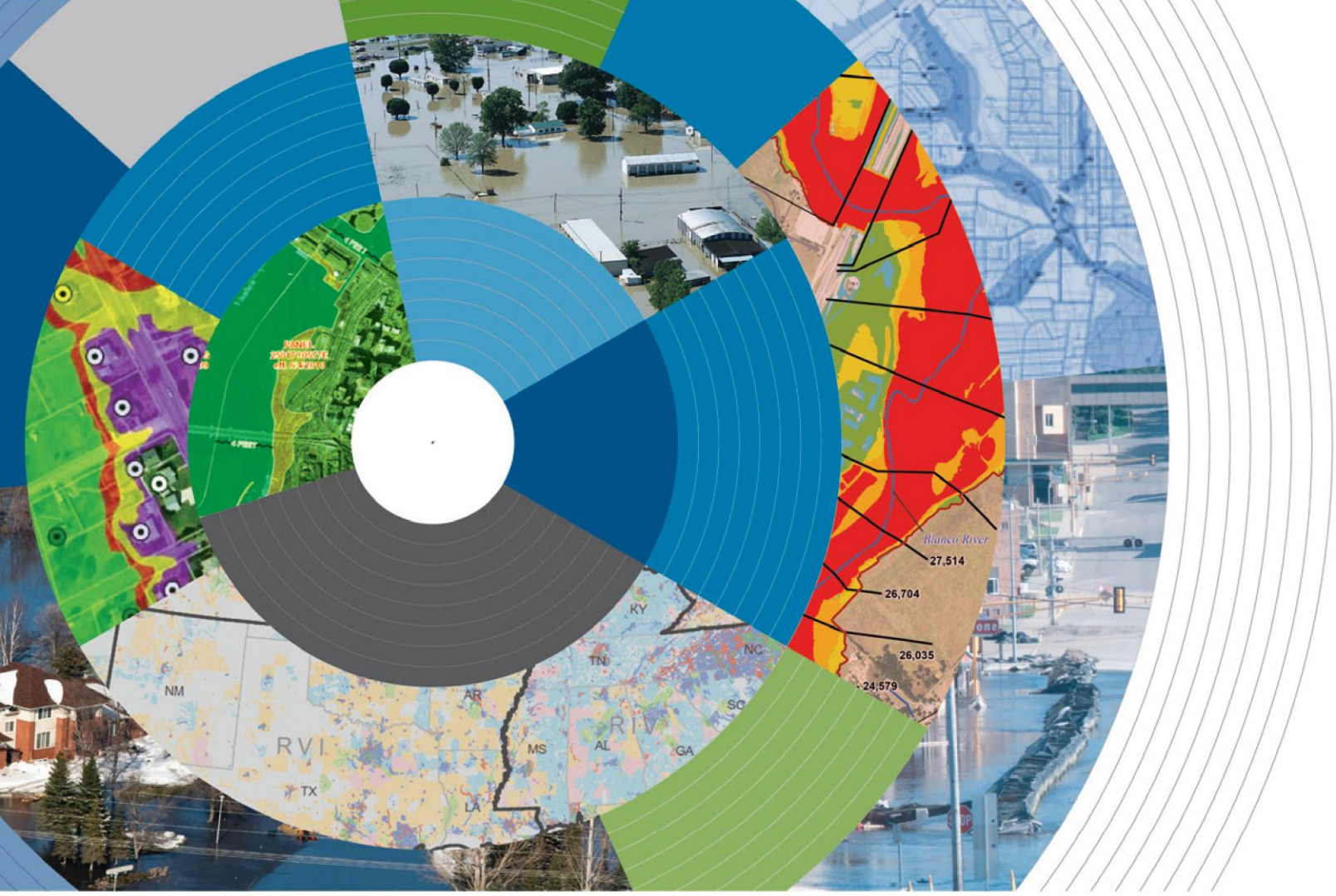

Flood Risk Report

Upper West Fork Trinity Watershed

HUC-8 12030101

September 2023

FEMA

Project Area Community List

Community Name
Archer County (Unincorporated Areas)
Clay County (Unincorporated Areas)
Jack County (Unincorporated Areas)
Montague County (Unincorporated Areas)
Parker County (Unincorporated Areas)
Tarrant County (Unincorporated Areas)
Wise County (Unincorporated Areas)
Young County (Unincorporated Areas)
Town of Alvord
City of Aurora
City of Azle
Town of Bowie
Town of Boyd
City of Bridgeport

Community Name
Town of Chico
City of Decatur
City of Fort Worth
City of Jacksboro
City of Lake Bridgeport
City of New Fairview
City of Newark
City of Paradise
City of Pelican Bay
City of Reno
City of Rhome
City of Runaway Bay
Town of Sanctuary
Town of Springtown

Flood Risk Report History

Version Number	Version Date	Summary
V1.0	June 26, 2023	Discovery and Flood Risk Report Draft

Preface

The Department of Homeland Security Federal Emergency Management Agency's (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) program provides states, tribes, and local communities with flood risk information, datasets, risk assessments, and tools that they can use to increase their resilience to flooding and better protect their residents. By pairing accurate floodplain maps with risk assessment tools and planning and outreach support, Risk MAP transforms the traditional flood mapping efforts into an integrated process of identifying, assessing, communicating, planning for, and mitigating flood-related risks.

This Flood Risk Report (FRR) provides datasets for floods and other natural hazards to help local or tribal officials, floodplain managers, planners, emergency managers, and others better understand their flood risk, take steps to mitigate those risks, and communicate those risks to their residents and local businesses. Flood risk often extends beyond community limits. This report provides flood risk data for the Upper West Fork Trinity watershed.

Flood risk is always changing, and studies, reports, or other sources may be available that provide more comprehensive information. This report is not intended to be regulatory or the final authoritative source of all flood risk data in the project area. Rather, it should be used in conjunction with other data sources to provide a comprehensive picture of flood risk within the project area.

Contents

Executive Summary

The FEMA Risk MAP program provides communities with flood information to help them understand their current flood risk and make informed decisions about taking action to become stronger and more resilient in the face of future risk. The Risk MAP process provides communities with new or improved information about their flood risk based on watershed models that use information from local, regional, state, and federal sources. Communities can use the resulting tools and data to enhance mitigation plans and better protect their residents.

This report is one such tool for communities impacted by an updated flood hazard analysis of the Upper West Fork Trinity watershed. The FRR has two goals: (1) **inform communities of their risks** related to certain natural hazards and (2) **enable communities to act** to reduce their risk. It is intended to assist federal, state, and local officials with the following:

- Updating local hazard mitigation plans (HMPs) and community comprehensive plans;
- Updating emergency operations and response plans;
- Communicating risk;
- Informing the modification of development standards; and
- Identifying mitigation projects.

Most importantly, during this phase of the process, communities are encouraged to review the flood hazard changes closely and provide feedback to FEMA Region 6, based on their local knowledge and any additional data available.

About the FEMA Risk Mapping, Assessment, and Planning (Risk MAP) Program

Flood risk is continually changing over time due to factors such as new building and development and weather patterns. The goal of FEMA's Risk MAP program is to work with Federal, state, tribal, and local partners to identify and reduce flood risk across communities. These projects are conducted using watershed boundaries and bring together multiple communities to identify broader mitigation actions and create consistency across the watershed. The program provides resources and support that are tailored to each community to help mitigate their risk and work towards a reduction in risk and future loss.

Through coordination and data sharing, the communities in the watershed work as partners in the mapping process. In addition to providing data, the communities can also provide insight into flooding issues and flood prevention within their areas. To prepare for a future study and assist in mitigation, FEMA provides several data sources, including information from the community, such as the following:

- Areas of repeated flooding and insurance claims
- Future development plans
- Areas of low water crossings
- High water marks from recent flooding events
- Areas of evacuation during high water
- Master drainage plans, flood risk reduction projects, and large areas of fill placement
- Local flood studies

- Other flood risk information

For more information about ways communities can take action or take advantage of available resources, please review the attached appendices.

FEMA provides communities with Base Level Engineering (BLE) data for select watersheds during the Risk MAP process. BLE is a form of automated hydrologic and hydraulic modeling which, when completed, can provide modeled flood hazard data in existing Zone As or where no effective flood hazard zone has been designated. Knowing the extent of flooding during the 1-percent-annual-chance flooding event supports both risk reduction efforts and more resilient community planning. Completed BLE data is provided to watershed communities for planning, risk communication, floodplain management, and permitting activities, and to inform future flood study needs. BLE is large scale watershed-based modeling that lacks the detail of Zone AE modeling such as road crossings and the effects of routing storage. BLE does not replace Zone AE data and should be used for comparison purposes only in these areas.

For the Upper West Fork Trinity watershed BLE datasets and products, see FEMA's Mapping Information Platform (MIP) Case Numbers 20-06-0038S (Upper West Fork Trinity), 17-06-1172S (Archer), and 17-06-1175S (Jack), The products are also available on the Interagency Flood Risk Management (InFRM) estimated Base Flood Elevation (BFE) Viewer at https://webapps.usgs.gov/infrm/estBFE/.

About the Upper West Fork Trinity Watershed

The North Central Texas Council of Governments (NCTCOG) became a FEMA Cooperating Technical Partner (CTP) in Fiscal Year 2004 (FY2004) and in FY2021 contracted with FEMA to provide Risk MAP Discovery for the Upper West Fork Trinity watershed. The project area covers the counties bounded by the Upper West Fork Trinity Hydrologic Unit Code 8 (HUC-8) watershed: Archer, Clay, Jack, Montague, Parker, Tarrant, Wise, and Young counties and their incorporated areas. Locator maps covering the study area can be found in Figure 1 and Appendix III of this report. Base Level Engineering (BLE) products were developed under FY2017 for Archer County, Texas (17-06-1172S) and Jack County, Texas (17-06-1175S) and the remaining areas of the Upper West Fork Trinity watershed under FY2019 (20-06-0038S).

The first FEMA flood hazard mapping product within the Upper West Fork Trinity watershed was released in the 1970s. As of 2023, all participating communities, aside from Clay County, have modernized countywide Digital Flood Insurance Rate Maps (DFIRMs) and Flood Insurance Study (FIS) Reports. Approximately 94 percent of the area in the Upper West Fork Trinity watershed is undeveloped; including 57 percent grasslands and pastures, five percent cropland, 30 percent forested areas. Roughly six percent of the area is developed, and the remaining two percent is open water. Over the past 50 years, the study area has experienced increased development and frequent flash floods. The Memorial Day floods and Tropical Storm Bill in 2015 damaged roads and necessitated civilian rescues from flooding throughout the Upper West Fork Trinity watershed. The Memorial Day Floods were declared a major disaster, and the communities within the study watershed were estimated to receive nearly $24 million in Public Assistance

from FEMA.[1] The unincorporated areas of Montague County alone received nearly $17.5 million dollars to repair damaged roads and other infrastructure affected by the floods.

In 2021, FEMA authorized NCTCOG to perform Discovery in the Upper West Fork Trinity watershed. The goal of the FY2021 project was to work closely with communities to better understand local flood risks, mitigation efforts, and other topics to spark watershed-wide discussions about increasing resilience to flooding.

[1] Data obtained from "The State of State of Texas Plan for Disaster Recovery Amendment No. 3" Appendix D" regarding Public Assistance for Major Disaster Declaration FEMA-4223-DR.

Introduction

Flood Risk

Floods are naturally occurring phenomena that can and do happen almost anywhere. In its most basic form, a flood is an accumulation of water over normally dry areas. Floods become hazardous to people and property when they inundate an area where development has occurred, causing losses. Mild flood losses may have little impact on people or property, such as damage to landscaping or the accumulation of unwanted debris. Severe flood losses can destroy buildings and crops and cause severe injuries or death.

Calculating Flood Risk

It is not enough to simply identify where flooding may occur. Even if people know where a flood might occur, they may not know the risk of flooding in that area. The most common method for determining flood risk, also referred to as vulnerability, is to identify both the probability and the consequences of flooding:

> **Flood Risk** (or Vulnerability) **= Probability x Consequences**, where:
>
> **Probability** = the likelihood of occurrence
>
> **Consequences** = the **estimated** impacts associated with the occurrence

The probability of a flood is the likelihood that it will occur. The probability of flooding can change based on physical, environmental, and/or engineering factors. Factors affecting the probability that a flood will have an impact on an area range from changing weather patterns to the existence of mitigation projects. The ability to assess the probability of a flood, and the level of accuracy for that assessment, are also influenced by modeling methodology advancements, better knowledge, and longer periods of record for the body of water in question.

The consequences of a flood are the estimated impacts associated with its occurrence. Consequences relate to human activities within an area and how a flood affects the natural and built environment.

The FRR has two goals: (1) inform communities of their risks related to certain natural hazards, and (2) enable communities to act to reduce their risk. The information within this FRR is intended to assist federal, state, and local officials to:

- **Communicate risk** – Local officials can use the information in this report to communicate with property owners, business owners, and other residents about risks and areas of mitigation interest.
- **Update local HMPs and community comprehensive plans** – Planners can use risk information to develop and/or update HMPs, comprehensive plans, future land use maps, and zoning regulations. For example, zoning codes can be changed to provide for more appropriate land uses in high-hazard areas.
- **Update emergency operations and response plans** – Emergency managers can identify high-risk areas for potential evacuation and low-risk areas for sheltering. Risk assessment information may show vulnerable areas, facilities, and infrastructure for which continuity of operations plans, continuity of government plans, and emergency operations plans would be essential.

- **Inform the modification of development standards –** Planners and public works officials can use information in this report to support the adjustment of development standards for certain locations.
- **Identify mitigation projects –** Planners and emergency managers can use this risk assessment to determine specific mitigation projects of interest. For example, a floodplain manager may identify critical facilities that need to be elevated or removed from the floodplain.

This FRR focuses on the FY2021 Risk MAP Discovery and the FY2017 and FY2019 BLE projects. It showcases risk assessments, which analyze how a hazard affects the built environment, population, and local economy. They help to identify mitigation actions and develop mitigation strategies.

The information in this report should be used to identify areas for mitigation projects as well as for additional efforts to educate residents on the hazards that may affect them. The areas of greatest hazard impact are identified in the Areas of Mitigation Interest section of this report, which can serve as a starting point for identifying and prioritizing actions a community can take to reduce its risks.

Watershed Basics

Background

The Upper West Fork Trinity watershed is in North Texas and covers portions of Archer, Clay, Jack, Montague, Parker, Tarrant, Wise, and Young Counties for a total of approximately 2,000 square miles (sq mi). The watershed encompasses six towns and 14 cities within the eight counties. See Figure 1 below for a location map of the Upper West Fork Trinity watershed.

