps.
Identify Area of Impact (Scope)	Digitize, create shape file, and theme selections.	Create Immediately.	Create a shapefile and begin taking notes of event for metadata.
Imagery Prioritization	Data transfers from external web sites.	**High Priority** - Satellite sources vary in timing, availability, and usability.	Provides a picture to identify the impact and severity of event.
Incorporate External Geodata (Magnitude)	GPS data, NEXRAD, HURRIVAC, HAZUS-MH, SPC, plot locations, and hot linking.	**High Priority** - Make requests for external data after location and data is established.	Begin augmenting disaster response with data from external sources showing magnitude of the event.
Locate Service Center Locations	Geocode, spatial selection, and intersect.	As needed for SEB and National Office.	**Required** for major event situations.
Metadata Maintenance	ArcCatalog, XML, projections, and attributes.	Create for each event and shapefile.	Needed to archive files.
Spatial Analysis	Intersect, spatial selections, predictive models, image comparisons, image interpretation, overlay operations, buffer, and query.	As needed.	This will vary by event type.

--*

***--291 GIS Specialist Duties for Emergency Management (Continued)**

D Recovery

Recovery activities provide an opportunity for the geospatial officers to summarize the overall event and create maps that display/designate damaged areas, county eligibility for a Secretarial disaster designation, Administrator physical loss notification, and Presidential disaster declarations. Tasks in the following table shall be considered for each event and completed as appropriate.

Activity	Timeframe	Audience	Notes
Archive Event Geospatial Data	1 week after event completion.	GIS specialists and National Office.	Archives and finalizes data developed for event response/recovery.
Complete Process and Event Notes	1 week after event completion.	GIS specialists and National Office.	Identifies what worked, what did not work, and details steps used for the event.
Finalize Metadata	1 calendar day after completion of event.	GIS specialists and National Office.	Helps in updating the geospatial data and developing geospatial data in the future.
Identify Needs And Key Recovery Areas Through Shapefile	Throughout recovery phase.	SEB, National Office, and CEB.	Maps created with this information are primarily used after major damage events, such as floods, hurricanes, tornadoes, and wildfires.
Map Creation (Includes maps showing Presidential, Secretarial, and Administrative physical loss notifications.)	Throughout event.	SEB, SED, State Office, National Office, and CEB.	Provide overview maps (such as State, county, and area maps) that define the scope, extent, and magnitude of the event.
Obtain Post-Event Satellite Imagery	Approximately 1 month after event, as needed.	GIS specialists and SEB.	Image comparisons of the event before, during, and after, as needed.
Geospatial Data Coordination During /After Events	Throughout event.	Government Agencies addressing Emergency Management	FSA may only share aggregate data (totals, generalized statistics, State- or county-level reference maps), and shall not share actual FSA geospatial data, such as CLU, CRP, wetlands, or bin information with non-USDA Federal, State, or local agencies during an event. All maps for public release must be cleared by SED. If additional guidance is needed, contact EPD for emergency management issues or the FSA FOIA officer for privacy concerns.

--*

***--291 GIS Specialist Duties for Emergency Management (Continued)**

E Mitigation

Mitigation efforts are a core component of geospatial officer responsibilities. Effective mitigation improves FSA's ability to respond to and recover from disaster events. Mitigation tasks should be considered ongoing and are summarized in the following table.

Activity	Timeframe	Notes/Examples
County Agricultural Assets and Mapping	Review for each SEB meeting.	Identify FFSF facility locations and Service Center points locations with elevation, bin locations, prime farmland, soils susceptible to flooding, CLU cropland, CRP, FLP easements, employee locations, etc.
Develop County Risk Maps	Develop and maintain.	Create a set of State maps that show counties thematically for overall risk, flood risk, prevent plant claims, tornado touchdowns, drought, etc.
Develop Service Center Risk Maps	Develop and maintain.	Use NAIP and Service Center location overlay risks, such as flood zones, seismic zones, sink hole locations, etc.
GIS Drill Exercises	After every 3 years.	Participate in State and FSA emergency drills run by FEMA, State, or local emergency groups. **Note:** FSA may only share aggregate data (totals, generalized statistics, State- or county-level reference maps), and shall not share actual FSA geospatial data, such as CLU, CRP, wetlands, or bin information with non-USDA Federal, State, or local agencies during an event. All maps for public release must be cleared by SED. If additional guidance is needed, contact EPD for emergency management issues or the FSA FOIA officer for privacy concerns.
Identify Risk Areas/Hazard Identification for the State	Ongoing updates.	Flood risks, earthquake zones, inundation zones, high risk areas, and prevent plant areas.

--*

***--291 GIS Specialist Duties for Emergency Management (Continued)**

F Emergency Training Requirements

To successfully prepare for and respond to an emergency or disaster events, some specialized training is necessary. Free, online and self-paced emergency preparedness and response training resources are available to FSA employees and shall be added to the GIS specialist/geospatial officer IDP in consultation with their supervisor. The courses in the following table are part of a curriculum that will build overall skill sets in emergency management. Optional courses discussed later further strengthen skills in emergency management and geospatial concentration. Skills acquired, particularly in the geospatial arena, translate into GIS support for other FSA program areas. Listed classes are free resources provided by USDA (AgLearn or USDA ESRI Enterprise Contract) or FEMA at **http://training.fema.gov/is/crslist.asp**. The classes last an average 1 hour and the curriculum can be spread out over 2 calendar years for the core emergency management classes identified.

Year 1			
Course Number	**Course Title**	**Training Location**	**Contact Hours**
	Emergency and Disaster Preparedness	AgLearn	0.5
	Reading and applying the national grid	**http://publicintelligence.net/us-national-grid-training-information-and-maps/**	1.0
	SEB and CEB Training	AgLearn	0.5
ICS-100	Introduction to the Incident Command System	AgLearn	3.0
ICS-200	Incident Command System	AgLearn	1.5
ICS-288	The Role of Voluntary Agencies in Emergency Management	AgLearn	0.5
IS-271	Anticipating Hazardous Weather & Community Risk	FEMA EMI at **http://training.fema.gov/IS/crslist.asp**	1.0
SEC-NIMS-001	Introduction to National Incident Management System	AgLearn	1.0

--*

***--291 GIS Specialist Duties for Emergency Management (Continued)**

F Emergency Training Requirements (Continued)

Year 2			
Course Number	**Course Title**	**Training Location**	**Contact Hours**
IS-1	Emergency Manager: An Orientation to the Position	AgLearn	10.0
IS-111.a	Livestock in Disasters	FEMA EMI at **http://training.fema.gov/IS/crslist.asp**	3.5
IS-120.a	An Introduction to an Exercise		1.0
IS-230.b	Fundamentals of Emergency Management		1.0
IS-241	Decision Making and Problem Solving		0.5
IS-331	Introduction to Radiological Emergency Preparedness		1.0
IS-800.b	National Response Framework		0.3
IS-811	Emergency Support Functions #11 Agriculture and Natural Resource Annex		.25

The following table provides additional courses beyond the 2-year curriculum for consideration when developing IDP's.

Course Number	Course Title	Training location	Contact Hours
IS-10a	Animals in Disasters: Awareness and Preparedness	FEMA EMI	0.4
IS-11a	Animals in Disasters: Community Planning		0.6
IS-102a	Deployment Basics for FEMA Response Partners	**http://training.fema.gov/IS/docs/IS%20Brochure.pdf**	1.0
IS-241.a	Decision Making and Problem Solving	FEMA EMI	0.8
IS-393.a	An Introduction to Hazard Mitigation	AgLearn	1.0
IS-546.a	Continuity of Operations Awareness Course	FEMA EMI	1.0
IS-547.a	Introduction to Continuity of Operations		2.0
IS-814	Emergency Support Function #14 – Long Term Community Recovery		1.0

--*

***--291 GIS Specialist Duties for Emergency Management (Continued)**

F Emergency Training Requirements (Continued)

The USDA ESRI Enterprise Contract offers free online GIS courses through the ESRI Virtual Campus and should be considered a resource when IDP's are developed. ESRI courses provide the geospatial officer an opportunity to refine existing GIS skill sets and develop new GIS skill sets as they relate both to emergency management and daily activities for GIS responsibilities within FSA. State Office GIS specialists can contact Amy Penechar by e-mail to **amy.penechar@slc.usda.gov** to register for Virtual Campus courses. Some course examples are as follows:

- Basics of the Geodatabase Data Model
- Geocoding with ArcGIS Desktop
- Geoprocessing with ArcGIS Desktop
- HAZUS-MH Flood Model Output and Applications
- Introduction to the HAZUS-MH Comprehensive Data Management System
- Introduction to Using HAZUS-MH for Earthquake Loss Estimation
- Introduction to Using HAZUS-MH for Hurricane Loss Estimation
- Introduction to Using HAZUS-MH to Assess Losses from a Riverine Flood Hazard
- Learning ArcGIS Spatial Analyst
- The 15-Minute Map: Creating a Basic Map in ArcMap
- Understanding GIS Queries
- Using LiDAR Data in ArcGIS.

