Task 7: Flood Response Information and Activities

Source: Hays County Onion Creek Flood Photo

Overview

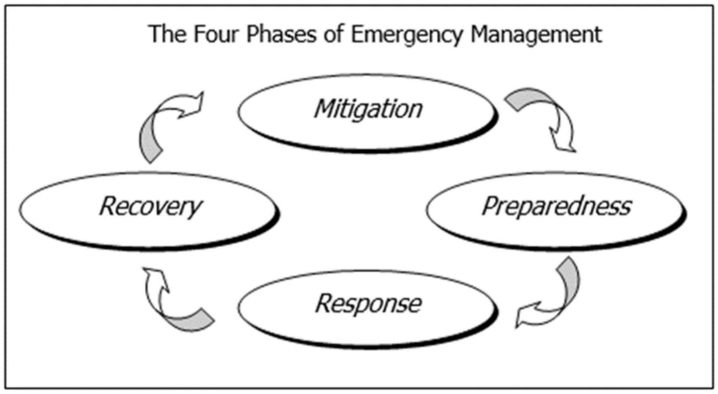
Pursuant to the Texas Water Development Board (TWDB) rules and guidelines for Task 7, this chapter presents a summary of "…the nature and types of flood response preparations within the flood planning region, including providing where more detailed information is available regarding recovery." This task does not include analyses or other activities related to planning for disaster response or disaster recovery.

Introduction

In 2011, a Presidential Policy Directive[1] was issued establishing a national preparedness goal "…aimed at strengthening the security and resilience of the United States through systematic preparation for the threats that pose the greatest risk to the security of the Nation, including … catastrophic natural disasters." The directive also established the National Preparedness System, which includes a series of "integrated national planning frameworks" that address prevention, protection, mitigation, response, and recovery. Together these establish an overall institutional framework through which flood response preparedness is planned and implemented at the federal, state, and local levels of government. As depicted in *Figure 7.1,* this national framework for emergency management is organized around four phases: mitigation, preparedness, response, and recovery.

[1] Presidential Policy Directive/PPD-8. National Preparedness. The White House, March 30, 2011. Available at: https://www.dhs.gov/xlibrary/assets/presidential-policy-directive-8-national-preparedness.pdf

Figure 7.1 The Four Phases of Emergency Management



Source: FEMA, 1998

Table 7.1 Definitions and Examples of the Four Phases of Emergency Management

Phase	Definition	Examples
Flood Preparedness	Actions, aside from mitigation, that are taken before flood events to prepare for floods and plan flood response activities	Flood awareness education, emergency management and evacuation plans, and the development of flood early warning systems
Flood Response	Actions taken during and in the immediate aftermath of a flood event	Conduct evacuations, establish and operate shelters, road closures, and operation of flood early warning systems
Flood Recovery	Actions are taken after a flood event involving clean-up, repairs, or other actions necessary to return to pre-event conditions	Restoration of utilities and infrastructure, debris clean-up, insurance payouts, rebuilding resiliently
Flood Mitigation	The implementation of actions, including both structural and non-structural solutions, to reduce flood risk to protect against the loss of life and property	Building floodwalls/seawalls, floodgates, and levees; establishing evacuation routes; elevating structures; property buyouts and relocations; and regulatory measures

Note: Table adapted from the TWDB Guidance, which was adapted from Animals in Disaster, Module A, Awareness, and Preparedness (FEMA, 1998)

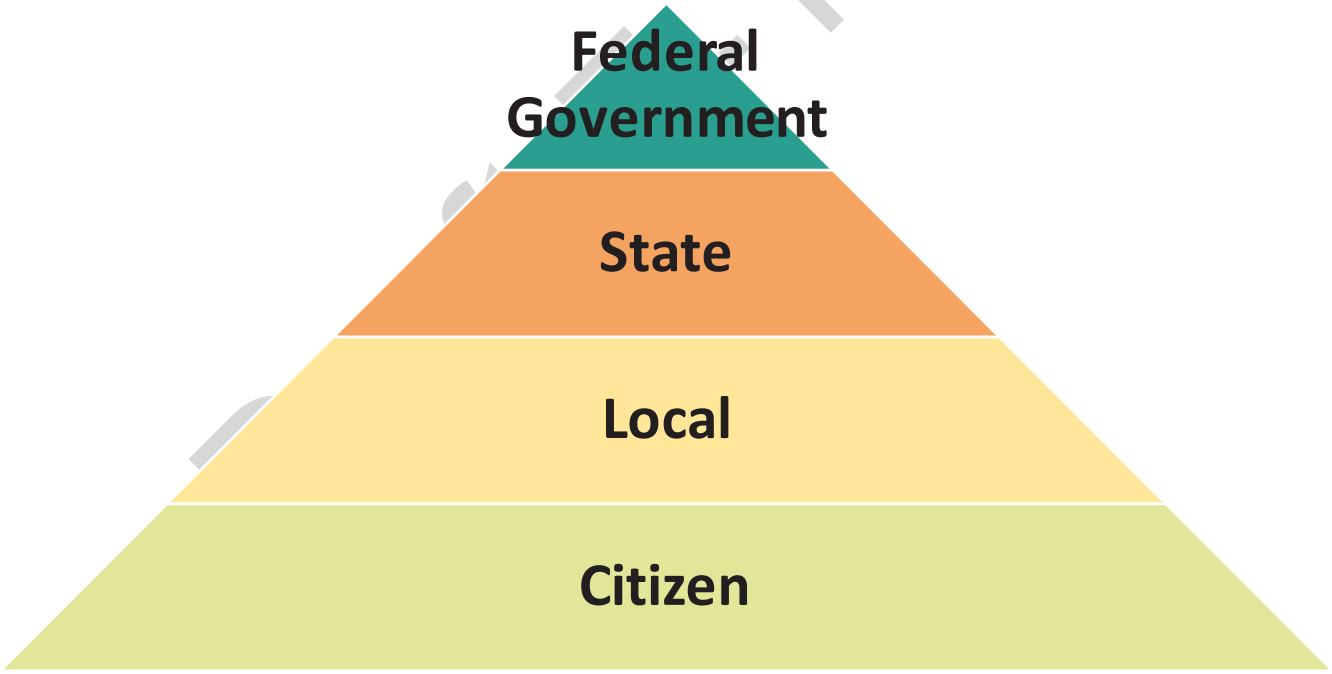
As set out in the TWDB's requirements and guidance for regional flood planning, this chapter is focused on three of the four emergency management phases: preparedness, response, and recovery. Flood mitigation or flood risk reduction is, of course, a primary focus of this Lower Colorado-Lavaca Regional Flood Plan but is not addressed in this chapter. The chapter is organized into three sections: roles and