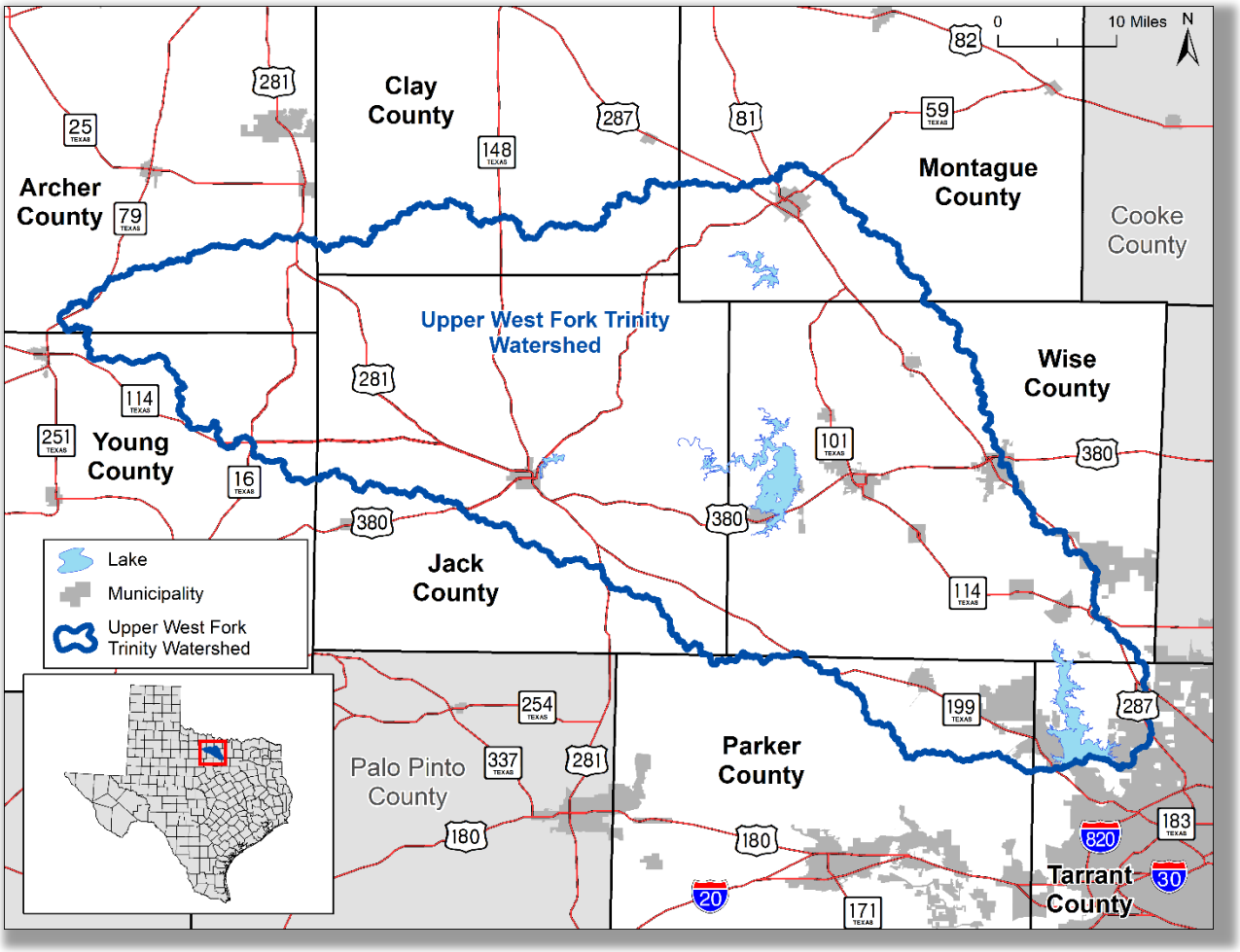

Figure 1: Overview map for the Upper West Fork Trinity watershed

The Upper West Fork Trinity watershed is entirely in the Cross Timbers ecoregion, which is primarily comprised of wooded land, grassland, sandstone-capped hills, and pastures in non-urbanized areas. Crops grown in this ecoregion are peanuts, grain sorghums and small grains. The bottomland soils are reddish brown to dark gray and slightly acid loams. Eastern Cross Timbers' surface runoff is moderate to rapid. The study area can be further described as entirely within the sub-ecoregion is the West Cross Timbers region. The West Cross Timbers region has some elevation changes with hills, escarpments, and exposed boulders. Vegetation is usually either Post Oak or Blackjack Oak woodlands and open grasslands or bushed rangeland used for cattle ranging.

The Upper West Fork Trinity watershed has approximately 132 dams which are primarily used for flood control. These dams provide other benefits such as fire protection, irrigation, recreation, and water supply. An estimated 43 of the dams are privately owned and the remaining dams are owned either by the local communities, or the county's water districts, including Tarrant Regional Water District and others. None of the dams are owned by the state or by nationwide organizations such as the United States Army Corps of Engineers (USACE). The largest dam is the Bridgeport Dam, which was completed in 1931 and is used for flood control and water supply. There are five levees in the Upper West Fork Trinity watershed and none are accredited by FEMA.

Intense, localized thunderstorms and frontal-type storms in spring and summer cause many of the flooding issues in the Upper West Fork Trinity watershed. Flash flooding occurs throughout the watershed, with the clay subsoils often eroding during large rain events. Recently, the most significant flooding event happened in 2015 in Jack, Montague, and Wise Counties when a stalled front produced softball sized hail, E-1 and E-0 tornados, along with flashing flooding. Flash flooding occurred in the cities of Decatur, New Fairview, and Rhome, and the Town of Bowie.

Population

A review of land cover changes and population growth patterns in the watershed revealed that significant development occurred from 2010 to 2020 in many cities within Parker, Tarrant, and Wise Counties. The Cities of Azle, Fort Worth, Pelican Bay, and Runaway Bay, and the Towns of Boyd and Springtown all increased in population between 15 to 32 percent. Clay County and Montague County had the largest population increases of 89 percent and 95 percent, respectively in the watershed.

Since 2010, 60 percent of communities within the watershed have experienced population growth. However, five communities (the Cities of Jacksboro and Lake Bridgeport, the Town of Chico, and the unincorporated areas of Archer and Young Counties) have declined in population since 2010. The City of Jacksboro now serves approximately seven percent fewer people than it did in 2010, the greatest population decline in the watershed.

Excluding the combined areas of previously developed land and open water, roughly 1,795 sq mi of the Upper West Fork Trinity watershed still has the potential for new construction. Using the average annual growth for the communities within the project watershed, the total population has the potential to increase up to 20 percent by 2030 based on population trends from 2010 to 2020. Therefore, the probability is high that populated areas will expand, and some rural land will be developed, thereby increasing impervious areas.

Watershed Land Use

The majority of Upper West Fork Trinity watershed is undeveloped and rural. The urbanized areas within the watershed are located around the southern and southeastern borders. The 20 municipalities range in population from New Fairview's 130 residents to Fort Worth's estimated 47,000 residents within the study watershed. In the western and central portions of the study watershed, the land area is primarily rural, with a makeup of agriculture, pastures, and deciduous forests. Eagle Mountain Lake, located largely in Tarrant County and partially in Wise County, offers many aquatic opportunities for the communities situated along the lake. Lake Bridgeport, which sits in Wise County, also offers water recreation such as fishing, boating, and swimming, as well as hiking trails along the lake. Although most of the study watershed area is undeveloped, as of 2020 it will likely have steady growth due do the increasing demand of housing in the communities closest to the Dallas-Fort Worth metroplex.

Table 1 below shows a summary of the population and area characteristics of the study watershed.

Table 1: Population and Area Characteristics[2]

Risk MAP Project	Total Population in Study Area	Average % Population Growth/Yr (2010-2020)	Predicted Population (by 2030)	Land Area*	Developed Area	Open Water
Upper West Fork Trinity Watershed (HUC 12030101)	168,701	0.36	203,539	1,956 sq mi	115 sq mi	46 sq mi

*Total Land Area includes land and water.

National Flood Insurance Program (NFIP) Status and Regulation

To be a participant in the NFIP, all interested communities must adopt and submit floodplain management ordinances that meet or exceed the minimum NFIP regulations. These regulations can be found in the Code of Federal Regulations and most of the community ordinance requirements are in Title 44, Parts 59 and 60. The level of regulation depends on the level of information available and the flood hazards in the area. The levels are as follows:

- A: FEMA has not provided any maps or data – *60.3(a)*
- B: Community has maps with approximate A zones – *60.3(b)*
- C: Community has a Flood Insurance Rate Map (FIRM) with Base Flood Elevations (BFE) – *60.3(c)*
- D: Community has a FIRM with BFEs and floodways – *60.3(d)*
- E: Community has a FIRM that shows coastal high hazard areas (V zones) – *60.3(e)*

To help mitigate the risk to areas where increased population and development are expected, communities can adopt (or exceed) the minimum standards of the NFIP. This is recommended as a proactive strategy to manage construction within the floodplain and avoid negative impacts to existing and future development.

To increase mitigation efforts and community flood awareness through potentially discounted premium rates, an NFIP community that has adopted more stringent ordinances or is actively completing mitigation and outreach activities is encouraged to consider joining the Community Rating System (CRS). The CRS is a voluntary incentive-based program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions. The City of Forth Worth is the only CRS participating community in the watershed.

Communities can review their current ordinances and reflect potential flood hazard changes by adopting updated ordinances early. This action can reduce future flood losses by affecting how substantial improvements or new construction are regulated.

Table 2 depicts NFIP and CRS participation status and provides an overview of the effective flood data availability.

[2] Data obtained from the U.S. Census Bureau; ESRI Demographic 5-year Projections; and National Land Cover Database

Table 2: NFIP and CRS Participation[3]

Risk MAP Project	Participating NFIP Communities/ Total Communities	Number of CRS Communities	CRS Rating Class Range	Average Years since FIRM Update	Level of Regulations (44 CFR 60.3)
Upper West Fork Trinity Watershed (HUC 12030101)	27/28	1	8	10	b-d

Clay County has FIRM maps from 1991 and only include Approximate Zone A flood hazards. The area in Clay County which is present in the study watershed are on panels not printed and are recorded as having no Special Flood Hazard Areas (SFHAs). Therefore, while Clay County regulates to maps with Approximate A zones – 60.3(b), there are no regulations in the area specific to this study.

Within the limits of the Upper West Fork Trinity, the Cities of Aurora, Decatur, New Fairview, Paradise, Pelican Bay, Rhome, and Runaway Bay, and the Towns of Boyd, Chico, and Sanctuary have FIRM maps with Approximate A zones – 60.3(b). The Cities of Fort Worth and Jacksboro, the Town of Bowie, and the unincorporated areas of Archer, Jack, Montague, Parker, and Young Counties have FIRMs with Base Flood Elevations (BFE) – 60.3(c) inside the study watershed.

The Cities of Azle, Bridgeport, Newark, and Reno, the Town of Springtown, and unincorporated areas of Tarrant and Wise Counties have a level of regulation suitable for managing floodplains with mapped regulatory floodways and BFEs (44 CFR 60.3(d)). The City of Alvord does not participate in the NFIP and therefore, does not have any regulation for managing flood risk at any level for non-coastal areas (44 CFR 60.3(a-d)).

Hazard Mitigation Plan

State and local governments must develop and adopt Hazard Mitigation Plans (HMPs) to be eligible for certain types of funding. To remain eligible, communities need to update and resubmit their plans every five years for FEMA approval. HMPs are created to increase education and awareness, identify strategies for risk reduction, and identify other ways to develop long-term strategies to reduce risk and protect people and property.

As of July 2023, the Cities of Aurora, Lake Bridgeport, New Fairview, Newark, Pelican Bay, Reno, and Rhome and the Towns of Boyd and Sanctuary do not have HMPs. The Cities of Bridgeport, Paradise, and Runaway Bay, the Towns of Alvord and Chico, and the unincorporated areas of Wise County participate in the Wise County HMP, which is currently in progress. The City of Decatur had its own HMP, which expired in August 2021.

Archer and Clay County each have a HMP that is set to expire in June and August 2025, respectively. The City of Jacksboro and the unincorporated areas of Jack County participate in the Jack County HMP, which is set to expire in August 2025. The Town of Bowie and the unincorporated areas of Montague County participate in the Montague County HMP, which will also expire in August 2025. The Town of Springtown and the unincorporated areas of Parker County participate in the Parker County HMP, which will expire in May 2026. The Cities of Azle and Fort Worth and the unincorporated areas of Tarrant County all participate

[3] Data obtained from FEMA Community Information Systems.

in the Tarrant County HMP, which will expire March 2025. Young County has its own HMP and is set to expire in September 2025.

HMPs are prepared and adopted by communities with the primary purpose of identifying, assessing, and reducing the long-term risk to life and property from hazard events. When applying for certain types of non-emergency disaster assistance, FEMA requires a hazard mitigation plan. These requirements are part of the laws, regulations, and policy surrounding hazard mitigation planning.

Flood Insurance Rate Maps

The average age of the effective FIRMs within the Upper West Fork Trinity watershed is almost 11 years. The oldest effective map is in Clay County; it is 31 years old and has an effective date of April 2, 1991. The newest effective maps in Archer County are a little more than a year old (at the time of this report) and have an effective date of February 12, 2021. As of 2023, all communities, except for Clay County and its incorporated areas, in the watershed have modernized county-wide effective DFIRMs.

Dams

The Upper West Fork Trinity watershed has several dams and reservoirs used mainly for water supply, recreation, navigation, irrigation, and flood control. As recorded by the USACE National Inventory of Dams (NID) database and the FEMA DFIRM databases, there are approximately 132 dams within the study watershed, with six of these dams classified as high-hazard dams. For these high-hazard dams, the owners and operators are required to develop and maintain Emergency Action Plans (EAP) to reduce the risk of loss of life and property if the dam fails. Figure 2 below shows locations of dams in the study watershed. Table 3 shows a summary of the dams and associated characteristics in the watershed.

