



Chapter 3 – Floodplain Management Practices and Flood Protection Goals

31 TAC § 361.35, 361.36

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3 Floodplain Management Practices and Flood Protection Goals

The goal of this task is for regional flood planning groups (RFPGs) to

- evaluate and make recommendations on forward-looking floodplain management, land use, and economic practices, and
- define overarching flood mitigation and floodplain management goals to protect against the loss of life and property, including specific and achievable short-term (10-year) and long-term (30-year) goals.

These two goals are addressed in the following sections on Floodplain Management Practices and Goals.

3.1 Evaluation and Recommendations on Floodplain Management Practices

Floodplain management, land use, infrastructure design, and other practices play a key role in identifying and reducing risk and impact that flooding causes to life and property, specifically in preventing the creation of additional flood risk in the future. This section considers current floodplain management practices, evaluates how best to address future development and population growth, and provides recommendations regarding forward-looking floodplain management strategies for inclusion in the Regional Flood Plan.

3.1.1 Current Floodplain Management Practices

3.1.1.1 Entities with Flood-Related Authority

Entities identified as having flood-related authority in the region are listed in Appendix A5 – TWDB Table 6 – Existing Floodplain Management Practices. The list includes 31 counties, 57 cities, and 46 districts with flood-related authority.

3.1.1.2 Outreach to Entities with Flood Authority

A Current Floodplain Management Practices and Goal survey was sent to floodplain stakeholders and administrators representing Nueces Region entities with flood-related authority on June 17, 2021. As of June 14, 2022, 32 of 134 entities had completed the survey on existing floodplain practices. Specifically, 15 counties of 31, 12 municipalities of 57, and 5 of 46 other government entities responded to the survey. The survey results are summarized in Appendix C3 – Floodplain Management Practices and Goal Survey Results. Entities that responded to the survey include the following.

- Aransas County
- Bandera County
- Bexar County
- City of Beeville
- City of Bishop
- City of Corpus Christi
- City of Cotulla La Salle County
- City of Gregory
- City of Hondo
- City of Ingleside
- City of Ingleside on the Bay
- City of Leakey
- City of Port Aransas
- City of Portland
- City of Sinton
- City of Uvalde
- Dimmit County
- Duval County
- Duval County Conservation / Reclamation District
- Frio County
- Karnes County
- Kerr County
- McMullen County Water Control and Improvement District (WCID) #1
- Medina County
- Real County
- Refugio County
- San Patricio County
- San Patricio County Drainage District
- Uvalde County Underground Water Conservation District (UWCD)
- Webb County
- Wilson County
- Zavala County

The survey gathered information on the use of various floodplain practices typically employed by entities in the Nueces Basin with flood authority. This information is summarized for each entity listed in the Existing Floodplain Management Practices Summary Table. Floodplain management regulations are common with 25 of the 32 cities and counties that responded to the flood practice survey. Descriptions and details of floodplain management practices in the Nueces Basin are described in further detail in the sections below.

3.1.1.3 Minimum Floodplain Management Regulations

Minimum floodplain management regulations include compliance with Texas Water Code Section 16.3145 and FEMA's National Flood Insurance Program (NFIP) participation.

- Texas Water Code Section 16.3145 requires a city or county to adopt the necessary ordinances or orders for the city or county to be eligible to participate in the NFIP. This practice is common with 23 of the 28 reporting cities and counties complying with this requirement.
- NFIP participation is voluntary and is based at a minimum on a community's agreement to adopt and enforce the Federal standards for building within a Special Flood Hazard Area (SFHA). In exchange the FEMA makes flood

insurance available. NFIP participation is a wide-spread practice in the Nueces Basin with 85 of 86 reporting cities and counties participating.

3.1.1.4 Higher Floodplain Management Standards

Higher floodplain management standards can include an assortment of practices to further reduce flood risk above and beyond minimal standards. The Texas Floodplain Management Association (TFMA) produced a guide for higher standards in 2018 that describes 32 higher standard practices that if implemented would reduce flood risks (<https://www.tfma.org/page/documents-reports>).

Of these practices, the implementation of freeboard requirements was listed as the single most effective means for reducing flood risks. Freeboard is the standard for placing the first floor of a structure above the elevation of the calculated 1% annual chance flood level to allow for nature’s uncertainty and future changes in the watershed that will increase flood levels.