G Software

The following software that is available from OCIO, TSD, directly supports emergency management and shall be installed on all GIS specialist/geospatial officer workstations/laptops:

- ArcGIS Geostatistical Analyst
- ArcGIS Spatial Analyst
- Desktop ArcGIS Arc/Info
- FEMA HAZUS-MH
- FSA Map Series
- HURREVAC (all States with hurricane risk, or as needed, if providing support/assistance).**--***

***--291 GIS Specialist Duties for Emergency Management (Continued)**

H Outreach for Emergency Management

State and local groups in both emergency management and geospatial fields have resources, training, and information that are beneficial for FSA. Opportunities to partner with and develop an awareness of State-based activities occur at both State and regional meetings and conferences throughout the year. The geospatial officer shall engage in outreach efforts to build partnerships with outside groups and agencies as they relate to emergency management and GIS. Examples of these activities include the following.

Activity	Frequency	Benefit/Considerations	Notes
Emergency Brochures	Develop and maintain, as needed. Consider only major events impacting the State.	Educational resource for producers and other emergency management groups to define FSA involvement and resources.	The geospatial officer shall work with the State communication coordinator to obtain existing brochures or develop local materials that meet visual standards. Powerful and easy to maintain outreach tool for State and local governments and producers.
GIS Consortium Conference	Once per year.	Valuable partnership opportunities, resource awareness, and ongoing education.	Opportunities for FSA presentations about how GIS is used in the State for FSA.
Newsletter or Professional Articles	Periodic, as needed.	Outreach opportunity for FSA to further define what FSA is doing in each State as it relates to emergency management and GIS.	Quantifiable outreach component that serves as an FSA resource for producers, stakeholders, and partners.
State Emergency Management Associations	Once or twice per year.	Allows for FSA to develop and maintain contacts in the emergency management area Statewide.	Outreach opportunity to educate emergency management groups of USDA, FSA role in disaster recovery and available resources.
State GIS Committees and Regional GIS Groups	Periodic throughout the year.	Allows FSA to have a visible role in GIS nationwide.	Powerful partnership opportunities for NAIP and other FSA- and GIS-based programs.
Table Top Exercises	Once per year with Executive Board and once every 3 years for FSA.	Develop and practice response and recovery plans for FSA to protect and serve producers. Ensure readiness for FSA, when needed.	Required in 1-SEM.

--*

292-300 (Reserved)

*--Section 2 Supporting Geospatial Hazards

301 Hail

A Overview

Hail may cause damage to crops, livestock, buildings, and equipment, including:

- complete destruction of crops from large amounts of hail
- damage to USDA buildings
- damage to USDA employee homes
- damage to farm buildings, such as roof damage, broken windows, or damaged siding
- severe injuries or death of livestock because of very large hail
- yield losses to crops that are damaged, but not destroyed, by hail.

B Recommended Data Sources

Hail events can be mapped based on reports from the public, observations by FSA personnel, analysis of radar data, or analysis of post-event satellite imagery.

Potential data sources for hail location and estimated size include the following:

- NOAA NCDC at **http://www.ncdc.noaa.gov/nexradinv**
- NOAA NWS at **http://www.nws.noaa.gov**
- NOAA SPC at **http://www.spc.noaa.gov**.

C Best Practices for Analysis

GIS analysis can be effective in determining the location and estimated size of hail damage, but **cannot** be used in place of a field visit to determine actual damage. Typical analysis of hail data may require the GIS specialist to complete the following processes and tasks:

- provide preliminary location data to CED based on storm reports catalogued on the SPC web site

- extract hail index data from NCDC archives to identify more refined point locations of potential hail storms

- extract storm total precipitation data from NCDC archives to identify areal extents of potential hail storms--*

***--301 Hail (Continued)**

C Best Practices for Analysis (Continued)

- heads-up digitizing of aerial extents of hail storms
- create attribute and spatial queries
- union and intersect overlay operations
- data manipulation
- process GPS data.

When a hail storm has occurred in an area, the GIS specialist shall determine the best available data to use in analysis. Preliminary data within 24 hours of a storm tends to be less refined and may be limited to SPC reports, but as data becomes available through NCDC, location data may become more usable. Extreme hailstorms that cause large amounts of defoliation may be visible on satellite images acquired after the storm event.

D Presentation of Analysis Results

Maps generated in response to a hail event are generally designed to provide CEB with spatial information to assist in locating damage and completing LAR. Hail maps should be designed to:

- depict the general location and extent of a hail storm in relation to known landmarks like roads or cities
- differentiate between radar-estimated hail size and location and observer reports
- support local and national reporting requirements.**--***

***--301 Hail (Continued)**

D Presentation of Analysis Results (Continued)

Datasets that should be included on hail analysis maps include:

- city locations
- CLU's
- county boundaries
- FFSF facilities
- hail report locations (points)
- highway or other road data
- other farm data as available
- section and/or township boundaries
- storm total precipitation
- USDA Office locations.

Note: Maps containing CLU and FFSF data are for internal distribution **only**. Cropland and other land use data may be included on maps for use outside of Service Center Agencies **only** if data has been sufficiently aggregated to protect sensitive data covered under 2008 Farm Bill, Section 1619. Guidance about protected data can be found in 2-INFO.**--***

*--302 Heavy Precipitation

A Overview

Heavy precipitation events can cause significant property, soil, and crop damage or loss. This type of event can occur in very short bursts or over a more prolonged period of time. The damage from these events can be modeled over a couple hours, a 24-hour period, a 48-hour period, a week, or longer accumulations. Crops, feed, and hay supplies are the most susceptible to heavy precipitation events. Doppler weather radar can be used for the detection of heavy precipitation within a storm system.

Common agricultural losses for heavy precipitation include:

- crops
- feed and hay supplies
- fence damage
- transportation infrastructure damage or loss.

GIS analysis can be very effective in assessing damage and losses caused by heavy precipitation events. State Office GIS specialists shall use GIS analysis to assist with program administration for heavy precipitation in disaster, conservation, and prevented plant program requirements. This includes tracking and compiling weather events, imagery analysis, and map development.

B Recommended Data Sources

The following are heavy precipitation data sources/resources for GIS specialists.

Note: In addition to the following resources, local data is often available from many State agencies and may provide more detailed information.

Data Source/Resource	Purpose	Resource Location	Notes
AHPS	Single-day shapefile archive for precipitation data that are quality-controlled, multi-sensor (radar and rain gauge) precipitation estimates obtained from NWS River Forecast Centers.	**http://water.weather.gov/precip/download_nonjs.php**	The original data are in XMRG format and projected Hydrologic Rainfall Analysis Project grid coordinate system.
GLOVIS	Access to several types of imagery, including Landsat and MODIS.	**http://glovis.usgs.gov/**	

--*

***--302 Heavy Precipitation (Continued)**

B Recommended Data Sources (Continued)

Data Source/Resource	Purpose	Resource Location	Notes
HDDS	Access to pre-and post-event imagery for selected disaster events.	**http://hdds.usgs.gov/hdds2/**	A log-in account **must** be established to access restricted data and can be requested on the web site.
NCDC Data Inventory Search	Access and download NEXRAD data files in shapefile format by national Doppler Radar sites.	**http://www.ncdc.noaa.gov/nexradinv/**	1-hour precipitation (N1P/78), 3-hour precipitation (N3P/79), and Digital Precipitation Array (DPA/81).
NCDC NEXRAD Data Inventory Search	Documentation and summary reports for all weather-related events for the entire U.S.	**http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms**	Users can query State, county, date, and type of weather event.
NCDC Weather Station Results	Summary reports for the weather stations throughout the U.S.	**http://www.ncdc.noaa.gov/oa/climate/stationlocator.html**	Users can select, State, county, city, or latitude and longitude, if known.
NEXRAD National Mosaic Reflectivity Images	Archival mosaiced reflective images from NEXRAD that can be searched by day, month, and year.	**http://www.ncdc.noaa.gov/extremes/scec/searchrecs.php**	
NOAA Heavy Precipitation	U.S. climate monitoring weekly products that summarize NCDC for weekly temperatures map, weekly precipitation maps, and the Palmer Crop Moisture Index Map.	**http://www.ncdc.noaa.gov/oa/climate/severeweather/rainfall.html**	
NOAA Heavy Rainfall Frequencies	Archival information for summaries of major precipitation events in the U.S.	**http://www.ncdc.noaa.gov/oa/documentlibrary/rainfall.html**	Summaries occur for the entire country and can be isolated by State.

