

Strategic Plan Evaluation

Activity 610

Flood Warning Program

D R A F T

August 2010



National Flood Insurance Program
Community Rating System

EXECUTIVE SUMMARY

The Strategic Plan evaluation report for Activity 610 (Flood Warning Program) recommends several changes to the existing requirements for credit under the Community Rating System. However, the recommendations included in this report retain the basic structure of activities and credit points for a community's flood warning program. This is a list of the more substantive changes:

- Maximum credit points stay at 255.
- A flood threat vulnerability analysis must be provided to get Flood Threat Recognition (FTR) credit.
- A community must receive credit for Flood Threat Recognition (FTR), Early Warning Dissemination (EWD), and Other Response Efforts (ORE), to get credit under Activity 610.

More specifically, the recommendations include:

- Flood Threat Recognition (FTR)
 - Maximum credit points increased from 40 to 50 points.
 - Prerequisites: vulnerability analysis, EWD & ORE.
- Early Warning Dissemination (EWD)
 - Maximum credit points decreased from 60 to 50.
 - Prerequisites: FTR & ORE.
- Other Response Efforts (ORE)
 - Maximum credit points increased from 50 to 60.
 - New requirement: plans must be updated every five years.
- Critical Facilities Planning (CFP)
 - Maximum credit points to remain at 50.
 - Credit point change: An additional 10 points for individual response plans and 10 fewer points for providing phone numbers and early notifications and special warnings for critical facilities.
- StormReady Community (SRC)
 - Maximum credit points reduced from 55 to 45.
 - Maximum StormReady credit reduced from 25 to 20.
 - Maximum TsunamiReady credit reduced from 30 to 25.
- Other Recommendations
 - The self assessment be tested in 5-10 volunteer communities.

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INTRODUCTION

Background

The Community Rating System (CRS) has been successful in recognizing and encouraging communities to implement new and more effective floodplain management activities. However, FEMA and its partners want to ensure that the program is doing all it can to meet its goals and to improve it. Such an objective requires an in-depth evaluation of each part of the program.

In 2008, FEMA adopted a CRS Strategic Plan that lays out a road map to conduct such an evaluation. The Strategic Plan is available on the CRS Resource Center website at <http://training.fema.gov/EMIWeb/CRS/>. The Plan sets forth five objectives to accomplish the CRS goals during federal fiscal years 2008 through 2013. The first three objectives are

1. Ensure that all CRS credits are appropriate and fully earned.
2. Support FEMA's initiatives to reduce repetitive flood losses.
3. Encourage communities to improve their floodplain management programs continually.

Each objective has two or more strategies. Several strategies are interrelated and mutually supportive:

- 1.1 Ensure that all credited activities properly reflect the CRS goals.
- 1.3 Improve the CRS verification process.
- 2.1 Improve CRS incentives and opportunities to encourage communities to reduce repetitive flood losses.
- 3.1 Develop a set of incentives for implementing each CRS-credited activity.

A 2008 work program was adopted with eight projects to implement related strategies. The first project is to review two to four activities each year, pursuant to a master schedule. The reviews are looking at whether the activity and its credit criteria are still appropriate and what can be done to make them more effective and easier to verify, and what can be done to encourage communities to implement them.

This report is for CRS Activity 610, Flood Warning Program. The results of this evaluation are expected to be integrated into the 2012 edition of the *CRS Coordinators Manual*.

Approach

The CRS Task Force created an Activity 610 evaluation committee. The members are W. Dave Canaan, Mecklenburg County, North Carolina; Eugene Henry, Hillsborough County, Florida; K. Scott Jackson, ASFPM; Joshua McSwain, Mecklenburg County, North Carolina; Al Goodman, Mississippi State Coordinator; Bill Lesser (DHS-FEMA); David Garcia, City of Waveland, Mississippi; and Berry Williams (ISO CRS consultant).

Previous concerns and comments about the activity were collected from published reports and meetings with interest groups. Two CRS evaluations were conducted after hurricanes in the 1990s and in 2004 and 2005. These reports are briefly described below.

Review of the Impact of CRS Activities on Areas Impacted by Hurricanes Bertha and Fran in North Carolina, April 20, 1998. Hurricane Fran tested the flood warning and response systems of local governments in North Carolina. Wayne County's flood warning program was reviewed as part of the Post-Fran Evaluation. Interviews were conducted with local officials, and files from the National Weather Service and the U.S. Army Corps were reviewed, along with the after-action report prepared by the County Office of Emergency Management.

Post-Hurricane CRS Activity Evaluation, A Report to the CRS Task Force, October 29, 2006. The 2004 and 2005 hurricanes that hit Florida, Mississippi, and Louisiana tested local hazard mapping, regulatory, mitigation, response, and public information activities. Accordingly, FEMA initiated analyses of their impact and the effectiveness of floodplain management programs that prepared for and responded to them. As part of this effort, a special evaluation was conducted of activities credited under the CRS.

The CRS project team collected information and reports on the performance of certain activities before, during, and after the hurricanes, interviewed state and local officials, and analyzed the findings. This work included visits to Gulf Coast communities, interviews of 26 people who were directly involved in hurricane preparation, recovery and mitigation activities, and a review of more than 50 papers, reports, and other research documents that related to the hurricanes.

The CRS project team conducted a series of interviews with the mitigation staff from the Joint and Area Field Offices in Louisiana and Mississippi. A short talk on the project was given at relevant conferences and people were invited to provide comments. This was done at

- Florida Floodplain Management Association (February 28–March 4, 2006, Gainesville);
- Louisiana Floodplain Management Association (April 19–21, 2006, Natchez);
- Mississippi Floodplain Management Association (April 19–21, 2006, Natchez);
- Association of State Floodplain Managers (June 11–16, 2006 Albuquerque); and the
- Natural Hazards Workshop (July 2006, Boulder).

Interviews were also held with several key state and local floodplain managers and visits were made to the stricken Mississippi communities of Waveland, Bay St. Louis, Pass Christian, Long Beach, Gulfport, and Biloxi.

The second approach to collecting information was to review reports, testimony, and research related to the types of floodplain management, emergency management, and public information activities credited by the CRS. There was no shortage of publications and other documents by academics, government agencies, and other experts following the hurricanes of 2005 and 2006.

The third information collection approach was a series of requests for input. Notices were published in several professional newsletters and handouts were made for conferences and

meetings. Special invitations for input were sent to selected groups, such as the National Emergency Management Association.

All of these requests invited people to submit comments or request that a project team member contact them. The submission was through the Association of State Floodplain Managers' website, which also included a description of the project. It should be noted that the project team received no comments from this system.

HISTORY AND RATIONALE

Activity 610 is part of the 600 series of flood preparedness activities and has been a CRS credit since the program began in 1990. The 600 series is largely built on the work of H. James Owen as described in the *Community Handbook on Flood Warning and Preparedness Programs*. This report describes the activities, procedures, and other factors that make up a local flood warning and preparedness program. The program can be divided into four major elements: flood recognition system; warning arrangements; preparedness plan; and arrangements for maintenance of the program.

Flood Threat Recognition Credit

In 1990, having a Flood Threat Recognition (FTR) system was a prerequisite for receiving flood warning credit. No credit was provided for FTR. Instead the program included an element called Local System Data Sharing (LSDS). Credit was provided for collecting data and sharing it with other agencies, researchers and the private sector.

Local System Data Sharing (LSDS)

LSDS = 10, if the data collected by the local flood warning system is kept at 15 minute or shorter intervals (or is event-based) and is made available to other agencies, researchers and the private sector, or:

LSDS = 5, if the data collection interval is longer than 15 minutes and is made available to other agencies, researchers and the private sector.

If the flood warning program did not cover the entire Special Flood Hazard Area (SFHA), an impact adjustment was applied to the credit calculation based on the number of buildings affected by the warning system.

In 1992, this activity was completely revised. Credit for Local System Data Sharing (LSDS) was deleted. The same basic documentation is still required: a description of the flood threat recognition system and excerpts from the flood response plan. However, all the elements and the scoring were changed.

The impact adjustment was changed to three options, including a default value for local governments who do not want to calculate the affected areas. The maximum number of points was decreased slightly from 205 to 200.

In 2002, a new element, SRC (StormReady Community), was added to credit communities that participate in the National Weather Service's StormReady Community Program. The maximum number of points was increased to 225.

In 2006, TsunamiReady credit was added to SRC. Communities that participate in the National Weather Service's TsunamiReady Program, meet tsunami-mapping requirements, and have an adopted tsunami hazard operations plan receive 30 points. This increased the maximum credit for Activity 610 to 255 points.

Prerequisites: Credit is provided if the community has a system that provides an early notice of a flood for at least one location within the community. The notice must be generated by meteorological and/or hydrologic data. The system must be able to forecast specific flood conditions in the future.

To receive credit for this element:

- (a) The data collection, communications, and data analysis components of the flood threat recognition system must be regularly maintained and tested at least annually; and
- (b) The community must submit descriptions of the flood hazard and the flood threat recognition system.

Credit points: The minimum requirement for credit for this activity is a flood threat recognition system to identify impending flooding. The system can use locally collected data or data from the National Weather Service, or other rain, river, or storm monitoring agency.

A total of 40 points is available for either a local or non-local flood threat recognition system. The scoring is based on whether the data collection and data analysis components of the system are manual or automated, and on the percentage of the floodplain occupants covered.

Current Credit (as of 5/1/08)	
Element	FTR
Communities receiving credit	36%
Maximum possible points	40
Average credit received	31

a. Systems operated by federal, state, or regional agencies.

- (1) 20 points if community demonstrates it can receive warnings with flood elevations and arrival times 24/7 for one or more sites.
- (2) EITHER:
 - ((a)) 5 points manual prediction technique.
 - ((b)) 20 points for a computerized flow or storm surge prediction model, or “real time” model run during a flood, or maps, charts or other output from a model that provides detailed data for points other than those credited under 2a(1) above.

b. System operated by local state, or other non-federal agency.

- (1) EITHER:
 - ((a)) 15 points for manual collection of precipitation and/or river gage data.
 - ((b)) 20 points for automated collection of precipitation and/or river gage data.
- (2) 10 points for gage density.
- (3) EITHER:
 - ((a)) 5 points for manual technique to predict downstream arrival time and peak flow or elevations.
 - ((b)) 10 points for digital technique to predict downstream arrival time and peak flow or elevations.

Emergency Warning Dissemination Credit

In 1990, warning dissemination was credited under two elements: Warning Dissemination (WD) and Warning Special Recipients (WSR).

Warning Dissemination (WD)

WD = 8 = (2.8 x Warning time) Warning time is the number of hours between the issuance of a warning to the general public and when the flood waters first isolate an insurable building. There must be at least one-half hour of warning time to receive credit for WD. The maximum number of points for WD is 75.

Warning Special Recipients (WSR)

WSR = 20 if there are written instructions on warning special recipients such as the police department, hospitals, and hazardous materials storage areas.

In 1992, the *Schedule* was changed by deleting WD and WSR. Emergency Warning Dissemination (EWD) was added with credit points for specific methods of warning the general public. Credit points were set at 60.

1996: Credit for additional methods for emergency warning dissemination was included in the schedule; however, the maximum credit points remained at 60.

Prerequisites: This element has five prerequisites.

1. The community must receive flood threat recognition (FTR) system credit.
2. The community must have adopted an emergency response plan. The term “plan” includes annexes and standard operating procedures (SOPs) that may be developed pursuant to the plan. The items for which EWD credit is requested must be in that plan or in its annexes or procedures.
3. The warning must be disseminated in ways that can reach people in a timely manner, including under conditions of night or heavy storms. If the warning lead time is under 12 hours, it is not sufficient to rely solely on radio and TV announcements. In coastal communities, hurricane and tropical storm warnings are provided 24 hours in advance, so using the Emergency Alert System would suffice. However, as noted below, more points are available for using multiple methods of disseminating the warning.
4. The warning dissemination equipment and procedures must be tested at least annually. This requirement is met if (1) the tests are done specifically for a flood warning drill, (2) the community responds to a real flood warning, or (3) there is a drill or real warning to respond to another hazard, provided the personnel and equipment involved are substantially the same.

For example, if both flood warnings and tornado warnings are disseminated via siren activated by the fire department, an annual test or drill of either, or an event for which the system was used, will meet this requirement for that method of dissemination.

5. The community must conduct an annual outreach project covering the topics “flood warning” and “flood safety” as discussed in Section 331 of the *Coordinator’s Manual*. This may be credited under Outreach Projects to the Community (OPC), Outreach Projects to Floodplain Residents (OPF), or the community’s Outreach Project Strategy (OPS) under Activity 330 (Outreach Projects). Additionally, a project that is not credited by the CRS but reaches at least 90% of the properties in the floodplain and adequately covers “flood warning” and “flood safety” can meet this public information requirement. If an OPS is used, the strategy document must discuss the best way to publicize warning and safety information to the target audience.

Credit points: This element credits a community’s arrangements for disseminating a flood warning to the general public. The credit points are based on the dissemination methods used. Credit for this element is available only if the community has a creditable flood threat recognition system, an annual outreach project that covers flood warning and flood safety and reaches at least 90% of the target audience, and an adopted flood response plan.

Current Credit (as of 5/1/08)	
Element	EWD
Communities receiving credit	30%
Maximum possible points	60
Average credit received	40

- (a) 10 points for adopted message policy that provides adequate guidance to allow staff to quickly issue appropriate warnings.
- (b) 15 points for outdoor voice-sound system or fixed siren system.
- (c) 30 points for disseminating warnings door-to-door or by mobile public address.
- (d) 10 points for warning dissemination through the Emergency Alert System.
- (e) 15 points for telephone warning that reaches all residents.
- (f) 10 points for cable television override systems.
- (g) 10 points for public AM radio transmitters used for public announcements.
- (h) Additional points may be awarded for flood warning methods not identified above.

Other Response Efforts Credit

In 1990 this element was called Flood Response Plan (FRP) and had a maximum value of 100 points. Today this element (ORE) credits the flood response tasks undertaken by the community, other agencies, the private sector, and volunteer organizations. These tasks should be itemized in the community’s flood response plan.

Prerequisites: There are three prerequisites for credit.

1. The community must receive credit for its flood threat recognition system and for disseminating a flood warning to the general public.
2. The community must conduct at least one exercise of the response plan each year. The exercise may be a table top exercise, drill, or response to an actual disaster. If the flood response plan is part of a multi-hazard plan, then the exercise may be in response to another type of disaster provided the parties and tasks involved are substantially the same.
3. The other response tasks must be included in the community's adopted flood response plan.

Credit points: Up to 50 points of credit are available for ORE. The amount of credit awarded is based on the emergency plan's identification of flood tasks, tying tasks to predicted flood levels, and identifying resources needed to complete response tasks.

- (a) 20 points if actions in the response plan are keyed to specific predicted flood levels.
- (b) 10 points if the plan identifies flood response tasks for community staff and other public and private organizations.
- (c) 20 points if the plan includes a summary of estimated staff, equipment, supplies, and time required for each response task and the sources of necessary resources.

Current Credit (as of 5/1/08)	
Element	ORE
Communities receiving credit	30%
Maximum possible points	50
Average credit received	18

Critical Facility Planning Credit

This element (CFP) credits warning and coordinating with critical facilities.

Prerequisites: There are three prerequisites for credit.

1. The community must receive credit for the flood threat recognition system and for disseminating a flood warning to the general public.
2. The community must update the information on the critical facilities at least annually.
3. Coordination with critical facilities must be included in the community's adopted flood response plan.

Credit points: The community's flood response plan must list the facilities considered critical in a flood. Facilities not subject to flooding generally do not need to be addressed, although in some cases loss of access can cause a critical situation. Other facilities in flood-free sites may be needed to support the flood response effort and should be on the critical facility list.

Current Credit (as of 5/1/08)	
Element	CFP
Communities receiving credit	10%
Maximum possible points	50
Average credit received	32

More credit points are available if the community provides warnings tailored to the needs of its critical facilities. Additional credit is provided if there are flood response plans for individual critical facilities. The plans may be developed by the community or developed by the facilities' operators and reviewed by the community.

- (a) CFP1 = 10 points if the adopted plan includes the names and phone numbers of the operators of all critical facilities affected by flooding.
- (b) CFP2 = 20 points if the adopted plan includes arrangements for special warnings or early notifications directly to all critical facilities that need early warning.
- (c) CFP3 = 20 points if the critical facilities needing them have their own flood response plans that have been developed, reviewed, or accepted by the community.

StormReady Credit

The National Weather Service established the StormReady and TsunamiReady programs to help local governments improve the timeliness and effectiveness of hazardous weather-related warnings for the public. By participating, local agencies can earn recognition for their jurisdictions by meeting the guidelines established by the National Weather Service in partnership with federal, state, and local emergency management professionals.

Prerequisites: There are two prerequisites for this element.

1. The local government must receive credit for a flood threat recognition system operating within its jurisdiction.
2. The flood warning program must be able to forecast the arrival time and peak flow or elevation of floods.

In addition, for TsunamiReady credit, the community must

3. Meet the mapping requirements described in *CRS Credit for Management of Tsunami Hazards*, sections 410TS and 430TS; and
4. Adopt a tsunami hazards operations plan or annex that addresses actions to take after a tsunami warning.

Credit points: The National Weather Service established the StormReady and TsunamiReady programs to help local governments improve the timeliness and effectiveness of hazardous-weather related warnings for the public. By participating, local agencies can earn recognition for their jurisdiction by meeting the guidelines established by the NWS in partnership with federal, state, and local emergency management professionals.

Current Credit (as of 5/1/08)	
Element	SRC
Communities receiving credit	8%
Maximum possible points	55
Average credit received	25

The StormReady and TsunamiReady programs have communications and educational requirements that go beyond the elements credited by the CRS. Therefore, CRS credit is provided to local governments that receive credit for flood threat

recognition (FTR) and are designated by the NWS as a StormReady or a TsunamiReady community.

- 25 points if the community obtains and maintains SRC designation by the National Weather Service.
- 30 points if the community obtains and maintains the TsunamiReady designation by the National Weather Service.

Attachment 1 is a crosswalk that illustrates how Activity 610 is related to other CRS Activities.

Verification

Current Flood Threat Recognition Verification Procedures

The community must submit descriptions of the flood hazard and the flood threat recognition system. These descriptions are reviewed to determine the appropriate credit.

The data collection, communications, and data analysis components of the flood threat recognition system must be regularly maintained and tested at least annually.

Current Emergency Warning Dissemination Verification Procedures

Documentation for this credit is generally found in the local government's emergency operations plan, an annex to the plan or a standard operating procedure document.

Outdoor warning notification is awarded based on a description of the local system with a map showing the coverage area of each siren. The siren coverage areas are compared to the SFHA to determine an impact adjustment.

Annual publicity must fully cover the topics of flood warning and flood safety. The materials must reach at least 90% of the target audience. Copies of the materials that publicize the warning system are reviewed by the ISO/CRS Specialists during the verification cycle.

Annually, the community must certify that it is still distributing brochures that cover flood warning and flood safety, and that these materials reach at least 90% of the target audience.

Current Other Response Efforts Verification Procedures

Credit is based on a review of the local government's emergency operations plan, annexes to the plan and standard operating procedure documents.

In 2007, CRS added the requirement for a community to provide a description of the exercise, drill, or response to an actual emergency or disaster conducted during the previous year. The description must include a list of who participated and any lessons learned from the exercise, drill, emergency, or disaster.

If the community experienced at least one flood during the previous year that damaged more than 10 buildings, caused more than \$50,000 in property damage, or caused the death of one or more persons, it must submit an evaluation report that describes the performance of the warning program. For each flood meeting the above criteria, this report must describe how the program

operated in response to the flood, and any improvements that may be needed. The performance report must be submitted with its annual CRS recertification.

Current Critical Facility Planning Verification Procedures

If the community has credit for critical facilities planning (CFP1), the list of the operators of the critical facilities affected by flooding must be updated at least annually. A page from the list of the operators of the critical facilities affected by flooding must be submitted with the community's annual CRS recertification. (This was a new requirement in 2007.)

Current StormReady Verification Procedures

The National Weather Service website is checked to determine if the local government has been recognized as a StormReady or TsunamiReady community. If so, CRS requirements for the flood threat recognition system and emergency operations planning are checked to make sure CRS prerequisites are met.

