

# Coryell County Hazard Mitigation Plan

Planning Participants:  
Unincorporated Coryell County, City of Copperas Cove, City of Gatesville, City of  
Evant, City of Oglesby, Copperas Cove ISD, and Gatesville ISD



*Proactive Mitigation for a Disaster-Resilient Future*



**For More Information, Please Visit Our Website at:**

[www.coryellcountyhmp.com](http://www.coryellcountyhmp.com)

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# Coryell County Hazard Mitigation Plan 2023



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# Coryell County Hazard Mitigation Plan 2023



**Additional comments or notes on Record of Changes:**



**Chapter 1: Introduction**

**Overview**

The Texas State Legislature created Coryell County, Texas (County) in 1854, named after Texas Ranger James Coryell. Coryell County is approximately 1,056 square miles situated in rural Central Texas, bordered by Hamilton, Bosque, McLennan, Bell, and Lampasas counties. While a majority of the County is rural, with approximately 25% considered prime farmland, Coryell County is experiencing steady growth (Coryell County Courthouse 2022). Current population centers include Gatesville and Copperas Cove, with growth in these areas expected to continue to increase.

Coryell County is susceptible to a wide array of natural hazards and residents often experience subsequent impacts. Life-threatening hazards can impact property, the environment, and the quality of life of Coryell County residents. The County is committed to mitigating impacts from these natural hazards and creating a disaster-resilient community for its citizens and their property.

The Federal Emergency Management Agency (FEMA) 2023 *Local Mitigation Planning Policy Guide* describes local mitigation plans as investment strategies that communities develop to identify hazards, assess risks and vulnerabilities, and develop mitigation strategies. Further, the Code of Federal Regulations, 44 CFR § 201.1(b) describes the purpose of mitigation planning as a means to identify natural hazards, identify actions and activities to reduce any losses from those hazards, and to establish a coordinated process to implement the plan.

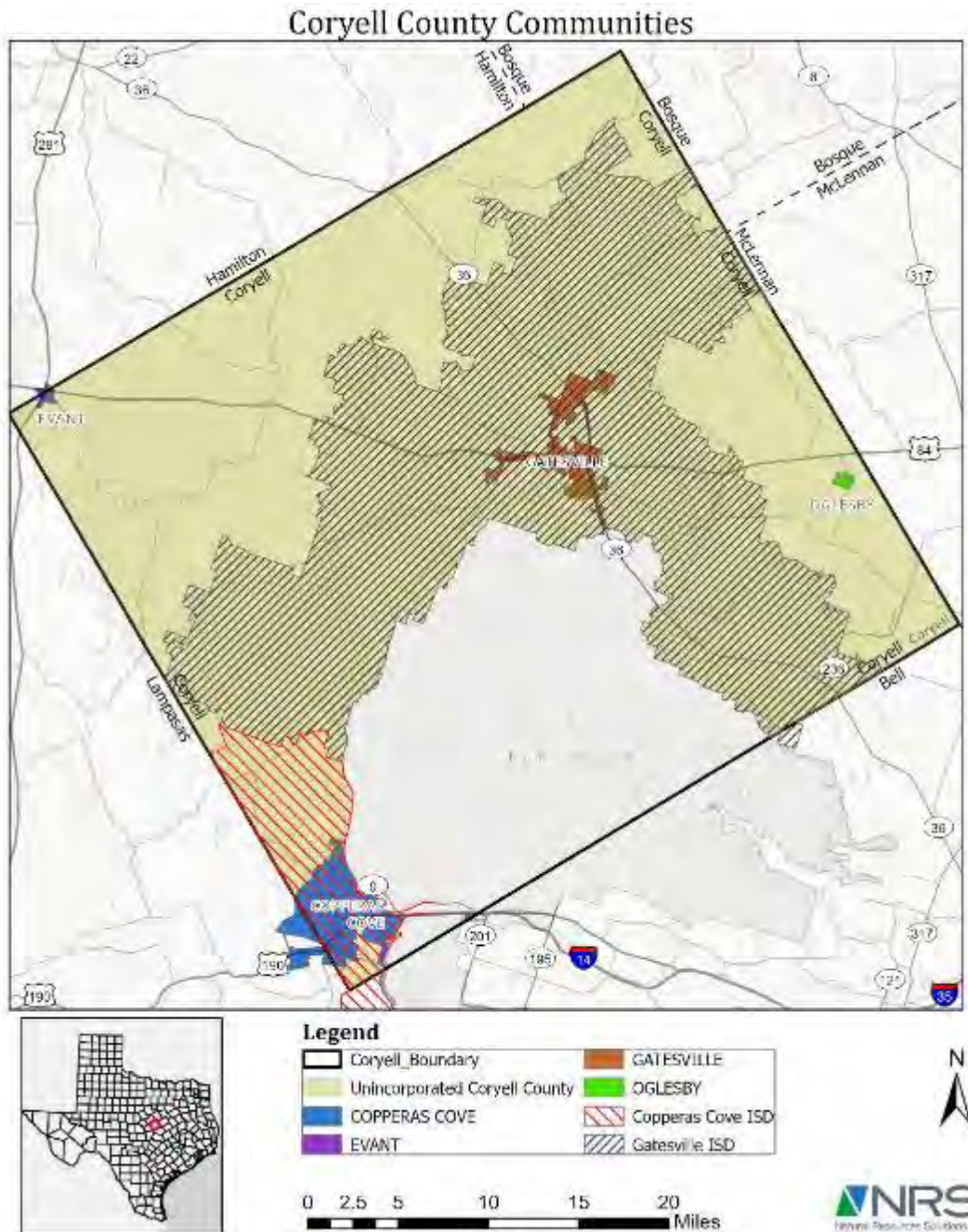
In early 2023, Coryell County contracted Natural Resources Solutions (NRS, Consultant Team) for the development of a comprehensive Hazard Mitigation Plan (HMP, Plan). The purpose of the HMP is to provide participating jurisdictions and the public with the knowledge, data, and tools necessary to properly prepare for and mitigate impacts from natural disasters. While it is impossible to prevent a natural disaster from occurring, this HMP was developed in accordance with official FEMA policy to ensure it will be effective at mitigating disaster risks and impacts. In addition, the County prioritized collaboration with the Texas Division of Emergency Management (TDEM) throughout the development of the HMP and ensured all TDEM requirements were adhered to.

*Table 1. Participating jurisdictions in the Coryell County HMP Planning Area.*

The HMP contemplates hazards affecting the entirety of Coryell County. The Planning Area consists of the participating jurisdictions, which include the cities of Copperas Cove, Gatesville, Evant, and Oglesby as well as Copperas Cove Independent School District (ISD), Gatesville ISD, and Unincorporated Areas (Table 1, Figure 1).

<b>Participating Jurisdictions</b>
Unincorporated Coryell County
Copperas Cove
Gatesville
Evant
Oglesby
Copperas Cove ISD
Gatesville ISD

Figure 1. The map depicts participating jurisdictions in the Coryell County HMP Planning Area.



## Authority

The Coryell County HMP was developed in accordance with all TDEM requirements and all applicable provisions of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390). The HMP is also in compliance with Title 44, Chapter 1, Part 201 (44 CFR Part 201) of the Code of Federal

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Regulations, which details requirements and procedures to implement the hazard mitigation planning provisions of the Stafford Act.

In addition, the Coryell County HMP complies with the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108-264), which amended the National Flood Insurance Act of 1968 (42 U.S.C. 4001, et al). As well as 44 CFR Part 60, Subpart A (flood plain management criteria for flood-prone areas); 44 CFR Part 77 (flood mitigation grants); and 44 CFR part 206, Subpart N (hazard mitigation grant program). The HMP was developed in accordance with FEMA's Community Rating System (CRS) Floodplain Management Plan standards and policies.

The HMP also adheres to the 2023 FEMA *Local Mitigation Planning Policy Guide* and the 2013 *Local Mitigation Planning Handbook*. Important steps and processes described in these documents were key to the comprehensive development of the HMP. The HMP is built upon the principles described in the FEMA resources and is tailored specifically for Coryell County and its participating jurisdictions.

## **Scope**

The overall scope of the HMP includes the identification of the most common and most concerning natural hazards and their impacts in the Planning Area, as well as prioritized mitigation actions to lessen those impacts. Please note that the HMP Planning Area includes portions of a town or city's jurisdiction that is divided by county lines. For example, participating jurisdictions Copperas Cove and Evant are divided between neighboring counties; however, the entirety of both jurisdictions are contemplated in the HMP.

The HMP is focused on the identification of actions to mitigate natural hazards classified as "highly likely" or "likely," determined through the Risk Assessment detailed in Chapter 4 (Risk Overview). Natural hazards identified as "unlikely," and "highly unlikely" will be continuously evaluated during future Plan updates. This approach results in the prioritization of mitigation actions based on the natural hazards that are commonly understood to produce the greatest risk of impacts to citizens, property, and the environment.

## **Purpose**

The overarching purpose of the Plan is to develop Coryell County's long-term strategy to reduce disaster losses and break the cycle of repetitive disaster damage and costly reconstruction. The main goal of the HMP is to increase the County's resiliency to natural disasters by minimizing long-term risks or impacts to human life and property, and identifying and implementing attainable mitigation actions.

### **Mission Statement:**

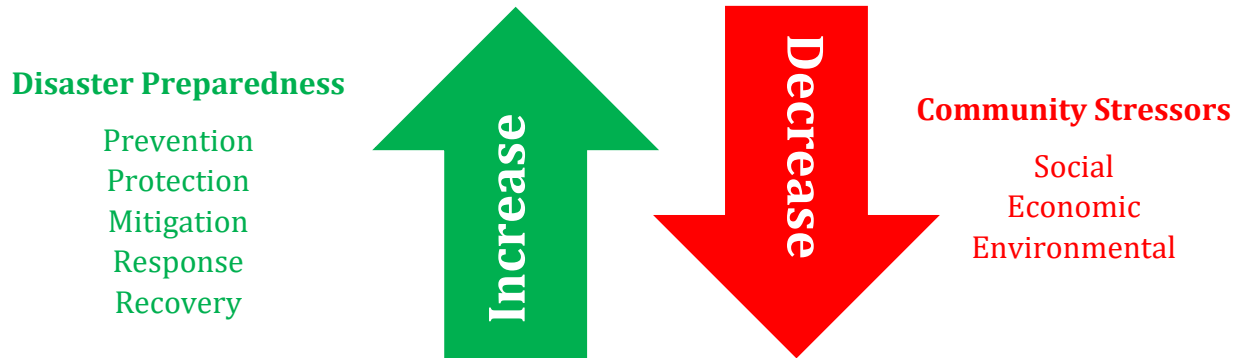
***Establish a disaster-resilient community and protect residents and their property by developing and implementing tailored mitigation actions.***

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Coryell County initiated development of an HMP to proactively prepare for anticipated natural hazards, adapt to changing conditions, and withstand and rapidly recover from disaster risks and impacts. The County is committed to natural disaster preparedness (prevention, protection, mitigation, response, and recovery) and the reduction of community stressors, or social, economic, and environmental conditions that may weaken a community (Figure 2).

Figure 2. Goals for Coryell County disaster preparedness and community resilience.



## Plan Organization

Chapter 1 (Introduction), Chapter 2 (Planning Process), and Chapter 3 (County Profile) outline key background, planning, and development information. Chapter 4 (Risk Overview) offers a high-level overview of the Risk Assessment used to identify and assess the natural hazards addressed in the HMP. The subsequent Chapters 5 through 15 delve into hazard-specific information, including hazard description; extent; location; historical occurrences; probability of future events; climate change; vulnerability; and impacts. The Mitigation Strategy is discussed in Chapter 16, followed by Mitigation Actions in Chapter 17, and Plan Maintenance in Chapter 18.

The structure of the Planning Group is illustrated in Appendix A. Appendix B documents public engagement, followed by the Public Survey and Results in Appendix C. Meeting documentation can be found in Appendix D. The Capabilities Assessment Table for Coryell County and participating jurisdictions is located in Appendix E, followed by Critical Infrastructure and Facilities in Appendix F.

## Chapter 2: Planning Process

### Overview

Coryell County contracted NRS in December 2022 to provide technical expertise and oversight for the development of the HMP. The Consultant Team utilized the FEMA 2023 *Local Mitigation Planning Policy Guide* and the 2013 *Local Mitigation Planning Handbook*, as well as HMPs of similar scope and complexity, to plan and develop the HMP. All planning and

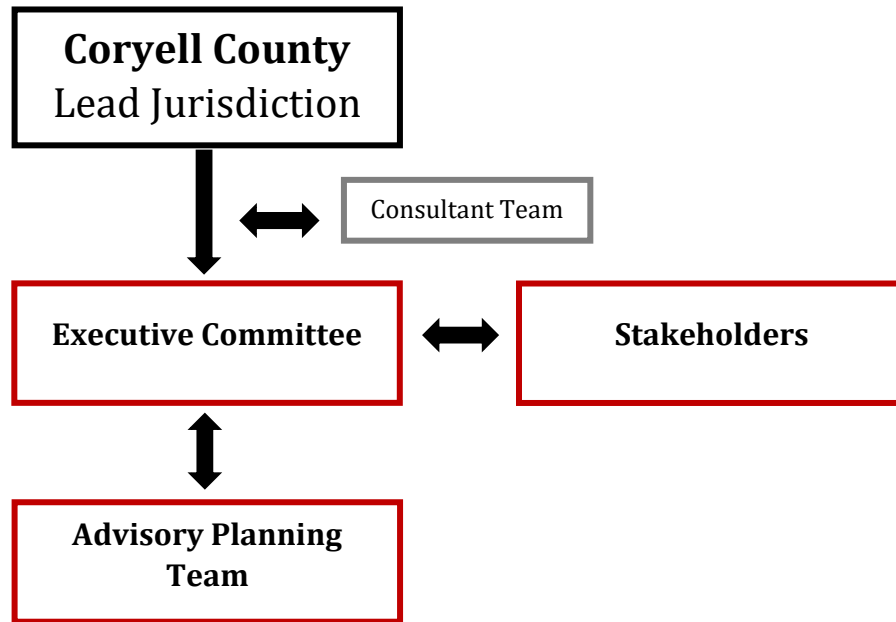


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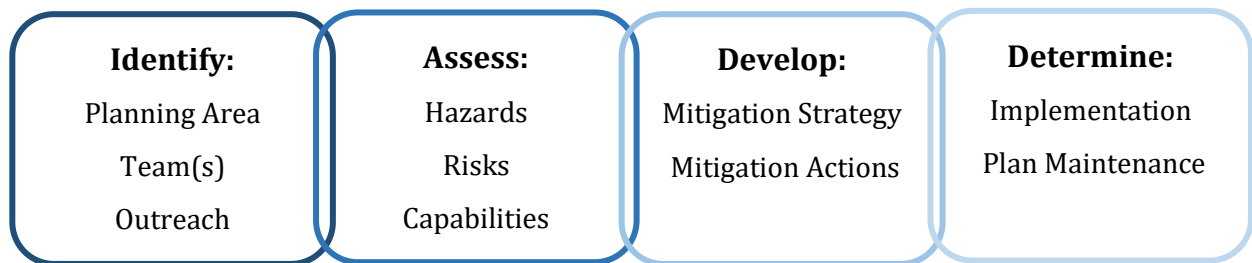
development activities were done in coordination with the Planning Group, consisting of the Executive Committee, Advisory Planning Team (APT), Stakeholders, and Consultant Team (Figure 3). Additional information on the roles and responsibilities of the Planning Group can be found below.

Figure 3. Participants and relationships in the HMP Planning Group.



The development of a comprehensive HMP is contingent on proper planning and coordination with an array of constituents to ensure the HMP is representative of all relevant interests in Coryell County. Figure 4 is an overview of the Planning Process from planning to development to implementation and maintenance.

Figure 4. Overview of the HMP Planning Process.



## Roles and Responsibilities

### **Local (44 CFR § 201.3(d))**

As detailed in FEMA’s 2023 *Local Mitigation Planning Policy Guide*, it is the local government’s responsibility to ensure each participating jurisdiction was involved in the Planning Process and meet all FEMA and TDEM requirements. According to 44 CFR § 201.6(a)(4), multi-jurisdictional HMPs may be accepted, if each jurisdiction has participated

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in the process. Coryell County is the designated lead jurisdiction and has actively coordinated with representatives from each participating jurisdiction throughout the development of the HMP. Individual jurisdictions will meet all mitigation planning requirements, adopt the HMP, and provide all necessary documentation to TDEM and FEMA.

### *Executive Committee*

Coryell County and NRS established an Executive Committee to coordinate the development of the HMP, provide guidance, and serve as the final decision-making body. On behalf of Coryell County, the Honorable Judge Roger Miller formally invited representatives from the participating jurisdictions to participate on the Executive Committee (Table 2).

*Table 2. Coryell County HMP Executive Committee participants.*

<b>Participating Jurisdictions</b>	<b>Title</b>
Coryell County	County Judge
Copperas Cove	Fire Chief and Emergency Management Coordinator
Gatesville	City Manager
Evant	Superintendent
Oglesby	School Board Member

Examples of actions undertaken by the Executive Committee include, but are not limited to: [1] final approval of public engagement and involvement strategy; [2] completion of Capabilities Assessment; [3] input into the identification of hazards; [4] identification of mitigation goals and objectives; and [5] input and final approval of mitigation strategy and actions.

One key responsibility of the Executive Committee was to establish an APT and Stakeholder group to ensure HMP goals, objectives, and projects are relevant and appropriate, and the diverse interests of Coryell County are represented. In addition, the Executive Committee decided to host a final public meeting to discuss the public survey results and inform the public of how their input was utilized in the planning process.

The Executive Committee met in-person throughout the planning and development of the HMP. This level of coordination ensured the HMP was tailored to Coryell County and that all varied interests were represented. The initial kickoff meeting was held on January 13, 2023. The purpose of this meeting was to inform key personnel about HMPs and discuss the planning and development process as well as expectations, roles, and responsibilities. The Executive Committee received a working binder and discussed the following documents/information:

- Kickoff presentation;
- Draft timeline;
- HMP flyer;
- HMP summary;
- Draft public survey;
- Two FEMA factsheets; and
- Hazard mitigation graphic.

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Subsequently, the Executive Committee held monthly meetings throughout the planning process. At each meeting, additional documents were added to the Executive Committee’s working binders, including but not limited to status updates; timelines; FEMA and TDEM resources; preliminary and final public survey results and analysis (Appendix C); draft Capabilities Assessment (Appendix E); draft goals and objectives; and draft mitigation actions. Executive Committee documentation can be found in Appendix D.

### *Advisory Planning Team*

The APT was appointed by the Executive Committee and is comprised of technical experts representing each participating jurisdiction included in the Plan as well as other key personnel (Table 3). APT members are considered the “do-ers,” as they possess the local knowledge and experience that is beneficial throughout the development of the HMP to ensure there is understanding and general alignment among all represented interests.

The APT was critical in the drafting and review of one of the most important sections of the Plan, the mitigation actions (Chapter 17). Their input into the mitigation actions is identified in Table 50 in the “Considerations” column as “identified need from Planning Group.”

The APT also played an important role in the development and review of the Capabilities Assessment (Appendix E), which entailed reviewing and documenting all existing planning, technical and regulatory tools and policies; administrative and technical capabilities; and financial resources for the participating jurisdictions. In addition, the APT reviewed and edited several drafts of the HMP and provided excellent comments that improved the inclusiveness, accuracy, and quality of the HMP.

*Table 3. Coryell County HMP Advisory Planning Team participants.*

<b>APT Entity</b>	<b>Title</b>
Coryell County	Precinct 2 Commissioner
Copperas Cove	Development Services Director
Gatesville	Director of Planning, Community Development, and Geographic Information Systems
Evant	School Board Member and Volunteer Fire Department Member
Oglesby	Mayor Pro Tem
Copperas Cove ISD	Superintendent
Gatesville ISD	Executive Director of Testing and Federal Programs
Gatesville	Fire Chief
Coryell County Road and Bridge Department	Road and Bridge Administrator
TDEM	Coryell County Liaison Officer
<i>Please note that the Coryell County Sheriff was provided with an opportunity to participate.</i>	



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Similar to the Executive Committee, the APT received information, resources, and several documents to assist with their understanding and duties throughout the entire planning process. The APT received regular status updates, project timelines, TDEM and FEMA resources, preliminary and final public survey results, and analysis (Appendix C), draft Capabilities Assessment (Appendix E), draft goals and objectives, and draft mitigation actions. They also received several iterations of the draft HMP and participated in the review and editing process. APT documentation can be found in Appendix D.

## *Stakeholders*

A Stakeholder Group was selected by the Executive Committee to ensure all interests are represented in the HMP planning process (Table 4). Stakeholders were formally invited via email to provide their input on specific topics, which was crucial to ensure a well-rounded Plan that considers diverse interests. The external and high-level nature of this group was important to ensure consideration of multiple perspectives. Stakeholders were asked to provide input and information or resources beneficial for integration into the HMP. All information received was reviewed and incorporated appropriately into the HMP and the planning process. It is important to note that various nonprofit organizations were included in the development of the HMP. The American Red Cross: Heart of Texas Chapter and the Central Texas Disaster Action Response Team (DART) are nonprofit entities that had been selected to participate in the Stakeholder Group. The Boys and Girls Club of Gatesville and Mission Gatesville are local nonprofits located in Coryell County that were solicited for their input on specific topics to ensure support to underserved communities and socially vulnerable populations. There is a shortage of non-military and community-based groups that support and assist under-represented groups in Coryell County. With increased growth in the County, it is probable that those nonprofit groups would increase in the near future.

*Table 4. Coryell County HMP Stakeholders.*

<b>Stakeholder Entity</b>	<b>Title</b>
Texas Forest Service	WUI Coordinator
Fort Hood	Deputy Director, Emergency Services
U.S. Army Corps of Engineers	Chief of Emergency Management Services
American Red Cross: Heart of Texas Chapter	Disaster Program Manager
Central Texas Disaster Action Response Team (DART)	Director
<i>Please note that the Texas Department of Criminal Justice, Texas Department of Transportation, Coryell Health EMS, and FOX 44 News were provided an opportunity to participate.</i>	

## **State (44 CFR § 201.3(c))**

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The State Hazard Mitigation Officer (SHMO) or representative is responsible for the initial review of all local mitigation plans, authorized under 44 CFR § 201.6(d)(1). As part of this process, the state has the authority to seek revisions to Plans submitted for review. The state acknowledges and confirms the Plan meets all requirements when Plans are forwarded to FEMA for final review and approval. States are also encouraged to communicate with local governments concerning HMP expiration dates and the availability of mitigation planning technical assistance and training. They are encouraged to communicate consistently and well in advance of any expiration dates to ensure timely submissions to meet program application cycles and deadlines. The HMP was developed in accordance with all state regulations and requirements.

## ***Federal (44 CFR § 201.3(b))***

Once the state reviews and submits the Plan to FEMA, FEMA will be responsible for the coordination of the HMP's review, tracking, and approval. FEMA is responsible for the final approval of all local hazard mitigation plans. The HMP was developed in accordance with all federal regulations and requirements. Specifically, the newly released *Local Mitigation Planning Policy Guide* effective April 19, 2023 was used to ensure adherence to FEMA policy.

Coryell County is the designated lead jurisdiction and has actively coordinated with representatives from each participating jurisdiction throughout the development of the HMP. Individual jurisdictions will meet all mitigation planning requirements, adopt the HMP, and provide all necessary documentation to TDEM and FEMA. Coryell County will ensure that each jurisdiction adopt the HMP and assist each jurisdiction in that process as requested.

## **Public Engagement and Involvement**

The Consultant Team developed an inclusive public engagement and outreach strategy to ensure appropriate public involvement and input was obtained early and often throughout the planning process. Each participating jurisdiction was included in this process. The Planning Group made note of areas of low-to-moderate income and areas considered for environmental justice so that those areas with lower income were treated equitably.

## ***Resources***

Initial engagement included the construction of Coryell County's HMP website, found at <https://www.coryellcountyhmp.com/>. The Consultant Team included general information about HMPs and the planning process, access to the public survey (discussed below), important documents (e.g., flyers, public survey results, public meeting presentations, etc.), a Frequently Asked Questions (FAQ) page, and contact information. In addition, a Facebook page was also created and shared by numerous community members. The HMP website and Facebook page will remain active to keep the public notified about the successful completion of mitigation actions and future HMP updates.

Similar information was also included on Coryell County's Emergency Management webpage and Gatesville, Evant, and Copperas Cove websites, as well as FOX 44 News. These resources

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were continuously updated throughout the planning process to ensure Coryell County citizens were provided the most up-to-date information.

An informational flyer was created to ensure visibility and accessibility of the public survey, public meeting details, and to provide general information on the HMP. Flyers were posted at various publicly accessible locations such as the Gatesville City Hall, Public Library, Tax Office, and County Annex; Copperas Cove Council Chambers, Public Library, and Utility Administration; and the Evant and Oglesby City Halls. Please see Appendix B.

Several news articles and press releases detailing public meetings and the public survey were also created and distributed including FOX 44 News, Gatesville Messenger, Evant Star, McGregor Mirror, Copperas Cove Leader Press, Temple Daily Telegram, Killeen Daily Herald, Copperas Cove Herald, and the City of Copperas Cove. Please see Appendix B.

### ***Public Survey***

A critical aspect of the public engagement strategy was the development and deployment of a comprehensive and inclusive public survey. We carefully planned for the public survey to be deployed prior to the public meetings and remain open during the meetings to allow citizens time to engage face-to-face and ask questions in real time. Focus was put on constructing a public survey that would be simple in its design and written in a way to ensure that all segments of the public would be comfortable completing the survey in less than 10 minutes online *or* in-person.

The survey was developed and deployed to collect data reflecting public concerns regarding natural hazards in Coryell County and potential mitigation actions. A total of 367 surveys were completed. The public survey also gave the option for citizens to supply their e-mail address to receive additional communications about the HMP; 160 participants provided their e-mail addresses. Survey results were used to guide and inform several aspects of the HMP, including the vulnerability and impact sections of each hazard chapter as well as the Mitigation Actions (Chapter 17). Public input into the mitigation actions is identified in Table 50 in the "Considerations" column as "Public Survey Priority."

For the final survey analysis and results, please reference Appendix C.

### ***Public Meetings***

As a supplement to the public survey, four initial public meetings were held in the participating jurisdictions to give the public the opportunity to provide input into the HMP and discuss details of the planning process and the next phases of action. The goal was to be informative, but not present an overwhelming amount of information in a formal setting. Public meeting agendas were designed so that each meeting was an inviting two-way stream of information and communication, providing the public with important information and receiving important information from the public. The Consultant Team and the Honorable Judge Roger Miller were present at each meeting to answer questions and to welcome insight from the public.

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All meetings were advertised on the appropriate channels mentioned in Resources above. Consideration was made for those unable to attend in person and zoom information was also distributed. Public meetings were held on the following dates and locations:

- January 18, 2023 – Gatesville Auditorium;
- January 19, 2023 – Evant City Hall;
- January 25, 2023 – Copperas Cove Council Chambers;
- January 26, 2023 – Oglesby Community Center; and
- March 7, 2023 – Gatesville Civic Center.

Reference Appendix D for meeting documentation.

The questions and comments at the public meetings generated a FAQ page on the HMP website. The FAQ page includes, but is not limited to, questions such as what happens once an HMP is developed, will the HMP address man-made hazards, and is Fort Hood involved in the HMP process. Please visit <https://www.coryellcountyhmp.com/faq> for more information.

## **Review and Integration of Existing Plans**

Coryell County and the Consultant Team requested formal review and input from the Executive Committee and APT on the draft Capabilities Assessment within the first 60-days of the HMP process. Detailed in Appendix E, the Capabilities Assessment summarizes all existing planning, technical, and regulatory tools, and policies; administrative and technical capabilities; and financial resources for each participating jurisdiction.

Once completed, the Consultant Team created an inclusive list of all existing plans, including any formal or informal plan, study, report, policy, ordinance, regulation, and miscellaneous technical information in all formats. The Consultant Team also searched for plans such as Emergency Operations Plans, Continuity of Operations Plans, Land Use Plans, Comprehensive Plans, Capital Improvement Plans, Drainage Studies, etc. Each jurisdictions' plans could contain information from federal, state, local, or other sources, including but not limited to:

- |   |   |
|---|---|
| ➤ FEMA;   | ➤ TDEM;                                 |
| ➤ U.S. Army Corps of Engineers (USACE);                   | ➤ Texas General Land Office (GLO);      |
| ➤ U.S. Department of Agriculture (USDA);                  | ➤ Texas Water Development Board (TWDB); |
| ➤ U.S. Forest Service;                                    | ➤ Texas Forest Service (TFS);           |
| ➤ National Oceanic and Atmospheric Administration (NOAA); | ➤ Coryell County;                       |
| ➤ NOAA's National Centers for Environmental Information;  | ➤ City of Copperas Cove;                |
| ➤ U.S. Census Bureau;                                     | ➤ City of Gatesville,                   |
| ➤ U.S. Army- Fort Hood;                                   | ➤ Evant;                                |
|   | ➤ Oglesby;                              |
|   | ➤ Copperas Cove ISD; and                |
|   | ➤ Gatesville ISD.                       |

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In addition, the Consultant Team carefully reviewed resources and materials from FEMA and TDEM guidance on HMP content and development requirements. All relevant information above was compiled and summarized in a comprehensive Capabilities Assessment (Appendix E).

All appropriate plans were further reviewed and analyzed, including annotating each plan for information relevant to hazards, risks, and mitigation actions in Coryell County. The resulting compilation of information was then reviewed with a focus on whether each jurisdiction's plan was relevant to the County-wide HMP. All pertinent information that could be integrated into the HMP was presented to the Executive Committee and APT for final review. Once the Executive Committee completed the review and final approval, all relevant information was incorporated into the Coryell County HMP.

There is a provision in Chapter 18 (Plan Maintenance) that allows for the HMP to be updated with a minor amendment when jurisdictions complete and/or approve a plan in the future that contains information that would be appropriate to include in the HMP. This allows for continual input from the jurisdictions into the HMP on an as needed basis, rather than waiting for the HMP to be reviewed and updated at 5-year intervals.

Coryell County will integrate the HMP and portions thereof into other County-wide and jurisdictional planning mechanisms, as appropriate. The participating jurisdictions will integrate mitigation actions contained in this HMP into existing planning mechanisms such as subdivision regulations, Emergency Operation Plans, Continuity of Operation Plans, and other County and/or jurisdictional planning efforts, as appropriate. The participating jurisdictions are each responsible for implementing mitigation actions contained in this HMP.

## **Plan Preparation and Development**

The Consultant Team was responsible for directing HMP preparation and development. The Coryell County HMP planning process began in December 2022, with an expedited schedule to complete and submit the draft HMP to TDEM by April 13, 2023. The total project schedule was 120 days from initiation through completion and submission of the draft. With an actual TDEM submission date of April 6, 2023, the project was completed ahead of schedule.

FEMA's 2023 *Local Mitigation Planning Policy Guide* and *Local Mitigation Plan Review Tool* were used to plan and develop the HMP. The Consultant Team also ensured adherence to TDEM requirements. In addition, all applicable federal and state guides were reviewed to ensure a complete understanding of the HMP preparation and development process. Recent HMPs of similar scope and complexity from neighboring jurisdictions were also analyzed. Further, the Texas State Mitigation Plan was reviewed to understand the larger efforts undertaken by the state of Texas. The initial review of the aforementioned documents resulted in a comprehensive understanding of HMP expectations and accepted norms and practices.



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Once a comprehensive understanding of all relevant policies and requirements was accomplished, the Consultant Team coordinated with the Honorable Judge Roger Miller to identify potential participating jurisdictions. Once finalized, the participating jurisdictions were formally invited to participate in the development of the HMP. The Consultant Team focused on ensuring all participants were well-represented and engaged throughout this process. The initial Executive Committee meeting was held on January 13, 2023, with subsequent monthly meetings until the completion of the project on April 6, 2023. Please see Roles and Responsibilities - Executive Committee above for more information on this process.

The Executive Committee was tasked with identifying appropriate representatives to serve on the APT. Potential APT participants were informed of the HMP process and formally invited to participate. The initial APT meeting was held on February 27, 2023, with subsequent email communication and access to a Dropbox link to receive several iterations of the draft HMP electronically. The APT followed the process outlined in the Roles and Responsibilities – Advisory Planning Team section above.

The Executive Committee identified key Stakeholders to participate in the Stakeholder group. Participation was confirmed by March 17, 2023. While no formal Stakeholder meeting was held, information was disseminated and Stakeholders were provided the opportunity to share any resources or information beneficial to the development of the HMP. For more information, please see Roles and Responsibilities – Stakeholders above.

Concurrent to these engagement processes, the Consultant Team also deployed the public survey on January 12, 2023, with a closing date of February 12, 2023. More details on the public survey can be found in Public Engagement and Involvement above. In addition, the Consultant Team coordinated the five public meetings mentioned above in the Public Engagement and Involvement section. The Consultant Team prioritized an inclusive and comprehensive process to ensure all citizens were able to participate, if desired.

Incorporating the resources, information, and input obtained through the processes mentioned above, the Consultant Team drafted the HMP to be inclusive and representative of all Planning Group and public interests. Specifically, input from the Planning Group was used to conduct the Risk Assessment discussed in Chapter 4. Their input was also heavily relied upon in the completion of the HMP Goals and Objectives (Chapter 16), Mitigation Actions (Chapter 17), and the Capabilities Assessment (Appendix E). Public input received through the public survey and public meetings was used to assess the vulnerability and impact sections associated with each chapter (Chapter 5 through 15), as well as the Mitigation Actions (Chapter 17).

Once drafted, the Consultant Team provided the Planning Group with several opportunities to review the draft HMP, ask questions, and provide suggested revisions. All comments and suggested revisions were appropriately incorporated into the HMP to ensure it reflects the needs and concerns of Coryell County citizens and officials. In order to ensure neighboring communities involved in hazard mitigation activities were provided the opportunity to

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review the draft Plan, the Consultant Team also sent draft HMP to the Central Texas Council of Governments (CTCOG) on March 24, 2023. All comments received by CTCOG were incorporated into the draft Plan, as appropriate.

Throughout the entire HMP preparation and development process, the Consultant Team coordinated with TDEM to ensure alignment with all relevant policies required for HMP approval. TDEM's Coryell County Liaison Officer was instrumental in this coordination as well as the TDEM Mitigation Coordinator. The Consultant Team prioritized communication consistently throughout the process, which in part allowed the project's expedited schedule. TDEM officials provided key resources and information that added to the overall quality and completeness of the HMP.

At the conclusion of all the processes mentioned above, the Consultant Team finalized the draft HMP and sent it to the Executive Committee for final review and approval on April 5, 2023. On April 6, 2023, the Executive Committee approved the final draft HMP for submission to TDEM. The Consultant Team submitted the final draft to TDEM on April 6, 2023 in accordance with all FEMA and TDEM requirements.

## Chapter 3: County Profile

### Overview

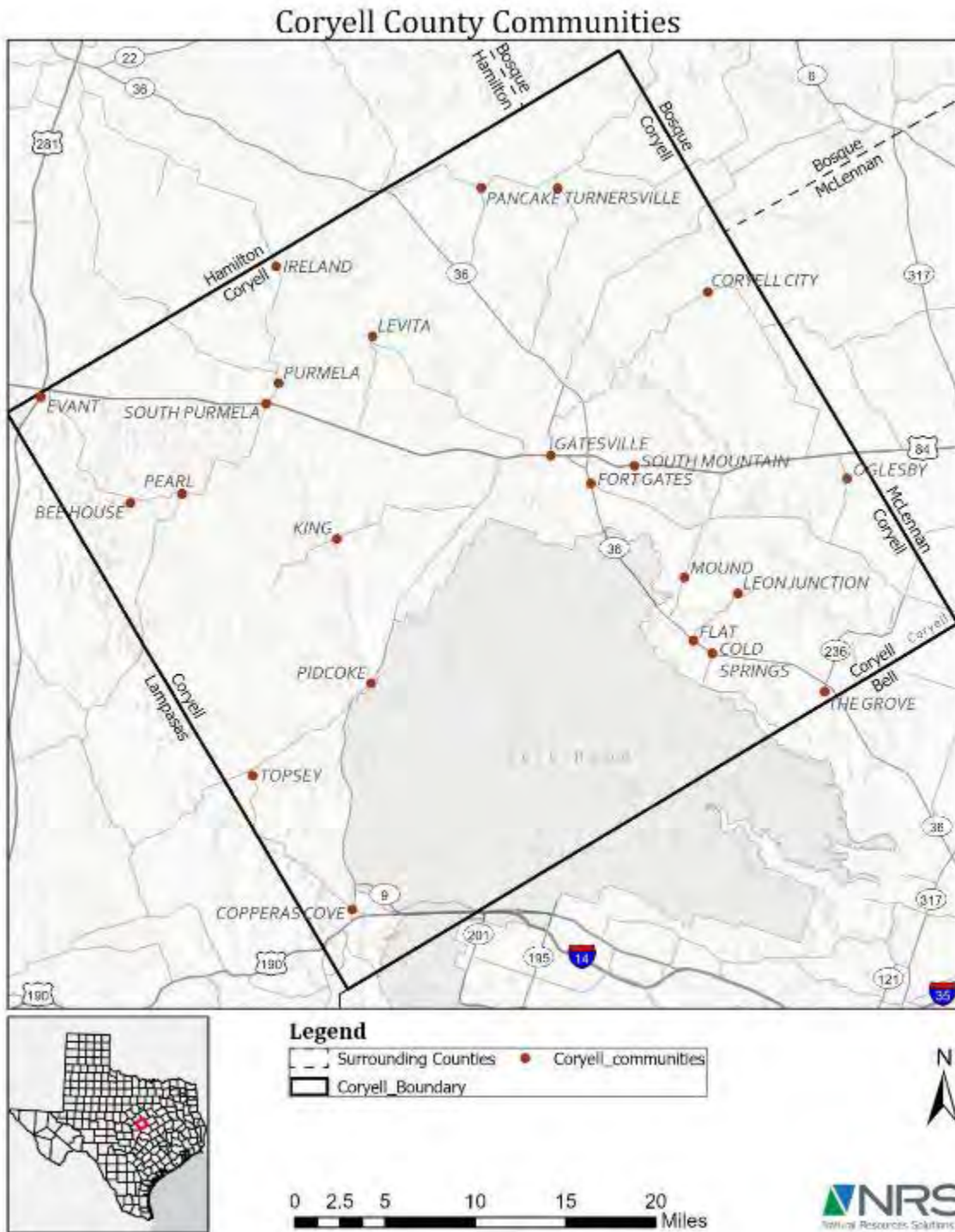
Coryell County is quintessential central Texas. Located approximately 210 miles inland from the Gulf of Mexico, Coryell County is bordered by Hamilton, Bosque, McLennan, Bell, and Lampasas counties. It was created by the Texas State Legislature in 1854 and named after James Coryell, a Texas Ranger and early Texas explorer. The County Seat, Gatesville, was established in 1849 and is approximately 88 miles north of Austin and 110 miles southwest of Dallas. Gatesville also houses the historic Courthouse built in 1898 and hosts various community-driven events. Founded in 1879, Copperas Cove is the largest city in the County.

A total of approximately 1,056 square miles, Coryell County is home to many cities, towns, Census-designated places, and unincorporated communities, including:

- **Cities:** Copperas Cove, Gatesville, McGregor, and Oglesby;
- **Towns:** Evant, South Mountain, and Turnersville;
- **Census-Designated Place:** Fort Hood; and
- **Unincorporated Communities:** Bee House, Bluestem Village, Coryell City, Flat, Ireland, Jonesboro, Levita, Mound, Osage, Pancake, Pearl, Pidcoke, Purmela, and The Grove.

Please see Figure 5 below for a map depicting these communities.

Figure 5. Map of communities in Coryell County.







**Population and Demographics**

The historical populations in Coryell County have been relatively low. Table 5 below details participating jurisdictions’ historical populations from 1950, 1960, 1970, 1980, 1990, 2000, 2010, and 2020. Evant and Oglesby data were obtained from the Texas State Historical Association, Copperas Cove and Gatesville from The Texas Almanac, and Unincorporated Coryell County from the U.S. Census Bureau.

*Table 5. Historical and recent population estimates for each participating jurisdiction in the HMP.*

<b>Participating Jurisdictions</b>	<b>Year</b>	<b>Population</b>
Unincorporated Coryell County	1950	11,313
	1960	14,354
	1970	26,369
	1980	30,283
	1990	27,874
	2000	29,165
	2010	29,878
	2020	29,383
Copperas Cove**	1950	1,052
	1960	4,567
	1970	10,818
	1980	19,469
	1990	24,079
	2000	29,592
	2010	32,391
	2020	36,258
Gatesville**	1950	3,856
	1960	4,626
	1970	4,683
	1980	6,260
	1990	11,492
	2000	15,591
	2010	12,475
	2020	16,559
Evant	1950	-
	1960	-
	1970	-
	1980	425
	1990	444
	2000	393
	2010	426
	2020	455
Oglesby	1950	-

# Coryell County Hazard Mitigation Plan 2023



	1960	414
	1970	440
	1980	470
	1990	452
	2000	458
	2010	484
	2020	441
<i>** Including relevant ISDs</i>		

According to the Coryell County Profile compiled by the Texas Association of Counties, the 2021 estimated population, based on the U.S. Census Bureau, is 84,232 (Census 2023). Table 6 below details population estimates for each participating jurisdiction. The average annual County population increase is over 5% based on population trends over the last 70 years.

Table 6. Participating jurisdictions' 2021 population estimates.

Participating Jurisdiction	Estimated Population
Unincorporated Coryell County	29,449
Copperas Cove**	37,041
Gatesville**	16,854
Evant	454
Oglesby	434
<i>** Including relevant ISD</i>	

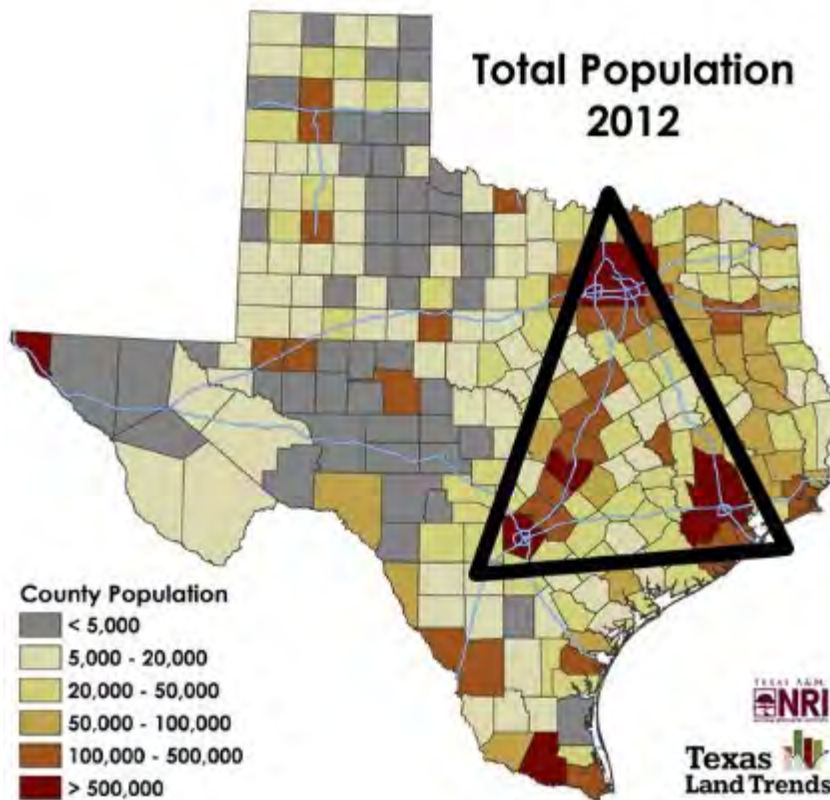
Coryell County is located in an area of the state referred to as the “Texas Triangle.” It consists of a geographical triangle encompassing the state’s largest cities (Dallas/Fort Worth, Houston, San Antonio, and Austin) and is home to the majority of the population (Figure 6). The Texas Triangle is expected to experience the greatest population growth. In fact, urban areas within the Texas Triangle have experienced approximately 80% of the state’s population growth since 2000 (Lund 2018).

Projections using Texas A&M University (TAMU) Land Trends data indicate continued growth will occur in areas within and surrounding the Texas Triangle. They warn that “City and County leaders should recognize projected population increases and prepare for anticipated transportation, water supply, education, and health needs for fast-developing communities.”

# Coryell County Hazard Mitigation Plan 2023



Figure 6. Map depicting Texas counties color-coded by population, and denoting the "Texas Triangle" region, a designated region between major cities and highways in East-Central Texas. Created by Kevin Skow, Geospatial Manager, TAMU Natural Resources Institute.



Another aspect of projected population growth involves water availability. The TWDB categorizes Texas by Water Region. Under the Texas Legislature, each Region is required to develop a comprehensive Water Plan. The 2021 Brazos Region G Regional Water Plan Volume 1 describes the County’s historical and projected population (Table 7) and illustrates a significant projected increase in water demand (Table 8) (Brazos River Authority 2021).

Table 7. Coryell County historical and projected population from Brazos Region G Regional Water Plan Volume 1.

	Year	Coryell County Population
Historical	2000	74,978
	2010	75,388
Projections	2020	86,105
	2030	97,771
	2040	110,752
	2050	122,101
	2060	134,199
	2070	146,240
Annual Percent Growth	2000-2010	0.05%
	2010-2070	1.11%

# Coryell County Hazard Mitigation Plan 2023



Table 8. Coryell County projected municipal water demand (acre-feet per year) from Brazos Region G Regional Water Plan Volume 1.

Year	Acre-Feet/Year
2020	14,624
2030	15,972
2040	17,583
2050	19,090
2060	20,782
2070	22,496

The demographics most relevant to natural hazards are those that are vulnerable and sensitive (including the elderly and impoverished) to potential risks and impacts. Below, Table 9 details estimated the amount of vulnerable and sensitive populations in each participating jurisdiction. For the purposes of the HMP, vulnerable and sensitive populations include the elderly (65 and over) and those below the poverty level. Approximately 6.2% of the County is considered elderly and approximately 13.6% are below the poverty level. When developing the HMP and designing mitigation actions, it is important to be cognizant of these populations to ensure their safety and continued representation.

Table 9. Estimated vulnerable and sensitive populations in Coryell County from the U. S. Census Bureau 2023.

Jurisdiction	Total 2020 Population	Percentage	Elderly (65 and Over)	Below Poverty Line
Unincorporated Coryell County	29,449	35 %	6 %*	14 %*
Copperas Cove**	37,041	44 %	10 %	10 %
Gatesville**	16,854	20 %	9 %	13 %
Evant	454	0.5 %	19 %	15 %
Oglesby	434	0.5 %	20%	13 %
*County-wide				
**Including relevant ISDs				

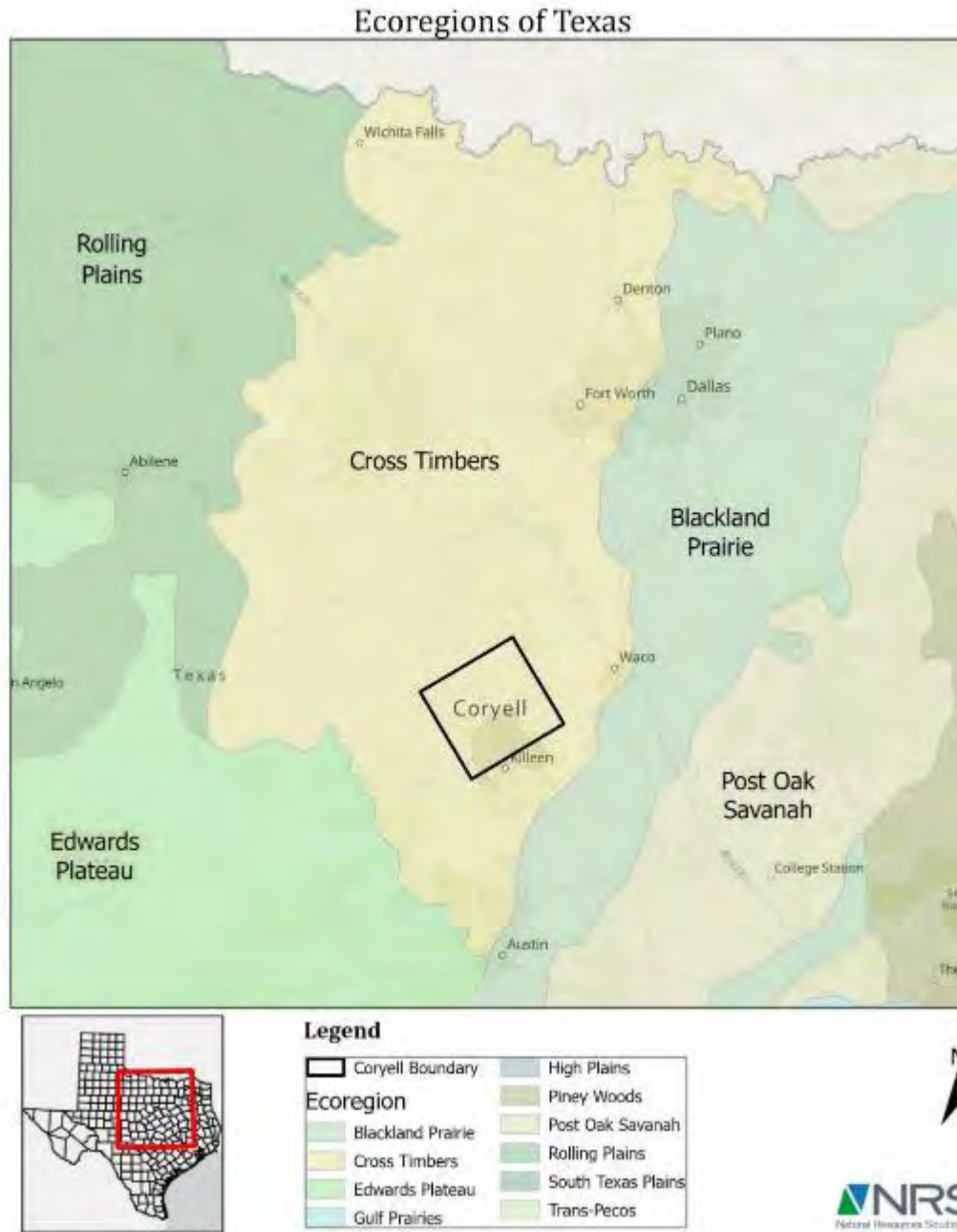
## Ecological

Coryell County has elevations ranging from 600 to 1,493 feet above sea level. There are two primary rivers that run through the County; the Leon River drains the northern and eastern parts of the County and Cowhouse Creek drains the western and southern portions. Coryell County is completely encompassed in the Cross Timbers Ecoregion of Texas (Figure 7). The Cross Timbers of Central Texas includes areas with a high density of trees and irregular plains and prairies.

# Coryell County Hazard Mitigation Plan 2023



Figure 7. The Ecoregions of Texas, as defined by Texas Parks and Wildlife Department.



# Coryell County Hazard Mitigation Plan 2023



Surface water is critical in Central Texas because it is a historically drought-prone portion of the state. Each river basin in Texas is monitored and controlled by the Texas River Authority. Coryell County is in the Brazos River Basin, which is managed by the Brazos River Authority (BRA). Texas River Authorities are integral in the management of flood hazards for each river basin. They also monitor and regulate river flow and help to protect, develop, and manage the water quantity and quality of their basins. In addition, River Authorities provide recreation areas for communities to enjoy.

TWDB also categorizes Texas by Water Regions to ensure consistent river management across the state. Coryell County and the Brazos River are located in Region G (Brazos River Authority 2021).

It is important to note that Coryell County is situated between 2 large dams and reservoirs or lakes managed by the USACE. Proctor Dam and Lake are located to the northwest in Comanche County, and Belton Dam and Lake are located to the southeast in Bell County.

Proctor Lake and Dam, however, are considered a potential risk. In 2018, Coryell County experienced significant flooding, with a sizable portion attributed to USACE-managed water releases used to mitigate heavy rainfall.

## **Fort Hood**

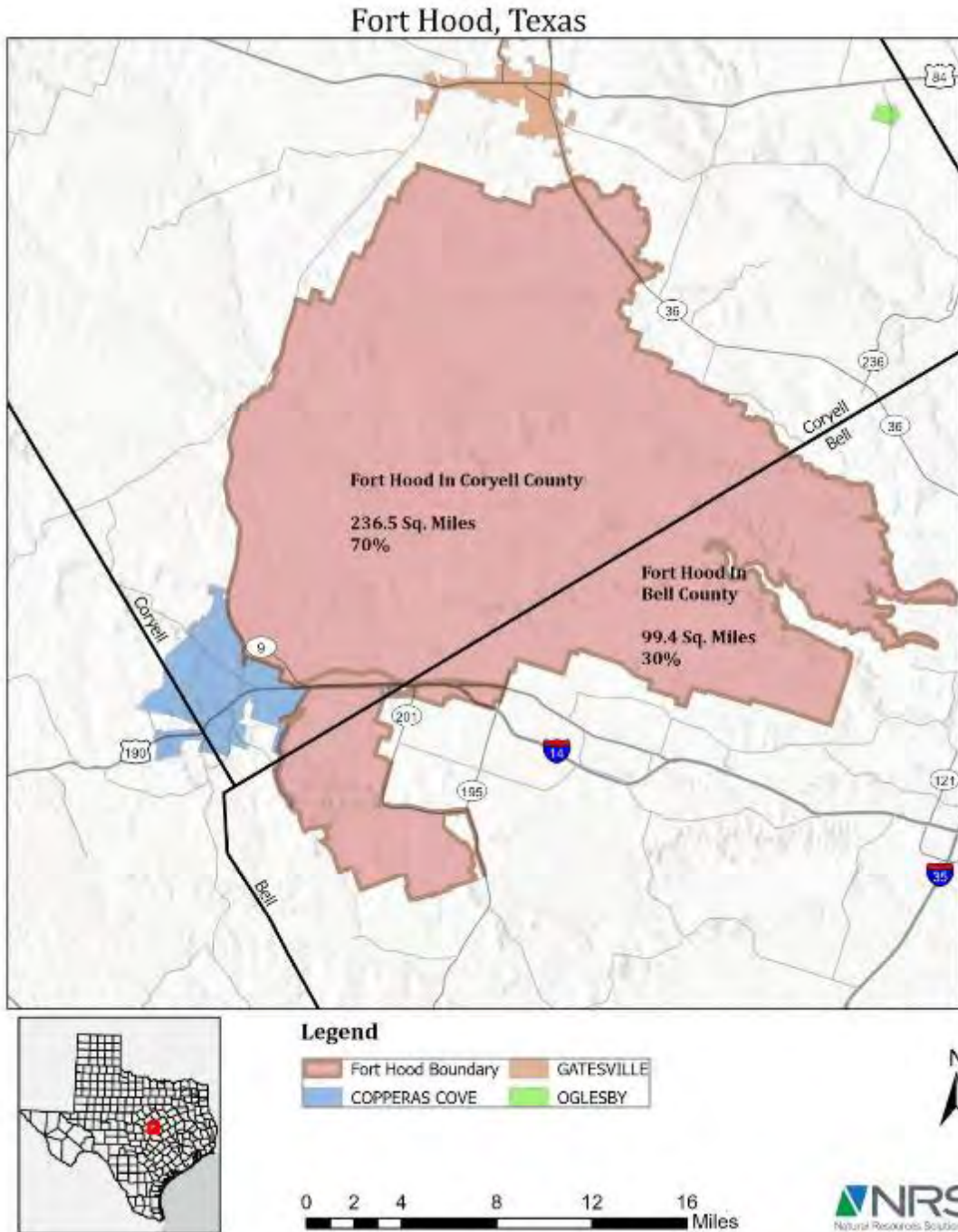
It is important to note that Fort Hood and all natural hazards and associated risks that occur within its boundaries will not be contemplated in the Coryell County HMP. Fort Hood is one of the largest United States military installations in the world, and is the home of III Corps, 1st Cavalry (CAV) Division, 13th Sustainment Command, 3rd Cavalry Regiment (CR), and First Army Division West. The installation serves as the primary Training Platform for the above units; and is considered the premier location for training heavy forces. Fort Hood is located near Killeen, Texas and is approximately 335.9 square miles of which, 236.5 square miles or 70% is located in Coryell County and the other 99.4 square miles acres or 30% is in neighboring Bell County.

Fort Hood, named after General John Bell Hood, is located halfway between Austin and Waco. During World War II, Fort Hood fulfilled a need for wide-open space to test and train tank destroyers. The main cantonment of Fort Hood had a total population of 53,416, as of the 2010 U.S. Census.

Fort Hood training operations have ignited wildfires that have crossed the boundary of the Army installation and impacted Coryell County residents and their property. It is important that county and local civilian emergency personnel build relationships and coordinate efforts to minimize and mitigate hazards common to all jurisdictions. Reference Chapter 15 (Wildfire) for more information on the most recent 2022 wildfire.



Figure 8. Map depicting location and boundaries of Fort Hood Military Installation in Coryell County, Texas.



**Economic Impact**

Protection of critical infrastructure and facilities will benefit the County in several ways, especially economically. Natural hazards pose risks to the people and the infrastructure and impacts from those hazards could impede economic progress in the County.

## Coryell County Hazard Mitigation Plan 2023



Transportation is the segment most often impacted by natural hazards in a rural county. Coryell County citizens require safe access to and from their homes, work, schools, emergency services and medical providers, and basic life necessities. Safe transportation is also key when wildfires force evacuations and migrate across roads and highways in the County causing road closures. Flooding can also impact a County's vital access to critical services by closing roads and stream crossings for days at a time.

Electricity and other utilities must remain intact and accessible for repair during emergencies. Companies that contribute to the economy of the County require power, water, and transportation access for employees and customers.

Winter Storms can impact power and water services, and affect critical infrastructure such as water systems, wastewater treatment plants, etc. Winter storms can also impact transportation safety if roads are not passable due to snow and ice accumulation.

All of these natural hazards can impact the County's ability to progress and even sustain economically. Natural hazards are costly and can significantly impact a county of any size. However, smaller, more rural counties cannot absorb the economic impacts as easily as larger counties with larger tax bases.

Coryell County has an Economic Development Board. The Board's mission is to stimulate and enhance Coryell County's long-term prosperity and quality of life. The Board promotes economic development and improvements of all business conditions, including industrial and commercial development, tourism, and job creation, retention, and training.

The major employment sectors in the County include state prisons, Fort Hood, schools, County and city government, and private industry. Further, Gatesville's economy is based primarily on retail, agriculture, corrections, and manufacturing. The state of Texas is the city's largest employer, with approximately 2,500 employees at several prison facilities (City of Gatesville 2023). Copperas Cove (the largest city in Coryell County) also has the largest economy, which is intricately linked to nearby Fort Hood. Major employers in the area include Metroplex Hospital, Walmart, Scott & White Hospital and Clinics, Central Texas College, and GC Services (Chamber of Commerce Copperas Cove 2023).

### **Critical Infrastructure and Facilities**

Coryell County and the participating jurisdictions have existing critical infrastructure and facilities that may be vulnerable to the natural hazards included in the HMP. Table 10 below details the number of each critical infrastructure and facilities associated with the participating jurisdictions. In addition, critical infrastructure and facilities impacted by specific hazards are discussed in the associated hazard chapter (Chapter 5 through Chapter 15). Examples of those hazards that may impact specific facilities include Flood, Erosion (Riverine), Dam Failure, Wildfire, and Tornado. Conversely, some hazards can impact all of the County's critical infrastructure and facilities in general, without specific vulnerability to specific facilities. Those more general hazards include Drought, Extreme Heat, Winter Storm,



# Coryell County Hazard Mitigation Plan 2023



Hail, Lightning, and Straight-line Wind. Please see Appendix F for maps associated with Table 10.

Table 10. Number of critical infrastructure and facilities in the participating jurisdictions that may be vulnerable to impacts from the hazards addressed in the HMP.

Participating Jurisdiction	Number and Type of Critical Infrastructure and Facilities
Unincorporated Coryell County	Childcare Center: 1 Fire Station: 5 Substation: 5 Water Tower: 8 Water Treatment Plant: 2
Copperas Cove**	Childcare Center: 22 Fire Station: 3 Hospital: 0 Law Enforcement: 1 Nursing Home: 2 Pharmacy: 4 Public School: 13 Shelter Facilities: 0 Substation: 1 Water Tower: 5 Water Treatment Plant: 3
Gatesville**	Airport: 1 Childcare Center: 6 Courthouse: 1 Fire Station: 1 Hospital: 1 Law Enforcement: 4 Nursing Home: 3 Pharmacy: 4 Prison Area Public School: 7 Shelter Facilities: 4 Substation: 5 Water Tower: 6 Water Treatment Plant: 1
Evant	Childcare Center: 1 Fire Station: 1 Public School: 2 Water Tower: 1
Oglesby	Fire Station: 1 Public School: 1 Water Tower: 1
<b>** Including relevant ISDs</b>	



## Chapter 4: Risk Overview

### Hazard Identification

In hazard mitigation planning, risk is the potential for damage, loss, or other impacts to community assets caused by natural hazards. Community assets of concern are people, property, infrastructure, and the environment that may be exposed to natural hazards. The type and severity of impacts are based on the extent of the hazard and the vulnerability of the asset, as well as the community's ability to prepare for, respond to, mitigate, and recover from events. Identifying and understanding these risks will enhance the County's ability to thrive in a natural disaster-prone area of Texas.

A thorough review of natural hazards suggested by FEMA guidance and the state of Texas 2018 Hazard Mitigation Plan was conducted. Anecdotal information regarding hazards and vulnerabilities of the County was collected through public outreach and used to identify and prioritize local hazards. Of all hazards listed by FEMA, 11 natural hazards were identified as significant to the Planning Area. These hazards were grouped into 3 categories: atmospheric, hydrologic, and other.

Atmospheric Hazards are generally associated with weather events and often cause direct harm to community assets. Atmospheric hazards that have been identified as significant for Coryell County are Extreme Heat, Hail, Lightning, Straight-line Wind, Tornado and Winter Storm.

Hydrologic Hazards are associated with water-related damage occurring as a result of weather events. Hydrologic hazards that have been identified as significant for Coryell County are Drought, Erosion (Riverine), and Flood.

For this Risk Assessment, Dam Failure and Wildfire are considered Other Hazards because they are not usually natural occurrences but typically result directly or indirectly from human activity.

The following is a breakdown of the hazards addressed in this HMP, by the hazard categories mentioned above:

**Atmospheric:**

Extreme Heat;  
Hail;  
Lightning;  
Straight-line Wind;  
Tornado; and  
Winter Storm.

**Hydrologic:**

Drought;  
Erosion (Riverine); and  
Flood.

**Other:**

Dam Failure; and  
Wildfire.

Other hazards that were contemplated but ultimately not included in this Plan are presented in Table 11. Hazards that are not included in the HMP at this time will be monitored and considered again in future Plan updates.



Table 11. Hazards considered for inclusion in the Coryell County HMP, but deferred, with reasons for exclusion.

Considered Hazard	Reason for Exclusion
Coastal Erosion	The Planning Area is not located on the coast and coastal erosion does not pose a risk.
Earthquake	According to the Texas State Plan, no earthquakes have occurred in the Planning Area since at least 1973. The Planning Area is also considered at very low risk for earthquakes.
Expansive Soils	There is no history of damages caused by expansive soils. The Texas State Plan identifies the Planning Area as low potential of swelling from expansive soils.
Hurricane	The Planning Area is not located on the coast and hurricanes do not pose a direct risk. The Planning Area has experienced post tropical cyclones or remnants of a hurricane, and it was determined that the risks associated with these events are covered in the Flood and Thunderstorm (Hail, Straight-line Wind, and Lightning) profiles.
Land Subsidence	There are no records of land subsidence occurrences in the Planning Area. The Texas State Plan indicates a very low risk of subsidence occurring in the future.

**Climate Change**

Climate change is described as a significant change in either the average state of the climate or in its variability over an extended period. Climate change in and of itself is not necessarily a hazard, but it may increase the frequency and/or intensity of identified hazards over time. Climate change could affect communities in a variety of ways, but it is currently unclear what extent the impacts will have on the Planning Area. It is anticipated that hazard-causing events will fluctuate due to climate change over time. As new information and new models are developed, a climate change Risk Assessment may be enhanced to measure and assess these impacts more accurately.

The changing climate is considered a “force multiplier” meaning that natural hazards expected to occur would be exacerbated and made worse by the effects of climate change. “Made worse” by climate change is described as the potential for an increased number of natural hazards as well as increased magnitude of damage caused by natural hazards. At present, there is no accurate way to measure or predict the increased number or severity of natural hazards that would be attributable to climate change. It is generally accepted that there would be more storm events, more floods, more fires, more winter storms, etc. and there is a potential for the impacts from those increased events to be more severe (greater in magnitude of damages). The effects of climate change would impact the safety of communities and would create financial burdens for communities preparing for and recovering from natural hazards.



Coryell County would encourage the use of predictive tools to help prepare for and address the impacts of climate change. One of the tools that was used during this analysis was the U.S. Climate Resilience Toolkit and Climate Explorer, which are managed by NOAA Climate Program Office. Another tool that is available to help communities understand and prepare for future climate change impacts is the Climate Risk and Resilience Portal (ClimRR), which was developed by the Center for Climate Resilience and Decision Science (CCRDS) at Argonne National Laboratory in collaboration with AT&T and the United States Department of Homeland Security's Federal Emergency Management Agency (FEMA). Coryell County and the jurisdictions included in this HMP would continue to use the U.S. Climate Resilience Toolkit as well as explore the use of the ClimRR tool and other tools as appropriate.

## **Hazard Risk Assessment**

The Hazard Risk Assessment provides a thorough description of each identified hazard that can affect the participating jurisdictions in the Planning Area. In accordance with the FEMA *Local Mitigation Planning Handbook*, each hazard included information on the following:

- Description;
- Extent (potential magnitude);
- Location;
- Historical occurrences including any related local, state, and federal disaster declarations;
- Probability of future events, including climate change;
- Vulnerability (parts of the community may be affected); and
- Impact (potential consequences).

Information for each hazard was collected through government-sourced data, subject matter experts, and regional and local authorities. Each hazard typically has a common description for the intensity, developed by government agencies or subject matter experts that are widely accepted. Extent measurements are identified and described for each hazard. Hazards were evaluated to determine the likely location of the hazard within the Planning Area based on historical occurrences. Weather-related records were retrieved from the National Centers for Environmental Information (NCEI), NOAA, and other sources that maintain natural events data.

The probability of occurrence in the future is calculated by dividing the number of historical events by the time period of record to determine events per year. Events per year are converted to an annual probability (Table 12).

Vulnerability is a description of which assets are at risk from the effects of the hazard. If an individual participating jurisdiction has a unique risk, that is identified by jurisdiction. Once loss estimates and vulnerabilities are known, consequences of each hazard are identified. All variables are then considered to determine the overall risk for each hazard.



Table 12. Categories of probability of occurrence that are used in describing future vulnerability to hazards.

Probability	Description	Chance to Occur in Any Year (%)
Highly Likely	Event will occur at least once every year	100%
Likely	Event will occur once within three years	33%
Occasional	Event will occur once every five years	20%
Unlikely	Event will occur in the next ten years	10%
Highly Unlikely	More than 10 Years between occurrences	< 10%

**Hazard Ranking**

As mentioned, a public survey was distributed to citizens to help understand concerns about natural hazards experienced in the Planning Area. An important aspect of the survey was to determine what hazards are the most concerning for local residents. The mean *level of concern* on a scale of 0-10 is presented in Table 13, with hazards in descending level of concern.

*Drought ranks the highest level of concern, with responses indicating a concern of 7.32, nearly 6 times higher than the hazard of least concern, Dam Failure. In addition to Drought and Wildfire, Winter Storms and Tornados also showed levels of expressed concern (>6 on the 10-point scale). Please note that Hail, Lightning, and Straight-line Wind are collectively part of the Thunderstorm hazard, and Erosion (Riverine) is closely tied to the Flood hazard. Table 13. The table presents the results from the HMP public survey. Column one indicates average respondents score for their level of concern on a scale of 1-10. The second column indicates the percentage of respondents that reported having directly experienced impacts resulting from the given hazard.*

Hazard	Mean Concern Score 1 to 10	Reported Impacts %
<b>Drought</b>	7.32	46.30%
<b>Wildfire</b>	6.38	23.30%
<b>Winter storm</b>	6.16	69.60%
<b>Tornados</b>	6.04	15.10%
<b>Extreme heat</b>	5.83	29.50%
<b>Thunderstorm</b>	4.73	50%
<b>Flood</b>	3.44	18.90%
<b>Dam Failure</b>	1.5	1.40%

**Hazard Impacts**

The effects of changes in population patterns (migration, density, etc.) positively alter the future impacts of all hazards on the vulnerable assets for each participating jurisdiction by generating funding from the increase in population in the area. As more people migrate to the planning area, the jurisdictions are able to collect more taxes which can then be used towards modernizing infrastructure and allowing for more opportunities to pursue

additional funding, such as the Building Resilient Infrastructure and Communities (BRIC) program, in order to mitigate future hazards.

## Chapter 5: Extreme Heat

### Hazard Description

Extreme heat occurs when the temperature reaches extremely high levels (> 100°F) or when the combination of heat and humidity causes the air to become oppressive (Centers for Disease Control 2023). The occurrence of extreme heat was analyzed in all participating jurisdictions in the Planning Area. It was concluded that extreme heat occurs or could occur in all participating jurisdictions and has or could impact all existing and future critical infrastructure and facilities, residents, and their property in Coryell County.

Critical infrastructure can experience rapid degradation due to extreme heat causing damage and unsafe conditions. For example, building foundations can be destabilized by the extreme heat disrupting the moisture and compaction requirements for the foundation, causing cracks or other damage to the building. The natural environment suffers direct impacts, especially if it is exposed for a prolonged period. When this occurs, vegetation declines lead to wind and water erosion. The most significant threat of extreme heat is to the safety and well-being of people. Occupations that require physical labor outdoors as well as school districts holding extracurricular activities during extreme heat events are especially at risk. Common risks associated with extreme heat to people are heat exhaustion, heat cramps and heat stroke (U.S. Department of Homeland Security 2023).

### Extent

The intensity of an extreme heat event is dependent on two factors, temperature, and humidity (Figure 9). This combination of factors is known as the “heat index.” The heat index is described as what the temperature feels like to the human body, which intensifies as one or both factors increase.

In the figure below, four categories are presented as risk levels:

- **Caution:** 80°F to 90°F, fatigue possible with prolonged exposure and/or physical activity;
- **Extreme Caution:** 90°F to 103°F, heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity;
- **Danger:** 103°F to 124°F, heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity; and
- **Extreme Danger:** 125°F or higher, heat stroke highly likely.

The heat index is used to determine heat intensity in all participating jurisdictions, including the ISDs. For example, 90° Fahrenheit (°F) ambient air temperature could have a heat index of 91°- 132°F. The risk of outdoor activity could be “Extreme Caution” to “Extreme Danger,” depending on the humidity. It should be noted that these temperatures are based on outdoor



# Coryell County Hazard Mitigation Plan 2023



shaded areas; if an activity is in direct sunlight, the temperature could increase as much as 15°F in the same general location (National Weather Service 2023).

Figure 9. Chart depicting heat index levels based on temperature and relative humidity from NOAA and National Weather Service (NWS).

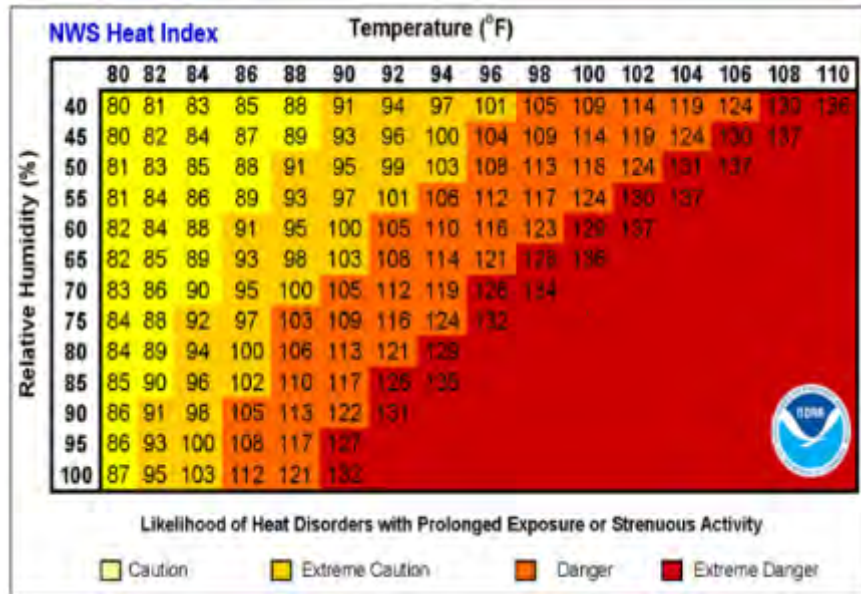
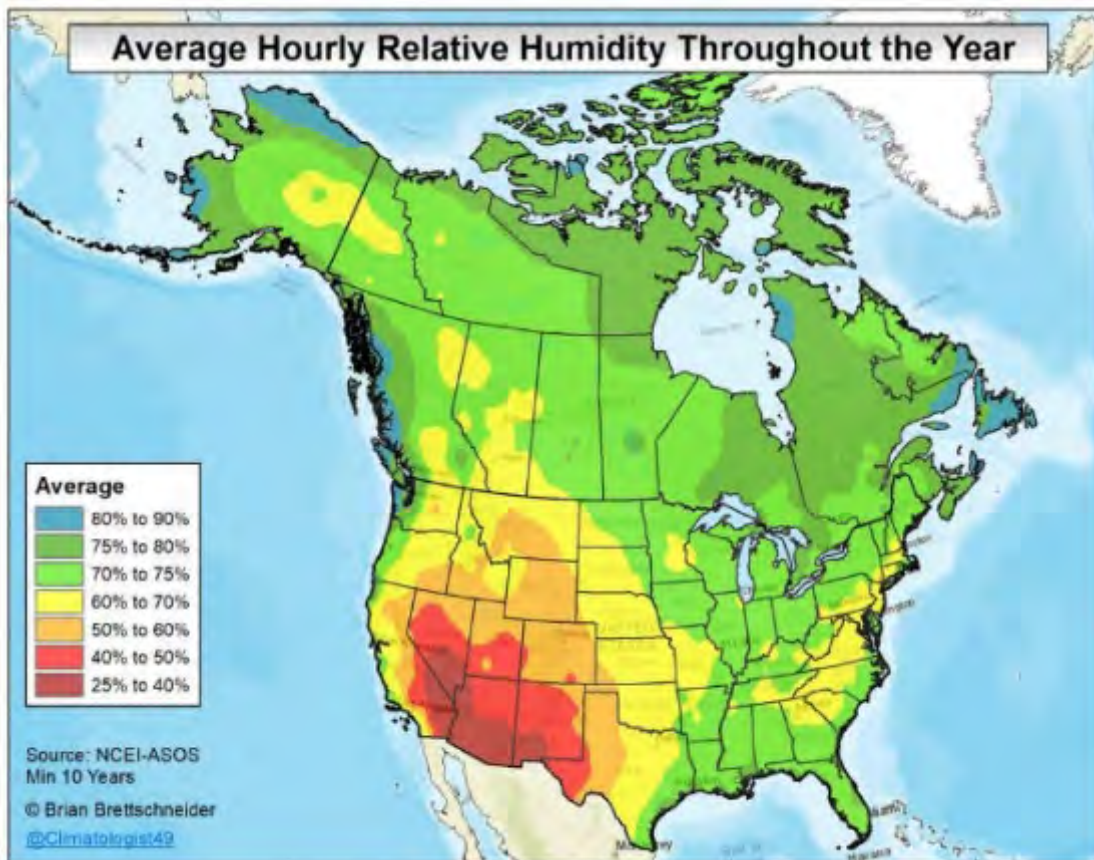


Table 14. The table describes the effects of heat index levels on the human body.

Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

According to the NCEI, the average relative humidity (RH) for the Central Texas region, including the Planning Area, is approximately 60% to 70% (Figure 10) (Brettschneider 2018). Summertime temperatures are commonly in the 100s, leaving the Planning Area frequently in the “Danger” to “Extreme Danger” classification.

Figure 10. Annual average hourly relative humidity in the U.S. and Canada, from NCEI.



The Gatesville ISD and Copperas Cove ISD have guidelines set by the University Interscholastic League (UIL) for extracurricular activities in the state of Texas (University of Texas Austin 2023). These are based on heat index and activities lasting more than 30 minutes outdoors (Table 15). The UIL “Danger Zone” for students is comparable to the “Caution” in the NWS categories, and the “Critical Zone” is similar to the “Extreme Caution” NWS category. As these heat index thresholds are reached, additional cautionary measures are implemented to reduce risks of extreme heat to the students and staff of these ISDs.

Table 15. University of Texas University Interscholastic League extreme heat guide for outdoor activities lasting 30 minutes or more.

Air Temperature (°F)	Danger Zone	Critical Zone
70°F	80 % RH	100 % RH
75°F	70 % RH	100 % RH
80°F	50 % RH	80 % RH
85°F	40 % RH	68 % RH
90°F	30 % RH	55 % RH
95°F	20 % RH	40 % RH
100°F	10 % RH	30 % RH



# Coryell County Hazard Mitigation Plan 2023



## Location

Enduring Texas heat is a common practice year after year. As Coryell County is situated near the center of Texas, extreme heat hazard exists throughout the Planning Area, including all participating jurisdictions. People participating in outdoor activities between May and September are the most vulnerable. Others at risk are those who have underlying health conditions, over 65 or under 5 years of age, overweight, diabetic, or taking certain medications.

## Historical Occurrences

Extreme heat, whether as high ambient temperature or as the heat index, occurs regularly during the months of May through September in Texas. The Planning Area has not had any federal or state declared disasters for extreme heat. Since 2010, Coryell County has had five excessive heat warnings issued by the NWS Fort Worth/Dallas Weather Forecast Office (Table 16). Each of these excessive heat warnings recorded the heat index to be between 105°F to 110°F, which is in the NWS heat index “Danger” category. Daily records from the Gatesville Municipal Airport beginning in 2010 show 227 days of a heat index over 103°F (data obtained from Iowa Environmental Mesonet 2023). That is generally considered to be in the “Danger” category.

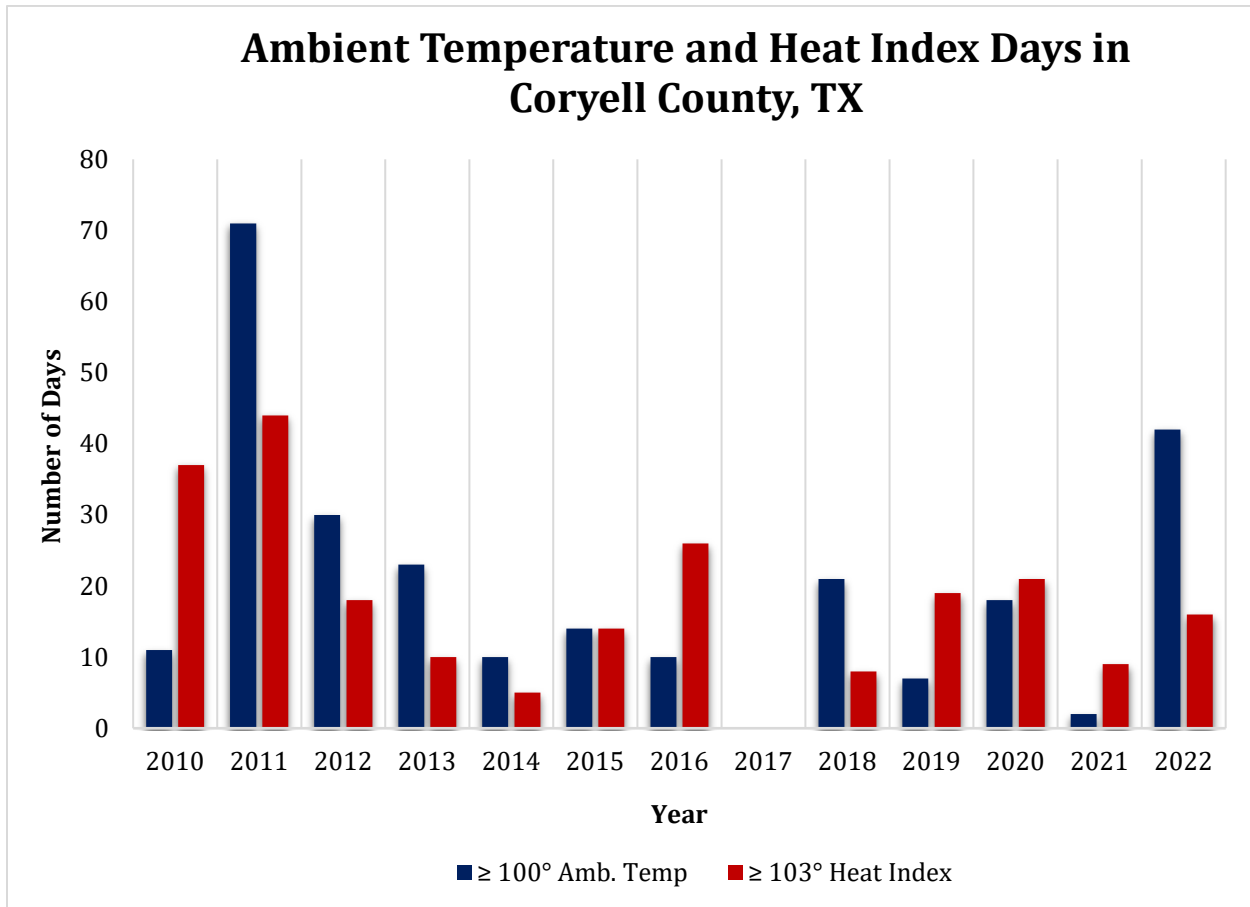
Further analysis reveals that 259 days have had ambient temperatures over 100°F in the last 12 years. Both heat index and ambient temperature thresholds occurred every year except 2017 (Figure 11).

*Table 16. Excessive heat warnings issued by the National Weather Service for Coryell County, Texas since 2010.*

<b>NWS Office</b>	<b>Initial Issue Date</b>	<b>Expiration Date</b>
Fort Worth/Dallas	7/18/2018	7/24/2018
Fort Worth/Dallas	8/14/2020	8/16/2020
Fort Worth/Dallas	6/12/2022	6/13/2022
Fort Worth/Dallas	7/10/2022	7/13/2022
Fort Worth/Dallas	7/18/2022	7/21/2022



Figure 11. Number of days with dangerous ambient air temperature and heat index in Coryell County, Texas for 2010 to 2022.



As indicated in Figure 11, almost every summer heat-related illness becomes a significant threat, especially to those working outdoors. Serious illness and death can occur in extreme heat. The Center for Disease Control reports that across Texas, there have been 1,066 deaths due to “exposure to excessive natural heat (hyperthermia)” between 1999 and 2020 (Table 17). Despite several excessive heat warnings, Coryell County is fortunate to not have any confirmed heat-related deaths recorded between 1999 and 2020. This is likely due to the community being aware, prepared, and educated about the risks of extreme heat. Bell County, which borders Coryell, has reported 22 heat-related deaths during this time (Centers for Disease Control and Prevention 2021).