--*

***--302 Heavy Precipitation (Continued)**

B Recommended Data Sources (Continued)

Data Source/Resource	Purpose	Resource Location	Notes
NOAA Satellite and Information Services for Temperature and Precipitation Maps	Information and summary maps for both temperature and precipitation based by 1-month to 1-year increments.	**http://www.ncdc.noaa.gov/temp-and-precip/maps.php**	
NOAA U.S. State Climate Extremes Committee	Summarizes major weather events for all-time extremes for temperature, precipitation, and snow depth.	**http://www.ncdc.noaa.gov/extremes/scec/searchrecs.php**	
NWS CPS	Various outlook forecasts for temperature and precipitation.	**http://www.cpc.ncep.noaa.gov/**	
USDA FAS Crop Explorer	Access to daily MODIS imagery.	**http://www.pecad.fas.usda.gov/cropexplorer/modis_summary/index.cfm**	
USGS Earth Explorer	Access to several types of imagery including Landsat and SPOT.	**http://earthexplorer.usgs.gov/**	A log-in account **must** be established to access restricted data and can be requested on the web site.
USGS Landsat Acquisition Schedule	Landsat 5 and Landsat 7 acquisition schedule.	**http://landsat.usgs.gov/tools_acq.php**	

--*

***--302 Heavy Precipitation (Continued)**

C Best Practices for Analysis

Heavy precipitation events are characterized by point data that can be interpolated to define the severity and extent using spatial analysis techniques in GIS. The damage for heavy precipitation events is often characterized by saturated soils, washouts, and standing water that can often be further identified using satellite imagery, and ground truthing using GPS and digital cameras. Typical analysis requires the State Office GIS specialist to complete the following geospatial techniques:

- create thematic maps to summarize various aspects of the data by State, county, and tract
- IDW, Trend, and Kriging interpolations
- perform attribute and spatial queries
- perform table manipulations
- perform union and intersect overlay operations
- plot and project precipitation point data
- rasterize data
- use cartographic displays to depict precipitation intensity
- use spatial selections to identify impacted CLU's.

The State Office GIS specialist shall use the following table to better understand and depict damage for heavy precipitation.

Note: The period of time that is covered and spatial analysis techniques that need to be used are often determined by the severity of the event and the amount of damage that has occurred. A combination of multiple days of worth of data to possibly weeks or months of data may be needed depending on the situation. The following table is a guide.

IF...	**THEN...**			
heavy precipitation events occurs	follow steps 1 through 5.			
	Step	**Action**	**Purpose**	**Notes**
	1	Obtain the precipitation shapefile for the past days event.	Needed to create rainfall interpolation map.	Data source is AHPS at **http://water.weather.gov/precip/download_nonjs.php**.
	2	Interpolate rainfall data.	Creates a gridded shapefile to display rainfall.	ArcToolbox - Interpolation - IDW.

--*

***--302 Heavy Precipitation (Continued)**

C Best Practices for Analysis(Continued)

IF...	THEN...			
heavy precipitation events occurs (Continued)	**Step**	**Action**	**Purpose**	**Notes**
	3	Request Field Offices to obtain GPS points and digital photos.	Support information for disaster requests.	Used in APLN requests and Secretarial disasters.
	4	Plot field GPS points and add to Map Document (Hot Links).	Assists in developing damage reports.	
	5	Determine if Imagery is available and needed	Assists in identifying areas of standing water or flooding.	Improves data accuracy and assists the field in addressing standing water issues in fields. Possible data sources are SPOT, LandSat TM (30-Meter), AWiFS (56-Meter), or MODIS (250-Meter).
exceptional precipitation is sustained over time	complete steps 1 through 5 and continue with the following steps.			
	6	Obtain imagery to show standing water over time.	Valuable support information for heavy precipitation events.	Requires a number of satellite images to show length of time water inundated fields or impacted land. Possible Data Sources are SPOT, LandSat TM (30-Meter), AWiFS (56-Meter), or MODIS (250-Meter).
	7	Use AHPS.	Obtain the gridded rainfall data for length of time precipitation has occurred.	Data source is AHPS at **http://water.weather.gov/precip/download.php**.
	8	Use imagery analysis to show standing water.	Show concentrations of water standing on the ground or flooded areas.	Used in APLN requests and Secretarial disasters. Look for Bands 5 and 3 combine to a numeric grid. High values will reflect water reflectivity.

--*

***--302 Heavy Precipitation (Continued)**

C Best Practices for Analysis(Continued)

IF...	THEN...			
exceptional precipitation is sustained over time (Continued)	**Step**	**Action**	**Purpose**	**Notes**
	9	Request additional GPS and digital images of impacted areas.	Streamline field data collection and document event.	Used in APLN requests and Secretarial disasters.
	10	Check NCDC NEXRAD inventory.	Create additional documentation of rainfall event, if needed.	Can create a base weather image of event path using Level II data. Useful for SEB and CEB discussions of rain events to make factual decisions on storm paths.
	11	CLU intersect or overlay.	Identify areas impacted by a heavy precipitation event.	Allows for identification and statistical summary of total farmland impacted.

D Reports and Maps

At the conclusion of heavy precipitation events, the State Office GIS specialist shall create a series of reports and maps that assist in the local Field Offices, SEB's, CEB's, and the National and State Offices in assessing the scope, magnitude, and extent of the event. Reports and maps can be created to determine the scale of damages and the impact to agriculture. To evaluate the location and spatial extent of damage:

- assess possible structural impacts or damage concerning agriculture
- assist in coordinating efforts with Field Offices, SEB's, and CEB's in completing LAR's
- identify areas in the State or county that are highly susceptible to crop damage because of standing water, hydric soils, and/or flooding conditions
- pinpoint areas of damage that include CLU.**--***

***--302 Heavy Precipitation (Continued)**

D Reports and Maps (Continued)

The following table provides examples of reports and maps that will be prepared for heavy precipitation depending on the damage impact and situation.

Note: Maps containing CLU and FFSF data are for internal distribution **only**. Cropland and other land use data may be included on maps for use outside of Service Center Agencies **only** if data has been sufficiently aggregated to protect sensitive data covered under 2008 Farm Bill, Section 1619. Guidance about protected data can be found in 2-INFO.

Heavy Precipitation Event	Base Tasks to Accomplish	Timeframe to Complete	Primary Product Recipients	Primary Data Sources/Resources
Multi-Day Events	FSA Map Series Emergency Management	Defines farms impacted by standing or flood water.	CED and producers impacted.	Current NAIP, CLU, national grid, and bin locations.
Multi-Day Events	Landsat Map Comparisons	Approximately 16 calendar days after event. Requires before and after satellite images.	GIS specialist/ geospatial officer.	Satellite imagery, county boundary, and digitized path location.
Single-Day Events	County Precipitation Extent Maps (Use FSA map series to create individual county maps based on the Precipitation Extent State Map.)	Next workday after event.	CED and CEB.	AHPS, county boundary, national grid, major roads, Service Center locations, and major geographical features.
Single-Day Events	Damage Point Map (If needed, based on the situation.)	Completed and updated as field data is provided.	CEB and SEB.	County boundary, major roads, Service Center locations, national grid, and major geographical features.

--*

***--302 Heavy Precipitation (Continued)**

D Reports and Maps (Continued)

Heavy Precipitation Event	Base Tasks to Accomplish	Timeframe to Complete	Primary Product Recipients	Primary Data Sources/Resources
Single-Day Events	Precipitation Extent State Map	Next workday after event.	SED and CED.	AHPS and county boundary.
Single-Day or Multi-Day Events	PowerPoint Overview of Storm Damage Report	Compiled before SEB Meeting.	SEB.	Maps in this table, statistics from analysis, digital photos, news articles, and other related information.

303 Floods

A Overview

Flooding is the most common natural disaster in the U.S. and can negatively impact both agriculture and USDA business functions. Potential negative impacts from flooding include:

- damage or destruction of homes of FSA employees
- damage or destruction of USDA buildings
- inability of FSA employees to report to work because of inundated roads
- losses to crops because of prolonged inundation, inability to plant, or inability to access fields
- losses to dairy production because of the inability to deliver product because of inundated roads
- losses to farms, including damaged or destroyed buildings, fences or livestock feed supplies
- losses to livestock either because of inundation or inability to graze.**--***

***--303 Floods (Continued)**

B Recommended Data Sources

Floods are classified according to whether they are slow- or fast-rising. The type of flood may dictate the data used to perform flood impact analysis. For preliminary situation reports, modeled flood extents may be the most accurate data available. For slow-rising flood events, remotely sensed data (satellite imagery, radar data, or aerial photography) may be available to determine actual flood extents after the event has occurred.

Potential data sources for modeled flood extents include:

- FEMA floodplain maps at **http://www.fema.gov/hazard/map/flood.shtm**
- flood extents developed by local emergency management groups or engineering firms
- HAZUS-MH-generated flood extents
- U.S. Bureau of Reclamation at **http://www.usbr.gov/pmts/flood/index.html**
- USACE modeled discharges (for rivers managed by USACE).

Analysis of flood extents should be performed using the best available data.

The geospatial officer should communicate with local emergency managers to identify availability of modeled data.

Data sources for remotely sensed data include:

- GLOVIS at **http://glovis.usgs.gov** for access to several types of imagery, including Landsat and MODIS

- HDDS at **http://hdds.usgs.gov/hdds2** for access to pre- and post-event imagery for selected disaster events

  Note: A log-in account **must** be established to access restricted data and can be requested on the web site.

