

**Daggett County, Utah Annex**  
**2024 Uintah Basin Region**  
**Multi-Jurisdictional All Hazard Mitigation Plan**



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# **PART I: COMMUNITY PROFILE**



## CHAPTER 1 DAGGETT COUNTY PROFILE

### LOCATION

Daggett County is located in the northeastern corner of Utah, with its northern border adjoining the southern border of Wyoming and its eastern border adjoining the western border of Colorado. The Uinta Mountains make up the southwestern area of the county as well as the southern border. The Green River also weaves through the east-central part of the county. It is bordered on the north by Sweetwater County, WY; on the east by Moffat County, CO; on the south by Uintah County; on the southwest by Duchesne County; and on the west by Summit County. Total area of the county is 721 square miles, of which 24 square miles is water (U.S. Census QuickFacts, 2022). It is the 26th largest county by area in Utah out of 29 counties.

### TOPOGRAPHY & VEGETATION

Daggett County is in the semi-arid region of northeastern Utah. The county is positioned on the north side of the Uinta Mountains. The county's terrain slopes to the north and the east on the northern side of the Uintas, which run east to west along the southern border of the county. The highest crest in the range is around 12,276 feet. Manila has an elevation of 6,348 feet, and Dutch John has an elevation of 6,430 feet. The elevation range within the county is from nearly 12,300 feet in the Uinta Mountains to 5,370 feet along the Green River in the eastern part of the county near the Utah-Colorado border (Daggett County Topographic Map, 2024).

The Uinta Mountains are the highest mountain range in the contiguous United States with no modern glaciers. Lush mountain forests, as part of Ashley National Forest, cover the lower parts of the range while rock and permafrost dominate the upper elevations. The most common species of tree in the lowest elevations of the forested land in the county is pinyon pine and juniper. Douglas-fir, white fir, ponderosa pine, limber pine, and lodgepole pine can be found at mid-elevations. The highest elevation species are primarily Englemann spruce and Subalpine fir. Quaking aspen can be found at all elevations, and blue spruce is often found in the lower riparian areas. Many species of grasses, shrubs, and forbs can also be found throughout the county (Daggett County General Plan Appendix, 2017).

Daggett County has many lakes, reservoirs, and springs, especially in the basins between the summits and ridgelines of the Uintas. The Green River flows southeastward through the central region of the county and passes through the eastern border of Utah into Colorado where it later turns southwest and dips back into Utah through Uintah County (Daggett County Topographic Plan, 2023). Fremont cottonwood, willow, narrowleaf cottonwood, alder, birch, and dogwood are common species found in the riparian areas of the county (Daggett County General Plan Appendix, 2017).

Flaming Gorge National Recreation Area is made up of 207,363 acres and is located in northeastern Utah and extends into Wyoming. It includes deep, red canyons carved by the Green River and the Flaming Gorge Reservoir, which is 91 miles long (Travel Wyoming, 2023).

### NATURAL RESOURCES

Coal, iron, phosphate, oil, and natural gas are significant natural resources present in Daggett County. Daggett County is the eighth largest producer of natural gas in the state of Utah as of January 2024 with a lifetime production of 193,703,035 MCF. The county produced 748,794 MCF of natural gas in 2023



(Utah DNR, 2024). Approximately 30,273 acres in Daggett County has been set aside by the BLM for phosphate mining and related development. Smaller resources in the region that have been mined in the past include kerogen, bituminous sandstone, wurlitzite, bituminous limestones, ozokerite, nigrite, and tabbyite (Daggett County General Plan Appendix, 2017).

The Green River is an important water resource in Daggett County. A number of streams also flow down the north slope of the Uinta Mountains toward the Green River. This water is often used for irrigation and other municipal and industrial uses. Groundwater is used as culinary and agricultural water. An abundance of fish present in these water resources has historically been a lifeline for Native Americans and settlers in the area but is now primarily used for sport fishing (Daggett County General Plan Appendix, 2017).

### CLIMATE

The climate in Daggett County is primarily semi-arid, with occasional severe cold in the winter. The climate in the upper elevations of the Uinta Mountains is often colder with increased snowfall (Daggett County General Plan Appendix, 2017).

In the summer, the average daily temperature in Manila is 65.7°F, with the warmest month of each year typically being July (NOWData, 2024). In the winter, the average daily temperature is 24.4°F in Manila, and the coldest month is typically December (NOWData, 2024).

Average annual precipitation is approximately 9.63 inches in Manila (NOWData, 2024). Temperature in Flaming Gorge is similar to the temperature in Manila, but Flaming Gorge averages more rainfall with 10.65 inches each year. The wettest month in Manila is May, and the driest month is November. The table below outlines monthly average maximum and minimum temperatures and average precipitation and snowfall at Manila.

Table 1-1. Manila Monthly Climate Summary

Manila, UT												
Average Maximum Temperature (°F)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
34.7	38.4	48.7	55.4	64.0	76.9	83.3	80.9	72.7	58.8	46.6	34.1	56.6
Average Minimum Temperature (°F)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
12.2	15.3	24.5	29.8	38.2	47.1	54.5	52.0	43.9	31.9	21.8	12.4	30.7
Average Total Precipitation (in.)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
0.34	0.4	0.66	0.8	1.46	0.95	0.86	1.06	0.92	0.71	0.32	0.49	9.63
Average Total Snowfall (in.)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
5.0	5.6	7.8	5.3	1.9	0.0	0.0	0.0	0.4	3.0	4.7	4.2	37.9

Source: NOWData, 2024; Western Regional Climate Center, 2016

### LAND OWNERSHIP, LAND USE, & FUTURE DEVELOPMENT

Daggett County has 461,201 total acres of land. Nearly 90% of the land in Daggett County is owned by the federal and state government. Roughly 11% of the land is privately owned, with 44,000 acres of this



land designated for agricultural use. Grazing of livestock is allowed on parts of the federal and state land. Approximately 235,299 acres or 54.7% of the county land is owned by Ashley National Forest and is divided between the Flaming Gorge Recreation Area, Flaming Gorge Ranger District, and Vernal Ranger District. All this land is managed by the Forest Service. 98% of the total land in the county is considered open land (Headwaters, 2024; Daggett County General Plan, 2008).

The figure below shows the land ownership statistics for Daggett County, as taken from the Headwaters Economic Profile System:

**Land Ownership**

Daggett County, UT	
Total Acres	461,201
Private Lands	49,391
Conservation Easement	0
Federal Lands	371,296
Forest Service	258,024
BLM	113,272
National Park Service	0
Military	0
Other Federal	0
State Lands	40,514
State Trust Lands*	29,432
Other State	11,082
Tribal Lands	0
City, County, Other	0
<b>Percent of Total</b>	
Private Lands	10.7%
Conservation Easement	0.0%
Federal Lands	80.5%
Forest Service	55.9%
BLM	24.6%
National Park Service	0.0%
Military	0.0%
Other Federal	0.0%
State Lands	8.8%
State Trust Lands*	6.4%
Other State	2.4%
Tribal Lands	0.0%
City, County, Other	0.0%

Figure 1-1. Land Ownership in Daggett County

Agriculture is a huge part of the county. Much of the land is used for crop production, raising livestock, and grazing. Pastures and rangeland are vital for livestock grazing, and large portions of livestock are grazed on public lands (Daggett County General Plan Appendix, 2017). According to the USDA Census of Agriculture, Daggett County had 52 farms covering 17,671 acres in 2017 (USDA, 2022). 5,409 acres of this land is harvested cropland, and 7,168 acres is irrigated land. The Natural Resources Conservation Service holds the most influence over these private farms. Daggett County and its municipalities also have control over land use and zoning, which affects agriculture in the county (Daggett County General Plan Appendix, 2017).

Only 10.7% of the lands within Daggett County are privately owned, and 90% of which is set aside for agricultural purposes. Private lands are typically used for new development, which means that future residential, commercial, and industrial land use needs in the county must be met through the limited supply of privately owned land (Daggett County General Plan Appendix, 2017).



There is currently enough undeveloped private land to meet the demand of future population growth in Daggett County. According to the Governors Office and Envision Utah, Utah develops at a rate of about 3.2 people per acre or 14%. Daggett County, however, has a much slower overall growth rate of 2.8% and even declines in population some years. No land shortages are currently expected in Daggett County in the coming decades.

## HISTORY

Scattered archeological remains throughout present-day Daggett County indicate the presence of the Fremont peoples (AD 1–1301) hundreds of years ago. Although the Fremont peoples were more common on the southern side of the Uinta Mountains, a few lived on the northern side at lower elevations along the Green River and its tributaries (Daggett County General Plan Appendix, 2017).

In the 1700s, the Utes and Shoshone tribes occupied the land, and Spanish explorers later came through the area (Daggett County, 2024). Settlers from Europe and the eastern U.S. developed homesteads in the region in the 1800s (Daggett County General Plan Appendix, 2017). Daggett County was officially designated a county in 1918, and the boundaries were adjusted once in 1919.

## POPULATION & DEMOGRAPHICS

In 2022, Daggett County had a population of 1,014 (U.S. Census QuickFacts, 2022). This is an increase of 8.3% from the population taken during the 2020 Census, which was 935. Since 1918 when Daggett County was designated as a county, the population has fluctuated drastically from decennial census to decennial census. The most dramatic changes occurred in 1960 with a 219.8% population increase and 1970 with a -42.8% decline (U.S. Census, 1960, 1970).

The population trends for Daggett County and the two largest towns in the county are shown in the table below.

Table 1-2. Daggett County Population Trends

County Location	2010	2020	Percent Change 2010–2020
Entire County	1,059	935	-11.7%
Manila	310	308	-0.6%
Dutch John	145	141	-2.8%

Source: U.S. Census Bureau, 2010, 2020

Between 2010 and 2020, the county as a whole decreased in population by -11.7%, although there were periods of growth within that time. The two towns in the county, Manila and Dutch John, both declined in population, as well, with -0.6% and -2.8% declines respectively.

Of the total population in the county, 44.2% are female (U.S. Census QuickFacts, 2022). 21.9% of the total population are under 18 years of age, and 25.8% are 65 years and older. The median age in 2020 was 38.9 years. 0% of residents were foreign born. The population is mainly homogenous with 95.1% of county residents listed as white alone. The county’s racial and ethnic distribution is listed in the table below. Only the six most common ethnicities in the county are included, and some members of the population may identify as more than one race.



Table 1-3. Daggett County Racial and Ethnic Distribution

Race	Percent of Population
White	95.1%
Black or African American	0.3%
American Indian and Alaska Native	1.1%
Asian	0.6%
Native Hawaiian and Other Pacific Islander	0.1%
Hispanic or Latino	6.5%

*Source: U.S. Census Bureau, 2020; American Community Survey, 2022*

## HOUSING

In 2018–2022, there were 235 households in Daggett County. The average household size was 2.44 people. 84.9% of residents who are one year or older are living in the same house now that they were a year ago (U.S. Census QuickFacts, 2022).

In July 2022, Daggett County had a total of 1,176 housing units, 65.6% of which were vacant (U.S. Census QuickFacts, 2022). An estimated 25.9% of occupied housing units were built since the year 2000. Of the total occupied housing units, 63.8% were single-unit structures, 0% were multi-unit structures, and 36.2% were mobile homes or another type of unit (American Community Survey, 2022). The median value of owner-occupied housing units in the county from 2018 to 2022 was \$252,400. Daggett County has a homeownership rate of 78.2%, which is higher than the national average of 64.6% (Data USA, 2024). Median gross rent was \$420 from 2017 to 2021 (U.S. Census QuickFacts, 2022). All households were estimated to have telephone service, and 4.7% had no vehicles available (American Community Survey, 2022).

## ECONOMY

An estimated 52.4% of the population 16 years or older in Daggett County is in the civilian labor force (258 people). An estimated 54.2% of the people employed in 2022 were private wage and salary workers; 26.9% were federal, state, or local government; and 18.9% were self-employed (U.S. Census QuickFacts, 2022). The Accommodation & Food Services (59 people); Retail Trade (36 people); and Arts, Entertainment, & Recreation (21 people) industries currently hold the highest number of employees of any other industry in the county (Data USA, 2024). The most common job groups, regardless of industry, are Management (35 people); Building & Grounds Cleaning & Maintenance (27 people); and Sales (27 people).

The adjusted unemployment rate is 4.0% for Daggett County as of January 2024 compared to the state of Utah unemployment rate of 2.8% and the United States unemployment rate of 3.9% for the same period (Utah Department of Workforce Services, 2024).

The median household income in 2022 in Daggett County was \$61,250. An estimated 75.7% of households received earnings, and 35.7% received retirement income. 35.7% of households received Social Security (American Community Survey, 2022). These income sources are not mutually exclusive; that is, some households received income from more than one source. The poverty rate in the county is 7.3% (U.S. Census QuickFacts, 2022).

## EDUCATION



The total school enrollment from kindergarten to 12th grade in Daggett County was 142 students in 2022 (American Community Survey, 2022). Nursery school and preschool enrollment was 0. Daggett School District is the only public school district in the county, with three in-person schools: Flaming Gorge Elementary School, Manila Elementary School, and Manila Jr./Sr. High School (Daggett School District, 2023). There are no charter or private schools in Daggett County.

College or graduate school enrollment in the county was 24 in 2022 (American Community Survey, 2022). Daggett County has no physical college facilities in the county. However, Utah State University serves the Daggett County area through their Extension Office in Uintah County. The office in Vernal offers research-based community education, resources, and programs in several topics (e.g., agriculture, business, food, health, home, finance, and 4-H and youth) to the communities in Daggett and Uintah Counties (USU Extension, 2024).

### BRIDGES

The following table provides a list of the 13 Daggett County bridge locations, lengths, years constructed, and daily traffic counts, taken from the National Bridge Inventory.

Table 1-4. Daggett County Bridges

Location	Length (ft)	Year Built	Average Daily Traffic Count
Clay Basin	45.7	1987	112
Brown’s Park	91.9	1984	25
SR-191 over Cart Creek	171.9	1962	2,178
Flaming Gorge Dam	188.5	1964	1,152
5.9 mi. S of Manila	7	1966	671
.1 mi. W Jct. U-44	19.5	1965	180
1.1 mi. W Jct. U-44	16.5	1976	10
4.7 mi. W Jct. U-44	26.8	1968	10
7.6 mi. W Jct. 10218	9.1	1987	20
8.5 mi. W Jct. 10218	10.1	1980	60
2.5 mi. S Jct. 10221	9.1	1944	8
2.7 mi. S Jct. 10221	8.5	1975	30
No Data Entered	8.5	2019	50

Source: National Bridge Inventory, 2024

### COUNTY FACILITIES/CRITICAL INFRASTRUCTURE

The following table lists important facilities in Daggett County:

Table 1-5. Daggett County Critical Facilities/Infrastructure

Classification	Facility Name	Facility Address	Phone Number



Classification	Facility Name	Facility Address	Phone Number

### CULTURAL & HISTORICAL SITES

Sites in Daggett County listed on the National Register of Historic Places can be found in the table below.

Table 1-6. Historic Places in Daggett County

Site	Address	Nearest City/Location
Dr. John Parson Cabin Complex	SW of Bridgeport	Bridgeport
John Jarvie Historic Ranch District	Green River and Indian Crossing Bridge SW of Jarvis, Brown’s Park Rd.	Brown’s Park
Swett Ranch	NE of Dutch John	Dutch John
Manila Petroglyphs	Address Restricted	Manila
Ute Mountain Fire Tower	SW of Manila	Manila

*Source: National Register of Historic Places, 2024*



## **PART II: RISK ASSESSMENT**



## CHAPTER 2 HAZARD RISK SUMMARY

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The process focuses on the following elements:

- Hazard identification—Use all available information to determine what types of disasters may affect a jurisdiction, how often they can occur, and their potential severity.
- Vulnerability identification—Determine the impact of natural hazard events on the people, property, environment, economy, and lands of the region.
- Cost evaluation—Estimate the cost of potential damage or cost that can be avoided by mitigation.

The risk assessment for this hazard mitigation plan update evaluates the risk of natural hazards prevalent in the planning area and meets requirements of the DMA (44 CFR, Section 201.6(c)(2)).

### IDENTIFIED HAZARDS

There are countless hazards that pose a threat to human life, health, and well-being, and no attempt is made here to compile an exhaustive list. Those that are addressed in disaster planning are generally categorized as “natural” or “technological” (sometimes “manmade”). The FEMA website contains a thorough discussion and list of hazards in the section entitled “National Risk Index for Natural Hazards” (FEMA, 2022). Some hazards are a threat to all geographic areas while others (e.g., flooding) are more limited in their extent. Studies were conducted to determine which hazards are of concern in Daggett County.

Daggett County hazards were identified and their frequency of occurrence evaluated using a number of resources, including:

- 2019 Uintah Basin Region 5 Hazard Mitigation Plan
- 2008 Daggett County General Plan
- 2017 Daggett County General Plan Resource Management Plan Appendix
- Hazard planning documents developed by state, federal, and private agencies
- NOAA weather data from the past 74 years
- Data from the United States Geological Survey (USGS) and the Utah State Geological Survey (UGS)

Hazards that have been identified as significant in this county and that will be considered in this plan are listed below:

#### Natural Hazards

- Severe Summer Weather
  - Extreme Heat
  - Lightning
  - Hail
  - Tornado
  - Straight-line Wind
- Severe Winter Weather



- Extreme Cold
- Winter Storm
- Avalanche
- Wildfire
- Flood
  - River or Stream Flood
  - Flash Flood
  - Dam Failure
- Drought

**Geological Hazards**

- Earthquake
- Landslide
- Problem Soils
  - Expansive Soils
  - Land Subsidence

Per FEMA’s mandate to address all natural hazards, the following natural hazards were not included because these hazards do not directly impact Daggett County or the towns of Dutch John and Manila due to geographic location:

- Hurricane
- Sea Level Rise
- Storm Surge
- Tsunami
- Volcanic Eruption

**HAZARD PROFILE**

The risk assessments in the following chapters describe the risks associated with each identified hazard of concern. The following sections were used to describe each hazard and communicate each respective level of risk:

- **Hazard Description**—Each hazard profile contains a description of the general definition and causes of the hazard. It may also include background information for understanding the context of the hazard within Daggett County.
- **Location**—The location or region in Daggett County where each hazard may occur is described.
- **Extent**—The strength or magnitude of each hazard is defined, usually through a form of measurement, such as a formula, scale, chart, or graph.
- **Historical Frequency & Probability of Future Occurrence**—This section identifies past hazard events of note that have occurred in Daggett County. It also includes the likelihood of each hazard occurring again if available.
- **Impacts & Loss Estimates**—The potential impacts of each hazard on the county are discussed. This section also outlines the potential economic/monetary loss from a hazard event, in addition to loss of property, structures, facilities, systems, livestock, and life. An assessment of affected vulnerable populations and changes in development is included.



- **Climate Change Implications**—The effects of climate change on the probability of future events and severity of impacts for each hazard are assessed.
- **FEMA NRI Score**—The hazard-specific FEMA National Risk Index scores for each natural hazard are included.
- **Related Hazards**—The hazard profiles that fall under a greater hazard category can be found within this section.

## RISK ASSESSMENT METHODOLOGY

Each hazard included in this plan was assessed and ranked based on a pre-defined hazard risk methodology consistent with FEMA’s mitigation plan requirements. Information from the hazard profiles and input from subject matter experts were used to inform the hazard risk assessment process. The following is a description of the key factors.

### Probability/Likelihood of Occurrence

The probability of occurrence of a hazard is indicated by a probability factor based on the likelihood of annual occurrence:

- **High**—Significant hazard event is likely to occur annually (Probability Factor = 3)
- **Medium**—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)
- **Low**—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)
- **Unlikely**—There is little to no probability of significant occurrence, or the recurrence interval is greater than every 100 years (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the area.

### Extent

Extent was assessed in two categories: extent/intensity and catastrophic potential of the hazard. Numerical impact factors were assigned as follows:

**Extent/Intensity**—Extent is defined as the range of anticipated intensities of the identified hazards. Extent is most commonly expressed using various scientific scales, such as the Enhanced Fujita scale.

- **High**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a high-intensity incident (Extent Factor = 3)
- **Medium**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a medium-intensity incident (Extent Factor = 2)
- **Low**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a low-intensity incident (Extent Factor = 1)
- **Unlikely**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of little to no intensity (Extent Factor = 0)

**Catastrophic**—The potential that an occurrence of this hazard could be catastrophic.

- **High**—High potential that this hazard could be catastrophic (Extent Factor = 3)
- **Medium**—Medium potential that this hazard could be catastrophic (Extent Factor = 2)
- **Low**—Low potential that this hazard could be catastrophic (Extent Factor = 1)



- **Unlikely**—Virtually no potential that this hazard could be catastrophic (Extent Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *Extent/Intensity* and its potential to be *Catastrophic*.

## Vulnerability

Vulnerabilities were assessed in three categories: population exposure, property exposure, and exposure based on changes in development. Numerical impact factors were assigned as follows:

**People**—Values were assigned based on the percentage of the total population exposed to the hazard event.

- **High**—30% or more of the population is exposed to this hazard (Vulnerability Factor = 3)
- **Medium**—15% to 29% of the population is exposed to this hazard (Vulnerability Factor = 2)
- **Low**—14% or less of the population is exposed to this hazard (Vulnerability Factor = 1)
- **No Vulnerability**—None of the population is exposed to this hazard (Vulnerability Factor = 0)

**Property Exposed**—Values were assigned based on the percentage of the total property value exposed to the hazard event.

- **High**—25% or more of the total assessed property value is exposed to the hazard (Vulnerability Factor = 3)
- **Medium**—10% to 24% of the total assessed property value is exposed to the hazard (Vulnerability Factor = 2)
- **Low**—9% or less of the total assessed property value is exposed to the hazard (Vulnerability Factor = 1)
- **No Vulnerability**—None of the total assessed property value is exposed to the hazard (Vulnerability Factor = 0)

**Changes in Development**—Changes in development since the previous plan was approved have increased or decreased the community’s vulnerability/exposure to this hazard.

- **High**—Changes in development have significantly increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 3)
- **Medium**—Changes in development have increased the vulnerability/exposure of the community to this hazard, but not significantly (Vulnerability Factor = 2)
- **Low**—Changes in development have minimally increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 1)
- **No Vulnerability**—Changes in development have had no effect and/or have decreased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *People*, and a weighting factor of 1 was assigned for *Property Exposed* and *Changes in Development*.



## Impact

Hazard impacts were assessed in eight categories: population and life/safety, underserved/equity, property damages, economic, environmental, essential operations, future development, and climate change. Numerical impact factors were assigned as follows:

**Population and Life/Safety**—Values were assigned based on (1) best available historical and probabilistic data for individuals who are vulnerable to the hazard event and (2) the likelihood to experience adverse impacts in the event of its occurrence.

- **High**—Populations exposed to this hazard are likely to experience significant adverse impacts (Impact Factor = 3)
- **Medium**—Populations exposed to this hazard are likely to experience some adverse impacts (Impact Factor = 2)
- **Low**—Populations exposed to this hazard are likely to experience minimal adverse impacts (Impact Factor = 1)
- **No Impact**—Populations exposed to this hazard are not likely to experience significant adverse impacts (Impact Factor = 0)

**Underserved/Equity**—Values were (1) assigned based on best available data for underserved populations vulnerable to the hazard event and (2) are likely to experience adverse/disproportionate impacts from the hazard incident resulting in greater disparity in equity.

- **High**—Underserved populations exposed to this hazard are likely to experience significant adverse/disproportionate impacts (Impact Factor = 3)
- **Medium**—Underserved populations exposed to this hazard are likely to experience some adverse/disproportionate impacts (Impact Factor = 2)
- **Low**—Underserved populations exposed to this hazard are likely to experience minimal adverse/disproportionate impacts (Impact Factor = 1)
- **No Impact**—Underserved populations exposed to this hazard are not likely to experience significant adverse/disproportionate impacts (Impact Factor = 0)

**Property Damages**—Values were assigned based on the expected total property damages incurred from a hazard incident. It is important to note that values represent estimates of the loss from a major incident based on historical data or probabilistic models/studies.

- **High**—More than \$5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
- **Medium**—More than \$500,000 but less than \$5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
- **Low**—Less than \$500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
- **No Impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)



**Economic**—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, crops, worker wages, and local tax revenues or on the impact on the local gross domestic product (GDP).

- **High**—Total economic impact is likely to be greater than \$10,000,000 (Impact Factor = 3)
- **Medium**—Total economic impact is likely to be greater than \$100,000 but less than or equal to \$10,000,000 (Impact Factor = 2)
- **Low**—Total economic impact is not likely to be greater than \$100,000 (Impact Factor = 1)
- **No Impact**—Virtually no significant economic impact (Impact Factor = 0)

**Environmental Factor**—Environmental impact from a major hazard event requiring outside resources and support; and/or repair, clean-up, restoration, and/or preservation work.

- **High**—Environmental impact from a single major hazard event is likely to be significant, requiring extensive outside resources and support; and/or repair, clean-up, restoration, and/or preservation work (Impact Factor = 3)
- **Medium**—Environmental impact from a single major hazard event is likely to be localized, requiring some outside resources and support; and/or repair, clean-up, restoration, or preservation work (Impact Factor = 2)
- **Low**—Environmental impact from a single major hazard event is likely to be minimal, requiring little to no outside resources and support, and/or minimal repair, clean-up, restoration, or preservation work (Impact Factor = 1)
- **No Impact**—No environmental impacts from a single major hazard event is likely (Impact Factor = 0)

**Essential Operations Factor**—Impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event.

- **High**—Significant impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 3)
- **Medium**—Some impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 2)
- **Low**—Minimal impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 1)
- **No Impact**—No impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 0)

**Future Development**—The potential that future development will have on increasing or decreasing the impact/consequence of this hazard.

- **High**—Future development trends will significantly increase the impact/consequence of this hazard (Impact Factor = 3)
- **Medium**—Future development trends will increase the impact/consequence of this hazard, but not significantly (Impact Factor = 2)



- **Low**—Future development trends will minimally increase impact/consequence of this hazard (Impact Factor = 1)
- **No Impact**—Future development trends will not increase the impact/consequence of this hazard and/or may even decrease the impact/consequence of this hazard (Impact Factor = 0)

**Climate Change**—The potential that climate change will increase the risk of this hazard (e.g., type, location, and range of anticipated intensities of the identified hazard and impacts).

- **High**—Climate change trends will significantly increase the risk of this hazard and its impacts (Impact Factor = 3)
- **Medium**—Climate change trends will increase the risk of this hazard and its impacts, but not significantly (Impact Factor = 2)
- **Low**—Climate change trends will minimally increase the risk of this hazard and its impacts (Impact Factor = 1)
- **No Impact**—Climate change trends will not increase the risk of this hazard and its impacts (Impact Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *Population and Life Safety* and *Underserved/Equity*, and a weighting factor of 2 was assigned for *Property Damages*. In addition, a weighting factor of 1 was assigned for *Economic, Environmental, Essential Operations, Future Development, and Climate Change*.

## FEMA NRI RISK SCORES

The National Risk Index (NRI) is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: avalanche, coastal flooding, cold wave, drought, earthquake, hail, heat wave, hurricane, ice storm, landslide, lightning, riverine flooding, strong wind, tornado, tsunami, volcanic activity, wildfire, and winter weather. Because not all hazards are applicable to Daggett County, only those hazards with a defined risk to the county are included.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, and Social Vulnerability and Community Resilience to develop a baseline relative risk measurement for each United States county and census tract (National Risk Index, 2024d). These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

## Social Vulnerability

Social Vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.

Table 2-1. Social Vulnerability for Daggett County, UT | FEMA National Risk Index

Census Tract	Communities in Census Tract	Social Vulnerability Score	Rating
960100	Town of Dutch John, Town of Manila, and Unincorporated Daggett County	6.6	Very Low



Census Tract	Communities in Census Tract	Social Vulnerability Score	Rating
<i>Social Vulnerability is measured using the Social Vulnerability Index (SoVI) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI). Source: National Risk Index, 2024e; 2023f</i>			

## Community Resilience

Community Resilience measures a community’s ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

Table 2-2. Community Resilience for Daggett County, UT | FEMA National Risk Index

Census Tract	Communities in Census Tract	Community Resilience Score	Rating
960100	Town of Dutch John, Town of Manila, and Unincorporated Daggett County	79.34	Relatively High
<i>Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI). Source: National Risk Index, 2024b; 2024e</i>			

## Expected Annual Loss

The table below shows the overall Expected Annual Loss score for the entire county based on all natural hazards. Hazard-specific scores are included in each hazard chapter under *Impacts & Loss Estimates*.

Table 2-3. Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Census Tract	Communities in Census Tract	Expected Annual Loss Score	Rating
960100	Town of Dutch John, Town of Manila, and Unincorporated Daggett County	26.4	Relatively Low
<i>Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: National Risk Index, 2024d; 2024e</i>			

## Overall NRI Score

The table below shows the overall FEMA National Risk Index Score for the entire county based on all natural hazards. Hazard-specific scores are included in each hazard chapter under *FEMA NRI Score*.

Table 2-4. Overall National Risk Index Score for Daggett County, UT

Census Tract	Communities in Census Tract	FEMA National Risk Index Score	Rating
960100	Town of Dutch John, Town of Manila, and Unincorporated Daggett County	15.39	Very Low
<i>Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024c; 2024e</i>			



## OVERALL RISK SCORES

The following table represents the new overall risk scores for Daggett County based on the described methodology. Following a data-driven quantitative assessment, the planning team utilized subject matter knowledge and expertise and further refined the scores.

Double click the Microsoft Excel icon below to access the full assessment and tool (this is only accessible when utilizing the Microsoft Word version of the plan).

### Daggett County

Table 2-5. 2024 Hazard Risk Scores for Daggett County

Hazard Event	Probability	Consequence			Total Risk	
	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Factors	Sum of Weighted Impact Factors	Consequence Score	Total Risk Score (Probability x Consequence)
Flash Flood						
Wildfire						
Winter Storm						
River or Stream Flood						
Drought						
Extreme Heat						
Straight-line Wind						
Extreme Cold						
Lightning						
Hail						
Landslide						
Expansive Soils						
Land Subsidence						
Avalanche						
Earthquake						
Dam Failure						
Tornado						

Table 2-6. Hazard Risk Scores Legend

Probability Factor		Sum of Weighted Extent Factors		Sum of Weighted Vulnerability Factors		Sum of Weighted Impact Factors		Consequence Score		Total Risk Score	
1	Low (L)	0–6	Low (L)	0–6	Low (L)	0–12	Low (L)	0–25	Low (L)	0–24	Low (L)
2	Medium (M)	7–12	Medium (M)	7–12	Medium (M)	13–26	Medium (M)	26–50	Medium (M)	25–59	Medium (M)
3	High (H)	13–18	High (H)	13–18	High (H)	27–39	High (H)	51–75	High (H)	60–100	High (H)

\*The **Legend**—specifically the assignment of low, medium, and high—provides an additional means to qualitatively assess the probability factor, sum of weighted factors, and the total risk scores for each hazard.