Table 17. Extreme heat-related deaths in Texas from 1999 to 2020, from the Center for Disease Control.

Year	Number of Deaths
1999	42
2000	61
2001	26
2002	39
2003	44

# Coryell County Hazard Mitigation Plan 2023



2004	44
2005	66
2006	55
2007	16
2008	34
2009	47
2010	65
2011	126
2012	40
2013	35
2014	26
2015	38
2016	54
2017	36
2018	46
2019	72
2020	54
<b>Grand Total</b>	<b>1,066</b>

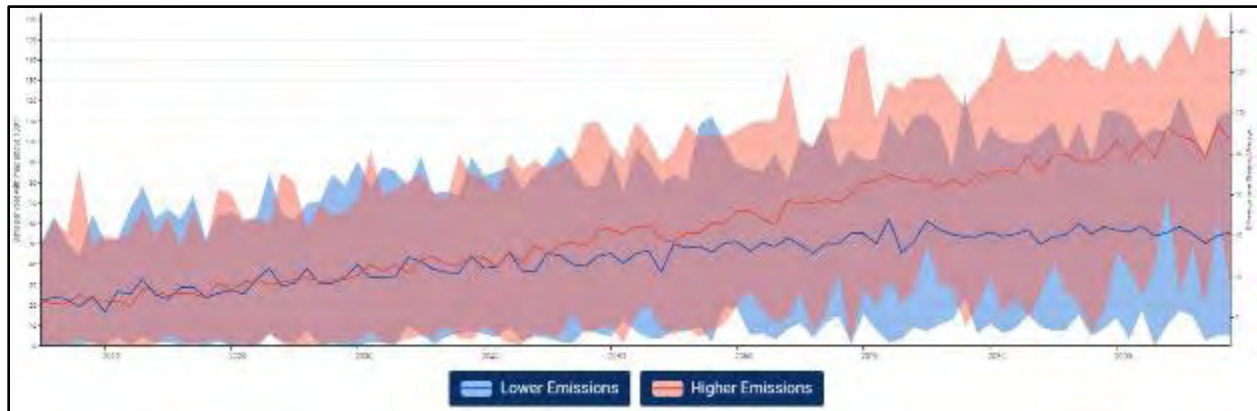
## Probability of Future Events

Over the last 12 years, Coryell County has experienced an average of 19 days per year of temperatures over 100°F and 17 days per year with the heat index exceeding 103°F. Excessive heat warnings have noticeably increased in recent years, and it is expected to continue creating category “Danger” or “Extreme Danger” heat events multiple times a year. Based on historical events and trends, the Planning Area will experience extreme heat weather events every year for the foreseeable future. This frequency supports a “highly likely” probability of future events.

### *Climate Change*

As previously mentioned, climate change may increase the frequency or intensity of hazards over time. The U.S. Climate Resilience Toolkit, Climate Explorer (Climate Explorer) provides projected climate conditions for counties across the United States. Projections for two long-term climate scenarios were calculated for temperature (Figure 12). One scenario describes a future in which humans stop increasing harmful emissions by 2040 and then continue to reduce emissions through the end of the century (Lower Emissions). The second scenario describes a future in which harmful emissions continue to increase through the end of the century (Higher Emissions). The data show that emissions could impact climate, specifically extreme heat, in Coryell County over the next 80 years causing the number of 100°F days per year to steadily increase over time (U.S. Federal Government 2021).

Figure 12. Predicted number of  $\geq 100^{\circ}\text{F}$  days in Coryell County through 2100 using the U.S. Climate Resilience Toolkit, Climate Explorer.



## Vulnerability

Extreme heat occurs in all jurisdictions, impacting all community assets of the Planning Area. Public infrastructure, property (including land and livestock), the natural environment, and public health and welfare are all vulnerable to extreme heat events. The integrity of highways and roads can be compromised by softening asphalt and creating cracks and potholes. Industrial equipment and motor vehicles are at higher risk of failure due to the increased stress on moving parts during these events.

During times of drought, extreme heat can exacerbate negative environmental impacts to water, air, and wildlife resources by depleting the available water. Extreme heat causes ozone production to accelerate, reducing air quality and increasing the risk of respiratory illness (U.S. Environmental Protection Agency 2023). While these assets are vulnerable to extreme heat, they are not likely to sustain significant damage. The greatest risk from extreme heat are the health dangers to the public. The most vulnerable of the population are the elderly (over 65), children under 5 years of age, and those who lack air conditioning. Older adults often cannot adjust to sudden temperature changes efficiently because of medications or chronic illnesses (Center for Disease Control and Prevention 2023). A child's body heats up 3 to 5 times faster than an adult. They are also subject to being left in a car, unable to escape on their own. In fact, Texas leads the nation in hot car deaths among children (Texas Health and Human Services 2023).

Serious life threatening concerns from extreme heat are hyperthermia, heat cramps, heat exhaustion, and heat stroke. Other at-risk populations are response personnel such as emergency teams, utility workers, construction workers, and other professions where individuals are required to work outside. High energy demands during the summer can potentially cause rolling brownouts, leaving portions of the population, including the most vulnerable, without air conditioning. Water suppliers throughout the County may face increased water use during extreme heat causing water shortages. These impacts affect all geographic areas of the County and participating jurisdictions.

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The school districts (Gatesville and Copperas Cove ISDs) have a unique situation, where extracurricular activities such as football and band practice occur during very hot and humid conditions. Due to the uniform and equipment requirements for football, most of the heat-related problems have been associated with football. During hot weather conditions, athletes are subject to heat cramps, heat exhaustion, and heat stroke (University of Texas 2023).

## **Impacts**

### ***People***

- Vulnerable populations, especially the elderly (over 65) and children under 5 are subject to serious or life-threatening health problems from exposure to extreme heat, including hyperthermia, heat cramps, heat exhaustion, and heat stroke.
- Emergency personnel, utility workers, public works personnel, and other professions where individuals are required to work outside, are subject to extreme heat-related illness.
- School sponsored extracurricular outdoor activities such as football and band practice in August are exposed to extreme heat and may experience heat-related illnesses.

### ***Utility Systems***

- High energy demands during extreme heat can overwhelm the electrical grid system creating “brownouts,” which can increase risk to more vulnerable citizens.
- Water suppliers may face increased water demands and reduced water supply resulting in water rationing and/or increased costs for the public.

### ***Infrastructure and Property***

- Highways and roads may be damaged by extreme heat causing asphalt roads to soften and wear unevenly and/or the road base to crack or shift and distort the travel surface.
- Vehicle engines and equipment have increased stress on moving parts causing increased mechanical failures.

### ***Economy***

- Extreme heat causes increased stress on crops and livestock, potentially resulting in crop failures or increased cost to produce these products.
- Food suppliers incur increased costs due to increased production costs.

### ***Environment***

- Extreme heat events stress natural resources including natural water supplies, air quality, and vegetation and have an impact on wildlife.

## *Climate*

- Extreme heat trends have shown that events are occurring more frequently. Long-term projection data show that extreme heat events will increasingly occur throughout the next 80 years.

## *Land Use and Development*

The effects of changes in land use and development negatively alter the future impacts of extreme heat on the vulnerable assets for each participating jurisdiction by putting the residents and their structures at an increased risk of being impacted by extreme heat. With more development, such as the building of new homes or ranch and agricultural development, it is likely that in the event of extreme heat, they could be negatively impacted. The County is currently developing a Land Use Plan through funding from the Texas General Land Office (GLO) through the Resilient Communities Program (RCP). Upon completion of the RCP, all participating jurisdictions will better understand the impacts of changes in land use and development and these impacts will be addressed in future HMP updates.

The overall economic and public health impacts of extreme heat on the community will depend on the duration of the event, demand for energy, drought, and other factors. The level of awareness and preparedness of the County and its citizens will impact the overall risk the public will be exposed to.

## **Chapter 6: Hail**

### **Hazard Description**

Hail is a form of solid precipitation consisting of balls or irregular lumps of ice called hailstones, which are typically 5 mm- 15 cm in diameter. Hail is produced by cumulonimbus clouds<sup>1</sup> and is thus a product of thunderstorms. It is a damaging phenomenon found in many areas of the world. Hail events are much more frequent than tornados. In many locations in the U.S., hail occurs at a rate of more than one event per year.

Hail formation requires conditions including strong, upward air flow (similar to tornados) and a lowering of the altitude of the freezing level (i.e., the altitude at which the air temperature descends to 32°F). Hailstones form when ice crystals, frozen raindrops, dust, or other prospective particles collide with super cooled water drops, which freeze on contact. Updrafts within a thunderstorm then move the hailstones upward in the storm cloud, where they may gather more layers of ice in high moisture cloud layers. The hailstone will continue ascending and gathering ice layers until its mass becomes too great to be supported by the

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<sup>1</sup> Cumulonimbus clouds are dense, towering vertical clouds typically formed by water vapor condensing in the lower troposphere that builds upward by powerful buoyant air currents. Beyond the lower portion of a cumulonimbus cloud, water vapor becomes ice crystals, the interaction of which can lead to hail and to lightning formation. When occurring as a thunderstorm, these clouds may be referred to as thunderheads. Cumulonimbus can form alone, in clusters, or along squall lines. These clouds can produce hail, lightning, tornados, and hazardous winds.





updraft. As hailstones fall toward the ground, they may continue to grow in size as they collide with water droplets, until it leaves the cloud. The hailstone may begin to melt as it descends, if it passes into air that is above freezing temperature (National Weather Service 2023).

**Extent**

The severity of damage caused by hail depends on several factors, including hailstone sizes (average and maximum), density (number of hailstones per unit area), and associated winds. Storms that produce high winds in addition to hail are most damaging and can result in significant damage. The NWS classifies a storm as “Severe” if there is hail three-quarters of an inch in diameter (approximately the size of a penny) or greater, based on radar intensity or as seen by observers. The NOAA/TORRO Hailstorm Intensity Scale ranks the damage from hailstorms (Table 18) (National Oceanographic and Atmospheric Administration 2023).

*Table 18. The TORRO International Hailstorm Intensity Scale identifying hail intensity, diameter, kinetic energy, and possible or likely damage resulting from each level of hail intensity.*

Scale	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy (J/m <sup>2</sup> )	Typical Damage Impacts
H0	Hard Hail	5	0-20	No noticeable damage
H1	Potentially Damaging	5-15	>20	Slight general damage to plants and crops
H2	Significant	10-20	>100	Significant damage to fruit, crops, and vegetation
H3	Severe	20-30	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	>500	Widespread glass damage; vehicle bodywork damage
H5	Destructive	30-50	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60		Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75		Severe roof damage, risk of serious injuries
H8	Destructive	60-90		Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

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H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
* Approximate range (typical maximum size in bold), since other factors (e.g., number and density of hailstones, hail fall speed and surface wind speeds) affect severity.				

Fortunately, most hailstorms produce marble-size or smaller hailstones. However, even small hailstones can cause damage, such as damage to crops. Depending on the factors describes above such as hailstone size, density, and associated wind, hail can cause impacts such as:

- Crop damage;
- Property damage to landscaping, fences, or other out-structures;
- Injury to wildlife and livestock;
- Damage to buildings (commonly roofs, windows, and outside walls are affected);
  - Secondary damage can be incurred due to water entering buildings through broken windows or roof damage.
- Damage to vehicles (broken windows and auto body damage are common); and
  - Secondary damage can be incurred to vehicles due to water entering through broken windows.
  - Vehicles may be total losses due to hail damage.
  - Damage to aircrafts or other vehicles (e.g., military vehicles) can be incurred.
- Injuries, including loss of life possible.

The National Center for Environmental Information (NCEI) Storm Event Database estimated that hailstorms were the 4<sup>th</sup> most costly weather-related hazard in Texas during a measurement period of 1996-2016 statewide. The Texas Department of Public Safety divides the 254 Texas counties into six regions; Coryell County is in Region 6. During the period of study, in region 6, data from the aforementioned database estimate that 48% of property losses were from hailstorms. Estimated losses for the 21-year period for which data has been summarized are depicted in Table 19 below.

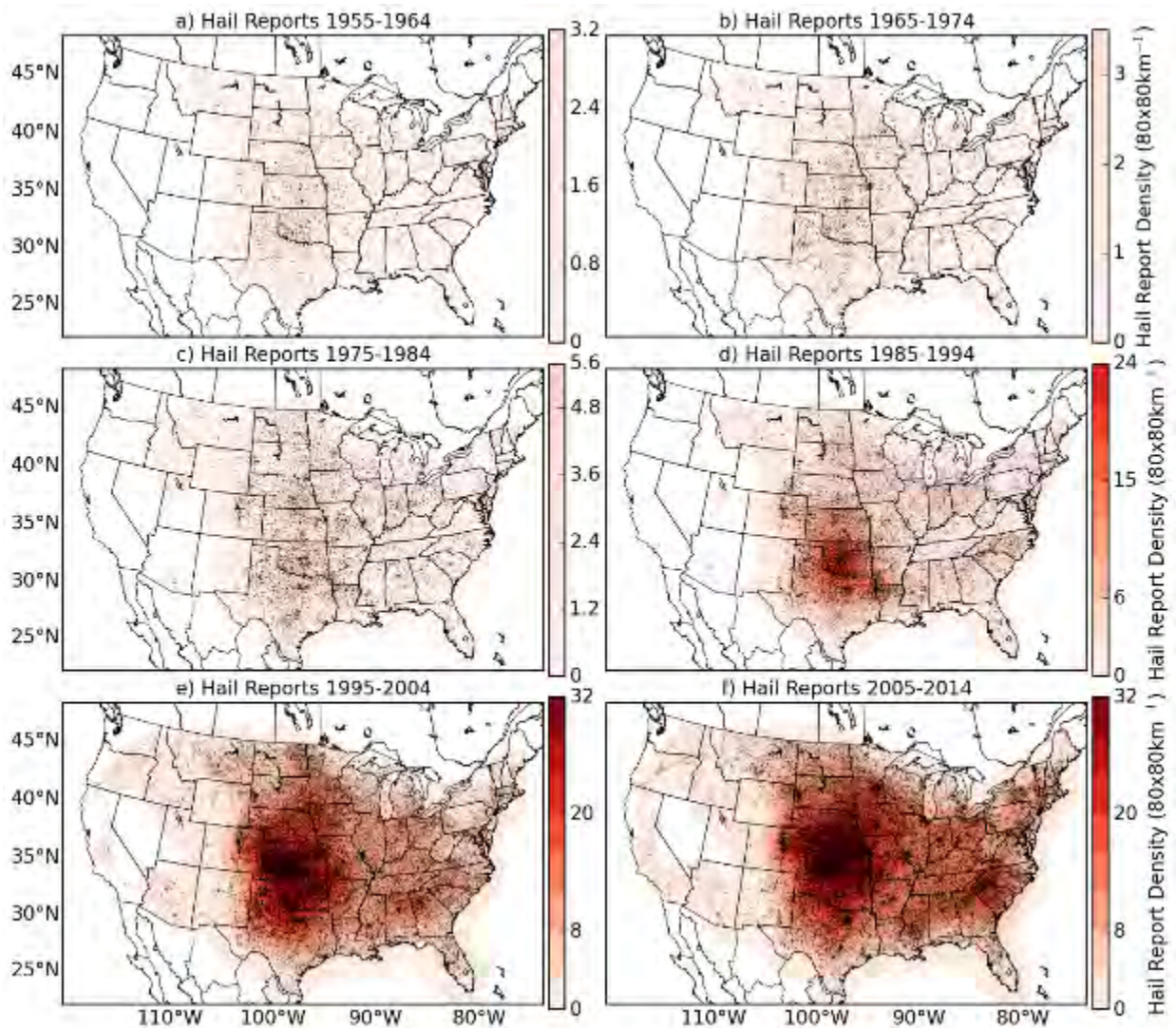
Table 19. Estimated costs of hail-related losses, including property losses, crop losses, injuries, and deaths in Region 6 of Texas, 1996 to 2016

Loss Type Due to Hail	Estimated Cost or Number 1996-2016
Total Property Losses	\$2,285,536,463
Per Capita Property Losses	\$400.3
Crop Losses	\$48,807,081
Deaths	0
Injuries	20

## Location

Hailstorms are a potential extension of severe thunderstorms. Conditions that produce severe thunderstorms are common in the south-central U.S., including Central Texas. Data documenting the frequency or reports of hail events show that, while Central Texas does not show the highest nationwide frequency of reported hail events, the density of hail events is relatively high compared to most other regions (Figure 13) (Allen et al 2015).

Figure 13. Maps depict mean annual hail report density for 10-year intervals from 1955-2014. Overlaid are point reports of hail diameter for the corresponding decades. The figure also illustrates the growth in report frequency through time. Density contours are scaled by the peak density of the 2005 to 2014 period, such that the color scales are equivalent to the 0–32 report density per 80×80-km range.



Severe thunderstorms are not a location-specific hazard in Central Texas and are not confined to any specific geographic location. Severe storms can vary greatly in size, location, intensity, duration, and the likelihood of producing damaging hail. Similarly, available data indicates that the size and kinetic energy of hail may vary across the U.S. but is largely similar

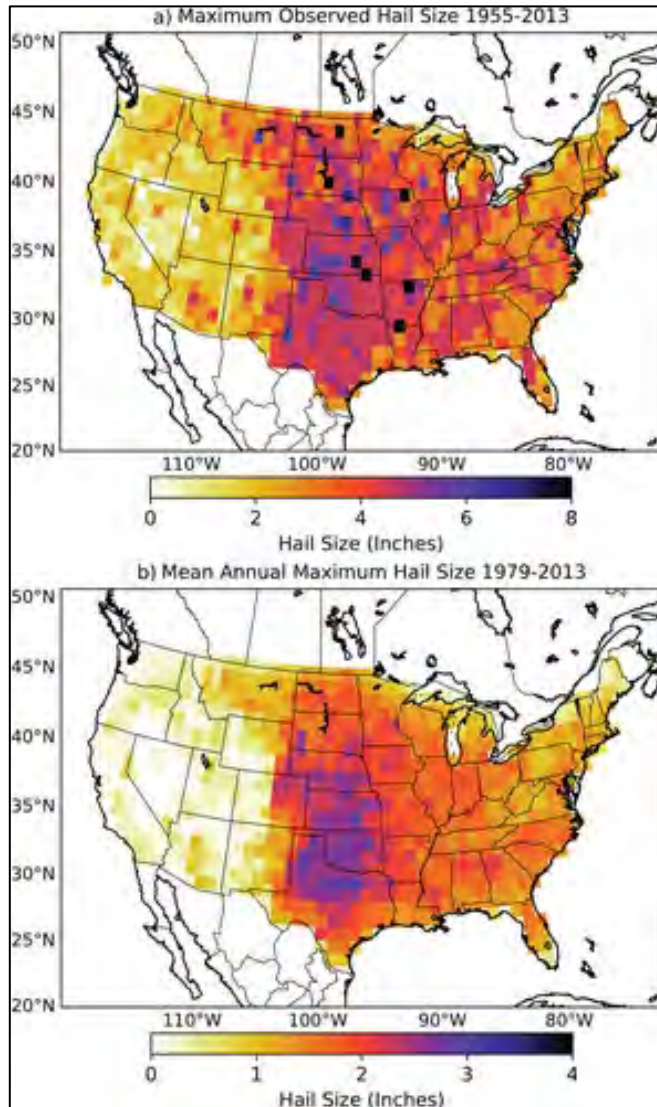


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across the region of Central Texas and specifically Region 6 where the County is located (Figure 14). The occurrence of hail was analyzed in all participating jurisdictions in the Planning Area. It was concluded that Hail occurs or could occur in all participating jurisdictions and has or could impact all existing and future critical infrastructure and facilities, residents, and their property in Coryell County.

Figure 14. Observed Hail size based on the NCEI data set. Map (a) depicts maximum observed hail size for the period of 1955–2013, whereas map (b) depicts mean annual maximum hail size 1979–2013 (Allen et al 2020).



## Historical Occurrences

Historical occurrences of hail events can be approximated using several tools. In some cases, instrumentation detecting hail can provide estimates of hail events. However, in most locations, reports from trained observers or reporters present the most direct way to estimate historical frequency and location of hail events (Tang et al 2019). NOAA’s Storm

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Events Data contains U.S. hail reports dating back to 1955, but accessing and interpreting this data can be prohibitive. However, this can provide an overview of reported events that can provide a broad view of the frequency and impacts of events (Table 20) (data derived from NOAA NCEI Storm Events dataset accessed 2023). Using proxies such as historical doppler radar and thunderstorm data may be used to derive proxies for possible hail events, but these indirect approaches do not account for local conditions that may or may not result in hail production.

Figure 13 and Figure 14 above depict moderate to high frequency of hail events in the region documented over the last century. More local records of actual hail events are available, but of limited accuracy and completeness as they are contingent upon incomplete and inconsistent reporting.

*Table 20. Coryell County hail reports, 2000 to 2022, from NOAA NCEI database.*

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Location	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Data Source	Narrative details
PIDCOKE	2/16/2001	119	0.88	0	0	0	0	LAW ENFORCEMENT	
GATESVILLE	5/5/2001	1518	1	0	0	2000	0	LAW ENFORCEMENT	A car was damaged.
COPPERAS COVE	5/6/2001	1525	4.5	0	0	0	0	LAW ENFORCEMENT	
COPPERAS COVE	5/6/2001	2053	0.75	0	0	0	0	LAW ENFORCEMENT	
COPPERAS COVE	5/20/2001	1620	1	0	0	0	0	OFFICIAL NWS OBS.	
COPPERAS COVE	3/19/2002	1855	1	0	0	0	0	LAW ENFORCEMENT	
PURMELA	4/7/2002	1830	1	0	0	0	0	LAW ENFORCEMENT	
COPPERAS COVE	5/27/2002	2340	0.75	0	0	0	0	LAW ENFORCEMENT	Dime size hail covered the ground.
COPPERAS COVE	12/23/2002	1859	1	0	0	0	0	LAW ENFORCEMENT	
GATESVILLE	12/30/2002	1459	0.88	0	0	0	0	LAW ENFORCEMENT	
BEE HOUSE	5/1/2003	1812	0.75	0	0	0	0	LAW ENFORCEMENT	
GATESVILLE	5/30/2004	1849	1.75	0	0	0	0	TRAINED SPOTTER	
SOUTH MTN	6/4/2004	1608	1.75	0	0	0	0	LAW ENFORCEMENT	
GATESVILLE	6/4/2004	1627	1.75	0	0	0	0	LAW ENFORCEMENT	
GATESVILLE	11/23/2004	845	0.75	0	0	0	0	NWS STORM SURVEY	Occurred at Flat.
PURMELA	5/9/2005	1655	1.75	0	0	0	0	GOVT OFFICIAL	Golf ball hail size covering the ground 1 mile southwest of Evant.
PURMELA	5/9/2005	1656	2.5	0	0	0	0	GENERAL PUBLIC	Hail the size of tennis balls fell 2 miles south of Evant.
OGLESBY	6/3/2005	1450	1.75	0	0	0	0	BROADCAST MEDIA	KWTX-TV in Waco reported golf ball size hail.
COPPERAS COVE	4/20/2006	1725	0.75	0	0	0	0	GENERAL PUBLIC	Reported on the south side of Highway 190.
PURMELA	4/25/2006	1722	0.88	0	0	0	0	GENERAL PUBLIC	
GATESVILLE	4/25/2006	1745	4	0	0	40000	0	LAW ENFORCEMENT	Orange to grapefruit-size hail was reported along Highways 36 and 182. A greenhouse was destroyed, and dozens of cars were damaged with windshields broken.
COPPERAS COVE	4/28/2006	2030	1.5	0	0	5000	0	GENERAL PUBLIC	Relayed by media.
PEARL	5/5/2006	2213	2.75	0	0	40000	0	OFFICIAL NWS OBS.	Dime-size hail gradually increased to baseball-size throughout the duration of the storm. Extensive damage



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									occurred to churches in the area. Reported by cooperative observer.
PURMELA	5/5/2006	2242	1	0	0	0	0	GENERAL PUBLIC	
GATESVILLE	5/5/2006	2305	1.75	0	0	5000	0	AMATEUR RADIO	
GATESVILLE	5/5/2006	2341	1.75	0	0	5000	0	TRAINED SPOTTER	
FLAT	5/5/2006	2350	1	0	0	0	0	NEWSPAPER	
OGLESBY	5/14/2006	1213	1.75	0	0	5000	0	GENERAL PUBLIC	
COPPERAS COVE	3/30/2007	1500	1.75	0	0	5000	0	Other Federal Agency	Golf ball-size hail reported by military personnel.
GATESVILLE	4/8/2008	1930	1.75	0	0	15000	0	Amateur Radio	
PIDCOKE	4/8/2008	1935	1.75	0	0	5000	0	Amateur Radio	Golf ball-size hail covered the ground on Highway 116.
KING	5/9/2008	1947	1	0	0	0	0	Amateur Radio	
GATESVILLE ARPT	5/9/2008	1954	1	0	0	0	0	Amateur Radio	Quarter-size hail was reported at the intersection of Highway 116 and FM 1783.
GATESVILLE	5/9/2008	2001	0.88	0	0	0	0	Amateur Radio	
GATESVILLE	5/9/2008	2008	1.25	0	0	0	0	Public	A report of half-dollar size hail was relayed by broadcast media.
OGLESBY	2/10/2009	2114	1	0	0	0	0	Broadcast Media	Quarter size hail fell in Oglesby.
COPPERAS COVE	4/17/2009	754	0.88	0	0	0	0	Amateur Radio	Nickel size hail covered the ground in the western portions of Copperas Cove.
BEE HOUSE	6/10/2009	2011	2.5	0	0	10000	0	Trained Spotter	Hail up to Tennis Ball size was covering the ground in Evant.
COPPERAS COVE	6/10/2009	2050	0.75	0	0	0	0	Amateur Radio	Penny size hail was reported at Fort Hood on the Coryell County side.
TOPSEY	10/1/2009	1800	1	0	0	500	0	Newspaper	Hail the size of a thumb fell north of Topsey. The amount of hail was large enough to nearly cover the ground.
COPPERAS COVE	4/22/2011	10	0.88	0	0	0	0	CoCoRaHS	Nickel size hail was reported by a CoCoRaHS observer south of Copperas Cove.
GATESVLL MOCCASIN AR	4/25/2011	1438	0.75	0	0	0	0	Broadcast Media	Dime size hail was reported between the cities of Gatesville and Levita.
COPPERAS COVE	5/11/2011	1841	0.75	0	0	0	0	Trained Spotter	
COPPERAS COVE	5/20/2011	1559	1.25	0	0	0	0	Trained Spotter	Nickel to half dollar sized hail was reported in Copperas Cove.
BEE HOUSE	5/21/2011	1500	2.75	0	0	12000	0	Broadcast Media	Baseball sized hail fell in Evant.

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COPPERAS COVE	5/21/2011	1702	1.75	0	0	2000	0	NWS Employee	
TOPSEY	5/21/2011	1706	1	0	0	0	0	Trained Spotter	
TOPSEY	5/21/2011	1706	3.25	0	0	25000	0	Public	Hail stones ranging from 2 to just over 3 in diameter fell in Topsey.
COPPERAS COVE	5/21/2011	1711	1.75	0	0	4000	0	Trained Spotter	
COPPERAS COVE	5/21/2011	1715	1.5	0	0	0	0	Amateur Radio	
TOPSEY	5/21/2011	1718	1	0	0	0	0	Amateur Radio	
COPPERAS COVE	5/21/2011	1745	0.88	0	0	0	0	Amateur Radio	
HOOD VLG	5/21/2011	1755	2.5	0	0	3000	0	Broadcast Media	Tennis ball sized hail fell about 9 miles northeast of Copperas Cove.
GATESVILLE	5/21/2011	1847	0.75	0	0	0	0	Amateur Radio	
GATESVILLE	5/21/2011	1851	1.75	0	0	12000	0	Broadcast Media	
GATESVILLE ARPT	9/26/2011	1744	1.75	0	0	3000	0	Law Enforcement	
GATESVILLE	3/19/2012	1923	0.75	0	0	0	0	Amateur Radio	
COPPERAS COVE	3/19/2012	1945	1	0	0	0	0	Law Enforcement	
PURMELA	5/20/2013	2218	1.75	0	0	0	10000	Trained Spotter	Trained Spotters reported golf ball sized hail, nine miles east of Evant.
BEE HOUSE	5/20/2013	2223	1	0	0	0	0	Trained Spotter	Trained spotters reported nickel to quarter sized hail, approximately 12 miles east of Evant.
GATESVILLE	3/28/2014	1323	1.5	0	0	5000	0	Law Enforcement	Ping pong ball sized hail was reported 7 miles west of Gatesville.
GATESVILLE	3/28/2014	1335	0.75	0	0	0	0	Trained Spotter	
COPPERAS COVE	3/28/2014	1340	1.5	0	0	5000	0	Fire Department/Rescue	
COPPERAS COVE	3/28/2014	1342	1.75	0	0	20000	0	Fire Department/Rescue	
THE GROVE	3/28/2014	1420	1	0	0	0	0	Amateur Radio	Quarter sized hail was reported at the intersection of Highway 36 and 360.
COPPERAS COVE	5/8/2014	1658	1	0	0	0	0	Public	
BEE HOUSE	6/12/2014	1720	2	0	0	20000	0	Storm Chaser	Quarter to hen egg sized hail was reported in Evant over a ten minute period.
BEE HOUSE	6/12/2014	1743	0.75	0	0	0	0	Amateur Radio	Penny sized hail was reported south of Evant between US 281 and FM 183.
BEE HOUSE	6/12/2014	1803	1.5	0	0	0	0	Amateur Radio	Ping pong ball sized hail was reported on FM 1690.

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BEE HOUSE	4/16/2015	1310	1	0	0	0	0	Law Enforcement	Dime to quarter sized hail with heavy rain was reported in Evant.
GATESVILLE	4/16/2015	1334	1	0	0	0	0	Public	The public reported 1 inch hail in Gatesville.
GATESVLL MOCCASIN AR	4/22/2015	1748	1.5	0	0	500	0	Public	The public reported 1.5 inch hail near Gatesville.
OGLESBY	3/8/2016	1442	0.88	0	0	0	0	Broadcast Media	Broadcast media reported nickel-sized hail near the intersection of Hwy 84 and FM 1996.
CORYELL	3/8/2016	1612	0.88	0	0	0	0	Broadcast Media	Broadcast media reported nickel to dime sized hail covering the ground on FM 929.
IRELAND	3/8/2016	1735	1.25	0	0	0	0	Trained Spotter	A trained spotter reported quarter to half-dollar sized hail in Ireland, TX.
COPPERAS COVE	4/29/2016	1955	1.75	0	0	15000	0	Trained Spotter	Spotters reported quarter to golf ball sized hail approximately one mile east-northeast of Copperas Cove. Damage was done to several vehicles.
SEATTLE	4/10/2017	2200	1	0	0	0	0	Trained Spotter	A trained spotter reported quarter-sized hail near the weather station at Fort Hood.
PURMELA	5/19/2017	1800	1.75	0	0	0	0	Broadcast Media	A broadcast media report indicated golf-ball sized hail in the city of Purmela, TX.
LEVITA	5/21/2017	519	1	0	0	0	0	Broadcast Media	Broadcast media reported quarter-sized hail approximately 10 miles west-northwest of the city of Gatesville, TX.
COPPERAS COVE	4/3/2018	934	0.75	0	0	0	0	Other Federal Agency	Penny sized hail was reported at Fort Hood Military Base.
FT HOOD AAF	4/3/2018	945	0.75	0	0	0	0	Other Federal Agency	Fort Hood soldiers reported penny-sized hail near the intersection of Murphy Road and 53rd street.
COPPERAS COVE	4/3/2018	1037	0.88	0	0	0	0	Trained Spotter	A trained spotter reported nickel-sized hail on Highway 377 approximately 4 miles west-southwest of the city of Copperas Cove, TX.
JONESBORO	4/3/2018	1448	0.88	0	0	0	0	Broadcast Media	Broadcast media reported nickel sized hail in the city of Jonesboro, TX.
PURMELA	4/13/2018	1730	1	0	0	0	0	Amateur Radio	Amateur radio reported quarter-sized hail approximately 9 miles east of the city of Evant, TX.

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JONESBORO	5/1/2019	1923	1	0	0	0	0	Trained Spotter	A trained spotter reported quarter size hail in the city of Jonesboro, TX.
COPPERAS COVE	6/16/2019	2047	1	0	0	0	0	Trained Spotter	A trained spotter reported quarter size hail near the city of Copperas Cove, TX.
PIDCOKE	1/10/2020	1810	1.3	0	0	0	0	Trained Spotter	
GATESVILLE	1/10/2020	1830	1	0	0	0	0	Social Media	
SOUTH MTN	5/24/2020	1448	1	0	0	0	0	Public	Hail report received via mPing.
THE GROVE	5/24/2020	1655	1	0	0	0	0	Trained Spotter	
THE GROVE	5/24/2020	1704	1.75	0	0	1000	0	Trained Spotter	
GATESVILLE	5/27/2020	1217	1	0	0	0	0	Trained Spotter	A trained spotter reported quarter sized hail east southeast of Gatesville.
GATESVILLE	5/27/2020	1226	1	0	0	0	0	Trained Spotter	A trained spotter reported quarter sized hail east of Gatesville.
COPPERAS COVE	5/28/2020	1725	1.5	0	0	0	0	Trained Spotter	Hail ranging from nickel to ping pong ball size was reported on the west side of Copperas Cove.
BEE HOUSE	3/17/2021	250	0.75	0	0	0	0	Public	
TOPSEY	3/22/2021	1845	1.5	0	0	0	0	Trained Spotter	A trained spotter reported ping pong ball size hail.
ARNETT	5/28/2021	1330	1	0	0	0	0	Broadcast Media	
COPPERAS COVE	4/12/2022	1723	1.25	0	0	0	0	Public	A public report indicated half-dollar sized hail about 2 miles east-southeast of Copperas Cove, TX.
COPPERAS COVE	4/12/2022	1740	1	0	0	0	0	Public	A public report indicated quarter sized hail about 3 miles northwest of Copperas Cove, TX.

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Citizen science records using trained hail event reporters, compiled by StormerSite (Stormer Site 2023) have tallied 19 hail reports since 2004 through 2021 (Table 21). Reports are mapped to locations in Figure 15 below. Red points on the map depict locations of citizen science reports of hail in Coryell County since 2014. Numbers noted on each point represent the estimated hail diameter for each event. Coryell County is among those locations in the U.S. that often report more than one hail event per year. Annual frequency varies, with some years experiencing multiple hail events per year, with an average of approximately 1.05 per year.

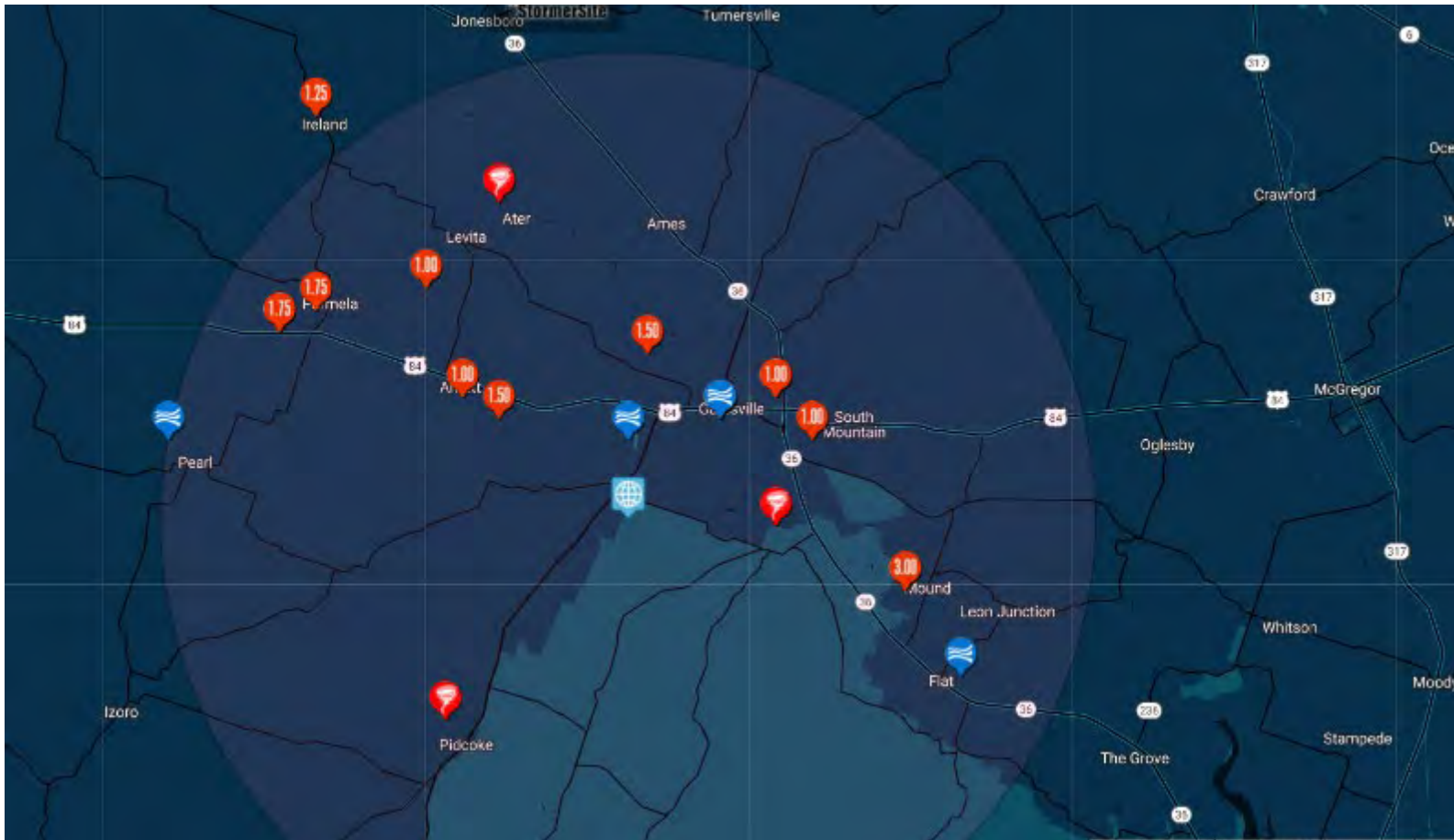
*Table 21. Citizen science reports of hail events in Coryell County as compiled on StormerSite.*

<b>Year</b>	<b>Citizen Science Hail Event Reports</b>
2004	3
2006	1
2008	4
2011	2
2014	1
2015	2
2017	1
2020	4
2021	1

# Coryell County Hazard Mitigation Plan 2023



Figure 15. Map depicts locations of citizen science hail reports, 2004 to 2021 using data from StormerSite.





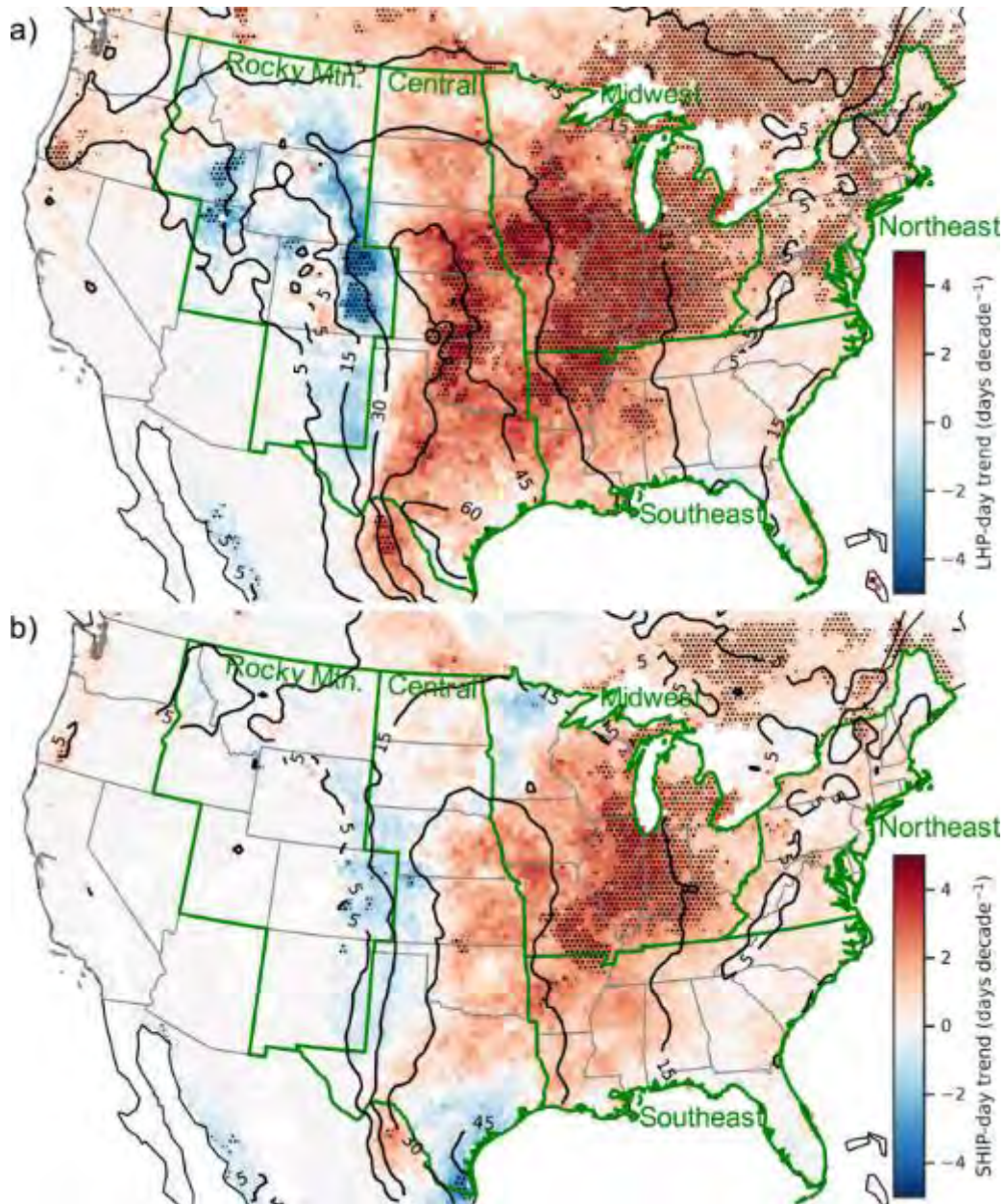


### **Probability of Future Events**

Research on predicted changes to hail event frequency and severity relies on predicted changes to storm frequency and severity along with other environmental conditions that may result in a severe storm producing hail. Previous analyses using modelling of empirical data from 1979 indicate that there has not been a clear trend (i.e., either increasing or decreasing) in hail event occurrences. Other studies have suggested that some metrics, such as the number of “hail days” (i.e., days with hail outbreaks recorded), and the kinetic energy of hail events, with a shift to larger hail sizes, have increased (Schlie et al 2019). An increase in “large hail days” appears to be reasonably well supported, particularly for the Central U.S., while increases in “small hail days” is possible but less certain (Figure 16). It is important to understand that historic trends, and extrapolations to predict future occurrences have focused on broad-scale predictions to continents or regions, and thus local patterns or trends cannot be well understood with these studies (Allen et al 2015). Additionally, given the number of variables that can be investigated, from the frequency of hail events of all kinds to the size or kinetic energy of the hail, it can be difficult to extrapolate with confidence what changes, if any, one should expect in the broad phenomenon of damaging hail, particularly for locally specific predictions.

Studies suggest that there has been an increase in the number of days during which conditions favorable to the production of hail occur, since 1979, particularly in Central and Eastern portions of the U.S. This trend appears to be driven by a suite of atmospheric variables, including an increasing frequency of days with steep mid-tropospheric lapse rates, and a combination of instability and vertical wind shear, which contribute to severe thunderstorms (Tang et al 2019). However, evidence derived from damage costs indicate that the average annual insured losses due to hail (estimated at \$8–13 billion nationwide) have increased substantially over recent decades. Extrapolations of these findings suggest that an increase in hail damage costs is reasonably likely in future decades. The evidence, though limited, suggests it is likely for hail events to occur ranging from a scale of H0-H4 for all participating jurisdictions. Large hail days for Texas broadly, indicates cause for concern about increasing economic damages given large hail can produce “extreme amounts of damage to commonly exposed assets” (Dessens et al 2007).

Figure 16. Trends in a) Large hail days [LHP] (shaded) and annual mean number of LHP days (contoured), and b) trends in Small hail [SHIP] days (shaded) and annual mean number of SHIP days (contoured) from 1979 to 2017. Green outlines are regions. Stippling indicates where trends are statistically significant at the 95% confidence level (Tang et al 2019).



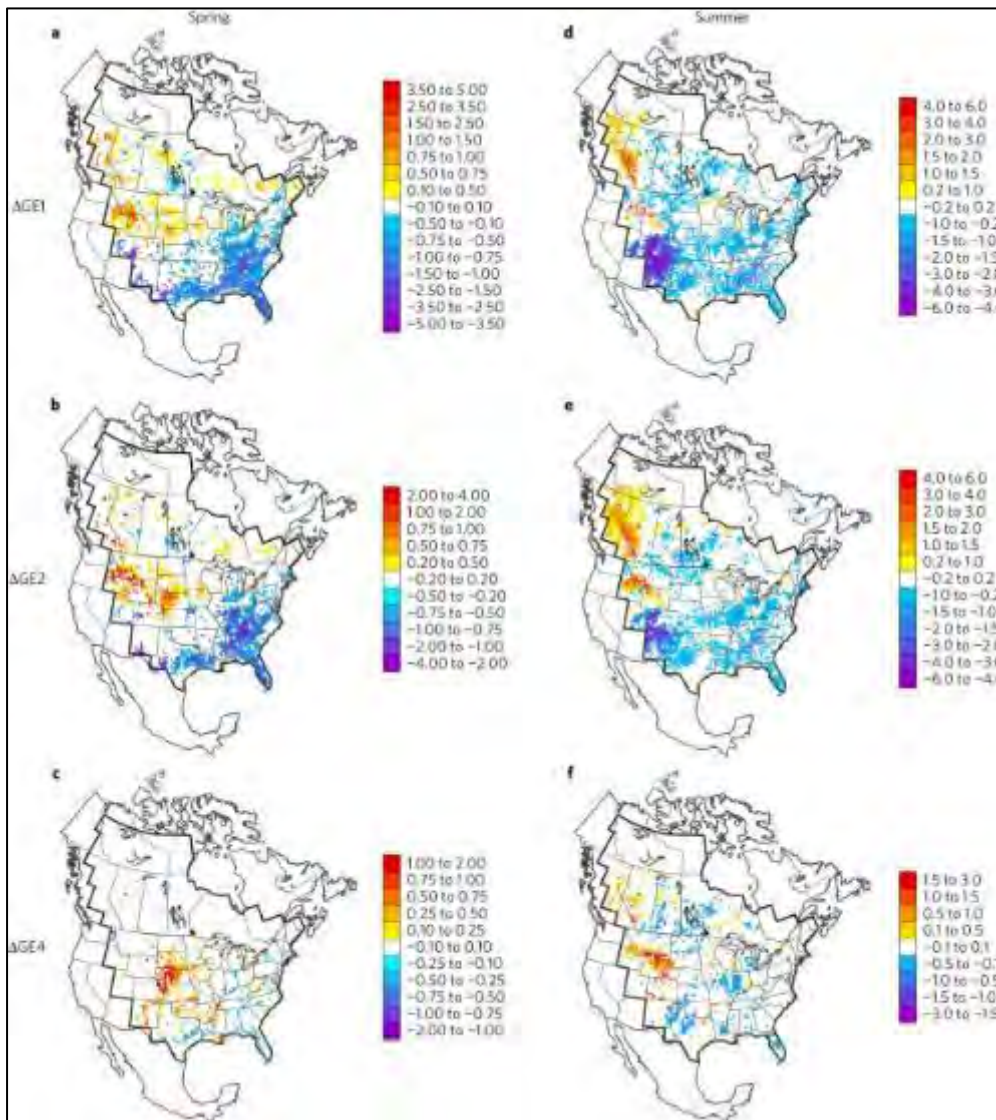
**Climate Change**

Predictions about the effects of climate changes on hail, including event frequency, spatial distribution, and intensity (e.g., hail size or kinetic energy) are limited and uncertain. Research suggests that climate change is expected to result in conditions that increase the potential for severe thunderstorms in the U.S., broadly. However, the resulting changes to specific storm-related events is not well-understood. Some predictive models predict fewer hail events broadly across the U.S., though may simultaneously predict an increase in the

mean hail size, suggesting fewer small hail events but more frequent large hail events. However, regional conditions that may affect the likelihood of hail production vary and regionally specific, precise predictions are not well-understood.

However, most predictions appear to suggest that the most likely future trend is an increase in the proportion of hail events consisting of large hail. Large hail tends to produce greater and more significant economic damage, suggesting that planning for a future environment in which hail events and hail damage are likely to increase to some extent is reasonably well supported (Brimelow et al 2017).

Figure 17. Details spatial changes in hail diameter classes for spring and summer. a–c, mean multi-model changes in future (2041–2070) minus present (1971–2000) for spring hail days (GE1;  $D_s \geq 1.0\text{cm}$ ) per season (a), severe hail days (GE2;  $D_s \geq 2\text{cm}$ ) per season (b), and very large-hail days (GE4;  $D_s \geq 4\text{cm}$ ) per season (c). d–f, The same variables as for a–c, except for summer. Colored cells indicate mean changes for all model pairings that agree on the direction of change; cells with colored circles indicate mean changes for at least two model pairings that are statistically significant (90% significance) (Brimelow et al 2017).





## **Vulnerability**

Hail can occur in all jurisdictions and impact all community assets. It can also happen any time of year, but it is most common during the spring and early summer months (March – June). Damage from hail in The Texas Department of Public Safety’s Region 6, where Coryell County is located, is estimated to be over \$2.2 billion during the measurement period of 1996-2016. This represents an estimated \$114 million per year just for this region. Hail-related damage is generally ranked as one among the top 3-4 natural hazards in terms of economic costs in the state. Hail can be very damaging to crops, especially those normally harvested in spring and early summer such as wheat. Relatively small hail can destroy an entire crop in a matter of minutes. Personal property such as vehicles, roofs and windows of homes and landscaping are also commonly damaged by hail. Utility systems on the roofs of critical infrastructure and other commercial buildings can be vulnerable to hail. School Districts that have students participating in outdoor activities during school events are at increased risk during spring and summer months. Hail damage primarily affects property and infrastructure, with far fewer deaths or injuries attributed to hail compared to many other top-ranking natural disasters.

## **Impact**

Hail-related damage is generally ranked as one among the top 3-4 natural hazards in terms of economic costs in the state. The primary property and infrastructure affected are:

### ***Agricultural***

- Crop damage is one of the primary economic losses caused by hail. Large hail can be devastating to crops, but even small hail can result in significant damage.
- Hail may injure or, in rare cases, kill livestock.
- Hail can damage critical infrastructure for agricultural production, including specialized vehicles and machinery, livestock pens, etc.

### ***Homes, Barns, and Outbuildings***

- Roofs, windows, and landscaping are commonly damaged by hail.
- Manufactured homes may be more vulnerable to hail-related damage if built to lower or less stringent construction standards than newer home construction.
- Building utility systems such as heating and cooling systems that are located on a building roof, solar energy generation, or other roof-mounted units are commonly impacted.

### ***Vehicles***

- Vehicle bodies and roofs are commonly damaged.

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## ***Infrastructure***

- Energy distribution substations and power lines can be affected. Hail can result in local power outages, which can in turn present additional risks to residents who may rely on power to operate critical medical devices, etc.
- Telecommunication facilities, including telephone wires, cell phone towers, and cable lines can be affected. Hail storms can result in communication outages which can lead to additional hazards, particularly during storm conditions that often include strong winds, lightning, or flood risks.
- Sewer and wastewater treatment facilities.

## ***People***

- Humans can be struck and injured by falling hail, though direct injury or death due to hail impact is typically infrequent.
- Hail may cause dangerous road or driving conditions due to ice and/or visibility issues.
- Hail can cause damage that may secondarily result in injury or death, such as damage to trees/branches or building structures which can fall and strike a nearby person. Fallen trees and branches may also constrain travel and access to or by emergency services providers.
- Hail can cause indirect human impacts through loss of access to work days or school days due to vehicle or structural damage that prohibits use for a period of time.

## ***Land Use and Development***

The effects of changes in land use and development negatively alter the future impacts of hail on the vulnerable assets for each participating jurisdiction by putting the residents and their structures at an increased risk of being impacted by hail. With more development, such as the building of new homes or ranch and agricultural development, it is likely that in the event of hail, they could be negatively impacted. The County is currently developing a Land Use Plan through funding from the Texas General Land Office (GLO) through the Resilient Communities Program (RCP). Upon completion of the RCP, all participating jurisdictions will better understand the impacts of changes in land use and development and these impacts will be addressed in future HMP updates.

## **Chapter 7: Lightning**

### **Hazard Description**

Lightning is a massive electrostatic discharge (discharge of electrical energy) between electrically charged regions within clouds or between a cloud and the Earth's surface, resulting from the buildup of positive and negative charges within a thunderstorm. Lightning is most often associated with thunderstorms, as the causal conditions can frequently occur in thunderstorm conditions. However, lightning strikes can occur at a significant distance

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from storms (up to 10 miles observed) and can occur during storms without significant rainfall (National Weather Service 2023).

Lightning can have direct effects. An estimated average of 300 people are injured and 80 killed in the U.S. annually due to lightning, according to FEMA reports. Direct lightning strikes also can cause significant damage to buildings and critical infrastructure and facilities. Lightning can strike communications equipment (i.e., radio and cell towers, antennae, satellite dishes, etc.) which will hamper communication and emergency response.

Secondary effects resulting from lightning strikes can cause significant effects. A single bolt of lightning can attain temperatures at or above 50,000°F and can ignite fires. Forest and grass wildfires, explosive steam conditions in masonry, trees and other water-bearing objects can result in damages to property and additional personal injury or death (National Weather Service 2023).

Lightning activity is categorized according to the NOAA Lightning Activity Levels (Table 22).

*Table 22. NOAA lightning activity levels.*

Level	Description
1	No thunderstorms.
2	Isolated thunderstorms. Lightning is very infrequent, 1–5 cloud-to-ground strikes in a 5-minute period.
3	Widely scattered thunderstorms. Lightning is infrequent, 6–10 cloud-to-ground strikes in a 5-minute period.
4	Scattered thunderstorms. Lightning is frequent, 11–15 cloud-to-ground strikes in a 5-minute period.
5	Numerous thunderstorms. Lightning is frequent and intense, greater than 15 cloud-to-ground strikes in a 5-minute period.
6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for starting fires and is normally highlighted in fire weather forecasts with a red flag warning.

## Extent

Lightning can happen anywhere in the state of Texas. The occurrence of lightning was analyzed in all participating jurisdictions in the Planning Area. It was concluded that lightning occurs or could occur in all participating jurisdictions, and has or could impact all existing and future critical infrastructure and facilities, residents, and their property in Coryell County.

According to the NOAA, the average number of cloud-to-ground flashes for the State of Texas between 2007 and 2016 was 11.3 flashes per square mile. The National Lightning Detection Network lightning flash density map shows a range of 12-20 flashes for Coryell County.

The extent for lightning can be expressed in terms of the number of strikes within an interval.



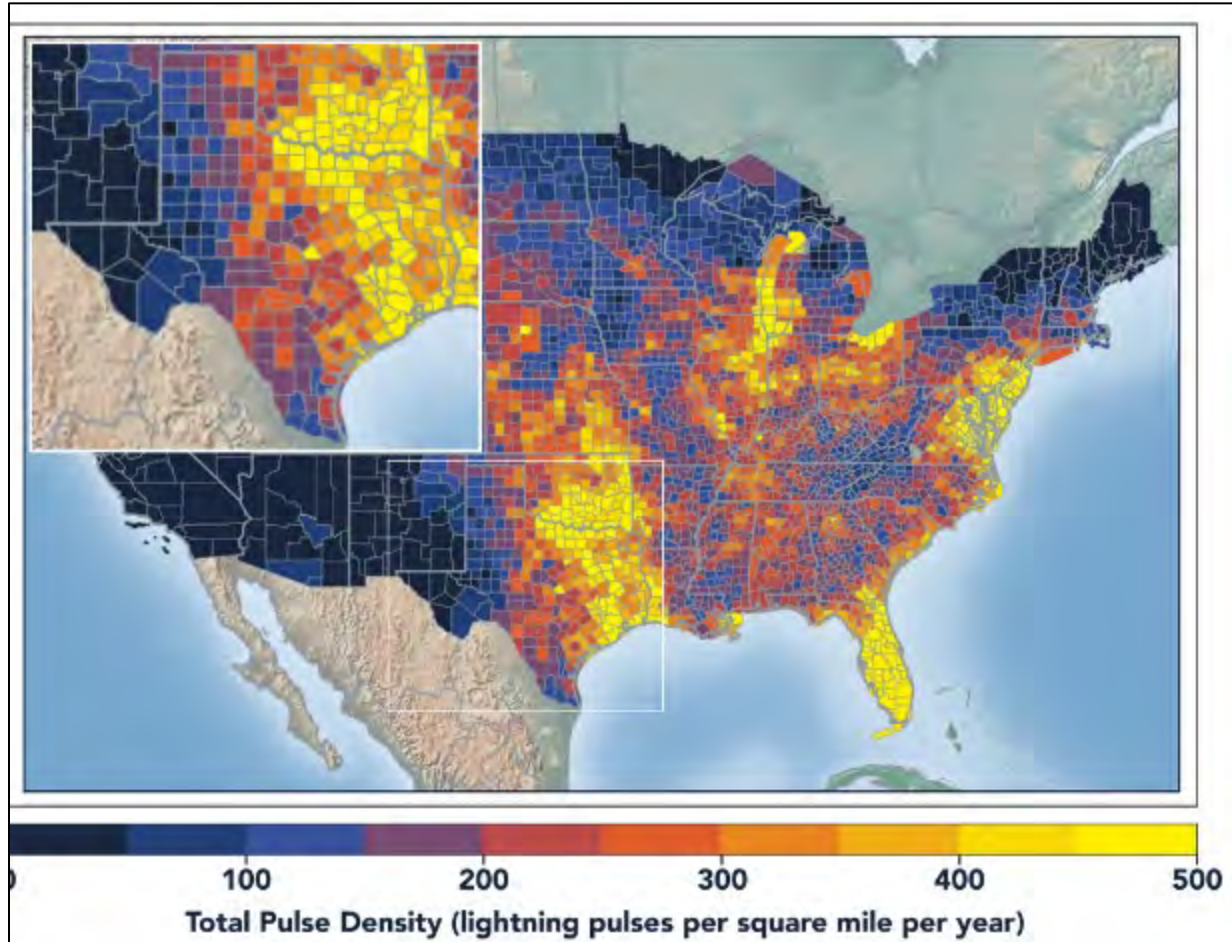
## Coryell County Hazard Mitigation Plan 2023



Given the lack of specific lightning strike data for Coryell County, it is expected that Coryell County and all participating jurisdictions could experience a varying degree of lightning strikes during LAL 2, LAL 3, LAL 4, LAL 5, and LAL 6 conditions at any time. Based on historical events, it is highly likely that all participating jurisdictions will experience LAL 2 and LAL 3. Lightning strikes during any event could impact and affect all assets within all jurisdictions in Coryell County. Reference Table 22 above.

Because of the association between lightning and thunderstorms, conditions that result in thunderstorms are one factor predicting possible lightning occurrences. Pulse density is the best indicator of lightning activity (i.e., compared to total lightning counts) because it enables comparison among differently sized areas by scaling for size. The map below depicts pulse density for 2020 across the U.S. (Figure 18). It illustrates a relatively high pulse density in the Planning Area. At finer scales than the County-level, there is limited data on fine-scale distinctions in lightning risk. Thus, we can consider that the entire Planning Area is comparably vulnerable to the risk of lightning impacts.

Figure 18. Data on lightning pulse density for the U.S., and for Texas for 2020. Figure from the 2020 Lightning Report, prepared by Earth Networks. The data was collected using the Earth Networks Total Lightning Network (ENTLN), and includes in-cloud, cloud-to-ground, and total lightning data for this state and the surrounding water bodies (if any) throughout 2020. Counts, densities, rankings, Dangerous Thunderstorm Alerts (DTAs), and Thunder Days in this report are from January 1, 2020 to December 31, 2021.



## Location

Because conditions leading to thunderstorms are widespread in Texas, and specifically in the Planning Area, the region has relatively high likelihood of lightning strikes compared to other areas of the U.S. (Figure 19). Because the conditions driving thunderstorms, and possible lightning strikes, are considered broadly uniform across the Planning Area, there are no distinct areas of high or low vulnerability. All areas are considered potential locations for lightning events. Figure 20 shows significant lightning hazard risk zones for Texas expressed in the number of expected cloud-to-ground strikes per square mile per year.

The occurrence of lightning was analyzed in all participating jurisdictions in the Planning Area. It was concluded that lightning occurs or could occur in all participating jurisdictions, and has or could impact all existing and future critical infrastructure and facilities, residents, and their property in Coryell County.

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Figure 19. Lightning Flash Density Nationwide, 2007 to 2016. Data compiled, mapped, and reported by Vaisala (Vagasky 2022).

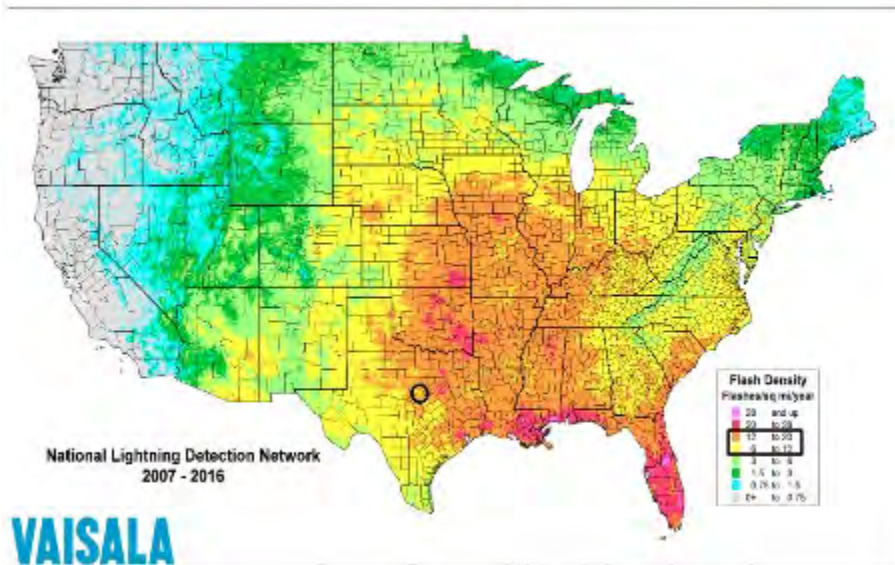
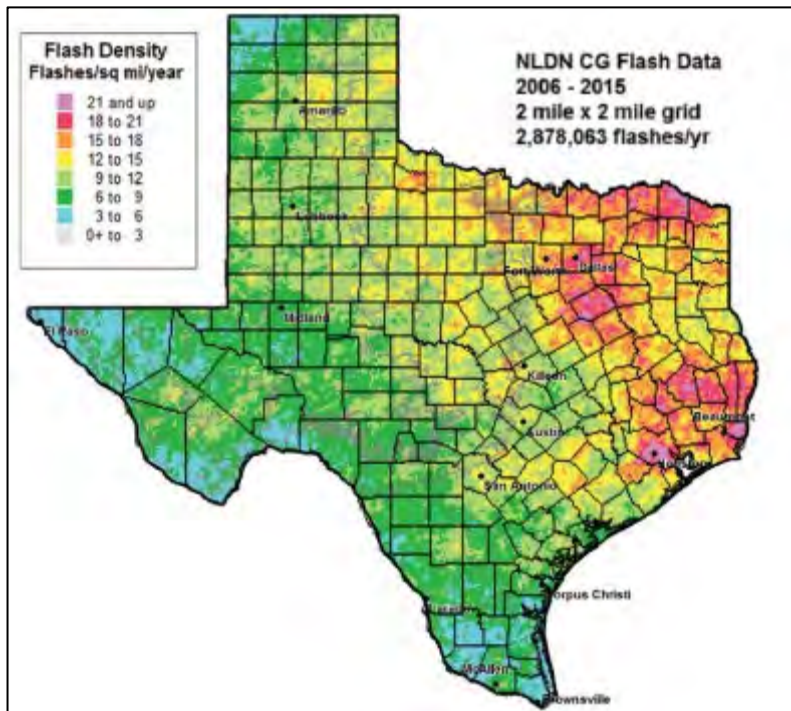


Figure 20. Texas Lightning Flash Density, 2006 to 2015. Data was compiled and mapped by The National Lightning Detection Network, NLDN, consisting of more than 100 remote, ground-based sensing stations located across the US. Electromagnetic signals given off when lightning strikes the earth's surface are sent via satellite to the Network Control Center (NCC) operated by Vaisala Inc. in Tucson, Arizona.



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The Texas Department of Public Safety divides the 254 Texas counties into six regions; Coryell County is in Region 6. In Region 6, 10 deaths and 49 injuries due to lightning were reported for the measurement period of 1996-2016. Estimated losses in Region 6 for the 21-year period have been summarized in Table 23 below, and year by year costs are shown in Table 24. The map below (Figure 21) depicts the distribution of lightning-related losses across Texas, with county-level and region level summaries (NOAA NCEI 2023).

Table 23. Region 6 (Texas) costs due to lightning, 1996 to 2016, derived from the Texas Hazard Mitigation Plan 2018.

Loss Type Due to Lightning	Estimated Cost and Number
Total Property Losses	\$6,140,647
Crop Losses	No Data
Deaths	10
Injuries	49

Table 24. Region 6 (Texas) annual estimated losses due to lightning derived from the Texas Hazard Mitigation Plan 2018.

Year	Estimated Annual Losses (\$)
1996	3,053
1997	141,760
1998	88,159
1999	14,376
2000	No Data
2001	No Data
2002	No Data
2003	676,848
2004	253,573
2005	49,053
2006	403,919
2007	23,107
2008	895,483
2009	884,310
2010	878,496
2011	127,790
2012	144,587

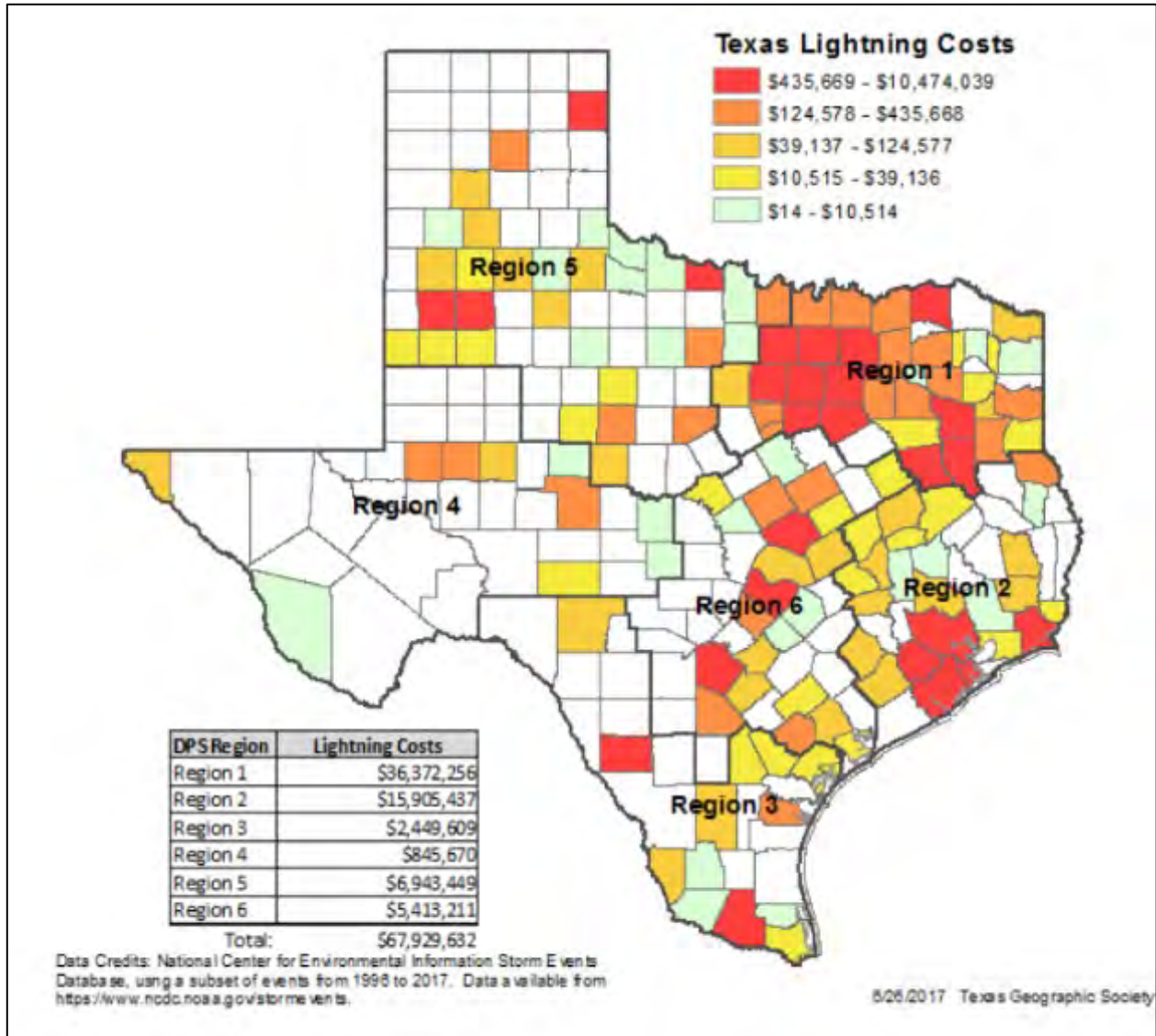


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2013	1,379,438
2014	25,295
2015	38,400
2016	113,000

Figure 21. Lightning Costs Per Region, 1996 to 2016, derived from the Texas Hazard Mitigation Plan 2018.





## Historical Occurrences

There are no locally specific, precise data documenting lightning for the Planning Area. Data collected and predicted at a broader scale, including Region 6, provides some general insight into lightning events for Coryell County specifically. Figure 20 above indicates the locations of lightning strikes during the 2006 to 2015 period. Coryell County and neighboring areas show moderate levels of historically documented strikes during the time period, with the County showing 9 to 15 strikes per square mile per year. While this number is lower than other parts of the state, these are relatively high rates compared to many other regions of the U.S. and indicate a level of risk that requires planning and mitigation. The estimates of losses due to lightning (Table 23 and Table 24 above) further indicate that lightning can have significant impact in the region.

NOAA's NCEI database compiles reported hazard event data, including lightning. However, this information source is of limited use in drawing conclusions about past and future risks because reporting is not consistent. We can see that data for Coryell County, from 2000 to the end of 2022 shows only 5 lightning events compiled in this database (Table 25). Other data such as the tables and figures above suggest that lightning events are likely somewhat more common than is indicated by the available NCEI data.

*Table 25. Lightning Events in Coryell County, 2000 to 2022 derived from NOAA NCEI dataset.*



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Location	Date	Time	Deaths	Injuries	Property Damage	Crop Damage	Data source	Narrative details	Precipitating conditions
GATESVILLE	7/15/2005	2230	0	0	30000	0	NEWSPAPER	Lightning started a house fire on CR 272 off FM 185. The house was abandoned and burned to the ground.	
COPPERAS COVE	5/14/2008	300	0	0	30000	0	Newspaper	Lightning struck a home and started a fire which caused substantial damage to the residence.	A deep slow-moving upper-level trough moved from the desert southwest into west Texas during this period. Several shortwaves combined with surface boundaries to produce several rounds of storms. Downbursts as well as large hail were reported in addition to flash flooding.
COPPERAS COVE	4/17/2009	815	0	0	5000	0	Newspaper	Lightning struck a roof-top air conditioning unit on the Parsons Building at C.R. Clements/Hollie Parsons Elementary School. Only the A/C unit was damaged.	A large MCS rolled through north Texas during the morning hours with most of the severe weather occurring south of Interstate 20. Strong east winds up to 50 miles per hour (mph) occurred on the back edge of the precipitation shield resulting in additional wind damage.
FT HOOD AAF	5/11/2011	1800	0	0	50000	0	Newspaper	Lightning started a fire in a housing complex at Fort Hood.	Scattered thunderstorms developed along a dryline during the early afternoon hours. These storms consolidated into a couple of linear mesoscale convective systems that produced wind damage mainly north of the Interstate 20 corridor. During the evening hours, storms consolidated into a long quasi-

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									linear convective system across the CWA. Isolated reports of large hail and wind damage occurred during the evening hours as well as heavy rainfall which led to localized flash flooding. Two EF-0 tornados also occurred on this day; one in Cooke County and the second in Tarrant County.
THE GROVE	10/27/2013	430	0	0	2000	0	Newspaper	A lightning strike damaged an underground cable near Lake Belton that caused the Gatesville Regional Water Intake Structure to lose power. As a result, all Gatesville ISD campuses and less than 100 homes were without water through Monday.	Severe thunderstorms developed as a strong shortwave and cold front moved into the region. These storms produced lots of hail up to golf ball sized. One person was struck by lightning in Montague County but survived without significant injuries. Some flash flooding also occurred in Tarrant County.

## Probability of Future Events

Historical data for the region indicates a high probability of occurrence of future lightning events. Given an average of approximately 9 to 15 strikes per year in the area, similar rates of lightning can reasonably be expected in future years. As such, continued risks to personal safety and property due to lightning strikes and sequelae are expected.

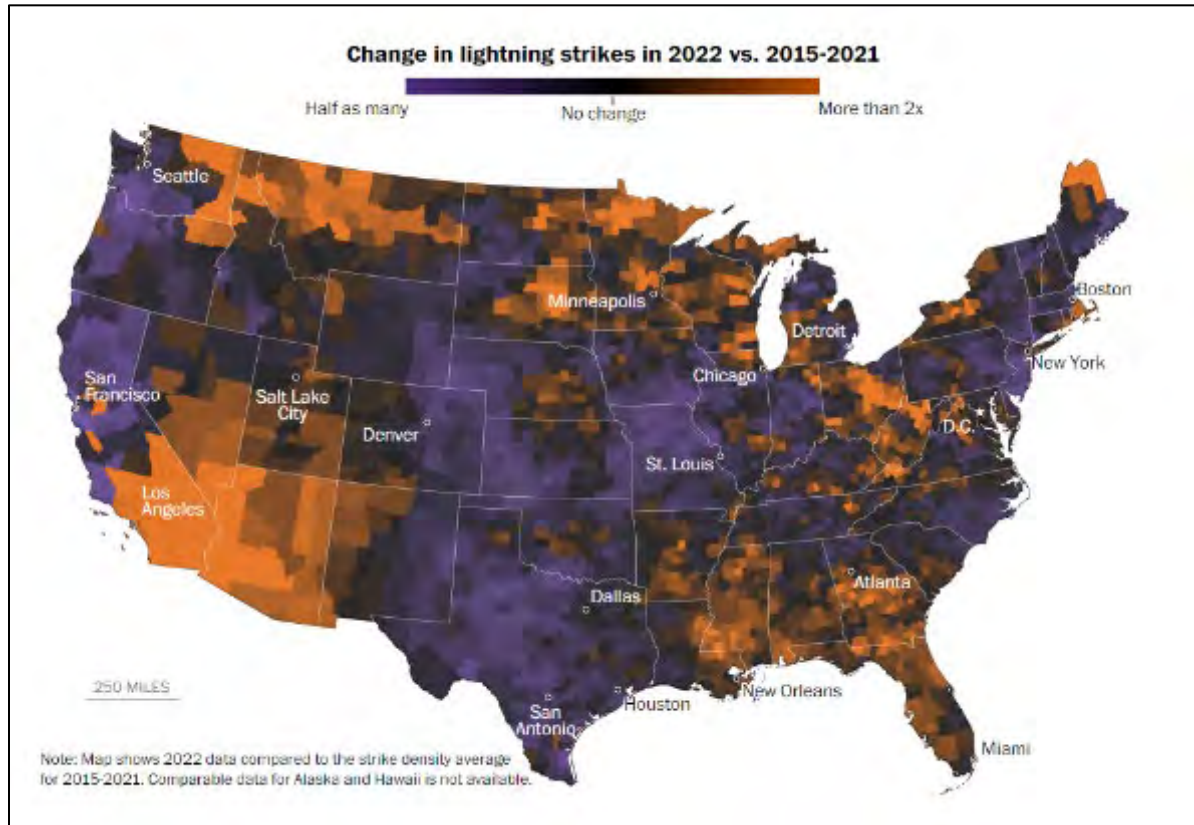
### *Climate Change*

Because lightning is correlated with severe storm conditions but ultimately is caused by hyper-local, transitory conditions, identifying patterns, and generating predictions are difficult to conduct at a local scale. Broad predictive efforts indicate that lightning strikes are likely to increase nationwide due to climate change (Romps et al 2018). Predictions of future lightning frequency largely rely on predictions of changes to, or increases in, thunderstorm storm frequency and severity, as well as the trend that lightning is more likely to occur in warmer conditions, on average. Areas with predicted increases in thunderstorm frequency or severity, and/or where temperatures are predicted to increase, can reasonably expect that lightning frequency will remain the same or increase (Price and Rind 1994). Spatial and temporal changes to lightning occurrence and severity may be expected to result in higher risk of sequelae such as wildfires (Kahraman et al 2022). Research indicating recent, short term changes to lightning strike density (i.e., comparing 2022 to the average rates for 2015 to 2021) nationwide show that during 2022, in Texas, strike density was down compared to the prior 6-year average (Figure 22). In Vaisala 's annual lightning report executive summary (Vagasky 2022), it was noted that:

*Texas remains the United States lightning count leader: The Lone Star State continued its run as the number one state for lightning with 27,696,688 total lightning events in 2022. While it secured the top spot, its total count dropped significantly from the 41 million events recorded in 2021. Texas has faced its most severe drought since 2011, with more than a quarter of the state experiencing exceptional drought conditions in mid-August.*

However, locally specific future predictions regarding changes to lightning frequency or location are not well understood and limited data exist to make locally specific predictions of such changes.

Figure 22. 2022 Lightning strike density compared to averages from 2015 to 2021. Compiled, mapped, and reported by Vaisala (Vagasky 2022).



## Vulnerability

Lightning events can occur at a wide range of locations across the Planning Area. Lightning risk is closely associated with storm frequency and severity along with other environmental conditions that may result in severe storms. Lightning risk is thus widespread and relatively uniform across the Planning Area. Some sites, and some site-specific conditions, such as large swathes of dry grass or vegetation during a drought period, may be particularly susceptible to certain sequelae such as wildfire ignition and propagation.

## Impact

Future direct and indirect impacts due to lightning events are expected to be similar to historical data. Lightning-related impacts can include:

- All buildings and infrastructure are considered at direct and indirect risk of impact due to lightning:
  - Direct impacts include direct lightning strikes that damage structures.
  - Indirect impacts include:
    - Fires ignited by strikes.
    - Explosions due to rapid heating of objects.

- Damage to buildings or infrastructure from falling trees or poles that are struck.
- Infrastructure such as powerlines and communication towers:
  - May be directly damaged.
  - May experience electrical fires.
  - Outages due to direct strikes or propagating fires can occur, resulting in significant periods of utility outages including loss of power and communications.
- Wildfires are often ignited by lightning strikes, particularly in dry conditions. Wildfire presents risks to human life, property, and wildlife. Wildfires may also present added challenges to first responders and emergency services during storms, by impeding access, limiting power and communications services, etc.
- Crops may be damaged by direct strikes or subsequent wildfire. This risk is particularly of concern during period of drought when dry vegetation makes wildfire ignition more likely.
- Property damage to homes, landscaping, fences, or other out-structures.
- Injury to wildlife and livestock can occur through direct strikes and/or exposure to wildfires.
- Injuries, including fatal injuries possible. Fatalities occur most often when people are outdoors. Moving to a lower risk location will decrease individual risk of injury or death.

## ***Land Use and Development***

The effects of changes in land use and development negatively alter the future impacts of lightning on the vulnerable assets for each participating jurisdiction by putting the residents and their structures at an increased risk of being impacted by lightning. With more development, such as the building of new homes or ranch and agricultural development, it is likely that in the event of lightning, they could be negatively impacted. The County is currently developing a Land Use Plan through funding from the Texas General Land Office (GLO) through the Resilient Communities Program (RCP). Upon completion of the RCP, all participating jurisdictions will better understand the impacts of changes in land use and development and these impacts will be addressed in future HMP updates.

## **Chapter 8: Straight-Line Wind**

### **Hazard Description**

Severe, non-tornado winds can occur alone, such as the widespread, long-lived, straight-line wind events (derechos) or may accompany other natural hazards including hurricanes and thunderstorms (National Weather Service 2023). Here, the focus is on strong straight-line winds associated with severe storms, as these are the primary types of non-tornado wind conditions that are likely to affect the Planning Area.

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Thunderstorms can be associated with strong, straight-line (non-tornado) wind events. Wind is the horizontal motion of the air. Wind begins with a difference in air pressure between locations or altitudes. The pressure differential (air pressure that is higher in one place and lower in another) generates a force as the air seeks to move from the higher-pressure areas to the lower pressure area. Greater differences in pressure result in stronger force generated by this movement of air molecules from high to low pressure areas. The distance between high- and low-pressure areas also influences the speed and strength of the air movement (National Weather Service 2023).

Thunderstorms are generally created when heat and moisture near the Earth's surface are transported to the upper levels of the atmosphere. Thunderstorms can produce a variety of hazards including Hail, Lightning, and Winds. Straight-line winds are the wind type responsible for most thunderstorm-related wind damage. Straight-line wind can take on several forms, with a downburst, a small area of rapidly descending air beneath a thunderstorm, capable of generating damage equivalent to a strong tornado. Wind is primarily categorized following the Beaufort Scale (Table 26).

Severe winds can pose a risk of human injury or loss of life, damage to property, agricultural damage, and damage to infrastructure such as utilities. The effects of strong winds are primarily due to impacts from flying debris, downed trees, downed powerlines, and ramifications (such as exacerbating fires), and hazardous travel conditions. Severe winds tend to cause the greatest damage to structures with light construction (i.e., manufactured homes) and can be most severe in areas with limited wind breaks (e.g., wide open areas with limited trees or other obstructions).

## **Extent**

Severe wind events can happen anywhere in the state of Texas. Available information indicates that all parts of the Planning Area are at equal or similar risk of experiencing severe wind conditions. Severe winds zones, as described above, cover broad areas and do not make significant distinctions at fine spatial scales.

The occurrence of straight-line wind was analyzed in all participating jurisdictions in the Planning Area. It was concluded that straight-line wind occurs or could occur in all participating jurisdictions and has or could impact all existing and future critical infrastructure and facilities, residents, and their property in Coryell County.



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Table 26. Beaufort Scale describing wind conditions.

