Task 7: Flood Response Information and Activities

The following chapter summarizes the flood response preparations using demographic, historical, projected, and statistical data from the previous chapters, and by implementing data from the survey responses. The TWDB specifically stated that the RFPG "shall not perform analyses or other activities related to planning for disaster response or recovery activities." The focus of this chapter is summarizing the information obtained and providing general recommendations regarding flood response activities.

Types of Flooding in the Guadalupe Basin

For the most part there are five different types of floods: flash floods, coastal floods, urban floods, river floods, and pluvial flood. With coastal flooding not being prevalent in Region 11relevant, the two most common are river and flash floods. River flooding tends to be more widespread, encompassing huge swaths of land while flash floods tend to be more dangerous. The Guadalupe region is prone to each type depending on the part of the region.

Flash floods are floods caused by heavy rainfall over a period. The flood water can be very powerful making it extremely dangerous.

Riverine floods occur when excess rain fall moves downstream causing an overtopping of the riverbank. This overtopping then spills the water onto the nearby land.

Pluvial floods happen when there is flooding independent from an overflowing body of water due to extreme rain fall. The most common example of this is when the drainage system is overwhelmed, and the excess water pours out into the streets.

Urban flooding is flooding that is caused by excess runoff water in developed areas, where the water doesn't have anywhere else to go.

When such flood events occur, it is imperative that plans are in place to combat the effects of the flooding.

The Nature and Types of Flood Activities

There are four phases to emergency management:

- **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.
- **Flood Preparedness:** Actions, aside from mitigation, that are taken before flood events to prepare for flood response activities.
- **Flood Response:** Actions taken during and in the immediate aftermath of a flood event.
- **Flood Recovery:** Actions taken after a flood event involving repairs or other actions necessary to return to pre-event conditions.

For example, when a severe rain event is projected to occur, steps are taken for **preparedness**: disaster preparedness plans are in place, drills and exercises are performed, an essential supply list is created, and potential vulnerabilities are assessed. During the **response** phase, disaster plans are implemented, search and rescues may occur, low water crossing signs may be erected. In the **recovery** phase, evaluation of flood damage, rebuilding damaged structures, and removing debris occurs. The most important step of the four phases of emergency management is **mitigation**.

Hazard Mitigation is defined as any sustained action taken to reduce or eliminate the lasting risk to life and property from hazard events. It is an on-going process that occurs before, during, and after disasters and seeks to break the cycle of damage and restoration in hazardous areas.

Flood mitigation is the primary focus of the regional flood planning process and plan development efforts regarding identifying and recommending FMEs, FMSs and FMPs by the RFPG. The plan may also include flood preparedness FMEs, FMSs and FMPs. As of May 2022, the number of Flood Mitigation Strategies (FMSs) is approximately 30% being devoted to preparedness.

Examples of mitigation actions include planning and zoning, floodplain protection, property acquisition and relocation, or public outreach projects. Examples of preparedness actions include installing disaster warning systems, purchasing radio communications equipment, or conducting emergency response training.

Guadalupe Basin Flood Response – Stakeholder Input

Actions and Preparations

Hazard Mitigation Action Plans served as the primary data source for identifying flood mitigation (and preparation) actions. This initial list was refined and expanded upon through two different avenues of public input: a "survey" conducted through the Region 11 online Data Collection Tool that filtered questions based on whether the respondent indicated general public or practitioner, and direct "questionnaires" with potential action sponsors.

Mitigation Actions from Hazard Mitigation Action Plans include:

- Buyout/Acquisition/Elevation projects
- Drainage Control & Maintenance
- Education & Awareness for Citizens
- Equipment Procurement for Response
- Erosion Control Measures
- Flood Insurance Education
- Flood Study/Assessment
- Infrastructure Improvement
- Installation/Procurement of Generators
- Natural Planning Improvement
- Outreach and Community Engagement
- Technology Improvement
- Urban Planning and Maintenance

The survey indicated that several of the types of actions listed were in place or being implemented in the next 5 years including Flood Warning signs, system like the Reverse 911 system, crews to set up barricades or close gates, social media, portable and/or temporary traffic message boards, stream or rain gauges with alerts, and flood gauges.