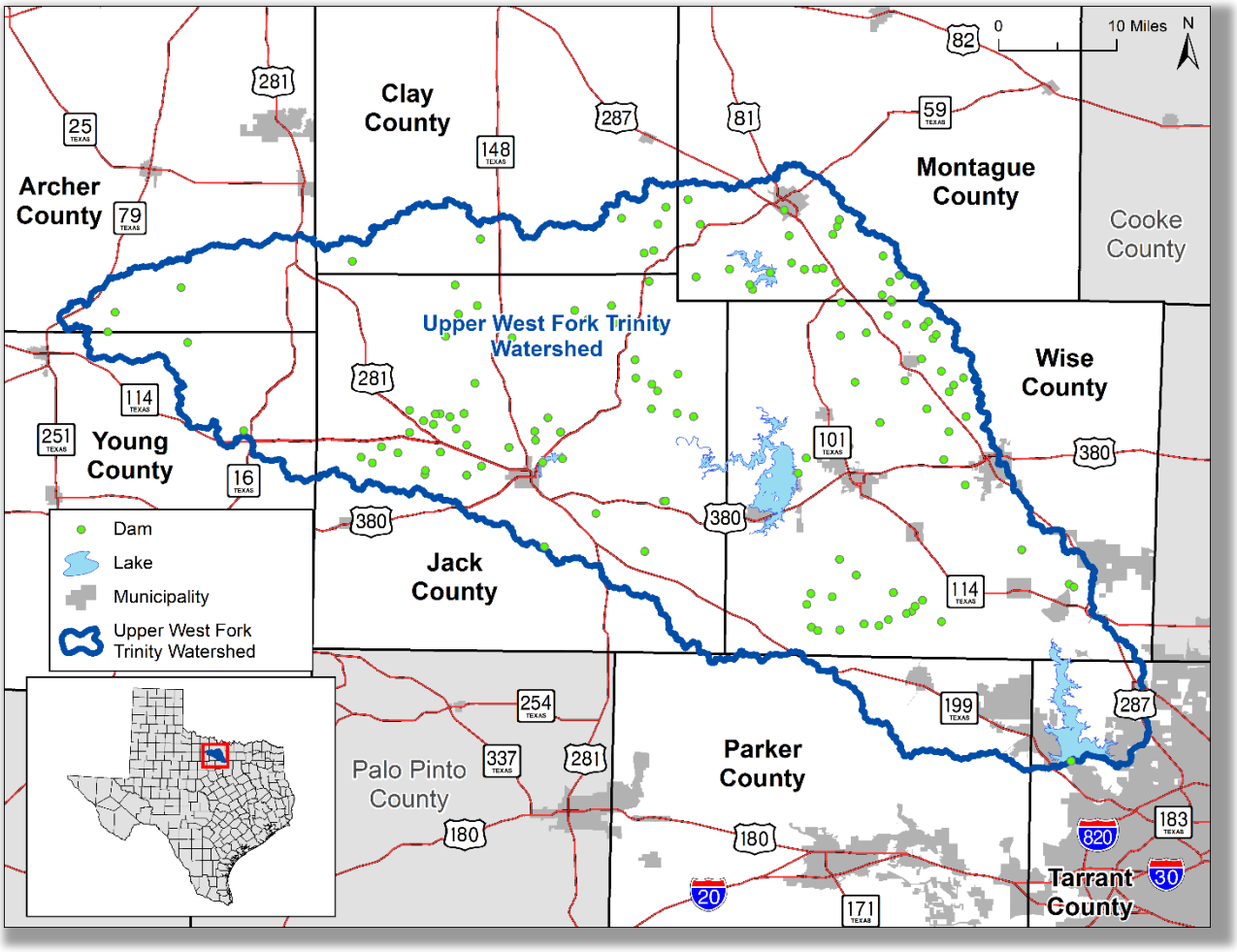

Figure 2: Dam Location Map for Upper West Fork Trinity watershed

Table 3: Risk MAP Project Dam Characteristics[4]

Risk MAP Project	Total Number of Identified Dams	Number of Dams Requiring EAP	Percentage of Dams without EAP	Average Years since Inspection	Average Storage (acre-feet)
Upper West Fork Trinity Watershed (HUC 12030101)	132	6	94.5	-*	4,514

[4] Data obtained from USACE National Inventory of Dams
* Unknown

Project Phases and Map Maintenance

Background

FEMA manages several risk analysis programs, including the Flood Hazard Mapping, National Dam Safety, Earthquake Safety, Multi-Hazard Mitigation Planning, and Risk Assessment Programs, that assess the impact of natural hazards and lead to effective strategies for reducing risk. These programs support the Department of Homeland Security's objective to "strengthen nationwide preparedness and mitigation against natural disasters."

FEMA manages the NFIP, which is the cornerstone of the national strategy for preparing American communities for flood hazards. In the Nation's comprehensive emergency management framework, the analysis and awareness of natural hazard risk remains challenging. For communities to make informed risk management decisions and take action to mitigate risk, a consistent risk-based approach to assessing potential vulnerabilities and losses is needed, as are tools to communicate the message. Flood hazard mapping remains a basic and critical component for a prepared and disaster-resilient Nation.

> *Flood-related damage between 1980 and 2013 totaled $260 billion, but the total impact to our Nation was far greater—more people lose their lives annually from flooding than any other natural hazard.*
>
> *FEMA, "Federal Flood Risk Management Standard (FFRMS)" (2015)*

In FY2009, FEMA's Risk MAP program began to synergize the efforts of federal, state, and local partners to create timely, viable, and credible information identifying natural hazard risks. The intent of the Risk MAP program is to share resources to identify the natural hazard risks a community faces and ascertain possible approaches to minimizing them. Risk MAP aims to provide technically sound flood hazard information to be used in the following ways:

- To update the regulatory flood hazard inventory depicted on FIRMs and the National Flood Hazard Layer (NFHL);
- To provide broad releases of data to expand the identification of flood risk (flood depth grids, water surface elevation grids, etc.);
- To support sound local floodplain management decisions; and
- To identify opportunities to mitigate long-term risk across the Nation's watersheds.

How are FEMA's Flood Hazard Maps Maintained?

FEMA's flood hazard inventory is updated through several types of revisions.

Community-submitted Letters of Map Change. First and foremost, FEMA relies heavily on the local communities that participate in the NFIP to carry out the program's minimum requirements. These requirements include the obligation for communities to notify FEMA of changing flood hazard information and to submit the technical support data needed to update the FIRMs.

Although revisions may be requested at any time to change information on a FIRM, FEMA generally will not revise an effective map unless the changes involve modifications to SFHAs. Be aware that the best floodplain management practices and proper assessments of risk result when the flood hazard maps present information that accurately reflects current conditions.

> *Under the current minimum NFIP regulations, a participating community commits to notifying FEMA if changes take place that will affect an effective FIRM no later than 6 months after project completion.*
>
> *Section 65.3, Code of Federal Regulations*

Letters of Map Amendment (LOMA). The scale of an effective FIRM does not always provide the information required for a site-specific analysis of a property's flood risk. FEMA's LOMA process provides homeowners with an official determination on the relation of their lot or structure to the SFHA. Requesting a LOMA requires a homeowner to work with a surveyor or engineering professional to collect site-specific information related to the structure's elevation; it may also require the determination of a site-specific BFE. Fees are associated with collecting the survey data and developing a site-specific BFE. Local survey and engineering professionals usually provide an Elevation Certificate to the homeowner, who can use it to request a LOMA. A successful LOMA may remove the federal mandatory purchase requirement for flood insurance, but lending companies may still require flood insurance if they believe the structure is at risk.

FEMA-Initiated Flood Risk Project. Each year, FEMA initiates a number of Flood Risk Projects to create or revise flood hazard maps. Because of funding constraints, FEMA can study or restudy only a limited number of communities, counties, or watersheds. As a result, FEMA prioritizes study needs based on a cost-benefit approach whereby the highest priority is given to studies of areas where development has increased, and the existing flood hazard data has been superseded by information based on newer technology or changes to the flooding extent. FEMA understands communities require products that reflect current flood hazard conditions to best communicate risk and implement effective floodplain management.

Flood Risk Projects may be delivered by FEMA or one of its CTPs. The CTP initiative is an innovative program created to foster partnerships between FEMA and participating NFIP communities, as well as regional and state agencies. Qualified partners collaborate in maintaining up-to-date flood maps. In Region 6, CTPs are generally statewide agencies that house the State Floodplain Administrator. However, some Region 6 CTPS are also large River Authority or Flood Control Districts. They provide enhanced coordination with local, state, and federal entities, engage community officials and technical staff, and provide updated technical information that informs updates to the national flood hazard inventory.

Risk MAP has modified FEMA's project investment strategy from a single investment by fiscal year to a multi-year phased investment, which allows the Agency to be more flexible and responsive to the findings of the project as it moves through the project lifecycle. Flood Risk Projects are funded and completed in phases.

General Flood Risk Project Phases

Each phase of the Flood Risk Project provides both FEMA and its partner communities an opportunity to discuss the data that has been collected to determine a path forward. Local engagement throughout each phase of the project enhances the opportunities for partnership and discussion about current and future risk, as well as offering the opportunity to identify projects and activities that local communities may pursue to reduce their long-term natural hazard risk.

Flood Risk Projects may be funded for one or more the following phases:

- Phase Zero – Investment
- Phase One – Discovery
- Phase Two – Risk Identification and Assessment
- Phase Three – Regulatory Product Update

Local input is critical throughout each phase of a Flood Risk Project. More detail about the tasks and objectives of each phase are included below.

Phase Zero: Investment

Phase Zero of a Flood Risk Project initiates FEMA's review and assessment of the inventories of flood hazards and other natural hazards within a watershed area. During the Investment Phase, FEMA reviews the availability of information to assess the current floodplain inventory. FEMA maintains several data systems in order to perform watershed assessments and selects watersheds for a deeper review of available data and potential investment tasks based on the following factors:

Availability of High-Quality Ground Elevation. FEMA reviews readily available and recently acquired ground elevation data. This information helps identify development and earth-moving activities near streams and rivers. Where necessary, FEMA may partner with local, state, and other federal entities to collect necessary ground elevation information within a watershed.

If high-quality ground elevation data is both available for a watershed area and compliant with FEMA's quality requirements, FEMA and its mapping partners may prepare engineering data to assess, revise, replace, or add to the current flood hazard inventory.

Mile Validation Status within Coordinated Needs Management Strategy (CNMS). FEMA uses the CNMS database to track the validity of the flood hazard information prepared for the NFIP. The CNMS database reviews 17 criteria to determine whether the flood hazard information shown on the current FIRM is still valid.

Communities may also inform and request a review or update of the inventory through the CNMS website at https://msc.fema.gov/cnms/. The CNMS Tool Tutorial provides an overview of the online tool and explains how to submit requests.

Local Hazard Mitigation Plans. Reviewing current and historic HMPs provides an understanding of a community's comprehension of its flood risk and other natural hazard risks. The mitigation strategies within a local HMP provide a lens to local opportunities and underscore a potential for local adoption of higher standards related to development or other actions to reduce long-term risk.

Cooperating Technical Partner State Business Plans. In some states, a CTP generates an annual state business plan that identifies future Flood Risk Project areas that are of interest to the state. The Texas Water Development Board (TWDB) and the Texas Natural Resources Information System (TNRIS) work to develop user-friendly data. In this project area, FEMA has worked closely with both entities to develop the project scope and determine the necessary project tasks.

Communities that have identified local issues are encouraged to indicate their data needs and revision requests to the State CTP so that they can be prioritized and included in the state business plans.

Possible Investment Tasks. After a review of the data available within a watershed, FEMA may choose to (1) purchase ground elevation data and/or (2) create some initial engineering modeling against which to compare the current inventory. This type of modeling is known as BLE.

Phase One: Discovery

Phase One, the Discovery Phase, provides opportunities both internally (between the state and FEMA) and externally (with communities and other partners interested in flood potential) to discuss local issues with flooding and examine possibilities for mitigation action. This effort is made to determine where communities currently are with their examination of natural hazard risk throughout their community and to identify how state and federal support can assist communities in achieving their goals.

The Discovery process includes an opportunity for local communities to provide information about their concerns related to natural hazard risks. Communities may continue to inform the project identification effort by providing previously prepared survey data, as-built stream crossing information, and engineering information.

For a holistic community approach to risk identification and mapping, FEMA relies heavily on the information and data provided at a local level. Flood Risk Projects are focused on identifying (1) areas where the current flood hazard inventory does not provide adequate detail to support local floodplain management activities, (2) areas of mitigation interest that may require more detailed engineering information than is currently available, and (3) community intent to reduce the risk throughout the watershed to assist FEMA's future investment in these project areas. Watersheds are selected for Discovery based on these evaluations of flood risk, data needs, availability of elevation data, regional knowledge of technical issues, identification of a community-supported mitigation project, and input from federal, state, and local partners.

Possible Discovery Tasks. Discovery may include a mix of interactive webinars, conference calls, informational tutorials, and in-person meetings to reach out to and engage with communities for input. Data collection, interviews and interaction with community staff, and data-mining activities provide the basis for watershed-, community-, and stream-level reviews to determine potential projects that may benefit the communities. A range of analysis approaches are available to determine the extent of flood risk along streams of concern. FEMA and its mapping partners will work closely with communities to

determine the appropriate analysis approach, based on the data needs throughout the community. These potential projects may include local training sessions, data development activities, outreach support to local communities wanting to step up their efforts, or the development of flood risk datasets within areas of concern, to allow a more in-depth discussion of risk.

Phase Two: Risk Identification and Assessment

Phase Two (Risk Identification and Assessment) continues the risk awareness discussion with communities through watershed analysis and assessment. Analyses are prepared to review the effects of physical and meteorological changes within the project watershed. The new or updated analysis provides an opportunity to identify how development within a watershed has affected the amount of stormwater generated during a range of storm probabilities and shows how effectively stormwater is transported through communities in the watershed.

Coordination with a community's technical staff during engineering and model development allows FEMA and its mapping partners to include local knowledge, based on actual on-the-ground experience, when selecting modeling parameters.

The information prepared and released during Phase Two is intended to promote better local understanding of the existing flood risk by allowing community officials to review the variability of the risk throughout their community. As FEMA strives to support community-identified mitigation actions, it also looks to increase the effectiveness of community floodplain management and planning practices, including local hazard mitigation planning, participation in the NFIP, use of actions identified in the CRS Manual, risk reduction strategies for repetitive loss and severe repetitive loss properties, and the adoption of stricter standards and building codes.

FEMA is eager to work closely with communities and technical staff to determine the current flood risk in the watershed. During the Risk Identification and Assessment phase, FEMA would like to be alerted to any community concerns related to the floodplain mapping and analysis approaches being taken. During this phase, FEMA can engage with communities and review the analysis and results in depth.

Possible Risk Identification and Assessment Tasks. Phase Two may include a mixture of interactive webinars, conference calls, informational tutorials, and in-person meetings to reach out to and engage with communities for input. Flood Risk Project tasks may include hydrologic or hydraulic engineering analysis and modeling, floodplain mapping, risk assessments using Hazus-MH software, and preparation of flood risk datasets (water surface elevation, flood depth, or other analysis grids). Additionally, projects may include local training sessions, data development activities, outreach support to local communities that want to step up their efforts, or the development of flood risk datasets within areas of concern, to allow a more in-depth discussion of risk.

Phase Three: Regulatory Products Update

If the analysis prepared in the previous Flood Risk Project phases indicate that physical or meteorological changes in the watershed have significantly changed the flood risk since the last FIRM was printed, FEMA will initiate the update of the regulatory products that communities use for local floodplain management and NFIP activities.

Delivery of the preliminary FIRMs and FIS reports begins another period of coordination between community officials and FEMA to discuss the required statutory and regulatory steps both parties will perform before the preliminary FIRM and FIS reports can become effective. As in the previous phases, FEMA and its mapping partners will engage with communities through a variety of conference calls, webinars, and in-person meetings.

Once the preliminary FIRMs are prepared and released to communities, FEMA will initiate the statutory portions of the regulatory product update. FEMA will coordinate a Consultation Coordination Officer (CCO) meeting and initiate a 90-day comment and appeal period. During this appeal period, local developers and residents may coordinate the submittal of their comments and appeals through their community officials to FEMA for review and consideration.