Force	Wind Speed (mph) <b>(knots)</b>	Description	Appearance of Wind Effects	
			At Sea	On Land
0	0-1 <b>0-1</b>	Calm	Sea surface smooth and mirror-like	Calm, smoke rises vertically
1	1-3 <b>1-3</b>	Light Air	Scaly ripples, no foam crests	Smoke drift indicates wind direction, still wind vanes
2	4-7 <b>4-6</b>	Light Breeze	Small wavelets, crests glassy, no breaking	Wind felt on face, leaves rustle, vanes begin to move
3	8-12 <b>7-10</b>	Gentle Breeze	Large wavelets, crests begin to break, scattered whitecaps	Leaves and small twigs constantly moving, light flags extended
4	13-18 <b>11-16</b>	Moderate Breeze	Small waves 1-4 ft. becoming longer, numerous whitecaps	Dust, leaves, and loose paper lifted, small tree branches move
5	19-24 <b>17-21</b>	Fresh Breeze	Moderate waves 4-8 ft taking longer form, many whitecaps, some spray	Small trees in leaf begin to sway
6	25-31 <b>22-27</b>	Strong Breeze	Larger waves 8-13 ft, whitecaps common, more spray	Larger tree branches moving, whistling in wires
7	32-38 <b>28-33</b>	Near Gale	Sea heaps up, waves 13-19 ft, white foam streaks off breakers	Whole trees moving, resistance felt walking against wind
8	39-46 <b>34-40</b>	Gale	Moderately high (18-25 ft) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks	Twigs breaking off trees, generally impedes progress
9	47-54 <b>41-47</b>	Strong Gale	High waves (23-32 ft), sea begins to roll, dense streaks of foam, spray may reduce visibility	Slight structural damage occurs, slate blows off roofs
10	55-63 <b>48-55</b>	Storm	Very high waves (29-41 ft) with overhanging	



			crests, sea white with densely blown foam, heavy rolling, lowered visibility	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
<b>11</b>	64-72 56-63	Violent Storm	Exceptionally high (37-52 ft) waves, foam patches cover sea, visibility more reduced	Widespread structural damage
<b>12</b>	72-83 64-71	Hurricane	Air filled with foam, waves over 45 ft, sea completely white with driving spray, visibility greatly reduced	Considerable widespread structural damage

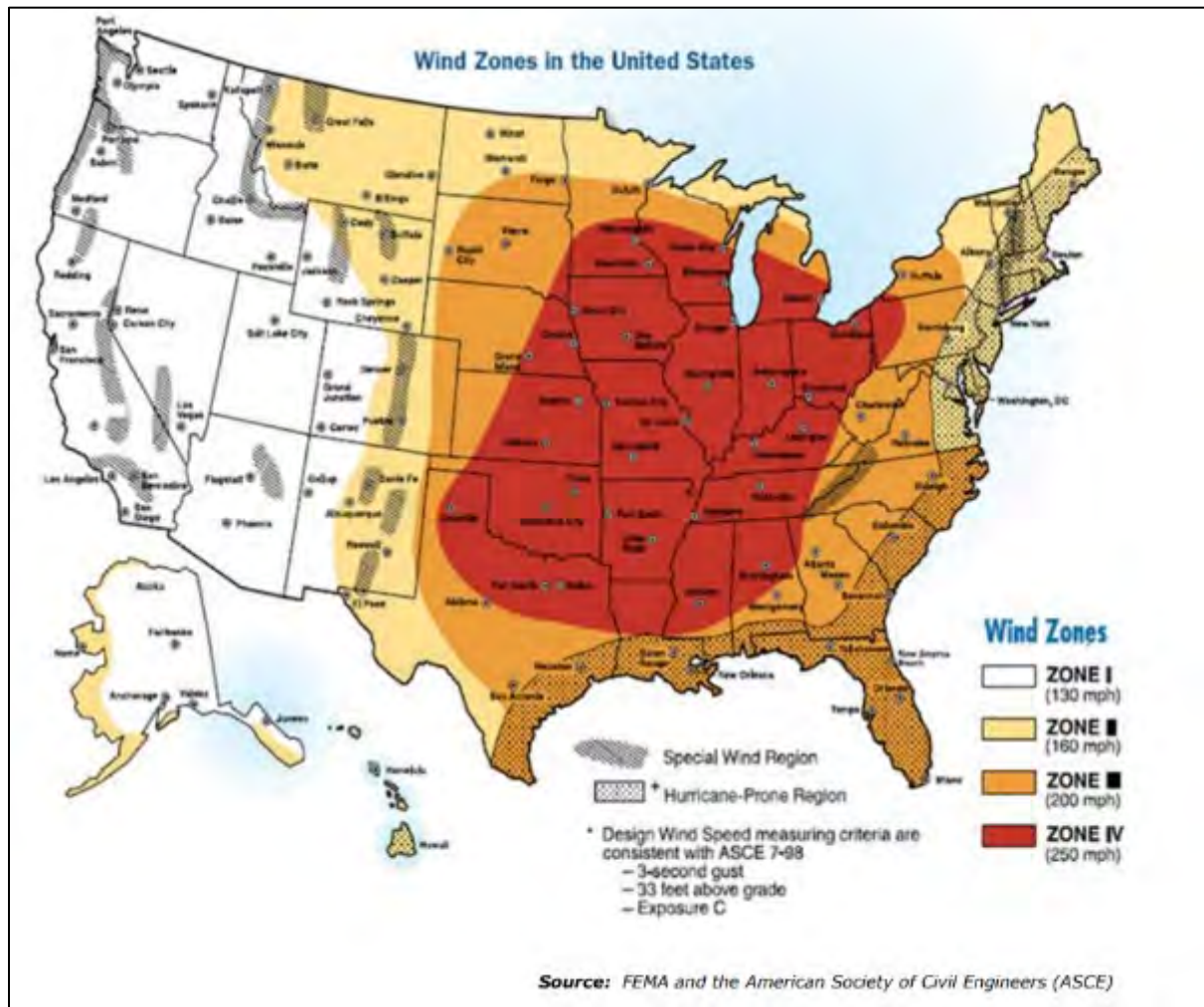
**Location**

Patterns of wind vary across regions of the U.S., but there is less variability and predictability in wind activity at finer spatial scales, at the local level. North and Central/Central-Eastern Texas is part of a high wind zone that covers much of the Eastern-Central U.S. (Figure 23). These winds zones are based on a combined assessment of wind (including tornados and hurricane or thunderstorm-associated straight-line winds. The Planning Area falls within a relatively high wind zone designation of III, and adjacent to Zone IV areas.

# Coryell County Hazard Mitigation Plan 2023

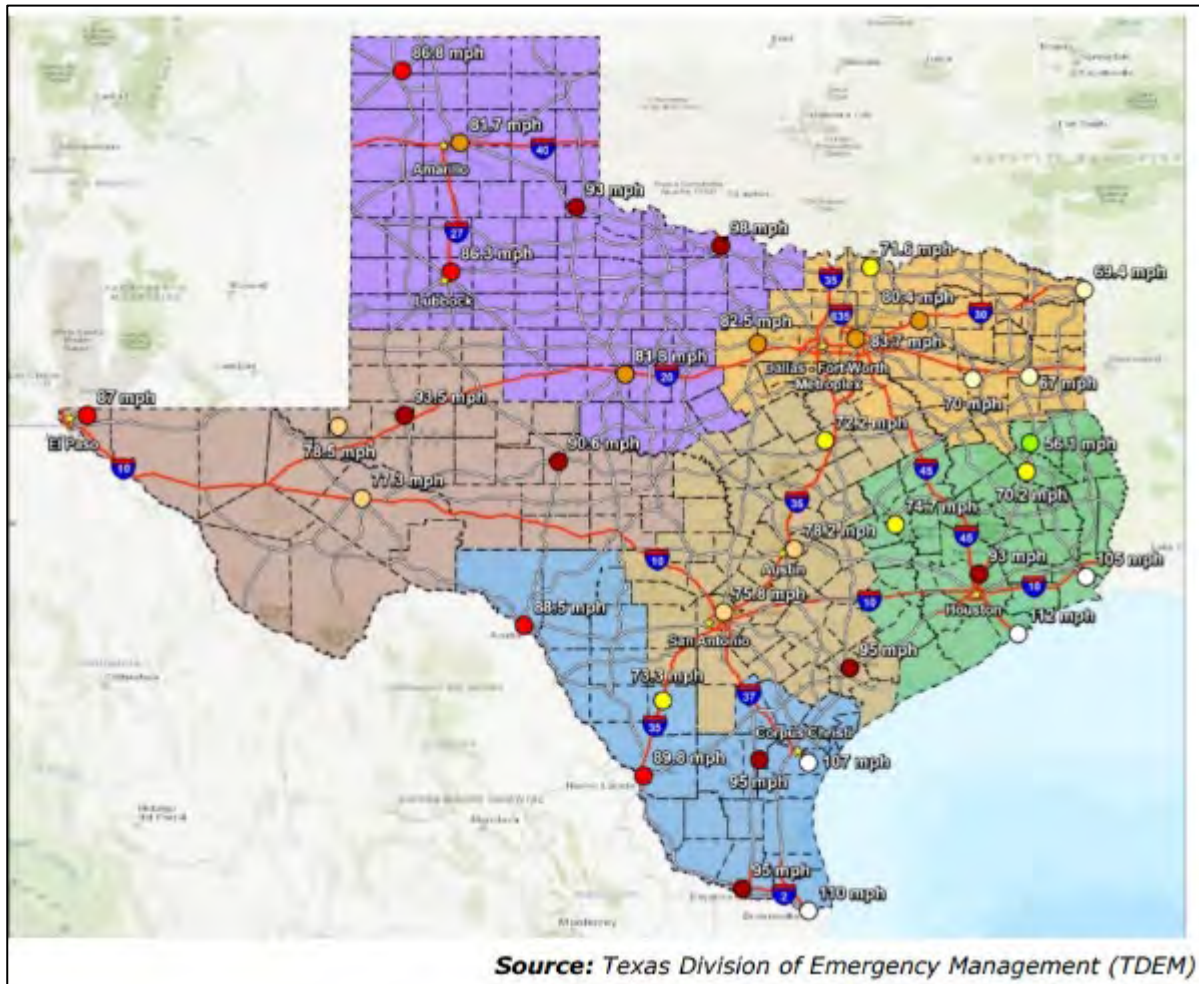


Figure 23. U.S. wind zone designations reported by FEMA.



Data from weather stations across Texas for a 50-year period, compiled by the TDEM, analyzes expected peak wind speed (Figure 24). Peak wind speed estimates for the Planning Area are approximately 78 miles per hour. TDEM indicates that most of the state can expect to see 80 to 90 mph winds at least once in 50 years.

Figure 24. Expected peak wind speed (at least three second durations) for weather stations over 50-year period.



**Historical Occurrences**

Historical evidence demonstrates that the Planning Area is vulnerable to hail events overall, which typically result from severe thunderstorm activity. The Planning Area experiences an average of 3 to 6 significant thunderstorms each year. These storms are typically the drivers of severe straight-line wind events. The Texas Department of Public Safety divides the 254 Texas counties into 6 regions; Coryell County is in Region 6. During the period of study, in Region 6, data from the aforementioned database estimate that approximately 13% of all natural hazard-related property losses and 19% of all natural hazard-related injuries were a result of severe wind. Severe wind accounts for a significant cost in Region 6 (Table 27, Table 28 and Figure 25).

# Coryell County Hazard Mitigation Plan 2023



Table 27. Region 6 wind-related losses, 1996 to 2016, derived from the Texas Hazard Mitigation Plan 2018.

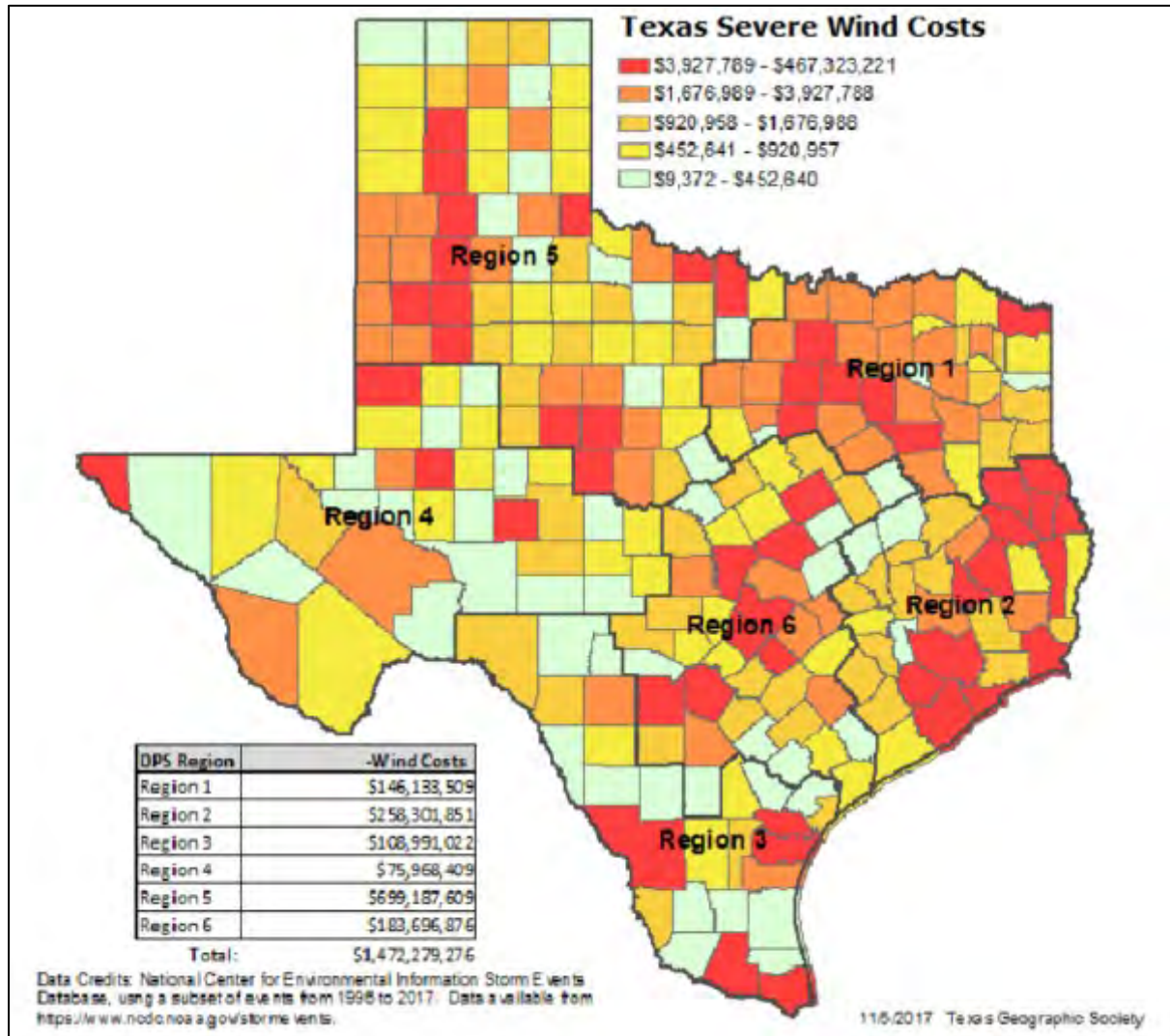
Loss Type Due to Wind	Estimated Cost and Number
Property Losses	\$180,726,508
Per Capita Property Losses	\$455
Crop Losses	\$2,970,368
Deaths	1
Injuries	83

Table 28. Region 6 (Texas) annual estimated losses due to wind derived from the Texas Hazard Mitigation Plan 2018.

Year	Estimated Annual Losses (\$)
1996	3,454,336
1997	3,035,153
1998	19,586,851
1999	2,526,406
2000	3,059,804
2001	9,678,715
2002	10,810,131
2003	32,113,832
2004	2,787,404
2005	1,109,820
2006	8,825,627
2007	3,152,901
2008	58,398,279
2009	13,542,377
2010	1,355,075
2011	1,946,674
2012	1,020,381
2013	411,877
2014	703,220
2015	6,037,013
2016	141,000



Figure 25. Wind costs per region, 1996 to 2016, derived from the Texas Hazard Mitigation Plan 2018.



NOAA’s NCEI database compiles reports of hazardous wind events. This data has limited utility for assessing past frequency or inferring future risk, due to incomplete and inconsistent reporting, so this data provides some evidence of reported wind events but does not represent a complete record of wind events in the County (Table 29). The NCEI records indicate approximately 56 reported severe wind events in Coryell County from 2000 to 2022.

Table 29. Wind Events in Coryell County, 2000 to 2022. Data compiled from NOAA’s NCEI database.



# Coryell County Hazard Mitigation Plan 2023



Location	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage	Source	Narrative Details
GATESVILLE	5/5/2001	1512	Thunderstorm Wind	52	0	0	0	0	LAW ENFORCEMENT	Numerous trees were blown down by high winds.
GATESVILLE	5/5/2001	1518	Thunderstorm Wind		0	0	15000	0	LAW ENFORCEMENT	A veterinary clinic was heavily damaged by high winds.
COPPERAS COVE	8/13/2001	1600	Thunderstorm Wind	52	0	0	0	0	NEWSPAPER	Two trees were blown down by high winds.
OGLESBY	8/16/2001	1730	Thunderstorm Wind	52	0	0	0	0	NEWSPAPER	Trees and signs were blown down by high winds.
GATESVILLE	3/19/2002	1910	Thunderstorm Wind		0	0	1000	0	LAW ENFORCEMENT	Large trees were blown down by high winds.
COPPERAS COVE	6/16/2002	45	Thunderstorm Wind	52	0	0	4000	0	LAW ENFORCEMENT	Numerous trees were down in Copperas Cove and Gatesville.
OGLESBY	3/4/2004	1443	Thunderstorm Wind	52	0	0	0	0	NEWSPAPER	
PEARL	6/1/2004	1640	Thunderstorm Wind	61	0	0	5000	0	NWS EMPLOYEE(OFF DUTY)	Numerous trees were blown down along

# Coryell County Hazard Mitigation Plan 2023



										Highway 281 near Evant.
GATESVILLE	6/1/2004	1721	Thunderstorm Wind	52	0	0	10000	0	LAW ENFORCEMENT	Trees were blown down across FM 1883 at King Ranch Road, and a barn was blown down.
COPPERAS COVE	6/1/2004	1730	Thunderstorm Wind	52	0	0	2000	0	LAW ENFORCEMENT	Numerous trees were blown down in the Hind Ranch area west of FM 116.
COPPERAS COVE	6/4/2004	2154	Thunderstorm Wind	52	0	0	10000	0	LAW ENFORCEMENT	A tree was blown onto a house, and power lines were blown down.
GATESVILLE	5/8/2005	538	Thunderstorm Wind	52	0	0	0	0	LAW ENFORCEMENT	Several trees knocked down.
OGLESBY	7/14/2005	1300	Thunderstorm Wind	50	0	0	0	0	LAW ENFORCEMENT	
GATESVILLE	10/31/2005	1210	Thunderstorm Wind	50	0	0	0	0	LAW ENFORCEMENT	A tree was blown down near Osage on County Road 260.

# Coryell County Hazard Mitigation Plan 2023



No Data	4/20/2006	745	Strong Wind	45	0	0	3000	0	LAW ENFORCEMENT	A metal building was damaged, and limbs were blown down.
COPPERAS COVE	4/20/2006	1725	Thunderstorm Wind	50	0	0	40000	0	GENERAL PUBLIC	Trees, power lines, and large tree limbs down around the city. A carport was also blown away. Most of the damage was reported on the south side of Highway 190.
OGLESBY	4/28/2006	2018	Thunderstorm Wind	50	0	0	3000	0	LAW ENFORCEMENT	Trees down on CR 315 and power lines down on CR 318.
COPPERAS COVE	4/28/2006	2128	Thunderstorm Wind	52	0	0	0	0	GENERAL PUBLIC	
PEARL	5/5/2006	2230	Thunderstorm Wind	50	0	0	15000	0	EMERGENCY MANAGER	A roof was blown off a building and trees were blown down.
GATESVILLE	5/8/2006	300	Thunderstorm Wind	56	0	0	15000	0	NEWSPAPER	A barn was blown onto FM 929.

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No Data	11/15/2006	1100	Strong Wind	43	0	0	10000	0	Newspaper	Strong winds blew down numerous trees and tree limbs, as well as power lines around the county.
COPPERAS COVE	4/13/2007	1830	Thunderstorm Wind	50	0	0	0	0	Public	Limbs broken off trees.
TURNERSVILLE	6/14/2007	1450	Thunderstorm Wind	50	0	0	0	0	Law Enforcement	Two trees blown down.
OGLESBY	3/3/2008	457	Thunderstorm Wind	50	0	0	15000	0	Public	A horse barn was destroyed.
GATESVILLE	5/9/2008	1958	Thunderstorm Wind	61	0	0	90000	0	Amateur Radio	Roofs were ripped off two buildings in downtown Gatesville. At least ten utility poles and numerous large trees and tree limbs were blown down. Seven large windows had to be replaced on the Coryell County courthouse after they were shattered by

**Coryell County Hazard Mitigation Plan  
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										debris from the storm. The Stillhouse Water Treatment Plant lost a roof as well.
TURNERSVILLE	7/23/2008	1850	Thunderstorm Wind	50	0	0	20000	0	Newspaper	Two 13' x 150' sheds holding chickens, geese, and quail were destroyed by an isolated downburst. Both structures rolled, killing, or injuring some of the birds and releasing others.
PIDCOKE	7/31/2008	1904	Thunderstorm Wind	50	0	0	2000	0	Law Enforcement	Trees were blown down.
GATESVILLE	8/29/2008	2200	Thunderstorm Wind	50	0	0	3000	0	Newspaper	Several trees along with a high school scoreboard were blown down. Several trees fell across roadways.



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GATESVILLE ARPT	2/10/2009	2105	Thunderstorm Wind	64	0	0	0	0	AWOS	A 74 MPH wind gust was measured at the AWOS 3 miles west of Gatesville.
GATESVILLE	2/10/2009	2107	Thunderstorm Wind	60	0	0	75000	0	Newspaper	A gas station near the intersection of US HWY 84 and State HWY 36 had its windows blown in. A sheriff's deputy was injured in the eye by blowing glass. High winds damaged an overhead door at a fire station in Gatesville. A business next to the fire station had the roof blown off. The roof over the swimming pool at a fitness center was partially peeled back

**Coryell County Hazard Mitigation Plan  
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										and two windows were blown out. Several homes in the Stoneridge Addition had minor damage. Also, trees and power lines were down.
TOPSEY	7/31/2009	1600	Thunderstorm Wind	52	0	0	12000	0	Newspaper	The metal roof of a barn on Lutheran Church Road was blown off. A second barn in the same area was also damaged.
LEON JCT	8/22/2009	1405	Thunderstorm Wind	56	0	0	5000	0	Emergency Manager	Multiple trees were blown down across county roads and a structure was pushed into County Road 321 near Leon Junction.

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TOPSEY	10/1/2009	1800	Thunderstorm Wind	65	0	0	50000	0	Newspaper	Significant damage occurred to a double wide home on CR 118 north of Topsey. Strong winds destroyed three sheds, one of which was a car shed. The winds also tore shingles off the roof and the side of the home. Some eaves of the home were also damaged, and a 2x4 was driven through a wall. Three holes were created in the home and rainwater entered the home through the holes causing significant water
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**Coryell County Hazard Mitigation Plan  
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										damage. Also on the property, cattle fences were damaged.
TOPSEY	10/1/2009	1800	Thunderstorm Wind	61	0	0	10000	0	Newspaper	Damage to two sheds occurred at the Topsey Exotic Ranch. The roof was blown off one shed, and the tin bent up on another shed. A flagpole was also bent.
No Data	12/24/2009	1400	Strong Wind	39	0	0	8000	0	Newspaper	The sign of the Luxury Inn on Hwy 190 in Copperas Cove was blown down in high winds. The winds at the time were gusting to 45 mph.

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COPPERAS COVE	4/23/2010	2226	Thunderstorm Wind	52	0	0	5000	0	Broadcast Media	A 60 MPH wind gust was measured in Copperas Cove. A local newspaper reported some property damage was reported in Copperas Cove, but no other information was given.
COPPERAS COVE	4/23/2010	2229	Thunderstorm Wind	58	0	0	2000	0	Broadcast Media	A 67 MPH wind gust was measured just east of Copperas Cove.
ATER	4/23/2010	2230	Thunderstorm Wind	56	0	0	500	0	Newspaper	The local newspaper reported a few trees were down in Ater and were blocking roads.
GATESVILLE	4/23/2010	2235	Thunderstorm Wind	56	0	0	1000	0	Newspaper	The local newspaper reported some trees down in Gatesville, but

**Coryell County Hazard Mitigation Plan  
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										no other property damage was reported.
THE GROVE	4/23/2010	2300	Thunderstorm Wind	56	0	0	500	0	Newspaper	The local newspaper reported a few trees were down in The Grove area and were blocking roads.
OGLESBY	4/23/2010	2300	Thunderstorm Wind	56	0	0	500	0	Newspaper	The local newspaper reported a few trees were down in Oglesby and were blocking roads.
BEE HOUSE	5/21/2011	1510	Thunderstorm Wind	61	0	0	25000	0	Emergency Manager	Several homes suffered roof damage in downtown Evant due to high winds. The metal roof of the old firehouse was torn off and several large trees were also knocked down.



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OGLESBY	6/5/2011	1945	Thunderstorm Wind	61	0	0	40000	0	Newspaper	The chimney of a home on Knowles Road near Oglesby was knocked off the home by strong thunderstorm winds. A tractor and three cars on the property were also damaged. The carport at his neighbor's house was blown across the yard.
HOOD VLG	6/12/2012	1505	Thunderstorm Wind	52	0	0	5000	0	Broadcast Media	Numerous large tree limbs and some large trees were blown down near Fort Hood. Wind speeds were estimated to be around 60 mph.
GATESVILLE	8/9/2012	1527	Thunderstorm Wind	52	0	0	0	0	Emergency Manager	Emergency management reported winds estimated at

**Coryell County Hazard Mitigation Plan  
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										50 to 60 MPH in Gatesville.
GATESVILLE	8/9/2012	1530	Thunderstorm Wind	52	0	0	2000	0	Broadcast Media	Photos of tree damage and tin roof damage were relayed from broadcast media via NWS chat.
PEARL	5/28/2015	2228	Thunderstorm Wind	50	0	0	0	0	Law Enforcement	Coryell County Sheriff's Department reported trees blown down near the town of Pearl, TX.
SOUTH MTN	12/13/2015	215	Thunderstorm Wind	48	0	0	500	0	Law Enforcement	The sheriff's office reported trees had fallen on CR 274, blocking the road, and requiring removal.
GATESVILLE	1/2/2017	355	Thunderstorm Wind	60	0	0	2000	0	Public	A public report confirmed wind damage to an HEB Grocery Store sign and multiple

**Coryell County Hazard Mitigation Plan  
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										street lights bent from thunderstorm winds in Gatesville, TX.
GATESVLL MOCCASIN AR	1/15/2017	1736	Thunderstorm Wind	60	0	0	3000	0	Law Enforcement	Homes in the Coryell City area were damaged due to thunderstorm winds.
GATESVILLE	3/26/2017	2035	Thunderstorm Wind	50	0	0	0	0	AWOS	The Gatesville, TX AWOS recorded a thunderstorm wind gust of 58 MPH.
FLAT	3/17/2018	1613	Thunderstorm Wind	50	0	0	0	0	Storm Chaser	A storm chaser reported trees down between the communities of Flat and The Grove.
BEE HOUSE	5/15/2018	1515	Thunderstorm Wind	50	0	0	0	0	Trained Spotter	A trained spotter reported multiple trees down approximately 1 mile west of the city of Evant, TX along Hwy 84.

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COPPERAS COVE	4/17/2019	2221	Thunderstorm Wind	50	0	0	10000	0	Broadcast Media	Broadcast media reported damage to the roofs of the homes in the Copperas Cove area.
BEE HOUSE	6/9/2019	1615	Thunderstorm Wind	61	0	0	1000	0	Public	A homeowner on Self Road between Pearl and Izoro reported damage to many trees on their property. In her words: One large live oak and two large elms were completely knocked down, many large limbs and the tops of many trees were ripped off, a massive cedar looked like the top was twisted off..

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GATESVILLE ARPT	5/28/2021	1330	Thunderstorm Wind	65	0	0	0	0	Law Enforcement	Four small aircraft were overturned at Gatesville Airport and significant damage was reported to at least 1 hanger. Seven other hangers sustained damage. A handful of trees were also reported down the across the city of Gatesville.
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## Probability of Future Events

On average, the Planning Area experiences 3 to 6 significant thunderstorm events every year. The County is in wind Zone III, meaning they can experience winds up to 200 mph. Assuming unchanged frequencies of storms capable of producing severe winds, there is a high likelihood of 1 or more significant wind events in the County annually.

Most thunderstorms, and thunderstorm-associated severe winds, occur during March to May as well as September. Based on NCEI data indicating 56 reported severe wind events in a 22-year sampled period, we can expect approximately 2.5 incidents per year assuming unchanged rates. Notably, the NCEI data on wind events is likely to underestimate the number of severe wind events, due to incomplete and inconsistent reporting. Annual estimates and any related predictions are likely to be underestimates.

### *Climate Change*

Severe winds are associated with severe storm conditions. Predictions about trends in severe storm likelihood and severity are typically made at broader spatial scales than the Planning Area, or even the region. Broad predictive efforts indicate that severe storms are likely to increase in *severity* globally and in the U.S. due to climate change. However, predictions also indicate that *frequency* of strong storms may decrease. Some predictions indicate a shift in storm loci, such that strong storms that affect the Central and South-Central U.S. may become less frequent as they become more frequent in Eastern and North-Eastern North America (Haberlie et al 2022).

Other climate models consistently project environmental changes that would predict an increase in the *frequency and intensity* of severe thunderstorms (a category that combines Tornadoes, Hail, and Winds), especially over regions that are currently prone to these hazards such as the Southern and Eastern U.S (Trapp et al 2007). However, the confidence intervals and predictive power of many of these models is relatively low (Wuebbles et al 2017).

Predictions specifically about wind are also varied. Some research points to a “global stilling,” meaning a reduction in mean winds globally. Other research suggest evidence for trends of increasing wind speeds globally (Zeng et al 2019). While yet other work predicts declines in wind speed for many regions as the climate warms and a shift in high wind regions moving poleward increases in winds and wind speeds in specific locations, for example due to increases in hurricane severity in some regions (Abell et al 2021). The IPCC currently forecasts that on average, worldwide annual wind speeds are expected to drop by up to 10%. Predictions of future severe wind patterns largely rely on predictions of changes to, or increases in, thunderstorm storm frequency or severity, and are thus saddled with the same uncertainty and limits to predictive power.

Given the varied and uncertain predictions regarding storm frequency, severity, and resulting effects on severe wind event frequency and severity, planners should act with the expectation that severe storm and wind conditions are likely to be similar, if slightly lower



or slightly higher, in frequency and severity in the future. For the Planning Area, a reasonable baseline for planning purposes would be approximately 3 to 6 significant thunderstorms per year, several of which may be accompanied by significant wind conditions.

## **Vulnerability**

Vulnerability is difficult to evaluate on a highly precise, fine, or local scale because thunderstorm wind events can occur because of severe storms, which are relatively frequent within the Planning Area, but can create highly localized impacts. All parts of the Planning Area, current and future structures and facilities and personal property are potentially vulnerable to severe wind impacts. The economic impacts of severe winds vary widely among severe wind events and local, site-specific conditions where the event occurs.

## **Impact**

Pre- impact preparation and planning can minimize or mitigate wind-related impacts. Impacts to the planning area can include:

- All buildings and infrastructure are considered at direct and indirect risk of impact due to severe wind events:
  - Severe winds can directly cause damage to buildings including homes, business, barns and agricultural structures, outbuildings, schools, emergency service buildings and other facilities:
    - Roof damage and roof destruction are common types of damage to buildings.
    - Damage to windows.
  - Vehicles can also be directly damaged.
  - Indirect impacts (sequelae) include:
    - Fires (e.g., lightning triggered fires) may be propagated by strong winds.
    - Damage to buildings, vehicles, or infrastructure due to blowing debris, such as tress, tree branches, waste bins, outdoor furniture or equipment, and other debris.
  - Infrastructure such as powerlines and communication towers:
    - May be directly damaged, resulting in significant periods of utility outages, including loss of power and communications.
      - Loss of power and communication can result in significant subsequent impacts:
        - Individuals without power may experience food or water shortages, lack of heat or cooling, etc.
        - Communication disruptions can limit access to emergency services.
    - May experience subsequent electrical fires.

- Downed powerlines can present risk to human safety and can impede travel; can impact access to emergency services.
- In some severe wind conditions, vehicles may not be able to safely traverse the area.
- Wildfires, which may be ignited by lightning strikes that can accompany severe storms that concurrently produce strong winds, can be exacerbated by strong winds, particularly in dry conditions. Wildfire presents risks to human life, property, and wildlife. Wildfires may also present added challenges to first responders and emergency services during storms, by impeding access, limiting power and communications services, etc.
- Crops may be damaged by severe winds directly. Damage to other components of agricultural production are also possible.
- Property damage to homes, landscaping, fences, or other out-structures.
- Property damage to vehicles and equipment, commonly due to flying debris.
- Injury to wildlife and livestock can occur through blowing debris or tree falls.
- Injuries, including fatal injuries possible:
  - Fatalities occur most often when people are outdoors.
  - Injuries and fatalities are most commonly associated with blowing debris.
- Damage to property and risk of injury or fatality may be greater for light construction buildings or portable structures, such as manufactured homes, where structures may be more vulnerable to severe wind damage and sequelae that can cause damage to property and human safety. Typically, Texans require a shelter/safe room to withstand 160 to 200 mph wind with a maximum expectance of 250 mph, which is unlikely to be met by many temporary or portable structures.

## ***Land Use and Development***

The effects of changes in land use and development negatively alter the future impacts of straight-line wind on the vulnerable assets for each participating jurisdiction by putting the residents and their structures at an increased risk of being impacted by straight-line wind. With more development, such as the building of new homes or ranch and agricultural development, it is likely that in the event of straight-line wind, they could be negatively impacted. The County is currently developing a Land Use Plan through funding from the Texas General Land Office (GLO) through the Resilient Communities Program (RCP). Upon completion of the RCP, all participating jurisdictions will better understand the impacts of changes in land use and development and these impacts will be addressed in future HMP updates.

## **Chapter 9: Tornado**

### **Hazard Description**

# Coryell County Hazard Mitigation Plan 2023



A tornado is a violently rotating column of air that extends from a cloud to the surface of the earth. Wind speeds can be in excess of 250 miles per hour which is significantly higher than design wind speeds in modern building codes. Damage paths can be a mile wide and up to 50 miles long. Although tornados typically occur in the spring and summer months, they can occur at any time in any part of the country. In some cases, hurricanes spawn tornados (National Weather Service 2023).

## Extent

The severity of a tornado is categorized by the Enhanced Fujita Scale (EF Scale). As of February 2007, the NOAA adopted the EF Scale to replace the Fujita Scale (F Scale). The EF Scale is designed to be similar to the F Scale but has been revised to have a greater number of Damage Indicators, which are used to characterize the degree of damage experienced by buildings during a tornado. See Table 30 and Figure 26 below.

Destruction from tornados can range from minimal to extensive depending on the severity of the storm (Figure 26 below) and the area that is affected. Tornados damage varies according to intensity, size, and duration of the storm. Typically, tornados cause the least amount of damage in areas with few structures. Damage to areas with few structures may be associated with impacts to agriculture as well as utility infrastructure such as power lines.

The greatest damage associated with tornados occurs in developed areas. Structures impacted by tornados include single family homes, multiple family housing (apartment complexes, etc.), school buildings, commercial buildings, and other man-made structures. Most impacts to people occur when housing (single family or multifamily) is impacted. Of the housing types, mobile homes incur the most severe damage and human injuries and loss of life.

Table 30. Fujita scale describing tornado intensity (NOAA).

FUJITA SCALE			DERIVED EF SCALE		OPERATIONAL EF SCALE	
F Number	Fastest 1/4-mile (mph)	3-Second Gust (mph)	EF Number	3-Second Gust (mph)	EF Number	3-Second Gust (mph)
0	40-72	45-78	0	65-85	0	65-85
1	73-112	79-117	1	86-109	1	86-110
2	113-157	118-161	2	110-137	2	111-135
3	158-207	162-209	3	138-167	3	136-165
4	208-260	210-261	4	168-199	4	166-200
5	261-318	262-317	5	200-234	5	Over 200

# Coryell County Hazard Mitigation Plan 2023



Figure 26. Typical tornado damage according to the EF scale (2018 State of Texas HMP).



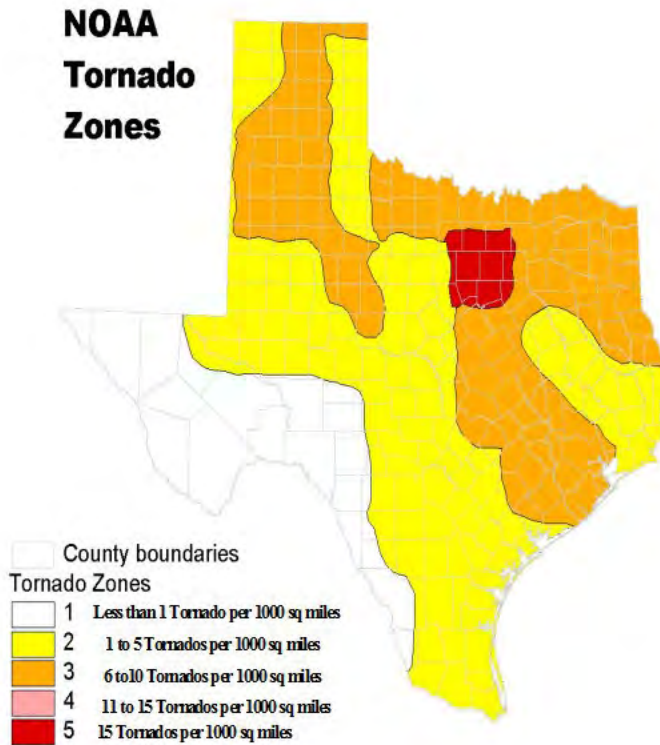
## Location

The Cross Timbers ecoregion described in the County Profile Section above includes areas with a high density of trees and irregular plains and prairies. Rainfall is moderate, but somewhat erratic, and the Cross Timbers are an area prone to tornado producing storms.

Tornados are not equally distributed across Texas but appear to occur more frequently in what is referred to as “Tornado Alley,” a line of activity that stretches from Central Texas, north into Oklahoma and beyond (Dixon and Moore 2012).

Tornados occur annually and frequently in the northern two-thirds of the state, caused by frontal systems that enter from the north and west (Figure 27). Tornados occur in the remainder of the state primarily caused as a cascading hazard from tropical storms (NWS 2023).

Figure 27. Tornado Zones in Texas based on historical occurrences (NOAA).



## Historical Occurrences

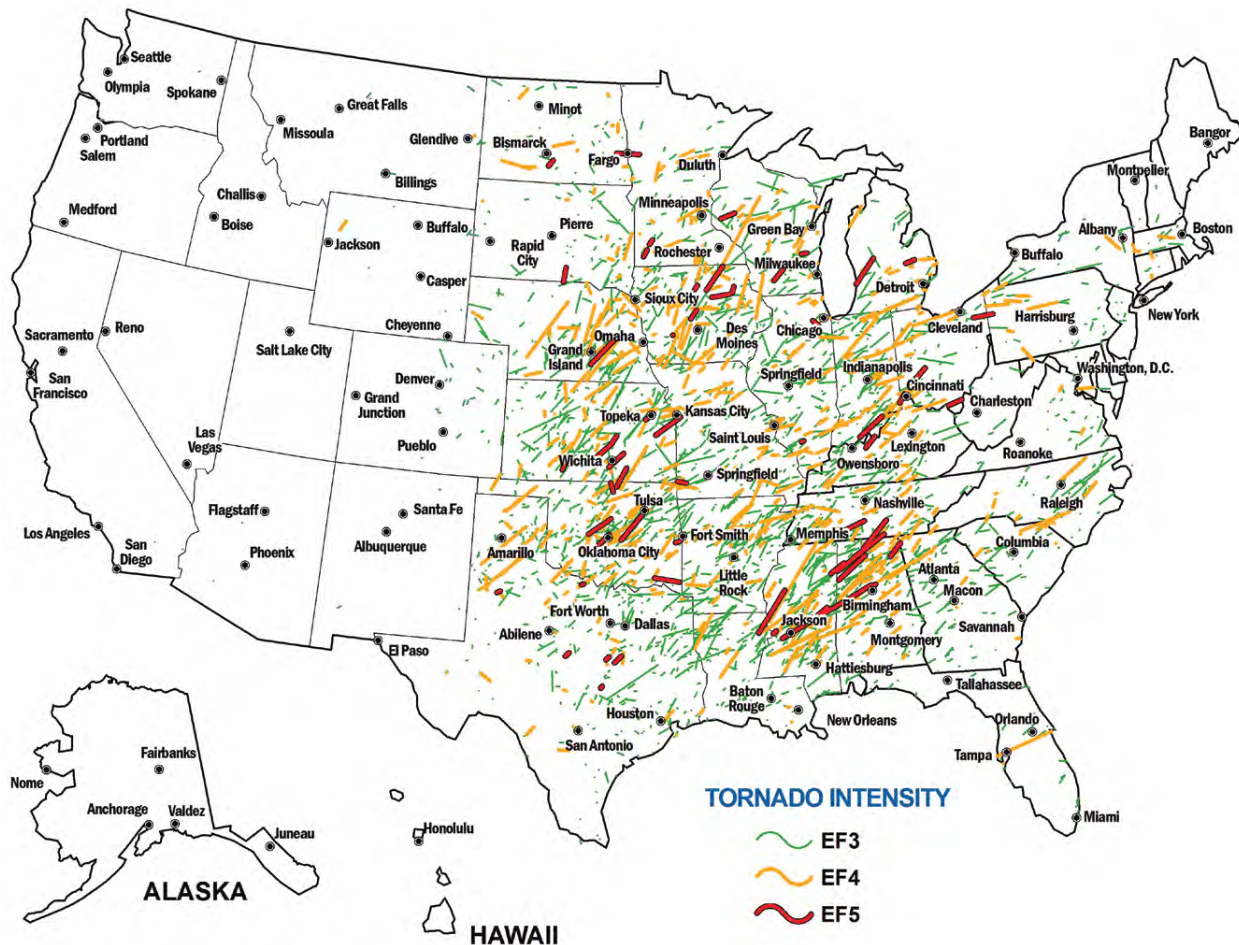
The risk and frequency of tornados varies across the country and within each state. Comparing the numbers of tornados recorded in different areas of the country can give you a better understanding of potential tornado activity in those areas. Figure 28 shows the general locations of recorded EF3, EF4, and EF5 tornados in the United States between 1950 and 2013 (NOAA 2014). While this map presents a reasonable portrayal of tornado activity in the United States since 1950, it should not be assumed that locations that do not have a tornado track marked have never had a tornado or will never experience one.



# Coryell County Hazard Mitigation Plan 2023



Figure 28. EF3, EF4 and EF5 tornado paths between 1950 and 2013 (NOAA 2014).



Based on historical occurrences of tornados recorded in Coryell County by the National Weather Service, 37 tornados have occurred in Coryell County since about 1950 (Table 31). The City of Oglesby and surrounding area (5 tornados have been documented there) has had more tornados than other locations in Coryell County (Figure 29). National Weather Service data indicate that the month of May has the most documented tornados (12) and most tornados occurred in mid-afternoon (NWS 2023, Tornado Project 2023; Table 31).

Table 31. Recorded Tornados in Coryell County (NWS 2023 and Tornado Project 2023).

Date	Time	F-Scale	Casualties	Injuries
3/21/1956	15:00	2	0	0
5/1/1956	15:15	1	0	0
5/17/1968	10:00	1	0	0
4/17/1971	21:00	1	0	0
4/20/1976	00:20	2	0	0



# Coryell County Hazard Mitigation Plan 2023



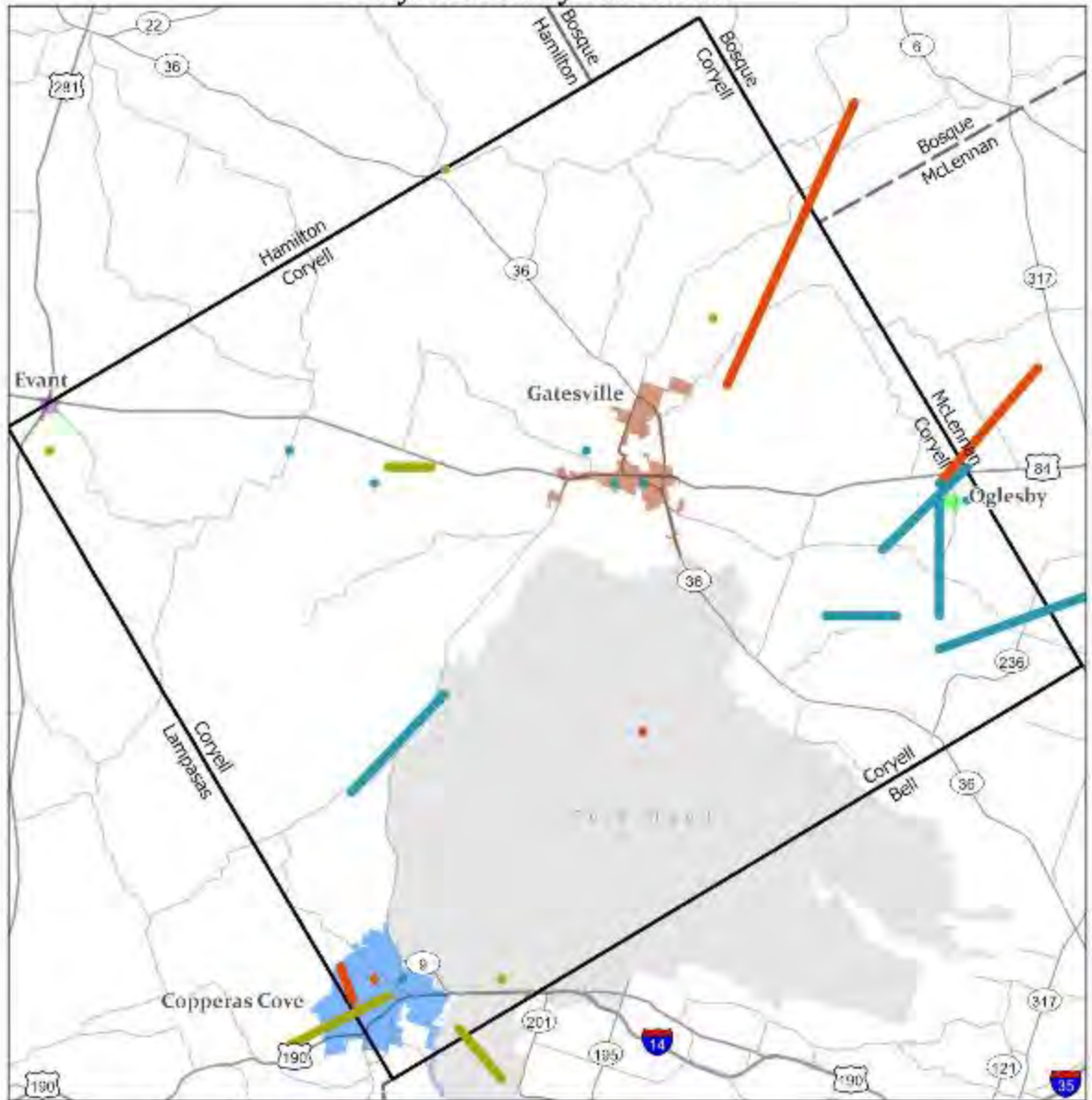
9/26/1976	15:18	1	0	0
5/2/1977	15:40	1	0	0
9/15/1977	00:10	2	0	0
10/15/1979	18:15	1	0	0
6/2/1987	12:47	0	0	0
10/1/1988	18:10	1	0	0
5/17/1989	07:10	1	0	0
5/17/1989	07:37	1	0	0
4/5/1990	22:10	0	0	0
5/26/1994	16:43	0	0	0
4/19/1995	19:53	0	0	0
4/19/1996	18:30	0	0	0
9/19/1996	20:15	0	0	0
5/30/1997	16:54	1	0	2
4/26/1998	16:55	0	0	0
4/26/1998	17:45	0	0	0
10/17/1998	10:17	2	0	0
5/5/2006	23:06	0	0	0
5/5/2006	23:08	0	0	0
12/29/2006	13:01	1	0	0
3/30/2007	15:36	1	0	0
4/8/2008	19:18	0	0	0
9/8/2010	03:18	0	0	0
5/21/2011	15:24	0	0	0
5/25/2015	13:06	1	0	0
1/15/2017	17:45	2	0	0
5/1/2019	20:25	0	0	0
6/9/2019	17:24	2	0	0
4/12/2022	16:04	UNK	0	0

Figure 29. Tornado locations in Coryell County identified by EF Scale, where lines indicate the location and scale of tornado tracts.

# Coryell County Hazard Mitigation Plan 2023



## Coryell County Tornadoes



### Legend

Boundary		EF Scale	
	Coryell County		0
	Copperas Cove		1
	Evant		2
	Gatesville		
	Oglesby		





## **Probability of Future Events**

Based on historical records, Coryell has experienced 37 tornado events in the 66-year time span indicating that a tornado event occurs in the Planning Area once every 1.8 years (National Weather Service 2023; 66-time span divided by 37 tornado events). This frequency supports a likely probability that the Planning Area will experience either an EF1 or EF2 tornado in the future. Some studies predict that climate change may drive more frequent severe weather, and that tornados are likely to increase in frequency, coinciding with warmer temperatures in Coryell County.

### ***Climate Change***

The fourth National Climate Assessment summarizes the complicated relationship between tornados and climate change: “Some types of extreme weather (e.g., rainfall and extreme heat) can be directly attributed to climate change. Other types of extreme weather, such as tornados, are also exhibiting changes that may be linked to climate change, but scientific understanding isn’t detailed enough to project direction and magnitude of future change.” In other words, we still have a lot to learn about how climate change might affect tornados (U.S. Global Change Research Program 2018).

There is increasing evidence linking global warming to changes in severe weather that gives rise to tornados. Observational data indicate detectable increases in tornado risk over the past few decades. There are several factors that contribute to tornados and tornado outbreaks in the last decade, which are influenced by climate change.

### **Vulnerability**

Tornados could occur anywhere in Coryell County, so all existing and future structures, facilities, and populations in the County (all jurisdictions included in this HMP) are considered vulnerable to tornado hazards and could potentially be impacted. Tornado damage can be a result of high wind velocity directly impacting objects and structures or indirectly by debris flying from the damaged structures or other objects. The power of tornados can be great enough to send large objects over long distances.

Mobile homes or manufactured housing are particularly vulnerable. Many mobile homes or manufactured housing units are not anchored to the ground and may allow tornado winds to lift or roll over the structure. Larger and multistory structures such as multifamily housing units (apartments), schools, office buildings, factories, etc. with larger footprints are more vulnerable because they present a larger target for severe winds.

A significant threat to people exists if they are inside a structure that is damaged by a tornado. This is particularly concerning for school districts that typically have a large concentration of children and employees in a few buildings during the springtime. Tornados also pose a threat to people who are in the open or exposed to flying debris. Debris from

# Coryell County Hazard Mitigation Plan 2023



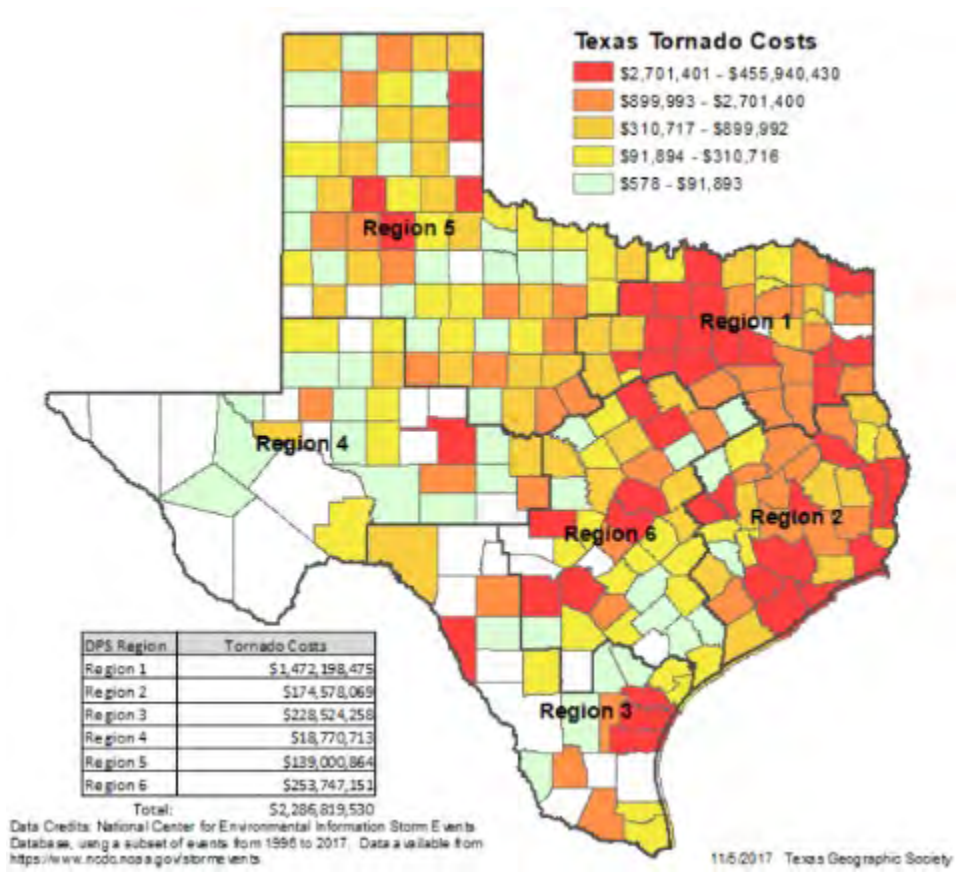
damaged buildings, damaged above-ground powerlines, trees/branches, damaged vehicles, etc. can cause a variety of injuries and even deaths in the United States.

The prison facilities located in Coryell County (discussed in the County Profile Section) would be more vulnerable to tornado damage due to their size/building(s) footprint. Older homes can also be more vulnerable to damage from tornadoes because of the building materials and building codes associated with older structures. Roads and bridges could be damaged and/or destroyed. Roads could be rendered unpassable from debris such as downed trees, downed powerlines, debris from damaged structures, damaged or abandoned vehicles.

## Impacts

Impacts from tornadoes depend on the severity associated with the scale (EF number) and where the tornado damage is located. For tornadoes in Texas over a 10-year period, 2010-2020; it cost over \$1.6 billion in damages and resulted in 35 deaths (NCEI 2023). For Texas Region 6 (encompassing Coryell County) from 1996 – 2017, Texas tornado costs were \$253,747,151. Coryell County tornado damages costs ranged from \$310, 717 to 899,992 (Texas Hazard Mitigation Plan 2018).

Figure 30. Costs of tornado damage in Texas counties for 1998-2017, derived from the Texas Hazard Mitigation Plan 2018.



# Coryell County Hazard Mitigation Plan 2023



Although tornados do not typically produce widespread damage throughout a region, they pose a significant risk to the population and its resources where they actually occur. These impacts could be expected in the immediate and adjacent areas of the tornado.

## ***People***

- Those in the vicinity of a tornado could be struck by flying debris, objects, downed trees, or tree limbs.
- Emergency personnel, utility workers, public works personnel, and other professions could have limited access to areas due to downed trees.
- Tornados can damage or destroy residential structures leaving residents without shelter for a short or long term.
- Damaged areas contain numerous hazards as first responders enter sites. They can be exposed to downed power lines, hazardous materials, and generally unsafe conditions to traverse through.
- Downed power and communication lines may impact first responders' ability to effectively respond to disasters.

## ***Utility Systems***

- Tornados result in localized or widespread power and communication outages.
- Water suppliers may have damaged or destroyed infrastructure providing services to residents.

## ***Infrastructure and Property***

- Structures, vehicles, and other property can be damaged by direct wind damage or by falling trees, limbs, and debris.
- Mobile and manufactured homes can be lifted from the surface causing substantial damage compared to site-built homes and buildings.

## ***Economy***

- Damages to business and government services can cause loss of revenue for residents.
- Inaccessible roads and utility outages can cause loss of revenue even to those not directly impacted by tornado.
- Displaced residents may not be able to return to work, slow economic recovery.

## ***Environment***

- Tornados could destroy trees and vegetation in undeveloped areas creating a negative impact on food and habitat for wildlife.

## ***Climate***

- Climate change can be linked to changes in severe weather and increasing tornado activity.



## *Land Use and Development*

The effects of changes in land use and development negatively alter the future impacts of a tornado on the vulnerable assets for each participating jurisdiction by putting the residents and their structures at an increased risk of being impacted by a tornado. With more development, such as the building of new homes or ranch and agricultural development, it is likely that in the event of a tornado, they could be negatively impacted. The County is currently developing a Land Use Plan through funding from the Texas General Land Office (GLO) through the Resilient Communities Program (RCP). Upon completion of the RCP, all participating jurisdictions will better understand the impacts of changes in land use and development and these impacts will be addressed in future HMP updates.

The impacts to the community and its assets will depend on the scale of the event, where it occurs, what is damaged, costs of repair and replacement, and lost business days. It can be difficult to assess the impacts that are inflicted on people who suffer even minor damage to their properties or have their lives disrupted while tornado recovery occurs because these details are usually not reported or documented. The level of preparedness and planning done by the jurisdictions and its residents will contribute to reducing the overall impact a tornado can have.

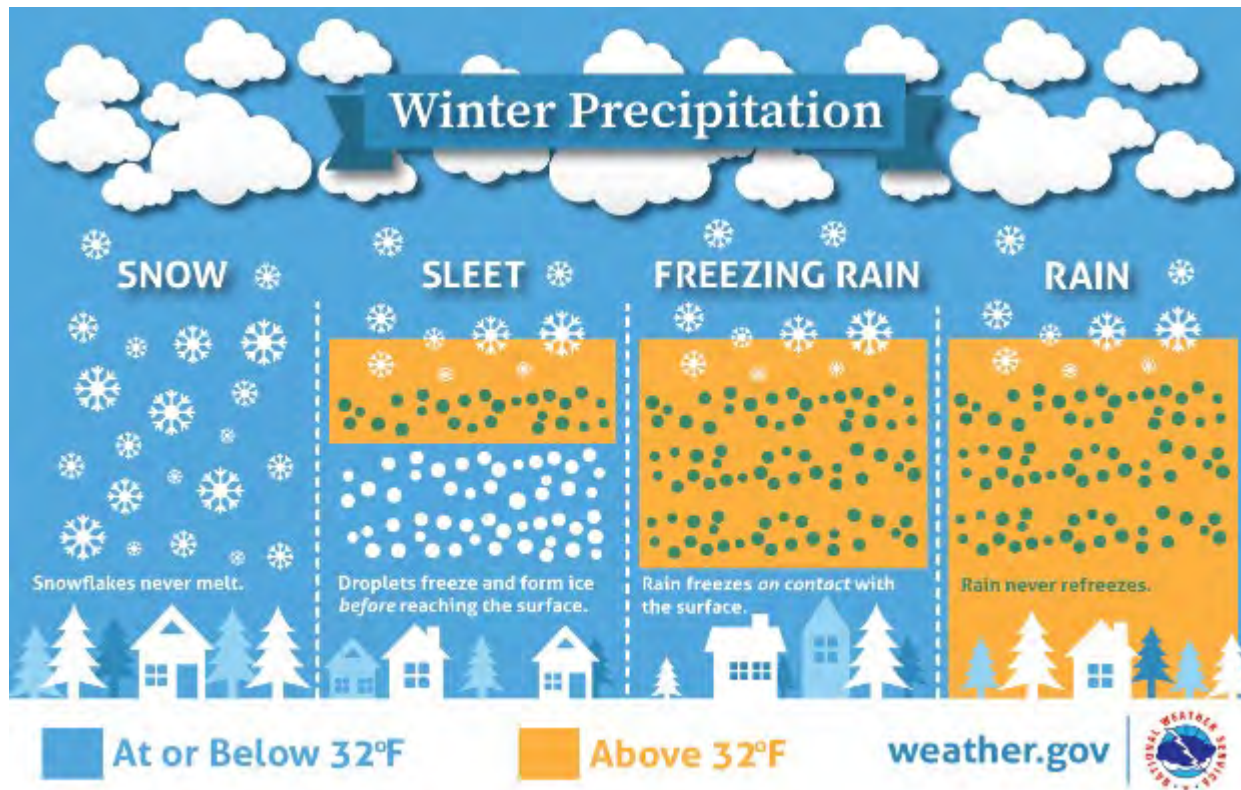
## **Chapter 10: Winter Storm**

### **Hazard Description**

The 2018 State of Texas Hazard Mitigation Plan defines severe winter weather as heavy snow and blizzards, sleet, ice storm (or freezing rain), frost/freeze, or a mix of these. Extreme cold is also included since it often accompanies severe winter storms; however, extreme cold can also be independent of winter storms. In Texas, heavy snowfall is considered to be an accumulation of 4 or more inches of snow in a 12-hour period. When there is a combination of strong winds exceeding 35 mph and blowing snow, it is referred to as a blizzard. Similarly, an ice storm is characterized by freezing rain colliding with a cold, dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces. Damage can often occur with just half an inch of rain freezing on trees and utility wires; the damage increases if there are also high winds. Because of this, an icing event is categorized as an ice storm totaling half an inch or more.



Figure 31. Diagram of winter precipitation types from National Weather Service.



According to the NWS, a winter weather event is a phenomenon in which winter weather (e.g., snow, sleet, ice, and wind chill) impacts public safety. Winter weather that may cause significant impact within 3 to 7 days and eventually lead to the issuance of a watch or warning is contained in the Hazardous Weather Outlook. When the risk of a winter weather event increases, a *watch* is typically issued within 24 to 72 hours. There are also *warnings*, which are issued when a winter weather event is occurring, is imminent, or has a very high probability of occurrence. Warnings typically indicate winter conditions that pose a threat to life and property. Similarly, an *advisory* is issued when a winter weather event is occurring, is imminent, or has a very high probability of occurrence; however, the winter conditions are expected to be less severe than a warning and cause more of an inconvenience. Please note that if caution is not exercised, advisories could lead to situations that may threaten life and property, according to the National Weather Service. See Table 32 for the categories of winter watches, warnings, and advisories.

Table 32. Winter weather terminology and descriptions from the National Weather Service.

Watch Type	Watch Description
Winter Storm Watch	Conditions are favorable for a winter storm event (heavy sleet, heavy snow, ice storm, heavy snow and blowing snow or a combination of events) to meet or exceed local winter storm warning criteria in the next 24 to 72 hours. Criteria for snow is

# Coryell County Hazard Mitigation Plan 2023



	7 inches or more in 12 hours or less; or 9 inches or more in 24 hours covering at least 50% of the zone or encompassing most of the population. Use "mid-point" of snowfall range to trigger a watch (i.e., 5 to 8 inches of snow = watch). Criteria for ice is 1/2 inch or more over at least 50 percent of the zone or encompassing most of the population. This includes lake effect snow.
Wind Chill Watch	Conditions are favorable for wind chill temperatures to meet or exceed local wind chill warning criteria in the next 24 to 72 hours. Wind chill temperatures may reach or exceed -25°F.
Warning Type	Warning Description
Blizzard Warning	A blizzard event is imminent or expected in the next 12 to 36 hours. Sustained wind or frequent gusts greater than or equal to 35 mph will accompany falling and/or blowing snow to frequently reduce visibility to less than 1/4 mile for 3 or more hours.
Ice Storm Warning	An ice storm event is expected to meet or exceed local ice storm warning criteria in the next 12 to 36 hours. Criteria for ice is 1/2 inch or more over at least 50% of the zone or encompassing most of the population.
Winter Storm Warning	A winter storm event (heavy sleet, heavy snow, ice storm, heavy snow and blowing snow or a combination of events) is expected to meet or exceed local winter storm warning criteria in the next 12 to 36 hours. Criteria for snow is 7 inches or more in 12 hours or less; or 9 inches or more in 24 hours covering at least 50% of the zone or encompassing most of the population. Use "mid-point" of snowfall range to trigger warning (i.e., 5 to 8 inches of snow = warning). Criteria for ice is 1/2 inch or more over at least 50% of the zone or encompassing most of the population.
Lake Effect Snow Warning	A lake effect snow event is expected to meet or exceed local lake effect snow warning criteria in the next 12 to 36 hours. Widespread or localized lake induced snow squalls or heavy snow showers which produce snowfall accumulation to 7 or more inches in 12 hours or less. Lake effect snow usually develops in narrow bands and impacts a limited area within a forecast zone. Use "mid-point" of snowfall range to trigger warning (i.e., 5 to 8 inches of snow = warning).
Wind Chill Warning	Wind chill temperatures are expected to meet or exceed local wind chill warning criteria in the next 12 to 36 hours. Wind chill temperatures may reach or exceed -25°F.
Advisory Type	Advisory Description



<p>Winter Weather Advisory</p>	<p>A winter storm event (sleet, snow, freezing rain, snow and blowing snow, or a combination of events) is expected to meet or exceed local winter weather advisory criteria in the next 12 to 36 hours but stay below warning criteria. Criteria for snow is 4 inches or more in 12 hours or less covering at least 50% of the zone or encompassing most of the population. Use "mid-point" of snowfall range to trigger advisory (i.e., 2 to 5 inches of snow = advisory). Criteria for ice is any ice accumulation less than 1/2 inch over at least 50% of the zone or encompassing most of the population. Winter Weather Advisory can also be issued for black ice. This is optional.</p>
<p>Wind Chill Advisory</p>	<p>Wind chill temperatures are expected to meet or exceed local wind chill advisory criteria in the next 12 to 36 hours. Wind chill temperatures may reach or exceed -15°F.</p>

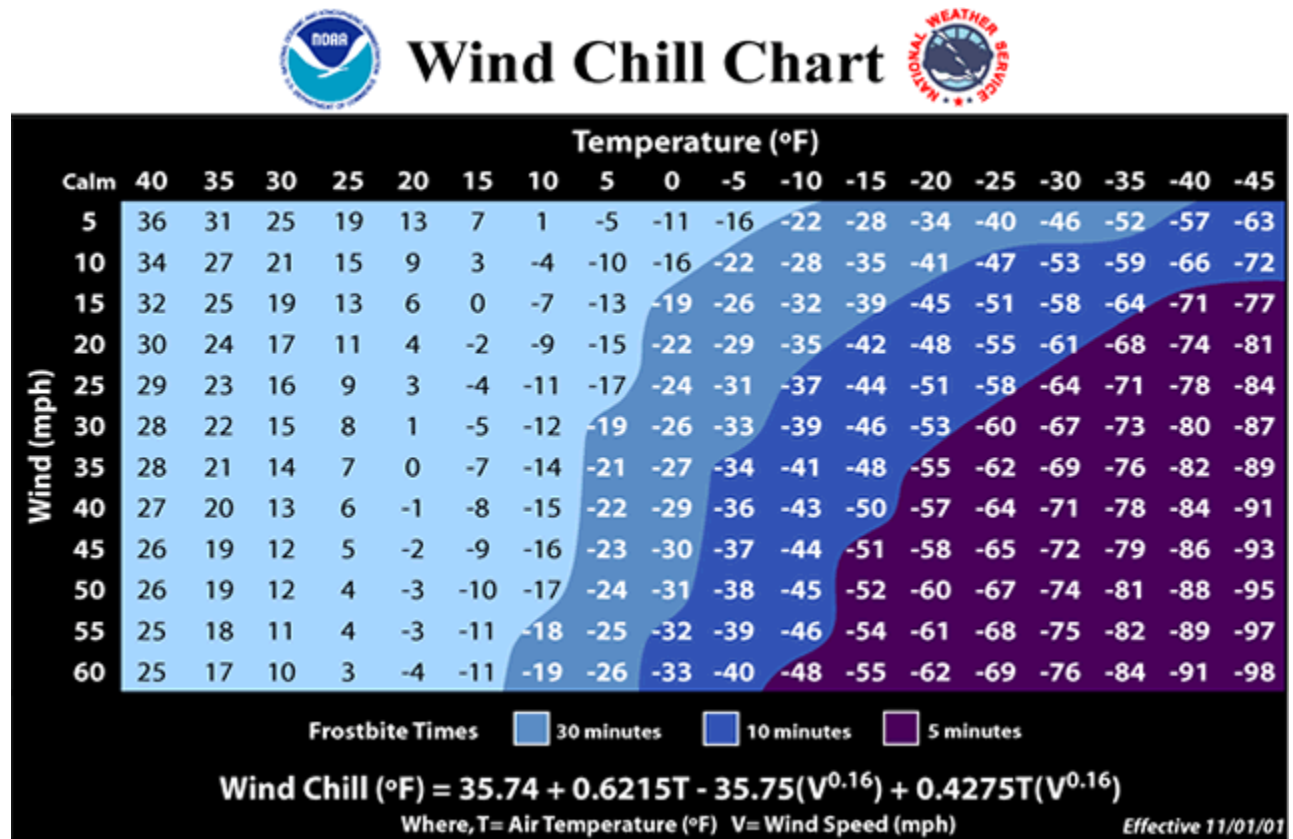
**Location**

The occurrence of a winter storm was analyzed in all participating jurisdictions in the Planning Area. It was concluded that a winter storm occurs or could occur in all participating jurisdictions and has or could impact all existing and future critical infrastructure and facilities, residents, and their property in Coryell County. Winter storms occurring in Coryell County are not restricted to specific geographic areas and have or could occur anywhere in the County.

**Extent**

The extent or magnitude of a severe winter storm is measured in intensity, based on the temperature and level of snow, sleet, and ice accumulations. The NWS describes the magnitude of severe winter storms in conjunction with wind chill to determine the intensity of a winter storm (Figure 32).

Figure 32. Wind chill chart depicting wind chill resulting from temperature and wind speed. Figure from National Weather Service.



### Historical Occurrences

Winter storms are a common occurrence in some parts of Texas; however, severe winter storms are rare. Snow has been reported on occasion in every county in Texas. In addition to snow events, freezing rain is highly disruptive to vehicular travel and to electric power transmission. Freezing rain is most common in the northeastern part of the state.

In the southern portion of the state and in coastal regions snow is rare, but accumulations of snow are still possible. Given the size of Texas, it is rare for individual snowstorms to affect most of the state simultaneously, but there is a recent example of a winter storm affecting most of Texas during a single event (Neilson-Gammon 2021).

Winter Storm Uri was an unprecedented weather event affecting most of Texas that turned into a declared disaster. Winter Storm Uri occurred throughout Texas on February 11-21, 2021. It was one of only four snowstorms in the historical record to have brought measurable snow to most of the state. On February 19, 2023, FEMA issued disaster declaration 4586-DR-TX. Millions of Texans lost power and snow and ice paired with ultra-low temperatures



# Coryell County Hazard Mitigation Plan 2023



caused widespread road closures and dangerous travel conditions. State emergency management leaders activated warming centers in communities across Texas and numerous personnel were deployed to assist stranded motorists and conduct welfare checks.

Coryell County also declared a local disaster due to impacts from Winter Storm Uri. According to Order No. 2021-02:

*During the period of February 11-19, 2021, Coryell County and the state of Texas experienced a winter storm on a scale of severity which has never been experienced in the history of this state. New record low temperatures were reached, new records for consecutive days and hours below freezing, and the historic scope of the severe weather impacting all 254 Counties in the State simultaneously. The result of the severe winter weather has had a devastating impact on the Cities, Towns, Communities, and especially the Citizens of Coryell County.*

## **Probability of Future Events**

Weather experts note that extreme wintertime cold is more variable than other types of temperature extremes, so significant cold winter temperatures will continue to be possible even as overall warming trends continue. The probability of winter storms would remain stable, and the weather trends would continue to be variable—even as overall temperatures rise in all seasons (Neilson-Gammon 2021).

The probability for winter storms based on historical records is high. The Coryell County planning area, including all participating jurisdictions, has experienced approximately one winter storm event per year. Therefore, the probability of a future winter storm event affecting the Coryell County planning area, including all participating jurisdictions, is highly likely. Coryell County, like most areas in north Central Texas, has a high probability to experience a winter storm on an annual basis.

## ***Climate Change***

Temperatures are warming during all seasons. In many regions, winters are warming faster than any other season. Climate Central reports that winters across the contiguous United States have warmed by an average of nearly 3°F over the last half of the century (Climate Central 2023).

Extreme precipitation events appear to be increasing in frequency in Texas, and more broadly across other parts of the U.S. Consequently, the increasing temperatures that lead to increase evaporation and thus increased precipitation, can also be expected to lead to increased snowfall as well.” Additionally, Research suggests that increases in average global temperatures and average Arctic temperatures, the jet stream may also change, slowing down and growing wavier. Changes in the jet stream may allow extremely cold Arctic air to advance farther south than usual in the winter months, and may affect areas that are not

accustomed to low temperatures for longer periods of time. Though on average winters are predicted to be shorter and warmer, many areas are predicted to continue to experience significant cold weather over time (Climate Reality Project 2022). Climate Change could increase the probability, severity, and impacts of winter storms in each jurisdiction in Coryell County.

## Vulnerability

Winter storms present extended periods of extreme cold and freezing temperatures. All water lines, both indoor and outdoor, could be impacted by freezing temperatures for extended periods of time. Water lines (inside structures), outdoor faucets and pipes freeze and crack and cause significant water damage once the water thaws and leaks from the damaged pipe.

During winter storms, precipitation freezes and becomes snow, sleet, or ice. Liquid precipitation also forms on surfaces when the air temperature is below the freezing point. Ice forming on surfaces could also accumulate on above ground power lines, causing them to break under the weight of the ice. Ice can also accumulate on trees and cause tree limbs to fall onto above ground electric lines. These events can disrupt electric service for prolonged periods.

Figure 33. The 4 P's of cold weather, from the City of Copperas Cove.





# Coryell County Hazard Mitigation Plan 2023



Economic impacts from winter storms may occur due to increased costs to heat homes and businesses. House fires may occur from increased and improper use of alternate heating sources such as space heaters, fireplaces, etc. Fires during winter storms also present added danger because water supplies could be impacted by freezing weather and roads could be impassable due to snow and ice and impede firefighting efforts. Power outages may result from a variety of natural (ice buildup on power lines) or man-made (failures of the Texas Grid) reasons. In Coryell County, all populations, buildings, critical facilities, and infrastructure in the jurisdictions covered by this HMP are vulnerable to severe winter events of all types, duration and magnitude.

## Impacts

Impacts from winter storms and extreme winter weather occur county-wide. The occurrence of winter storms was analyzed in all participating jurisdictions in the Planning Area. It was concluded that winter storm occurs or could occur in all participating jurisdictions and has or could impact all existing and future critical infrastructure and facilities, residents, and their property in Coryell County. Figure 34 from the National Weather Service provides descriptions of potential impacts from winter storms in Texas.

According to an estimate from the Texas A&M AgriLife Extension Service, Texas agriculture experienced losses of more than \$608 million from Winter Storm Uri. AgriLife Extension found that ranchers not only lost

Figure 34. Potential impacts associated with winter storms. Information from the National Weather Service.

<b>Potential Winter Storm Impacts</b>	
	<p><b>Winter Weather Area</b>  <b>Expect Winter Weather.</b>  <ul style="list-style-type: none"> <li>• Winter driving conditions. <b>Drive carefully.</b></li> </ul> </p>
	<p><b>Minor Impacts</b>  <b>Expect a few inconveniences to daily life.</b>  <ul style="list-style-type: none"> <li>• Winter driving conditions. <b>Use caution while driving.</b></li> </ul> </p>
	<p><b>Moderate Impacts</b>  <b>Expect disruptions to daily life.</b>  <ul style="list-style-type: none"> <li>• Hazardous driving conditions. <b>Use extra caution while driving.</b></li> <li>• Closures and disruptions to infrastructure may occur</li> </ul> </p>
	<p><b>Major Impacts</b>  <b>Expect considerable disruptions to daily life.</b>  <ul style="list-style-type: none"> <li>• Dangerous or impossible driving conditions. <b>Avoid travel if possible.</b></li> <li>• Widespread closures and disruptions to infrastructure may occur</li> </ul> </p>
	<p><b>Extreme Impacts</b>  <b>Expect substantial disruptions to daily life.</b>  <ul style="list-style-type: none"> <li>• Extremely dangerous or impossible driving conditions. <b>Travel is not advised.</b></li> <li>• Extensive and widespread closures and disruptions to infrastructure may occur.</li> <li>• Life-saving actions may be needed.</li> </ul> </p>

cattle, sheep, goats, and poultry to the extreme cold, but much of their grazing grain was lost

# Coryell County Hazard Mitigation Plan 2023



as well. The latter left ranchers with few options except to buy additional feed, which was an expense that few ranchers had prepared for in 2022. Livestock producers also incurred additional losses when Winter Storm Uri hit Texas because it occurred during birthing season and led to the loss of many newborn calves. Overall, AgriLife Extension tallied economic losses to ranchers in Texas at nearly \$228 million.

During the winter storm in February 2021, 69% of Texans reported losing power at some point during Feb. 14-20, and 49% percent reported experiencing disruptions in water service. The February 2021 storm was estimated to have contributed approximately 210 deaths, and the financial losses from storm impacts were estimated to reach as much as \$80-\$130 billion (Watson et al 2021).

The effects of changes in land use and development negatively alter the future impacts of a winter storm on the vulnerable assets for each participating jurisdiction by putting the residents and their structures at an increased risk of being impacted by a winter storm. With more development, such as the building of new homes or ranch and agricultural development, it is likely that in the event of a winter storm, they could be negatively impacted. The County is currently developing a Land Use Plan through funding from the Texas General Land Office (GLO) through the Resilient Communities Program (RCP). Upon completion of the RCP, all participating jurisdictions will better understand the impacts of changes in land use and development and these impacts will be addressed in future HMP updates.

## **Chapter 11: Drought**

### **Hazard Description**

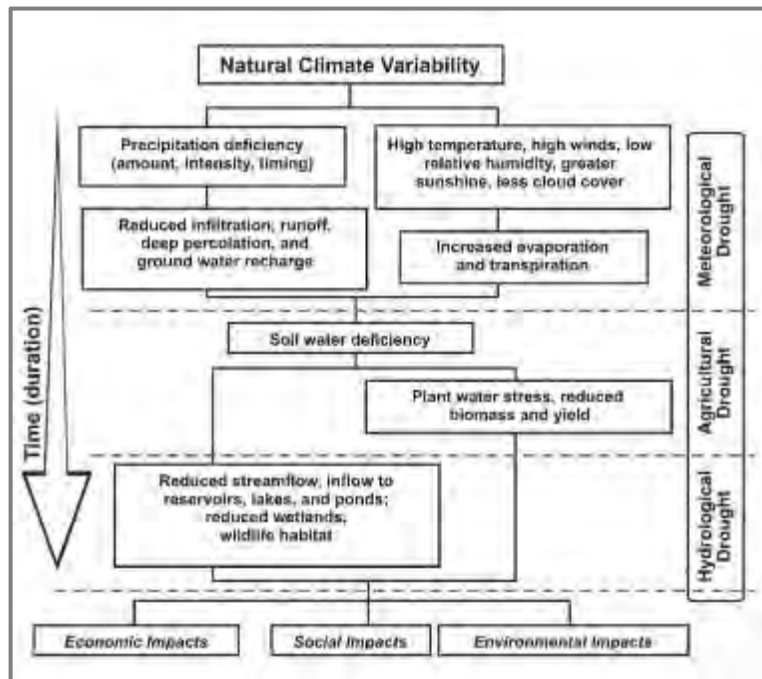
Drought can generally be defined as a deficiency of precipitation over an extended period (University of Nebraska 2023). However, there is no standard definition quantifying the deficiency or the time to be considered a drought. Drought affects people and resources in diverse ways during its duration. It is difficult to define and virtually impossible to determine when it starts and ends in real time. The lack of a precise definition has led to misunderstanding and inaction among managers and policy makers.

The occurrence of drought was analyzed in all participating jurisdictions in the Planning Area. It was concluded that drought occurs or could occur in all participating jurisdictions, and has or could impact all existing and future critical infrastructure and facilities, residents, and their property in Coryell County.

Drought can be subdivided into four types based on physical impacts. These are meteorological, agricultural, hydrological, and socioeconomic (Wilhite and Glantz 1985).

Meteorological drought refers to the lack of precipitation or a deviation below the average precipitation for a region. All other drought definitions stem from meteorological description of drought. Agricultural droughts use agricultural impacts as the defining characteristics. Metrics involving plant and soil properties are common indicators of agricultural droughts. Hydrological droughts are defined by impacts to surface and subsurface water levels. Hydrological droughts are typically out of sync with other drought indicators. Symptoms of meteorological and agricultural droughts are usually apparent before the impacts of hydrological droughts are observed. Socioeconomic drought occurs when the supply or demand of an economic good is influenced by any or all elements of meteorological, agricultural, and hydrological drought (University of Nebraska 2023).

Figure 35. Drought categories and impacts, from Wilhite and Glantz 1985.



## Extent

In 1999, NOAA, USDA, and the National Drought Monitor Center (NDMC) coordinated to produce and maintain a drought monitoring product that would incorporate weather data coupled with other federal, state, and local level drought indicator data to improve drought monitoring across the U.S. (Svoboda et al 2002). The drought monitor itself is not a single index but a composite of data that includes various indices, numerical models, and input from regional and local experts around the country. Output from this effort is classified into categories associated with impacts and depict the severity of a drought in a region. These categories help define the type of drought and the impacts associated with each (Table 33). As of January 2023, Coryell County is experiencing D2 and D3 categories of drought (University of Nebraska 2023b; Figure 36).

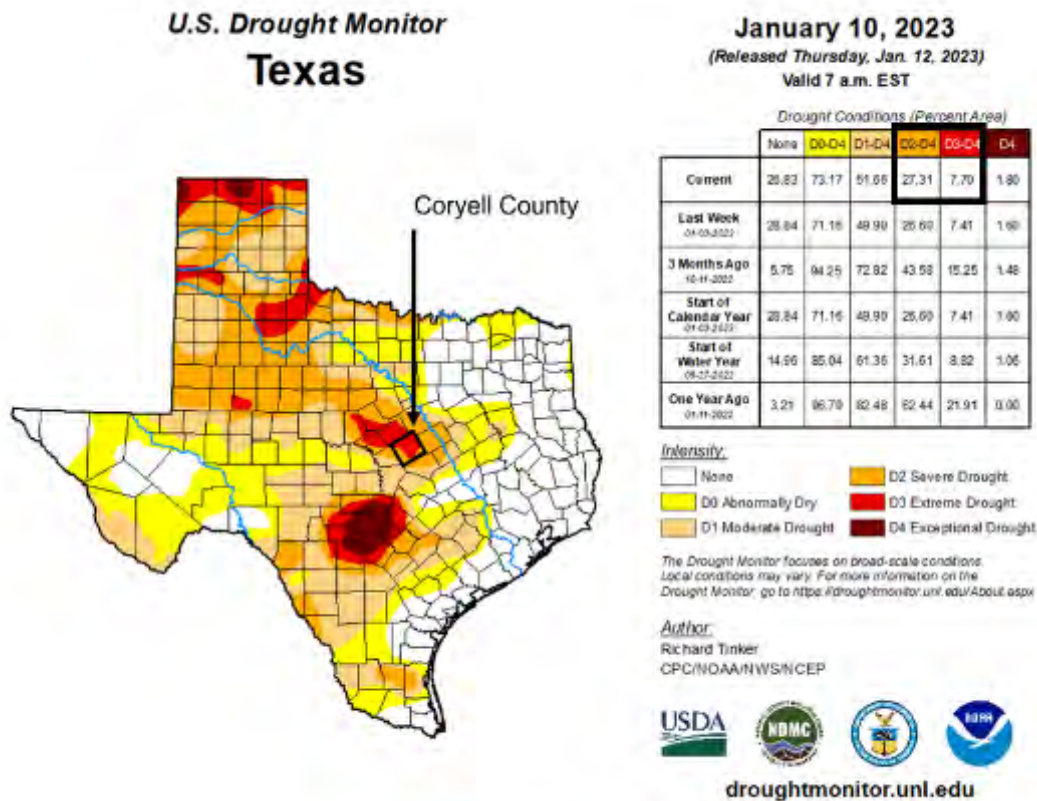
# Coryell County Hazard Mitigation Plan 2023



Table 33. Drought categories and associated impacts, from NOAA and NIDIS Drought Impacts.