responsibilities for flood emergency preparedness and management; acquisition and dissemination of real-time data and information in advance of and during flood events, often referred to as "flood early warning"; and public education and awareness of flood risk and flood preparedness measures that can be taken by at-risk individuals, businesses, and other organizations. This chapter provides an overall state of flood preparedness in the Lower Colorado-Lavaca Region.

Roles and Responsibilities for Flood Emergency Preparedness, Response, and Recovery

Responsibility for flood emergency preparedness, response, and recovery is a shared responsibility between multiple federal agencies, the states (and tribes and territories), and communities (i.e., individuals, businesses, and local government) operating within the national emergency management framework. Additionally, the United States Department of Homeland Security has established the National Incident Management System, which "…provides a consistent nationwide template to enable partners across the Nation to work together to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity."[2]

Figure 7.2 Emergency Management Support



Source: Emergency Management Institute, Are You Ready?

In many respects, the institutional framework for flood emergency preparedness, response, and recovery is "bottom-up." Much of the responsibility and authority for emergency management rests

[2] Federal Emergency Management Agency, National Incident Management System, Third Edition, October 2017.

with local government and the communities they serve. This allows emergency management processes and activities to be tailored to only those areas affected by a natural disaster, such as a flood emergency. That said, federal and state agencies play a critical and central role in coordinating emergency management activities and providing support and assistance to local entities in emergency preparedness planning, emergency response, and post-disaster recovery. Starting with the federal role, the following presents a discussion of the emergency management roles and responsibilities at each level of government.

Federal Emergency Management Responsibilities

Nationally, the Federal Emergency Management Agency (FEMA) and their federal agency partners have legal authorities, technical and financial resources, and programs to assist state and local governments with flood preparedness and emergency response and with flood risk reduction through prevention and mitigation. Below is a brief description of the lead role played by FEMA at the federal level in flood emergency preparedness, response, and recovery.

Federal Emergency Management Agency (FEMA)

FEMA is an agency of the United States Department of Homeland Security (DHS). FEMA's primary focus is to coordinate the response to all types of disasters in the United States and its territories, particularly those of a magnitude that may overwhelm the capabilities and resources of state and local authorities. At the federal level, FEMA plays the central role in helping people before, during, and after disasters.

Specifically, FEMA assists with:

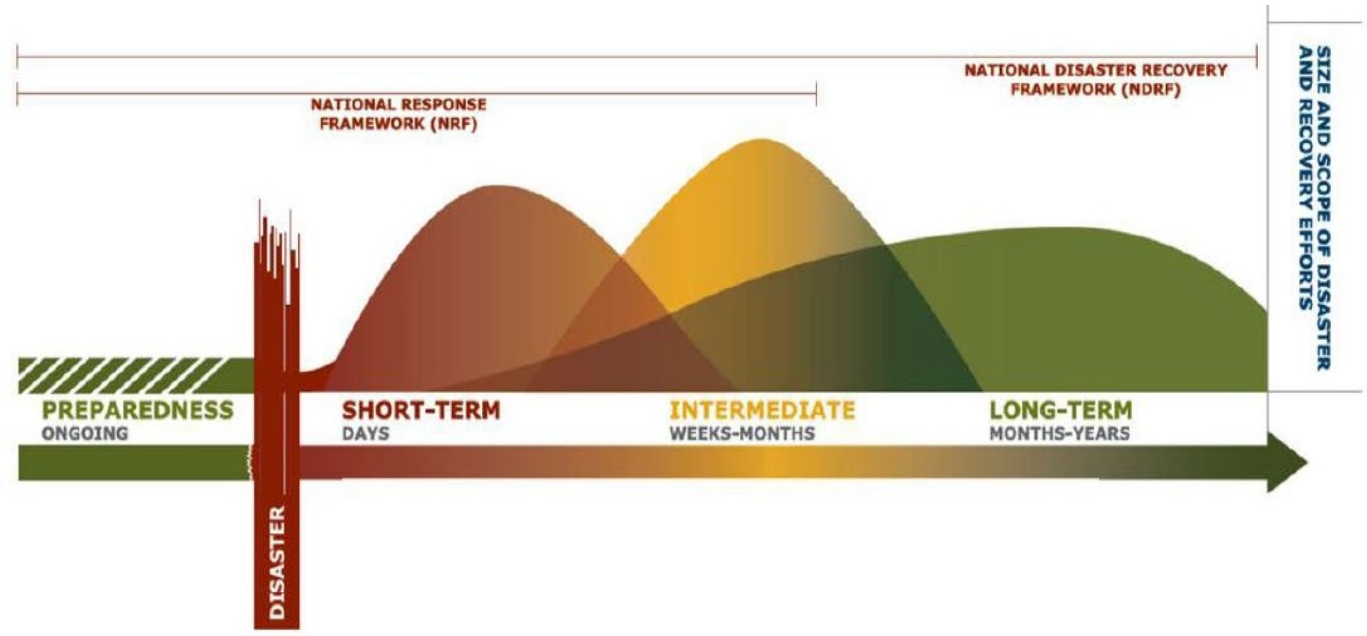
- Public outreach and education, through raising flood risk awareness, informing the public and interest groups about flood risk reduction options, and providing technical and financial assistance with flood emergency planning and preparedness;
- Coordination of the federal response to flood disasters and mobilization and management of the federal resources during disasters; and
- Coordination of the federal disaster recovery efforts and provision of resources.