RECENT DEVELOPMENTS

Public/Private Partnerships

Effective warnings should reach, in a timely fashion, every person at risk who needs and wants to be warned, no matter what they are doing or where they are located. Such broad distribution means utilizing not only government-owned systems such as NOAA Weather Radio and local sirens, but all privately owned systems such as radio, television, pagers, telephones, the internet, and printed media.

In recent years disaster warning has increasingly become a public/private partnership. Most warnings, including all official warnings, are issued by government agencies. While most dissemination and distribution systems are owned and operated by private companies; liability issues make it problematic for private entities to originate warnings. At the same time, public entities typically cannot afford to duplicate private dissemination and distribution systems. Thus, an effective public/private partnership is necessary.

Forecasting and Warnings

Improved Flood Forecasting

Important elements in the nation's program to reduce flood damage include flood warnings and river forecasts. Timely warnings and forecasts save lives and aid disaster preparedness. Although the issuance of flood forecasts is now accepted as common and routine, their preparation is no minor feat. This technical achievement is made possible by the joint efforts of several federal, state, and local agencies.

River-flood forecasts are prepared by 13 NWS river-forecast centers and disseminated by NWS offices to the public. During periods of flooding, the NWS river-forecast centers issue forecasts for the height of the flood crest, the date and time when the river is expected to overflow its banks, and the date and time when the flow in the river is expected to recede to within its banks. These forecasts are updated as new information is acquired.

By using automated equipment in the gaging station, river stage can be continuously monitored and reported to an accuracy of 1/8 of an inch. Linking battery-powered stage recorders with satellite radios enables transmission of stage data to computers in facilities of the U.S. Geological Survey and the NWS, even when extreme high waters and strong winds disrupt normal telephone and power services. In this way, USGS and NWS hydrologists know the river stage at remote sites and how fast the water is rising or falling.

Communication with these automated gages is done in one of two ways. Many gages have a **data collection platform (DCP)** that is connected to the stream-gaging equipment. The DCP stores the data from the gage and then transmits the data through a geostationary satellite (GOES). A few DCP platforms also have automated rain gages allowing precipitation data to be relayed along with the river stage data.

In the early 1990s the National Weather Service deployed a network of WSR-88D radar units, popularly known as NEXRAD. These Doppler radar units use a 10-cm wavelength (S-band) that

suffers less attenuation in heavy rainfall making it useful for hydrologic applications. As a result, warnings are becoming predictive in nature rather than reactive.

ALERT Systems

Recent developments in real-time radar rainfall, automated stream gauge systems, and automated data dissemination via the internet, have made customized site-specific warning systems possible. Contributing to this capability are the local and regional ALERT systems. ALERT is a NWS acronym for “Automated Local Evaluation in Real-Time.” The NWS estimates that the number of automated local flood warning systems nationally is approximately 500, and that the economic benefits from these systems are in the millions of dollars annually.

The National Hydrologic Warning Council (NHWC) was established in 1993 by the ALERT Users Group and the Southwestern Association of ALERT Systems (SAAS) to provide a focal point for national cooperation and become an effective voice for the flood warning community. The ALERT-FLOWS East Coast Users Group was subsequently formed and joined the NHWC in 1999.

The general purpose of the NHWC is to improve the performance and utilization of real-time environmental/hydrological monitoring systems. Specific NHWC activities include: promoting public awareness of ALERT and other real-time hydrologic collection systems used in flooding monitoring/forecasting, reservoir management; encouraging new research and development; and assisting with flood preparedness and related emergency management planning.

Enhanced Warning-Receiving Capability

Today, technologies exist to add warning-receiving capability as an added feature on all radios, televisions, pagers, and telephones. The technology exists not only to add such a feature, but to have the local receiver personalize the warnings to say, for example, “Flood waters will crest at 21 feet on the Tar River in Goldsboro, North Carolina on Thursday, October 4, at noon. Residents in the Shilo subdivision should take property protection measures and evacuate before 11am on October 3, when flood water will close the evacuation route.” What does not exist is a public/private partnership that can work out the details to deliver such disaster warnings effectively.

Latitude/Longitude Polygons

Vendors are already supplying receivers that can be programmed with latitude and longitude based on street address entered through a 1-800 telephone number. The numbers are either entered over the telephone line or by transmission to the unit through a paging service or other means. Location systems utilizing signals from global positioning satellites (GPS) are becoming widespread in truck fleets and rental cars. Phones within the vertices of very specific polygons - for example, around a basin prone to flash floods or along a projected tornado track – can receive messages.

Emergency Alert System

The Emergency Alert System (EAS) is a joint government-industry response to a Presidential requirement to have the capability to address the entire nation on very short notice in case of a grave threat or national emergency. In 1994, EAS replaced the Emergency Broadcast System, which was in use since 1963. In addition to national-level emergencies, EAS is used at the state and local levels to provide emergency messages. Reports received by the Federal Communications Commission (FCC) reveal that the EAS is activated more than 100 times a month at state and local levels. EAS messages are originated by the NWS and state and local authorities such as governors, emergency managers, police, and others, for natural or technological disasters posing an immediate threat to life and property. All broadcast station and cable system participation in EAS at the State and local levels is at the discretion of management. Therefore, they are not required to transmit State and local emergency messages.

FEMA coordinates all EAS activities relating to government entities including

- Integration of EAS into emergency telecommunications policies, plans, and programs
- Coordination of the participation of state and local emergency management personnel in EAS

Radio Broadcast Data System

The RBDS Open Data Application allows for the retransmission of emergency information sent by the EAS. Unlike EAS, RBDS does not interrupt programming for all listeners, only for those with appropriate receivers with the warning function enabled. The RBDS standard contains criteria for processing EAS messages. The Tennessee State EAS plan contains provisions for using RBDS to distribute EAS messages. Tennessee FM stations with RBDS equipment can process EAS messages without interrupting their main channel programming and RBDS pagers, signs and device controls can access EAS messages. Codes can be used to turn on the receiver, set the volume, stop any tape cassette or CD and issue a warning.

Focusing Warnings on those at Risk

EAS/NWRSAME (Emergency Alert System/NWR Specific Area Message Encoding) uses code numbers for counties specified in the Federal Information Processing Standard (FIPS). It is also possible to specify one-ninth parts of a county. Up to 31 different counties or 1/9th sections of counties can be specified in a given transmission. The 1/9th sections are not currently implemented in most areas, but use is increasing. Buyers of certain NWR receivers and EAS decoders can enter their county codes determined, for example, from a website (<http://www.nws.noaa.gov/nwr>) or by telephone (1-888-NWR-SAME).

Some counties are very large and flash floods or tornadoes may only affect a small part of a county. The NWS also uses a form of the FIPS codes in their Universal Generic Code, which is included in many NWS products to identify the affected area by county. This code enables users to specify the locations they want information on.

Communications

NOAA Weather Radio

NOAA Weather Radio (NWR) transmits local weather forecasts currently from more than 520 transmitters located in all states and territories (USDA, FEMA, USDOC, 1999). Each Weather Forecast Office (WFO) generates for each transmitter a program that is typically four to six minutes in length. The program is updated every time there is a significant change in the applicable forecast. This program is replayed continuously. Emergency warnings can be broadcast at any time. The NWR signal is available currently to approximately 90% of the U.S. population with a goal to expand to 95% over the next few years. The signal must be received on a special radio set available at modest cost from several suppliers. Advanced receivers are available that will turn themselves on and set the volume in order to broadcast a warning when it is received. These receivers can also be set to the Specific Area Message Encoder code so that only identified events for a specific location will set off an alarm. Access to NWR would be substantially increased if the signal could be detected by most standard radios.

Pagers

Pagers are used by 100 million people in the United States. Modern pagers can be used to transmit limited warning information. Some new systems integrate a pager and a small computer into a box the size of a smoke detector and provide warnings if the box is located in the region at risk or if the owner of the system belongs to a volunteer fire department or other group.

There is an unpredictable delay of seconds to tens of seconds while individual pagers are queued for transmission or while signals are relayed through satellites for transmission in other parts of the country. Standard pagers could be made into important warning devices if there were agreement on transmission of a standard warning channel and there were agreement on message protocols.

Cable Television

By FCC mandate, as of October 1, 2002 EAS signals are now delivered by all cable television operators. Many cable operators are adding EAS codes to all television channels, and vendors are providing small separate boxes that can be attached to the cable and produce audible or other warnings without involving the television sets. Some of these boxes can also be used to listen to NOAA Weather Radio. Television sets are also being equipped to turn on, set their volume, and broadcast warnings.

Telephones

Telephones can be dialed by computers to warn people within a specific area (Reverse 911 or Call Warning). Available commercial systems allow emergency managers to quickly specify the small region of interest and to have as many as hundreds of computers dialing simultaneously with a specific message. New systems are under development to dial from central telephone switches as many as 180,000 telephones per minute to give a 10-second message.

Wireless Telephones

Wireless telephones provide the capability to call a person rather than simply a location, but they also allow broadcast to all telephones within a cell or specific location without knowing which specific telephones are currently there. Individual cells are typically 10 miles in radius for analog systems and only 3 miles in radius for digital systems. This unique ability to reach any mobile receivers within a specific cell at a given time makes wireless telephones an excellent existing method to deliver warnings to only those people at risk. This means, for example, that as a tornado sweeps through a given community, people within the telephone cells at highest risk could be alerted.

Mapping and Modeling

Flood Inundation Maps

The Flood Inundation Maps are web-based graphics being developed by NOAA. Inundation areas depicted in the maps are derived using two models plus a geographic information system (GIS). The NWS hydrologic model is used to predict the amount of flow entering a river at various points. Using these predicted flows, a dynamic routing model, “Flood Wave Dynamic Model” (FLDWAV), is used to predict a profile of water surface elevations. This FLDWAV implementation predicts the water surface profile only along the main stem of a river, and is not intended to predict water surface elevations on tributaries. A map that provides a visual depiction of a flood forecast is created using a series of GIS algorithms and is then posted to the NWS web page. A text version of the actual river forecast numbers is also available. The web page has a description of the product and there are four views/maps available. Each view/map will show the maximum extent of the flood inundation for the 7-day forecast period, plus instantaneous inundation at 6 hour intervals for the next 72 hours.

Improved Prediction of Hurricane Landfalls

Historically, hurricane track forecasts have improved 1% per year. Predictions continue to improve with the use of better models and data from hurricane-hunting aircraft.

HURREVAC

HURREVAC stands for “HURRricane EVACuation” and is a restricted-use computer program funded by FEMA and the U.S. Army Corps of Engineers for government emergency managers to track hurricanes and assist in evacuation decision-making for their communities. This real-time data analysis tool allows state and local emergency management officials to make prudent and informed decisions based on information developed during the FEMA Hurricane Evacuation Studies process and real time forecast data distributed by the NWS and the Tropical Prediction Center/National Hurricane Center. Storm Surge Inundation graphics, where available, are also displayed by the program, using data from the NWS SLOSH (sea, lake and overland surge from hurricanes) model.

SLOSH (sea, lake and overland surges from hurricanes) is a computerized model run by the National Hurricane Center to estimate storm surge heights and winds resulting from historical, hypothetical, or predicted hurricanes by taking into account pressure, size, forward speed, track

and winds. Emergency managers use this data from SLOSH to determine which areas must be evacuated for storm surge.

Emergency Management

National Incident Management System

On February 28, 2003, President Bush issued Homeland Security Presidential Directive–5. HSPD–5 directing the Secretary of Homeland Security to develop and administer a National Incident Management System. NIMS provides a consistent nationwide template to enable all government, private-sector, and nongovernmental organizations to work together during domestic incidents. The intent of NIMS is to

- Be applicable across a full spectrum of potential incidents and hazard scenarios, regardless of size or complexity.
- Improve coordination and cooperation between public and private entities in a variety of domestic incident management activities.

HSPD-5 required federal departments and agencies to make the adoption of NIMS by state and local organizations a condition for federal preparedness assistance (grants, contracts, and other activities) by FY 2005. Jurisdictions can comply in the short term by adopting the Incident Command System. Other aspects of NIMS require additional development and refinement to enable compliance at a future date.

NIMS comprises several components that work as a system to provide a national framework for preparing for, preventing, responding to, and recovering from domestic incidents. These components include

- Command and management,
- Preparedness,
- Resource management,
- Communications and information management,
- Supporting technologies, and
- Ongoing management and maintenance.

Incident Command System

NIMS requires that responses to all domestic incidents utilize a common management structure. The Incident Command System is a standard, on-scene, all-hazard incident management concept. ICS is a proven system that is used widely for incident management by firefighters, rescuers, emergency medical teams, and hazardous materials teams. ICS has several features that make it well suited to managing incidents. These features include

- Common terminology,
- Organizational resources,

- Manageable span of control,
- Organizational facilities,
- Use of position titles,
- Reliance on an Incident Action Plan,
- Integrated communications, and
- Accountability

FEMA Comprehensive Preparedness Guide

FEMA's *Comprehensive Preparedness Guide*, (CPG 101), issued in 2008, continues the more than 50-year effort to provide guidance about emergency operations planning to state, local, territorial, and tribal governments. CPG 101 integrates concepts from the National Incident Management System and National Response Framework, and it incorporates recommendations from the 2005 Nationwide Plan Review. It also references the Target Capabilities List (TCL) that outlines the fundamental capabilities essential to implementing the National Preparedness Guidelines.

This Guide provides emergency managers and other emergency services personnel with the FEMA's best judgment and recommendations on how to address the entire planning process—from forming a planning team, through writing and maintaining the plan, to executing the plan. It also encourages emergency managers to follow a process that addresses all of the hazards that threaten their jurisdiction through a suite of plans connected to a single, integrated emergency operations plan (EOP).

This guide should help state and local government emergency management organizations produce EOPs that

- Serve as the basis for effective response to any hazard that threatens the jurisdiction,
- Integrate prevention and mitigation activities with traditional response and recovery planning, and
- Facilitate coordination with the federal government during incidents that require the implementation of the National Response Framework.

Guide for All-Hazards Emergency Operations Planning

Emergency planning addresses all hazards. The causes of emergencies can vary greatly, but many of the effects do not. This means planners can address emergency functions common to all hazards in the basic plan instead of having unique plans for every type of hazard. For example, floods, wildfires, and hazardous materials releases may lead a jurisdiction to issue an evacuation order. Even though each hazard's characteristics (e.g., speed of onset, size of the affected area) are different, the general tasks for conducting an evacuation are the same. Differences in the speed of onset may affect when an evacuation order is given, but the process of issuing an evacuation order does not change. All-hazards planning ensures that when we plan for emergency functions, we identify common tasks and who is responsible for accomplishing those tasks.

The Emergency Support Function (ESF) format is the plan structure used in the NRF. Many state-level EOPS also use this format. It begins with a basic plan provides an overview of the jurisdiction's emergency management system. It briefly explains the hazards faced, capabilities, needs and demands, and the jurisdiction's emergency management structure. It also reviews expected mission execution for each emergency phase and identifies the agencies that have the lead for a given ESF. The basic plan then outlines the ESFs activated during an emergency.

Appendices provide relevant information not already addressed in the basic plan. Typically, this includes common information such as a list of terms and definitions, guidelines for EOP revision, or an EOP exercise program. It may also include forms used for managing most emergencies.

The ESF annexes identify the ESF coordinator and the primary and support agencies for each ESF. ESFs with multiple primary agencies should designate an ESF coordinator to coordinate pre-incident planning. An ESF annex describes expected mission execution for each emergency phase and identifies tasks assigned to members of the ESF.

The support annexes describe the framework through which a jurisdiction's departments and agencies, the private sector, not for profit and volunteer organizations, and other non-governmental organizations coordinate and execute the common emergency management strategies. The actions described in the support annexes apply to nearly every type of emergency. Each support annex identifies a coordinating agency and cooperating agencies. In some instances, two departments or agencies share coordinating agency responsibilities.

The incident annexes describe the policies, situation, CONOPS, and responsibilities for particular hazards or incident types. Each incident annex has four sections:

- *Policies*: The policy section identifies the authorities unique to the incident type, the special actions or declarations that may result, and any special policies that may apply.
- *Situation*: The situation section describes the incident or hazard characteristics and the planning assumptions. It also outlines the management approach for those instances when key assumptions do not hold (e.g., how authorities will operate if they lose communication with senior decision makers).
- *Concept of Operations*: This section describes the flow of the emergency management strategy for the incident or hazard. It identifies special coordination structures, specialized response teams or unique resources needed, and other special considerations unique to the type of incident or hazard.
- *Responsibilities*: Each incident annex identifies the coordinating and cooperating agencies involved in an incident- or hazard-specific response.

Disaster Research

Since the CRS became operational in 1990, several efforts have been made to evaluate activities credited by the program. An evaluation of the CRS in 1998 asked participants in two focus groups to assess the CRS flood warning activity. Overall, the focus groups said the CRS considers the right components to measure the effectiveness of local flood warning programs.

They said that the CRS should continue to grade local flood warning programs based on the elements of the flood threat recognition system, methods of warning dissemination, content of the response plan, and the level of planning and flood warning notification for critical facilities.

Activity 610, Flood Warning, was included in the post-Hurricane Fran study in 1998. That study looked at the flood warning program in Wayne County, North Carolina and the conclusions from that report are described below in the flood threat recognition, emergency warning dissemination, other response efforts and critical facility planning sections.

University researchers, the Inspector General, the U.S. Government Accountability Office, the American Institutes of Research, and others have conducted disaster research following hurricanes and flooding events. Findings related to flood warning and emergency operations planning are reported in the appropriate sections of this report. A summary of research findings is located at Attachment 2.

LINKAGES

In 2007, the CRS Task Force and FEMA revised the 1987 goals, which had been the foundation of the CRS since its inception. The new, 2007, goals are to

- Reduce flood damage to insurable property;
- Strengthen and support the insurance aspects of the NFIP; and
- Encourage a comprehensive approach to floodplain management.

Through its River and Flood Program, the NWS maintains an around-the-clock monitoring of rivers throughout the country and issues watches and warnings to protect life and property when the threat of flooding does occur. When sufficient flood warning time is given to the communities, appropriate actions can be taken to reduce losses. Advanced warnings for floods can mean the difference between life and death, as well as curtailing economic losses. Some studies suggest that as little as one hour of lead-time can result in a ten-percent reduction in flood damage.

While the NWS has the primary responsibility for the issuing river forecasts and flood warnings for the nation, other entities are seriously involved with river forecasting for their own special purposes. For example, among federal water agencies, the Corps of Engineers and the Bureau of Reclamation regularly forecast river flows for their operational needs. Entities like the Lower Colorado River Authority in Austin, Texas, routinely make river forecasts for its needs, as a major supplier of electric power. LCRA also collaborates with the NWS.

With expansion of the Advanced Hydrologic Prediction Service (AHPS), new partnerships are forming while relationships with existing cooperators are strengthened. The business of hydrologic forecasting is becoming more of a communal effort through public private partnerships leading to fewer flood-related deaths, lower disaster costs, increased public awareness, and ultimately proactive actions by individuals.

FINDINGS

Impact on Reducing Flood Damage

Through the NWS's River and Flood Forecasting Program, pertinent information on river conditions is disseminated to its cooperators: local, state, and federal decision-makers and the general public. However, a river forecast is only of value if it induces a response from the residents in the threatened area that leads to an effective action. For example, when a flood warning is issued to the general public through appropriate dissemination channels, a benefit can only accrue through evacuations, flood proofing, flood fighting, or the shutdown of facilities to reduce potential flood losses.

The modernized NWS provides hydrologic forecasts for approximately 4,000 locations in the United States, using sophisticated models and large amounts of data. Based on these forecasts, flood-control structures are operated to reduce damage. Then, emergency actions are taken at state and community levels to flood fight, evacuate, or take other measures to lessen the impacts of flooding. The amount of lead-warning time for floods can mean the difference between life and death.

Although the recurrence rate of floods has not changed during the past century, the nature of associated disasters has mutated because of population growth and rapid changes in our society (Institute for Business & Home Safety, 2001). For example, more people live on marginal lands subject to floods and modern economics depend on large-scale infrastructure (networks of roads, pipelines, railroad tracks), which are costly to repair when damaged by natural hazards. Natural disasters cause more than physical damage. They shut down businesses, many of which never re-open. Indirect societal costs associated with loss of jobs and business disruptions often exceed the costs of repairing structures.