Category	Meteorological	Agricultural	Hydrological
D0	Abnormally dry	Slows farm activity and crop/pasture growth	Streamflow below average
D1	Drought – Moderate	Some damage to crops and pastures	Streamflow, reservoir and well levels are low
D2	Drought – Severe	Crop and pasture losses likely	Water shortages common; water restrictions imposed
D3	Drought – Extreme	Major crop/pasture losses	Widespread water shortages and restrictions
D4	Drought – Exceptional	Exceptional and widespread crop/pasture losses	Shortage of water in stream, reservoirs, and wells creating emergencies

Figure 36. The U.S. Drought Monitor for Texas with all the drought categories represented throughout the state (University of Nebraska 2023b).







## Location

The risks that are a result of drought exist throughout the Coryell County Planning Area, including all participating jurisdictions and types of community assets. The most common risks are economic damages to property, especially crops and livestock, as well as natural resources. Drought often causes crops to suffer significant yield losses and/or increased irrigation expenses. Many livestock operations throughout the Planning Area rely on rain filled stock tanks for water and native forage for grazing. As drought intensifies, these water tanks dry up along with available forage and forcing producers to either provide alternative water and feed or reduce stocking rates. Consequently, the rural parts of the County are at the greatest risks of drought.

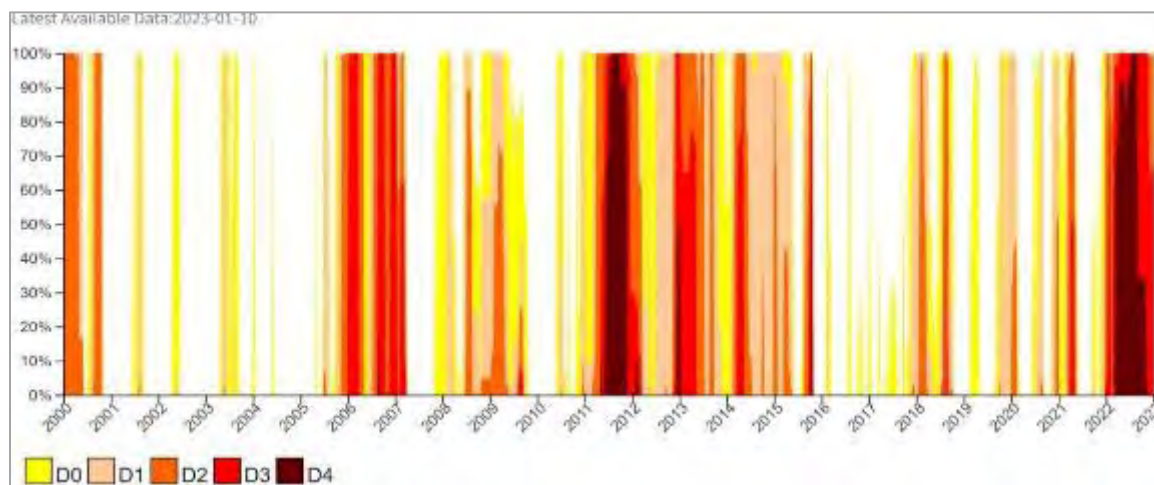
Table 34. The Drought Monitor 1,202 Weekly Reports in Coryell County, 2000 to 2023 (University of Nebraska 2023b).

Category	# of Weekly Reports	Percentage of 1,202 Reports
No Drought	438	36%
D0 or higher	764	64%
D1 or higher	595	50%
D2 or higher	398	33%
D3 or higher	181	15%
D4 or higher	70	6%

## Historical Occurrences

The National Integrated Drought Information System (NIDIS) monitors drought occurrences over time at the County level. For each County, the percentage of each category is calculated on a weekly basis. From the beginning of 2000 through 2022, approximately 1,202 weekly descriptions of drought were analyzed (NIDIS 2023; Figure 37).

Figure 37. The percentage of Coryell County that experienced D0 to D4 levels of drought (y axis) and year of occurrence (x axis) from 2000-2023. Obtained from NIDIS 2023.



# Coryell County Hazard Mitigation Plan 2023



An analysis of individual drought types indicates that drought frequently occurs in Coryell County. These droughts can be short or long in duration. When a drought is shorter in duration, the impacts depend on what time of year the drought occurs. For example, if a short-term drought occurs in the spring or summer months, warm season crops such as sorghum and corn may suffer the most. Conversely, a fall or winter drought would impact winter crops such as wheat or oats planted for grazing more. Long term droughts tend to impact crops and livestock in any season and eventually water supplies affecting other community assets including the public water supply.

When historically considering only meteorological drought metrics, the six-month span from March to August reveals that 2011 and 1954 were the driest in history for Coryell County (NCEIC 2023; Table 35). The 2011 span is represented by the first dark red area in Figure 37. Three of the driest spans were within the last 15 years (Table 36). Significant droughts that impact agriculture in Coryell County are shown in Table 36 (U. S. Department of Agriculture). Although 2011 and 2022 were the driest in recent years, the 2022 and 2018 droughts had the biggest crop losses after planting in terms of crop insurance claims. For 2011, the drought began during the planting season in the fall of 2010 causing a reduction in acres planted for the 2011 season which reduced the overall crop production. Despite the lowered baseline, 2011 drought was a close 3<sup>rd</sup> in crop insurance claims due to drought. All aspects of agriculture production, including crops and livestock, declined throughout the 2010 to 2012 years as a result of the 2011 drought.

*Table 35. Top 10 driest years (since 1895) in Coryell County, March to August.*

<b>Drought Year</b>	<b>March to August Precipitation (In.)</b>
2011	5.61
1954	7.45
1901	7.68
1925	8.48
1896	9.21
2022	9.22
1956	9.31
2018	10.2
1913	10.23
1943	10.27



# Coryell County Hazard Mitigation Plan 2023



Table 36. Significant agriculture drought years. Acres and cost are the total amount of crop insurance claims in Coryell County.

Year	Acres	Cost
2006	8,118	\$400,807
2011	10,833	\$1,605,121
2013	6,464	\$598,384
2018	11,914	\$1,749,940
2022	19,583	\$3,797,574

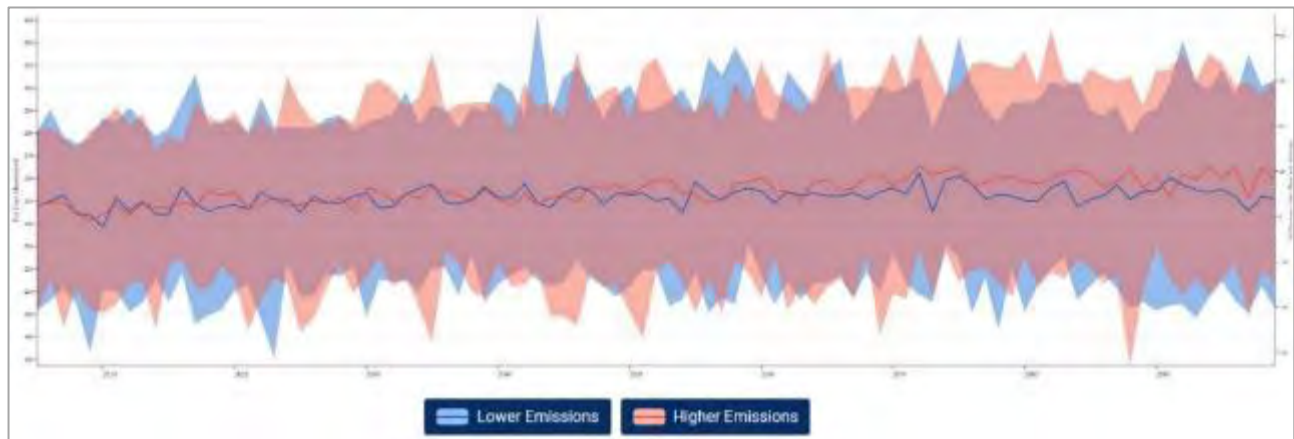
## Probability of Future Events

Coryell County experiences some level of drought over 60% of the time (Table 34). Most of these occurrences are not extreme or long-lasting droughts. The County has experienced extremely dry periods in recent years as shown in Table 36 resulting in significant economic impacts. Based on historical events and trends, the Planning Area is highly likely to experience some level of drought every year and at least moderate (D2) to severe (D4) drought in the next 5 years.

### *Climate Change*

Climate change may increase the frequency or intensity of hazards over time (National Environmental Modelling and Analysis Center (NEMAC) 2023). Projections for two long-term climate scenarios were calculated for dry days. Dry days are defined as the number of days in a year that receive less than 0.01 inch of rain. From 1961 to 1990, the average number of dry days per year was 243. For these projections, two harmful emissions scenarios are assessed. One scenario describes a future in which humans stop increasing harmful emissions by 2040 and then continue to reduce emissions through the end of the century (Lower Emissions). The second scenario describes a future in which harmful emissions continue to increase through the end of the century (Higher Emissions). The trend for the number of dry days per year is generally consistent over time and the two emission scenarios have only a slight impact on dry days in Coryell County over the next 80 years (NEMAC 2023).

Figure 38. Predicted dry days per year in Coryell County, through 2100 (NEMAC 2023).



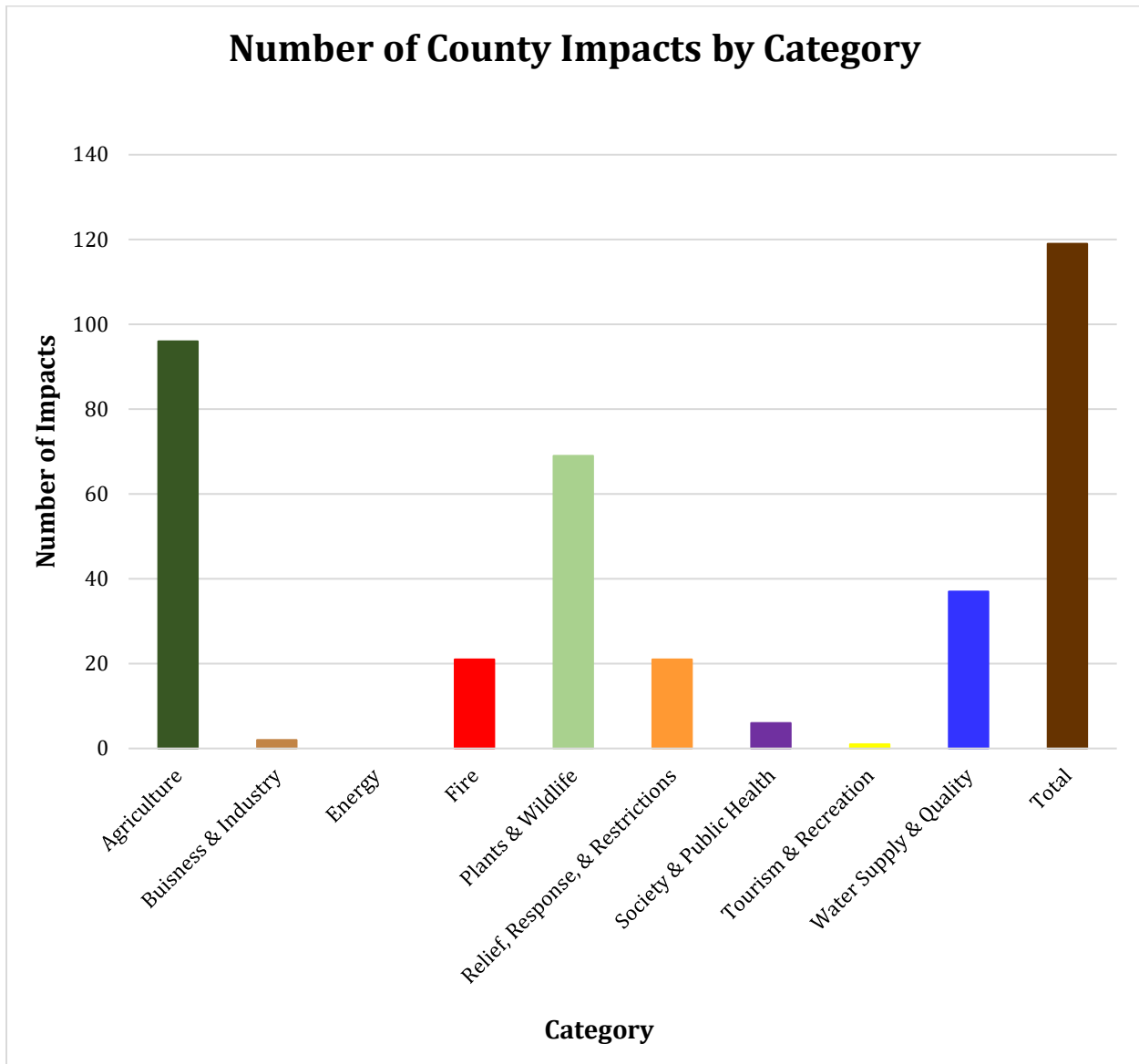
## Vulnerability

Drought occurs in all jurisdictions, impacting all community assets of the Planning Area. Public infrastructure, private property, the natural environment, and public health and welfare are all vulnerable to drought. Coryell County is particularly vulnerable to drought due to the large agriculture economy that relies on rainfall for production. If the drought lasts over several years, the impacts can span many sectors of the economy and have direct and indirect impacts to all community assets. Crop and livestock losses in the agriculture industry have been significant in the past and continue to be at risk. Dry ground caused by drought can impact foundations of buildings causing structural problems or damage. However, infrastructure and public health impacts are minimal as there has been limited property destroyed and no reports of injuries or fatalities due directly from drought.

## Impacts

A total of 119 drought impacts are recorded for Coryell County between 2005 and 2022 (National Drought Mitigation Center 2023). Coryell County has had more Agriculture and Plant/Wildlife impacts than all other types of impacts combined. Agriculture has had 96 impacts, plants/wildlife has had 69 impacts while all other categories (7) have had a total of 88 impacts. It should be noted that the sum of the individual category of impacts does not equal the total impacts. Some impacts can affect multiple categories. For example, a report of a decrease in white-tail deer population and harvest weight caused by drought would impact both the Plants/Wildlife category and Tourism & Recreation.

Figure 39. Categories and number of drought impacts (National Drought Mitigation Center 2023).



Drought has the potential to impact people, utilities, infrastructure, the economy, the environment, and climate. Severe water shortages can have far reaching impacts for a region and community. Specific impacts can include:

**People**

- Recreational activities may be limited or halted due to lack of water resources.
- Drought increases the risks for wildfires.
- Respiratory ailments may increase as the air quality degrades.
- Water management conflicts may arise as water availability decreases.
- Severe water shortages could propel demand beyond available supply.
- Limiting water resources could reduce water quality in available water.

## ***Utility***

- Utility providers may cut back services to prioritize critical needs.
- Utility suppliers could see a decrease in revenue as water supplies diminish.

## ***Environment***

- Fish and wildlife habitat will be degraded.
- Wildlife will concentrate in more desirable areas, creating an imbalance in the ecosystem.
- Severe drought can result in population reduction across all species.
- Plant and soil resources are more susceptible to wind erosion during drought.

## ***Economy***

- Crop and livestock production decreases as drought increases.
- Severe drought could lead to significant economic losses resulting in unemployment and/or loss of business.
- Limited water availability may lead to increased cost to provide water to livestock.
- Drought can impact future economic development.

## ***Land Use and Development***

The effects of changes in land use and development negatively alter the future impacts of drought on the vulnerable assets for each participating jurisdiction by putting the residents and their structures at an increased risk of being impacted by drought. With more development, such as the building of new homes or ranch and agricultural development, it is likely that in the event of drought, they could be negatively impacted. The County is currently developing a Land Use Plan through funding from the Texas General Land Office (GLO) through the Resilient Communities Program (RCP). Upon completion of the RCP, all participating jurisdictions will better understand the impacts of changes in land use and development and these impacts will be addressed in future HMP updates.

The overall economic and public health impacts of drought on the Planning Area will depend on the duration, intensity, demand for resources, and other factors. The level of awareness and preparedness in each jurisdiction and their citizens will impact the overall risk the public will be exposed to.

## **Chapter 12: Erosion (Riverine)**

### **Hazard Description**

Erosion is the collapse, undermining, or subsidence of land along the shore of a lake or other body of water (FEMA 2023). Riverine erosion is specific to streams and rivers and includes both the erosional and depositional processes. There are 4 types of riverine erosion, and

# Coryell County Hazard Mitigation Plan 2023



each contribute to stream channel deviations, potentially impacting community assets (Table 37). Erosion can be the result of natural or man-made events, and is often a combination of both. Large Floods and climatic changes are natural events, whereas urbanization and construction in or near the flood plain are man-made factors that contribute to erosion.

*Table 37. Types of riverine erosion.*

Type	Description
General Scour	Lowering of the streambed in a general area such as a consequence of a short-duration event such as a flood.
Local Scour	Lowering of the streambed due to localized phenomena such as a vortex formation around a bridge pier.
Deposition	Raising of a streambed caused by sediment deposition. An example is a sand bar formation after a flood.
Lateral Migration	Shifting of the streambank alignment due to the combination of the erosional and depositional processes. Streambank collapse and channel meandering often result from lateral migration.

## Extent

The intensity of Riverine erosion is generally measured by the extent or distance that erosion occurs in an area. Rosgen developed the Bank Erosion Hazard Index (BEHI) as a river and riparian management tool that identifies erosion risks on streambanks (Rosgen 2001). Several streambank characteristics have been identified that contribute to the process of erosion.

These variables include the bank height to bank-full height ratio, the vegetation root depth to bank height ratio, root density, bank angle, the various layers and types of soil and stream bank protection. Table 38 shows the hazard categories for each variable. Currently, the Leon River and Cowhouse creek have not been assessed and mapped using the BEHI, but these factors can be used as a guideline to assess risk on any streambank in the Planning Area.

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Table 38. Streambank erosion factors and corresponding risk categories (Rosgen 2001).

Risk of Streambank Erosion	Bank Height/ Bank Full Height	Root Depth/Bank Height	Root Density (%)	Bank Angle (°)	Surface Protection (%)
Very Low	1.0 – 1.1	1.0 – 0.9	100 – 80	0 – 20	100 – 80
Low	1.11 – 1.19	0.89 – 0.5	79 – 55	21 – 60	79 – 55
Moderate	1.2 – 1.5	0.49 – 0.3	54 – 30	67 – 80	54 – 30
High	1.6 – 2.0	0.29 – 0.15	29 – 15	81 – 90	29 – 15
Very High	2.1 – 2.8	0.14 – 0.05	14 – 5	91 – 119	14 – 10
Extreme	>2.8	< 0.05	< 5	>119	< 10

## Location

Riverine erosion occurs in streambeds, streambanks, and around bridge components when waterflow becomes rapid and compromises the soil. Figure 40 identifies the major streams and bridges within the Planning Area where riverine erosion could occur. Within the Planning Area, Unincorporated Coryell County, Gatesville, Gatesville ISD, Copperas Cove, and Copperas Cove ISD have the most miles of erodible streams with 489.9, 13.6, and 9.6 miles, respectively. Evant has just a small section (0.3 miles) and Oglesby has no major stream within its boundary. There are also 66 bridges located throughout the County that may be subject to local scour erosion.





## Historical Events

With erodible soils and rushing water, streambank erosion occurs regularly throughout the County. However, erosion causing significant damage to County assets is rare but can have devastating effects. Significant stream bank erosion events have occurred multiple times in Gatesville’s Faunt Le Roy Park. Flooding has caused the banks to erode to the point where it has damaged the road infrastructure inside the park (Figure 41 and Figure 42). Gatesville has received over \$1 million to fix the roads and park amenities (Roger Williams 2023).

*Figure 41. Guardrail damage from streambank erosion, Faunt Le Roy Park, 2018. Photo by Bill Parry.*



*Figure 42. Road surface damage from streambank erosion, Faunt Le Roy Park, 2019. Photo by kxxv.com.*



Stream channel deviations or re-routes can occur through a series of erosion events. First, streambank erosion occurs, leaving the root system of large trees near the bank exposed and vulnerable to falling into the stream. In a large flood event, if several trees fall in and get stuck along the path, a logjam can form, blocking the natural flow of the stream. This creates a



stream diversion or re-route of the flow and can permanently alter the flow of the stream. This causes areas of land to be inaccessible as was the case in Figure 43 and Figure 44.

*Figure 43. Portion of the Leon River Subject to stream deviation. A logjam is present in the bend of the stream.*



*Figure 44. The same portion of the Leon River re-routed to the north, leaving approximately 15 acres inaccessible.*



Other types of erosion that occur in the Planning Area is local scour of bridge infrastructure. The cities and County have spent thousands of dollars repairing and protecting infrastructure that is constructed within the streambed. Figure 45 to Figure 47 are examples of local scour erosion.

Figure 45. Streambank erosion along a bridge foundation, 2020. Photo by TxDOT.



Figure 46. Local scour erosion with 5 feet of bridge pier exposed, 2020. Photo by TxDOT.





Figure 47. Local scour erosion with 10.5 feet of bridge pier exposed, 2020. Photo by TxDOT.



## **Probability of Future Events**

Riverine Erosion is dependent on flood events. As discussed in Chapter 13 (Flood), the Leon River and Cowhouse Creek have an 84% and 63% chance of reaching minor flood stage each year, respectively. Other factors such as soil type, bank height, slope, and protection also play a role in erosion intensity. Historically, significant erosion events have occurred on the Leon River due to the increased flooding risks and other erosion risk factors that are more prevalent on the Leon River. Therefore, with the probability of flood events and other risk factors present, significant riverine erosion events will occasionally occur in the erosion hazard locations in the participating jurisdictions.

## ***Climate Change***

Climate change could influence some or all the factors that contribute to erosion. Several hazards were examined for effects of climate change in other hazard chapters. These hazards each play a unique role in the riverine erosion process. For example, extended periods of drought can cause vegetation root density to decrease and trees to die off during a dry season making the soil more susceptible to erosion and the trees more vulnerable to falling in the stream and creating logjams when a flood eventually comes. With multiple factors influencing riverine erosion to consider, climate change could increase risks of riverine erosion for the Planning Area for the next 80 years.

## **Vulnerability**

The Planning Area has 682 miles of streams that are vulnerable to riverine erosion and 66 bridges that span across these streams. In recent years, the County has had to invest in protection measures for bridges to mitigate erosion around the structures. Streambank erosion has caused damage to infrastructure in Faunt LeRoy Park and has caused valuable land to be severed rendering it inaccessible. Other instances like these events are likely to have occurred in more remote areas of the County and with expected population growth in the rural areas, economic and infrastructure damage will likely occur again within the next 5 years. Erosion risks increase as the population grows and climate change impacts more erosion factors across the Planning Area.

## **Impacts**

### ***People***

- Erosion can cause stream to diversion / re-route and cut off access to other land.
- Erosion in urban areas damages public parks used for recreation.

### ***Infrastructure***

- Erosion causes unstable foundations for public roads and buildings and can cause damage.
- Local scour on bridge components can reduce the integrity and safety of the bridge.

### ***Economy***

- Damage to infrastructure may impact economic recovery since repairs may be extensive and slow.
- Productive crop and pasture land may be severed from accessible land.

### ***Environment***

- All types of erosion lead to sedimentation downstream creating sandbars and filling ponds with sediment as well as potentially changing the chemistry of downstream waters.

### ***Climate***

- Several factors contributing to riverine erosion can be impacted by climate change and should be monitored for changes in intensity and frequency.

### ***Land Use and Development***

The effects of changes in land use and development negatively alter the future impacts of erosion on the vulnerable assets for each participating jurisdiction by putting the residents and their structures at an increased risk of being impacted by erosion. With more development, such as the building of new homes or ranch and agricultural development, it is



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likely that in the event of erosion, they could be negatively impacted. The County is currently developing a Land Use Plan through funding from the Texas General Land Office (GLO) through the Resilient Communities Program (RCP). Upon completion of the RCP, all participating jurisdictions will better understand the impacts of changes in land use and development and these impacts will be addressed in future HMP updates.

The overall impacts have been manageable with only occasional damages occurring in localized areas; however, streams are constantly experiencing some type of erosion and as population and infrastructure increases riverine erosion could impact more community assets over time.

## **Chapter 13: Flood**

### **Hazard Description**

Floods are part of Earth's natural hydrologic cycle. Flooding generally results from storms that produce copious amounts of precipitation. The type and severity of a flood event is determined by a combination of several factors including topography, weather patterns, soil type, and landcover. These factors influence the severity and duration of flooding, which can be a few hours to several days. Generally, there are two types of floods in Texas: coastal and inland flooding. Due to Central Texas topography and inland location, only inland riverine flooding will be described in this section. The flooding events recorded in Coryell County occur from high volumes of precipitation within the watershed, creating runoff that overbanks the river or stream channel. With large watersheds, flooding can occur with little to no warning as upstream rain events can cause flooding in the downstream watershed. In Coryell County, some floods can occur seasonally when winter or spring rainfalls inundate regional watersheds, while other floods are due to the torrential rains of weakening hurricanes from the Gulf of Mexico.

### **Location**

Coryell County is located in the Cross Timbers Region of Texas. Two major watersheds cover the majority of the County: the Leon River watershed in the Northern portion and the Cowhouse Creek watershed in the Southern portion. Coryell County is approximately 30 miles across from where the Leon River enters the County on the northern boundary to where it exits into Bell County on the southern boundary. However, the sinuosity of the river channel constitutes about 100 miles of river within the County.

The topography and watersheds of the Leon River and Cowhouse Creek in Coryell County create a sizable number of floodplains. Floodplains are defined as generally flat lands adjacent to bodies of water such as lakes, rivers, or streams, and are subject to becoming inundated during flood events. In the hilly areas of the County, flash flooding may occur with short notice, and is particularly dangerous to people and property in its path. Flash flooding

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in urban areas can also occur where impervious surfaces, gutters, and storm sewers speed runoff. With full urbanization (75% or greater) impervious surface, more than 55% of the rainwater runs off the land (U.S. Climate Resilience Toolkit 2023). Flash floods can also be caused by dam failure, which is covered in Chapter 14 (Dam Failure). According to FEMA, flash floods rank first as the cause of flood related deaths. (U.S. Department of Homeland Security 2023). Debris flowing downstream occurs in several places throughout the County, which piles up and prevents water from flowing freely. Frequent snag locations have been mapped via desktop survey and historical knowledge (Figure 48). A bridge near Mother Neff State Park (on the Leon River) is a repetitive snag location that has caused major flooding to the park. This is currently being mitigated with a new, higher bridge constructed over the river to prevent the buildup of debris.

Flood Insurance Rate Map (FIRM) data provided by FEMA show the following flood hazard zones for Coryell County:

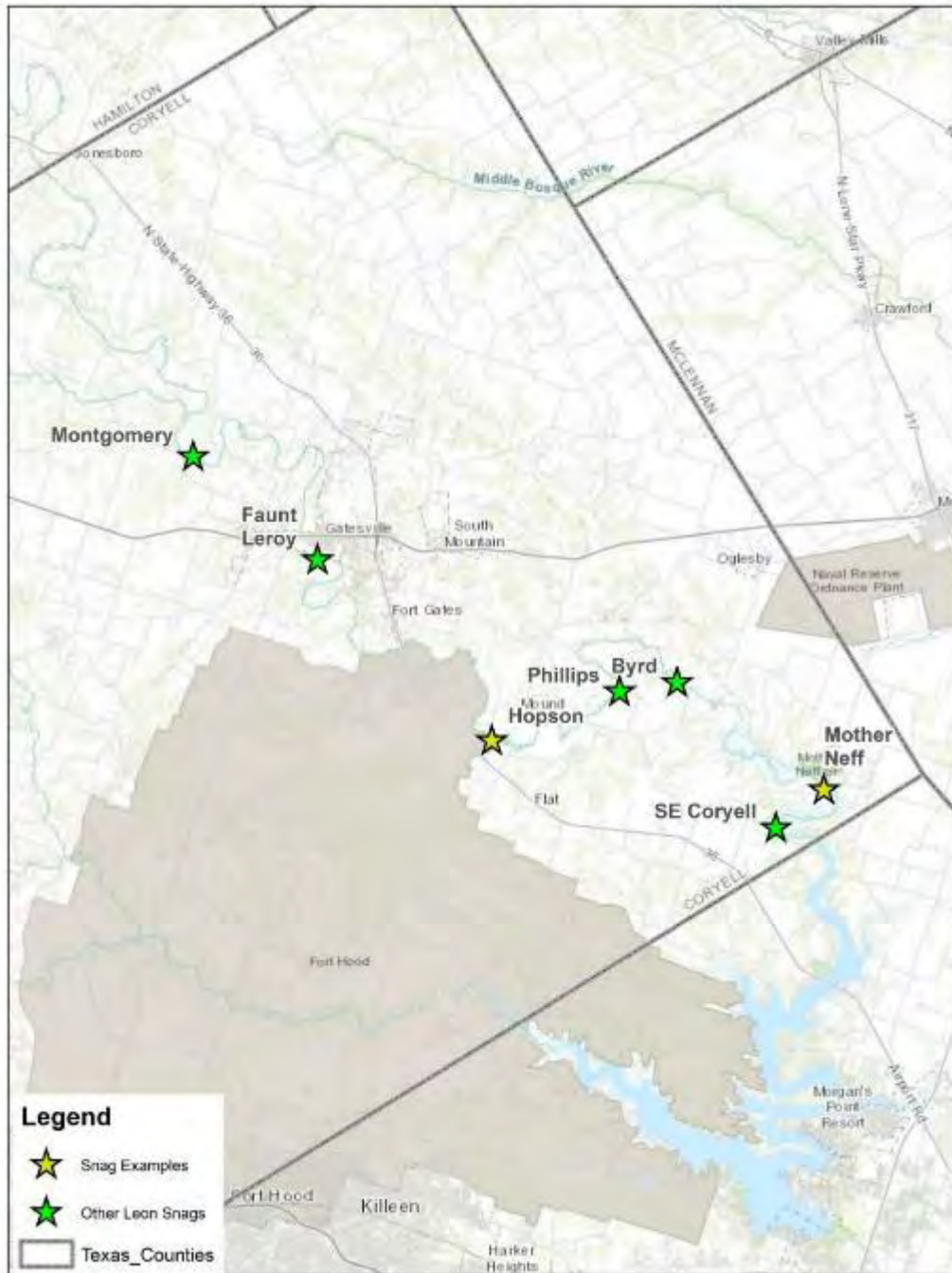
- **Zone A:** Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance requirements and floodplain management standards apply;
- **Zone AE:** Areas subject to inundation by 1-percent-annual-chance shallow flooding. It is the base floodplain where base flood elevations are provided. AE zones are now used on new format FIRMs instead of A1-30 zones; and
- **Zone X:** Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones.

Locations of flood zones for Coryell County and its participating jurisdictions according to the FIRM are shown in Figure 49 through Figure 53. Figure 49 includes the Gatesville and Copperas Cove ISDs. No FEMA flood zone maps are currently available for the Hamilton County portions of the City of Evant, and the Lampasas County portion of Copperas Cove and Copperas Cove ISD. These areas are addressed in Chapter 17 (Mitigation Actions).

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Figure 48. Known logjams on the Leon River that potentially cause flooding.



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Figure 49. FEMA 100 Year Flood Zones for Coryell County.

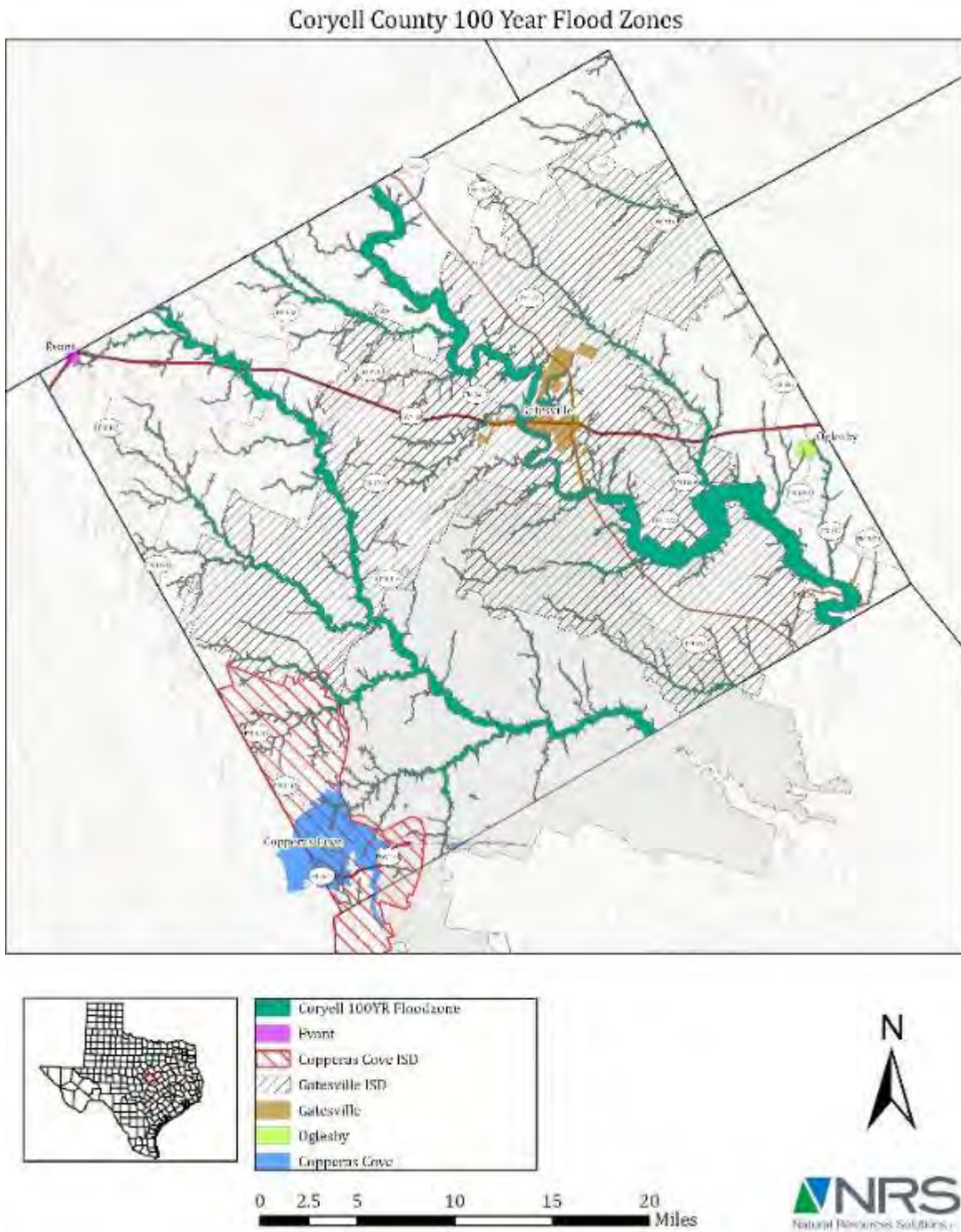




Figure 50. FEMA 100 Year Flood Zones for Gatesville.

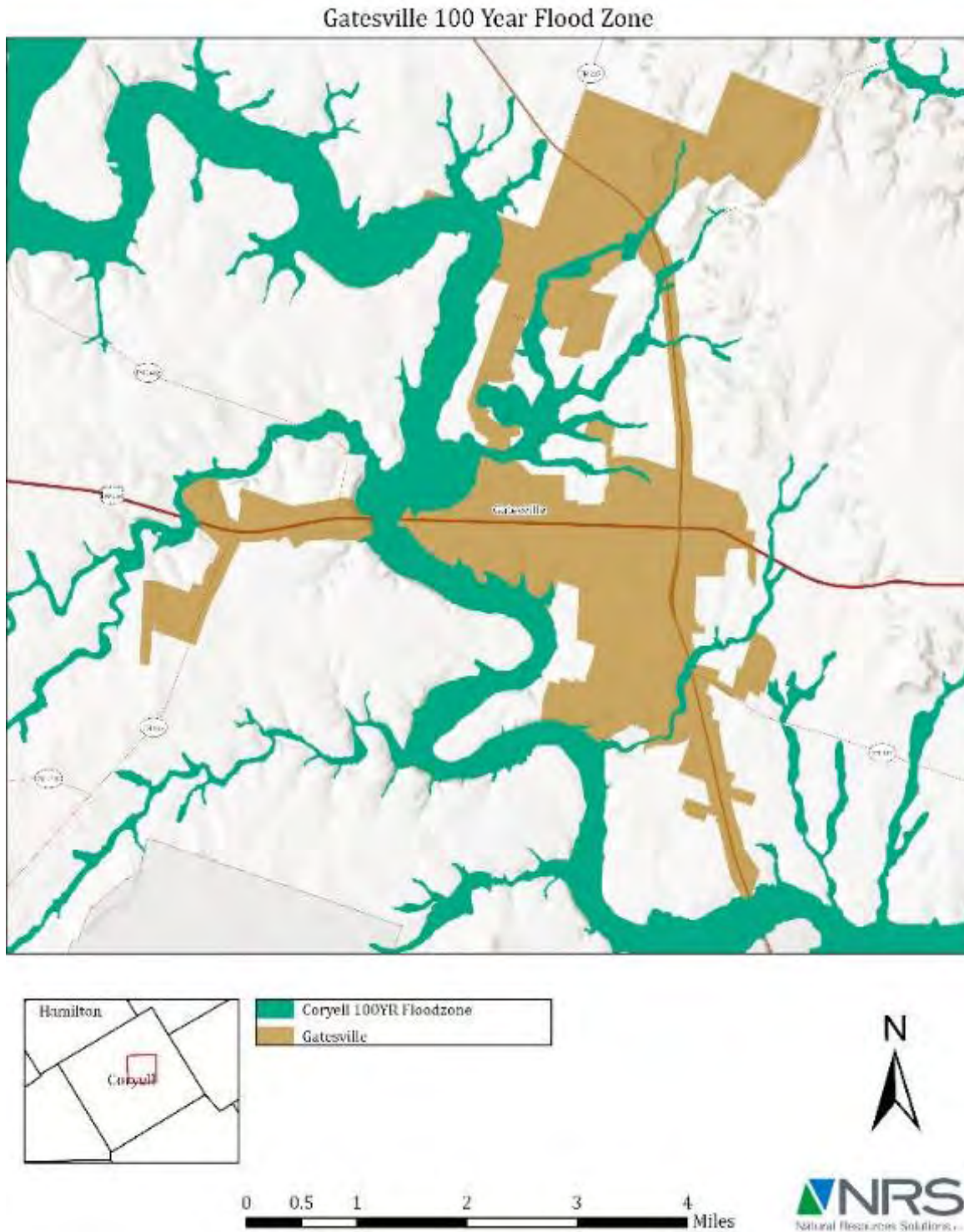
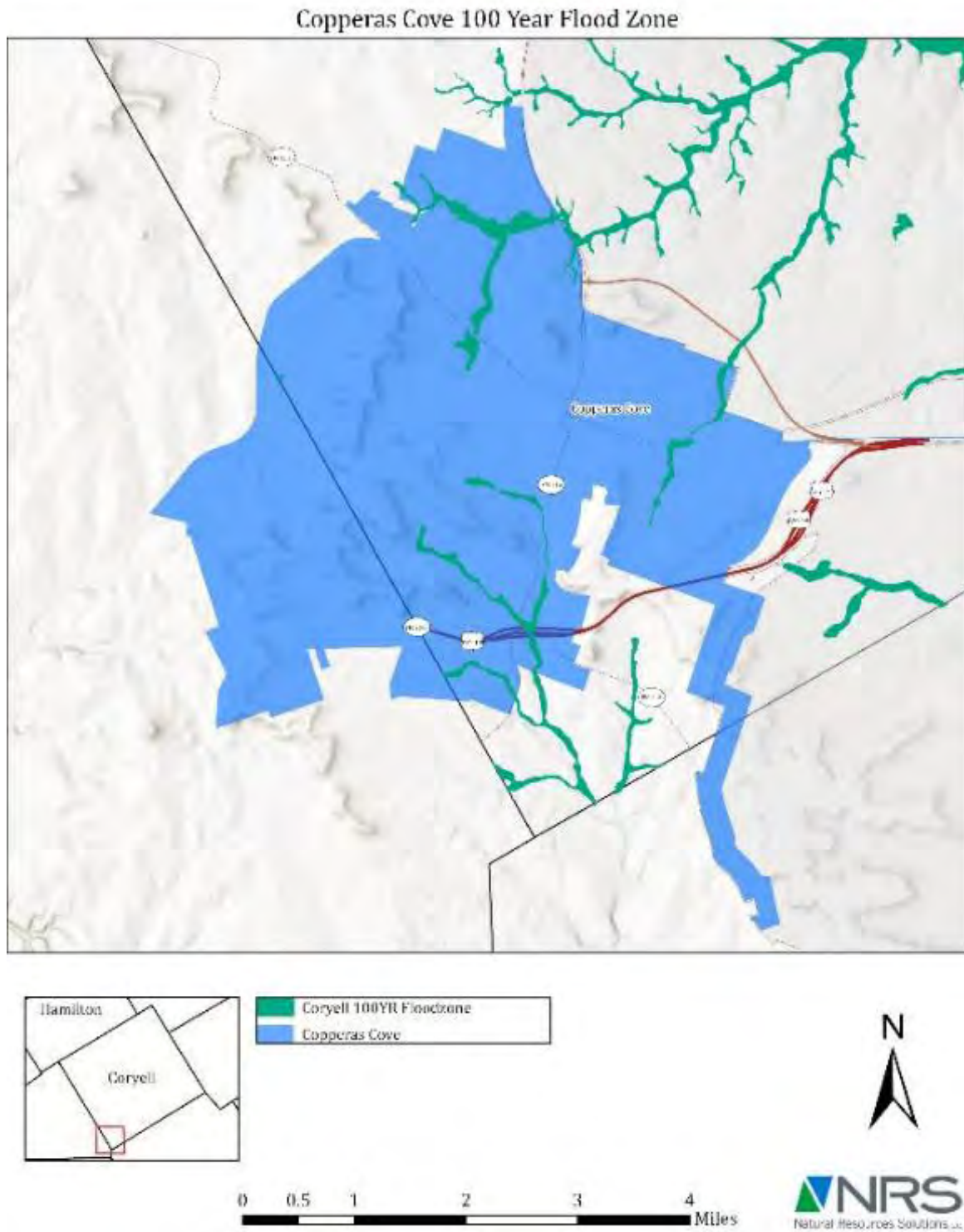




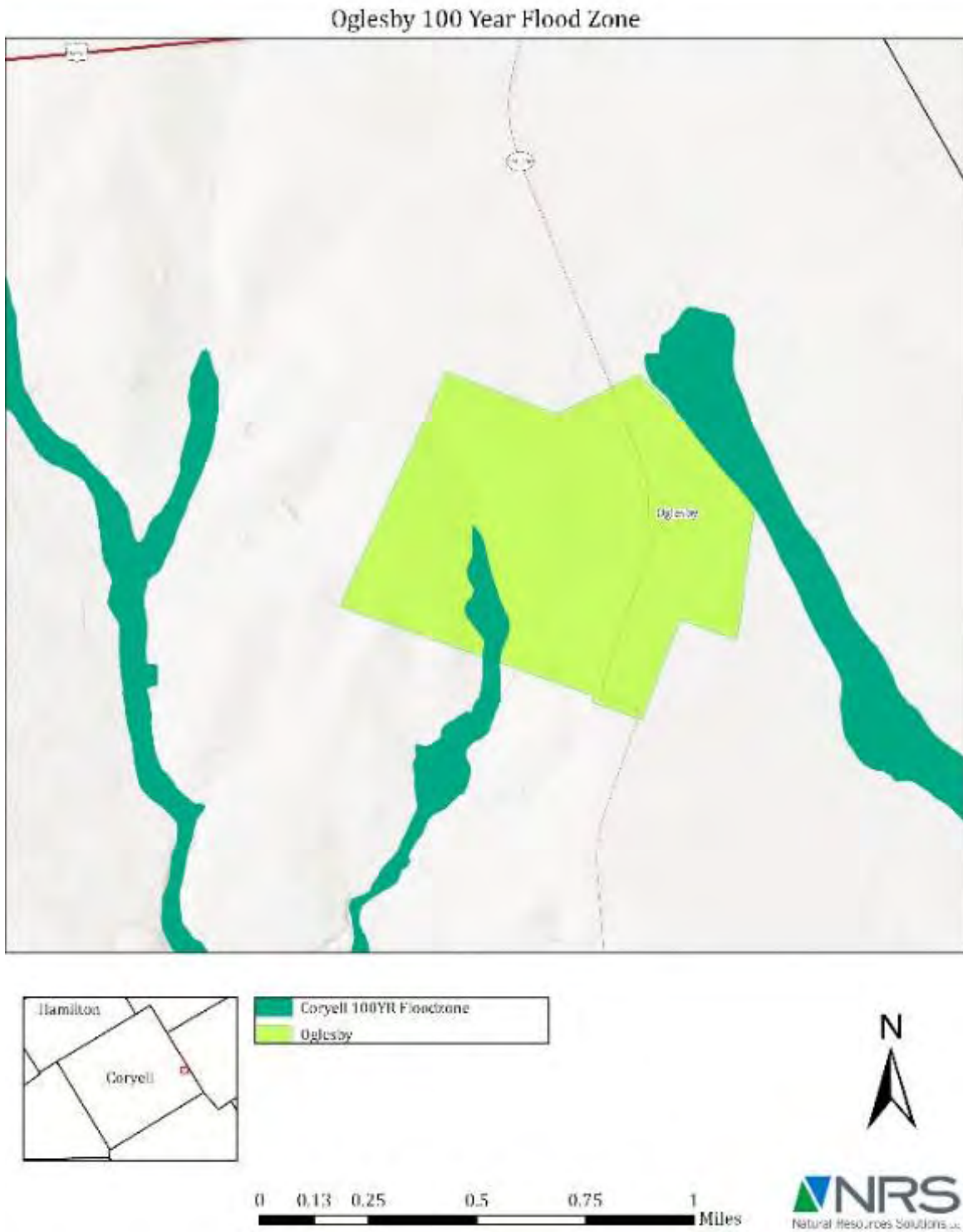
Figure 51. FEMA 100 Year Flood Zones for Copperas Cove.



# Coryell County Hazard Mitigation Plan 2023



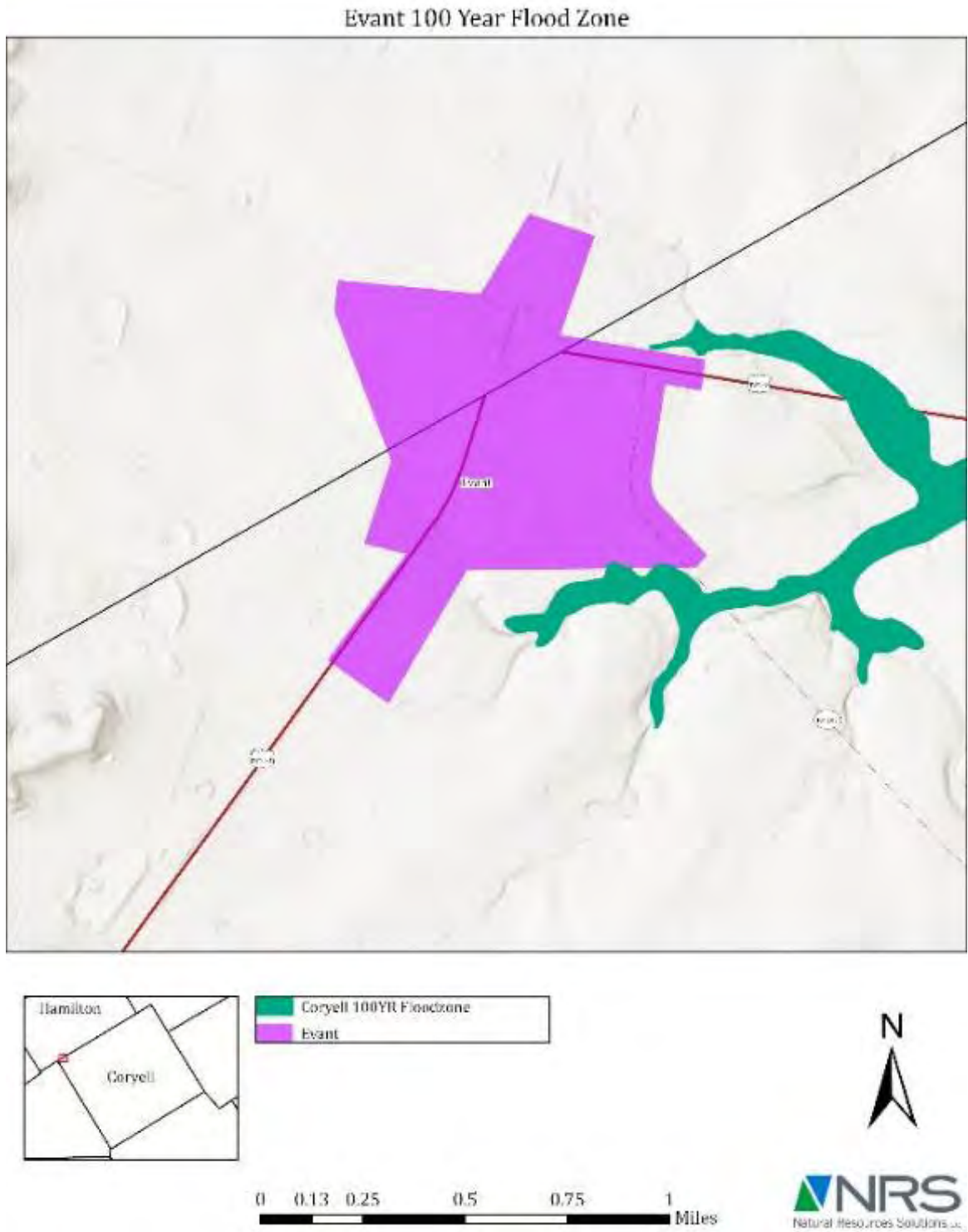
Figure 52. FEMA 100 Year Flood Zones for Oglesby.



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Figure 53. FEMA 100 Year Flood Zones for Evant.





## Extent

The type and severity of floods are geographically unique based on factors including stream basin topography, precipitation rate, soil moisture and impervious cover within the watershed. These factors contribute to the water depth and rate of the stream flow. To generally describe the extent of floods throughout the Planning Area, flood zones were established to identify where flooding risks are greatest. As described previously, FEMA has categorized zones into areas with a 1% or greater chance of flooding each year or the 100-year flood plain and 0.2% chance of flooding each year known as the 500-year flood plain. These are described in the location section of this chapter and the 100-year flood plains are depicted in Figure 49 through Figure 53. Since flooding is location specific, the intensity of flooding can only be determined where flood depths are measured, and baseline flooding is established.

Currently there are 9 United States Geological Service (USGS) Streamflow gauges within Coryell County (Figure 54); 6 gauges are located on the Fort Hood Military Installation and 3 are within the County on nonfederal land. The Fort Hood gauges do not have base flood zone levels available to the public. The Leon River at Gatesville and the Cowhouse Creek at Pidcoke gauges have baseline flood levels established. The Cowhouse at Purmela gauge was recently deployed (November 2022) and will likely have flood levels established in the future. According to USGS, the stages of flooding for each established Streamflow gauge are shown in Table 39 (U. S. Geological Survey 2023). Table 40 describes the extent associated with each type of flood stage (NWS 2023).

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Figure 54. USGS Streamflow Gauge Locations in Coryell County.

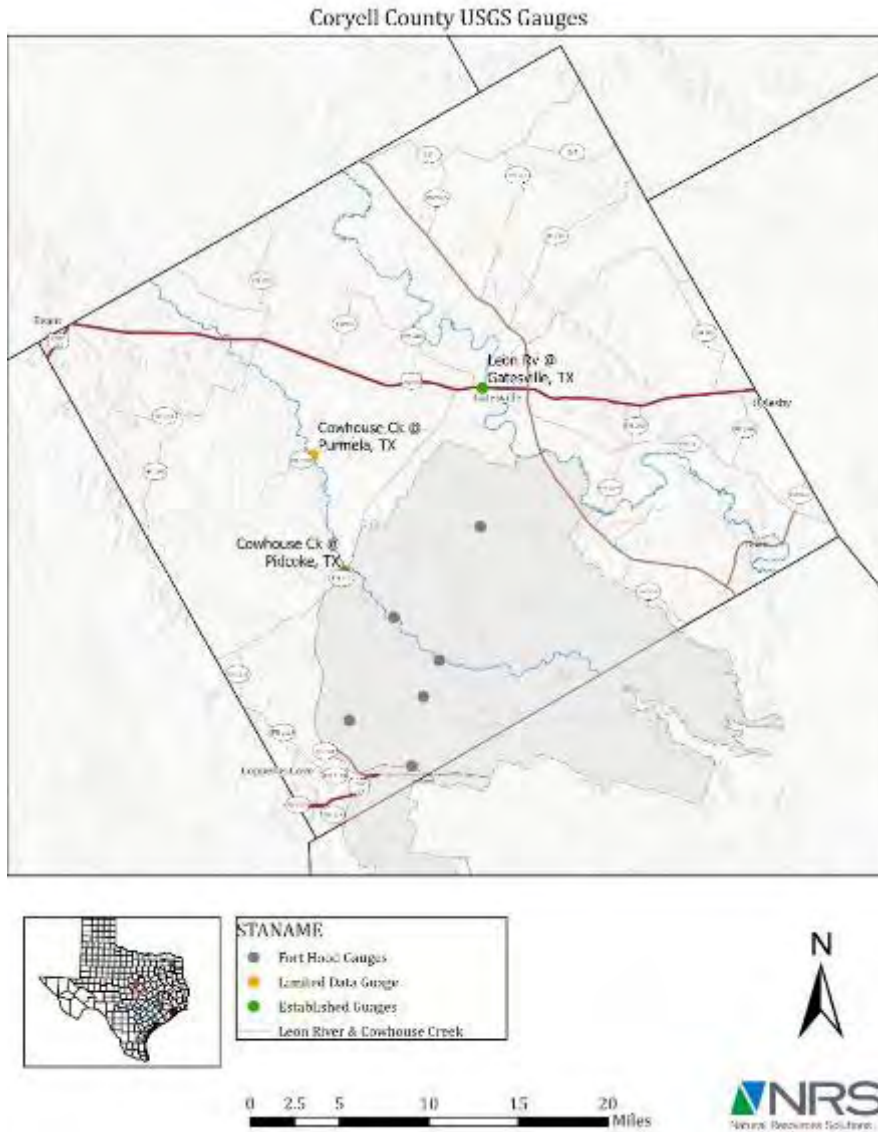


Table 39. Water Depth Flood Stages for Individual Stream Flow Gauges.

Flood Stage	Cowhouse Creek @ Pidcoke (ft)	Leon River @ Gatesville (ft)
Major	38	34
Moderate	35	28
Minor	20	22
Action	18	20
Low	0	0



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Table 40. Description of USGS Flood Stages.

Flood Stage	Description
Major	Extensive flooding of structures, main roadways, and other critical infrastructure may occur. Schools, hospitals, police stations, fire stations, residences, businesses, and roadways may become flooded. Evacuations may be necessary. Significant disruptions to daily life.
Moderate	Flooding of structures and main roadways may occur. Residences and numerous roadways near the stream may become flooded. Evacuations may be necessary. Disruptions to daily life.
Minor	Some property flooding and public threat may occur. Roadways, trails, park land, and private property near the stream may become flooded.
Action	Action is taken for possible high water. Water may cause minor impacts and be a nuisance to persons near the stream. Local governments or agencies may take actions to reduce property damage and danger to life.
Low	Water is low enough to be a public threat, causing impacts to commerce, or damaging property. Boating or shipping traffic may be restricted. Water supply intakes may be affected.

## Historic Events

The average depth for the Leon River at Gatesville is approximately 2.5 to 3 feet in depth, depending on the season. As one of the two major watersheds in the County, flooding has occurred numerous times over the years at this location. The USGS and NWS maintain a database of peak crests during storm events. Table 41 shows the dates and depth for events that reached the minor flood stage or higher. The Leon River at Gatesville has had 41 events in the minor flood stage category, 16 events in the moderate flood stage, and 2 events recorded as major flood stage since the 1950s. The Cowhouse creek at Pidcoke has an average streamflow depth of approximately 3 feet and has recorded 35 events in the minor flood stage, 4 moderate flood events, and 5 major flood events during the same period.

Table 41. Flood Events by Category on the Leon River and Cowhouse Creek, with orange representing minor flood stage, red representing moderate flood stage, and purple representing major flood stage.

Cowhouse Creek @ Pidcoke			
Date	Depth (ft.)	Date	Depth (ft.)
5/12/1953	26.97	12/20/1991	44.3
5/19/1955	29.7	4/4/1995	26.65
5/1/1956	38.76	2/21/1997	31.16
4/26/1957	35.8	3/16/1998	39.7
5/13/1957	37.93	6/10/2004	21.96
10/4/1959	40.1	8/20/2004	22.33

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10/10/1961	33.2	11/17/2004	30
9/22/1964	26.45	2/24/2005	20.86
5/10/1965	27.98	8/10/2005	26.3
5/14/1965	30.25	3/30/2007	21.95
5/16/1965	39.85	6/27/2007	27.06
11/8/1965	37.07	6/28/2007	36.69
8/12/1966	27.47	7/5/2007	25.65
9/1/1970	33.24	9/5/2007	22.84
10/31/1974	30.1	9/5/2007	23.7
7/4/1976	32.43	4/27/2009	26.11
6/15/1981	34.03	10/22/2009	26.03
6/6/1985	31.18	1/29/2010	32.87
5/17/1989	28.44	5/25/2015	22.98
4/26/1990	27.84	5/29/2015	21.78
5/3/1990	29.15	10/24/2015	24.45
5/12/1990	27.37	6/3/2016	32.29

Leon River @ Gatesville			
Date	Depth (ft.)	Date	Depth (ft.)
5/28/1952	24.79	8/31/1996	26.94
5/12/1953	24.6	2/24/1997	31.04
5/19/1955	28.1	3/16/1998	29.14
5/1/1956	31.06	6/4/2000	24.11
5/13/1957	31.6	10/9/2003	26.94
5/4/1958	26.03	11/18/2004	27.07
10/4/1959	34.14	8/10/2005	27.1
10/6/1959	30.75	3/30/2007	25.29
6/16/1961	24.1	3/31/2007	23.11
10/10/1961	32.63	3/31/2007	23.85
6/16/1964	24.37	6/29/2007	32.33
5/16/1965	31.02	7/6/2007	25.31
11/8/1965	30.5	7/11/2007	25.35
1/21/1968	25.42	9/6/2007	27.14
5/7/1969	23.82	10/22/2009	25.89
7/25/1971	26.88	1/29/2010	28.42
10/21/1971	24.12	9/8/2010	26.55
10/31/1974	28.42	5/26/2015	27.31
7/4/1976	27.81	5/27/2015	24.11

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4/19/1977	23.72	5/31/2015	28.57
6/1/1979	25.21	10/24/2015	25.82
6/16/1981	27.77	11/30/2015	22.3
6/6/1986	22.63	12/1/2015	22.18
6/12/1987	22.96	4/18/2016	25.53
6/5/1988	24.23	6/8/2016	28.52
5/17/1989	25.54	6/17/2016	27.72
5/5/1990	28.63	10/17/2018	29.94
12/21/1991	35	3/20/2020	22.74
5/15/1994	22.23	5/29/2021	22.96
8/5/1995	26.42		

## ***Significant Events***

There have been several federal disasters declared in Coryell County over the years. DR-930-TX was released after a major flooding event in December of 1991. DR-4223-TX; Amendment 12, was declared after a flooding event in May of 2015. FEMA-4269-DR; Amendment No.3, was declared after severe storms and flooding during the period of April 17-24, 2016. Flooding in September 2018 led to DR-4416-TX, in which the impact to Coryell County was \$7.97 County-wide per capita.

According to Storm Prediction Center (NOAA), NCEI data, there have been a total of 16 deaths caused by flooding since 1996. Nine of the deaths in Coryell County occurred during a flash flood event on June 2<sup>nd</sup>, 2016, where a military truck transporting soldiers attempted to cross a low water crossing on Fort Hood. Total flood-related damages reported in Coryell County since 1996 are \$1.8 million.

There are several locations throughout the County that are prone to flooding. Faunt Le Roy Park in Gatesville has flooded several times in the past years, causing damage to the structures in the park as well as the road around the park. Highway 116 has been known to have water run across it during flash flood events as well as have many of the County's low-water crossings. In June of 2015, a flood event that overcame the banks of the Leon River flooded into a slough, crossing County Road 321. That section of the County Road was covered in rushing water and swept a vehicle off the road, in which 3 people perished. The County's Road and Bridge Department continuously repair water crossings damaged from flooding.

## **Probability of Future Events:**

The average precipitation for Coryell County from 1900 to 2022 is 32 inches per year (NCEI 2023). The 1 percent annual chance, or risk of a 100-year flood event, may be higher in Coryell County than in other areas across Texas (Bonin et al 2006). Less severe flooding occurs regularly in the Planning Area. Table 41 shows that at least minor flood stage levels

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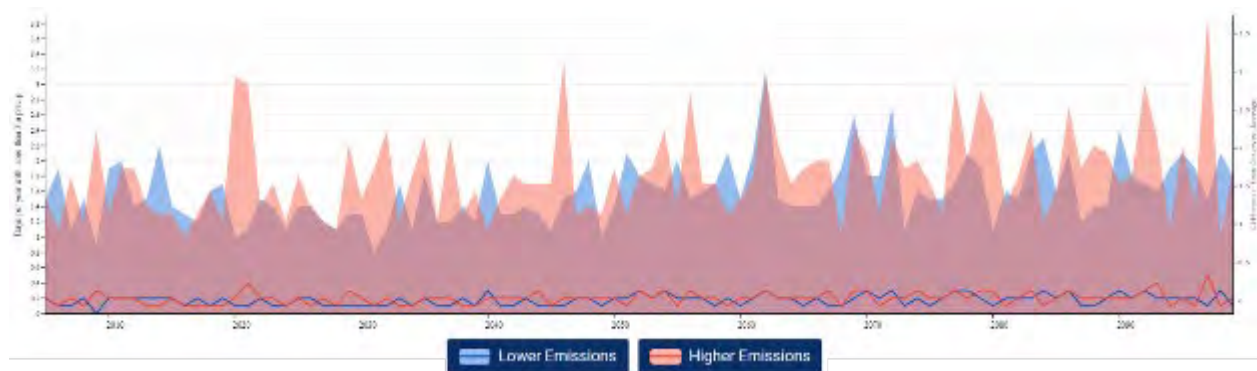


have occurred 59 times on the Leon River and 44 times on the Cowhouse in the last 70 years (NWS NOAA). Based on the history of flooding for each watershed, the Leon and Cowhouse watersheds have an 84% and 63% chance of reaching minor flood stage each year, respectively. Due to the proximity of the Leon River running through Gatesville, flooding could impact residents as well as temporarily close parks and recreation areas within the city.

## ***Climate Change***

Projections for two long-term climate scenarios were calculated using Climate Explorer data (NEMAC 2023) for number of days with greater than 3 inches of precipitation. One scenario describes a future in which humans stop increasing harmful emissions by 2040 and then continue to reduce emissions through the end of the century (Lower Emissions). The second scenario describes a future in which harmful emissions continue to increase through the end of the century (Higher Emissions).

*Figure 55. Predicted number of days per year with more than 3 inches of precipitation in Coryell County through 2100 using the US Climate Resilience Toolkit, Climate Explorer.*



The trend for the number of days per year with more than 3 inches of precipitation is generally consistent over time and the two emission scenarios have little to no impact on days with more than 3 inches of precipitation in Coryell County over the next 80 years. Another source was examined to determine the impacts of climate change on River flooding. The Environmental Protection Agency (EPA) developed an interactive map that examines the historical magnitude and frequency of river flooding in the U.S. since 1965 and climate change indicators during the same time. The data is consistent with the Climate Explorer data in that it shows little to no change in magnitude and frequency for River Flooding (U. S. Environmental Protection Agency 2023).

## **Vulnerability**

A desktop analysis using ArcPRO software was used to determine the number of structures within the FEMA 100-year floodplain. There are 585 structures in Coryell County that are

# Coryell County Hazard Mitigation Plan 2023



inside the 100-year floodplain, excluding Fort Hood (Figure 56). Of those, 492 of them are classified as residential and 31 have a commercial classification.

There are two critical infrastructure locations within the County that are partially in the 100-year FEMA floodplain. The Stillhouse Branch Wastewater Treatment Plant is almost entirely within the floodplain boundary and one of the Crain Unit prison buildings is partially inside the floodplain boundary. The participating jurisdictions have structures in the 100-year flood zones making these structures more vulnerable to floods. Figure 57 through Figure 59 show each participating jurisdiction and the number of structures. Evant is not shown as it does not contain any structures within the FEMA floodplain.

Figure 56. There are 585 Structures in Coryell County within the Designated FEMA Floodplain.

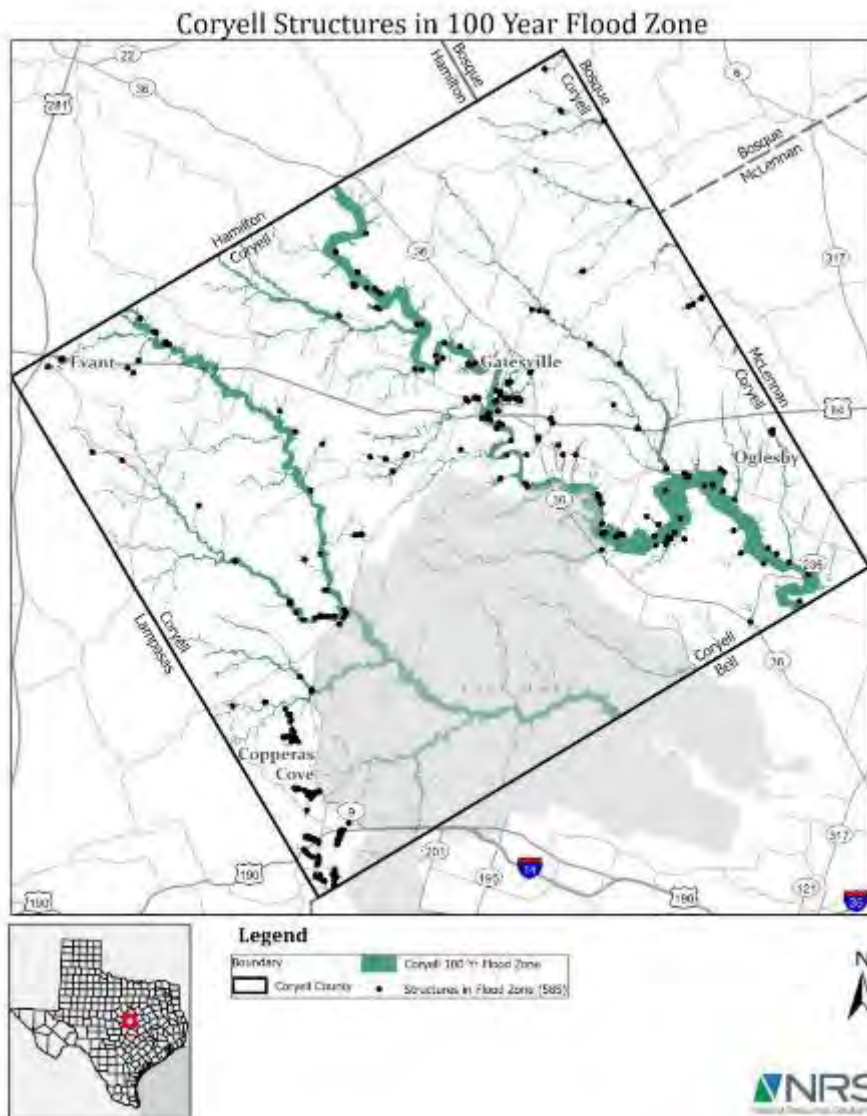
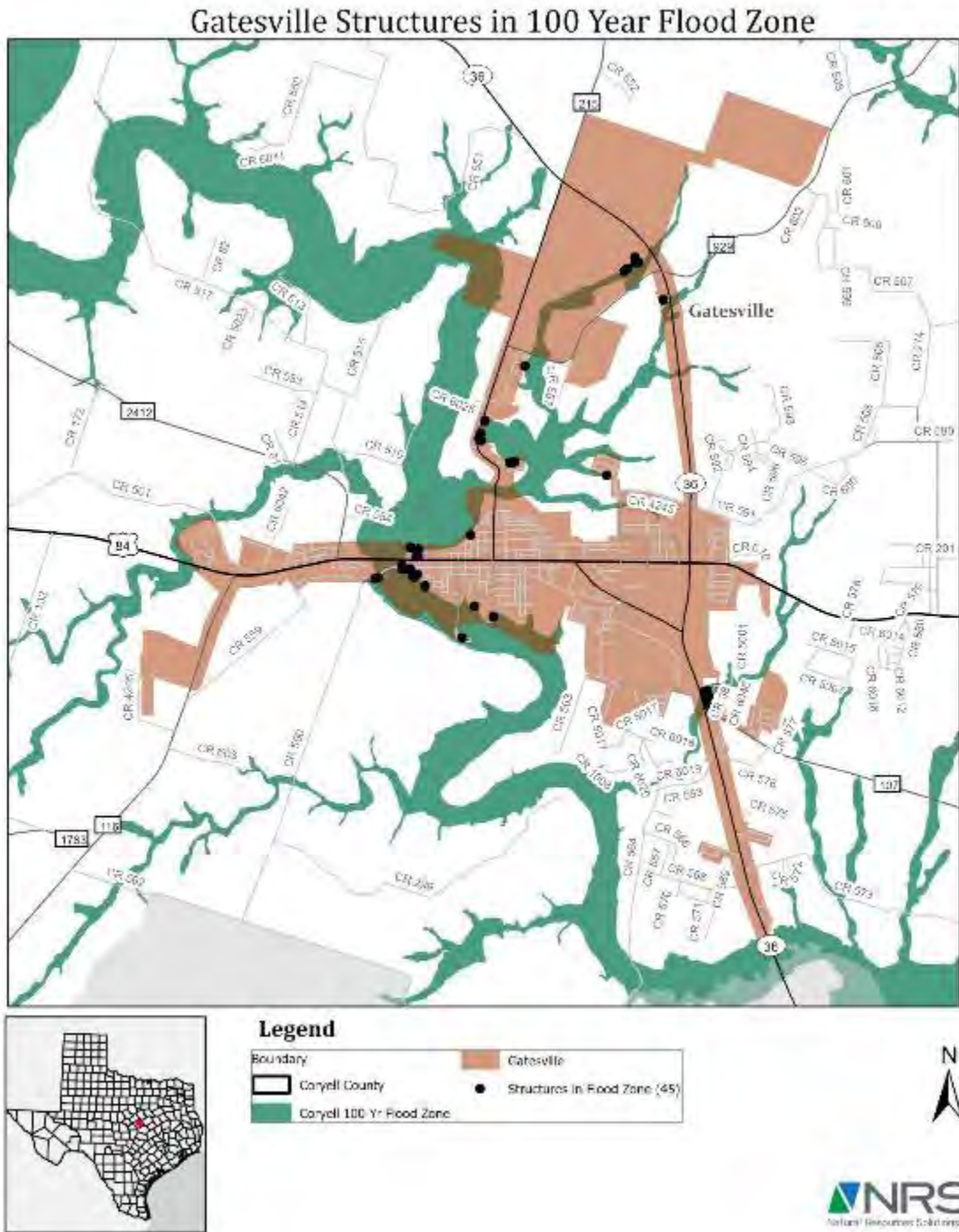




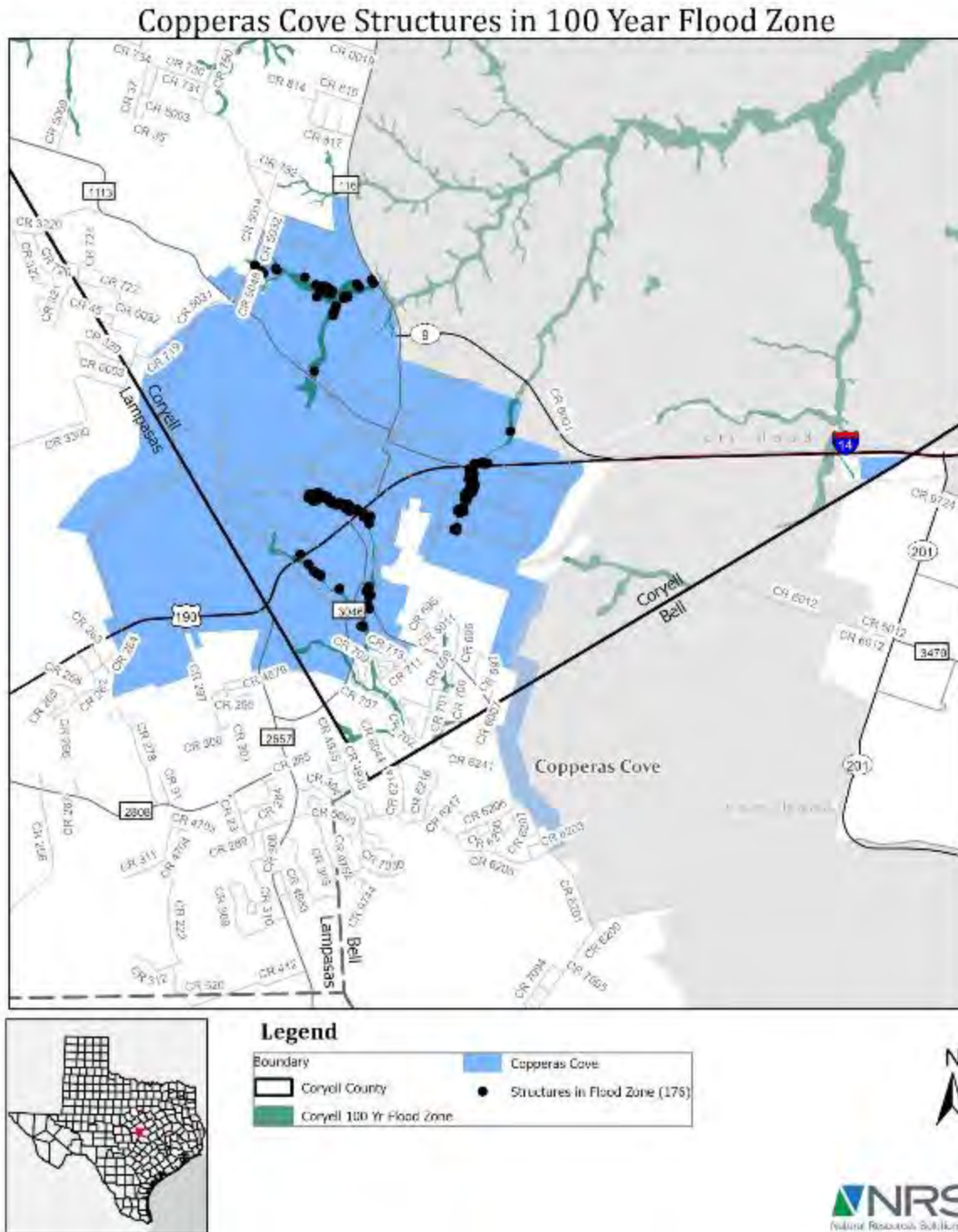
Figure 57. 45 Structures in Gatesville within the Designated FEMA Floodplain.



# Coryell County Hazard Mitigation Plan 2023



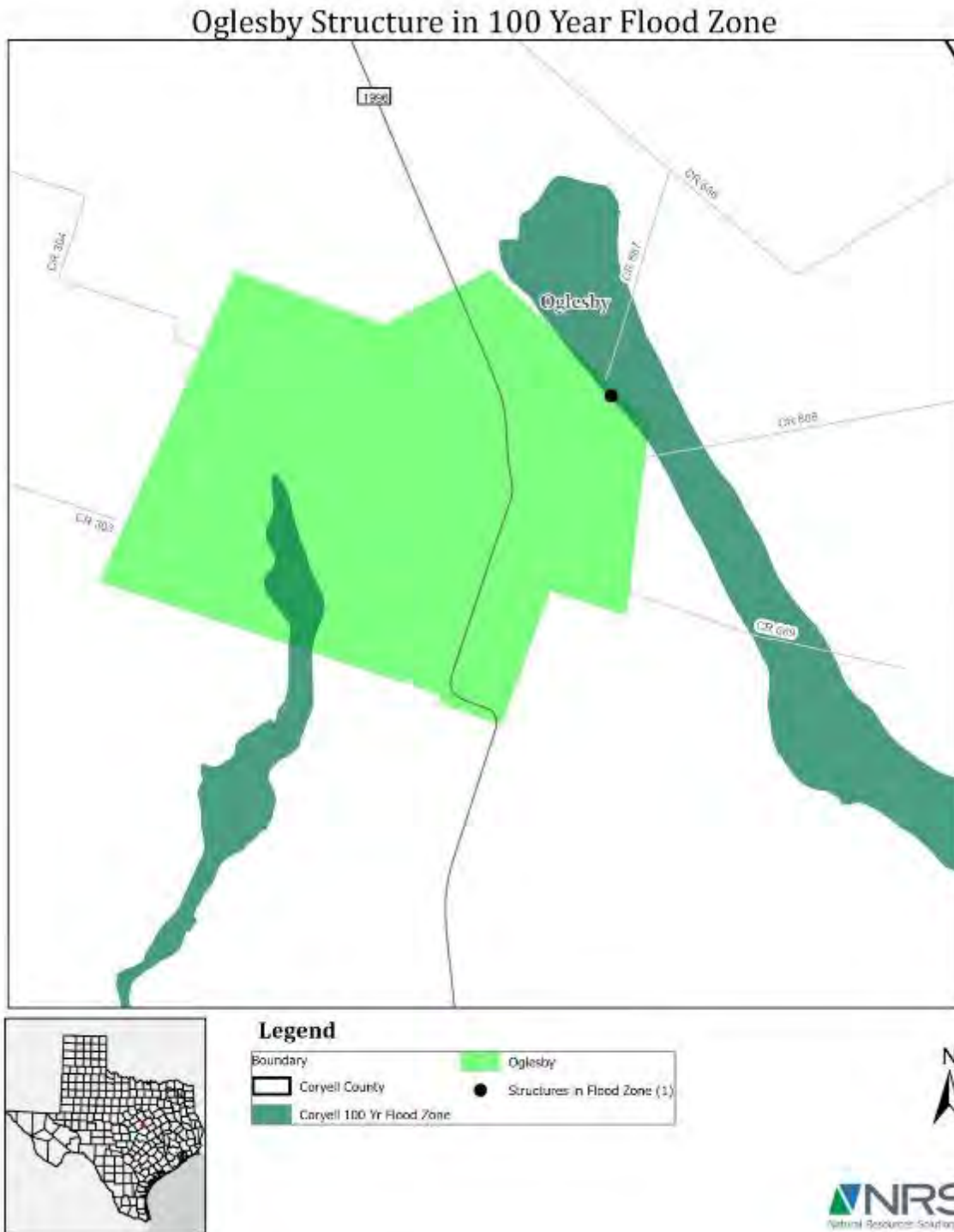
Figure 58. There are 176 Structures in Copperas Cove within the Designated FEMA Floodplain.



# Coryell County Hazard Mitigation Plan 2023



Figure 59. 1 structure in Oglesby within the Designated FEMA Floodplain.





## **Impacts**

### ***People***

- Flood-related rescues may be necessary in sloughs, low water crossings, or in flooded neighborhoods where roads have become impassable, placing first responders in harm's way.
- Health risks increase after flood waters have receded due to contaminated flood waters and mold growth found in homes and buildings.
- Flood events can result in widespread power outages increasing the risk to the more vulnerable residents.
- Extended power outages can result in an increase in structure fires and/or carbon monoxide poisoning as individuals attempt to cook or heat their home with unsafe cooking or heating devices.
- Floods can destroy or make residential structures uninhabitable, requiring alternate shelter or relocation efforts for residents.
- First responders may be exposed to downed powerlines, contaminated waters and debris, hazardous materials, and generally unsafe conditions increasing the risk of injury to first responders and diminishing emergency response resources.
- Roadway flooding can result in the inability of emergency response vehicles to access areas of the community.
- Private sector entities that the residents rely on, such as food suppliers, financial institutions, and medical care providers may not be fully operational.

### ***Utility Systems***

- Flooding may cause significant disruptions of clean water and sewer services, increasing health risks and delaying recovery efforts.

### ***Infrastructure and Property***

- Recreation activities at places such as Faunt Le Roy Park may be unavailable and/or facilities damaged for years following a large flood event.
- Evacuations may be required for entire neighborhoods because of rising floodwaters, increasing the burden of community resources.

### ***Economy***

- Damage to infrastructure may impact economic recovery since repairs may be extensive and slow.
- Businesses not directly impacted by floods may experience economic impacts due to utilities being restored or related business being shut down.
- Displaced residents may not be able to return to work for days or weeks, slowing economic recovery.
- Businesses that are uninsured or under-insured may have difficulty reopening.

## Coryell County Hazard Mitigation Plan 2023



- Extensive or repetitive flooding can lead to decreases in property value for the community.
- Flood poses a risk to annual and perennial crop production.
- Large floods may lead to diseased or loss of livestock and increased costs for livestock care.

### ***Environment***

- Flooding causes erosion in streambanks creating deposits of sediment and vegetation and debris in the stream. Major flooding can cause river avulsions to occur leaving acres of land inaccessible.

### ***Climate***

- Historical events have shown that floods have generally been consistent in their intensity and frequency over the last 50 years. However, with changing weather patterns impacting temperatures and precipitation, climate change impacts to floods should continue to be monitored.

The overall economic and public health impacts of flooding on the community will depend on the intensity, duration, and frequency of flooding events. The level of awareness and preparedness in each jurisdiction and their citizens will impact the overall risk the public will be exposed to.