By law, FEMA is tasked with a lead role in disaster prevention, protection, mitigation, response, and recovery, consistent with the agency's statutory authorities. FEMA has incorporated the Presidential Policy Directive into their established emergency management program, which focuses on the four-phase *all-hazards* approach to emergency management that is implemented in partnership with state and local government, private sector entities, and non-governmental organizations (e.g., the American Red Cross). As discussed in some detail in Chapter 3, FEMA also plays a key role nationally in flood risk prevention and reduction as the administering agency for the National Flood Insurance Program (NFIP). As noted in Chapter 3, nearly all eligible local entities in the Lower Colorado-Lavaca Region are current participants in the NFIP. They, therefore, have adopted and enforced at least the minimum required standards for floodplain management.

FEMA also oversees the National Disaster Recovery Framework to promote disaster effectiveness. A core component of the National Disaster Recovery Framework advances the concept that recovery extends beyond simply repairing damaged structures. It also includes "the continuation or restoration of

services critical to supporting the physical, emotional, and financial well-being of impacted community members."[3] In other words, it includes the restoration and strengthening of key systems and assets critical to the community's long-term vitality. One of the key concepts of the National Disaster Recovery Framework is the Recovery Continuum—an acknowledgment that the foundation for a strong recovery starts with effective pre-incident preparedness planning (*Figure 7.3*).

Figure 7.3 National Disaster Recovery Framework (NDRF) Recovery Continuum



FEMA also has the lead role in initiating federal emergency response actions and for mobilizing and coordinating federal resources in "real-time" immediately before and during flood disasters. This involves coordinating with the Governors of affected states and state emergency management agencies and the Texas Division of Emergency Management (TDEM). State Emergency Managers coordinate with local officials in impacted areas, primarily at the county level, and county officials coordinate and collaborate with the local officials. During the pre-event preparedness and response phases, FEMA's authority and resources may be bolstered by an "Emergency Declaration" by the President, which is one of two types of federal disaster declarations provided for in the federal Stafford Act (42 U.S.C. §§ 5121-5207). For Emergency Declarations, the President can declare an emergency for any occasion or instance where there is a need for federal assistance. Emergency Declarations are generally issued in response to a direct request from the Governor of the affected state and/or upon recommendation of FEMA.

An Emergency Declaration intends to enable the federal government to mobilize resources in real-time to support and supplement state and local efforts to "…provide emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe

[3] NRDF. Available at: https://www.fema.gov/sites/default/files/2020-06/national_disaster_recovery_framework_2nd.pdf

in any part of the United States."[4] Once the President issues an Emergency Declaration, FEMA can assist state and local entities with debris removal and implementation of emergency protective measures. Before an imminent natural disaster and often in advance of an Emergency Declaration, FEMA may also place federal resources on standby or even pre-position federal personnel and other resources; for example, to have personnel and equipment at the ready to aid in rescue operations and/or to prepare for the recovery phase, such as by pre-positioning of drinking water and food to expedite delivery to impacted areas. The Governor of an affected state may, in some circumstances, request and receive a Pre-Disaster Emergency Declaration, which enables FEMA to assist with emergency protective measures.

The second type of federal disaster declaration is a "Major Disaster Declaration," issued only by the President and considered in the aftermath of a major natural disaster. Major disasters are any natural event (e.g., hurricanes, severe storms, floods, water, tidal waves, etc.) where it has been determined that the damage is of such severity that it is beyond the combined capabilities of state and local government. A major disaster declaration provides for a wide range of federal assistance programs for both impacted individuals, businesses, public infrastructure, and for continuity of local governmental operations. All requests for a presidential declaration of a major disaster are made by the Governor of the affected state or territory.

FEMA plays a central role in the process for issuance of Major Disaster Declarations, which are required for full mobilization of federal disaster recovery resources. The process begins with a preliminary damage assessment, often conducted jointly by FEMA and state officials and agencies, such as TDEM, and with the participation of affected local entities. In this step, the extent of the disaster is assessed along with impacts on the public and public facilities. From the assessment, a preliminary determination is made as to the types of federal assistance that may be needed. Typically, the preliminary damage assessment provides the basis for a Governor's request for a Major Disaster Declaration. However, in some cases where the magnitude of the disaster is such that the level of damage and the need for federal assistance is overwhelming and apparent, a Major Disaster Declaration may be requested before the completion of the preliminary assessment.