TFMA’s 2018 Higher Standards Survey identified 368 entities across Texas and 19 entities in the Nueces Basin that have adopted higher standards. These include 10 counties: Aransas, Bandera, Bexar, Kerr, Live Oak, Medina, Nueces, Refugio, San Patricio, and Webb. The remaining nine are municipalities: Alice, Aransas Pass, Charlotte, Corpus Christi, Ingleside, Kingsville, Port Aransas, Rockport, and Uvalde. In general, many entities in the lower basin and those near San Antonio and Laredo have adopted higher standards.

Most of the entities in the Nueces Basin identified in the TFMA survey results have adopted freeboard requirements of greater than 1 foot above the existing base flood elevation (BFE), with Rockport and Aransas County adopting 1.5 feet above the existing BFE, with Uvalde and San Patricio County adopting 2.0 feet above the existing BFE, and Bandera County adopting 3 feet above the existing BFE. Multiple entities (5) have 1 foot above fully developed BFE requirements. For further information see Appendix C4 – TFMA Higher Standard Survey Results for the Nueces Basin.

NFIP’s Community Rating System (CRS) credits community efforts beyond meeting minimum NFIP standards. For the Nueces Basin only, Corpus Christi has been identified as a CRS community with a rate class of 7. For more information on CRS see Section 1.8.

3.1.1.5 Degree of Floodplain Management Practices

Existing floodplain management practices are generally described as none, low, moderate, and strong, as defined below and displayed in Table 3-1 and Figure 3-1.

- None – no floodplain management practices in place
- Low – regulations meet the minimum NFIP standards

- Moderate – Some higher standards, such as freeboard, detention requirements, or fill restrictions
- Strong – Significant regulations that exceed NFIP standard with enforcement, or community belongs to the Community Rating System.

Table 3-1. Level of Floodplain Management Standards

Floodplain Management Practice	Entity Response	Counties (31 total)	Municipalities (57 total)	Other (46 total)
Floodplain Management Practices (Strong/Moderate/Low/None)	Strong	3	5	2
	Moderate	8	6	0
	Low	3	2	1
	None	1	0	1
	Unknown	16	44	42

Entities with strong flood management practices are generally concentrated near the large population growth urban areas of Corpus Christi, San Antonio, and Laredo. The locations that lack floodplain management practices generally consist of more rural counties in historically low population growth areas.