Probability Factor	Sum of Weighted <u>Extent</u> Factors	Sum of Weighted <u>Vulnerability</u> Factors	Sum of Weighted <u>Impact</u> Factors	Consequence Score	Total Risk Score
<p><i>The <b>Consequence Score</b> represents the sum of the Extent, Vulnerability, and Impact Factors.</i></p> <p><i>The <b>Total Risk Score</b> is a measure of Probability and Consequence.</i></p>					



## CHAPTER 3 SEVERE SUMMER WEATHER

### HAZARD DESCRIPTION

Severe summer weather includes those hazards that are typically found during the spring, summer, and early fall season of the year in Daggett County. Severe summer weather can and does affect the entire county, and all critical facilities are susceptible to severe weather. Included in this category are extreme heat, lightning, hail, tornado, and straight-line wind. Each hazard is examined independently; however, it is recognized that these hazards typically occur together.

### RELATED HAZARDS

#### Extreme Heat

##### *Hazard Description*

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Countywide, including Dutch John and Manila
<b>Seasonal Pattern or Conditions</b>	Late spring, summer, and early fall
<b>Duration</b>	Events may last hours to days
<b>Analysis Used</b>	NOAA, NWS, Western Regional Climate Center, NCEI, Neighborhoods at Risk, National Risk Index, Headwaters Economics, U.S. Census, Climate and Economic Justice Screening Tool, Resilience Analysis and Planning Tool, HHS, UCAR

The term “extreme heat,” sometimes called “heat wave,” is to some extent a relative one describing a period when weather conditions include temperatures and humidity significantly higher than those usual for a particular geographic area.

##### ***Location***

Due to the dry, semi-arid climate of Daggett County in desert Utah, the entire county may be affected by extreme heat, including the jurisdictions of Dutch John and Manila.

##### ***Extent***

The National Weather Service (NWS) issues alerts to the public based on its Heat Index (HI), which takes both temperature and humidity into account. The NWS will initiate alert procedures when the HI is expected to exceed 105°–110°F (depending on local climate) for at least two consecutive days (NWS, 2024).

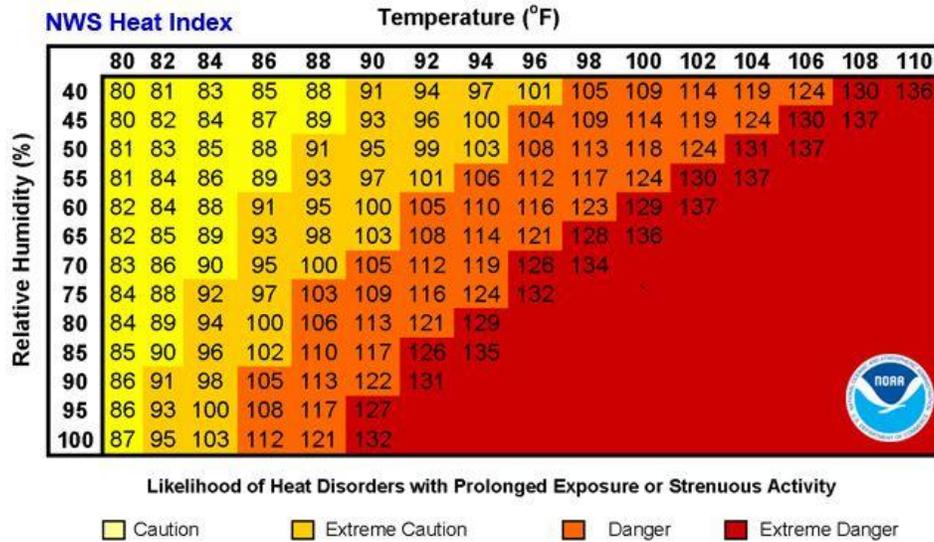


Figure 3-1. NOAA National Weather Service Heat Index (NWS, 2024)

### Historical Frequency & Probability of Future Occurrence

According to NWS available data, the record high temperature in the town of Manila, Utah is 102°F in July 1943 (NOWData, 2024). The record high temperature in the town of Dutch John at Flaming Gorge is also 102°F in July 2002. July is historically the hottest month of the year in Daggett County, with an average temperature of 68.5°F in Manila and 68.7°F in Dutch John (NOWData, 2024). The average high in Manila in July is 84.3°F and 86.6°F in Dutch John. Both Manila and Dutch John have had zero instances of extreme heat of 105°F or higher since 1900.

According to Neighborhoods at Risk, Daggett County is expected to experience four more days that reach above 95°F by 2049. As annual temperatures continue to increase, more extreme heat events are likely to occur. In fact, Daggett County is expected to experience an increase in average annual temperature of 3°F by 2049. Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

### Impacts & Loss Estimates

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by extreme heat, as presented in the table below.

Table 3-1. Impacts of Extreme Heat by Jurisdiction

Jurisdiction	Impacted by Heat Events (95–104°F) Within Last 25 Years	Impacted by Extreme Heat Events (105+°F) Within Last 25 Years	Potential Impacts of Extreme Heat
Daggett County	Yes	Yes	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
Town of Dutch	Yes	No	Sunstroke, heat exhaustion, heat



Jurisdiction	Impacted by Heat Events (95–104°F) Within Last 25 Years	Impacted by Extreme Heat Events (105+°F) Within Last 25 Years	Potential Impacts of Extreme Heat
John			cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
Town of Manila	Yes	No	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)

The primary impact of extreme heat is on human health, with disorders such as sunstroke, heat exhaustion, and heat cramps. There are also undoubtedly indirect and chronic health effects from extreme heat, the magnitude of which are difficult or impossible to estimate. Environmental effects can include loss of wildlife and vegetation and increased probability of wildfires.

Power outages may occur during times of extreme heat. Large electrical panels and motors used in water production may also be negatively affected by extreme heat. Economic impacts result from such factors as increased energy prices and loss of business as people avoid leaving their homes to escape the heat. Agricultural losses can also occur. The magnitude of these and other, more indirect impacts is, again, difficult to assess, but for severe heat waves, the economic impact has been estimated to be significant.

Table 3-2. Heat Wave: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
0 events per year	0.0	\$0	\$0	\$0	\$0	0.0	No Expected Annual Losses
<p><u>Annualized Frequency:</u> The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.</p> <p><u>Population:</u> Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.</p> <p><u>Expected Annual Loss</u> scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (<math>Expected Annual Loss = Exposure \times Annualized Frequency \times Historic Loss Ratio</math>). Source: National Risk Index, 2024e; 2024f</p>							

**Vulnerable Populations**



There are many vulnerable populations in Daggett County, including those in the table below. People particularly susceptible to extreme heat are the elderly, small children, and persons with chronic illnesses.

Table 3-3. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

*Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024*

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Extreme heat places high demands on electrical power supplies that can lead to blackouts or brownouts. The following table lists types of critical facilities that could be negatively affected by power outages during extreme heat, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-4. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila

*Source: Resilience Analysis and Planning Tool, 2024*

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

**Changes in Development**

There is no impact based on current development trends on either current or future development.

**Climate Change Implications**

**Effects of Climate Change on Severity of Impacts**

According to the University Corporation for Atmospheric Research (UCAR), climate change is causing more extreme weather events, including more extreme temperatures. Places prone to high heat are expected to become even drier and hotter over the following century (UCAR, 2024). Higher temperatures,



increasing variation in precipitation patterns, and changes in lake levels are likely to increase the vulnerability of cities to extreme events (including flooding, drought, heat waves, and more intense urban heat island effects), compounding already existing stressors. According to Neighborhoods at Risk, extremely hot days are the leading cause of weather-related fatalities in the U.S. and contribute to economic stress as the need for and cost of air conditioning rises.

**Effects of Climate Change on Probability of Future Events**

Table 3-5. Climate Projections for Daggett County, UT | Neighborhoods at Risk

<b>Heat Projections</b>	By 2049, Daggett County is expected to experience 4 more days that reach above 95°F (from 2 days to 6 days per year).
	By 2049, Daggett County is expected to have a 3°F increase (from 41°F to 44°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent extreme heat events.
<i>Source: Neighborhoods at Risk, 2024</i>	

**FEMA NRI Score**

Table 3-6. Heat Wave: Overall National Risk Index Score for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
<i>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</i>			
0.0	No Rating	Very Low	Relatively High
<i>Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d</i>			

**Lightning**

**Hazard Description**

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Countywide, including Dutch John and Manila
<b>Seasonal Pattern or Conditions</b>	Late spring, summer, and early fall
<b>Duration</b>	Storms that produce lightning may last hours to days
<b>Analysis Used</b>	NOAA, NWS, Vaisala, NCEI, NFPA, NIFC, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS

Lightning is defined by the NWS as “a visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground, or between the ground and a cloud.” A lightning discharge may be over five miles in length,



generate temperatures upwards of 50,000°F, and carry 50,000 volts of electrical potential. Lightning is most often associated with thunderstorm clouds, but lightning can strike as far as five to 10 miles from a storm. Thunder is caused by the rapid expansion of air heated by a lightning strike. Cloud-to-ground lightning strikes occur with much less frequency in the northwestern U.S. than in other parts of the country.

**Location**

This hazard can affect the entire county and the state of Utah, but the risk to the county is relatively low. The jurisdictions of Dutch John and Manila may experience lightning, as well.

**Extent**

A lightning flash is created by a transfer of significant charge between two charged objects. Lightning discharges can occur inter-cloud, cloud-to-cloud, cloud-to-air, and cloud-to-ground. Cloud-to-ground (CG) lightning has the greatest risk to society. A CG stroke can kill, destroy equipment, start fires, and disturb power delivery systems.

Lightning is commonly measured using the Lightning Activity Level (LAL), which is a scale that describes the frequency of lightning strikes in a specific area (NWS, 2024).

Lightning Activity Level (LAL)	
Is a scale which describes lightning activity. Values are labeled 1-6:	
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five minute period.
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5 minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced Lightning is frequent, 11 to 15 cloud to ground strikes in a 5 minute period.
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a 5 minute period.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

Figure 3-2. NWS Lightning Activity Level

**Historical Frequency & Probability of Future Occurrence**

Lightning is common in Utah, with an average of 1,040,446 lightning strikes per year in the state from 2015 to 2019 (Vaisala, 2020). However, this average is much less compared to other states, such as those



in the Midwest and Southeast. For example, Florida received an average of 13,989,300 strikes per year within the same time period.

The Storm Events Database records 10 significant lightning events in Daggett County since 2000, as seen in the table below.

Table 3-7. Significant Lightning Events in Daggett County, UT

Location Within County	Date	Fatalities/Injuries	Property Damage	Description
Manila	06/20/2004	0	\$2,000	Lightning damaged equipment at water treatment plant
Dutch John	05/06/2005	0	\$500	Lightning struck Ross Springs Water Treatment Plant and destroyed pressure transducer
Dutch John	05/17/2005	0	\$500	Lightning struck Ross Springs Water Treatment Plant and destroyed pressure transducer
Dutch John	05/30/2005	0	\$500	Lightning struck Ross Springs Water Treatment Plant and destroyed pressure transducer
Dutch John	06/23/2005	0	\$500	Lightning struck Ross Springs Water Treatment Plant and destroyed pressure transducer
Manila	06/06/2007	0	\$500	Lightning struck Red Canyon Water Treatment Plant and destroyed pressure transducer
Manila	07/21/2007	0	\$500	Lightning struck Red Canyon Water Treatment Plant and destroyed pressure transducer
Dutch John	06/03/2008	0	\$1,000	Lightning struck Red Canyon Water Treatment Plant and destroyed pressure transducer
Manila	05/30/2009	0	\$500	Lightning struck Red Canyon Water Treatment Plant and destroyed pressure transducer
Lucerne Valley	07/22/2016	1/1	\$0	Lightning struck and killed a 14-year-old girl on a jet ski at Flaming Gorge Reservoir. A 49-year-old female on the jet ski was injured.

*Source: Storm Events Database, 2024*

Significant lightning strikes causing significant damage and/or injuries or fatalities are likely to occur again within the next 10 years and could occur anywhere in the county or in the towns of Dutch John or Manila. Damage-causing lightning is more likely in Dutch John than in other parts of the county due to Dutch John’s higher population. Both Dutch John and Manila are surrounded by forestland and susceptible to wildfire from lightning strikes. In fact, 80% of lightning strikes in the Manila area cause fires. Lightning events typically coincide with thunderstorms, which bring precipitation. However, unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an increase in thunderstorms—and therefore lightning events—is not currently likely (NCEI, 2022). Future lightning trends are predicted to remain consistent in the next 20 years in



Daggett County. However, as global warming continues, thunderstorms with lightning may increase in the coming decades.

**Impacts & Loss Estimates**

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by lightning, as presented in the table below.

Table 3-8. Impacts of Lightning by Jurisdiction

Jurisdiction	Impacted by Lightning	Experienced Significant Lightning Strike with \$1,000+ in Damage Since 2000	Fatalities Due to Lightning	Potential Impacts of Lightning
Daggett County	Yes	Yes	1	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities
Town of Dutch John	Yes	Yes	0	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities
Town of Manila	Yes	Yes	0	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities

Lightning is the second most deadly weather phenomenon in the U.S., being second only to floods. On average, 20 to 50 deaths per year are attributed to lightning nationally, and in Utah the average is less than one per year. The last death in Utah due to lightning was in 2016, with six total deaths in Utah since 2008 (NWS, 2024). There has been one death in Daggett County due to lightning. A 14-year-old girl was struck and killed in 2016 while on a jet ski at Flaming Gorge Reservoir. Despite the enormous energy carried by lightning, only about 10% of strikes are fatal (NWS, 2024). Injuries include central nervous system damage, burns, cardiac effects, hearing loss, and trauma. The effects of central nervous system injuries tend to be long-lasting and severe, leading to such disorders as depression, alcoholism, chronic fatigue, and in some cases suicide. Lightning also strikes structures, causing fires and damaging electrical equipment. Wildland fires are often initiated by lightning strikes as are petroleum storage tank fires. About one third of all power outages are lightning-related.

The magnitude of economic losses is difficult to estimate. Between 2007 to 2011, \$451 million in property damage was reported due to fires caused by lightning strikes in the U.S. (NFPA, 2013). The state of Utah experienced 408 fires caused by lightning strikes in 2023 alone (NIFC, 2023).



Table 3-9. Lightning: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
16.5 events per year	0.0	\$2,657	\$884	N/A	\$3,541	38.0	Relatively Low
<p><i>Annualized Frequency:</i> The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.</p> <p><i>Population:</i> Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.</p> <p><i>Expected Annual Loss scores</i> are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (<math>Expected Annual Loss = Exposure \times Annualized Frequency \times Historic Loss Ratio</math>). Source: National Risk Index, 2024e; 2024f</p>							

**Vulnerable Populations**

There are many vulnerable populations in Daggett County, including those in the table below. Any community, whether vulnerable or not, may experience lightning. However, those with inadequate living conditions or shelter may be more vulnerable to a strike.

Table 3-10. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Lightning strikes may lead to power outages depending on the location of the strike and amount of damage inflicted. The following table lists types of critical facilities that could be negatively affected by power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment. Any damage to any of these locations due to lightning could delay critical resources to those in need.

Table 3-11. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John



Critical Facility Type	Location
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
<i>Source: Resilience Analysis and Planning Tool, 2024</i>	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

**Changes in Development**

There is no impact based on current development trends on either current or future development.

**Climate Change Implications**

**Effects of Climate Change on Severity of Impacts**

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop (USGS, 2023). An uptick in lightning strikes could lead to more frequent and severe lightning damage.

**Effects of Climate Change on Probability of Future Events**

Lightning events typically coincide with thunderstorms, which bring precipitation. However, unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an increase in thunderstorms—and therefore lightning events—is not currently likely (NCEI, 2022). Future lightning trends are predicted to remain consistent in the next 20 years in Daggett County, although precipitation may increase slightly. However, as global warming continues, thunderstorms with lightning may increase in the coming decades.

*Table 3-12. Climate Projections for Daggett County, UT | Neighborhoods at Risk*

<b>Lightning Projections</b>	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	If increased participation leads to additional thunderstorms, the risk of lightning may increase.
<i>Source: Neighborhoods at Risk, 2024</i>	

**FEMA NRI Score**

*Table 3-13. Lightning: Overall National Risk Index Score for Daggett County, UT*

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
<i>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</i>			
29.3	Relatively Low	Very Low	Relatively High



Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
<i>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</i>			
<i>Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d</i>			

## Hail

### Hazard Description

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Countywide, including Dutch John and Manila
<b>Seasonal Pattern or Conditions</b>	Late spring, summer, and early fall
<b>Duration</b>	Hailstorms may last hours to days
<b>Analysis Used</b>	NOAA, NWS, Weather on the Web, III, TORRO, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS

The NWS definition of hail is “showery precipitation in the form of irregular pellets or balls of ice more than 5 mm in diameter, falling from a cumulonimbus cloud. Its size can vary from the defined minimum, a little over a quarter of an inch, up to 4.5 inches or larger.” Severe hail is defined as being 0.75 inches or more in diameter. The largest hailstones are formed in supercell thunderstorms because of their sustained updrafts and long duration.

### Location

Daggett County can experience hailstorms countywide, including the jurisdictions of Dutch John and Manila.

### Extent

The TORRO Hailstorm Intensity Scale was developed by Jonathan Webb to measure and categorize hailstorms (TORRO, 2024). It extends from H0 (hard hail, no damage) to H10 (super hailstorm, extensive structural damage, risk of severe/fatal injuries) with its increments of intensity or damage potential related to hail size (distribution and maximum), texture, numbers, fall speed, speed of storm translation, and strength of the accompanying wind. The scale could be modified depending on factors such as building materials and types (e.g., whether roofing tiles are predominantly slate, shingle, or concrete). See the scale in the figure below (TORRO, 2024).



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 damage
H1	Potentially damaging	5-15	>20	Slight general damage to plants, crops
H2	Significant	10-20	>100	Significant damage to fruit, crops, 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		(Severest recorded in the British Isles) 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
H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Figure 3-3. TORRO Hailstorm Intensity Scale

Hail is considered severe when reaching a size of 0.75 inches in diameter or greater. The following figure shows different hail sizes with a description for comparison (TORRO, 2024).

Size code	Maximum diameter (mm)	Description
0	5-9	Pea
1	10-15	Mothball
2	16-20	Marble, grape
3	21-30	Walnut
4	31-40	Pigeon's egg > squash ball
5	41-50	Golf ball > Pullet's egg
6	51-60	Hen's egg
7	61-75	Tennis ball > cricket ball
8	76-90	Large orange > soft ball
9	91-100	Grapefruit
10	>100	Melon

Figure 3-4. TORRO Hail Size and Diameter

As demonstrated below, the National Weather Service also defines the local threat of severe hail for specified areas based on the likelihood that severe hail will occur combined with the anticipated size or diameter of the largest hailstones (NWS, 2024).



Severe Hail Threat Level	Threat Level Descriptions
<b>Extreme</b>	<p><b>"An Extreme Threat to Life and Property from Severe Hail."</b>            Within 12 miles of a location, a moderate likelihood or greater (16% probability or greater) of severe hail, with storms capable of baseball to softball sized stones. See diameter description below.</p> <p>AND/OR... a high likelihood or greater (26% probability or greater) of severe hail, with storms capable of golf ball to baseball sized hail stones. See diameter description below.</p> <p>AND/OR... a very high likelihood (36% or greater) of severe hail, with storms capable of nickel to golf ball sized hail stones. See diameter description below.</p>
<b>High</b>	<p><b>"A High Threat to Life and Property from Severe Hail."</b>            Within 12 miles of a location, a low likelihood (6% to 15% probability) of severe hail with storms capable of baseball to softball sized stones. See diameter description below.</p> <p>AND/OR... a moderate likelihood (16% to 25% probability) of very large hail (golf ball to baseball sized hail stones). See diameter description below.</p> <p>AND/OR... a high likelihood (26% to 35% probability) of large hail (nickel to golf ball sized hail stones). See diameter description below.</p>
<b>Moderate</b>	<p><b>"A Moderate Threat to Life and Property from Severe Hail."</b>            Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of baseball to softball sized stones. See description below.</p> <p>AND/OR... a low likelihood (6% to 15% probability) of severe hail, with storms capable of golf ball to baseball sized hail stones. See description below.</p> <p>AND/OR... a moderate likelihood (16% to 25% probability) of severe hail, with storms capable of nickel to golf ball sized hail stones. See diameter description below.</p>
<b>Low</b>	<p><b>"A Low Threat to Life and Property from Severe Hail."</b>            Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of golf ball to baseball sized hail stones. See diameter description below.</p> <p>AND/OR... a low likelihood (6% to 15% probability) of severe hail, with storms capable of nickel to golf ball sized hail stones. See diameter description below.</p>
<b>Very Low</b>	<p><b>" A Very Low Threat to Life and Property from Severe Hail."</b>            Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of nickel to golf ball sized hail stones. See diameter description below.</p> <p>AND/OR... a low likelihood or greater (6% or greater) of small hail (less than 3/4 inch). See diameter description below.</p>
<b>Non-Threatening</b>	<p><b>" No Discernable Threat to Life and Property from Severe Hail."</b>            Within 12 miles of a location, environmental conditions do not support the occurrence of severe hail.</p>

**Note:** To be considered severe, hail stones must be at least 3/4 inch in diameter.

Figure 3-5. Severe Hail Threat Level

### Historical Frequency & Probability of Future Occurrence

In the 10-year period from 1986 to 1995, the NWS recorded severe hail in Utah on 101 occasions, while in the same time period, severe hail was recorded in Colorado nearly 1,400 times (Weather on the Web, 2024).

Hail has been recorded throughout the county and in the towns of Dutch John and Manila. The Storm Events Database has recorded 10 instances of severe hail in Daggett County since 2000. The hailstones from these events range in size from 0.75 inches to 1.75 inches. Six of these hail events occurred in Manila and four in Dutch John (Storm Events Database, 2024).



Hail is likely to occur again in the future in any part of the county, including Dutch John and Manila. Although many parts of the United States are experiencing increased precipitation, Utah has not yet experienced an upward trend in the frequency of precipitation events, so an increase in hailstorms is not currently likely. However, as global warming continues, hailstorms may increase in the coming decades.

**Impacts & Loss Estimates**

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by hail, as presented in the table below.

*Table 3-14. Impacts of Hail by Jurisdiction*

Jurisdiction	Impacted by Hail	Experienced Significant Hail Damage (\$1,000+) Since 2000	Fatalities Due to Hail	Potential Impacts of Hail
Daggett County	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation
Town of Dutch John	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation
Town of Manila	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation

Deaths and injuries due to hail have occurred but are rare. Most impacts are economic, but hailstorms can also cause utility failure through damage to critical infrastructure. Hailstorms may also lead to car accidents and road closures.

Economic loss can be extensive, especially to agriculturally based economies. Hail is very damaging to crops. Severe hail may also cause extensive property damage, including damage to vehicle paint and bodywork, glass, shingles and roofs, plastic surfaces, etc. Through the Storm Events Database, Daggett County has reported three severe hail events that resulted in \$130,000 worth of property damage total, as seen in the table below. Hail-related insured losses averaged between \$8 billion to \$14 billion each year in the years 2000–2019 in the U.S. (III, 2024).

*Table 3-15. Property Damage in Daggett County*

Location Within County	Date	Property Damage (\$)	Description
Manila	07/15/2004	\$30,000	1.25-inch hail dented many trailers and vehicles in mobile home park and broke a car windshield
Dutch John	08/06/2009	\$80,000	1.75-inch hail dented vehicles and broke windshields and headlights along Hwy 191



Location Within County	Date	Property Damage (\$)	Description
			in eastern Uintas
Manila	08/06/2009	\$20,000	1.25-inch hail broke windows, dented vehicles, and damaged siding on residences

*Source: Storm Events Database, 2024*

Table 3-16. Hail: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
0.1 events per year	0.0	\$74	\$1,134	\$31	\$1,239	46.1	Relatively Low
<p><i>Annualized Frequency:</i> The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.</p> <p><i>Population:</i> Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.</p> <p><i>Expected Annual Loss</i> scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (<math>Expected Annual Loss = Exposure \times Annualized Frequency \times Historic Loss Ratio</math>). <i>Source: National Risk Index, 2024e; 2024f</i></p>							

**Vulnerable Populations**

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions or shelter or those who cannot move to shelter quickly enough may be more vulnerable to hailstorms.

Table 3-17. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

*Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024*

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Severe hailstorms may cause significant damage to critical facilities in the county and could even bring down power lines, causing power outages. The following table lists types of critical facilities that could be



negatively affected by damage from hailstorms or power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-18. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
<i>Source: Resilience Analysis and Planning Tool, 2024</i>	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

**Changes in Development**

There is no impact based on current development trends on either current or future development.

**Climate Change Implications**

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop (USGS, 2023). Although many parts of the United States are experiencing increased precipitation, Utah as a whole has not yet experienced an upward trend in the frequency of precipitation events, so an increase in hailstorms is not currently likely. However, as global warming continues, hailstorms may increase in the coming decades, and a slight increase in precipitation is expected in Daggett County within 25 years.

Table 3-19. Climate Projections for Daggett County, UT | Neighborhoods at Risk

<b>Hail Projections</b>	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	If increased participation leads to additional thunderstorms, the risk of hail may increase.
<i>Source: Neighborhoods at Risk, 2024</i>	

**FEMA NRI Score**

Table 3-20. Hail: Overall National Risk Index Score for Daggett County, UT

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
<i>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</i>			
39.9	Very Low	Very Low	Relatively High



Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
<i>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</i>			
<i>Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d</i>			

## Tornado

### Hazard Description

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Countywide, including Dutch John and Manila
<b>Seasonal Pattern or Conditions</b>	Spring, summer, and early fall
<b>Duration</b>	Tornadoes may last seconds to hours
<b>Analysis Used</b>	NOAA, NWS, National Risk Index, NCEI, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS

The NWS describes a tornado as “a violently rotating column of air, usually pendant to a cumulonimbus, with circulation reaching the ground. It nearly always starts as a funnel cloud and may be accompanied by a loud roaring noise. On a local scale, it is the most destructive of all atmospheric phenomena” (NWS, 2024). Like hail, most tornadoes are spawned by supercell thunderstorms. They usually last only a few minutes, although some have lasted more than an hour and traveled several miles.

### Location

Although the risk is low, a tornado event is possible anywhere in the county, including in the jurisdictions of Dutch John and Manila.

### Extent

Wind speeds within tornadoes are estimated based on the damage caused and expressed using the Enhanced Fujita (EF) Scale.

Table 3-21. Enhanced Fujita (EF) Scale for Estimation of Tornado Wind Speeds

EF Scale	Class	Windspeed (mph)	Windspeed (km/h)	Description
EF0	Weak	65–85	105–137	Gale
EF1	Weak	86–110	138–177	Weak
EF2	Strong	111–135	178–217	Strong
EF3	Strong	136–165	218–266	Severe
EF4	Violent	166–200	267–322	Devastating
EF5	Violent	> 200	> 322	Incredible



EF Scale	Class	Windspeed (mph)	Windspeed (km/h)	Description
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*Source: NOAA, 2024*

**Historical Frequency & Probability of Future Occurrence**

Tornado occurrence in Daggett County is very low. The Storm Events Database records two tornadoes in the county since 1950, as seen in the table below. The town of Dutch John has experienced two tornadoes, but the town of Manila has not experienced any tornadoes.

*Table 3-22. Tornado Events in Daggett County, UT*

Location Within County	Date	EF Scale	Property Damage	Description
Dutch John	05/05/1999	EF0	\$0	Tornado touched down over rangeland, about 8 mi. NW of Browns Park National Wildlife Refuge, throwing debris 300 feet into the air
Dutch John	08/21/2001	EF0	\$0	A narrow and long, rope-like tornado touched down in Flaming Gorge National Recreation Area, traveling for 2 miles and picking up brush, branches, and tree limbs

*Source: Storm Events Database, 2024*

Future tornadoes are possible and likely, but significant damage is improbable. However, according to Neighborhoods at Risk, Daggett County is expected to experience an increase in average annual temperature of 3°F by 2049, which could prompt the formation of additional tornadoes in the fall and winter with the increased warm air (2024). Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

**Impacts & Loss Estimates**

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by tornadoes, as presented in the table below.

*Table 3-23. Impacts of Tornado by Jurisdiction*

Jurisdiction	May Be Impacted by Tornado	Experienced Significant Tornado Damage (\$1,000+) Since 2000	Fatalities Due to Tornadoes	Potential Impacts of Tornadoes
Daggett County	Yes	No	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services
Town of Dutch John	Yes	No	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures,



Jurisdiction	May Be Impacted by Tornado	Experienced Significant Tornado Damage (\$1,000+) Since 2000	Fatalities Due to Tornadoes	Potential Impacts of Tornadoes
				fallen trees, risk to emergency services
Town of Manila	Yes	No	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services

Loss of utilities (primarily due to fallen trees and wind damage) is common following tornadoes, and depending on circumstances, communities might be deprived of almost any kind of goods and services including food, water, and medical care. Agriculturally, crop and livestock loss are also possible.

The Storm Events Database records \$0 in total property damage from tornadoes in Daggett County since 1950. See the table under *Historical Frequency & Probability of Future Occurrence* for specific events and descriptions.

Table 3-24. Tornado: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
0 events per year	0.0	\$1,261	\$2,032	\$11	\$3,304	9.6	Very Low
<p><u>Annualized Frequency:</u> The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.</p> <p><u>Population:</u> Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.</p> <p><u>Expected Annual Loss</u> scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (<math>Expected Annual Loss = Exposure \times Annualized Frequency \times Historic Loss Ratio</math>). Source: National Risk Index, 2024e; 2024f</p>							

**Vulnerable Populations**

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions or shelter or those who cannot move to shelter quickly enough may be more vulnerable to tornadoes.

Table 3-25. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%



Vulnerability Category	Number	Percent
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

*Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024*

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

A tornado may cause significant damage to critical facilities in the county and could even bring down power lines, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from a tornado or power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-26. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila

*Source: Resilience Analysis and Planning Tool, 2024*

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

**Changes in Development**

There is no impact based on current development trends on either current or future development.

**Climate Change Implications**

**Effects of Climate Change on Severity of Impacts**

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop, which could produce more frequent and severe tornadoes (USGS, 2023).