FEMA welcomes this information because additional proven scientific and technical information increases the accuracy of the mapping products and better reflects the community's flood risks identified on the FIRMs.

Communities may host or hold Open House meetings for the public. The Open House layout allows attendees to move at their own pace through several stations, collecting information in their own time. This format allows residents to receive one-on-one assistance and ask questions pertinent to their situation or their interest in risk or flood insurance information.

FEMA will review all appeals and comments received during the statutory 90-day appeal period, including the community's written opinion, to determine the validity of the appeal. Once FEMA issues the appeal resolution, the associated community and all appellants will receive an appeal resolution letter and FEMA will make any revisions to the FIRM as appropriate. A 30-day period is provided for review and comment on successful appeals. Once all appeals and comments are resolved, the flood map is ready to be finalized.

After the appeal period, FEMA will send community leaders a Letter of Final Determination (LFD) stating that the preliminary FIRM will become effective in six months. The letter also discusses the actions each affected community participating in the NFIP must take to remain in good standing with the NFIP.

After the preceding steps are complete and the six-month compliance period ends, the FIRMs are considered effective maps and new building and flood insurance requirements become effective.

Next, the Flood Risk Report will provide details on the efforts in the Upper West Fork Trinity watershed.

Phase Zero: Investment

The Upper West Fork Trinity watershed represents one of the dominant flooding sources in North Texas and lies northwest of the "flash-flood alley" of Texas. Figure 3 the documented storm events in Texas in relation to the flash flood risk in the Upper West Fork Trinity watershed. The Upper West Fork Trinity watershed includes the headwaters of the West Fork Trinity River, which drains into Eagle Mountain Lake. The watershed impacts over 28 communities which include approximately 168,000 people. The watershed covers more than 1,957 sq mi with over 193 sq mi of mapped flood hazards. Much of the floodplain in the Upper West Fork Trinity watershed is in the unincorporated areas in Jack and Wise Counties. See Appendix III for figures showing effective floodplain mapping in the Upper West Fork Trinity watershed.

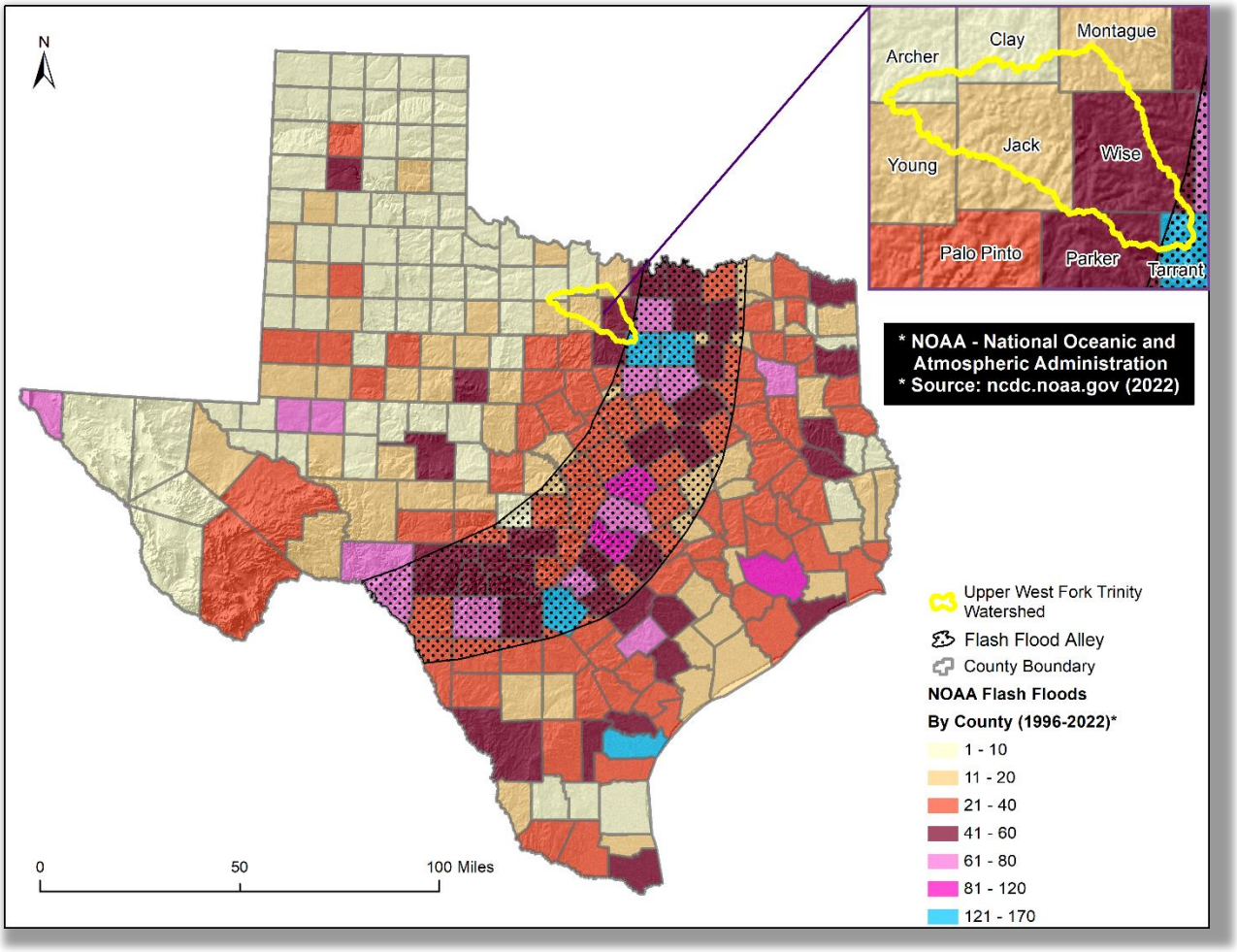

Figure 3: Flash Flood Incidents per County

All streams in the watershed are either direct or indirect tributaries to the West Fork Trinity River. The West Fork Trinity River passes through 19 of the 51 HUC-12 subwatersheds with the study area. Flooding is highly dependent on rainfall and often follows tropical thunderstorm events hitting the watershed.

Throughout the watershed, annual rainfall totals exceed the Texas average annual precipitation rate of 28.87 inches. There is an increase in rainfall from southwestern counties to northeastern counties, with an average rainfall of 29.78 inches in Archer County to 34.70 inches in Parker County. The mainstem of West Fork Trinity River and its many tributaries have several dams along their segments, including Eagle Mountain Dam in Tarrant County and Bridgeport Dam in Wise County.

All FEMA Risk MAP project life cycles begin with Phase Zero (Investment) and Phase One (Discovery), and the FY21 Upper West Fork Trinity watershed project paves the way for local communities in North Texas to move towards flooding resilience. FEMA selected and prioritized the watershed for BLE Investment and Discovery with the overall goal of assisting the local governments in identifying flood risks and strengthen their ability to make informed decisions about reducing these risks.

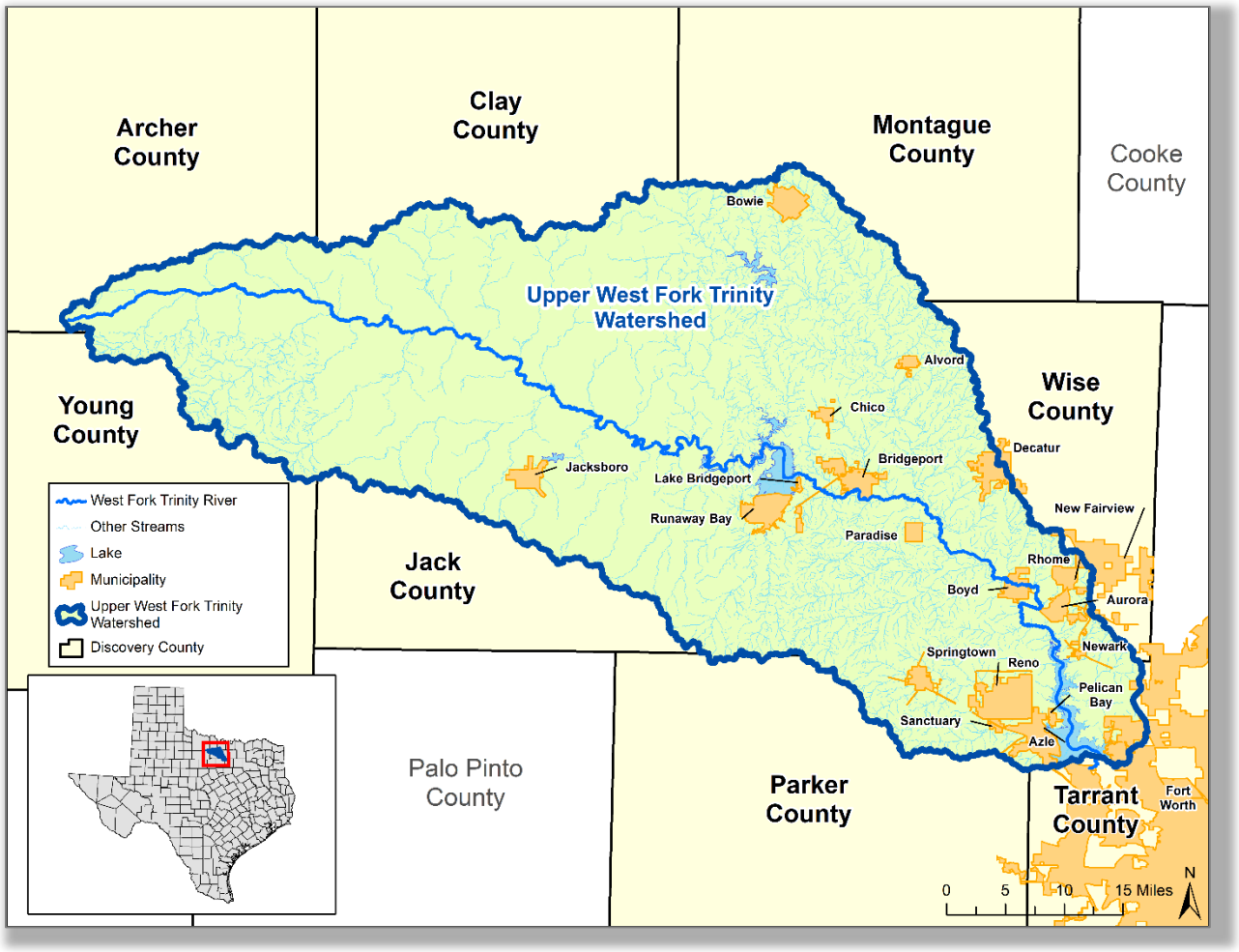

Figure 4: Overview of communities located within the Upper West Fork Trinity watershed.

Watershed Selection Factors

Many factors and criteria are reviewed to determine which watershed is selected: flood risk, the age of the current flood hazard data, population growth trends and potential for growth, recent flood claims, and disaster declaration history. Figure 4 shows the location of the watershed and associated study area communities. The availability of local data and high-quality ground elevation data is reviewed for use in preparing flood hazard data. The CNMS database is reviewed to identify large areas of unknown or unverified data for streams. FEMA consults the State of Texas CTP, the State NFIP Coordinator, and the State Hazard Mitigation Officer when basins are identified for study.

Flood Risk. People who live along the West Fork Trinity River and its tributaries are not strangers to flood events, and numerous flooding events are listed in the historical record.

Archer County experienced several floods over the last 70 years, and within the Upper West Fork Trinity watershed, US Highway 281 flooded in May 2015. Jack County and the City of Jacksboro experienced flash floods that caused road closures in March and June of 2007, May 2015, and April 2016, in addition to major floods in 1990 and 2005. The June 2007 flooding additionally destroyed parts of Erwin Road in the City of Jacksboro.

In Montague County on March 29-30, 2007, a heavy rainstorm flooded multiple homes, washed out four bridges, flooded parts of US Highway 287, and created several sinkholes, including one which was over six feet deep. Historic issues in Parker County include flooding along Walnut Creek and its tributaries 10 times between 1951 and 2004. Ash Creek flooded in October 1981 in the southern end of the Upper West Fork Trinity watershed. The eastern portion of Parker County experienced four feet of flooding over Icehouse Road in October 2009, and the Town of Springtown experienced multiple road closures in May 2015 due to flash floods.

A flash flood occurred in Tarrant County in 2004 resulting in several rescues for people trapped in high water. Tarrant County experienced Tropical Storm Hermine in September 2010, which flooded creeks and roads and required evacuations from a well drill site and closed several intersections in the northwest corner of the county. The City of Azle experienced severe flooding at the intersection of State Highway 199 and FM 730, and multiple rescues occurred at that location in 2009.

The Town of Chico experienced a flood in June 2015, which flooded several homes during Tropical Storm Bill. Wise County and the City of Bridgeport experienced a large-scale flood on March 7, 2016, which required multiple high-water rescues and evacuations of homes. Many additional flood events have been recorded in the various communities within the watershed. These flood events cause extensive damage to local infrastructure and illustrate the ongoing threat in the Upper West Fork Trinity watershed.

Growth Potential. Despite a population decline in the Cities of Jacksboro and Lake Bridgeport, the Town of Chico, and Archer and Clay Counties, the overall population in the watershed increased between 2010 and 2020 and is expected to continue to increase over the next decade at a rate of 20 percent.

Age of Current Flood Information. The portion of Parker County and its incorporated areas that are inside of the study watershed were last redelineated on historic effective maps in 2008, a process that uses existing models and new terrain to determine floodplain boundaries. The unincorporated areas of Young County and Wise County and its incorporated communities inside the study watershed were redelineated on new FIRMs in 2011. The Cities of Azle and Pelican Bay were last redelineated on historic effective maps in 2009 in Tarrant County and a portion of the City of Azle within Parker County in 2008.

Tarrant County and the City of Fort Worth were last redelineated on effective FIRMs in 2009. Though portions of Tarrant County and the City of Fort Worth have FIRMs that were updated in 2019, none of the information in the 2019 update occurred in the Upper West Fork Trinity watershed. Archer and Jack Counties updated their Approximate Zone A mapping after their 2017 and 2018 BLE studies, respectively, and both counties released new Effective FIRMs in 2021.

Availability of High-Quality Ground Elevation Data. FEMA's data availability review indicated that high-quality ground elevation data was available for all the Upper West Fork Trinity watershed in the form of Light Detection and Ranging (LiDAR) data. High quality elevation data such as LiDAR provides a great basis for preparing hydrologic and hydraulic modeling and help identify development and earthmoving activities near the streams and creeks. The available LiDAR data was collected by TNRIS, FEMA, and United States Geological Survey (USGS). between 2010 and 2019. The USGS 3D Elevation Program (3DEP) data were used in areas where no LiDAR was available. The source and data of the LiDAR topographic data coverage used in the Discovery and BLE projects for the Upper West Fork Trinity watershed is shown in Figure 5.