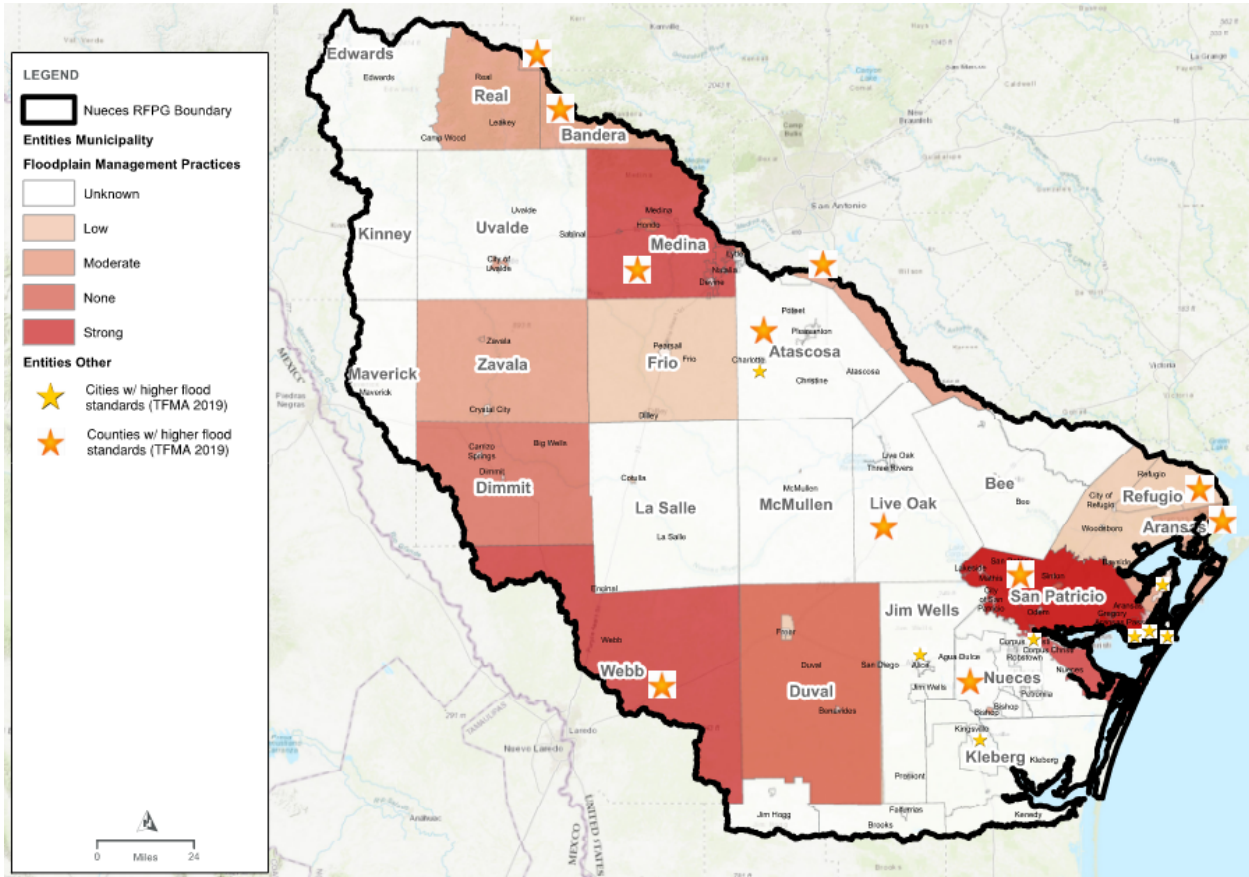


Figure 3-1. Level of Floodplain Management Standards

3.1.1.6 Level of Enforcement of Floodplain Management Practices

- The level of enforcement varies among entities from none to high, as defined below and displayed in Table 3-2

Table 3-2 and Figure 3-2.

- High – actively enforces the entire ordinance, performs many inspections throughout building construction process, issues fines, violations, and Section 1316s where appropriate, and enforces substantial damage and substantial improvement. Note: Section 1316 of the National Flood Insurance Act of 1968 provides for the denial of flood insurance coverage for any property determined to be in violation of State or local floodplain management regulations.
- Moderate – enforces much of the ordinance, performs limited inspections and is limited in issuance of fines and violations.
- Low – provides permitting of development in the floodplain, may not perform inspections, may not issue fines or violations.
- None – does not enforce floodplain management practices

Table 3-2. Level of Enforcement Practices

Floodplain Management	Entity	Counties	Municipalities	Other
Level of Enforcement of Practices (High/Moderate/Low/None)	High	3	5	2
	Moderate	8	6	0
	Low	3	2	1
	None	1	0	1
	Unknown	16	44	42

Similar to the strength of flood plain practices, levels of enforcement (shown in Figure 3-2), are strongest near the high growth urban areas of Corpus Christi, San Antonio, and Laredo.