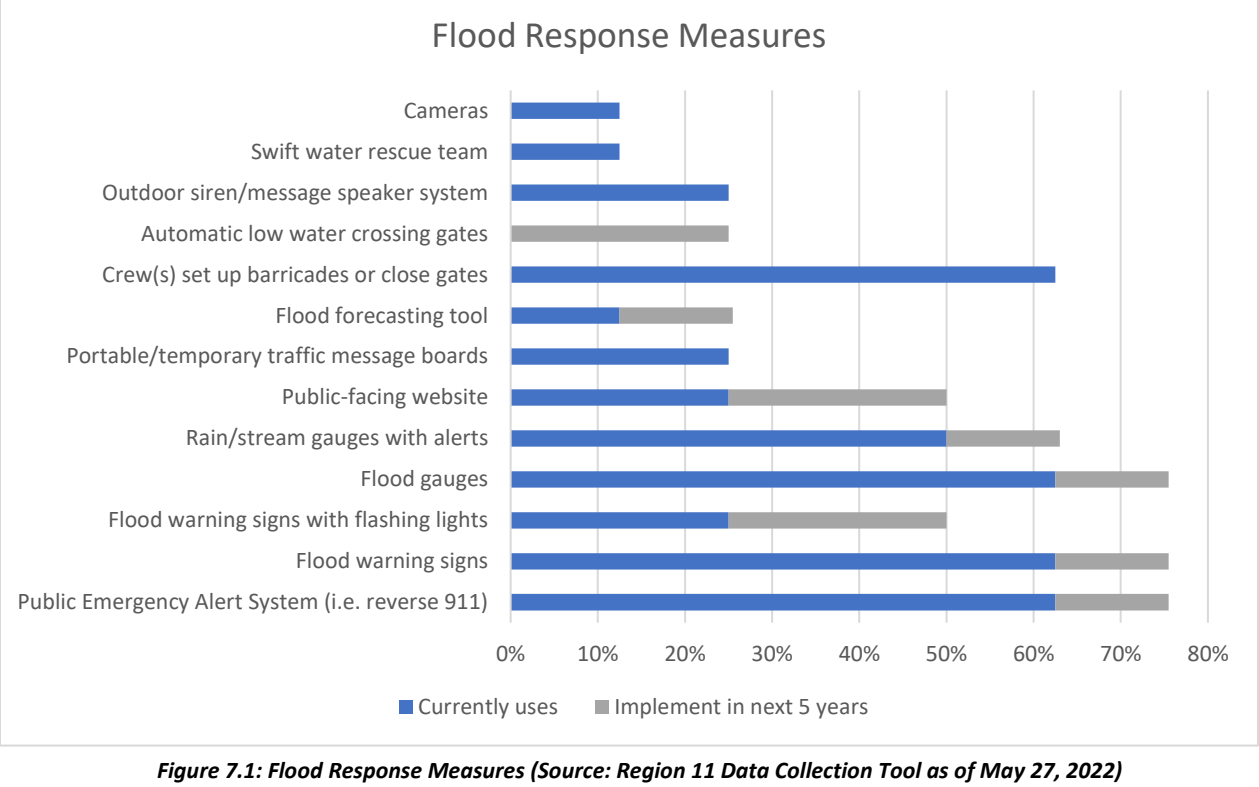

Figure 7.1: Flood Response Measures (Source: Region 11 Data Collection Tool as of May 27, 2022)

The Sponsor Questionnaire sent out in February/March 2022 provided more information on the current utility measures in place and gave information on what future utility measures are to potentially be implemented. This effort reached out to entities within the region to provide more robust data concerning the utility's use of specific flood measures. While not all respondents answered each question, the data was tabulated per the answers provided.

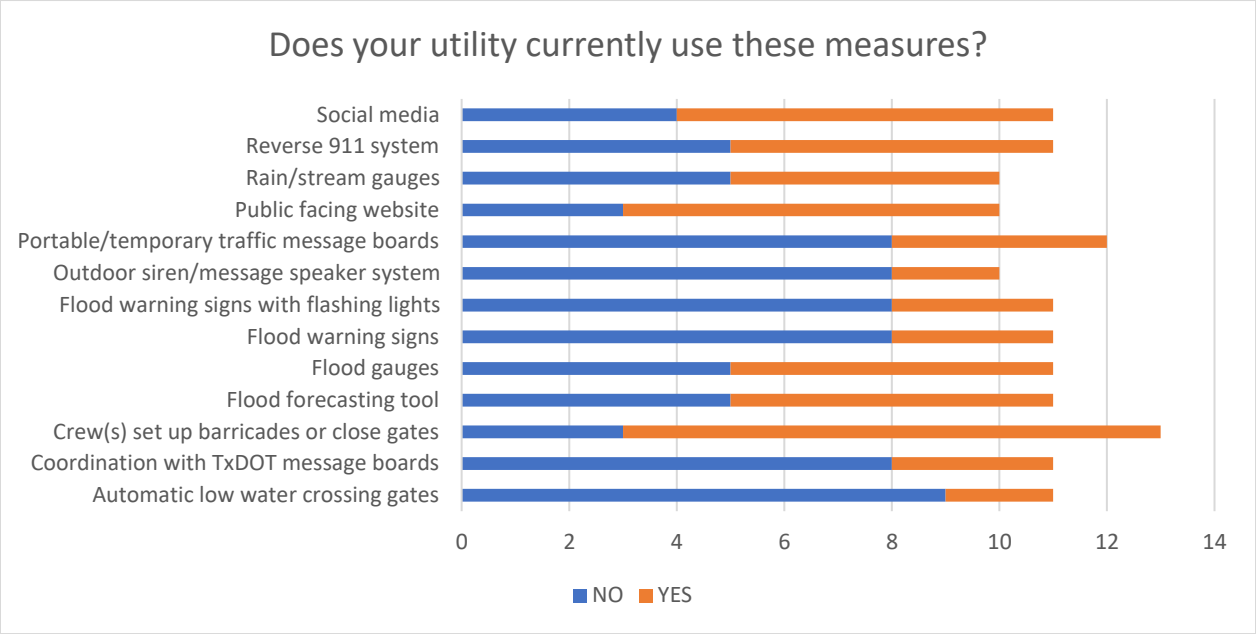

Figure 7.2: Flood Response Measures Utilities are Currently Using (Source: Region 11 Sponsor Questionnaire)