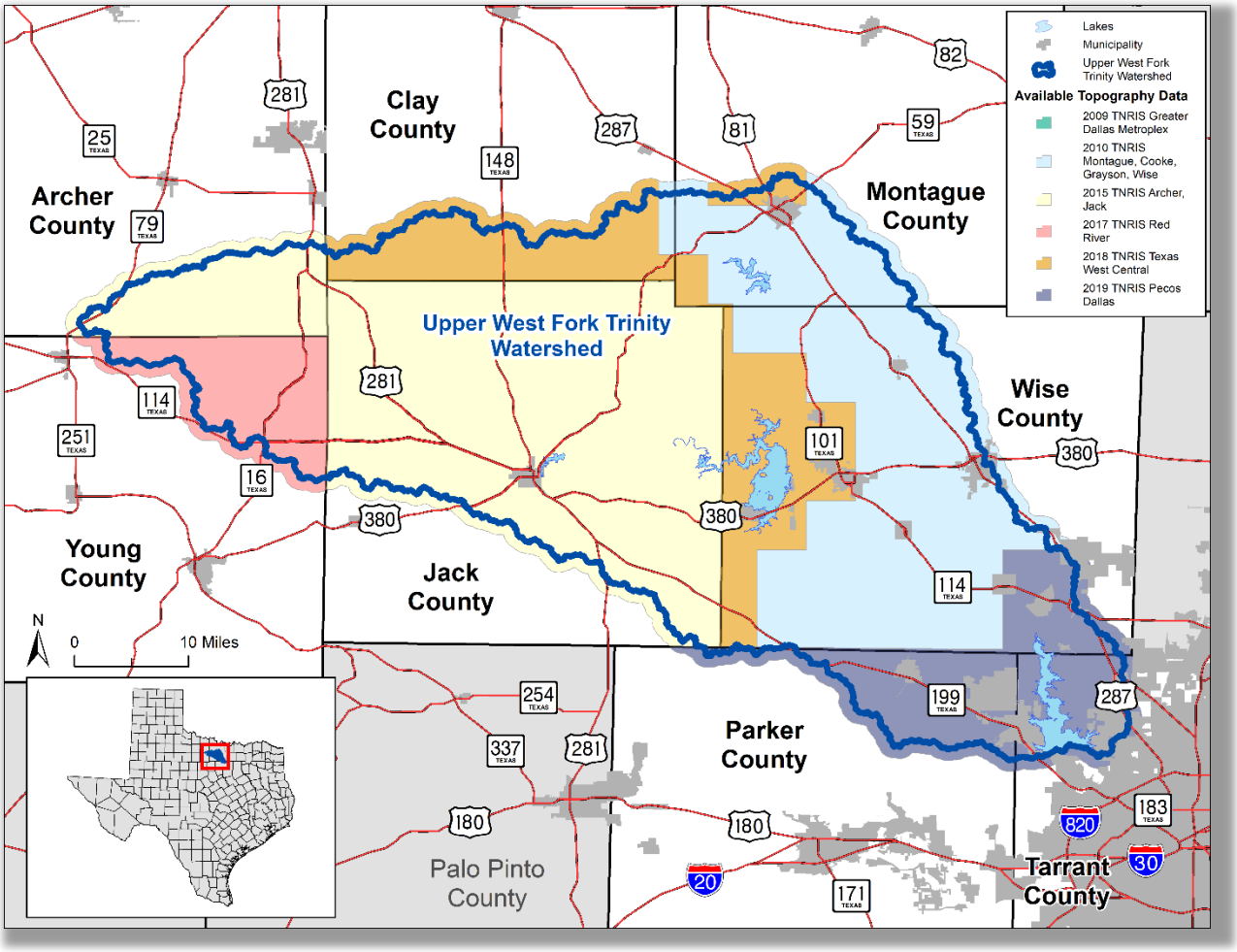

Figure 5: Availability of LiDAR data

Coordinated Needs Management Strategy Database Review. The CNMS database indicates the validity of FEMA's flood hazard inventory. Streams that are indicated as ***Unverified*** or ***Unknown*** in the database indicate that the information used to map the floodplains currently shown on the FIRM is inaccessible or in-queue for evaluation, or that a complete evaluation of the critical and secondary CNMS elements could not be performed. Figure 6 shows the CNMS-based attributed streams for the study watershed.

Unmapped Stream Coverage. FEMA also reviewed the current stream coverage and reviewed the areas against the National Hydrography Dataset (NHD). The NHD medium-resolution data inventoried by the USGS maps created at a 1:100,000 scale was used to review the watercourses within the Upper West Fork Trinity Watershed. Population centers of 1,000 or more were reviewed for additional mileage against the high-resolution data inventoried by the USGS Quadrangle maps created at a 1:24,000 scale. CNMS was completed as part of the FY2017 Archer County BLE project, the FY2017 Jack County BLE project, the FY2019 Upper West Fork Trinity BLE project, and was updated as part of the Discovery process. Unverified streams may either be assigned resources for a restudy in a future year or is currently being studied.

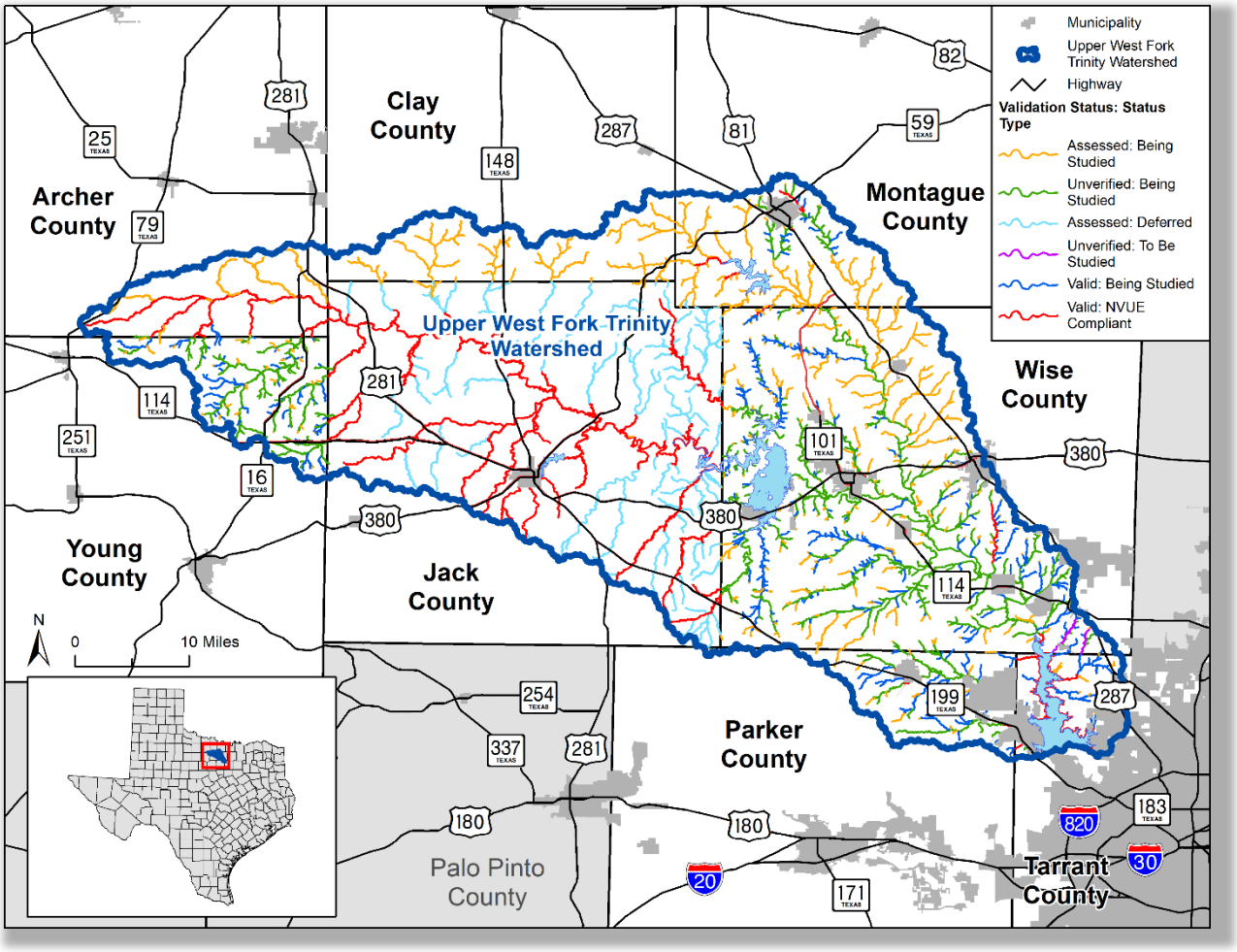

Figure 6: Overview of CNMS streams

Base-Level Engineering

In 2017, FEMA through its Production and Technical Services (PTS) provider, Strategic Alliance for Risk Reduction (STARR), began investing in BLE data development for the Upper West Fork Trinity watershed. This approach prepares multi-profile hydrologic (how much water) and hydraulic (how is water conveyed in existing drainage) data for a large stream network or river basin to generate floodplain and other flood risk information for the basin area. BLE utilizes USGS regional regression equations with gage analysis to calculate flows. Three BLE projects were conducted within the study watershed. The Archer County BLE project was released in 2017 under FEMA's MIP Case Number 17-06-1172S, the Jack County BLE project was released in 2018 under MIP Case Number 17-06-1175S. BLE in the rest of the watershed was funded and completed by the TWDB through its contractors, and the Upper West Fork Trinity BLE project was released in 2021 under MIP Case Number 20-06-0038S.

BLE provides an opportunity for FEMA to produce and provide non-regulatory flood risk information for a large watershed area in a much shorter time. The data prepared through BLE provides planning-level data that is prepared to meet FEMA's Standards for Floodplain Mapping. BLE is scalable and can be updated for use as regulatory and non-regulatory products. Communities could choose to adopt the BLE as approximate, model-backed mapping in locations without model-backed approximate Zone A mapping.

Field survey data as well as hydraulic structure information can be added to the BLE modeling for further refinement into Limited Detail studies or Detailed studies without floodway. Figure 7 shows the BLE streams and mapping developed for the watershed.

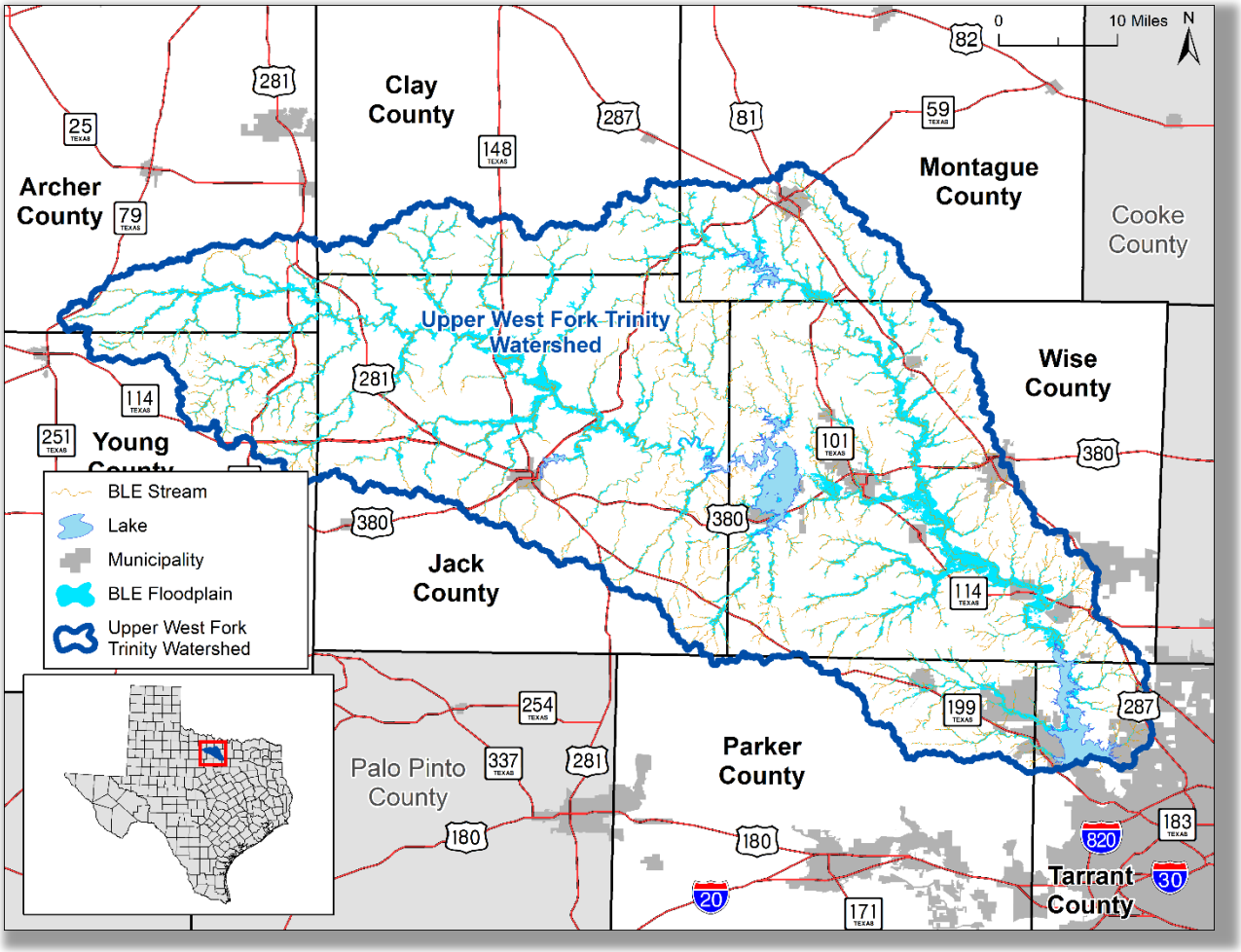

Figure 7: Overview of BLE streams and BLE floodplain

FEMA Investment (2017-2021). The BLE will provide the following items for use in the Upper West Fork Trinity watershed:

- Hydrologic modeling (regression) flow values for the 10%, 4%, 2%, 1%, 1%+ and 0.2%, and 1%-frequencies
- Hydraulic (HEC-RAS) modeling for all study streams (for the same frequencies listed above)
- 10-, 1-, and 0.2-percent-annual-chance floodplain boundaries
- 1- and 0.2-percent-annual-chance Water Surface Elevation Grids
- 1- and 0.2-percent-annual-chance Flood Depth Grids
- HAZUS flood analysis for the watershed
- Point file indicating the location of culverts and inline structures that may be informed by local as-built information

- Flood Risk Map (See Appendix III)

The BLE approach prepared flood hazard information for approximately 2,500 miles of stream, thus adding over 765 miles of supplementary flood hazard information for communities throughout the watershed. The BLE information is available on FEMA's Estimated BFE viewer (https://webapps.usgs.gov/infrm/estBFE/) to allow communities for use in planning, risk communication, floodplain management and permitting activities. A Flood Risk Map was also generated as part of the Discovery process and is available in Appendix II.