- USDA FAS Crop Explorer - MODIS Rapid Response at **http://www.pecad.fas.usda.gov/cropexplorer/modis_summary/index.cfm** for access to daily MODIS imagery

- USGS Landsat Acquisition Schedule at **http://landsat.usgs.gov/tools_acq.php** that provides the Landsat 5 and Landsat 7 acquisition schedule.**--***

***--303 Floods (Continued)**

C Best Practices for Analysis

GIS analysis can be effective in assessing impacts of flooding to agriculture. Typical analysis may require the GIS specialist to complete the following processes and tasks:

- attribute and spatial queries
- data manipulation
- heads-up digitizing
- processing GPS data
- processing satellite imagery
- union and intersect overlay operations.

When flooding is predicted for an area, preliminary analysis shall be done to determine potential flood impacts, as follows:

- if modeled flood extent data is available for the area that may be affected, use the modeled flood extent data that corresponds with the forecast flood magnitude (for example 100-year flood, 500-year flood)

- if no modeled flood extent data is available, but historical imagery from a flood event of similar magnitude is available, use the historical imagery for analysis

- use the Intersect Tool in ArcToolbox to “cut” CLU polygons based on the flood extent

- update the “Calculated Acres” column of the resulting CLU data to reflect the updated geometry

- summarize the attribute table of the resulting data by land classification code, including the sum of the calculated acres as a summary statistic

- use a spatial query to identify all Service Centers, FFSF points, and grain storage bins within the affected area.**--***

***--303 Floods (Continued)**

C Best Practices for Analysis (Continued)

When flooding has occurred in an area, the GIS specialist shall determine the best available data for use in analysis. Data sources, in preferred order, may include:

- high resolution imagery (for example SPOT satellite imagery, FEMA aerial photography, etc.)
- medium resolution imagery (LandSat TM 30-Meter satellite imagery and AWiFS 56-Meter satellite imagery)
- low resolution imagery (MODIS 250-Meter satellite imagery)
- modeled flood-extent data from USACE or other authoritative source
- modeled flood-extent data from HAZUS-MH
- observations from field personnel.

Note: Observations from field personnel may be impossible to obtain for a large flood area and do not necessarily lend themselves to large-scale analysis.

After a flood extent has been obtained for the flood event:

- use the Intersect Tool in ArcToolbox to “cut” CLU polygons based on the flood extent
- update the “Calculated Acres” column of the resulting CLU data to reflect the updated geometry
- summarize the attribute table of the resulting data by land classification code, including the sum of the calculated acres as a summary statistic
- use a spatial query to identify all Service Centers, FFSF points, and grain storage bins within the affected area.**--***

***--303 Floods (Continued)**

D Presentation of Analysis Results

Maps and reports generated in response to a flood event should be designed to:

- depict the general location and extent of flooding
- distinguish flooded cropland from other agricultural land
- identify other impacts to agriculture, including farm buildings, USDA offices, and FFSF facilities
- support local and national reporting requirements.

Datasets that should be included on flood analysis maps include:

- CLU
- FFSF facilities
- flood extent
- satellite imagery
- USDA office locations
- other farm data as available.

Note: Maps containing CLU and FFSF data are for internal distribution **only**. Cropland and other land use data may be included on maps for use outside of Service Center Agencies **only** if data has been sufficiently aggregated to secure data according to 2008 Farm Bill, Section 1619. Guidance about protected data can be found in 2-INFO.

Because flood-extent data of riverine floods may not be suited for detailed presentation (for example, the flood extent is extremely narrow in relation to the length of the river), textual summaries and charts are useful for identifying flooded cropland totals.**--***

*--304 Tornadoes

A Overview

Tornadoes are violent storms that arrive with little or no notice. The damage inflicted by tornadoes can be devastating in the areas that are directly impacted by the event. Crops, farm buildings, equipment, infrastructure, and lives can be wiped out in an instant. Doppler weather radar can detect rotational algorithms that indicate the likely presence of a strong mesocyclone that is in some stage of tornadic development. This data can be used to further address tornado impacts when combined with satellite imagery.

Common agricultural losses for tornadoes include:

- barns and other structures
- crops
- equipment and machinery
- feed and hay supplies
- fences
- forests
- grazing/pasture losses
- homes
- livestock
- transportation infrastructure
- utilities.

GIS analysis is very effective in assessing damage and losses caused by tornadoes. GIS specialists shall assist in tornado-related program administration by tracking tornado events, compiling imagery, and develop maps in support of emergency management efforts for tornado events impacting agriculture.--*

***--304 Tornadoes (Continued)**

B Recommended Data Sources

Potential data sources for tornado analysis are provided in the following table.

Note: In addition to the following resources, local data is often available from many State agencies and may provide more detailed information.

Data Source	Purpose	Resource Location	Notes
GLOVIS	Access to several types of imagery including Landsat and MODIS.	**http://glovis.usgs.gov/**	
HDDS	Access to pre- and post-event imagery for selected disaster events.	**http://hdds.usgs.gov/hdds2/**	A log-in account **must** be established to access restricted data and can be requested on the web site.
NCDC Data Inventory Search	Access and download NEXRAD data files in shapefile format by National Doppler Radar Sites.	**http://www.ncdc.noaa.gov/nexradinv/**	Mesocyclone (NME/60) and Tornadic Vortex Signature (NTV/61).
NCDC NEXRAD Data Inventory Search	Documentation and summary reports for all weather-related events for the entire U.S.	**http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms**	Users can query by State, county, date and type of weather event.
NCDC Weather Station Results	Summary reports from weather stations throughout the U.S.	**http://www.ncdc.noaa.gov/oa/climate/stationlocator.html**	Users can select by State, county, and city, or latitude and longitude, if known.
NOAA Severe Weather for Tornadoes	Information for tornado activity in the U.S. Includes recent tornadic activity and historical information.	**http://www.ncdc.noaa.gov/oa/climate/severeweather/tornadoes.html**	
NOAA State of the Climate Tornadoes	Access monthly tornado reports by month and year.	**http://www.ncdc.noaa.gov/sotc/tornadoes/**	

--*

***--304 Tornadoes (Continued)**

B Recommended Data Sources (Continued)

Data Source	Purpose	Resource Location	Notes
SPC	Access to preliminary storm reports for hail, tornadoes, and high winds for the past 24 hours.	**http://www.spc.noaa.gov/climo/reports/yesterday.html**	CSV files can be downloaded and plotted using latitude and longitude.
USDA FAS Crop Explorer	Access to daily MODIS imagery.	**http://www.pecad.fas.usda.gov/cropexplorer/modis_summary/index.cfm**	
USGS Earth Explorer	Access to several types of imagery, including Landsat and SPOT.	**http://earthexplorer.usgs.gov/**	A log-in account **must** be established to access restricted data and can be requested on the web site.
USGS Landsat Acquisition Schedule	Landsat 5 and Landsat 7 acquisition schedule.	**http://landsat.usgs.gov/tools_acq.php**	

C Best Practices for Analysis

GIS analysis can be effective in assessing the damage inflicted by a tornado for agriculture. Analysis may require the following tasks be completed:

- create thematic maps to summarize various aspects of the data
- heads-up digitizing
- hot link digital photos of the area
- imagery comparisons
- insert buffer zones around line and area layers
- perform attribute and spatial queries
- perform table manipulations
- perform union and intersect overlay operations
- process GPS data
- process satellite imagery
- process XY event theme data from NWS.**--***

***--304 Tornadoes (Continued)**

C Best Practices for Analysis (Continued)

The following table of spatial analysis options can be used to understand and depict damage from tornadoes.

Note: The amount of damage inflicted by a tornado will dictate the spatial analysis techniques that will need to be applied.

<table>
<tr><th>IF…</th><th colspan="4">THEN…</th></tr>
<tr><td rowspan="6">a tornado with EF0 to EF2 winds occurs</td><td colspan="4">follow steps 1 through 4.</td></tr>
<tr><td>Step</td><td>Action</td><td>Purpose</td><td>Notes</td></tr>
<tr><td>1</td><td>Plot the latitude and longitude of the tornado in a shapefile/ geodatabase.</td><td>Identifies touchdown locations.</td><td>Data source is SPC.</td></tr>
<tr><td>2</td><td>Request Field Offices collect GPS points and digital photos.</td><td>Supporting information for disaster requests.</td><td rowspan="3">Supports APLN requests and Secretarial disaster designations.</td></tr>
<tr><td>3</td><td>Plot GPS points and add to map document.</td><td>Assists in developing damage reports.</td></tr>
<tr><td>4</td><td>Use hot links to include GPS point data linked with digital photos.</td><td>Overview information for overall damage.</td></tr>
<tr><td rowspan="3">a tornado with winds exceeding EF3 or greater occurs</td><td colspan="4">complete steps 1 through 4 and continue with the following steps.</td></tr>
<tr><td>Step</td><td>Action</td><td>Purpose</td><td>Notes</td></tr>
<tr><td>5</td><td>Determine best imagery available before and after tornado.</td><td>Imagery analysis.</td><td>Possible data sources are SPOT, LandSat TM (30-Meter), AWiFS (56-Meter) or MODIS (250-Meter).</td></tr>
</table>

--*

***--304 Tornadoes (Continued)**

C Best Practices for Analysis (Continued)

IF…	THEN…			
a tornado with winds exceeding EF3 or greater occurs (Continued)	**Step**	**Action**	**Purpose**	**Notes**
	6	Create tornado path (shapefile) based on imagery comparison.	Identify tornado damaged areas.	See tornado methodology using imagery. Use pan sharpening or principle component analysis.
	7	Obtain weather warning polygons.	Narrow down and verify tornado location.	Data source at **http://www.nws.noaa.gov/regsci/gis/shapefiles/**.
	8	Intersect CLU with tornado path.	Quantify damage to cropland.	See tornado methodology. Intersect in ArcToolbox.
	9	Summarize CLU to define damage based on land class codes and total farms/tract impacted.	Provide CED and CEB statistical support for LAR.	Used as supporting documentation for STORM Reports.
	10	Use spatial query to identify all Service Centers, FFSF points, and grain storage bins in tornado path.	Identify agricultural resources impacted by tornado.	Used as supporting documentation for STORM Reports.