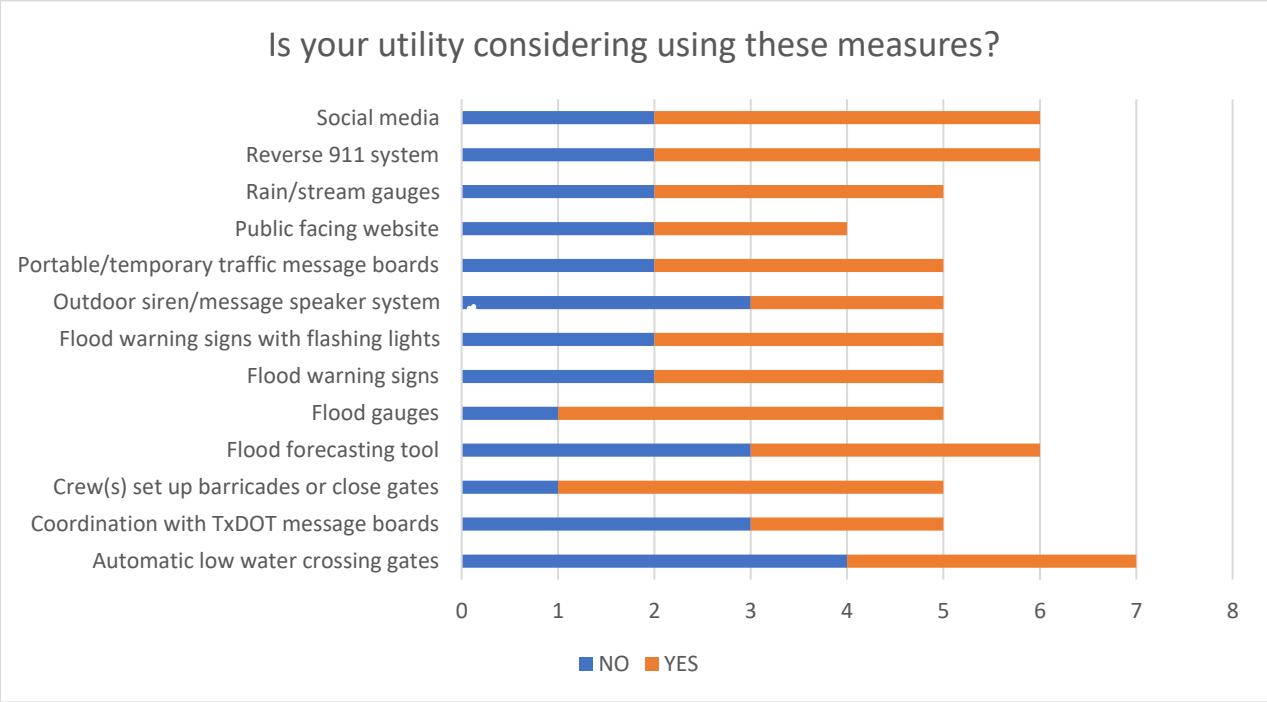

Figure 7.3: Flood Response Measures Utilities are Considering (Source: Region 11 Sponsor Questionnaire)

Additional measures indicated by the survey include measures undertaken by jurisdictions to promote the development review and regulation, ordinance enforcement, and reactive maintenance following complaints or damages after a storm.

