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SECTION 1: JURISDICTIONAL ADOPTION AND FEMA APPROVAL

1.1 DMA 2000 Requirements

1.1.1 General Requirements

The Yuma County Multi-Jurisdictional Hazard Mitigation Plan (the Plan) has been prepared in compliance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act), 42 U.S.C. 5165, as amended by Section 104 of the Disaster Mitigation Act of 2000 (DMA 2000) Public Law 106-390 enacted October 30, 2000. The regulations governing the mitigation planning requirements for local mitigation plans are published under the Code of Federal Regulations (CFR) Title 44, Section 201.6 (44 CFR §201.6). Additionally, a DMA 2000 compliant plan that addresses flooding will also meet the minimum planning requirements for the Flood Mitigation Assistance program as provided for under 44 CFR §78.

DMA 2000 provides requirements for States, Tribes, and local governments to undertake a risk-based approach to reducing risks to hazards through mitigation planning.[1] The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from hazards, serving as a guide for decision makers as they commit resources to reducing the effects of hazards. Local plans will also serve as the basis for the State to provide technical assistance and to prioritize project funding.

Under 44 CFR §201.6, local governments must have a Federal Emergency Management Agency (FEMA)-approved local mitigation plan in order to apply for and/or receive project grants under the following hazard mitigation assistance programs:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)

1.1.2 Update Requirements

DMA 2000 requires that existing plans be updated every five years, with each plan cycle requiring a complete review, revision, and re-approval of the plan at both the state and FEMA level. Yuma County, the incorporated communities of San Luis, Somerton, Wellton, Yuma City, and the Cocopah Tribe all currently do not have a FEMA approved hazard mitigation plan. This updated Plan is the result of an multi-jurisdictional update process performed by the Yuma County jurisdictions and the Cocopah Tribe, which updates the 2010 Plan.

1.1.3 Tribal Government Assurances

The Cocopah Indian Tribe is familiar with and will continue to comply with all applicable federal statutes and regulations in effect with respect to the periods for which it receives grant funding, including 2 CFR Parts 200 and 3002. The Tribe will also mend its portions of this mitigation plan whenever necessary to reflect changes in tribal or federal laws and statutes.

1.2 Official Record of Adoption

Adoption of the Plan is accomplished by the governing body for each participating jurisdiction in accordance with the authority and powers granted to those jurisdictions by the State of Arizona. Participating jurisdictions in the Plan include:

Counties	Tribes	Cities	Towns
• Yuma	• Cocopah	• San Luis • Somerton	• Wellton

[1] FEMA, 2008, *Local Multi-Hazard Mitigation Planning Guidance*

		• Yuma	

A digital copy of each official resolution of adoption is located in Appendix A of the Plan.

1.3 FEMA Approval Letter

The Plan was submitted to the Arizona Department of Emergency & Military Affairs (DEMA), the authorized state agency, and FEMA for review and approval. FEMA's approval letter is provided on the following page.

[Insert FEMA Approval Letter Here]

SECTION 2: INTRODUCTION

2.1 Plan History

In 2010, Yuma County, all incorporated cities and towns in Yuma County, along with Cocopah Tribe, participated in a multi-jurisdictional mitigation planning process that resulted in one unified plan. Three planning team meetings, one tribal planning meeting, and several other individual community outreach meetings were conducted over the period of March 2009 to June 2010. Collectively and individually, this plan will be referred to herein as the 2010 Plan. The 2010 Plan has expired its FEMA 5-year planning cycle. In 2017, Yuma County initiated a Plan update process. This updated Plan received official FEMA approval on <insert 2018 date> and is set to expire five years from the date of the first formal adoption of this Plan.

2.2 Plan Purpose and Authority

The purpose of the Plan is to identify hazards that impact the various jurisdictions and Tribe located within Yuma County, assess the vulnerability and risk posed by those hazards to community-wide human and structural assets, develop strategies for mitigation of those identified hazards, present future maintenance procedures for the plan, and document the planning process. The Plan is prepared in compliance with DMA 2000 requirements and represents a multi-jurisdictional update of the 2010 Plan.

Yuma County and all of the Cities and Towns are political subdivisions of the State of Arizona and are organized under Title 9 (cities/towns) and Title 11 of the Arizona Revised Statutes (ARS). The Cocopah Indian Tribe is a federally recognized sovereign nation that was created by Executive Order in 1917 and is governed by a Tribal Council that is elected by tribal members pursuant to the Tribe's Constitution. As such, each of these entities are empowered to formally plan and adopt the Plan on behalf of their respective jurisdictions.

Funding for the development of the Plan was provided through a PDM planning grant obtained by the State of Arizona from FEMA. Michael Baker International was retained by Yuma County to provide consulting services in guiding the update planning process and Plan development.

2.3 General Plan Description

The Plan is generally arranged and formatted to be consistent with the 2013 State of Arizona Multi-Hazard Mitigation Plan (State Plan) and is comprised of the following major sections:

Community Description – this section provides an overall description of the participating jurisdictions and the County as a whole.

Planning Process – this section summarizes the planning process used to update the Plan, describes the assembly of the Planning Team and meetings conducted, and summarizes the public involvement efforts.

Risk Assessment – this section summarizes the identification and profiling of hazards that impact the County and the vulnerability assessment for each hazard that considers exposure/loss estimations and development trend analyses.

Mitigation Strategy – this section presents a capability assessment for each participating jurisdiction and summarizes the Plan mitigation goals, objectives, actions/projects, and strategy for implementation of those actions/projects.

Plan Maintenance Strategy – this section outlines the proposed strategy for evaluating and monitoring the Plan, updating the Plan in the next 5 years, incorporating plan elements into existing planning mechanisms, and continued public involvement.

Plan Tools – this section includes a list of Plan acronyms and a glossary of definitions.

2.4 Overall Plan Update Process

The Plan is the result of a thorough update process that included a section by section review and evaluation of the 2010 Plan by the planning participants. Table 2.1 summarizes the review and analysis of each section of the 2010

Plan and generally describes what changes were or were not made and why. Additional details of that process are also discussed in the Plan sections as well.

Table 2-1: Summary of 2010 Plan review and 2018 Plan correlation		
2012 Plan Section	**2018 Plan Section**	**Review and Changes Description**
1	1	• No major changes occurred in this section, besides inclusion of an updated FEMA Approval Letter.
2	2	• No major changes occurred in this section, besides applicable updates to this table.
3	4	• Sections 3 & 4 were swapped, to place the community descriptions earlier in the plan document. • All other planning process details were updated, as applicable to this updated planning process.
4	3	• Sections 3 & 4 were swapped, to place the community descriptions earlier in the plan document. • Community descriptions updated as updated data allowed.
5	5	• Removed the Transportation Accident profile and added in Drought, Earthquake, Extreme Heat (Power Failure), and Dust Storm (added to Severe Wind). • Updated risk and vulnerability assessments, as improved data allowed. • Produced first time Hazus standard analysis for the hazards of flood and earthquake.
6	6	• Updated all parts of this section, as applicable to this updated planning process and past efforts over the last five years.
7	7	• Plan maintenance updated, as applicable to this updated planning process and past efforts over the last five years.
8	8	• Updated as necessary.
Appendixes	Appendixes	• Documentation updated, as applicable to this updated planning process. • Historical completed mitigation actions were migrated from Section 6 to Appendix D.

SECTION 3: COMMUNITY DESCRIPTIONS

3.1 General

The purpose of this section is to provide updated basic background information on Yuma County as a whole and includes information on geography, climate, population, and economy. Abbreviated details and descriptions are also provided for each participating jurisdiction.

3.2 County Overview

3.2.1 History & Geography

The history of Yuma County is quite colorful and continues to live on today in a fast-growing and vibrant community. In 1540, 18 years after the conquest of Mexico by Cortez, and 67 years before the settlement of Jamestown, Hernando de Alarcon visited the site of what is now the current City of Yuma. He was the first European to visit the area and to recognize the best natural crossing of the Colorado River. Much of Yuma County's later development occurred because of this strategic location. From the 1850's through the 1870's, steamboats on the Colorado River transported passengers and goods to various mines, military outposts in the area, and served the ports of Yuma, Laguna, Castle Dome, Norton's Landing, Ehrenberg, Aubry, Fort Mohave and Hardyville. During this time, stagecoaches also carried the mail and passengers on bone-jarring rides through the area.

The Cocopah (Kwapa), also known as the River People, have long lived along the lower Colorado River and delta. When Don Juan de Onate and Father Escobar sailed up the Colorado River, there were estimated to be about 6,000-7,000 Cocopah people living along the delta and the lower Colorado River. Throughout the mid 1800s and early 1900s, the Cocopah Indian Tribe effectively resisted assimilation to an established reservation and maintained its social, religious and cultural identities. In the last half of the nineteenth century, the steamboat business became important to the Cocopah people. Cocopah men, known for their skillful river navigating, were valued pilots.

Yuma County is located in the extreme southwestern corner of Arizona, as depicted in Figure 1. The County is larger than the state of Connecticut, and much of Yuma County's 5,519 square miles is desert land accented by rugged mountains. Yuma County limits generally lie between longitudes 114.82 to 113.33° west and latitudes 32.03 to 33.46° north. According to the Arizona Department of Commerce,[2] Yuma County is one of four original counties designated by the first Territorial Legislature. In 1864, Yuma was selected as the county seat and has remained so to this day. The County maintained its original boundaries until 1983, when voters decided to split Yuma County, forming La Paz County in the north and the new, present day Yuma County in the south.

[2] Arizona Department of Commerce, 2008, *Community Profile for Yuma County*

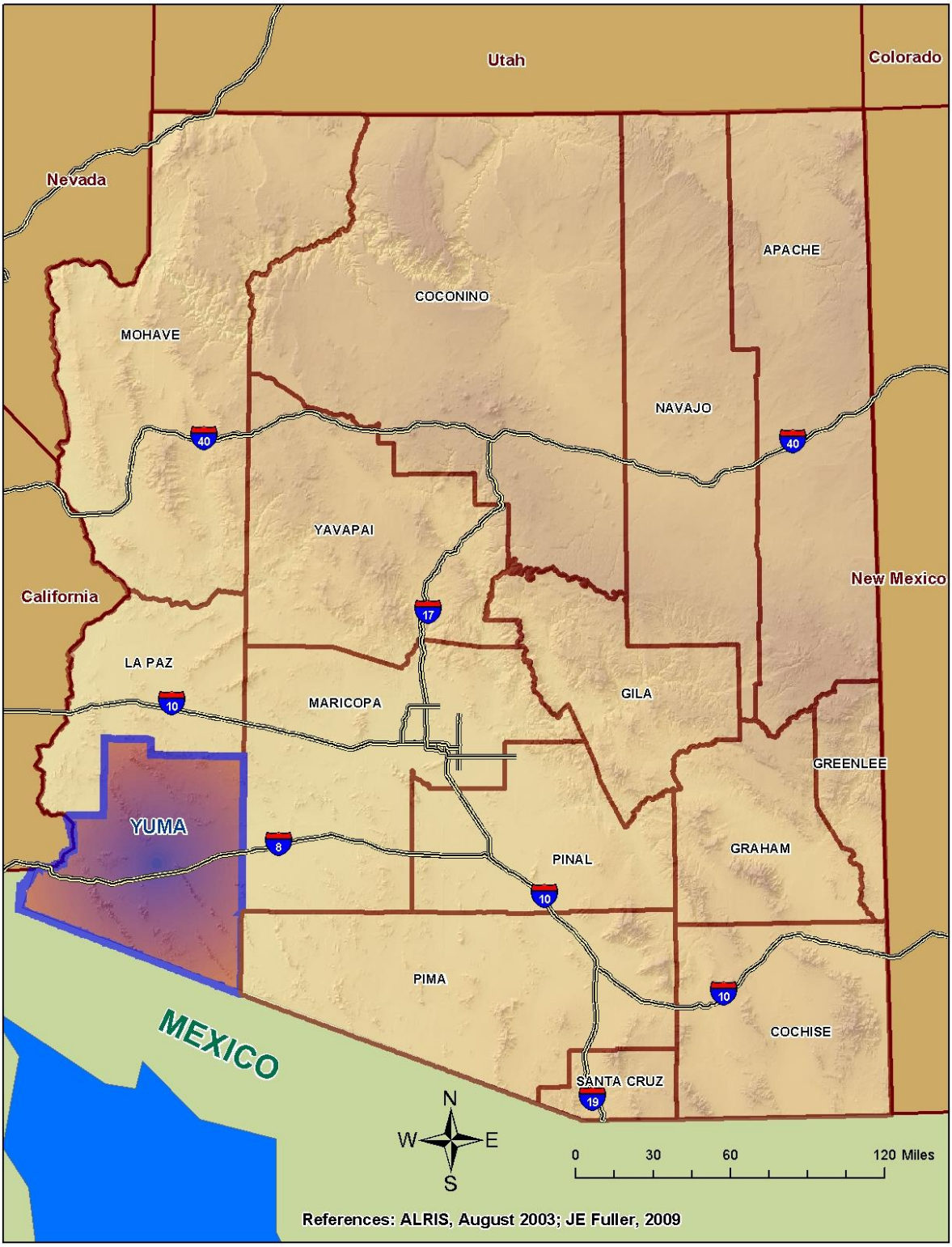


Figure 1. Yuma County Vicinity Map

Yuma County is characterized by two prominent river valley regions formed by the Gila and Colorado Rivers. Within these regions exist an abundance of arable land which is irrigated with water from the Colorado River and groundwater supplies. There are also over 200 miles of irrigation canals that extend at regular intervals through the County's agricultural belt. The Colorado and Gila River Valley areas have some of the most fertile soils in the world, having received silt and mineral deposits from flooding of the watercourses until the rivers were "tamed" by an intricate series of dams and canals.

For many years, Yuma served as the gateway to the new western territory of California, which brought thousands of people from around the world in search of gold, or provide services to those who had it. In 1870, the Southern Pacific Railroad bridged the Colorado River and Yuma became a hub for the railroad. The Ocean-to-Ocean Bridge (or Old Highway 80 Bridge) was the first vehicle bridge across the Colorado River. Prior to the construction of the bridge, cars were ferried across. Present day major highways through the County include Interstate 8 and U.S. Highways 95 and 80, and State Highway 195, the high speed truck route from Mexico to Yuma. Yuma County is bordered by California on the West and Mexico on the South. The Marine Corps Air Station (MCAS) shares one of the longest runways in the country with the Yuma International Airport. Additionally, the U.S. Air Force operates Laguna Air Force Base in the central-western portion of the County. Figure 2 depicts the geographic location and major transportation routes, including roadways, railways, and airports, of Yuma County.

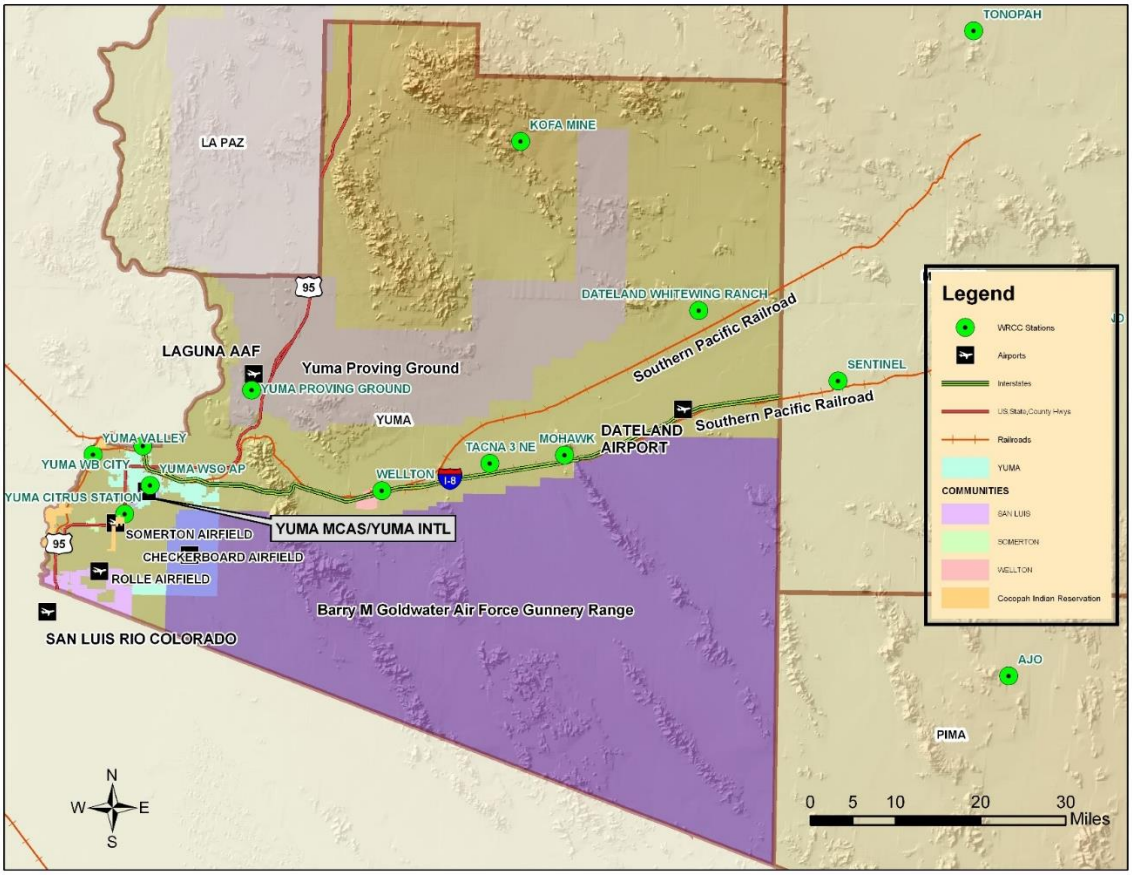


Figure 2. General Location and Transportation Map

The U.S. Forest Service and Bureau of Land Management own 42% of Yuma County land; Indian Reservations, 0.5%; and the State of Arizona 5%; individual and corporations 13%; and other public lands 40%. Figure 3 illustrates the land ownership in Yuma County.

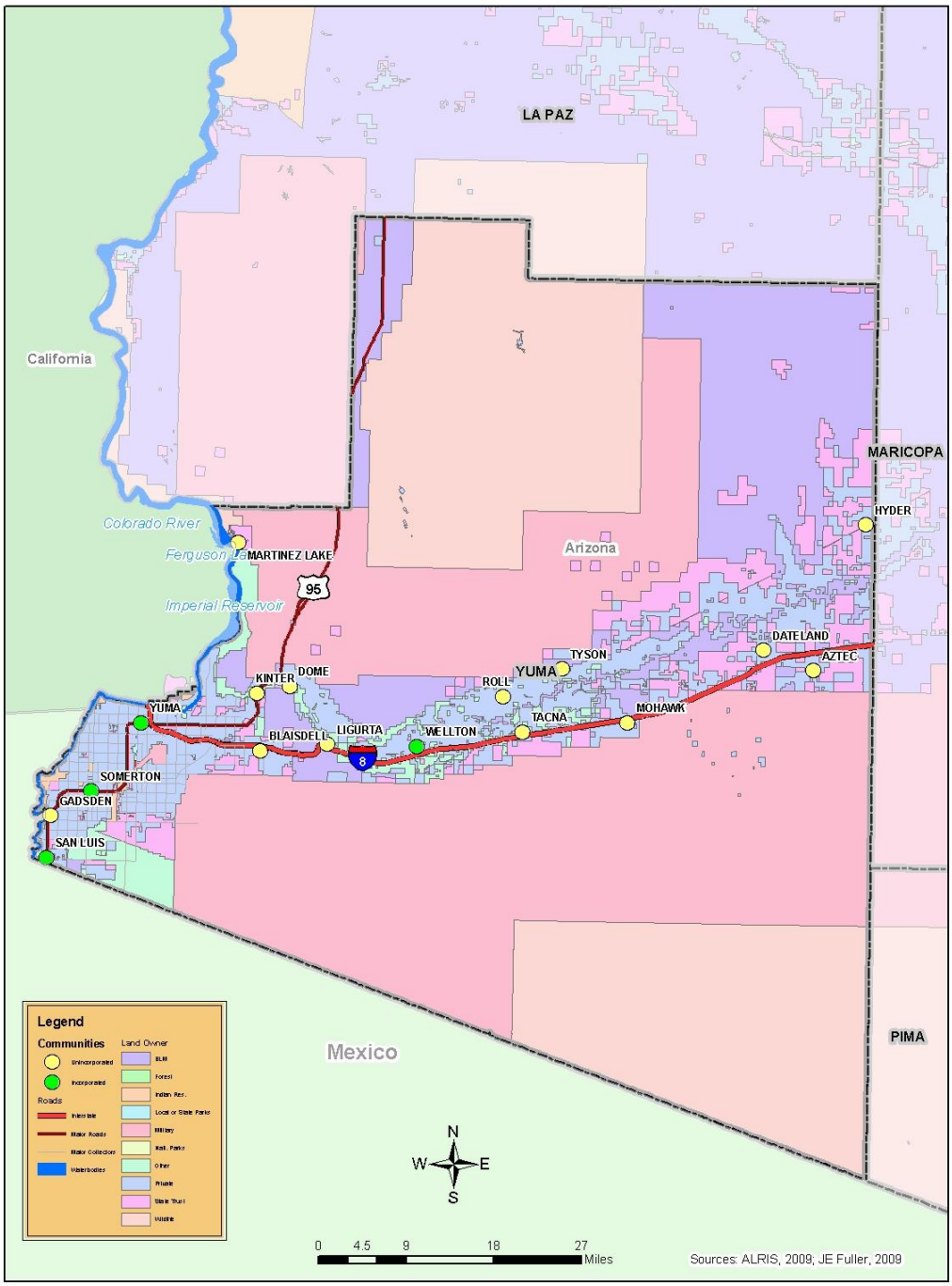


Figure 3. Community Location and Land Ownership Map

3.2.2 Climate

The climate in Yuma County is typically hot and dry during the summer and mild during the winter. Climatic statistics for weather stations within Yuma County are produced by the Western Region Climate Center[3] and span records dating back to the early 1900's. Statistics for the Dateland Whitewing Ranch and Yuma Proving Grounds Stations are provided in the following discussions.