**Effects of Climate Change on Probability of Future Events**

Table 3-27. Climate Projections for Daggett County, UT | Neighborhoods at Risk

<b>Tornado Projections</b>	By 2049, Daggett County is expected to experience 4 more days that reach above 95°F (from 2 days to 6 days per year).
	By 2049, Daggett County is expected to have a 3°F increase (from 41°F to 44°F) in average annual temperatures.



	Increasing annual temperatures can contribute to more frequent tornadoes in the fall and winter due to the increased warm air.
<i>Source: Neighborhoods at Risk, 2024</i>	

### FEMA NRI Score

Table 3-28. Tornado: Overall National Risk Index for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>			
5.5	Very Low	Very Low	Relatively High
<i>Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d</i>			

## Straight-line Wind

### Hazard Description

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Countywide, including Dutch John and Manila
<b>Seasonal Pattern or Conditions</b>	All seasons
<b>Duration</b>	Events may last hours to days
<b>Analysis Used</b>	NOAA, NWS, National Risk Index, NCEI, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS

The term “straight-line wind” is used to describe any wind not associated with rotation, particularly tornadoes. Of concern is high wind, defined by the NWS as “sustained wind speeds of 40 mph or greater, lasting for one hour or longer, or winds of 58 mph or greater for any duration.” Like tornadoes, strong, straight-line winds are generated by thunderstorms, and they can cause similar damage. Straight-line wind speeds can approach 150 mph, equivalent to those in an EF3 tornado. Additionally, derechos—which are widespread, long-lived, straight-line windstorms—may occur in Daggett County, although less common.

### Location

Straight-line wind events affect the entire county, including the jurisdictions of Dutch John and Manila. Dutch John, specifically, is located in a pocket that creates frequent microbursts.

### Extent

The Beaufort Wind Scale explains different wind speeds based on how they would affect land conditions and sea conditions (NOAA, 2024).



Table 3-29. Beaufort Wind Scale

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects on Land
0	Less than 1	Calm	Calm, smoke rises vertically
1	1–3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4–6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	7–10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	11–16	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move
5	17–21	Fresh Breeze	Small trees in leaf begin to sway
6	22–27	Strong Breeze	Larger tree branches moving, whistling in wires
7	28–33	Near Gale	Whole trees moving, resistance felt walking against wind
8	34–40	Gale	Twigs breaking off trees, generally impedes progress
9	41–47	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	48–55	Storm	Seldom experienced on land, trees broken or uprooted, “considerable structural damage”
11	56–63	Violent Storm	
12	64+	Hurricane	

Source: NOAA, 2024

**Historical Frequency & Probability of Future Occurrence**

High straight-line wind events are frequent in Daggett County, including in the towns of Dutch John and Manila. According to the Storm Events Database, there have been eight reported high wind, strong wind, or thunderstorm wind events 40 mph or greater in Daggett County between 2000–2024, as seen in the table below. Four of these high wind events occurred in Dutch John. The other four high wind events in the county occurred in the Eastern Uinta Mountains.

Table 3-30. High Wind Events in Daggett County, UT

Location Within County	Date	Wind Speed (kts.)
Eastern Uinta Mountains	04/18/2000	45 kts.
Eastern Uinta Mountains	06/02/2001	51 kts.
Dutch John	07/04/2007	55 kts.
Dutch John	06/16/2015	70 kts.
Dutch John	06/06/2020	67 kts.
Eastern Uinta Mountains	11/07/2020	67 kts.
Dutch John	09/18/2021	50 kts.
Eastern Uinta Mountains	02/15/2023	68 kts.

Source: Storm Events Database, 2024

Future significant straight-line wind events are likely to occur multiple times each year throughout the entire county, including in Dutch John and Manila. According to Neighborhoods at Risk, Daggett County is expected to experience an increase in average annual temperature of 3°F by 2049, which could influence the variability of regional and seasonal winds in Utah as carbon dioxide levels increase (2024). Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).



**Impacts & Loss Estimates**

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by straight-line wind, as presented in the table below.

Table 3-31. Impacts of Straight-Line Wind by Jurisdiction

Jurisdiction	Impacted by Straight-Line Wind	Experienced Significant Straight-Line Wind Damage (\$1,000+) Since 2000	Potential Impacts of Straight-Line Wind
Daggett County	Yes	Yes	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities
Town of Dutch John	Yes	Yes	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities
Town of Manila	Yes	Yes	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities

The impacts of straight-line winds are virtually the same as those from tornadoes with similar wind speeds. The damage is distinguishable from that of a tornado only in that the debris is generally deposited in nearly parallel rows. Many homes in Dutch John and Manila are mobile homes and don't have the durability to withstand strong winds. Downbursts are particularly hazardous to aircraft in flight. Though losses aren't regularly reported, it is known that they occur because of the frequency and magnitude of high wind events.

Table 3-32. Strong Wind: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
0.2 events per year	0.0	\$1,504	\$2,370	\$10	\$3,884	35.0	Relatively Low
<p><i>Annualized Frequency:</i> The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.</p> <p><i>Population:</i> Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.</p> <p><i>Expected Annual Loss</i> scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (<math>Expected Annual Loss = Exposure \times Annualized Frequency \times Historic Loss Ratio</math>). Source: National Risk Index, 2024e; 2024f</p>							



**Vulnerable Populations**

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions or shelter or those who cannot move to shelter quickly enough may be more vulnerable to severe straight-line wind conditions.

*Table 3-33. Vulnerable Populations in Daggett County*

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

*Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024*

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Straight-line wind may cause significant damage to critical facilities in the county and could even bring down power lines, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from straight-line wind or power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

*Table 3-34. Critical Facility Types in Daggett County*

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila

*Source: Resilience Analysis and Planning Tool, 2024*

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

**Changes in Development**

There is no impact based on current development trends on either current or future development.

**Climate Change Implications**

**Effects of Climate Change on Severity of Impacts**



With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop, which could produce more frequent and severe straight-line wind events and even derechos (USGS, 2023). However, there are still many questions and factors yet to be resolved about wind with some studies suggesting climate change may even reduce wind speeds. Uncertainty remains high as it relates to climate change and its impact on this hazard. Further analysis and studies need to be conducted, specifically for this region.

**Effects of Climate Change on Probability of Future Events**

*Table 3-35. Climate Projections for Daggett County, UT | Neighborhoods at Risk*

<b>Wind Projections</b>	By 2049, Daggett County is expected to experience 4 more days that reach above 95°F (from 2 days to 6 days per year).
	By 2049, Daggett County is expected to have a 3°F increase (from 41°F to 44°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent straight-line wind events as more powerful storms develop.

*Source: Neighborhoods at Risk, 2024*

**FEMA NRI Score**

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>			
28.3	Relatively Low	Very Low	Relatively High
<i>Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d</i>			



## CHAPTER 4 SEVERE WINTER WEATHER

### HAZARD DESCRIPTION

Severe winter weather includes extreme cold, winter storm, and avalanche. Severe winter weather can and does affect the entire county, and all critical facilities are susceptible to severe weather. It should be noted that straight-line wind is also associated with severe winter storms, commonly referred to as blizzard conditions, where snow is driven by wind-caused drifting.

### RELATED HAZARDS

#### Extreme Cold

##### *Hazard Description*

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Countywide, including Dutch John and Manila
<b>Seasonal Pattern or Conditions</b>	Winter
<b>Duration</b>	Events may last hours to days
<b>Analysis Used</b>	NOAA, NWS, Public Health Post, National Risk Index, Neighborhoods at Risk, NCEI, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund

“Extreme cold” is another of the terms describing hazards that must be defined relative to what is considered normal in a given locale. What might be considered extreme cold varies considerably in the state of Utah where normal winter temperatures in the south are appreciably more moderate than those in the north. Very cold temperatures become a particular hazard when accompanied by winds of 10 mph or greater. As with extreme heat, extreme cold is of greatest concern when the condition persists for an extended period of time.

##### **Location**

Extreme cold temperatures affect the entire county, including the jurisdictions of Dutch John and Manila.

##### **Extent**

The NWS has developed a formula for calculating wind chill based on temperature and wind speed and issues wind chill advisories in this region when the wind chill temperature is predicted to be -10°F or less with winds of 10 mph or higher for one hour or more. Wind chill warnings are issued when wind chill temperature will be -20°F or less with winds of 10 mph or higher for one hour or more (see the figure below).

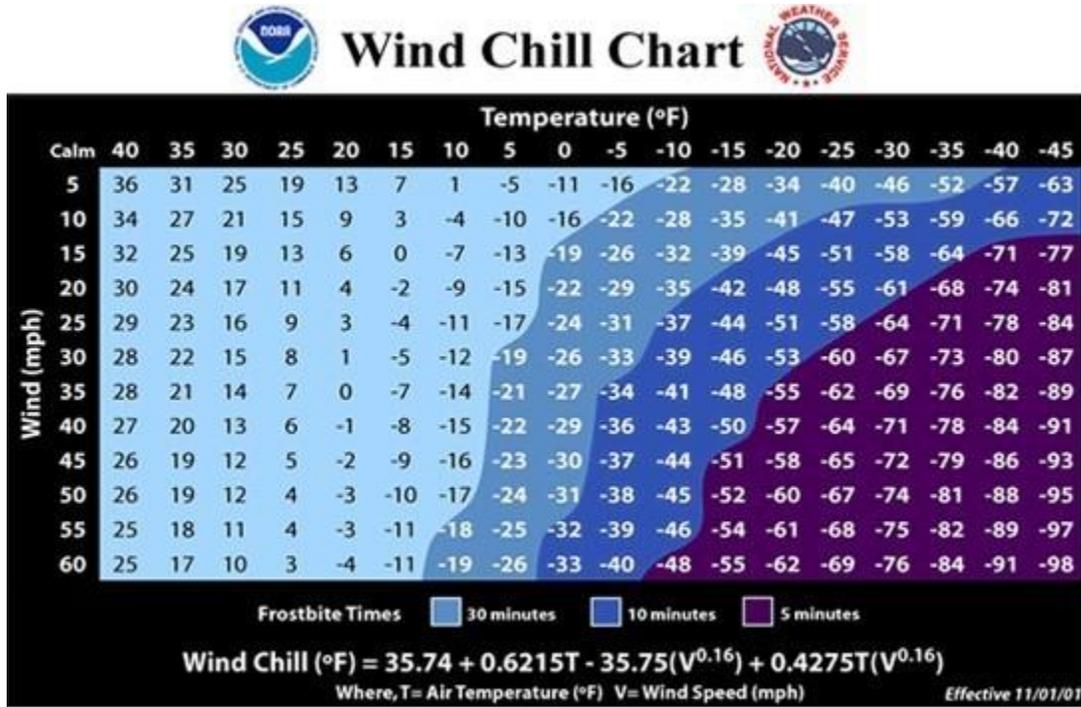


Figure 4-1. National Weather Service Wind Chill Chart

**Historical Frequency & Probability of Future Occurrence**

According to NWS available data, the record low temperature in the town of Manila is -33°F, which was recorded twice in February 1933 and January 1963 (NOWData, 2024). The record low temperature in the town of Dutch John at Flaming Gorge Reservoir is -38°F in January 1963. January is historically the coldest month of the year in Daggett County with an average temperature of 23.1°F in Manila and 22.8°F in Dutch John (NOWData, 2024). Cold clusters are particularly damaging. Most recently in January 2023, Manila, UT experienced 24 days of the month with a low of 10°F or less. There have been several months within the last decade with over 20 days of extreme cold. During the 10-year period from 2013–2023, Manila recorded a total of 448 extreme cold days of 10°F or less (NOWData, 2024).

Extreme cold temperatures are likely every year throughout the county, including in Dutch John and Manila. However, since Daggett County is expected to experience an increase in average annual temperature of 3°F by 2049, extreme cold events may become less and less over the coming decades (Neighborhoods at Risk, 2024). Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

**Impacts & Loss Estimates**

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by extreme cold, as presented in the table below.

Table 4-1. Impacts of Extreme Cold by Jurisdiction

Jurisdiction	Impacted by Extreme Cold Events (≤ 10°F) Within Last 100 Years	Potential Impacts of Extreme Cold
Daggett County	Yes	Hypothermia, frostbite, death, loss of



Jurisdiction	Impacted by Extreme Cold Events ( $\leq 10^{\circ}\text{F}$ ) Within Last 100 Years	Potential Impacts of Extreme Cold
		crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
Town of Dutch John	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
Town of Manila	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)

Health effects of exposure to extreme cold include hypothermia and frostbite, both of which can be life-threatening. Infants and the elderly are most susceptible. In the United States, approximately 1,300 deaths are attributed to hypothermia or cold exposure annually (Lane, 2018).

Extreme cold may cause loss of wildlife and vegetation and kill livestock and other domestic animals. Economic loss may result from flooding due to burst pipes, large demands on energy resources, and diminished business activity. River flooding may take place as a result of the formation of ice jams.

Extreme cold affects the individual, families, cities, and the county. Damage typically occurs to individual properties; however, city water systems are usually vulnerable to extreme cold. Repairs to water line freeze-ups and breaks typically require the roadways to be excavated, necessitating additional maintenance and repairs during the warmer months.

Extreme cold can cause death and injury especially to those working or stranded outside for prolonged periods. Economic loss is related to private individuals, businesses, and government agencies in heating homes and facilities. Additional losses can be expected to the livestock industry. During extreme cold periods the schools are closed to protect children traveling to and from school.

During the spring, summer, and fall, temperatures can drop low enough to produce frost. While such temperatures are not low enough to damage infrastructure or require extra heating costs, it can be devastating to crops. Extreme minimum temperatures can fall below freezing much of the fall, winter, and spring.

Table 4-2. Cold Wave: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<i>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</i>							
0.1 events per year	0.0	\$3,093	\$13	\$387	\$3,494	64.7	Relatively Low
<i>Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or</i>							



Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
<p><i>probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.</i></p> <p><i>Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.</i></p> <p><i>Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f</i></p>							

### Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions or shelter from the cold may be more vulnerable to extreme cold conditions. Additionally, those who cannot afford to sufficiently heat their homes may be at risk.

Table 4-3. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Extreme cold may cause significant damage to critical facilities in the county due to frozen or burst water lines. The following table lists types of critical facilities that could be negatively affected by damage from freeze-ups, which could delay emergency response.

Table 4-4. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila

Source: Resilience Analysis and Planning Tool, 2024



Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

**Changes in Development**

There is no impact based on current development trends on either current or future development.

**Climate Change Implications**

**Effects of Climate Change on Severity of Impacts**

According to the Environmental Defense Fund (EDF), more snowfall during snowstorms is an expected effect of climate change. EDF further explains that a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Extreme cold temperatures are likely to remain a common occurrence in Daggett County but may begin a slight downturn in frequency over the next century.

**Effects of Climate Change on Probability of Future Events**

*Table 4-5. Climate Projections for Daggett County, UT | Neighborhoods at Risk*

<b>Cold Projections</b>	By 2049, Daggett County is expected to experience 4 more days that reach above 95°F (from 2 days to 6 days per year).
	By 2049, Daggett County is expected to have a 3°F increase (from 41°F to 44°F) in average annual temperatures.
	Increasing annual temperatures can contribute to less frequent extreme cold events.
<i>Source: Neighborhoods at Risk, 2024</i>	

**FEMA NRI Score**

*Table 4-6. Cold Wave: Overall National Risk Index Score for Daggett County, UT*

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>			
58.9	Relatively Low	Very Low	Relatively High
<i>Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d</i>			

**Winter Storm**

**Hazard Description**

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium



	High
<b>Location</b>	Countywide, including Dutch John and Manila
<b>Seasonal Pattern or Conditions</b>	Winter
<b>Duration</b>	Storms may last hours to days
<b>Analysis Used</b>	NOAA, NWS, 2019 Utah Hazard Mitigation Plan, NCEI, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund, Neighborhoods at Risk

The NWS describes winter storm as weather conditions that produce heavy snow or significant ice accumulations. For the purposes of this analysis, a severe winter storm is defined as any winter condition where the potential exists for a blizzard (winds  $\geq 35$ mph and falling/drifting snow frequently reduce visibility  $< \frac{1}{4}$  mile, for two hours or more), heavy snowfall (six inches or more snowfall in 24 hours in the valleys; nine inches or more snowfall in 24 hours in the mountains), ice storm, and/or strong winds.

**Location**

Severe winter storms are a risk countywide and occur frequently, including in the jurisdictions of Dutch John and Manila.

**Extent**

The magnitude or severity of a severe winter storm depends on several factors, including a region’s climatological susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, time of occurrence during the day and week (e.g., weekday versus weekend), and time of season. The NOAA produces the Regional Snowfall Index (RSI) for significant snowstorms that impact the eastern two thirds of the U.S., but Utah is not included in this scale. However, the scale is still included below for reference and can be a useful tool for considering extent values of snowfall throughout the planning area (NCEI, 2024).

Category	RSI Value	Description
1	1-3	Notable
2	3-6	Significant
3	6-10	Major
4	10-18	Crippling
5	18,0+	Extreme

Figure 4-2. NCEI Regional Snowfall Index (RSI)

**Historical Frequency & Probability of Future Occurrence**

According to the Storm Events Database, Daggett County has had 180 instances of severe winter storm since 2010 (classified under “blizzard,” “heavy snow,” “winter storm,” and “winter weather”). In the last five years (January 2018–January 2023), the county has experienced 52 winter storm events, many of which have occurred in the towns of Dutch John and Manila. The Eastern Uinta Mountains receive the most winter storms in the county.



Daggett County will continue to experience multiple winter storms every year throughout the county, including in Dutch John and Manila. Unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an overall increase in winter storms is not currently likely (NCEI, 2022). Future winter storm trends are predicted to remain consistent in the next 20 years in Daggett County. However, as global warming continues and more water evaporates into the atmosphere, additional snowfall and precipitation may be seen in the coming decades.

**Impacts & Loss Estimates**

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by winter storms, as presented in the table below.

*Table 4-7. Impacts of Winter Storm by Jurisdiction*

Jurisdiction	Impacted by Winter Storms	Experienced Significant Winter Storm with \$1,000+ in Damage Since 2010	Potential Impacts of Winter Storms
Daggett County	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services
Town of Dutch John	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services
Town of Manila	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services

The impacts of the very cold temperatures that may accompany a severe winter storm are discussed in the previous section. Other life-threatening impacts are numerous. Motorists may be stranded by road closures or may become trapped in their automobiles in heavy snow and/or low visibility conditions. Bad road conditions cause automobiles to go out of control. People can be trapped in homes or buildings for long periods of time without food, heat, and utilities. Those who are ill may be deprived of medical care



by being stranded or through loss of utilities and lack of personnel at care facilities. Use of heaters in automobiles and buildings by those who are stranded may result in fires or carbon monoxide poisoning. Fires during winter storm conditions are a particular hazard because fire service response is hindered or prevented by road conditions and because water supplies may be frozen. Emergency Services may also not be available if telephone service is lost. People who attempt to walk to safety through winter storm conditions often become disoriented and lost. Downed power lines not only deprive the community of electricity for heat and light but pose an electrocution hazard. Death and injury may also occur if heavy snow accumulation causes roofs to collapse. There have been 41 fatalities in Utah from 1962–2018 due to winter storms. About 70% of these fatalities occur in automobiles, while 25% are a result of people caught out in the elements (Utah Hazard Mitigation Plan, 2019).

The total economic impact in Utah for a 24-hour statewide winter storm is \$66.36 million, including \$42.81 million in lost wages and salaries and overtime, \$18.26 million in lost retail sales, \$3.32 million in federal taxes, and \$1.98 million for state and local taxes (Utah Hazard Mitigation Plan, 2019). Economic impacts arise from numerous sources, including hindered transportation of goods and services; flooding due to burst water pipes; forced closing of businesses; inability of employees to reach the workplace; damage to homes and structures, automobiles, and other belongings by downed trees and branches; loss of livestock and vegetation; and many others. Loss of crops is also common.

Table 4-8. Winter Weather: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
9.9 events per year	0.0	\$15,930	\$11,650	\$8	\$27,587	96.0	Relatively High
<p><i>Annualized Frequency:</i> The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.</p> <p><i>Population:</i> Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.</p> <p><i>Expected Annual Loss</i> scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (<math>Expected Annual Loss = Exposure \times Annualized Frequency \times Historic Loss Ratio</math>). Source: National Risk Index, 2024e; 2024f</p>							

Table 4-9. Ice Storm: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
0 events per year	0.0	\$168	\$1,436	N/A	\$1,603	40.4	Relatively Low
<p><i>Annualized Frequency:</i> The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.</p> <p><i>Population:</i> Population exposure is defined as the estimated number of people determined to be exposed to a</p>							



Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
<p><i>hazard according to a hazard type-specific methodology. Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f</i></p>							

**Vulnerable Populations**

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions or shelter from the cold and winter storms may be more vulnerable to winter conditions. Additionally, those who cannot afford to sufficiently heat their homes or transport themselves to a safe location may be at risk.

*Table 4-10. Vulnerable Populations in Daggett County*

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

*Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023*

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Winter storms may cause significant damage to critical facilities in the county due to frozen or burst water lines. High wind during winter storms may knock down power lines, as well, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from freeze-ups or power outages, which could delay emergency response and access to life-saving medical equipment.

*Table 4-11. Critical Facility Types in Daggett County*

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila

*Source: Resilience Analysis and Planning Tool, 2024*



Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

**Changes in Development**

There is no impact based on current development trends on either current or future development.

**Climate Change Implications**

**Effects of Climate Change on Severity of Impacts**

According to the Environmental Defense Fund (EDF), more snowfall during snowstorms is an expected effect of climate change. EDF further explains that a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023).

**Effects of Climate Change on Probability of Future Events**

Table 4-12. Climate Projections for Daggett County, UT | Neighborhoods at Risk

<b>Precipitation Projections</b>	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	Increased participation can lead to more frequent and severe winter storms.
<i>Source: Neighborhoods at Risk, 2024</i>	

**FEMA NRI Score**

Table 4-13. Winter Weather: Overall National Risk Index Score for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Score	Community Resilience Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>			
93.0	Relatively High	Very Low	Relatively High
<i>Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d</i>			

Table 4-14. Ice Storm: Overall National Risk Index Score for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>			
29.7	Very Low	Very Low	Relatively High
<i>Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d</i>			



# Avalanche

## Hazard Description

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Uinta Mountains and any steep slopes that may accumulate snow
<b>Seasonal Pattern or Conditions</b>	Winter
<b>Duration</b>	Events may last seconds to minutes; snowstorms that cause avalanches may last hours to days
<b>Analysis Used</b>	NOAA, NWS, 2019 Utah Hazard Mitigation Plan, North American Public Avalanche Danger Scale, Utah Avalanche Center, NCEI, Environmental Defense Fund, Neighborhoods at Risk

Snow avalanches are common in mountainous terrain where heavy snowfall accumulates on steep slopes. Avalanches generally occur on slopes between 30 and 45 degrees with 38 degrees being the “ideal” slope for development of avalanche conditions. They are often categorized as either “loose snow” or “slab” types. A loose snow avalanche is initiated when snow is dislodged at a point upslope and, in turn, dislodges more snow as it moves downward. Such avalanches usually grow wider and larger as they proceed but are usually somewhat limited in size. The generally more dangerous slab avalanche occurs when a cohesive mass of snow breaks free and moves downward, either as a single unit, or breaking into smaller pieces traveling together. Four factors combine to produce a slab avalanche: (1) a large mass of snow that is cohesive as a result of a single, large snowfall, or some physical change due to temperature, introduction of water content, or other factors; (2) some source of instability or weakness that forms a boundary capable of breaking free; (3) a surface, called a sliding layer, upon which the slab may easily slide; and (4) a triggering event, such as increased weight, strong vibration, wind, or a temperature increase, that overcomes the binding forces at, or further weakens the boundary of instability. It is estimated that around 90% of avalanches where victims are involved are triggered by their victims or those who accompany them.

Avalanches are comprised of three zones—the release zone where the mass breaks free and accelerates, the track where the mass travels downward at a relatively constant speed (often approaching 80 mph), and the runout zone where the mass slows and comes to rest. While the exact moment of an avalanche cannot be predicted, avalanche conditions are readily recognizable, and avalanches tend to recur on the same slopes year after year.

### Location

Snow avalanches can occur anywhere in the county with mountains and/or slopes that accumulate with snow. However, the primary avalanche zone in Daggett County is the Uinta Mountains in the southern region (Utah Hazard Mitigation Plan, 2019).



**Extent**

The North American Public Avalanche Danger Scale is a tool used by avalanche forecasters throughout the U.S. to communicate the potential for avalanches to cause harm or injury to backcountry travelers.

<b>North American Public Avalanche Danger Scale</b>			
<i>Avalanche danger is determined by the likelihood, size, and distribution of avalanches. Safe backcountry travel requires training and experience. You control your risk by choosing when, where, and how you travel.</i>			
Danger Level	Travel Advice	Likelihood	Size and Distribution
<b>5 - Extreme</b>	 Extraordinarily dangerous avalanche conditions. Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Very large avalanches in many areas.
<b>4 - High</b>	 Very dangerous avalanche conditions. Travel in avalanche terrain not recommended.	Natural avalanches likely; human-triggered avalanches very likely.	Large avalanches in many areas; or very large avalanches in specific areas.
<b>3 - Considerable</b>	 Dangerous avalanche conditions. Careful snowpack evaluation, cautious route-finding, and conservative decision-making essential.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
<b>2 - Moderate</b>	 Heightened avalanche conditions on specific terrain features. Evaluate snow and terrain carefully; identify features of concern.	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas; or large avalanches in isolated areas.
<b>1 - Low</b>	 Generally safe avalanche conditions. Watch for unstable snow on isolated terrain features.	Natural and human-triggered avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.

Figure 4-3. North American Public Avalanche Danger Scale

**Historical Frequency & Probability of Future Occurrence**

Avalanches occur often in Daggett County, primarily in the Uinta Mountains, but most go unreported and/or undetected. The Utah Avalanche Center records observations of avalanches throughout Utah, including in the Western Uinta Mountains. However, the eastern half of the Uintas in Daggett County is not tracked by the Utah Avalanche Center because this area is not a common recreation ground for backcountry users during the winter. No avalanches have been reported in the towns of Dutch John or Manila.

Avalanches in the Uinta Mountains are likely to continue at the existing trend, but avalanches in the towns of Dutch John and Manila would still be extremely unlikely in the future. However, avalanches in the surrounding areas of Dutch John are possible due to rising terrain. Unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an overall increase in snowfall—and therefore avalanches—is not currently likely (NCEI, 2022). Future avalanche conditions are predicted to remain consistent in the next 20 years in Daggett County. However, as global warming continues and more water evaporates into the atmosphere, additional snowfall and precipitation may be seen in the coming decades, which could lead to an uptick in avalanches.



Additionally, an increase in average temperatures during the winter could cause unstable avalanche conditions, thus triggering more frequent events.

**Impacts & Loss Estimates**

Parts of unincorporated Daggett County may be impacted by avalanches, as presented in the table below. However, the towns of Dutch John and Manila are not likely to be directly impacted by avalanches.

Table 4-15. Impacts of Avalanche by Jurisdiction

Jurisdiction	Impacted by Avalanches	Fatalities Due to Avalanches	Potential Impacts of Avalanches
Daggett County	Yes	0	Injury, trauma, hypoxia, suffocation, death, property damage, fallen trees/vegetation, rockslides, damage to power lines, road/railway closures, utility losses, rescue/recovery expenses, debris/snow removal expenses
Town of Dutch John	No	0	No impacts likely
Town of Manila	No	0	No impacts likely

It is common for avalanche impacts to be somewhat limited. Because avalanches usually occur in remote areas, the most frequent victims are recreational users of the slopes on which they occur. Of those who die in avalanches, approximately one third of the deaths are a result of trauma while the remaining two thirds are from suffocation. Trauma may be the result of being carried into obstructions, such as boulders and trees, or over cliffs, or from rocks, trees, or large chunks of snow being carried downward at high speed. Avalanches may also damage or destroy structures, break power lines, block roadways and railroads, and damage trees and vegetation.

Visiting tourists and recreational users may be at an increased risk of triggering avalanches and/or being caught in one if they are not well-versed in the area and where common avalanche hot spots are located. It’s important for visitors to stay informed about the risks of any recreational activity they participate in.

As with landslides, losses from snow avalanches come from damage to roadways and the resulting snow and debris removal costs. Additionally, if a rescue and/or recovery is necessary for any people caught in the avalanche, physical and monetary resources must go toward rescue helicopters, rescue crew, rescue equipment, additional transport, medical treatment, etc., which can add up to thousands of dollars.

The Expected Annual Loss score for Avalanche from the National Risk Index is not available due to limited avalanche data in Daggett County.

**Vulnerable Populations**

Because those typically affected by avalanches in Daggett County are often recreational users who ventured into avalanche terrain by choice, the vulnerable populations in the county are unlikely to be at risk from this hazard, especially because the county’s two towns are not directly located within avalanche terrain or mountains. No critical facilities in the county are located near avalanche terrain or potentially at risk of being damaged in an avalanche.

**Changes in Development**

There is no impact based on current development trends on either current or future development.



### Climate Change Implications

#### Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), more snowfall during snowstorms is an expected effect of climate change. EDF further explains that a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additional heavy snow could create unstable avalanche conditions and lead to more frequent avalanches.

#### Effects of Climate Change on Probability of Future Occurrence

Table 4-16. Climate Projections for Daggett County, UT | Neighborhoods at Risk

<b>Precipitation Projections</b>	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	Increased participation can lead to more unstable avalanche conditions and frequent avalanches.
<i>Source: Neighborhoods at Risk, 2024</i>	

#### FEMA NRI Score

The Overall Risk Index score for Avalanche from the National Risk Index is not available due to limited avalanche data in Daggett County.



# CHAPTER 5 WILDFIRE

## HAZARD DESCRIPTION

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Countywide, including around Dutch John and Manila; URWIN zones near the foothills and in forested areas
<b>Seasonal Pattern or Conditions</b>	Summer and fall months. Wildfire-prone areas are areas affected by drought and/or heavily overgrown and dry brush and debris. Lightning and human triggers cause wildfires.
<b>Duration</b>	Wildfires typically last days but can last months, depending on climate and fuel load as well as resources (financial, manpower) to extinguish the fire.
<b>Analysis Used</b>	U.S. Forest Service, National Climate Center, FEMA, AGRC, County Hazard Analysis Plans, 2019 Utah Hazard Mitigation Plan, NWCG, Utah Forestry, Fire & State Lands, local newspaper articles, Utah Fire Marshal, Wildfire Risk, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, UCAR

Wildfires—uncontrolled fires spreading through both naturally occurring and non-native vegetative fuel sources—are a significant hazard, often beginning unnoticed and spreading quickly while threatening any structures in its path. Wildfires can cover a large geographic area, can be ignited by natural or human sources, and are hard to predict. They help to maintain a healthy ecosystem and have been a natural and fundamental part of the world’s forests and grasslands for millions of years. Fires cleanse and regenerate forests, giving new life to the soil and encouraging biodiversity. They are responsible for the evolution of many of the grasses, brushes, and tree species found in Utah (Utah Hazard Mitigation Plan, 2019).