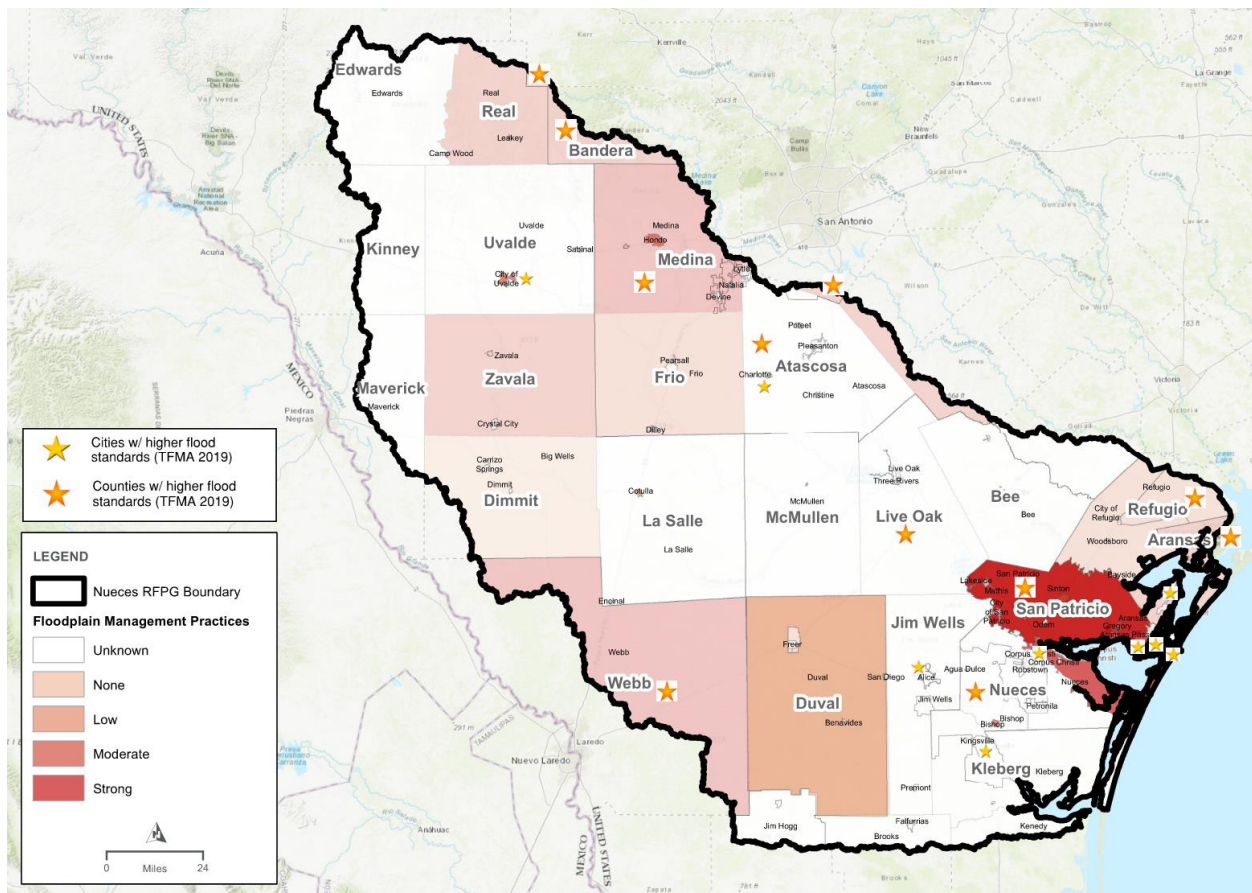


Figure 3-2. Level of Enforcement in Areas with Established Floodplain Management Practices (Map 13)

3.1.1.7 Stormwater or Drainage Fee

The existence of a stormwater or drainage fee is uncommon. Only the City of Portland reported to have this type of fee. The city issues a \$3 drainage utility fee on each monthly utility bill for city services. The fee was established in 2004 and is intended to

finance needed drainage system improvements such as curb, gutter, and associated storm inlet reconstruction as part of major street maintenance and improvement programs throughout the City.

3.1.2 How to Address Future Development and Population Growth

The future exposure analysis, summarized in Chapter 2, identified approximately 73,000 structures at potential risk of flooding from the 1% annual chance floodplain. This analysis did not include the potential for new structures to be added to the floodplain as development occurs. New development is anticipated in the Nueces Basin, especially for areas located near the large urban areas of San Antonio, Laredo, and Corpus Christi.

The best approach to address future development and population growth is to limit exposure of new development to the existing and future flood hazard. This can be accomplished by pro-actively

- (1) defining accurate floodplain limits through the development of detailed hydrologic and hydraulic models and mapping in areas of anticipated high development and population growth, and
- (2) adopting freeboard requirements in these high growth areas to require finished floor elevations of structures to be located safely above the 1% annual chance floodplain elevations.

Implementing higher standards beyond freeboard requirements should also be considered to further reduce the future flood risk to life and property. Some of the more effective higher standards for consideration include:

- No Adverse Impact – Requires new development to mitigate adverse impacts to other properties throughout the watershed.
- Floodplain Fill/Use Standards – Provide standards and restrictions for the placement of fill or development activity in a floodplain.
- Setbacks – provides a limited use/development area along waterways.