Average temperatures within Yuma County are fairly uniform and range from near freezing during the winter months to over 110° Fahrenheit during the hot summer months. Average extreme temperatures have exceeded either end of the spectrum by 10 to 15°. Figure 4 presents a graphical depiction of temperature variability and extremes throughout the year for the Yuma Proving Ground Station, which is situated at an elevation of 320 feet. The Yuma Proving Ground data are fairly representative of the lower valley regions of the County. Additionally, Figure 5 show climate averages for the Yuma Proving Ground Station.

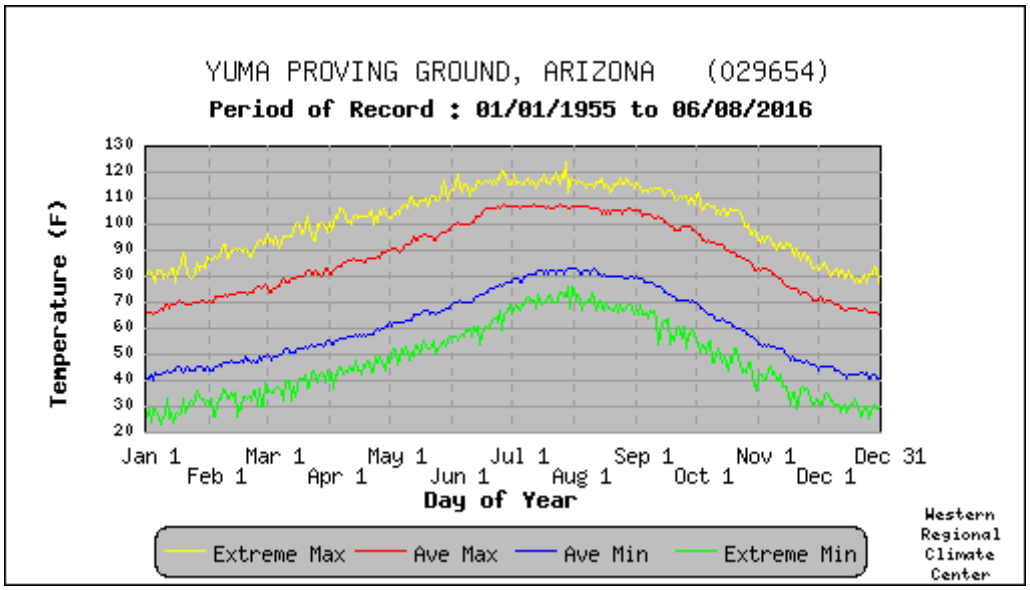


Figure 4. Daily Temperatures and Extremes for Yuma Proving Grounds, Arizona

[3] Most of the data provided and summarized in this plan are taken from the WRCC website beginning at the following URL: http://www.wrcc.dri.edu/CLIMATEDATA.html

YUMA PROVING GROUND, ARIZONA (029654)

Period of Record Monthly Climate Summary

Period of Record : 01/01/1955 to 06/08/2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	68.6	72.9	78.6	85.6	94.1	103.2	106.7	105.5	100.6	89.8	76.9	67.8	87.5
Average Min. Temperature (F)	43.3	46.8	51.4	57.2	64.8	72.9	80.8	80.8	74.2	62.1	50.0	42.7	60.6
Average Total Precipitation (in.)	0.51	0.42	0.33	0.14	0.03	0.04	0.23	0.53	0.42	0.31	0.25	0.45	3.64
Average Total SnowFall (in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 98.4% Min. Temp.: 98.4% Precipitation: 98.2% Snowfall: 98.4% Snow Depth: 98.4%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

Figure 5. Monthly Climate Summary for Yuma Proving Ground, Arizona

Annual precipitation across Yuma County varies significantly with elevation. For example, the urbanized Yuma Valley area receives less than three (3) inches of rainfall annually while the eastern portion of the County receives nearly five (5) inches annually and the northern areas approach seven (7) inches annually.[4] From a rainfall perspective, the Yuma Valley area is one of the driest areas of the State, however, as residents will testify, "you have to be here on the day it all comes!"

From November through March, storm systems from the Pacific Ocean cross the state as broad winter storms producing mild precipitation events and snowstorms at the higher elevations. Summer rainfall begins early in July and usually lasts until mid-September. Moisture-bearing winds move into Arizona at the surface from the southwest (Gulf of California) and aloft from the southeast (Gulf of Mexico). The shift in wind direction, termed the North American Monsoon, produces summer rains in the form of thunderstorms that result largely from excessive heating of the land surface and the subsequent lifting of moisture-laden air, especially along the primary mountain ranges. Thus, the strongest thunderstorms usually do not form in Yuma County area, but are found in the mountainous regions of the central southeastern portions of Arizona. Thunderstorms that do materialize are often accompanied by strong winds, blowing dust, and infrequent hail storms.[5] During the period of October through February, temperature inversions occur nightly and last about one hour after sunrise. Air pollution levels can rise significantly during this period, as does the potential for fog. Prevailing winds are basically northwesterly, except during the months of June, July, August and September when they become south to southwesterly. Average wind speed through the year is about 7.8 miles per hour.

All of Yuma County is situated within the Sonoran Desert and is characterized by an arid environment typical to much of southwestern Arizona. The elevations vary across the County with mountain peaks that are less than 3,000 feet in elevation to a low elevation of 175 feet. Vegetation in this zone is comprised mainly of a mixture of palo verde, cacti, creosotebush, and bursage communities.[6] The river bottoms are primarily comprised of saltbrush and arroweed scrub, with a few sparse stands of mesquite and riparian deciduous woodland. Figure 6 depicts the various Sonoran Desert biotic regions for the County.

[4] Per WRCC statistics for the Kofa Mine Station, which is at an elevation of 1,780 feet (see Figure 1-2).

[5] Office of the State Climatologist for Arizona, 2004. Partially taken from the following weblink: http://geography.asu.edu/azclimate/narrative.htm

[6] Brown, D.E., University of Utah, 1999, *Biotic Communities; Southwestern United States and Northwest Mexico.*

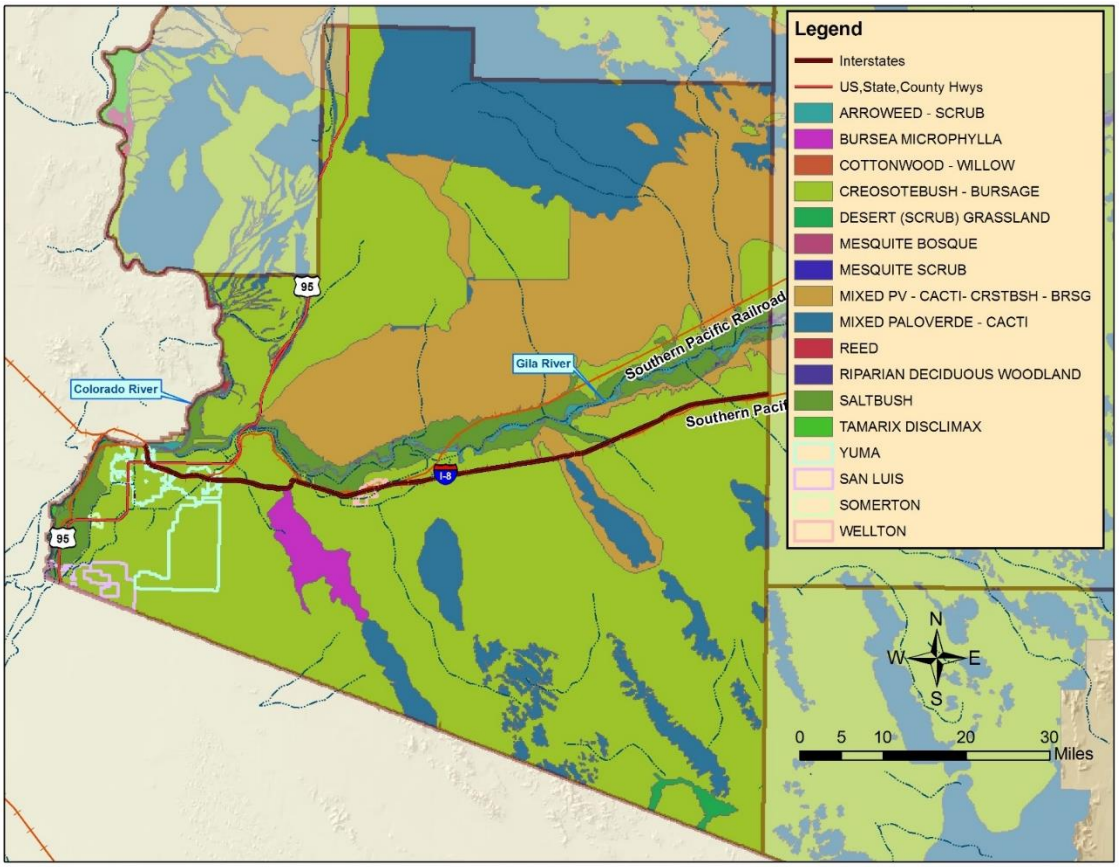


Figure 6. Vegetative Communities Within Yuma County

3.2.3 Population

Yuma County is home to 203,779 residents, with the majority of the citizens living in the incorporated communities or Indian Reservation portions of Yuma County. The largest community is the City of Yuma. All three incorporated cities and one town are geographically located in the southwest portion of the County. The other 13 towns and communities located throughout the county, with most situated along major highways are mostly comprised of only a few structures or landmark. Table 1 summarizes jurisdictional population statistics for Yuma County communities and the County as a whole.

Table 1. Summary of jurisdictional population estimates for Yuma County

Jurisdiction	1990	2000	2010	2025	2040
Yuma County (total)	106,895	160,026	195,751	251,130	307,708
Cities, Towns and Tribes					
Cocopah Indian Tribe	N/A	1,025	817	883	876
City of San Luis	4,212	15,322	27,909	49,888	72,566
City of Somerton	5,282	7,266	14,287	19,929	26,834
Town of Wellton	1,066	1,829	2,882	3,852	4,955
City of Yuma	56,966	77,515	90,660	109,943	132,518
Unincorporated	39,369	57,033	60,013	67,518	70,835

Note: Figures for 1990, 2000 and 2010 from US Census Bureau:http://www.azcommerce.com/econinfo/demographics/Census+2000.html
Figures for 2025 to 2040: Arizona Office of Economic Opportunity, https://population.az.gov/population-projections*, accessed March 2018*

3.2.4 Economy

The Yuma valley regions contain an abundant of arable land, which utilizes the close proximity of the Colorado River water through a network of canals. Agriculture, tourism, military and government and retail trade are the county's main industries.

The Yuma County labor force in 2017 numbered 99,001 with an unemployment rate of 15.7%[7]. Farming, cattle raising, tourism, retail trade, and the US Marine Corp Air Station Yuma and US Army Yuma Proving Ground military bases are Yuma County's principal industries. Some of the major tourist attractions in Yuma County include the historical Territorial Prison, Yuma Crossing Historic Park, Kofa Mountain Range and Wildlife Refuge, Martinez and Mittry Lakes, and hunting for a variety of game.

Arizona Western College (AWC) is located in Yuma County, and offers a two-year community college education to full-time and part-time on-campus and off-campus students. AWC shares its campus with a satellite campus of Northern Arizona University, which offers a variety of two year, four year and postgraduate programs.

Yuma County is currently experiencing rapid growth, with the most significant growth having occurred in the last ten years. Growth factors of economic opportunity, beneficial climate, and an active lifestyle are beginning to transform the region's prime agricultural lands into residential, commercial, and industrial development. This rapid growth presents a significant challenge to the County in the effort of maintaining a sustained economic prosperity, enhancing the quality of life, and maintaining the safety of County residents.

In order to plan more efficiently, the County has been divided into nine Designated Study Areas (DSA). A map showing the boundaries of each DSA is provided in Figure 7. The development histories for each

[7] Arizona Office of Economic Opportunity, https://laborstats.az.gov/sites/default/files/documents/files/pr-laus-04cnt-2010to2020-nsa.pdf

DSA are provided in the following text and are excerpts from the Yuma County 2020 Comprehensive Plan. Figure 3 represents the community locations and land ownership throughout Yuma County.

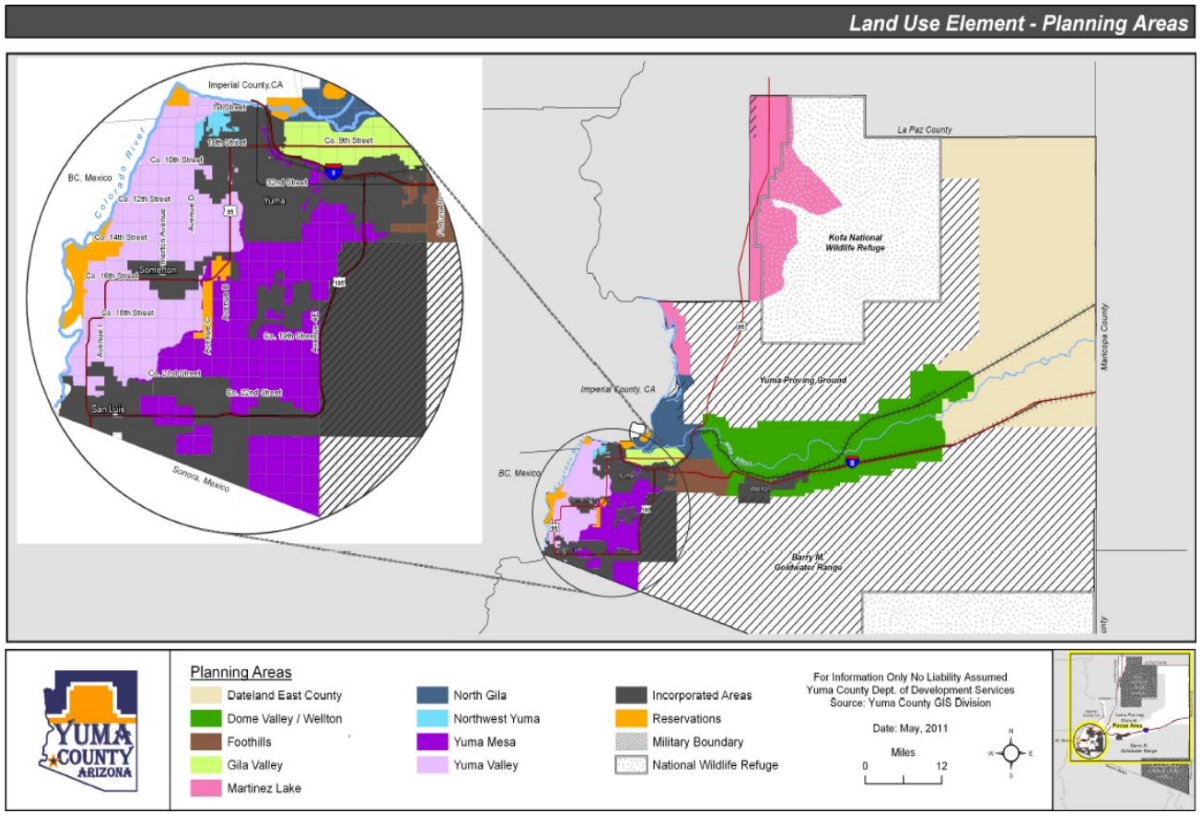


Figure 7. Development Study Areas within Yuma County

North Gila - The North Gila Planning Area is comprised of the area roughly bounded by California to the west, Yuma Proving Ground and the Gila Mountains to the east, Levee Road to the south and Imperial Dam to the north. The planning area is almost exclusively located in the Colorado and Gila River valley. The confluence of the Colorado and Gila Rivers is located along the southern boundary of the planning area.

- The North Gila Planning Area is a rural area that is predominately used for agricultural purposes with nonagricultural land being mountainous or riparian areas owned by various government entities.
- Farmland within the North Gila Planning Area tends to be of the highest quality found in Yuma County.
- The total population of the North Gila Planning Area is 1,038.
- Low overall population density with 15 persons per square mile over the 60.5 square miles.

Yuma Mesa - The Yuma Mesa Planning Area is comprised of the unincorporated portion of Yuma County that is roughly bounded by the East Main Canal and a small portion of the City of Somerton to the west, the Barry M. Goldwater Range and City of Yuma to the east, the City of San Luis and Mexico to the south and Interstate 8 and MCAS-Yuma to the north. A portion of the Cocopah Reservation is located within the planning area; however, it is part of a sovereign nation and not under the land use planning jurisdiction of Yuma County.

- Total population of the Yuma Mesa Planning Area is 7,411.
- The planning area has a low population density of approximately 79 persons per square mile.

- MCAS Yuma is directly adjacent to the planning area.
- All farmland within the planning area is classified by the United States Department of Agriculture as "farmland of unique importance."
- Residential development in the planning area has occurred almost exclusively at rural style densities.

Northwest Yuma - The Northwest Yuma Planning Area is comprised of the unincorporated portion of Yuma County that is roughly bounded by Avenue D to the west, the City of Yuma to the south and east and the West Main Canal and 1st Street to the north.

- Almost entirely composed of older residential neighborhoods.
- Because the area has been nearly built out for quite some time, development in the planning area tends to occur as redevelopment or infill development.
- The planning area is located in the Yuma Valley close to the Colorado River. As such, extensive drainage systems and pumping are necessitated due to the high ground water that is found in much of the planning area.
- here are two areas within the Northwest Yuma Planning Area federally recognized by the U.S. Department of Housing and Urban Development (HUD) as a colonia.
- The total population of the planning area is 9,649. The planning area has a relatively high population density of approximately 5,517.12 persons per square mile.

Gila Valley - The Gila Valley Planning Area is comprised of the area roughly bounded by Pacific Avenue to the west, Fortuna Wash to the east, Levee Road to the north and the City of Yuma to the south. The planning area is almost exclusively located in the Colorado and Gila River valleys. The confluence of the Colorado and Gila Rivers is located along the northern boundary of the planning area.

- 2010 population of 2,833.
- The overwhelming majority of acreage within the planning area is used for agricultural production.
- Extensive drainage systems and pumping are utilized due to the high groundwater found in much of the planning area.
- MCAS Yuma is located just south of the planning area.

Foothills - The Foothills Planning Area is comprised of the unincorporated portion of Yuma County that is roughly bounded by the City of Yuma to the west, the crest of the Gila Mountains to the east, the Barry M. Goldwater Range to the south and the Gila Gravity Main Canal and County 9th Street to the north. Fortuna Wash, which runs in a northeasterly direction, more or less bisects the planning area.

- The Foothills Planning Area is an unincorporated community of 28,867 people located directly east of the City of Yuma. The planning area is the most urbanized area in unincorporated Yuma County.
- The planning area has a mix of young families and retirees. The planning area represents the center of residential growth in Yuma County.

Yuma Valley - The Yuma Valley Planning Area is comprised of the unincorporated portion of Yuma County that is roughly bounded by Mexico to the west, the City of Yuma, Avenue D, the City of Somerton and the East Main Canal to the east, the City of San Luis to the south and California to the north. The planning area is located in the Yuma Valley close to the Colorado River.

- Extensive drainage systems and pumping are required due to the high ground water that is found in much of the planning area.

- There are four areas within the Yuma Valley Planning Area federally recognized by the U.S. Department of Housing and Urban Development (HUD) as a colonia.
- The overwhelming majority of the Yuma Valley Planning Area is comprised of large acreage parcels that are actively being used for agricultural purposes.
- Farmland within the planning area tends to be of the highest quality found in Yuma County, all of it located off the mesa in the fertile river bottoms.

Martinez Lake - The Martinez Lake Planning Area is comprised of two geographically separate areas that can be roughly defined as the portion of Yuma County that is located north of Imperial Dam and west of Yuma Proving Ground and the Kofa National Wildlife Refuge. The topography of the southern portion of the planning area is dominated by the Colorado River and Martinez Lake which forms the western boundary of the planning area and the County. Development in this area centers around the Martinez Lake shoreline. The northern portion of the Martinez Lake Planning Area is a sliver of land located between the La Paz County line and the Kofa Mountains and the Kofa National Wildlife Refuge.

- Martinez Lake is one of a series of man-made lakes along the Colorado River, and was formed with the construction of Imperial Dam in 1935.
- In 1955, the Martinez Lake Resort began as a fishing camp and eventually expanded into a year-round community that caters to winter visitors, sightseers, fishermen, rock hounds, boaters, hunters, and water skiers.
- Currently, retirees, winter visitors, military personnel, and recreation are fueling the growth and adding another facet to the ever-evolving character of this area.
- The Martinez Lake Planning Area is surrounded on multiple sides by Yuma Proving Ground (YPG). Because of this, activities on YPG have the potential to have a major impact on the planning area.

Dome Valley/Wellton - The Dome Valley/Wellton Planning Area is comprised of the unincorporated portion of Yuma County that is roughly bounded by the crest of the Gila Mountains to the west, the Barry M. Goldwater Range to the south, the crest of the Mohawk Mountains to the east and Yuma Proving Ground to the north. The Gila River runs from east to west, bisecting the planning area.