Wildfires are classified as Wildland and Wildland-Urban Interface (WUI). Wildland fires occur in areas where development is essentially nonexistent except for roads, railroads, or power lines. WUI fires materialize in a geographical area where structures and other human development adjoins wildlands. A fireshed is an area that will adversely affect a community or high-value resource and/or asset if ignited (Utah Hazard Mitigation Plan, 2019).

## LOCATION

On average in Utah, years with more spring rainfall typically have higher wildfire incidents in the summer and fall after vegetation dries out and becomes combustible material. Hot temperatures, high winds, and dry conditions brought on by years of drought have caused high mortality rates in low elevation timber and shrubs, all contributing to prime fire conditions (Utah Hazard Mitigation Plan, 2019). Wildfires may occur in any part of Daggett County, including in or around the towns of Dutch John and Manila. Daggett County is 80% forest land, and approximately 80% of lightning strikes in the county result in fires, which is of high concern in regard to wildfires.



Daggett County sees an average of approximately nine to 12 inches of precipitation per year (NOWData, 2024). The northwestern and eastern parts of the county typically see lower precipitation averages due to its mostly semi-arid climate. However, the Flaming Gorge region often sees three to four inches of additional rainfall than the rest of the county.

As documented in the previous regional plan, the following table identifies the roads and utilities within Daggett County at potential risk to wildfire.

Table 5-1. Roads and Utilities at Risk to Wildfire

Transportation	
Name	Miles
Local Neighborhood/Town Roads	218.1
State Route 43	1.18
State Route 44	21.31
US Highway 191	21
Utilities	
Name	Description
Flaming Gorge	Power Generation
Power Lines	53.45 miles
KV-230	4.25 miles
Natural Gas	6.41 miles

## EXTENT

The National Wildfire Coordinating Group (NWCG) classifies fire sizes using the following standards (NWCG, 2024). These standard data values are included in the data table below.

### Size Class of Fire

- As to size of wildfire:
  - Class A - one-fourth acre or less;
  - Class B - more than one-fourth acre, but less than 10 acres;
  - Class C - 10 acres or more, but less than 100 acres;
  - Class D - 100 acres or more, but less than 300 acres;
  - Class E - 300 acres or more, but less than 1,000 acres;
  - Class F - 1,000 acres or more, but less than 5,000 acres;
  - Class G - 5,000 acres or more.

Figure 5-1. NWCG Size Class of Fire

The State of Utah Division of Forestry, Fire, and State Lands provides five categories of wildfire risk, which are listed below:

- Extreme



- High
- Medium
- Low
- Very Low

These ratings cover all of Daggett County and are based on the type and density of vegetation in each area. Additional factors influencing wildfires, such as weather conditions, wind speed, and direction, are not considered in this risk assessment.

The Utah Wildfire Risk Explorer from the Utah Division of Forestry, Fire & State Lands maps the Burn Probability and Damage Potential for wildfire for every county in Utah. Burn Probability is the probability that a specific geographic location will experience a wildland fire during the specified time period of one year. Estimates were generated with the large-wildfire simulation system (Utah FFSL, 2024). The Burn Probability for Daggett County can be seen in the first map below. The lower southeastern corner of the county has the greatest likelihood of wildfire, while the northern riverine region of the county and the northern side of the Uinta Mountains have a decreased likelihood of wildfire.

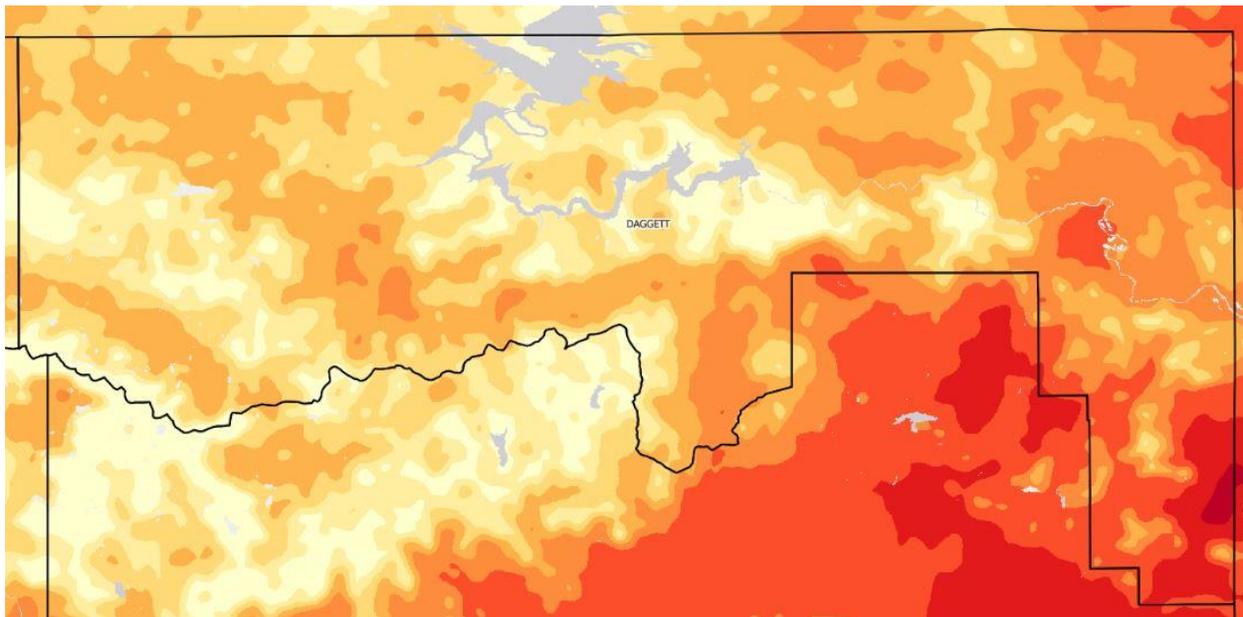


Figure 5-2. Daggett County Burn Probability

Damage Potential represents the potential consequences of fire to a home at a given location if a fire were to occur and if a home were located there. Damage Potential incorporates ember load and conditional risk to potential structures as a generalized measure of potential loss to homes (Utah FFSL, 2024). The Damage Potential for Daggett County can be seen in the second map below. Homes located in the higher elevations of Daggett County are most at risk to wildfire damage than those located in the lower elevations.

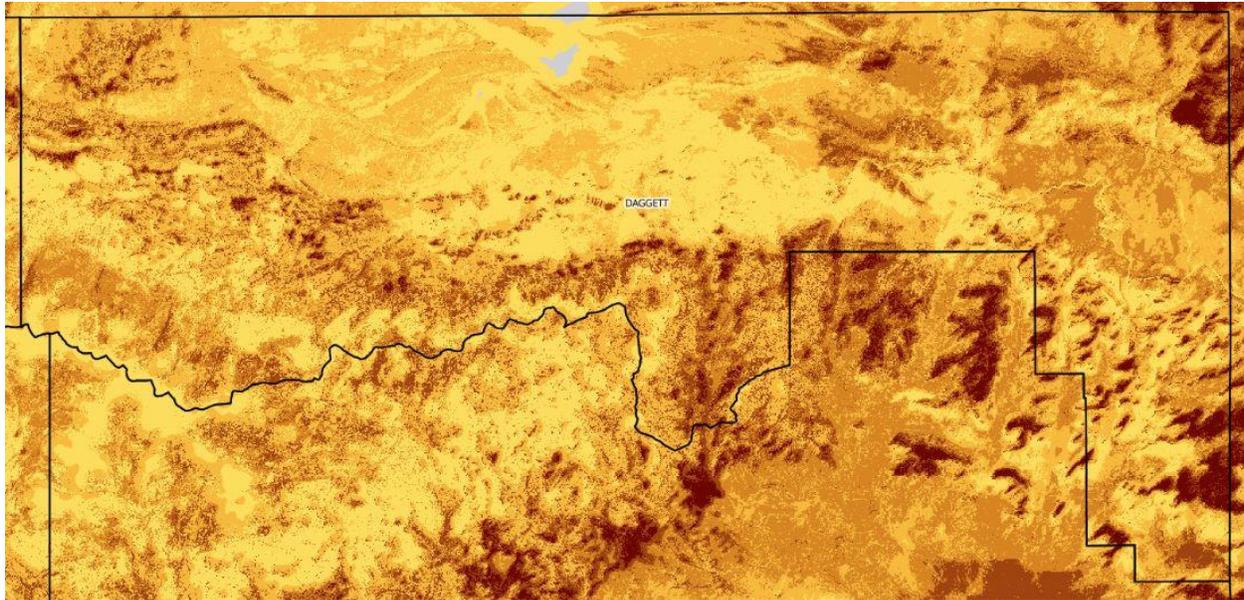


Figure 5-3. Daggett County Damage Potential

### HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

The state of Utah experienced 808 reported wildfires over 18,061 acres in 2023. This is a 16.1% decrease in total wildfires from 2022 and a 29.3% decrease in human-caused fires. The Uintah Basin Region experienced 99 reported wildfires (Utah FFSL, 2023). One of the largest wildfires in Daggett County began on August 3, 2020 and lasted for a week as it burned through 7,632 acres between Daggett County in Utah and Sweetwater County in Wyoming. The wildfire, called the Richard Mountain Fire, began in Wyoming and spread south into Utah within the same day. No structures or lives were lost (ABC4 News, 2020).

The three most significant fires in Daggett County over 50 acres since 2017 are listed in the table below.

Table 5-2. Significant Fires in Daggett County

Date Discovered	Wildfire Name	Location	Size in Acres	Cause	Buildings Destroyed
09/02/2018	Bender Mountain	Eastern Daggett County over Utah-Colorado border	4,120	Vehicle Crash	0
08/03/2020	Richard Mountain	Northeast of Flaming Gorge over Utah-Wyoming border	7,632	N/A	0
07/17/2023	Sunny Cove	3 mi. northwest of Dutch John	85	Lightning	0

Source: Utah FFSL, 2017–2023



The most devastating fire in Daggett County occurred on July 16, 1977 near Flaming Gorge Dam in Ashley National Forest when lightning struck a grassy area nearby. Firefighters battled the blaze for two hours when the fire suddenly intensified and changed directions, overtaking and killing three firefighters. The fire, known as the Ashley National Forest Fire or Cart Creek Fire, burned 1,500 acres overall (NWCG, 2023).

### IMPACTS & LOSS ESTIMATES

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by wildfire, as presented in the table below.

Table 5-3. Impacts of Wildfire by Jurisdiction

Jurisdiction	Impacted by Wildfire	Experienced Significant Wildfire with \$1,000+ in Damage Since 2000	Fatalities Due to Wildfire	Potential Impacts of Wildfire
Daggett County	Yes	Yes	3	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses
Town of Manila	Yes	No	0	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses
Town of Dutch John	Yes	Yes	0	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses

According to the 2019 Utah State Hazard Mitigation Plan, Daggett County has three schools, zero hospitals, and five emergency response facilities that are exposed to potential wildfires. The combined value of the residential buildings in Daggett County is \$125,097,000, and the combined value of non-residential buildings is \$25,304,000. The total building value is \$150,401,000 (Utah Hazard Mitigation Plan, 2019).

Fatalities from wildfire in Utah are relatively uncommon, with 22 recorded deaths since 1950. Three deaths have occurred in Daggett County due to wildfire from the Ashley National Forest Fire in 1977 (Utah Hazard Mitigation Plan, 2019).



The potential losses to critical facilities in Daggett County due to wildfires are identified in the table below.

Table 5-4. Daggett County Potential Impacts from Wildfire

Facility	Impacted	Not Impacted	Description
Hospitals/Medical Clinics	X		Medical clinic could be inundated with inhalation issues due to smoke.
Schools	X		Manila has two schools on the edge of town that could potentially be at risk. Dutch John has one school that would be at risk.
EOC	X		The EOC lies on the outskirts of town in a wildfire area and would receive damage.
Police Stations	X		The Sheriff's Office is located on the outskirts of town in a potential wildfire area and would receive damage.
Fire Stations		X	
County/City Facilities		X	
Homes	X		Full and part-time residences in The Acres, Deer Lodge, and The Pines developments could be damaged or destroyed.
Crops	X		Hay and alfalfa fields, as well as ranchland, could be destroyed.
Businesses	X		Recreational and resort businesses (Flaming Gorge, Dutch John, Cedar Springs, etc.) located within forested areas could be destroyed.

Table 5-5. Wildfire: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
0.182% chance per year	0.0	\$2,082	\$182,475	\$47	\$184,605	96.0	Relatively High
<p><i>Annualized Frequency:</i> The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.</p> <p><i>Population:</i> Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.</p> <p><i>Expected Annual Loss</i> scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (<math>Expected Annual Loss = Exposure \times Annualized Frequency \times Historic Loss Ratio</math>). Source: National Risk Index, 2024e; 2024f</p>							

As documented in the previous regional plan, the following table identifies the roads and utilities within Daggett County at potential risk to wildfire.



Table 5-6. Cost of Roads and Utilities at Risk to Wildfire

Transportation	
Name	Estimated Cost
Local Neighborhood/Town Roads	\$436,200,000
State Route 43	\$2,847,930
State Route 44	\$51,431,685
US Highway 191	\$50,683,500
Utilities	
Name	Estimated Cost
Flaming Gorge Power Plant	\$50,000,000
Power Lines	\$2,580,566
KV-230	\$205,190
Natural Gas	\$1,547,309

*Note: Costs are in 2012 dollars.*

### Vulnerable Populations

Potentially vulnerable populations may experience difficulty preparing for and responding to wildfire. The table below lists the vulnerable populations in Daggett County that may be at greater risk during a wildfire.

Table 5-7. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

*Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024*

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Wildfire places high demands on electrical power supplies that can lead to blackouts or brownouts. The following table lists types of critical facilities that could be negatively affected by power outages during extreme heat, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 5-8. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila



Critical Facility Type	Location
Solid Waste Landfill Facility	South of Manila
<i>Source: Resilience Analysis and Planning Tool, 2024</i>	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

### Changes in Development

There is low impact based on current development trends, meaning future development will minimally increase the impacts of wildfire. As housing continues to encroach on WUI areas, more structures may become vulnerable to wildfire.

## CLIMATE CHANGE IMPLICATIONS

### Effects of Climate Change on Severity of Impacts

According to University Corporation for Atmospheric Research (UCAR), climate change is causing more extreme weather events, including more extreme drought and heat, which can lead to more frequent and severe wildfires. UCAR explains that warmer temperatures cause more evaporation, turning water into vapor in the air and causing drought in some areas of the world. Places prone to drought are expected to become even drier over the following century, creating perfect dry conditions for wildfires (UCAR, 2023). Higher temperatures, increasing variation in precipitation patterns, and changes in lake levels are likely to increase the vulnerability of cities to extreme events (including flooding, drought, heat waves, wildfires, and more intense urban heat island effects), compounding already existing stressors.

### Effects of Climate Change on Probability of Future Events

*Table 5-9. Climate Projections for Daggett County, UT | Neighborhoods at Risk*

<b>Heat Projections</b>	By 2049, Daggett County is expected to experience 4 more days that reach above 95°F (from 2 days to 6 days per year).
	By 2049, Daggett County is expected to have a 3°F increase (from 41°F to 44°F) in average annual temperatures.
	Increasing annual temperatures can contribute to longer and more catastrophic wildfire seasons.
<i>Source: Neighborhoods at Risk, 2024</i>	

## FEMA NRI SCORE

*Table 5-10. Wildfire: Overall National Risk Index Score for Daggett County, UT | FEMA National Risk Index*

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
<i>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</i>			



Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
<i>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</i>			
94.8	Relatively Moderate	Very Low	Relatively High
<i>Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d</i>			



# CHAPTER 6 FLOOD

## HAZARD DESCRIPTION

Flooding is defined by the National Weather Service (NWS) as “the inundation of normally dry areas as a result of increased water levels in an established water course.” River flooding, the condition where the river rises to overflow its natural banks, may occur due to a number of causes, including prolonged, general rainfall, locally intense thunderstorms, snowmelt, and ice jams. In addition to these natural events, there are a number of factors controlled by human activity that may cause or contribute to flooding. These include dam failure (discussed below) and activities that increase the rate and amount of runoff, such as paving, reducing ground cover, and clearing forested areas. Flooding is a periodic event along most rivers, with the frequency depending on local conditions and controls, such as dams and levees. The land along rivers that is identified as being susceptible to flooding is called the floodplain.

Flooding is a dynamic natural process. Along rivers and streams, a cycle of erosion and deposition is continuously rearranging and rejuvenating the aquatic and terrestrial systems. Although many plants, animals, and insects have evolved to accommodate and take advantage of these ever-changing environments, property and infrastructure damage often occurs when people develop floodplains and natural processes are altered or ignored.

Flooding can also threaten life, safety, and health and often results in substantial damage to infrastructure, homes, and other property. The extent of damage caused by a flood depends on the topography, soils, and vegetation in an area, and the depth and duration of flooding, velocity of flow, rate of rise, and the amount and type of development in the floodplain.

## TYPES OF FLOODING

Flooding can occur in a number of ways, and many instances are not independent of each other and can occur simultaneously during a flood event. The types of flooding considered for this plan include:

- Heavy rainfall
- Urban stormwater overflow
- Rapid snowmelt
- Rising groundwater (generally in conjunction with heavy prolonged rainfall and saturated conditions)
- Riverine ice jams
- Flash floods
- Alluvial fan flooding
- Flooding from dam failure

## RELATED HAZARDS

### River or Stream Flood

#### *Hazard Description*

<b>Potential Probability</b>	Low
	Medium



	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Along Flaming Gorge Reservoir and the Green River, Henrys Fork, Blacks Fork, Birch Creek, Red Creek, Crouse Creek, Sheep Creek, and their respective tributaries
<b>Seasonal Pattern or Conditions</b>	Heavy snowfall runoff in spring and early summer; monsoonal thunderstorms and heavy rainfall in late summer
<b>Duration</b>	Flooding can last hours to days or even months
<b>Analysis Used</b>	FIS, FIRM, GIS data, information from community residents, UGS, BasinNow, HUD Exchange, NOAA, NWS, NFIP, 2019 Utah Hazard Mitigation Plan, local newspaper articles, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund

River flooding—the condition where the river rises to overflow its natural banks—may occur due to a number of causes, including prolonged, general rainfall, locally intense thunderstorms, snowmelt, and ice jams.

**Location**

Riverine flooding occurs in the low-lying areas of the county adjacent to streams and rivers, such as the Green River, Henrys Fork, Blacks Fork, Birch Creek, Red Creek, Crouse Creek, Sheep Creek, and their respective tributaries. Erosion along rivers and streams can cause flooding during unusually wet years during spring snowmelt (UGS, 1987). Additionally, during high snowmelt years or high moisture conditions, the Green River can threaten bridges and lead to flooding. It’s common for waters at Flaming Gorge Reservoir to rise several feet during high snowmelt years, often swallowing camper trailers left on the beaches. The photo to the right shows rising waters at Flaming Gorge Reservoir during the summer of 2023.



Figure 6-1. Rising Waters at Flaming Gorge Reservoir (Cowboy State Daily, 2023)

Because of their locations near Flaming Gorge Reservoir, the Green River, and many streams and creeks, Dutch John and Manila are vulnerable to flooding. However, the town of Manila, which is the county seat and the largest community in the county, is not directly in the path of any major rivers and is therefore at a reduced risk to significant flooding within town boundaries. Flooding is still possible within the town from the Sheep Creek Canal if it overtopped or failed (Manila General Plan, 2022).

Several roads in Daggett County are low water crossings that pass over creeks and are often inundated with water during high flow seasons. Browns Park Road, Red Creek Road, State Line Road, Bennion Lane, South Valley, Dutch John Bench, Hwy 43, Hwy 44, Hwy 191, Linwood Lane, E 3rd Road in Manila, Sols Canyon Road, and any roads that cross rivers or streams are all subject to repeat flooding in



Daggett County. Both Dutch John and Manila have primarily dirt roads, including many in Manila that slope from north to south. Emergency repairs are frequently necessary to maintain passage over the roads.

**Extent**

The NFIP classifies floods through the use of recurrence intervals as seen in the chart below.

Flood Recurrence Interval	Chance of occurrence during any given year
5 year	20%
10 year	10%
50 year	2%
100 year	1%
500 year	0.20%

Figure 6-2. NFIP Flood Recurrence Intervals

The federal standard for floodplain management under the National Flood Insurance Plan (NFIP) is the “100-year floodplain.” This area is chosen using historical data such that in any given year there is a 1% chance of a “base flood” (also known as “100-year flood” or “regulatory flood”). A base flood is one that covers or exceeds the 100-year floodplain. A “500-year floodplain” is an area with at least a .2% chance of flood occurrence in any given year (HUD Exchange, 2024).

**Historical Frequency & Probability of Future Occurrence**

Changes in climate will likely increase the region’s flood risk as the planning area experiences more extreme precipitation events triggering flash flooding, monsoons during late summer to early fall, and runoff from rain falling on snow events, common with warming temperatures.

Streams and rivers (Flaming Gorge Reservoir and the Green River, Henrys Fork, Blacks Fork, Birch Creek, Red Creek, Crouse Creek, Sheep Creek and their respective tributaries) create a very high flood threat and increases the probability of future events.

The Storm Events Database from the NOAA lists two river flood events in Daggett County between 2000–2023. Only one of these events affected Dutch John, and none of them occurred in Manila.

Table 6-1. River Flood Events in Daggett County, UT (2000–2023)

Location Within County	Date	Property Damage (\$)	Cause
Eastern Uinta Mountains	05/21/2005	\$0	Rapid snowmelt
Dutch John	07/03/2011	\$0	High releases from Flaming Gorge Reservoir

Source: NOAA Storm Events Database, 2010–2023

River flooding is likely to occur again in the future. According to Neighborhoods at Risk, Daggett County is expected to experience 0.3 more days of heavy precipitation per year by 2049 (from 1.3 days to 1.6 days per year). By 2049, Daggett County is also expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation. Heavy precipitation can lead to riverine flooding as the ground fails to



absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation can contribute to sustained flooding.

**Impacts & Loss Estimates**

The towns of Dutch John and Manila and parts of unincorporated Daggett County may be impacted by river flooding, as presented in the table below. Manila is not as likely to be impacted by river flooding since it is not located in the direct path of any large rivers. Dutch John is located in close proximity to Flaming Gorge Reservoir and therefore more vulnerable to river flooding.

Table 6-2. Impacts of River Flood by Jurisdiction

Jurisdiction	Impacted by River Floods	Fatalities Due to River Floods	Potential Impacts of River Floods
Daggett County	Yes	0	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
Town of Dutch John	Yes	0	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
Town of Manila	Yes	0	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses

Human death and injury sometimes occur as a result of river flooding but are not common. Daggett County has not seen any deaths related to river flooding. Human hazards during flooding include drowning, electrocution due to downed power lines, leaking gas lines, fires and explosions, hazardous chemicals, and displaced wildlife. Economic loss and disruption of social systems are often enormous. Floods may destroy or damage structures, furnishings, business assets including records, crops, livestock, roads, and highways. They often deprive large areas of electric service, potable water supplies, wastewater treatment, communications, and many other community services, including medical care, and may do so for long periods of time.

Daggett County participates in the Emergency Program of the National Flood Insurance Program (NFIP), which is the initial phase of NFIP participation. The towns of Dutch John and Manila do not participate.



Table 6-3. Riverine Flooding: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
0.5 events per year	0.0	\$0	\$1	\$0	\$1	25.5	Very Low
<p><b>Annualized Frequency:</b> The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.</p> <p><b>Population:</b> Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.</p> <p><b>Expected Annual Loss scores</b> are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (<math>Expected Annual Loss = Exposure \times Annualized Frequency \times Historic Loss Ratio</math>). Source: National Risk Index, 2024e; 2024f</p>							

**Vulnerable Populations**

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions, especially those who are homeless or live in mobile homes, may be more vulnerable to river flooding. Structures without foundations are more likely to be swept away or damaged in a flood. Additionally, those who are unable to transport themselves to a safe location may be at risk.

Table 6-4. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

River floods may cause significant damage to critical facilities in the county. The following table lists types of critical facilities that could be negatively affected by damage from floods, which could delay emergency response and access to life-saving medical equipment.

Table 6-5. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John



Critical Facility Type	Location
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
<i>Source: Resilience Analysis and Planning Tool, 2024</i>	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

**Changes in Development**

There is low impact based on current development trends, meaning future development will minimally increase the impacts of riverine flooding.

**Climate Change Implications**

**Effects of Climate Change on Severity of Impacts**

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation contributes to sustained flooding (Neighborhoods at Risk, 2024).

**Effects of Climate Change on Probability of Future Events**

*Table 6-6. Climate Projections for Daggett County, UT | Neighborhoods at Risk*

<b>Precipitation Projections</b>	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	Increasing annual precipitation can contribute to sustained flooding.
<i>Source: Neighborhoods at Risk, 2024</i>	

**FEMA NRI Score**

*Table 6-7. Riverine Flooding: Overall National Risk Index Score for Daggett County, UT | FEMA National Risk Index*

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>			
25.4	Very Low	Very Low	Relatively High
<i>Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d</i>			



## Flash Flood

### Hazard Description

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Along Flaming Gorge Reservoir and the Green River, Henrys Fork, Blacks Fork, Birch Creek, Red Creek, Crouse Creek, Sheep Creek, and their respective tributaries
<b>Seasonal Pattern or Conditions</b>	Heavy snowfall runoff in spring and early summer; monsoonal thunderstorms and heavy rainfall in late summer
<b>Duration</b>	Flooding can last hours to days or even months
<b>Analysis Used</b>	FIS, FIRM, GIS data, information from community residents, UGS, HUD Exchange, NOAA, NWS, NFIP, 2019 Utah Hazard Mitigation Plan, local newspaper articles, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund

Flash flood is defined by the NWS as “a rapid and extreme flow of high water into a normally dry area or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event (e.g., intense rainfall, dam failure, ice jam). Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters.” Flash floods differ from floods (discussed above in *River or Stream Flood*) in the rapidity with which they develop. River floods generally develop over a period of several days, providing more warning time and time for preparation and evacuation. Flash floods occur with little or no warning. They may occur during thunderstorms due to rapid runoff from steep terrain, from areas where the soil is already saturated, or in urban areas where vegetation has been removed and pavement has replaced exposed soil. Flash floods may also arise as the result of dam failure (discussed below).

### Location

Flooding affects the majority of Utah due to heavy mountain precipitation and runoff. Consistent wildfires also exacerbate existing flood risks. Daggett County can experience changes in the geography of the landscape from sediment movement during flash floods (Utah Hazard Mitigation Plan, 2019). Swelling or shrinking rocks and soils due to summer thunderstorms can cause favorable conditions for flash flooding in Daggett County. Swelling or shrinking soils are found in the Mancos Shale, the Brushy Basin Member of the Morrison Formation, the Chinle Formation, and the Moenkopi Formation within the county (UGS, 1964). However, despite their locations near many streams and rivers, Dutch John and Manila have a low flash flood threat.

Areas in Daggett County that are susceptible to flash flooding include Jarvie Ranch, Clay Basin, Browns Park, South Valley, Dutch John Bench, Birch Creek, Red Creek, and Sheep Creek. Browns Park Road, Red Creek Road, State Line Road, Bennion Lane, Hwy 43, Hwy 44, Hwy 191, Linwood Lane, E 3rd Road in Manila, and Sols Canyon Road are also prone to repeat flash flooding. Both Dutch John and



Manila have primarily dirt roads, including many in Manila that slope from north to south. Emergency repairs are frequently necessary to maintain passage over the roads.

**Extent**

Flash floods occur suddenly within six hours of intense rainfall from a thunderstorm or several thunderstorms. Flash floods are possible amongst Daggett County’s creek beds, making these areas especially hazardous during rainfall.

Figure 6-3. Understanding Flooding (NWS, 2015)

**Historical Frequency & Probability of Future Occurrence**

The Storm Events Database from the NOAA lists seven flash flood events and one debris flow event in Daggett County between 2000–2023. Five of these flash flood events occurred in Dutch John, two in Manila, and one in unincorporated Daggett County. The following table lists all documented flash flood and debris flow events since 2000.

Table 6-8. Flood Events in Daggett County, UT (2000–2023)

Location Within County	Date	Event Type	Property Damage (\$)	Description
Manila	07/15/2004	Flash Flood	\$30,000	Heavy rain and hail fell in a short period of



Location Within County	Date	Event Type	Property Damage (\$)	Description
				time, causing water and mud to wash away a new construction area and several roads and flowing into garages and homes.
Eastern Uinta Mountains	08/09/2005	Debris Flow	\$500	Heavy rains caused mudslides 12 mi. N of Lapoint, wiping out 200 feet of fence.
Dutch John	08/03/2007	Flash Flood	N/A	Heavy rain caused flash flooding near Jarvie Ranch.
Dutch John	09/05/2007	Flash Flood	\$2,000	Heavy rain caused flash flood with water five feet deep that ran across Browns Park Road, damaging and eroding it.
Manila	07/22/2008	Flash Flood	\$75,000	Heavy rain caused flash flooding over Hwy 43 and Hwy 44. Debris flowed onto roads, into canals, houses, and fields. Roads and a settling pond were washed out, and crops, fences, landscaping, and irrigation systems were damaged.
Dutch John	09/17/2013	Flash Flood	N/A	Flash flooding from rain and hail observed along Hwy 191.
Dutch John	08/26/2014	Flash Flood	\$100,000	Flash flooding from heavy rain in Brown's Park basin, Jarvie Ranch, and Red Creek areas. Cofferdam failed.
Dutch John	07/20/2017	Flash Flood	N/A	Hail and heavy rain caused flash flooding on streets.

*Source: NOAA Storm Events Database, 2000–2023*

Flash flooding is likely to occur again in the future. According to Neighborhoods at Risk, Daggett County is expected to experience 0.3 more days of heavy precipitation per year by 2049 (from 1.3 days to 1.6 days per year). By 2049, Daggett County is also expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation. Heavy precipitation can lead to flash flooding as the ground fails to absorb



the high volume of precipitation that falls in a short period. Increasing annual precipitation can contribute to sustained flooding.

**Impacts & Loss Estimates**

Any area in Daggett County along Flaming Gorge Reservoir and the Green River, Henrys Fork, Blacks Fork, Birch Creek, Red Creek, Crouse Creek, Sheep Creek, and their respective tributaries, or along any gullies and washes are at risk to flash flooding, including the jurisdictions of Dutch John and Manila.