Advanced warnings for floods can mean the difference between life and death, as well as curtailing economic losses. Some studies suggest that as little as one hour of lead-time can result in a 10% reduction in flood damage (see Day, 1970).

Impact on Repetitive Losses

Similar floods of magnitude and frequency do not necessarily equate to identical benefits. Often, when a second flood strikes in the same place, the residents react more effectively because they have already experienced great loss. They take immediate action to reduce or prevent further flood damage. In general, flood-control structures, automated local flood warning systems, and hydrologic forecasts accomplish their intended purposes. They reduce damage and loss of life from flooding. Following are several case histories that show these successes.

In Pennsylvania, 66 out of 67 counties have implemented manual self-help local flood warning systems. In Lycoming County, the Sprout Waldron Company, in cooperation with county officials and the NWS, has documented substantial savings by implementing flood warnings in tandem with flood-proofing procedures. In the 1975 flood, over \$800,000 (\$2 million at 2000 price levels) in damage was prevented by operation of a local flood warning system and flood-proofing measures (WMO, 1983).

The City of Milford, Connecticut, is vulnerable to inland riverine flooding from the Wepawaug River, which flows through the center of town. Milford suffered four major floods during the 1990s. However, Milford installed an ALERT system in 1993, which provided the city and its residents with five hours of lead time to make preparations. A newly installed public address system was added the following year, complete with evacuation signs. Combined, the ALERT system and the public address system have saved the city of Milford four times the cost of their installation in just seven years.

In March 1997, the NWS and the State of Ohio flood-warning programs saved lives and potentially tens of millions of dollars in property damage (NWS, 1997). With flood forecasts and warnings issued for the main stem of the Ohio River up to four days in advance, residents and businesses had adequate time to prepare for the worst flooding since 1964. Cooperation between state and federal agencies was critical as flood-warning information was developed and disseminated to the public. Almost a half million dollars in flood damage to vehicles, office equipment, and other goods were saved because of a single car dealership having sufficient time to move its inventory to higher ground. Other examples of prompt responses involving vehicles include: (1) a flood in July 1990 at Las Vegas, Nevada (Sutko, 1997), when evacuation of all the automobiles from a hotel garage, with only one hour of advance notice, reduced the loss of cars; and (2) a similar success event in Roseville, California, in 1993 (Rutherford, 1993) when numerous automobiles were moved out of danger from a flash flood.

Stakeholder Input

During the evaluation of CRS Activity 610 the Committee identified some concerns and issues where it wanted the opinions of a larger audience. Several meetings had been held with the National Hydrologic Warning Council and the Council agreed to sponsor a questionnaire that was sent to those on its email list.

Three hundred fifty-one (351) responded to the survey. Two hundred seventy-two (272) or 77% of the respondents are local government employees. The other respondents are primarily from regional, state or federal agencies. Less than 1% of those responding are from private consulting firms.

One hundred sixty five (165) of the respondents (47%) identified themselves as planners, CRS Coordinators, floodplain administrators, code enforcement officers, public works directors, or community development directors. One hundred thirty-one (131) said they are engineers or hydrologist (37%). Forty-three (43) are emergency managers (12%).

Respondents to the survey come from across the United States with the largest percentage coming from the eastern portion of the country. The results of the survey are described in Attachment 3 to this report.

Issues

Credit is provided for flood response plans under Activity 610. This activity can receive a maximum of 255 points. 375 communities receive Activity 610 credit, averaging 95 points. Generally, it is easier for coastal counties to receive this credit, because the NWS provides flood

threat recognition of tropical storms and hurricanes. Eight coastal Mississippi communities receive 104–205 points (above the average). Jefferson Parish, Louisiana, receives 160 points.

General

When sufficient flood warning time is given to the communities, appropriate actions can be taken to reduce losses. Advanced warnings for floods can mean the difference between life and death, as well as curtailing economic losses. Some studies suggest that as little as one hour of lead-time can result in a ten-percent reduction in flood damage.

- What should be the objectives for CRS flood warning program credits?
- Is CRS doing all it can or should do to encourage improvements in flood warning programs?

Flood Threat Recognition Credit

- Up to 40 points can be earned for FTR. Should the current standards for the allocation of these points be changed?
- What recent changes in flood forecasting technology should be added to the CRS credit description? How would this affect the distribution of FTR credit?

Emergency Warning Dissemination Credit

It is not enough to provide real-time information. The information must be understood and the necessary steps must be taken. The data and interpretations made possible by today's technologies are only as good the means of communicating them to the emergency managers, and the public who have to react to the flood events.

- Should CRS warning dissemination credit be based on the number of warning methods used by the local jurisdiction?
- The EAS interrupts normal programming or at least adds a “crawl” to the margin of the television screen. Program producers and advertisers want to minimize unnecessary interruptions. As a result, only a modest percent of severe weather warnings issued by the NWS are relayed to citizens by available stations. Should CRS credit activation of the EAS? If yes, what local capability should be required? Should a municipality receive credit for county activation of the EAS?
- The information and technology revolutions now underway provide a multitude of ways to deliver effective disaster warnings. Are there new local flood warning dissemination activities that should receive credit from CRS?
- Should a local government receive credit for outdoor siren activation for flood warning?
- Some emergency managers rave about reverse 911 while others don't like it. Should it get more attention?

Other Response Efforts Credit

- Does providing more detailed information through standard operating procedures, annexes and checklists improve performance during disaster response and recovery?
- Should CRS require the flood risks and consequences identified in the community's hazard mitigation plan to be addressed in the emergency operations plan?
- If the community experienced at least one flood during the previous year that damaged more than 10 buildings, caused more than \$50,000 in property damage, or caused the death of one or more persons, it must submit an evaluation report that describes the performance of the warning program. Should this requirement be changed?
- In many cases, the requirement to have a site-specific warning of flooding associated with flood elevations is met by referring to a table generated by a SLOSH model, which gives very general results. Is this adequate for CRS credit?
- A prerequisite for ORE credit is an annual exercise of the emergency plan. Is it adequate for a community to meet this requirement by conducting an exercise for some other hazard identified in its emergency operations plan?
- Should emergency operations plans that are more than 5 years old receive CRS credit?
- Should CRS provide credit for emergency operations plans that address special needs populations?

Critical Facility Planning Credit

- Should CRS target its credit to critical facilities that address special needs?

StormReady Credit

- Should CRS continue to give 25 points for StormReady and 30 points for TsunamiReady designations?

Recovery Plans (No current CRS credit)

- Should local warning programs that lead to property loss reduction receive more credit points than those that just address evacuation?

CHANGES NEEDED

Description of the Flood Hazard

The CRS requires a local government to provide a description of the local flood hazard for FTR system credit. Usually, that is limited to an identification of the sources of flooding. The CRS does not require the community to do a vulnerability analysis or describe potential flood problems.

- The Committee recommends that a vulnerability analysis become a prerequisite for Activity 610 credit. It should be a prerequisite for a community to receive credit for FTR, EWD, ORE, and CFP.

Comprehensive Approach to Flood Warning and Emergency Response

The current approach of CRS is to provide credit for Flood Threat Recognition without a local government receiving credit for EWD or ORE. Similarly, a community could get EWD credit without receiving ORE credit.

- The Committee recommends that a community's flood warning and emergency response program including data collection, data analysis, agency and public notifications and response planning become a prerequisite for any Activity 610 credit.

Flood Data Collection

CRS has traditionally given more credit to automated data collection systems. The Committee wanted to verify the acceptance of this approach and obtain information about the value practitioners think this difference is worth. The questionnaire asked, "Compared to a manual system, how much more CRS credit, if any, should an electronic data collection system receive?"

- The current CRS schedule gives only twenty-five (25%) more credit. Considering the survey results the Committee rebalanced the proposed CRS credit so that an automated system is worth twice as much credit as a manual data collection system.

Redundant Methods for Receiving Stream and Precipitation Data

Redundant communications equipment is always desirable when critical data are involved. Redundancy can be achieved by combining data transmission methods at a single collection site.

- The Committee recommends adding 5 credit points for systems that have redundant methods (both phone and satellite link) for receiving stream and precipitation data.

Flood Forecast

The CRS does not provide additional credit for flood warning systems that can identify both the beginning and end of the flood threat. Seventy-two percent (72%) of all survey respondents said such systems provide greater value to communities. Sixty-nine percent (69%) of emergency managers agreed.

- The Committee recommends up to 20 points be awarded to local systems that can predict both the beginning and end of the flood threat.

Maintenance of the Flood Threat Recognition System

Maintenance of the FTR system must be performed periodically to minimize the occurrence of equipment failure during flood emergencies. A preventive maintenance schedule should be devised that will ensure proper operation of the gages during a flooding situation. Currently, the CRS schedule says the system operator should perform “regular maintenance”. Several committee members thought the *Coordinator’s Manual* should be more specific. Half of those responding to the questionnaire said the maintenance schedule should provide for inspection and maintenance at least every six month.

- For locally operated flood threat recognition systems the Committee recommends the term “regular maintenance” should mean at least every six months. This is consistent with the maintenance procedures for the NWS and the USGS.

Monitoring Gages for Failure

The CRS requires gages to receive “regular maintenance.” The program does not have a standard for how frequently gages should be monitored for failure. The Committee asked those responding to the questionnaire to identify what they thought the standard for credit should be for CRS. Fifty-three percent (53%) of all respondents said at least monthly. Fifty percent (50%) of emergency managers said the test should be weekly.

- The committee thinks any electronic gage that is part of a flood warning system should be checked daily for proper operation and reliability. If the gage is at a remote location and cannot be easily examined, the data reception from that gage should be verified each day. The Committee proposes adding the following language to the *Coordinator’s Manual*.

At the time of the CRS application and at their cycle the community must provide a copy of the maintenance procedures for the flood threat recognition system. The document must describe the procedures for determining the reliability of data collected from gages. It must describe the preventive maintenance schedule for gages, communications equipment and other components of the flood threat recognition system.

Flood Stage Inundation Maps

Maps provide a visual image of areas expected to flood and are more easily understood than charts or narrative descriptions. Up to 20 points are available to communities that have maps showing flood stage data for areas other than specific forecast points. The current method of credit does not distinguish between static maps and real time inundation maps. Those completing the survey think there is added value for flood warning systems that have access to static flood inundation maps and even more value if the maps are in real time.

- The Committee recommends the CRS provide:
 1. Up to 10 points for static maps that identify the likely areas to be inundated by flood water.
 2. Up to 15 points for a system that produces real-time flood inundation maps.
 3. The credit should be contingent upon its use in identifying a community's vulnerability and in its emergency operations planning.

Age of Emergency Response Plans

Many of the emergency operations plans submitted for credit are more than 5 years old. Several are more than 10 years old. The CRS does not have a standard for the age of a plan. The Committee wanted to know what local officials thought about establishing a standard. While most agree a plan should be reviewed and updated at least every 5 years, there was less agreement about how the situation should be handled by CRS.

- The Committee's recommendation is that CRS add a requirement that the emergency operations plan must be revised at least every 5 years.

RECOMMENDATIONS

Proposed changes to the credit and documentation requirements are described in two tables attached to this report. Attachment 4 is a short general summary of the recommendations. Attachment 5 is a more detailed table that included documentation requirements.

These recommendations, if approved, will result in changes to the CRS, some major and some minor. For all changes, appropriate procedures and transition periods will be developed. Communities are encouraged to provide suggestions about the transition process.

Recommendations for Transitions

The committee recommends these changes be implemented in a phased process. This should include a period of education for local governments and the ISO staff. Local governments that will lose a class due to these changes should be given at least two years to make changes to their program before a class reduction is implemented. Additionally, this process should not begin until the *CRS Credit for Flood Warning* supplement has been modified and made available to local governments.

NEXT STEPS

Field Testing

The committee recommends that, after coordination with the self-assessment team, the 610 self assessment be tested in 5 to 10 volunteer communities. This could be done during verification visits scheduled by ISO/CRS Specialists. A member of the Project Team would accompany the Specialist to conduct the field test. It should be noted that this is not a test of the local government. Instead, it is a test of the self-assessment form and instructions. The pilot will give the consultants and the Task Force information on which to base changes or a decision on whether the process should be continued as part of CRS. A draft of the Activity 610 Flood Warning Self Assessment is located at Attachment 6.

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ACTIVITIES	ELEMENT	ELEMENT DESCRIPTION	CREDIT POINTS
330 OUTREACH PROJECTS	Outreach Projects to Community [OPC]	Flood Warning System Description	6
		Flood Safety Information	6
		Flood Map	6
	Outreach Projects to Floodplain Residents [OPF]	Flood Warning System Description	13
		Flood Safety Information	13
		Flood Map	13
	Additional Outreach Projects [OPA]	Flood Warning System Description	6
		Flood Safety Information	6
		Flood Map	6
350 Flood Protection Information	Flood Protection Website [WEB]	Flood Warning System Description	4
		Flood Safety Information	4
		Flood Map	4
		Real Time River Gage Data	10
		Flood Warning Information (evacuation routes, etc.)	20
440 Flood Data Maintenance	Additional Map Data	Showing floodplain, corporate limits, streets parcel boundaries.	32
		GIS layer that shows buildings.	15
		500-year floodplain boundary	8
		GIS layer that shows topographic contour lines.	10
		Linking floodplain data to tax assessment data base	8
510 Floodplain Management Planning	Step 3 Coordinate	Coordination with emergency management agency and others.	4

ACTIVITIES	ELEMENT	ELEMENT DESCRIPTION	CREDIT POINTS
		Coordination with the NWS	4
	Step 4 Risk Assessment	Map the SFHA, repetitive loss areas, areas that flood but are not on the FIRM	5
		Describe known flood hazards, including depth of flooding, velocities and warning time.	5
		Discussion of past floods.	5
		Map and describe magnitude or severity, history, and probability of other natural hazards, such as erosion, tsunamis, earthquakes and hurricanes.	5
	Step 5 Assess the Problem	Overall assessment of the community's vulnerability to flooding.	2
		Describe the impact of flooding on life, safety, health, the need and procedures for warning and evacuating residents and visitors, the impact on critical facilities and infrastructure, and the impact on the jurisdiction's economy and tax base.	15
		Tell the number and types of buildings subject to flooding.	5
		Estimate the potential dollar loss to buildings subject to flooding.	4
		Describe the development, redevelopment and population trends.	5
	Step 7 Review Possible Activities	Plan reviews emergency activities, such as warning and sandbagging, hazard response, critical facility protection, and health and safety maintenance.	5
	Step 8 Draft an Action Plan	Plan includes emergency service measures to improve warning, protect property, protect critical facilities and maintain the health and safety of the community.	10

ACTIVITIES	ELEMENT	ELEMENT DESCRIPTION	CREDIT POINTS
		Plan establishes post-disaster mitigation policies and procedures.	10
530 Flood Protection	Prerequisite	Projects that require human intervention must be able to receive at least 1-hour of warning to receive credit.	
610 Flood Warning			255
620 Levee Safety	Prerequisites	When the flood reaches within 4 feet of the crown of the levee local emergency officials must be warned.	
		Monthly communications checks must be made with local emergency officials.	
		Annual drills must be held.	
		Outreach materials must be sent to occupants in the area protected by the levee.	
630 Dam Safety	Dam Failure Emergency Action Plan	Procedures for notifying communities downstream of a dam in the event of an impending or actual dam failure.	25
		Include projected inundation areas, flood elevations, estimated arrival times for flood peaks arising from a dam failure.	
		Annual exercise.	
		A procedure to obtain annual reports by dam safety operators on the safety and operational status of their dam.	
		Monthly communications checks.	
	Dam Failure Warning System	There must be at least three methods of warning affected residents of an imminent flood event resulting from a possible or ongoing dam failure.	25

ACTIVITIES	ELEMENT	ELEMENT DESCRIPTION	CREDIT POINTS
	Dam Failure Emergency Plan	There is an adopted emergency plan that includes evacuation routes and detailed procedures for notifying and evacuating critical facilities, especially schools, hospitals, nursing homes, jails, and other locations where people have a difficulty evacuating.	50
		At least annually notifications are sent to occupants in the dam failure area telling them about the area that would be affected, evacuation routes, and flood safety topics.	
		Flood Warning Related Points.	629

Early Research Findings

Activity 610 Flood Warning Programs

Flood Threat Recognition:

The national flood warning system is supplemented in Wayne County, NC by a flood watch patrol with 42 observers established by the emergency management office and trained by the National Weather Service to collect and report rainfall and river levels on the Neuse and other rivers and streams within the county. This data is converted to a recurrence interval. Using the flood study profiles and contour maps, areas expected to flood are identified and warned. This system served as a check on the river forecast from the Corps and National Weather Service during Hurricane Fran. The flood threat recognition system worked because the local observers recognized that local flood levels were worse than those forecast by the NWS. As a result, the local emergency management office expanded the area to be evacuated. Later, local, state, and federal officials determined that the lower flood elevation forecast was the result of faulty data from a stream gage at Clayton. [Post-Fran Study of CRS Activities, 1998. p. 28]

Emergency Warning Dissemination:

Specific recommendations from AARP, pp. 7 – 8:

- Provide public information on emergency preparedness to older persons and persons with disabilities that is appropriate to their needs and in accessible formats. As part of these focused education efforts, include information about the need to evacuate if an order to evacuate is given and what can happen if one does not do so.

- Educate older persons and others to have emergency supplies ready to “shelter in place” for three to six days without power or being able to go out for food, water, or medicines, and to make a personal plan to meet their “special needs,” such as temporary back-up power for home dialysis.

Following Fran, the Wayne County Evaluation concluded the warning dissemination (door-to-door notification by Sheriff Deputies and Volunteer Fire Departments) worked well for getting notification to residents. Unfortunately, some did not leave when warned and later had to be rescued by boat or National Guard vehicle. [Post-Fran Study of CRS Activities, 1998. p. 29]

Warnings are most effective when delivered to just the people at risk. If people not at risk are warned, they will tend to ignore future warnings. Thus, if tornado or flash-flood warnings, for example, are issued for a county or larger region, but only a small percentage of the people who receive the warning are ultimately affected, most people conclude that such warnings are not likely to affect them.

If warnings that are not followed by the anticipated event are inconvenient, people are likely to disable the warning device. For example, if you are awakened in the middle of the night to be warned of several events that do not ultimately affect you, you are likely to disable the warning device.

Appropriate response to warning is most likely to occur when people have been educated about the hazard and have developed a plan of action well before the warning (Liu et al., 1996).

There is a window of opportunity to capture peoples' attention and encourage appropriate action. Studies of responses to tornado warnings, for example, found that those who sought shelter did so within five minutes of first becoming aware of the tornado warnings (Balluz et al., 1997).

A variety of warning devices needs to be used in order to reach people according to what activity they are engaged in.

Warnings must be issued in ways that are understood by the many different people within our diverse society.

The probabilistic nature of warnings, particularly for natural disasters, needs to be made clear. For example, the NWS issues probabilities of where an approaching hurricane will strike the coast.

Other Response Efforts:

While the tasks identified in the Wayne County Emergency Operations Plan appear to have been carried out adequately, there is the question of whether the list of tasks identified are adequate given the level of vulnerability and time available to complete flood loss reduction activities. For example, two days is long enough to organize the removal of household contents to safe storage areas. This was not done. [Post-Fran Study of CRS Activities, 1998. p. 29]

The flood threat recognition system, early warning dissemination and critical facilities aspects of the flood warning program worked. Individual private properties and critical facilities did take protective actions and some property damage and pollution was prevented. Most people exposed to the danger got out of harm's way in time. On the other hand, the public response efforts could have been more comprehensive. [Post-Fran Study of CRS Activities, 1998. p. 30]

More attention needs to be given to advance planning for emergency operations for natural hazards. Many of the reports mention this during their critiques of the federal and state response, but the lessons are just as pertinent to local governments. In addition, special attention was noted that emergency response plans need to allow adaptation to the situation and need to be revised based on past experiences.