- The valley through which the Gila River flows contains irrigated, prime farmland and is extensively used for agriculture. The mesa rises abruptly above the Gila River Valley and is a flat area drained by washes. The majority of residential development has occurred on the "mesa."
- Located in the northwest corner of the planning area, the Muggins Mountains Wilderness Area covers 12 square miles.
- The Dome Valley/Wellton Planning Area contains 31 platted subdivisions. Combined there are 2,222 lots contained within these subdivisions. The 2010 Census reported a combined population of 2,915.
- Many but not all of the subdivisions have little to no physical infrastructure for improved roads.

Dateland/East County - The Dateland/East County Planning Area is comprised of the unincorporated portion of Yuma County that is roughly bounded by the crest of the Mohawk Mountains and Yuma Proving Ground to the west, the Barry M. Goldwater Range to the south, Maricopa County to the east and La Paz County to the north. The Gila River runs from east to west bisecting the planning area. The Eagle Tail Mountains Wilderness Area covers 12 square miles. This area is managed by the Bureau of Land Management in a manner that minimizes as much as possible human impact on the land.

- The economic base is primarily farming, agricultural production and associated railroad activities.
- Planning area covers 554,156 acres or about 861 square miles.

- The 2010 Census reported a combined population of 815, of which 35.7% of the total population of the planning area live in a platted subdivision. Further, the Census reported 118 housing units within in these subdivisions which means that of 5,157 lots contained within platted subdivision, 96.9% are vacant lots.
- Many but not all of the subdivisions have little to no physical infrastructure.
- Low population density (approximately one person per square mile).
- The Dateland Elementary School serves as the focal point for the community.

3.3 Jurisdictional Overviews

The following are brief overviews for each of the participating jurisdictions in the Plan.

3.3.1 Cocopah Indian Tribe

Cocopah Indian Reservation is located in the western portion of Yuma County, Arizona, as depicted in Figure 2. The Reservation is comprised of three non-contiguous bodies of land known as the North, West and East Reservations. The Reservation is situated at an elevation of 103 feet, and is geographically positioned at longitude 114.72 degrees west and latitude 32.6 degrees north. Cocopah Indian Reservation is located adjacent to the Colorado River; 13 miles south of Yuma; 15 miles north of San Luis, a national border city with Mexico; 197 miles west of Phoenix; and Tucson is approximately 250 miles to the southeast. U.S. Highway 95 and I-8 are nearby roadways for travel to the Reservation. The major transportation routes and land features around the Reservation are shown on Figure 2. Established by Executive Order in 1917, the Reservation currently encompasses approximately 6,500 acres.

Cocopah Indian Reservation location is primarily surrounded by Bureau of Land Management and State Trust lands as represented in Figure 3.

The total 2010 Census population for Cocopah Indian Tribe and Yuma County is 817 and 195,751. Table 1 summarizes population estimates for Cocopah Indian Tribe and Yuma County from 1990 to 2040, however population data is not available for Cocopah Indian Tribe prior to 2000.[8]

Agriculture has always been an important part of the economy, as well as today. Continually adjusting to the river's seasonal changes, they relied on the lush riparian habitats to obtain food. Tribal members grew grains, corn, beans and melons in the floodplains of the Colorado River. In traveling the waterways on log rafts, they collected wild wheat and shellfish. They netted fish and collected shellfish in the delta and hunted deer and small game in the mesquite forests. As time progressed and farms and towns populated the West, the flow of water eventually stopped due to the construction of dams along the Colorado River. This altered the Cocopah's way of life along the river.[9]

The Cocopah Indian Tribe is one of seven descendant Tribes stemming from the Yuman language-speaking people who occupied the lands along the Colorado River. The Cocopah people had no written language, but the records were passed on orally or interpreted in documents and written by outsiders.

During the westward expansion in the 1840s and discovery of gold in California in 1849, this brought many migrants through the area. The U.S. government recognized the importance of the river crossing and therefore established Camp Independence in 1850 to protect the entry route through the Tribe's territories. Soon after the camp was moved to an old Spanish Mission later call Fort Yuma, which still exists today. The Cocopahs effectively resisted assimilation to an established reservation and continued its social, religious, and cultural identities. During the last half of the nineteenth century, the Cocopah men, known for their skillful river navigability abilities, were valuable as pilots for the steamboat business.

As recent as the 1960s, a number of Tribal families continued to live in traditional arrow weed-thatched homes. In the late 1970s and 80s, the Tribe began acquiring lands for building homes, installing utilities, developing an infrastructure system and initiating economic development.

The agricultural industry provides annual income through leasing land to non-Indians. In 1985, the Tribe started new business ventures including a Bingo hall and Casino, in order for the Tribe to become more self-sufficient. The civilian labor force estimate in 2016 was 292 with an unemployment rate of 22.4%.

[8] U.S. Census Bureau and Arizona Office of Economic Opportunity, https://population.az.gov/population-projections

[9] http://www.cocopah.com/about.html

3.3.2 San Luis

The City of San Luis lies in Yuma County at the southwest corner of the State of Arizona. San Luis is a growing U.S. Port of Entry city and shares a border with Mexico on the south and the Colorado River and State of Baja California del Norte, Mexico on the west, as depicted in Figure 2. Many visitors come to San Luis as a stopover for shopping in Mexico or for a fishing trip in the Gulf of Mexico.

The total 2010 population for San Luis is 27,909. Table 1 summarizes population estimates from 1990 to 2040.[10]

San Luis was established in 1930 as a U.S. Port of Entry into Mexico. In 1979, the city was incorporated. Since then, it has experience a rapid growth, both in population and commercial sectors, and is one of the fasted growing communities in Yuma County. San Luis Rio Colorado, Sonora, Mexico is the sister city across the border with an estimated population of 178,380 in 2010.

The City of San Luis is geographically positioned at longitude 114.70 degrees west and latitude 32.49 degrees north, and currently encompasses nearly 30 square miles. San Luis is located 206 miles west of Phoenix and 259 miles west of Tucson. The Gulf of Mexico is located 75 miles to the south.

The population center of the City is located on both sides of U.S. Highway 95. Major airports in the vicinity include the Marine Corps Air Station Yuma/Yuma International Airport in Yuma, and the new MCAS auxiliary field located east of the city. San Luis is also served by Rolle Airfield which currently operates as a day-use airfield located in the north central portion of the city. Figure 2 depicts the general geographic features and transportation routes within the region surrounding the City of San Luis.

All of the City of San Luis is geographically situated within the Sonoran Desert ecoregion and is characterized by an arid environment typical to much of southwestern Arizona. Across Yuma County, the elevations vary with mountain peaks that are less than 3,000 feet in elevation to a low elevation of 140 feet near San Luis. Typical Sonoran Desert vegetation is comprised mainly of a mixture of palo verde, cacti, creosotebush, and bursage communities;[11] however, most of the City is surrounded by agriculture with little of the original desert flora remaining. Figure 6 depicts the various Sonoran Desert biotic regions for the City and County.

Development within San Luis has been primarily tied to agriculture and border activities and economies. Established in 1930 with the U.S. Port of Entry, the city grew slowly over the first 50 years. Since its incorporation in 1978, the city population has grown over 700% and is expected to outpace the rest of Yuma County. Past challenges to growth have included water supply, wastewater treatment, and other infrastructure needs.

The city has identified a future growth area for planning purposes. Figure 8 is an excerpt from the City of San Luis General Plan depicting this future growth area and the planned land uses. Much of the future growth is centered around the construction of a new commercial Port of Entry (POE) east of the current location, and the corresponding Robert A. Vaughan Expressway (formerly Area Service Highway) and upon completion known as State Highway 195.

The civilian labor force estimate in 2016 was 12,904 with an unemployment rate of 17.2%. The San Luis economy is driven by retail trade, agriculture and manufacturing. Several light industries are located on both sides of the international border.

[10] U.S. Census Bureau and Arizona Office of Economic Opportunity, https://population.az.gov/population-projections

[11] Brown, D.E., University of Utah, 1999, *Biotic Communities; Southwestern United States and Northwest Mexico.*

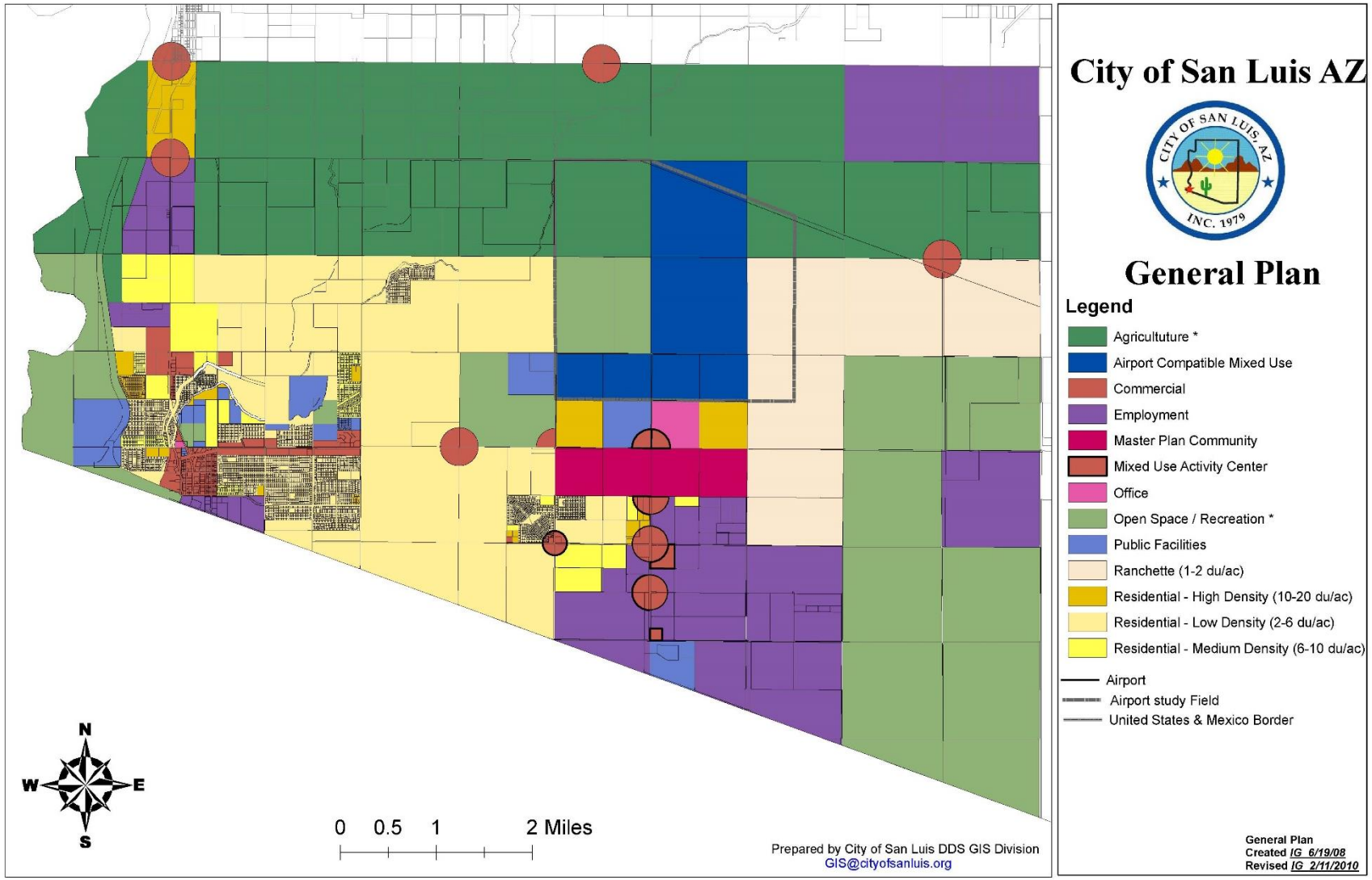


Figure 8. Land Use Map from the City of San Luis General Plan

3.3.3 Somerton

According to the Somerton General Plan, the City lies in South Yuma County approximately 10 miles southwest of the City of Yuma and 12 miles from the U.S./Mexican border, as depicted in Figure 2. [12] The area is bounded by the Cocopah Indian Reservation at locations that limit the City's ability to expand east onto the mesa or west to the Colorado River.

The total 2010 population for Somerton is 14,287. Table 1 summarizes population estimates from 1990 to 2040.[13]

Also, the mild winter weather brings about 90,000 additional, part-time residents to the Yuma Valley that are not reflected by these numbers.

Somerton was established in 1898 and incorporated in 1918. The city is located on land once claimed for the fraudulent Rancho El Paso de los Algodones (land) Grant. Land along the Colorado River was attractive to speculators. One of them, a citizen of the Mexican city of Hermosillo, petitioned authorities in Sonora, Mexico, for 21,692 acres between the Gila River on the north and Algodones Pass on the south and was granted the land in 1838. Arizona historian Jay J. Wagoner said rights to the alleged grant passed to the Colorado Commercial and Land Company in 1873, and the U.S. government withdrew the land from public entry in 1875. An investigation revealed that the grant's original title papers had been forged. Despite this, the U.S. Court of Private Land Claims confirmed the Algodones grant in 1893. Immediately, Wagoner said, "the alleged owners...began selling deeds...for tracts of 40 acres or less." The government appealed, and the U.S. Supreme Court reversed the land court in 1898. After the reversal, the U.S. Congress passed a law allowing settlers who were on the land before May 25, 1898, to buy up to 40 acres for $1.25 per acre.[14]

The City of Somerton is geographically positioned at longitude 114.71 degrees west and latitude 32.60 degrees north, and currently encompasses nearly 900 acres. Somerton is located 192 miles west of Phoenix and 248 miles west of Tucson.

The City is located on both sides of U.S. Highway 95 (Main Street) and Somerton Avenue runs north and south. Major airports in the vicinity include the Marine Corps Air Station Yuma/Yuma International Airport in Yuma, and the new MCAS auxiliary field located southeast of the city. Somerton is also served by a small day-use airfield located northwest of the city on the mesa. Figure 2 depicts the general geographic features and transportation routes within the region surrounding the City of Somerton.

According to the Somerton General Plan, the city has a long history of overcoming physical and economic adversity. Early settlers had to prevail over annual flooding of the Colorado River in order to benefit from the tremendous potential offered in the rich floodplain soils. In 1902, the Somerton school district was formed and in 1917, Main Street was paved. The downtown business district survived a huge fire in 1926 and was able to continue to be a major economic influence in Yuma County until the early 1960's. The reduced need for manual labor caused by technological improvements in agriculture mirrored the decline of the local economy even as the surrounding communities of Yuma and San Luis began to grow. Census counts for Somerton never tallied the hundreds of temporary farm workers who lived outside the community during the Bracero Program from 1942 to 1964.

Over the last 10 years, growth has been small but steady in Somerton. Somerton is expected to continue growing, especially with the Cities of Yuma and San Luis growing at such rapid paces. In order to address this growth potential, the city has identified a future growth area for planning purposes. Figure

[12] City of Somerton, 2005, *Somerton General Plan*, prepared by Partners for Strategic Action, Inc.

[13] U.S. Census Bureau and Arizona Office of Economic Opportunity, https://population.az.gov/population-projections

[14] Description obtained from the following web site: http://arizonan.com/Somerton/

9 is an excerpt from the Somerton General Plan depicts this future growth area and the planned land uses. [15]

The City of Somerton labor force estimate in 2016 was 6,773 with an unemployment rate of 12.7%. Economic activity within the city is predominantly agricultural but also includes light industrial and commercial service. Major employers include Del Sol Market, King Market, Sunset Community Health, Housing America Corporation, Puentes De Amistad, Arizona Department of Economic Security, Somerton School District and the City of Somerton.

[15] Figure 5.1 of the Somerton General Plan found at the end of Section 5.0 after page 37

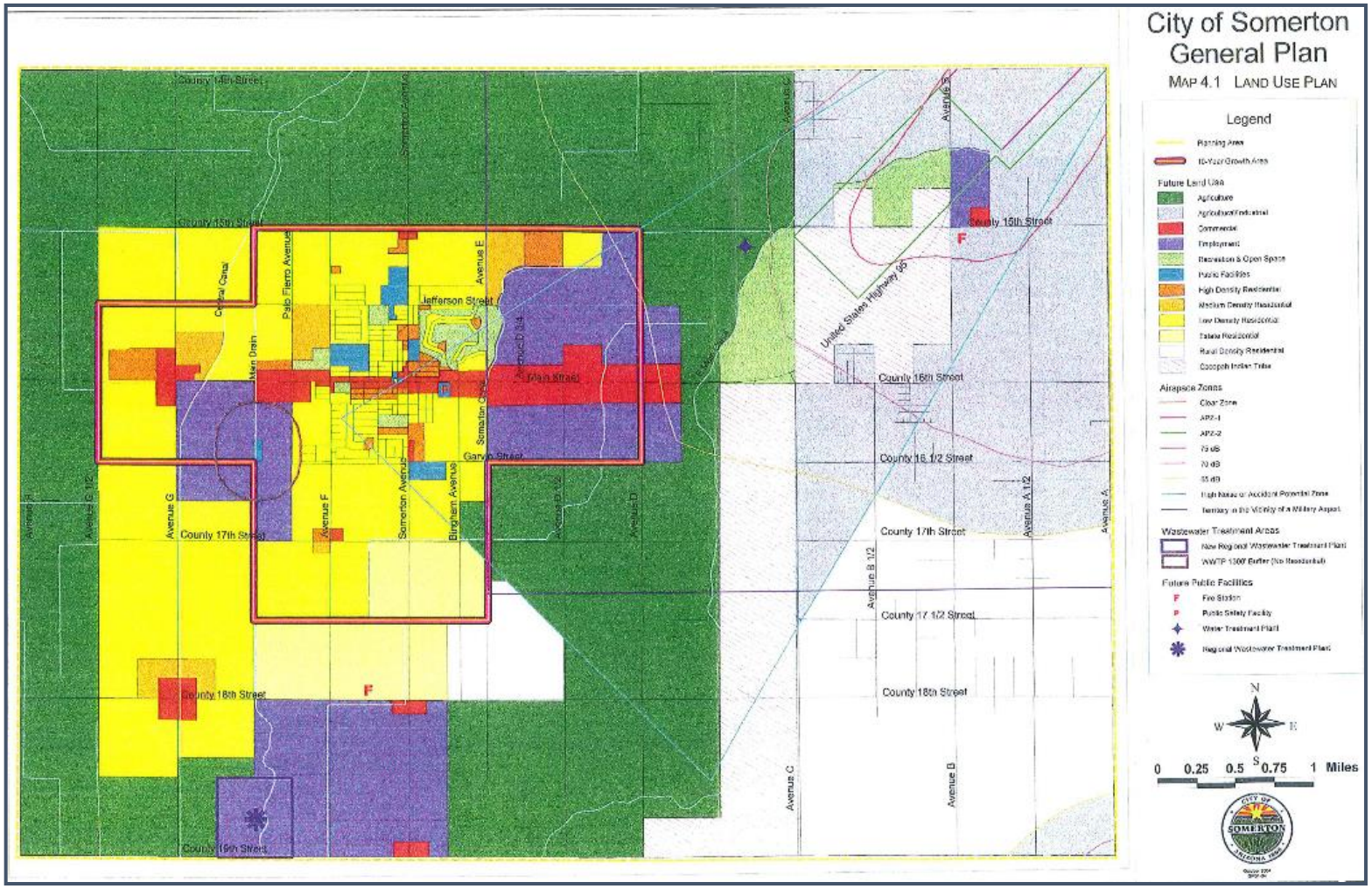


Figure 9. City of Somerton Land Use Map[16]

[16] City of Somerton, General Plan 2005, Part 4a, p.49

3.3.4 Wellton

According to the Town of Wellton General Plan[17], Wellton was officially founded in 1878 and was named for a time when water wells were drilled to service the new Southern Pacific Railroad. The town was incorporated in 1970. Wellton is situated approximately 30 miles east of the City of Yuma and the California border in the extreme southwestern corner of Arizona, as depicted in Figure 2.

The total 2010 population for Wellton is 2,882. Table 1 summarizes population estimates from 1990 to 2040.[18]

The Town of Wellton is geographically positioned at longitude 114.15 degrees west and latitude 32.66 degrees north, and currently encompasses nearly 4.5 square miles. Wellton is located 155 miles west of Phoenix and 208 miles west of Tucson. The Gila River is the primary watercourse in the area and is located approximately 1.5 miles north of the town. A smaller, ephemeral watercourse named Coyote Wash runs south to north through the eastern portion of the town. Interstate 8 and the Southern Pacific Railroad pass through the central portion of the town limits along an east-west alignment. The portion of Wellton north of Interstate 8 comprises the original townsite and downtown area. Areas south of Interstate 8 are primarily residential and agricultural areas. Figure 2 depicts the general geographic features and transportation routes within the region surrounding the Town of Wellton.

All of the Town of Wellton is situated within the Sonoran Desert and is characterized by an arid environment typical to much of southwestern Arizona. Across Yuma County, the elevations vary with mountain peaks that are less than 3,000 feet in elevation to a low elevation of 175 feet. Sonoran Desert vegetation is comprised mainly of a mixture of palo verde, cacti, creosotebush, and bursage communities.[19] The river bottoms are primarily comprised of saltbrush and arroweed scrub, with a few sparse stands of mesquite and riparian deciduous woodland.

Figure 10 is an excerpt from the Town of Wellton General Plan depicts this future growth area and the planned land uses.