### **National Flood Insurance Program (NFIP)**

In 1968, Congress passed the National Flood Insurance act, which created the NFIP. As a part of this program, FEMA has prepared a floodplain map and developed flood hazard data for most communities in the country. There are several zones on these floodplain maps, which help to determine risk, regulations, and insurance rates in the floodplain. Special Flood Hazard Areas (SFHA) are identified on the FIRM. SFHA are defined as the area that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. The 1% annual chance flood is also referred to as the base flood or 100-year flood, but this is just a statistical probability. 100-year flood can occur twice in the same year. SFHA are areas where NFIP Floodplain management regulations must be enforced (A, AE, A1-30, AO, V, VE, V1-30) (U. S. Department of Homeland Security 2023).

On February 17, 2010, Coryell County and all participating jurisdictions adopted the most current version of the FIRM as well as the Flood Insurance Study. The FIRM data provided by FEMA for Coryell County shows the following flood hazard areas: Zone A, Zone AE, and Zone X. A detailed description of each zone along with maps are in the Location section of this chapter.

Coryell County adopted their floodplain ordinance on August 28, 1995 and on January 11, 2010 the floodplain ordinance was updated. It encompasses the unincorporated



# Coryell County Hazard Mitigation Plan 2023



communities and ISDs in the County as well as Evant and Oglesby. The County issues and monitors floodplain development permits, tracks substantial improvement, and substantial damage in the floodplain. The City of Copperas Cove approved and adopted their Flood Damage Prevention Ordinance in 2009. The City of Gatesville approved and adopted their Flood Damage Prevention Ordinance in 2013 and a current permitting system that is maintained by a floodplain manager. Coryell County currently does not have a floodplain administrator in place, but in their absence a representative from the County Road & Bridge Department manages this role until one can be appointed.

All the communities in Coryell County participate in the NFIP. Every building located in a participating jurisdiction may be covered by a flood insurance policy; buildings not located in a floodplain can be covered by a flood insurance policy as well. According to FEMA, there are 116 total policies in force in Coryell County (Table 42). The NFIP is a part of the FEMA Mitigation Division, as insurance is a mode of mitigation. An online, digital version of the mapped floodplains can be found using the search function (FEMA Flood Map Service Center 2023).

Table 42. Policies in Force in Coryell County.

Community Name (Number)	Policies in Force	Total Coverage
Copperas Cove, City of (480155)	56	\$13,955,000
Coryell County (480768)	30	\$7,474,400
Gatesville, City of (480156)	7	\$1,414,000
Lampasas County (480899)	2	\$525,000
Unknown (Unknown)	21	\$5,101,000
TOTAL	116	\$28,469,400

## ***Repetitive Loss Properties***

A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by NFIP within any rolling ten-year period, since 1978. An RL property may or may not be currently insured by the NFIP. Flood insurance rates will increase for a repetitive loss structure.

A Severe Repetitive Loss (SRL) structure is one that has had four or more separate claim payments of more than \$5,000 each (including building and contents payments), and cumulative claims exceeding \$20,000 or two or more separate claim payments where the total payments exceed the current value of the property. SRL properties can only obtain coverage through the NFIP Servicing Agents Special Direct Facility, which is a separate insurance program. As with RL, SRL properties will have higher insurance rates, but may also qualify for mitigation funding options.

# Coryell County Hazard Mitigation Plan 2023



In either case, two of the claim payments must have occurred within 10 years of each other. Multiple losses within 10 days of each other are considered a single loss with payments added together. To date, there are no RL or SRL structures in Coryell County.

## ***Ordinance and Enforcement***

The NFIP does require that local ordinance be legally enforceable and enforced uniformly throughout the community (44 CFR 60.1b). In 2010, Coryell County adopted a Flood Damage Prevention Order. This order lays out regulations and definitions that were adopted by the County to support the NFIP.

There are a few basic rules laid out by Chapter 44 of the Code of Federal Regulations (44CFR):

- Rule 1: The community must use the latest maps and data to administer floodplain management ordinances (44CFR 60.2h);
- Rule 2: A permit is required for all development in the SFHA shown on the FIRM;
- Rule 3: Development must not increase the flood hazard on other properties; and
- Rule 4: New, substantially damaged, or substantially improved buildings must be protected from damage by the base flood (1% annual chance flood).

## ***Community Rating System (CRS)***

CRS is a voluntary program that a community participates in to reduce flood insurance rates. These include practices that go beyond the minimum NFIP requirements. There are many distinct categories for a community to gain credits for the CRS. There are 3 overarching goals of the CRS Program:

1. Reduce and avoid flood damage to insurable property;
2. Strengthen and support the insurance aspects of NFIP; and
3. Foster comprehensive floodplain management.

Credits add up and can increase the discount a community receives. Credits include Classes 1 to 6 at 10% and classes 7 to 9 at 5%. Premium reductions are subject to change (U. S. Department of homeland Security 2023).

*Table 43. Community Rating System by credit points.*

Credit Points	Class	Premium Reduction SFHA*	Premium Reduction Non-SFHA**
4,500+	1	45%	10%
4,000 – 4,499	2	40%	10%
3,500 – 3,999	3	35%	10%
3,000 – 3,499	4	30%	10%
2,500 – 2,999	5	25%	10%
2,000 – 2,499	6	20%	10%

# Coryell County Hazard Mitigation Plan 2023



1,500 - 1,999	7	15%	5%
1,000 - 1,499	8	10%	5%
500 - 999	9	5%	5%
0 - 499	10	0	0

*\*Special Flood Hazard Area*

*\*\*Preferred Risk Policies are available only in B, C and X Zones for properties that are shown to have a minimal risk of flood damage. The Preferred Risk Policy does not receive premium rate credits under the Community Rating System because it already has a lower premium than other policies. The Community Rating System credit for AR and A99 Zones are based on non-Special Flood Hazard Areas (non-SFHAs) (B, C and X Zones).*

As of May 1, 2018, Copperas Cove has been an active participant in the CRS with a current classification of 8. Copperas Cove receives a 10% discount in SFHA and 5% discount in Non-SFHA.

## **Chapter 14: Dam Failure**

### **Hazard Description**

Dams are water storage, control, or diversion structures that impound water upstream in reservoirs. Benefits provided by dams include water storage, such as water supplies for drinking, irrigation and industrial uses, flood control, hydroelectric power, and recreation.

Dams play a vital role in the nation’s overall infrastructure. They contribute to the economic development of the United States and to the social welfare of the American public by storing water for future use. Dam infrastructure can be affected by natural hazards, man-made threats, as well as an imbalance between resources invested and a dam’s age.

Dams represent a risk to public safety. They require ongoing maintenance, monitoring, safety inspections, and repair and rehabilitation to continue safe operation. Dam failure can occur in several ways, including the collapse of a dam or a breach in the dam structure. While most dams in Coryell County have small storage volumes, such that failures have few or no repercussions, dams storing copious amounts of water can cause major flooding downstream. Dam failures can result from any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding;
- Inadequate capacity, resulting in excess overtopping of the embankment;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, or maintain gates, valves, and other operational components;
- Improper design or use of improper construction materials and;
- Failure to manage water release properly during flood events.

## Coryell County Hazard Mitigation Plan 2023



Dam failure is most often caused by prolonged periods of rainfall and flooding. In the event of a dam failure, the energy of the water stored behind the dam can cause rapid and unexpected flooding downstream.

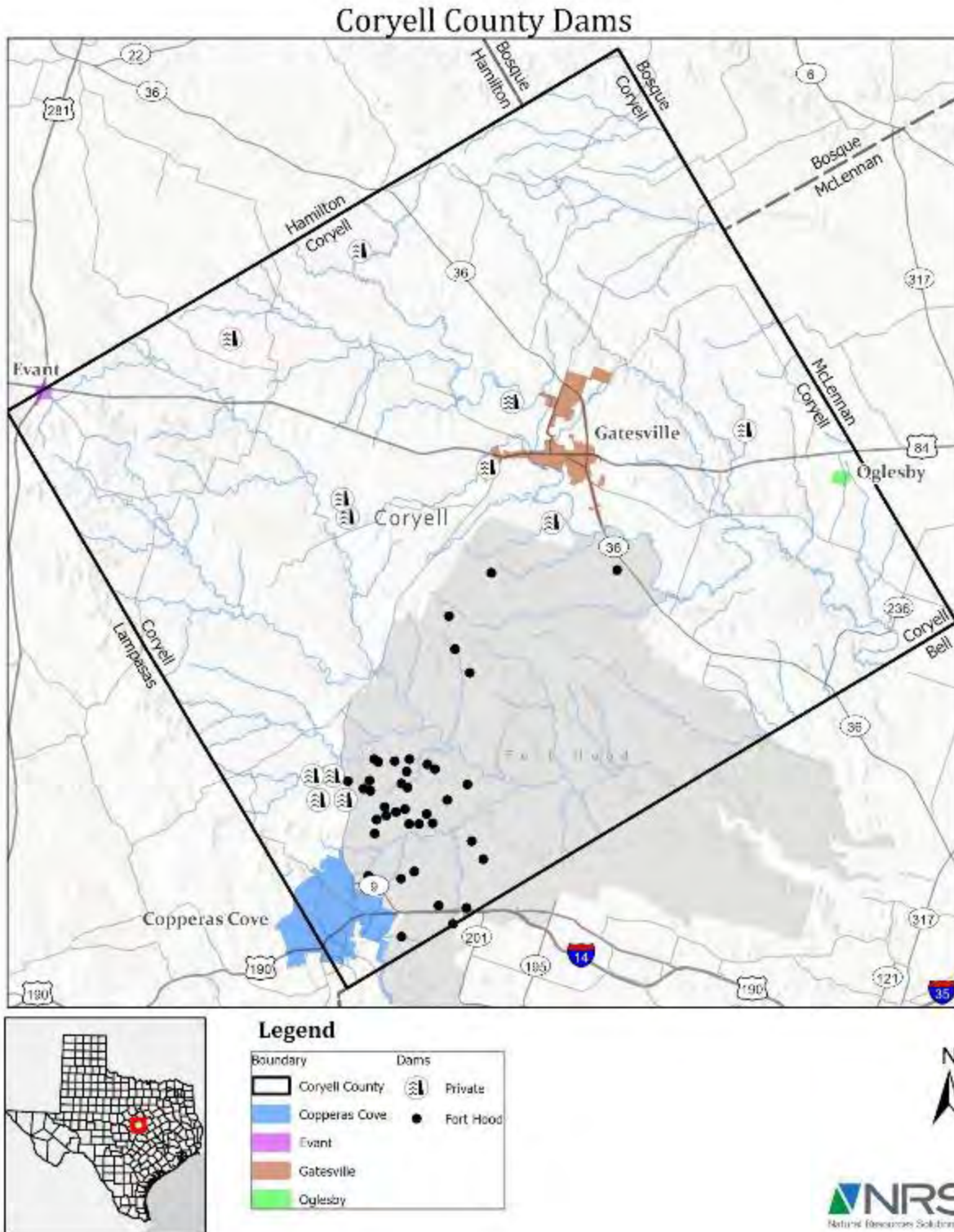
### **Location**

The Texas Commission on Environmental Quality (TCEQ) regulates the 7,413 dams located in the state of Texas. The National Dam Safety Review Board (in coordination with FEMA) and the National Inventory of Dams (NID) list a total of 52 dams located in Coryell County. Of those 52 dams, 40 are located on Fort Hood and are not included or addressed in this HMP. The remaining 12 dams are located on private property in Coryell County. All 12 dams in Coryell County are earthen embankments for small amounts of water retention. These small dams pose no risk to structures, infrastructure, or citizens of Coryell County.

# Coryell County Hazard Mitigation Plan 2023



Figure 60. Dam locations in Coryell County.







**Extent**

The extent or magnitude of a dam failure event is described in terms of the classification of damages that could result from a dam’s failure, not the probability of failure. For dams with a maximum storage capacity of 100,000 acre-feet or more, all structures within five miles are at risk of potential dam failure hazards. For dams with a maximum storage capacity between 10,000 and 100,000 acre-feet, all structures within three miles are at risk of potential dam failure hazards. For dams with a maximum storage capacity of less than 10,000 acre-feet, all structures within one mile are at risk of potential dam failure hazards (Table 44).

*Table 44. Structures at risk of potential dam failure based on acre-feet capacity.*

<b>Storage Capacity (Acre-Feet)</b>	<b>Structures at Risk (Mile Radius)</b>
Less Than 10,000	Within 1 mile
10,000 to 100,000	Within 3 miles
100,000	Within 5 miles

All 12 dams on private property in Coryell County are *not* considered capable of causing impacts beyond the private property on which they are located.

**Historical Occurrences**

There have not been any recorded structural dam failures impacting Coryell County. However, controlled water release between dams have attributed to flood events in the County. In 2018, USACE released unscheduled substantial amounts of water from a dam upstream from the Planning Area, Proctor Dam, to ensure that heavy rainfall did not cause damage to the structure or overtopping of the spillway. During this event, water was not released at Belton Dam, portions of Coryell County flooded, and the City of Gatesville and surrounding private properties were severely impacted. Several roads and low water crossings were damaged, impassable, and human loss of life occurred (Gately 2018).

**Probability of Future Events**

No historical events of dam failure have been recorded in the Coryell County Planning Area. Due to the lack of historical occurrences, the probability of a future event is highly unlikely.

***Climate Change***

Climate change could affect the safety of all dam structures, including large and small dams and earthen or concrete dams. Specifically, significant changes in a region’s climate, such as increased incidence of extreme temperatures and the increased frequency of heavy precipitation, could seriously impact the integrity and viability of dams in Coryell County.



**Vulnerability**

TCEQ evaluated all 52 dams in Coryell County to determine the risk, if any, associated with each dam. The analysis indicated an average dam age of 47 years, and included the hazard potential classification that categorizes dams according to the degree of adverse incremental consequences of a failure or mis-operation. The hazard potential classification does not reflect in any way on the current condition of the dam (e.g., safety, structural integrity, flood routing capacity). Dams classified as a Low hazard potential are those where failure or mis-operation results in no probable loss of human life and low economic and environmental losses. In fact, losses associated with a Low hazard potential are principally limited to the owner’s property. Comparatively, dams classified as a significant hazard potential are those where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, and disruption of lifeline (i.e., public works and utility) facilities. These dams are often located in predominantly rural or agricultural areas. Please see Table 45 for more information.

*Table 45. Hazard Potential Classifications (Title 30, Texas Administrative Code, Section 292.14)*

<b>Hazard Potential Classification</b>	<b>Loss of Human Life</b>	<b>Economic, Environmental, and Lifeline Losses</b>
High	Probable, One or More Expected	Yes
Significant	None Expected	Yes
Low	None Expected	Low, Limited to Owner

The analysis indicated there is 1 dam classified as *High*, 3 dams classified as *Significant*, and 33 dams classified as *Low*. All 12 dams outside and 3 inside of Fort Hood had no classification available. As mentioned, dams located on Fort Hood are not addressed in this HMP; however, due to the larger number of dams on Fort Hood, Table 46 summarized Coryell County dams by Hazard Potential.

*Table 46. Number of Coryell County dams by hazard potential.*

<b>Hazard Potential Classification</b>	<b>Total Dams</b>	<b>Location</b>	
		<b>Fort Hood</b>	<b>Private Property</b>
High	1	1	0
Significant	3	3	0
Low	33	33	0
Not Available	15	3	12
<b>Total</b>	<b>52</b>	<b>40</b>	<b>12</b>

Areas outside of Fort Hood are not vulnerable to dam failure impacts from dams located on Fort Hood due to the location and small size of the dams and the amount of water retained

# Coryell County Hazard Mitigation Plan 2023



by the dams. Thus, the risk to the Planning Area including all jurisdictions from any Fort Hood Dam Failure is zero.

Table 47 below details the 12 dams in Coryell County located on private property. For each dam, the maximum storage capacity and nearest cities have been identified. Based on Table 47, the capacity and proximity to urban areas of these dams are well below established hazardous parameters. The private dams in Coryell County do not pose a risk to persons or property in any jurisdiction beyond the structure and use of the dam itself.

*Table 47. Dams on private property in Coryell County.*

Dam	Latitude	Longitude	Storage Capacity (ac-ft)	Nearest Cities (miles)
[1] Bluestem Estates Lake Dam	31.198331°	-97.930000°	328	Copperas Cove, TX - 5.39 Kempner, TX - 9.17 Killeen, TX - 13.23 Lampasas, TX - 17.54
[2] Peni-Bilt Dam	31.388272°	-97.742497°	970	Fort Gates, TX - 2.16 Gatesville, TX - 3.23 South Mountain, TX - 4.67 Oglesby, TX - 14.00
[3] Kercho Lake Dam	31.404063°	-97.108620°	112	Fort Gates, TX - 2.13 Gatesville, TX - 2.19 South Mountain, TX - 4.24 Oglesby, TX - 13.98
[4] Hempel Dam	31.198331°	-97.908332°	160	Copperas Cove, TX - 5.15 Kempner, TX - 9.84 Killeen, TX - 12.08 Harker Heights, TX - 16.73
[5] Anchor Lake Dam	31.425459°	-97.793664°	104	Gatesville, TX - 3.01 Fort Gates, TX - 5.36 South Mountain, TX - 6.85 Oglesby, TX - 16.89 Evant, TX - 21.42
[6] MDM Grazing Association Dam	31.391667°	-97.906666°	119	Gatesville, TX - 8.85 South Mountain, TX - 11.35 Fort Gates, TX - 11.98 Cranfills Gap, TX - 15.30 Oglesby, TX - 19.69

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[7] Coryell Creek Ranch Dam	31.450923°	-97.588225°	654	South Mountain, TX – 6.44 Oglesby, TX – 5.84 Coryell City, TX - 8.03
[8] Childress Lake Dam	31.513332°	-97.999999°	160	Purmela, TX – 3.53 Levita, TX – 7.83 Pearl, TX - 8.92
[9] Woodward Dam #1	31.214999°	-97.934999°	520	Topsey, TX – 3.32 Copperas Cove, TX - 6.58 Killeen, TX – 14.02
[10] Woodward Dam #2	31.214999°	-97.918332°	80	Topsey, TX – 4.52 Copperas Cove, TX - 6.36 Killeen, TX – 13.16
[11] JP Brocksch Dam	31.573331°	-97.896667°	62	Gatesville, TX - 13.14 Cranfills Gap, TX - 14.46 Gatesville, TX - 16.39
[12] Walker Lake Dam	31.470238°	-97.774731°	180	Gatesville, TX - 3.04 Fort Gates, TX - 6.29 South Mountain, TX - 6.47 Oglesby, TX - 16.20

## Impacts

Flooding is the most probable effect of a large dam failure. If the dam failure is extensive, a large amount of water would enter the downstream waterways and force overbanking if the amount of water were large enough. There may be significant environmental effects, resulting in flooding that could disperse debris and hazardous materials downstream that could impact the ecosystem. If the flooding event is significant, debris carried downstream could block transportation (low water crossings) and disrupt local utilities, such as water and wastewater treatment plants.

There is only one dam classified as *High* hazard potential capable of causing economic or environmental impacts and potential loss of human life. This dam is located on Fort Hood; if it were to fail, the impacts would be localized immediately downstream, and limited to Fort Hood. The 12 dams located on private property in Coryell County are all classified as *Low* hazard potential and are not capable of impacting any critical infrastructure and/or facilities in the event of dam failure. There are no economic impacts expected in Coryell County.

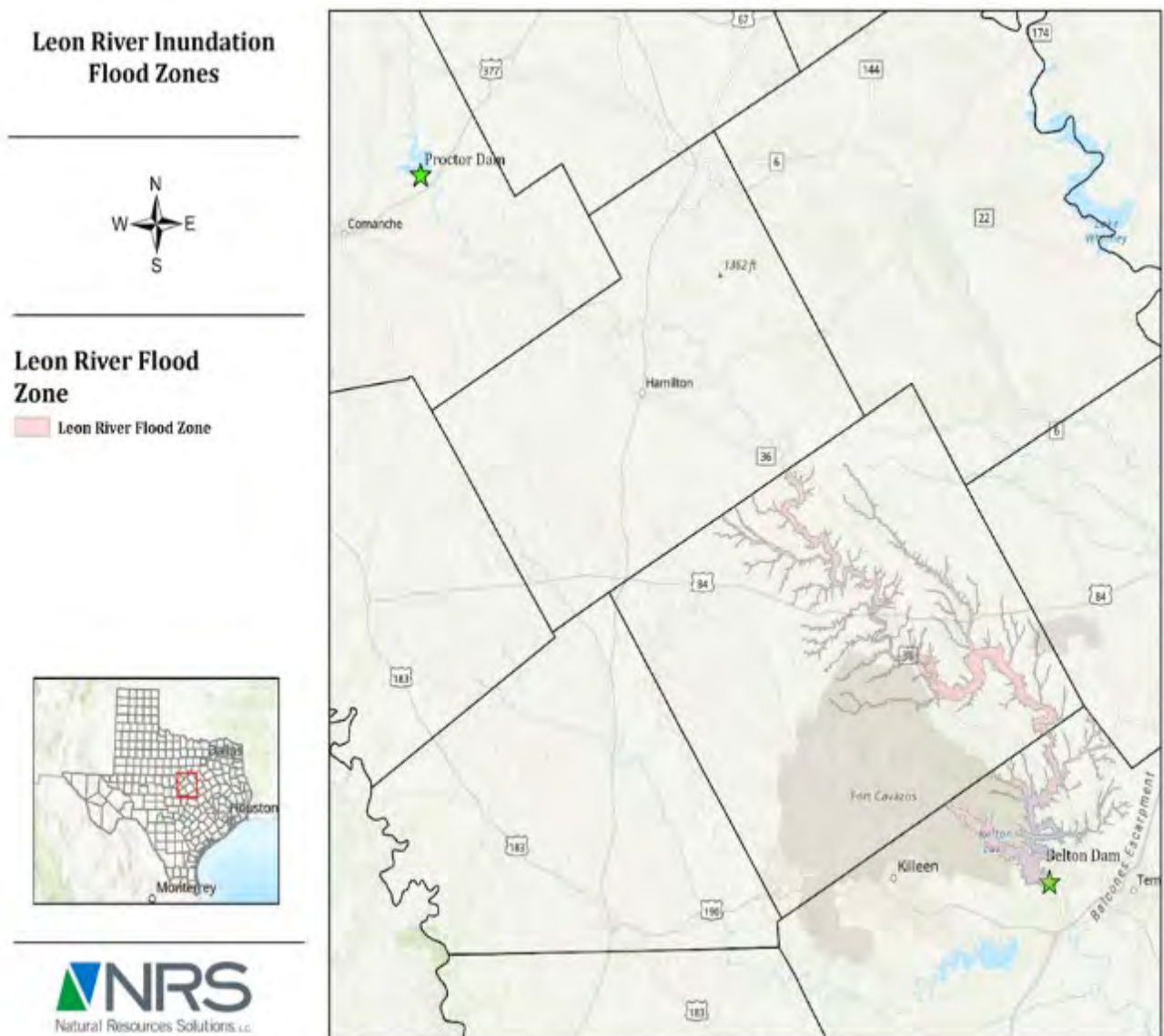
While severe impacts from dam failure in Coryell County are not anticipated due to the size and location of dams, it is worth mentioning Proctor Lake and Dam in Comanche County. Comanche County is located northwest of Coryell County and Proctor Dam is situated at river mile 238.9 on the Leon River. Inflow to Proctor Dam is partially regulated by Lake Leon,

# Coryell County Hazard Mitigation Plan 2023



which is located about 48 miles upstream from Proctor Dam and is operated by the Eastland County Water Supply District. The USACE completed Proctor Dam in 1964. With a maximum storage of 585,800 acre-feet, Proctor Dam is classified as a *High* hazard potential dam. While Proctor Dam is *not* located in the HMP Planning Area and not considered a hazard for Coryell County, dam failure at Proctor Dam has the potential to flood via the Leon River and impact Coryell County. This potential is exacerbated when water is released from Proctor Dam but not at Belton Dam, a dam just over the Coryell County border in Bell County. Due to Coryell County's position south of Proctor Dam and North of Belton Dam, it is in prime flooding area if both dams do not release water in coordination with each other.

Figure 61. Location of Proctor and Belton Dam in relation to Coryell County.





## **Chapter 15: Wildfire**

### **Hazard Description**

A wildfire is an unplanned, uncontrolled fire that burns in a natural environment, such as a forest, grassland, or prairie (commonly referred to as a wildland area). Wildfires are most often caused by human activities or from natural causes, such as lightning or in response to extended periods of drought. Wildfires pose many threats to the environment, economy, and communities due to their erratic behavior. Wildfire behavior refers to the way a wildfire starts and spreads. This is influenced by the interaction of distinct types of fuel, weather, and topography in the area. Factors such as new development and poor fire-prevention management increases the susceptibility of a region to a wildfire event.

There are three types of wildfires:

1. Ground/Subsurface Fires;
2. Surface Fires; and
3. Crown Fires.

During a wildfire event, multiple types of wildfires can occur simultaneously. Ground or subsurface fires are fueled by buried, dead vegetation, such as peat or decayed roots. These fires move slowly underground and produce little to no smoke, which makes them difficult to detect on the surface. This type of wildfire can last for months or even years. Surface fires burn debris such as leaf litter, herbaceous vegetation, and grasses. These are the easiest type of wildfire to extinguish but can evolve into a more difficult crown fire if the right conditions exist. Crown fires burn in the tree canopy, often engulfing the entire tree. This type of fire burns extremely hot, and often spreads rapidly through the interconnected branches of trees. This is the most dangerous type of wildfire and is usually ignited by a surface fire.

In 2022, the state of Texas had approximately 12,400 wildfires that burned about 650,000 acres. The TFS alone responded to about 2,000 of these wildfires (Currie 2023). According to TFS, there have been 18 large fires (fires that burn over 500 acres) in Coryell County between 2005 and 2015, with half of those wildfire events occurring on Fort Hood. Fort Hood occupies approximately 151,392 acres (22%) in Coryell County. Fort Hood conducts live-fire training operations for the soldiers which can lead to the ignition of a wildfire. A recent wildfire event started this way during March 2022, which began on the Crittensburg Complex Range of Fort Hood and crossed the installation boundary into Coryell County, endangering the nearby community of Flat.

Mitigation for wildfires is paramount for creating more fire-resistant communities. This Plan will work in conjunction with a Community Wildfire Protection Plan (CWPP) that Coryell County is anticipating to develop, contingent upon grant funding.

## Extent

The Keetch-Byram Drought Index (KBDI) is used to determine the fire potential within the state of Texas and is based on the daily water balance. The daily water balance is the relationship of the drought factor proportional to the amount of precipitation and soil moisture (Texas A&M Forest Service 2023). The drought index ranges from 0 (complete saturation of the soil) to 800 (absolutely dry conditions). TFS utilizes temperature and precipitation data from weather stations throughout the state to derive the numbers. Below are the ranges of KBDI values and their associated fire potential (Texas A&M Forest Service 2023)

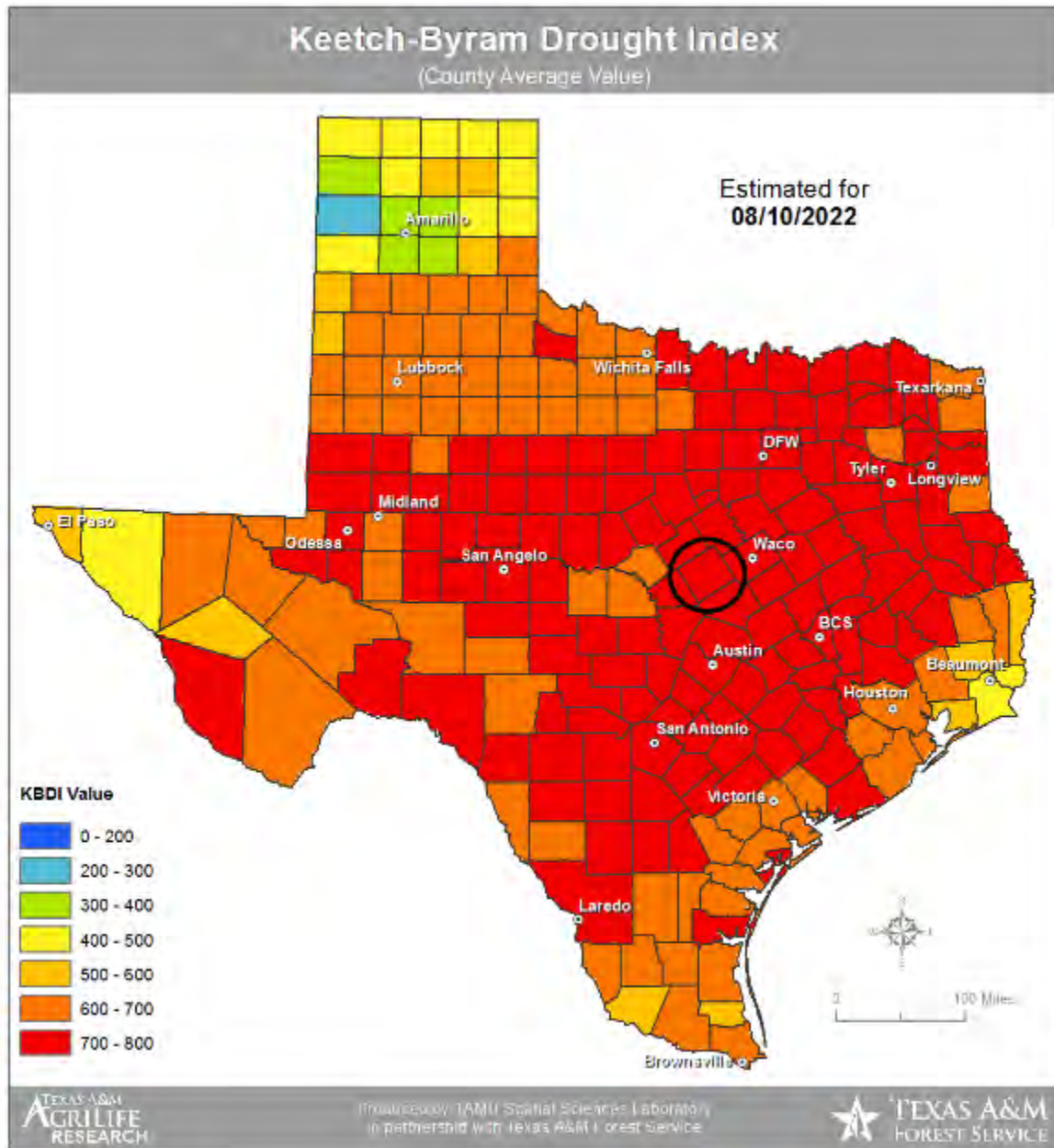
- 0 – 200: Soil moisture and large class fuel moistures are high and do not contribute much to fire intensity. Typical in early spring following winter precipitation.
- 200 – 400: Fuels are beginning to dry and contribute to wildfire intensity. Heavier fuels will still not readily ignite and burn. This is often seen in late spring or early summer.
- 400 – 600: Lower litter and duff layers contribute to fire intensity and will burn actively. Wildfire intensity begins to increase significantly. Larger fuels could burn or smolder for several days. This is often seen in late summer and early fall.
- 600 – 800: Often associated with severe drought with increased wildfire occurrence. Intense, deep-burning fires with extreme intensities can be expected. Live fuels can also be expected to burn actively at these levels.

The KBDI is updated daily by TFS. As an example, to show that Coryell County experiences the entire range of KBDI values, the year 2022 of KBDI values will be used. The driest season, with values between 600 and 800, began late June and lasted until the end of November with the highest KBDI value of the year, 753, on August 10, 2022. Figure 62 represents the peak KBDI value for the County in 2022. Coryell County is in a dry season for the majority of the year, which puts the County at a greater wildfire risk each year. With the planning and management of resources, mitigation of wildfires can be achieved.

# Coryell County Hazard Mitigation Plan 2023



Figure 62. Highest 2022 KBDI for Coryell County (circled in black).

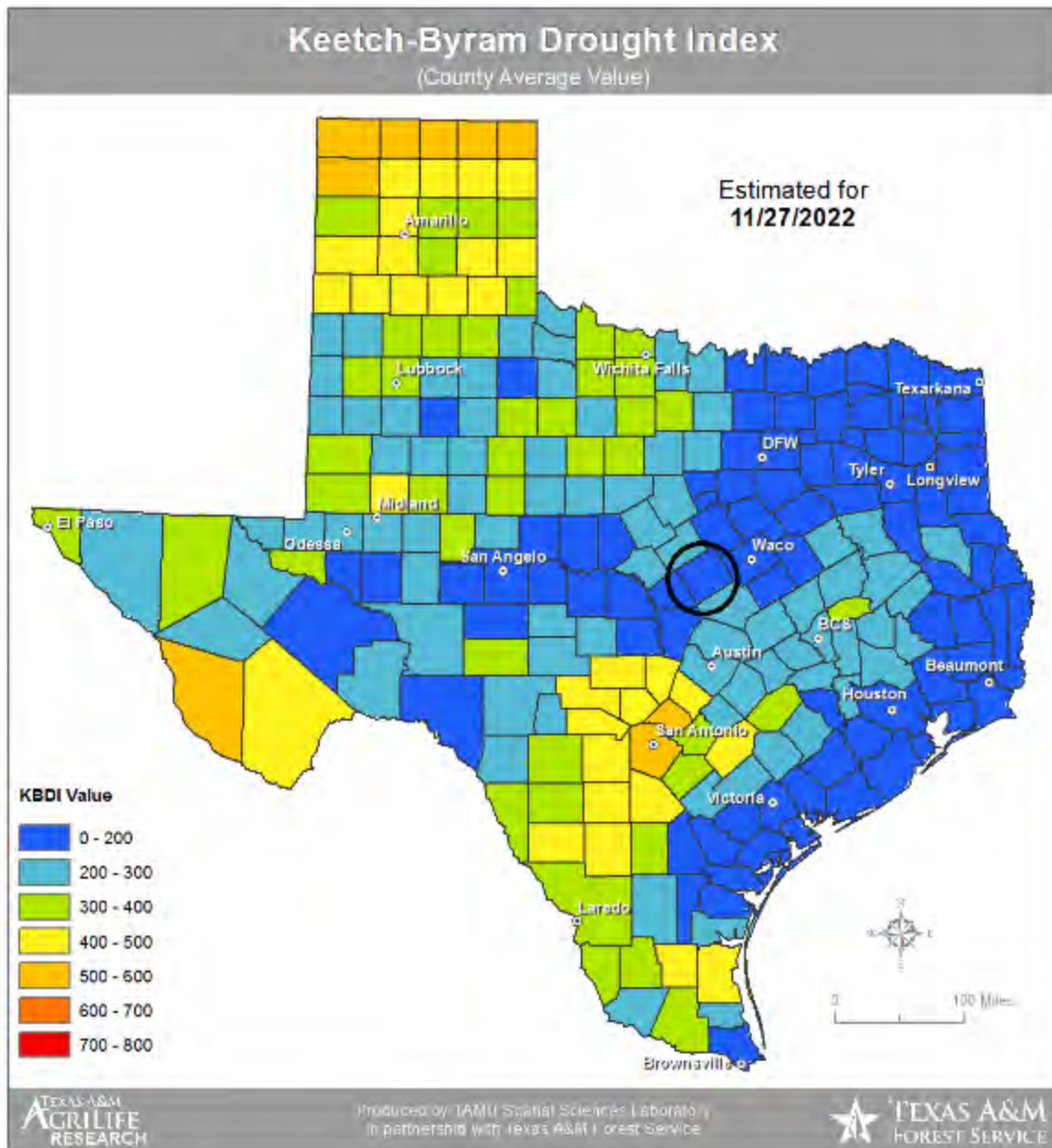


Conversely, the County had the lowest KBDI values, 0 to 200, for about a week in 2022, which spanned from November 27 to December 2. The lowest value in 2022 that Coryell County reached was 182 on November 27, 2022. Figure 63 represents the lowest KBDI value for the county in 2022.

# Coryell County Hazard Mitigation Plan 2023



Figure 63. Lowest 2022 KBDI for Coryell County (circled in black).



Coryell County’s yearly KBDI average value for 2022 was 540, which falls between the 400-600 values. Therefore, the intensity and threat of wildfires are elevated year-round. Wildfire intensity is measured by the heat energy expected from a wildfire. TFS has a tool, the Texas Wildfire Risk Assessment Portal (TxWRAP), that informs the public about wildfire risk and creates awareness about wildfire issues across the state. The Fire Intensity Scale (FIS) identifies areas where significant fuel hazards and associated critical fire potential exist,

## Coryell County Hazard Mitigation Plan 2023



regardless of previous fire occurrences. It is influenced by three environmental factors: fuels, weather, and topography. FIS provides a standard scale to measure potential wildfire intensity. FIS is categorized into 5 classes, where the order of magnitude between classes is ten-fold. The class descriptions are listed below.

- Class 1 (Very low): Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.
- Class 2 (Low): Small flames, usually less than two feet long; small amount of very short-range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
- Class 3 (Moderate): Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
- Class 4 (High): Large Flames, up to 30 feet in length; short-range spotting common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers is generally ineffective; indirect attack may be effective. Significant potential for harm or damage to life and property.
- Class 5 (Very High): Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.

Figure 64 through Figure 68 depicts the FIS for Coryell County and the cities of Gatesville, Copperas Cove, Evant, and Oglesby.



# Coryell County Hazard Mitigation Plan 2023



Figure 64. Map of Coryell County fire intensity.

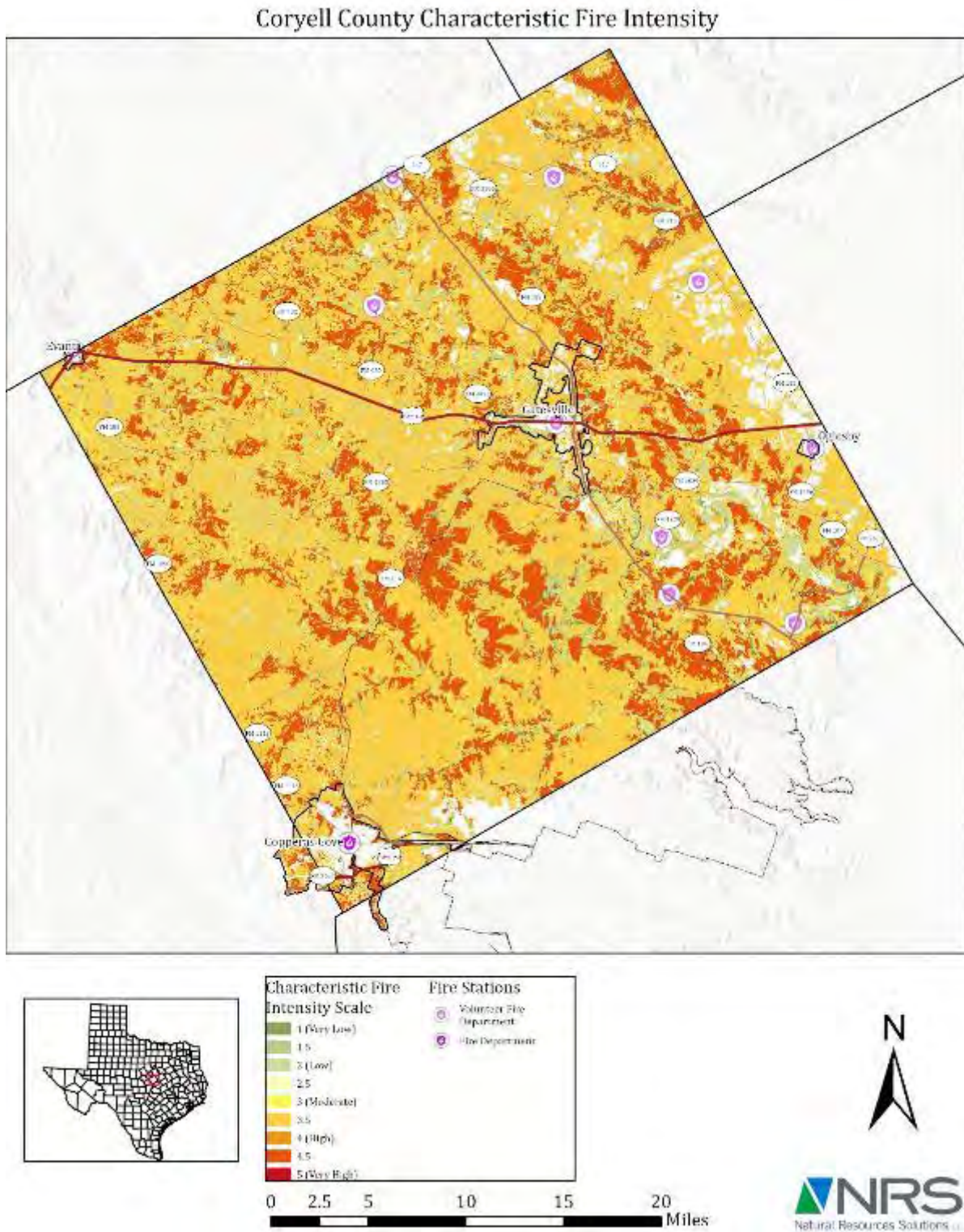




Figure 65. Map of Gatesville fire intensity.

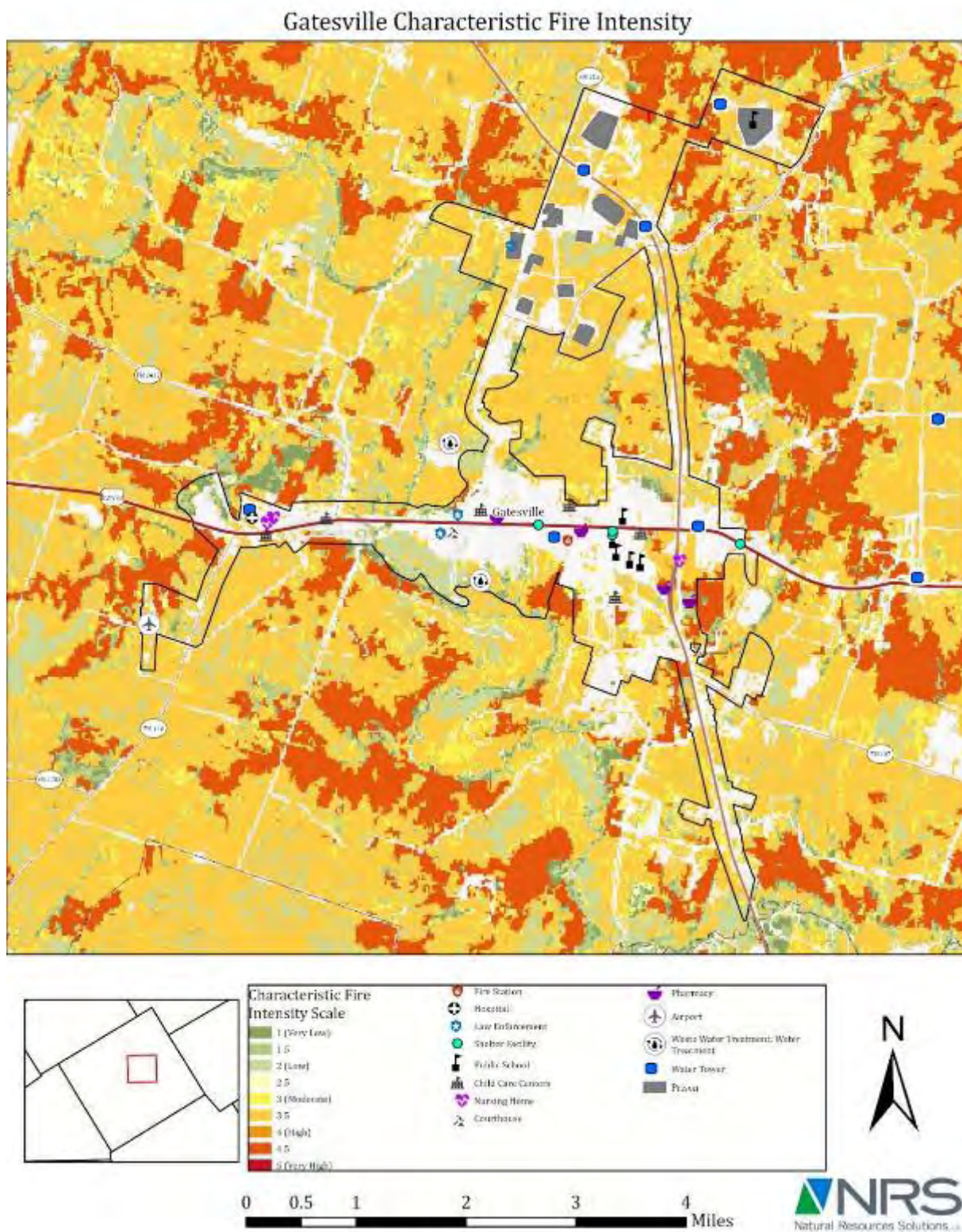




Figure 66. Map of Copperas Cove fire intensity.

## Copperas Cove Characteristic Fire Intensity

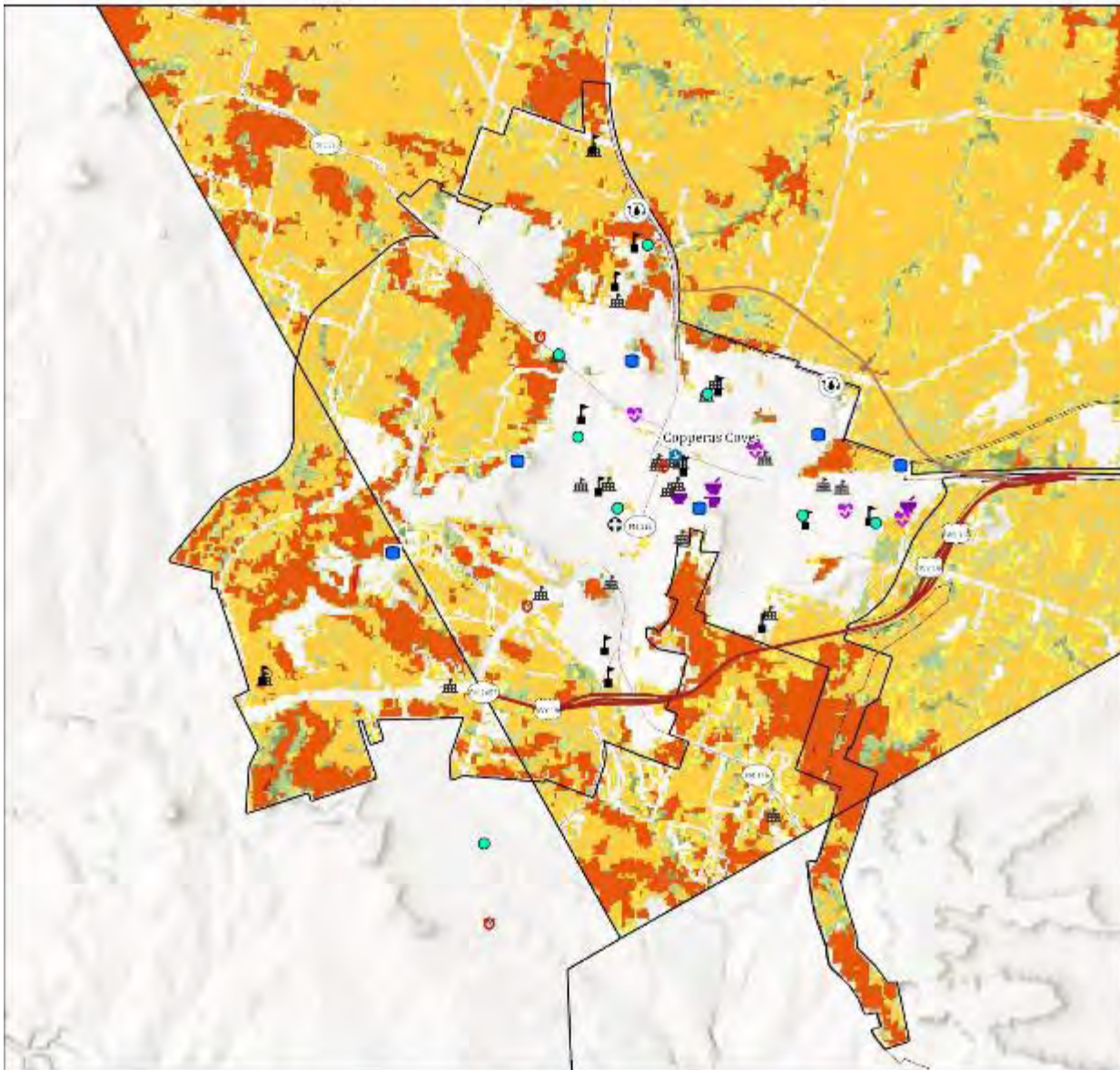


Figure 67. Map of Evant fire intensity.

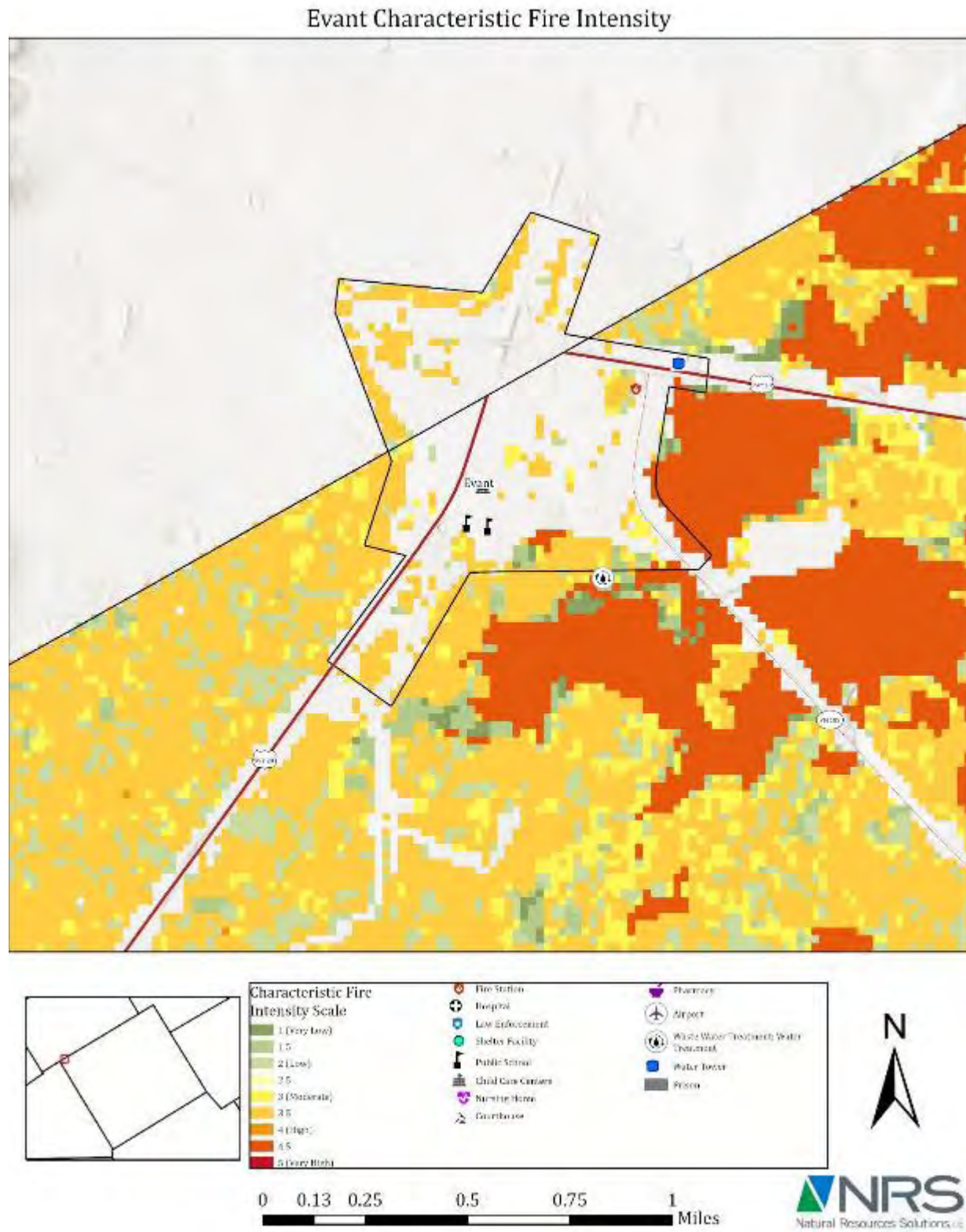
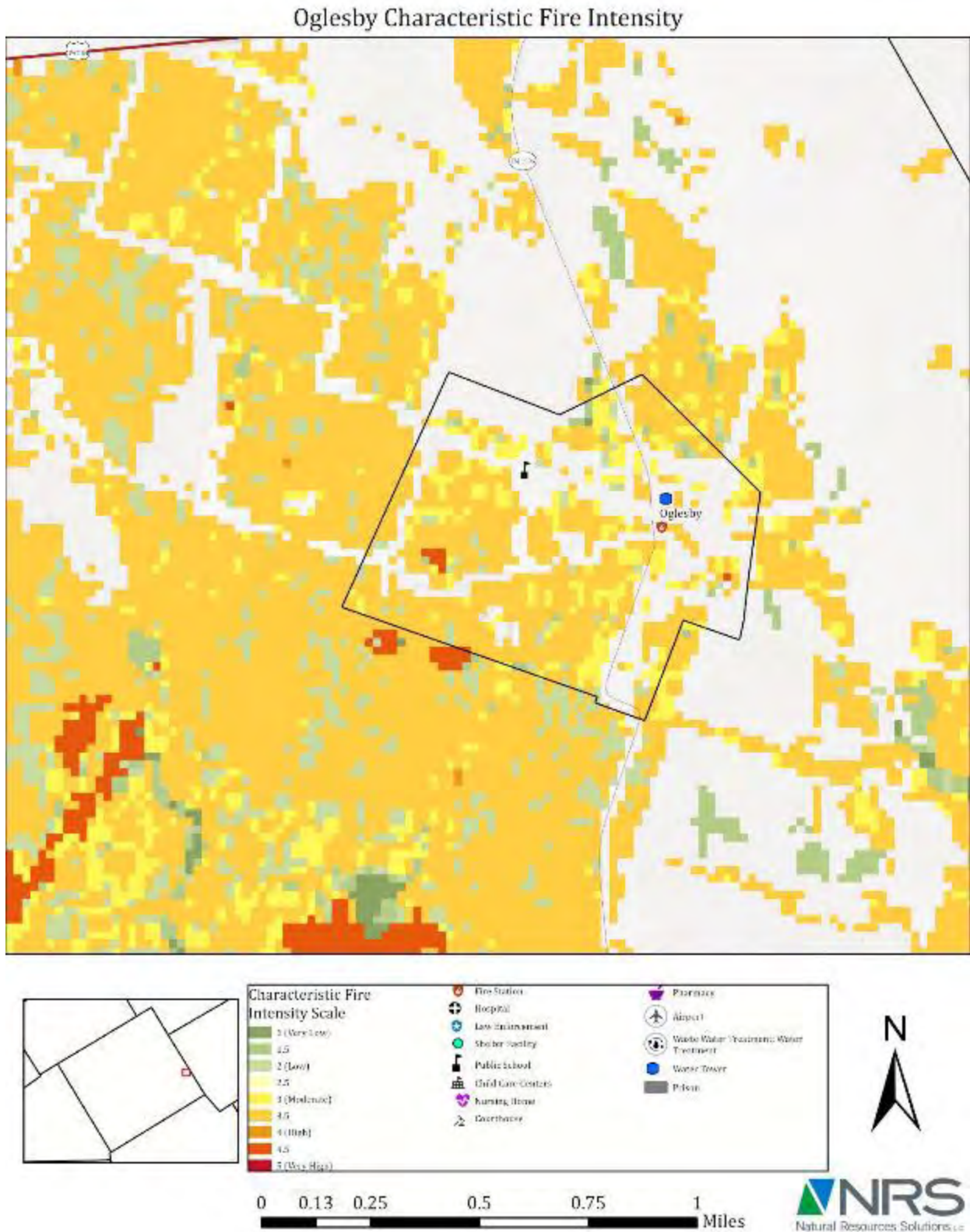




Figure 68. Map of Oglesby fire intensity.







## Location

Coryell County is located in the Cross Timbers ecoregion in Central Texas. The County is dominated by grasslands, shrubs, juniper, deciduous, and live oak forests. This vegetation is considered highly flammable and the combination of these grasses, shrubs, and trees with periods of long drought create an at-risk geographic area that is susceptible to wildfires. According to the 2020 U.S. Census, Coryell County's population is estimated to be 83,093. An estimated 57,334 people, or 69% of residents in Coryell County live within the Wildland Urban Interface (WUI). However, the County and all participating jurisdictions are considered at-risk for future wildfire events. The occurrence of Wildfire was analyzed in all participating jurisdictions in the Planning Area. It was concluded that Wildfire occurs or could occur in all participating jurisdictions and has or could impact all existing and future critical infrastructure and facilities, residents, and their property in Coryell County.

A majority (86%) of wildfires occur within 2 miles of populated areas, threatening property and life (Texas Forest Service 2020). The WUI layer on TxWRAP depicts housing density where the number of houses per acre intermix with wildland fuels. The WUI area is the area where wildfires are the most dangerous to people and property. Figure 69 through Figure 73 identify the WUI areas for Coryell County, Gatesville, Copperas Cove, Evant, and Oglesby. The scale shows that areas of gray to light blue have a greater chance of property damage than the dark purple areas. Homes and structures in these rural areas of the County are at a greater risk due to their proximity to wildland fuels and the lack of developed or urban land.

As previously mentioned, Fort Hood occupies approximately 22% of Coryell County. With that, military live-fire training regularly occurs in the County. Over approximately 80 years, there have been several events where a wildfire has begun on Fort Hood and migrated into private property. In addition to WUI, the land adjacent to and surrounding Fort Hood is of concern. Figure 68 includes the Fort Hood boundary.

# Coryell County Hazard Mitigation Plan 2023



Figure 69. Coryell County WUI.

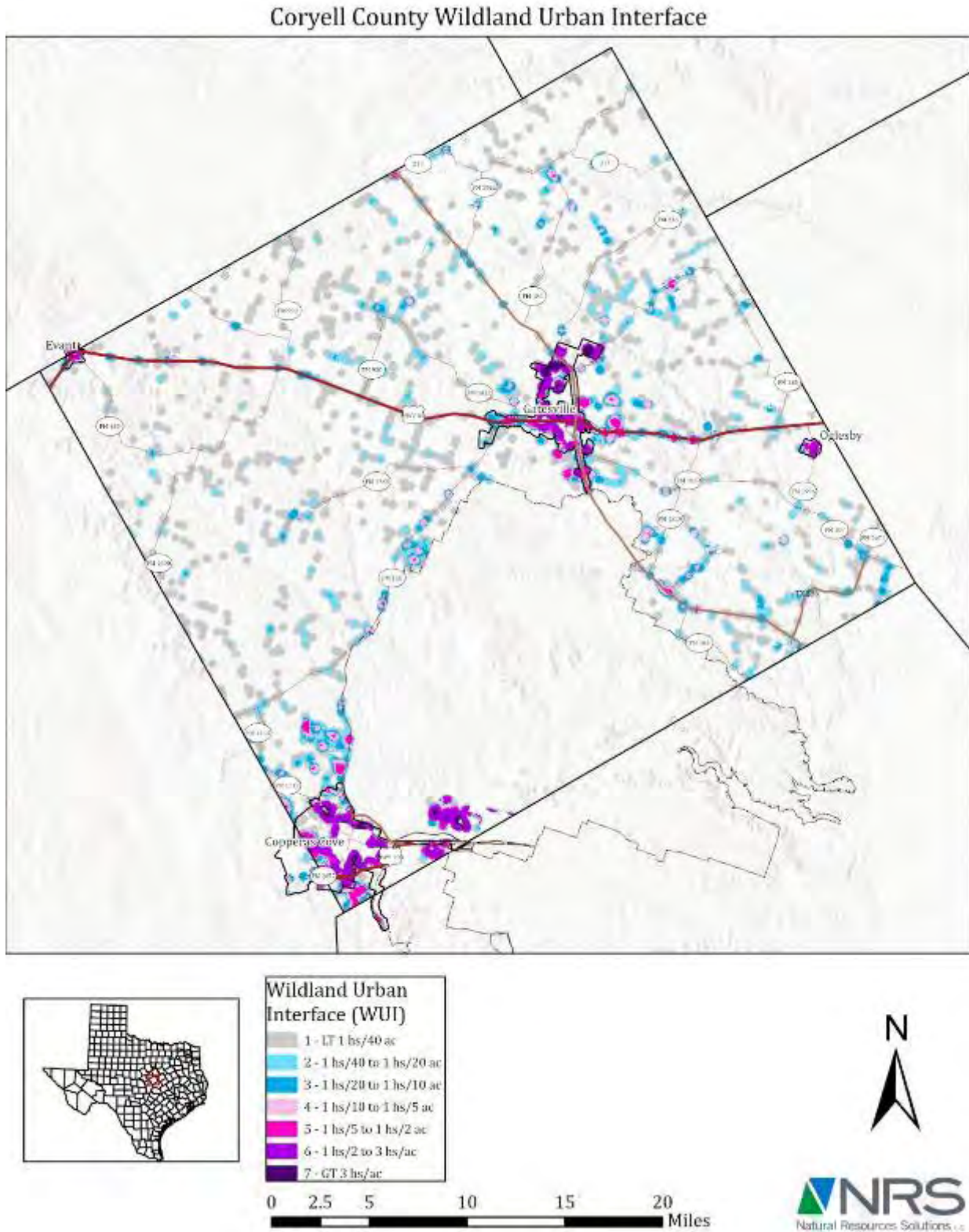


Figure 70. Gatesville WUI.

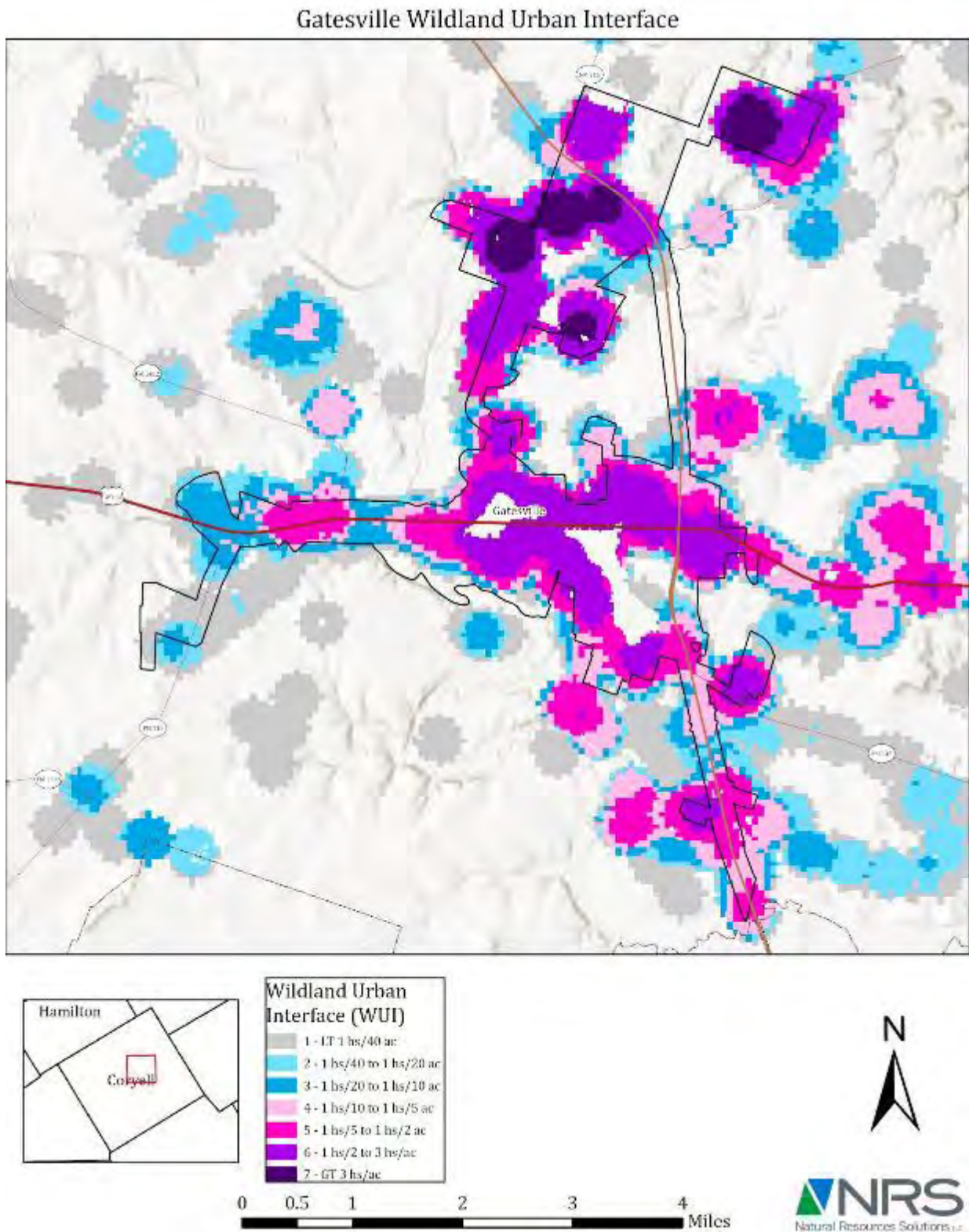




Figure 71. Copperas Cove WUI.

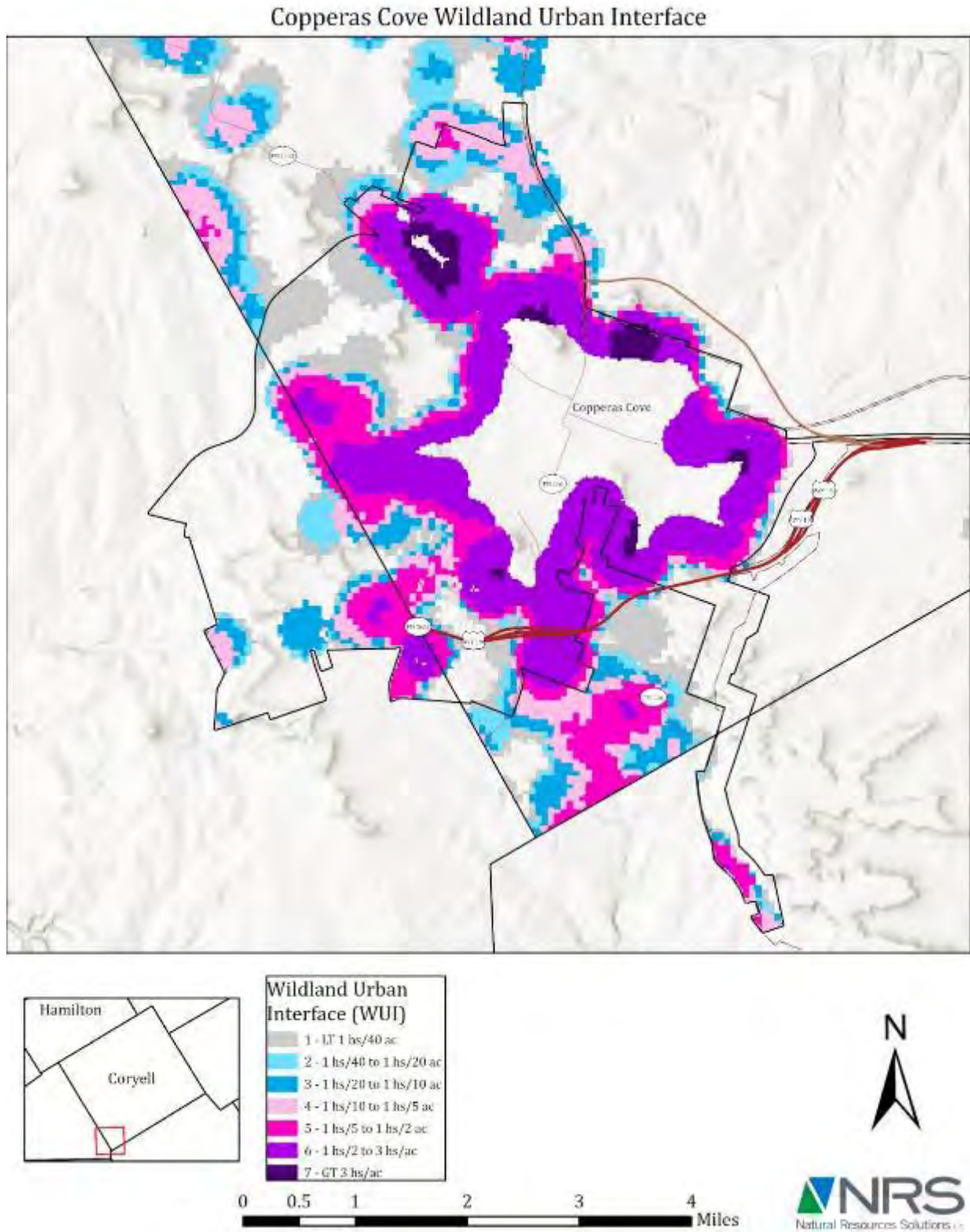
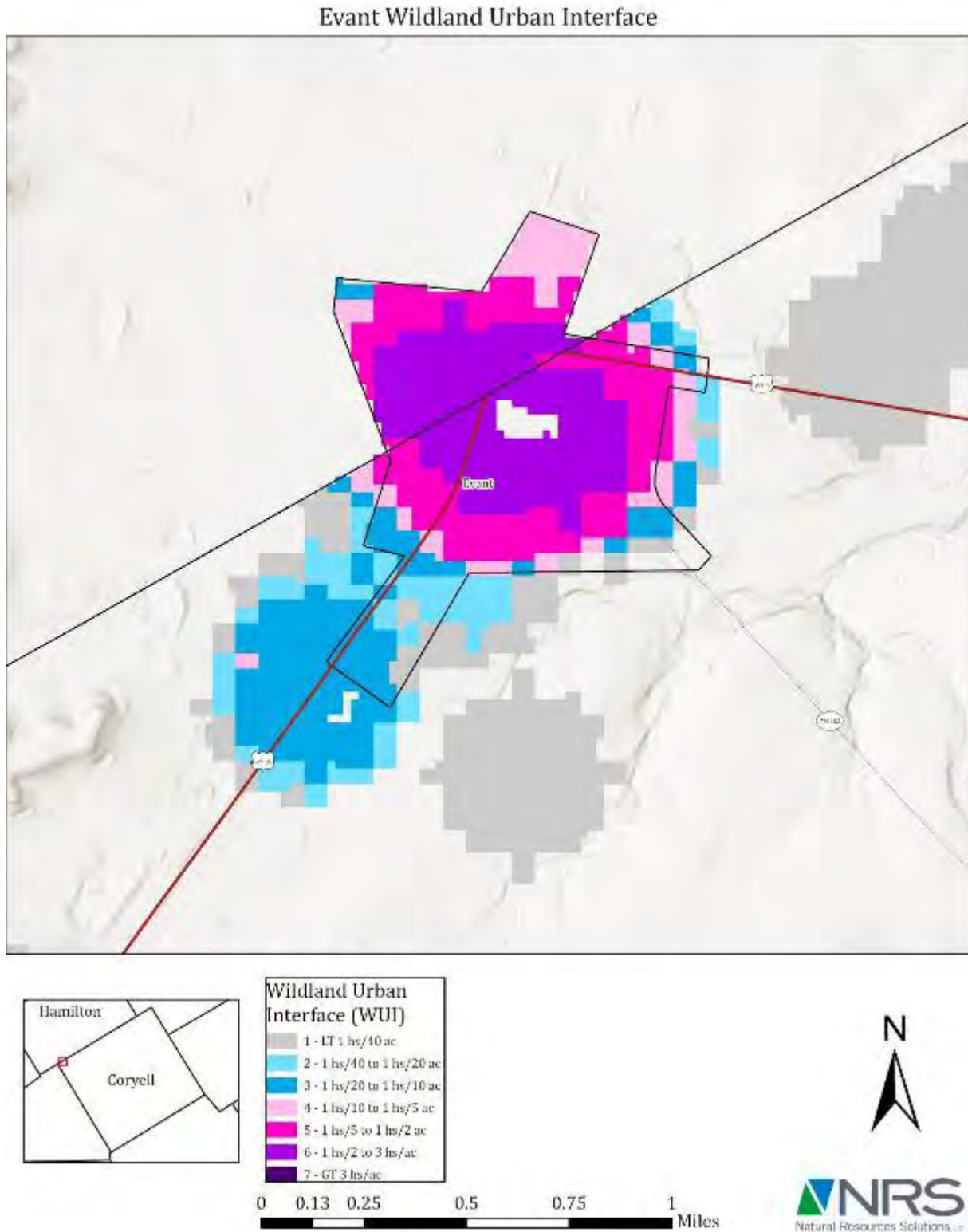


Figure 72. Evant WUI.

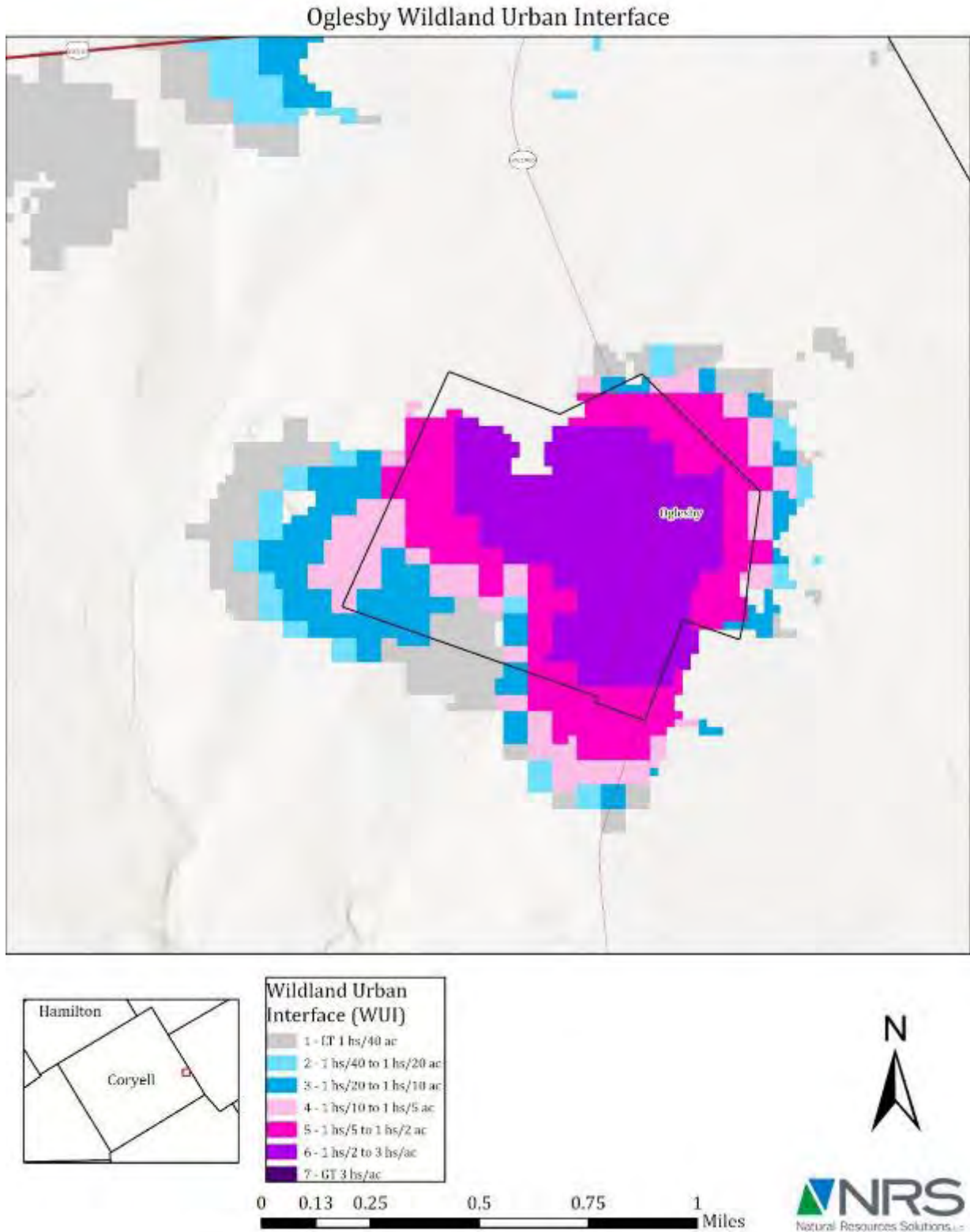




# Coryell County Hazard Mitigation Plan 2023



Figure 73. Oglesby WUI.





## Historical Occurrences

TFS manages and updates TxWRAP regularly to depict fires in Texas. TFS has identified occurrences of wildfires dating back to 2005. Coryell County experienced 2,300 federally recorded wildfires between 2005 and 2021 that have burned 55,883 acres. Of the 2,300 ignitions, 551 have burned 5 or more acres. There have been 491 wildfires ranging from 5-100 acres, 44 wildfires ranging from 101-500 acres, 3 wildfires ranging from 501-1000 acres, and 13 wildfires that burned 1001 acres or greater. There has only been one significant fire recorded prior to 2005, which was in February of 1996. This fire was ignited by military training on Fort Hood and burned almost 10,000 acres, including private land off the installation (Reemts and Hansen 2018). More recently, another significant Fort Hood wildfire was the Crittensburg Complex Fire that burned 33,175 acres in March of 2022. It is thought to have begun as a result of live-fire training on Fort Hood. This fire threatened residents in the nearby community of Flat and they were asked to evacuate.

Fort Hood has an alternative approach from the County regarding the treatment of wildfires. Military training exercises on ranges occasionally ignite fires in the impact area. The impact area is a training area located on Fort Hood where soldiers conduct live-fire training, by using live ammunition and other explosives. Periodically, some of the explosives do not detonate and become Unexploded Ordnance (UXO) in the impact areas on Fort Hood. These areas are off limits for personnel to enter, even to extinguish a fire. Fires that occur in these areas are observed from a safe distance until they are able to be extinguished. Occasionally, these fires spread faster than can be controlled and advance over the boundary into private land. To mitigate this alternative approach, Fort Hood maintains firefighting equipment at each range, educates soldiers on firefighting techniques, restricts fire inducing munitions during dry periods, and maintains a firebreak along boundary lines to lessen the chance of a wildfire migrating onto private property.

Figure 74 below shows the location and size of 551 large (5 acres and greater) wildfires that have occurred in the County between 2005 and 2021.

Figure 74. Wildfire occurrences in Coryell County between 2005 to 2021.

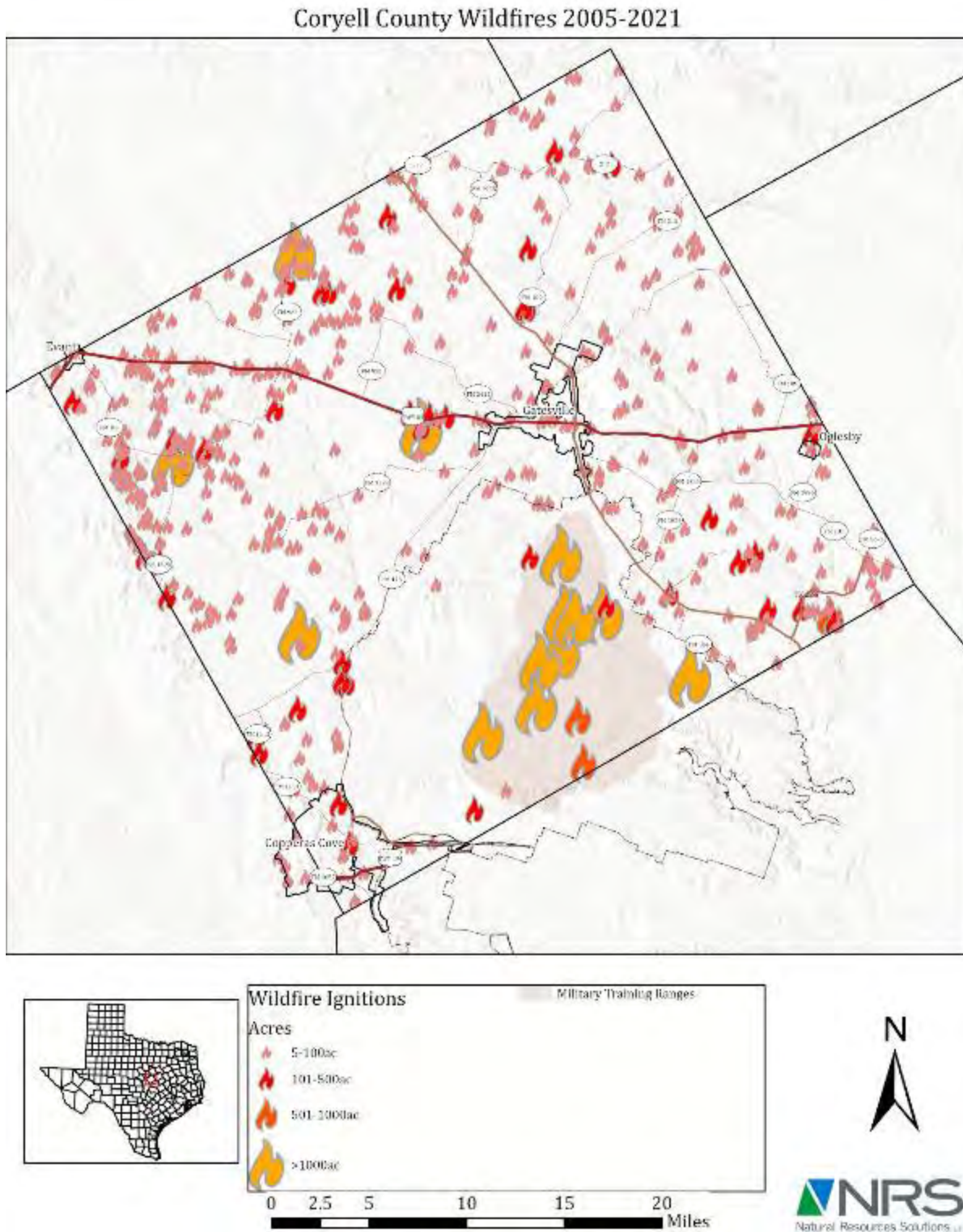
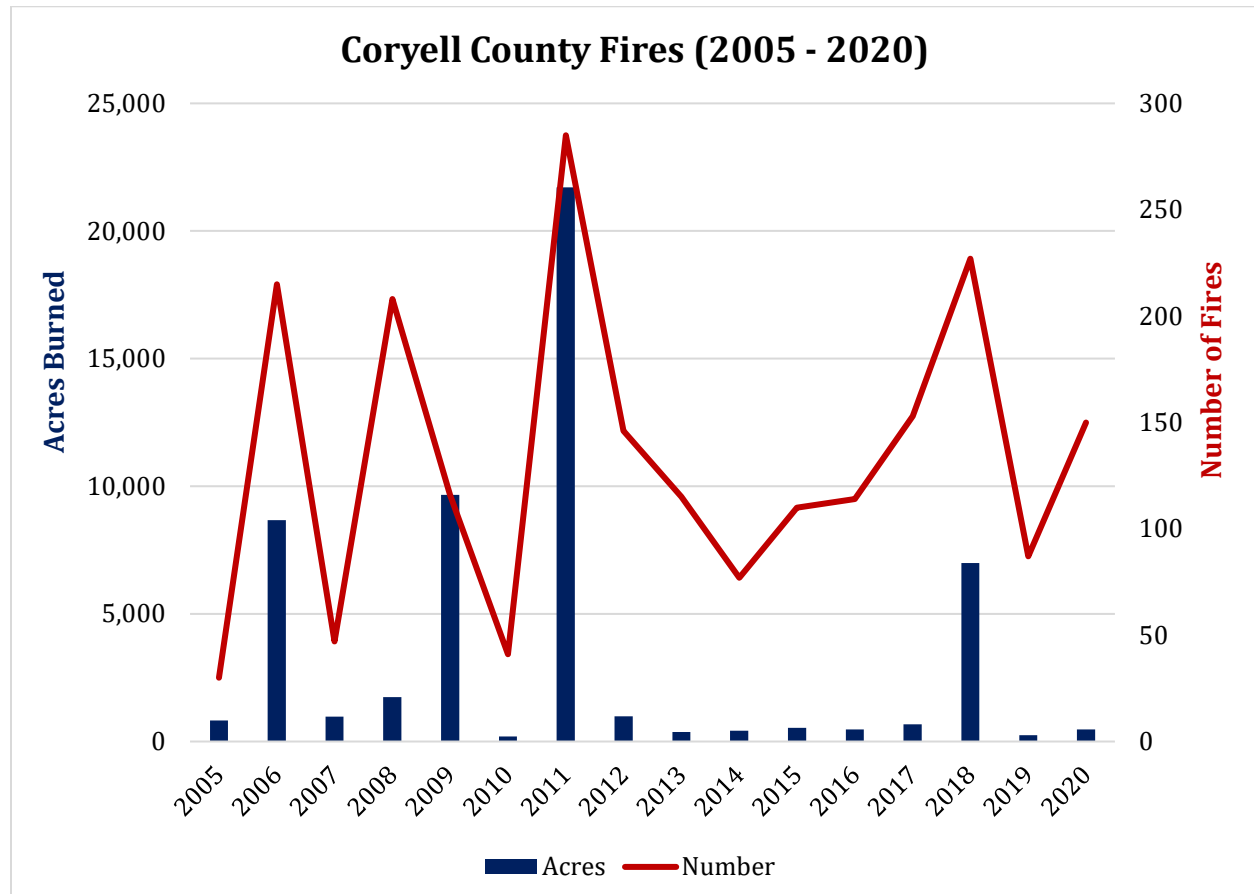




Figure 75 shows the relationship of the number of fires that occurred between 2005 and 2020 in Coryell County to the acres that burned.