CNMS Validation and Assessment. The BLE results were compared to the current flood hazard inventory identified in the CNMS database. This assessment will allow FEMA and NCTCOG to compare this updated flood hazard information to the current effective floodplain mapping throughout the watershed. A key feature of this assessment also included the collection of Areas of Mitigation Interest layers containing suggested structure inventory for the Discovery collection efforts and flood hazard inventory assessments. The BLE CNMS datasets were revised for the study watershed during Discovery and the report tables are available in Appendix II.

Post-Discovery Webinar and Community Coordination. FEMA and NCTCOG communicated the results of the Discovery process to the study area communities in the Summer of 2023. Through a one-hour webinar meeting held on June 26, 2023, communities were provided information and training to support the use of BLE for planning, floodplain management, permitting, and risk communication activities. FEMA will work with communities to review, interpret, and incorporate the BLE information into their daily and future community management and planning activities.

Follow-Up On Phase Project Decisions. The BLE results and the effective DFIRM floodplains were compared to identify any areas of significant change. If the results showed large areas of change (expansions and contractions of the floodplain, increases and decreases of the computed BFEs, and increases in expected flow values), FEMA will continue to coordinate with the communities to identify the streams that should be considered for FIRM updates.

To identify other streams for future refinement, community growth patterns and potential growth corridors should be discussed with FEMA. These areas of expected community growth and development may benefit from updated flood hazard information. BLE can be further refined to provide detailed study information for a Flood Risk Identification Study and a FIRM update.

Areas of communities that were developed prior to 1970 (pre-FIRM areas) may include repetitive and severe repetitive loss properties. They may also be areas where re-development is likely to occur. Having updated flood hazard information before re-development and reconstruction activities take place may benefit communities by providing guidance to mitigate future risk.

FEMA will work with communities following the delivery of BLE to identify a subset of stream studies to be updated and included on the FIRMs. Communities may wish to review these possible areas and provide feedback once the BLE data has been received. Local communities can also refine BLE information and submit it through the Letter of Map Revision (LOMR) process to revise the existing flood hazard information and maintain the FIRMs throughout their community.

Phase One: Discovery

The FY2021 NCTCOG Discovery project was about the "Discovery" of flood hazards and risks throughout the Upper West Fork Trinity watershed. Through the Discovery process, FEMA can determine which areas of the watershed may/will be funded for further flood risk identification and assessment in a collaborative manner, while taking into consideration the information collected from local communities. Discovery initiates open lines of communication and relies on local involvement for productive discussions about flood risk. The process provides a forum for a watershed-wide effort to understand the interrelationships between upstream and downstream community flood risk throughout the watershed.

The Upper West Fork Trinity watershed FY2021 Discovery project was completed through the following activities:

- Pre-Discovery Engagement Efforts
- Data Gathering
- Discovery Meeting
- Watershed Findings and Prioritization

All possible efforts were made to ensure that stakeholders understood Discovery and the Risk MAP process through emails, phone calls, newsletters, and a developed website created for this Discovery project.

Pre-Discovery Engagement Efforts

A Discovery flyer was mailed out to the communities one month prior to the Pre-Discovery meeting. A Discovery newsletter was also developed and distributed to all stakeholders to gain public awareness of the Upper West Fork Trinity watershed Discovery process. The newsletter contained information about FEMA's Risk MAP program, the Discovery process, details of the upcoming Pre-Discovery Meeting, the data collection process, and the Risk MAP process beyond Discovery. A copy of the flyer and the newsletter are included in Appendix III.

NCTCOG held two informational Pre-Discovery webinars, dated September 27, 2022, and September 29, 2022, for stakeholders in the study watershed. A copy of the presentation is available in Appendix III. The Pre-Discovery informational meetings were held to increase awareness of the Discovery process prior to the Discovery Meeting so that stakeholders would be prepared to fully participate in the Discovery process. Five stakeholders participated in these meetings. The goals of the Pre-Discovery meeting were to:

- Explain the Discovery process
- Explain why NCTCOG was conducting Discovery in the Upper West Fork Trinity watershed
- Explain FEMA's Risk MAP program and benefits
- To obtain information for Discovery in the watershed

Data Gathering

Data was collected from state and federal organizations. These data were used to generate "backgrounder" information about each watershed community, and included various population metrics, collections of high-water marks and low water crossings, and historical flooding information.

Table 4 below summarizes the geospatial data collected. The Discovery engagement process also included the development of a user-friendly website for data collection, verification, and coordination. The website was developed to become a repository to disseminate project information such as community background data, newsletters, planned meeting dates, time, and locations, project data deliverables, and reports.

For this FEMA NCTCOG Discovery project, the website allowed participating stakeholders to view and update flood-related information about their community, including local flood risk, flood hazards, mitigation plans, mitigation activities, flooding history, development plans, and floodplain management activities. It also allowed stakeholders to input mitigation concerns, mapping needs, and requests on an interactive web map.

Table 4: Geospatial Data Collection

Data Type	Data Source	Data Description
Census Tract Population Data	US Census Bureau	Census Tract Population data based on 2020 Census Data
Coordinated Needs Management Strategy	FEMA	CNMS database dated Summer 2023
Congressional Areas	US Census Bureau	Congressional District Boundaries
Current Effective Floodplain Information	FEMA DFIRMs	Data includes Floodplains, BFEs, and Cross Sections
Flood Claims	NFIP	Total claims per jurisdiction
Flood Risk Rating	FEMA	Estimates for communities' risks in relation to their expected annual loss and risk factors
HAZUS-based Average Annualized Loss Estimates	FEMA	HAZUS loss estimates based on the BLE datasets
High Water Marks	TNRIS	Historical high-water marks obtained by TNRIS from USACE, FEMA Mitigation Team, USGS, and the Texas Department of Transportation
HUC Watershed Boundaries	USGS	HUC boundaries clipped to the Upper West Fork Trinity HUC-8. Also includes HUC-10 and HUC-12.
Jurisdictional Boundaries	TNRIS	Data includes city and county boundaries
Location of Dams	USACE NID	Dam locations with EAP status
Locations of LOMRs	FEMA	LOMRs incorporated into Effective DFIRM databases and LOMRs filed after Effective DFIRM dates for watershed counties
Low Water Crossings	TNRIS	Identified low water crossings in Texas with flooding source and road name

Data Type	Data Source	Data Description
Population Exposed to Flooding	FEMA	
Population Density	US Census Bureau	Population density based on 2020 Census Data
Population Social Vulnerability	FEMA	Communities' relative susceptibility to damage from flooding events
Resilience Rating	FEMA	Communities' relative ability to prepare for and recover from flooding events
Roadways and Railroads	TNRIS Stratmap	Transportation Lines
Stream Gauges	USGS	Stream Gauge locations
Streamlines	FEMA DFIRMs	Stream Centerlines from DFIRM
Topography	TNRIS	2009 TNRIS Greater Dallas Metroplex 2010 TNRIS Montague, Cooke, Grayson, Wise 2015 TNRIS Archer, Jack 2017 TNRIS Red River 2018 TNRIS Texas West Central 2019 TNRIS Pecos Dallas
Urban Cover	National Land Cover Database 2020 from US Department of Agriculture (USDA)	Land Cover data as of 2020, developed by USDA

Discovery Meeting

One in-person Discovery Meeting was held in the watershed as an open house (come and go) format. The Discovery Meeting occurred on January 17, 2023, from 1:00pm-5:00pm at the Bridgeport Public Library in Bridgeport, Texas. Hosts of this meeting included FEMA, NCTCOG, TWDB, USACE, USGS, and Halff.

The main goals of the Discovery Meeting were to gather additional flood risk data; discuss the communities' flooding history, development plans, flood mapping needs, and flood risk concerns; discuss the vision for the watershed's future, and the importance of mitigation planning and community outreach.

The Discovery Meeting was held over a four-hour period. Community stakeholders were able to participate in the meeting when most convenient to them. Discovery Ambassadors assisted stakeholder attendees through various stations in an "come and go" format. The stations included:

- *United States Army Corps of Engineers (USACE)* – discussion of current USACE projects in the region
- *NCTCOG Programs* – information on NCTCOG programs available to stakeholders as well as answering NCTCOG questions from attendees
- *Tarrant Regional Water District (TRWD)* – information of current TRWD projects in the region
- *Texas Water Development Board (TWDB)* – information regarding TWDB's current projects and information on floodplain regulation

- *United States Geological Survey (USGS)* – information regarding USGS's ongoing projects in the study watershed
- *Laptop Data Collection* – stakeholders were able to review, edit, or add information entered on the Discovery website
- *Discovery Maps* – data collection process to capture information on identifying flood risk locations and problems, areas of growth or planned development, answering floodplain questions, and identifying map need locations.

The Upper West Fork Trinity Discovery project gathered 72 comments, including 12 new mapping requests.

Watershed Findings and Prioritizations

Watershed Findings

Following the Discovery meeting, the gathered community comments were placed into categories by comment type and summarized by HUC-12, as shown in Table 5.

Dry Creek-West Fork Trinity River HUC-12 had the highest number of comments with 27 comments submitted. This subwatershed included many different types of comments, including roads in the 1-percent-annual-chance floodplain that overtop during storm events, structures causing streamflow constrictions, and records of historical flooding events. There were 34 out of 51 HUC-12s which did not receive any comments, and these were mostly in the western half of the watershed. Of the 72 unique comments, some were located across multiple subwatersheds.

Table 5: Upper West Fork Trinity watershed Comment Distribution by HUC-12

HUC-12 Watershed Code	HUC-12 Watershed Name	Comment Type					Total
		Flooding Risk	Mapping Needs	Mitigation Actions-Identified	Mitigation Actions-Completed	Regulations	Number of Comments
120301010609	Ash Creek	No comments received					**0**
120301010402	Beans Creek	No comments received					**0**
120301010206	Big Cleveland Creek	No comments received					**0**
120301010405	Big Creek-Lake Bridgeport	No comments received					**0**
120301010605	Blue Creek-Eagle Mountain Lake	7					**7**
120301010407	Boons Creek	No comments received					**0**

HUC-12 Watershed Code	HUC-12 Watershed Name	Comment Type					Total
		Flooding Risk	Mapping Needs	Mitigation Actions-Identified	Mitigation Actions-Completed	Regulations	Number of Comments
120301010510	Briar Branch-Big Sandy Creek	No comments received					**0**
120301010503	Brier Creek-Lake Amon G Carter			1	1		**2**
120301010303	Carroll Creek	No comments received					**0**
120301010509	Chicken Creek-Big Sandy Creek	No comments received					**0**
120301010401	Cottonwood Creek-Big Creek			1			**1**
120301010505	Cowskin Creek-Big Sandy Creek			1	1		**2**
120301010207	Crooked Creek	No comments received					**0**
120301010103	Dead Horse Creek-Brushy Creek	No comments received					**0**
120301010610	Dosier Creek-Eagle Mountain Creek				2		**2**
120301010411	Dry Creek-West Fork Trinity River	14	8	1	4		**27**
120301010208	Flag Springs Creek-West Fork Trinity River	No comments received					**0**
120301010107	Flat Creek-West Fork Trinity River	No comments received					**0**
120301010602	Garrett Creek	No comments received					**0**
120301010302	Hall Creek-West Fork Trinity River	No comments received					**0**

HUC-12 Watershed Code	HUC-12 Watershed Name	Comment Type					Total
		Flooding Risk	Mapping Needs	Mitigation Actions-Identified	Mitigation Actions-Completed	Regulations	Number of Comments
120301010304	Howard Creek-West Fork Trinity River	No comments received					**0**
120301010606	Indian Creek-Eagle Mountain Lake	No comments received					**0**
120301010406	Jasper Creek	No comments received					**0**
120301010204	Jones Creek	No comments received					**0**
120301010409	Lake Bridgeport	1			1		**2**
120301010201	Lodge Creek	No comments received					**0**
120301010301	Lost Creek	No comments received					**0**
120301010507	Lower Brushy Creek	1		1	2		**4**
120301010106	Lower Cameron Creek	No comments received					**0**
120301010608	Lower Walnut Creek	No comments received					**0**
120301010601	Martin Branch-West Fork Trinity Branch	8	1				**9**
120301010205	North Creek	No comments received					**0**
120301010403	Pecan Branch-West Fork Trinity River	No comments received					**0**

HUC-12 Watershed Code	HUC-12 Watershed Name	Comment Type					Total
		Flooding Risk	Mapping Needs	Mitigation Actions-Identified	Mitigation Actions-Completed	Regulations	Number of Comments
120301010104	Plum Creek	No comments received					**0**
120301010501	Prairie Branch			1			**1**
120301010102	Prickly Pear Branch-West Fork Trinity River	No comments received					**0**
120301010508	Pringle Creek-Big Sandy Creek			1			**1**
120301010504	Red Oak Creek-Jones Creek	1		1			**2**
120301010203	Roberts Prairie Branch-West Fork Trinity River	No comments received					**0**
120301010603	Salt Creek	No comments received					**0**
120301010502	South Creek-Big Sandy Creek			1			**1**
120301010101	South Fork Trinity River-West Fork Trinity River	No comments received					**0**
120301010202	Turkey Creek	No comments received					**0**
120301010506	Upper Brushy Creek		1	1	8		**10**
120301010105	Upper Cameron Creek	No comments received					**0**
120301010607	Upper Walnut Creek	No comments received					**0**

HUC-12 Watershed Code	HUC-12 Watershed Name	Comment Type					Total
		Flooding Risk	Mapping Needs	Mitigation Actions-Identified	Mitigation Actions-Completed	Regulations	Number of Comments
120301010404	Venchoner Creek	No comments received					**0**
120301010410	Village Creek-West Fork Trinity River	1	1		1		**3**
120301010511	Waggoner Branch-Big Sandy Creek		1			1	**2**
120301010604	Walnut Creek-West Fork Trinity River	4					**4**
120301010408	Willow Creek	No comments received					**0**