[17] HDR Engineering, Inc., 2003, *Town of Wellton General Plan 2003-2013*

[18] U.S. Census Bureau and Arizona Office of Economic Opportunity, https://population.az.gov/population-projections

[19] Brown, D.E., University of Utah, 1999, *Biotic Communities; Southwestern United States and Northwest Mexico.*

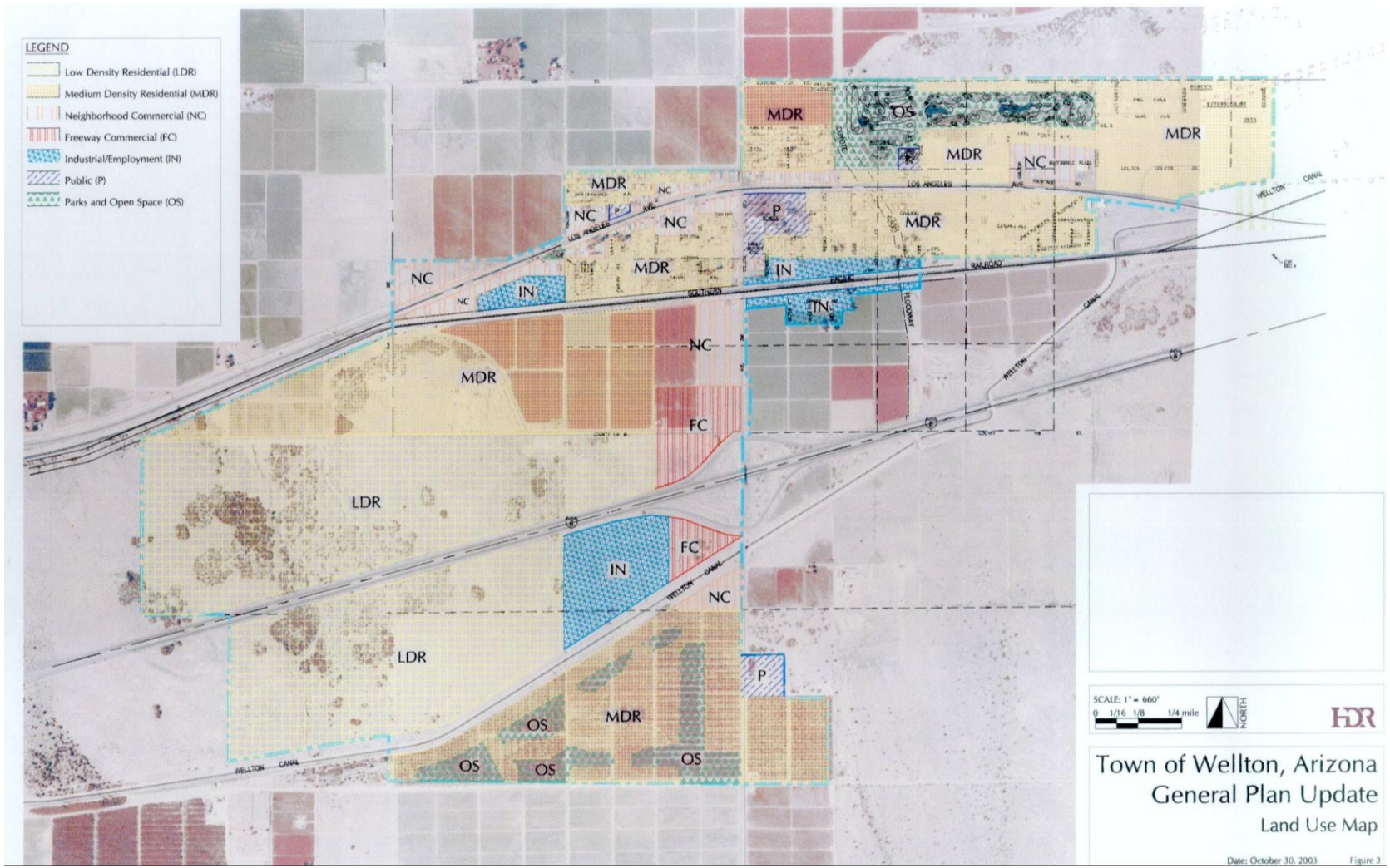


Figure 10. Land Use Plan from the Wellton General Plan

3.3.5 Yuma

The City of Yuma is the county seat for Yuma County and is situated at the extreme southwestern corner of Arizona, as depicted in Figure 2. The City of Yuma is geographically positioned at longitude 114.53 degrees west and latitude 32.59 degrees north, and currently encompasses nearly 110 square miles. Yuma is located 185 miles west of Phoenix and 237 miles west of Tucson. The Colorado and Gila River confluence is located along the northern limit of the city and several large irrigation canals cross through the city to provide irrigation water to farm fields located to the south and west of Yuma.

The total 2010 population for City of Yuma is 90,660. Table 1 summarizes population estimates from 1990 to 2040.[20]

For many years, Yuma served as the gateway to the new western territory of California, which brought thousands of people from around the world in search of gold, or provide services to those who had it. In 1870, the Southern Pacific Railroad bridged the Colorado River and Yuma became a hub for the railroad. The Ocean-to-Ocean Bridge (or Old Highway 80 Bridge) was the first vehicle bridge across the Colorado River. Prior to the construction of the bridge, cars were ferried across. Present day major highways through the City include Interstate 8, U.S. Highways 95 and 80, and State Highway 95. The Marine Corps Air Station (MCAS) shares one of the longest runways in the country with the Yuma International Airport, and a new MCAS auxiliary field is located in the extreme southern portion of the city boundaries. Figure 2 depicts the general geographic features and transportation routes within the region surrounding the City of Yuma.

The largest landholder in the city is the federal government with approximately 65% in military and Bureau of Land Management holdings. Private landholdings are next at about 30%, with the rest being the State of Arizona. Figure 3 provides a visual depiction of the land ownership within and around the City of Yuma.

The history of Yuma is quite colorful and continues to live on today in a fast-growing and vibrant community. In 1540, just 48 years after Columbus discovered the New World, 18 years after the conquest of Mexico by Cortez, and 67 years before the settlement of Jamestown, Hernando de Alarcon visited the site of what is now the current City of Yuma. He was the first European to visit the area and to recognize the best natural crossing of the Colorado River. Much of Yuma County's later development occurred because of this strategic location. From the 1850's through the 1870's, steamboats on the Colorado River transported passengers and goods to various mines, military outposts in the area, and served the ports of Yuma, Laguna, Castle Dome, Norton's Landing, Ehrenberg, Aubry, Fort Mohave and Hardyville. During this time stagecoaches also carried the mail and passengers on bone-jarring rides through the area. In its early years, Yuma was identified by several names. From 1854 until 1858, Yuma was known as Colorado City, from 1858 until 1873, it was named Arizona City. Yuma received its present name by the Territorial Legislature in 1873 and was incorporated in 1914.

The City limits of Yuma include approximately 108 square miles of developed and undeveloped land. Yuma’s location is primarily surrounded by agriculture lands as represented in Figure 11 and Figure 12.

[20] U.S. Census Bureau and Arizona Office of Economic Opportunity, https://population.az.gov/population-projections

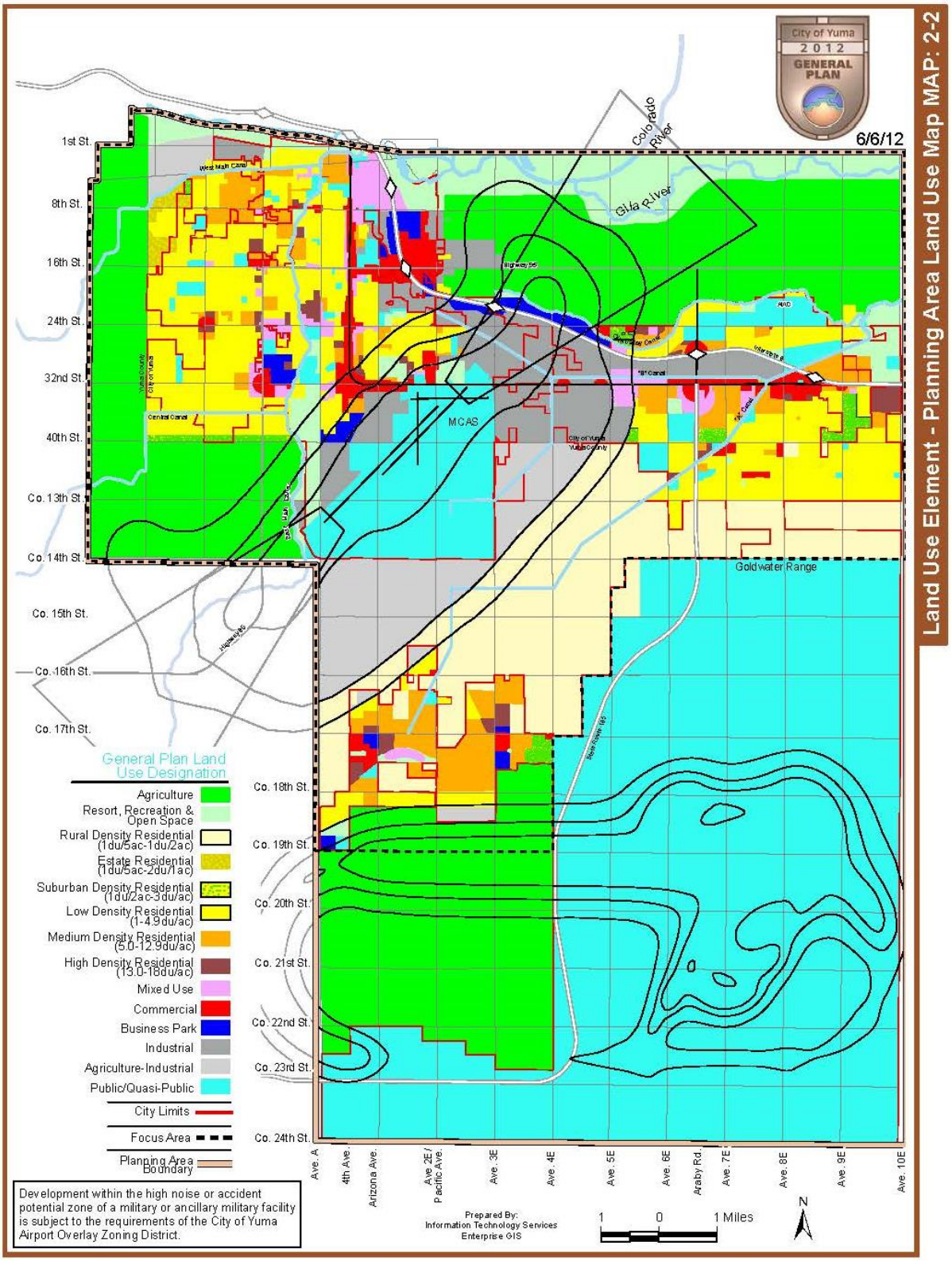


Figure 11. City of Yuma Land Use Map

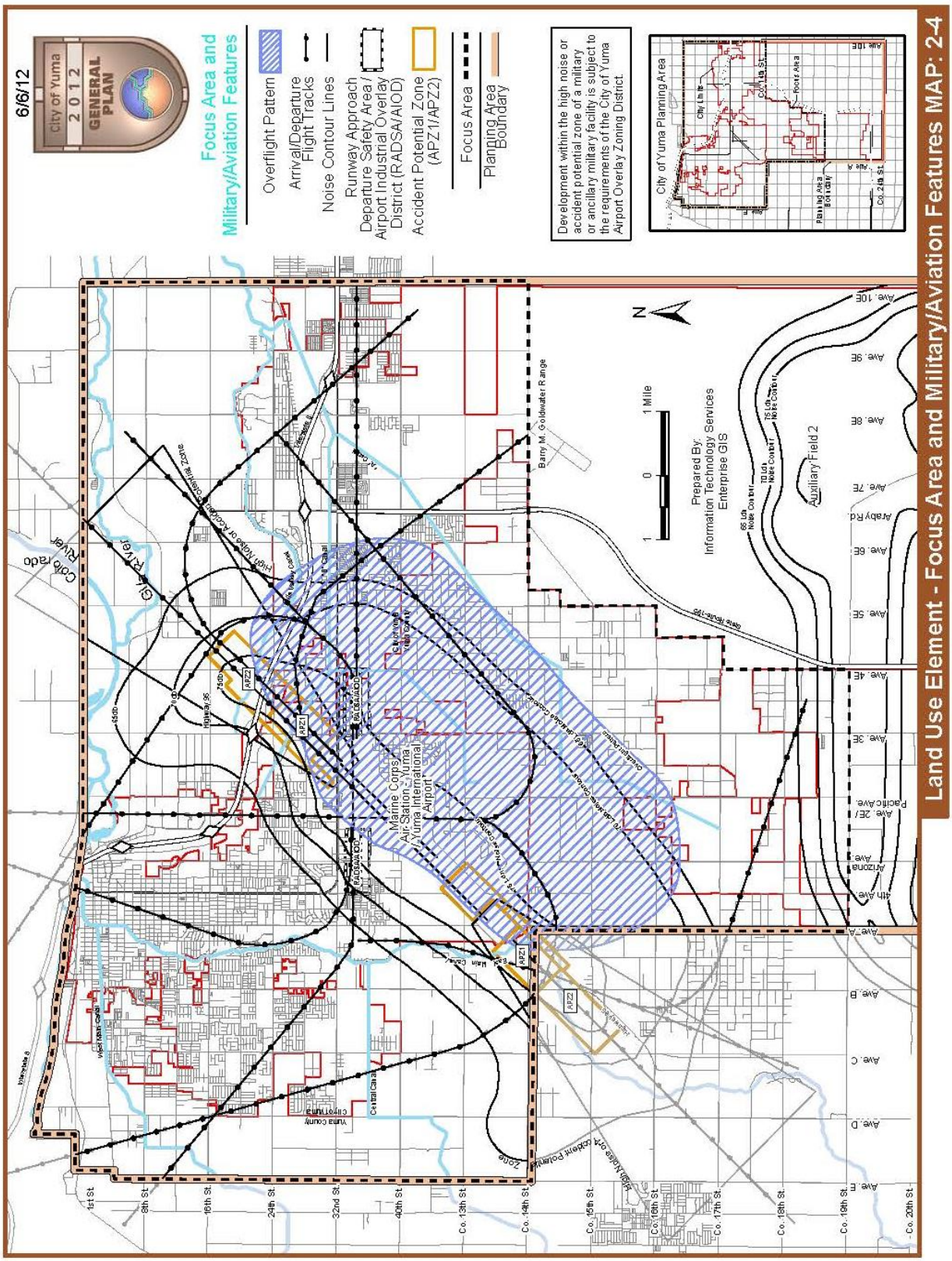


Figure 12. City of Yuma Focus Areas Map

SECTION 4: PLANNING PROCESS

This section includes the delineation of various DMA 2000 regulatory requirements, as well as the identification of key stakeholders and Planning Team members within Yuma County. In addition, the necessary public involvement actions that were applied to this process are also detailed.

4.1 Planning Process Description

Yuma County applied for and received a PDM planning grant to fund a multi-jurisdictional effort to review and update the 2010 Plan. Once the grant was received, the county then selected Michael Baker International (Michael Baker) to work with the participating jurisdictions, including the Cocopah Tribe, and guide the Plan update process. An initial project kickoff call, and follow-up call between Michael Baker and Yuma County Emergency Management occurred in February and March of 2017. Discussions included the new plan format, the Planning Team and process, and other administrative tasks. Initial data collection efforts and contacts were also established. A total of three Planning Team meetings/webinars were conducted over the period of April 2017 through April 2018, beginning with the first Planning Team workshop on April 3, 2017. Throughout that period and for several months afterward, all the work required to collect, process, and document updated data, make changes to the Plan, and prepare the draft of the Plan was performed. The culmination of the project included individual mitigation strategy workshops, specific to each jurisdiction and the Tribe. Details regarding key contact information and promulgation authorities, the planning team selection, participation, and activities, and public involvement are discussed in the following sections.

4.2 Previous Planning Process Assessment

The first task of preparation for this Plan, was to evaluate the process used to develop the 2010 Plan. This was initially discussed by the county and Michael Baker prior to the Planning Team kickoff meeting. The previous planning approach included a mix of in person Planning Team meetings and webinars. This was mostly planned this way so that all participating jurisdictions could participate without having to travel long distances. The previous process of creating one multi-jurisdictional plan for all participating communities, was carried into this new plan update process. Having one combined plan for all participants helps to streamline the process, yet allows the communities to collaboratively work together to come up with solutions to hazards they face together. Additionally, the previous planning approach utilized in 2010 formed a single Planning Team comprised of representatives from all participants, including other agencies and organizations.

4.3 Primary Point of Contact

Table 4-1 summarizes the primary points of contact identified for each participating jurisdiction.

Table 4-1: List of adopting participants points of contact

Jurisdiction	Name	Department / Position
City of San Luis	Eulogio Vera	Public Works Director
City of Somerton	Paul Deanda	Fire Chief
City of Yuma	Michael Erfert Don Willits	YFD / PIO Police Lieutenant
Cocopah Indian Tribe	Michael Fila	Emergency Manager
Town of Wellton	Donald Jones	Police Chief
Unincorporated Yuma County	Tony C. Badilla	Emergency Management Director

4.4 Planning Team

The Planning Team was comprised of one or more representatives from each participating jurisdiction. The role of the Planning Team was to work with the county and planning consultant to perform the coordination, research, and planning element activities required to update the 2010 Plan. Attendance/participation by each jurisdiction was strongly encouraged for every Planning Team workshop and webinar as the meetings were structured to progress through the planning process. Steps and procedures for updating the 2010 Plan was presented and discussed at each Planning Team meeting, and assignments were normally given. Each meeting built on information discussed and assignments given at the previous meeting.

It was stressed during the planning process that these primary jurisdictional points of contact needed to help serve the role as a liaison between the Planning Team and the local jurisdictional leadership/staff. The Planning Team understood this role would include:

- Conveying information and assignments received at the Planning Team meetings to their jurisdictions.
- Engaging local leadership and staff to ensure a collective community voice as assignments/information were requested.
- Soliciting jurisdictional-wide input as decisions were made and draft documents were prepared for review.
- Ensuring that all requested assignments were completed fully and returned on a timely basis.
- Arranging for review and official adoption of the Plan.

4.4.1 Planning Team Assembly

At the beginning of the update planning process, Yuma County Emergency Management (YCEM) organized and identified members for the Planning Team by initiating contact with all participants in the 2010 Plan planning effort. The participating members of the Planning Team are summarized in Table 3-2.

Table 3-2: Summary of Planning Team participants

Name	Jurisdiction / Organization
Alfonso Zavala	Yuma County Sheriff's Office, PIO
Chris Flores	Yuma County, Emergency Management Planner
Jason Phipps	Yuma County Public Works, Deputy Director
Robert Oberosler	Yuma County Sheriff's Office, Lieutenant
Pat Headington	Yuma County, Chief Building / Fire Code Official
Paul Melcher	Yuma County, Chief Deputy Administrator
Shannon Gunderman	Yuman County, Administrative Services Director
Tony Badilla	Yuma County, Director of Emergency Management
Ujwal Pandey	Yuma County, Department of Development Services Engineer
Kevin Tunell	Yuma County, Communications Director
Carlos Flores	Yuma County, Information Technology Services GIS Analyst
Daniel Cruz	Yuma County, Information Technology Services GIS Manager
Joseph Waterford	Yuma County, Public Health Emergency Preparedness Planner
Bill Olvera	Yuma County, Public Works Highway Construction Supervisor
Jeremy McCall	City of Yuma, Water Utilities Manager
Don Willits	City of Yuma, Police Lieutenant
Michael Erfert	City of Yuma, Fire Administrative Officer
Jennifer Albers	City of Yuma, Community Development Principal Planner
Donald Jones	Town of Wellton, Police Chief
Paul De Anda	City of Somerton, Fire Chief
Louie Carlos	City of Somerton, Fire Inspector
Eulogio Vera	City of San Luis, Public Works Director
Angel Ramirez	City of San Luis, Fire Chief
Jose Guzman	City of San Luis, Planning and Zoning
Michael Fila	Cocopah Indian Tribe, Emergency Manager
Joseph Jenkins	Cocopah Indian Tribe, Police Chief
Don Black	U.S. Bureau of Reclamation, Environmental Compliance
Frank Macaluso	U.S. Bureau of Reclamation
Sue Wood	State of Arizona
Michael Garner	Michael Baker International

4.4.2 Planning Team Activities

The Planning Team activities are documented below. Agendas and sign-in sheets for these meetings are included in Appendix B. Following each Planning Team meeting, the Points of Contact for each jurisdiction were encouraged to convene meetings with their local government leadership and staff, as needed, to work through the assignments.

Planning Team Kick-Off Workshop: 4/3/2017: The first workshop focused on ensuring the Planning Team understood the goals of this project and that there was adequate future Planning Team representation for all jurisdictions and the Tribe. A five year plan review was held and an initial risk ranking exercise was conducted. The hazards to be profiled were also agreed upon. Post-meeting actions were then reviewed and included discussions relating to Planning Team input necessary, which related to: critical infrastructure and key resources, capability assessments, mitigation strategy, data requests, and public outreach.

Risk Assessment Workshop & Webinar: 12/7/2017: The second workshop focused on presenting the results of the risk and vulnerability assessment. Discussions also continued relating to: the goals of this project, Planning Team representation, capability assessments, mitigation strategy and actions, and public outreach. There were two meetings held back to back, one from the Planning Team and the other which overlapped with the LEPC meeting. A post-meeting on-line survey and additional requests were action items following this meeting.

Planning Team Meeting & Webinar: 4/3/2018: The third Planning Team meeting was developed to allow participants to understand what was expected of them and their jurisdictions and governments at the upcoming Mitigation Strategy Workshops. Discussions also continued relating to: public outreach survey results, plan maintenance and implementation, community profiles, and final hazard rankings. A post-meeting on-line survey and additional requests were action items following this meeting.

Mitigation Workshops & Webinars: May 2018: A final round of individual Mitigation Workshops were held with each participant formally adopting the Plan. These workshops were all-inclusive and the Planning Team representatives from each jurisdiction and the Tribe were integral in including a diverse cross-section of each community. The first half of each workshop focused on updating mitigation action status from the 2010 Plan. The second half of the workshops focusing on identifying new or continued mitigation actions for this Plan update.