The preparation and response to Hurricane Katrina are similar to lessons learned from past catastrophic disasters. These include the critical importance of (1) clearly defining and communicating leadership roles, responsibilities, and lines of authority for catastrophic response in advance of such events, (2) clarifying the procedures for activating the National Response

Plan and applying them to emerging catastrophic disasters, (3) conducting strong advance planning and robust training and exercise programs, and (4) strengthening response and recovery capabilities for a catastrophic disaster. [GAO-06-442T, Exec summary]

Command and control was impaired at all levels of government. [Summary of 3 Katrina reports]

Leaders were not well versed in protocol and therefore failed to successfully implement the National Response Plan, and with it, NIMS. [Summary of 3 Katrina reports]

...how various governmental partners in emergency response and recovery are going to respond shouldn't be a surprise filled adventure. Key players at every level of government should have very good idea of what each will be expected to do or provide when a particular disaster hits. Most important to the strength of the intergovernmental chain are solid relationships among those who might be called upon to work closely together in times of high stress. "You don't want to meet someone for the first time while you're standing around in the rubble," says Jarrod Bernstein, spokesman for the New York City Office of Emergency Management. "You want to meet them during drills and exercises." In New York, notes Bernstein, the city has very tight relationships with state and federal officials in a variety of agencies. "They're involved in all our planning and all our drills. They have a seat at all the tabletop exercises we do." During those exercises, says Bernstein, federal, state and local officials establish and agree on what their respective jobs will be when a "big one" hits. [U Penn, p. 257]

Moreover, plans had not been tested with a robust exercise program. None of the exercises that were conducted prior to Katrina called for a major deployment of DOD capabilities in response to a catastrophic hurricane. As a result, a lack of understanding exists within the military and among federal, state, and local responders as to the types of assistance and capabilities that DOD might provide in the event of a catastrophe, the timing of this assistance, and the respective contributions of the active-duty and National Guard forces. [GAO-06-643, p.4].

With almost any skill and capability, experience and practice enhance proficiency. For first responders, exercises—particularly for the type or magnitude of events for which there is little actual experience—are essential for developing skills and identifying what works well and what needs further improvement. Major emergency incidents, particularly catastrophic incidents, by definition require the coordinated actions of personnel from many first responder disciplines and all levels of government, plus nonprofit organizations and the private sector. It is difficult to overemphasize the importance of effective interdisciplinary, intergovernmental planning, training, and exercises in developing the coordination and skills needed for effective response. [GAO-06-467T, p. 11]

Recommendation 41: Emergency agencies at the federal, state, and local levels of government, as well as first responder groups outside of government, should receive regular training on NRP and NIMS, integrating the ESF structure, including statutorily required exercises and simulations to expose unaddressed challenges, provide feedback about progress, and maintain pressure to improve. These exercises and simulations should be objectively assessed by an independent evaluator. DHS should consider tying future cost-share requirements for preparedness grant

funds to performance and results of these exercises. [Nation Still Unprepared, Recommendations – p. 20]

There was a failure to heed to past lessons learned (Hurricane Pam, Hurricane Andrew, and TOPOFF 3 are all mentioned). [Summary of 3 Katrina reports]

Evacuation before the hurricanes received a lot of media coverage and research. Evacuation plans were found to be out of date and did not address special populations, such as the infirm and those without cars. [Texas Task Force]

Some emergency management officials told GAO they did not yet have a good understanding of the size, location, and composition of the transportation disadvantaged in their community. However, GAO also observed efforts in some locations to address the evacuation needs of the transportation disadvantaged by encouraging citizens to voluntarily register with their local emergency management agency, integrating social service providers into emergency planning, and other measures. [GAO-06-443R, p. 9. The report provides recommendations on the ingredients of a good program.]

Recommendation 50: DHS should encourage individuals, and state and local governments to plan for the evacuation and sheltering of pets. [Nation Still Unprepared, Recommendations – p. 22]

Specific recommendations from AARP, pp. 7 – 8:

- Establish clear lines of authority among federal, local, and state governments as well as with private sector entities, including nursing homes, with regard to emergency management, especially evacuations of older persons.
- Train emergency management personnel in the needs of older persons and train aging network personnel in emergency management procedures.
- Make identifying, registering, and tracking older persons who cannot evacuate on their own a high priority in local communities.
- Encourage voluntary use of ~~special needs~~ registries.

The failure of complete evacuations led to preventable deaths, great suffering, and further delays in relief ... Evacuations of general populations went relatively well in all three states. [Failure of Initiative, p. 2]

The evacuation, especially of special needs populations, was very poor. [Summary of 3 Katrina reports]

The rapid aging of the U.S. population (e.g., the number of people 65 and older in the United States is increasing at a rapid rate) also presents challenges in terms of emergency evacuations and shelters. According to Rodríguez, women over the age of 70 are among the fastest growing

groups in the United States. Elderly individuals with chronic illnesses, such as diabetes and heart disease, require special care and medications during times of emergency, noted Rodríguez. These needs of the elderly, and the infirm, must also be considered in evacuation planning. [Disasters Roundtable, p. 15]

Prior to 1989, as much as 25 percent of the public who evacuated went to public shelters. Since then, only 5 to 10 percent of evacuees utilize public shelters; which is a significant decrease in the demand for and use of public shelters. [Disasters Roundtable, p. 7]

Baker also noted that the surveys highlighted the significant ‘shadow evacuation’ that occurred during Hurricane Floyd. Shadow evacuation occurs when residents of areas that are unlikely to be directly impacted evacuate without being instructed to leave by authorities. The shadow evacuation phenomenon gained salience following the unnecessarily large number of people that evacuated their communities in response to the approach of Hurricane Floyd. Often, people evacuate because they do not understand whether or not they are at risk. In addition to evacuating unnecessarily, some residents evacuate farther than they need to by driving through areas that are not targeted for evacuation. This activity may contribute to road congestion.... Communities and states now provide public education programs that discourage people from evacuating unnecessarily or traveling farther than needed. [Disasters Roundtable, p. 7]

Recommendation 79: States should establish neighborhood pre- and post-disaster information centers at schools, shopping centers, places of worship, and other community institutions, to provide information on evacuations and the location of disaster assistance sites. [Nation Still Unprepared, Recommendations – p. 27]

The failure of initiative was also a failure of agility. Response plans at all levels of government lacked flexibility and adaptability. Inflexible procedures often delayed the response. Officials at all levels seemed to be waiting for the disaster that fit their plans, rather than planning and building scalable capacities to meet whatever Mother Nature threw at them.... One-size-fits-all plans proved impervious to clear warnings of extraordinary peril. Category 5 needs elicited a Category 1 response. [Failure of Initiative, p. 2]

Two of the main findings that can enable greater efficiency in GIS response to a similar disaster are the need for 1) a specific response plan that includes the use of volunteers early in the response and designates these people well before a disaster; and 2) digital and paper copies of existing products for standard requests, such as road maps for the impacted areas, which save time, money, and personnel from duplicating efforts on a product that is already available. In combat GIS, especially of the scale we provided for Katrina, time is of the essence, and that makes organization before the storm an integral part of a successful response. [QR 180, p. 6]

Critical Facility Planning:

Recommendation 11: The scope of ESF-8 (Public Health and Medical Services), as defined in the NRP, should be expanded to clearly include the public health and medical needs not only of victims of an emergency, but also those of evacuees, special-needs populations, and the general

population who may be impacted by the event or may need to be evacuated or sheltered-in-place. [Nation Still Unprepared, Recommendations – p. 13]

In summary, we found that hospital and nursing home administrators are often responsible for deciding whether to evacuate patients from their facilities due to disasters, including hurricanes or other natural disasters. State and local governments can order evacuations of the population or segments of the population during emergencies, but health care facilities may be exempt from these orders.

Recommendation 81: State agencies responsible for licensing of hospitals and nursing homes should ensure those facilities have evacuation plans and audit them annually, including evaluation of availability of transportation resources, to verify that they are viable. [Nation Still Unprepared, p. Recommendations – 27]

For existing critical and essential facilities located within a SFHA, develop emergency operation plans that allow building occupants and operations to be re-located to sites outside of SFHAs before the onset of the storm. Do not occupy vulnerable facilities during an event.

Evacuate emergency supplies and equipment to the extent possible if an existing facility is to be evacuated before hurricane landfall. For example, if personnel evacuate a fire station, also evacuate the equipment. [FEMA 548, p. 4.5]

Recovery Planning:

A major challenge to both policy makers and individuals is thus to design recovery efforts that manage to achieve two seemingly conflicting goals: righting communities as quickly as possible while rebuilding in a way that maximally learns from past mistakes. The only way it can effectively happen, of course, is if such recovery planning is done ex ante in the form of long-term contingent reconstruction and recovery plans. One of the major critiques of hurricane planning in New Orleans was that policies in place dealt only with the earliest stages of a flood disaster – how to get people to survive the initial impact of the event. Shockingly absent was careful foresight into the longer-term problems of recovery that would obviously follow, such as transportation and housing of those in temporary shelters and the treatment of displaced businesses. Likewise, the Mississippi Gulf coast now faces the same set of challenges it did after Camille: there is a widespread appreciation for the need for rebuilding to be done carefully and safely, but such time-consuming planning processes are fighting a losing battle of time against the greater need to provide homes and places of employment for residents. [U Penn, p. 170]

Morrow noted that some communities of south Miami-Dade County, Florida were also experiencing instability and increased transience due to rapid turnover in home ownership. Many badly damaged homes had been repeatedly sold, often without repairs, based on housing market speculation. There was an important relationship between the extent of the damage to a house and the number of times it was likely to be resold. Homes that suffered as much as 80 percent damage had been sold and resold as many as six times. She also observed that many of the minority-owned homes in this area had been insured by marginal insurance companies that offered poor coverage or went bankrupt. [Disasters Roundtable, p. 14]

Socio-economic demographics complicated matters as many residents were taken advantage of due to lower levels of education and limited fluency in English. The nature of the community also changed due to the increased number of residents that rented rather than owned their homes. Morrow's experience suggests that disaster recovery is uneven. For those with limited resources, economic or human, recovery can be a long, frustrating process, and some never fully recover. [Disasters Roundtable, p. 14]

If the solutions to the repeated flooding of individual structures can be addressed in local areas rather than for each individual home, then the integrity of the communities is maintained and there is cost efficiency in the process. Urban sociology recognizes that neighborhoods are vulnerable to decline if vacant lots are created and not maintained and the communities themselves become vulnerable without the tax base previously supported by those structures. Considering approaching repetitive loss in a watershed manner rather than by mitigating each individual structure is new to FEMA. It is a neighborhood, community response rather than an individual one. [Laska, p. 2]

The sociological findings beneficial to this project are the recognition that pre-disaster discrimination—be it economic, educational or social—will exacerbate the impact of a disaster on a community. Sociological research also indicates that enhancing the capacity of a community to take responsibility in partnership with government officials for its own hazard and disaster planning reduces vulnerability and contributes to a resiliency when future disasters occur. [Laska, p. 3]

Communication about the long range planning efforts is paramount. Outreach efforts aimed at increasing the level of planning awareness among civic leaders is needed. ... [The LRA report includes the following recommendations:]

- Accelerate basic communication and outreach to civic leaders and other key stakeholder groups. Private and public sector leaders should “champion” the plan.
- Do whatever it takes to achieve and demonstrate a high degree of inclusion on the front end of the process.
- Fire up the sense of can-do, local self reliance and provide a “distributed intelligence” model of planning that fully engages the talent around the region.
- Build confidence by emphasizing the implementation phase of the plan early and often: focus on timelines, goals, funding strategies, short term wins, measurable results and real accountability. [South Louisiana Recovery Survey, Page 25]

Work with cities and counties to educate them about Smart Growth—or as some are now calling it, Safe Growth—principles, implement international building codes, and develop community hazard mitigation and disaster recovery plans. [Coastal Services, p. 10]

Wetlands and coastal restoration is an almost universally supported priority. The already existing consensus around this issue could be leveraged as an initial unifying theme.” [South Louisiana Recovery Survey, Page 25]

Economic development strategy for the recovery needs greater cohesion. Taking care of existing businesses and creating a climate that empowers entrepreneurs are two elements that resonate well with civic leaders. [South Louisiana Recovery Survey, Page 25]

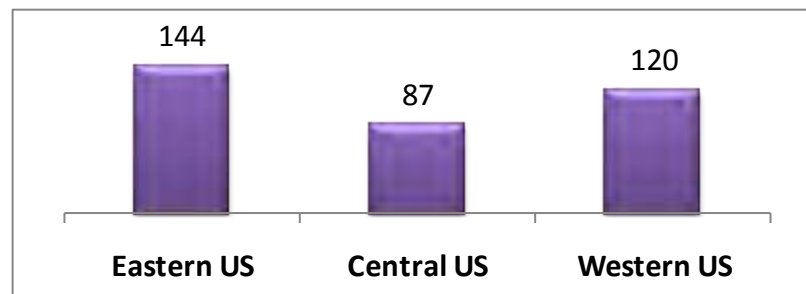
Flood Warning Emergency Preparedness Stakeholder Survey

During the evaluation of CRS Activity 610 the Committee identified some concerns and issues where it wanted the opinions of a larger audience. Several meetings had been held with the National Hydrologic Warning Council and the Council agreed to sponsor a questionnaire that was sent to those on its email list.

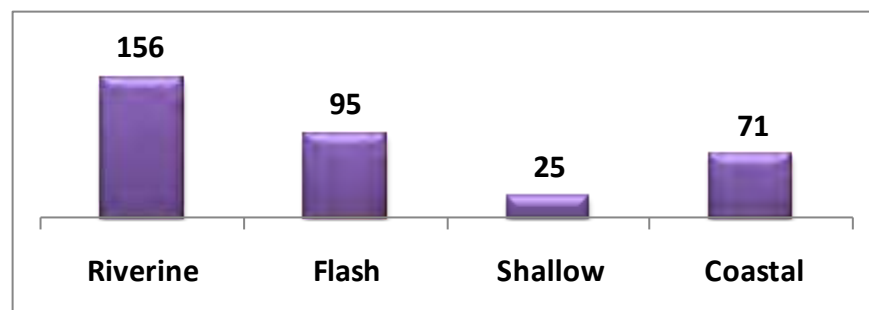
Three hundred fifty-one (351) responded to the survey. Two hundred seventy-two (272) or 77% of the respondents are local government employees. The other respondents are primarily from regional, state or Federal agencies. Less than 1% of those responding are from private consulting firms.

One hundred sixty five (165) of the respondents (47%) identified themselves as planners, CRS Coordinators, floodplain administrators, code enforcement officers, public works directors, or community development directors. One hundred thirty-one (131) said they are engineers or hydrologist (37%). Forty-three (43) are emergency managers (12%).

Respondents to the survey come from across the United States with the largest percentage coming from the eastern portion of the country.



Riverine flooding is the most common type of flooding experienced by those responding to the survey.

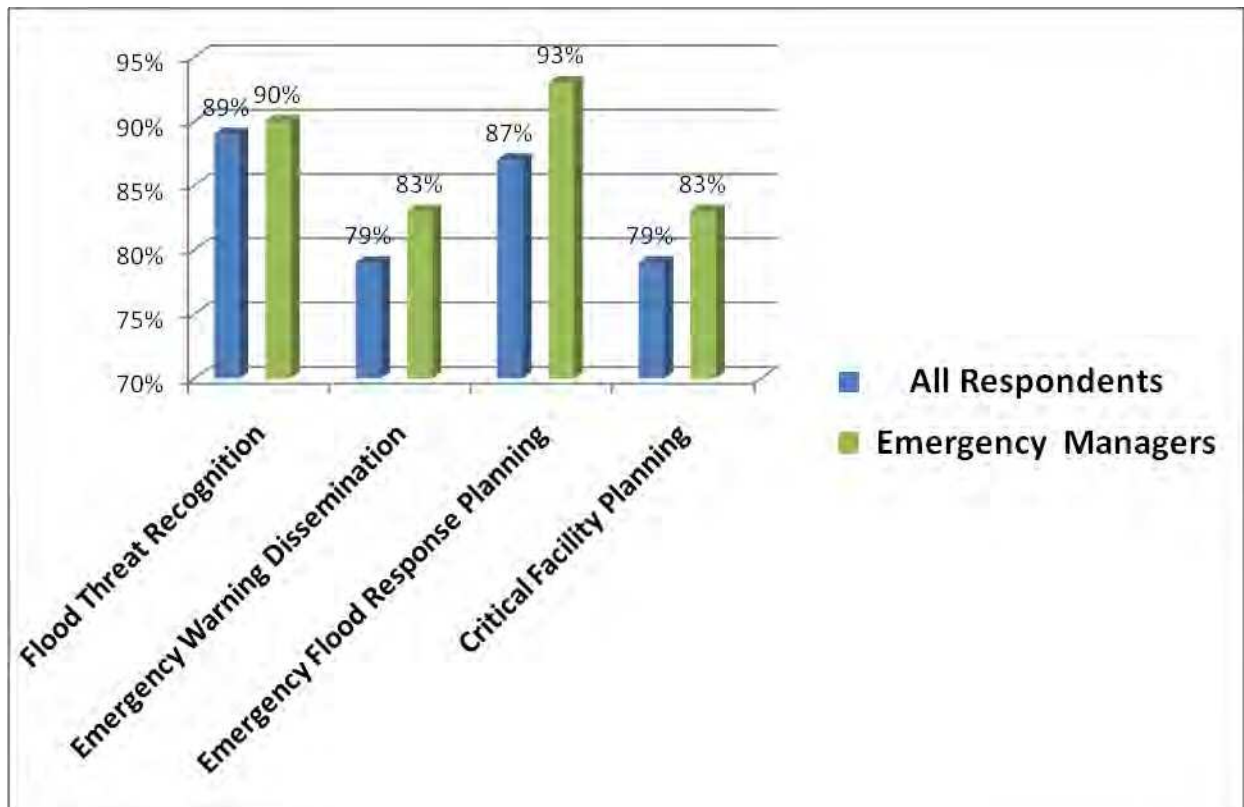


The results of the survey are described below by topic.

Description of the flood hazard

CRS requires a local government to provide a description of the local flood hazard for Flood Threat Recognition (FTR) system credit. Usually, that is limited to an identification of the sources of flooding. CRS does not require the community to do a vulnerability analysis or describe potential flood problems.

The Committee asked those completing the questionnaire if a description of the local flood hazard and potential flooding problems should be a prerequisite for a community to receive credit for Flood Threat Recognition (FTR), emergency Warning Dissemination (EWD), Emergency Flood Response Planning (ORE), and Critical Facility Planning (CFP). In each case the respondents gave a clear answer, YES.



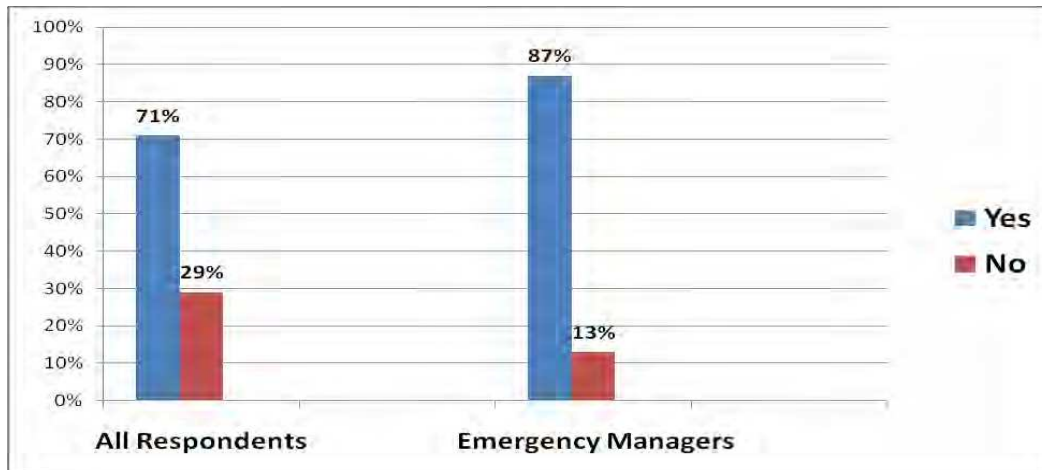
The Committee recommends that a vulnerability analysis become a prerequisite for Activity 610 credit.

Comprehensive Approach to Flood Warning and Emergency Response

The current approach of CRS is to provide credit for Flood Threat Recognition without a local government receiving credit for Emergency Warning Dissemination (EWD) or Emergency

Response Planning (ORE). Similarly, a community could get EWD credit without receiving ORE credit.