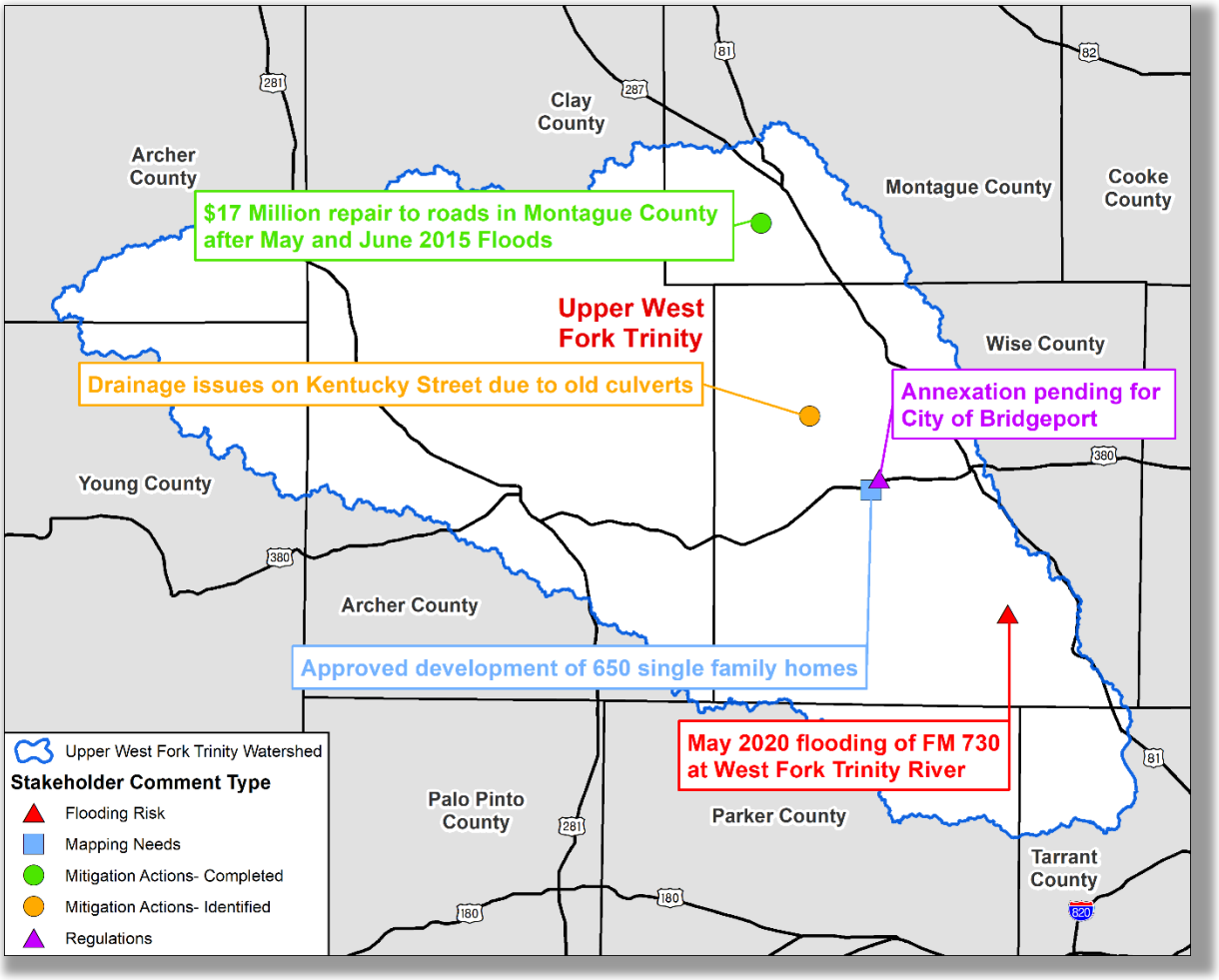

Figure 8: Stakeholder Comment Example Types

Figure 8 above shows examples of the types of comments submitted by communities. There were 31 comments about roads overtopping or flooding during storm events, several of which were accompanied by photos showing the flooding across the roads. There was one comment related to erosion, where several culverts in the City of Bowie were damaged due to erosion. Only one comment was submitted that identified a flood study that was not included on the DFIRMs. There are 13 comments related to land use change that could have potential Conditional Letter of Map Revisions (CLOMRs) or LOMRs developed in the future.

Figure 9 below shows the type and distribution of stakeholder comments across the watershed. Most comments were submitted in the eastern areas of the Upper West Fork Trinity watershed. The community that contained the highest number of comments was the most populated in the study watershed, but otherwise, there was not a strong correlation between population and comments received.

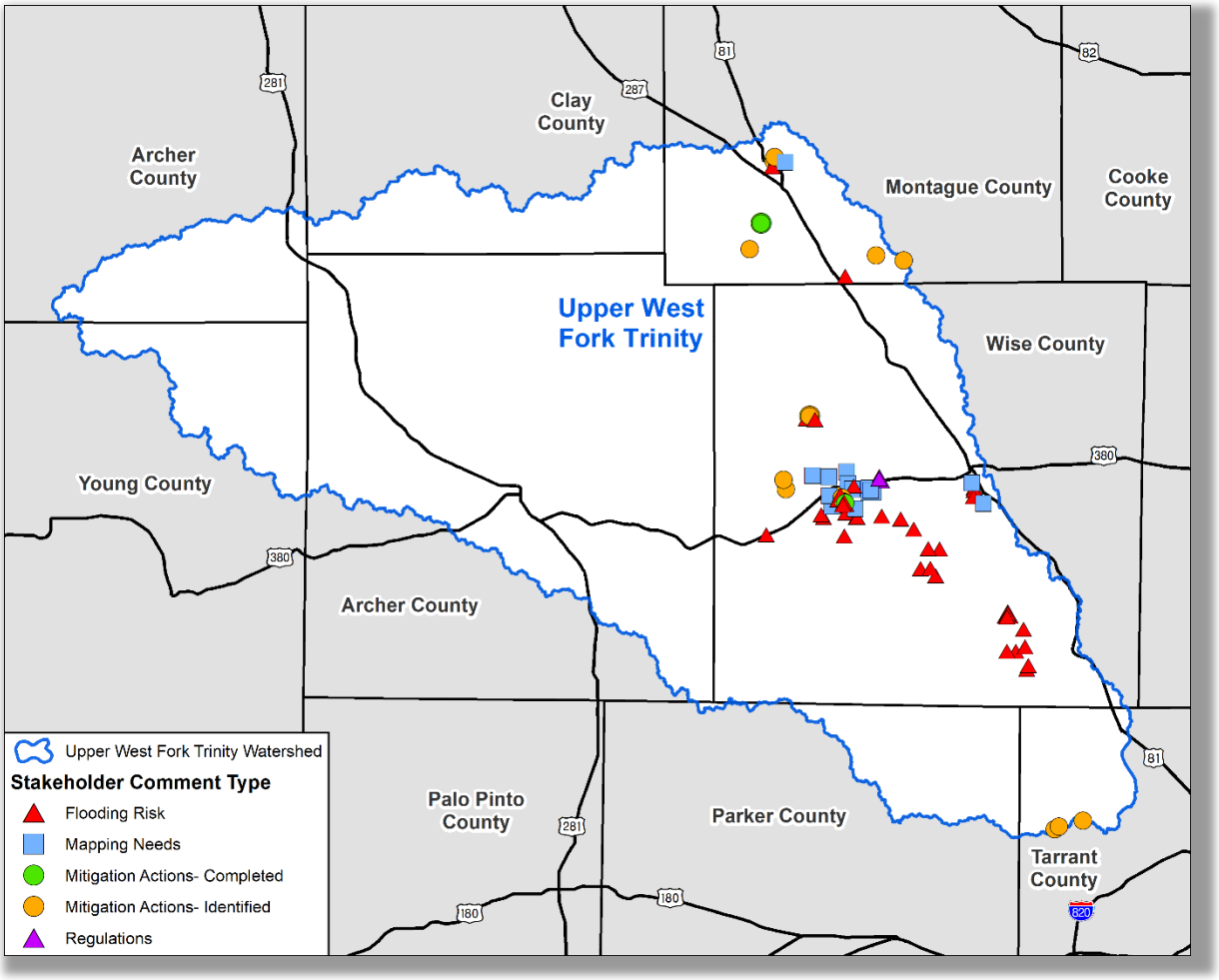

Figure 9: Stakeholder Comment Totals.

Figure 9 demonstrates the difference in numbers per comment type. Thirty-eight comments were submitted for studies needed due to Flooding Risk, such as roads overtopping during storm events or streamflow constrictions. There were 12 Mapping Needs comments for unmapped sections in the watershed, such as places with new commercial development which need a Hydrology & Hydraulics study update. Comments related to mitigation projects (needed or planned but have not yet started) are identified Mitigation Actions. These 19 Identified Mitigation Actions include the dams for Eagle Mountain Lake dam and Lake Bridgeport, six locations with damaged stormwater infrastructures, a soil washout around Lake Amon G Carter, and several damaged structures including old culverts and roads. While these areas have been identified, none of them have mitigation programs in progress. Montague County reported the only recently Mitigation Actions-Completed, where the County repaired roads throughout the county damaged in the May and June 2015 flood events. The one comment received on Regulations pertains to an upcoming land annexation by the City of Bridgeport, who will need to compare their new boundaries against the effective mapping.

Watershed Prioritization

The community comments were one of 14 criteria for prioritization of the HUC-12 subwatersheds according to the 2009 NCTGOG Upper Trinity River Basin Mapping Needs Assessment (MNA) standard of

prioritization, described in Table 6. One of the prioritization categories from the 2009 MNA, LiDAR Availability, has been replaced with the FEMA National Risk Index (NRI), as LiDAR is available throughout the entire watershed. Criteria number 14, "Stakeholder Mapping Request" was documented from stakeholder comments listed in Table 5. These needs may come from outdated stream studies, large-scale development along a stream, or alterations to a stream itself to reduce flooding risk. An in-depth description of each field in Table 6 is available in the 2009 NCTCOG Upper Trinity River Basin MNA report.

Table 6: Prioritization Criteria

Criteria No.	Description	Weight
1	2020 Population density	10
2	Population change (2010 to 2020)	10
3	Predicted population growth	10
4	History of flood claims	10
5	History of flood events	10
6	Number of Letters of Map Change (LOMR/LOMA)	5
7	FEMA NRI	10
8	Age of technical data – Hydrology	5
9	Age of technical data – Hydraulics	5
10	Ability to leverage current studies	5
11	Potential for local funding	5
12	Potential for local "work in kind"	3
13	Previous contribution to a FEMA study	2
14	Stakeholder mapping request	10

The criteria in Table 6 were used to calculate a priority score for each HUC-12. The HUC-12s were ranked into three risk groups (moderate, elevated, and high) based on their scores shown in Table 7.

Table 7: Prioritization Ranking of HUC-12s

HUC-12 Subwatershed	Rank (listed Most-Least risk)
Brier Creek-Lake Amon G Carter	High
Dosier Creek-Eagle Mountain Creek	High
Dry Creek-West Fork Trinity River	High
Garrett Creek	High
Indian Creek-Eagle Mountain Lake	High
Lower Walnut Creek	High

HUC-12 Subwatershed	Rank (listed Most-Least risk)
Martin Branch-West Fork Trinity Branch	High
Upper Brushy Creek	High
Upper Walnut Creek	High
Waggoner Branch-Big Sandy Creek	High
Walnut Creek-West Fork Trinity River	High
Ash Creek	Elevated
Blue Creek-Eagle Mountain Lake	Elevated
Briar Branch-Big Sandy Creek	Elevated
Chicken Creek-Big Sandy Creek	Elevated
Cowskin Creek-Big Sandy Creek	Elevated
Lake Bridgeport	Elevated
Lower Brushy Creek	Elevated
Prairie Branch	Elevated
Pringle Creek-Big Sandy Creek	Elevated
Red Oak Creek-Jones Creek	Elevated
Salt Creek	Elevated
South Creek-Big Sandy Creek	Elevated
Venchoner Creek	Elevated
Village Creek-West Fork Trinity River	Elevated
Willow Creek	Elevated
Beans Creek	Moderate
Big Cleveland Creek	Moderate
Big Creek-Lake Bridgeport	Moderate

HUC-12 Subwatershed	Rank (listed Most-Least risk)
Boons Creek	Moderate
Carroll Creek	Moderate
Cottonwood Creek-Big Creek	Moderate
Crooked Creek	Moderate
Dead Horse Creek-Brushy Creek	Moderate
Flag Springs Creek-West Fork Trinity River	Moderate
Flat Creek-West Fork Trinity River	Moderate
Hall Creek-West Fork Trinity River	Moderate
Howard Creek-West Fork Trinity River	Moderate
Jasper Creek	Moderate
Jones Creek	Moderate
Lodge Creek	Moderate
Lost Creek	Moderate
Lower Cameron Creek	Moderate
North Creek	Moderate
Pecan Branch-West Fork Trinity River	Moderate
Plum Creek	Moderate
Prickly Pear Branch-West Fork Trinity River	Moderate
Roberts Prairie Branch-West Fork Trinity River	Moderate
South Fork Trinity River-West Fork Trinity River	Moderate
Turkey Creek	Moderate
Upper Cameron Creek	Moderate

The prioritization rankings listed in Table 7 will be used by FEMA to determine targeted action items, potential projects, and multi-year flood risk project plans within the Upper West Fork Trinity watershed. Other figures, including Figures 14 and 24 in Appendix III, display the watershed-based prioritization ranking.

Pursuing studies along the entirety of requested miles would be cost prohibitive, so it was necessary for NCTCOG to reduce the list of potential stream projects. The five Study Stream Requests, listed in Table 8, are possible project highlights based on stakeholder comments and the results of the HUC-12 subwatershed prioritization.

Table 8: Stream Study Requests

Communities	Stream	HUC-12s	HUC 12 Rank
City of Bowie Montague County	Brushy Creek Tributary A	Upper Brushy Creek	High
City of Bridgeport Wise County	Turkey Creek	Dry Creek-West Fork Trinity River	High
City of Boyd City of Bridgeport Wise County	West Fork Trinity River	Dry Creek – West Fork Trinity River Martin Branch – West Fork Trinity Branch Walnut Creek – West Fork Trinity River	High High High

Potential Study Streams

Table 8 lists the streams with comments related to requests for updated Hydrology and Hydraulic studies along streams. Upper Brushy Creek, and its tributary Brushy Creek Tributary A, are Zone As on the existing DFIRM maps. However, these Zone A mapping areas do not match limited detail studies provided by the City of Bowie and developers. A hydrology study was done within the past ten years due to recurrent flooding and secondary damage to stormwater infrastructure along Brushy Creek Tributary A. Stormwater run-off within the city limits as well as an updated floodplain study would benefit this area greatly.

During flooding events, Turkey Creek gets around six inches of water and four years ago, buildings had 13 inches of flooding that FEMA helped resolve. In addition, the West Fork Trinity River backs up into Turkey Creek which causes more flooding, especially in flatter areas. There is ongoing work around Turkey Creek for Creek Restoration, adding in a Trail, and a possible flood study. With this ongoing work and future development plans such as a retention pond and solar powered pump stations, a new study or update to the DFIRM would benefit the areas that have continuously been affected by Turkey Creek as well as the Dry Creek Watershed as a whole.

The West Fork Trinity River has numerous low water crossings where roads are flooded during storm events. Tarrant Regional Water District has identified these areas that are not currently in the state database. Because of these multiple incidents across many high prioritized watersheds, the West Fork Trinity River would benefit from one cohesive study.

The HUC-12 subwatershed prioritizations and potential study stream projects are shown in Figures 14, 23, and 24 in Appendix III. FEMA's Hazards U.S. Multi-Hazard (HAZUS-MH) software was used to assess the consequences of flood events in the Upper West Fork Trinity watershed.