D Presentation of Analysis Results

In the aftermath of a tornado, the geospatial officer shall create a series of reports and maps that assist local Field Offices, SEB's, CEB's, and the National Office in assessing the scope, magnitude and extent of the tornado. This information can be used to:

- assess possible structural damage concerning agriculture
- assist in coordination efforts of Field Offices, SEB's, and CEB's in assessing and completing LAR's
- evaluate the location and spatial extent of damage
- pinpoint CLU in damage areas.**--***

***--304 Tornadoes (Continued)**

D Presentation of Analysis Results (Continued)

Use following table as a guide for reports and maps for tornadoes:

Note: Maps containing CLU and FFSF data are for internal distribution **only**. Cropland and other land use data may be included on maps for use outside of Service Center Agencies **only** if data has been sufficiently aggregated to secure data according to 2008 Farm Bill, Section 1619. Guidance about protected data can be found in 2-INFO.

Tornado Scale	Tasks to Accomplish	Timeframe to Complete	Primary Product Recipients	Primary Data Sources and Resource Sites
EF0 - EF5	Tornado Touchdown Map	Day of or next workday after event.	SED and CED.	SPC and national grid.
EF1 - EF5	Damage Point Map	Completed and updated as local offices provide field data.	CEB and SEB.	County boundary, major roads, Service Center locations, national grid, and major geographical features.
EF1 - EF5	Initial Tornado Path Overview Map	Day of or next workday after event.	SED, CED, and CEB.	SPC, county boundary, national grid, major roads, Service Center locations, major geographical features, and bin locations.
EF2 - EF5	PowerPoint Overview of Storm Damage Report	Compiled before SEB meeting.	SEB.	Maps listed in this table, statistics from analysis, digital photos, news articles, and other related information.
EF3 - EF5	FSA Map Series Emergency Management	After the path has been delineated.	CED and producers impacted.	Current NAIP, CLU, tornado path, national grid, and bin locations.
EF3 - EF5	Landsat Map Comparisons	Approximately 16 calendar days after event. Requires before and after satellite images.	GIS specialist.	Satellite imagery, county boundary, and digitized path location.
EF3 - EF5	Updated Tornado Path Overview Map	After the path has been delineated.	CEB and SEB.	County boundary, national grid, tornado path, major geographical features, and CLU.

--*

*--305 Hurricanes

A Overview

Hurricanes are predictable, seasonal, maritime storms that arrive with significant advance warning. Hurricanes largely affect the Gulf of Mexico and southern Atlantic Coast regions. They occur less frequently in the northeast Atlantic coastal region and rarely in the Hawaiian Islands. Although a hurricane is primarily a coastal event, the powerful storms can travel deep inland causing far reaching negative impact. The widespread damage caused by hurricanes can affect crops, livestock, structures, and equipment. Damage can be because of high winds, tornadoes, excessive precipitation, storm surge, and flooding.

Hurricane can cause damage or destruction to:

- barns and other structures
- crops
- equipment and machinery
- feed and hay supplies
- fences
- forests
- grazing lands/pasture
- homes
- levees and dams
- livestock
- soils
- transportation infrastructure
- utilities.

GIS analysis can be effective in assessing hurricane damage. It can assist in storm-tracking, disaster-related program administration, disaster recovery, and provide analysis and supporting documentation for Secretarial disaster declaration or Administrator's loss notification.--*

***--305 Hurricanes (Continued)**

B Data Sources

In addition to the following resources, local data is often available and may provide more detailed information.

Data Source/Resource	Purpose	Resource Location
GLOVIS		**http://glovis.usgs.gov/**
HAZUS-MH	Nationally applicable standardized methodology that contains models for estimating potential losses from hurricanes and floods.	**http://www.fema.gov/plan/prevent/hazus/** **http://hazus.org/**
HDDS		**http://hdds.usgs.gov/hdds2/**
HSIP Gold		**http://www.hifldwg.org**
HURREVAC	Software used by emergency managers to track hurricanes and assist in decisionmaking.	**http://www.hurrevac.com/**
NOAA Historical Hurricane Tracks	Comprehensive historical hurricane and typhoon track data worldwide.	**http://csc-s-maps-q.csc.noaa.gov/hurricanes/**
NOAA, NWS, AHPS	Archived precipitation data.	**http://water.weather.gov/precip/**
NWS, NHC	Continually updated alerts, warnings, and status of tropical storm activity.	**http://www.nhc.noaa.gov/**
The National Association of Radio Distress		**http://hisz.rsoe.hu/alertmap/index2.php**
USDA FAS Crop Explorer		**http://www.pecad.fas.usda.gov/cropexplorer/modis_summary/index.cfm**
USGS Earth Explorer		**http://earthexplorer.usgs.gov/**
USGS Landsat Acquisition Schedule		**http://landsat.usgs.gov/tools_acq.php**

--*

***--305 Hurricanes (Continued)**

C Best Practices for Analysis

Hurricane data can be used effectively before and after the storm occurs. It can assist in making agriculture-related damage assessments within a hurricane affected area. Typical analysis may require the geospatial officer to complete the following tasks:

- classify soil types
- create thematic maps to summarize various aspects of the data
- insert buffer zones around line and area layers
- perform attribute and spatial queries
- perform table manipulations
- perform union and intersect overlay operations
- use HAZUS-MH to model hurricane scenarios
- use NWS AHPS to provide precipitation data
- use NWS NHC and HURREVAC to provide geospatial data (tracks, wind).

Note: The damage inflicted by a hurricane will often dictate the spatial analysis techniques that need to be used and the time needed to complete them. Prestaged data (paragraph 291) is particularly important in hurricane prone areas.

The following spatial analysis steps can be used to better understand and depict damage from hurricanes.

Follow these steps **before** a significant hurricane is expected.

Step	Action	Purpose	Notes
1	Plot hurricane track using latitude and longitude.	Needed to track hurricane path and predict landfall sceneries.	
2	Complete HAZUS-MH scenarios for review.	Scenarios should have already been run as part of a exercise and testing process for FSA according to 1-SEM.	HAZUS–MH hurricane module.
3	Use HURREVAC to track predicted path.	Support information for disaster requests.	

--*

***--305 Hurricanes (Continued)**

C Best Practices for Analysis (Continued)

Follow these steps **after** landfall of a hurricane.

Step	Action	Purpose	Notes
1	Obtain imagery to show standing water over time.	Valuable support information for heavy precipitation events.	Requires a number of satellite images to show length of time water inundated fields or impacted land. Possible data sources are SPOT, LandSat TM (30-Meter), AWiFS (56-Meter), or MODIS (250-Meter).
2	Use AHPS.	Obtain the gridded rainfall data for length of time precipitation has occurred.	Data source at **http://water.weather.gov/precip/download.php**.
3	Use imagery analysis to show standing water.	To show concentrations of water standing on the ground or flooded areas.	Used in APLN requests and Secretarial disasters. Look for Bands 5 and 3 combine to a numeric grid. High values will reflect water reflectivity.
4	Use imagery comparison from previous month for damage assessments.	Assists in addressing high damage areas and crop losses.	Used in APLN requests and Secretarial disasters.
5	Request additional GPS and digital images of impacted areas, as appropriate, from County Offices.	To streamline field data collection and document event.	
6	Check NCDC NEXRAD inventory.	To create additional documentation of rainfall event, if needed.	Can create a base weather image of event path using Level II data. Useful for SEB and CEB discussions of rain events to make factual decisions on storm paths.
7	CLU intersect or overlay.	To identify areas impacted by heavy precipitation from hurricane.	Allows for identification and statistical summary of total farmland impacted.
8	Identify proximity risk to Service Centers.	For status reports.	

--*

***--305 Hurricanes (Continued)**

D Presentation of Analysis Results

The geospatial officer shall create maps and reports to assist local Field Offices, SEB's, CEB's, and the National Office in assessing the scope, magnitude, and extent of the event. Maps and reports should be designed to:

- assess possible structural impacts or damaged concerning agriculture
- assist in coordinating efforts with Field Offices, SEB's, and CEB's in assessing and completing LAR's
- evaluate the location and spatial extent of damage
- identify areas of risk for Service Center employees
- identify areas of risk for Service Centers
- implement and support State and County Emergency Operations Plans and cooperative activities
- pinpoint affected areas of damage for CLU.