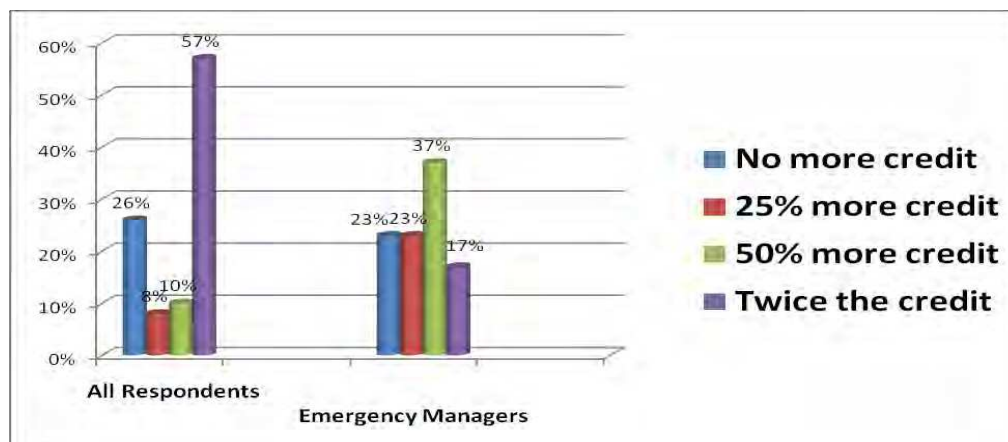
In the questionnaire the Committee asked if CRS should require a flood warning program to include multiple components including data collection, data analysis, agency and public notifications and response planning before credit is given for Activity 610. The response from all respondents and emergency managers was a clear, YES.



The Committee recommends that a community's flood warning and emergency response program including data collection, data analysis, agency and public notifications and response planning become a prerequisite for any Activity 610 credit.

Flood Data Collection

CRS has traditionally given more credit to automated data collection systems. The Committee wanted to verify the acceptance of this approach and obtain information about the value practitioners think this difference is worth. The questionnaire asked, "Compared to a manual system, how much more CRS credit, if any, should an electronic data collection system receive?"

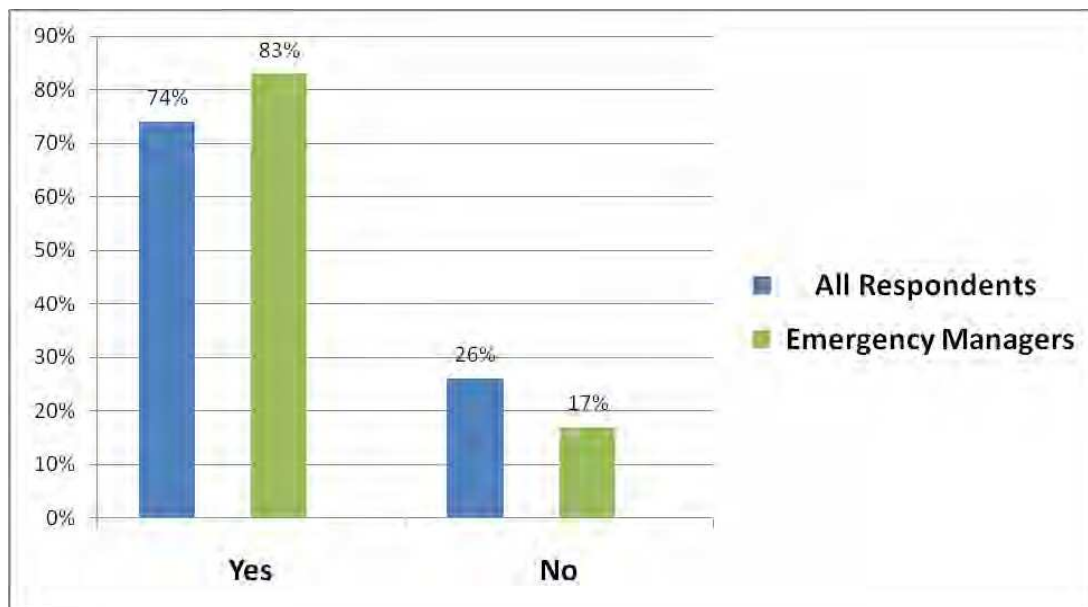


Respondents could give only one response. Most (57%) think an automated system is worth twice as much credit as a manual data collection system. The current CRS schedule gives only twenty-five (25%) more credit. Considering the survey results the Committee rebalanced the proposed CRS credit.

Redundant Methods for Receiving Stream and Precipitation Data

Redundant communications equipment is always desirable when critical data are involved. Redundancy can be achieved by combining data transmission methods at a single collection site. For example, a cellular phone could be a backup to a satellite transmission. At very critical gage sites, it may be wise to install two sets of gage equipment (transmitters, sensors, batteries) and receive data from both. Redundancy can also be achieved by running manual and automated systems on the same stream.

The Committee asked if additional credit should be given for Flood Threat Recognition when the system includes redundant methods for receiving stream and precipitation data. Seventy-four percent (74%) of all respondents said yes. Eighty-three percent (83%) of emergency managers said yes.

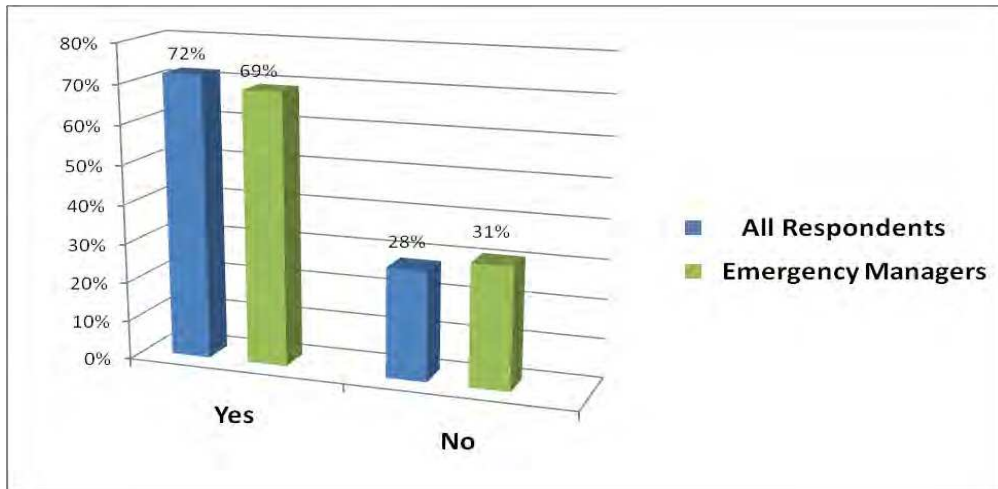


The Committee recommends adding 5 credit points for systems that have redundant methods for receiving stream and precipitation data.

Flood Forecast

The current CRS schedule provides 5 points for manual techniques to predict downstream arrival time and peak flow or elevations. 10 points are provided for digital techniques that predict downstream arrival time and peak flow or elevations.

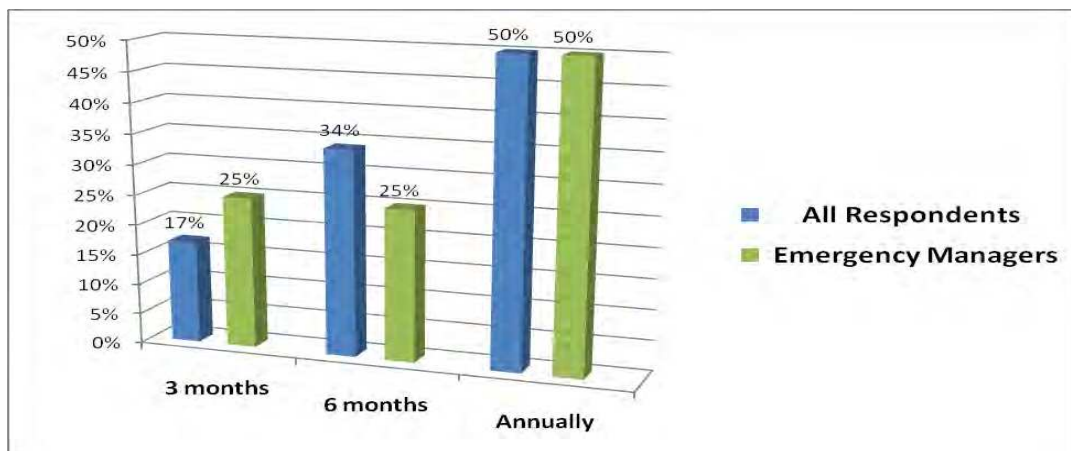
The Committee wanted to know if practitioners thought this approach is appropriate. The survey found a majority of all respondents (58%) approved. The Committee also wanted to know if those participating in the survey saw value in flood prediction systems that identify both the beginning and end of the flood threat. Seventy-two percent (72%) of all respondents said yes. Sixty-nine percent (69%) of emergency managers agreed.



The Committee recommends up to 20 points be awarded to local systems that can predict both the beginning and end of the flood threat.

Maintenance of the Flood Threat Recognition System (FTR)

Maintenance of the Flood Threat Recognition System (FTR) must be performed periodically to minimize the occurrence of equipment failure during flood emergencies. A preventive maintenance schedule should be devised that will ensure proper operation of the gages during a flooding situation. Currently, the CRS schedule says the system operator should perform “regular maintenance”. Several committee members thought the Coordinator’s Manual should be more specific.

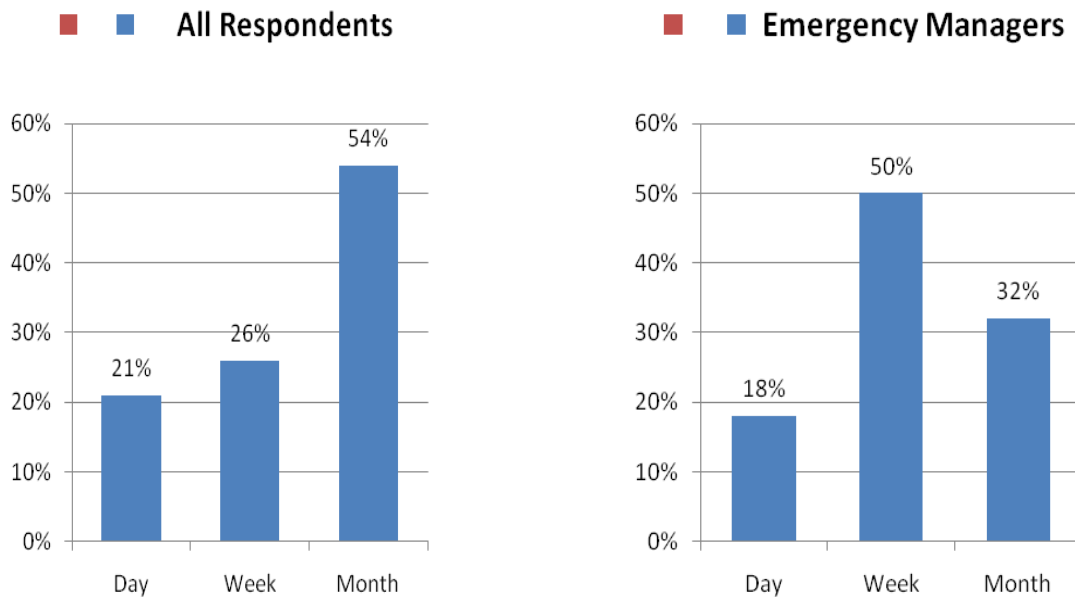


The questionnaire asked respondents to identify how frequent the stream and precipitation gages of a flood threat recognition system should be maintained. Half of those responding to the questionnaire said the maintenance schedule should provide for inspection and maintenance at least every six months. The other half said an annual maintenance schedule is sufficient.

For locally operated flood threat recognition systems the Committee recommends the term “regular maintenance” should mean at least every six months. This is consistent with the maintenance procedures for the National Weather Service and the USGS.

Monitoring Gages for Failure

CRS requires gages to receive “regular maintenance”. The program does not have a standard for how frequently gages should be monitored for failure. The Committee asked those responding to the questionnaire to identify what they thought the standard for credit should be for CRS. Fifty-three percent (53%) of all respondents said at least monthly. Fifty percent (50%) of emergency managers said the test should be weekly.



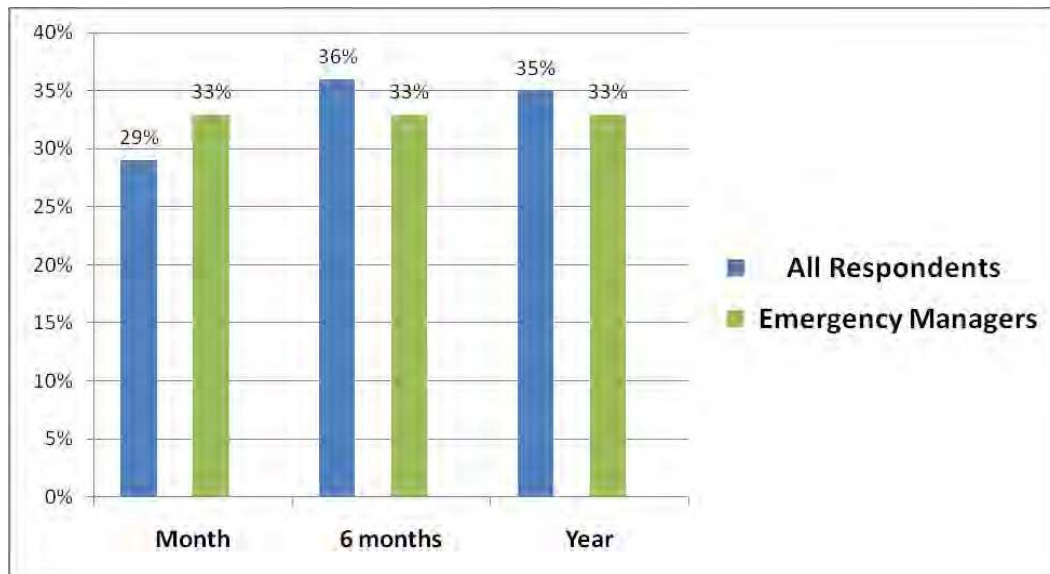
The committee thinks any electronic gage that is part of a flood warning system should be checked daily for proper operation and reliability. If the gage is at a remote location and cannot be easily examined, the data reception from that gage should be verified each day. The Committee proposes adding the following language to the *Coordinator’s Manual*.

At the time of the CRS application and at their cycle the community must provide a copy of the maintenance procedures for the flood threat recognition system. The document must describe the procedures for determining the reliability of data collected from gages. It must describe the preventive maintenance schedule for

gages, communications equipment and other components of the flood threat recognition system.

Validation of Real and Raw Stage and Discharge Data

The CRS does not have a standard for the validation of real and raw stage and discharge data from gage sites. Respondents to the survey could not agree on the frequency with which such validation should occur.



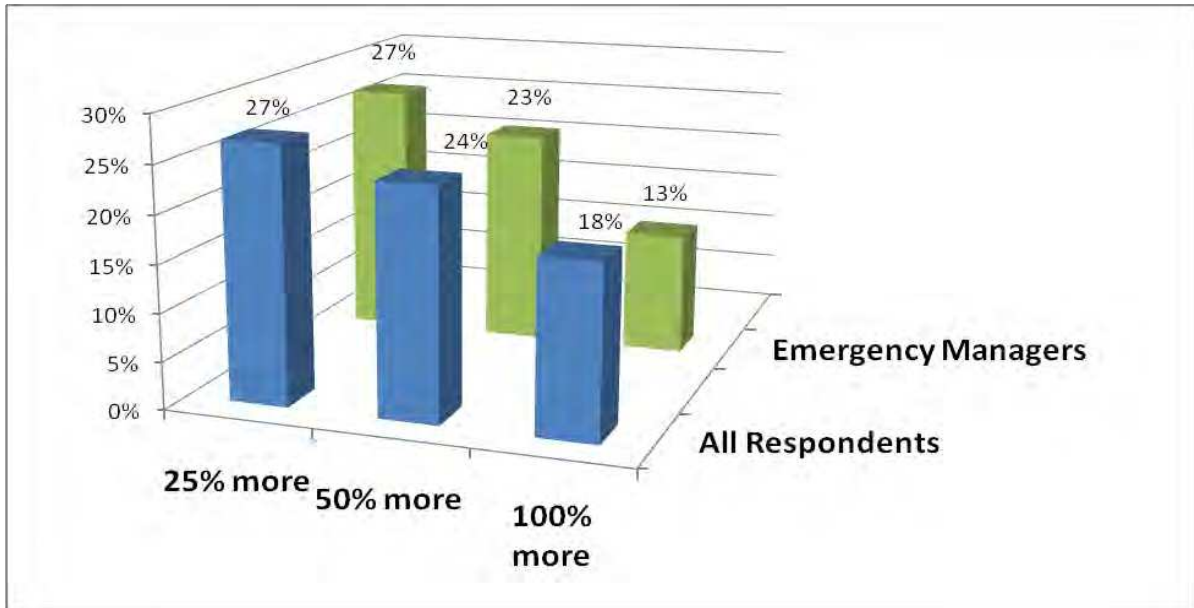
The committee proposes to leave setting the validation schedule to the system operator, but require that the description validation schedule be included in the maintenance procedures submitted by the local government. Annually, the community would be required to certify that reliability of the system has been verified.

Flood Stage Inundation Maps

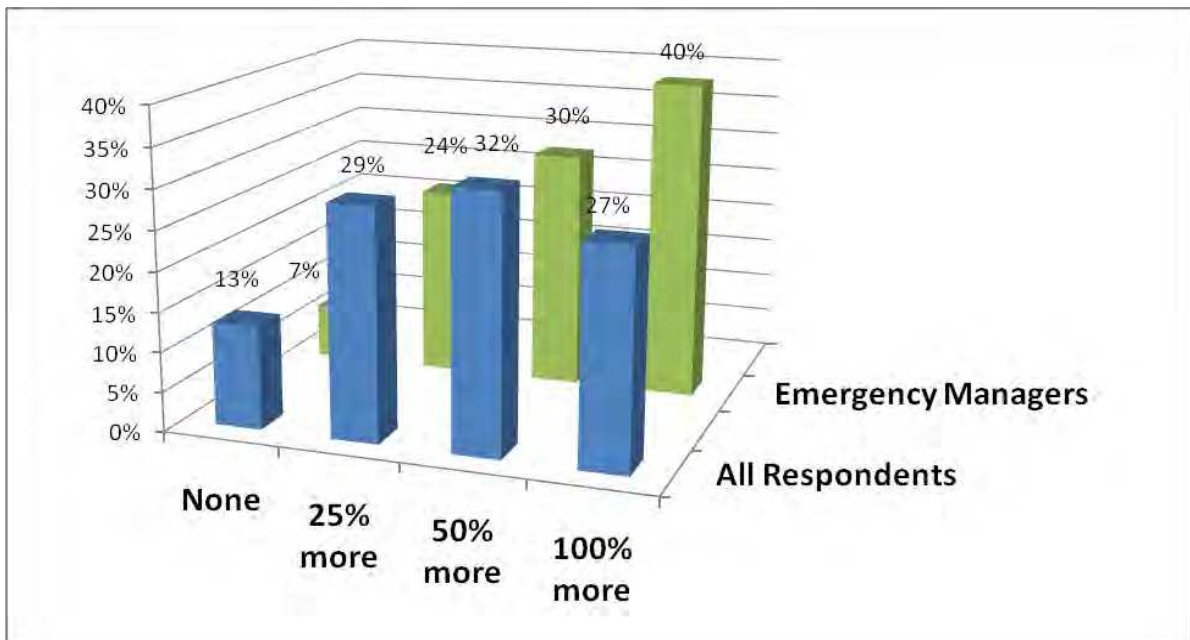
Maps provide a visual image of areas expected to flood and are more easily understood than charts or narrative descriptions. Up to 20 points are available to communities that have maps showing flood stage data for areas other than specific forecast points. The current method of credit does not distinguish between static maps and real time inundation maps. The Committee wanted to know whether emergency managers and others see a difference in the value of the two approaches. There was also interest in knowing if practitioners thought the credit should be contingent upon its use in identifying a community's vulnerability and in its emergency operations planning.