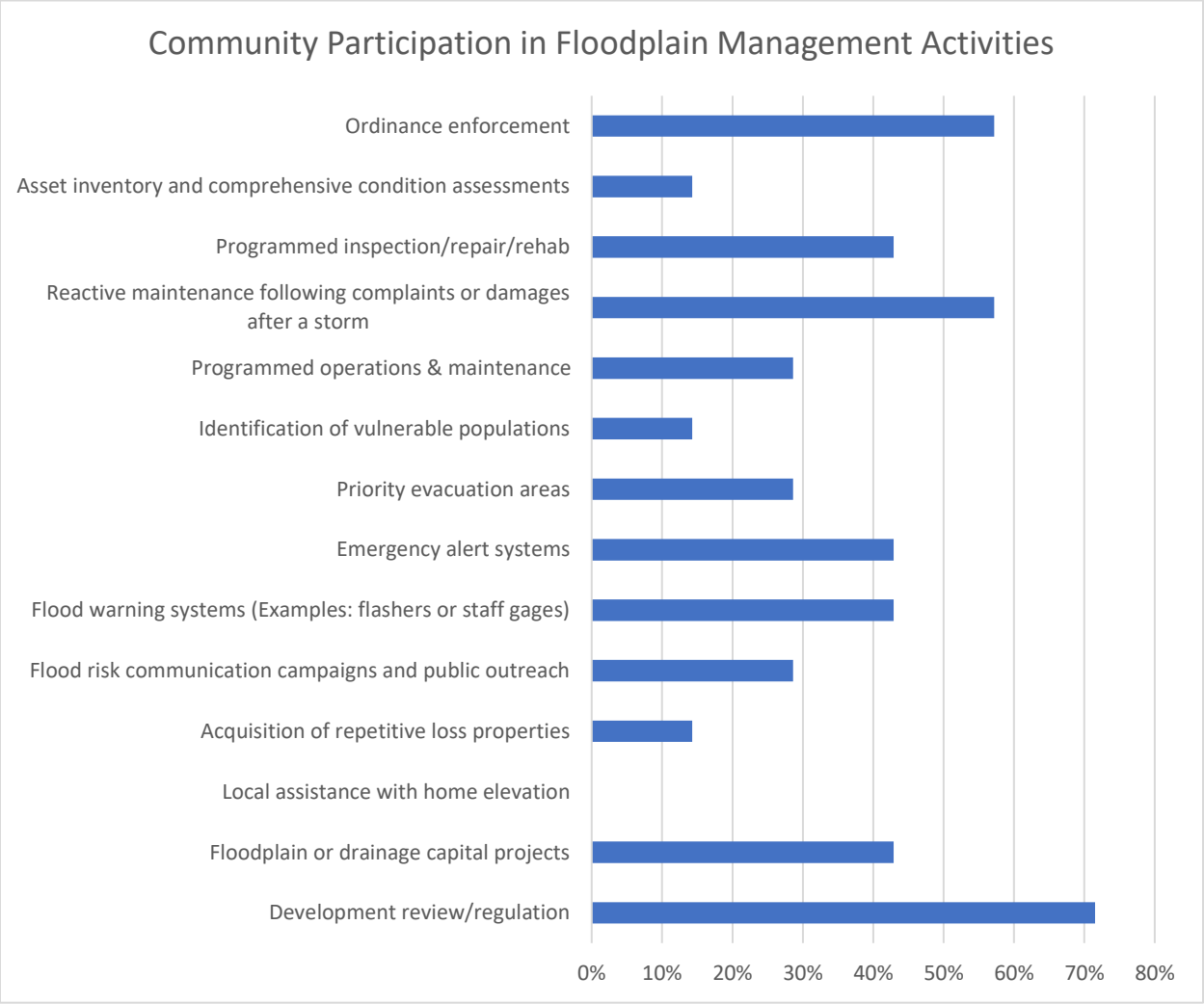

Figure 7.4: Community Participation in Flood Management Activities (Source: Region 11 Data Collection Tool as of May 27, 2022)

Survey respondents indicated that specific activities have already been in place to address flooding concerns in their jurisdiction, including performing existing drainage system maintenance and implementation and enforcement of drainage design criteria/floodplain management policies.

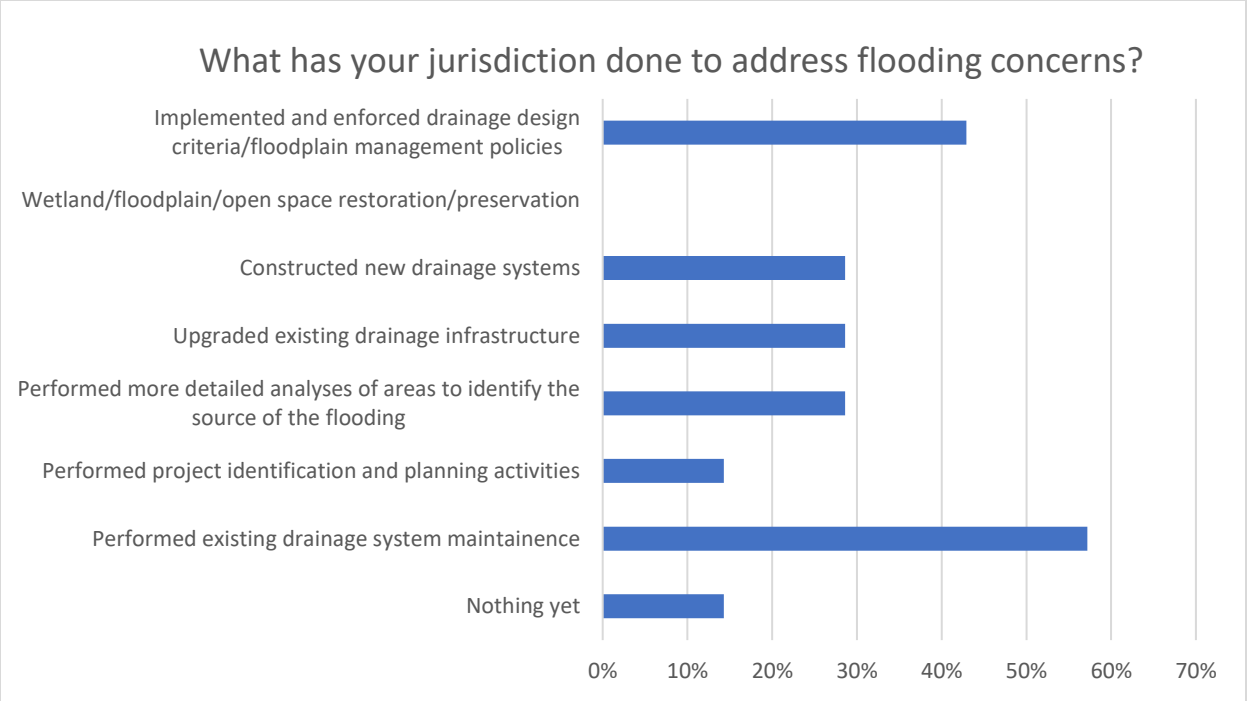

Figure 7.5: Flooding Concerns (Source: Region 11 Data Collection Tool as of May 27, 2022)

Many of the mitigation and preparatory actions are done in conjunction with the relevant entities who put these actions into practice.

Relevant Entities in the Region

The purpose of flood risk management is to help prevent or reduce flood risk by using either structural or non-structural means or a combination of the two. Responsibility for flood risk management is shared between Federal, State, and local government agencies; private-sector stakeholders; and the general public. In Chapter One, the various stakeholders that were contacted to provide data via the survey were listed: Agriculture, Cities, Counties, Councils of Government (COGs), Districts such as MUDs, SUDs, etc, and State and Federal Agencies. Listed below are the various contributing entities and partners.