4.4.3 Agency/Organizational Participation

The planning process used to develop the 2018 Plan included participation from several agencies and organizations, including the adopting entities, that operate within or have jurisdiction over small and large areas of Yuma County. At the start of the Plan update, a list of the agencies and organizations that participated in the development of the 2010 Plan was compiled to provide continuity and institutional knowledge to the planning team and the overall update process. Invitations were sent via an email that was addressed to the original participant or their successor. The invitation list included the following entities:

- Arizona Division of Emergency Management
- City of San Luis (multiple departments)
- City of Somerton (multiple departments)
- City of Yuma (multiple departments)
- Cocopah Indian Tribe
- Town of Wellton Police
- U.S. Bureau of Reclamation
- Yuma County Development Services
- Yuma County Emergency Management
- Yuma County Flood Control District
- Yuma County Public Works
- Yuma County Sheriff's Office
- Michael Baker International

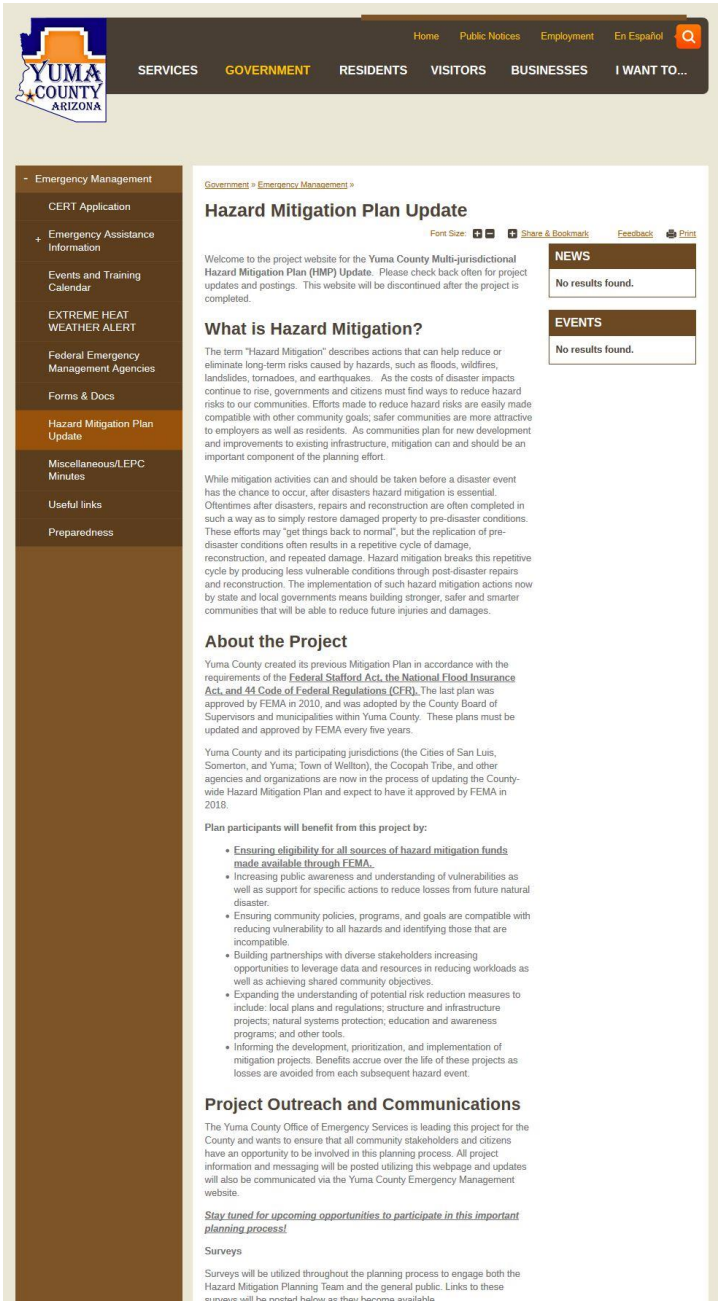
An integral part of the planning process included coordination with agencies and organizations outside of the participating jurisdiction's governance to obtain information and data for inclusion into the Plan or to provide more public exposure to the planning process. Much of the information and data that is used in the risk assessment is developed by agencies or organizations other than the participating jurisdictions. In some cases, the jurisdictions may be members of a larger organization that has jointly conducted a study or planning effort like the development of a community wildfire protection plan or participation in an area association of governments. Examples of those data sets include the FEMA floodplain mapping, the county-wide community wildfire protection plan, severe weather statistics and incidents, and the Yuma Area Agricultural Council. A summary of the resources obtained, reviewed

and compiled into the risk assessment are summarized at the end of each subsection of Section 5.3. Jurisdictions needing these data sets obtained them by either requesting them directly from the host agency or organization, downloading information posted to website locations, or engaging consultants.

4.5 Public Involvement

An important component to the success of the mitigation planning process involved ongoing public, jurisdiction, and stakeholder participation. Public outreach provided the planning team with a clearer perspective of local concerns and ensured a higher degree of mitigation success by developing community feedback from those directly affected by policy decisions.

A broad range of public and private stakeholders were invited to participate in the development of the 2018 Yuma County Multi-Jurisdictional Hazard Mitigation Plan Update. The public was primarily directed to planning and reference materials that were available on the project website.



The most valuable information obtained from the public came from three surveys. These surveys solicited feedback about a number of topics relating to hazard risk perception & disaster preparedness, mitigation strategies, and comments on the final draft version of the Plan document itself.

Creating and analyzing surveys plays an integral role in better understanding a community's asset, needs and goals moving forward with hazard resiliency. The first public survey received over 500 responses and was broadcast via the county's and other jurisdiction's social media accounts.

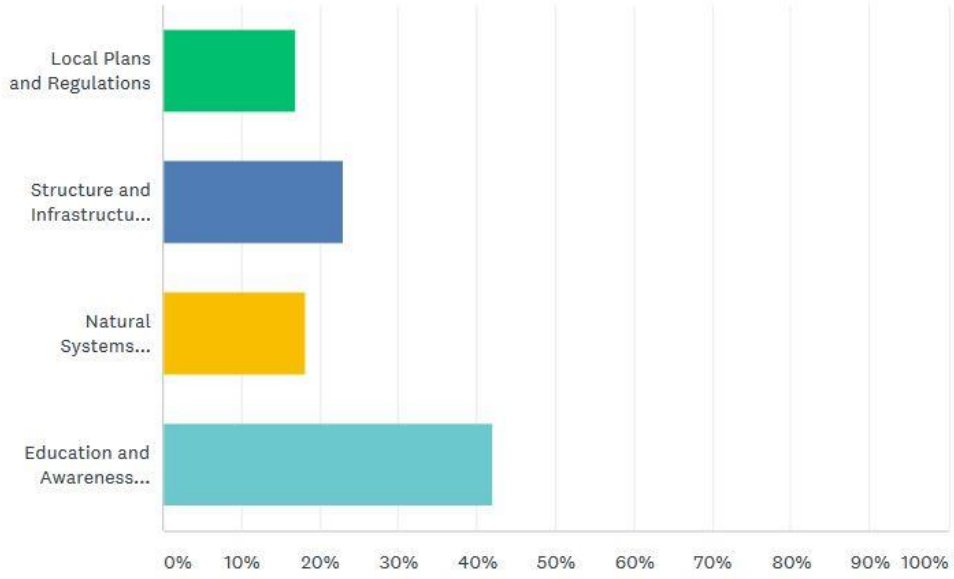
This Public Risk Perceptions survey was aimed at soliciting information from communities about a range of topics, including: what hazards they feel present the most risk to them, have they implemented hazard mitigation, what is the best communication medium to utilize to engage the public, and ideas for mitigation actions.

Q7 Do you have any ideas for projects or actions that you would like to see the county or its jurisdictions implement to reduce your community's risk from natural disaster events?

The second public survey focused on identifying the community's preferences relating to the types of mitigation project implemented and again soliciting suggestions for mitigation actions to consider. Close to 450 responses were received which included over 100 mitigation action ideas. These ideas were reviewed and evaluated by the Planning Team as each community developed their mitigation strategies.

Which of the above four categories are you most supportive of?

Answered: 431 Skipped: 6



The final survey was utilized to solicit public comments on the draft HMP document. This survey and the draft HMP document were posted to the project website for a period of 30 days. Information pertaining to this was shared with the public via the project website, public email distribution lists, and multiple jurisdictional social media accounts. A total of xx comments were received and reviewed by the Planning Team for incorporation into the final draft HMP. Interested citizens were also encouraged to participate in the local community adoption process which, depending upon the jurisdiction, may have included a public meeting and a formal public hearing.

The Cocopah Indian Tribal government, as part of this and other planning processes, defines "public" as all public citizens living on Tribal land.

4.6 Reference Documents and Technical Resources

Over the course of the update planning process, all relevant plans, studies, reports, and technical information were obtained and reviewed for incorporation or reference purposes. All current community comprehensive/master plans were consulted, in addition to current capital improvement plans and other emergency management planning documents. For this Plan update, this information was most applicable to the development of each community's mitigation strategy and capabilities.

SECTION 5: RISK ASSESSMENT

One of the key elements to the hazard mitigation planning process is the risk assessment. In performing a risk assessment, a community determines "what" can occur, "when" (how often) it is likely to occur, and "how bad" the effects could be[21]. According to DMA 2000, the primary components of a risk assessment that answer these questions are generally categorized into the following measures:

Hazard Identification and Screening

Hazard Profiling

Assessing Vulnerability to Hazards

The risk assessment for Yuma County, the Cocopah Tribe, and participating jurisdictions was performed using a county-wide, multi-jurisdictional perspective, with much of the information gathering and development being accomplished by the Planning Team. This integrated approach was employed because many hazard events are likely to affect several jurisdictions within Yuma County, and are rarely relegated to a single jurisdictional boundary. The vulnerability analysis was performed in a way such that the results reflect vulnerability at an individual jurisdictional level, and at a countywide level.

5.1 Hazard Identification and Screening

Hazard identification is the process of answering the question; *"What hazards can and do occur in my community or jurisdiction?"* For this Plan, the list of hazards identified in the 2010 Plan were reviewed by the Planning Team with the goal of refining the list to reflect the natural hazards that pose the greatest risk to the jurisdictions and Cocopah Tribe represented by this Plan. The Planning Team decided to focus on natural hazards for this plan update. The Planning Team also compared and contrasted the 2010 Plan list to the comprehensive hazard list summarized in the 2013 State Plan[22] to ensure compatibility with the State Plan. Table 2 summarizes the hazards profiled in the 2010 Plan, the 2013 State Plan, and this updated 2018 Plan.

[21] National Fire Protection Association, 2000, *Standard on Disaster/Emergency Management and Business Continuity Programs*, NFPA 1600.

[22] ADEM, 2013, *State of Arizona Multi-Hazard Mitigation Plan*

Table 2. Summary of Initial Hazard Identification Lists

2010 Yuma County Plan Hazard List	2013 State Plan Hazard List	2018 Yuma County Plan Hazard List
• Flooding • Severe Wind • Transportation Accident • Wildfire	• Dam Failure • Disease • Drought • Earthquake • Extreme Heat • Fissures • Flooding/Flash Flooding • Hazardous Materials Incidents • Landslides/Mudslides • Levee Failure • Severe Winds • Subsidence • Terrorism • Wildfires • Winter Storms	• Drought • Earthquake • Extreme Heat (Power Outage) • Flooding • Severe Wind/Dust Storms • Wildfire

The review included an initial screening process to evaluate each of the listed hazards based on the following considerations:

- Experiential knowledge on behalf of the Planning Team with regard to the relative risk associated with the hazard
- Documented historic context for damages and losses associated with past events (especially events that have occurred during the last plan cycle)
- The ability/desire of Planning Team to develop effective mitigation for the hazard under current DMA 2000 criteria
- Compatibility with the state hazard mitigation plan hazards
- Duplication of effects attributed to each hazard

The culmination of the review and screening process by the Planning Team resulted in a revised list of hazards that will be carried forward with this updated mitigation plan.

Table 3 summarizes the federal and state disaster declarations that included Yuma County.

Table 3. State and Federally Declared Natural Hazard Events That Included Yuma County – April 1973 to August 2017

Hazard	No. of Declarations	Recorded Losses		
		Fatalities	Injuries	Property Damage($)
Drought	9	0	0	$303,000,000
Earthquake	1	0	0	$0
Flooding	8	22	112	$505,750,000
Wildfire	19	0	0	$0

Notes: Damage Costs include property and crop/livestock losses and are reported as is with no attempt to adjust costs to current dollar values. Furthermore, wildfire damage costs do not include the cost of suppression which can be quite substantial (approximately $2.3 million for eleven wildfire events).
Sources: ADEM, FEMA, USDA

5.2 Vulnerability Analysis Methodology

5.2.1 General

The following sections summarize the methodologies used to perform the vulnerability analysis portion of the risk assessment. For this Plan, the entire vulnerability analysis was either revised or updated to reflect the new hazard categories, the availability of new data, or differing loss estimation methodology. Specific changes are noted below and/or in Section 5.3.

For the purposes of this vulnerability analysis, hazard profile maps were developed for Earthquake, Flood, Severe Wind, and Wildfire, to map the geographic variability of the probability and magnitude risk of the hazards as estimated by the Planning Team. Hazard profile categories of HIGH, MEDIUM, and LOW were used and were subjectively assigned based on the factors discussed in Probability and Magnitude sections below. For Earthquake, peak acceleration scale of %g was used to reflect hazard level. Within the context of the county limits, the other hazards do not exhibit significant geographic variability and were not categorized as such.

Unless otherwise specified in this Plan, the general cutoff date for new, historic or hazard profile data is the end of September 2017.

5.2.2 Calculated Priority Risk Index (CPRI) Evaluation

The first step in the vulnerability analysis (VA) is to assess the perceived overall risk for each of the plan hazards using a tool developed by the State of Arizona called the Calculated Priority Risk Index[23] (CPRI). The CPRI value is obtained by assigning varying degrees of risk to four (4) categories for each hazard, and then calculating an index value based on a weighting scheme. Table 4 summarizes the CPRI risk categories and provides guidance regarding the assignment of values and weighting factors for each category.

[23] ADEM, 2003, *Arizona Model Local Hazard Mitigation Plan*, prepared by JE Fuller/ Hydrology & Geomorphology, Inc.

Table 4. Summary of Calculated Priority Risk Index (CPRI) categories and risk levels

CPRI Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Index Value	
Probability	Unlikely	▪ Extremely rare with no documented history of occurrences or events. ▪ Annual probability of less than 0.001.	1	45%
	Possibly	▪ Rare occurrences with at least one documented or anecdotal historic event. ▪ Annual probability that is between 0.01 and 0.001.	2	
	Likely	▪ Occasional occurrences with at least two or more documented historic events. ▪ Annual probability that is between 0.1 and 0.01.	3	
	Highly Likely	▪ Frequent events with a well documented history of occurrence. ▪ Annual probability that is greater than 0.1.	4	
Magnitude/ Severity	Negligible	▪ Negligible property damages (less than 5% of critical and non-critical facilities and infrastructure). ▪ Injuries or illnesses are treatable with first aid and there are no deaths. ▪ Negligible quality of life lost. ▪ Shut down of critical facilities for less than 24 hours.	1	30%
	Limited	▪ Slight property damages (greater than 5% and less than 25% of critical and non-critical facilities and infrastructure). ▪ Injuries or illnesses do not result in permanent disability and there are no deaths. ▪ Moderate quality of life lost. ▪ Shut down of critical facilities for more than 1 day and less than 1 week.	2	
	Critical	▪ Moderate property damages (greater than 25% and less than 50% of critical and non-critical facilities and infrastructure). ▪ Injuries or illnesses result in permanent disability and at least one death. ▪ Shut down of critical facilities for more than 1 week and less than 1 month.	3	
	Catastrophic	▪ Severe property damages (greater than 50% of critical and non-critical facilities and infrastructure). ▪ Injuries or illnesses result in permanent disability and multiple deaths. ▪ Shut down of critical facilities for more than 1 month.	4	
Warning Time	Less than 6 hours	Self explanatory.	4	15%
	6 to 12 hours	Self explanatory.	3	
	12 to 24 hours	Self explanatory.	2	
	More than 24 hours	Self explanatory.	1	
Duration	Less than 6 hours	Self explanatory.	1	10%
	Less than 24 hours	Self explanatory.	2	
	Less than one week	Self explanatory.	3	
	More than one week	Self explanatory.	4	

As an example, assume that survey participants are assessing the hazard of flooding, and have decided that the following assignments best describe the flooding hazard for their community:

- Probability = Likely
- Magnitude/Severity = Critical
- Warning Time = 12 to 24 hours
- Duration = Less than 6 hours

That individual's CPRI for the flooding hazard would then be:

CPRI = [(3*0.45) + (3*0.30) + (2*0.15) + (1*0.10)]
CPRI = 2.65 (with 4.0 being the highest possible rating)

For the 2018 Plan Update, the CPRI assessment was conducted utilizing an online survey, which was distributed to community representatives in order to solicit feedback. This resulted in 13 completed responses from across all participating jurisdictions and Tribe. CPRI Tables are included in each hazards' section with scores averaged based on the responses from all participating community representatives. It should be noted that these Index Values are presented as an average of the collective responses received from each jurisdiction or Tribe and should provide a more holistic opinion from each jurisdiction or Tribe, as compared to past Plan updates.

It is noted that this process differed from that following during past plan updates. Previously, the CPRI values were agreed upon by one or two jurisdictional or Tribal representatives. For this plan update, both jurisdictional or Tribal representatives and community members were asked to complete this evaluation. The results of which were then averaged. This average risk perception value varies (in some instances greatly) for many hazards as compared to the 2010 values. In some cases, it may seemingly contradict what the historical, vulnerability, and/or loss estimation information presents. The Planning Team found value in this exercise as it helps to identify misconceptions regarding some of the hazard risks facing these communities, which can help identify opportunities for public outreach and education.

5.2.3 Asset Inventory

A detailed critical asset inventory was performed for the 2010 Plan to establish a fairly accurate baseline data-set for assessing the vulnerability of each jurisdiction's assets to the hazards previously identified. The asset inventory from the 2010 Plan was reviewed and updated by all participating jurisdictions as part of the 2018 Plan update process.

Critical facilities and infrastructure are systems, structures, and infrastructure within a community whose incapacity or destruction would:

- Have a debilitating impact on the defense or economic security of that community.
- Significantly hinder a community's ability to recover following a disaster.

Following the criteria set forth by the Critical Infrastructure Assurance Office (CIAO), the State of Arizona has adopted eight general categories[24] that define critical facilities and infrastructure:

1. Communications Infrastructure: Telephone, cell phone, data services, radio towers, and internet communications, which have become essential to continuity of business, industry, government, and military operations. Electrical Power Systems: Generation stations and transmission and distribution networks that create and supply electricity to end-users.
2. Gas and Oil Facilities: Production and holding facilities for natural gas, crude and refined petroleum, and petroleum-derived fuels, as well as the refining and processing facilities for these fuels.
3. Banking and Finance Institutions: Banks, financial service companies, payment systems, investment companies, and securities/commodities exchanges.
4. Transportation Networks: Highways, railroads, ports and inland waterways, pipelines, and airports and airways that facilitate the efficient movement of goods and people.
5. Water Supply Systems: Sources of water; reservoirs and holding facilities; aqueducts and other transport systems; filtration, cleaning, and treatment systems; pipelines; cooling systems; and other delivery mechanisms that provide for domestic and industrial applications, including systems for dealing with water runoff, wastewater, and firefighting.
6. Government Services: Capabilities at the federal, state, and local levels of government required to meet the needs for essential services to the public.
7. Emergency Services: Medical, police, fire, and rescue systems.

Other assets such as public libraries, schools, businesses, museums, parks, recreational facilities, historic buildings or sites, churches, residential and/or commercial subdivisions, apartment complexes, businesses, and so forth, are typically not classified as critical facilities and infrastructure unless they serve a secondary function to the community during a disaster emergency (e.g. - emergency housing or evacuation centers). As a part of the update process, each community was tasked with identifying other assets that should be considered as being critical. Each community was also tasked with making any needed changes to the geographic position, revision of asset names, updating replacement costs, etc. to bring the dataset into a current condition. The updated asset inventory is attributed with a descriptive name, physical address, geospatial position, and an estimated building/structure and contents replacement cost for each entry to the greatest extent possible and is stored in a GIS geodatabase.

The following Table 5 summarizes the facility counts provided by each of the participating jurisdictions in this Plan.

[24] Instituted via Executive Order 13010, which was signed by President Clinton in 1996.

Table 5. Summary of Critical and Non-Critical Facility counts by category and jurisdiction as of September 2017

	Critical Facilities and Infrastructure					Non-Critical Facilities and Infrastructure					
Participating Jurisdiction	**Electrical Power Systems**	**Transportation Networks**	**Water Supply Systems**	**Government Services**	**Emergency Services**	**Education**	**Cultural**	**Business**	**Residential**	**Recreational**	**Total**
Cocopah Indian Tribe			5	14	1	3	2	4	1	4	34
San Luis	1		2	13	7	11	1	2		4	41
Somerton			1	5	4	6	1	1		1	19
Wellton			2	1	1	2					6
Yuma	1	1	5	20	16	49	1			7	100
Yuma County			8	22	6	12			1		49
Total	2	1	23	75	35	83	5	7	2	16	249

5.2.4 Loss Estimations

Loss estimates for this Plan reflect best available data utilizing: current hazard map layers, an updated asset database, Hazus 3.2, and/or the use of Census 2010 block level data for estimating exposures and losses when possible.