Figure 75. Coryell County wildfires and acres burned.



### Wildfire Ignitions

TFS has categorized Wildfire Ignitions to depict the point location of wildfires in the County from 2005 to 2021. Figure 77 through Figure 81 identify the approximate locations and respective sources of wildfire ignitions in Coryell County, Gatesville, Copperas Cove, Evant, and Oglesby. However, this does not display the size of the wildfires. Each ignition type is color coded depending on the cause; ignitions beginning on private County land and Fort Hood have been documented separately. Reference Table 48 for the numerical data and Figure 76 for the visual representation of data on wildfire ignitions in Coryell County. Although the total number of ignitions was fewer on Fort Hood, the total acres burned were higher than the County. Fort Hood has a total of 50 ignitions and 28,434 acres burned, while the County has 2,250 ignitions and 27,449 acres burned.

# Coryell County Hazard Mitigation Plan 2023



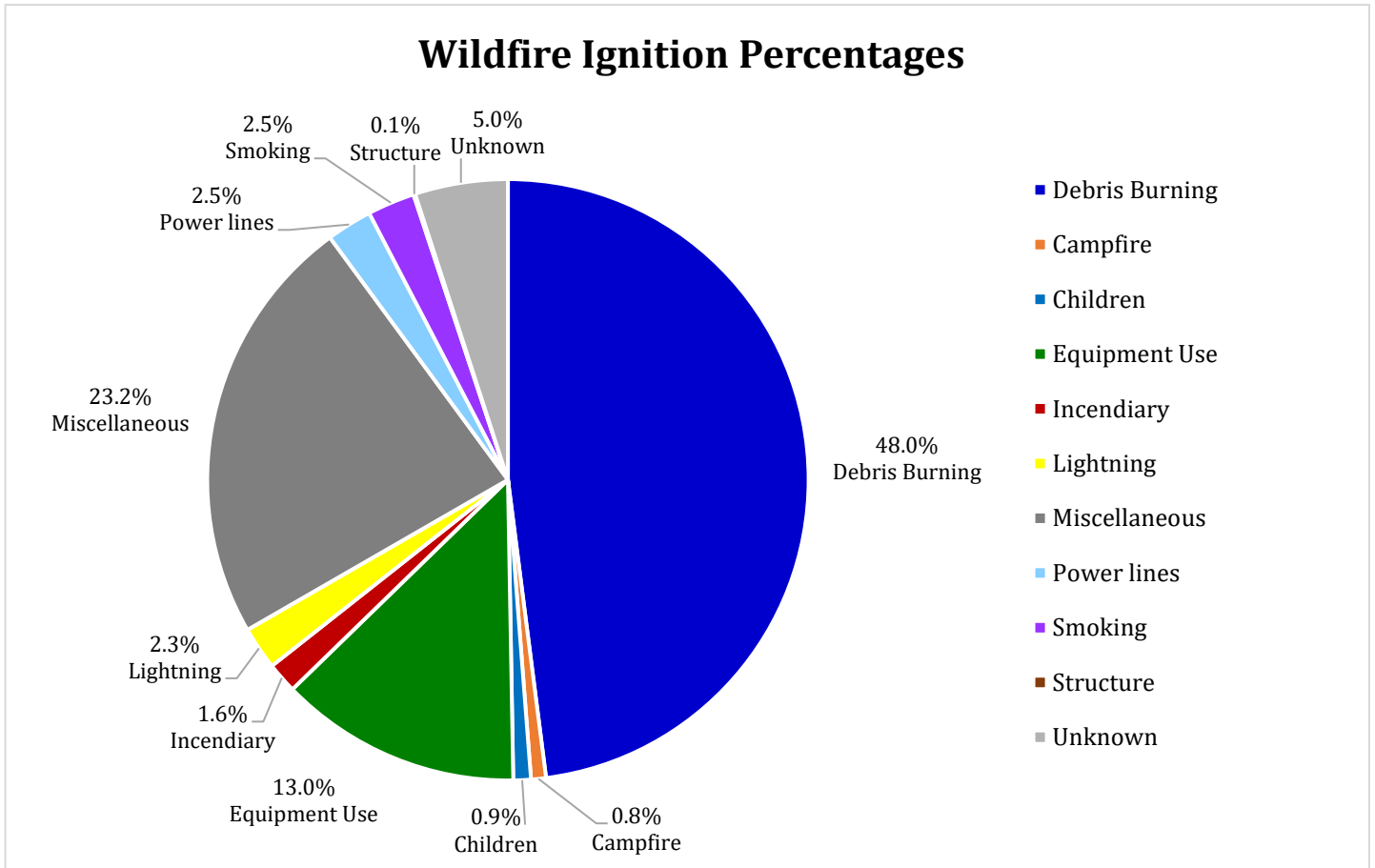
Table 48. Wildfire ignitions in Coryell County between 2005 and 2021.

Cause	Location	# of Incidents	Acres Burned
Campfire	County-wide	18	53
	Fort Hood	0	0
Children	County-wide	21	34
	Fort Hood	0	0
Debris Burning	County-wide	1,085	8,967
	Fort Hood	6	162
Equipment Use	County-wide	287	3,304
	Fort Hood	5	772
Incendiary	County-wide	42	731
	Fort Hood	2	3,000
Lightning	County-wide	47	1,989
	Fort Hood	1	0
Miscellaneous	County-wide	512	8,142
	Fort Hood	28	23,477
Power Lines	County-wide	56	297
	Fort Hood	1	1
Smoking	County-wide	55	454
	Fort Hood	0	0
Structure	County-wide	2	2
	Fort Hood	0	0
Unknown	County-wide	125	3,476
	Fort Hood	7	1,022
County-wide Total		2,250	27,449
Fort Hood Total		50	28,434
<b>GRAND TOTAL</b>		<b>2,300</b>	<b>55,883</b>





Figure 76. Percentages of wildfire ignitions in Coryell County.



# Coryell County Hazard Mitigation Plan 2023



Figure 77. Wildfire ignition sites and sources in Coryell County between 2005 and 2021.

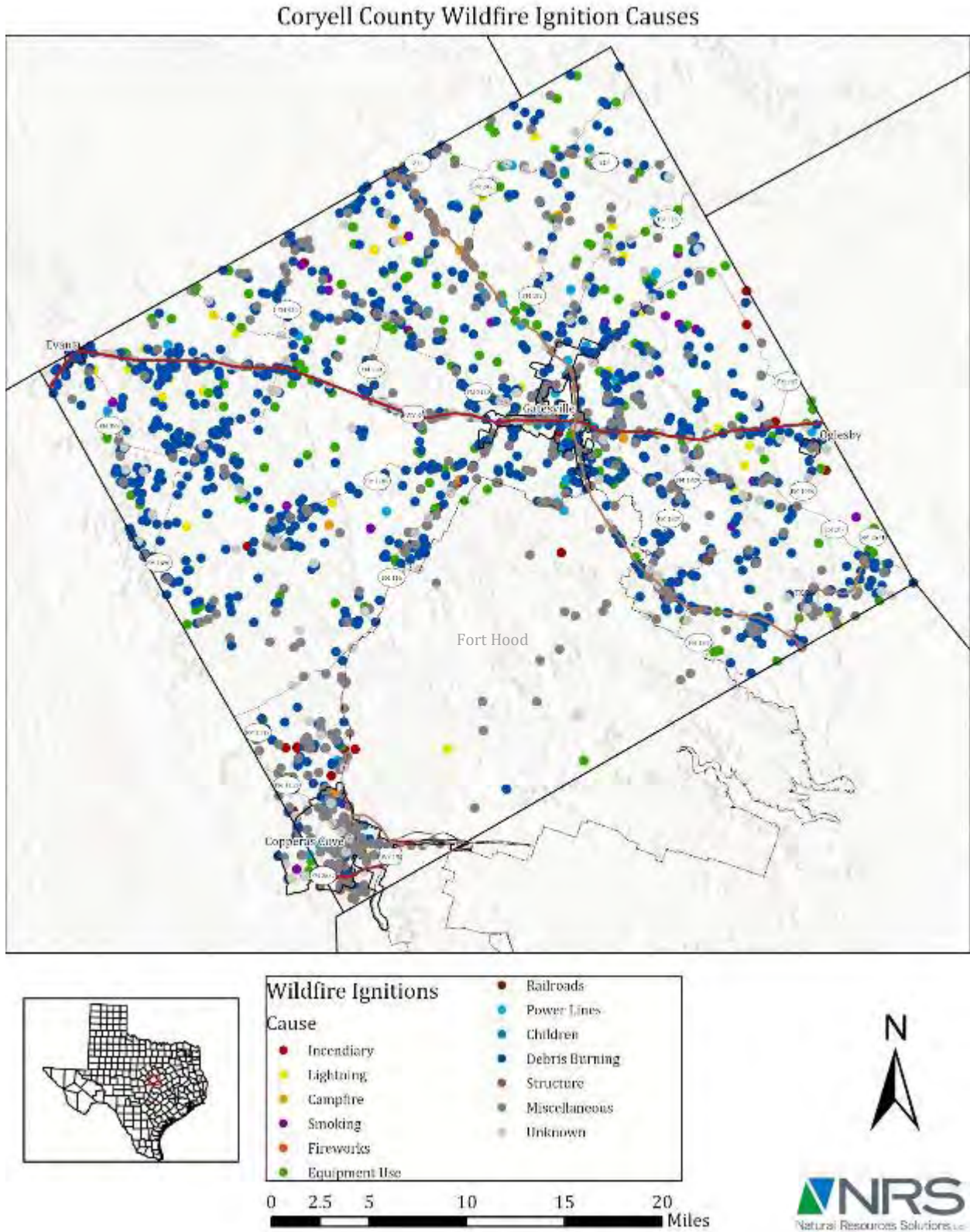


Figure 78. Wildfire ignition sites and sources in Gatesville between 2005 and 2021.

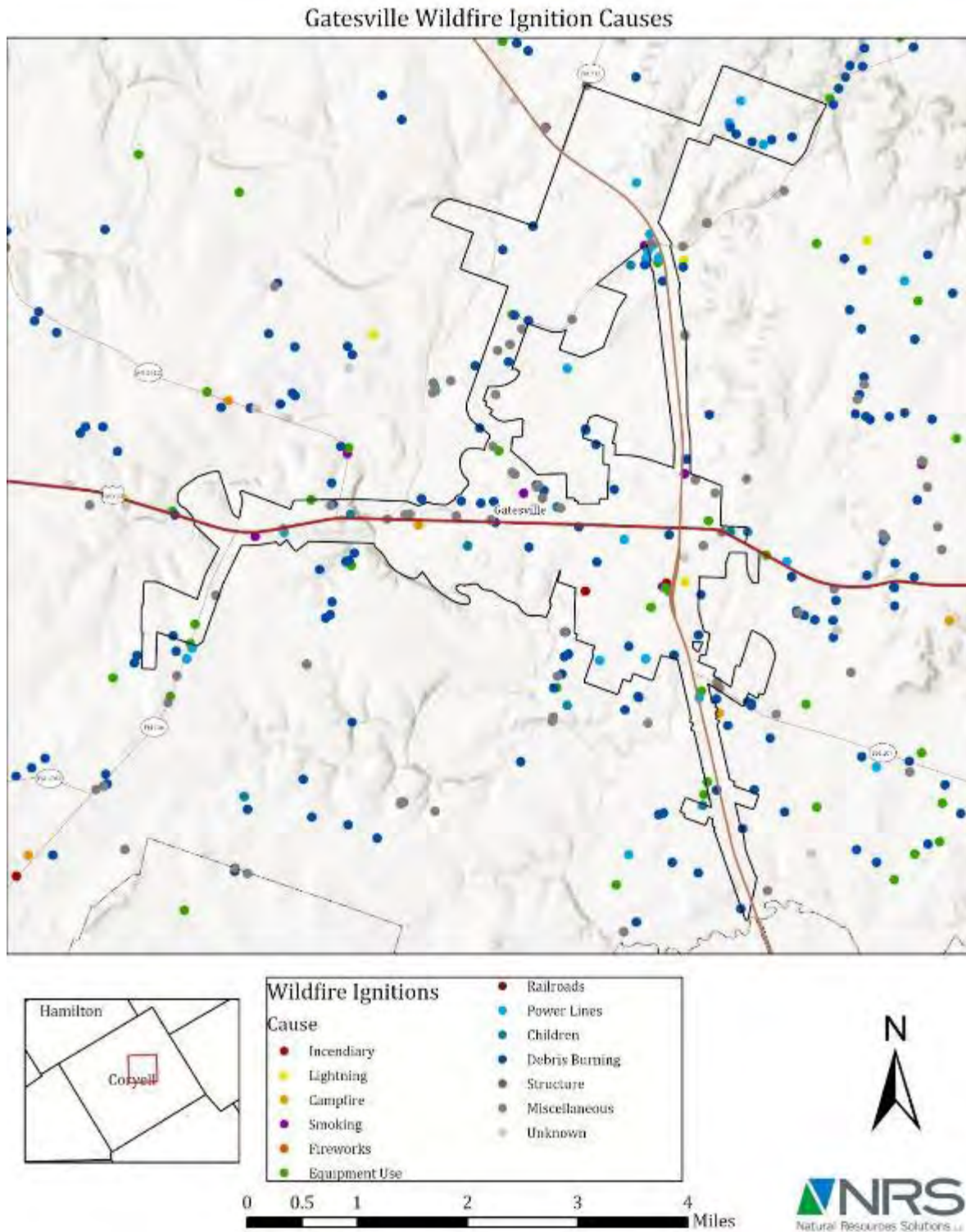




Figure 79. Wildfire ignition sites and sources in Copperas Cove between 2005 and 2021.

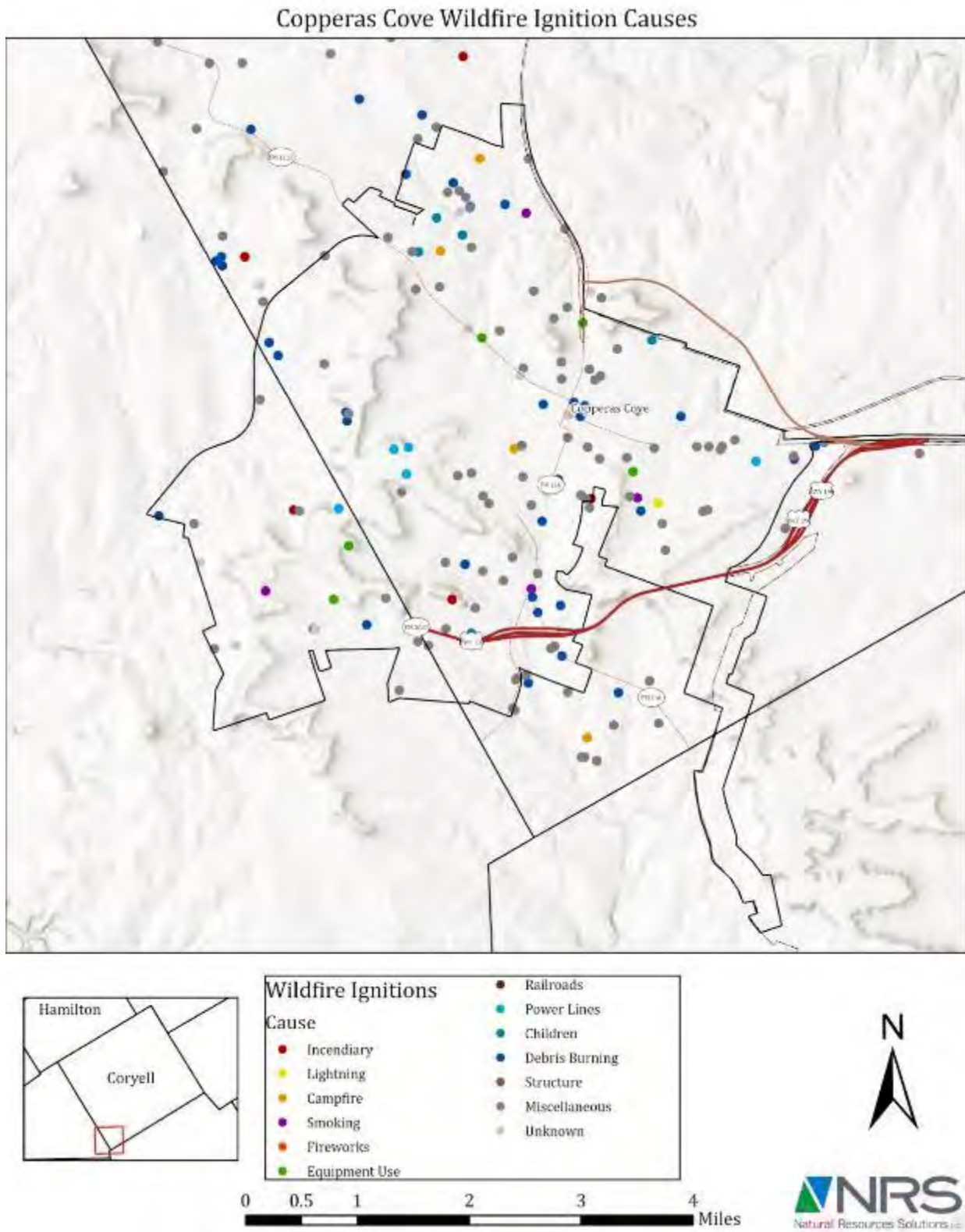


Figure 80. Wildfire ignition sites and sources in Evant between 2005 and 2021.

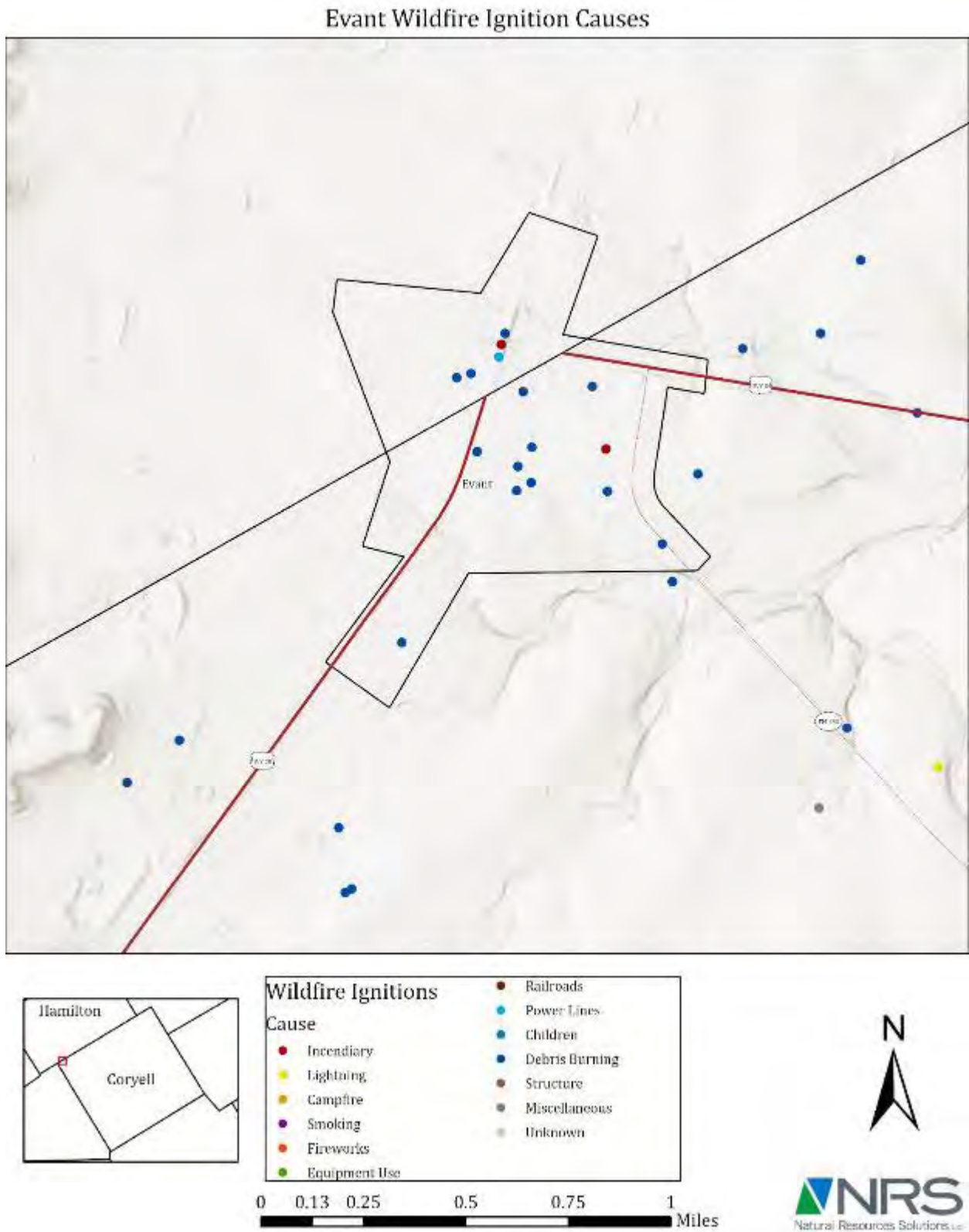
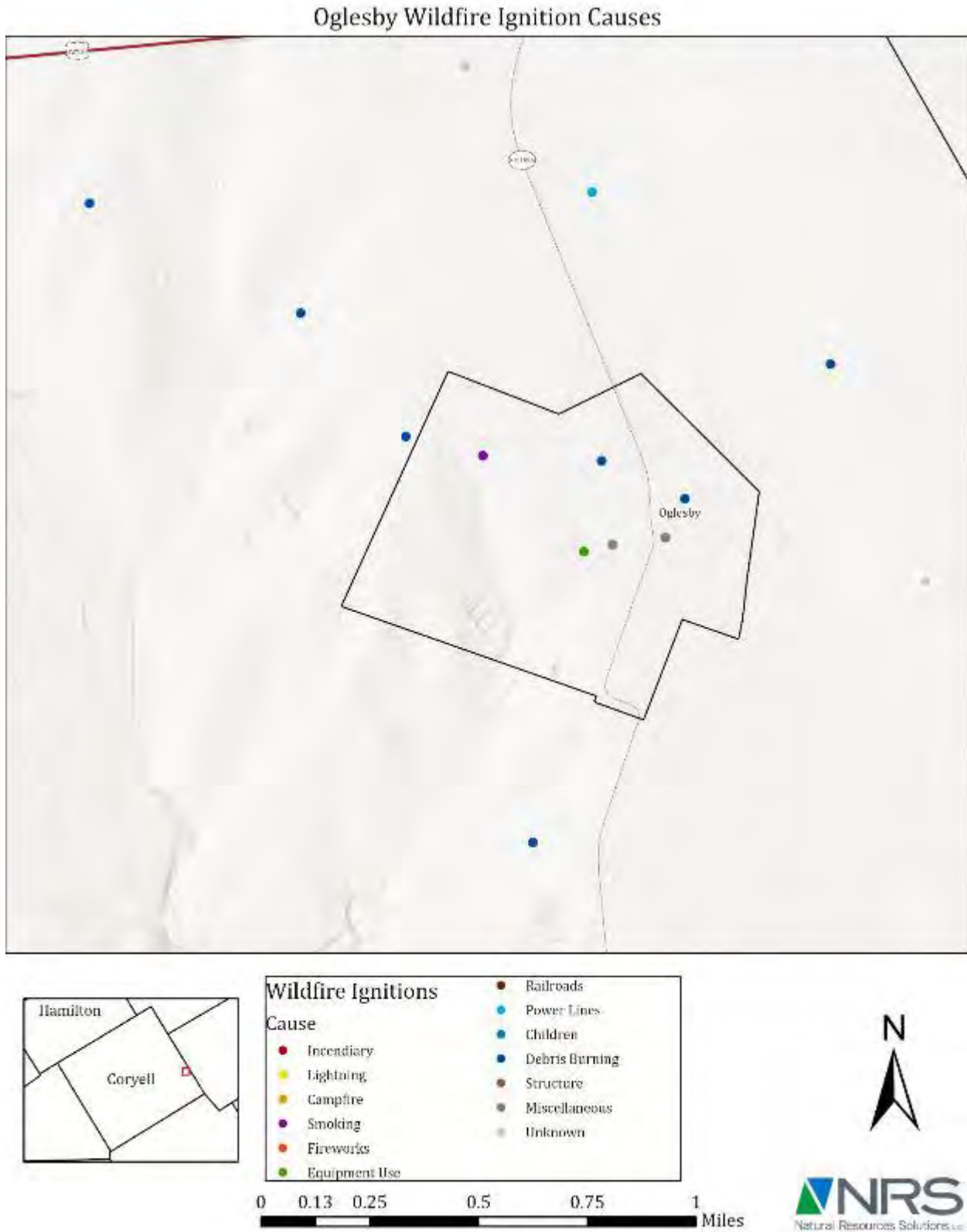




Figure 81. Wildfire ignition sites and sources in Oglesby between 2005 and 2021.





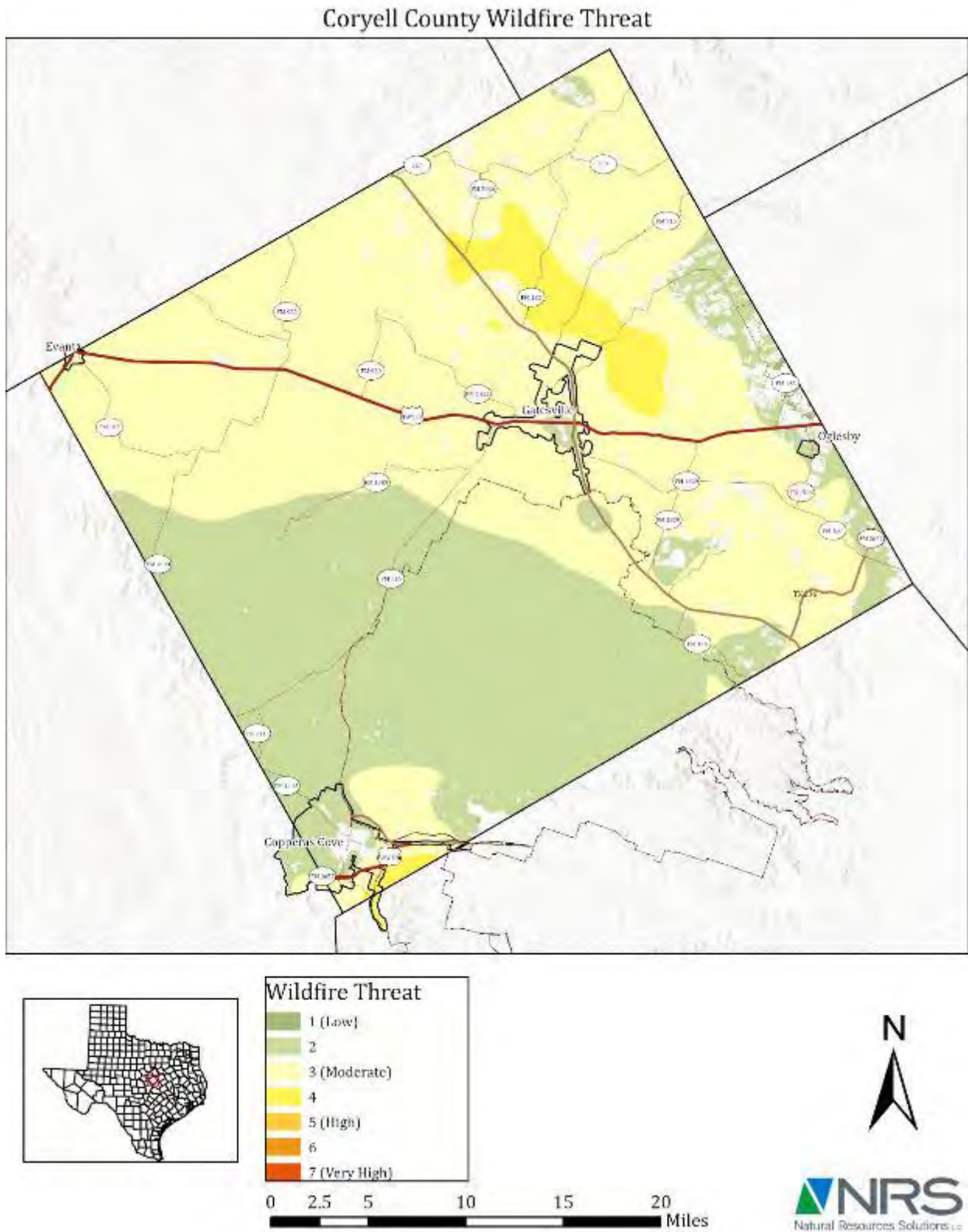
## **Probability of Future Events**

To identify the probability of a future wildfire event, the Wildfire Threat layer on TxWRAP is used to determine the likelihood of a wildfire occurring or burning in an area. Figure 82 depicts the wildfire threat for Coryell County. The measure of wildfire threat used in the Texas Wildfire Risk Assessment (TWRA) is based on the Wildland Fire Susceptibility Index (WFSI). WFSI combines the probability of an acre igniting (Wildfire Ignition Density), and the expected final fire size based on rate of spread in four percentile weather categories. WFSI is defined as the likelihood of an acre burning. Although the map below depicts the County as having a low to moderate wildfire threat, by having 2,300 wildfire events in a 16-year period shows that the County is very susceptible to future wildfire events and will have several wildfires throughout the County every year.

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Figure 82. Coryell County wildfire threat.



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## *Wildfire Ignition Density*

Wildfire Ignition Density illustrates the likelihood of a wildfire starting based on historical ignition patterns. By modeling past ignition locations, it creates an average ignition rate map. Ignition rate is the number of fires per year per 1,000 acres. The Texas Wildfire Risk Assessment (TWRA) used 5 years (2005-2009) of ignition point data reported from federal, state, and local fire departments to create this model. Figure 83 through Figure 87 identify the probability of a wildfire event in Coryell County, Gatesville, Copperas Cove, Evant, and Oglesby.



# Coryell County Hazard Mitigation Plan 2023



Figure 83. Probability of a wildfire event in Coryell County.

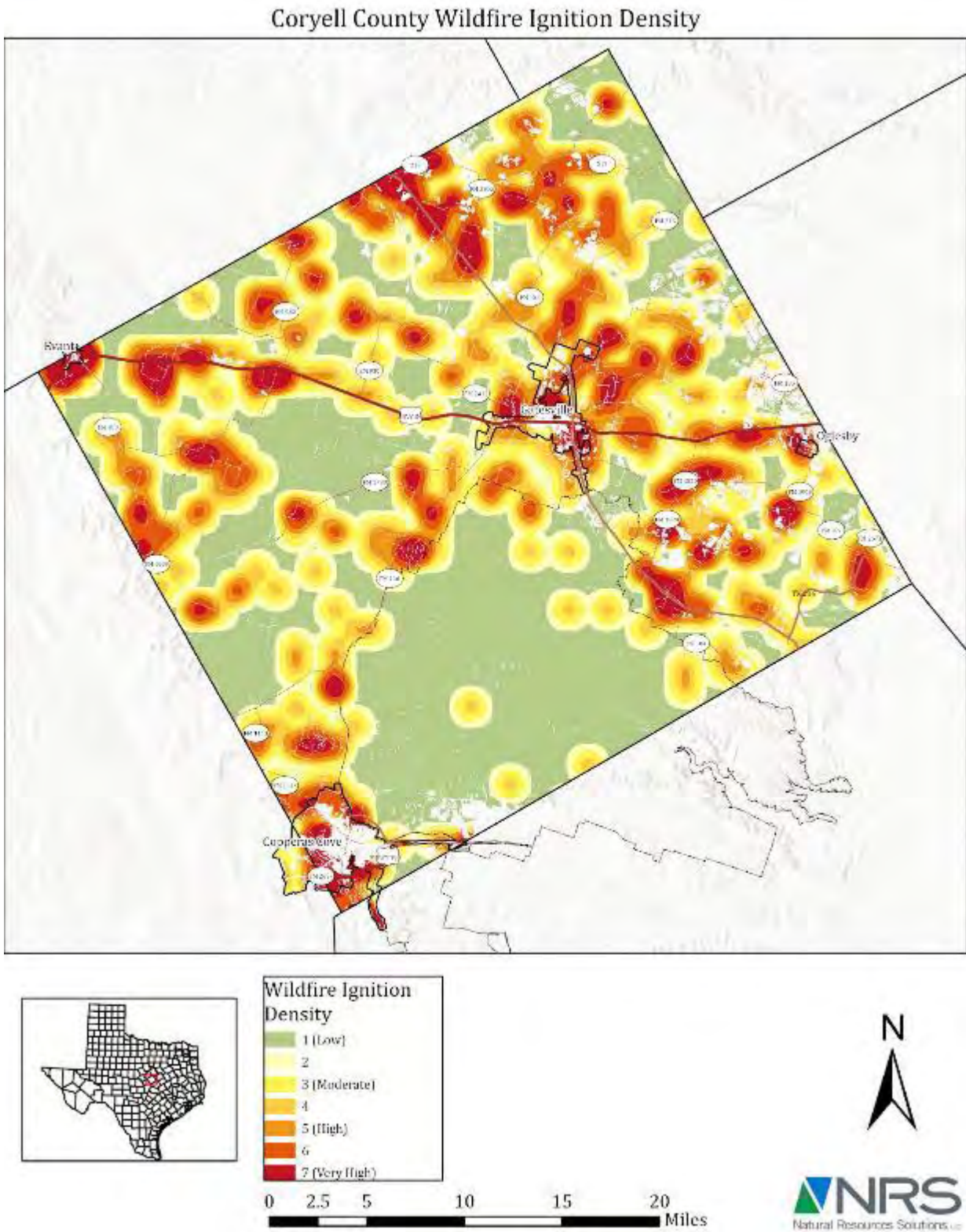




Figure 84. Probability of a wildfire event in Gatesville.

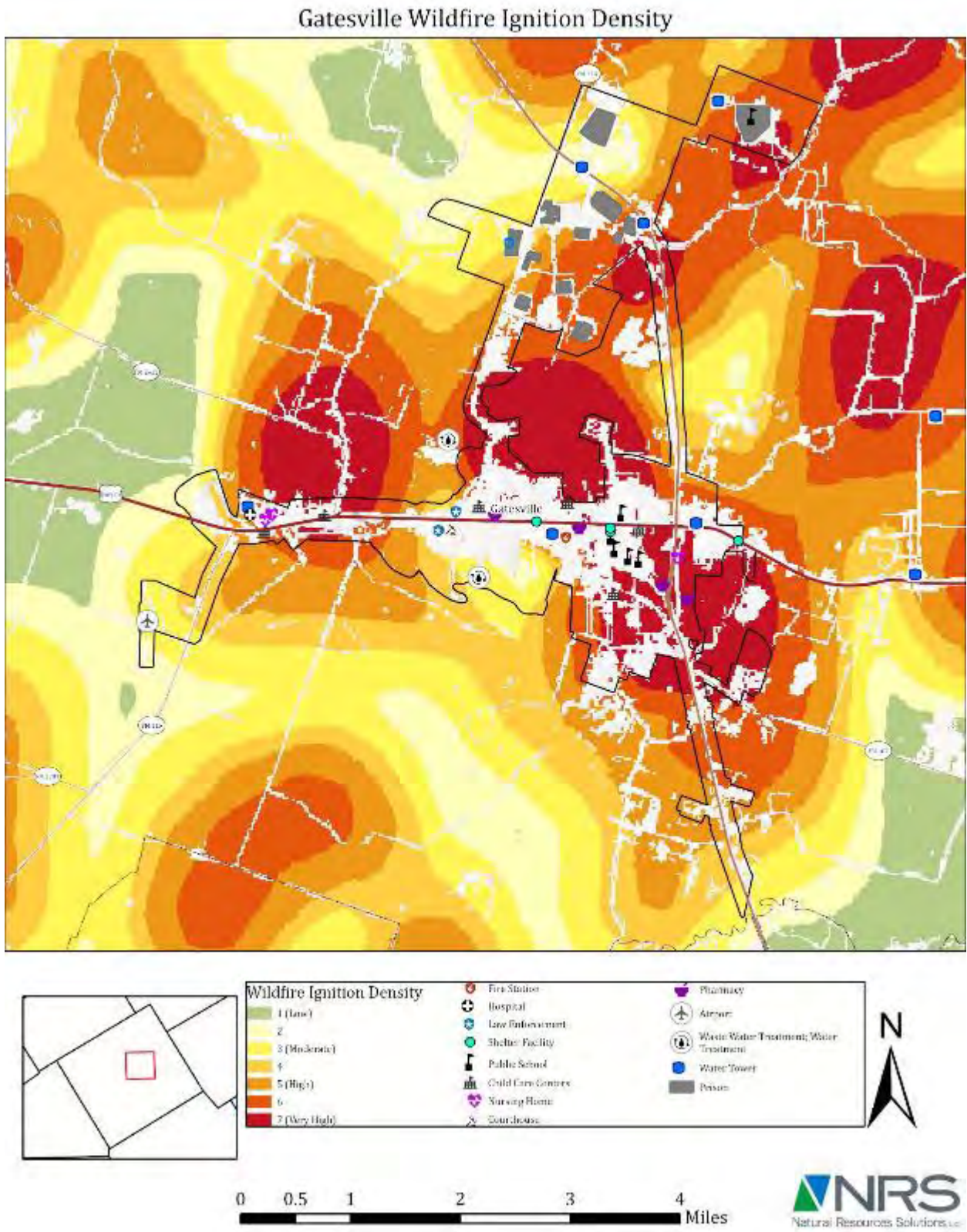


Figure 85. Probability of a wildfire event in Copperas Cove.

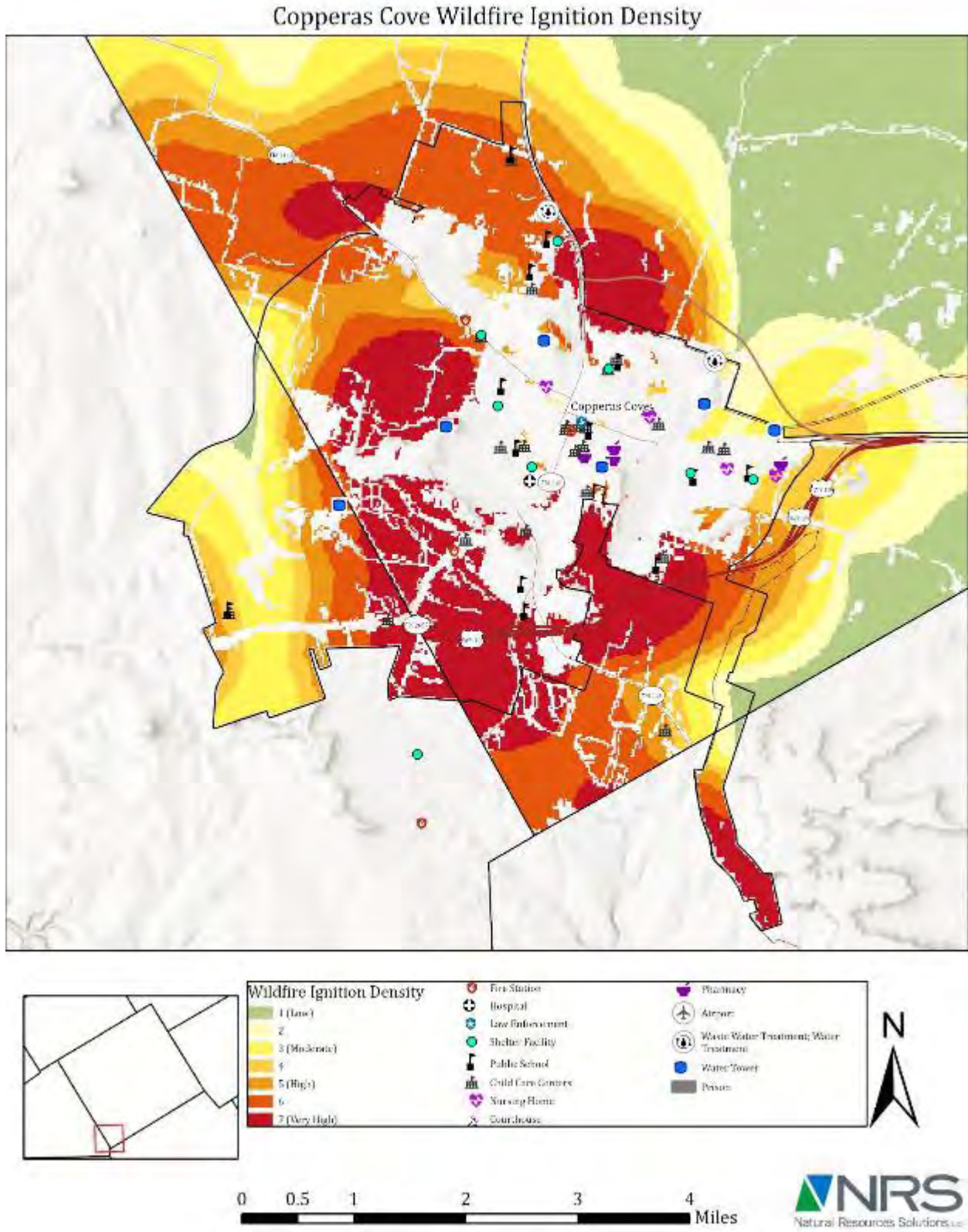
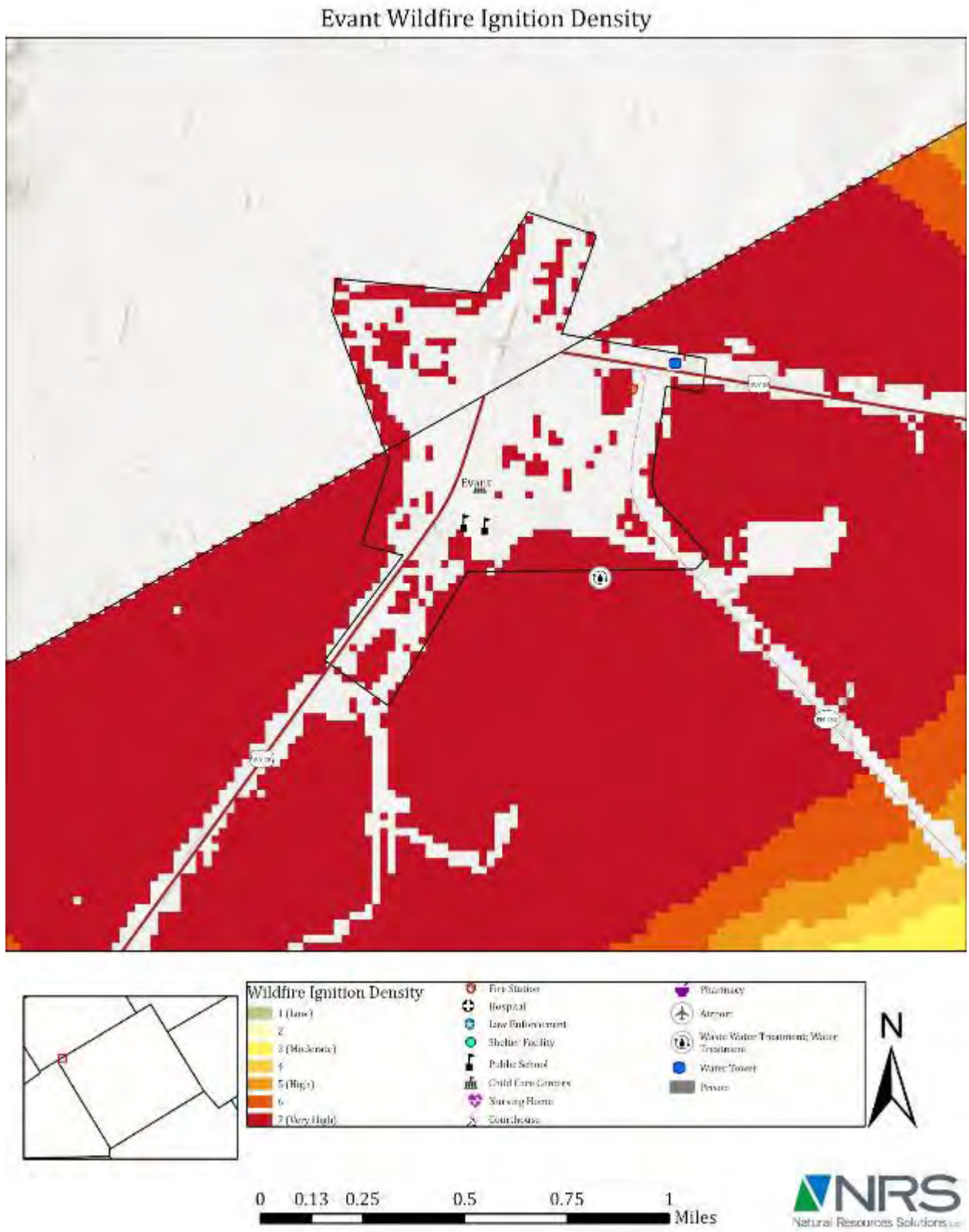




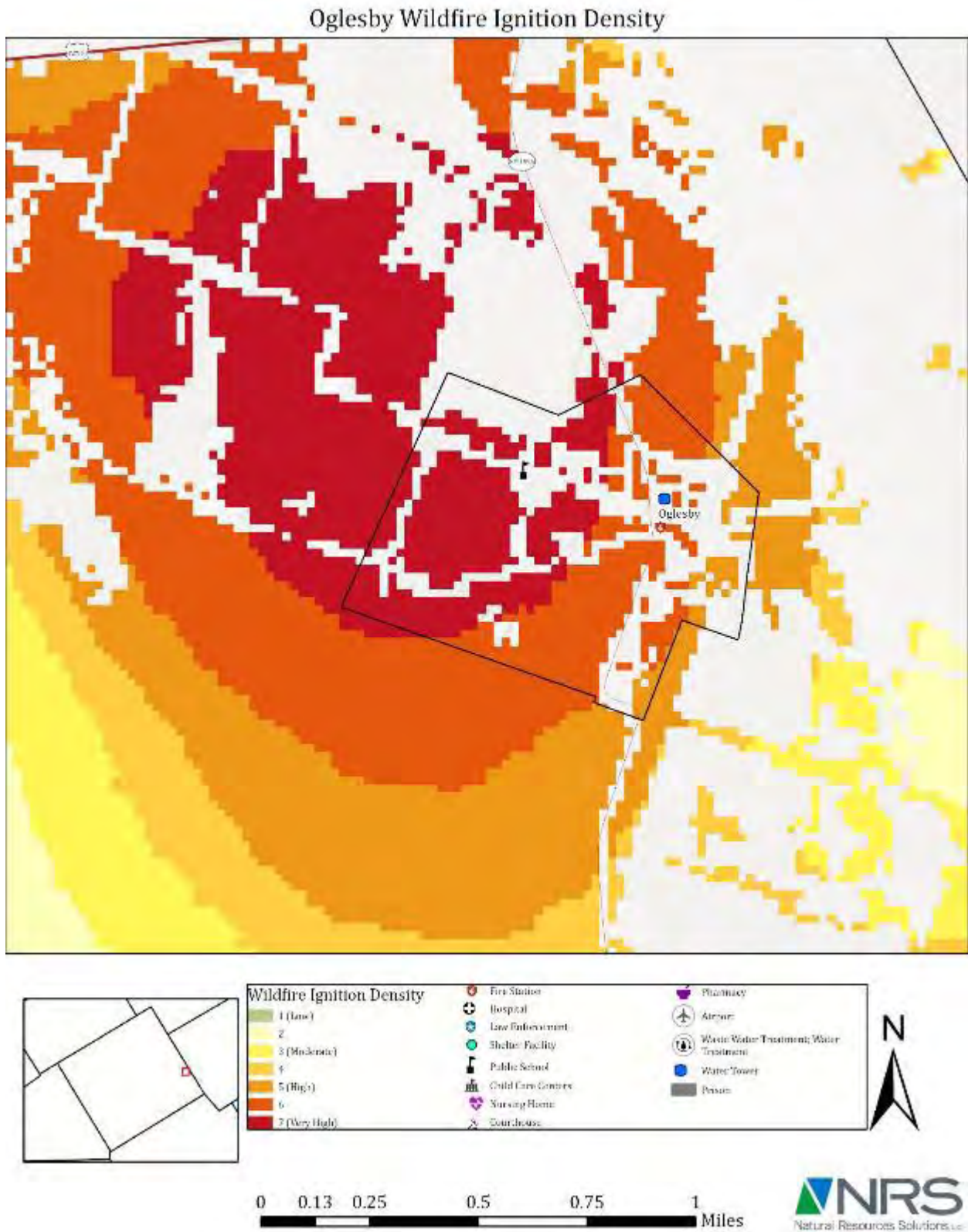
Figure 86. Probability of a wildfire event in Evant.



# Coryell County Hazard Mitigation Plan 2023



Figure 87. Probability of a wildfire event in Oglesby.



# Coryell County Hazard Mitigation Plan 2023



## *Climate Change*

Climatic cycles have occurred naturally over hundreds of thousands of years. These cyclical fluctuations happen on varying time scales lasting from a couple of years to decades to centuries to millennia. Natural climate cycles can help determine what climate patterns are expected and how the recent increase in greenhouse gas emissions is causing deviations from these patterns (U. S. Department of Agriculture 2023). Interannual to Decadal climate cycles involve the relationship between the ocean and the atmosphere which affect the cycles on a years to decade basis. El Niño (or its opposite La Niña) occurs every 3 to 7 years and delivers a variety of weather conditions around the world. There is some evidence that global warming may be intensifying El Niño/La Niña events. La Niña is the weather phenomenon that is responsible for the drier climate, including drought, in the Southern U.S (NOAA 2023).

According to the EPA: “Most of [Texas] has warmed between one-half and one degree (F) in the past century. In the Eastern two-thirds of the state, average annual rainfall is increasing, yet the soil is becoming drier.... In the coming decades, storms are likely to become more severe, deserts may expand, and summers are likely to become increasingly hot and dry, creating problems for agriculture and possibly human health.... Higher temperatures and drought are likely to increase the severity, frequency, and extent of wildfires, which could harm property, livelihoods, and human health.” (U. S. Environmental Protection Agency 2023). Research shows the fluctuations in climate have created warmer, more arid conditions that can cause a prolonged, more active fire season.

## **Vulnerability**

The population, property, infrastructure, agricultural commodities, and the natural environment in all participating jurisdictions are vulnerable to wildfire events. The occurrence of Wildfire was analyzed in all participating jurisdictions in the Planning Area. It was concluded that Wildfire occurs or could occur in all participating jurisdictions and has or could impact all existing and future critical infrastructure and facilities, residents, and their property in Coryell County.

Residents in the WUI area and undeveloped/open spaces, especially those adjacent to the Fort Hood boundary, have the greatest vulnerability to wildfires. In the event of a wildfire, the critical facilities and their localities are essential in response to a wildfire event. Please see Critical Infrastructure and Facilities (Chapter 3 and Appendix F).

## **Impacts**

### ***Population***

Poor air quality, because of smoke and air pollution from wildfires, can be a severe health risk to more sensitive populations, such as children, the elderly, and those with respiratory and cardiovascular diseases. Smoke generates visible and invisible particulates that affect the surrounding communities by causing difficulty in breathing, decreased visibility, and



# Coryell County Hazard Mitigation Plan 2023



odor. The health and safety of first responders fighting the fire have an increased risk for smoke inhalation, carbon monoxide poisoning, and heat exposure/heat stroke.

## ***Property***

An estimated 1,715 annual acre loss on private land and 3,493 annual acre loss County-wide (private land and Fort Hood) has occurred between 2005 to 2021 due to wildfires.<sup>2</sup> A primary industry in Coryell County is agriculture. Farmlands, livestock, and crops are all impacted in the event of a wildfire. Losses of crops and livestock can then impact prices and the local economy negatively.

## ***Infrastructure***

Homes, critical facilities, historical buildings, and other building structures are vulnerable during wildfire events. Factors such as building materials, electrical wiring, and defensible space can determine the probability of combustion of a structure. Utility poles are likely to burn due to the wooden post used to support the equipment. Roads could be damaged, but only in the event of a severe wildfire. Wildfires can limit accessibility of emergency responders and isolate residents if a road or bridge is blocked.

## ***Environmental***

Wildfire serves as an agent of renewal and destruction. It is a natural and essential part of nature that can have severe environmental impacts, such as, but not limited to (Earthh.org 2023):

- Polluted Water Sources:
  - Contaminants (ash, volatile organic compounds, sediments, and debris, etc.) pollute water sources that can harm fish, aquatic plants, and other organisms.
- Destroys Rare, Threatened, and Endangered Species habitat:
  - There are 57 species of amphibians, birds, fishes, mammals, reptiles, insects, arachnids, mollusks, and plants in the County (TPWD 2023).
- Loss of Vegetation:
  - Shrubs, low-lying vegetation, and grasses are destroyed, which leaves the soil surface exposed to wind and water erosion.
  - Reduces nutrient availability in the soil.
  - Increased risk of disease and pest infestation.
- Animal Death and/or Displacement.

## **Chapter 16: Mitigation Strategy**

Coryell County's Mitigation Strategy was developed to represent the County's overarching Goals and Objectives. Input from the Executive Committee, APT, Stakeholders, and the public,

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<sup>2</sup> Numbers derived from total acres burned and 16 years of data.

# Coryell County Hazard Mitigation Plan 2023



as well as the Capabilities Assessment (Appendix E), were used to inform the development of this Strategy.

The overall purpose was to create a plan or strategy to lessen the force and intensity of natural hazards and their associated impacts. The HMP presents a culmination of all the information provided in this document pertaining to natural risks, hazards, and potential impacts upon the citizens, infrastructure, and other assets found within Coryell County.

Below, we present broad overarching Mitigation Goals and Objectives (Table 49). The overall intent of these Mitigation Goals and Objectives is to reduce the impacts of natural hazards and improve public safety. The Executive Committee and APT prioritized the Goals and Objectives for all participating jurisdictions. Approved HMPs from adjacent Counties were reviewed; however, the Goals, Objectives, and subsequent Mitigation Actions are tailored to Coryell County needs and concerns. The Goals and Objectives will be achieved through the implementation of the Mitigation Actions detailed in Chapter 17 (Mitigation Actions) below.

*Table 49. Coryell County HMP goals and objectives developed using input from the Executive Committee, Advisory Planning Team, Stakeholders, public, and Capabilities Assessment (Appendix E).*

<b>Goal 1: Protect public health and safety.</b>	
Objective 1.1	Inform the public about health and safety precautions to prevent injury and loss of life from natural hazards.
Objective 1.2	Use the latest technology to provide adequate warning, notification, communication, and mitigation of natural hazard events.
Objective 1.3	Reduce the danger to and enhance the protection of high-risk areas during natural hazard events.
Objective 1.4	Protect critical infrastructure, facilities, and services.
<b>Goal 2: Protect existing properties and practice smart growth to ensure protection of new development and infrastructure.</b>	
Objective 2.1	Use the most cost-effective approach to protect existing buildings and public infrastructure from <i>natural</i> hazards.
Objective 2.2	Enact or enforce regulatory measures to ensure that future development will not increase threats to existing properties and new development.
<b>Goal 3: Build and support local capacity and commitment to continue to recognize and mitigate natural hazards.</b>	
Objective 3.1	Build and support local partnerships to continuously reduce vulnerability to natural hazards.
Objective 3.2	Empower the Coryell County Emergency Coordinator to prepare for and recover from natural disasters.
Objective 3.3	Include hazard mitigation concerns into planning and budgeting processes.

# Coryell County Hazard Mitigation Plan 2023



Objective 3.4	Review capabilities and assets for revision or creation of new capabilities in response to emergencies, hazards, or other situations that warrant additional capabilities.
<b>Goal 4: Increase Planning Group and public understanding and support for natural hazard mitigation.</b>	
Objective 4.1	Heighten awareness regarding the full range of natural and man-made hazards the public may experience.
Objective 4.2	Educate the public on actions they can take to prevent or reduce the loss of life or property from all natural hazards and increase individual efforts to respond to potential natural hazards.
Objective 4.3	Publicize and encourage the adoption of appropriate hazard mitigation measures.
<b>Goal 5: Maximize the resources for funding natural hazard mitigation.</b>	
Objective 5.1	Maximize the use of external sources of funding for specific natural hazard mitigation activities and projects.
Objective 5.2	Maximize participation of property owners in protecting their properties.
Objective 5.3	Maximize insurance coverage to provide financial protection against natural hazard events.
Objective 5.4	Prioritize mitigation projects based on cost-effectiveness and sites facing the greatest threat to life, health, and property.
<b>Goal 6: Promote growth in a sustainable manner.</b>	
Objective 6.1	Incorporate natural hazard mitigation activities into long-range planning and development activities.
Objective 6.2	Promote beneficial uses of hazardous areas while expanding open space and recreational opportunities.
Objective 6.3	Utilize regulatory approaches to prevent creation of future hazards to life and property.

## Chapter 17: Mitigation Actions

The mitigation actions were developed by the Executive Committee and APT. The actions represent the varied interests of Coryell County, including public input sought through the public survey and key information obtained through the Executive Committee and APT.

All Mitigation Actions were divided into one of four distinct categories based on the *type* of actions. Local Plans and Regulations (LPR) actions include government authorities, policies, or codes that influence the way land and buildings are being developed and built. Conversely, Structure and Infrastructure Project (SIP) actions include the modification of existing structures and infrastructure to protect them from a hazard. SIP actions apply to public or private structures, as well as critical infrastructure and facilities. This type of action also

# Coryell County Hazard Mitigation Plan 2023



involves projects to construct man-made structures to reduce the impact of hazards. In addition, Natural Systems Protection (NSP) actions minimize damage and losses and preserve or restore the functions of natural systems. And finally, Education and Awareness Programs (EAP) are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.

Further, all actions were categorized by priority (high- red, moderate- orange, and low-green), type (LPR, SIP, NSP, or EAP), description, participating jurisdiction, addressed hazard(s), benefit, estimated cost, and consideration (input from Planning Group, Public Survey priority, or specific benefit). Actions were prioritized (high, moderate, low) based on level of concern and input from the Planning Group and public. All provided cost ranges are estimations and may be subject to change.

Table 23 below summarizes all mitigation actions by participating jurisdiction, type of action (LPR, SIP, NSP, and EAP), and hazard. There are a total of 26 mitigation actions. Of which, 9 address local plans and regulations, 6 are structure and infrastructure projects, 4 protection of natural systems, and 7 are focused on education and awareness. Each participating jurisdiction has one or more mitigation action to implement for each hazard addressed in the Risk Assessment.

Table 50. Number of mitigation actions by participating jurisdiction and hazard.

Participating Jurisdiction	Extreme Heat	Hail	Lightning	Straight-line Wind	Tornado	Winter Storm	Drought	Erosion	Flood	Dam Failure	Wildfire
Unincorporated Coryell County	10	10	10	10	9	11	10	13	16	9	16
Copperas Cove	11	10	10	10	11	12	10	13	16	10	17
Gatesville	11	10	10	10	11	12	10	13	16	10	17
Evant	11	10	10	10	11	12	10	13	16	10	17
Oglesby	11	10	10	10	11	12	10	13	16	10	17
Copperas Cove ISD	8	9	9	9	8	10	8	9	11	8	13
Gatesville ISD	8	9	9	9	8	10	8	9	11	8	13

Table 51. Coryell County HMP mitigation actions, with red representing high priority, yellow representing moderate priority, and green representing low priority.

# Coryell County Hazard Mitigation Plan 2023



Type	Description	Participating Jurisdiction(s)	Addressed Hazard(s)	Benefit	Estimated Cost (\$)	Potential Funding Sources	Estimated Timeframe	Responsible Party	Considerations
EAP	[1] Educate and encourage participation in the National Flood Insurance Program	Unincorporated County; Copperas Cove; Gatesville; Evant; Oglesby	Flood	Reduces risks; lowers cost	\$10,000	Local Funding	Within 12 months of plan adoption, performed annually	Coryell County Office of Emergency Management (CCOEM)	Public Survey indicates confusion regarding NFIP
LPR	[2] Adopt and implement tree trimming programs along the right-of-way of roads and utilities	All participating jurisdictions	Wildfire; Winter Storm; Hail; Lightning; Straight-line Wind	Protects critical infrastructure, facilities, and services	\$100,000	Local Funding State & Federal Grants	Within 36 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 1; identified need from Planning Group; benefits and protects infrastructure
LPR	[3] Create, revise, or enhance appropriate building codes or similar regulations to include additional development restrictions and construction techniques to reduce damages from natural hazard events	Unincorporated County; Copperas Cove; Gatesville; Evant; Oglesby	All hazards	Promotes protection of new development and infrastructure	\$250,000	Local Funding State & Federal Grants	Within 24 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Identified need from Planning Group
LPR	[4] Develop Drought Contingency Plan; develop and adopt regulations for	Unincorporated County; Copperas Cove; Gatesville; Evant; Oglesby	Drought; Wildfire; Extreme Heat	Supports research to better understand and prepare for drought impacts; guides effective mitigation	\$300,000	Local Funding State & Federal Grants	Within 24 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Identified need from Planning Group



# Coryell County Hazard Mitigation Plan 2023



	water conservation during periods of drought.								
LPR	<b>[5]</b> Adopt and implement a program to regularly clean and clear debris from bridges, streams, and culverts	Unincorporated County; Copperas Cove; Gatesville; Evant; Oglesby	Flood; Erosion	Maintains or repairs bridges and low water crossings	\$50,000	Local Funding	Within 24 months of plan adoption, performed annually	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 3; benefits low water crossings
LPR	<b>[6]</b> Complete a flood study for all areas of the County and update floodplain maps	All participating jurisdictions	Flood	Supports research to better understand and predict flood risks and other threats; guides effective mitigation	\$500,000	Local Funding State & Federal Grants	Within 36 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Supports flood risks and flood warning systems
SIP	<b>[7]</b> Install flood warning systems and flood gates in high-risk areas	All participating jurisdictions	Flood	Reduces risks to health, life, and property	\$36,000/unit	Local Funding State & Federal Grants	Within 24 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 2; improves roadways  <b>Prerequisite:</b> flood study
SIP	<b>[8]</b> Upgrade low water crossings to prevent erosion and mitigate damages during flood events	All participating jurisdictions	Flood; Erosion	Increases safety and reduces flood damage and erosion at low water crossing sites	\$300,000+/ bridge	Local Funding State & Federal Grants	Within 24 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 2; improves roadways

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SIP	<b>[9]</b> Identify deficiencies, upgrade and/or install local emergency notifications and warning systems	Copperas Cove; Gatesville; Evant; Oglesby	Tornado; Dam Failure*; Wildfire	Adequately warns residents of on-coming hazards	\$100,000	Local Funding State & Federal Grants	Within 36 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 4; identified need from Planning Group; improves emergency response capabilities
SIP	<b>[10]</b> Upgrade and/or install communication systems for first responders	All participating jurisdictions	All hazards	Improves emergency response from first responders by improving communications among all participating jurisdictions	\$5,000,000	Local Funding State & Federal Grants	Within 24 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 4; identified need from Planning Group; improve emergency response capabilities
EAP	<b>[11]</b> Distribute pamphlets with information on pre-disaster mitigation ideas, health and safety tips, and local risk for all natural hazards	All participating jurisdictions	All hazards	Informs the public about health and safety precautions to prevent injury and loss of life from natural hazards	\$10,000	Local Funding	Within 12 months of plan adoption, performed annually	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 5; improves access to information
EAP	<b>[12]</b> Provide training opportunities to firefighters and provide support and financial assistance to local fire departments for training and equipment	All participating jurisdictions	Wildfire	Enhances emergency response capabilities for providers and facilities	\$250,000	Local Funding State & Federal Grants	Within 24 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 4; improves emergency response capabilities

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EAP	<b>[13]</b> Develop and implement education and awareness programs that focus on protecting public and private property as well as residents and students from all hazards that can impact the community	All participating jurisdictions	All hazards	Improves access to information about hazards, risks, and strategies to limit risk	\$50,000	Local Funding	Within 12 months of plan adoption, performed annually	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 5; improves access to information
EAP	<b>[14]</b> Identify hazard warning programs and meet with the public to distribute the information sources and how to sign up for them	All participating jurisdictions	All hazards	Improves access to information about hazards, risks, and strategies to limit risk	\$50,000	Local Funding	Within 12 months of plan adoption	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 5; improves access to information
EAP	<b>[15]</b> Identify and implement better information sharing during town hall meetings and on social media outlets	All participating jurisdictions	All hazards	Provides educational and information resources to help residents better prepare for natural hazards	\$10,000	Local Funding	Within 12 months of plan adoption	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 5; improves access to information

# Coryell County Hazard Mitigation Plan 2023



LPR	<b>[16]</b> Establish a working group consisting of all participating jurisdictions and communities in planning area for disaster planning	All participating jurisdictions	All hazards	Improves access to information about hazards, risks, and strategies to limit risk	\$100,000	Local Funding	Within 12 months of plan adoption	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 5; improves access to information
LPR	<b>[17]</b> Establish a working group consisting of all participating jurisdictions and communities to seek funding opportunities to address hazard risks	All participating jurisdictions	All hazards	Provides educational and information resources to help residents better prepare for natural hazards	\$100,000	Local Funding	Within 12 months of plan adoption	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 6; provides information resources to help residents better prepare for natural hazards
LPR	<b>[18]</b> Identify, develop, and adopt a back-up generator plan for critical infrastructure	All participating jurisdictions	All hazards	Reduces risks to health, life, and property	\$300,000	Local Funding State & Federal Grants	Within 24 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 4; improves emergency response capabilities
SIP	<b>[19]</b> Provide warming and cooling centers for communities	Copperas Cove; Gatesville; Evant; Oglesby	Extreme Heat; Tornado; Winter Storm	Improves emergency response communities can provide to residents during extreme natural hazards	\$100,000	Local Funding State & Federal Grants	Within 36 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 4; improves emergency response capabilities
SIP	<b>[20]</b> Equip County and City Road and Bridge Departments with de-icing abilities	All participating jurisdictions	Winter Storm	Increases safety on all roads for residents	\$100,000	Local Funding State & Federal Grants	Within 24 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 4; improves emergency response capabilities

# Coryell County Hazard Mitigation Plan 2023



EAP	<b>[21]</b> Identify and map existing fire hydrants; identify and install needed fire hydrants	All participating jurisdictions	Wildfire	Increases awareness, identifies shortfalls, and reduces wildfire risks to residents	\$50,000	Local Funding	Ongoing and performed annually	CCOEM & appropriate participating jurisdiction(s) department	Identified need from Planning Group
LPR	<b>[22]</b> Become a Firewise Community	All participating jurisdictions	Wildfire	Increases awareness and reduces wildfire risks to residents	\$250,000	Local Funding State & Federal Grants	Within 36 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Identified need from Planning Group
NSP	<b>[23]</b> Develop and implement a fuel reduction program in the Wildland Urban Interface	All participating jurisdictions	Wildfire	Reduces wildfire risks near critical infrastructure and other developed areas	\$500,000	Local Funding State & Federal Grants	Within 36 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 8; improves firebreaks
NSP	<b>[24]</b> Develop and implement a plan to control brush and vegetation on private land	Unincorporated County; Copperas Cove; Gatesville; Evant; Oglesby	Wildfire	Reduces wildfire risks near critical infrastructure and other developed areas	\$500,000	Local Funding State & Federal Grants	Within 36 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 8; improves firebreaks
NSP	<b>[25]</b> Acquire flood prone areas for open space projects	Unincorporated County; Copperas Cove; Gatesville; Evant; Oglesby	Flood; Erosion	Reduces the risk to property during flood events	\$500,000	Local Funding State & Federal Grants	Within 36 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 8; improves natural systems
NSP	<b>[26]</b> Remove dead and downed trees from river systems	Unincorporated County; Copperas Cove; Gatesville; Evant; Oglesby	Flood; Erosion	Improves river systems and reduces flooding and erosion risks	\$500,000	Local Funding State & Federal Grants	Within 36 months of plan adoption, contingent on funding	CCOEM & appropriate participating jurisdiction(s) department	Public Survey Priority 8; improves natural systems





## **Chapter 18: Plan Maintenance**

### **Implementation**

The Consultant Team developed the HMP in coordination with the Executive Committee and APT. Input from Stakeholders and the public was also incorporated in various ways throughout this process. Once finalized, Coryell County will submit the final HMP to TDEM, who will then review it and subsequently submit the HMP to FEMA for final approval. Once approved by FEMA, all participating jurisdictions will formally adopt the HMP, which is then ready to be implemented.

The CCOEM will maintain the Plan and monitor and oversee the implementation of all HMP mitigation actions. Please note that one County-wide mitigation action is to hire an Emergency Management Coordinator (EMC) position within the CCOEM. The EMC will track implementation and review the HMP *annually* to produce a status report on the effective implementation of the HMP. The EMC will present this status report to the Coryell County Commissioners Court at a regularly scheduled meeting.

The EMC will also assess any changes in risk and whether mitigation action implementation is on schedule, as well as identify any implementation problems (e.g., technical, political, legal, or coordination issues). Mitigation actions that have not been implemented will be evaluated to determine if any social, political, or financial barriers are impeding implementation and if any changes are necessary to improve the viability of the action.

The EMC will ensure each participating jurisdiction monitors and implements the mitigation actions within their jurisdictions. Each participating jurisdiction will be responsible for reporting information *annually* on hazards, associated costs, and the status of mitigation actions to the EMC, who will then provide all reports to the Executive Committee and the Coryell County Commissioners Court.

The annual HMP implementation review and status report will be completed prior to Coryell County's annual budget process. This allows for any revisions or additions to budget requests, specifically to implement high priority HMP mitigation projects, to be made to coincide with the County's budget process in a timely manner.

### **Evaluation and Updates**

The Disaster Mitigation Act of 2000 and 44 CFR § 201.6(c)(4)(i) require the HMP to be updated at least once *every 5 years*. In tandem with the *annual* implementation status report, the EMC will conduct an *annual* evaluation of the success of the mitigation actions, hazards of concern and associated impacts, as well as public concerns and needs. The EMC will also *annually* assess the effectiveness of the Plan in achieving its stated Goals and Objectives. This will be accomplished by seeking input from the Executive Committee, APT, Stakeholders, and the public, and comparing such input to the Goals and Objectives originally identified in the HMP.

The EMC will maintain all *annual* evaluation documents (e.g., reports, notes, sign-in sheets, agendas, etc.) and include all documentation in an administrative record. If anything in the administrative record calls for immediate action, the EMC will present it to the Executive Committee, and APT as needed, for review, action, and approval. The call for immediate action may occur at any point and is not contingent upon the *annual* review or *5-year* review.

In addition, the EMC will conduct a review of the HMP *every 5 years* from FEMA approval date, in accordance with all federal and state requirements. All information and documentation obtained *annually* will be assessed during the *5-year review*. The EMC is responsible for reviewing and updating the HMP with any new information, as appropriate. In addition, all mitigation actions will be reviewed and subsequently modified or developed, as needed. This review will determine whether there have been significant changes that necessitate formal changes or updates to the HMP. There are several factors that may affect the content of the HMP, including new development in identified hazard areas, increased exposure to hazards, disaster declarations, increase or decrease in participating jurisdiction(s) capability to address hazards, and changes to federal or state legislation.

The annual HMP review process also provides participating jurisdictions (both the local governments and the public, through a consolidated comment period) an opportunity to evaluate mitigation actions to determine which actions or projects have been successful. Mitigation Actions that have been determined to be less than fully successful will be scrutinized to determine to what extent the activities or projects were successful and determine, if possible, why they were not fully successful.

The Plan will be similarly evaluated immediately after extreme weather events, including but not limited to state and federally declared disasters. Should any disasters occur within the County, an after-action review of the disaster, response, mitigation, and recovery will be commenced and the HMP may be amended, as necessary.

If the HMP is revised for any reason, the EMC will submit the revised HMP will to the Executive Committee and APT for review, with final approval from the Executive Committee needed to submit the revised HMP through TDEM to FEMA for final review and approval. The approved HMP will be provided to the Coryell County Commissioners Court and made available to the public at <https://www.coryellcountyhmp.com/>.

All scheduled reviews will occur prior to Coryell County's budget process, should any revisions or additions need to be made to the County's budget.

### ***Amendments***

At any time, minor changes and editorial corrections may be made to the HMP. Substantive changes and corrections of significant errors must be formally adopted by the County and participating jurisdictions through a formal amendment process. All proposed amendments, minor and major, must be submitted to the EMC. The EMC will present all proposed amendments to the Executive Committee to vote to accept and approve. The EMC will transmit all approved amendments to TDEM for approval and submission to FEMA for final

approval. All approved amendments must be added to the HMP's Record of Changes table, which will serve as an administrative record of all amendments.

### **Continued Public Involvement**

Public input was an integral part of the preparation of the HMP and will continue to be essential for HMP implementation, monitoring, evaluation, and updates in each participating jurisdiction. The HMP will be publicly available at [www.coryellcountyhmp.com](http://www.coryellcountyhmp.com). The EMC will be responsible for maintaining the website and educating the community about HMP implementation and updates.

The EMC will also ensure all Coryell County citizens are afforded the opportunity to participate in HMP processes, as desired. As part of the Public Survey Results and Analysis (Appendix C), the Consultant Team documented a public preference to receive hazard *communications* through the internet (25%) and social media (20%). There was also notable preference to receive hazard *notifications* by text message (30%), phone calls (17%), and television (16%). In alignment with public preference, the EMC will notify the public *annually* regarding any HMP updates via the HMP website, Coryell County Emergency Management webpage, HMP Facebook, text message, and television ads, as appropriate. Local newspapers may also be contacted to assist in the dissemination of information concerning HMP reviews and updates. The EMC is responsible for the dissemination of all HMP-related information to the public.

When appropriate, the EMC and Executive Committee will plan and host public meetings to inform the public and seek their input on specific HMP topics. Coryell County favors an inclusive, comprehensive public outreach strategy. Public meetings will provide a range of citizens the opportunity to provide input on mitigations actions, hazards of concern, community needs, and overarching Goals and Objectives. The EMC may also distribute *annual* surveys or questionnaires to obtain public input.

During the cyclical reviews and updates, the EMC and Executive Committee may decide to seek input regularly (e.g., annually, bi-annually, etc.) from representatives from the APT, Stakeholders, or citizens. Doing so will promote continued interest and participation in the Plan, which is important to maintaining a functional HMP.

Public participation and involvement will continue to be a key aspect of implementation in all participating jurisdictions, resulting in an HMP that continues to be tailored to Coryell County and its unique concerns and needs.

### **Integration**

Coryell County as a whole, including all of the participating jurisdictions and all communities within those jurisdictions, will integrate the mitigation actions (Table 51) according to priority and funding availability. Local, State, and Federal funding will be sought collectively (by Coryell County) and independently (by jurisdiction/community) as appropriate on a continuous basis. Each participating jurisdiction (and the communities therein) represented

on the Executive Committee and APT understand that they may seek funding independently to complete mitigation actions. In addition, the CCOEM will coordinate with all jurisdictions within the County and will disseminate information on funding opportunities.

In early 2023, Coryell County applied to the Texas GLO for Resilient Communities Program (RCP) Land Use grant funding. If awarded, the County Judge intends to solicit competitive bids through a Request for Proposals process to obtain a contractor to complete a Comprehensive/Land Use Plan for Coryell County. The Land Use Plan would cover all of the jurisdictions included in the HMP. That Land Use Plan would function as a County-wide comprehensive planning mechanism and would integrate hazard mitigation strategies, actions, and other important information for each participating jurisdiction into the County's overarching Land Use Plan. We estimate that the Coryell County Land Use Plan would be complete by early 2024.

Coryell County is in the process of securing a contractor to complete the Land Use Plan/Comprehensive Plan that will reference and integrate the HMP and other appropriate plans (County Plans and jurisdictions' plans) (e.g., CWPP, Copperas Cove Master Drainage Study Report, Gatesville, Drainage study, etc.) and cross reference mitigation actions, funding opportunities, and dissemination of public information on County and jurisdictions' web pages.

The CCOEM and other County leaders will review the HMP as outlined in the Plan Maintenance Section and coordinate/communicate with jurisdictions to ensure that mitigation actions are completed in a timely manner as funding is obtained. By ensuring that mitigation actions are funded and completed by all participating jurisdictions, the mitigation actions (planned, pending funding, and completed) may then be included and integrated into individual jurisdictions' plans and routine processes, as appropriate. The CCOEM will review jurisdictions' plans as they are completed or updated to ensure adequate integration of the HMP (especially mitigation actions), as appropriate.

## **Literature Cited**

- Abell, J.T., G. Winckler, R. F., Anderson, R.F. and T. D. Herbert. 2021. Poleward and weakened westerlies during Pliocene warmth. *Nature* 589:70–75.  
<https://doi.org/10.1038/s41586-020-03062-1>
- Allen, J., and M. Tippet. 2015. The characteristics of United States hail reports: 1955-2014. *Electronic Journal of Sever Storms* 10:1–31. < <https://doi.org/10.55599/ejssm.v10i3.60>>
- Allen, J. T., M. K. Tippet, and A. H. Sobel. 2015. An empirical model relating U.S. monthly hail occurrence to large-scale meteorological environment. *Journal of Advances in Modeling Earth Systems* 7:226–243.< <https://doi.org/10.1002/2014MS000397>>
- Allen, J. T., I. M. Giammanco, M. R. Kumjian, H. J. Punge, Q. Zhang, Q., P. Groenemeijer, M. Kunz and K. Ortega. 2019. Understanding hail in the Earth system. *Reviews of Geophysics* 58: e2019RG000665. <https://doi.org/10.1029/2019RG000665>
- Bonnin, G. M., D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley. 2006. NOAA Atlas 14 Precipitation-Frequency Atlas of the United States: Volume 2 Version 3.0: Delaware, District of Columbia, Illinois, Indiana, Kentucky, Maryland, New Jersey, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, West Virginia. National Oceanographic and Atmospheric Administration, Washington D.C., USA. < <https://hdsc.nws.noaa.gov/hdsc/pfds/docs/NA14Vol2.pdf>> Accessed multiple dates 2023.
- Brimelow, J., W. Burrows, and J. Hanesiak, 2017. The changing hail threat over North America in response to anthropogenic climate change. *Nature Climate Change* 7:516–522.  
<https://doi.org/10.1038/nclimate3321>
- Chamber of Commerce Copperas Cove, Texas. 2023. Employment, Copperas Cove Chamber & Visitors Bureau. <<https://copperascove.com/employment/>> Accessed 23 February 2023
- City of Gatesville Development Services. 2023. Business & Industry, Gatesville Development Services Community Profile.  
<<https://www.gatesvilletx.com/developmentservices/page/business-industry>> Accessed 3 January 2023
- Climate Central. Researching and communicating climate change impacts and solutions. <<https://www.climatecentral.org/>> Accessed 3 January 2023
- Climate Change Resource Center. United States Department of Agriculture and United States Forest Service. <https://www.fs.usda.gov/ccrc/education/climate-primer/natural-climate-cycles> Accessed 15 February 2023



Climate Reality Project. 2022. Winter Weather and the Climate Crisis: Explained. <<https://www.climaterealityproject.org/blog/winter-weather-and-climate-crisis-explained>> Accessed 3 January 2023.

Coryell County Texas. 2023. History. <<https://www.coryellcounty.org/page/coryell.History>> Accessed 3 January 2023

Currie, K. 2023. 2022 Texas wildfire year worst in over a decade. KXAN > <<https://www.kxan.com/weather-traffic-qas/2022-texas-wildfire-year-worst-in-over-a-decade/>> Accessed 15 January 2023

Dessens, J., C. Berthet, and J. L. Sanchez. 2007. A point hailfall classification based on hailpad measurements: The ANELFA scale. Atmospheric Research 83:132–139. <<https://doi.org/10.1016/j.atmosres.2006.02.029>>

Dixon, R. W., and T. W. Moore. 2012: Tornado Vulnerability in Texas. Weather, Climate, and Society 4:59–68. <<https://doi.org/10.1175/WCAS-D-11-00004.1>>

EarthNetworks. 2023. Weather-influenced Decisions Homepage. <<https://www.earthnetworks.com/>> Accessed multiple dates 2023.

Earth.org. The Environmental Impact of Wildfires. <<https://earth.org/environmental-impact-of-wildfires/>> Accessed 15 February 2023.