Flood Risk Assessments Results

HAZUS-MH is a risk assessment software program for analyzing potential losses in dollars from floods, hurricanes, winds, and earthquakes. The BLE flood data developed for this Discovery project was used as input data for the HAZUS-based flood risk assessment. The Upper West Fork Trinity watershed has an estimated $12 billion worth of vulnerable assets, including residential, commercial, and other asset types. If a 1-percent-annual-chance storm event were to occur throughout the watershed, HAZUS estimated nearly one percent of the assets will be damaged, with losses estimated at nearly $478 million dollars to physical assets. There will also be economic losses, including lost wages, inventory losses, losses in production, and economic opportunity losses, valued at $328 million. Figures 10 and 11 below show the capital stock inventory within the study watershed and the corresponding 1-percent-annual-chance event losses, respectively.

The HAZUS-based 1-percent-annual-chance flood loss estimates were aggregated to the watershed communities to assess risk on a community level. The unincorporated areas of Montague, Tarrant, and Wise Counties have the highest potential losses due to flooding damage, ranging from $51 million to $158 million dollars of losses in the study watershed.

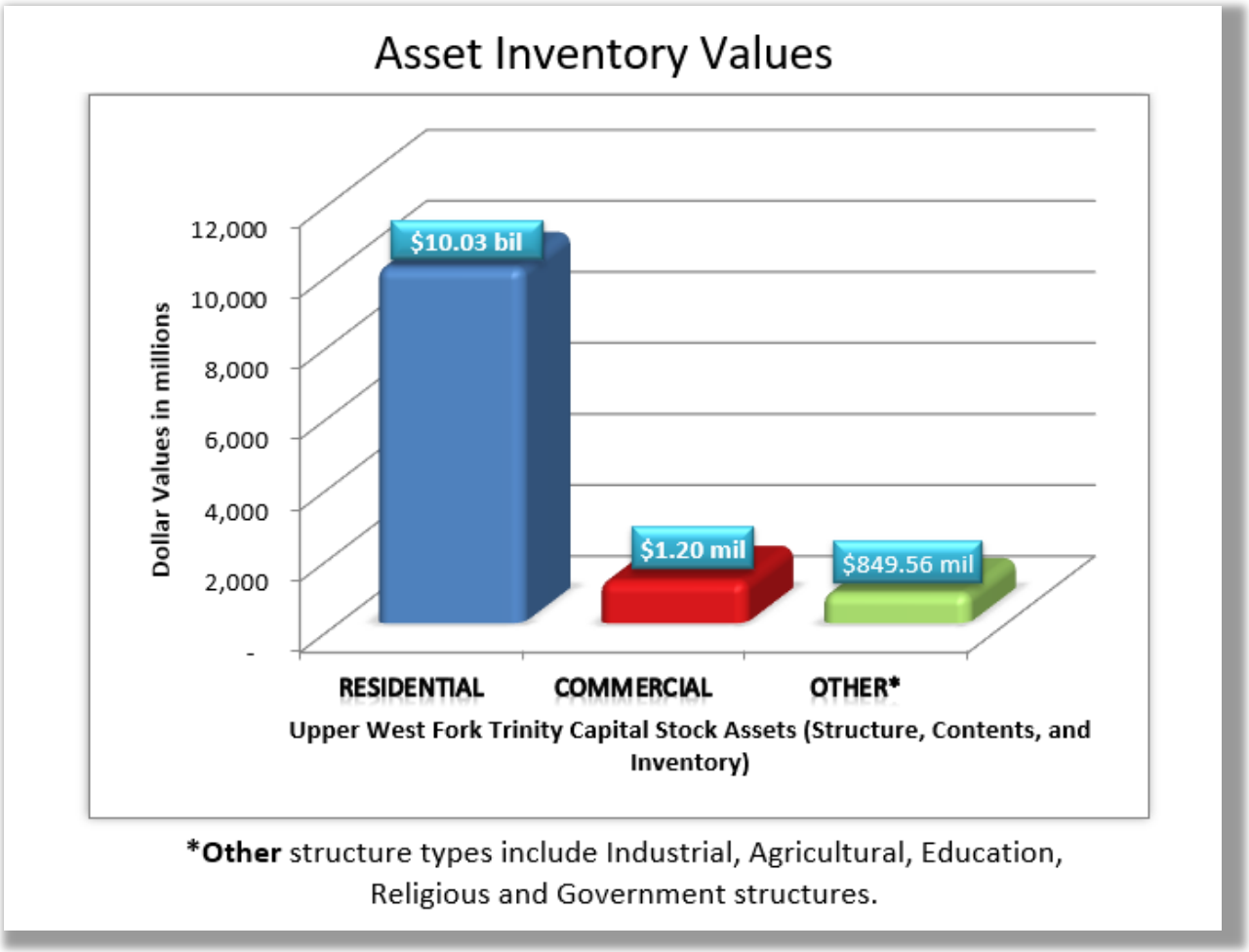

Figure 10: Asset Inventory Value Totals

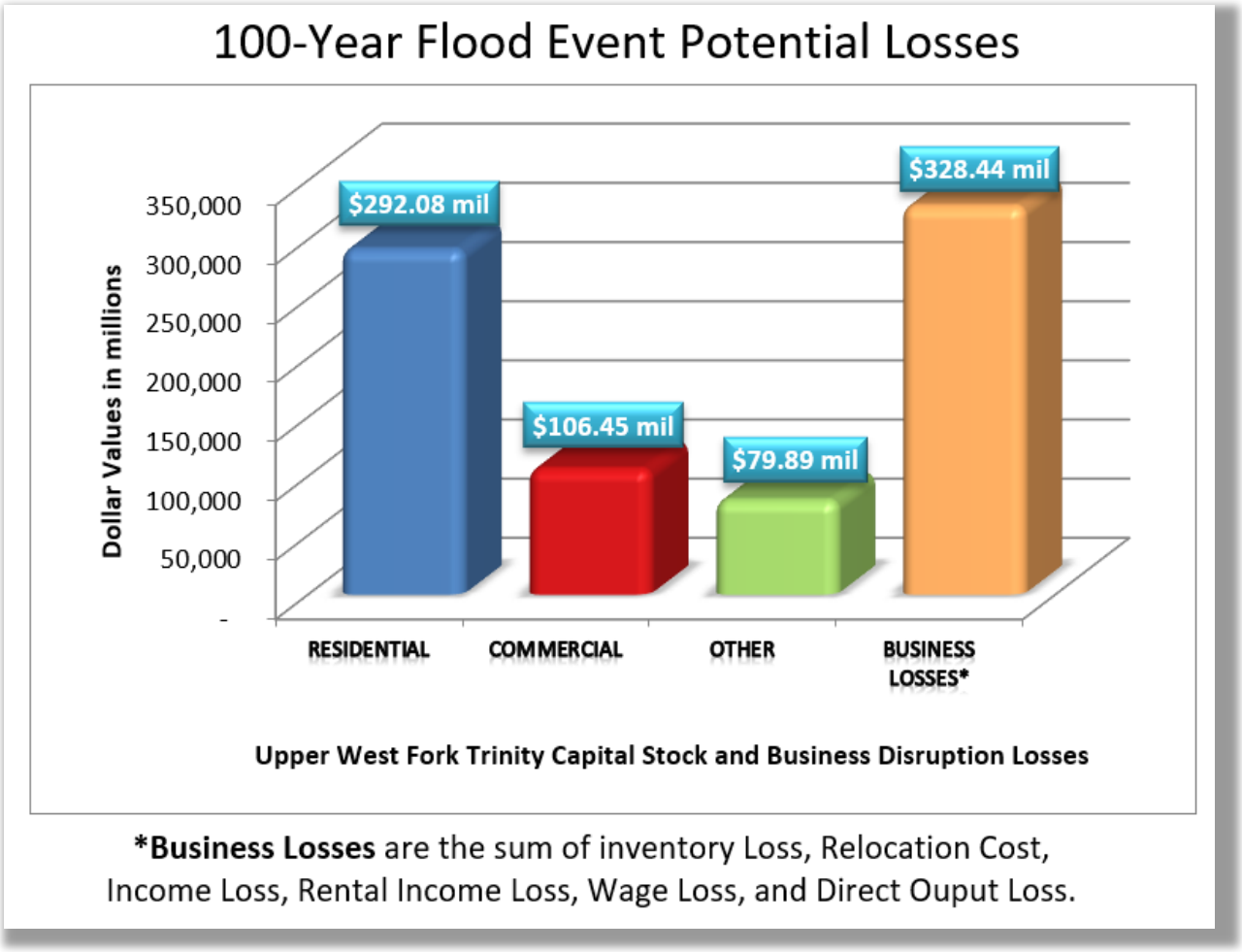

Figure 11: 100-Year Flood Event Potential Loss Totals

Around 14 communities in the Upper West Fork Trinity watershed include land in at least one other HUC-8 watershed. These HAZUS-based 1-percent-annual chance flood loss estimates are not indicative of their total potential loss estimates. Hence, the losses shown in this report do not necessarily represent community-wide totals.

Aggregating the HAZUS-based 1-percent-annual-chance flood loss estimates to HUC-12 subwatersheds provides another method to prioritize new studies and hazard mitigation projects in the watershed. Figure 13 below ranks the HUC-12s by estimated flood losses. Dosier Creek-Eagle Mountain Creek, the outlet HUC-12 that drains Eagle Mountain Lake, has the highest potential loss, $58.9 million, if there is a 1-percent-annual-chance flood event in the watershed. There are 36 HUC-12 subwatersheds with elevated risk, six HUC-12 subwatersheds with moderate risk, and nine HUC-12 subwatersheds with high risk based on the 1-percent-annual-chance flood loss estimates.

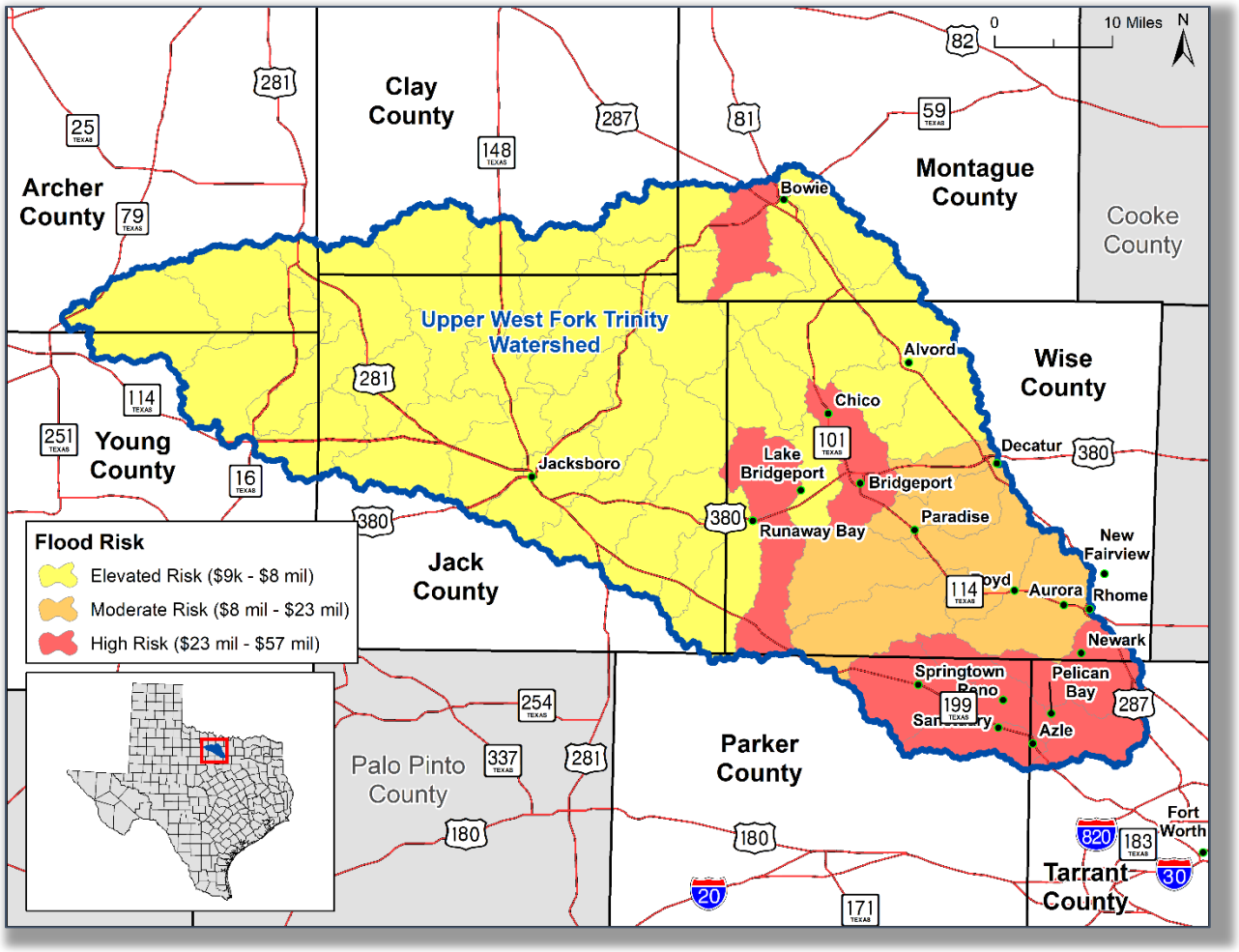

Figure 12: *HAZUS-based 1-Percent-Annual-Chance Loss Estimates by HUC-12*

Post-Discovery Coordination Effort

NCTCOG held one Post-Discovery informational webinar on June 26, 2023 for stakeholders in the watershed. A copy of the presentation is available in Appendix III.

The Post-Discovery informational webinar was held to discuss the results of the Discovery process and findings, including a review of comments received, preliminary HAZUS results, and BLE data. The FEMA Estimated BFE viewer (https://webapps.usgs.gov/infrm/estBFE/), which can be used for reporting and downloading data, was presented and demonstrated to community stakeholders. The goals of the Post-Discovery webinar were to:

- Recap the FEMA's Risk MAP program's benefits and the Discovery process
- Discuss comments received by stakeholders
- Explain watershed prioritization and stream study requests
- Review HAZUS results
- Demonstrate the permanent FEMA BFE viewer
- Release a draft report to the communities prior to the release of the final report.

Future Investments for Refinement

The conclusion of the Phase One: Discovery and BLE investment ends with several identified streams that are at risk for flooding and cause damage in the communities. FEMA and NCTCOG will work closely together with watershed communities to identify areas for future investment pending funding availability. This Phase 2 data development will include engineering analysis that leads to the initial updates to the flood maps. Once the data development is completed, a Flood Risk Review Meeting is held. At this meeting, community officials give feedback on the developed datasets and draft flood maps. They also learn more about new mapping datasets and information called Flood Risk Products and other supporting resources the community can start using for mitigation planning. Upon acceptance of the Phase 2 data, the study can progress to Phase 3 preliminary map release. The preliminary map products are then distributed to the affected study communities where it goes thought due process before final map adoption at Phase 4 to become new effective FIRMs for the community. It must be also noted that the Risk MAP process also includes the identification and implementation of flood mitigation activities and projects for communities.

Maps and community-specific reports associated with this study are included in the Appendices attached to this report. All project data will be loaded to FEMA's MIP in the project's study-centric folder.