Several of the hazards profiled in this Plan will not include quantitative exposure and loss estimates. The vulnerability of people and assets associated with some hazards are nearly impossible to evaluate given the uncertainty associated with where these hazards will occur as well as the relatively limited focus and extent of damage. Instead, a qualitative review of vulnerability will be discussed to provide insight to the nature of losses that are associated with the hazard. For subsequent updates of this Plan, the data needed to evaluate these unpredictable hazards may become refined such that comprehensive vulnerability statements and thorough loss estimates can be made.

5.2.5 Development Trend Analysis

The 2018 Plan development trend analysis will require updating to reflect growth and changes in Yuma County over the last planning cycle. The updated analysis will focus on the potential risk associated with projected growth patterns and their intersection with the Plan identified hazards.

5.3 Hazard Risk Profiles

The following sections summarize the risk profiles for each of the Plan hazards identified in Section 5.1. For each hazard, the following elements are addressed to present the overall risk profile:

- **Description**
- **History**
- **Probability and Magnitude**
- **Vulnerability**
- **Sources**

- **Profile Maps (if applicable)**

Much of the 2010 Plan data has been updated, incorporated and/or revised to reflect current data and Planning Team changes. County-wide and regional/community profile maps are provided at the end of the section (if applicable).

5.3.1 Drought

Description

Drought is a normal part of virtually every climate on the planet, including areas of high and low rainfall. It is different from normal aridity, which is a permanent characteristic of the climate in areas of low rainfall. Drought is the result of a natural decline in the expected precipitation over an extended period of time, typically one or more seasons in length. The severity of drought can be aggravated by other climatic factors, such as prolonged high winds and low relative humidity (FEMA, 1997).

Drought is a complex natural hazard which is reflected in the following four definitions commonly used to describe it:

- Meteorological – drought is defined solely on the degree of dryness, expressed as a departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
- Hydrological – drought is related to the effects of precipitation shortfalls on streamflows and reservoir, lake, and groundwater levels.
- Agricultural – drought is defined principally in terms of naturally occurring soil moisture deficiencies relative to water demands of plant life, usually arid crops.
- Socioeconomic – drought associates the supply and demand of economic goods or services with elements of meteorological, hydrologic, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply as a result of weather-related supply shortfall. It may also be called a water management drought.

A drought's severity depends on numerous factors, including duration, intensity, and geographic extent as well as regional water supply demands by humans and vegetation. Due to its multi-dimensional nature, drought is difficult to define in exact terms and also poses difficulties in terms of comprehensive risk assessments.

Drought differs from other natural hazards in three ways. First, the onset and end of a drought are difficult to determine due to the slow accumulation and lingering effects of an event after its apparent end. Second, the lack of an exact and universally accepted definition adds to the confusion of its existence and severity. Third, in contrast with other natural hazards, the impact of drought is less obvious and may be spread over a larger geographic area. These characteristics have hindered the preparation of drought contingency or mitigation plans by many governments.

Droughts may cause a shortage of water for human and industrial consumption, hydroelectric power, recreation, and navigation. Water quality may also decline and the number and severity of wildfires may increase. Severe droughts may result in the loss of agricultural crops and forest products, undernourished wildlife and livestock, lower land values, and higher unemployment.

History

Arizona has experienced 17 droughts declared as drought disasters/emergencies from 1987 to 2013, and 93 drought events (droughts affecting multiple years are recorded as a distinct event for each year affected)[25]. Figure 13 depicts the most recent precipitation data from the National Centers for Environmental Information (NCEI) regarding average statewide annual precipitation variances from a 30-year mean.[26] Between 1849 and 1905, the most prolonged period of drought conditions in 300 years occurred in Arizona (NOAA, 2003). Another prolonged drought occurred during the period of 1941 to

[25] Source: 2013 State of Arizona Hazard Mitigation Plan

[26] Source: NOAA, NCEI, https://www.ncdc.noaa.gov/cag/statewide/time-series/2/pcp/all/12/1998-2018?base_prd=true&firstbaseyear=1987&lastbaseyear=2018, accessed March 2018.

1965. The period from 1979-1983 appears to have been anomalously wet, while the rest of the historical records shows that dry conditions are most likely the normal condition for Arizona. Between 1998 and 2018, there have been many more months with below normal precipitation than above normal precipitation.

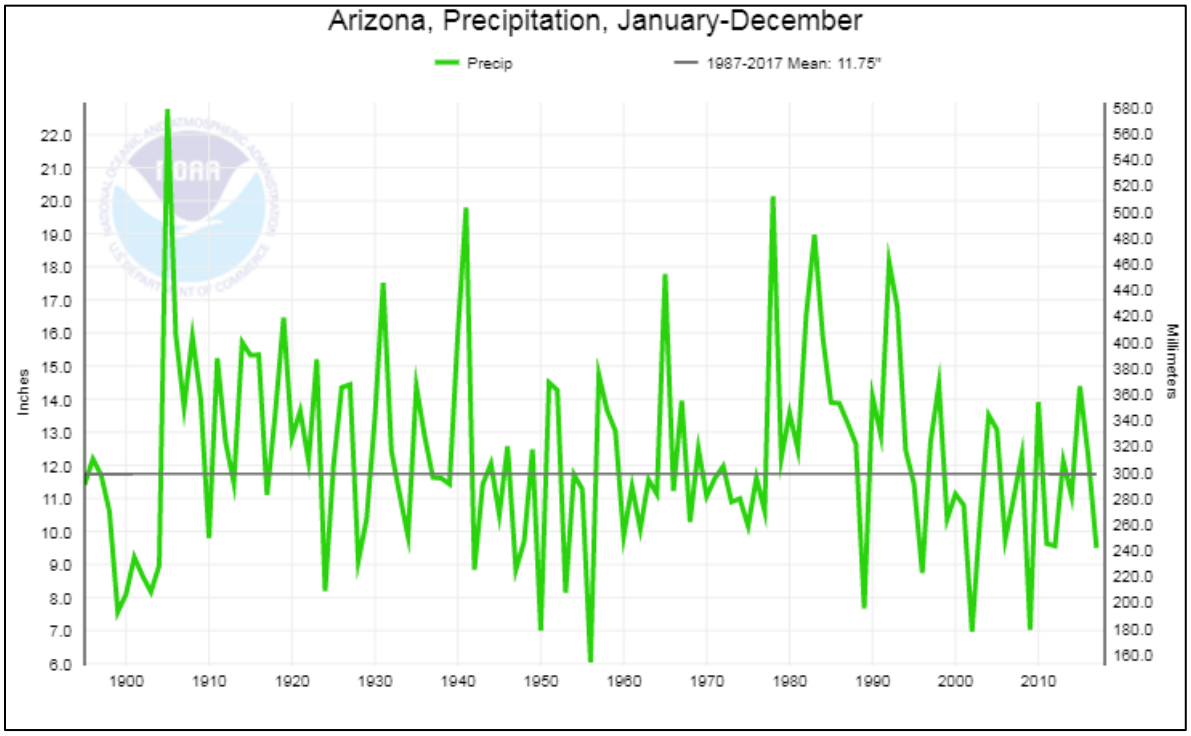


Figure 13. Average statewide annual precipitation variances from a 1897 to 2017 mean from 1895 to 2018.

The following figures demonstrate the current statewide drought levels and the annual precipitation for the nation. It can be seen that Yuma County is currently experiencing moderate to severe conditions, with higher levels being seen in the central and southeast part of the county. Precipitation for the State of Arizona, and especially Yuma County, is much lower than the majority of the nation.

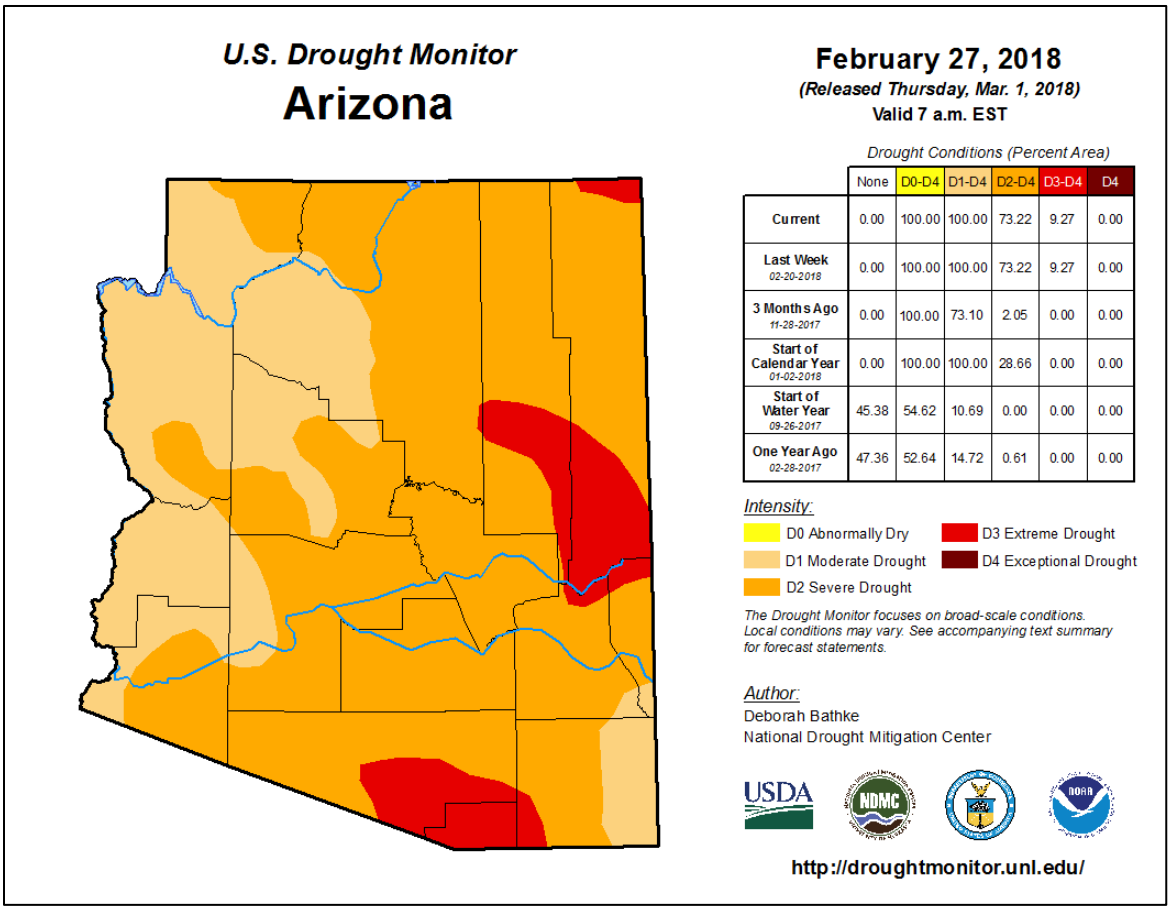


Figure 14. Arizona Drought 2017 Monitor

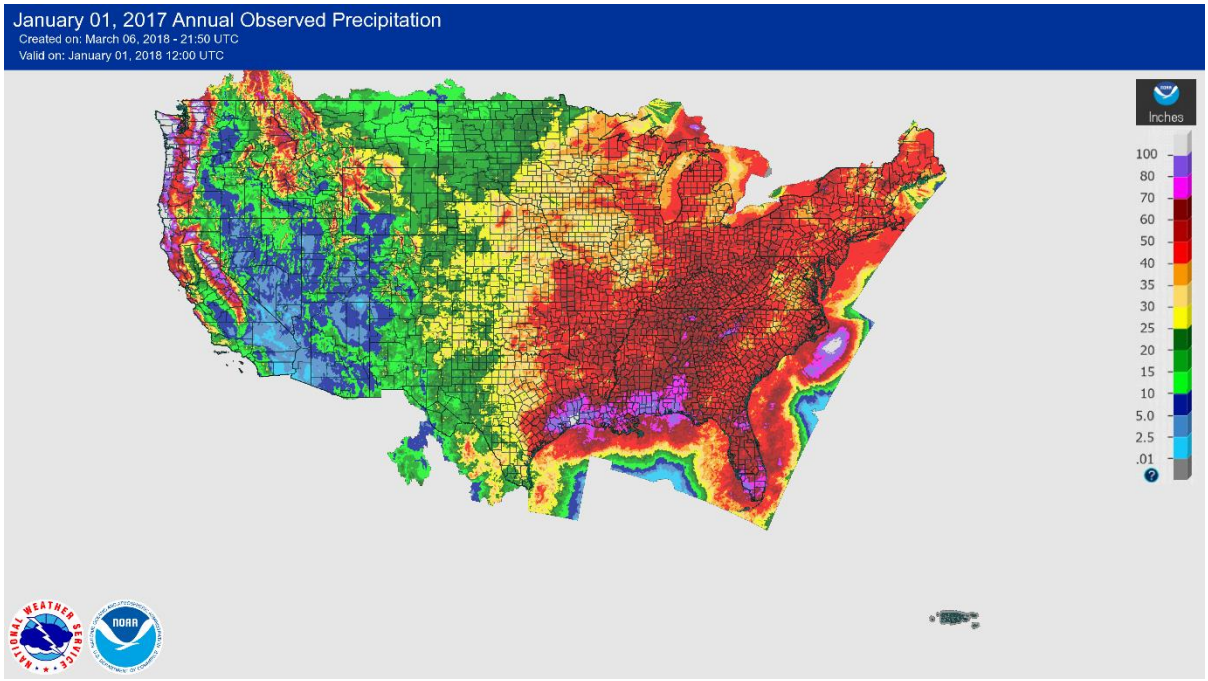


Figure 15. Nationwide Precipitation, 2017

The State of Arizona consistently experiences drought conditions and has often been declared eligible for drought emergency assistance through the U.S. Department of Agriculture. Drought declarations for the entire State have occurred consecutively since 1996, with numerous prior declarations dating back to the time of statehood.

The impacts of a sustained drought affect many aspects of the industry, economy, and natural resources of Yuma County. The most direct impacts are to the agricultural community, the development of domestic water supplies, and hydroelectric generation.

The primary source of irrigation water for the agricultural community within Yuma County is the Colorado River. Secondary water supplies are provided by groundwater pumping. The Colorado River is also a significant source of hydroelectric power generation with distribution administered and operated by the Western Area Power Authority (WAPA) through two local electric utility companies, Arizona Public Service and Wellton Mohawk Irrigation and Drainage District. During extended periods of drought, impoundment levels behind the various dams along the Colorado River can decline to levels such that both agricultural and electric utility resources are affected. In extreme cases of storage reduction, electricity generating turbines could cease to function and the energy needed to pump the Colorado River water into the agricultural distribution systems would not be available. This event would have devastating impacts on not only Yuma County, but also much of Arizona and California.

With regard to agriculture, when drought conditions persist such as what is currently being experienced statewide, more demand is placed on groundwater supplies. Other agricultural areas impacted include cattle ranching and rangeland grazing. With ongoing drought, rangeland grasses and other fodder, along with stock tank water supplies, are significantly reduced. This reduction forces ranchers to feed more hay and to truck in water, both of which significantly increase expenses.

From 1995 to 2016, Yuma County farmers and ranchers have received approximately $10.4 million[27] in disaster related assistance funds. According to the USDA, 35 to 55% of the disaster assistance money[28] from 2000-2010 can be attributed to drought related losses. Accordingly, it is realistic to estimate that $3.6 million to $5.7 million of the assistance money is related to drought conditions in the county. These impacts are translated into the general economy in the form of higher food and agricultural goods prices.

Probability and Magnitude

There are no commonly accepted return period or non-exceedance probability for defining the risk from drought (such as the 100-year or 1% annual chance of flood). The magnitude of drought is usually measured in time and the severity of the hydrologic deficit. There are several resources available to evaluate drought status and even project very near future expected conditions.

The National Integrated Drought Information System (NIDIS) Act of 2006 (Public Law 109-430) prescribes an interagency approach for drought monitoring, forecasting, and early warning (NIDIS, 2007). The NIDIS maintains Drought.gov[29] which is a centralized, web-based access point to several drought related resources including the U.S. Drought Monitor (USDM) and the U.S. Seasonal Drought Outlook (USSDO). The USDM, shown in Figure 16, is a weekly map depicting the current status of drought and is developed and maintained by the National Drought Mitigation Center. The USSDO, shown in Figure 17, is a six month projection of potential drought conditions developed by the National Weather Service's Climate Prediction Center. The primary indicators for these maps for the Western U.S. are the Palmer Hydrologic Drought Index and the 60-month Palmer Z-index. The Palmer Drought Severity Index (PSDI) is a commonly used index that measures the severity of drought for agriculture and water resource management. It is calculated from observed temperature and precipitation values and estimates soil moisture. However, the Palmer Index is not considered to be consistent enough to characterize the risk of drought on a nationwide basis (FEMA, 1997) and neither of the Palmer indices are well suited to the dry, mountainous western United States.

[27] Environmental Working Group, Farm Subsidy Database, https://farm.ewg.org/region.php?fips=04027

[28] U.S. Department of Agriculture, 2004, *News Release No. fs0199.04*, web link at: http://www.usda.gov/Newsroom/fs0199.04.html

[29] NIDIS U.S. Drought Portal website is located at: https://www.drought.gov/drought/

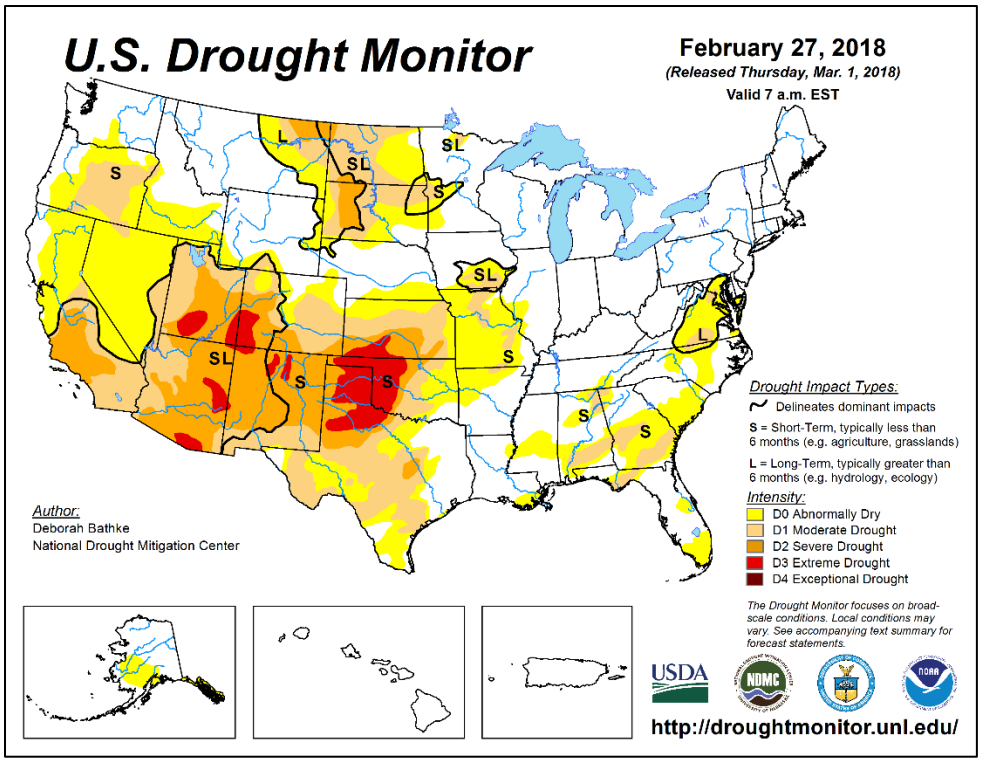


Figure 16. U.S. Drought Monitor Map for February 27, 2018

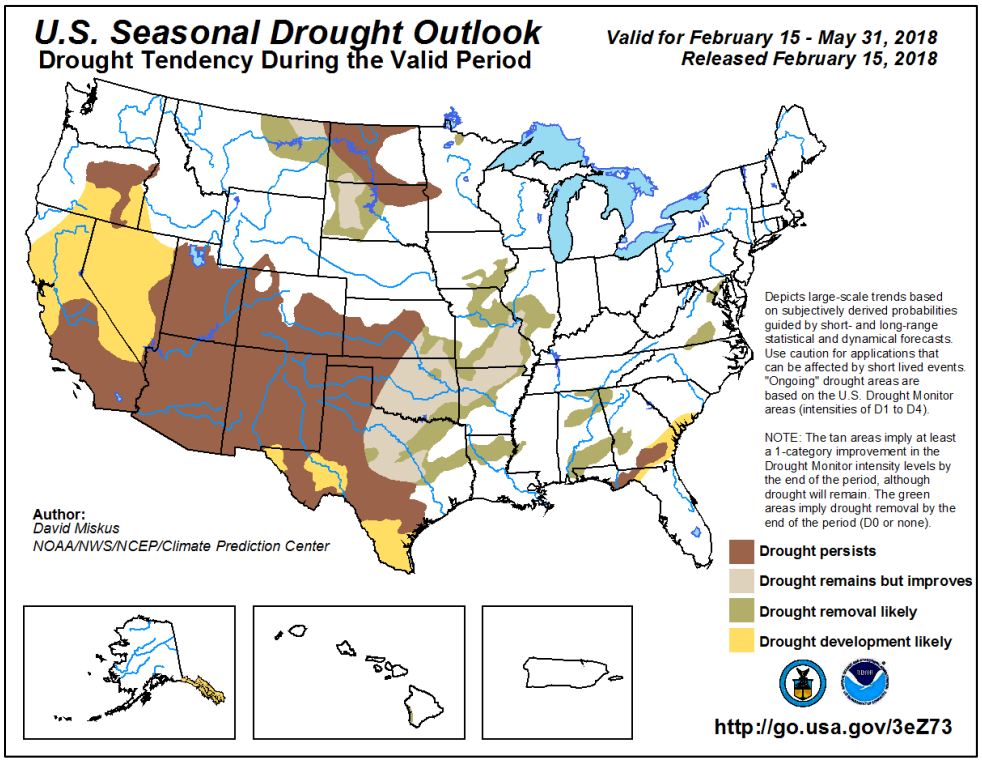


Figure 17. U.S. Seasonal Drought Outlook, February to May 2018

In 2003, Governor Janet Napolitano created the Arizona Drought Task Force (ADTF), led by ADWR, which developed a statewide drought plan. The plan includes criteria for determining both short and long-term drought status for each of the 15 major watersheds in the state using assessments that are based on precipitation and stream flow. The plan also provides the framework for an interagency group which reports to the governor on drought status, in addition to local drought impact groups in each county and the State Drought Monitoring Technical Committee. This interagency group reports to the governor on an annual basis about the existing drought status and the potential need for drought declarations. The counties use the monthly drought status reports to implement drought actions within their drought plans. The State Drought Monitoring Technical Committee uses the Standardized Precipitation Index (SPI) for the short-term drought status and a combination of the SPI and streamflow for the long-term drought status. Figure 18 present the most current long-term map available as of the writing of this plan. The State Drought Monitoring Technical Committee recognizes moderate and severe drought conditions in the short-term; and severe to exceptional conditions in the long-term. The quarterly drought status update report for October through December 2017 states that a dry winter and meager snowpack caused expansion of drought conditions across the State, and water equivalent ranks with Arizona's driest years, including 2000 and 2006.[30]