Federal Emergency Management Administration [FEMA]. FEMA News, Flash Flooding: Be Ready to Act. <<https://www.fema.gov/fact-sheet/flash-flooding-be-ready-act>> Accessed 18 January 2023

Federal Emergency Management Administration [FEMA]. FEMA Flood Map Service Center. <<https://www.fema.gov/flood-maps>> Accessed 18 January 2023

Gately, P. J. 2018. Surge of water from dam release causes widespread flooding. KWTX <<https://www.kwtx.com/content/news/Dam-release-sends-surge-of-water-barreling-down-local-river-498039911.html>> Accessed 15 January 2023

Haberlie, A. M., W. S. Ashley, C. M. Battisto, and V. A. Gensini. 2022. Thunderstorm activity under intermediate and extreme climate change scenarios. Geophysical Research Letters 49:e2022GL098779. <<https://doi.org/10.1029/2022GL098779>>

Iowa State University. 2023. Iowa Environmental Mesonet Dataset. <[https://mesonet.agron.iastate.edu/request/daily.phtml?network=TX\\_ASOS](https://mesonet.agron.iastate.edu/request/daily.phtml?network=TX_ASOS)> Accessed 5 January 2023

Kahraman, A., E. J. Kendon, H. J. Fowler, and J. M. Wilkinson. 2022. Contrasting future lightning stories across Europe. Environmental Research Letters 17: <<http://doi/10.1088/1748-9326/ac9b78>.

National Drought Mitigation Center [NDMC]. Drought Basics. < <https://drought.unl.edu/Education/DroughtBasics.aspx> > Accessed 13 January 2023

National Drought Mitigation Center [NDMC]. Drought Monitor. < <https://droughtmonitor.unl.edu> > Accessed 13 January 2023

National Environmental Modeling and Analysis Center. University of North Carolina, Asheville, NC, USA. < <https://crt-climate-explorer.nemac.org/> > Accessed 19 January 2023.

National Oceanic and Atmospheric Administration- National Centers for Environmental Information [NCEI]. 2023. < <https://www.ncei.noaa.gov/access> > Accessed multiple dates 2023

National Oceanic and Atmospheric Administration- National Integrated Drought Information System [NIDIS]. 2023. < <https://www.drought.gov/> > Accessed multiple dates 2023

National Weather Service- National Oceanic and Atmospheric Administration. 2023. Coryell County Tornado Climatology. < <https://www.weather.gov/fwd/coryell-tor> > Accessed 3 April 2023

National Weather Service- National Oceanic and Atmospheric Administration. 2023. What is the heat index? < <https://www.weather.gov/ama/heatindex> > Accessed 3 January 2023

National Weather Service- National Oceanic and Atmospheric Administration. 2023. Homepage. < <https://www.weather.gov/> > Accessed multiple dates 2023.

National Weather Service- National Oceanic and Atmospheric Administration. 2023. Types of Precipitation. < <https://www.weather.gov/jetstream/preciptypes> > Accessed 3 January 2023

National Weather Service- National Oceanic and Atmospheric Administration. 2023. Hail. < <https://www.weather.gov/ffc/hail> > Accessed 3 January 2023

National Weather Service- National Oceanic and Atmospheric Administration. Historic crests for the Leon River at Gatesville. < <https://water.weather.gov/ahps2/crests.php?wfo=fwd&gage=gast2&crest type=historic> >

National Weather Service- National Oceanic and Atmospheric Administration. 2023. Lightning Safety. < <https://www.weather.gov/safety/lightning-safety> > Accessed 3 January 2023

National Weather Service- National Oceanic and Atmospheric Administration. 2023. Wind. < <https://www.weather.gov/safety/wind> > Accessed 3 January 2023

Nielsen-Gammon, J. S. Holman, A. Buley, S. Jorgensen, J. Escobedo, C. Ott, J. Dedrick\*, and A. Van Fleet. 2021. Assessment of Historic and Future Trends of Extreme Weather in Texas

1900-2036. Office of the State Climatologist, Texas A&M University, College Station, TX, USA. <<https://climatexas.tamu.edu/files/ClimateReport-1900to2036-2021Update>>

Price, C., and D. Rind. 1994. Possible implications of global climate change on global lightning distributions and frequencies. *Journal of Geophysical Research Atmospheres* 99:10823– 10831. <https://doi:10.1029/94JD00019>

Proctor Dam,  
[www.hec.usace.army.mil/confluence/sspdocs/ssptutorialsguides/paleoflood-examples/proctor-dam](http://www.hec.usace.army.mil/confluence/sspdocs/ssptutorialsguides/paleoflood-examples/proctor-dam). Accessed 17 July 2023.

Rasuly, A. A., K. K. W. Cheung, and B. McBurney. 2015. Hail events across the greater metropolitan severe thunderstorm warning area. *Natural Hazards and Earth System Sciences* 15: 973–984. < <https://doi.org/10.5194/nhess-15-973-2015>>

Reemts, C. M., and L. Hansen. 2008. Slow recolonization of burned oak-juniper woodlands by Ashe juniper (*Juniperus ashei*): ten years of succession after crown fire. *Forest Ecology and Management* 255:1057-1066

Romps, D. M., J. T. Seeley, D. Vollaro, and J. Molinari. 2014. Projected increase in lightning strikes in the United States due to global warming. *Science* 346:851-854. <<https://doi.org/10.1126/science.125910>>

Rosgen, D.L. 2001. A practical method of computing streambank erosion rate. *Wildland Hydrology, Inc.* < <https://semspub.epa.gov/work/01/554370.pdf>>

Schlie, E. E.-J., D. Wuebbles, S. Stevens, R. Trapp, and B. Jewett. 2019. A radar-based study of severe hail outbreaks over the contiguous United States for 2000–2011. *International Journal of Climatology* 39:278–291. < <https://doi.org/10.1002/joc.5805>>

StormerSite. 2023. Hail reports for Coryell County, Texas. <<http://www.stormersite.com/hail-reports/coryell-county-texas/all>> Accessed 2 February 2023

Svoboda, M., D. LeComte, M. Hayes, R. Heim, K. Gleason, J. Angel, B. Rippey, R. Tinker, M. Palecki, D. Stooksbury, D. Miskus, and S. Stephens. 2002. The Drought Monitor. *Bulletin of the American Meteorological Society* 83: 1181-1190. <doi: <https://doi.org/10.1175/1520-0477-83.8.1181>>

Tang, B.H., V. A. Gensini, and C. R. Homeyer. 2019. Trends in United States large hail environments and observations. *Nature npj Climate and Atmospheric Science* 2:45. <<https://doi.org/10.1038/s41612-019-0103-7>>

Texas A&M University. 2018. Bright Lights and Big Cities: Urban Growth in Texas. Texas A&M University Natural Resources Institute. <https://nri.tamu.edu/blog/2018/february/map-of-the-month-bright-lights-and-big-cities-urban-growth-in-texas/>> Accessed 23 February 2023.

Texas Association of Counties- County Information Project. 2023. Coryell County Profile. <https://txcip.org/tac/census/profile.php?FIPS=48099> accessed 3 January 2023.

Texas Department of State Health Service- Texas Health and Human Services. 2023. Hyperthermia Dangers in Texas. <https://www.dshs.texas.gov/injury-prevention/safe-riders/hyperthermia-dangers-texas> Accessed 6 January 2023

Texas Division of Emergency Management- Texas A&M University. 2018. State of Texas Hazard Mitigation Plan- October 2018. < <https://www.tdem.texas.gov/mitigation/hazard-mitigationsection#:~:text=A%20FEMA%2Dapproved%20State%20Hazard,disaster%20damages%20for%20hazard%20mitigation.>> Accessed multiple dates 2023

Texas Forest Service. 2020. Community Wildlife Protection Plan. <<https://tfsweb.tamu.edu/ProtectYourCommunity/>> Accessed multiple dates 2023.

Texas Parks and Wildlife. Rare, Threatened and Endangered Species of Texas by County. <https://tpwd.texas.gov/gis/rtest/> Accessed 15 February 2023

Texas Water Development Board. 2021. 2021 Brazos G Regional Water Plan, Brazos River Authority. <http://www.twdb.texas.gov/waterplanning/rwp/plans/2021/index.asp>> Accessed 23 February 2023>

Tornado Project Online. 2023. Texas Tornadoes 1950-2012 Tornado Data. < <http://www.tornadoproject.com/alltorns/txtorn1.htm>> Accessed 3 January 2023

Trapp R. J., N. S. Diffenbaugh, H. E. Brooks, M. E. Baldwin, E. D. Robinson, and J. S. Pal. 2007. Changes in severe thunderstorm environment frequency during the 21st century caused by anthropogenically enhanced global radiative forcing. Proceedings of the National Academy of Sciences of the United States of America 104:19719–19723. <https://doi.org/10.1073/pnas.0705494104>

University of Texas- University Interscholastic League. 2023. Heat Stress and Athletic Participation. <<https://www.uiltexas.org/health/info/heat-stress-and-athletic-participation>> Accessed 23 February 2023

U. S. Census Bureau. 2023. QuickFacts: United States. <<https://www.census.gov/quickfacts>> Accessed 3 January 2023

U. S. Department of Agriculture. Risk Management Agency, Cause of Loss Historical Data Files.< <https://www.rma.usda.gov/Information-Tools/Summary-of-Business/Cause-of-Loss>> Accessed 18 January 2023

U.S. Department of Health & Human Services, Centers for Disease Control and Prevention. 2023. Extreme Heat: A Prevention Guide to Promote Your Personal Health and Safety. <[https://www.cdc.gov/disasters/extremeheat/heat\\_guide.html](https://www.cdc.gov/disasters/extremeheat/heat_guide.html)> Accessed 3 January 2023

U.S. Department of Health & Human Services, Centers for Disease Control and Prevention. 2023. Older Adults and Extreme Heat. <<https://www.cdc.gov/aging/emergency-preparedness/older-adults-extreme-heat/index.html#:~:text=People%20aged%2065%20or%20older,ability%20to%20regulate%20body%20temperature.>> Accessed 3 January 2023

U.S. Department of Health & Human Services, Centers for Disease Control and Prevention. 2021. National Center for Health Statistics. National Vital Statistics System, Mortality 1999-2020 on WONDER Online Database. <<https://wonder.cdc.gov/>> Accessed 3 January 2023

U. S. Department of Homeland Security- Federal Emergency Management Agency [FEMA]. 2023. National Risk Index. <<https://hazards.fema.gov/nri/>> Accessed 23 February 2023

U. S. Department of Homeland Security- Federal Emergency Management Agency [FEMA]. 2023. Glossary. <<https://www.fema.gov/about/glossary>> Accessed 23 February 2023

U. S. Department of Homeland Security- Federal Emergency Management Agency [FEMA]. 2023. Dam Safety Fact Sheet. <[https://www.fema.gov/sites/default/files/2020-08/damsafety\\_fs1.pdf](https://www.fema.gov/sites/default/files/2020-08/damsafety_fs1.pdf)> Accessed 23 February 2023

U. S. Department of Homeland Security- Ready. 2023. Extreme Heat. <<https://www.ready.gov/heat>> Accessed 3 January 2023

U. S. Environmental Protection Agency. 2023. Trends in Ozone Adjusted for Weather Conditions. <<https://www.epa.gov/air-trends/trends-ozone-adjusted-weather-conditions>> Accessed 27 January 2023

U. S. Environmental Protection Agency. 2023 What Climate Change Means for Texas. <<https://www.epa.gov/sites/default/files/2016-09/documents/climate-change-tx.pdf>> Accessed 27 January 2023

U. S. Environmental Protection Agency. 2023. Climate Change Indicators: River Flooding. <<https://www.epa.gov/climate-indicators/climate-change-indicators-river-flooding>> Accessed 31 January 2023

U.S. Federal Government. 2021: U.S. Climate Resilience Toolkit Climate Explorer. <<https://crt-climate-explorer.nemac.org/>> Accessed 23 February 2023

U. S. Geological Survey. Waterwatch. <<https://waterwatch.usgs.gov/>> Accessed multiple dates 2023.

U.S. Global Change Research Program [USGCRP]. 2017. Climate Science Special Report: Fourth National Climate Assessment, Volume I. Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock, editors. U.S. Global Change Research Program, Washington, DC, USA. <https://doi:10.7930/J0J964J6>



U.S. Global Change Research Program [USGCRP]. 2018. Fourth National Climate Assessment, Volume II- Impacts, Risks, and Adaptation in the United States. U.S. Global Change Research Program, Washington, DC, USA. < <https://nca2018.globalchange.gov>>

Vagasky, C. 2022. Vaisala Xweather 2022 Annual Lightning Report. <<https://www.vaisala.com/en/digital-and-data-services/lightning>> Accessed 23 February 2023

Watson, K. P., R. Cross, M. P. Jones, J. A. Baker III, G. Buttorff, J. Granato, P. Pinto, S. L. Sipole, and A. Vallejo. 2021. The Winter Storm of 2021. Hobby School of Public Affairs at the University of Houston, Houston, TX, USA. < <https://uh.edu/hobby/winter2021/storm.pdf>>

Wilhite, D. A., and M. H. Glantz. 1985. Understanding: the Drought Phenomenon: The Role of Definitions. *Water International* 10:111-120

Williams, Robert. "Rep. Williams announces \$1 Million FEMA Grant for Faunt Le Roy Park repairs". <https://williams.house.gov/media-center/press-releases/rep-williams-announces-1-million-fema-grant-for-faunt-le-roy-park> Accessed 14 February 2023

Zeng, Z., A. D. Ziegler, T. Searchinger, L. Yang, A. Chen, K. Ju, S. Piao, L. Z. X. Xi, P. Ciais, D. Chen, J. Liu, C. Azorin-Molina, A. Chappell, D. Medvigy, and E. F. Wood. 2019. A reversal in global terrestrial stilling and its implications for wind energy production. *Nature Climate Change* 9: 979–985. <<https://doi.org/10.1038/s41558-019-0622-6>>



# **Appendix A:**

## **Planning Group Structure**

- Executive Committee
- Consultant Team
- Advisory Planning Team
- Stakeholders

## Planning Group Structure

### Executive Committee:

- Coryell County (Lead Jurisdiction) – County Judge
- Copperas Cove – Fire Chief and Emergency Management Coordinator
- Gatesville – City Manager
- Evant – Superintendent
- Oglesby – School Board Member

### Consultant Team:

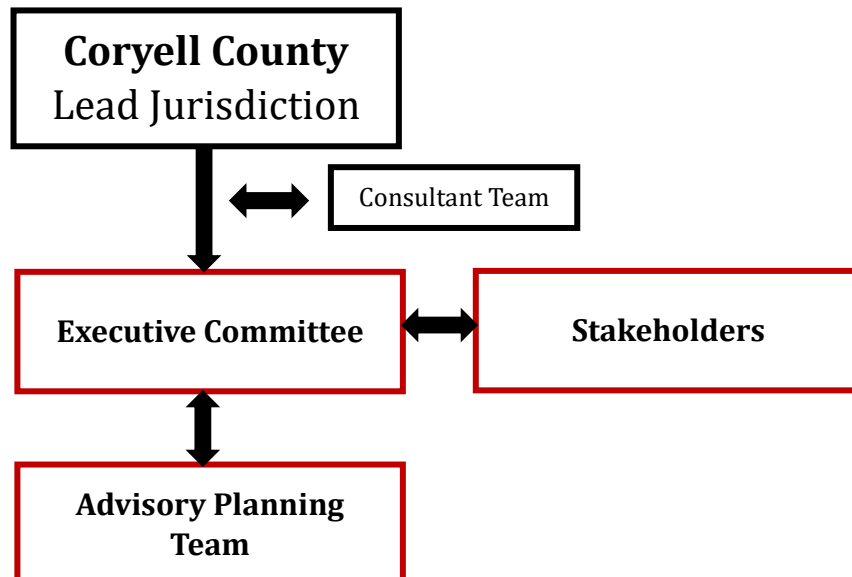
- Natural Resources Solutions

### Advisory Planning Team:

- Coryell County – Precinct 2 Commissioner
- Copperas Cove – Development Services Director
- Gatesville – Director of Planning, Community Development, and Geographic Information Systems
- Evant – School Board Member and Volunteer Fire Department Member
- Oglesby – Mayor Pro Tem
- Copperas Cove ISD – Superintendent
- Gatesville ISD – Executive Director of Testing and Federal Programs
- Gatesville – Fire Chief
- Coryell County Road and Bridge Department – Road and Bridge Administrator
- Texas Division of Emergency Management – Coryell County Liaison Officer

### Stakeholders:

- Texas Forest Service – WUI Coordinator
- Fort Hood – Deputy Director, Emergency Services
- U.S. Army Corps of Engineers – Chief of Emergency Management Services
- American Red Cross: Heart of Texas Chapter – Disaster Program Manager
- Central Texas Disaster Action Response Team – Director





# **Appendix B:**

## **Public Engagement**

- HMP Website
- HMP Facebook Page
- Flyer 1
- Flyer 2
- Gatesville Messenger Article 1 (11/29/2022)
- Gatesville Messenger Article 2 (01/06/2023)
- Copperas Cove Leader Press Article (01/13/2023)
- Gatesville Messenger Public Notice 1 (01/14/2023)
- Evant Star Public Notice (01/17/2023)
- Gatesville Messenger Article 3 (01/18/2023)
- Gatesville Messenger Public Notice 2 (01/18/2023)
- McGregor Mirror Public Notice (01/19/2023)
- Gatesville Messenger Article 4 (01/20/2023)
- Copperas Cove Leader Press Public Notice (01/20/2023)
- City of Copperas Cove Press Release (01/21/2023)
- Temple Daily Telegram Article (01/22/2023)
- Killeen Daily Herald Article (01/22/2023)
- FOX 44 News Article (01/25/2023)
- Copperas Cove Herald Article (01/27/2023)
- Gatesville Messenger Article 5 (01/27/2023)
- Gatesville Messenger Article 6 (01/28/2023)
- Gatesville Messenger Article 7 (03/06/2023)



March 7, 2023, Gatesville Civic Center  
Public Meeting from 6-7 PM



# Coryell County Hazard Mitigation Plan

## Mitigating Risk for a Safe and Sustainable Future

Coryell County has begun development of a countywide Hazard Mitigation Plan (HMP). An HMP outlines actions to be taken to eliminate or reduce long-term risks to residents and their property from hazards. Development of a plan requires effort and input from the citizens, cities, and villages in Coryell County as well as County officials.

Public involvement and feedback is essential to develop a comprehensive HMP. Input from the public will be sought throughout the HMP process. You, as a Coryell County citizen, can provide vital information by partaking in the "Public Survey for the Coryell County Hazard Mitigation Plan".

For more information and to access the survey, please visit our [Survey Page](#).

PROTECTION PREVENTION RESPONSE RECOVERY







## Coryell County Hazard Mitigation Plan

24 likes • 37 followers



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### Intro

Coryell County has begun the development of a countywide Hazard Mitigation Plan (HMP)

- [Page](#) · Public & Government Service
- [P.O Box 217, Gatesville, TX, United States, Texas](#)
- [\(512\) 478-1003](#)
- [admin@nrslc.com](mailto:admin@nrslc.com)
- [coryellcountyhmp.com](http://coryellcountyhmp.com)

### Featured



Coryell County Hazard Mitigation Plan is in Coryell County, Texas.

December 22, 2022 · 🌐

Welcome! Coryell County has begun the development of a countywide Hazard Mitigation Plan (HMP) which will outline...



# Coryell County Hazard Mitigation Plan Underway

**Coryell County is developing a county-wide Hazard Mitigation Plan (HMP). Your participation is a vital part of this process.**

An HMP is a written document that identifies natural hazards that have or can occur in an area and provides information on how to prepare for and respond to those hazards. An HMP also identifies tools and strategies that can reduce impacts to you, your property, your community, and the environment.

Coryell County is one of 27 counties in Texas that does not have an HMP and is the only county in Central Texas without an HMP. We are in the process of changing that.

**Our goal is to help Coryell County prepare for emergencies and protect its residents and their property.**

## **We want to hear from you!**

Scan the QR code or visit <https://s.surveyplanet.com/qyobvfqy> to participate in the Public Survey. Hardcopies available at public meetings and county/city offices.

Open now through February 12, 2023.



## **Upcoming Public Meetings**

**January 18<sup>th</sup> 530-730 pm – Gatesville City Auditorium**

**January 19<sup>th</sup> 530-730 pm – Evant City Hall**

**January 25<sup>th</sup> 530-730 pm – Copperas Cove Council Chambers**

**January 26<sup>th</sup> 530-730 pm – Oglesby Community Center**



Please visit [www.coryellcountyHMP.com](http://www.coryellcountyHMP.com) for more information.

# Coryell County Hazard Mitigation Plan: Final Public Meeting

**Public engagement and participation are vital to the Hazard Mitigation Plan (HMP) development process to ensure the HMP is comprehensive, inclusive, and representative of all Coryell County interests.**

We held four initial public meetings at the end of January 2023 to solicit information from residents regarding their natural hazard concerns and the need to lessen, or mitigate, physical impacts. We also opened a Public Survey, which closed on February 12, 2023. We were very pleased with the turnout at the public meetings and the amount of public survey responses!

We will host a final public meeting to discuss the results from the public survey and inform residents how their input will be contemplated and addressed in the HMP.

We look forward to seeing you there!

## **Final Public Meeting**

**March 7<sup>th</sup> at 6:00 PM**

Gatesville Civic Center

## **ZOOM Participation**

Dial In: +1 (346) 248-7799

Meeting ID: 874 8364 2574

Passcode: 602780

<https://us06web.zoom.us/j/87483642574?pwd=S2RZQTgwUXZqNlFIRW5yeTd2dFRNQOT09>



Please visit [www.coryellcountyHMP.com](http://www.coryellcountyHMP.com) for more information.

[https://www.gatesvillemessenger.com/news/county-selects-nrs-for-hazard-mitigation-plan/article\\_0a6648ee-703a-11ed-81fe-cbaabca22680.html](https://www.gatesvillemessenger.com/news/county-selects-nrs-for-hazard-mitigation-plan/article_0a6648ee-703a-11ed-81fe-cbaabca22680.html)

TOP STORY

## County selects NRS for hazard mitigation plan

By Jeff Osborne Senior writer & editor

Nov 29, 2022



HCNews Room

After receiving six proposals by different organizations to help the county develop a local hazard mitigation plan, the Coryell County Commissioners Court chose Natural Resources Solutions of Austin for the job.

The six organizations were scored based on several criteria, including the time frame to develop the plan as well as the cost.

Commissioner Scott Weddle asked what consequences a company might face if it did not meet the time frame proposed for completing the work.

County Attorney Brandon Belt said whoever is chosen by the county (in this case, NRS) will present a contract and the court would decide the penalties for not meeting a timeline.

"Once the court approves a hazard mitigation plan, it goes to the state and then to FEMA (the Federal Emergency Management Agency)," Belt said. "FEMA doesn't have much of a timeline. It could be three weeks, three months, or something else. We're not going to be able to hold any contractor to FEMA's timeline because who knows what they will do."

Weddle said he would have liked more time to look through the proposed contracts. He asked if commissioners could view partial submissions before a decision is made.

"Generally, bids are not opened until the time for bidding closes," Belt said. "Opening them along the way presents if not issues, the appearance of issues."

County Judge Roger Miller said he will work to try to give commissioners more time to consider proposals.

"In the future I will try to have the submissions deadline a week before the court date," Miller said. "Then if exceptional circumstances arise, we'd still have time."

"I was trying to look through all the information to make a smart \$70,000 to \$100,000 decision," Weddle said.

Other companies that submitted proposals were: Centurion Solutions, Langford Community Services, Grantworks, H2O Partners and IEM.

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[jeff@gatesvillemessenger.com](mailto:jeff@gatesvillemessenger.com)

Jeff Osborne



## Public input sought on hazard plan

By Jeff Osborne Senior writer & editor

Jan 6, 2023

In an effort to help the county prepare for – and potentially avoid – disasters, Coryell County leaders are working with Natural Resources Solutions (NRS) on a hazard mitigation plan and are seeking public input.

In addition to helping prevent or offset the consequences of disasters, the plan will also help the county qualify for additional grants.

"Within the Central Texas Council of Governments (which includes Bell, Coryell, Hamilton, Lampasas, Milam, Mills and San Saba counties), Coryell County is the only county that doesn't have a hazard mitigation plan," said Coryell County Judge Roger Miller. "Across the state, there are only seven or eight counties that don't have one.

"One of the reasons that is important is that there are millions of dollars available in grant funding but one of the requirements for those grants is to have a hazard mitigation plan. A great benefit is that this plan will help us prevent problems in advance instead of just reacting to them."

The Coryell County Commissioners Court reached an agreement with NRS on Dec. 13 to complete the hazard mitigation plan (HMP). The plan, which is updated every five years, will help to identify concerns related to natural disasters and develop strategies to reduce the risks.

The county is looking for local residents to provide their concerns and priorities. Four public meetings are scheduled:

\* 5:30-7:30 p.m. Jan. 18 at the Gatesville City Auditorium, 110 N. Eighth St.

\* 5:30-7:30 p.m. Jan. 19 at Evant City Hall

\* 5:30-7:30 p.m. Jan. 25 at the Copperas Cove Council Chamber

\* 5:30-7:30 p.m. Jan. 26 at Oglesby Community Center

The county and NRS have also set up a website, [www.coryellcountyhmp.com](http://www.coryellcountyhmp.com) and will also have a Facebook page for the HMP that will provide updates and information and will have a survey for people to give their input on local hazards and concerns.

"Both state and federal agencies look at community involvement, and we want to do our due diligence and involve the community and get their feedback," Miller said.

This process could help the county greatly multiply its efforts to improve local safety, Miller said.

"One of our priorities is replacing low-water crossing, but with limited funding available we've only been able to do two or three a year," Miller said. "There are grant funds available that would help us to do much more and getting the hazard mitigation plan in place is an important part of that."

The process will potentially provide significant financial benefits for the county.

"The return on the taxpayer investment (for the HMP) is astronomical," Miller said. "We are applying for \$14.5 million in grants and have budgeted \$500,000 for grant support. If we are able to get all of these grants, it would be a 3000% return for our taxpayers. I don't see how you cannot do that."

Miller said the county expects to be notified within the next 60 to 90 days which grants they will receive.

The county is working to submit its HMP to the state this spring.

"The goal is that we have our hazard mitigation plan written and ready to submit to the state for their approval by April 15," Miller said. "The Texas Department of Emergency Management is involved in the process. They have an interest and will give interim approval. Then it goes to FEMA (the Federal Emergency Management Agency) for approval.

"We are working to see what we can do to lessen the impact of disaster events before they happen."

[jeff@gatesvillemessenger.com](mailto:jeff@gatesvillemessenger.com)

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Jeff Osborne

## HOME



## County Seeks Public Input On Hazard Mitigation Plan

Fri, 2023-01-13 10:32 david\_morris

### Public meetings to start next week; meeting in Copperas Cove set for Jan. 25

By LYNETTE SOWELL

*Cove Leader-Press*

Coryell County officials are looking for input from county residents on the upcoming hazard mitigation plan, also known as an HMP. An HMP is crafted from public input and is updated every five years. Having a plan in place will help the county to qualify for funding from agencies such as FEMA, in the event it faces a natural or other disaster.

Coryell County is working with Natural Resources Solutions to complete the HMP.

According to NRS, an HMP identifies risks from natural hazards and includes strategies to reduce the impacts of those risks to people, property, and the local environment.

Right now, Coryell County does not have an HMP.

There are four upcoming public meetings to help educate residents about hazard mitigation plans and give residents a chance to share their input.

The meeting in Copperas Cove is coming up on Wednesday, Jan. 25, from 5:30-7:30 p.m. at the Copperas Cove city council chambers, located at 508 S. 2nd. St.

Other public meetings include Wednesday, Jan. 18, 5:30-7:30 p.m. at the Gatesville City Auditorium (110 N. 8th St.); Jan. 19, 5:30-7:30 p.m. at Evant City Hall (598 W. Hwy. 84); and Thursday, Jan. 26, from 5:30-7:30 p.m. at the Oglesby Community Center (118 Main St.).

There is an executive committee for HMP planning, to include Coryell County Judge Roger Miller, as well as one representative each from Copperas Cove, Gatesville, Evant, and Oglesby.

However, public input is needed at this time for the plan, and a survey is now live online, as of Jan. 12.



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Input can be information about local natural hazards, residents' level of concern, possible future hazards, as well as giving the county ideas on how to address those risks.

The online survey link, now live, can be found at <https://s.surveypal.com/qyobvfqy/>. The county's website for the HMP can be found at <http://www.coryellcountyhmp.com/>.

For more information, please contact NRS Project Manager Madelyn Todd at (512) 478-1003. Visit

Section: [NEWS](#)

#### Popular Content

Today's:

- **21-year-old man struck by train in Copperas Cove**
- **Litchfield cold case reopened**
- **Exercise and earn ice cream**
- **Perry touches on pot policy in international forum**
- **CCISD technology professional receives national honors**

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**Candidates in local elections answer questions**

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**AARP Chapter 1359 holds candidate forum**

**Copperas Council hears from citizens on the status of the Five Hills Scholarship Pageant Program**

#### Copperas Cove Leader Press

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DATED the 7 day of Jan., 2023.

Dori Ray Mistic

Attorney for Mary Janice Gardner

State Bar No.: 04091800

P.O. Box 246, Copperas Cove, Texas 76522

Telephone: (254) 547-6000 or 6800

Facsimile: (254) 547-4157

E-mail: doriraymistic@hotmail.com

### **Notice of Public Meetings**

Coryell County is developing a Hazard Mitigation Plan, which identifies natural hazard risks and develops long-term strategies to reduce impacts to people, property, and the environment. Four public meetings will be held from 5:30 to 7:30 PM on January 18 (Gatesville City Auditorium), January 19 (Evant City Hall), January 25 (Copperas Cove Council Chambers), and January 26 (Oglesby Community Center). A public survey will be open January 12 to February 12 that focuses on public awareness and concern about natural hazards that can or have occurred in the County and their impacts on the community. Scan the QR Code or visit <https://s.surveypplanet.com/qyobvfqy> to take the survey. Hard copies will also be available at all public meetings and county offices.

For more information, please visit [www.coryellcountyhmp.com](http://www.coryellcountyhmp.com).



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TX  
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# Strange But True by Lucie Winborne

\* Research has shown that girls and women who watched the TV series "The X-Files" were more likely to believe in the importance of STEM (science, technology, engineering and math) and to encourage their own daughters and granddaughters to pursue careers in those fields — something called "The Scully Effect" after the series' female main character, Dana Scully.

\* Pentheraphobia is the

fear of your mother-in-law.

\* In 2006, actor William Shatner, beloved by "Star Trek" fans as Captain James Tiberius Kirk, sold his kidney stone, complete with stent and string, to a casino for \$25,000. While Shatner retained "visitation rights," the complete proceeds were donated to Habitat for Humanity.

\* Whack, zoom, out of the way! A table tennis ball can travel off the paddle at a speed of 105.6 mph.

\* All of the world's pandas are technically owned by China. The country leases them to zoos in an act called panda diplomacy.

\* Ever dreamed of being a swashbuckling buccaneer? Try attending MIT, where after completing courses in pistol shooting, fencing, archery and sailing, undergraduates can earn a bona fide Pirate Certificate. (Note: For entertainment purposes only!)

\* On Dec. 19, 1881, Sir

William Payne Gallwey, a retired conservative member of the British Parliament, died while out shooting on his estate, Thirkleby Park — but not from a gunshot. Instead, Gallwey suffered a fall and

landed on a turnip, sustaining serious internal injuries to which he succumbed a few days later.

\* Bananas get their curves by turning skyward as they grow, to absorb sunlight. \*\*\*

"Nobody grows old merely by living a number of years. We grow old by deserting our ideals. Years may wrinkle the skin, but to give up enthusiasm wrinkles the soul." — Samuel Ullman

## King Crossword

### ACROSS

- 1 Energy
- 4 Amtrak express
- 9 Sushi fish
- 12 Praise in verse
- 13 VIP on Air Force One
- 14 Tennis feat
- 15 Museum piece
- 17 Train lines (Abbr.)
- 18 Sprite
- 19 Holler
- 21 Word game with dice
- 24 Horseshoe site
- 25 Brit. record label
- 26 Not 'neath
- 28 Bolivian city
- 31 Wilson's predecessor
- 33 Observe
- 35 Castle
- 36 Caper
- 38 Music booster
- 40 GPS suggestion
- 41 Skip
- 43 Telethon array
- 45 Soft and weak
- 47 Kanga's kid
- 48 Use a shovel
- 49 Land in the Irish Sea

1	2	3		4	5	6	7	8		9	10	11
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- 54 Oklahoma city
- 55 Beethoven's "Fuer — "
- 56 Kimono sash
- 57 Unruly group
- 58 Impudent
- 59 Tex- — cuisine
- 7 "The Addams Family" butler
- 8 Houston team
- 9 Picnic veggie
- 10 Beige
- 11 For fear that
- 16 Small barrel
- 20 Thy
- 21 Alpha follower
- 22 Muscat's land
- 23 Eloquent person's talent
- 27 Actor Stephen
- 29 Memory method
- 30 Stretches (out)
- 32 Marathoner's stat
- 34 Catherine, notably
- 37 Municipalities
- 39 "Nuts!
- 42 Inventor Nikola
- 44 Gut-punch reaction
- 45 Wax-coated cheese
- 46 Rover's pal
- 50 Fleur-de- —
- 51 Oft-tattooed word
- 52 Jurist Fortas
- 53 Kibosh

### DOWN

- 1 Pledge
- 2 Wedding words
- 3 Mal de —
- 4 Moon mission
- 5 Brewed beverages
- 6 JFK info

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### Notice of Public Meetings

Coryell County is developing a Hazard Mitigation Plan, which identifies natural hazard risks and develops long-term strategies to reduce impacts to people, property, and the environment. Four public meetings will be held from 5:30 to 7:30 PM on January 18 (Gatesville City Auditorium), January 19 (Evant City Hall), January 25 (Copperas Cove Council Chambers), and January 26 (Oglesby Community Center). A public survey will be open January 12 to February 12 that focuses on public awareness and concern about natural hazards that can or have occurred in the County and their impacts on the community. Scan the QR Code or visit <https://s.surveypal.com/qyobvfqy> to take the survey. Hard copies will also be available at all public meetings and county offices.

For more information, please visit [www.coryellcountyhmp.com](http://www.coryellcountyhmp.com).



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## Raffle set for 2022 GHS graduate's medical expenses

A medical raffle is underway for 2022 GHS graduate Dayne Zacha, who was recently diagnosed with leukemia. Zacha is in his first year of college, majoring in nursing. He plans on being an oncology nurse to help others battling cancer. Zacha has a huge love for his family and for tennis.

Those wishing to contribute to the raffle can purchase a \$50 raffle ticket for a chance to win a half

of beef donated by Barnard Beef Cattle Company. Those purchasing the



raffle tickets, if their ticket is not selected, they can use their \$50 donation on any half or whole purchased in the next six months. One hundred percent of the proceeds go to the family.

Four interest-free payments of \$12.50 can be made on PayPal.

To purchase a ticket or for more information, visit <https://www.barnardbeef.com/product-page/dayne-cole-raffle-ticket> or call 254-22-3297.

## Coryell County Hazard Mitigation Plan meetings set for public input

Public input is sought in an effort to help the county develop a Hazard Mitigation Plan to prepare for, and

potentially avoid, disasters and help the county qualify for grants. Public meetings are being scheduled in cities around Coryell County.

Public meetings are scheduled for: Gatesville - today, Jan. 18, 5:30 - 7:30 p.m. in the Gatesville City Auditorium, 110 N. Eighth St. Event - Thursday, Jan. 19, 5:30 - 7:30 p.m. in the Event City Hall, 598 W. US Hwy. 84, Copperas Cove

- Wednesday, Jan. 25, 5:30 - 7:30 p.m. in the Council Chambers Technology Bldg., 508 S. Second St. Oglesby - Thursday, Jan. 26, 5:30 - 7:30 p.m. in the Oglesby Community Center, 118 Main St.

Check the Coryell County Hazard Mitigation Plan Facebook page for more information and updates or visit [www.coryellcountyhmp.com](http://www.coryellcountyhmp.com).

To participate in an online survey, please follow this link, <https://s.surveymonkey.com/gyobvfyq>.



FROM MY FRONT PORCH

## The computer age: what future wonders could be headed our way?

**SAM HOUSTON**

Sam Houston is a newspaper publisher, an actor, author, playwright, performer and entertainment producer/promoter.

Growing up in the age of computerization has been a time of awe and amazement. How can a small machine change and enrich our lives so much?

Technology gives us access to information and data at lightning speeds, all while enhancing our lives with the entertainment opportunities it provides.

The computer allows us to connect to people around the world, to have access to weather, news, and sports, and to store an endless number of photos and information. We can order goods and services, learn how to speak a different language, or find out the name of the first movie Cary Grant starred in. Truly remarkable stuff!

I often reflect on how a large metropolitan newspaper could produce both a morning and evening newspaper without the use of computers. The newspaper staff had to be twice as big and work twice as long as what we do now. The stress had to be palpable. Maybe that is why in old movies they depict newspaper editors as being tattered and worn while they seem to have three cigarettes burning in the ash tray and a bottle of booze in their bottom desk drawer! It would not have been a job for the faint of heart.

I venture to say, few if any people under the age of 40 even know what a "slide rule" is, much less know how to use one. The device was invented by mathematician William Oughtred in 1620 and until the electronic calculator was invented in 1973, it was the instrument of choice for engineers, scientists, and mathematicians for performing complex mathematical computations.

Just this past week I was showing someone a photo

of the Gateway Arch in St. Louis, taken while the project was under construction in the mid-60s. The stainless-steel arch is 714 feet high and was designed to be constructed so the legs of the arch grew from ground level to meet at the pinnacle 714 feet above the ground. Importantly, when the top and final piece was set in place, the two legs could not be out of kilter more than 1/2 of an inch. Think about that! Only 1/2 inch of variance over 714 feet! If I had been on the construction crew, we would have been off that much within the first five feet!

All of the Arch design and layout was completed by engineers and draftsmen who used a slide rule; there were no design computers in 1965. The same is true with the Great Wall of China, the Pyramids of Egypt, and the Brooklyn Bridge. Stop and think how much easier the job would have been if computers had been around on those projects to keep track of logistics, handle design issues, and schedule tasks for workers. Looking back through contemporary eyes, it is almost unconceivable how such monumental projects could be accomplished without computers.

I recently learned from a "bird watcher" friend that there is a new app to assist them in identifying different species. Basically, it allows a person to record the birds as they sing, and the computer app identifies the species of bird from the sounds they make. This allows a bird watcher to identify birds easily and accurately. Simply by hearing



HOUSTON

the sounds they make, the computer can distinguish between a Golden Cheeked Warbler and a Black Capped Vireo. Fascinating!

It got me to thinking, will computer engineers eventually do the same thing with human voices? Suppose a computer could listen to someone's voice and identify the speaker's motive? What if somehow the computer could discern if they were telling the truth? Imagine entering a business agreement and the computer discerning if the other side would be a good partner? Will we ever get to such a point?

This could be taken to extremes. Suppose during the first date a computer could tell a young woman if the man she is having dinner with snores, leaves the lid up on the toilet, or leaves his towel on the floor of the bathroom. Perhaps it could tell the young man if the woman he is pursuing likes to shop incessantly, is consistently late, or if she will be a good mother. Would such an app be progress or a recipe for social disaster? If we live long enough, I am sure we will find out.

Thought for the day: The real danger is not that computers will begin to think like men, but that men will begin to think like computers.

Until next time... I'll keep riding the storm out.

sam@hnews.com | 817-573-7066, ext. 260



DAVID SCOTT | THE GATESVILLE MESSENGER

THAT'S A WRAP: The Coryell County Youth Fair wrapped up on Jan. 14 and members of 4-H, FFA and FCCLA were rewarded for their hard work and talents. Pictured is Mary Mitchell of Gatesville who received Grand Champion and Reserve Grand Champion for her broilers.

# Congratulate Your Youth Fair Participant

with an ad in The Gatesville Messenger's Coryell County Youth Fair results pages.



## 2x4 for \$45

Ad can include photo. Other sizes available.



CALL BAILEY AT 254-223-4579 or email [advertising@gatesvillemessenger.com](mailto:advertising@gatesvillemessenger.com)

# CLASSIFIEDS

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JOINT NOTICE OF SALE

THE STATE OF TEXAS  
COUNTY OF CORYELL

BY VIRTUE OF ORDERS OF SALE issued pursuant to judgments decrees of the District Court of Coryell County, Texas, by the Clerk of said Court on said date in the hereinafter named and styled cases, and in the directed and delivered as Sheriff of said Court, I have on the 11<sup>th</sup> day of January, 2023, seized, levied upon, and will on the 19<sup>th</sup> day of February, 2023, at the Courtrooms Steps, at 10:00 A.M. on said day, present to sell for cash at the highest bidder all of the rights, title, and interest of the defendants in such suit in and to the following described real estate levied upon as the property of said defendants, as provided for by the TEXAS PROPERTY TAX CODE.

All of the following properties being located in Coryell County, Texas and each property being more particularly described on an instrument recorded in the Volume and Page referenced (V...P...) or document number of the Deed Record, Coryell County, Texas: The approximate property addresses reflected herein are the addresses on the tax records and may or may not be completely accurate.

PROP #	CAUSE #	STYLE	PROP DESCRIPTION, ADDRESS, ACCT #	MIN BID
1	CTX-14-03433	Coryell County v Tim Sullivan	Lot 5, Block 6, Town of Leon Junction (V960397), CR 347, #00000116464	\$15,046.83
2	CTX-19-03359	Coryell County v William Hames, et al	A Manufactured Home only, LPARAD1906837, SFDV10028, located on Cedar Grove Estates Mobile Home Park, #53, 53 LACORN DRIVE #147241	\$2,724.89
3	C13-21-0371	Coryell County v Prime Choice Properties, LLC	Lot 11, Block 8, Northern Hills Addition, lot Elevation: Elevation #71353, 827 East Dr, #123126	\$5,940.69
4	CTX-21-0372	Coryell County v Lulu Chason, et al	Part of Lot 14 & 15, Block 13, Lutterloh Addition (Instrument #322773), 409 N 14th St, Gateville, #13140	\$6,666.67
5	CTX-22-03960	Coryell County v Christie Reuter, et al	Lot 18, Block 1, Arlo Addition (Instrument #331976), 2109 Saunders St, #111132	\$4,323.60

This sale will be conducted to satisfy the judgment(s) for defendants property interest and account penalties and interests due on the properties described herein, and for all sums of court and sale.

I do hereby verify this sale and correct copies of the foregoing Joint Notice of Sale have been delivered by United States Certified Mail, Return Receipt Requested, and by regular mail, each of the Defendants named in each of the numbered and styled cases.

DATED the 11<sup>th</sup> day of January 2023, at Gatesville, Texas

*[Signature]*  
JIM CRONKLE  
Chief Deputy, Coryell County, Texas

You may contact the attorney for the taxing units at (254) 756-7735

Notice of Public Meetings

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PUBLISHER'S NOTICE:

All real estate advertising in this newspaper is subject to the Fair Housing Act which makes it illegal to advertise "any preference, limitation or discrimination based on race, color, religion, sex, handicap, familial status or national origin, or an intention, to make any such preference, limitation or discrimination." Familial status includes children under the age of 18 living with parents or legal custodians, pregnant women and people securing custody of children under 18.

This newspaper will not knowingly accept any advertising for real estate which is in violation of the law. Our readers are hereby informed that all dwellings advertised in this newspaper are available on an equal opportunity basis.

To complain of discrimination call HUD toll-free at 1-800-669-9777. The toll-free telephone number for the hearing impaired is 1-800-927-9275.



## Whatever happened to....

**TWENTY YEARS AGO (2003)**

Charles Niemeier, a 1975 graduate of Gatesville High School, was named acting chief of an accounting oversight board for the Securities and Exchange Commission in Washington, D.C. Niemeier had received an accounting degree from Baylor University and a law degree from Georgetown University in Washington, D.C.

Thomas Bone was named "Teacher of the Month" by the Gatesville Lions Club. He was a sixth-grade math teacher at Gatesville Intermediate School. Bone had attended the University of Texas and the University of Mary Hardin-Baylor.

Larry Secrest was named "Firefighter of the Year" at a banquet held at the Gatesville Volunteer Fire Department. Secrest joined the department in September 1995 and earned an advanced certification as a firefighter.

Mason Jones, age 8, of Gatesville, brought home a seven-point buck from the Jones and Son Ranch in Co-

ryell County. Jones shot the big deer with a .243 from about 120 yards. He is listed as the son of Philip and Hollie Jones.

Dr. William F. Floyd was the guest speaker for the January Live Longer and Like It Club of the First Baptist Church in Gatesville. Floyd recalled the hard times America experienced during the Depression when people with bad physical problems relied on family members to care for them.

**THIRTY YEARS AGO (1993)**

Charles A. Reeve was installed as vice-president of the George B. Erath Chapter of the Sons of the Republic of Texas. The object of the organization is to perpetuate the memory and spirit of the men and women who achieved the independence of Texas.

Navy Seaman Recruit Derek S. Amberson, son of James and Linda Greene of Gatesville, was selected as the Academic Award Winner of his recruit company, Am-

berson was a 1992 graduate of Evant High School.

New officers were elected to posts at the Evant Fire Department. Those assuming new duties were Ricky Richardson, assistant chief, David Rainbolt, chief, and Randy Rigney, deputy chief. Rigney had stepped down as chief to assume new duties as the mayor of Evant.

Petty Officer 3rd-class Ronald Harris of Mound graduated from the Naval Nuclear Field "A" School in Orlando, Florida. Harris began his training in May of 1992. He was a 1991 graduate of Gatesville High School and was the son of Dennis and Nancy Harris of Mound. The Gatesville Independent School District's new \$250,000 administration building was listed as one of the largest building permits issued by the city of Gatesville. Building permits had reached the highest since 1989.

**FORTY YEARS AGO (1983)**

Guaranty Bank and Trust

Co. stockholders, at their annual meeting, voted places on the board of directors for two members of the bank's management team - Ronnie Sullins, age 31, and Gary L. Wood, 29. At the time, both were senior vice presidents at Guaranty.

Gatesville High School's S.L. Pruitt Chapter of the National Honor Society had nominated two of its members, seniors Lisa Davis and Paul Foust, as candidates for national scholarships. Davis was the daughter of Mr. and Mrs. Hugh Davis. Foust was the son of Mr. and Mrs. Charlie Foust.

Freeman Vise of Pearl and Jim Gebhardt of Coppers Cove were guests at an awards program of the American Farm Bureau convention in Dallas. The two men were able to hear the addresses made to the convention by President Ronald Reagan and by Sir Henry Plumb, president of the British Farmers Union.

Randy McClinton, the 14-year-old son of Mr. and Mrs. Donald McClinton of

Oglesby, showed the Grand Champion Suffolk buck ram at the Coryell County Youth Fair. McClinton won Grand Champion honors with his Suffolk at the previous year's Youth Fair.

Mr. and Mrs. Alvin Hollingsworth were planning to celebrate their 50th wedding anniversary on Jan. 29, with a reception. Hostesses for the reception were the couple's daughters, Mrs. Leon Kirchmeier and Mrs. Charles Fisher.

**FIFTY YEARS AGO (1973)**

Charles Rogers, son of Mr. and Mrs. Curtis Rogers of Gatesville, was accepted for membership in the American Society of Professional Engineers. A 1951 graduate of Gatesville High School, Rogers held degrees in petroleum engineering and business administration from Texas A&M University.

Several homes were damaged and one mobile home severely damaged at Purme-la when the area was hit by a tornado. Telephones and

electricity were knocked out for some time due to many poles being snapped off.

Mr. and Mrs. Bob Thrasher returned home from a six-day business conference in Hawaii. They won the trip by reaching sales goals and recruiting new distributors for Rosebud Sales. The Thrashers spent the week at the Kuli Lima Hotel on the island of Oahu.

Charles Wise, general manager of Medical Plastics Laboratory, addressed members of the Morris Federation. Wise opened his address by complimenting Federation members for keeping alert and being willing to work for advancement.

Mrs. John Shoaf Sr., was honored on the occasion of her 80th birthday. Hosting the event were two daughters, Mrs. Clifford Maxwell and Mrs. Leta Nicholas. Those attending enjoyed refreshments of fruit punch and a birthday cake, which had been baked by her daughters, Fern and Leta.

## RECIPE

This recipe appeared in the "Methodist Best" cookbook in 2008. The Gatesville Messenger plans to run a series of recipes from that cookbook.

If your church has a cookbook or if you would like to submit your own recipe of a favorite dish for possible publication, please email it to [editor@gatesvill-messenger.com](mailto:editor@gatesvill-messenger.com).

**Branding Crew Meat Loaf**  
Paula Melbern Weeks

- 1 ½ lbs. ground beef
- ¼ c. tomato soup (optional)
- Onions to taste
- ¼ c. ketchup
- Salt, pepper, savory salt
- 3 T. brown sugar
- 1 c. cracker crumbs
- ¼ tsp. nutmeg
- 1 c. milk
- 1 tsp. dry mustard
- 1 egg, slightly beaten
- little water

Mix beef, onions, seasonings, cracker crumbs, milk, eggs and tomato soup and place in loaf pan. Mix remaining ingredients and pour over top of meat loaf. Bake at 350 for 1 hour.





### Rules allow Democrats to chair committees

New House rules adopted in the first week of the legislative session allow the appointment of Democrats to chair certain committees, despite being in the minority in that chamber. The Texas Standard reported that was a victory for Phelan, who defied Republicans wanting to ban Democrats from holding chair positions.

In Phelan's first speech after being re-elected speaker, he talked about the importance of both parties working together.

"After watching Congress attempt to function last week, I cannot imagine why some want Texans to be like D.C.," Phelan said, referring to the protracted battle over electing a U.S. Speaker of

254-840-3261

## Keith ACE Hardware

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### Notice of Public Meetings

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Code or visit <https://s.surveypal.com/qyobvfyq> to take the survey. Hard copies will also be available at all public meetings and county offices. For more information, please visit [www.coryellcountyhmp.com](http://www.coryellcountyhmp.com).



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Kris Rhodes

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Dale Evers  
Glenda Holland

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## County working on plan to reduce disasters

By Jeff Osborne Senior writer & editor

Jan 20, 2023

Finding ways to protect Coryell County residents and their property – and also finding out what concerns people the most when it comes to natural disasters and how prepared they are – are the primary points of emphasis of the hazard mitigation plan (HMP) that Coryell County is working on with Natural Resources Solutions.

On Jan. 18, local residents had a chance to learn more about the plan, why it's important, and to give their input during a public meeting at the Gatesville City Auditorium. A meeting was also held on Jan. 19 in Evant. County residents will have two more opportunities to talk to county leaders about their concerns or questions – from 5:30-7:30 p.m. Jan. 25 at the Copperas Cove Council Chamber and from 5:30-7:30 p.m. Jan. 26 at the Oglesby Community Center.

"This is being tailored to Copperas Cove, Gatesville, Oglesby, Evant and throughout the county," said County Judge Roger Miller. "A key point is trying to get your feedback to identify the hazards that are relevant to you based on your particular concerns in your geographic area of the county."

Maddie Todd with NRS, who is helping lead the efforts, said Coryell County is developing a comprehensive countywide plan that identifies dangers or threats and seeks a way to reduce or lessen their impact.

The county HMP focuses on natural disasters such as thunderstorms, flooding, tornadoes, extreme heat, drought, wildfire, winter storms, and dam failure.

"We are looking for projects or strategies to mitigate or lessen the impact (of disasters)," Todd said. "This is intended to be community-driven with the citizens' needs and concerns in mind."

Once the plan is approved, it will be updated at least once every five years.

"Hazards may occur in the future that we're not currently experiencing," Todd said.



"There are two main benefits (to having an HMP) – we want to make sure county residents and property are protected, and we want to secure future funding opportunities. This is intended to make this the most disaster-resilient community possible."

Although the HMP is a county initiative, Todd said local municipalities can also benefit and apply for grants related to reducing threats to their communities.

"The main goal is to help make sure the public knows what we're doing with the HMP and why it's important to get their input," Todd said. She said the primary way people can make their concerns known is to fill out a public survey "that will take 5-10 minutes and is completely anonymous. The majority of the questions goes to the different hazards, people's level of concern about each of them, and also how prepared they feel to deal with different hazards."

The deadline for people to complete the survey, which can be found online at [www.coryellcountyhmp.com](http://www.coryellcountyhmp.com) or at the scheduled public meetings, is Feb. 12.

The plan is expected to be submitted to the state by April 13.

Judge Miller said that Coryell County is one of only 27 counties statewide – and the only county in the eastern half of the state – that does not have a hazard mitigation plan.

"The ultimate goal – rather than just reacting to natural disasters, hopefully we'll be proactive and reduce the impact these disasters have on people's lives and property," he said.

He added that because the county does not have an HMP, "we are prohibited from qualifying for hundreds of millions of dollars in grants every year – that's at least \$400 million has been ineligible to apply for in the last four years."

One resident attending the meeting asked about the evacuation of Flat in the spring of 2022 when wildfires threatened the community.

"People were asked to evacuate, and I looked online for information and there wasn't anything," she said. "Where are we supposed to go for information?"

Miller said that is one thing the HMP will allow the county to develop – a trusted source of information when disasters arise.

"We do not have a streamlined emergency response program, and we rely heavily on volunteers," Miller said. "That fire was going on for four or five hours before I knew about it. When we implement the plan, we'll look at (the best way to provide quick and accurate information)."

Todd said part of the HMP focuses on ways to "disseminate information so that everyone is aware of what to do in certain situations."

Gatesville City Manager Bill Parry said along with the HMP, the county is also working on a separate wildfire protection plan that addresses what needs to be done to reduce risks.

"Emergency communication is very important, but a wildfire plan is being developed separately," he said.

Miller said the state spent about \$2.2 million fighting the Crittenberg Complex fire last spring, and that local fire departments spent an additional \$80,000 battling the blaze.

"There are potentially some things that can be done ahead of time to prevent fires from spreading," Miller said.

One resident asked why Coryell County can't simply copy Bell County's plan.

"For the (Federal Emergency Management Agency) grant to be implemented, there has to be local input," Miller said. He added that much of the same wording used in plans from Bell, McLennan, Hamilton, Milam, and other counties would also be in the Coryell County plan, but added, "we're trying to tailor this to the needs of people in Coryell County."

Another question asked was to give examples of ways to mitigate disasters.

"We have 72 low-water crossings in Coryell County, and we experience flooding events," Miller said. "If we can improve those, that is one example of mitigation."

"Another example goes back to the wildfire protection plan. If it is approved by (the Texas Department of Emergency Management and the Texas A&M Forest Service), up to \$10 million is available for mitigation. You can do what Fort Hood did and cut firebreaks along the fence line. If funding is available to help, local residents might do that."

Miller said the county is "very fortunate to have NRS working with us and getting the word out."

He also asked community members to do their part.

"I ask you to do two things," Miller said. "Number one, take the survey. It will tell us how these hazards are impacting you. Number two, get five other people to take the survey. It's important for us to have your input."

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[jeff@gatesvillemessenger.com](mailto:jeff@gatesvillemessenger.com)

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Jeff Osborne

# CLASSIFIEDS

Jan. 20, 2023 ♦ Copperas Cove Leader-Press ♦ 254-547-4207 ♦ Page 7

**EXCHANGE SUNSHINE APARTMENTS**  
 1103 Leonhard St.  
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 income-based,  
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 For independent seniors  
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**FISH DAY!**  
 It's Time To Stock Your Pond!  
 Wed., Feb. 1  
 4 PM - 4:45 PM Coryell Feed & Supply in Gatesville  
 Thurs., Feb. 2  
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 9:15 AM - 10:00 AM  
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**PUBLIC NOTICE**  
 Notice is hereby given that public hearings will be held in the City Council Chambers of the City of Copperas Cove, Information Technology Center, 508 South 2<sup>nd</sup> Street.

The public is permitted to offer public comments telephonically as stated by the agenda and as allowed by the presiding officer during the meeting. Written questions or comments will be accepted two hours prior to the meeting. A recording of the proceedings will be made available to the public in accordance with the Texas Public Information Act upon written request.

The public hearings will be held by the **Planning and Zoning Commission on January 23, 2023, at 6:00 p.m.** and by the **City Council on February 7, 2023, at 6:00 p.m.** The purpose of these public hearings is to allow citizens of the City of Copperas Cove an opportunity to be heard in connection with Planning and Zoning Commission and City Council consideration and action for the following requests described as follows:

**A public hearing and consideration of making amendments to Chapter 17.5 - Subdivisions, adding to Chapter 11 - Municipal Utilities and Services, Section 11 -147, and incorporating changes to the Infrastructure Design & Construction Manual (IDCM) as recommended by the Subdivision Technical Advisory Committee.**

Anyone having an interest in this request is invited to attend and present comments.

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For more information, please visit [www.coryellcountyhmp.com](http://www.coryellcountyhmp.com).



**ADVERTISEMENT FOR BIDS**

**Bid No. PW 2023-01-53**

**Constitution Drive Reconstruction Project**

Notice is hereby given that the City of Copperas Cove will receive sealed bids for the below referenced item. Bids will be received on behalf of the City Public Works Department, Attn. Cynthia Taylor, at the City of Copperas Cove Public Works Department, located at 1601 N. 1st St., Copperas Cove, TX 76522, until **2:00 p.m. on 02/02/2023**. Bid opening will be held in the Public Works Conference Room, 1601 N. 1st St., Copperas Cove, TX 76522. Bids will be opened publicly and read aloud immediately after closing time.

Digital copies of the Bid Package, including Plans and Specifications can be obtained at no cost beginning 01/13/2023 from CivCast (<https://civcastusa.com/>). Reference bid number PW 2023-01-53.

There will be a **non-mandatory** site visit held at **10:00am on 01/24/2023**. This site visit is not a prerequisite to bid submission. Please RSVP if you are attending to:

Jordan Kiewit Project Engineer  
 Kimley-Horn and Associates, Inc.  
 512-418-4509  
 Jordan.Kiewit@kimley-horn.com

All employees directly employed on the work shall be paid not less than the established prevailing wage scale for work of a similar character in this locality. A prevailing wage determination for the work has been included with the contract associated with this project and is incorporated therein for all purposes. The Contractor shall pay not less than the general prevailing wages as established by the U.S. Department of Labor and shall keep accurate wage records accessible in accordance with Chapter 2258, Texas Government Code.

The City reserves the right to award the bid to either the lowest responsible bidder or to the bidder who provides goods or services at the best value for the City, in accordance with the Texas Local Government Code.

All bids submitted must be plainly marked on the outside indicating the bid number, opening time and date. Award will be made at a later date. Any Bid received after closing time will be returned unopened. The City of Copperas Cove reserves the right to reject any or all bids.

**Section 106 Public Notice**

Cambium Networks, Ltd, proposes to construct the following new Telecommunications Towers in Killeen, Coryell County, Texas: a 65-foot-tall Monopole Telecommunications Tower at the following location: 56112 West Range Road, Killeen, Coryell County, TX 76543, coordinates N31° 14' 4.65"/W97° 47' 22.91" (DEA# 22211057) and an 80-foot-tall Monopole Tower at the following location: E LZ Phantom Road, Killeen, Coryell County, TX 76543, coordinates N31° 8' 7.65"/W97° 49' 56.49" (DEA# 22211060). Interested parties with comments regarding potential effects on Historic Properties may contact Cambium Networks, Ltd c/o Julia Klima at Dynamic Environmental Associates, Inc., 3850 Lake Street, Suite C, Macon, GA 31204, 877-968-4787, Sec106@DynamicEnvironmental.com within 30 days from the date of this publication. Re: DEA# 22211057 and/or DEA# 22211060.

**TEXAS CROSSWORD**  
 by Charley & Guy Orbison  
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**ACROSS**

- TXism: " 'nuff \_\_\_"
- "love" south of the border
- Boerne event: "Kid '\_\_\_' \_\_\_ Fiber Fair"
- TXism: "quick on the \_\_\_"
- TXism: "he shoots from the \_\_\_"
- TXism: "play possum"
- imperfection (2 wds.)
- TX Nash's "\_\_\_ Clearly Now"
- TXism: "your barn \_\_\_ open" (unzipped fly)
- Stephens of Cowboy cheer-leader movies
- "Texas Troubadour" Tubb
- words yankees think TXns say
- Midland-Odessa FM radio
- TX Roy Orbison ballad
- WWII military track vehicle that moved on land or water
- TX Duane Allen's "Oak \_\_\_ Boys"
- TXism: "\_\_\_ enough to pucker a pig"
- kid area at "Six Flags Fiesta Texas": "\_\_\_ Springs"
- TXism: "aggressive as \_\_\_ salesman"
- \_\_\_ Rivers, TX
- TV ratings co.
- TXism: "\_\_\_ more of them than liars in Texas"
- TXism: "\_\_\_ charge hell with a bucket of water" (fearless)
- apt call letters for a Red River radio station?
- TXism: "\_\_\_abouts"
- relaxation tub
- TXism: "mad as \_\_\_-eyed cow"
- destruction
- co. that TX Perot founded (abbr.)
- TXism: "old as \_\_\_"
- drunkard
- major Dallas artery ending with "way"
- golf peg
- citrus drink
- TXism: "hell bent \_\_\_" (determined)
- "The \_\_\_ Ranger"
- Denton's 940 code
- UT famed formation: "\_\_\_-bone"
- seize a crook
- Dublin celebrates \_\_\_ Patrick's Day
- TXism: "how \_\_\_ doing?"
- Gov. \_\_\_ Roberts (1878-82)
- San Antonio university (abbr.)
- Switzerland tourist resort town
- NASA event in Space Shuttle era
- TXism: "the rodeo \_\_\_ over" (finished)
- TX singer Henley who wrote & sang "Dirty Laundry" (init.)
- 43rd president: TX \_\_\_ Bush (2001-09)
- TXism: "take a look \_\_\_"
- Livingston is seat of this county
- series of items
- TX Mickey Gilley sang "\_\_\_! I've Said It Again"
- an Astro or a Ranger messed up
- Aransas Pass festival: "Shrimpo \_\_\_"
- "Billy the \_\_\_"
- ex-Cowboy RB (init.)
- silent film? (2 wds.)
- TXism: "lower \_\_\_ a snake's navel"
- TXism: "ain't"

**DOWN**

- in the winter, you can see one at the Muleshoe National Wildlife Refuge (2 wds.)
- title for TXns Phyllis George & Shirley Cothran: "Miss \_\_\_"
- in Wichita Co.
- this Cowboy Pearson caught the "Hail Mary"
- many TXns fought in Southeast \_\_\_

P-1149

Crossword Courtesy of:  
**Medical Arts Pharmacy**  
 'Neighbors Caring for Neighbors'  
 Your Hometown Drugstore  
 Jim Shave, R.Ph.  
  
**Medical Arts Pharmacy**  
 254-547-4146  
 806 E. Ave. D • Copperas Cove  
[www.medicalartsc.com](http://www.medicalartsc.com)

**Last Puzzle Solution**

S-1148

**FOR IMMEDIATE RELEASE**

January 21, 2023



City of Copperas Cove

Kevin Keller, Public Relations Director  
[kkeller@copperascovetx.gov](mailto:kkeller@copperascovetx.gov)  
Fax: (254) 542-8965

508 South 2<sup>nd</sup> Street  
Copperas Cove, Texas  
Phone: (254) 547-4221

### **Coryell County Hazardous Mitigation Plan**

Copperas Cove, Texas – Local governments have the responsibility to aid in protecting the health, safety, and welfare of their citizens. When disasters hit and cause loss of life; damage property and infrastructure; they have devastating consequences for a community's economic, social, and environmental well-being. Coryell County has therefore begun development of a countywide Hazard Mitigation Plan (HMP). An HMP outlines actions to be taken to eliminate or reduce long-term risks to residents and their property from natural hazards.

The goal is to increase Coryell County's resiliency in response to the hazards it faces by developing an HMP. This Plan will identify and outline the types of hazards the County experiences and how the County will address and mitigate vulnerabilities and risks associated with those hazards. Having an HMP in place would benefit the County in numerous ways such as protect public safety and prevent loss of life and injury, reduce harm to existing and future development, minimize operational downtime and accelerate recovery of government and business after disasters, just to name a few.

Development of a plan requires effort and input from the citizens, cities, and villages in Coryell County as well as County officials. Furthermore, public involvement and feedback is essential to develop a comprehensive HMP. Coryell County citizens can provide vital information by partaking in the "Coryell County Hazard Mitigation Planning Public Opinion Survey". This short survey is comprised of questions about your awareness and concern about natural hazards and their impacts on you, your family, property, and community. Participation in the survey is voluntary and should be completed by an adult. All individual responses are strictly confidential; your name will not be requested or collected, and your survey responses will be completely anonymous and will be used for research and planning purposes only. The survey is available electronically and will be distributed in paper form at various venues including public meetings and county offices. The survey is currently open and will close on February 12, 2023.

To partake in the survey, please follow this link: <https://s.surveyplanet.com/qyobvfqy>  
For more information on the HMP please visit: [www.coryellcountyhmp.com](http://www.coryellcountyhmp.com)

The public is encouraged to attend the Copperas Cove Public Meeting scheduled for Wednesday, January 25, 2023, from 530pm to 730pm in the City Council Chambers, located at 508 S. 2<sup>nd</sup> Street, Copperas Cove. Citizens may also join the meeting virtually via Zoom at: <https://us06web.zoom.us/j/82777686791?pwd=TG1NOU51eJ1RGsrbIV0MVc4L1JRdz09>



Meeting ID: 827 7768 6791  
Passcode: 224066  
One tap mobile +1 346 248 7799 (Houston)

(Survey Flyer Attached)

###

[https://kdhnews.com/news/local/coryell-co-emergency-plan-survey-public-meeting-wednesday/article\\_a4bcea8e-9aa0-11ed-b613-87bd361301d0.html](https://kdhnews.com/news/local/coryell-co-emergency-plan-survey-public-meeting-wednesday/article_a4bcea8e-9aa0-11ed-b613-87bd361301d0.html)

## Coryell County emergency plan meeting Wednesday

FME News Service

Jan 22, 2023



Coryell County officials said they are working on a plan for hazard mitigation and set a meeting Wednesday as well as an online survey for public input.

**KZ**  
KZAMORE  
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A STAGE PLAY BY KERRY ANN ZAMORE KZAMORE FOUNDATION

*Cory* **FREEDOM**

THIS EVENT IS SUPPORTED, IN PART, BY FUNDS FROM THE CITY OF KILLEEN, TEXAS, MUNICIPAL HOTEL OCCUPANCY TAX REVENUE, AND OTHER FUNDING SOURCES AS STATED IN THE CONTRACT.

**FEB 25**  
10:30 PM  
DOORS OPEN  
10:30 PM

## Coryell Co. emergency plan survey, public meeting Wednesday



By Jana Lynn Kilcrease | Herald Staff Writer Jan 22, 2023 0



In a news release issued Sunday from Coryell County officials, it was stated they are working on a county-wide approach and plan a public meeting as well as an online survey to get answers and feedback from the public.

“Local governments have the responsibility to aid in protecting the health, safety and welfare of their citizens,” the release said. “To this end, Coryell County officials are developing a ‘Hazard Mitigation Plan’ and are asking the public for help in completing the plan in a meeting scheduled for 5:30 to 7:30 p.m. Wednesday in the City Council Chambers.”

The chambers are located at 508 S. Second St., Copperas Cove. Residents may also join the meeting virtually via Zoom.

AdChoices

**Learn more**





CORYELL COUNTY

# Share feedback for Coryell County Hazard Mitigation Plan

by: [Matt McGovern](#)  
Posted: Jan 25, 2023 / 07:00 AM CST  
Updated: Jan 25, 2023 / 08:32 AM CST



(file/MGN photo)

SHARE ...

COPPERAS COVE, Texas (FOX 44) – Coryell County has started development of a countywide Hazard Mitigation Plan (HMP).

According to the City of Copperas Cove, an HMP outlines actions to be taken to eliminate or reduce long-term risks to residents and their property from natural hazards. This comes due to local governments claiming to have the responsibility to aid in protecting the health, safety, and welfare of citizens.



[https://kdhnews.com/copperas\\_cove\\_herald/coryell-county-seeking-public-input-on-hazard-mitigation-plan/article\\_6e6080b2-9d9e-11ed-a133-573bda21edb8.html](https://kdhnews.com/copperas_cove_herald/coryell-county-seeking-public-input-on-hazard-mitigation-plan/article_6e6080b2-9d9e-11ed-a133-573bda21edb8.html)

## Coryell County seeking public input on hazard mitigation plan

By Thaddeus Imerman | Herald staff writer

Jan 27, 2023



Area residents and government officials listen to Coryell County Judge Roger Miller speak Wednesday evening in Copperas Cove about a hazard mitigation plan.

Thaddeus Imerman | Herald

If Texas was divided into an eastern half and a western half, Coryell County is the only county in the eastern part of the state without a hazard mitigation plan. That fact is one County Judge Roger Miller said Wednesday he is not proud of.

Miller was in Copperas Cove to get public feedback on the desired hazard mitigation plan.



A hazard mitigation plan reduces loss of life and property by minimizing the impact of disasters, according to the Federal Emergency Management Agency.

In December, the county contracted with Natural Resource Solutions of Austin to help develop the plan that will be sent to FEMA and the Texas Department of Emergency Management.

The plan will encompass the entire county, including the city of Copperas Cove, the Copperas Cove ISD, the city of Gatesville, the Gatesville ISD, the city of Evant and the city of Oglesby.

“Coming out of that, each of those entities will then be able to tap into funding that supports the mitigation of natural hazards within their own jurisdictions,” Miller said. “And, of course, the county will have their ability to tap in that as well.”

Miller explained that the money available for mitigation via federal and state emergency departments is money that is there annually.

“The funding is pre-existing,” Miller said. “This is not COVID-related money.”

The goal of the HMP is to increase Coryell County’s resiliency in response to the hazards it faces.

Madelyn Todd, policy analyst and project manager for NRS, explained Wednesday that natural disasters could include floods, winter storms, tornadoes, etc.

To identify the potential hazards facing the county, public input is imperative.

At the public meeting, surveys were available for people to fill out. The survey, which takes around 5-10 minutes to complete, is also available online at <https://s.surveyplanet.com/qyobvfqy>. The survey is open through Feb. 12 and is comprised of questions about your awareness and concern about natural hazards and their impacts on you, your family, property and community.

Miller explained that the concerns of Copperas Cove residents will differ from each other as well as differ from those of other communities, where hazards can vary.

“Your responses coming down to the Copperas Cove area should reflect those hazards that are going to have a partial or economic impact on you,” Miller said.

During a Q&A session at the end of the meeting, multiple residents expressed concerned with man-made disasters rather than natural disasters. One resident in particular was more concerned with the effects should a derailment of a BNSF train occur in or near the city.

Todd explained that the plan the county is currently developing is for natural disasters only, but the reason for public input is because it could also develop a plan for man-made disasters.

“What I will say is the policy that kind of guides this program is you have to do natural hazards,” she said. “They have an option to where you can do man-made (disasters) as an option.

“If we have a lot of people that say, ‘Hey, this train is coming through; we’re really concerned about it,’ we — the executive committee that the judge needs — they can decide to open it up and maybe have a chapter for the train or maybe address some of the (others). But, we’re not just going to automatically do that; there needs to be a need for it. So, that’s why the public survey is really important.”

For more information on the HMP please visit: [www.coryellcountyhmp.com](http://www.coryellcountyhmp.com).

[timerman@kdhnews.com](mailto:timerman@kdhnews.com) | 254-501-7559

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Thaddeus Imerman

## Work continues to hazard mitigation plan

By Jeff Osborne Senior writer & editor

Jan 27, 2023

Coryell County's efforts to complete a hazard mitigation plan are well underway, and the public has responded.

During the Jan. 24 meeting of the Coryell County Commissioners Court, Maddie Todd with NRS, a consulting firm working with Coryell County, said there have been more than 1,000 visits to the county's HMP website and that a Facebook page devoted to HMP has reached more than 3,000 people.

County residents have until Feb. 12 to participate in a public survey to voice their concerns and views on natural disaster threats to the area. As of the morning of Jan. 24, a total of 218 people had completed the survey.

"You've done a really good job getting the word out to the public," Todd told county leaders. She said that public meetings had been held in Gatesville and Evant, with additional meetings planned for Copperas Cove and Oglesby.

"We've been able to answer a lot of questions, including about Fort Hood's role – they are a stakeholder," Todd said.

Another question that has been directed to the Texas Department of Emergency Management is what happens in instances where communities straddle the county line, such as Evant, which is partly in Coryell County and partly in Hamilton County.

"We are still shooting for an April third date to have the information submitted," Todd said.

The county also selected NRS to help guide its community wildfire protection program during the Jan. 24 meeting.

jeff@gatesvillemessenger.com

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Jeff Osborne





Community offers strong response to county hazard plan

BY JEFF OSBORNE Senior Writer & Editor

Coryell County's efforts to complete a hazard mitigation plan are well underway, and the public has responded. During the Jan. 24 meeting of the Coryell County Commissioners Court, Maddie Todd with NRS, a consulting firm working with Coryell County, said there have been more than 1,000 visits to the county's HMP website and that a Facebook page devoted to HMP has reached more than 3,000 people. County residents have until Feb. 12 to participate in a

public survey to voice their concerns and views on natural disaster threats to the area. As of the morning of Jan. 24, a total of 218 people had completed the survey. "You've done a really good job getting the word out to the public," Todd told county leaders. She said that public meetings had been held in Gatesville and Evant, with additional meetings planned for Copperas Cove and Oglesby. "We've been able to answer a lot of questions, including about Fort Hood's role — they are a stakeholder," Todd said.

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Wishing a fond farewell to the Chief



Retiring Gatesville Police Chief Nathan Gohlke receives a ceremonial flag from Mayor Gary Chumley during a Jan. 24 reception in appreciation for his service. Gohlke joined the Gatesville Police Department in 1998, and was sworn in as chief in 2005.

Gohlke recognized for 25 years of service to city

BY JEFF OSBORNE Senior Writer & Editor

Gatesville residents had an opportunity to show their appreciation to retiring Gatesville Police Chief Nathan Gohlke during a reception Jan. 24 at Gatesville City Hall, as the city honored him for nearly 25 years of service. "I never thought I'd see the day when I retired," Gohlke said. "This is a job that I've enjoyed, and I couldn't have done it without outstanding staff and great support from the people of Gatesville."

After joining the police department in April 1998, Gohlke was sworn in as chief on March 8, 2005. He spent a total of 31 years in law enforcement.

During the reception, Gatesville City Manager Bill Parry, Mayor Gary Chumley and Police Lt. Cody Lee thanked Gohlke for his work in helping to protect the community.

An engraved gift from the police department said, "Thank you for the 25 years you gave to the Gatesville Police Department. Your tireless work ethic and professionalism has set the tone for the rest of the department. You will always have a home here. We wish you the best of luck in all your future endeavors."

Gohlke, who graduated from Gatesville High School in 1989, will remain in his hometown and is working as a funeral director and planner for Scott's Funeral Home. Before joining the Gatesville police, he has worked as a sheriff's deputy in Hamilton County.

His successor as chief, Brad Hunt, was selected to lead the Gatesville Police Department in January. Hunt, who most recently served as police chief in Keene, Texas, worked for the Temple Police Department for 25 years.



Nathan Gohlke chats with community members during a Jan. 24 reception.

County gets update on potential projects

BY JEFF OSBORNE Senior Writer & Editor

County leaders received an update on the list of projects they submitted to the state during a Jan. 24 meeting of the Coryell County Commissioners Court.

County Judge Roger Miller said he and other county leaders recently participated in a conference call with representatives for the Texas General Land Office (GLO), "and we got some good insight."

This summer, a notice will be issued that will open up "in excess of \$100 million" in grant funding, Miller said, adding that in order to qualify, projects are expected to be completed by April 25, 2025.

The list of projects the county submitted to the GLO got a favorable response based on rankings and technical aspects, but a request for additional information was made related to the impacts projects will have on low to moderate income families as well as another rating category referred to as environmental justice or social justice. This includes the impact of projects on veterans and minorities, as well as how the projects might help to secure school bus routes.

"We need to expand the list to include more potential projects," Miller said. "We've had a fairly continuous connection with the land office over the past several months," said Steve Manning, president of Natural Resources Solutions, which has worked closely with the county during the grant application process. "The land office is looking for additional information to be able to consider additional projects. It is going to be a very short application process."

Miller said projects that have a low to moderate income (LMI) impact requirement don't necessarily have to originate in an area with LMI residents, but should in some way support those residents, such as if a project upstream from that area could mitigate concerns, or would improve safety on a school bus route that travels to LMI areas.

As for the veterans component, Miller said that about 18.5% of the county population is designated as belonging to that category, which can help with the environmental justice component of the grant process.

County Road and Bridge Administrator Justin Latham said quite a bit of time and effort was spent in compiling a list of key projects and then narrowing it down to a top 10 list, and expressed concerns that the rules for the grants had changed after the list was submitted.

Manning said what had been a two-part process for the grants was narrowed into one, and that more funding became available beyond initial expect-

PLEASE SEE COUNTY | A2



Trinity Baptist Church

A Church That Cares

Sunday School 9:30 am
Worship 10:50 am

Bro. Sam Crosby, Pastor

1506 W. Main Street, Gatesville, TX
Church 865-8495 | Pre-school 248-0041



Mission Statement:

"The family of Trinity Baptist Church exists to love God and people, teach God's Word, and to help all mankind to follow the Lord Jesus Christ in absolute obedience."

[https://www.gatesvillemessenger.com/news/final-hazard-mitigation-plan-hmp-public-meeting/article\\_2464d854-bc53-11ed-ad74-9b04b9c2e34d.html](https://www.gatesvillemessenger.com/news/final-hazard-mitigation-plan-hmp-public-meeting/article_2464d854-bc53-11ed-ad74-9b04b9c2e34d.html)

TOP STORY

## Final Hazard Mitigation Plan (HMP) Public Meeting

Wade Blake

Mar 6, 2023



Courtesy of [www.coryellcountyhmp.com](http://www.coryellcountyhmp.com)

HCNews Room

Coryell County will host a final Public Meeting to discuss the results of the Hazard Mitigation Plan (HMP) public survey and inform residents how their input will be contemplated and addressed in the HMP.

Please join us at 6 PM on March 7 at the Gatesville Civic Center, or join Zoom virtually (Dial +1 (346) 248-7799; Meeting ID: 874 8364 2574; Passcode: 602780)

Please visit [www.coryellcountyhmp.com](http://www.coryellcountyhmp.com) for the Zoom link and more information.



# **Appendix C:**

## **Public Survey and Results**

- Public Survey
- Public Survey Results





## Public Survey for the Coryell County Hazard Mitigation Plan

Thank you for choosing to participate in this survey.

Coryell County is in the process of developing a county-wide Hazard Mitigation Plan (HMP). Your input is a vital part of the hazard mitigation planning process. This survey is one significant way that you and other residents of Coryell County can contribute to the plan.

This short survey (5-10 minutes) is comprised of questions about your awareness and concern about natural hazards and their impacts on you, your family, property, and community. The survey focuses on natural hazards that can or have occurred in Coryell County, including Thunderstorms, Floods, Tornadoes, Extreme Heat, Drought, Wildfires, Winter Storms, and Dam Failure.

Participation in the survey is voluntary and should be completed by an adult. All responses are strictly confidential. Your name will not be collected, and your survey responses will be completely anonymous. You have the option to enter your email if you wish, to receive additional communications about the HMP only; your email will not be used for any other purposes.

Your answers will be used to help the Coryell County HMP Executive Committee better understand and address the community's concerns about natural hazards, loss from such hazards, and needs and tools for reducing risk. This survey will be available electronically from January 12th 2023 to February 12th 2023. Paper copies will also be distributed at various venues including public meetings and county offices.

For more information, please see the Coryell County HMP website at <https://www.coryellcountyhmp.com/>. Survey data will be analyzed, and results will be summarized and presented in the final HMP and posted to website in late February.

**Q1** Please enter your zip code.

Zip code

---

**Q2** Please select your gender: \*

- Male
- Female
- I prefer not to answer.

**Q3** Please select your age group: \*

- 16 - 24 years old
- 25 - 34 years old
- 35 - 44 years old
- 45 - 54 years old
- 55 - 64 years old
- 65 - 74 years old
- 75 years old and above

**Q4** On a scale of 0 to 10, how concerned are you about the impacts of **thunderstorms** to you, your family, or community. Zero indicates no concern; 10 indicates a great deal of concern.

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

**Q5** Which of the following elements of **thunderstorms** are you most concerned about? Select all that apply.

- Hail
- Wind
- Lightning

**Q6** Have you experienced impacts due to **thunderstorms** including physical impacts to yourself or others in your household, damage to personal property, or other impacts such as lost work days or school attendance due to storm impacts.

- Yes
- No

**Q7** If you answered “Yes” above to **thunderstorm** impacts, can you briefly list or describe specific impacts.

**Q8** On a scale of 0 to 10, how concerned are you about the impacts of **flooding** to you, your family, or community. Zero indicates no concern; 10 indicates a great deal of concern.

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

**Q9** Have you experienced impacts due to **flooding**, including physical impacts to yourself or others in your household, damage to personal property, or other impacts such as lost work days or school attendance due to flooding.

- Yes
- No

**Q10** If you answered “Yes” above to **flood** impacts, can you briefly list or describe specific impacts.

**Q11** Do you have flood insurance?

- Yes
- No
- Not sure

**Q12** On a scale of 0 to 10, how concerned are you about the impacts of **tornadoes** to you, your family, or community. Zero indicates no concern; 10 indicates a great deal of concern.

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10



**Q13** Have you experienced impacts due to **tornadoes**, including physical impacts to yourself or others in your household, damage to personal property, or other impacts such as lost work days or school attendance due to tornado impacts.

- Yes
- No

**Q14** If you answered “Yes” above to **tornado** impacts, can you briefly list or describe specific impacts.

**Q15** On a scale of 0 to 10, how concerned are you about the impacts of **extreme heat** to you, your family, or community. Zero indicates no concern; 10 indicates a great deal of concern.

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

**Q16** Have you experienced impacts due to **extreme heat**, including physical impacts to yourself or others in your household, damage to personal property, or other impacts such as lost work days or school attendance due to extreme heat.

- Yes
- No

**Q17** If you answered “Yes” above to **extreme heat** impacts, can you briefly list or describe specific impacts.

**Q18** On a scale of 0 to 10, how concerned are you about the impacts of **drought** to you, your family, or community. Zero indicates no concern; 10 indicates a great deal of concern.

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

**Q19** Have you experienced impacts due to **drought**, including physical impacts to yourself or others in your household, damage to personal property, or other impacts such as lost work days or school attendance due to drought impacts.

- Yes
- No

**Q20** If you answered “Yes” above to **drought** impacts, can you briefly list or describe specific impacts.

**Q21** On a scale of 0 to 10, how concerned are you about the impacts of **wildfire** to you, your family, or community. Zero indicates no concern; 10 indicates a great deal of concern.

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

**Q22** Have you experienced impacts due to **wildfire**, including physical impacts to yourself or others in your household, damage to personal property, or other impacts such as lost work days or school attendance due to wildfire impacts.

- Yes
- No

**Q23** If you answered “Yes” above to **wildfire** impacts, can you briefly list or describe specific impacts.

**Q24** On a scale of 0 to 10, how concerned are you about the impacts of **winter storms** to you, your family, or community. Zero indicates no concern; 10 indicates a great deal of concern.

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

**Q25** Have you experienced impacts due to **winter storms**, including physical impacts to yourself or others in your household, damage to personal property, or other impacts such as lost work days or school attendance due to storm impacts.

- Yes
- No

**Q26** If you answered “Yes” above to **winter storms** impacts, can you briefly list or describe specific impacts.

**Q27** On a scale of 0 to 10, how concerned are you about the impacts of **dam failure** to you, your family, or community. Zero indicates no concern; 10 indicates a great deal of concern.