Other Federal Agency Partners

Several federal agencies partner with FEMA to provide support and assistance before, during, and after flood emergencies and disasters. For example, the United States Army Corps of Engineers often has a lead role as the federal contracting agency for acquiring, pre-positioning, and distributing drinking water, food supplies, equipment, and other goods and services. FEMA may also call upon them and other federal agencies to provide personnel and available equipment for debris removal or other recovery activities. Another example is the Small Business Administration, an agency of the United States Department of Commerce, which is often mobilized to assist impacted businesses with recovery by providing loans or other assistance.

[4] FEMA Declarations. Available at: https://www.fema.gov/disaster/how-declared.

State Emergency Management Responsibilities

As indicated in the above discussion, at the state level, the Governor and the Texas Division of Emergency Management (TDEM) also have central roles in emergency management before, during, and after flood emergencies and disasters. The Governor, for example, has the authority to issue State Disaster Declarations and, in doing so, mobilize and deploy state resources to prepare for and respond to natural disasters. This may include the deployment of state personnel or the National Guard to support public safety activities, such as a large-scale evacuation, as well as provision of material support, such as the deployment of equipment for clean-up in the immediate aftermath of a disaster and during the recovery phase. Most importantly, as noted, it is the Governor that can make requests for presidential Emergency Declarations and Major Disaster Declarations.

TDEM is an administrative unit of the Texas A&M University System and is the state agency charged with implementing the state's all-hazard emergency management program. A key TDEM responsibility is supporting the Governor with the state and federal emergency declaration and response processes. With this role, TDEM serves as the primary point of contact with FEMA, counties, and other local entities before and during flood emergencies. During the recovery phase, TDEM plays a central role in coordinating the participation of affected state and local entities in conducting preliminary damage assessments. Specifically, TDEM has a lead role in collecting, compiling, and analyzing data and information provided by local authorities regarding the extent of damages to public infrastructure and facilities, impacts on individuals and businesses, and costs for local response and recovery activities. Other responsibilities include disaster preparedness activities, including state and local emergency management planning, hazard mitigation planning, and training local officials and emergency management personnel.

Local Emergency Management Responsibilities

As noted previously, in many respects, emergency management is a bottom-up process with a large portion of the responsibility related to flood emergency preparedness, response, and recovery residing at the local level. In Texas, counties and municipalities are at the frontline of emergency management. The chief executives of these local governmental entities – county judges and mayors – have the authority under state law to declare local disasters and oversee local and/or inter-jurisdictional emergency management functions. As stated in Chapter 418 of the Texas Government Code and Title 37, Part 1, Chapter 7 of the Texas Administrative Code, these officials are authorized to declare local disasters.[5] A local disaster declaration allows public officials to exercise emergency powers to preserve life, property, and public health. For example, county or city officials can order evacuations from and control access to threatened or impacted areas under a local disaster declaration and temporarily suspend certain rules and regulations. Local disaster declarations are very often the first step in the process of requesting state and federal assistance.

[5] TWCA Emergency Management Guidebook. Available at: https://www.twcarmf.org/wp-content/uploads/2018/07/TWCARMF-Emergency_Management_Guide.pdf.

Flood Early Warning - Flood Data Acquisition, Monitoring, and Dissemination

It is widely recognized that an important element of flood preparedness and flood emergency response is the ability to alert or warn threatened and vulnerable populations about potential flood conditions before they occur so that timely actions can be taken "…to ensure their own safety and to minimize damage to their homes, businesses, and personal property." Early warning of impending flooding can significantly reduce loss of life and property damage from flooding. Sometimes referred to as Flood Early Warning Systems (FEWS), these "systems" are best viewed as an integration of various components that, in combination, provide the technical and operational capabilities required to warn at-risk populations of impending flood threats. These are flood risk knowledge, real-time data acquisition, monitoring and forecasting, and dissemination of data and warnings. All of these components of flood early warning provide information that is critical for proactive flood emergency response. Each of these elements of flood early warning is briefly discussed below.

Flood Risk Knowledge

Understanding flood risk is the starting point and underpins any approach to flood early warning. In simple terms, it is an understanding of flood hazards, exposures to such hazards and vulnerabilities to flood hazards, all of which have been evaluated in this planning process for the Lower Colorado-Lavaca Region, the results of which are reported in Chapter 2. Flood hazard assessment is a product of hydrologic and hydraulic analysis of watersheds, streams, rivers, and floodways using historical rainfall and other pertinent data to establish the stage (the height of water in a stream channel or floodway), the volume of flood flows generated by the contributing watershed(s), the volume and timing of water entering and moving through a stream system, and the use of topographic data to define the geometric characteristics of a stream or river. In combination, this information provides analytical tools (e.g., numerical models and geospatial representations/maps) that inform where flood waters are originating, where they will go, the stage and velocity of flood flow at a given point along a stream or floodway, and zones of inundation. The second essential piece of the flood risk puzzle is understanding what is exposed to flood hazards under varying conditions – people, property, and infrastructure. The third piece is to understand the vulnerability or degree of risk faced by exposed populations, property, infrastructure, etc.