Ag Extension Agents are employed by land-grant universities and serve the citizens of that particular state by serving as an expert or teacher on the topic of Agriculture. Ag extension agents can provide valuable information on preparation and recovery from flood events specific to agricultural entities. The Guadalupe region has a significant agricultural footprint making working closely with Ag Extension Agents crucial to prevent losses.

Cities, or Municipalities, generally take responsibility for parks and recreation services, police and fire departments, housing services, emergency medical services, municipal courts, transportation services (including public transportation), and public works (streets, sewers, snow removal, signage, and so forth). There are 36 municipalities within the Guadalupe region.

The major responsibilities of the 22 Guadalupe region **County** governments include providing public safety and justice, holding elections at every level of government, maintaining Texans' most important records, building and maintaining roads, bridges and in some cases, county airports, providing emergency management services, providing health and safety services, collecting property taxes for the county and sometimes for other taxing entities, issuing vehicle registration and transfers, and registering voters.

The five regional **Councils of Governments (COGs)** are voluntary associations that represent member local governments, mainly cities and counties, that seek to provide cooperative planning, coordination, and technical assistance on issues of mutual concern that cross jurisdictional lines. COGs can serve a resource for flood data, flood planning, and flood management.

The mission of the **Texas Water Development Board (TWDB)** is **to lead the state's efforts in ensuring a secure water future for Texas and its citizens.** TWDB provides water planning, data collection and dissemination, financial assistance, and technical assistance services to the citizens of Texas. TWDB provides several grant funding opportunities to aid in preparedness, response, recovery and mitigation efforts.

The **Federal Emergency Management Agency** (**FEMA**) is an agency of the United States Department of Homeland Security (DHS), initially created under President Jimmy Carter. While on-the-ground support of disaster recovery efforts is a major part of FEMA's charter, the agency provides state and local governments with experts in specialized fields and funding for rebuilding efforts and relief funds for infrastructure by directing individuals to access low-interest loans, in conjunction with the Small Business Administration. In addition to this, FEMA provides funds for training of response personnel throughout the United States and its territories as part of the agency's preparedness effort. FEMA also provides grant funding through the Hazard Mitigation Grant Program to aid in mitigation of various types of natural disasters.

A **Flood Control District** is a special purpose district created by the Texas Legislature and governed by County Commissioners Courts. It is a government agency established to reduce the effects of flooding. There are 14 Flood Control Districts in the region that provide flood control.

Dams and Levees are owned and operated by individuals, private and public organizations, and the government. The responsibility for maintaining a safe dam rests with the owner. A dam failure resulting in an uncontrolled release of the reservoir can have a devastating effect on persons and property downstream. It is critical that the owners are part of the flood planning process to ensure collaborative and cohesive flood planning.

The **National Weather Service (NWS)** mission is to provide weather, water and climate data, forecasts, warnings, and impact-based decision support services for the protection of life and property and enhancement of the national economy. NWS provides flash flood indicators through watches, warnings, and emergency notices.
Flash Flood WATCH is issued when conditions look favorable for flash flooding. A WATCH usually encompasses several counties. This is the time to start thinking about your plan of action and where you would go if water begins to rise.
Flash Flood WARNING is issued when dangerous flash flooding is happening or will happen soon. A WARNING is usually a smaller, more specific area. This can be issued due to excessive heavy rain or a dam/levee failure. This is when you must act quickly as flash floods are an imminent threat to you and your family. You may only have seconds to move to higher ground.

Flash Flood EMERGENCY is issued for the EXCEEDINGLY RARE situations when extremely heavy rain is leading to a severe threat to human life and CATASTROPHIC DAMAGE from a flash flood is happening or will happen soon. Typically, emergency official are reporting LIFE THREATENING water rises resulting in water rescues/evacuations.

The **National Oceanic and Atmospheric Administration (NOAA)** is an American scientific and regulatory agency within the United States Department of Commerce that forecasts weather, monitors oceanic and atmospheric conditions, charts the seas, conducts deep sea exploration, and manages fishing and protection of marine mammals and endangered species in the U.S. exclusive economic zone. In addition to forecasting potentially storm events, NOAA's National Center for Environmental Information (NCEI) provides historical data that can help communities determine their future probability of flood events and is key in the planning and mitigation process. NOAA's Office of Coastal Management plays a key role in providing information, technology, and flood management strategies.

The **General Land Office (GLO)** is the oldest state agency in Texas. The GLO manages state lands, operates the Alamo, helps Texans recovering from natural disasters, helps fund Texas public education through the Permanent School Fund, provides benefits to Texas Veterans, and manages the vast Texas coast. GLO, through the Community Development and Revitalization division aids communities in rebuilding, restoring critical infrastructure, and mitigating future damage through resilient community planning. The GLO administers both Community Development Block Grant Disaster Recovery (CDBG-DR) and Mitigation (CDBG-MIT) funds from the U.S. Department of Housing and Urban Development (HUD) on behalf of the state of Texas. These funds are key elements in recovery and mitigation in the Lower Brazos region.

River Authorities or Districts in the state of Texas are public agencies established by the state legislature and given authority to develop and manage the waters of the state. Guadalupe has five River Authorities within its region that each have the power to conserve, store, control, preserve, utilize, and distribute the waters of a designated geographic region for the benefit of the public.