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

**Q28** Have you experienced impacts due to **dam failure**, including physical impacts to yourself or others in your household, damage to personal property, or other impacts such as lost work days or school attendance due to dam failure.

- Yes
- No

**Q29** If you answered “Yes” above to **dam failure** impacts, can you briefly list or describe specific impacts.

**Q30** How prepared is your household for a natural hazard event?

- Not at all prepared
- Somewhat prepared
- Adequately prepared
- Well prepared
- Very well prepared

**Q31** How would you prefer to be notified in case of an imminent threat caused by a natural hazard? Select all that apply.

- Television
- Radio
- Facebook
- Twitter
- Text message
- Phone call
- Other website
- Other \_\_\_\_\_

**Q32** How many days of food, water, and vital supplies does your family have on hand in the event of a disaster? (FEMA suggests that households have at least 3 days of food, water, and vital supplies such as medications on hand in the event of a disaster.)

- 1-2 days
- 3-4 days
- 5-6 days
- 7 or more days

**Q33** How prepared are you to manage your household's basic needs without electricity or natural gas for 1-5 days?

- Very prepared
- Somewhat prepared
- Not prepared

**Q34** Where would you expect to find useful information to help you be prepared to respond in the event of a natural disaster? Select all that apply

- Television
- Radio
- Internet
- Newspaper
- Social media
- Public meetings

**Q35** Have you ever had problems securing homeowners or renters insurance due to risks from hazards?

- Yes
- No
- Not sure

**Q36** Do you or would you support policies that manage or limit certain kinds of development in designated hazard zones, to reduce risks?

- Yes
- No
- Undecided

**Q37** What types of projects do you believe local, county, state, or federal government agencies could be doing to reduce the risk and/or damage and disruption of natural disasters in Coryell County? Select all that apply.

- Improve roadways
  
- Repair or replace bridges and low water crossings
  
- Improve emergency response providers and facilities such as police, fire, EMT, ambulance
  
- Improve access to information about hazards, risks, and strategies to limit risk
  
- Provide educational and information resources to help residents better prepare for natural hazards
  
- Improve damage resistance of utilities such as electricity, communications systems, etc.
  
- Improve protective measures such as dams, levees, firebreaks
  
- Assist with management of flood prone lands in ways that mitigate flood impacts
  
- Enhance river/stream health and restoration programs
  
- Create a stream & weather monitoring system that is better able to detect, predict, and communicate risks
  
- Support research to better understand and predict flood risks and other threats to guide effective mitigation
  
- Other \_\_\_\_\_  
(please describe here)

**Q38** Please provide any additional comments or information you would like to share regarding natural hazards and hazard mitigation in Coryell County.

**Q39** If you would like to receive information regarding upcoming public events and other participatory opportunities and communications regarding Coryell County HMP and hazard mitigation, feel free to provide your email address below. This information will be used only for mailing communications and notifications regarding the HMP.

---

Thank you for taking the time to participate in this survey. Your input is important to us. Please feel free to share the survey link with friends and neighbors, to help us gain input from as many citizens as possible.

Please visit the website <https://www.coryellcountyhmp.com/> for more information and updates, and to contact us with any questions.

# Coryell County Hazard Mitigation Plan Public Survey Results



On behalf of Coryell County, Natural Resources Solutions designed and distributed a public survey to **obtain public input regarding natural hazards in Coryell County**. The survey was designed to broadly assess [1] public experiences and **level of concern** regarding the natural hazards included in the Hazard Mitigation Plan (HMP); [2] public perception of their personal **level of preparedness** in the event of impacts from these hazards; [3] public preference for means of **communication and emergency notifications** regarding the natural hazards included in the HMP; and [4] general public interest in a range of **mitigation and preparedness actions**, or projects, a County might choose to undertake.

The survey was designed using an **online** platform to enable user-friendly online access, as well as in a **hardcopy** form to ensure that a broad and representative array of citizens were able to participate, regardless of internet or computer access. The survey was **deployed on 1/12/2023 and active through 2/12/2023**. Hardcopy surveys were available at the following locations:

- All public meetings;
- Gatesville: City Hall, Public Library, Tax Office, and County Annex;
- Evant: City Hall;
- Oglesby: City Hall; and
- Copperas Cove: Council Chambers, Public Library, and Utility Authority.

**A total of 367 surveys were submitted, including 302 online and 65 hardcopies.**

Survey Respondents expressed the **highest levels of concern about Drought, Wildfire, Winter Storms, and Tornadoes**. Regarding whether they had experienced impacts due to each hazard (e.g., injury/fatality, damage or loss of property, loss of work/school days, etc.), 69% of Respondents indicated experiencing impacts due to Winter Storms, the highest rate of all hazards. Further, 50% of Respondents reported having experienced impacts due to Thunderstorms (Hail, Lightning, and Straight-line Wind, collectively), followed by 46% from Drought. By and large, Respondents sought to have access to communication (both information and emergency) through modern means, including text message, social media, and internet websites. Other more conventional forums included local newspaper and television. **Please see below for more detailed analyses.**

**Data and information obtained was used to inform the development of Coryell County's HMP.** The survey responses provided key information regarding the vulnerabilities and impacts associated with each hazard, as well as the comprehensive mitigation actions. Public input was key to ensuring the HMP is tailored to Coryell County and its residents.

**Thank you for your participation and interest in Coryell County's HMP public survey.**



# Coryell County Hazard Mitigation Plan Public Survey Results



## Zip Codes:

Table 1 provides the set of zip codes and a count number of surveys from each zip code. A total of 350 out of 367 surveys indicated the zip code the respondent was from. It is clear that some zip codes are more highly represented than others. It is important to note that Coryell County has 13 total zip codes that are fully or partially in the county. The survey responses indicate that 9 of those 13 zip codes were represented in the survey. Of the 350 responses, 340 (97%) were from zip codes in the HMP Planning Area. There were an additional 8 zip codes that that contributed 10 surveys located outside of the Planning Area, for a total of 17 zip codes represented in the survey responses.

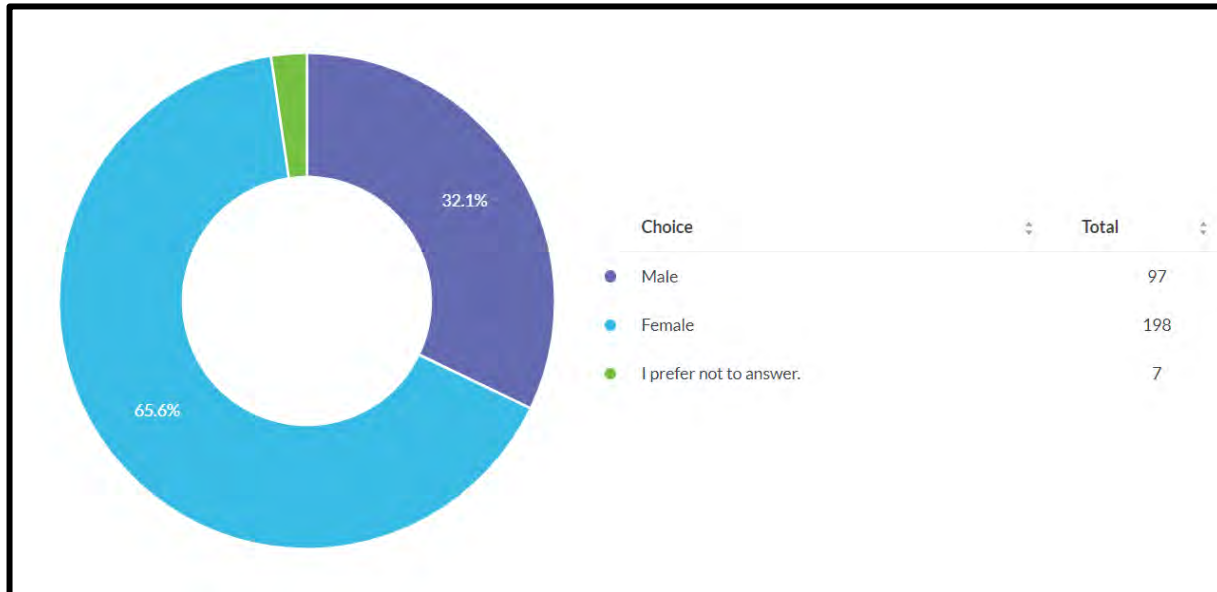
*It is important to note that zip codes were not provided by 17 Respondents.*

<b>Table 1. HMP Survey Responses by Zip Code.</b>				
<b>Zip Code</b>	<b>Community</b>	<b>County</b>	<b>Count</b>	<b>% of Total</b>
76528	Gatesville	<b>Coryell, Bell</b>	199	54%
76522	Copperas Cove	<b>Coryell, Lampasas</b>	73	20%
76538	Jonesboro	<b>Coryell, Hamilton</b>	26	7%
76525	Evant	<b>Coryell, Hamilton, Lampasas</b>	16	4%
76561	Oglesby	<b>Coryell, McLennan</b>	14	4%
76566	Purmela	<b>Coryell</b>	5	1.3%
76539	Kempner	Lampasas, <b>Coryell</b> , Burnet	5	1.3%
76523	Davilla	Milam	2	≤ 0.5%
76502	Temple	Bell	2	≤ 0.5%
76712	Woodway	McLennan	1	≤ 0.5%
76689	Valley Mills	Bosque, <b>Coryell</b> , McLennan	1	≤ 0.5%
76657	McGregor	McLennan, <b>Coryell</b>	1	≤ 0.5%
76638	Crawford	McLennan	1	≤ 0.5%
76622	Aquilla	Hill, McLennan	1	≤ 0.5%
76531	Hamilton	Hamilton	1	≤ 0.5%
76504	Temple	Bell	1	≤ 0.5%
76501	Temple	Bell	1	≤ 0.5%

**Gender:**

Respondents were primarily female, representing 65% of survey responses (Figure 1).

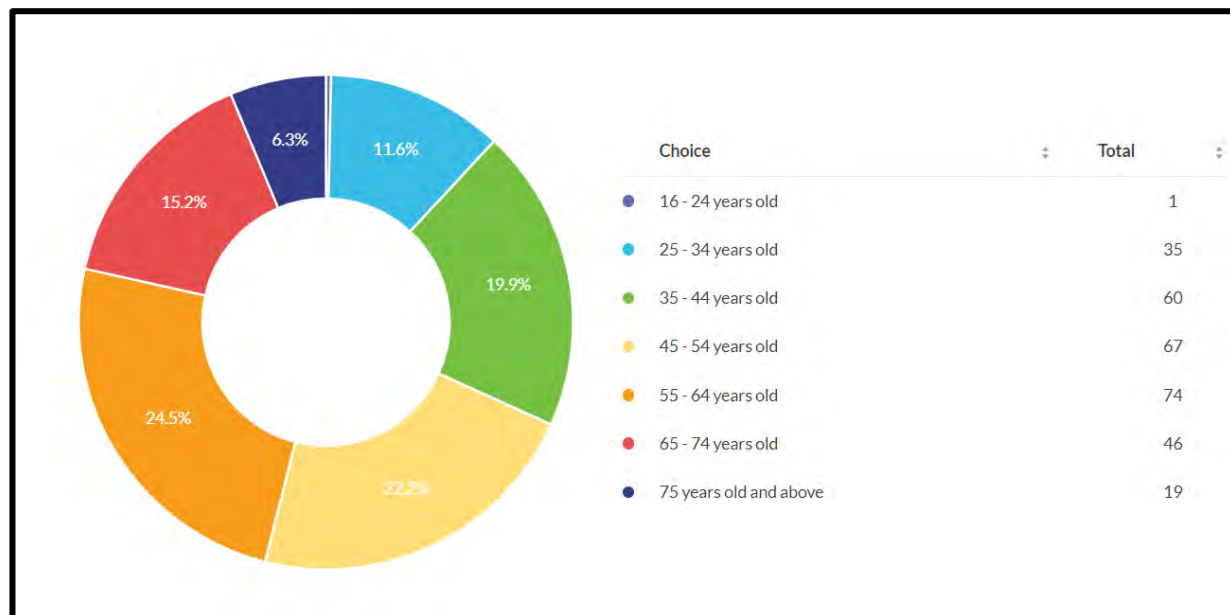
**Figure 1.** HMP Survey Responses (%) by Gender.



**Age:**

Survey responses captured a reasonably representative sample of working age adults (Figure 2). The most represented age category was 55-64 years of age, comprising 24.5% of Respondents. Age categories 35-44 (20%) and 45-54 (22%) were also well represented.

**Figure 2.** HMP Survey Responses (%) by Age.





**Level of Concern:**

Table 2 presents the mean *level of concern* on a scale of 0-10. The hazards are in descending level of concern. Responses indicate that Drought ranks the highest level of concern, with responses indicating a mean concern of 7.32, nearly 6 times higher than the hazard of least concern, Dam Failure. In addition to Drought and Wildfire, Winter Storms and Tornados also showed levels of expressed concern (>6 on the 10-point scale). It also provides the percentage of Respondents who answered yes to the question “Have you experienced impacts, including physical impacts to yourself or others in your household, damage to personal property, or other impacts such as lost work days or school?”

Please note that in Table 2 Hail, Lightning, and Straight-line Wind are collectively referred to as Thunderstorms. The Flood hazard is also closely related to Erosion.

<b>Table 2. Levels of Concern and Respondent Percentage Answered Yes to: “Have you experienced impacts, including physical impacts to yourself or others in your household, damage to personal property, or other impacts such as lost work days or school?”</b>		
<b>Hazard</b>	<b>Mean Concern Score</b>	<b>% Answered Yes</b>
Drought	7.32	46.3%
Wildfire	6.38	23.3%
Winter storm	6.16	69.6%
Tornados	6.04	15.1%
Extreme heat	5.83	29.5%
Thunderstorm	4.73	50%
Flood	3.44	18.9%
Dam Failure	1.5	1.4%

There are three primary hazards that are associated with thunderstorms (excluding Flood, an independent category), *Hail, Lightning, and Straight-Line Wind*. Respondents were asked to identify which thunderstorm-related hazard(s) they were concerned about, with an option to choose all that apply. Table 3 summarizes the results, indicating that the majority of concern is focused on Hail and Wind impacts.

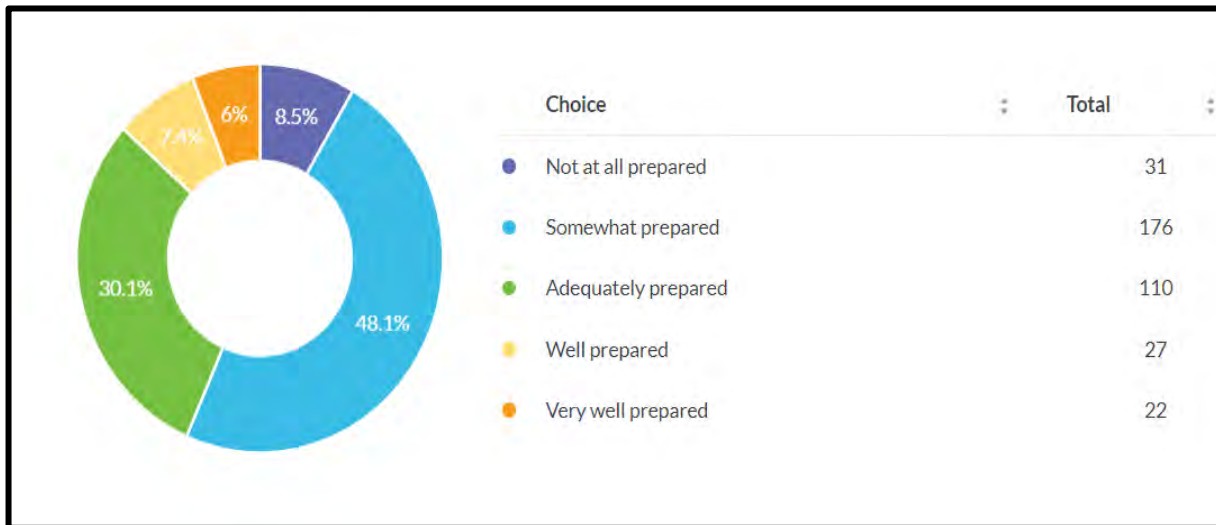
<b>Table 3. Concern for Thunderstorm-Related Hazards.</b>	
<b>Thunderstorm-Related Hazard</b>	<b>Total # Expressing Concern</b>
Hail	278
Wind	227
Lightning	159

**Level of Preparation:**

The majority of Respondents indicated that they did NOT have flood insurance, with 73% indicating no flood insurance, 10% with flood insurance, and 16% indicating uncertainty about whether they had flood insurance.

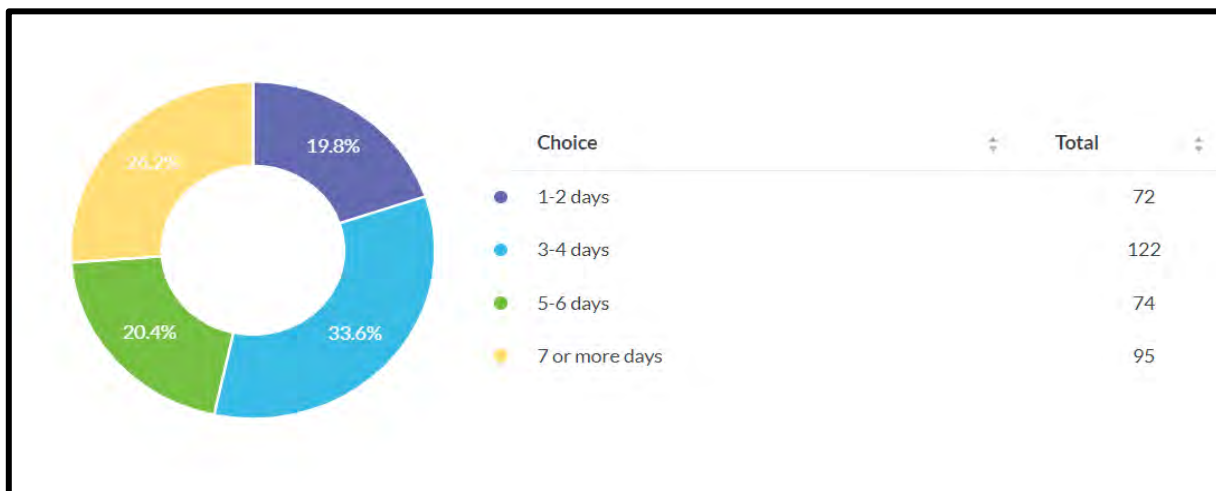
While approximately 43% of Respondents indicated they felt *adequately prepared, well prepared, or very well prepared* for a natural hazard, the majority of Respondents (~57%) indicated they were *somewhat prepared or not at all prepared* (Figure 3).

**Figure 3.** HMP Survey Responses (%) by Preparedness.



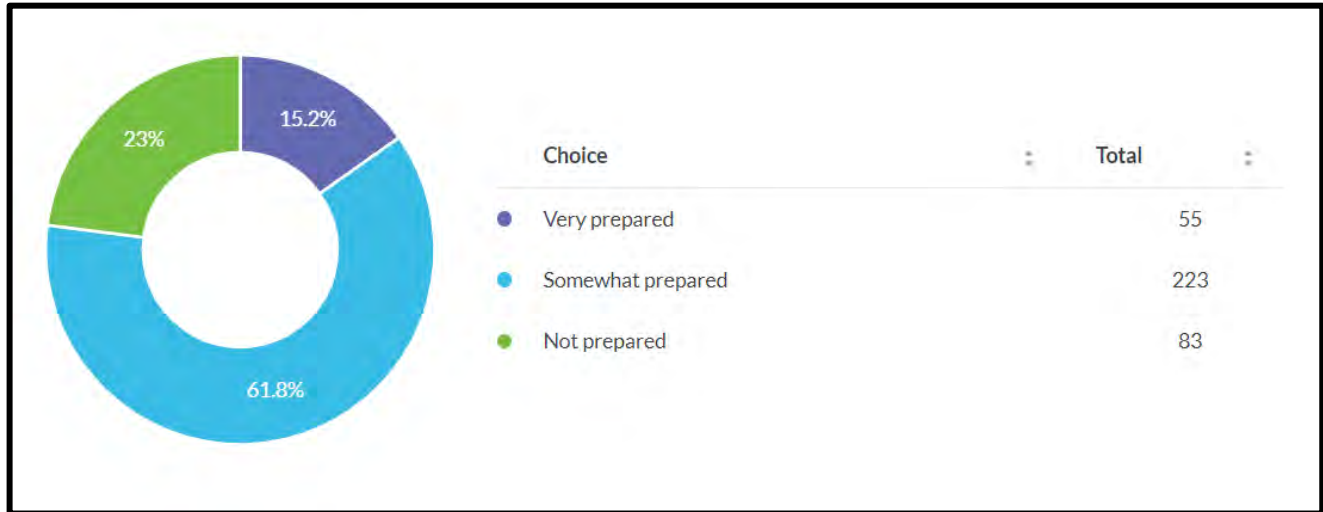
In Figure 4, Respondents indicated their level of household preparedness regarding amount of food, water, and vital supplies available on hand in the event of a natural disaster. Nearly 20% of households indicated less than 3 days of supplies on hand.

**Figure 4.** HMP Survey Responses (%) by Food/Water/Supplies Preparedness.



While the majority (77%) of Respondents indicated that they were *somewhat prepared* or *very prepared* to manage basic household needs in the event of loss of electricity or natural gas, approximately 23% indicated they were not *well prepared* for such an event (Figure 5).

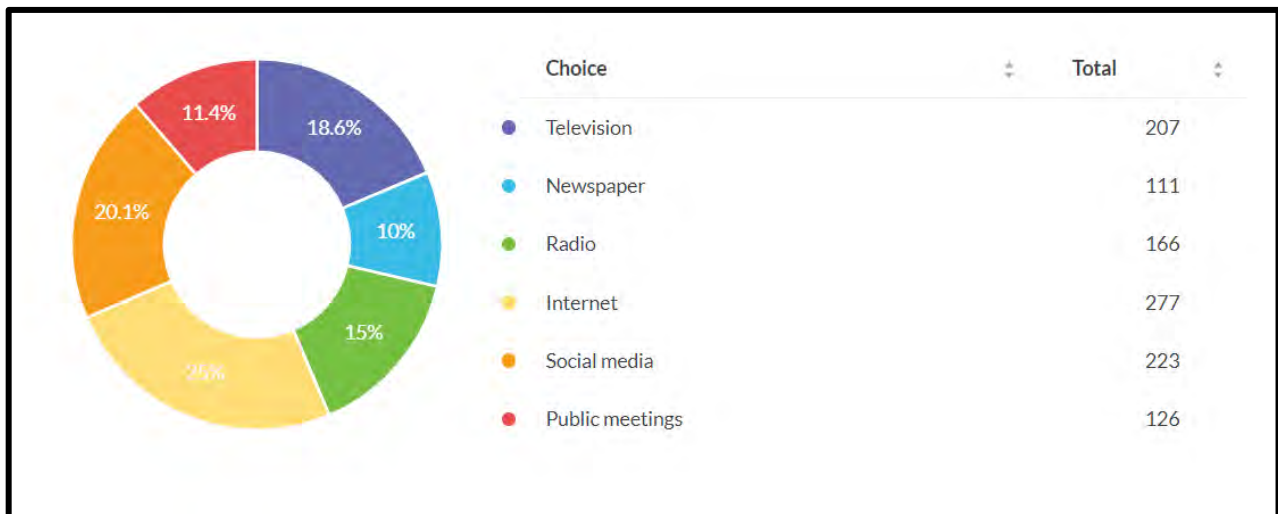
**Figure 5.** HMP Survey Responses (%) by Electricity/Gas Preparedness.



**Preferred Communication and Notification Platforms:**

In Figure 6, Respondents indicated an array of preferred sources for receiving useful information about hazards, preparations, etc. The largest proportion of responses indicated preferred *communication* through internet websites (25%) or social media (20%). Followed by television (19%) and radio (15%).

**Figure 6.** HMP Survey Responses (%) by Preferred *Communication* Platforms.

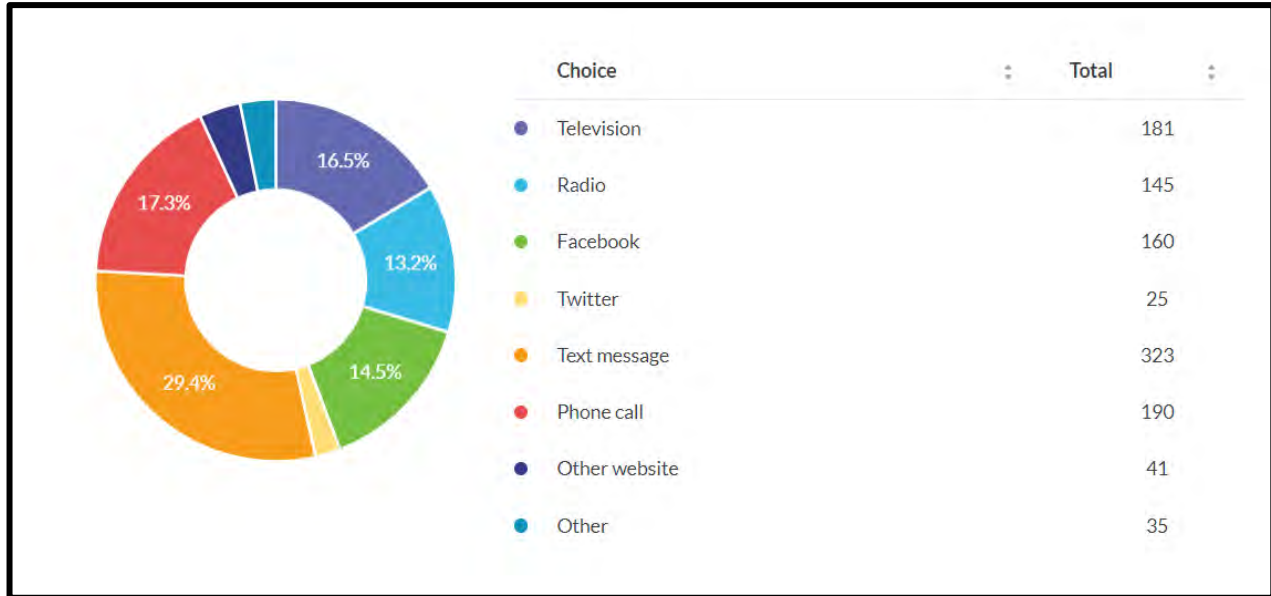


In Figure 7, Respondents similarly indicated an array of preferred platforms for *notification* regarding imminent hazards or threats, with a strong 30% of Respondents preferring text



message notifications. Followed by phone calls (17%), television (16%), and Facebook communications (15%).

**Figure 7.** HMP Survey Responses (%) by Preferred *Notification* Platforms.



**Mitigation Measures:**

We asked Respondents to indicate if they would support proposed mitigation measures among a specified list, selecting all that apply. Table 4 below details the number of Respondents who indicated support for mitigation measures of each type. The Table lists proposed measures in *descending* order of support with the first listed item being the *most* supported.

<b>Proposed Mitigation Type</b>	<b>Total Number of Respondents Expressing Support</b>
Improve damage resistance of utilities such as electricity, communications systems, etc.	283
Improve roadways	235
Repair or replace bridges and low water crossings	217
Improve emergency response providers and facilities such as police, fire, EMT, ambulance	205
Improve access to information about hazards, risks, and strategies to limit risk	197

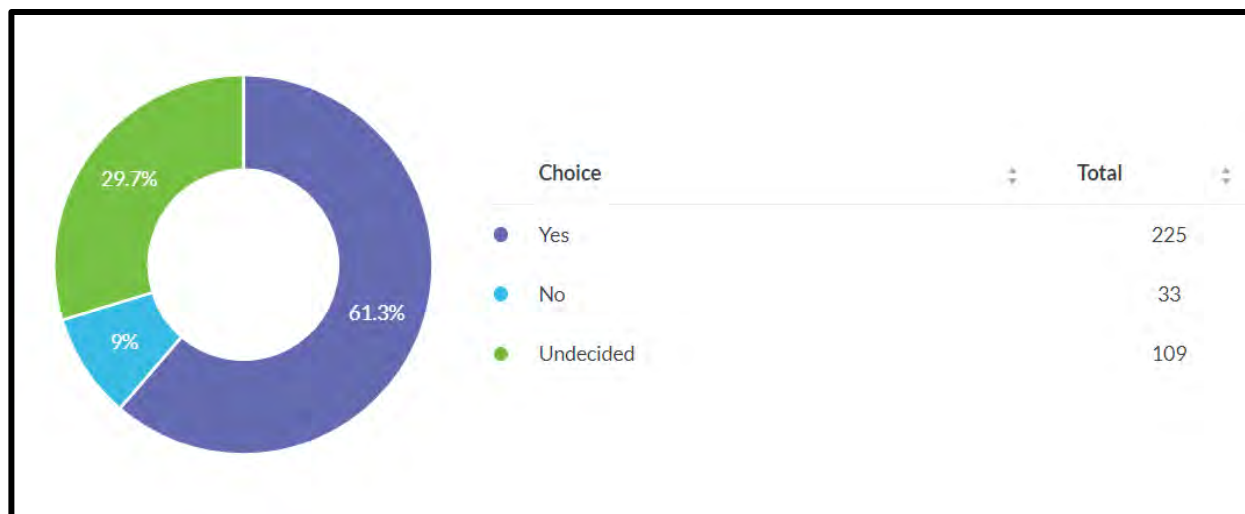
# Coryell County Hazard Mitigation Plan Public Survey Results



Provide educational and information resources to help residents better prepare for natural hazards	176
Create a stream and weather monitoring system that is better able to detect, predict, and communicate risks	164
Improve protective measures such as dams, levees, firebreaks	140
Enhance river/stream health and restoration programs	139
Support research to better understand and predict flood risks and other threats to guide effective mitigation	119
Assist with management of flood prone lands in ways that mitigate flood impacts	114

We asked Respondents whether they would support policies that manage or limit certain types of development in hazard zones in order to reduce risks. The majority (61%) of Respondents indicated support for such policies.

**Figure 8.** HMP Survey Responses (%) In Favor of Policies that Manage Development.



## Additional Meta-Data Analyses:

We can derive some information about the efficacy of various forms of communication from the survey response data. For example, we can look at how Respondents accessed the survey, whether it was via a link from Facebook or a paper survey acquired from a public meeting or obtained at another County facility. The ways that the public became aware of and/or accessed the survey may also indicate forums where other public communication may be effective.

# Coryell County Hazard Mitigation Plan Public Survey Results



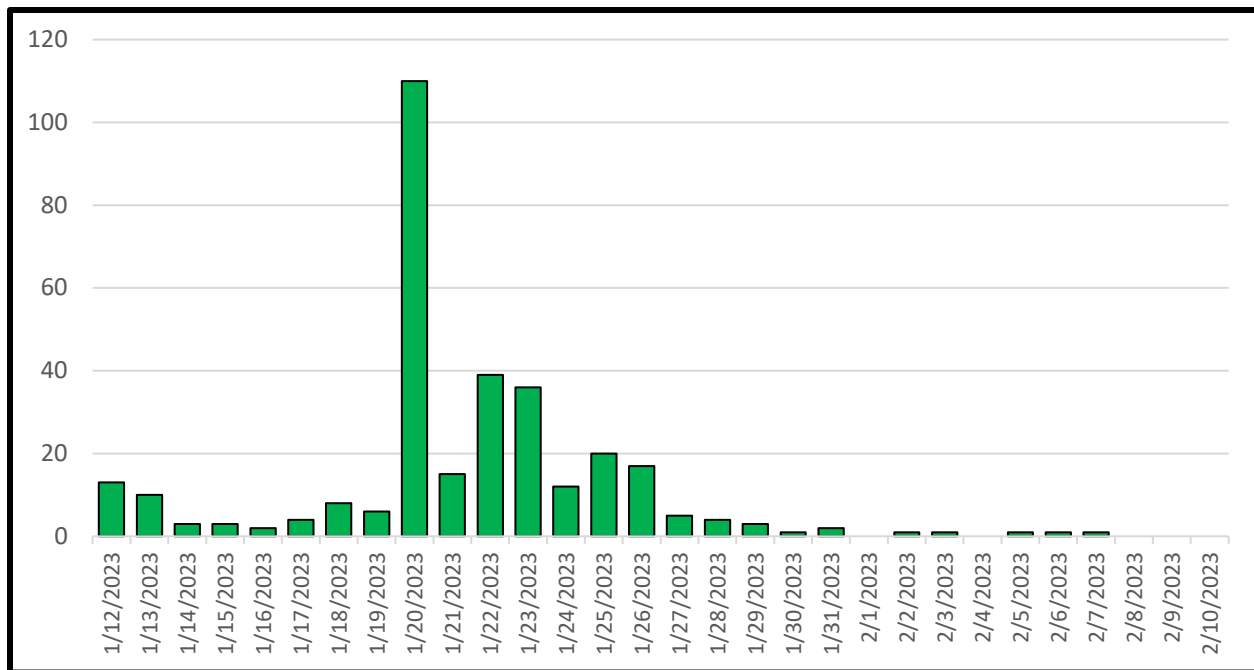
Of the 367 surveys completed, we have data indicating how the Respondent accessed the survey for 116 of the surveys. Table 5 summarizes the places or platforms where Respondents accessed or obtained the survey. Please note that for Respondents who were informed about the survey via a public meeting but chose to access the survey through an online tool (e.g., QR code), we do not have a record of which surveys were completed as a result of that pathway. However, data presented below, including dates of surveys, can show whether surveys were taken on days of or shortly after public meetings. This provides some indirect inference on the effect of public meetings on survey access.

**Table 5. Survey Access Points and Platforms.**

Access Source	Surveys	% of Total (out of 116)
Copperas Cove Library (paper survey)	1	<1%
Gatesville Library (paper survey)	11	9%
Coryell County Tax Office (paper survey)	1	<1%
Oglesby ISD	1	<1%
Jonesboro ISD (paper survey)	28	24%
Oglesby City Hall (paper survey)	1	<1%
Evant Public Meeting (paper survey)	1	<1%
Copperas Cove Public Meeting (paper survey)	5	4%
Oglesby Public Meeting	2	<1%
Google Search	9	7%
Facebook link	46	40%
copperascovetx.gov	1	<1%
coryellcounty.org	2	<1%
coveleaderpress.com	1	<1%
fox44news.com	1	<1%
gatesvilletx.com	5	4%
Cityofevanttx.com	1	<1%

We also have reliable data for the date a survey was taken for 317 (of the 367 total) surveys. The graph below depicts the number of surveys completed on each date that the survey was active from 1/12/2023 to 2/10/2023. This data may be useful for assessing the efficacy of various outreach approaches and venues for effectively directing traffic to the website and/or survey link, such as public meetings, newspaper articles, or other outreach and communication strategies. This may provide additional guidance about the ways the public may be most likely to see, read, or engage with information about hazards and preparedness. We can see in Figure 9 below that the largest number of surveys were completed on January 20<sup>th</sup>, with a substantial number of surveys completed during the subsequent week.

**Figure 9.** Number of HMP Surveys Completed Each Day.



**Conclusion:**

Respondents expressed the highest levels of concern about Drought, Wildfire, Winter Storm, and Tornadoes. Regarding whether they had experienced impacts (e.g., injury/fatality, damage or loss of property, loss of work/school days, etc.) due to each hazard, 69% of respondents indicated experiencing impacts due to Winter Storms (highest rate of all hazards). Respondents sought to have access to communication, both information and emergency, through modern means, including text message, social media platforms, and internet websites.

Please note that a final Public Survey Analysis will be included in the final HMP document as an Appendix. Once finalized, the HMP will be made available to the public through <https://www.coryellcountyhmp.com/>

Thank you again for your support and participation in Coryell County’s HMP public survey. Your input is invaluable and will help ensure the HMP is tailored to Coryell County and the concerns of its residents.



# **Appendix D:**

## **Meeting Documentation**

- Executive Committee Meeting 1
- Public Meeting 1
- Public Meeting 2
- Public Meeting 3
- Public Meeting 4
- Executive Committee Meeting 2
- Advisory Planning Team Meeting 1
- Public Meeting 5
- Executive Committee Meeting 3
- Executive Committee Meeting 4





**CORYELL COUNTY HAZARD MITIGATION PLAN**

**Executive Committee Meeting 1  
Coryell County Main Street Annex  
January 13, 2023, at 1:30 PM**

**Please print clearly.**

**Honorable Judge Roger Miller**

Name: Roger Miller  
Title: County Judge  
Phone Number: 254-865-5911  
Email: countyjudge@coryellcounty.org

**City of Copperas Cove Representative**

Name: BOBBY LEWIS  
Title: DEVELOPMENT SERVICES DIRECTOR  
Phone Number: 254-547-4221 EX. 6251  
Email: RLEWIS@COPPERASCOVE TX. GOV

**City of Gatesville Representative**

Name: BILL PARRY  
Title: CITY MANAGER  
Phone Number: (254) 865-8951 X111  
Email: wparry@gatesvilletx.com

**City of Evant Representative**

Name: Jennifer Ingram  
Title: Evant ISD Superintendent  
Phone Number: 254-471-5536 / 254-386-9312 cell  
Email: jingram@evantisd.org

**City of Oglesby Representative**

Name: Ronnie Sullins  
Title: \_\_\_\_\_  
Phone Number: 254-216-3332  
Email: rsullins@fubgatsville.com

**NRS Representatives**

Name: Steve Manning  
Title: President  
Name: Joy Nicholopoulos  
Title: Director of Operations  
Name: Madelyn Todd  
Title: Project Manager  
Name: \_\_\_\_\_  
Title: \_\_\_\_\_



## CORYELL COUNTY HAZARD MITIGATION PLAN

Public Meeting #1  
Gatesville City Auditorium  
January 18, 2023 from 5:30-7:30 PM

Please print clearly.

<u>Name</u>	<u>Representing (self, agency, etc.)</u>
Jeff Osborne	Gatesville Mosquito
Joseph Conside	SELF
Edwin Bageler	SELF
Gary Chemley	City of Gatesville
DAVID SPATZIER	SELF
ELENA SPATZIER	SELF
CARLA MANNING	NRS
Marie Dominguez	self
BILL PARRY	CITY OF GATESVILLE
RENE OCHOA	City of GATESVILLE
Kyle Matthews	County Commissioner
Julie Matthews	self
Andy James	self
Ryan Bisham	County Commissioner
ALAN MATHIS	SELF
Steve Manning	NRS
Madelyn Todd	NRS
Lillian Reed	NRS
David Jones	NRS
Casey Childers	NRS
Judge Roger Miller	Coryell County





**CORYELL COUNTY HAZARD MITIGATION PLAN**

**Public Meeting #2**

**Evant City Hall**

**January 19, 2023 from 5:30-7:30 PM**

**Please print clearly.**

**Name** **Representing (self, agency, etc.)**

Natalie Hall

Julie Matthews

self

Kyle Matthews

Commissioner Pet 1

Bill Wheelless N

EVANT VFD

Brian Mauney

Evant City Council/VFD

Judge Roger Miller

Coryell County

Steve Manning

NRS

Carla Manning

NRS

Madelyn Todd

NRS

David James

NRS

Lillian Reed

NRS

Bob Harnell

Self



## CORYELL COUNTY HAZARD MITIGATION PLAN

Public Meeting #3  
Copperas Cove Council Chambers  
January 25, 2023 from 5:30-7:30 PM

Please print clearly.

<u>Name</u>	<u>Representing (self, agency, etc.)</u>
Budd Johnson	Coryell Joint Comm Group
Fred Welch	Copperas Cove EIX
Joann Courtland	City of Copperas Cove
Joe Warley	Coryell County
LYNN BLAIR	SELF
Rosemary Blair	self
DARREN BLAIR	SELF
Kyle Matthews	Commissioner Det 1
Julie Matthews	SELF
SCOTT WEDDIE	CORYELL COUNTY
Gary Young	City of Copperas Cove
Joey Acfalbe	self
John Hale	City of Cove
Kevin Kulci	City of CC
Ryan Havisloh	City of cc.
Brittany Prober	Leader Press
Dale Treadway	WCTD#1 City of Copperas Cove
BOB HANWELL	self
Judge Roger Miller	Coryell County
Steve Manning	NRS
Madelyn Todd	NRS
Casey Childers	NRS
Lillian Reed	NRS





## CORYELL COUNTY HAZARD MITIGATION PLAN

Public Meeting #4  
Oglesby Community Center  
January 26, 2023 from 5:30-7:30 PM

Please print clearly.

<u>Name</u>	<u>Representing (self, agency, etc.)</u>
Willie Smith	Oglesby City Council
Marin Mlodzianowski	Self
Mike Thomas	Self
Steve Kepple	Self
James Lewis	Self
Kristin Weddle	Self
SCOTT WEDDLE	CORYELL COUNTY
Ryan Basham	Coryell County
Kennia Sullins	Oglesby
Isis Houtz	Self
Blair Barnard	Self
Tasha LeBlanc	Self
Bob Harnell	Self
Jennifer Thompson	City of Oglesby
MICHAEL DUNAGAN	SELF
Judge Roger Miller	Coryell County
Steve Manning	NRS
Carla Manning	NRS
Madelyn Todd	NRS
Casey Childers	NRS
Lillian Reed	NRS



**CORYELL COUNTY HAZARD MITIGATION PLAN**

**Executive Committee Meeting 2**

Thursday February 16, 2023  
130 pm CST

Please print clearly.

**Honorable Judge Roger Miller**

Name: Roger Miller

Title: County Judge

Phone Number: 254-865-5911

Email: countyjudge@coryellcounty.org

**City of Copperas Cove Representative**

Name: Gary D. Young

Title: Fire Chief / EMC

Phone Number: 254-547-2514 Ext 6301

Email: gyoung@copperascovetx.gov

**City of Gatesville Representative**

Name: WILLIAM H. PARRY, III

Title: CITY MANAGER

Phone Number: (254) 865-8951 X 111

Email: wparry@gatesvilletx.com

**City of Evant Representative**

Name: Jennifer Ingram  
Title: Superintendent - EISD  
Phone Number: 254-386-9312  
Email: jingram@evantisd.org

**City of Oglesby Representative**

Name: Bonnie Sullivan  
Title: \_\_\_\_\_  
Phone Number: 254-216-3332  
Email: bsullivan@fahquerville.com

**NRS Representatives**

Name: Steve Manning  
Title: President  
Name: Joy Nicholopoulos  
Title: Director of Operations  
Name: Madelyn Todd  
Title: Project Manager  
Name: \_\_\_\_\_  
Title: \_\_\_\_\_





**CORYELL COUNTY HAZARD MITIGATION PLAN**

**Advisory Planning Team Meeting 1**

Monday February 27, 2023  
10 AM CST

**Please print clearly.**

**Honorable Judge Roger Miller**

Name: Roger Miller

Title: County Judge

Phone Number: 254-865-5911 ext 300

Email: countyjudge@coryellcounty.org

**Texas Division of Emergency Management Representative**

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Phone Number: \_\_\_\_\_

Email: \_\_\_\_\_

**Coryell County Commissioner or Representative**

Name: SCOTT WEDDLE

Title: COMMISSIONER Pct 2

Phone Number: 254-410-3389

Email: @scott.weddle@coryellcounty.org

**Coryell County Road and Bridge Representative**

Name: Justin Latham  
Title: Road + Bridge Administrator  
Phone Number: 254-216-9079  
Email: Justin.Latham@CoryellCounty.Org

**Sheriff or Representative**

Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Phone Number: \_\_\_\_\_  
Email: \_\_\_\_\_

**Gatesville Fire Chief or Representative**

Name: Billy Vaden  
Title: Fire Chief  
Phone Number: 254-216-3444  
Email: bvaden@gatesvilletx.com

**City of Copperas Cove Representative**

Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Phone Number: \_\_\_\_\_  
Email: \_\_\_\_\_

**City of Gatesville Representative**

Name: RENE F. OCHOA  
Title: Director of Planning & Community Dev. & GIS  
Phone Number: 254-404-5297  
Email: rochoa@gatesvilletx.com



**City of Evant Representative**

Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Phone Number: \_\_\_\_\_  
Email: \_\_\_\_\_

**City of Oglesby Representative**

Name: MIKE Homan  
Title: CITY Council  
Phone Number: 254-749-9443  
Email: TXWACO34@AOL.COM

**Copperas Cove ISD Representative**

Name: JOE Burns  
Title: Superintendent  
Phone Number: 254-547-1227  
Email: burnsj@ccisd.com

**Gatesville ISD Representative**

Name: Yancy Sanderson  
Title: Executive Director  
Phone Number: 254-368-0732  
Email: ysanderson@gatesvilleisd.org

**NRS Representatives**

Name: Steve Manning  
Title: President  
Name: Jay Nicholopoulos  
Title: Director of operations

Name: Madelyn Todd

Title: Project Manager

Name: \_\_\_\_\_

Title: \_\_\_\_\_



## CORYELL COUNTY HAZARD MITIGATION PLAN

Final Public Meeting  
Gatesville Civic Center  
March 7, 2023 at 6:00 PM

Please print clearly.

Name	Representing (self, agency, etc.)
JOSEPH COSIDINO	Self
Reger Miller	Coryell County
Bruce & Pam Evetts	Self
Carla Manning	NRS
Bobby Saunders	CTCG/Texas RACES
Justin Kaphan	CCAB Coryell County
Ryan Basham	Coryell County
Jeff Osborne	Gatesville Messenger
Barbara Burrow	Gatesville City Council
SCOTT WEDDLE	COMMISSIONER PCT 2
Steve Manning	NRS
Madelyn Tadel	NRS
Lillian Reed	NRS
David Jones	NRS



## CORYELL COUNTY HAZARD MITIGATION PLAN

### Executive Committee Meeting 3

Thursday March 9, 2023  
9 AM CST

Please print clearly.

#### Honorable Judge Roger Miller

Name: Roger Miller

Title: County Judge

Phone Number: 254-865-5911

Email: countyjudge@coryellcounty.org

#### City of Copperas Cove Representative

Name: Gary D. Young

Title: Fire Chief

Phone Number: 254-547-2514

Email: gyoung@copperascovetx.gov

#### City of Gatesville Representative

Name: RENE F. OCHOA

Title: PLANNING Dir.

Phone Number: 254-484-5297

Email: rochoa@gatesvilletx.com



**City of Evant Representative**

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Phone Number: \_\_\_\_\_

Email: \_\_\_\_\_

**City of Oglesby Representative**

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Phone Number: \_\_\_\_\_

Email: \_\_\_\_\_

**NRS Representatives**

Name: Steve Manning

Title: President

Name: Jay Micholopoulos

Title: Director of Operations

Name: David Jones

Title: Technical Director

Name: Madelyn Todd

Title: Project Manager



Title

## Final HMP Executive Committee Meeting

Required

[Roger Miller](#);  [Ronnie Sullins](#);  [Jennifer Ingram](#);  [William Parry](#);  [Gary Young](#)

Optional

[Lisa Robuck](#);  [Steve Manning](#);  [Joy Nicholopoulos](#);  [Rene Ochoa](#);  [Lillian Reed](#)

Start time

Thu 4/6/2023



9:00 AM



Central Time (US & Cana

All day



Time zones

End time

Thu 4/6/2023



9:30 AM



Central Time (US & Cana

[Make Recurring](#)

Location

<https://us06web.zoom.us/j/88158663362?pwd=bGkzRTRHV2hoYVdFc2NUcFpCT1B6dz09>

	Name	Attendance
<input checked="" type="checkbox"/>	<input checked="" type="radio"/> <a href="#">Madelyn Todd</a>	Meeting Organizer
<input checked="" type="checkbox"/>	<input type="radio"/> <a href="#">Lisa Robuck</a>	Optional Attendee
<input checked="" type="checkbox"/>	<input checked="" type="radio"/> <a href="#">Steve Manning</a>	Optional Attendee
<input checked="" type="checkbox"/>	<input type="radio"/> <a href="#">Joy Nicholopoulos</a>	Optional Attendee
<input checked="" type="checkbox"/>	<input type="radio"/> <a href="#">Rene Ochoa</a>	Optional Attendee
<input checked="" type="checkbox"/>	<input type="radio"/> <a href="#">Roger Miller</a>	Required Attendee
<input checked="" type="checkbox"/>	<input type="radio"/> <a href="#">Ronnie Sullins</a>	Required Attendee
<input checked="" type="checkbox"/>	<input type="radio"/> <a href="#">Jennifer Ingram</a>	Required Attendee
<input checked="" type="checkbox"/>	<input type="radio"/> <a href="#">William Parry</a>	Required Attendee
<input checked="" type="checkbox"/>	<input type="radio"/> <a href="#">Gary Young</a>	Required Attendee
<input checked="" type="checkbox"/>	<input type="radio"/> <a href="#">Lillian Reed</a>	Optional Attendee



# **Appendix E:**

## **Capabilities Assessment**

- Unincorporated Coryell County
- Copperas Cove
- Gatesville
- Evant
- Oglesby

# Capabilities Assessment

Coryell County and the participating jurisdictions completed a Capabilities Assessment to ensure a comprehensive understanding of all existing planning, technical, and regulatory tools and policies; administrative and technical capabilities; and financial resources.

The charts below coincide with each of the following:

1. Unincorporated Coryell County, Texas;
2. City of Copperas Cove, Texas (including Copperas Cove ISD);
3. City of Gatesville, Texas (including Gatesville ISD);
4. City of Evant, Texas; and
5. City of Oglesby, Texas.

The following charts depict the completed Capabilities Assessment for each jurisdiction.

## 1. Unincorporated Coryell County, Texas

Community Capability Checklist				
Planning/Technical/Regulatory Tools/Policies	In Place	Under Development	Not In Place	Comments
Building Code			X	
Capital Improvements Plan			X	Capital Improvement Fund
Community Wildfire Protection Plan		X		
Comprehensive/Master Plan			X	
Continuity of Operations Plan	X			
Economic Development Plan			X	
Emergency Operations Plan			X	
Evacuation Plan			X	
Flood Response Plan			X	
Floodplain Management Plan			X	

Floodplain Ordinance	X			Floodplain Development Permit Application and "Flood Damage Prevention Order"
Hazard Mitigation Plan		X		
Historic Preservation Plan			X	
Land Use Plan			X	Funding requested through RCP application
Local Waterfront Protection Plan				N/A
Open Space/Parks Plan			X	
Post-Disaster Recovery Plan			X	
Property Set-Back Ordinance (Water/Wildfire/Other Hazard, etc.)	X			
Real Estate Disclosure Requirements	X			
Redevelopment Plan	X			
Site Plan Review Requirements	X			
Steep Slope Ordinance	X			
Stormwater Management Plan	X			
Stormwater Ordinance	X			
Subdivision Regulations	X			
Transportation Plan (Action Plan, Construction Plan, etc.)			X	SS4A funding awarded from USDOT to complete Safety Action Plan

Warning Systems/Services (Reverse 911, Warning Signals, etc.)			X	
Watershed Protection Plan			X	
Zoning Ordinance/Land Use Restrictions			X	
<b>Administrative and Technical Capability</b>	<b>In Place</b>	<b>Under Development</b>	<b>Not In Place</b>	<b>Comments</b>
Emergency Manager		X		
Engineers			X	
Fire Chief			X	
Floodplain Manager		X		Coryell County anticipates filling this position
Geographic Information Systems (GIS) Personnel			X	
Planners			X	
Police Chief (County Sheriff)	X			
Resource Development Staff or Grant Writers			X	
<b>Financial Resources</b>	<b>In Place</b>	<b>Under Development</b>	<b>Not In Place</b>	<b>Comments</b>
Capital Improvement Programming			X	
Community Development Block Grants	X			
Development Impact Fees			X	
Other Grants		X		
Partnering Agreements or Intergovernmental Agreements	X			
Stormwater Utility Fees	X			



## 2. City of Copperas Cove, Texas

Community Capability Checklist				
Planning/Technical/Regulatory Tools/Policies	In Place	Under Development	Not In Place	Comments
Building Code	X			
Capital Improvements Plan	X			
Community Wildfire Protection Plan			X	
Comprehensive/Master Plan	X			
Continuity of Operations Plan			X	
Economic Development Plan	X			
Emergency Operations Plan	X			
Evacuation Plan			X	
Flood Response Plan			X	
Floodplain Management Plan	X			
Floodplain Ordinance	X			
Hazard Mitigation Plan		X		
Historic Preservation Plan			X	
Land Use Plan	X			
Local Waterfront Protection Plan				N/A
Open Space/Parks Plan			X	
Post-Disaster Recovery Plan			X	
Property Set-Back Ordinance (Water/Wildfire/Other Hazard, etc.)	X			

Real Estate Disclosure Requirements	X			
Redevelopment Plan			X	
Site Plan Review Requirements	X			
Steep Slope Ordinance			X	
Stormwater Management Plan	X			
Stormwater Ordinance	X			
Subdivision Regulations	X			
Transportation Plan (Action Plan, Construction Plan, etc.)		X		SS4A funding awarded from USDOT to complete Safety Action Plan
Warning Systems/Services (Reverse 911, Warning Signals, etc.)	X			
Watershed Protection Plan			X	
Zoning Ordinance/Land Use Restrictions	X			
<b>Administrative and Technical Capability</b>	<b>In Place</b>	<b>Under Development</b>	<b>Not In Place</b>	<b>Comments</b>
Emergency Manager	X			
Engineers	X			
Fire Chief	X			
Floodplain Manager	X			
Geographic Information Systems (GIS) Personnel	X			
Planners	X			
Police Chief	X			

Resource Development Staff or Grant Writers			X	
<b>Financial Resources</b>	<b>In Place</b>	<b>Under Development</b>	<b>Not In Place</b>	<b>Comments</b>
Capital Improvement Programming	X			
Community Development Block Grants	X			
Development Impact Fees	X			
Other Grants	X			
Partnering Agreements or Intergovernmental Agreements	X			
Stormwater Utility Fees	X			

### 3. City of Gatesville, Texas

Community Capability Checklist				
Planning/Technical/Regulatory Tools/Policies	In Place	Under Development	Not In Place	Comments
Building Code	X			2021 Code approved 3/22/22
Capital Improvements Plan	X			Approved by Council as part of annual budget
Community Wildfire Protection Plan		X		
Comprehensive/Master Plan	X			
Continuity of Operations Plan			X	
Economic Development Plan			X	
Emergency Operations Plan	X			
Evacuation Plan			X	
Flood Response Plan	X			
Floodplain Management Plan	X			
Floodplain Ordinance	X			
Hazard Mitigation Plan		X		
Historic Preservation Plan			X	
Land Use Plan	X			
Local Waterfront Protection Plan				N/A
Open Space/Parks Plan			X	
Post-Disaster Recovery Plan			X	
Property Set-Back Ordinance (Water/Wildfire/Other Hazard, etc.)			X	

Real Estate Disclosure Requirements			X	
Redevelopment Plan			X	
Site Plan Review Requirements	X			
Steep Slope Ordinance			X	
Stormwater Management Plan		X		
Stormwater Ordinance		X		
Subdivision Regulations	X			
Transportation Plan (Action Plan, Construction Plan, etc.)		X		SS4A funding awarded from USDOT to complete Safety Action Plan
Warning Systems/Services (Reverse 911, Warning Signals, etc.)	X			
Watershed Protection Plan			X	
Zoning Ordinance/Land Use Restrictions	X			
<b>Administrative and Technical Capability</b>	<b>In Place</b>	<b>Under Development</b>	<b>Not In Place</b>	<b>Comments</b>
Emergency Manager			X	
Engineers	X			
Fire Chief	X			
Floodplain Manager	X			
Geographic Information Systems (GIS) Personnel	X			
Planners	X			
Police Chief	X			



Resource Development Staff or Grant Writers			X	
<b>Financial Resources</b>	<b>In Place</b>	<b>Under Development</b>	<b>Not In Place</b>	<b>Comments</b>
Capital Improvement Programming	X			
Community Development Block Grants	X			
Development Impact Fees			X	
Other Grants	X			
Partnering Agreements or Intergovernmental Agreements	X			
Stormwater Utility Fees			X	

#### 4. City of Evant, Texas

Community Capability Checklist				
Planning/Technical/Regulatory Tools/Policies	In Place	Under Development	Not In Place	Comments
Building Code			X	
Capital Improvements Plan			X	
Community Wildfire Protection Plan		X		
Comprehensive/Master Plan			X	
Continuity of Operations Plan			X	
Economic Development Plan			X	
Emergency Operations Plan			X	
Evacuation Plan			X	
Flood Response Plan			X	
Floodplain Management Plan			X	
Floodplain Ordinance*	X			
Hazard Mitigation Plan			X	
Historic Preservation Plan			X	
Land Use Plan			X	
Local Waterfront Protection Plan				N/A
Open Space/Parks Plan			X	
Post-Disaster Recovery Plan			X	
Property Set-Back Ordinance (Water/Wildfire/Other Hazard, etc.)			X	

Real Estate Disclosure Requirements			X	
Redevelopment Plan			X	
Site Plan Review Requirements			X	
Steep Slope Ordinance			X	
Stormwater Management Plan			X	
Stormwater Ordinance			X	
Subdivision Regulations			X	
Transportation Plan (Action Plan, Construction Plan, etc.)		X		SS4A funding awarded from USDOT to complete Safety Action Plan
Warning Systems/Services (Reverse 911, Warning Signals, etc.)			X	
Watershed Protection Plan			X	
Zoning Ordinance/Land Use Restrictions			X	
<b>Administrative and Technical Capability</b>	<b>In Place</b>	<b>Under Development</b>	<b>Not In Place</b>	<b>Comments</b>
Emergency Manager			X	
Engineers			X	
Fire Chief	X			Volunteer
Floodplain Manager			X	
Geographic Information Systems (GIS) Personnel			X	
Planners			X	
Police Chief	X			

Resource Development Staff or Grant Writers			X	
<b>Financial Resources</b>	<b>In Place</b>	<b>Under Development</b>	<b>Not In Place</b>	<b>Comments</b>
Capital Improvement Programming			X	
Community Development Block Grants			X	
Development Impact Fees			X	
Other Grants			X	
Partnering Agreements or Intergovernmental Agreements			X	
Stormwater Utility Fees			X	

## 5. City of Oglesby, Texas

Community Capability Checklist				
Planning/Technical/Regulatory Tools/Policies	In Place	Under Development	Not In Place	Comments
Building Code			X	
Capital Improvements Plan			X	
Community Wildfire Protection Plan		X		
Comprehensive/Master Plan			X	
Continuity of Operations Plan			X	
Economic Development Plan			X	
Emergency Operations Plan			X	
Evacuation Plan			X	
Flood Response Plan			X	
Floodplain Management Plan			X	
Floodplain Ordinance*	X			
Hazard Mitigation Plan		X		
Historic Preservation Plan			X	
Land Use Plan			X	
Local Waterfront Protection Plan				N/A
Open Space/Parks Plan			X	
Post-Disaster Recovery Plan			X	
Property Set-Back Ordinance (Water/Wildfire/Other Hazard, etc.)			X	



Real Estate Disclosure Requirements			X	
Redevelopment Plan			X	
Site Plan Review Requirements			X	
Steep Slope Ordinance			X	
Stormwater Management Plan			X	
Stormwater Ordinance			X	
Subdivision Regulations			X	
Transportation Plan (Action Plan, Construction Plan, etc.)		X		SS4A funding awarded from USDOT to complete Safety Action Plan
Warning Systems/Services (Reverse 911, Warning Signals, etc.)			X	
Watershed Protection Plan			X	
Zoning Ordinance/Land Use Restrictions			X	
<b>Administrative and Technical Capability</b>	<b>In Place</b>	<b>Under Development</b>	<b>Not In Place</b>	<b>Comments</b>
Emergency Manager			X	
Engineers			X	
Fire Chief (Volunteer)	X			
Floodplain Manager			X	
Geographic Information Systems (GIS) Personnel			X	
Planners			X	
Police Chief			X	

Resource Development Staff or Grant Writers			X	
<b>Financial Resources</b>	<b>In Place</b>	<b>Under Development</b>	<b>Not In Place</b>	<b>Comments</b>
Capital Improvement Programming			X	
Community Development Block Grants			X	
Development Impact Fees			X	
Other Grants		X		
Partnering Agreements or Intergovernmental Agreements			X	
Stormwater Utility Fees			X	

\*The Floodplain Ordinance for the City of Evant and Oglesby are included in Coryell County’s Floodplain Ordinance that was adopted August 28, 1995.

Coryell County is undertaking significant efforts to expand upon and overall improve the capabilities to prepare for and mitigate natural hazards within the County, which encompasses all jurisdictions included in the Plan. As listed in the charts above, starting on page 288, the County has been approved for funding from the Texas General Land Office (GLO) to complete a County-wide Land Use/Comprehensive Plan. The GLO funds are through the Resilient Communities Program (RCP) and will also be used by Coryell County to update or establish building codes, land use ordinances, and subdivision regulations.

Additionally, the GLO is providing Community Development Block Grant mitigation funds (CDBG-MIT) in Most Impacted & Distressed (MID) Designated Counties for the completion of transportation and infrastructure projects throughout Coryell County to address the significant flooding that occurred in 2015 and 2016 (Disaster Declarations DR-4223 (2015) and DR-4269 (2016)). Those significant flooding events in 2015 and 2016 resulted in many rescues from flooded, impassable roadways and 3 fatalities. Although flooding damaged the county roads, the rehabilitation or replacement of low water crossings and bridges will mitigate future hazardous conditions resulting from other various natural hazards.

The expanded efforts by Coryell County to seek and receive grant funding through the GLO will allow the County and all participating jurisdictions to address areas of deficiency through preparedness, response, and recovery. Once the Coryell County HMP is approved, Coryell County plans to seek FEMA funding through several programs, including Building Resilient

Infrastructure and Communities (BRIC), various Hazard Mitigation Assistance (HMA) funding opportunities, and infrastructure improvement funds.

Coryell County is working closely with the U.S. Army Corps of Engineers (USACE) Fort Worth District by seeking funds through their Continuing Authorities Programs (CAP): Flood Damage Reduction (Section 205), Aquatic Ecosystem Restoration (Section 206), and Snagging and Clearing for Flood Control (Section 208).

Coryell County has been in discussion with the U.S. Bureau of Reclamation relative to federal grant funding for the WaterSMART program that can assist in funding for modeling of aquifers and increasing water quantity.

All of these funding pursuits that result in funds awarded to Coryell County will expand on and improve the County's ability to address deficiencies in capabilities at the County and jurisdictional levels. The 5-year revision to the Coryell County HMP will document significant improvements in hazard policies, programs, and resources for every jurisdiction participating in the Plan.

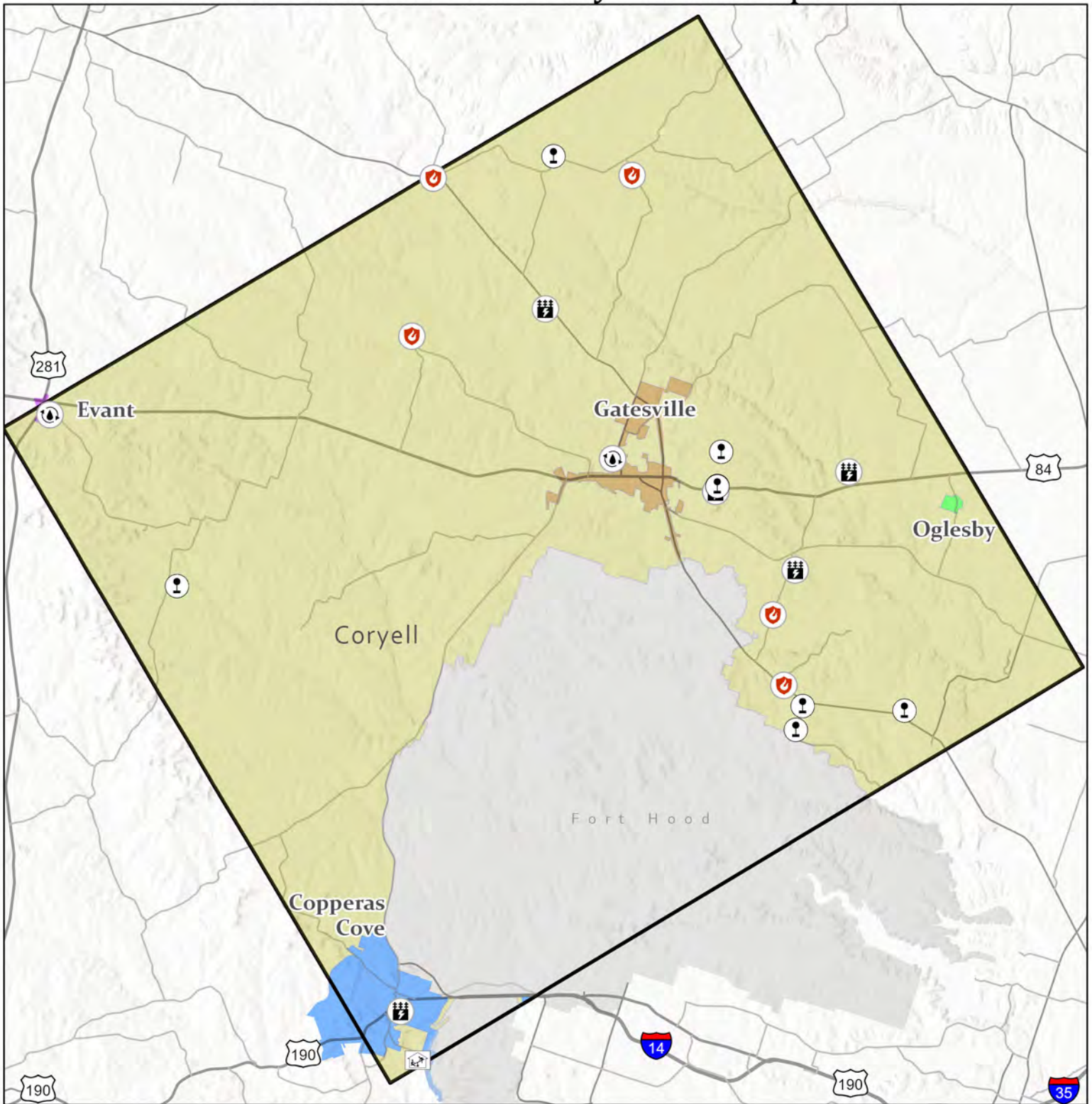


## **Appendix F:**

# **Critical Infrastructure and Facilities**

- Unincorporated Coryell County
- Copperas Cove
- Gatesville
- Evant
- Oglesby

# Critical Infrastructure Coryell Unincorporated



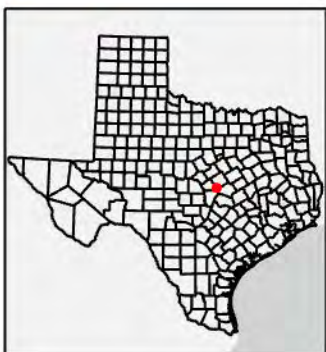
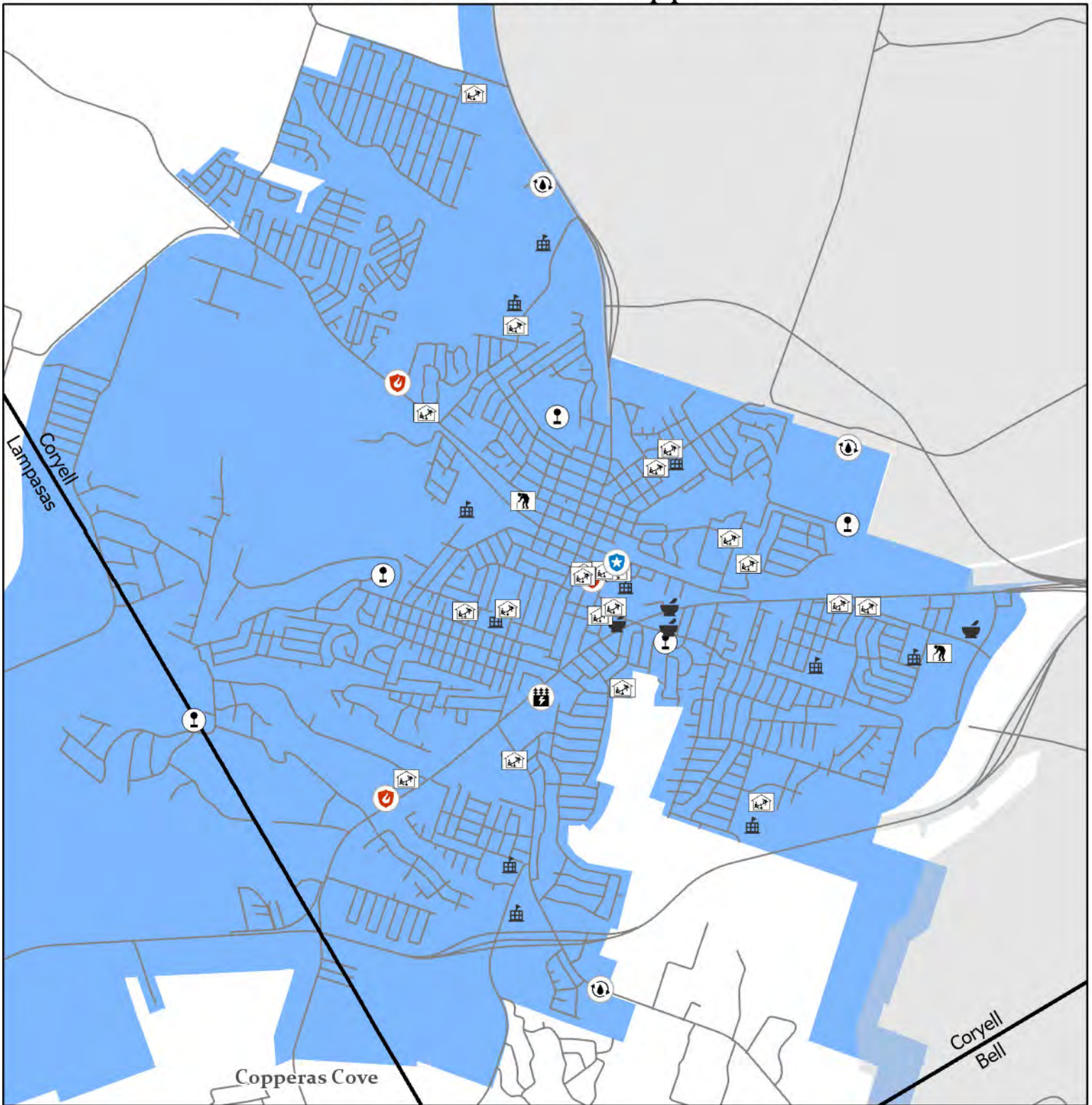
## Legend

	Coryell Boundary	<b>TYPE</b>		Child Care (1)
	Unincorporated Coryell County			Firestation (5)
	Copperas Cove			Substation (5)
	Evant			Water Tower (8)
	Gatesville			Wtr Trtmnt (2)
	Oglesby			





# Critical Infrastructure Copperas Cove



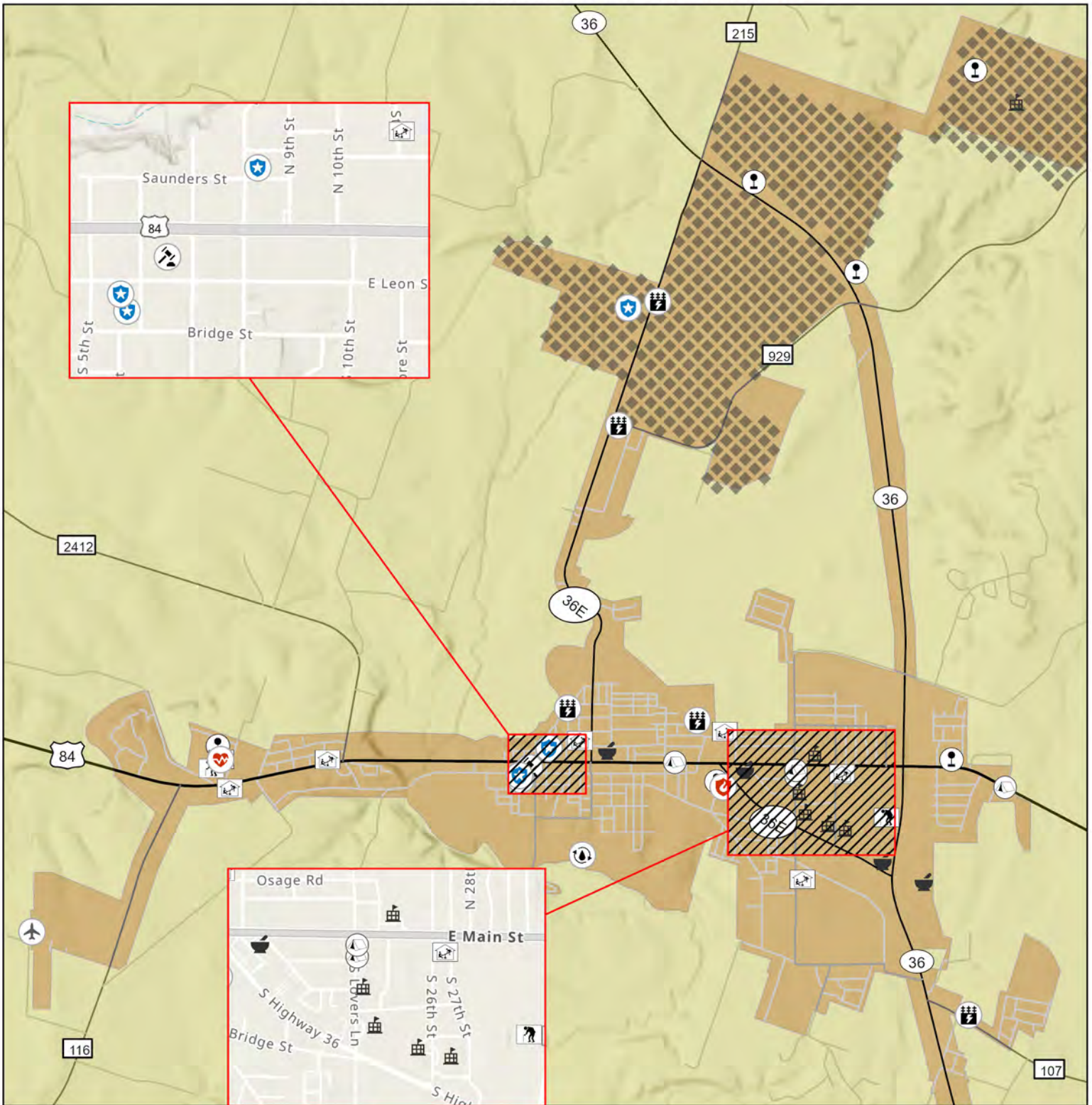
## Legend

Boundary	Firestation (3)	Public School (13)
Coryell County	Law Enforce (1)	Substation (1)
Copperas Cove	Nursing Home (2)	Water Tower (5)
Critical Infrastructure	Pharmacy (4)	Water Treatment (3)
Child Care (22)		





# Critical Infrastructure Gatesville

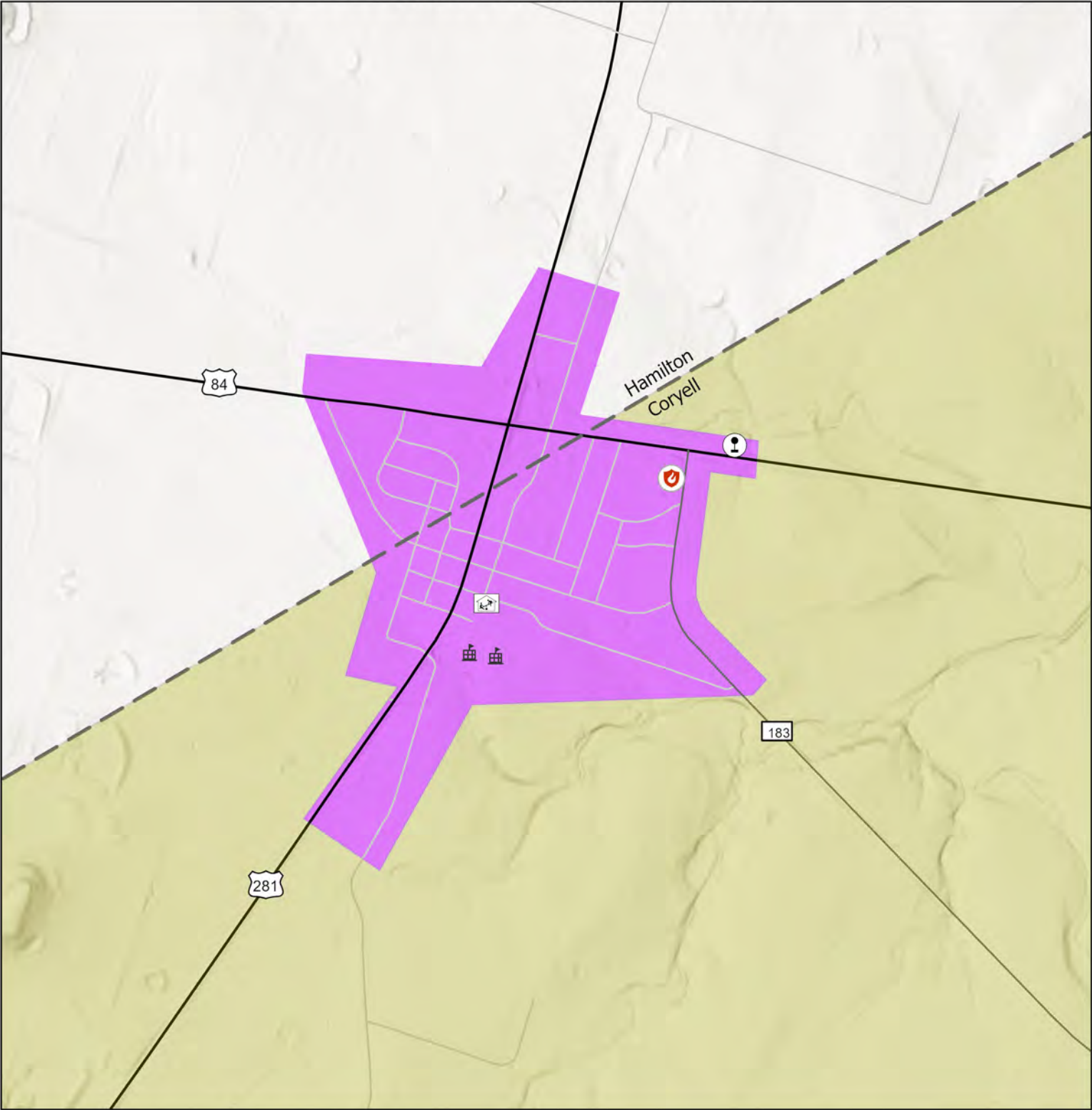


## Legend







Unincorporated Coryell County	Firestation (1)	Shelter (4)
Gatesville	Hospital (1)	Substation (5)
<b>Critical Infrastructure</b>	Law Enforce (4)	Water Tower (6)
Airport (1)	Nursing Home (3)	Water Treatment (1)
Child Care (6)	Pharmacy (4)	Prison Area
Courthouse (1)	Public School (7)	



# Critical Infrastructure Evant



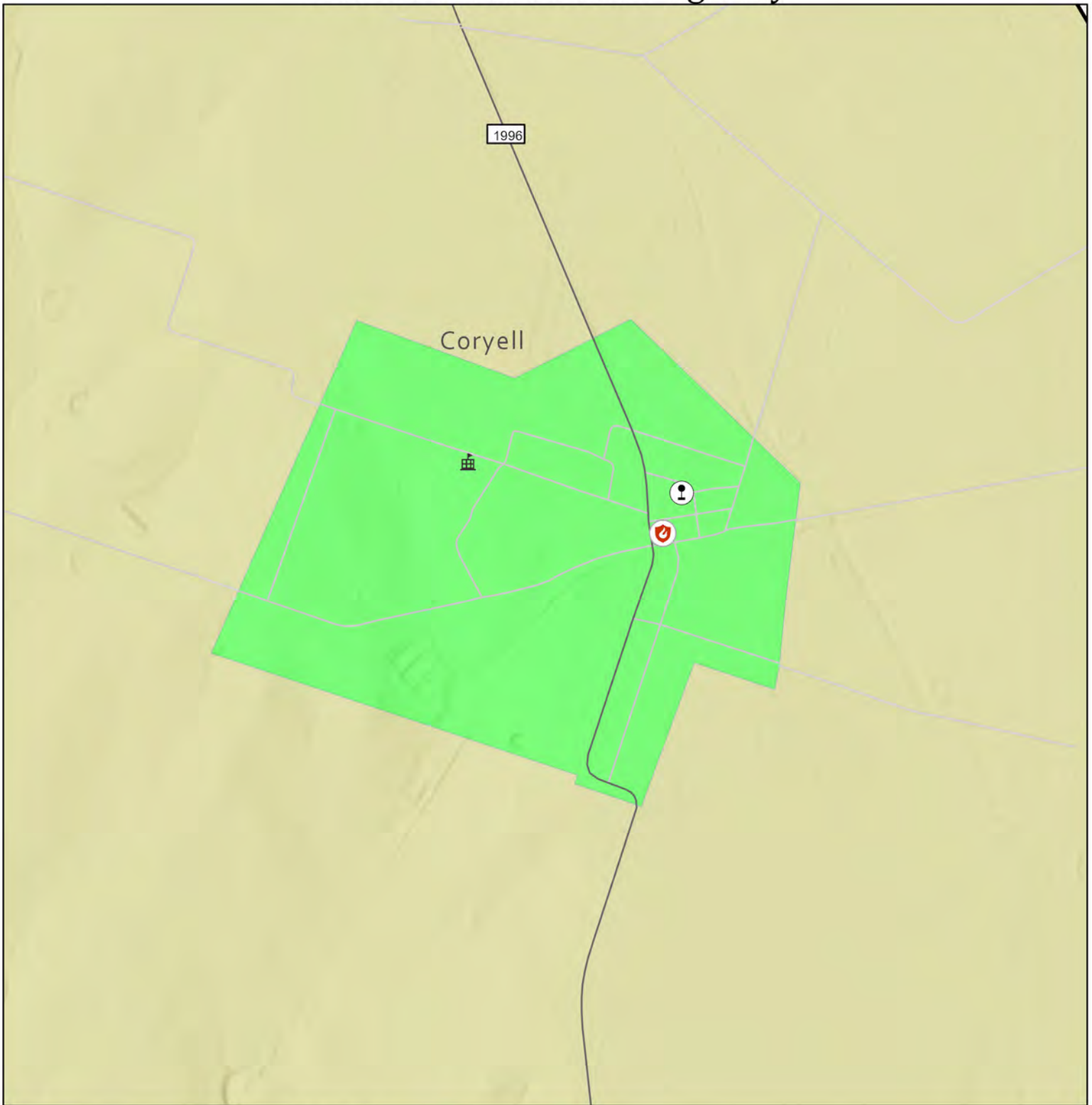
### Legend

 Unincorporated Coryell County	 Firestation (1)
 Evant	 Public School (2)
<b>Critical Infrastructure</b>	 Water Tower (1)
 Child Care (1)	





# Critical Infrastructure Oglesby



## Legend

Critical Infrastructure	
Coryell Boundary	Firestation (1)
Unincorporated Coryell County	Public School (1)
Oglesby	Water Tower (1)