In terms of flood early warning systems, the information provided by a flood hazard-exposure-vulnerability assessment allows emergency management professionals to determine where the greatest threats exist and under what conditions, particularly threats to vulnerable populations in high flood risk areas. For example, how many occupied structures are located in a 25-year or 100-year floodplain at a given location along a stream corridor. This information enables emergency management professionals to understand where real-time data collection points (e.g., stream gauges, weather stations) are needed and provides an ability to target specific locations and populations for flood warnings.

Real-Time Data Acquisition and Dissemination

A second essential component of flood early warning is the ability to acquire and process relevant real-time weather and hydrologic data. Multiple sources of such data are available from federal, state, regional, and local agencies.

A primary data source is the National Weather Service (NWS), an agency of the National Oceanic and Atmospheric Administration. The NWS's mission is to "Provide weather, water, and climate data, forecasts, warnings, and impact-based support services for the protection of life and property and enhancement of the national economy."[6] In performing its mission, the NWS works in partnership with a host of other federal agencies, such as the United States Geological Survey, the United States Army Corps of Engineers, the Natural Resources Conservation Service, and other organizations.

The NWS provides many weather and water-related products that serve as useful inputs for flood early warning and are well-known to emergency management personnel and other primary users of the products. These include access to real-time rainfall data, rainfall forecasts, and river forecasts at various time scales. For example, the NWS can provide hourly forecasts to guide decisions before and during flash floods and support local flood warning systems. NWS regional river forecast centers also provide river forecasting services and products. The Lower Colorado-Lavaca Region is located in the NWS' West Gulf Coast River Forecast Center.

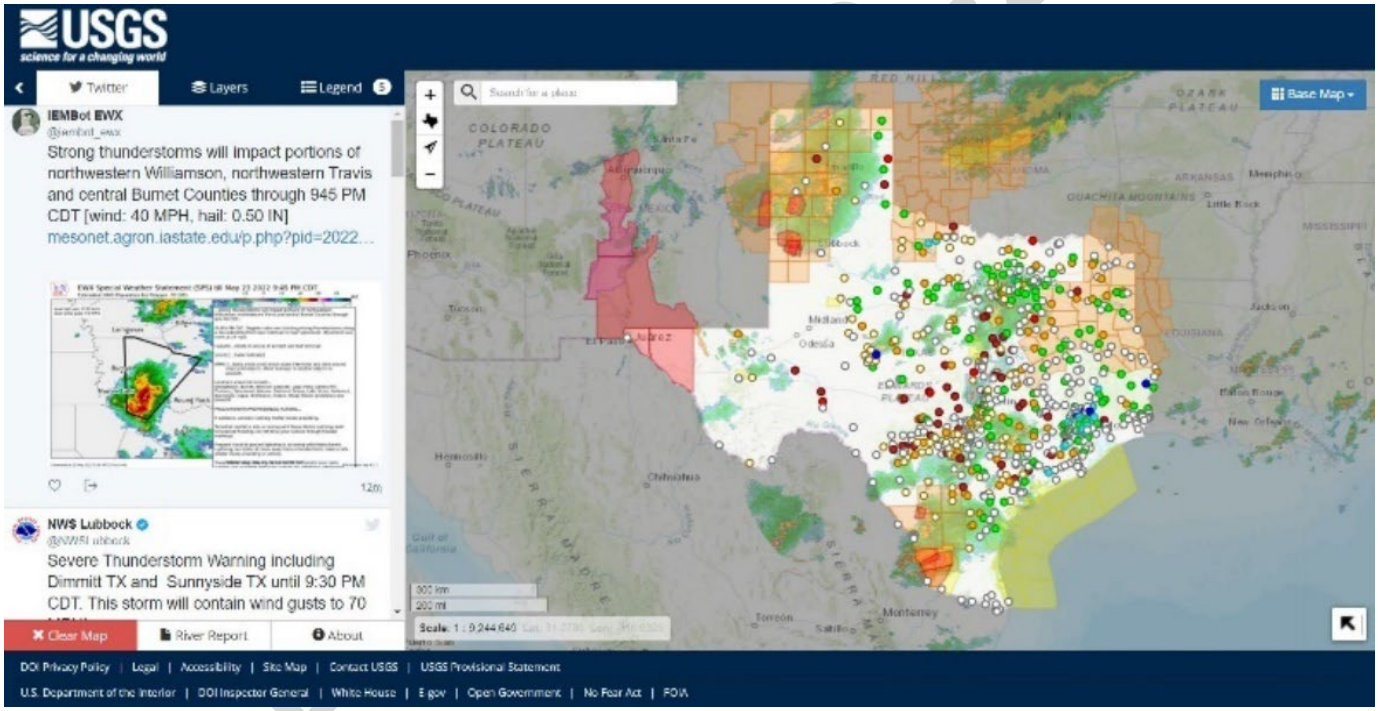
In addition to the weather, water, and climate data and forecasting products it provides, the NWS also administers the Weather-Ready Nation (WRN) program, which has a goal of providing "…forecast information in a way that better supports emergency managers, first responders, government officials, businesses and the public to make fast, smart decisions to save lives and property and enhance livelihoods."[7] This program is a partnership and collaboration between NWS and various external partners – Weather-Ready Nation Ambassadors – such as affiliated industry partners (e.g., the American Weather and Climate Industry Association), the emergency management community, and media partners. WRN Ambassadors in Central Texas include the Central Texas Disaster Action Response Team, the University of Texas at Austin, and the Williamson County Office of Emergency Management. WRN emergency warnings for various weather events are disseminated through a nationwide emergency alert system known as Wireless Emergency Alerts (WEA).