[30] Arizona State Drought Monitoring Technical Committee, https://new.azwater.gov/drought/drought-status, accessed March 2018

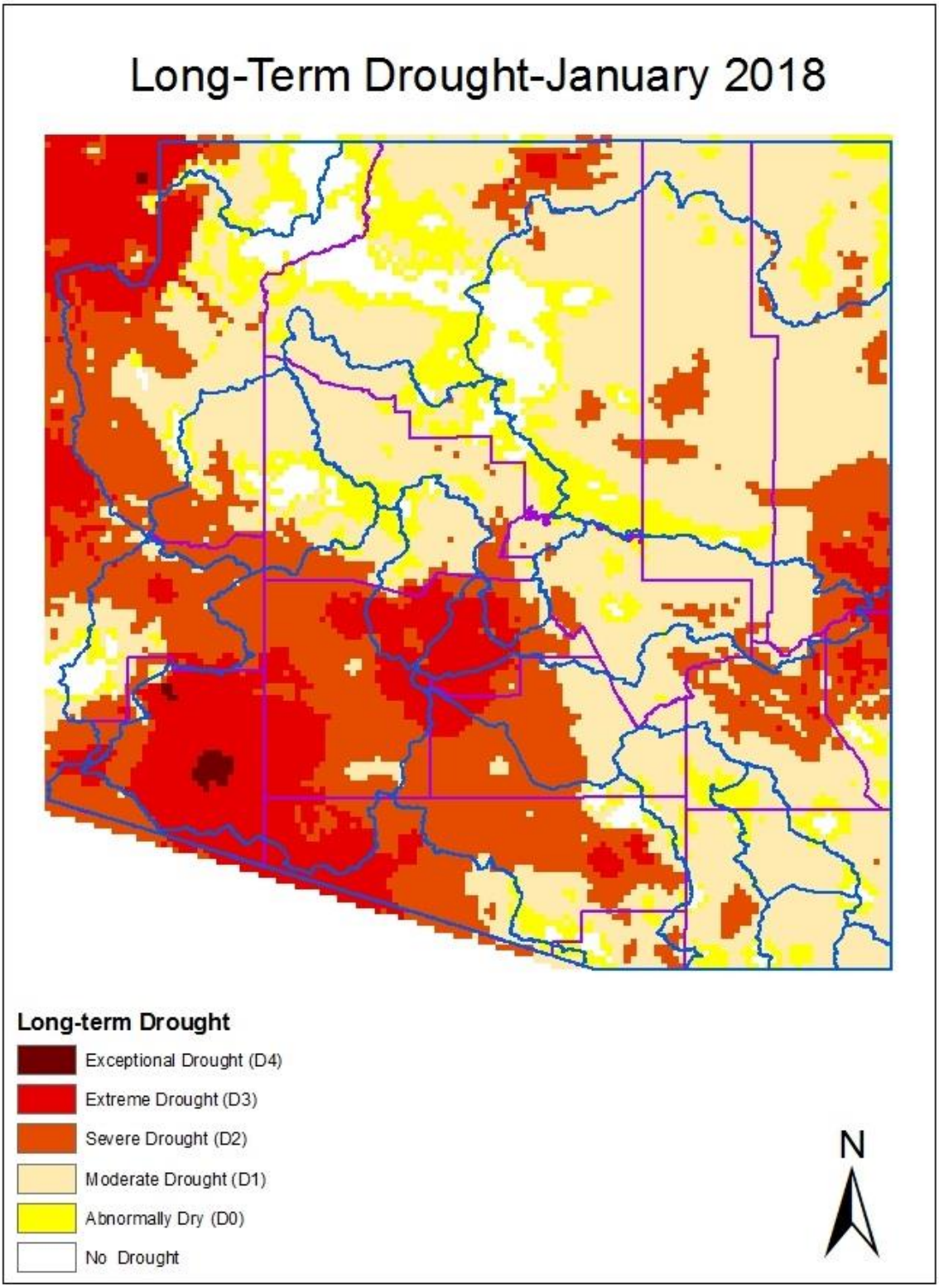


Figure 18. Arizona Long Term Drought Status map for January 2017

The 2017 Annual Drought Preparedness Report stated that the past year has seen improvements in terms of seasonal precipitation and streamflows, although many parts of the state are still experiencing abnormally dry conditions. The following Figure 19 displays winter precipitation levels from 2016-2017.[31]

[31] Source: 2017 Arizona Drought Preparedness Annual Report, https://new.azwater.gov/sites/default/files/media/2017%20Arizona%20Drought%20Preparedness%20Annual%20Report.pdf

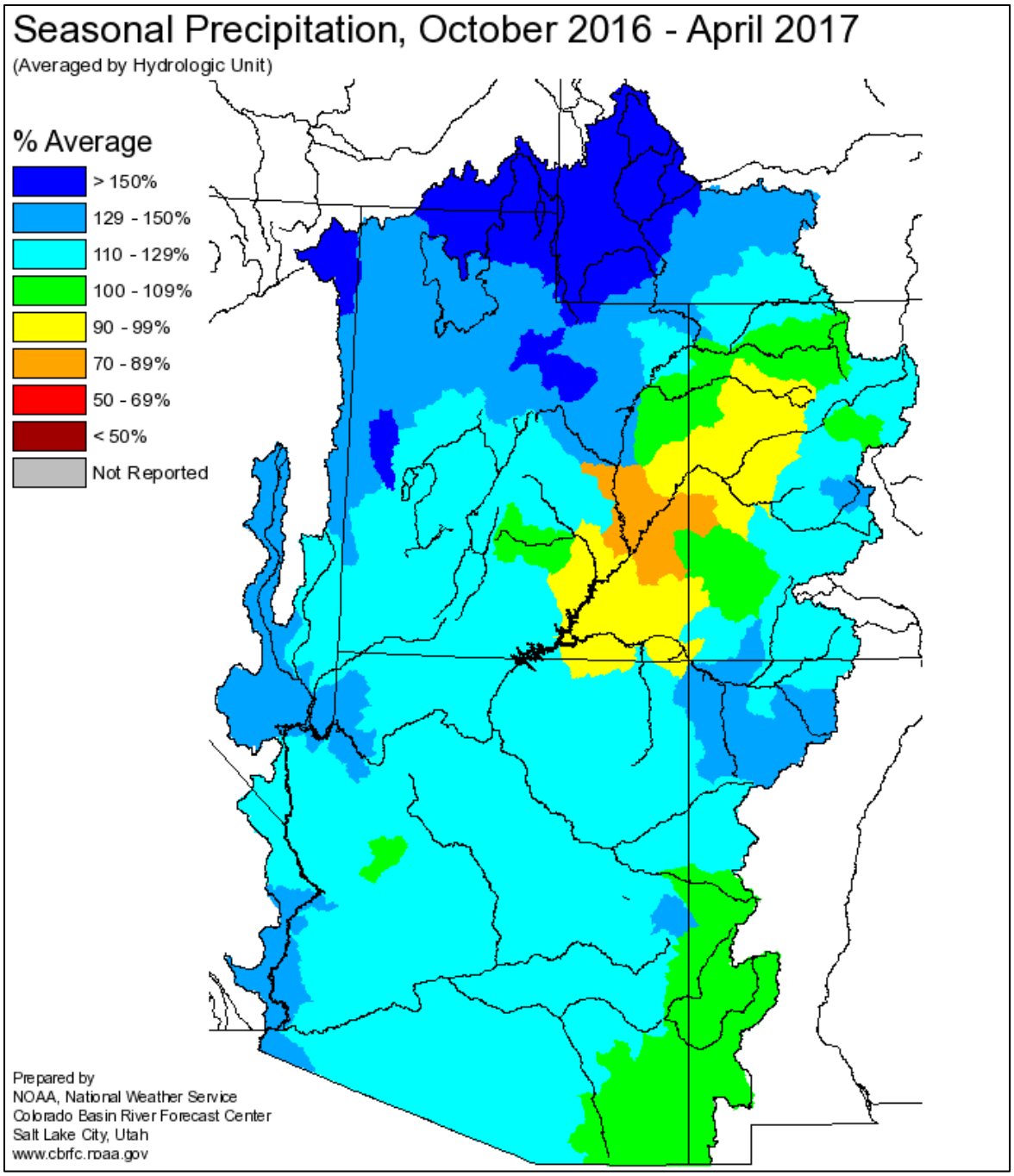


Figure 19. Winter Precipitation, October 2016 to April 2017

Vulnerability – CPRI Results

Drought CPRI results for each community are summarized in Table 6 below.

Table 6. Summary of CPRI results by jurisdiction for drought

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Cocopah Tribe	Likely	Negligible	>24 hours	>1 week	2.2
San Luis	Possibly	Critical	>24 hours	>1 week	2.4
Somerton	Highly Likely	Critical	>24 hours	>1 week	3.3
Unincorporated Yuma County	Possibly to Likely	Limited	>24 hours	>1 week	2.2
Wellton	Highly Likely	Limited	>24 hours	>1 week	3.0
Yuma	Possibly	Limited to Critical	>24 hours	>1 week	2.2
				County-wide average CPRI =	**2.6**
				CPRI Min/Max Score = 1.00/4.00	

Vulnerability – Loss Estimations

No standardized methodology exists for estimating losses due to drought and drought does not generally have a direct impact on critical and non-critical facilities and building stock. A direct correlation to loss of human life due to drought is improbable for Yuma County. Instead, drought vulnerability is primarily measured by its potential impact to certain sectors of the County economy and natural resources include the following:

- Crop and livestock agriculture
- Municipal and industrial water supply
- Recreation/tourism
- Wildlife and wildlife habitat

The impacts of drought to critical and non-critical facilities and building stock is generally indirect, in that drought is often a contributing factor to other hazards such as flooding and wildfire. Extended drought may weaken and dry the grasses, shrubs, and trees of wildfire areas, making them more susceptible to ignition. Drought also tends to reduce the vegetative cover in watersheds, and hence decreases the interception of rainfall and increases the flooding hazard. The sectors most directly impacted by drought are agriculture, ranching, potable water supplies, and recreation/tourism. The vulnerability and potential impact for this risk assessment will focus primarily on the potential economic impacts to agriculture and ranching. According to the Arizona Agricultural Statistics, which is a branch of the National Agricultural Statistic Service (NASS) and the U.S. Department of Agriculture (USDA), the 2012 market value of agricultural products in Yuma County was $985 million.[32] It is plausible to assume that all of the Yuma County agriculture is vulnerable to drought. Yuma County farmers and ranchers received approximately $10.4 million in USDA disaster assistance over the past 20 years, with an average of approximately $615,000 paid out annually during those years. Other economic losses associated with drought could include increased domestic water supply costs, increased wildfire risk and firefight costs, and impacts to tourism. There are no readily available references, however, for estimating these costs in relation to drought.

Vulnerability – Development Trends

[32] USDA Census of Agriculture, 2012 Census Volume 1, Chapter 2: County Level Data; https://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Arizona/st04_2_001_001.pdf

Population growth in Yuma County will also require additional surface and ground water to meet the demands of potable, landscape, and industrial uses. With the exception of the Cocopah Tribe, all jurisdictions have experienced significant population growth over the past decade, and are projected to continue to grow. It is unlikely that significant growth will occur in the ranching and farming sectors given the current constraints on water rights, grazing rights, and available range land. Drought planning should be a critical component of any domestic water system expansions or land development planning. The ADTF is also working cooperatively with water providers within the State to develop System Water Plans that are comprised of three components:

- *Water Supply Plan* – describes the service area, transmission facilities, monthly system production data, historic demand for the past five years, and projected demands for the next five, 10 and 20 years.
- *Drought Preparedness Plan* – includes drought and emergency response strategies, a plan of action to respond to water shortage conditions, and provisions to educate and inform the public.
- *Water Conservation Plan* – addresses measures to control lost and unaccounted for water, considers water rate structures that encourage efficient use of water, and plans for public information and education programs on water conservation.

The combination of these requirements will work to ensure that future development in Yuma County will recognize drought as a potential constraint.

Sources

Arizona Department of Water Resources, 2017, *Arizona Drought Preparedness Annual Report*, https://new.azwater.gov/sites/default/files/media/2017%20Arizona%20Drought%20Preparedness%20Annual%20Report.pdf

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National Oceanic and Atmospheric Administration, National Centers for Environmental Information, Climate at a Glance, https://www.ncdc.noaa.gov/cag/statewide/time-series/2/pcp/all/12/1998-2018?base_prd=true&firstbaseyear=1987&lastbaseyear=2018. Accessed March 2018.

Profile Maps

No profile maps are provided.

5.3.2 Earthquake

Description

An earthquake is a sudden, rapid shaking of the earth caused by the movement of tectonic plates. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, flash floods and fires. Buildings with foundations resting on unconsolidated landfill, old waterways, sandy soils with high water tables, or other unstable soil types are most at risk. Buildings or trailers and manufactured homes not tied to a reinforced foundation anchored to the ground are also at risk since they can be shaken off their mountings during an earthquake. Earthquakes can occur at any time of the year and usually result in either a ground surface rupture, strong ground motion, slope failure, and/or liquefaction.

Liquefaction caused by seismic activity is a significant hazard for the Yuma area. Liquefaction is the process wherein soils transform into a liquid state due to ground shaking from an earthquake. Structural failures due to liquefaction are due to lateral spread, flow failure, ground oscillation, and/or loss of bearing strength. The three primary criteria that must be satisfied for liquefaction to occur are; ground shaking during an earthquake, the presence of sandy soils, and shallow ground water. The Yuma and Gila valley regions of Yuma County meet these criteria and have been identified as potential liquefaction zones. Figure 20 is a map [33] of Yuma County depicting liquefaction hazard areas that were determined using these critical factors.

The Yuma area is located in relatively close proximity to several major geologic fault zones with historic seismic activity. All of the faults are related to tectonic movement between the North American Plate and the Pacific Plate. The seismic hazard for the Yuma region is considered the highest in Arizona because of its proximity to these faults. The major faults having the most potential for generating ground motion in the Yuma area are the San Jacinto, San Andreas, Elsinore, Cerro Prieto, Imperial, Sand Hills, and Algondones Faults and the Brawley Seismic Zone.

History

These faults have produced several damaging earthquakes during the last 150 years and there is reasonable probability that damaging levels of seismic shaking will occur in the next 50 years. The relative locations of these regional faults with respect to Yuma County are indicated on Figure 21.

Earthquakes have been documented for the Yuma Region since 1776 when the explorers on the Anza expedition landed at Fort Yuma. Figure 22 indicates the locations of several historic earthquakes and their approximate magnitudes. Figure 26 through Figure 30 at the end of this hazard profile show the location of historic earthquake epicenters, along with their recorded magnitude, at both a countywide and community scale. Figure 23 is an excerpt from the Ninyo & Moore (N&M) report summarizing various additional historic earthquake events that have impacted the Yuma area in the last 150 years. The following are some of the more recent or notable events:

- In April 2010, the Easter Sunday 7.2 earthquake swayed high-rises in downtown Los Angeles and San Diego and was felt across Southern California and Arizona. According to the U.S Geological Survey, the earthquake struck at 3:40 p.m. in Baja California, Mexico, about 19 miles southeast of Mexicali. The quake was felt as far north as Santa Barbara. A police dispatcher in Yuma, Arizona, said the quake was very strong here, but no damage was reported (U.S & World News). Additionally, severe loss of property occurred in San Luis Rio Colorado and neighboring Imperial County, causing millions and possibly billions of dollars in damage - less than 50 miles away. (Yuma County)

[33] Bausch, D.B., Brumbaugh, D.S., 1996, *Yuma Community Earthquake Hazard Evaluation*, Arizona Earthquake Information Center, Northern Arizona University.

- On July 29, 2008, Chino Hills, California Earthquake, a M5.4 earthquake shook Southern California. The earthquake was the strongest in the region since the Northridge earthquake in 1994. Shaking was felt as far as Las Vegas, Nevada and Yuma, Arizona. Buildings swayed in downtown Los Angeles and area amusement parks were evacuated. A minor landslide near Route 91 in the Anaheim Hills caused some traffic congestion, but no injuries or structural damage was reported.
- In May 1940, a 7.0 M_I earthquake ruptured the Imperial Fault and caused significant liquefaction in the Yuma area.
- In 1872, a 5.8 M_I quake was felt, causing minor damage to a store and saloon located on Main Street in the City of Yuma.
- In 1852, a 7.0 M_I earthquake shifted the course of the Colorado River away from the Fort, diminishing its domination of the ferry crossing.