Land development in upstream areas is apt to increase runoff in downstream areas by encroaching on riparian areas that diminishes the capacity of streams to store flood waters during storm events. The NRFPG recommends that cities and counties consider ordinances for land developers to consider flood mitigation measures to reduce future flood risk.

3.1.3 Recommended Strategy for Floodplain Management

The NRFPG does not have the authority to enact or enforce floodplain management, land use, or other infrastructure design standards. Thus, the NRFPG aims to encourage

implementation of recommended floodplain practices by local entities in the region with flood-related authority.

The NRFPG has recommended the following floodplain management standard for the region for consideration by Nueces basin counties, cities, and others with flood administrating authority:

Finished floor of structures should be a minimum of 1 foot above base flood elevations (BFE) (i.e. 1% annual chance or 100-year) or based on local ordinances, whichever is higher. The NRFPG strongly encourages cities and counties in the Nueces Basin to actively consider a minimum 2 feet above base flood elevations, consistent with upcoming 2025 FEMA ordinances. Such higher standards build more resilience and reduces future flood risk for homeowners. The standards are based on available data, to be updated based on Atlas 14 data when available.

Implementation of this recommendation along with defining accurate floodplain limits through the development of detailed hydrologic and hydraulic models and mapping in areas of anticipated high development and population growth is the best approach to address future development and population growth and to limit exposure of new development to the existing and future flood hazard. BLE mapping is in progress and will become available for the entire Nueces Basin in 2023. Although not regulatory in nature, the BLE will provide comprehensive and updated floodplain mapping information. The NRFPG encourages cities and counties in the Nueces Basin to consider adoption of flood ordinances that regulate to the best available data, such as BLE and FEMA floodplains.

Other high-standard practices that should be considered include participation in the NFIP's CRS, requiring new development to mitigate adverse impacts to other properties throughout the watershed, providing standards and restrictions for the placement of fill or development activity in a floodplain, and the use of setbacks, which limit use/development areas along waterways.

Floodplain mitigation studies in the Nueces Basin are encouraged to consider natural systems and beneficial functions of floodplains, including flood peak attenuation and ecosystem services when identifying projects to reduce flood risk. Flood mitigation design approaches that work together with natural floodplain patterns is advised. Most natural flood mitigation features, including floodplains, are in need of maintenance and can be improved with land use management.

Flood management agencies should carefully consider protecting existing streams, riparian areas, and floodplains when considering channelization projects. If channelization is necessary, a two-stage channel with a low-flow channel and a floodplain allows for the continued transport of sediment, habitat for aquatic wildlife, and can reduce maintenance (Rosgen 1996).

As basic flood delineation models become available, building more sophisticated hydrologic and hydraulic models that include soil absorption, geologic porosity, plant interception, and other variables that slow flows or convey surface water below ground can help to provide a deeper understanding of water quality improvements and ground water recharge potential to assess benefits of nature-based solutions.

The NRFPG did not choose to adopt region-specific, minimum floodplain management, land use, or other standards that impact flood-risk, that each entity in the flood planning region must adopt prior to inclusion of any of their Flood Mitigation Evaluations, Strategies, or Projects in the Regional Flood Plan.

3.2 Floodplain Mitigation and Floodplain Management Goals

This section defines specific and achievable flood mitigation and management short- and long-term goals. These goals were developed with the objective “to protect against the loss of life and property”, as set forth in the Guidance Principles in 31 Texas Administrative Code (TAC) §362.3. The short- and long-term goals identify specific and achievable flood mitigation and floodplain management goals that, when implemented, will demonstrate progress towards this overarching objective.

A subcommittee formed by NRFPG members¹ met on August 25 and September 8, 2021, to discuss floodplain priorities and prepare proposed short-term (10-year) and long-term (30-year) goals for RFPG consideration. During the September 27, 2021 RFPG meeting, comments were received and addressed on floodplain management standard and goals and the comment period remained open for 30 days after the meeting. On November 3, 2021, RFPG members, Sky Lewey and Lauren Hutch Williams, participated in a call with HDR Engineering, Inc. (HDR) to provide additional comments on nature-based goals.