Responses to questions about flood inundation mapping are illustrated by the next four charts. Those completing the survey think there is added value for flood warning systems that have access to static flood inundation maps and even more value if the maps are in real time.

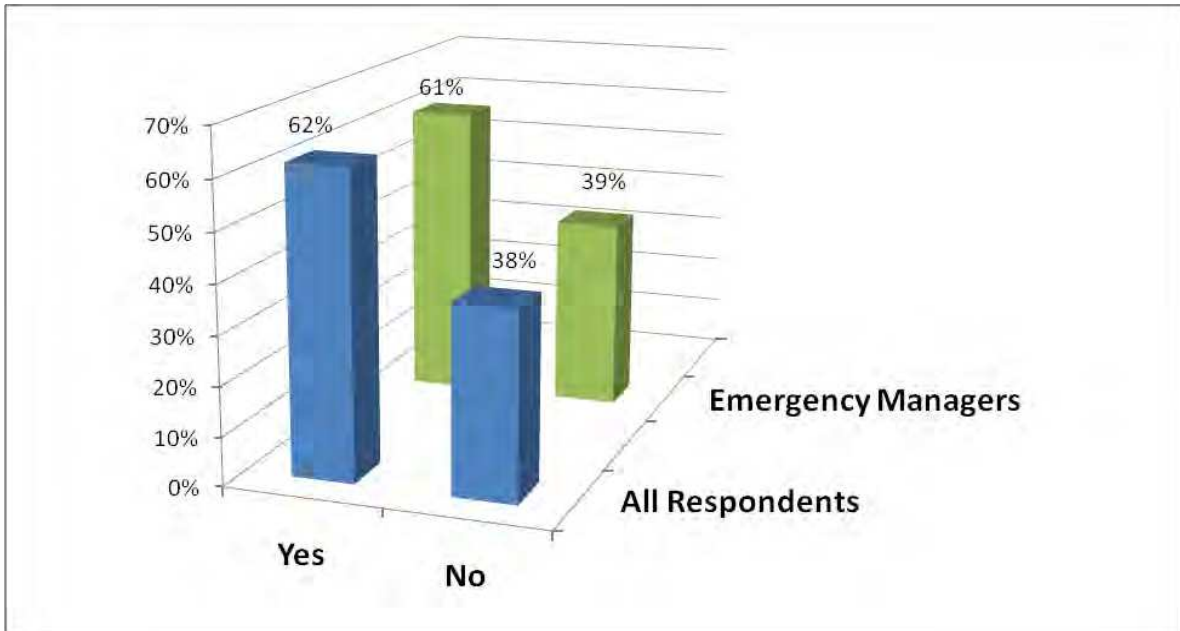
How much value added do static flood stage inundation maps add to a flood threat recognition system?



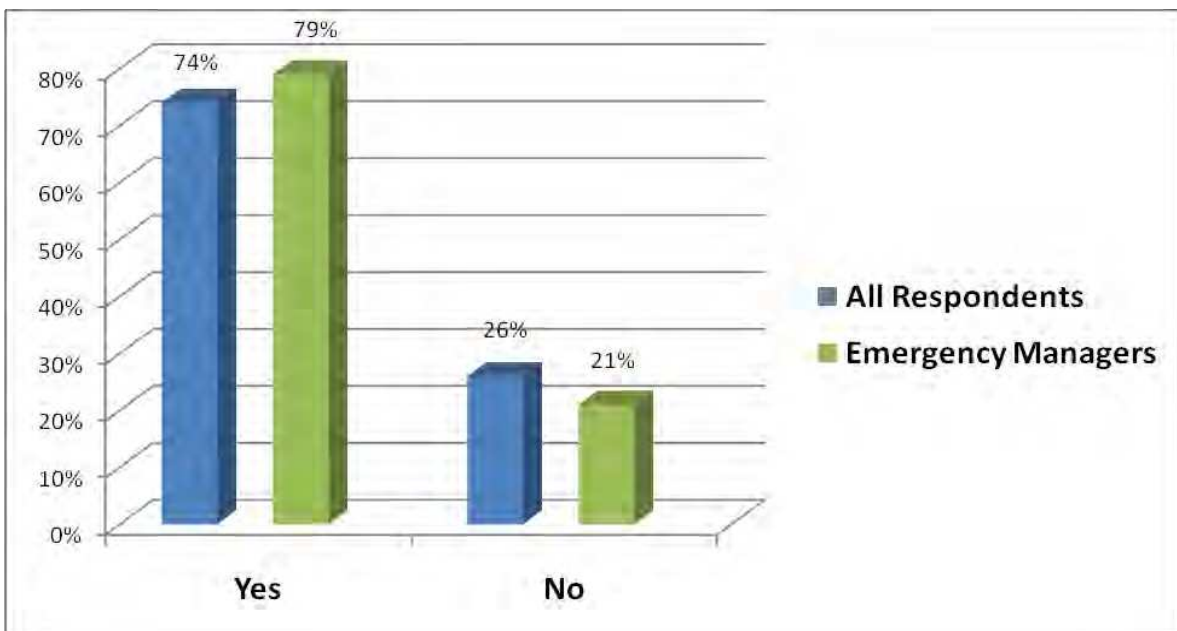
How much value added do real-time flood stage inundation maps add to a flood threat recognition system?



To receive CRS credit for flood inundation maps, the maps should be linked to the impacts and consequences for each flood stage.

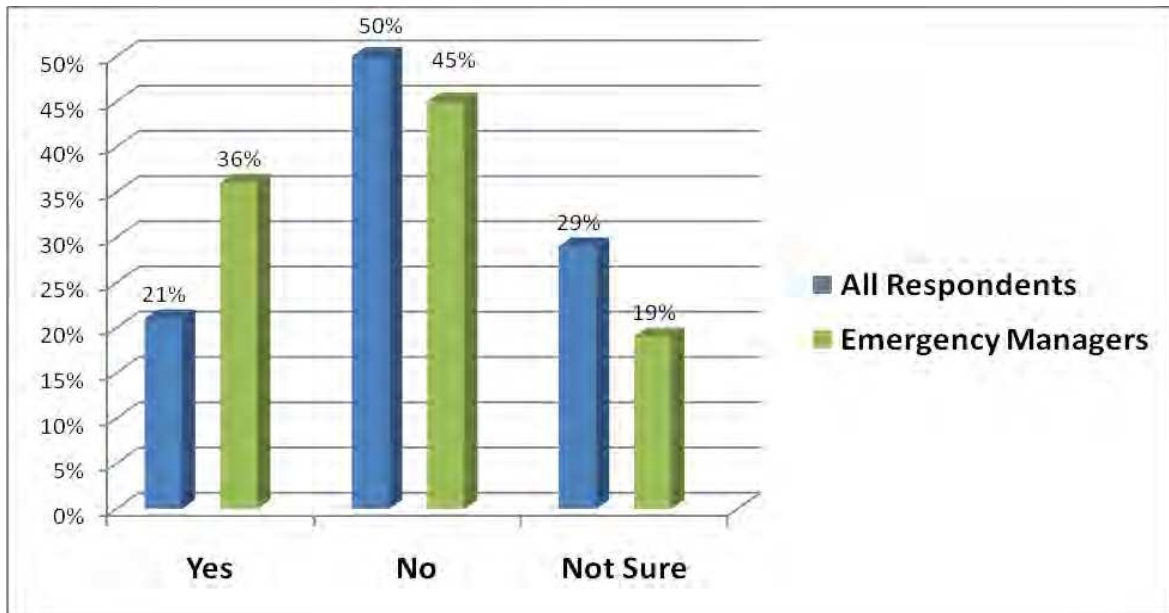


Should flood warning and response plans that include flood response measures for floods in varying degrees (e.g. 10-year, 25-year, 50-year, 100-year, 500-year floods) receive additional credit?



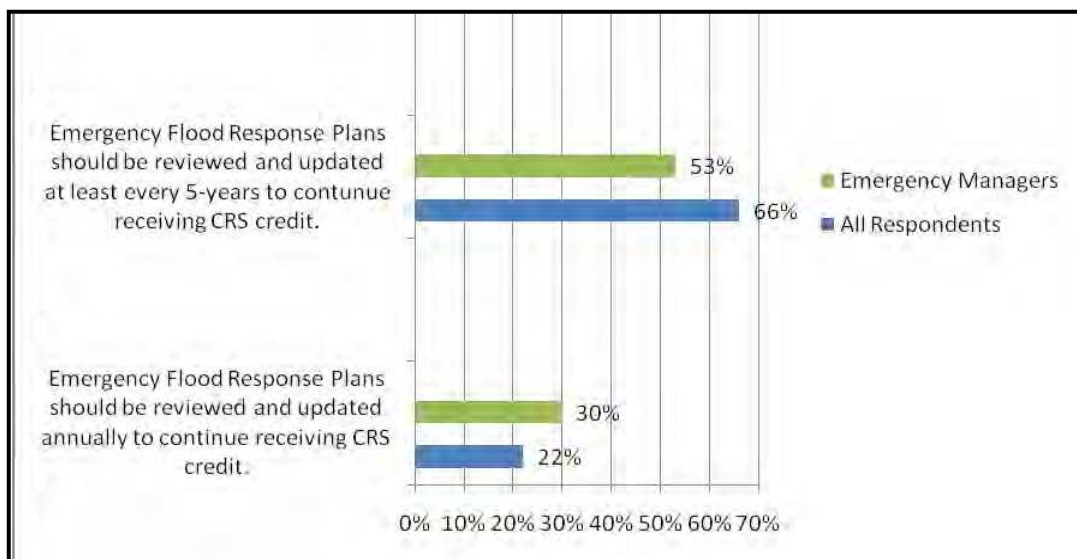
StormReady

There has been considerable discussion about the value of the StormReady program and whether it should be required for credit under Activity 610. When asked that question half of the respondents said it should not be a requirement.

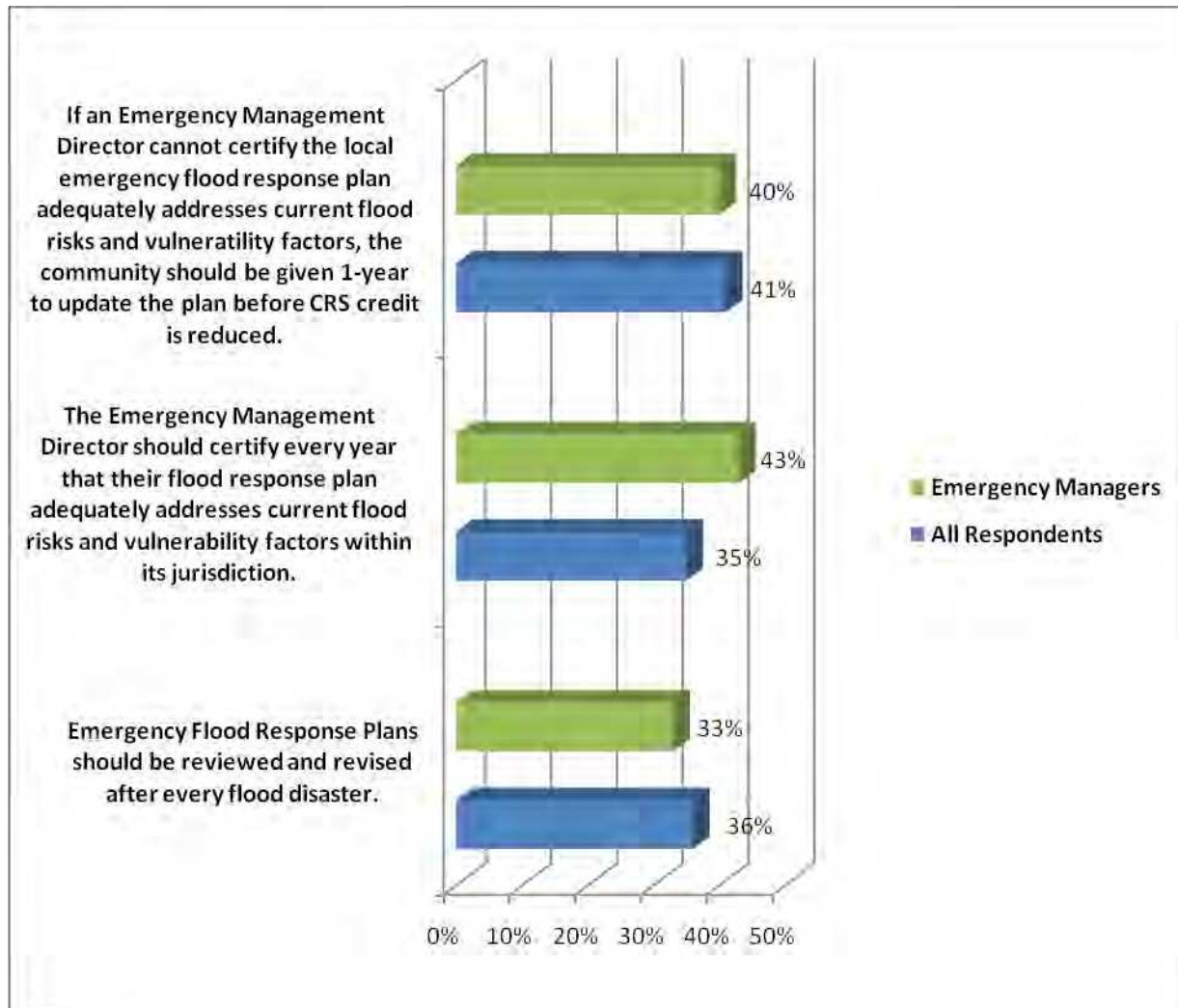


Age of Emergency Response Plans

Many of the emergency operations plans submitted for credit are more than 5-years old. Several are more than 10-years old. CRS does not have a standard for the age of a plan. The Committee wanted to know what local officials thought about establishing a standard.



While most agree a plan should be reviewed and updated at least every 5-years, there was less agreement about how the situation should be handled by CRS.



The Committee's recommendation is that CRS add a requirement that the emergency operations plan must be revised at least every 5-years.

June 1, 2010

ACTIVITY 610 FLOOD WARNING PROGRAM CURRENT SCHEDULE	ACTIVITY 610 FLOOD WARNING PROGRAM PROPOSED SCHEDULE
FLOOD THREAT RECOGNITION (FTR) Maximum Credit = 40 points	FLOOD THREAT RECOGNITION (FTR) Maximum Credit = 50 points
a. Systems operated by federal, state or regional agencies. (40 points)	Data Collection (20 POINTS)
(1) Up to 20 points if the community demonstrates it can receive warnings with flood elevations and arrival times 24/7 for one or more sites.	(1) Up to 10 points for manual collection of precipitation and/or river gage data.
(2) 5 points manual prediction technique.	(2) Up to 20 points for automated collection of precipitation and/or river gage data.
(3) 20 points for a computerized flow or storm surge prediction model, or "real time" model for points other than those credited under 2a(1) above.	(3) Up to 20 points for other data collection techniques (such as NEXRAD, doppler radar, etc) used in conjunction with precipitation and stream gages.
b. System operated by local state, or other non-federal agency. (40 points)	Flood Forecast (30 POINTS)
(1) 15 points for manual collection of precipitation and/or river gage data.	(1) Up to 5 points for manual technique to predict downstream arrival time and peak flow or elevations.
(2) 20 points for automated collection of precipitation and/or river gage data.	(2) Up to 10 points for a computerized "real time" model run during a flood, or to predict downstream arrival time and peak flow or elevations or a storm surge prediction model.
(3) 5 points manual prediction technique.	(3) Up to 20 points for maps, that identify the likely areas to be inundated by flood waters.
(4) 20 points for a computerized flow or storm surge prediction model, or "real time" model for points other than those credited under 2a(1) above.	

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EMERGENCY WARNING DISSEMINATION (EWD) Maximum Credit = 60 points	EMERGENCY WARNING DISSEMINATION (EWD) Maximum Credit = 50 points
(a) 10 points for adopted message policy that provides adequate guidance to allow staff to quickly issue appropriate warnings.	(a) 10 points for adopted message policy that provides adequate guidance to allow staff to quickly issue appropriate flood warnings.
(b) 15 points for outdoor voice-sound system or fixed siren system.	(b) 10 points for outdoor voice-sound system or fixed siren system.
(c) 30 points for disseminating warnings door-to-door or by mobile public address.	(c)(1) 5 points if the plan identifies the primary and support agencies responsible for door-to-door or mobile public address warning.
	(c)(2) 15 points if the plan identifies the requirements for route alerting and/or door-to-door warning, and describes the procedures, staff and equipment necessary to complete door-to-door or mobile public address warning.
(d) 10 points for warning dissemination through the Emergency Alert System.	(d) 10 points for warning dissemination through the Emergency Alert System through all channels/stations with pre-scripted draft messages.
(e) 15 points for telephone warning that reaches all residents.	(e) 15 points for telephone warning that reaches all residents.
(f) 10 points for cable television override systems.	(f) 10 points for cable television override systems.
(g) 10 points for public AM radio transmitters used for public announcements.	(g) 10 points for public AM radio transmitters used for public announcements.
(h) additional points may be awarded for flood warning methods not identified above.	(h) additional points may be awarded for flood warning methods not identified above.
	(i) 10 points if all schools, hospitals, nursing homes and other group facilities for the care of the elderly that need flood warning have NOAA weather radio receivers and at least one other automated backup system for receiving flood warnings.
	(j) 10 points if the public messages include information and instruction on: the expected elevation of the flood waters, and instructions on when to evacuate.