The NWS also administers the StormReady® program, which employs a grassroots approach "to help communities develop plans to handle all types of serve weather" through advanced planning, education, and awareness.[8] Several NWS Water Forecast Offices serve different portions of the Lower Colorado-Lavaca Region.

[6] NWS. Available at: https://www.weather.gov/about/
[7] NWS Weather-Ready Nation. Available at: https://www.weather.gov/wrn/about
[8] NWS StormReady®. Available at: https://www.weather.gov/wrn/collaborate

As noted, the United States Geological Survey (USGS) partners with the NWS to collect and provide access to data used for early warnings of a flood. Notably, the USGS provides the National Water Information System (NWIS) web application, which provides access to real-time and historical surface-water, groundwater, water quality, and water-use data collected at approximately 1.5 million sites across all 50 states and territories (*Figure 7.4*). The types of data collected include surface water data such as stream gage height to measure flood stage and streamflow for larger streams, rivers, and reservoirs.[9] The NWIS also ties into real-time weather information. In Texas, the NWIS provides access to 750 "real-time stream, lake, reservoir, precipitation, and groundwater stations in context with current weather and hazard conditions on both desktop and mobile devices."[10] The data is collected and then disseminated or made available to federal, state and local agencies, public and private utilities, and the public. In Texas, USGS disseminates NWIS data via Twitter at @USGS_TexasFlood and @USGS_TexasRain on current water level and precipitation data during flooding or severe rainfall events.

Figure 7.4 USGS NWIS Texas Water Dashboard [11]



Forecasting and Warnings

The data resources described above are critical inputs to the users of such information, particularly for emergency management personnel and decision-makers, before and during floods. Local emergency managers use the hydrologic and weather data and forecasts derived from such data to decide whether to issue alerts and warnings and whether to mobilize personnel and resources, such as first responders,

[9] USGS NWIS. Available at: https://waterdata.usgs.gov/nwis
[10] USGS Texas NWIS. Available at: https://waterdata.usgs.gov/tx/nwis/rt
[11] USGS Texas NWIS Dashboard. https://txpub.usgs.gov/txwaterdashboard/index.html

swift water rescue teams, and personnel and equipment needed for road closures. The NWS and other forecasters use real-time hydrological and weather data as inputs to sophisticated forecasting models to predict where, when, and how much rainfall is likely to fall over a given area and for an estimated duration. This forecasting information is then used in predictive models to estimate the stage, discharge, and duration of flood flows at various locations along a receiving stream, river, or reservoir. With this information, along with information about flood hazard areas and exposure information, emergency managers can make informed decisions about when and where impactful flooding can be expected and issue alerts and warnings.

Importantly, the NWS data, forecasts, bulletins, alerts, and warnings are accessible by all state and local jurisdictions, the media, and the public throughout the Lower Colorado-Lavaca Region.

Within the Lower Colorado-Lavaca Region, several entities also disseminate flood alerts and warnings, including the Lower Colorado River Authority (LCRA), which alerts subscribers to the LCRA Flood Operations Notification Service (LCRA FONS). This includes media, emergency managers, and the public. Notifications are by email, text, and/or recorded phone call and are focused on flood operations of the Highland Lakes system and river flooding conditions downstream of the lakes. LCRA also provides information via floodstatus.lcra.org, in its Flood Operations Report, on Twitter and Facebook, and on radio, via the NOAA Weather Radio All Hazards radio rebroadcasts on AM 1610 in the Highland Lakes area and AM 1670 along the Colorado River downstream of Austin.[12]

Another source of information, alerts, and warnings about flooding in a portion of the Lower Colorado-Lavaca Region is the Warn Central Texas service (WarnCentralTexas.org). This is an emergency notification system operated by the Capital Area Council of Governments (CAPCOG), which serves a 10-county area of Central Texas. Much like the LCRA notification system, WarnCentralTexas is a public portal for people to register for a Regional Notification System – a regional emergency and disaster preparedness resource for subscribers.[13] Local jurisdictions in the CAPCOG region generate alerts, warnings, and advisories disseminated through the WarnCentralTexas service via telephone, email, and text. In addition to emergency messages from the local jurisdictions, participants may also receive automated warnings from the National Weather Service for weather events such as tornados, severe thunderstorms, and flash floods.

After devastating floods on the Blanco River in 2015, the Hays County Office of Emergency Services initiated efforts to improve flood monitoring across the county. This includes new stream gauges on the Blanco River and rain gauges and monitoring the status of low water crossings. This includes low water crossings within the Onion Creek watershed in the northern portion of the county within the Lower Colorado-Lavaca Region. Public media access to real-time emergency information is provided through the Hays Informed website (haysinformed.com). The Office of Emergency Services also provides a

[12] LCRA Flood Information. Available at: https://www.lcra.org/water/floods/
[13] WarnCentralTexas.org. Available at: https://warncentraltexas.org/

restricted access Hays Informed blog for authorized governmental jurisdictions, including emergency responders, school districts, cities, utilities, and law enforcement.