Daily river forecasts are issued by the thirteen **River Forecast Centers (RFCs)** using hydrologic models based on rainfall, soil characteristics, precipitation forecasts, and several other variables. Some RFCs, especially those in mountainous regions, also provide seasonal snow pack and peak flow forecasts. These forecasts are used by a wide range of users, including those in agriculture, hydroelectric dam operation, and water supply resources. The forecasts can provide essential information on the river levels and conditions.

The **Texas Division of Emergency Management (TDEM)**, a division of the Texas Department of Public Safety (DPS), is charged with coordinating state and local responses to natural disasters and other emergencies in Texas. TDEM is intended to ensure the state and its local governments respond to and recover from emergencies and disasters and implement plans and programs to help prevent or lessen the impact of emergencies and disasters.

TDEM's Recovery and Mitigation divisions work closely with local jurisdictions, state agencies, and federal partners to ensure Texans successfully navigate recovery processes and become more resilient for future disasters. The Disaster Recovery Task Force was created to assist jurisdictions that have been impacted by an emergency or disaster, to recover more efficiently by starting the recovery process early in the response phase.

There are six TDEM regions within Texas and in those regions are Assistant Chiefs and District Coordinators. They serve as the Division's field response personnel stationed throughout the State.

They have a dual role as they carry out emergency preparedness activities and coordinate emergency response operations. In their preparedness role, they assist local officials in carrying out emergency planning, training, and exercises, and developing emergency teams and facilities. They also teach a wide variety of emergency management training courses. In their response role, they deploy to incident sites to assess damages, identify urgent needs, advise local officials regarding state assistance, and coordinate deployment of state emergency resources to assist local emergency responders. The Guadalupe region is completely within region 6.

The **Texas Department of Transportation** (**TxDOT**) is a government agency in the state of Texas. Though the public face of the agency is generally associated with the construction and maintenance of the state's immense state highway system, the agency is also responsible for overseeing aviation, rail, and public transportation systems in the state. TxDOT can provide real time road closure and low water crossing information during and after a flood event. Users can access this data through TxDOT's Drive Texas website: https://drivetexas.org.

Texas Public Works Emergency Response Council serves as a Statewide database of response assets available for response as requested to man-made and natural disasters through mutual aid. They serve to support and promote statewide emergency preparedness, disaster response, mutual aid assistance and training for Public Works Agencies and seeks to provide a system allowing jurisdictions impacted by disaster to request assistance through a standardized process.

Texas Association of Regional Councils assist state and federal partners by coordinating and improving regional homeland security preparedness, planning and response activities across jurisdictional boundaries. The Texas Department of Emergency Management works with the regional councils to ensure that all regional and local emergency plans are up-to-date and compliant with Texas Government Code. Regional councils also work with TDEM in the event of a disaster within their region to access state resources in a timely manner.

The **U.S. Corps of Engineers (USACE)** is an important part of the nation's military. The agency is responsible for a wide range of efforts in the United States including addressing safety issues related to waterways, dams, and canals but also environmental protection, emergency relief, hydroelectric power, and much more. USACE composed of several divisions with the Guadalupe region being Southwestern Division and, in the Galveston and the Fort Worth Districts.

The USACE Flood Risk Management Program (FRMP) works across the agency to focus the policies, programs and expertise of USACE toward reducing overall flood risk. This includes the appropriate use and resiliency of structures such as levees and floodwalls, as well as promoting alternatives when other approaches (e.g., land acquisition, flood proofing, etc.) reduce the risk of loss of life, reduce long-term economic damages to the public and private sector, and improve the natural environment.

In the planning process it is important to consider flood planning in preparation, during, and following a flood event to access the entities that provide the respondents with the most assistance and support. Of the entities we received survey data from, the top entities in which coordination was indicated as key were the County and the City with all other entities accounting for much smaller responses.