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<p>OTHER RESPONSE EFFORTS (ORE) Maximum Credit = 50 points</p>	<p>OTHER RESPONSE EFFORTS (ORE) Maximum Credit = 60 points</p>
<p>(a) 20 points if actions in the response plan are keyed to specific predicted flood levels.</p>	<p>(a) 10 points if actions in the response plan are keyed to specific predicted flood levels.</p>
<p>(b) 10 points if the plan identifies flood response tasks for community staff and other public and private organizations.</p>	<p>(b)(1) 10 points if the plan identifies flood response tasks and responsible community staff and other public and private organizations with responsibilities related to the flood tasks in the plan.</p>
	<p>(b)(2) 10 points if specific property loss mitigation actions are included in in the response plan based on the flood hazards analysis.</p>
	<p>(b)(3) 10 points for maintaining a database of people with special needs that require evacuation assistance when a flood warning is issued and for having a plan to provide transportation to secure locations. The plan must include the assumptions used in planning for the emergency evacuation, provide a list of actions pertinent to the evacuation and indicate who will be responsible for carrying out those tasks.</p>
<p>(c) 20 points if the plan includes a summary of estimated staff, equipment, supplies, and time required for each response task and the sources of necessary resources.</p>	<p>(c)(1) 10 points if the community has developed scenarios that identify how flood incidents might develop within the jurisdiction. The scenarios should describe the sequence of events from initial warning to the unfolding of consequences in specific sections of the community.</p>
	<p>(c)(2) 10 points if the plan includes a summary of estimated staff, equipment, supplies, and time required for each response task and the sources of necessary resources.</p>
	<p>(d) Identifies personnel, equipment, facilities, supplies, and other resources available--within the jurisdiction or by agreement with private suppliers or other jurisdictions--for use during response and recovery operations. CPG 101 [p.2-22]</p>
	<p>(e) Provide instructions for returning evacuees relating to reoccupancy of damaged homes and businesses, permit requirements and flood loss mitigation measures and programs.</p>
	<p>(f) Identifies steps to address mitigation concerns during response and recovery activities. SLG 101 [p.1-1]</p>

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CRITICAL FACILITY PLANNING (CFP) Maximum Credit = 50 points	CRITICAL FACILITY PLANNING (CFP) Maximum Credit = 50 points
<p>(a) CFP1 = 10 points if the adopted plan includes the names and phone numbers of the operators of all critical facilities affected by flooding.</p>	<p>(a) CFP1 = 20 points if the adopted plan includes the names and phone numbers of the operators of all critical facilities affected by flooding AND includes arrangements for special warnings or early notifications directly to all critical facilities that need early warning.</p>
<p>(b) CFP2 = 20 points if the adopted plan includes arrangements for special warnings or early notifications directly to all critical facilities that need early warning.</p>	
<p>(c) CFP3 = 20 points if the critical facilities needing them have their own flood response plans that have been developed, reviewed, or accepted by the community.</p>	<p>(c) CFP3 = 30 points if the critical facilities needing them have their own flood response plans that have been developed, reviewed, or accepted by the community.</p>
<p>StormReady COMMUNITY (SRC) Maximum Credit = 25 points</p>	<p>StormReady COMMUNITY (SRC) Maximum Credit = 20 points</p>
<p>TsunamiReady COMMUNITY Maximum Credit = 30 points</p>	<p>TsunamiReady COMMUNITY Maximum Credit = 25 points</p>

ACTIVITY 610 FLOOD WARNING PROGRAM
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ACTIVITY 610 FLOOD WARNING PROGRAM CURRENT SCHEDULE	PROPOSED CHANGE	COMMENTS	DOCUMENTATION
<p>FLOOD THREAT RECOGNITION (FTR) Maximum Credit = 40 points</p>	<p>FLOOD THREAT RECOGNITION (FTR) Maximum Credit = 40 points</p>	<p>A flood threat recognition system (FTR) is any system that is used to identify flooding severity.</p>	
<p>1. Prerequisites:</p>	<p>1. Prerequisites:</p>		
<p>a. Regular maintenance and annual testing.</p>	<p>a. Regular maintenance and annual exercise.</p>	<p>A commitment to regular maintenance is required for the successful operation of any flood warning program. Maintenance of the FTR must be performed periodically to minimize the occurrence of equipment failure during flood emergencies. Any gage that is part of a flood warning system should be checked daily for proper operation. If the gage is at a remote location and cannot be easily examined, the data from that gage should be verified each day. A preventative maintenance schedule should be devised that will ensure proper operation of the gage during a flooding situation. Typically, a file is kept for each station listing the directions to the site, station equipment, service history, etc. The processing equipment, or base station, receiving data from the remote site should also be checked daily and should also have a preventative maintenance schedule that ensures proper operation when it is most needed.</p>	<p>At the time of the CRS application the community must provide :</p> <ol style="list-style-type: none"> 1. A copy of the maintenance procedures for the flood threat recognition system. 2. A copy of the section of the Emergency Operations Plan, Emergency Warning Annex, Standard Operating Procedure or other documentation stating the frequency for testing gages, communications equipment and other components of the flood threat recognition system. <hr/> <p>Annually, the community must certify that system maintenance has been performed in accordance with the maintenance procedures filled with the CRS application.</p>

ACTIVITY 610 FLOOD WARNING PROGRAM
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ACTIVITY 610 FLOOD WARNING PROGRAM CURRENT SCHEDULE	PROPOSED CHANGE	COMMENTS	DOCUMENTATION
<p>b. Provide a description of the flood hazard and flood threat recognition system.</p>	<p>b.1. Describe the flood threat recognition system. Identify the rivers and streams <u>where flood stage forecast are be prepared</u>, identify each forecast point and the locations of stream and precipitation gages. Tell how the data are used in the flood response plan.</p>	<p>The discussion of Prerequisite "b" is expanded to provide better guidance on what is expected. This should help local officials preparing their documentation. Examples of response constraints may be a severely short time between flood detection and flooding, access to certain areas during severe storms, or distance between emergency resources and the flood hazard area.</p>	<p>Provide a map showing the location of each stream and precipitation gage. Identify the stream gages that are flood forecast points. Tell how the data are used in the flood response plan. It is helpful to summarize all calculations and decision triggers in a chart which shows situation versus action. A simple graphical summary is very useful in emergency situations and the decision-making and response time is reduced.</p>
	<p>b.2. Describe the flood threat recognition system <u>where other data are used to generate flood warning messages</u>. Describe the locations on the rivers and streams where this data is used and warning messages are developed. Tell how this data is used in the flood response plan.</p>	<p>Some local governments do not apply for flood warning credit because they think they must be able to forecast flood stages before they can receive credit. A separate discussion may encourage additional communities to apply for the credit. Examples should be included in the updated <i>CRS Flood Warning Program</i> publication.</p>	<p>Describe the other data [other than gage data] and methods used to generate flood warning messages. Tell how this data is used in the flood response plan. Provide a map showing where effective flood warnings can be issued using these methods. Provide samples of messages generated by the system.</p>
	<p>c. Document the community can receive flood warnings on a 24/7 basis.</p>	<p>Makes the 24/7 ability to receive a flood warning a prerequisite. StormReady and TsunamiReady require communities to be able to receive warnings on a 24/7 basis.</p>	<p>Provide the section of the plan that describes how and who is responsible for receiving flood warnings within the jurisdiction.</p>

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2. Credit Points:	2. Credit Points:	In 1990 Warning Dissemination (WD) credit was based on the number of hours between the issuance of a warning to the general public and when the flood waters isolated an insurable building. [Maximum points = 75]	
a. Systems operated by federal, state or regional agencies.		Eliminate the allocation of credit based on which agency provides the warning.	
(1) Up to 20 points if the community demonstrates it can receive warnings with flood elevations and arrival times 24/7 for one or more sites.		Credit for 24/7 warning is a requirement of StormReady and TsunamiReady. These points are already covered under SRC [25 points] and TSR [30 points] credit.	
	a. Level of flood threat data and warning available to the community.		
	Data Collection [Up to 20 points]		
	(1) Up to 10 points for gage density.	1 precipitation gage for each 10 square miles of watershed and at least 1 gage for each flooding source in the developed community.	Scott will research whether this standard should be changed.
(2) EITHER:	(2) EITHER:		

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ACTIVITY 610 FLOOD WARNING PROGRAM CURRENT SCHEDULE	PROPOSED CHANGE	COMMENTS	DOCUMENTATION
<p align="center">((a)) 5 points manual prediction technique.</p>	<p align="center">((a)) Up to 10 points for manual collection of precipitation and/or river gage data.</p>	<p>Volunteer observers and inexpensive equipment, such as plastic rain gages and box-cameras, are often the first and least complicated component of an FTR. Precipitation amounts and/or stream staff gage readings can be recorded and relayed to emergency personnel via telephone.</p>	<p>Describe the data collection system.</p>
<p align="center">((b)) 20 points for a computerized flow or storm surge prediction model, or "real time" model run during a flood, or maps, charts or other output from a model that provides detailed data for points other than those credited under 2a(1) above.</p>	<p align="center">((b)) Up to 20 points for automated collection of precipitation and/or river gage data.</p>	<p>The two basic types of automated flood detection gages are precipitation and water level. Depending on the level of sophistication that is justifiable, the base station hardware can be as simple as a telephone instrument for receiving observer data or as complex as a computer-network based automated data receiving, storage and management station.</p>	<p>Describe the data collection system.</p>
	<p align="center">((c)) Up to 20 points for other data collection techniques (such as NEXRAD, doppler radar, etc) used in conjunction with precipitation and stream gages.</p>	<p>The primary precipitation detection systems are based on radar, satellite and lightning technology.</p>	<p>Describe the data collection system.</p>

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		<p>Redundant communications equipment is always desirable when critical data are involved. Redundancy can be achieved by combining any of the previous data transmission methods at a single collection site, for example, a cellular phone backup at a satellite site. At very critical gage sites, it may be wise to install two sets of gage equipment (transmitters, sensors, batteries) and receive data from both. Redundancy can also be achieved by running manual and automated systems on the same stream.</p>	<p>Redundant systems should be considered by the committee.</p>
<p>b. System operated by local state, or other non-federal agency.</p>			
	<p><u>Flood Warning [Up to 20 points]</u></p>		
<p>(1) EITHER:</p>			

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ACTIVITY 610 FLOOD WARNING PROGRAM CURRENT SCHEDULE	PROPOSED CHANGE	COMMENTS	DOCUMENTATION
((a)) 15 points for manual collection of precipitation and/or river gage data.	(1) Up to 5 points for manual technique to predict downstream arrival time and peak flow or elevations.	In 1990 CRS gave 10 points if the data collected by a local flood warning program was kept at 15 minute or shorter intervals and made available to other agencies, researchers and the private sector. 5 points were given if the data was collected in an interval longer than 15 minutes and shared.	Describe the manual system used to forecast flooding, include tables, graphs and charts and other materials used derived average rainfall and flood indexes.
((b)) 20 points for automated collection of precipitation and/or river gage data.	(2) Up to 10 points for a computerized "real time" model run during a flood, or to predict downstream arrival time and peak flow or elevations or a storm surge prediction model.	In order to provide consistent response and minimize chaos during a flood emergency, it is advantageous to develop pre-set criteria to act as triggers during a flood threat. For example, Flood response along a river or channel could be triggered by a water-level reading (which might also indicate a hazardous velocity) or results from a hydrologic model simulation using real-time precipitation data.	Describe the computer systems data management, modeling, forecasting, and automated warning dissemination.
	(3) Up to 10 points for maps, that identify the likely areas to be inundated by flood waters.	Maps provide a visual image of areas expected to flood and are more easily understood than charts or narrative descriptions.	Provide a copy of maps used to convey warnings to the public. They should identify the likely areas to be inundated by flood waters.
(2) 10 points for gage density.		Credit moved to data collection section.	
(3) EITHER:			

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((a)) 5 points for manual technique to predict downstream arrival time and peak flow or elevations.			
((b)) 10 points for digital technique to predict downstream arrival time and peak flow or elevations.			
<p align="center">EMERGENCY WARNING DISSEMINATION (EWD) Maximum Credit = 60 points</p>	<p align="center">EMERGENCY WARNING DISSEMINATION (EWD) Maximum Credit = 60 points</p>	<p>Flood warning dissemination provides critical linkage between recognition of an impending flood and execution of emergency response actions.</p>	
<p>1. Prerequisites:</p>	<p>1. Prerequisites:</p>		
<p>(a) Receive FTR Credit.</p>	<p>(a) Receive FTR Credit.</p>		

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	<p>(a).(1) Provide a description of the flood hazard characteristics as well as any operational or response constraints. The description should include information about the nature of the flood hazard, such as flood depths, velocities, warning times, historical flood problems and special hazards. The following types of information should also be covered: number, types and, if available, elevations of buildings; land use (residential, commercial, industrial, natural desert, etc.); critical facilities; and historic flood problem areas including health and safety hazards.</p>	<p>When designing or expanding an FTR, it is necessary to first identify local flooding characteristics so that detection and monitoring components can be selected which are appropriate for the local flooding conditions. A good physical description of the watershed is necessary to determine the types of flooding that occur, areas threatened, what type of equipment will work in a given area, and emergency response requirements. The amount of lead time needed between the recognition of a flood event and the successful response to a flood warning greatly influences the type of FTR (flood threat recognition) system that is required.</p>	<p>Provide a copy of the EOP sections that describe the planning assumptions for flooding or hurricanes.</p>

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<p>(b) Adopted emergency response plan that includes EWD elements.</p>	<p>(b) Adopted emergency response plan that includes EWD elements. The plan must describe the methods and warning devices used to disseminate emergency alerts and warnings. It must include procedures for warning special locations, such as, schools, hospitals, nursing homes, those who live in manufactured homes, recreational facilities, major industrial sites, institutions, and places of public assembly. It should include procedures required to warn the hearing impaired and non-English speaking groups.</p>	<p>The Emergency Public Information function gives the public accurate, timely, and useful information and instructions throughout the emergency period. Individuals perceived to be under threat of the impending flood should personally receive the warning message from a recognized person in a position of authority (i.e., mayor, law-enforcement personnel, fire fighters, designated block watch representative). The message, should state the time before the flooding occurs, its expected severity, and describe appropriated response actions (e.g., evacuation routes, safe shelters, protective actions). Special needs groups such as the hearing-impaired, sight-impaired, physically disabled, or institutionalized require special attention to ensure a workable warning system is established.</p>	<p>NIMS. EOPs should include pre-incident and post-incident public awareness, education, and communications plans and protocols. The emergency public information function gives the public accurate, timely, and useful information and instructions throughout the emergency period. The plan should describe the procedures for warning special locations, such as schools, hospitals, nursing homes, recreational facilities, major industrial sites, institutions, and places of public assembly.</p>

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ACTIVITY 610 FLOOD WARNING PROGRAM CURRENT SCHEDULE	PROPOSED CHANGE	COMMENTS	DOCUMENTATION
(c) Warning must reach people in a timely manner.	(c) Warning must reach people in a timely manner.	In 1990 CRS had a requirement that any area credited must receive at least 30-minutes of warning. That was deleted in 1992. The NWS was not willing to say it could provide 30-minutes of warning. The plan should provide sufficient warning time to implement a planned evacuation for people identified as being at risk. The magnitude, intensity, speed of onset, duration, and impact on the local community, are all significant elements to be considered. They will determine the number of people to be evacuated, time available in which to effect the evacuation, and the time and distance of travel necessary to insure safety.	Provide a copy of the EOP sections that specifies who has authority to order activation of warning systems to include EAS. The plan must show the community can initiate the warning systems around-the-clock. Provide sections of the plan that designate public service agencies, personnel, equipment, and facilities that can augment the jurisdiction's warning capabilities.
(d) Warning dissemination equipment and procedures must be tested at least annually.	(d) Warning dissemination equipment and procedures must be tested at least annually.	Should these test be at least monthly?	Logistical support provisions to test and maintain equipment used to disseminate warning should be described in the plan or an annex to the plan. It should include provisions to get damaged warning equipment repaired or replaced.

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ACTIVITY 610 FLOOD WARNING PROGRAM CURRENT SCHEDULE	PROPOSED CHANGE	COMMENTS	DOCUMENTATION
<p>(e) Warning procedures must be publicized annually in a brochure provided to residents and businesses.</p>	<p>(e) Warning procedures must be publicized annually in a brochure provided to residents and businesses.</p>	<p>When developing any warning dissemination program, public education should be addressed. Public education serves two purposes. First, a community that is aware of flood dangers will be less likely to require emergency rescues. Second, education will assist warning dissemination efforts because the public will have been informed on where to turn for flood information, what the warnings mean, and what actions to take.</p>	<p>NIMS: The EOP should describe the public awareness and education to be provided to citizens about potential hazards, protective actions, and how they will be alerted if they are at risk. The local government must provide a copy of the brochure.</p>
	<p>(f) Where only one or two warning methods are used the community's warning policy must include contingency plans to provide warnings if the established warning system fails.</p>	<p>Large-scale emergency operations usually require a communications capability beyond the normal capacities of the equipment of a local government. Therefore, the type of equipment required and sources for the equipment (from the public and private sector) should be identified in an annex to the plan.</p>	<p>NIMS: A copy of the message policy including the contingency plans to follow when the primary warning system fails.</p>
	<p>(g) Monitor the media to determine the need to clarify issues and distribute pre-dated public instructions.</p>	<p>Local media should be briefed on the local warning system on a regular basis.</p>	<p>Provide a copy of the EOP sections that assign responsibility for this function.</p>

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2. Credit Points:	2. Credit Points:		
(a) 10 points for adopted message policy that provides adequate guidance to allow staff to quickly issue appropriate warnings.	(a) 10 points for adopted message policy that provides adequate guidance to allow staff to quickly issue appropriate flood warnings.	The concept of operations section should address how the jurisdiction will coordinate Emergency Public Information in order to "speak with one voice." Coordination must include procedures for verifying and authenticating information, and for obtaining approval to release information.	Provide a copy of the EOP sections that delegate authority for warning the public, provide instructions for activation of the warnings system, provide guidelines on how to determine who will be warned. Include pre-scripted flood warning messages, and public service announcements.
(b) 15 points for outdoor voice-sound system or fixed siren system.	(b) 10 points for outdoor voice-sound system or fixed siren system.	Fixed siren systems are an attractive choice for some communities because they involve little cost or complex procedural developments. Their shortcomings include: 1) systems must be expanded to maintain full coverage of the community as it grows, and 2) many systems are not sized to provide warnings loud enough to be identifiable during storms.	Provide a map of the siren locations and their effective coverage areas. This map should be shown as an overlay on a map of the floodplain.

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<p>(c) 30 points for disseminating warnings door-to-door or by mobile public address.</p>	<p>(c)(1) 5 points if the plan identifies the primary and support agencies responsible for door-to-door or mobile public address warning.</p>	<p>Mobile public address systems are one of the most popular means of warning dissemination in small to medium size communities. Advantages of this approach include: 1) use of disciplined and well organized personnel, 2) capability of public address systems to convey instructions instead of simply an alert, 3) relatively low vulnerability to disruption, 4) high degree of selectivity in area to be warned, 5) potential for persons in the field doing the warning to use initiative in adapting procedures to the situation which exists. The principal drawbacks to this approach are: 1) commitment of personnel and equipment to conduct warning who might</p>	<p>Provide a copy of the EOP sections that delegate authority for mobile public address or door-to-door warning.</p>
	<p>(c)(2) 15 points if the plan identifies the requirements for route alerting and/or door-to-door warning, and describes the procedures, staff and equipment necessary to complete door-to-door or mobile public address warning.</p>	<p>be needed elsewhere for other purposes, and 2) limitations on the size of the area which can be covered on a timely basis.</p>	<p>Provide a copy of the EOP Annex that describes how mobile public address or door-to-door warning will be implemented within the jurisdiction.</p>
<p>(d) 10 points for warning dissemination through the Emergency Alert System.</p>	<p>(d) 10 points for warning dissemination through the Emergency Alert System <u>through all channels/stations with pre-scripted draft messages.</u></p>	<p>Radio/TV stations which are not members of the EAS station network are generally willing to issue warning announcements.</p>	<p>A copy of the EAS procedures including the identifications of those authorized to activate the EAS and copies of prescribed draft messages.</p>

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(e) 15 points for telephone warning that reaches all residents.	(e) 15 points for telephone warning that reaches all residents.	Telephones can be dialed by computers to warn people within a specific area (Reverse 911 or Call Warning). Available commercial systems allow emergency managers to quickly specify the small region of interest and to have as many as hundreds of computers dialing simultaneously with a specific message.	Provide a copy of the description of a publically owned system or a copy of the contract with a private provider.
(f) 10 points for cable television override systems.	(f) 10 points for cable television override systems.	Television offers a means of conveying detailed warnings. One disadvantage is the lack of listeners during late night and early morning. They are also vulnerable to failure during severe storms.	A copy of the cable agreement and override procedures.
(g) 10 points for public AM radio transmitters used for public announcements.	(g) 10 points for public AM radio transmitters used for public announcements.	Some local governments are installing local AM transmitters to convey warnings to the public. Sometimes mitigation messages are included in the series of pre-recorded messages provided to the public.	Describe the capability and use of the local AM radio transmitter. Make sure information about the system is in the local outreach brochure.
(h) additional points may be awarded for flood warning methods not identified above.	(h) additional points may be awarded for flood warning methods not identified above.		

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ACTIVITY 610 FLOOD WARNING PROGRAM CURRENT SCHEDULE	PROPOSED CHANGE	COMMENTS	DOCUMENTATION
	(i) 10 points if all schools, hospitals, nursing homes and other group facilities for the care of the elderly that need flood warning have NOAA weather radio receivers and at least one other automated backup system for receiving flood warnings.	The NOAA Weather Radio (NWR) signal is available currently to approximately 90 percent of the U.S. population. Advanced receivers are available that will turn themselves on and set the volume in order to broadcast a warning when it is received. These receivers can also be set to the Specific Area Message Encoder code so that only identified events for a specific location will set off an alarm.	Provide a certification that all schools, hospitals, nursing homes and other group facilities for the care of the elderly that need flood warning have NOAA weather radio receivers and at least one other automated backup system for receiving flood warnings.
	(j) 10 points if the public messages include information and instruction on: the expected elevation of the flood waters, and instructions on when to evacuate.	Post-Katrina evaluation reports stated the failure of complete evacuations led to preventable deaths, great suffering, and further delays in relief.	Provide a copy of pre-scripted messages.
OTHER RESPONSE EFFORTS (ORE) Maximum Credit = 50 points	OTHER RESPONSE EFFORTS (ORE) Maximum Credit = 50 points	The essential element of warning dissemination for any community is a working Emergency Operations Plan (EOP). A community's emergency response plan should include a separate section for flood emergencies.	
1. Prerequisites:	1. Prerequisites:		
(a) Community must receive FTR and EWD credits.	(a) Community must receive FTR and EWD credits.		