*Table 6-9. Impacts of Flash Flood by Jurisdiction*

Jurisdiction	Impacted by Flash Floods	Experienced Significant Flash Flood with \$1,000+ in Damage Since 2000	Fatalities Due to Flash Floods	Potential Impacts of Flash Floods
Daggett County	Yes	Yes	0	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
Town of Dutch John	Yes	Yes	0	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
Town of Manila	Yes	Yes	0	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses

Because flash floods develop so rapidly, people on foot or in automobiles may be stranded or may be swept away and injured or drowned. They are characterized by high velocity water flow and large amounts of debris, both of which cause damage to or destroy structures and other objects in their path.



At least \$207,500 in property damage has occurred since 2000 due to flash flooding, as reported by the Storm Events Database, although actual damage over this time period is likely much higher.

**Vulnerable Populations**

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions, especially those who are homeless or live in mobile homes, may be more vulnerable to flash flooding. Structures without foundations are more likely to be swept away or damaged in a flood. Additionally, those who are unable to transport themselves to a safe location may be at risk.

Table 6-10. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Flash floods may cause significant damage to critical facilities in the county. The following table lists types of critical facilities that could be negatively affected by damage from floods, which could delay emergency response and access to life-saving medical equipment.

Table 6-11. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila

Source: Resilience Analysis and Planning Tool, 2024

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

**Changes in Development**

There is low impact based on current development trends, meaning future development will minimally increase the impacts of flash flooding.



## Climate Change Implications

### Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation contributes to sustained flooding (Neighborhoods at Risk, 2024).

### Effects of Climate Change on Probability of Future Events

Table 6-12. Climate Projections for Daggett County, UT | Neighborhoods at Risk

<b>Precipitation Projections</b>	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	Increasing annual precipitation can contribute to sustained flooding.
<i>Source: Neighborhoods at Risk, 2024</i>	

### FEMA NRI Score

FEMA does not evaluate flash flood as part of its National Risk Index.

## Dam Failure

### Hazard Description

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Dam locations are located throughout the county, including near Dutch John and Manila
<b>Seasonal Pattern or Conditions</b>	Rainy Day Failure happens primarily during heavy precipitation events and can have some warning time. Sunny Day Failure happens with no warning at all and can happen at any time.
<b>Duration</b>	Hours, days. Depends on spillway type and area, maximum cfs discharge, overflow or breach type, dam type. Refer to Dam Inventory for more information.
<b>Analysis Used</b>	FIS, Utah Division of Water Rights and Dam Safety, local input, 2019 Utah Hazard Mitigation Plan, National Inventory of Dams, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund

Dam failure is the unintended release of impounded waters. Dams can fail for one or a combination of the following reasons:

- Overtopping caused by floods that exceed the capacity of the dam



- Deliberate acts of sabotage
- Structural failure of materials used in dam construction
- Poor design and/or construction methods
- Movement and/or failure of the foundation supporting the dam
- Settlement and cracking of concrete or embankment dams
- Piping and internal erosion of soil in embankment dams.
- Inadequate maintenance and upkeep

Failures may be categorized into two types: component failure of a structure that does not result in a significant reservoir release, and uncontrolled breach failure that leads to a significant release. With an uncontrolled breach failure of a manmade dam there is a sudden release of the impounded water, sometimes with little warning. The ensuing flood wave and flooding have enormous destructive power. The Dam Safety Program of the Utah Division of Water Rights is responsible for dam safety in Utah.

**Location**

Daggett County has a total of 93 dams scattered throughout the county, with two high hazard and three moderate hazard dams that have the potential to cause significant loss to property and/or life in the event of a dam failure (Utah Division of Water Rights, 2024). As shown in the table below, Manila is the only jurisdiction in Daggett County that would potentially be affected by a dam breach if one occurred. However, there is a very small unincorporated community below Flaming Gorge Dam that would be completely inundated if the Flaming Gorge Dam failed. In addition, the community of Jensen in Uintah County would be at risk if the dam failed.

*Table 6-13. Vulnerable Downstream Communities in Daggett County, UT*

Dam Name	DWRi Hazard Rating	First Downstream Community	Distance in Miles
BOR Flaming Gorge	High	Jensen	55
Long Park (Daggett)	High	Manila, Lucerne Valley	13
Browne Lake	Moderate	None—drains to Carter Creek	N/A
Sheep Creek	Moderate	None—drains to Green River	N/A
Spirit Lake	Moderate	None—drains to Green River	N/A

*Source: Utah Division of Water Rights, 2024*

**Extent**

Dams in Utah are classified according to hazard, size, and use. There are three hazard ratings used by the Dam Safety Program in Utah: high, moderate, and low. The hazard rating reflects proximity to people and property. High hazard dams are located where there are significant consequences downstream if the dam fails, such as loss of human life and significant property damage. Moderate hazard is typically defined as a dam whose failure will cause significant property destruction. Low hazard dams will cause minimal property destruction (Utah Hazard Mitigation Plan, 2019). As growth continues, homes are being built closer to dams, creating “hazard creep,” which creates additional urgency to ensure dams meet safety standards and don’t put lives and property at unnecessary risk (Dam Safety, 2024). The National Dam Safety Program breaks out these three hazard ratings even further using the following scale (FEMA, 2015).



Urgency of action	Characteristics and considerations	Potential actions
I – VERY HIGH URGENCY	<p><b>CRITICALLY NEAR FAILURE:</b> There is direct evidence that failure is in progress, and the dam is almost certain to fail during normal operations if action is not taken quickly.</p> <p>OR</p> <p><b>EXTREMELY HIGH RISK:</b> Combination of life or economic consequences and likelihood of failure is very high with high confidence.</p>	<ul style="list-style-type: none"> <li>• Take immediate action to avoid failure. Communicate findings to potentially affected parties.</li> <li>• Implement IRRMs.</li> <li>• Ensure that the emergency action plan is current and functionally tested.</li> <li>• Conduct heightened monitoring and evaluation. Expedite investigations and actions to support long-term risk reduction.</li> <li>• Initiate intensive management and situation reports.</li> </ul>
II - HIGH URGENCY	<p><b>RISK IS HIGH WITH HIGH CONFIDENCE, OR IT IS VERY HIGH WITH LOW TO MODERATE CONFIDENCE:</b> The likelihood of failure from one of these occurrences, prior to taking some action, is too high to delay action.</p>	<ul style="list-style-type: none"> <li>• Implement IRRMs.</li> <li>• Ensure that the emergency action plan is current and functionally tested.</li> <li>• Give high priority to heightened monitoring and evaluation. Expedite investigations and actions to support long-term risk reduction.</li> <li>• Expedite confirmation of classification.</li> </ul>
III - MODERATE URGENCY	<p><b>MODERATE TO HIGH RISK:</b> Confidence in the risk estimates is generally at least moderate, but can include facilities with low confidence if there is a reasonable chance that risk estimates will be confirmed or potentially increase with further study.</p>	<ul style="list-style-type: none"> <li>• Implement IRRMs.</li> <li>• Ensure that the emergency action plan is current and functionally tested.</li> <li>• Conduct heightened monitoring and evaluation. Prioritize investigations and actions to support long-term risk reduction.</li> <li>• Prioritize confirmation of classification as appropriate.</li> </ul>
IV – LOW TO MODERATE URGENCY	<p><b>LOW TO MODERATE RISK:</b> The risks are low to moderate with at least moderate confidence, or the risks are low with low confidence, and there is a potential for the risks to increase with further study.</p>	<ul style="list-style-type: none"> <li>• Ensure that routine risk management measures are in place.</li> <li>• Determine whether action can wait until after the next periodic review.</li> <li>• Before the next periodic review, take appropriate interim measures and schedule other actions as appropriate.</li> <li>• Give normal priority to investigations to validate classification, but do not plan for risk reduction measures at this time.</li> </ul>
V – NO URGENCY	<p><b>LOW RISK:</b> The risks are low and are unlikely to change with additional investigations or studies.</p>	<ul style="list-style-type: none"> <li>• Continue routine dam safety risk management activities and normal operations and maintenance.</li> </ul>

Figure 6-4. Joint Federal Risk Categories for Dam Failure

Of the 93 total dams in Daggett County, the Utah Division of Water Rights (DWRi) Dam Safety database identifies two high hazard dams in Daggett County (excluding inactive, planned, or under construction dams), as seen in the table below. A high hazard rating means there is a possibility of life being lost due to dam failure. Three dams are listed as having a moderate hazard rating, meaning there would be significant downstream property loss if the dam were to fail. 84 dams have a low hazard rating, which means if a dam failure were to occur, there would be insignificant property loss; however, these dams should still be monitored. The remaining four dams do not have a hazard rating but are still listed in the database. The classification of a high hazard dam does not mean that the dam has a high probability of failure. Dam safety hazard classifications simply delineate the downstream consequences if a dam were to fail. Potential dam failure in Daggett County is rated as “possible.” If a dam were breached in the county, the communities identified in the table in the *Location* section above would be affected.



The National Inventory of Dams (NID) ranks dams as high, significant, or low. The NID lists five dams in Daggett County that have a rating of high or significant.

In addition to listing all dams from DWRi Dam Safety in Daggett County with a rating of high or moderate, the following table notes all five dams from the National Inventory of Dams (NID) that have a rating of high or significant.

Table 6-14. Dams in Daggett County, UT

	Dam Name	DWRi Hazard Rating	NID Hazard Rating
1	BOR Flaming Gorge	High	High
2	Long Park (Daggett)	High	High
3	Browne Lake	Moderate	Significant
4	Sheep Creek	Moderate	Significant
5	Spirit Lake	Moderate	Significant

Source: Dam Safety, 2024; NID, 2024

Flaming Gorge is a high hazard dam located in Daggett County. The first downstream community is Jensen, which is a census-designated place in Uintah County with 372 people and is 55 miles away. The dam was completed in 1964 and is owned by the Department of the Interior Bureau of Reclamation. The reservoir storage at spillway crest is 3,789,000 acre-feet, and the reservoir storage at dam crest is 4,003,000 acre-feet. The spillway type is a gated spillway, and the maximum dam breach flow is 999,000 cfs with a 0-square mile drainage basin area.

**Historical Frequency & Probability of Future Occurrence**

Presently, there is no historical record of dam failure in Daggett County aside from the minor failure of a coffer dam installed in Red Creek near Dutch John during a flash flood due to heavy rain in 2014 (Storm Events Database, 2024). However, dam failure could occur at any time without warning, so it’s imperative to continue monitoring each dam in the county, especially those with high or moderate hazard ratings. The town of Manila is most at risk of a dam failure. The town of Dutch John has minimal risk.

The risk of dam failure is not likely to increase so long as dams are maintained as they are required by law. However, according to Neighborhoods at Risk, Daggett County is expected to experience 0.3 more days of heavy precipitation per year by 2049 (from 1.3 days to 1.6 days per year). By 2049, Daggett County is also expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation. Heavy precipitation can lead to flooding as the ground fails to absorb the high volume of precipitation that falls in a short period, which has the potential to suddenly overwhelm a dam, especially if the dam is not carefully monitored and maintained.

**Impacts & Loss Estimates**

The town of Manila and parts of unincorporated Daggett County may be impacted by dam failure, as presented in the table below. Dutch John has minimal direct risk since there are no full-sized dams located upstream of Dutch John.

Table 6-15. Impacts of Dam Failure by Jurisdiction

Jurisdiction	May Be Impacted by Dam Failure	Potential Impacts of Dam Failure
Daggett County	Yes	Injury, drowning, blunt force trauma, death, downed power lines,



Jurisdiction	May Be Impacted by Dam Failure	Potential Impacts of Dam Failure
		displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses
Town of Dutch John	Yes (by small coffer or retention dams)	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses
Town of Manila	Yes	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses

High and moderate hazard dams have the potential to cause possible loss of human life (high hazard) or significant property damage (moderate hazard) if they were to fail and are therefore of most concern to the county. However, due to strict regulations, frequent monitoring, and periodic inspection of these high and moderate hazard dams, the likelihood of a dam failure is low.

The severity of a dam failure depends on the area surrounding the dam or levee, the volume and velocity of water that breaches the structure, and the structures and population in the area. A dam failure will result in flooding of normally protected areas, primarily low-lying areas downstream of the dam, resulting in impacts similar to those seen that are within the normal floodplain. Impacts include damaged or destroyed essential utilities, homes, major roads, crops, and businesses. See the table below for specific potential losses associated with the dam failure hazard.

Table 6-16. Critical Facilities Potentially Impacted by Dam Failure

Dam	Potentially Impacted if Dam Failed										
	Hospitals/ Medical Clinics	Schools	EOC	Police Station	Fire Station	County/City Facilities	Essential Utilities	Major Roads/Bridges	Homes	Crops	Businesses
BOR Flaming Gorge							X	X	X	X	
Long Park (Daggett)	X				X	X	X	X	X	X	X
Browne Lake											
Sheep Creek								X	X	X	
Spirit Lake								X			

The 2019 Utah State Hazard Mitigation Plan compiled the total potential dam inundation area for each county in Utah. For Daggett County, 24.74 square miles (out of 718.9 total square miles in the county)



could potentially be affected by one or more dam failures. This is a percentage of 3.44%. The town of Manila has the most potential for significant loss of life and/or property.

**Vulnerable Populations**

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions, especially those who are homeless or live in mobile homes, may be more vulnerable to dam failure. Structures without foundations are more likely to be swept away or damaged in the event of a dam failure and the subsequent flash flood. Additionally, those who are unable to quickly transport themselves to a safe location may be at risk.

Table 6-17. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Dam failure and subsequent flooding may cause significant damage to critical facilities in the county. The following table lists types of critical facilities that could be negatively affected by damage from dam failure, which could delay emergency response and access to life-saving medical equipment.

Table 6-18. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila

Source: Resilience Analysis and Planning Tool, 2024

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

**Changes in Development**

There is low impact based on current development trends, meaning future development will minimally increase the impacts of dam failure.



### Climate Change Implications

#### Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation contributes to sustained flooding and places more pressure on existing dams (Neighborhoods at Risk, 2023).

#### Effects of Climate Change on Probability of Future Events

Table 6-19. Climate Projections for Daggett County, UT | Neighborhoods at Risk

<b>Precipitation Projections</b>	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	Increasing annual precipitation can contribute to sustained flooding and threaten reservoir/lake capacities, which may place additional pressure on existing dams.
<i>Source: Neighborhoods at Risk, 2024</i>	

#### FEMA NRI Score

FEMA does not evaluate dam failure as part of its National Risk Index.



# CHAPTER 7 DROUGHT

## HAZARD DESCRIPTION

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Countywide, including Dutch John and Manila
<b>Seasonal Pattern or Conditions</b>	Generally summer and early fall
<b>Duration</b>	Drought events may last one month to several months to years
<b>Analysis Used</b>	National Drought Mitigation Center, NCEI, 2019 Utah Hazard Mitigation Plan, RGJ, NOAA, NWS, Utah Division of Water Resources, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, UCAR

Drought is an expected phase in the climactic cycle of almost any geographical region. Objective, quantitative definitions for drought exist but most authorities agree that, because of the many factors contributing to it and because its onset and relief are slow and indistinct, none is entirely satisfactory. According to the National Drought Mitigation Center, drought “originates from a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector” (NDMC, 2024). What is clear is that a condition perceived as “drought” in a given location is the result of a significant decrease in water supply relative to what is “normal” in that area.

It should be noted that water supply is not only controlled by precipitation (amount, frequency, and intensity) but also by other factors, including evaporation (which is increased by higher-than-normal heat and winds), transpiration, temperature, soil moisture, and human use.

Utah specifically is a dry landscape and is among one of the driest states in the country, receiving on average approximately 13 inches of precipitation per year (Utah Hazard Mitigation Plan, 2019).

## LOCATION

Daggett County is subject to drought events due to its partial location in the semi-arid region of Utah. The county is represented by one of the seven different climate divisions in Utah, which is referred to as the Northern Mountains division (see following figure). The part of the Northern Mountains division that is located in Daggett County primarily consists of the Uinta Mountains, which have no real dry season with warm-to-hot summers and cold, snowy winters (Climate of Utah, 2009). Drought events affect the county, incorporated cities, and unincorporated communities.

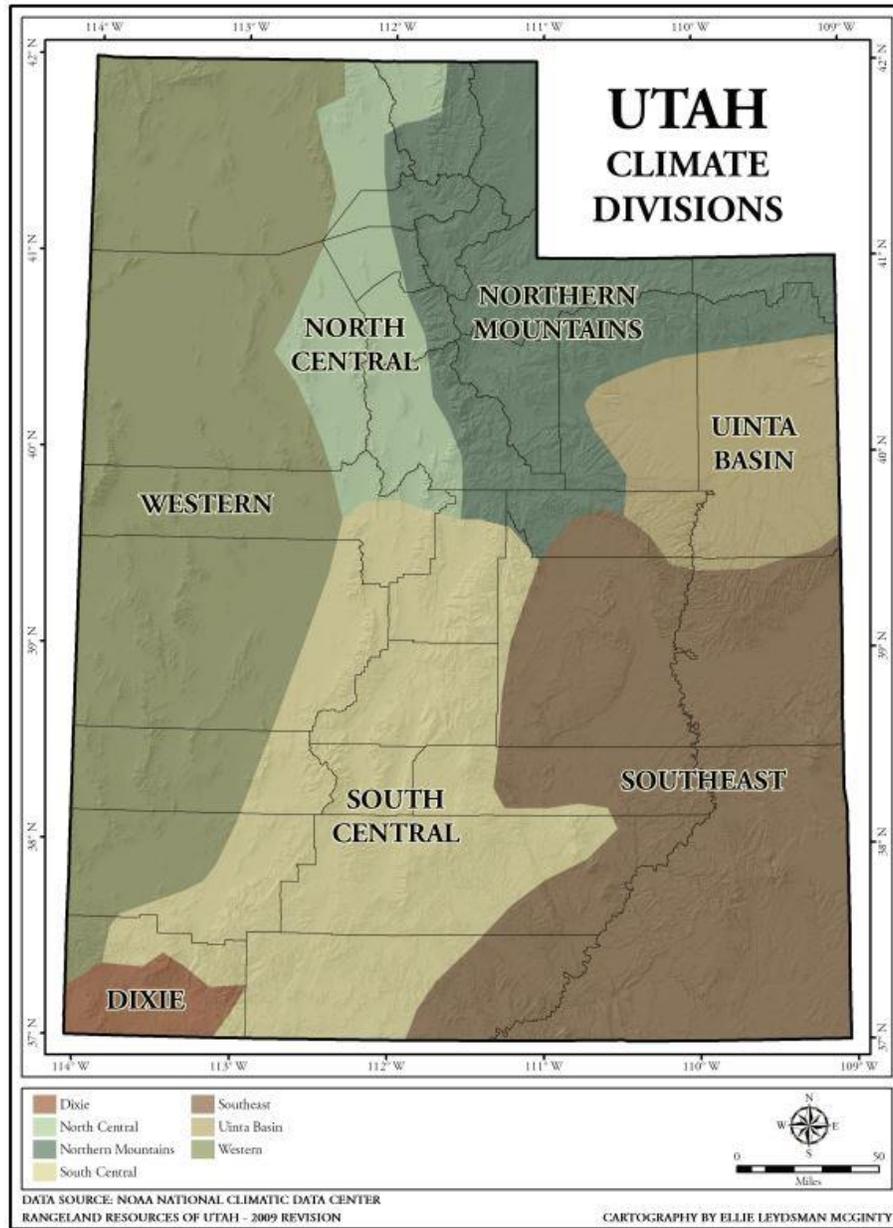


Figure 7-1. Utah Climate Divisions

## EXTENT

The following figure displays the precipitation conditions for the United States using the Palmer Drought Severity Index, which is taken from the National Weather Service (NWS). The Palmer Drought Severity Index (PDSI) is a means of quantifying drought in terms of prolonged and abnormal moisture deficiency or excess. This index indicates general conditions and not local variations caused by isolated rain. The PDSI is an important climatological tool for evaluating the scope, severity, and frequency of prolonged periods of abnormally dry or wet weather. It can be used to help delineate disaster areas and indicate the availability of irrigation water supplies, reservoir levels, range conditions, amount of stock water, and potential intensity of forest fires (NWS, 2024).



The PDSI expresses this comparison of moisture deficiency and moisture excess on a numerical scale that usually ranges from positive five to negative five. Positive values reflect excess moisture supplies, while negative values indicate moisture demands in excess of supplies.

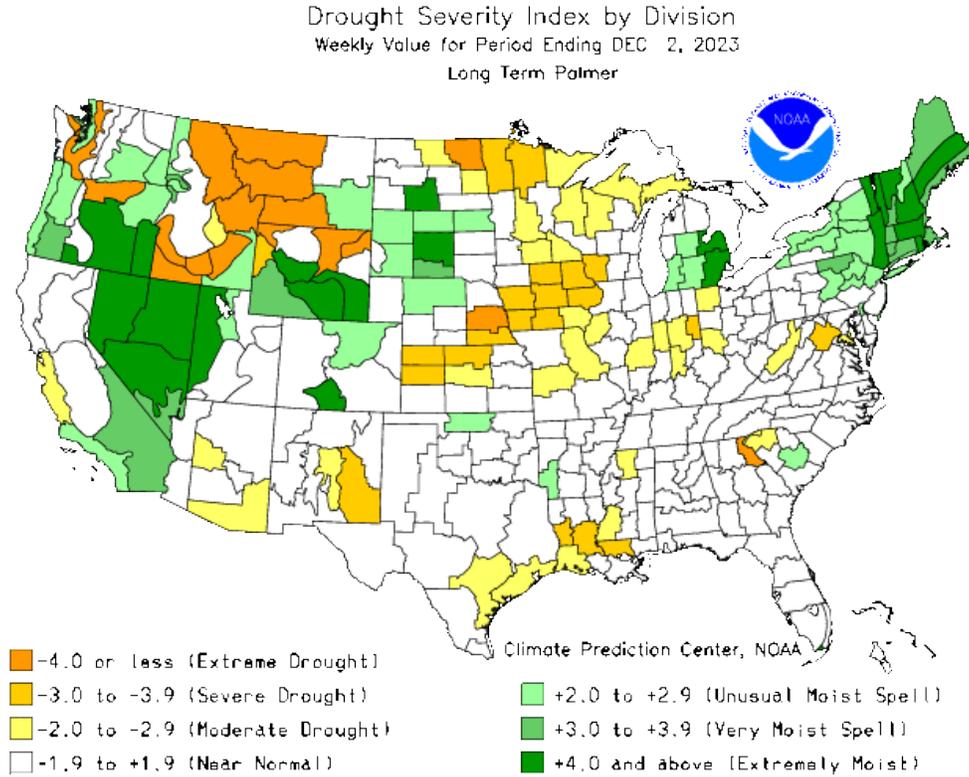


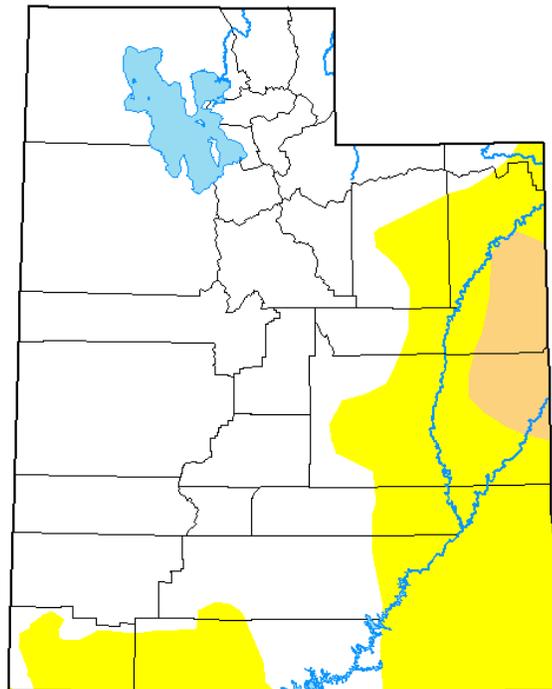
Figure 7-2. U.S. Drought Severity Index

The National Drought Mitigation Center also rates drought throughout the nation by intensity using a D0 (Abnormally Dry) to D4 (Exceptional Drought) scale, as seen in the map of Utah below. The majority of Daggett County is currently experiencing no drought but is abnormally dry (NDMC, 2024).



# U.S. Drought Monitor Utah

**March 12, 2024**  
(Released Thursday, Mar. 14, 2024)  
Valid 8 a.m. EDT



**Intensity:**

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>*

**Author:**

Curtis Riganti  
National Drought Mitigation Center



**droughtmonitor.unl.edu**

Figure 7-3. U.S. Drought Monitor Utah (NDMC, 2024)

The Standardized Precipitation Index (SPI) is a probability index that considers only precipitation. The SPI is based on the standardized probability of recording a given amount of precipitation in a specific area. The index is negative for drought and positive for wet conditions. The index becomes more positive or negative as conditions become more severe. The 1-month SPI for North America in February of 2024 can be seen below (NCEI, 2024).



### 1-Month Standardized Precipitation Index

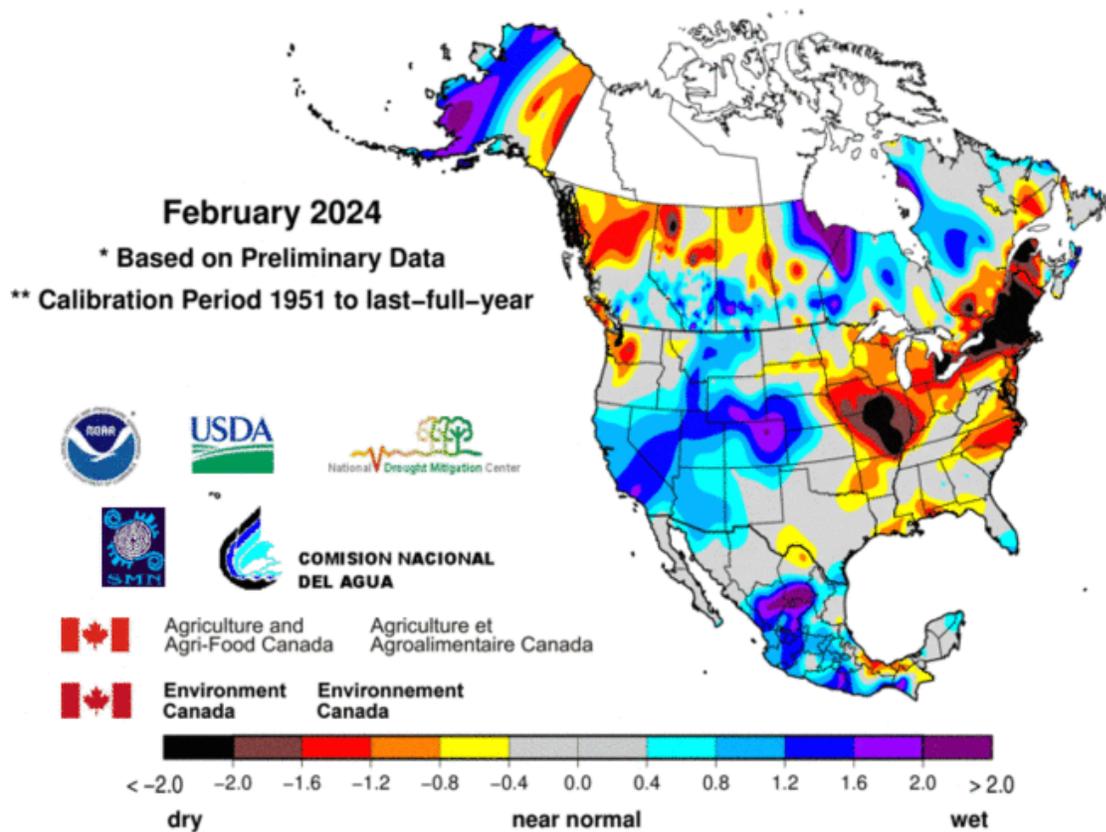


Figure 7-4. 1-Month Standardized Precipitation Index

## HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Droughts are common occurrences in Daggett County. There have been several multi-year droughts in Utah since 1898, which are listed below (Utah Hazard Mitigation Plan, 2019). Utah has been in a prolonged drought since 1987 until recently in 2023.

- 1898–1905
- 1933–1943
- 1950–1966
- 1971–1977
- 1987–2023

Daggett County has historically experienced prolonged drought events followed by nearly equally prolonged periods of no drought until about 2017 when droughts began occurring closer together (RGJ, 2024). The southeastern region of the county is currently abnormally dry, while the central region has no drought or notable dryness (Drought, 2024). The list below notes the periods of drought in Daggett County since 2000 (RGJ, 2024).



- July 2000–October 2000
- June 2001–November 2001
- February 2002–February 2006
- July 2006–October 2006
- November 2006–May 2008
- February 2010–June 2010
- January 2012–October 2013
- March 2014–August 2014
- January 2018–February 2019
- October 2019–March 2020
- July 2020–March 2023

An extended drought is likely to occur again in the future. According to Neighborhoods at Risk, Daggett County is expected to experience 4 more days that reach above 95°F by 2049 (2024). As annual temperatures continue to increase and dry conditions remain consistent, more frequent and lengthy droughts are likely to occur. In fact, Daggett County is expected to experience an increase in average annual temperature of 3°F by 2049. Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NOAA, 2022).

## IMPACTS & LOSS ESTIMATES

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by drought, as presented in the table below.

*Table 7-1. Impacts of Drought by Jurisdiction*

Jurisdiction	Impacted by Drought	Experienced Exceptional Drought Since 2010	Potential Impacts of Drought
Daggett County	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages
Town of Dutch John	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages
Town of Manila	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages

Drought is agriculture’s most expensive, frequent, and widespread form of natural disaster. Drought produces a complex web of impacts that spans many sectors of the economy and reaches well beyond the



area experiencing physical drought. This complexity exists because water is integral to our ability to produce goods and provide services.

Impacts are commonly referred to as direct or indirect. Reduced crop, rangeland, and forest productivity; increased fire hazard; reduced water levels; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat are a few examples of direct impacts. The consequences of these impacts illustrate indirect impacts. For example, a reduction in crop, rangeland, and forest productivity may result in reduced income for farmers and agribusiness, increased prices for food and timber, unemployment, reduced tax revenues because of reduced expenditures, increased crime, foreclosures on bank loans to farmers and businesses, migration, and disaster relief programs. The impacts of drought can be categorized as economic, environmental, or social.

Many economic impacts occur in agricultural and related sectors because of the reliance of these sectors on surface and subsurface water supplies. In addition to obvious losses in yields in crop and livestock production, drought is associated with increases in insect infestations, plant disease, and wind erosion. The incidence of forest and range fires increases substantially during extended droughts, which in turn places both human and wildlife populations at higher levels of risk.