GIS can also be used to create maps and reports to assist SEB's and CEB's in damage assessments and National and State Offices with information dissemination.

Note: The types and number of maps and reports needed, and the updates required to properly assess the situation, will be based on the severity of the hurricane.**--***

***--305 Hurricanes (Continued)**

D Presentation of Analysis Results (Continued)

Hurricane Maps	Purpose	Completion Timeframe	Primary Recipients	Primary Data Sources
Before Landfall				
Track Maps	Depicts potential hurricane path.	Days to hours before landfall.	National Office, SED, and CED.	County boundary and wind speeds.
HAZUS-MH Scenario Maps	Defines possible damage expected from a landfall event.	Months to days before event.	SED, CED, and CEB.	HAZUS-MH scenario, county boundary, national grid, major roads, Service Center locations, and major geographical features.
Destruction Point Map	Compiles field information from GPS and digital photos defining the hurricane impact.	Completed and updated as Field Offices provide data.	CEB and SEB.	County boundary, major roads, Service Center locations, national grid, and major geographical features.
After Landfall				
Landsat Comparisons	Compares previous month imagery by county or localized areas of concern.	Approximately 16 calendar days after event. Requires before and after satellite images.	GIS specialist.	Satellite imagery, county boundary, and digitized path location.
FSA Map Series	Identifies farms impacted by standing or flood water.	If needed based on the situation.	CED and producers impacted.	Current NAIP, CLU, national grid, and bin locations.
Report	PowerPoint overview of Hurricane Damage Report.	Compiled before SEB Meeting.	SEB.	Maps in this table, statistics from analysis, digital photos, news articles, and other related information. Includes images submitted by local offices to document extent, scope, and magnitude of the event.

--*

*--306 Droughts

A Overview

Although defining a drought event can be difficult, the basic premise is the deficiency of precipitation over a period of time compared to normal conditions. Drought conditions take time to develop and can last for long periods. In addition, drought conditions may be localized in a small area or persist across many States.

Determining impact to agriculture can be complicated. Many factors must be considered, such as timing of precipitation in relation to the growing season, wind, and temperature. Common agricultural losses for drought include:

- crops
- grazing/pasture losses
- water resources.

GIS analysis is effective in assessing impacts of a drought event. GIS specialists shall assist by monitoring drought events and developing maps and reports in support of emergency management efforts and program administration.

B Data Sources

The following are core data sources for drought.

Note: In addition to the following resources, local data is often available and may provide more detailed information.

Data Source/Resource	Purpose	Resource Location	Notes
CPC	Various precipitation and drought outlook maps.	**http://www.cpc.ncep.noaa.gov**	
Crop Moisture Index	Weekly crop moisture index.	**http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/cmi.gif**	
NASS Vegetation Condition	Vegetation condition images derived from AVHRR NDVI data.	**http://www.nass.usda.gov/research/avhrr/avhrrmnu.htm**	Includes comparison map from previous year.

--*

***--306 Droughts (Continued)**

B Data Sources (Continued)

Data Source/Resource	Purpose	Resource Location	Notes
National Integrated Drought Information System, U.S. Drought Portal	Comprehensive source of drought information and data.	**http://www.drought.gov/portal/server.pt/community/drought_gov/202**	
NWS AHPS	Multiple gridded precipitation products. Cumulative data is based on various timeframes.	**http://water.weather.gov/precip/download.php**	Use "Normal", "Departure", and "Percent" datasets.
NWS Drought Information Statements	Access to regional NWS drought statements that include summaries and impacts.	**http://www.drought.gov/portal/server.pt/community/drought.gov/drought_information_Statements**	
Palmer Drought Severity Index	Access to weekly Palmer Drought Severity Index.	**http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/palmer.gif**	
U.S. Drought Monitor	Access to weekly drought level shapefiles and tabular data.	**http://www.drought.unl.edu/dm/dmshps_archive.htm**	
U.S. Drought Monitor Graphics	Customized drought monitor statistics in a time-series chart format.	**http://www.drought.gov/portal/server.pt/community/drought.gov/drought_monitor_graphics**	
USDA FAS Crop Explorer, MODIS NDVI Image Gallery	Download access to regional NDVI composites and NDVI departure from 5-year average.	**http://www.pecad.fas.usda.gov/cropexplorer/modis_imageview2.cfm?regionid=us&product=modis_ndvi**	

--*

***--306 Droughts (Continued)**

C Best Practices for Analysis

Typical analysis requires the GIS specialist to complete the following processes and tasks:

- attribute and spatial queries
- data manipulation
- spatial interpolation
- union and intersect overlay operations.

The following table provides specific analysis steps associated with disaster response and reporting during a drought event.

Note: The extent and duration of a drought event will often dictate the time period and spatial analysis techniques to be applied.

Step	Action	Purpose	Notes
1	Download USDM weekly shapefile.	• To evaluate the extent and intensity of the drought event. • For requests for managed haying and grazing on CRP and prevented planting purposes.	Archive in F:\geodata\disaster_events\ USDM folder.
2	Clip CLU based on the weekly USDM shapefile.	Overview of the types of acreage affected.	Display CLU's by land class code.
3	Join acreage report data to CLU.	Allows for displaying specific crops and acreage reported as failed.	For large events, summarize failed acreage at the county level.
4	Interpolate AHPS precipitation data.	Displays percent of normal and departure from normal precipitation estimates.	Use "Departure" and "Percent" datasets. Timeframes available are previous 7, 14, 30, 60, 90, and 180 calendar days. Month, year, and water year to date is also available. Determine appropriate timeframe based on time of year, length of drought, and local conditions.

--*

***--306 Droughts (Continued)**

D Maps and Reports

Maps and reports are needed to assess impacts to agriculture and support various reporting requirements at the local, State, and national level. See 1-SEM for guidance when including maps with disaster situation reports.

Note: Maps containing CLU, CRP, or acreage report data are for internal FSA distribution **only**. Cropland and other land use data may be included on maps for use outside of Service Center Agencies only if data has been sufficiently aggregated to secure data according to the 2008 Farm Bill, Section 1619. Guidance about protected data can be found in 2-INFO.

See this table for maps and reports as they relates to drought events.

Map/Report Description	Timeframe	Primary Recipient	Notes
General overview of areas impacted by drought.	Update weekly.	SED and CED.	
Assemble supplemental maps and graphics from other sources.	Bi-weekly.	SED and CED.	CPC drought outlook, NASS vegetation condition, CPC precipitation outlook, Crop Moisture Index, etc.
Precipitation (percent of normal and departure from normal).	Monthly.	SED and CED.	More frequent updates may be needed depending on normal precipitation amounts.
NDVI and NDVI departure from average.	Monthly.	SED.	
Land use map based on CLU, identifying failed acreage.	Update throughout growing season.	SEB and CEB.	For large events, summarize failed acreage at the county level.
Map of approved haying and grazing on CRP.	Update as needed.	SEB.	Include effective dates.
Tabular report of failed acreage by crop type and intended use.	Update throughout growing season.	SEB and CEB.	

--*

*--307 Wildfires

A Overview

Wildfires are a major threat to agriculture and generally occur with little or no notice. Wildfires vary in size, are unpredictable, and have the potential to spread quickly. While row crops are usually not affected, grass, rangeland, and timber losses can be significant.

Common agricultural losses for wildfires include:

- barns and other structures
- equipment and machinery
- feed and hay supplies
- fences
- grazing/pasture losses
- livestock
- timber
- watering systems.

GIS analysis is effective in assessing damage and losses caused by wildfires. GIS specialists shall assist in wildfire-related activities by tracking wildfire events, compiling imagery, and developing maps and reports in support of emergency management efforts and program administration.

B Data Sources

The following are wildfire data resources for GIS specialists.

Note: In addition to the following resources, local data is often available and may provide more detailed information.

Data Source	Purpose	Resource Location	Notes
FS Active Fire Mapping	Access to daily MODIS imagery and fire detection shapefiles. Available shapefiles include MODIS fire detections for the previous 7 days, and cumulative fire detections for the year, are updated hourly.	**http://activefiremaps.fs.fed.us**	

--*

***--307 Wildfires (Continued)**

B Data Sources (Continued)

Data Source	Purpose	Resource Location	Notes
FS Active Fire Mapping ArcIMS Service	Access to several datasets through ArcMap including active watches/warnings and current MODIS, AVHRR, and Geostationary Operational Environmental Satellite fire detections.	**http://activefiremaps.fs.fed.us**	Create an ArcIMS server connection in ArcMap.
FS Burned Area Reflectance Classifications	Access to burn severity data for selected fires. Burned area reflectance classifications data has 4 classes; high, moderate, low, and unburned.	**http://activefiremaps.fs.fed.us/baer/download.php**	
GeoMAC	Access to fire perimeter shapefiles.	**http://rmgsc.cr.usgs.gov/outgoing/GeoMAC**	
GeoMAC ArcIMS Service	Access to several wildfire related datasets through ArcMap including satellite detected fires and fire perimeters.	**http://www.geomac.gov**	Create an ArcIMS server connection in ArcMap using **http://activefiremaps.fs.fed.us**.
GLOVIS	Access to several types of imagery including Landsat.	**http://glovis.usgs.gov**	
HDDS	Access to pre- and post-event imagery for selected disaster events.	**http://www.firedetect.noaa.gov**	A log-in account **must** be established to access restricted data and can be requested on the web site.