The City of Austin's Flood Early Warning System (FEWS), which in many respects is state-of-the-art, continuously monitors rainfall, stream water levels and flows, and low water crossings at 130 locations. It also produces gauge-adjusted radar rainfall measurement data. Additionally, FEWS personnel uses predictive models in real-time during floods for immediate near-term forecasting of when and where severe stream flooding conditions are expected. The Austin FEWS is maintained and operated by the City's Watershed Protection Department.[14]

The City of Austin FEWS provides essential early warning information, particularly in flash floods where hazardous flooding conditions can develop quickly, and rapid decision-making and emergency response is critical. The City of Austin's FEWS, both its technical capabilities and the personnel that manage the system, are integral to City and Travis County emergency operations immediately before and during flood emergencies. During a flood, FEWS personnel works closely with emergency management decision-makers to provide accurate and timely information and advice about potential flooding in advance of major storms, current real-time conditions, and predictive information about future near-term flooding. This allows for timely decision-making regarding issuing warnings to the public and the media, deployment of first responders, road closures, and evacuations.

Public Awareness and Education

A critical element of flood emergency preparedness, and response, is public awareness of flood risks and public education as to actions that individuals can take in advance of and during floods. In terms of public safety, many factors may determine the number of lives saved or lost when flood disasters occur. One factor is what the community – local government, individuals, businesses, and community organizations – has done to reduce flood risks and prepare for flood emergencies. For example, putting in place plans for the evacuation of areas threatened by flooding, having properly trained and equipped personnel to control access to high-risk areas (e.g., road closures), or conducting flood rescue operations. A second and often determinant factor is how individuals act or fail to act appropriately during major flood events. Public awareness and education are key to community and individual preparedness and response.

Many governmental and non-governmental entities engage to some degree in flood awareness, flood preparedness, and flood safety outreach and education. For example, and as noted previously, flood risk awareness, preparedness, and safety messaging are part and parcel of the missions and day-to-day work of many entities in the flood "space" – at the federal level, the National Weather Service, the United States Army Corps of Engineers, the United States Department of Education, the federal Occupational and Safety Administration; in Texas, the Texas Division of Emergency Management, Texas Water

[14] City of Austin FEWS. Available at: https://www.austintexas.gov/department/flood-early-warning-system

Development Board, Texas A&M AgriLife Extension Service; and the Texas Floodplain Management Association, other professional organizations; and many others at the local level and in the private sector. These and many other entities offer flood awareness, preparedness, and safety educational resources, many of which can be easily found and accessed online (tip – search the web for "flood safety education").

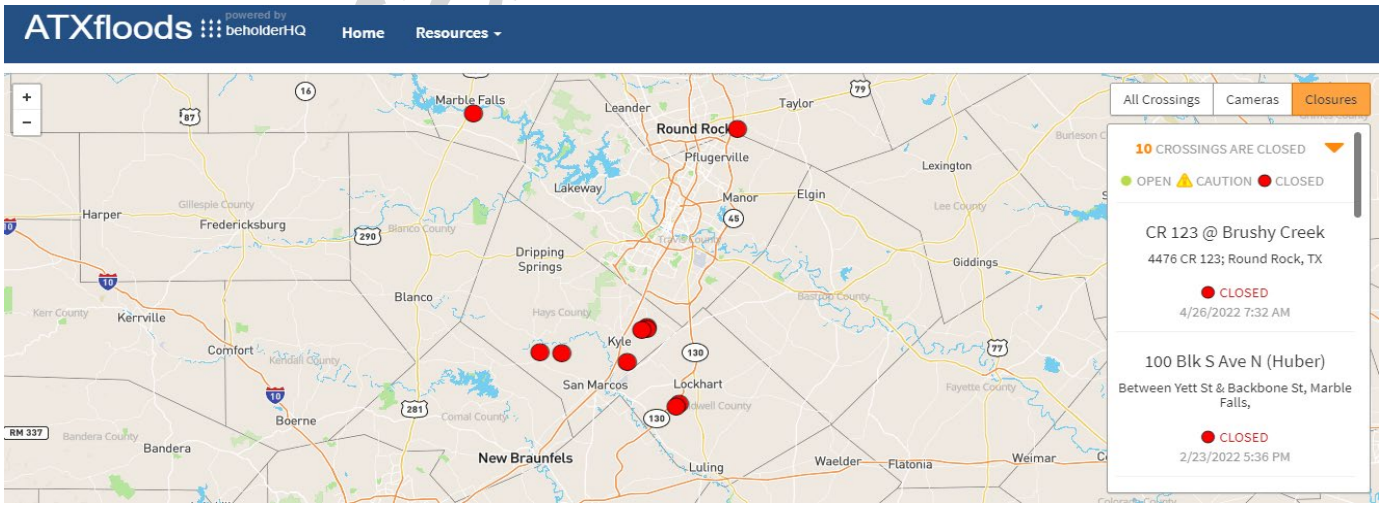
Within the Lower Colorado-Lavaca Region, the City of Austin stands out because of the breadth and reach of its flood awareness and flood safety outreach and education programs. Breadth in terms of content and messaging tailored to adult and school-age audiences and their multi-media approach (e.g., broadcast, print, social). Also, the geographic reach of Austin's flood awareness and education efforts is such that a very large portion of the Lower Colorado-Lavaca Region and its population is within the Austin Metropolitan Area regional media market. For example, the "Austin Designated Market Area" in 2022 has a TV Household population of approximately 770,000, including 12 of 43 of the Lower Colorado-Lavaca Region counties. Combined, these counties represent roughly 90-95 percent of the entire estimated 2019 population of the region. Notably, Travis County (by far the most populous) and several surrounding Hill Country counties lie in the heart of what is commonly known as Flash Flood Alley. Flash Flood Alley is considered the most flash-flood-prone region in North America because of its steep terrain, shallow soils, and periodically high rainfall rates.