The NRFPG defined 10 overarching flood mitigation and floodplain management goals as summarized in Table 3-3. Each goal includes both specific and achievable short-term and long-term goals. Short-term goals were set for a duration of 10-years with a target year of 2033 and long-term goals were set for a duration of 30-years with a target year of 2053. The 10 goals were developed to prepare the Nueces Basin for flooding for the following four categories and 10 sub-categories:

- Protect against loss of life caused by flooding
 - o Improve safety at low water crossings
 - o Reduce risks at high-hazard dams
 - o Implement flood warning systems and improve regional data collection

¹ The Region 13 floodplain management practices and goals subcommittee consisted of Larry Dovalina, Andy Rooke, Larry Thomas, and Jim Tolan.

- Protect against property damage caused by flooding
 - o Perform flood mapping evaluations and update floodplain maps
 - o Reduce the number of structures within the 1% annual chance floodplain
- Floodplain management
 - o Prepare minimum flood management standards
 - o Nature-based practices through land conservation and restoration programs
 - o Develop public information campaign
- Funding
 - o Increase funding for maintenance of drainage systems
 - o Identify funding for community outreach and for permit support

A more detailed table of the goals is provided in Appendix A6 – TWDB Table 11 – Flood Mitigation and Floodplain Management Goals. This table includes additional columns to describe the residual risk of each goal and to describe how each goal will be measured. The residual risk represents the amount of remaining risk that would be expected if the floodplain mitigation and management goals are fully achieved. Any flood risk not avoided or reduced through meeting a goal will remain as a residual risk. Note it is not possible to protect against all potential flood risks.



Table 3-3. Nueces Region Floodplain Goals

Region 13 Draft Floodplain Goals		10 Year	30 Year
Protect against loss of life caused by flooding			
1	Improve Safety at Low Water Crossings through Structural Improvements or Warning Systems	Conduct an inventory of low water crossings (LWCs), characterize risk, and rank LWCs to prioritize those with high risk. Prepare a large-scale public outreach campaign to include "Turn Around Don't Drown" signage at LWCs or roadways aimed at reducing loss of life. Address top 30% of high-risk, LWCs through mitigation or warning systems.	Address 80% of high-risk LWC identified in the study.
2	Rehabilitate, Remove, or Replace Deficient High Hazard Dams as Identified by the Texas Commission on Environmental Quality (TCEQ) Dam Safety Regulation Program	Conduct a comprehensive study to identify all deficient high-hazard dams in the 31-county region. Remove or rehabilitate the top 30% high-hazard dams.	Remove or rehabilitate 100% deficient high-hazard dams.
3	Improve regional coordination, data collection/sharing of flood events and impacts, and implement flood warning systems	Develop (or expand) a successful flood management program on a regional-scale to cover 20% of the data gap area(s) identified in the 2023 plan. Prepare large-scale public outreach to include "Turn Around Don't Drown" campaigns aimed at reducing loss of life.	Develop (or expand) a successful flood management program on a regional-scale to cover 80% of the data gap area(s) identified in the 2023 plan.

Region 13 Draft Floodplain Goals		10 Year	30 Year
Protect against property damage caused by flooding			
4	Perform flood mapping evaluations and update floodplain maps and flood hazard data.	Develop maps to Base Level Engineering (BLE) or National Flood Hazard Layer (NFHL)-level accuracy for 60% of the basin that does not currently have accurate mapping. Identify structures and buildings in the NFHL-Detailed Study Areas with elevations less than 1 foot above base flood elevation (BFE).	Develop accurate maps to NFHL-level accuracy for 100% of the basin. Identify structures and buildings in the NFHL-Detailed Study Areas with elevations less than 1 foot above BFE.
5	Reduce the number of structures within NFHL-Detailed Study Area and Existing Floodplain with 1% annual chance flood risk.	Identify structures within existing floodplain with 1% annual chance flood risk for 60% of the basin. Prepare a list of high-hazard buildings based on function, critical function, repetitive loss, or other community-related importance, summarize, and distribute results to affected floodplain management entities. Reduce the number of high hazard structures within the 1% existing floodplain by 10% for existing structures and identify new structures for targeting with 30-year goal.	Identify structures within existing floodplain with 1% annual chance flood risk for 100% of the basin, including areas that have been updated with more accurate mapping. Prepare a list of high-hazard buildings based on function, critical function, repetitive loss, or other community-related importance, summarize, and distribute results to affected floodplain management entities. Reduce the number of high-hazard structures within the 1% existing floodplain by 50%.