--*

***--307 Wildfires (Continued)**

B Data Sources (Continued)

Data Source	Purpose	Resource Location	Notes
NOAA National Environmental Satellite, Data, and Information Service Hazard Mapping System ArcIMS Service	Access to several fire-related datasets through ArcMap, including satellite analyzed fires.	**http://www.firedetect.noaa.gov**	Create an ArcIMS server connection in ArcMap.
USDA FAS Crop Explorer, MODIS Rapid Response	Access to daily MODIS imagery.	**http://www.pecad.fas.usda.gov/cropexplorer/modis_summary/index.cfm**	
USGS Earth Explorer	Access to several types of imagery including Landsat and SPOT.	**http://earthexplorer.usgs.gov**	A log-in account **must** be established to access restricted data and can be requested on the web site.
USGS Landsat Acquisition Schedule	Landsat 5 and Landsat 7 acquisition schedule.	**http://landsat.usgs.gov/tools_acq.php**	

C Best Practices for Analysis

Typical wildfire analysis requires the GIS specialist to complete the following tasks:

- attribute and spatial queries
- data manipulation
- heads-up digitizing
- process GPS data
- process satellite imagery
- union and intersect overlay operations.**--***

***--307 Wildfires (Continued)**

C Best Practices for Analysis (Continued)

The following table provides specific analysis steps associated with disaster response and reporting during and after a wildfire event.

Note: The location and size of a wildfire will often dictate the time period involved and spatial analysis techniques to be applied.

Step	Action	Purpose	Notes
1	Acquire and process satellite imagery.	To evaluate the location and spatial extent of the wildfire. Higher resolution imagery can also be used in program implementation, such as ECP.	MODIS should only be used when preparing initial estimates and maps when other imagery is not available. Do not use in detailed analysis or program administration. When using MODIS, the 7, 2, 1 False Color product is recommended. When using Landsat imagery, the 7, 4, 2 band combination is recommended.
2	Determine the fire perimeter.	Essential for detailed analysis.	This task is typically accomplished by heads-up digitizing from satellite imagery. Accuracy may be supplemented or validated with GPS data collected by field personnel. Perimeters for larger fires are often available from GeoMAC.
3	Clip CLU based on the fire perimeter layer.	Necessary to determine affected acreage.	When possible, join acreage report data to the CLU layer before intersecting with the fire perimeter layer. Depending on the location and scale of the event, join acreage report data at either the tract or field level.
4	Calculate affected acreage and summarize by land class code.	Data and statistics to support various reporting requirements.	If using acreage report data, also summarize by crop and intended use.
5	Intersect other layers such as grazing allotments or CRP with the fire perimeter, as needed.	Data and statistics to support various reporting requirements.	

--*

***--307 Wildfires (Continued)**

D Maps and Reports

Maps and reports are needed to assess impacts to agriculture and support various reporting requirements at the local, State, and National level. Since wildfires have the potential to last several weeks, maps and reports should be updated as needed. See 1-SEM for additional requirements when including maps with disaster situation reports.

Note: Maps containing CLU, CRP, or acreage report data are for internal FSA distribution **only**. Cropland and other land use data may be included on maps for use outside of Service Center Agencies only if data has been sufficiently aggregated to secure data according to the 2008 Farm Bill, Section 1619. Guidance about protected data can be found in 2-INFO.

See this table for maps and reports for wildfire events:

Map/Report Description	Timeframe	Primary Recipient	Notes
General overview of wildfire activity (State or county level, as appropriate).	Day of or next workday after event.	SED and CED.	Display initial wildfire activity as point data until fire perimeter is available.
Initial fire perimeter.	One or 2 calendar days after event.	SED, CED, and CEB.	Can be estimated using MODIS imagery.
Land use map based on CLU.	When wildfire perimeter is determined.	SEB and CEB.	When possible, include acreage report data.
Maps showing other acreage affected, such as CRP and grazing allotments.	When wildfire perimeter is determined.	SEB and CEB.	
Tabular report of affected acreage by land class code.	When wildfire perimeter is determined.	SEB and CEB.	When possible, acreage should also be summarized by crop type and intended use.
Updated fire perimeter.	After imagery is available or perimeter data is provided from other sources.	SEB and CEB.	Use Landsat, SPOT, or AWiFS 56-Meter imagery.

--*

*--308 Earthquakes

A Overview

Earthquakes are destructive events that arrive with little or no notice. The damage inflicted by an earthquake can be devastating in areas that are directly impacted by the event in terms of infrastructure damage. Crop damage for most types of earthquakes is a secondary concern because only those directly adjacent to the epicenter are typically destroyed. Damage moving out from the epicenter is moderated by distance and terrain type. Crops, farms, equipment, infrastructure, and lives can be wiped out in an instant during an earthquake, but the major damage is also associated with secondary events such as levee breaks, flooding, fires, and loss of infrastructure connections.

Common agricultural losses for earthquakes include:

- barns and other structures
- crops
- ditches
- equipment and machinery
- feed and hay supplies
- fences
- fish hatcheries
- forests
- grazing/pasture losses
- homes
- infrastructure damage or destruction
- irrigation infrastructure.
- levees and dams
- livestock
- nurseries
- pipelines
- ranches
- transportation infrastructure
- utilities.

GIS analysis is very effective in assessing damage and losses caused by earthquakes. GIS specialists shall assist in earthquake-related program administration, disaster recovery, and tracking. The assistance shall include tracking and compiling earthquake data, imagery analysis, HAZUS-MH support, and map development in support of emergency management efforts for FSA support and recovery of events impacting agriculture.**--***

***--308 Earthquakes (Continued)**

B Data Sources

The following are earthquake data resources for GIS specialists:

Note: In addition to the following resources, local data is often available from many State agencies and may provide more detailed information.

Data Source	Purpose	Resource Location	Notes
Advanced National Seismic System	Access to accurate and timely information products for seismic events, including their effects on buildings and structures, and employing modern monitoring methods and technologies.	**http://earthquake.usgs.gov/monitoring/anss**	
Earthquake Animations	Shows maps for the past 7 calendar days for the U.S., world, California/Nevada, and the Intermountain West (Utah and Yellowstone).	**http://earthquake.usgs.gov/earthquakes/recenteqsanim**	
Earthquake Lists and Maps	USGS historic inventory of earthquakes, including maps, statistics, and history of earthquakes in the U.S.	**http://earthquake.usgs.gov/earthquakes/eqarchives**	
GLOVIS	Access to several types of imagery, including Landsat and MODIS.	**http://glovis.usgs.gov**	
HAZUS-MH Seismic Data	HAZUS-MH data disks have seismic zones and software models for assessing earthquake damage.	**http://www.fema.gov/plan/prevent/hazus**	HAZUS-MH information at **http://hazus.org**.
HDDS	Access to pre- and post-event imagery for selected disaster events.	**http://hdds.usgs.gov/hdds2**	A log-in account **must** be established to access restricted data and can be requested on the web site.

--*

***--308 Earthquakes (Continued)**

B Data Sources (Continued)

Data Source	Purpose	Resource Location	Notes
HSIP Gold	A unified homeland infrastructure geospatial data inventory assembled by National Geospatial-Intelligence Agency in partnership with the Homeland Infrastructure Foundation-Level Data community for common use by the Homeland Security, Homeland Defense and Emergency Preparedness, and response and recovery communities.	**http://www.hifldwg.org**	Data is provided by a national level agreement through Citrix Systems, Inc.
The National Association of Radio Distress	Map and tabular placement of major events occurring and ongoing around the world.	**http://hisz.rsoe.hu/alertmap/index2.php**	
U.S. Earthquake Information by State	State-level summaries of earthquake information, maps, and other earthquake-related data or links.	**http://earthquake.usgs.gov/earthquakes/States**	
USDA FAS Crop Explorer	Access to daily MODIS imagery.	**http://www.pecad.fas.usda.gov/cropexplorer/modis_summary/index.cfm**	
USGS Earth Explorer	Access to several types of imagery, including Landsat and SPOT.	**http://earthexplorer.usgs.gov**	A log-in account **must** be established to access restricted data and can be requested on the web site.
USGS Earthquakes	USGS general information following current earthquake events.	**http://earthquake.usgs.gov/earthquakes**	Provides links to really simple syndication feeds, maps, earthquake reporting, notifications signups, and seismogram displays.