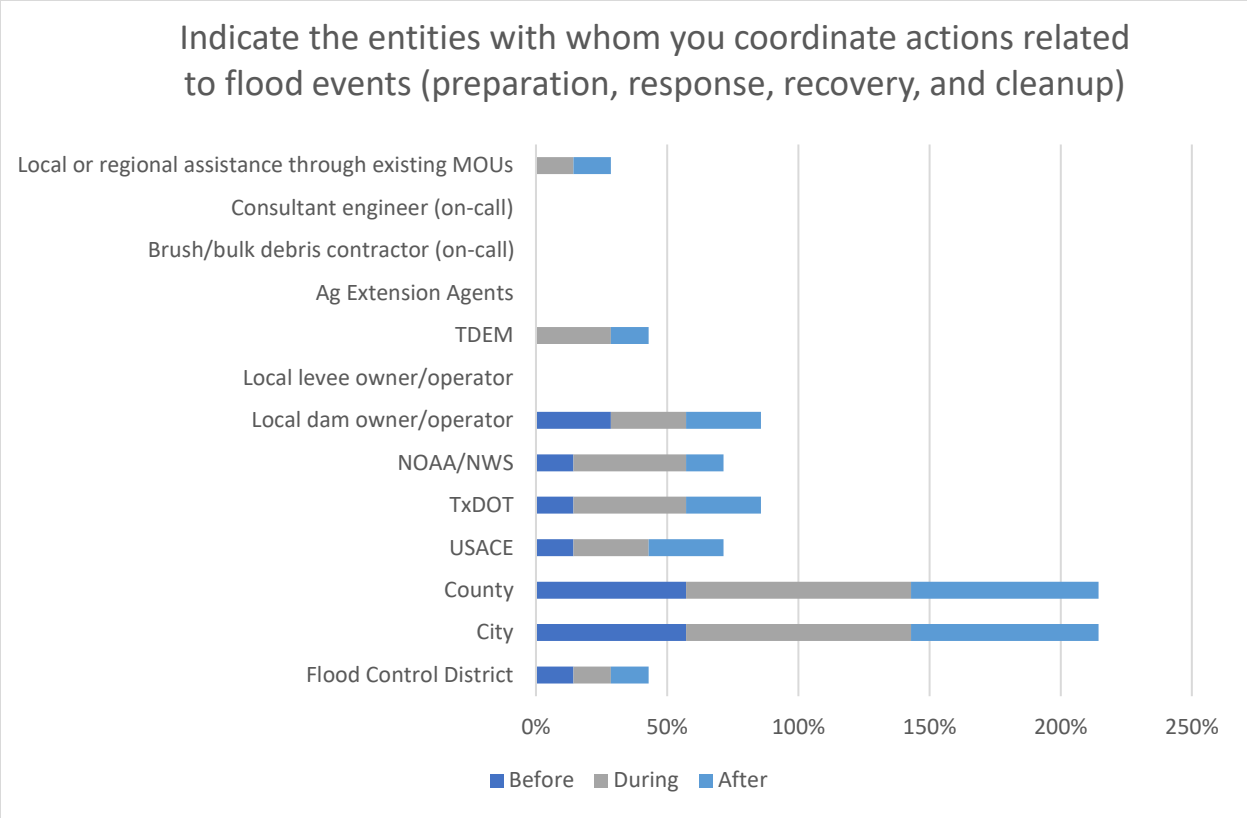

Figure 7.6: Coordination with Entities (Source: Region 11 Data Collection Tool as of May 27, 2022)

Emergency Information

There are various means by which data can be collected and disseminated in a flood event.

Two types of gauges used are rain gauges and stream gauges. A rain gauge is a meteorological instrument to measure the precipitating rain in a given amount of time per unit area. It collects water falling on it and records the change over time in the rainfall depth. Stream gauging is a technique used to measure the discharge, or the volume of water moving through a channel per unit time, of a stream. The height of water in the stream channel, known as a stage or gauge height, can be used to determine the discharge in a stream.

In addition to the National Weather Service, local news stations or radio stations are vital components in relaying real time information to local residents of inclement weather and flooding. They can also alert residents to low water crossing closings, dam or levee breaches, and other potential dangers. They can also issue flood watches, warnings, and emergency notifications.

An Emergency Alert System (EAS) is software that provides alert messages during an emergency Messages can interrupt radio and television to broadcast emergency alert information. Messages cover a large geographic footprint including about half of the Guadalupe region. Emergency message audio/text may be repeated twice, but EAS activation interrupts programming only once, then regular programming continues.

A reverse 911 system allows an agency to pull up a map on a computer, define an area and send off a recorded phone message to each business or residence in that area. It can provide data to residents of flood dangers in their area.

School emergency alert systems are tools that allow schools to communicate quickly to staff, students, first responders and others so that they can take appropriate action in the event of an emergency situation. Various versions this tool are used in schools through the region from daycares to K-12 grade, as well as universities. Messages may include important announcements about school events or emergency situations, such as inclement weather and local flooding.

Plans to be Considered

State and Regional Plans

The State Hazard Mitigation Plan is an effective instrument to reduce losses by reducing the impact of disasters upon people and property. Although mitigation efforts cannot completely eliminate impacts of disastrous events, the plan endeavors to reduce the impacts of hazardous events to the greatest extent possible.

The plan evaluates, profiles and ranks natural and human-caused hazards effecting the Texas as determined by frequency of event, economic impact, deaths and injuries. The plan:

- Assesses hazard risk.
- Reviews current state and local hazard mitigation and climate adaption capabilities.
- Develops strategies and identifies state agency (and other entities) potential actions to address needs.

The Regional Emergency Preparedness Program is one of the largest and most effective programs of its kind nationwide. Bringing together urban, suburban, and rural jurisdictions, the program facilitates information sharing, collaboration, and cooperation between jurisdictions in a politically neutral and supportive environment. The Regional Preparedness Program accomplishes this through networking, standardization of policy and procedures, and coordination efforts with stakeholders.

Local Plans

In the Guadalupe Region’s data collection effort and survey tool in 2021, the region requested local emergency management and emergency response plans that were publicly available. Some emergency plans are protected by law and are not available for public consumption. In addition to the plans provided by local entities, the region also obtained Emergency Management plans, Hazard Mitigation Plans and other regional and local flood planning studies from County and local jurisdictions.

An emergency management plan is a course of action developed to mitigate the damage of potential events that could endanger an organization's ability to function. Such a plan should include measures that provide for the safety of personnel and, if possible, property and facilities.

The Guadalupe Basin has several plans and regulations in place region wide that provide the framework that dictates a community’s capabilities in implementing mitigation and preparedness actions.