Due to the relatively high risk and exposure to flash flooding and its long history and experience with catastrophic flooding with loss of life and widespread property damage, the City of Austin has developed and sustained a comprehensive public outreach and flood awareness campaign and other educational programs. A key goal is to keep flood risk and preparedness messaging front and center in people's minds on an ongoing basis during the often long lapses between major floods, during the spring and fall rainy seasons, and of course, particularly when flooding is imminent or occurring. Another goal is to inform and equip the public, particularly those in flood-prone areas, with actionable information about individual actions one can take to prepare for flooding and to minimize risks to personal safety (e.g., Turn Around Don't Drown).

Information about the City of Austin Watershed Protection Department's flood awareness tools and educational resources can be found at www.ATXFloodSafety.com. Some of these tools, specifically ATXFloods.com and WarnCentralTexas.org, are described in the previous section of the chapter as they provide real-time information about flood conditions as they are occurring. Another tool, ATXFloodPro, provides public access to a viewer of floodplain information allowing a property owner or prospective property owner to assess the flood risk of specific parcels. These resources are readily available to other local entities in the Lower Colorado-Lavaca Region and can be used as-is or adapted to local conditions outside the Austin area.

Figure 7.5 ATXFloodSafety.com Flood Awareness and Education Resources

Figure 7.6 ATXFloodSafety.com Flood Awareness and Education Resources



The City of Austin also actively engages with the local/regional broadcast media with free and paid advertising (e.g., Turn Around Don't Drown radio spots) during impending or in-progress flood events

and through interviews and advisories targeted at broadcast media. Local TV and radio weather forecasters are a particularly effective conduit for disseminating real-time flood information and very often display such information in their live broadcasts. The city also issues press releases and email blasts to subscribers, sponsors an annual "Turn Around Don't Drown" poster contest in public schools, provides in-school presentations on flooding and flood preparedness and offers youth education programs[15] such as Watershed Detectives[16], Earth School,[17] and Earth Camp.[18] (*Figure 7.7)*

Figure 7.7 Example Advertising and Outreach Campaigns from the City of Austin Watershed Protection Department

Source: City of Austin

Table 7.2 Advertising and Outreach Campaigns from the City of Austin Watershed Protection Department

Campaign	Overview	Timeframe
Flood Safety Campaign	This campaign educates Austin drivers about the dangers of driving through flooded roadways through print, radio, television, social and digital advertising. The campaign runs several times per year, typically during Austin's rainy seasons. The primary theme is "Turn Around Don't Drown," which is promoted widely throughout the U.S.	Mid-May to Mid-June Late Summer/ Early Fall Mid-October to Mid-November

[15] City of Austin Youth Education. Available at: https://www.austintexas.gov/department/watershed-youth-education

[16] City of Austin Watershed Detectives. Available at: https://www.austintexas.gov/department/watershed-detectives

[17] City of Austin Earth School. Available at: https://www.austintexas.gov/department/earth-school

[18] City of Austin Earth Camp. Available at: https://www.austintexas.gov/department/earth-camp

Campaign	Overview	Timeframe
Turn Around - Don't Drown	This campaign focuses on educating school children through an annual Turn Around Don't Drown poster contest. The secondary objective for children is to influence their parents about the dangers of driving across flooded roadways. The campaign is promoted to Austin area art and science teachers through social media and the Austin Watershed Protection Department's Youth Education Programs.	Post Contest: Mid-January to Late March
Floodplain Property Owner Notifications	This campaign includes sending postcards to property owners who own or reside at a property within defined floodplains. The goal is to increase understanding of their risk to potential flooding.	Annually
Safety and Transportation Manager Outreach	This campaign is focused on outreach to emergency and transportation managers in the school districts and charter schools in the Austin area as well as to teachers, parents, students, and school volunteers. The goal is to connect them to established flood preparedness resources like school messaging systems, the Austin Flood Early Warning System (FEWS) email distribution list, ATXFloods, and other regional, state, and federal resources (e.g., the National Weather Service).	Annually
Emergency and Social Media Ads	This campaign is disseminated before and during emergency flooding situations via radio and digital ads and social media promoting ATXfloods.com and real-time information about flooded roads and closures.	Ongoing as Needed

Flood Preparedness

Taken as a whole, all of the many topics addressed in this chapter address flood preparedness in one way or another – the national institutional framework for emergency management; established processes and procedures for local, state, and federal disaster declarations; emergency response planning; training of emergency management professionals and first responders; technical professional capabilities needed for advanced warning of impending flooding; and outreach and education about flood risk, safety, and preparedness. Looking at the state of "flood information response and activities" in their entirety for the Lower Colorado-Lavaca Region, it's concluded that the region is well-prepared, in some areas more than others, and always with the potential for improvement. Of particular note from the discussion of flood early warning capabilities and public awareness and education, local entities in the major population center in the region, the Austin Metropolitan Area, have put in place technical and professional capabilities and have other resources that together provide a high-level of flood preparedness for a majority of the population of the region, populations that are in areas that are particularly flood-prone. There are already several items of flood preparedness in the central portion of the Lower Colorado-Lavaca Region that local entities in other areas of the region can learn from and build on from their colleagues.