Income loss is another indicator used in assessing the impacts of drought because so many sectors are affected. Reduced income for farmers has a ripple effect. Retailers and others who provide goods and services to farmers face reduced business. This leads to unemployment, increased credit risk for financial institutions, capital shortfalls, and loss of tax revenue for local, state, and federal government. Less discretionary income affects the recreation and tourism industries. Prices for food, energy, and other products increase as supplies are reduced. In some cases, local shortages of certain goods result in the need to import these goods from outside the stricken region.

Table 7-2. Drought: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
77.6 events per year	N/A	N/A	N/A	\$285	\$285	80.1	Very Low
<p><i>Annualized Frequency:</i> The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.</p> <p><i>Population:</i> Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.</p> <p><i>Expected Annual Loss</i> scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (<math>Expected Annual Loss = Exposure \times Annualized Frequency \times Historic Loss Ratio</math>). Source: National Risk Index, 2024e; 2024f</p>							

## Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People particularly susceptible to drought are farmers who rely on crop revenue, people living in poverty, and those with chronic illnesses, such as asthma.



Table 7-3. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

*Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024*

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Drought places high demands on the water supply and sometimes even electrical power supplies that can lead to blackouts or brownouts when accompanied by high heat. The following table lists types of critical facilities that could be negatively affected by power outages or limited water supply, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 7-4. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila

*Source: Resilience Analysis and Planning Tool, 2024*

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

### Changes in Development

There is no impact based on current development trends on either current or future development.

## CLIMATE CHANGE IMPLICATIONS

### Effects of Climate Change on Severity of Impacts

According to University Corporation for Atmospheric Research (UCAR), climate change is causing more extreme weather events, including more extreme drought. UCAR explains that warmer temperatures cause more evaporation, turning water into vapor in the air and causing drought in some areas of the world. Places prone to drought are expected to become even drier over the following century (UCAR, 2024).



Higher temperatures, increasing variation in precipitation patterns, and changes in lake levels are likely to increase the vulnerability of cities to extreme events (including flooding, drought, heat waves, and more intense urban heat island effects), compounding already existing stressors.

## Effects of Climate Change on Probability of Future Events

Table 7-5. Climate Projections for Daggett County, UT | Neighborhoods at Risk

<b>Heat Projections</b>	By 2049, Daggett County is expected to experience 4 more days that reach above 95°F (from 2 days to 6 days per year).
	By 2049, Daggett County is expected to have a 3°F increase (from 41°F to 44°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent extreme heat events.
<i>Source: Neighborhoods at Risk, 2024</i>	

## FEMA NRI SCORE

Table 7-6. Drought: Overall National Risk Score for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>			
78.5	Very Low	Very Low	Relatively High
<i>Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d</i>			



# CHAPTER 8 EARTHQUAKE

## HAZARD DESCRIPTION

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Countywide, including Dutch John and Manila; refer to earthquake quaternary faults map
<b>Seasonal Pattern or Conditions</b>	Can occur at any time
<b>Duration</b>	Event duration is short, but the recovery may be long term
<b>Analysis Used</b>	USGS, UGS, GIS data, SMS Tsunami Warning, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS

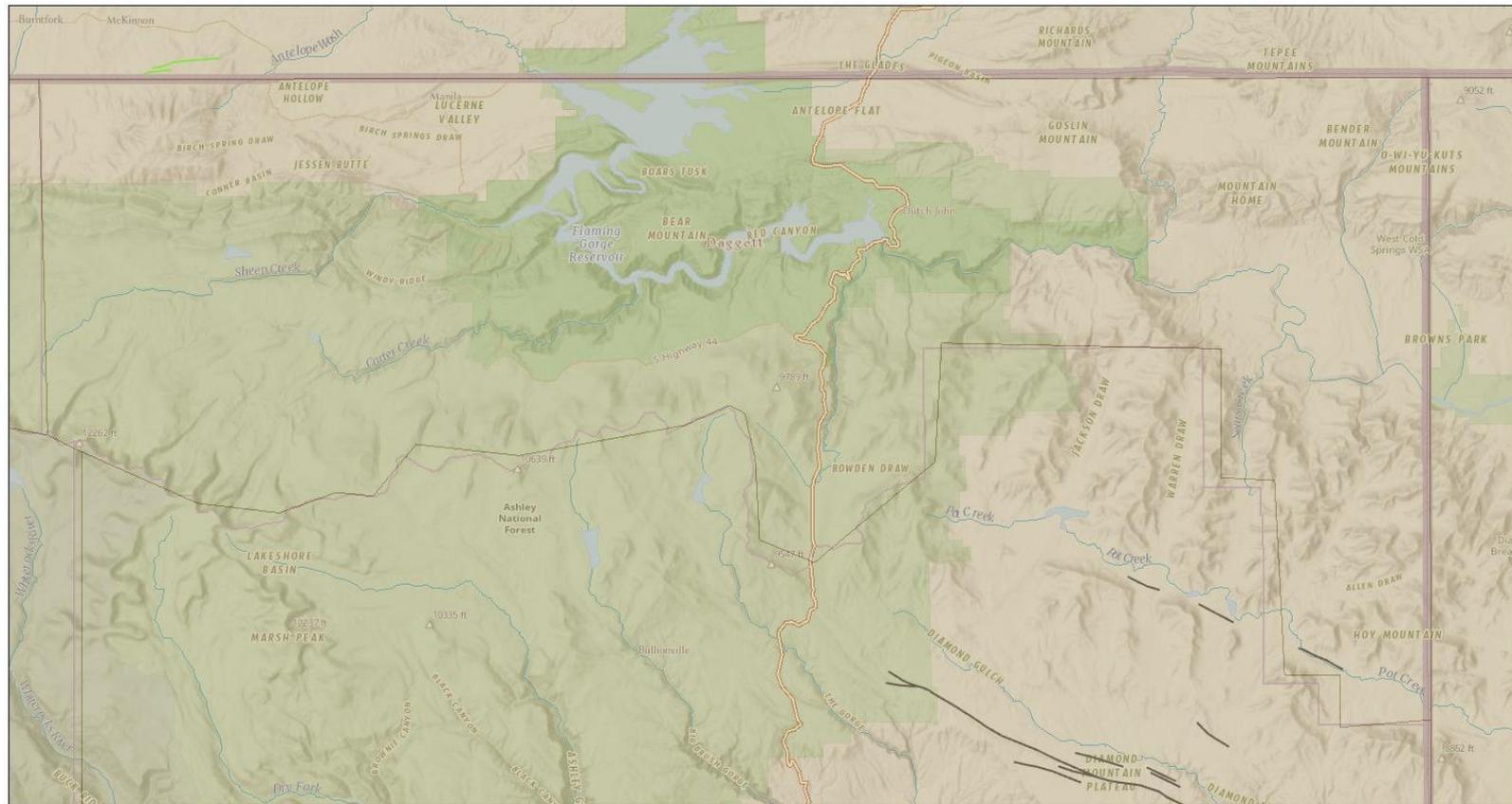
The U.S. Geological Survey (USGS) defines earthquake as “ground shaking caused by the sudden release of accumulated strain by an abrupt shift of rock along a fracture in the Earth or by volcanic or magmatic activity, or other sudden stress changes in the Earth.” The hazards associated with earthquake are essentially secondary to ground shaking (also called seismic waves), which may cause buildings to collapse; displacement or cracking of the earth’s surface; flooding as a result of damage to dams or levees; and fires from ruptured gas lines, downed power lines, and other sources. Earthquakes cause both vertical and horizontal ground shaking, which varies both in amplitude (the amount of displacement of the seismic waves) and frequency (the number of seismic waves per unit time), usually lasting less than thirty seconds.

## LOCATION

This hazard may affect every community in Daggett County, including the jurisdictions of Dutch John and Manila. The only quaternary fault in Daggett County is located in the extreme lower southeastern corner of the county along Pot Creek. This fault crosses remote ranchland and does not appear to present any fault rupture risk to structures or the population. However, a visible fault line in Dutch John would affect dam roads, pipelines, utilities, and systems, and older buildings and homes in the town if it were to rupture. Most of the structures in Dutch John and Manila are older and not up to current earthquake codes. A map of Daggett County’s quaternary faults can be seen below (USGS, 2024).

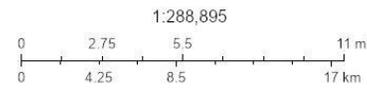


### Daggett County Quaternary Faults



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- |   |   |   |
|---|---|---|
| <ul style="list-style-type: none"> <li>USA Counties Generalized Boundaries - USA Counties - Generalized</li> <li>Fault Areas</li> <li>Class B</li> <li>Historic</li> <li>late Quaternary</li> <li>latest Quaternary</li> <li>middle and late Quaternary</li> <li>National Database</li> <li>Historic (&lt; 150 years), well constrained location</li> <li>Historic (&lt; 150 years), moderately constrained location</li> </ul> | <ul style="list-style-type: none"> <li>Historic (&lt; 150 years), inferred location</li> <li>Latest Quaternary (&lt; 15,000 years), well constrained location</li> <li>Latest Quaternary (&lt; 15,000 years), moderately constrained location</li> <li>Latest Quaternary (&lt; 15,000 years), inferred location</li> <li>Late Quaternary (&lt; 130,000 years), well constrained location</li> <li>Late Quaternary (&lt; 130,000 years), moderately constrained location</li> <li>Late Quaternary (&lt; 130,000 years), inferred location</li> <li>Middle and late Quaternary (&lt; 750,000 years), well constrained location</li> <li>Middle and late Quaternary (&lt; 750,000 years), moderately constrained location</li> <li>Middle and late Quaternary (&lt; 750,000 years), inferred location</li> </ul> | <ul style="list-style-type: none"> <li>Undifferentiated Quaternary (&lt; 1.6 million years), well constrained location</li> <li>Undifferentiated Quaternary (&lt; 1.6 million years), moderately constrained location</li> <li>Undifferentiated Quaternary (&lt; 1.6 million years), inferred location</li> <li>Unspecified age, well constrained location</li> <li>Unspecified age, moderately constrained location</li> <li>Unspecified age, inferred location</li> <li>Class B (various age), well constrained location</li> <li>Class B (various age), moderately constrained location</li> <li>Class B (various age), inferred location</li> </ul> |
|---|---|---|



Utah Geospatial Resource Center, Esri, TomTom, Garmin, SafeGraph, METINASA, USGS, Bureau of Land Management, EPA, NPS, USDA, USFWS, Esri, NASA, NGA, USGS

Sources: Esri, USGS | Utah Geospatial Resource Center, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METINASA, USGS, Bureau of Land Management, EPA, NPS, USDA, USFWS | Esri, NASA, NGA, USGS | USGS | Esri; U.S. Department of Commerce, Census Bureau; U.S. Department of

Figure 8-1. Daggett County Quaternary Faults (USGS, 2024)



## EXTENT

Earthquakes are measured both in terms of their inherent “magnitude” and in terms of their local “intensity.”

The magnitude of an earthquake is essentially a relative estimate of the total amount of seismic energy released and may be expressed using the familiar “Richter scale” or using the “moment magnitude scale” now favored by most technical authorities. On either scale, significant damage can be expected from earthquakes with a magnitude of about 5.0 or higher. What determines the amount of damage that might occur in any given location, however, is not the magnitude of the earthquake but the intensity at that particular place. Earthquake intensity decreases with distance from the earthquake’s “epicenter” (its focal point) but also depends on local geological features, such as depth of sediment and bedrock layers.

Intensity is most commonly expressed using the “Modified Mercalli Intensity Scale” (MMI). Mercalli intensity is assigned based on eyewitness accounts. More quantitatively, intensity may be measured in terms of “peak ground acceleration” (PGA) expressed relative to the acceleration of gravity (g) and determined by seismographic instruments.

While Mercalli and PGA intensities are arrived at differently, they correlate reasonably well. While the locations most susceptible to earthquakes are known, there is little ability to predict an earthquake in the short term.

The following table correlates the MMI intensity with the Richter scale and effects of ground shaking:

Category	Effects	Richter Scale (approximate)
I. Instrumental	Not felt	1-2
II. Just perceptible	Felt by only a few people, especially on upper floors of tall buildings	3
III. Slight	Felt by people lying down, seated on a hard surface, or in the upper stories of tall buildings	3.5
IV. Perceptible	Felt indoors by many, by few outside; dishes and windows rattle	4
V. Rather strong	Generally felt by everyone; sleeping people may be awakened	4.5
VI. Strong	Trees sway, chandeliers swing, bells ring, some damage from falling objects	5
VII. Very strong	General alarm; walls and plaster crack	5.5
VIII. Destructive	Felt in moving vehicles; chimneys collapse; poorly constructed buildings seriously damaged	6
IX. Ruinous	Some houses collapse; pipes break	6.5
X. Disastrous	Obvious ground cracks; railroad tracks bent; some landslides on steep hillsides	7
XI. Very disastrous	Few buildings survive; bridges damaged or destroyed; all services interrupted (electrical, water, sewage, railroad); severe landslides	7.5
XII. Catastrophic	Total destruction; objects thrown into the air; river courses and topography altered	8

Figure 8-2. Modified Mercalli Scale vs. Richter Scale (SMS Tsunami Warning, 2024)

## HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Daggett County is in the lowest earthquake risk zone in Utah, zone 1, according to the Utah State Building Code seismic zone map (UGS, 1987). Daggett County experiences very few earthquakes, with



most earthquakes in Daggett County occurring at a magnitude of 4.0 or lower. Due to the low magnitude of these earthquakes, there is very little recordable damage, and they are rarely noticeable by residents within this rural and sparsely populated region.

The USGS keeps a record of earthquakes throughout the world in their Earthquake Catalog. The following table lists all earthquakes felt in Daggett County since 1980 with a magnitude of 3.0 or higher, which is only two earthquakes. The USGS also records all mining explosions and quarry blasts in their database, which usually register as a 3.5 magnitude or lower and account for over half of the “felt earthquakes” in the county (USGS, 2024). These blasts are not included in the table below.

Table 8-1. Felt Earthquakes with Magnitude 3.0+ in Daggett County, UT

Date	Location	Magnitude	MMI Rating (as felt in Daggett County)
01/05/2006	Northwest corner of county, 7 km SSW of McKinnon, WY	3.2	N/A
05/25/2016	15 km NNE of Tabiona	4.0	I-II

Source: USGS, 2024

Low magnitude earthquakes of 4.0 or lower are expected to continue at the current trend. Higher magnitude earthquakes in Daggett County that cause significant damage are unlikely. Climate change currently has no known impact on earthquakes and is unlikely to contribute to earthquakes in Daggett County.

## IMPACTS & LOSS ESTIMATES

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by earthquakes, as presented in the table below.

Table 8-2. Impacts of Earthquake by Jurisdiction

Jurisdiction	May be Impacted by Earthquakes	Experienced Earthquake with Magnitude 3.0+	Potential Impacts of Earthquakes
Daggett County	Yes	Yes	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses
Town of Dutch John	Yes	No	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses
Town of Manila	Yes	No	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses



Earthquakes are capable of catastrophic consequences, especially in urban areas. Worldwide, earthquakes have been known to cost thousands of lives and enormous economic and social losses. In minor earthquakes, damage may be done only to household goods, merchandise, and other building contents, and people are occasionally injured or killed by falling objects. More violent earthquakes may cause the full or partial collapse of buildings, bridges and overpasses, and other structures. Most of the structures in Dutch John and Manila are older and not up to current earthquake codes and would be destroyed in a larger earthquake. Fires due to broken gas lines, downed power lines, and other sources are common following an earthquake and often account for much of the damage. Economic losses arise from destruction of structures and infrastructure, interruption of business activity, and innumerable other sources. Utilities may be lost for long periods of time and all modes of transportation may be disrupted. Emergency Services, including medical, may be both disabled and overwhelmed. In addition to broken gas lines, other hazardous materials may be released.

Table 8-3. Earthquake: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
0.074% chance per year	0.0	\$458	\$5,810	N/A	\$6,268	36.2	Very Low
<p><u>Annualized Frequency:</u> The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.</p> <p><u>Population:</u> Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.</p> <p><u>Expected Annual Loss</u> scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (<math>Expected Annual Loss = Exposure \times Annualized Frequency \times Historic Loss Ratio</math>). Source: National Risk Index, 2024e; 2024f</p>							

## Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People living in structures that are not up to current earthquake code, particularly older structures, are more likely to be damaged in an earthquake. Additionally, those who are unable to seek protection during an earthquake or transport themselves to a safe location after an earthquake may be at further risk.

Table 8-4. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%



Vulnerability Category	Number	Percent
<i>Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024</i>		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Earthquakes may cause significant damage to critical facilities, including power outages from downed power lines or damaged power plant facilities. The following table lists types of critical facilities that could be negatively affected by earthquakes, which could delay emergency response and access to life-saving medical equipment.

Table 8-5. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila

*Source: Resilience Analysis and Planning Tool, 2024*

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

### Changes in Development

No data exists demonstrating the impact of earthquakes on future development in Daggett County. However, past earthquakes have been shown to impact zoning regulations and building codes requiring developers to build structures more resistant to seismic activity.

### Probabilistic 100-Year Earthquake—Magnitude 5

Text

## CLIMATE CHANGE IMPLICATIONS

### Effects of Climate Change on Severity of Impacts

The exact nature and extent of this impact still needs to be studied and fully understood as it pertains to climate change.

### Effects of Climate Change on Probability of Future Events

Climate change currently has no known impact on earthquakes and is unlikely to contribute to future earthquakes in Daggett County.



### FEMA NRI SCORE

Table 8-6. Earthquake: Overall National Risk Index Score for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>			
28.4	Very Low	Very Low	Relatively High
<i>Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d</i>			



# CHAPTER 9 LANDSLIDE

## HAZARD DESCRIPTION

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Along northern flank of Uinta Mountains, especially near outcroppings of the Cretaceous Hilliard Shale formation and Bishop Conglomerate; along U.S. 191
<b>Seasonal Pattern or Conditions</b>	Runoff or heavy rain
<b>Duration</b>	Events may last minutes to hours to months
<b>Analysis Used</b>	UDOT, NOAA, UGS, USGS, 2019 Utah Hazard Mitigation Plan, Utah State University, local newspaper articles, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund

The term “landslide” encompasses several types of occurrences (including mudslides) in which slope-forming materials, such as rock and soil, move downward under the influence of gravity. Such downward movement may occur as the result of an increase in the weight of slope-forming materials, an increase in the gradient (angle) of the slope, a decrease in the forces resisting downward motion (friction or material strength), or a combination of these factors. Factors that may trigger a landslide include weather-related events, such as heavy rainfall (one of the most common contributors), erosion, and freeze-thaw weakening of geologic structures; human causes, such as excavation and mining, deforestation, and vibration from explosions or other source; and geologic causes, such as earthquake and shearing or fissuring. The speed of descent ranges from sudden and rapid to an almost imperceptibly slow creep where effects are only observable over a period of months or years.

## LOCATION

Landslides in Daggett County are most common along the northern flank of the Uinta Mountains in areas with Cretaceous Hilliard Shale outcroppings and areas adjacent to the Bishop Conglomerate formation (Kowallis, 2005). The Bishop Conglomerate is a bedrock layer that extends across the Uinta Mountains and goes into Wyoming and Colorado. It consists of loosely cemented boulders, cobbly conglomerate, and pebbly sandstone (USGS, 2009). There are many outcroppings of the Bishop Conglomerate that are exposed along the slopes of the Uinta Mountains with weak Mesozoic shales and mudstones underneath. This leads to a perfect opportunity for landslides to develop, especially when the slopes become steep and moisture conditions increase. Loose gravel atop the Bishop Conglomerate makes landslides even more probable; however, these gravel layers are more common on the south flank of the Uinta Mountains in Uintah County than on the north flank in Daggett County (Kowallis, 2005).

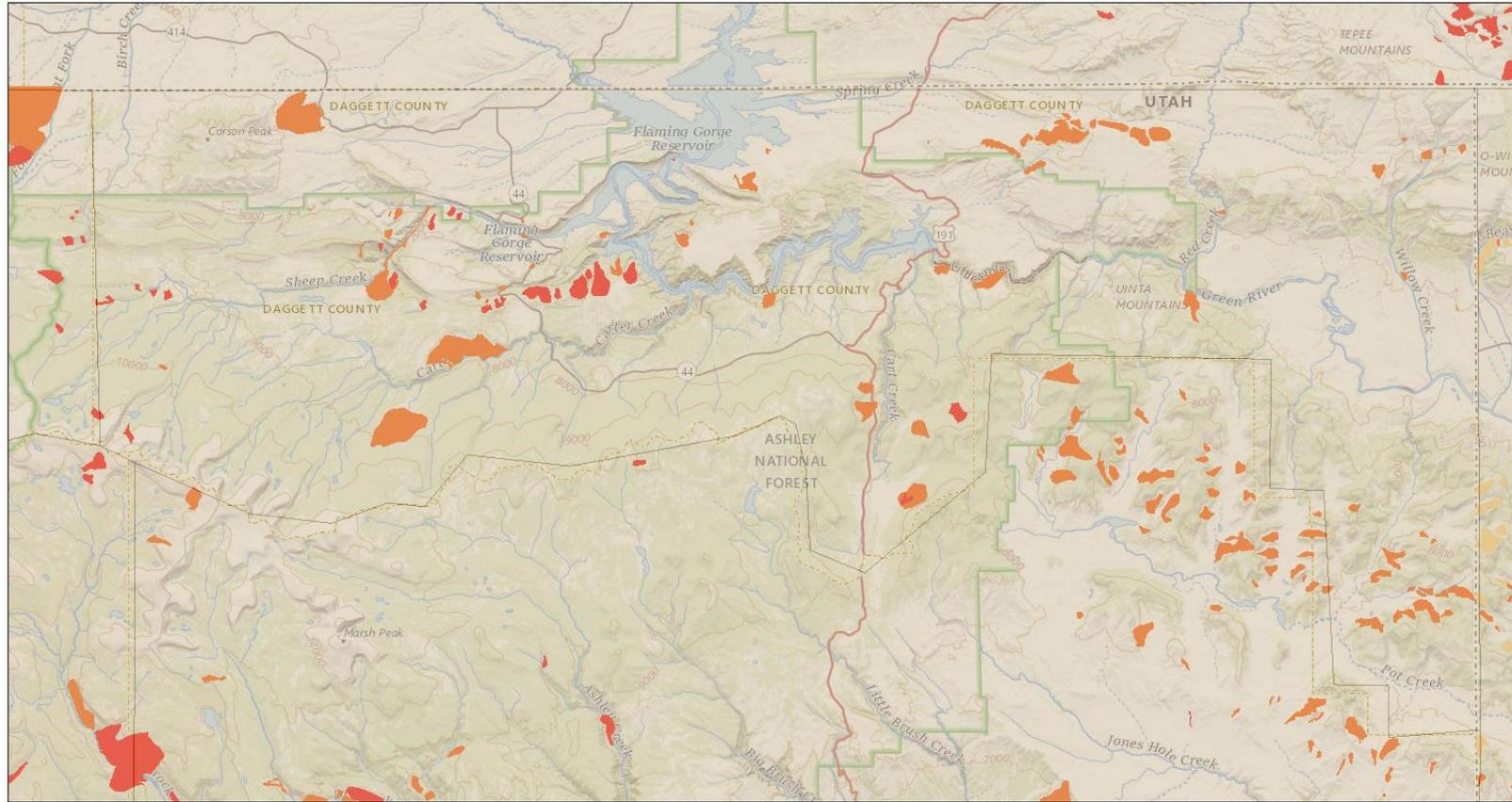
Spring run-off or heavy rain periods may cause expansion of soils, such as clay and large rock. This is mainly a problem on U.S. 191 and is the responsibility of the Utah Department of Transportation (UDOT) to manage. However, routes that are affected can cause traffic and travel time delays.



The map below shows the likely and probable landslide locations within Daggett County. There are several areas, namely north of Conner Basin along Hwy 43, north of Half Moon Park along Forest Road 218, Hwy 191, Hwy 44, Carter Creek, Dowd Mountain, Hideout Draw, Red Canyon, Goslin Mountain Road, Jesse Ewing Canyon, Browns Park Road, and Allen Draw, that could pose a potential risk to recreational visitors (hikers, etc.), local roads, and some primary residences due to landslides.



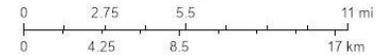
### Daggett County Landslides



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- USA Counties Generalized Boundaries - USA Counties - Generalized
- Likely landslide at or near this location (3)
- Probable landslide in the area (2)
- Possible landslide in the area (1)
- Confident consequential landslide at this location (5)

1:288,895



USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset. USGS

ArcGIS Web AppBuilder

Esri; U.S. Department of Commerce, Census Bureau; U.S. Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), National Geodetic Survey (NGS) | USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic

Figure 9-1. Daggett County Probable Landslide Locations (USGS, 2024)



As stated in the previous regional plan, there are approximately 12.8 residential structures within Daggett County located on approximately 5,551 acres of historically active landslides. The potential threat to roads and utilities is shown in the following table.

Table 9-1. Potential Landslide Threat to Roads and Utilities

Transportation	
Name	Miles
Local Neighborhood/City Roads	4.07
State Route 44	0.4
Utilities	
Name	Miles
Power Lines	0.747

### EXTENT

Factors that influence landslides are soil type and steepness of slope. Soil type is a key indicator for landslide potential and is used by geologists and geotechnical engineers to determine soil stability for construction standards. Past movements are also a good indicator of where movements might possibly exist.

The following map from Utah State University depicts landslide susceptibility in parts of Daggett County, Duchesne County, and Uintah County. Landslide susceptibility in the Uinta Basin is classified within the categories of High, Moderate, Low, and Very Low, as seen below (USU, 2013).

- *High Susceptibility:* Areas of existing shallow and deep landslides are shown as red on the map. Slope and geologic unit were not included as criteria in this category.
- *Moderate Susceptibility:* Areas that have slopes prone to landslides based on observed landslide slope angles are shown as orange on the map. The category includes slopes greater than 12% (7 deg.) to greater than 32% (18 deg.), depending on the geologic unit present.
- *Low Susceptibility:* Areas that have slopes that may produce landslides are shown as yellow on the map. This category includes slopes from 9–12% (5–7 deg.) as the lower threshold ranging to 23–32% (13–18 deg.), for the upper threshold depending on the geologic unit present.
- *Very Low Susceptibility:* Areas that are unlikely to produce landslides are not assigned any particular color, but generally show up as tan on the map. This category includes slopes less than 9% (5 deg.) to less than 12% (7 deg.), depending on the geologic unit.



### Landslide Susceptibility

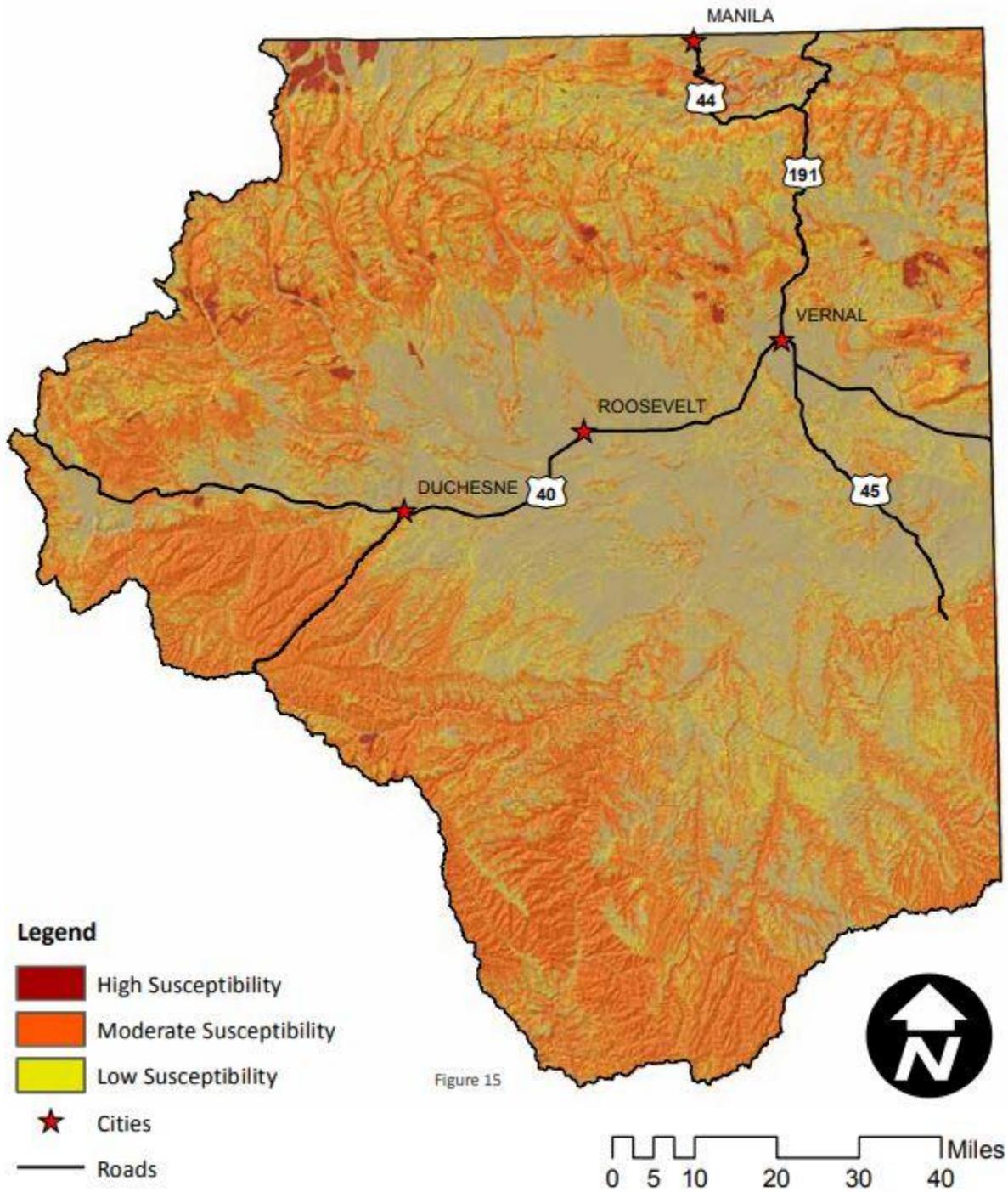


Figure 9-2. Landslide Susceptibility in the Uinta Basin (USU, 2013)



## HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Historically, many of the past landslides in the county occurred in the southern mountainous region of Daggett County. Generally, these landslides develop in well-defined, localized areas. Previous landslide areas will most likely be the location of future landslides. Additionally, several small-scale rockslides and landslides occur annually in Daggett County, usually due to heavy rain and flash flooding. These rockslides are often classified as debris flows, in which moving water carries mud, rocks, and other debris over the affected areas. The following table shows one mudslide between 2000–2023.