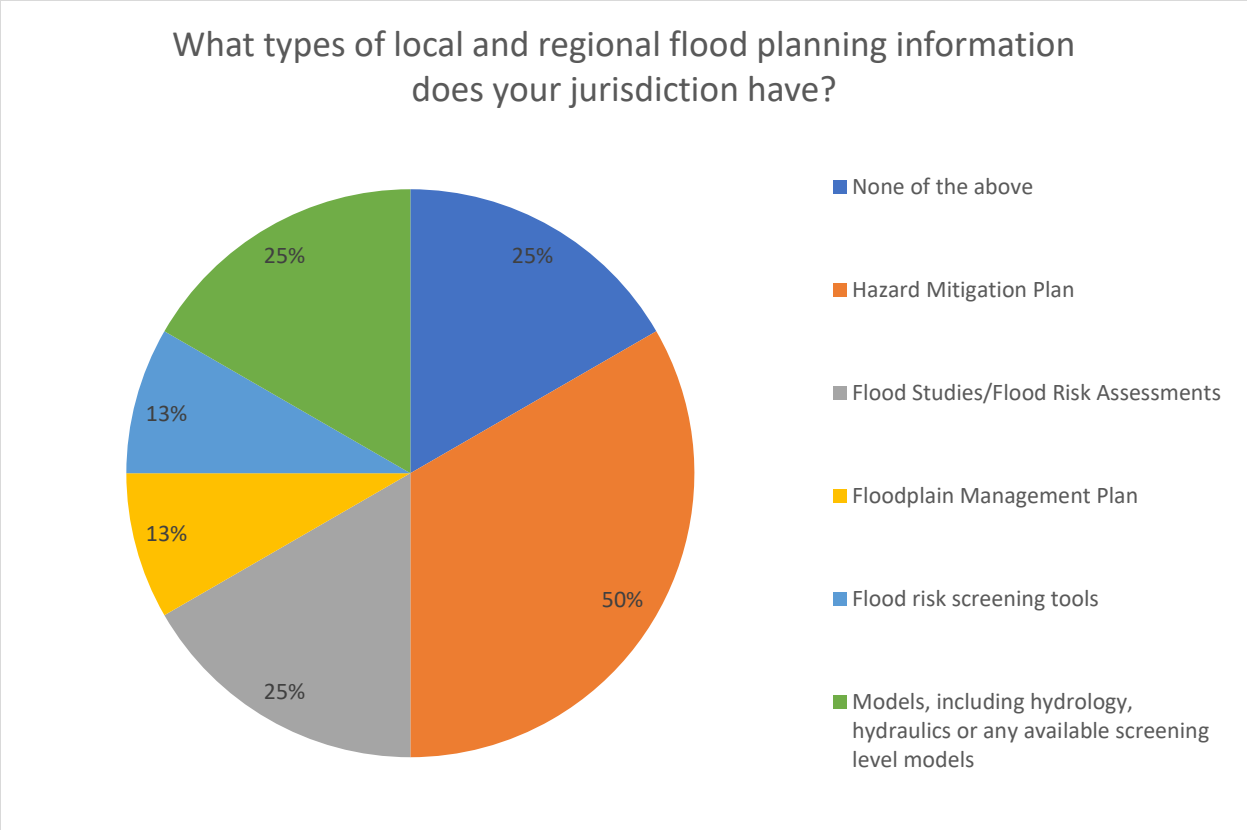

Figure 7.7: Flood Planning Resources (Source: Region 11 Data Collection Tool as of May 27, 2022)

Per Chapter One, the following are flood plans and regulations indicated to be in place currently as collected from the data collection tool.

Plan or Regulation	Total
Floodplain Ordinance	86
Drainage Ordinance	29
Stormwater Management Ordinance	43
Building Standards for Flood Proofing and Flood Protection	29
Future Conditions Land Use	57
Land Use Regulations	29

Table 7.1: Current Flood Plans and Regulations (Source: Region 11 Data Collection Tool as of May 27, 2022)

Other plans to consider include Hazard Mitigation Plans, Emergency Action Plans, as well as Watershed Master Plans. An Emergency Action Plan provides the basis for the coordinated planning and management of types of emergencies and disaster events. Watershed Master Plans promote that all sectors of the community work together to create a flood hazard resilient community.

Hazard mitigation planning reduces loss of life and property by minimizing the impact of disasters. It begins with state, tribal, and local governments identifying natural disaster risks and vulnerabilities that are common in their area. After identifying these risks, they develop long-term strategies for protecting

people and property from similar events. Mitigation plans are key to breaking the cycle of disaster damage and reconstruction. Of the countiesthat have had a Hazard Mitigation Plan, only 14 out of 22county plans are currently approved by FEMA, as they are to be updated on a 5 year cycle. Three counties (Bastrop, Kendall, and Travis) are in the process of having their plans updated. Having an up-to-date HMP is key in assessing risk and in developing mitigation actions.

In the private sector, an emergency action plan (EAP) is document required by particular OSHA standards. The purpose of an EAP is to facilitate and organize employer and employee actions during workplace emergencies. They are an essential element in emergency management for critical facilities.

A watershed master plan helps in the understanding and address existing flooding, erosion, and water quality problems. It can be useful in preparing for future challenges. Watershed Master Plans inform recommendations, help educate the public and influence decision makers regarding land use changes, investment in capital projects and modifications to development regulations within the basin.

The Guadalupe region's ability to prepare, respond, recover, and mitigate disaster events is determined by several factors. With a clear understanding of the plans that determine a community's capabilities, a recognition of the entities with whom coordination is key, and knowledge of the actions sustained to promote resiliency, the region can be better equipped to implement sound measures for flood mitigation and preparedness.