Region 13 Draft Floodplain Goals		10 Year	30 Year
Floodplain management			
6	<p>Prepare minimum flood management standards, including identifying operations and maintenance best practices to maintain drainage structures including remove gravel and sediment deposition to mitigate future flooding impacts.</p>	<p>Provide minimum flood standard recommendation(s) adopted by the NRFPG to floodplain administrators and community leaders, to include: Finished floor of structures are to be constructed a minimum of 1 foot above BFE 100-year or based on local ordinances, whichever is more stringent. The NRFPG strongly encourages cities and counties in the Nueces Basin to actively consider minimum 2 foot above base flood elevations, consistent with upcoming 2025 FEMA ordinances. The standards are based on available data, to be updated with Atlas 14 and/or TWDB BLE data when available. Achieve 30% voluntary adoption of the RFPG minimum standards by counties/cities. Define and recommend additional minimum flood standards for regional support towards implementation, as study results become available. Increase the number of communities adopting higher standards beyond NFIP requirements to 50% of counties and 30% of communities (current is 26% counties and 17% communities). Provide advocacy on the regional and state level to ensure that all communities across the region share a base-level of floodplain management support by 2030.</p>	<p>Achieve 100% voluntary adoption of RFPG minimum standards by counties/cities, including additional minimum flood standards defined during studies conducted through 2033 (10 year). Increase the number of communities adopting higher standards beyond NFIP requirements to 100% of counties and 100% of communities.</p>

Region 13 Draft Floodplain Goals		10 Year	30 Year
7	Increase nature-based practices through land conservation and restoration programs and participation in landowner incentive programs to encourage voluntary land stewardship practices to manage floodwaters, slow runoff and dissipate flood energy to include riparian, wetland, forest, upland, and other habitat protection programs.	Identify existing areas noted for conservation, restoration, and/or habitat protection, and develop a strategy for expanding these programs and/or identifying high success areas for riparian/wetland/forest conservation, restoration, and upland protection programs to enhance flood mitigation benefits. Identify preferred areas in Nueces Basin to expand federal and state land protection programs, and other programs that provide incentives for voluntary land conservation and restoration. Preserve 35% of undeveloped riparian corridor mileage and protect 25% of acreage within the 100-year floodplain through voluntary, local, state, or federal land conservation programs.	Work with local leadership to implement nature-based riparian, wetland, and upland conservation and/or restoration programs for 40% of the high success areas identified. Preserve 80% of undeveloped riparian corridor mileage and protect 50% of acreage within the 100-year floodplain through voluntary, local, state, or federal land conservation programs.
8	Develop public information campaign to increase community knowledge of rules and regulations, flood-prone areas, and importance of protecting floodplains from encroachment	Identify local, subregional workgroups aligned with flooding issues. Develop public information campaign templates with relevant flood-related communications for 20% of the Nueces Region.	Develop public information plan campaigns with relevant flood-related communications for 80% of the Nueces Region area.
Funding			
9	Increase dedicated funding sources to provide maintenance of drainage and culvert systems (both structural and non-structural solutions) to divert flood flows and identify structural improvements causing flooding issues to remove/rectify.	Increase dedicated funding sources, including state-funding opportunities to support operations and maintenance (O&M) for 20% of the communities and 30% counties in the Nueces Region.	Develop dedicated funding sources, including state-funding opportunities, to support O&M for 80% of the communities and 90% counties in the Nueces Region.



Region 13 Draft Floodplain Goals		10 Year	30 Year
10	Identify funding, resources, and technical training for floodplain districts, managers, administrators or designees to enhance technical capacity for identifying floodplain projects, community outreach, and permitting support to verify new projects meet floodplain development requirements.	Identify dedicated funding sources, including state-funding opportunities for 20% of the communities and 30% counties in the Nueces Region. Develop a strategy for public engagement on flood-related issues, including a list of flood mitigation funding programs and potential opportunities for communities to participate in programs to support flood risk reduction (such as the Federal Emergency Management Agency’s (FEMA) Community Rating System) to serve as a template for rural and underserved communities by 2030.	Develop dedicated funding sources, including state-funding opportunities for 80% of the communities and 90% counties in the Nueces Region.