Table 9-2. Rockslide/Mudslide/Landslide Events in Daggett County, UT (2000–2023)

Location Within County	Date	Description
Eastern Uinta Mountains	08/09/2005	Heavy rain caused several mudslides 12 miles north of Lapoint, wiping out 200 feet of fence

Source: NOAA Storm Events Database, 2000–2023

Landslides are influenced by weather and climate events, such as drought, severe weather, wildfire, and flooding, which are expected to increase in severity with climate change. According to Neighborhoods at Risk, Daggett County is expected to experience 4 more days that reach above 95°F by 2049 with an increase in average annual temperature of 3°F. Additionally, the county is expected to experience 0.3 more days of heavy precipitation per year by 2049 (from 1.3 days to 1.6 days per year) with a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation (2024). The planning area should anticipate potential for heightened landslide risk because of climate change and changing weather patterns. The planning area is subject to severe storms and weather on an annual basis, with monsoon rains regularly triggering flash flooding or debris flow events. Where severe storm events are expected to increase in frequency and intensity, landslides are likewise expected to become more frequent. Events such as wildfire and drought can change the landscape of an area as vegetation is damaged or lost with these events. These changes can make landscapes vulnerable to landslides and debris flows.

## IMPACTS & LOSS ESTIMATES

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by landslides, as presented in the table below.

Table 9-3. Impacts of Landslide by Jurisdiction

Jurisdiction	Impacted by Landslides	Potential Impacts of Landslides
Daggett County	Yes	Injury, blunt force trauma, death, property damage, road closures, road destruction/blockages, loss of land usage, industrial/agricultural/forest productivity losses, reduced property values, decreased tourism, loss of utilities, unintentional dams, reduced water quality, economic losses, repair expenses, debris removal expenses
Town of Dutch John	No	No impacts likely
Town of Manila	No	No impacts likely



Some of the many direct and indirect impacts of landslides are:

- Human and animal deaths and injuries and resulting productivity losses
- Damage or destruction of structures
- Destruction or blockage of roadways and resulting transportation interruption
- Loss of or reduced land usage
- Loss of industrial, agricultural, and forest productivity
- Reduced property values in areas threatened by landslide
- Loss of tourist revenues and recreational opportunities
- Damaged or destroyed infrastructure and utilities
- Damming or alteration of the course of streams and resulting flooding
- Reduced water quality

There is only limited information on the direct and indirect economic costs of geologic hazards in the U.S., such as landslides. However, it is estimated that landslides in the U.S. cause between \$1.7 and \$3.4 billion in damages each year (Utah Hazard Mitigation Plan, 2019).

Losses due to landslide events are generally tied to the repair of roadways or the removal of debris on roadways. These roads are maintained by UDOT. Limited course of mitigation may occur because it is not economically feasible for UDOT to spend tax dollars to rebuild a new road route or remove the large facing walls of rock and soil.

Based upon figures provided by the Daggett County Assessor’s Office in 2012, the market value of residential structures at risk to potential landslides was estimated to be \$960,000. The potential loss to roads and utilities is shown in the table below.

Table 9-4. Potential Landslide Losses to Roads and Utilities

Transportation	
Name	Estimated Cost
Local Neighborhood/City Roads	\$8,140,000
State Route 44	\$1,000,000
Utilities	
Name	Estimated Cost
Power Lines	\$36,065
<i>Note: Costs are in 2012 dollars.</i>	

The Expected Annual Loss scores from the National Risk Index can be seen below.

Table 9-5. Landslide: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
0 events per year	0.0	\$17,400	\$4,500	N/A	\$21,900	98.7	Relatively High
<i>Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or</i>							



Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>							
<p><i>probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.</i></p> <p><i>Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.</i></p> <p><i>Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f</i></p>							

### Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People who are unable to seek immediate protection during a landslide or transport themselves to a safe location after a landslide may be at further risk.

Table 9-6. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Landslides may cause significant damage to critical facilities and could take out power or communication lines. The following table lists types of critical facilities that could be negatively affected by landslides, which could delay emergency response and access to life-saving medical equipment.

Table 9-7. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila

Source: Resilience Analysis and Planning Tool, 2024



Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

### Changes in Development

There is no impact based on current development trends on either current or future development.

## CLIMATE CHANGE IMPLICATIONS

### Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. This can make the ground more unstable and at risk for increased landslides. Increasing annual precipitation contributes to sustained flooding (Neighborhoods at Risk, 2023).

### Effects of Climate Change on Probability of Future Events

Table 9-8. Climate Projections for Daggett County, UT | Neighborhoods at Risk

<b>Precipitation Projections</b>	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	Increasing annual precipitation can lead to unstable ground and contribute to landslides.
<i>Source: Neighborhoods at Risk, 2024</i>	

## FEMA NRI SCORE

Table 9-9. Landslide: Overall National Risk Index Score for Daggett County, UT | FEMA National Risk Index

<b>Risk Index Score</b>	<b>Risk Index Rating</b>	<b>Social Vulnerability Rating</b>	<b>Community Resilience Rating</b>
<b>Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County</b>			
97.8	Relatively High	Very Low	Relatively High
<i>Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d</i>			



## CHAPTER 10 PROBLEM SOILS

### HAZARD DESCRIPTION

Problem soils, such as expansive, compressible, and collapsible soils, can cause extensive damage to structures and foundations. Land subsidence, earth fissures, and radon gas are a few of the effects of problem soils and rock. Problem soils also prevent or limit successful crop production because the land is not fertile or productive, and there is a possibility of erosion hazard when cultivated.

Expansive soils and land subsidence are of most concern to the communities of Daggett County, so they are broken down further in the following *Related Hazards* section.

### RELATED HAZARDS

#### Expansive Soils

##### *Hazard Description*

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Countywide, including Dutch John and Manila
<b>Seasonal Pattern or Conditions</b>	Year-round event
<b>Duration</b>	Ongoing variable
<b>Analysis Used</b>	UGS, 2019 Utah Hazard Mitigation Plan, Science Direct, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Neighborhoods at Risk

Expansive soil and rock consist of high clay content that swells when wet and shrinks when dry (UGS, 2024). Expansive clay is prone to large volume changes when affected by water. In drier seasons, soils experience shrinkage, often causing deep cracks in the ground, which are called vertisols. These soils are considered to be one of the more problematic soils because they can cause damage to various structures, especially lightweight civil structures such as sidewalks and driveways, due to the shifting soils beneath the structures (Science Direct, 2024).

Soils consisting of coarse-grained particles (e.g., cobbles, pebbles, and sands) can also be expansive depending on the percentage and type of clay minerals present in the soil’s fine content. The primary elements present in clays are silicone, aluminum, and oxygen, although other elements such as hydrogen, sodium, calcium, magnesium, and sulphur may also be present. Common clay minerals that are prone to swelling include smectite, bentonite, montmorillonite, vermiculite, and chlorite (Science Direct, 2024).

##### **Location**

Expansive soils as a hazard is site-specific, meaning that each incorporated jurisdiction will have its own vulnerability level. Every jurisdiction, including Dutch John and Manila, may be affected by expansive



soils, although limited data currently exists on specific locations. Alkali soils are especially a concern in Dutch John and Manila.

**Extent**

Expansive soils have a swelling potential that depends on the mineral composition of the soil and the in situ moisture content and density. Soil permeability also affects the rate of swelling. According to Atterberg limits, which are useful in predicting soil behavior, the degree of expansion of a soil can be classified as seen in the table below (Science Direct, 2024).

Table 10-1. Degree of Expansion

Soil Properties	Low	Medium	High	Very High
Liquid Limit	20–25	35–50	50–70	70–90
Plasticity Index	< 12	12–23	23–32	> 32
Shrinkage Index	< 15	15–30	30–60	> 60
Free Swell Percentage	< 50	50–100	100–200	> 200

Source: Science Direct, 2024

Expansive soils can also be classified in terms of linear extensibility percent (LEP), which ranges from low to very high. LEP is the linear expression of the volume difference of natural soil fabric at 1/3 bar or 1/10 bar water content and oven dryness, as reported as a percent change for the whole soil (Canadian County, 2013). The following table shows the LEP classifications.

Table 10-2. Linear Extensibility Percent (LEP) Classifications

Expansion Potential	Linear Extensibility Percent
Very High	> 9%
High	6%–9%
Moderate	3%–6%
Low	< 3%
Water	0%

Source: Canadian County, 2013

**Historical Frequency & Probability of Future Occurrence**

Due to lack of data, there is no way to predict the likely frequency of expansive soil impacts. As of the time of this plan’s development, there is not an inventory of past problem soil events throughout the county. The history, therefore, has been largely reliant on the community knowledge of residents in the region, sharing experiences with problem soil impacts. Limited data makes it difficult to know how likely a future problem soil occurrence is in the county. However, as the county’s infrastructure ages, especially dated water and sewer lines, it becomes more susceptible to damage from expansive soils. A prolonged period of drought could also significantly speed and intensify infrastructure deterioration.

**Impacts & Loss Estimates**

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by expansive soils, as presented in the table below.



Table 10-3. Impacts of Expansive Soils by Jurisdiction

Jurisdiction	May Be Impacted by Expansive Soils	Potential Impacts of Expansive Soils
Daggett County	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
Town of Dutch John	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
Town of Manila	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures

Structural damage to lightweight structures, such as sidewalks, driveways, and roadways, is most common due to expansive soils. Lifting of buildings, damage to basements, building settlement, and cracks in walls and ceilings are other problems related to the continual shrinking and swelling of soils. Damage may occur to pipelines and other public utilities, as well. Lateral movement of foundations and retaining walls is a likely impact due to pressure exerted on vertical walls from shifting soils. This can also lead to loss of residual shear strength (Science Direct, 2024).

Damaged pavements may result in high maintenance and replacement costs, along with increased legal and financial liability from pavement separation and gaps causing possible trip hazards. Future maintenance may disrupt business activities, resulting in increased costs or loss of revenue. While problem soils have caused significant infrastructure damage and economic impact, there have been no deaths recorded in Utah due to problem soils directly (Utah Hazard Mitigation Plan, 2019).

Due to the nature of expansive soils, since it rests upon moisture content and geologic makeup throughout the county, it is difficult to mitigate. Transportation corridors have existed for decades throughout the county, and road structures were made during times when soil analysis was not utilized as it is today. When it is economically and environmentally feasible, roads may be relocated to accommodate vehicle travel. However, where building construction is an issue, building codes are followed to ensure lives and lands are protected.

Further studies and data will need to be explored to evolve the mitigation efforts and responses to avoid building and continuous repairing of problems caused by expansive soils.

**Vulnerable Populations**

There are many vulnerable populations in Daggett County, including those in the table below. People who live in areas with low infrastructure funding are more likely to experience issues with problem soils, such as damage to pavements and roads, crumbling building foundations, and sinkholes. While these issues could occur anywhere, the damage is more likely to go unrepaired and continue to worsen in disadvantaged locations. Those who are unable to immediately respond and transport themselves to a safe location after an incident may be at further risk.

Table 10-4. Vulnerable Populations in Daggett County, UT

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%



Vulnerability Category	Number	Percent
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

*Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024*

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Problem soils could cause significant damage to critical facilities depending on location. The following table lists types of critical facilities that could be negatively affected by problem soils, which could delay emergency response and access to life-saving medical equipment.

Table 10-5. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila

*Source: Resilience Analysis and Planning Tool, 2024*

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

**Changes in Development**

There is no impact based on current development trends on either current or future development.

**Climate Change Implications**

**Effects of Climate Change on Severity of Impacts**

The exact nature and extent of this impact still needs to be studied and fully understood as it pertains to climate change.

**Effects of Climate Change on Probability of Future Events**

Table 10-6. Climate Projections for Daggett County, UT | Neighborhoods at Risk

<b>Precipitation Projections</b>	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.



	Increasing annual precipitation can lead to unstable ground and contribute to additional soil swelling.
<i>Source: Neighborhoods at Risk, 2024</i>	

**FEMA NRI Score**

FEMA does not evaluate expansive soils as part of its National Risk Index.

**Land Subsidence**

**Hazard Description**

<b>Potential Probability</b>	Low
	Medium
	High
<b>Potential Consequence</b>	Low
	Medium
	High
<b>Location</b>	Countywide, including Dutch John and Manila
<b>Seasonal Pattern or Conditions</b>	Year-round event
<b>Duration</b>	Ongoing variable
<b>Analysis Used</b>	UGS, USGS, NOAA, 2019 Utah Hazard Mitigation Plan, Water Education Foundation, local newspaper articles, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Neighborhoods at Risk

Land subsidence is the sinking or settling of the Earth’s surface caused by groundwater depletion and/or underground mine subsidence or collapse. Earth fissures may result from subsidence, which are permanent, linear tension cracks in the ground that extend upward from the groundwater table (UGS, 2024). Primary causes of subsidence include groundwater withdrawals, drainage of organic soils, underground mining, and natural compaction or collapse (e.g., sinkholes). Natural hazards like earthquakes and erosion can cause subsidence, as well (USGS, 2019). The photo to the right depicts an earth fissure from land subsidence and groundwater withdrawal in Enoch, Utah (UGS, 2011).

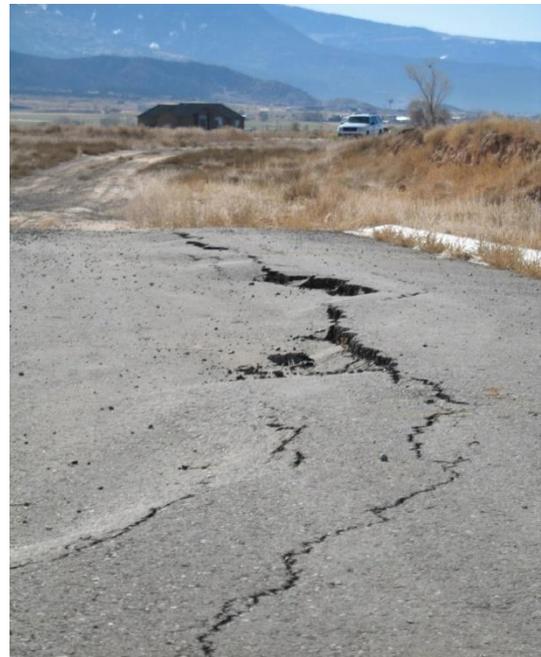


Figure 10-1. Earth Fissure in Enoch, UT (UGS, 2011)

**Location**

Every jurisdiction, including Dutch John and Manila, may be affected by expansive soils, although limited data currently exists on specific locations.

**Extent**

The NOAA National Geodetic Survey maintains a network of GPS receivers throughout the country, called a Continuously Operating Reference Station (CORS). This can track height changes at local stations to monitor subsidence. Areas without a CORS can measure



subsidence from satellite radar, temporary GPS receivers, repeated surveys of geodetic leveling, or installations of ground and water sensors (NOAA, 2024).

Extensometers are another way to measure subsidence and aquifer compaction by measuring the amount of compaction between the well anchor and the ground level. Extensometers are deep wells of up to 3000 feet below the ground surface. The following figure depicts a diagram of a borehole extensometer (Harris-Galveston, 2024).

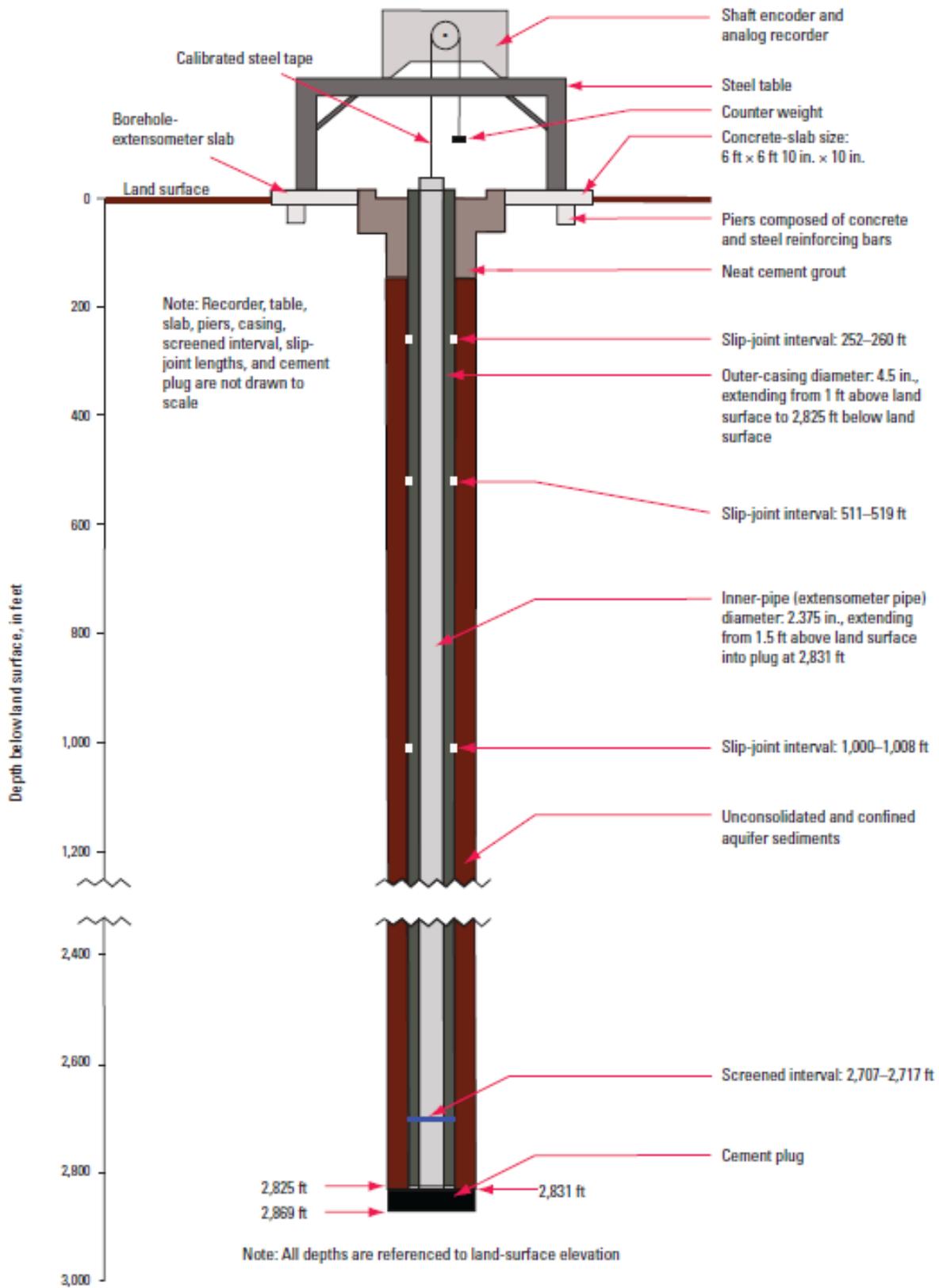


Figure 10-2. Borehole Extensometer Diagram



**Historical Frequency & Probability of Future Occurrence**

As of the time of this plan’s development, there is not an inventory of past problem soil events throughout the county. The history, therefore, has been largely reliant on the community knowledge of residents in the region, sharing experiences with problem soil impacts. Limited data makes it difficult to know how likely a future problem soil occurrence is in the county. However, as more water is pumped from the ground and prolonged periods of drought continue, land subsidence in Daggett County will only worsen. Damage from subsidence may occur more frequently as the county’s infrastructure ages.

**Impacts & Loss Estimates**

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by land subsidence, as presented in the table below.

*Table 10-7. Impacts of Land Subsidence by Jurisdiction*

Jurisdiction	May Be Impacted by Land Subsidence	Potential Impacts of Land Subsidence
Daggett County	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
Town of Dutch John	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
Town of Manila	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures

Land subsidence may damage buildings, civil structures, aqueducts, well casings, bridges, and highways. Flooding events can increase or intensify as the land sinks. This can also impact sewer lines, water lines, and storm drainage. Drought can magnify impacts as more groundwater is extracted from aquifers, causing the ground to compact and cave in on itself (Water Education, 2024).

Due to the nature of land subsidence, since it rests upon moisture content and geologic makeup throughout the county, it is difficult to mitigate. Transportation corridors have existed for decades throughout the county, and road structures were made during times when soil analysis was not utilized as it is today. When it is economically and environmentally feasible, roads may be relocated to accommodate vehicle travel. However, where building construction is an issue, building codes are followed to ensure lives and lands are protected.

Further studies and data will need to be explored to evolve the mitigation efforts and responses to avoid building and continuous repairing of problems caused by subsidence.

**Vulnerable Populations**

There are many vulnerable populations in Daggett County, including those in the table below. People who live in areas with low infrastructure funding are more likely to experience issues with problem soils, such as damage to pavements and roads, crumbling building foundations, and sinkholes. While these issues could occur anywhere, the damage is more likely to go unrepaired and continue to worsen in disadvantaged locations. Those who are unable to immediately respond and transport themselves to a safe location after an earth fissure or sinkhole opens up may be at further risk.



Table 10-8. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%

*Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024*

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Problem soils could cause significant damage to critical facilities depending on location. For example, if a sinkhole opened up under or near a hospital or fire station, the impact to the community could become detrimental. The following table lists types of critical facilities that could be negatively affected by land subsidence, which could delay emergency response and access to life-saving medical equipment.

Table 10-9. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila

*Source: Resilience Analysis and Planning Tool, 2024*

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

**Changes in Development**

There is no impact based on current development trends on either current or future development.

**Climate Change Implications**

**Effects of Climate Change on Severity of Impacts**

The exact nature and extent of this impact still needs to be studied and fully understood as it pertains to climate change.

**Effects of Climate Change on Probability of Future Events**



Table 10-10. Climate Projections for Daggett County, UT | Neighborhoods at Risk

<b>Heat Projections</b>	By 2049, Daggett County is expected to experience 4 more days that reach above 95°F (from 2 days to 6 days per year).
	By 2049, Daggett County is expected to have a 3°F increase (from 41°F to 44°F) in average annual temperatures.
	Increasing annual temperatures and prolonged periods of frequent drought can contribute to land subsidence as more groundwater is drained.
<i>Source: Neighborhoods at Risk, 2024</i>	

**FEMA NRI Score**

FEMA does not evaluate land subsidence as part of its National Risk Index.



# CHAPTER 11 CAPABILITY ASSESSMENT

## JURISDICTIONAL CAPABILITY ASSESSMENT

### Daggett County

Table 11-1. Daggett County Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
Daggett County Emergency Management	2024 Hazard Mitigation Plan; EOP; 2009 Hazardous Materials Response Plan	X			EOP: Currently in the development phase Hazardous Materials Response Plan: Addresses hazmat concerns, hazmat facilities, incident command centers, hazmat response plans, response training, etc. Landslides, mudslides, flash floods, and earthquakes are briefly mentioned.
Daggett County Planning & Zoning Commission	2008 General Plan; 2017 General Plan Appendix; Land Use Code; Zoning and Subdivision Ordinance; 2017 Resource Management Plan; Landownership/Parcel Maps	X			General Plan: No hazard section, but includes resource info and goals about building codes, land use, recreation/tourism, agriculture, public safety, transportation and infrastructure, environmentally sensitive areas, natural resources, and economic development. Recognizes need for mitigating development in hazardous areas.
Daggett County GIS	Parcel Map; Zoning Map	X			Parcel/Zoning Maps: Available through online interactive portal

**Expansion, Implementation, and Improvement:** The General Plan will more closely align with the hazard mitigation plan.

#### **Opportunities for Plan Integration**

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Daggett County Local



Emergency Planning Committee (LEPC), Daggett County department heads, and the incorporated towns of Dutch John and Manila. The Daggett County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Daggett County will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission meets every Tuesday at 9am.

Table 11-2. Daggett County Fiscal Capability

Fiscal Capability	
Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

**Expansion, Implementation, and Improvement:** There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants. The county will also anticipate that the time and cost of maintaining the hazard mitigation plan will be significantly higher than in previous updates due to increased planning requirements by FEMA. Funds to support the cost match for updating this plan will need to be strategically determined.

Table 11-3. Daggett County Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and Implement/ Enforce?
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	No
Floodplain Ordinance(s)	No
Post Disaster Recovery Program	No
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	Yes
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	Yes

**Expansion, Implementation, and Improvement:** Daggett County will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more



effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-4. Daggett County Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	Available?	Full Time/Part Time/Other	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning & Zoning Commission
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Planning & Zoning Commission
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Planning & Zoning Commission
Personnel skilled or trained in GIS applications	Yes	Full Time	Daggett County GIS
Emergency manager	Yes	Full Time	Daggett County Emergency Management Office
Grant writers	Yes	N/A	Each department is responsible for writing their own grants

**Expansion, Implementation, and Improvement:** Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-5. Daggett County National Flood Insurance Compliance

National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	Daggett County Planning & Zoning
Who is your jurisdiction’s floodplain administrator? (department/position)	?
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	Yes
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	Yes
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No



**Expansion, Implementation, and Improvement:** Work toward NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a CRS Classification. Floodplain mapping for the entire county is limited and needs to be completed.

### Town of Dutch John

Table 11-6. Town of Dutch John Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
Town of Dutch John	2022 General Plan; 2023 Planning and Zoning Ordinance; Zoning Map; Open Burn Notice; Planning Commission Ordinance; Subdivision Plan	X			General Plan: Chapter 2 outlines hazardous areas within the town due to faults, landslides, snow slides, and floodplains. Hazmat and wildfires are discussed. Chapter 3 includes a Land Use Map. The plan also references zoning ordinances and economic development.

**Expansion, Implementation, and Improvement:** The General Plan will more closely align with the hazard mitigation plan.

#### Opportunities for Plan Integration

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Daggett County Local Emergency Planning Committee (LEPC), Daggett County department heads, and the incorporated towns of Dutch John and Manila. The Daggett County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Dutch John will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission holds workshop meetings once a month on the third Wednesday of each month at 7pm.

Table 11-7. Town of Dutch John Fiscal Capability

Fiscal Capability	
Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas, or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes



Fiscal Capability	
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No

**Expansion, Implementation, and Improvement:** There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants.

Table 11-8. Town of Dutch John Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and Implement/ Enforce?
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	No
Floodplain Ordinance(s)	No
Post Disaster Recovery Program	No
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	No
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	No

**Expansion, Implementation, and Improvement:** Dutch John will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions, such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-9. Town of Dutch John Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	Available?	Full Time/Part Time/Other	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning & Zoning
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	?
Planners or engineers with an	Yes	Full Time	Planning & Zoning



Administrative and Technical Capability			
understanding of natural hazards			
Personnel skilled or trained in GIS applications	Yes	Full Time	Daggett County GIS
Emergency manager	Yes	Full Time	Daggett County Emergency Management
Grant writers	Yes	N/A	Each department is responsible for writing their own grants

**Expansion, Implementation, and Improvement:** Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-10. Town of Dutch John National Flood Insurance Compliance

National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	?
Who is your jurisdiction’s floodplain administrator? (department/position)	?
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	Yes
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

**Expansion, Implementation, and Improvement:** Work toward the town’s NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a CRS Classification.

## Town of Manila

Table 11-11. Town of Manila Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
Town of Manila	2022 General Plan; Zoning Ordinance; Wildlife Corridors Map	X			Chapter 2 discuss land use and includes a land use map. Chapter 4 provides an outlook on future economic development. A hazard mitigation section is included in



Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
					Chapter 9, which outlines how the town participates in hazard mitigation. Floodplains and wildfire hazard areas are identified.

**Expansion, Implementation, and Improvement:** The General Plan will more closely align with the hazard mitigation plan.

**Opportunities for Plan Integration**

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Daggett County Local Emergency Planning Committee (LEPC), Daggett County department heads, and the incorporated towns of Dutch John and Manila. The Daggett County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Manila will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission meets every first Monday of each month.

Table 11-12. Town of Manila Fiscal Capability

Fiscal Capability	
Financial Resources	Accessible or Eligible to Use?
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas, or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No

**Expansion, Implementation, and Improvement:** There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants.

Table 11-13. Town of Manila Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and Implement/ Enforce?
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes



Legal and Regulatory Capability	
Stormwater Management Program	No
Floodplain Ordinance(s)	No
Post Disaster Recovery Program	No
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	No
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	No

**Expansion, Implementation, and Improvement:** Manila will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions, such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-14. Town of Manila Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	Available?	Full Time/Part Time/Other	Department/Agency/Position
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning & Zoning?
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Building Department?
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Planning & Zoning?
Personnel skilled or trained in GIS applications	Yes	Full Time	Daggett County GIS
Emergency manager	Yes	Full Time	Daggett County Emergency Management
Grant writers	Yes	N/A	Each department is responsible for writing their own grants

**Expansion, Implementation, and Improvement:** Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-15. Town of Manila National Flood Insurance Compliance

**National Flood Insurance Compliance**



National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	?
Who is your jurisdiction’s floodplain administrator? (department/position)	?
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	Yes
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

**Expansion, Implementation, and Improvement:** Continue to manage the town’s NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a better CRS Classification.

## BUILDING CODES

Updating and adopting new building codes, as well as addressing the effectiveness of these codes, can be one of the best ways to conduct mitigation. When properly designed and constructed, many buildings can withstand the impacts of high winds, earthquakes, floods, snow loads, or a tornado. The communities in Daggett County are working with various versions of the International Codes published by the International Code Council, Inc. (ICC). These codes include:

- 2015 International Residential Code
- 2017 International Building Code
- 2017 International Mechanical Code
- 2017 International Plumbing Code
- 2017 International Fuel Gas Code
- The residential provisions of the 2015 International Energy Conservation Code
- The commercial provisions of the 2017 International Energy Conservation Code
- 2017 International Existing Building Code
- 2006 edition of the Utah Wildland Urban Interface Code

Additionally, Daggett County enforces the 2017 National Electrical Code and the 2005 edition of the NFPA 225 Model Manufactured Home Installation Standard, both issued by the National Fire Protection Association. Ground snow loads are found by entering specific locations into the 2018 Utah Ground Snow Load Map.

The towns of Dutch John and Manila all follow the above International Codes.

## Code Administration

Enforcement of code standards is very important to hazard mitigation. Adequate inspections are needed during the course of construction to ensure that the builder understands and implements the requirements. The Building Code Effectiveness Grading Schedule (BCEGS) is a national program used by the insurance industry to determine how well new construction is protected from wind, earthquake, and other non-flood hazards. It is similar to the CRS program and the fire insurance rating scheme: building permit programs



are reviewed and scored. A class 1 community is the highest rating, and a class 10 community is the most basic rating.

Training of code officials is also very important for code enforcement. Training of code officials and inspectors is a large part of the BCEGS rating for a community. Courses are offered through the building code associations to help local officials understand standards that apply to seismic, wind, and flood hazards.

The table below lists building code adoptions in use within Daggett County.