--*

***--308 Earthquakes (Continued)**

B Data Sources (Continued)

Data Source	Purpose	Resource Location	Notes
USGS Earthquakes Regional	USGS general information following current earthquake events displayed regionally.	**http://earthquake.usgs.gov/regional/neic**	
USGS Hazard Mapping	Data for past events that document historical earthquakes.	**http://earthquake.usgs.gov/hazards/products**	
USGS Landsat Acquisition Schedule	Landsat 5 and Landsat 7 acquisition schedule.	**http://landsat.usgs.gov/tools_acq.php**	
USGS Shakemap Products	USGS information and summary data for earthquake information collected by year and event.	**http://earthquake.usgs.gov/earthquakes/shakemap/list.php?y=2011**	
USGS Shakemaps	Maps that depict shaking intensity.	**http://earthquake.usgs.gov/earthquakes/shakemap/formats.php**	

C Best Practices for Analysis

Earthquakes typically exhibit damage along a slipped fault that radiates damage from the epicenter. Damage and strength of the earthquake are correlated with the earthquake's measured Richter Magnitude Scale. Events with magnitudes of over 4.5 are measured worldwide and typically result in damage that can be quantified. The damage inflicted by an earthquake can be analyzed and correlated using geospatial techniques that assist FSA in addressing damage assessments for the agricultural community within a given area impacted by an earthquake. Typical earthquake analysis may require that the GIS specialist complete the following tasks:

- classify soil types
- create epicenter analysis based on earthquake locations
- create thematic maps to summarize various aspects of the data.
- identify seismic zones and fault lines
- identify slope risks using triangulated irregular network, digital elevation model, or LiDAR data [Can't use "TIN", in 1-CM and DEM only used once so spell out.]
- insert buffer zones around line and area layers
- perform attribute and spatial queries**--***

***--308 Earthquakes (Continued)**

C Best Practices for Analysis (Continued)

- perform table manipulations
- perform union and intersect overlay operations
- use HAZUS-MH to model earthquake scenarios.

The geospatial officer shall use spatial analysis to better understand and depict damage for earthquakes by completing the following steps.

Note: The damage inflicted by an earthquake will often dictate the period of time and spatial analysis techniques that will need to be applied. GIS specialists should have staged data and scenarios based on real-time exercises completed in preparation for the eventual need to respond to an earthquake event.

Complete the following steps to **prepare** for an event.

Step	Action	Purpose	Notes
1	Identify Seismic zones and known fault lines Statewide.	Identifies what areas to focus HAZUS-MH earthquake scenarios.	
2	Run HAZUS-MH scenarios for earthquake in high risk areas.	Prepare State and County Offices with scenarios.	GIS specialists **must** practice using the HAZUS-MH software to become proficient.
3	Identify areas of high risk from previous earthquakes.	Identifies areas of high risk in a county.	Targets focus areas for planning purposes.
4	Assemble earthquake monitoring web sites.	Preload the web sites so they can be used.	

Complete the following steps **after** an event.

Step	Action	Purpose	Notes
1	Identify area impacted by earthquake and intensity.		
2	Plot earthquake epicenter.		
3	Identify earthquake damage areas.		
4	Complete HAZUS-MH scenario real-time using actual data.		
5	Request Field Offices to collect GPS points and digital photos.	Support information for disaster requests.	Used in APLN requests and Secretarial disasters.
6	Plot field GPS points and add to map document.	Assists in developing damage reports.	

--*

***--308 Earthquakes (Continued)**

C Best Practices for Analysis (Continued)

Step	Action	Purpose	Notes
7	Use hot links to include GPS point data linked with digital photos.	Overview information for overall damage.	Used in APLN requests and Secretarial disasters.
8	Determine best imagery available before and after.	Imagery analysis.	Possible data sources are SPOT, LandSat TM (30-Meter), AWiFS (56-Meter), or MODIS (250-Meter).
9	Intersect CLU with earth quake area.	Quantify damage to cropland and agricultural structures.	Intersect in ArcToolbox.
10	Identify proximity risk to Service Centers.	Status reports.	
11	Identify proximity risk to FSA staff home locations.	Status reports.	

D Presentation of Analysis Results

In the aftermath of an earthquake, maps and reports can be used to help assess impacts to agriculture and support various reporting requirements at the local, State, and National level. The purposes of the maps and report analysis are to:

- assess possible structural impacts or damaged concerning agriculture
- assist in coordinating efforts with Field Offices, SEB's, and CEB's in assessing and completing LAR's.
- evaluate the location and spatial extent of damage
- identify areas of risk for Service Center employees
- identify Service Center areas of risk
- implement and support State and County Emergency Operations Plans and cooperative activities
- pinpoint affected areas of damage as they relates to CLU.

Note: Maps containing CLU, FFSF, and CRP are for internal FSA distribution **only**. If data is sufficiently aggregated, cropland and other land use data may be included on maps for use outside of Service Center Agencies. Guidance about protected data can be found in 2-INFO.**--***

***--308 Earthquakes (Continued)**

D Presentation of Analysis Results (Continued)

This table provides maps and reports for earthquakes.

Earthquake Severity	Task	Completion Timeframe	Primary Product Recipients	Primary Data Sources and Resource sites
3.0 magnitude and greater	Complete Earthquake Epicenter Map.	Next workday after event.	SED and CED.	County boundaries.
5.0 magnitude and greater with impacts to agriculture	Complete Earthquake Event Overview Map, if needed based on the situation.	Next workday after event.	CED and CEB.	HAZUS-MH scenario, county boundary, national grid, major roads, Service Center locations, and major geographical features
	Complete Damage and Destruction Point Map, if needed based on the situation.	Completed and updated as local offices provide field data.	CEB and SEB.	County boundary, major roads, Service Center locations, national grid, and major geographical features
	Complete Landsat Map, if needed based on the situation.	Approximately 16 calendar days after event. Requires before and after satellite images.	GIS specialist.	Satellite imagery, county boundary, and digitized path location.
	Complete FSA Map Series, if needed based on the situation.	Defines farms impacted by standing or flood water.	CED and producers impacted.	Current NAIP, CLU, tornado path, national grid, and bin locations.
	PowerPoint overview of Earthquake Damage Report.	Compiled before SEB Meeting.	SEB.	Maps in this table, statistics from analysis, digital photos, news articles, and other related information.

--*

Reports, Forms, Abbreviations, and Redelegations of Authority

Reports

None

Forms

This table lists all forms referenced in this handbook.

Number	Title	Display Reference	Reference
AD-1026	Highly Erodible Land Conservation (HELC) and Wetland Conservation (WC) Certification		Ex. 10

Abbreviations

The following abbreviations are not listed in 1-CM.

Approved Abbreviation	Term	Reference
AHPS	Advanced Hydrologic Prediction Service	302, 305, 306
APLN	Administers Physical Loss Notification	302, 304, 305, 308
AVHRR	advanced very high resolution radiometer	306, 307
AWiFS	Advanced Wide-Field Sensor	302-305, 307, 308
CD	compact disc	253, Ex. 13, 19
CEB	County Executive Board	291, 301, 302, 304-308
CM	Conservation Management	92, 195
CPC	Climate Prediction Center	302, 306
DOQ	digital orthophotography quadrangle	134, Ex. 6-9
EF	Enhanced Fujita	304
EMI	Emergency Management Institute	295, 301, 306
ESRI	Environmental Systems Research Institute	291
FFSF	food, feed, seed, and fertilizer	291, 301-304, 308
FGDC	Federal Geographic Data Committee	281, Ex. 22
FTS	file transfer protocol	251, 253, 281
GeoMAC	Geospatial Multi-Agency Coordination Group	307
GLOVIS	USGS Global Visualization Viewer	302-305, 307, 308
GPS	global positioning system	94, 95, 97, 291, 301-305, 307, 308
GUID	globally-unique identifier	161

Reports, Forms, Abbreviations, and Redelegations of Authority (Continued)

Abbreviations (Continued)

Approved Abbreviation	Term	Reference
HAZUS-MH	Hazards U.S. Multi-Hazard	291, 303, 305, 308
HDDS	USGS Hazards Data Distribution System	302-305, 307, 308
IDW	inverse distance weighting	302
Landsat/ LandSat TM	land satellite thematic mapper	302-306, 307, 308
LAR	Loss Adjustment Report	291, 301, 302, 304, 305, 308
LiDAR	light detection and ranging	291, 308
MDOQ	mosaicked digital orthophotography	92, 31-133
MODIS	Moderate Resolution Imaging Spectroradiometer	302-308
NAIP	National Agriculture Imagery Program	291, 302, 304, 305, 308
NCDC	National Climatic Data Center	291, 301, 302, 304, 305
NDVI	Normalized Difference Vegetation Index	306
NEXRAD	Next-Generation Radar	291, 301, 302, 304, 305
NHC	National Hurricane Center	305
NOAA	National Oceanic and Atmospheric Administration	301, 302, 304, 305, 307
NWS	National Weather Service	301, 302, 304-306
PLSS	Public Land Survey System	291, Ex. 13
QC	Quality Control	Ex. 13
SCI	Service Center Initiative	281
SEB	State Executive Board	291, 302, 304-308
SPC	Storm Prediction Center	291, 301, 304
SPOT	Spot Image, a public limited company.	302-305, 307, 308
STORM	Systematic Tracking for Optimal Risk Management	304
TSD	Technical Service Division	291
USACE	U.S. Army Corps of Engineers	303
USDM	U.S. Drought Monitor	291, 306

Redelegations of Authority

None