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<p>(b) There must be at least one exercise of the adopted response plan each year.</p>	<p>(b) There must be at least one exercise of the adopted response plan each year.</p>	<p>NIMS: As stakeholders learn and practice their roles, they can reduce uncertainty, expedite response, and improve effectiveness during the critical initial stages after an event. This effort is a key to success in protecting people and property in crises. [See NIMS Guidelines p. 20]. The centerpiece of comprehensive emergency management is the EOP. Preparedness measures should not be improvised or handled on an <i>ad hoc</i> basis. CPG 101 [pp.2-25] The plan should be presented to the appropriate elected officials and obtain official promulgation of the plan. The promulgation process should be based in specific statute, law, or ordinance. Exercising provides a means to validate plans, checklists, and response procedures and to evaluate the skills of response personnel.</p>	<p>It is essential to any program that practice drills are held at least annually in years where no flood occurs. Also, the EOP should be updated periodically, at least annually, to include any changes in staff, telephone numbers, and responsibilities. After a drill is completed or a flood occurs, it is important to hold debriefings and implement any necessary changes which may have been discovered.</p>

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	<p>(c) The plan must describe the flood hazard assumptions about the population at risk, vulnerable facilities, community functions that may be impaired, the potential for secondary hazards, and resource dependencies on other jurisdictions. The plan should also note geographical and topographic features that may affect flood response operations and identify demographic and other trends in the jurisdiction that affect operational assumptions.</p>	<p>NIMS: Planning scenarios should establish common assumptions regarding potential vulnerabilities and consequences (or impacts) of flooding incidents. [See NIMS Guidelines p 3]. CPG 101 Planning Step 2 [pp 2-14 thru 2-19] In 1990 CRS gave 40 points if the plan was based on an analysis of the flood hazard characteristics; property, key facilities and access routes exposed to flooding; and coordination with the owners of key facilities to determine their warning and response needs.</p>	<p>Include a narrative description that identifies the parts of the jurisdiction that are subject to flooding caused by a storm surge. Also, maps that pictorially display this information. Identify the population at risk. Identify essential services (fire, police, utility substations/plants, etc.) and special custodial facilities at risk (hospitals, nursing homes, jails and juvenile correction facilities, etc.). Identify government resources such as essential equipment, tools, stockpiles, vital records, etc., that may need to be moved to a safe location. Identify facilities that must be evacuated such as trailer parks, campgrounds, etc.</p>

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ACTIVITY 610 FLOOD WARNING PROGRAM CURRENT SCHEDULE	PROPOSED CHANGE	COMMENTS	DOCUMENTATION
	<p>(d) To receive credit for item 2(a) the flood hazard analysis must describe the probable impacts for different stages of flooding.</p>	<p>NIMS: An analysis of the range of potential impacts is essential for defining capabilities in terms of both capacity and proficiency (what is needed, what is available, what is the deficiency) [See NIMS Guidelines p 3]. CPG 101 [pp.2-17 thru 2-19] See also FEMA Publication 386-2, <i>Understanding Your Risks: Identifying Hazards and Estimating Loss</i>. The hazards analysis helps the team determine what actions must be planned for, and what resources are likely to be needed. This consists of analyzing the hazards faced by the jurisdiction, determining the resource base, and noting characteristics of the jurisdiction that could affect emergency operations.</p>	<p>Hazard analysis requires the planning team to profile the flood hazard and its potential consequences. This includes identifying vulnerable zones and the estimated special extent of the hazard, estimating the lives and property at risk, and identifying critical facilities and community functions that may be impaired.</p>

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	(e) Describe potential areas to be evacuated due to flooding. Explain how evacuation warnings and related public information will be provided to individuals and special facilities.		Identifying specific evacuation zones. These zones delineate the natural and manmade geographic features of the areas(s) to be evacuated. The plan should identify the timing for taking action on the following critical concerns: 1) Alerting the public. 2) Closing schools and businesses. 3) Restricting access to the risk area. 4) Opening mass care facilities. 5) Ordering an evacuation.
	(f) describe the procedures for notifying jurisdictions located on outbound evacuation routes.	NIMS: A continuous flow of critical information is needed among multi-jurisdictional command posts to ensure an effective and coordinated evacuation. [NIMS guidelines p. 6]	
2. Credit Points:	2. Credit Points:		NIMS: Procedures should be written down - not simply understood by those who typically engage in emergency management activities.
(a) 20 points if actions in the response plan are keyed to specific predicted flood levels.	(a) 10 points if actions in the response plan are keyed to specific predicted flood levels.	In 1990 CRS gave 30 points if the plan identified access and evacuation routes and at what flood levels road access would be cut off.	

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<p>(b) 10 points if the plan identifies flood response tasks for community staff and other public and private organizations.</p>	<p>(b)(1) 10 points if the plan identifies flood response tasks and responsible community staff and other public and private organizations with responsibilities related to the flood tasks in the plan.</p>	<p>In 1990 CRS gave 10 points if the plan included explicit assignments for employees and/or emergency volunteers. The National Response Framework (NRF) identifies State, Territorial, Local, and Tribal jurisdiction responsibility to develop detailed, robust all-hazards EOPs. It says these plans must clearly define leadership roles and responsibilities and clearly articulate the decisions that need to be made, who will make them, and when.</p>	<p>Each phase in the schedule:</p> <ol style="list-style-type: none"> 1) Describes actions to be taken in the phase. 2) Identifies the official responsible for the action. 3) Defines the hours needed to carry out the activity. 4) Describes the priority of the action to be taken. 5) Contains other critical information that tasked organizations need to perform their assigned responsibilities.

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	<p>(b)(2) 10 points if specific property loss mitigation actions are included in the response plan based on the flood hazards analysis.</p>	<p>An EOP is usually not a mitigation plan and not a recovery plan. The EOP should however describe and provide the basis for a community's response and short-term recovery operations. The response activities typically take place initially and are designed to save lives, reduce suffering, protect property and the environment. The short-term recovery activities typically follow the response activities and are designed to stabilize the situation and set the stage for re-entry and recovery.</p>	<p>1) Identification of potential locations for the placement of temporary levees and inclusion of this information on the appropriate maps. 2) Address the relocation of government resources, vital records, and equipment to assure continuation of services and to prevent damage or loss. 3) Inspect buildings and other structures to determine whether they are safe to inhabit after a flood has occurred. 4) Protecting in place equipment by disconnecting electrical service, greasing, wrapping and other techniques. 5) Orderly shutdown of production facilities or modifications in procedures to continue operations. 6) Temporary protection of sewage pump stations, wastewater treatment facilities and water treatment plants.</p>

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	<p>(b)(3) 10 points for maintaining a database of people with special needs that require evacuation assistance when a flood warning is issued and for having a plan to provide transportation to secure locations. The plan must include the assumptions used in planning for the emergency evacuation, provide a list of actions pertinent to the evacuation and indicate who will be responsible for carrying out those tasks.</p>	<p>Plans should include strategies for both no-notice and forewarned evacuations, with particular considerations for assisting special-needs populations. Specific procedures and protocols should augment these plans to guide rapid implementation. CPG 101 [p. 6-5]</p>	

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<p>(c) 20 points if the plan includes a summary of estimated staff, equipment, supplies, and time required for each response task and the sources of necessary resources.</p>	<p>(c)(1) 10 points if the community has developed scenarios that identify how flood incidents might develop within the jurisdiction. The scenarios should describe the sequence of events from initial warning to the unfolding of consequences in specific sections of the community.</p>	<p>Planning is concerned with actions that take place in time. Using information from the profile, the planning team should think about how the hazard occurrence would develop in the jurisdiction. The team can imagine the hazard's development from initial warning and its generation of specific consequences (e.g., collapsed buildings; loss of critical services and infrastructure; death, injury, or displacement). Through this brainstorming the team can decide what actions and resources will become necessary. this will also help with the development of planning assumptions to be used in the functional annexes to the plan. CPG 101 [pp.2-20 thru 2-23]</p>	

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	<p>(c)(2) 10 points if the plan includes a summary of estimated staff, equipment, supplies, and time required for each response task and the sources of necessary resources.</p>	<p>In 1990 CRS gave 10 points if the plan listed and gave the locations of equipment and supplies needed to implement the plan.</p>	<p>For each task in the flood response plan, a summary comparison of resources should be kept on file. Data to be collected include a list of what resources are needed to complete each task, the time required to perform the task, and the source(s) available to complete each task. Resource lists that identify the quantity and location of the items mentioned above, as well as points of contact (day, night, and weekend) to obtain them. SLG 101</p>
	<p>(d) Identifies personnel, equipment, facilities, supplies, and other resources available--within the jurisdiction or by agreement with private suppliers or other jurisdictions--for use during response and recovery operations. CPG 101 [p.2-22]</p>	<p>NIMS 2007 local governments to validate the inventory of response assets using FEMA Resources Typing Standards. Agency heads and other potential emergency response team members should know what kinds of resources they have available. This should be compared the resources needed identified in (c)(2) above. Shortfalls may require negotiating agreements with private suppliers or other jurisdictions.</p>	

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	(e) Provide instructions for returning evacuees relating to reoccupancy of damaged homes and businesses, permit requirements and flood loss mitigation measures and programs.		
	(f) Identifies steps to address mitigation concerns during response and recovery activities. SLG 101 [p.1-1]	There is a need for planning to take advantage of mitigation opportunities in the aftermath of an emergency or disaster, when hazard awareness is high, funds may become available (with associated requirements for mitigation), and disruption of the status quo makes it possible to rethink design and location of some facilities and infrastructure. Attention to mitigation opportunities can make safer communities.	
CRITICAL FACILITY PLANNING (CFP) Maximum Credit = 50 points	CRITICAL FACILITY PLANNING (CFP) Maximum Credit = 50 points	Critical Facilities Planning is the coordination of warning efforts with facilities which may have special needs or require special attention during a flood.	
1. Prerequisites:			

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ACTIVITY 610 FLOOD WARNING PROGRAM CURRENT SCHEDULE	PROPOSED CHANGE	COMMENTS	DOCUMENTATION
(a) Community must receive FTR and EWD credits.	SAME		
(b) The community must update the information on its critical facilities at least annually.	SAME	NIMS: It is important to identify critical facilities in order to allow more timely and effective implementation of short-term protective actions and more rapid response and recovery. This will permit access to information-sharing networks and real time incident reporting to achieve more rapid response and recovery. [See NIMS Guidelines p. 14]	Local governments are to maintain an up-to-date, accurate list of individuals to contact in case of an emergency, including names and phone numbers of backup personnel.
2. Credit Points:			
(a) CFP1 = 10 points if the adopted plan includes the names and phone numbers of the operators of all critical facilities affected by flooding.	(a) CFP1 = 15 points if the adopted plan includes the names and phone numbers of the operators of all critical facilities affected by flooding AND includes arrangements for special warnings or early notifications directly to all critical facilities that need early warning.		

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<p>(b) CFP2 = 20 points if the adopted plan includes arrangements for special warnings or early notifications directly to all critical facilities that need early warning.</p>	<p>Merged requirement with (a) above.</p>	<p>In 1990 CRS provided 20 points if there were written instruction on warning special recipients such as the police department, hospitals and hazardous material storage sites.</p>	
	<p>(b) CFP2 = 15 points if the local information management system provides an effective and seamless capability to gather, analyze, disseminate, and use information flood risks and consequences to support prevention and response efforts at critical facilities.</p>	<p>As the response to Hurricane Katrina demonstrated, prompt and effective information sharing and reporting is essential for response activities. Successful responses are dependent upon real-time, accurate situational awareness of both the facts from the disaster area and ongoing response activities. Strengthened information sharing and collaboration capabilities will enable a more accurate situational awareness and allow development of a real-time common operating picture that facilitates the recovery of critical facilities. [See NIMS Guidelines pp. 15 - 16]</p>	<p>Local governments must show they have a single reporting system to ensure critical information reaches the appropriate decision-makers and the public in a timely manner. Check on DHS progress in developing the system for critical facilities.</p>

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<p>(c) CFP3 = 20 points if the critical facilities needing them have their own flood response plans that have been developed, reviewed, or accepted by the community.</p>		<p>A community could require that an individual emergency response plan be developed for critical facilities. This could be developed by the critical facility and reviewed by the agency, or developed for the facility by the agency. An advantage of individual response plans for critical facilities is that during an emergency, required effort by the emergency response team is reduced because the critical facilities are performing some or all of the response themselves. This does create additional effort in setting up and/or maintaining the individual response plan, but alleviates the drain on resources during the actual emergency when those resources are in highest demand.</p>	
	<p>Annual emergency drills should be a requirement of any individual response plan of a critical facility.</p>		

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ACTIVITY 610 FLOOD WARNING PROGRAM CURRENT SCHEDULE	PROPOSED CHANGE	COMMENTS	DOCUMENTATION
StormReady COMMUNITY (SRC) Maximum Credit = 25 points	StormReady COMMUNITY (SRC) Maximum Credit = 20 points		
1. Prerequisites:			
(a) Community must receive FTR credit.			
(b) Flood warning program must forecast the flood arrival time and peak flow or elevation of floods.			
2. Credit Points:			
25 points if the community obtains and maintains SRC designation by the National Weather Service.			

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ACTIVITY 610 FLOOD WARNING PROGRAM CURRENT SCHEDULE	PROPOSED CHANGE	COMMENTS	DOCUMENTATION
<p align="center">TsunamiReady COMMUNITY Maximum Credit = 30 points</p>	<p align="center">TsunamiReady COMMUNITY Maximum Credit = 25 points</p>		
<p>1. Prerequisites:</p>			
<p>(a) Community must receive FTR credit.</p>			
<p>(b) Flood warning program must forecast the arrival of the tsunami wave.</p>			
<p>(c)(1) Meet the CRS tsunami hazards mapping requirements</p>			
<p>(c)(2) Adopt a tsunami hazards operations plan that describes the actions the community is to take upon receiving a tsunami warning.</p>			
<p>2. Credit Points:</p>			
<p>30 points if the community obtains and maintains the TsunamiReady designation by the National Weather Service.</p>			

Community Name: _____

CID Number: _____

If the jurisdiction is a municipality:			Yes/No
Does the municipality have floodplain management authority in its extraterritorial area?			
Does the municipality provide flood warning to the public in all of its extraterritorial area?			
If the municipality provides flood warning in only a portion of the flood hazard area, provide an explanation describing where the service is provided.			List attachment Number:
<u>Flood Threat Recognition:</u>			
Sources of Flooding	Type of Flooding	Stream and Rain Gages	Flood Stage or Discharge Attach Description
1			
2			
3			
4			
5			
6			
7			
8			
9			
<u>Buildings and Facilities Subject to Flooding by Flooding Source</u>			
Flooding Source	Number of Single-family Residential Buildings	Number of Non-Residential Buildings	List Critical Facilities
1			
2			
3			
4			
5			
6			
7			
8			
9			

Community Name: _____

CID Number: _____

<u>Flood Warning System Description</u>	Yes or No	Description Location in Emergency Operations Plan	List attachment Number
Are any of the stream or rain gages operated by the local government?			
If gages are operated by the local government, is there a system to determine that the data from the gages are reliable?			
Does the community have formal written policies and procedures for the maintenance of precipitation and stream gages?			
Are flood warnings received 24/7?			
Does the local government have written procedures that tell warning point personnel when, how and what messages to issue.			
Does the local government use pre-scripted messages that can be easily modified to address current flooding conditions?			
<u>Vulnerability Analysis:</u>	In SFHA - Yes or No	In 500-year or CAT 4/5	Identify Actions in Emergency Response Plan. List Attachment No.
Critical Facilities			
City Hall			
Police station(s) (Include information for each)			
Fire station(s) (Include information for each)			
Communications facilities			
Emergency Operations Center			
Schools (Include information for each school)			
Public shelter(s) (Include information for each shelter)			
Hospital(s) (Include information for each hospital)			

Community Name: _____

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<u>Vulnerability Analysis:</u>	In SFHA - Yes or No	In 500-year or CAT 4/5	Identify Actions in Emergency Response Plan. List Attachment No.
Critical Facilities			
Nursing Homes (Include information for each)			
Houses with occupants who may not be sufficiently mobile to avoid death or injury during a flood.			
Daycare Centers (Include those for children, and those that serve the elderly and handicapped)			
Hazardous Material Sites (Include information for each required to file a SARA Title III report)			
Sewage Treatment Facilities			
Water Treatment Plants (Include information for each)			
Airports			
Dams			
Levees			
<u>Transportation Concerns</u>	Yes or No	Identify Actions in Emergency Response Plan. List Attachment No.	Identify Mitigation Actions and list Attachment No.
Will bridge(s) be unusable?			
Will roads blocked by storm debris be cleared in less than 24 hours?			
Will washout roads be passable in 24 hours?			
Will flooded areas (tunnels, roads in low-lying areas) be operational within 24 hours?			

Community Name: _____

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<u>Emergency Warning:</u>	Yes or No	Identify Actions in the Emergency Response Plan. List Attachment No.
Will flood warnings be needed for some areas of the community?		
Does the plan provide for timely advanced warning of the public?		
Will the general public be notified of a flood that occurs at night?		
Will multiple methods of communications be used to provide flood warnings to the public on a 24/7 basis?		
Does the community have a policy on warning dissemination, including who can issue a warning and draft pre-scripted messages?		
<u>Evacuation:</u>	Yes or No	Identify Actions in the Emergency Response Plan. List Attachment No.
Are there areas of the community that may need to be evacuated during a flood?		
Could flooding restrict the use of evacuation routes or resources?		
Have designated evacuation routes been publicized?		
Does the plan include provisions to respond to accidents and disabled vehicles that may block the evacuation routes?		
Will some of your citizens or visitors need assistance with evacuation?		
Have residents with "special needs" been registered for evacuation assistance?		
Will outside supplemental forces be needed to carryout the evacuation?		
Will some areas of the community need security during the evacuation?		

Community Name: _____

CID Number: _____

<u>Evacuation: (continued)</u>	Yes or No	Identify Actions in the Emergency Response Plan. List Attachment No.
Will emergency transportation be provided for those with medical needs?		
If needed, is the issuance of an evacuation order coordinated with other jurisdictions?		
Has a traffic control plan been established?		
Is the evacuation time based?		
<u>Shelters:</u>	Yes or No	Identify Actions in the Emergency Response Plan. List Attachment No.
Will shelters be opened during an evacuation?		
Are the shelter locations outside of the flood hazard area and accessible during the flood?		
Have enough safe shelter spaces been identified to accommodate the number of expected evacuees?		
How will those with special medical needs be accommodated at shelters?		
Will outside personnel and resources be needed during the response and/or recovery?		
<u>Response and Mitigation:</u>	Yes or No	Identify Actions in the Emergency Response Plan. List Attachment No.
Does the emergency operations plan [or annexes to the plan] identify flood response activities based on the level of the flood threat [inundation] expected?		
Does the emergency operations plan [or annexes to the plan] identify resources required to carryout the flood response and mitigation activities identified in the plan?		
Is flooding a potential threat to public safety resources within the community?		

Community Name: _____

CID Number: _____

<u>Response and Mitigation (continued)</u>	Yes or No	Identify Actions in the Emergency Response Plan. List Attachment No.
Does the community have emergency provisions to enable the orderly issuance of buildings permits for recovery activities?		
Does the community have plans describing how building inspections be completed following the flood?		
Does the community have a plan for obtaining outside resources to assist with building evaluations, permits, and inspections following a flood?		
Has the community identified response measures that can reduce the threats to public safety resources?		
Will flooding cause environmental or health problems that can be mitigated by response actions?		
Does the community provide special services to assist property owners, such as sand and sandbags, volunteers, etc.?		
Are there critical facilities in the floodplain the need advanced warning for evacuation or to complete mitigation actions before flood water reaches the facility or cuts off evacuation routes?		
Are there public records and equipment that need to be protected during a flood?		
<u>Employees:</u>	Yes or No	Identify Actions in the Emergency Response Plan. List Attachment No.
Does the community have employees who live in the flood hazard area?		
Does the emergency operations plan provide time for employees to evacuate their families and complete property protection measures?		

Community Name: _____

CID Number: _____

<u>Employees (continued)</u>	Yes or No	Identify Actions in the Emergency Response Plan. List Attachment No.
Have provisions been made to provide temporary housing for employees who are disaster victims?		
Have provisions been made to assist employees who are disaster victims to obtain relief supplies, file insurance claims, obtain federal assistance, etc.?		