Table 11-16. Building Code Adoptions in Daggett County

	Building Code Residential	Building Code Commercial
Daggett County	IRC 2015	IBC 2017
Dutch John	IRC 2021	Not specified; default to Daggett County code usage
Manila	IRC 2021	Not specified; default to Daggett County code usage

## PUBLIC SAFETY AGENCIES

### Fire Protection

The Utah Fire Marshal lists two fire departments in Daggett County, which include Manila Fire Department and Dutch John Fire Department (2020). The county’s fire warden is Corey Auger, who serves Uintah County and Daggett County (Uintah Fire District, 2024). Dutch John and Manila both have fire departments with rescue capabilities for accidents on highways.

When needed, Daggett County also has access to fire crews and resources from the U.S. Forest Service, BLM, National Park Service, U.S. Fish and Wildlife Service, and the U.S. Bureau of Indian Affairs. The state of Utah trains and provides hand crews and engine crews, as well.

### Healthcare Facilities

There are no hospitals in Daggett County, but there is one health clinic in Manila called The Clinic as part of Uintah Basin Healthcare. Ashley Regional Medical Center is the closest hospital to Daggett County, which is located in Vernal and provides 24/7 emergency services, a variety of surgery options, radiology and lab services, OB services, intensive care unit, cardiac rehabilitation, and chemotherapy/infusions (Ashley Regional, 2024). The 39-bed facility is owned by LifePoint Hospitals. The hospital has been in service since 1941 when it was known as Uintah Basin Hospital. It has changed names and ownership several times over the years and recently completed a new Women’s Center and Infusion Center in 2019.

### Emergency Services

The Daggett County Emergency Management Office is located in Manila, Utah and is under the direction of Leonard Isaacson, who is the county’s Emergency Manager.

EMS for the county are dispatched from Consolidated Dispatch through the Daggett County Sheriff’s Office in Vernal, Utah. EMTs are paid volunteers and are all certified by the state of Utah, Bureau of



EMS. Additional ambulance services are provided by Ashley Regional Medical Center and Uintah Basin Medical Center.

Several air ambulance and helicopter transport/rescue companies service the Daggett County area, including, but not limited to, Air Ambulance World, Classic Air Medical, Angel MedFlight, Intermountain Life Flight, and the Utah Department of Public Safety Aero Bureau.

### Law Enforcement & Public Safety

The Daggett County Sheriff’s Office is located at 590 S Sheriff’s Way in Manila. The Sheriff’s Office also operates out of the Consolidated Dispatch located at 641 E 300 S in Vernal, Utah. The Daggett County Sheriff is Erik Bailey. The Sheriff’s Office provides law enforcement throughout Daggett County, including in Dutch John and Manila. Manila has no individual law enforcement and instead contracts with the Daggett County Sheriff’s Office. There are also BLM-administered lands, U.S. Forest Service lands, SITLA lands, and one National Recreation Area in the county that each have their own attendant law enforcement authorities in addition to the county sheriff.

The Highway Patrol Office in the county is located at 641 E 300 S Suite 300 in Vernal. This office services the entire Uintah Basin Region of Daggett, Duchesne, and Uintah Counties.

### LAND USE PLANNING & CHANGES IN DEVELOPMENT AND FUTURE DEVELOPMENT

This section of the Daggett County Hazard Mitigation Plan Annex examines the relationship between the county’s General Plan, Land Use or Zoning Ordinances, and the AHMP. Incorporating hazard mitigation practices into land use planning is extremely important as future developments are planned and constructed. Through proper planning within the individual jurisdictions, risk to property owners can be reduced and future disaster related economic losses avoided. Land Use and Mitigation Planning Integration are seen as critical components of the mitigation program in Daggett County.

Daggett County’s General Plan was last revised and adopted in 2008, with an amendment to the appendix in 2017. The plan should be reviewed and updated to address condition changes within the county and the economy.

A Land Use section can be found in the Daggett County General Plan Resource Management Plan Appendix beginning on page 31, which was last updated in 2017. This section provides a comprehensive, legal, and strategic basis for implementing zoning changes and land use code updates that the county may want to pursue in the immediate term. It will also provide the basis for future decisions regarding individual rezone requests for years to come. The end goal is to produce a sustainable, well-balanced development pattern for the future.

The hazard risk assessment (see Chapter 2 Hazard Risk Summary) took into consideration changes in development and future development trends based on planning and zoning maps and documents. The following tables highlight those sections of the assessment:

<b>Hazard Event</b>	<b>Changes in Development and Hazard Vulnerability (High, Medium, Low)</b>	<b>Vulnerability Factor (Adjust Impact Factor to Change Scores)</b>	<b>Multiplied by Weighting Factor (1)</b>
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Hazard Event	Changes in Development and Hazard Vulnerability (High, Medium, Low)	Vulnerability Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Extreme Heat			
Lightning			
Hail			
Tornado			
Straight-line Wind			
Extreme Cold			
Winter Storm			
Avalanche			
Wildfire			
River or Stream Flood			
Flash Flood			
Dam Failure			
Drought			
Earthquake			
Landslide			
Expansive Soils			
Land Subsidence			
<p><b>Changes in Development Factor</b>—Changes in development since the previous plan was approved (if this is an update) or in the past five years (if this is a new plan) have increased or decreased the community’s vulnerability/exposure to this hazard. <b>[Weighted Factor: 1]</b></p> <p><b>High</b>—Changes in development have significantly increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 3)</p> <p><b>Medium</b>—Changes in development have increased the vulnerability/exposure of the community to this hazard, but not significantly (Vulnerability Factor = 2)</p> <p><b>Low</b>—Changes in development have minimally increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 1)</p> <p><b>No Vulnerability</b>—Changes in development have had no effect and/or have decreased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 0)</p>			

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Hazard Event	Impact of Future Development (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Extreme Heat			
Lightning			
Hail			
Tornado			



Hazard Event	Impact of Future Development (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Straight-line Wind			
Extreme Cold			
Winter Storm			
Avalanche			
Wildfire			
River or Stream Flood			
Flash Flood			
Dam Failure			
Drought			
Earthquake			
Landslide			
Expansive Soils			
Land Subsidence			
<b>Future Development Factor</b> —The potential that future development will have on increasing or decreasing the impact/consequence of this hazard. [ <b>Weighted Factor: 1</b> ]			
<b>High</b> —Future development trends will significantly increase the impact/consequence of this hazard (Impact Factor = 3)			
<b>Medium</b> —Future development trends will increase the impact/consequence of this hazard, but not significantly (Impact Factor = 2)			
<b>Low</b> —Future development trends will minimally increase impact/consequence of this hazard (Impact Factor = 1)			
<b>No Impact</b> —Future development trends will not increase the impact/consequence of this hazard, and/or may even decrease the impact/consequence of this hazard (Impact Factor = 0)			

## Town of Dutch John

The town of Dutch John updated their General Plan in 2022. The plan establishes how Dutch John will “maintain a safe, clean, healthy, economically diverse, and attractive environment. It will be a friendly, progressive community that strives to be affordable and sustainable” (Dutch John General Plan, 2022). It describes the town’s plans and goals for transportation, public services, public safety, varied housing options, economic development, recreation, parks, open space, aesthetics, historic preservation, and land use. It also complements the community profile in the Mitigation Plan by detailing the location, climate, history, socioeconomic drivers, and demographics of the area.



### Town of Manila

The town of Manila updated their General Plan in 2022. The plan’s mission is to “clarify the Town’s priorities and goals for the next 10–20 years to help maintain that character, while still welcoming the growth necessary to give the community economic strength and resilience” (Manila General Plan, 2022). It describes the town’s plans and goals for transportation, public services, public safety, moderate income housing, community beautification and economic development, infrastructure, historic preservation, community design, and land use. It also complements the community profile in the Mitigation Plan by detailing the location, history, socioeconomic drivers, land capacity, and demographics of the area.

### NFIP CONTINUITY STRATEGY

Daggett County participates in the Emergency Program of the National Flood Insurance Program (NFIP) as of July 22, 2004, but the towns of Dutch John and Manila do not participate. No major rivers flow through or threaten the towns directly, although flooding can still occur. Daggett County is in the initial phase of the NFIP and has no Flood Hazard Boundary Map or Flood Insurance Rate Map (FIRM) and a limited amount of flood insurance coverage.

Daggett County does not currently participate in CRS but is open to pursuing participation in the future if deemed appropriate.

Table 11-17. NFIP Participation in Daggett County

NFIP Participation Category	Daggett County
Emergency Program Date	07/22/2004
Participating in CRS (Class)	N/A
Number of NFIP Policies	1
Total Coverage	\$45,000
Total Written Premium + FPF	248
Repetitive Loss Properties	0
Severe Repetitive Loss Properties	0

Source: FEMA Repetitive Losses/BCX Claims Utah, 2023



## **PART III: MITIGATION STRATEGY**



## CHAPTER 12 CHANGES IN PRIORITY

### CHANGES IN PRIORITY

Mitigation priorities have not significantly changed for either Daggett County or the towns of Dutch John and Manila since the update of the last plan. For the 2024 plan update, mitigation goals for Daggett County and the towns of Dutch John and Manila were significantly updated to better align with current federal priorities, ongoing sustainability efforts in both jurisdictions, and a more concerted focus on achieving equitable outcomes for all communities, including underserved communities and socially vulnerable populations. The plan also underwent a complete rewrite to better align with new local mitigation plan requirements.

Also, for past mitigation projects identified in previous iterations of the plan, a *2024 Status Update and Changes in Priority* section was included for each past action. A description of the update and changes in priority were included, if appropriate and applicable.



## CHAPTER 13 MITIGATION STRATEGIES

### MITIGATION ACTION PLAN

The action plan helps to prioritize mitigation initiatives according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The action plan also provides the framework for how the proposed projects and initiatives will be implemented and administered over the next five years.

#### Mitigation Strategy/Action Timeline Parameters

While the preference is to provide definitive project completion dates, this is not possible for every mitigation strategy/action. Therefore, the parameters for the timeline (Projected Completion Date) are as follows:

- **Short-term**—To be completed in 1 to 5 years
- **Long-term**—To be completed in greater than 5 years
- **Ongoing**—Currently being implemented under existing programs but without a definite completion date

#### Mitigation Strategy/Action Benefit Parameters

Benefit ratings are defined as follows:

- **High**—Project will provide an immediate reduction of risk exposure for life and property.
- **Medium**—Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
- **Low**—Long-term benefits of the project are difficult to quantify in the short term.

#### Mitigation Strategy/Action Estimated Cost Parameters

While the preference is to provide definitive costs (dollar figures) for each mitigation strategy/action, this is not possible for every mitigation strategy/action. Therefore, the estimated costs for the mitigation initiatives identified in this plan are identified as high, medium, or low, using the following ranges:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (e.g., bonds, grants, and fee increases).
- **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
- **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.

#### Mitigation Strategy/Action Prioritization Process

The action plan must be prioritized according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant



Program (HMGP) and Building Resilient Infrastructure and Communities (BRIC) grant program. A less formal approach was used because some projects may not be implemented for up to 10 years, and associated costs and benefits could change dramatically in that time. Therefore, a review of the apparent benefits versus the apparent cost of each project was conducted. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

The priorities are defined as follows:

- **High**—A project that addressed numerous goals or hazards, has benefits that exceed cost, has funding secured or is an ongoing project, and meets eligibility requirements for the HMGP or BRIC grant program. High priority projects can be completed in the short term (1 to 5 years).
- **Medium**—A project that addressed multiple goals and hazards, that has benefits that exceed costs, and for which funding has not been secured but that is grant eligible under HMGP, BRIC, or other grant programs. The project can be completed in the short term once funding is secured. Medium priority projects will become high priority projects once funding is secured.
- **Low**—A project that will address few or no goals, mitigate the risk of one or few hazards, has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for HMGP or BRIC grant funding, and for which the timeline for completion is long term (1 to 10 years). Low priority projects may be eligible for other sources of grant funding from other programs.

For many of the strategies identified in this action plan, the partners may seek financial assistance under the HMGP or HMA programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, the partners reserve the right to define “benefits” according to parameters that meet the goals and objectives of this plan.

## MITIGATION PROJECTS

Listed below are the goals and objectives developed by the mitigation plan and the priority projects that were developed to address the risks posed. Included in the list are a rough estimate of cost and an anticipated period for further investigation, project development, and implementation.

Participating jurisdictions agreed upon [11](#) mitigation actions that apply to the county and all or some participating jurisdictions (see [17.2.1 New Mitigation Projects](#) and [17.2.2 Ongoing Mitigation Projects](#)). These shared actions, some of which address all hazards, help to meet the following FEMA requirement: “Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? Does the plan include one or more action(s) per jurisdiction for each hazard identified within the risk assessment?” In addition to the [11](#) mitigation measures that apply to the county and all participating jurisdictions, most communities identified additional mitigation actions unique to their jurisdiction. [The following table summarizes the jurisdictions’ mitigation measures in relationship to the hazards addressed in the risk assessment.](#)



	Drought	Earthquake	Flood	Landslide	Problem Soils	Severe Summer Weather	Severe Winter Weather	Wildfire
Daggett County								
Dutch John								
Manila								



## New Mitigation Projects

### Daggett County New Projects

Mitigation Project: Provide additional fire training and update fire equipment to industry standards.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2024	Daggett County	Daggett County Emergency Management	Dutch John Fire Department; Manila Fire Department	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		Hazard(s) Mitigated		Benefit Analysis (Low, Medium, High)		Potential Funding Source(s)
		Wildfire		High		Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						



Mitigation Project: Acquire digital road signage and portable road warnings and condition warnings.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2024	Daggett County	Daggett County Road Department	Daggett County Emergency Management	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		Hazard(s) Mitigated		Benefit Analysis (Low, Medium, High)		Potential Funding Source(s)
		All Hazards Severe Summer Weather Severe Winter Weather Wildfire Flood Drought Earthquake Landslide Problem Soils		High		Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Elevate and improve roads that are susceptible to flooding, including, but not limited to, Red Creek Rd, Browns Park, State Line Rd, Birch Creek, Bennion Lane, South Valley, and Dutch John Bench.



Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2024	Daggett County	Daggett County Road Department	Daggett County Emergency Management		Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
<b>Applicable Goal(s)</b>		<b>Hazard(s) Mitigated</b>		<b>Benefit Analysis (Low, Medium, High)</b>		<b>Potential Funding Source(s)</b>
		Flood				Daggett County general funds, SHGP, HMGP
<b>Action/Implementation Plan and Project Description:</b>						

Mitigation Project:						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)



Daggett County Multi-Jurisdictional All Hazard Mitigation Plan

2024

2024	Daggett County	Daggett County Emergency Management	N/A		Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		Hazard(s) Mitigated		Benefit Analysis (Low, Medium, High)		Potential Funding Source(s)
		All Hazards Severe Summer Weather Severe Winter Weather Wildfire Flood Drought Earthquake Landslide Problem Soils				Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

**Town of Dutch John New Projects**

Mitigation Project:						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)



2024	Town of Dutch John	Town of Dutch John	Daggett County		Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
<b>Applicable Goal(s)</b>		<b>Hazard(s) Mitigated</b>		<b>Benefit Analysis</b> (Low, Medium, High)		<b>Potential Funding Source(s)</b>
						Daggett County general funds, SHGP, HMGP
<b>Action/Implementation Plan and Project Description:</b>						

**Town of Manila New Projects**

Mitigation Project:						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2024	Town of Manila	Town of Manila	Daggett County		Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have



						a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
<b>Applicable Goal(s)</b>	<b>Hazard(s) Mitigated</b>			<b>Benefit Analysis</b> (Low, Medium, High)		<b>Potential Funding Source(s)</b>
						Daggett County general funds, SHGP, HMGP
<b>Action/Implementation Plan and Project Description:</b>						

## Ongoing Mitigation Projects

### Daggett County Ongoing Projects

Mitigation Project: Update Emergency Operations Plan to include dam failure estimates with inundation maps.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2019	Daggett County	Daggett County Emergency Management	BOR	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities.



Mitigation Project: Update Emergency Operations Plan to include dam failure estimates with inundation maps.						
						Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)	Hazard(s) Mitigated			Benefit Analysis (Low, Medium, High)	Potential Funding Source(s)	
	Dam Failure			Medium	Daggett County general funds, BOR, Sheep Creek Irrigation Co., Long Park Dam, local water districts	
Action/Implementation Plan and Project Description:						
2024 Update: Table tops with BOR are complete.						

Mitigation Project: Educate local elected officials about dam Emergency Action Plans each time new officials take office.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2019	Daggett County	Daggett County Emergency Management	BOR	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)	Hazard(s) Mitigated			Benefit Analysis	Potential Funding Source(s)	



Mitigation Project: Educate local elected officials about dam Emergency Action Plans each time new officials take office.			
		(Low, Medium, High)	
	Dam Failure	Medium	Daggett County general funds, BOR, Sheep Creek Irrigation Co., Long Park Dam, local water districts
Action/Implementation Plan and Project Description:			
2024 Update: Table tops with BOR are complete.			

Mitigation Project: Obtain and retain updated Emergency Action Plans for dams with inundation areas within the county.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2015	Daggett County	Daggett County Emergency Management		Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		Hazard(s) Mitigated		Benefit Analysis (Low, Medium, High)		Potential Funding Source(s)
		Dam Failure		Medium		Daggett County general funds, BOR, Sheep Creek Irrigation Co., Long Park Dam, local water



Mitigation Project: Obtain and retain updated Emergency Action Plans for dams with inundation areas within the county.			
			districts
Action/Implementation Plan and Project Description:			
2024 Update: Emergency Operations Plan is halfway complete.			

Mitigation Project: Conduct public awareness campaign(s) to promote reduced water usage.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2014	Daggett County	Daggett County Emergency Management		High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		Hazard(s) Mitigated		Benefit Analysis (Low, Medium, High)		Potential Funding Source(s)
		Drought		High		Daggett County general funds, BOR, local water districts
Action/Implementation Plan and Project Description:						



**Mitigation Project: Conduct public awareness campaign(s) to promote reduced water usage.**

2024 Update: The county conducts a preparedness fair each September during which they provide hazard awareness and water usage reduction information through flyers. Information is also disseminated through public newsletters that cover drought and wildfire mitigation, as well as identify websites for more info.

**Mitigation Project: The LEPC will hold meetings semi-annually to educate the public on the need to be water wise.**

Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2019	Daggett County	Daggett County Emergency Management	LEPC	Low	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
<b>Applicable Goal(s)</b>		<b>Hazard(s) Mitigated</b>		<b>Benefit Analysis (Low, Medium, High)</b>		<b>Potential Funding Source(s)</b>
		Drought		Low		Daggett County general funds, BOR, local water districts
<b>Action/Implementation Plan and Project Description:</b>						
2024 Update: The LEPC has met four times per year in the last few years.						



**Mitigation Project: Make citizens aware of programs whereby they can apply for funding to install new wheel lines that improve efficient water use.**

Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2019	Daggett County	Daggett County Emergency Management	NRCS; Salinity Control Program	Low	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
<b>Applicable Goal(s)</b>		<b>Hazard(s) Mitigated</b>		<b>Benefit Analysis (Low, Medium, High)</b>		<b>Potential Funding Source(s)</b>
		Drought		Low		Daggett County general funds, NRCS, Salinity Control Program
<b>Action/Implementation Plan and Project Description:</b>						

**Mitigation Project: Promote county and school participation in the Great Utah ShakeOut.**

Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)



Mitigation Project: Promote county and school participation in the Great Utah ShakeOut.						
Year	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2019	Daggett County	Daggett County Emergency Management	Daggett School District	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
<b>Applicable Goal(s)</b>		<b>Hazard(s) Mitigated</b>		<b>Benefit Analysis (Low, Medium, High)</b>		<b>Potential Funding Source(s)</b>
		Earthquake		Medium		Daggett County general funds, Daggett School District, SHGP, HMGP
<b>Action/Implementation Plan and Project Description:</b>						

Mitigation Project: Perform a seismic assessment of select county critical facilities.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2015	Daggett County	Daggett County Emergency Management	Planning & Zoning	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is



Mitigation Project: Perform a seismic assessment of select county critical facilities.						
						the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)	Hazard(s) Mitigated			Benefit Analysis (Low, Medium, High)	Potential Funding Source(s)	
	Earthquake			Medium	Daggett County general funds, SHGP, HMGP	
Action/Implementation Plan and Project Description:						

Mitigation Project: Implement storm drainage plans for new development in areas of the county that are susceptible to flooding due to storm runoff.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2016	Daggett County	Daggett County Emergency Management	Road Department; UDOT	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying



Mitigation Project: Implement storm drainage plans for new development in areas of the county that are susceptible to flooding due to storm runoff.						
						backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		Hazard(s) Mitigated		Benefit Analysis (Low, Medium, High)		Potential Funding Source(s)
		Flood		Medium		Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Perform landslide study of areas susceptible to landslide.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2016	Daggett County	Daggett County Emergency Management	Daggett County GIS	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		Hazard(s) Mitigated		Benefit Analysis		Potential Funding Source(s)



Mitigation Project: Perform landslide study of areas susceptible to landslide.			
		(Low, Medium, High)	
	Landslide	Medium	Daggett County general funds, SHGP, HMGP
<b>Action/Implementation Plan and Project Description:</b>			
2024 Update: The county is in the process of identifying areas of landslide.			

Mitigation Project: Enforce Wildland Urban Interface code requirements on all new construction through the building permit process.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2013	Daggett County	Daggett County Planning & Zoning	Daggett County Emergency Management	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
<b>Applicable Goal(s)</b>		<b>Hazard(s) Mitigated</b>		<b>Benefit Analysis (Low, Medium, High)</b>		<b>Potential Funding Source(s)</b>
		Wildfire		Medium		Daggett County general funds, SHGP, HMGP
<b>Action/Implementation Plan and Project Description:</b>						



**Mitigation Project: Enforce Wildland Urban Interface code requirements on all new construction through the building permit process.**

<b>Mitigation Project: Develop an alternate EOC location that is outside the wildfire area.</b>						
<b>Year Initiated</b>	<b>Applicable Jurisdiction</b>	<b>Lead Agency/ Organization</b>	<b>Supporting Agencies/ Organizations</b>	<b>Priority and Level of Importance</b> (Low, Medium, High)	<b>Projected Completion Date</b> (Short-term, Long-term, or Ongoing)	<b>Estimated Cost &amp; Analysis</b> (Low, Medium, High)
2019	Daggett County	Daggett County Emergency Management	Manila Fire Department; Dutch John Fire Department	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
<b>Applicable Goal(s)</b>		<b>Hazard(s) Mitigated</b>			<b>Benefit Analysis</b> (Low, Medium, High)	<b>Potential Funding Source(s)</b>
		Wildfire			High	Daggett County general funds, SHGP, HMGP
<b>Action/Implementation Plan and Project Description:</b>						



Mitigation Project:						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
	Daggett County	Daggett County Emergency Management			Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		Hazard(s) Mitigated		Benefit Analysis (Low, Medium, High)		Potential Funding Source(s)
						Daggett County general funds, BOR, local water districts
Action/Implementation Plan and Project Description:						

**Town of Dutch John Ongoing Projects**

Mitigation Project: Place a restrictive clause in the town ordinances that will prohibit any new development in the floodplain.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance	Projected Completion Date	Estimated Cost & Analysis (Low, Medium, High)



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2024

				(Low, Medium, High)	(Short-term, Long-term, or Ongoing)	
2019	Town of Dutch John	Town of Dutch John Planning & Zoning	Town of Dutch John; Daggett County Emergency Management	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
<b>Applicable Goal(s)</b>		<b>Hazard(s) Mitigated</b>		<b>Benefit Analysis</b> (Low, Medium, High)		<b>Potential Funding Source(s)</b>
		Flood		Medium		Daggett County general funds, SHGP, HMGP
<b>Action/Implementation Plan and Project Description:</b>						

<b>Mitigation Project: Attend and participate in training provided by the local LEPC on homeowner risk to wildfire and how to reduce that risk.</b>						
<b>Year Initiated</b>	<b>Applicable Jurisdiction</b>	<b>Lead Agency/ Organization</b>	<b>Supporting Agencies/ Organizations</b>	<b>Priority and Level of Importance</b> (Low, Medium, High)	<b>Projected Completion Date</b> (Short-term, Long-term, or Ongoing)	<b>Estimated Cost &amp; Analysis</b> (Low, Medium, High)
2019	Town of Dutch John	Daggett County Emergency Management	Town of Dutch John; LEPC	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be



Daggett County Multi-Jurisdictional All Hazard Mitigation Plan

2024

						required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		Hazard(s) Mitigated		Benefit Analysis (Low, Medium, High)		Potential Funding Source(s)
		Wildfire		Medium		Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Maintain defensible space around schools located in a wildfire area.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2019	Town of Dutch John	Dutch John Fire Department	Town of Dutch John; Daggett School District; Daggett County Emergency Management	Low	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.



Applicable Goal(s)	Hazard(s) Mitigated	Benefit Analysis (Low, Medium, High)	Potential Funding Source(s)
	Wildfire	Low	Daggett County general funds, SHGP, HMGP, Daggett School District
<b>Action/Implementation Plan and Project Description:</b>			

Mitigation Project: Mitigate risks of water supply pipeline that is primary source of water runs over fault from Flaming Gorge Dam.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
	Town of Dutch John	Daggett County Emergency Management	Town of Dutch John	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
<b>Applicable Goal(s)</b>		<b>Hazard(s) Mitigated</b>		<b>Benefit Analysis (Low, Medium, High)</b>		<b>Potential Funding Source(s)</b>
		Dam Failure		Medium		Daggett County general funds, SHGP, HMGP
<b>Action/Implementation Plan and Project Description:</b>						



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**Town of Manila Ongoing Projects**

Mitigation Project: Enforce rate policies that encourage water conservation.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2019	Town of Manila	Daggett County Emergency Management	Town of Manila	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		Hazard(s) Mitigated		Benefit Analysis (Low, Medium, High)		Potential Funding Source(s)
		Drought		High		Daggett County general funds, BOR, local water districts, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Provide adequate clearances for power lines, and conduct ongoing line maintenance. Maintain power outage plan.



Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2015	Town of Manila	Town of Manila Utilities	Town of Manila; Bridger Valley Electric; Moon Lake Electric; Daggett County Emergency Management	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
<b>Applicable Goal(s)</b>		<b>Hazard(s) Mitigated</b>		<b>Benefit Analysis (Low, Medium, High)</b>		<b>Potential Funding Source(s)</b>
		Severe Summer Weather, Severe Winter Weather		High		Daggett County general funds, SHGP, HMGP
<b>Action/Implementation Plan and Project Description:</b>						
2024 Update: Ongoing in conjunction with Bridger Valley Electric and Moon Lake Electric						

Mitigation Project: Place a restrictive clause in Daggett County and Manila ordinances that prohibit any new development within county floodplains.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)



Daggett County Multi-Jurisdictional All Hazard Mitigation Plan

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2013	Town of Manila	Daggett County Planning & Zoning	Town of Manila; FEMA; Daggett County Emergency Management	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
<b>Applicable Goal(s)</b>		<b>Hazard(s) Mitigated</b>		<b>Benefit Analysis (Low, Medium, High)</b>		<b>Potential Funding Source(s)</b>
		Flood		High		Daggett County general funds, SHGP, HMGP
<b>Action/Implementation Plan and Project Description:</b>						

Mitigation Project: Ensure through county and town building inspectors and LEPC that zoning ordinances are up to date or revised every five to six years.						
Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Supporting Agencies/ Organizations	Priority and Level of Importance (Low, Medium, High)	Projected Completion Date (Short-term, Long-term, or Ongoing)	Estimated Cost & Analysis (Low, Medium, High)
2013	Town of Manila	Daggett County Planning & Zoning	Town of Manila; Daggett County Emergency Management; LEPC	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community



						will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
<b>Applicable Goal(s)</b>	<b>Hazard(s) Mitigated</b>			<b>Benefit Analysis</b> (Low, Medium, High)		<b>Potential Funding Source(s)</b>
	Flood			High		Daggett County general funds, SHGP, HMGP
<b>Action/Implementation Plan and Project Description:</b>						

### Completed Mitigation Projects

COMPLETED MITIGATION PROJECTS						
Mitigation Project	Year Initiated	Applicable Jurisdiction	Lead Agency/ Organization	Priority (Low, Medium, High)	Status	Hazard(s) Mitigated
<i>Daggett County (County-Led)</i>						
Provide information to public on how the storm drainage plans will assist in preventing flood damage to residents of Daggett County.	2016	Daggett County	Planning & Zoning	High	Completed	Flood
Develop more redundant piping and stormwater lines for Dutch John and Flaming Gorge Reservoir.	2015	Daggett County	Pipeline Safety and Emergency Response	High	Completed	Drought
Install new wheel lines to improve efficiency of water use.	2015	Daggett County	Planning & Zoning	High	Completed	Drought
Conduct a public awareness campaign.	2015	Daggett County	Daggett County Emergency Management	Medium	Completed	Earthquake



COMPLETED MITIGATION PROJECTS						
Educate public on importance of vaccinating their animals against the threat of West Nile Virus and other diseases.	2015	Daggett County	Daggett County Emergency Management	High	Completed	Agricultural
Identify and maintain critical transportation and utility services.	2014	Daggett County	Daggett County Utilities; UDOT	Medium	Completed	Earthquake
Spread insect bait and spray for mosquitoes.	2013	Daggett County	Daggett County	High	Completed	Agricultural
Ensure 80 MPH wind load requirement if met by builders.	2013	Daggett County	Planning & Zoning	High	Completed	Severe Summer Weather, Severe Winter Weather
<i>Town of Dutch John</i>						
<i>Town of Manila</i>						
Improve water delivery system and implement strategies to encourage residents and businesses to utilize water saving devices and procedures.	2015	Town of Manila	Daggett County Emergency Management	High	Completed	Drought
Daggett County and Manila will form a partnership with the current owners of the Sheep Creek Canal to line or pipe portions of the canal as funding becomes available.	2015	Town of Manila	Daggett County Emergency Management	High	Completed	Flood
County and town building inspectors and the planning committee will implement a maintenance and inspection schedule in coordination with the owners of the canal.	2014	Town of Manila	Manila Utilities	High	Completed	Flood
Educate public on canal maintenance and repair.	2013	Town of Manila	Manila Utilities	High	Completed	Flood
Place a restrictive clause in the county and Manila ordinances	2013	Town of Manila	Road Department	High	Completed	Flood



COMPLETED MITIGATION PROJECTS						
that prohibit any undercutting of the canal.						
The LEPC will provide semi-annual training for the citizens of Daggett County and Manila regarding homeowner risk to wildfire and how to reduce risk.	2013	Town of Manila	Daggett County Emergency Management	High	Completed	Wildfire



# APPENDIX



## APPENDIX A: REFERENCES

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