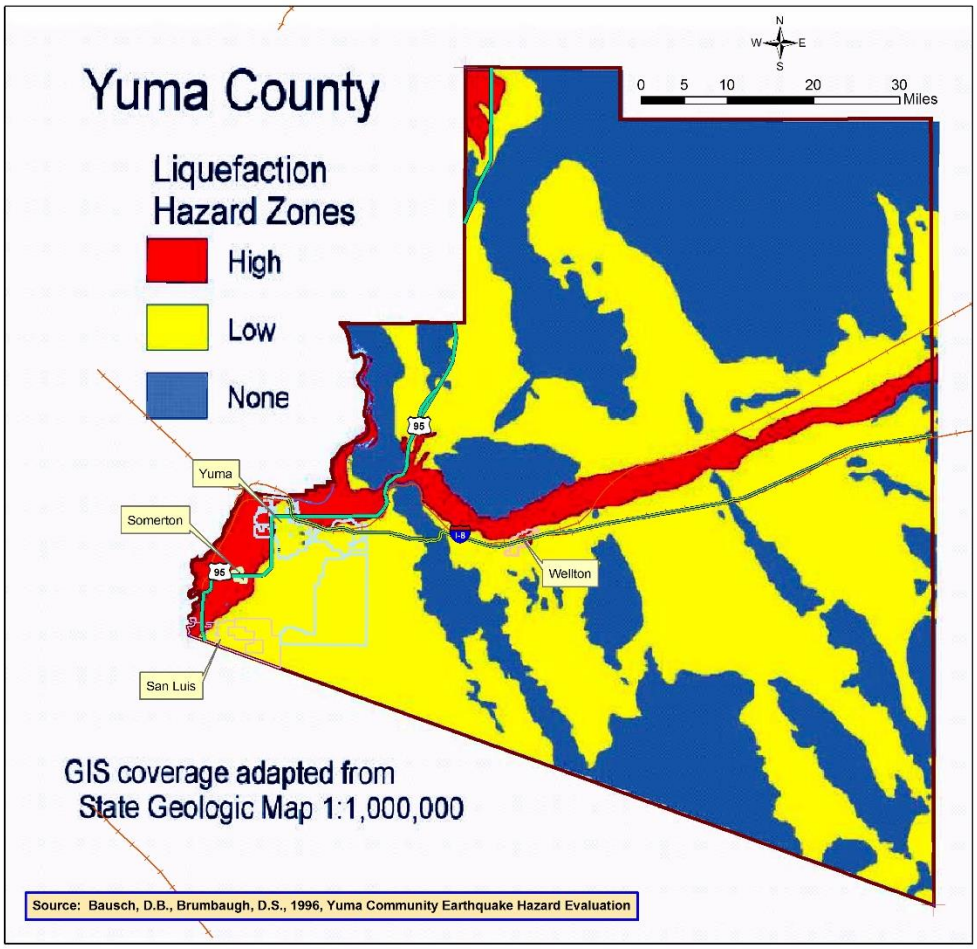

Figure 20. Liquefaction hazard map for Yuma County

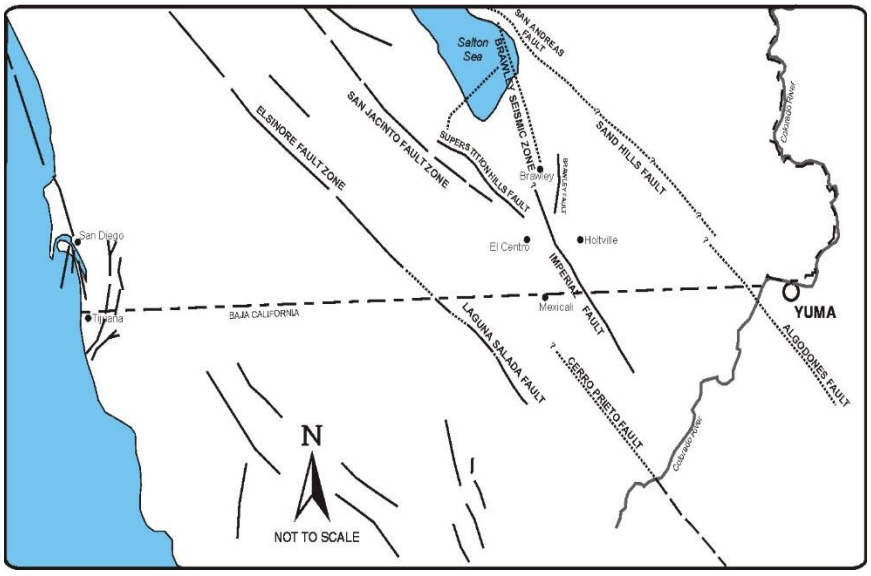

Figure 21. Approximate fault locations within the vicinity of Yuma, Arizona

Figure 22. Approximate locations of historic earthquakes in or near Arizona

Table 1 – Historic Earthquakes in the Yuma Region, M>5.5

Event Name	Day	Year	Epicenter Latitude (Degrees)	Epicenter Longitude (Degrees)	Distance from Yuma (miles)	Reported Magnitudes M_W	M_S	M_L	M_I
	11/29	1852	32.5?	115.0?	25 to 50	(7+)			7.0
Fort Yuma	05/03	1872	33.0?	115.0?	??				5.8
	11/15	1875	32.5	115.5	51				6.2
	07/30	1891	32.0	115.0	52				6.0
Laguna Salada	02/24	1892	32.6	115.6	58	(7)			7.0
	04/19	1906	32.9	115.5	51		6.2		5.8
Imperial Valley	06/23	1915	32.8	115.5	50		6.0		5.6
Imperial Valley	06/23	1915	32.8	115.5	50		5.9		5.6
	11/21	1915	32.0	115.0	52	(7)			7.1
Volcano Lake	11/07	1923	32.5	115.5	51			5.5	
	01/01	1927	32.5	115.5	51			5.8	
	01/01	1927	32.5	115.5	51			5.5	
Laguna Salada	12/30	1934	32.25	115.50	58	6.4		6.5	
Cerro Prieto	12/31	1934	32.00	114.75	49	7.1		7.1	
	02/24	1935	31.98	115.20	59			6.0	5.3
El Centro	05/19	1940	32.73	115.50	33*	7.0	7.2	6.2	7.0
Fish Creek Mountain	10/21	1942	32.97	116.00	81	6.6		6.5	6.3
	10/22	1942	33.23	115.72	72			5.5	
	07/29	1950	33.12	115.57	60			5.5	
	01/24	1951	32.98	115.73	66			5.6	
	06/14	1953	32.95	115.72	64			5.5	
Brawley Seismic Zone	02101	1954	32.30	115.30	47			5.6	
	12/01	1958	32.25	115.75	71			5.8	
	08/07	1966	31.80	114.50	63			6.3	
Imperial Valley	10/15	1979	32.61	115.32	39	6.5	6.9	6.6	
Brawley Aftershock	10/15	1979	32.98	115.55	56			5.8	
Victoria	06/09	1980	32.20	115.08	43	6.4	6.4	6.1	
Westmorland	04/26	1981	33.10	115.63	63	5.9	6.0	5.6	
	02/06	1987	32.37	115.30	44			5.4	
Elmore Ranch	11/23	1987	33.08	115.78	70	5.9	6.2	5.8	
Superstition Hills	11/24	1987	33.01	115.84	72	6.5	6.6	6.0	

Notes:
1.) Earthquake information primarily from Ellsworth (1990) and USBR (1976)
2.) Magnitude Scales: M_W - moment magnitude, M_L - Local (Richter) magnitude, M_S – surface-wave magnitude
M_I - estimated from felt area intensity. Moment magnitudes are considered a better measure of the seismic energy released during an earthquake.
4.) Before 1930, Epicenters of earthquakes are approximate, indicated to nearest 0.5 to 0.1 degree.
* Closest rupture distance

Figure 23. Summary of historic earthquake events impacting the Yuma area over the past 150 years

Probability/Magnitude

The impact an earthquake event has on an area is typically measured in terms of earthquake intensity. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects.

Another way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. Peak ground acceleration (PGA) measures the strength of ground movements in this manner. PGA represents the rate in change of motion of the earth's surface during an earthquake as a percent of the established rate of acceleration due to gravity. PGA can be partly determined by what soils and bedrock characteristics exist in the region. Unlike the Richter scale, PGA is not a measure of the total energy released by an earthquake, but rather of how hard the earth shakes at a given geographic area (the intensity). PGA is measured by using instruments including accelerographs and correlates well with the Mercalli scale.

When the peak ground acceleration nears 0.04 – 0.092g, an earthquake can be felt by people walking outside. As PGA nears 0.19 – 0.34g the intensity is considered to be very strong. At this level, plaster can break off and fall away from structures and cracks in walls often occur. PGA magnitudes of 1.24g are considered to be very disastrous. This magnitude of ground acceleration represents an earthquake of roughly 6.9 to 8.1 on the Richter Scale.

The Richter Scale is the most commonly used scale for measuring earthquake magnitudes and potential impacts. Because the public and policy makers are most familiar with the Richter Scale, this plan will use the Richter Scale coupled with PGA for the hazard risk assessment.

A detailed description of the Modified Mercalli Intensity Scale as it relates to PGA, the Richter Scale, and damage effects is shown in Table 7.

Table 7. Modified Mercalli Intensity Scale

SCALE	INTENSITY	DESCRIPTION OF EFFECTS	PGA (g)	RICHTER SCALE MAGNITUDE
I	Instrumental	Detected only on seismographs	< 0.0017	< 4.2
II	Feeble	Some people feel it	0.0018 – 0.014	
III	Slight	Felt by people resting; like a truck rumbling by		
IV	Moderate	Felt by people walking	0.015 – 0.039	
V	Slightly Strong	Sleepers awake; church bells ring	0.040 – 0.092	< 4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves	0.093 – 0.18	< 5.4
VII	Very Strong	Mild alarm, walls crack, plaster falls	0.19 – 0.34	< 6.1

SCALE	INTENSITY	DESCRIPTION OF EFFECTS	PGA (g)	RICHTER SCALE MAGNITUDE
VIII	Destructive	Moving cars uncontrollable, masonry fractures, poorly constructed buildings damaged	0.34 – 0.65	< 6.9
IX	Ruinous	Some houses collapse, ground cracks, pipes break open	0.65 – 1.24	
X	Disastrous	Ground cracks profusely, many buildings destroyed, liquefaction and landslides widespread	> 1.24	< 7.3
XI	Very Disastrous	Most buildings and bridges collapse, roads, railways, pipes and cables destroyed, general triggering of other hazards	> 1.24	< 8.1
XII	Catastrophic	Total destruction, trees fall, ground rises and falls in waves	> 1.24	> 8.1

Earthquakes are extremely difficult to predict and their occurrence rate is determined in one of two ways. If geologists can find evidence of distinct, datable earthquakes in the past, the number of these ruptures is used to define an occurrence rate. If evidence of ruptures is not available, geologists estimate fault slip rates from accumulated scarp heights and estimated date for the oldest movement on the scarp. Because a certain magnitude earthquake is likely to produce a displacement (slip) of a certain size, we can estimate the rate of occurrence of earthquakes of that magnitude.

Recurrence rates are different for different assumed magnitudes thought to be "characteristic" of that fault type. Generally, a smaller magnitude quake will produce a faster recurrence rate, and for moderate levels of ground motion, a higher hazard risk. Future earthquakes are assumed to be likely to occur where earthquakes have produced faults in the geologically recent past. Quaternary faults are faults that have slipped in the last 1.8 million years and it is widely accepted that they are the most likely source of future large earthquakes. For this reason, quaternary faults are used to make fault sources for future earthquake models.

Related Hazards

While the public may not be very concerned about flooding in the desert, if there was a strong earthquake serious flooding could result from damages to water canals. The following figure indicates an immediate potential in the "Ocotillo" Neighborhood that is west of Araby Road (Hwy 195), south of 32nd street. This canal carries a lot of water and if it failed due to strong ground shaking we could see flooding amongst the home closest to the canal.

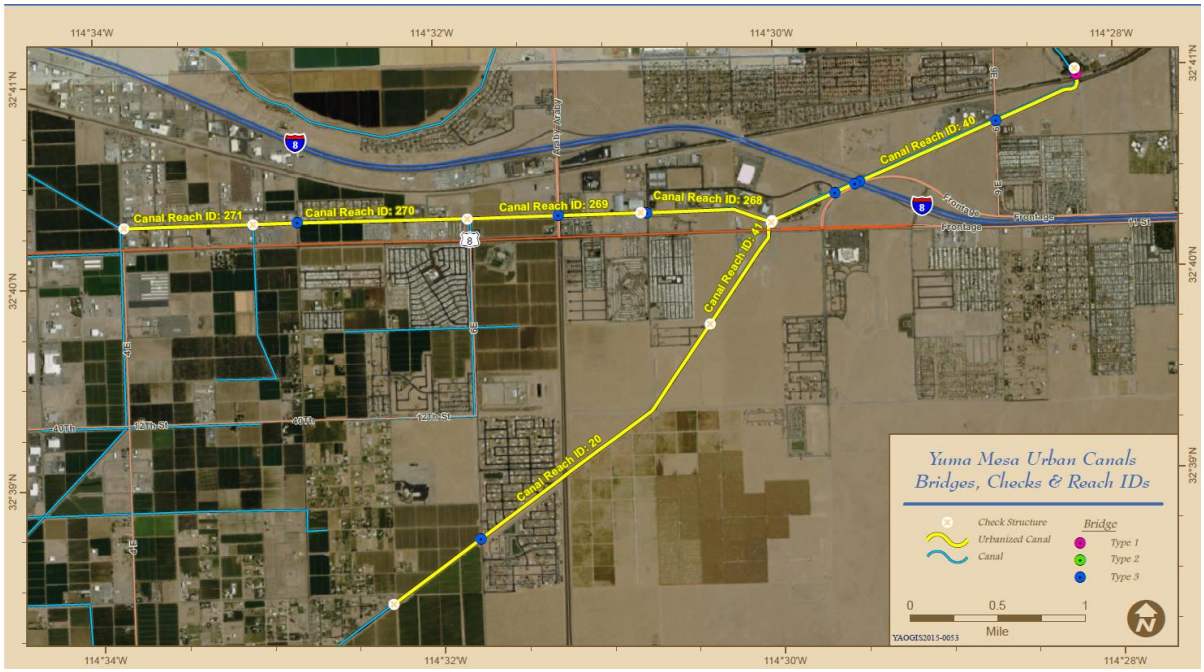

Figure 24. Yuma Mesa Canals

The next figure indicates flooding potential south of 1st street and in the homes along the Mesa's edge. The flooding potential depends on how high the canal is above the adjacent backyards. The canal in the middle is a smaller canal and the potential is not as great.

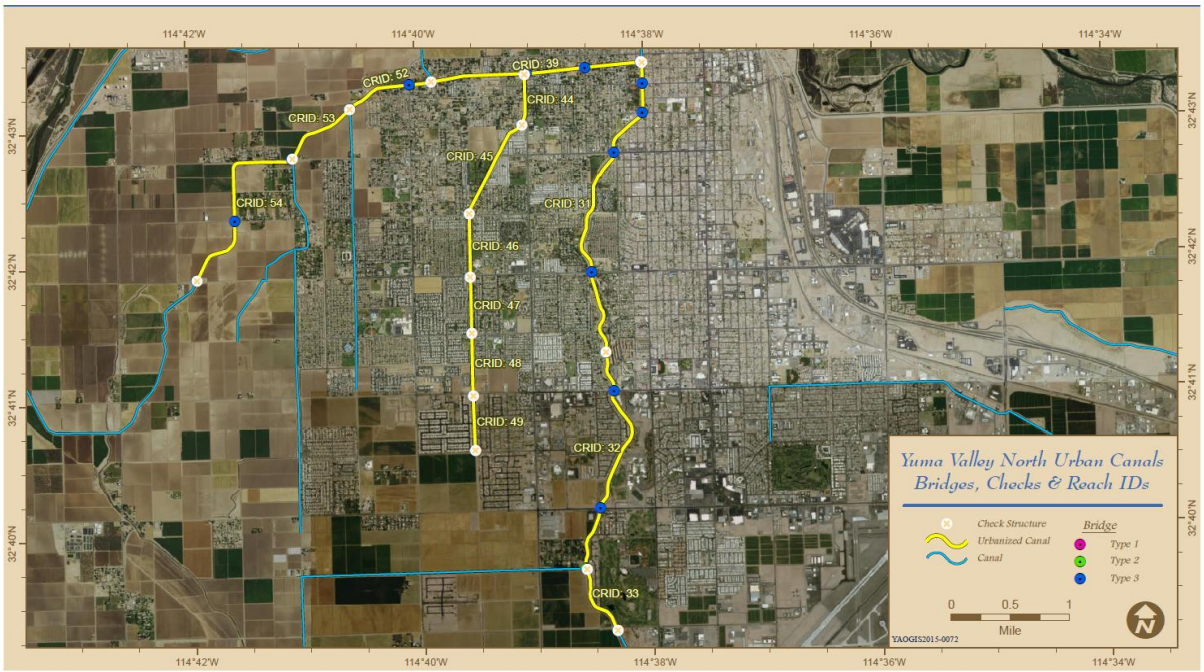

Figure 25. Yuma Valley Canals

Vulnerability – CPRI Results

Earthquake CPRI results for each community are summarized in Table 8 below.

Table 8. Summary of CPRI results by jurisdiction for earthquake hazard

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Cocopah Tribe	Highly Likely	Limited	<6 hours	>1 week	3.4
San Luis	Likely	Limited	<6 hours	>1week	3.0
Somerton	Highly Likely	Catastrophic	<6 hours	<24 hours	3.8
Unincorporated Yuma County	Likely to Highly Likely	Critical	<6 hours to 12 hours	<24 hours	3.3
Wellton	Possibly	Critical	<6 hours	<6 hours	2.5
Yuma	Possibly to Likely	Negligible	<6 hours	<6 hours	2.1
				County-wide average CPRI =	**3.0**
				CPRI Min/Max Score = 1.00/4.00	

Vulnerability – Loss Estimations

The most appropriate risk assessment methodology for seismic hazards involves scenario modeling using FEMA's Hazus loss estimation software. Hazus is a very useful planning tool because it provides an acceptable means of forecasting earthquake damage, loss of function of infrastructure, and casualties, among many other factors. A new Hazus analysis was conducted by FEMA at a national level for the United States in April 2017. The 'Hazus Estimated Annualized Earthquake Losses for the United States (FEMA Publication 366)' was developed by FEMA's Hazus Team, the National Earthquake Hazards Reduction Program (NEHRP), and the United States Geological Survey (USGS) using Hazus data from Version 3.0, 2010 U.S. Census Data, and updated USGS Probabilistic Earthquake Hazard Maps. This update serves as a more accurate estimate of losses than older versions of Hazus.

Figure 31 through Figure 34 include the total exposure each community faces due to a potential earthquake. Exposure demonstrates a worst case scenario, taking into account all exposed structures. These exposure maps show that the City of Yuma has the highest amount of exposure risk if an earthquake should occur. Figure 35 through Figure 38 include the total estimated losses for each community. Again, the City of Yuma is shown as having the highest number of estimated losses should an earthquake occur. Figure 39 through Figure 42 include an estimated number of displaced households for each community. This data shows that the City of Somerton will experience the highest number of displaced households in the county.

Vulnerability – Development Trends

It is reasonable to expect that future earthquakes as large as 7.2 will occur in or nearby Yuma County. Earthquakes strike with little to no warning and they are capable of having multiple impacts on an area. After-effects from an earthquake can include impacted roadways, downed power and communication lines, fires, and damages to structures (especially poorly built, or those already in disrepair). Earthquakes are not a seasonal hazard, and thus can be experienced year round. This fact presents its own set of planning and preparedness concerns.

With the exception of the Cocopah Tribe, all jurisdictions have experienced significant population growth over the past decade, and are projected to continue to grow. Increased population and associated developments is assumed to increase Yuma County's risk to earthquakes. The City of Yuma is estimated to experience a 46% increase in population from 2010 to 2040, as well as experience the most in losses and have the highest exposure in the event of a major earthquake. Additionally, the City of Somerton is estimated to experience an 88% increase in population from 2010 to 2040, as well as experience the highest number of displaced households in the event of a major earthquake. In order to reduce the risk of new developments to earthquakes, structures located in areas prone to liquefaction should adhere to the most current seismic building codes. It is also recommended that if development should occur on

any of these properties, a geotechnical investigation should be required in order to address the liquefaction potential and provide recommendations for mitigation.

Sources

Arizona Division of Emergency Management, 2013, State of Arizona Multi-Hazard Mitigation Plan

FEMA, April 2017, Hazus Estimated Annualized Earthquake Losses for the United States

Ninyo & Moore, Earthquake and Flooding Hazard Review Project Impact, City of Yuma, Arizona

Profile Maps

Figure 26 – Earthquake Hazard Countywide

Figure 27 – Earthquake Hazard Yuma

Figure 28 – Earthquake Hazard Somerton

Figure 29 – Earthquake Hazard San Luis

Figure 0-18 – Earthquake Hazard Wellton

Figure 31 – Earthquake Total Exposure Yuma

Figure 32 – Earthquake Total Exposure Somerton

Figure 33 – Earthquake Total Exposure San Luis

Figure 34 – Earthquake Total Exposure Wellton

Figure 35 – Earthquake Total Losses Yuma

Figure 36 – Earthquake Total Losses Somerton

Figure 37 – Earthquake Total Losses San Luis

Figure 38 – Earthquake Total Losses Wellton

Figure 39 – Earthquake Displaced Households Yuma

Figure 40 – Earthquake Displaced Households Somerton

Figure 41 – Earthquake Displaced Households San Luis

Figure 42 – Earthquake Displaced Households Wellton

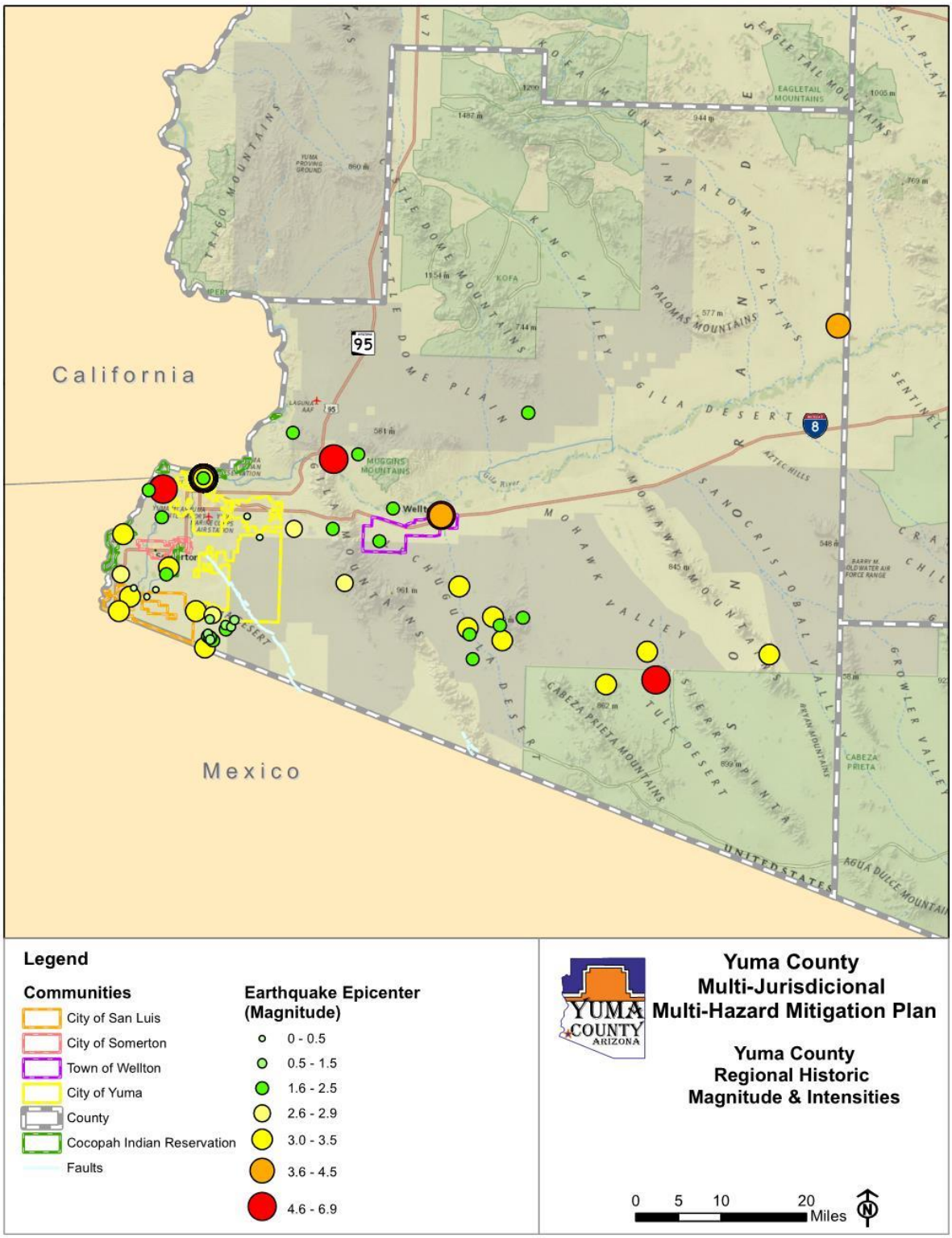

Figure 26. Yuma County Regional Historic Earthquakes Magnitude and Intensities

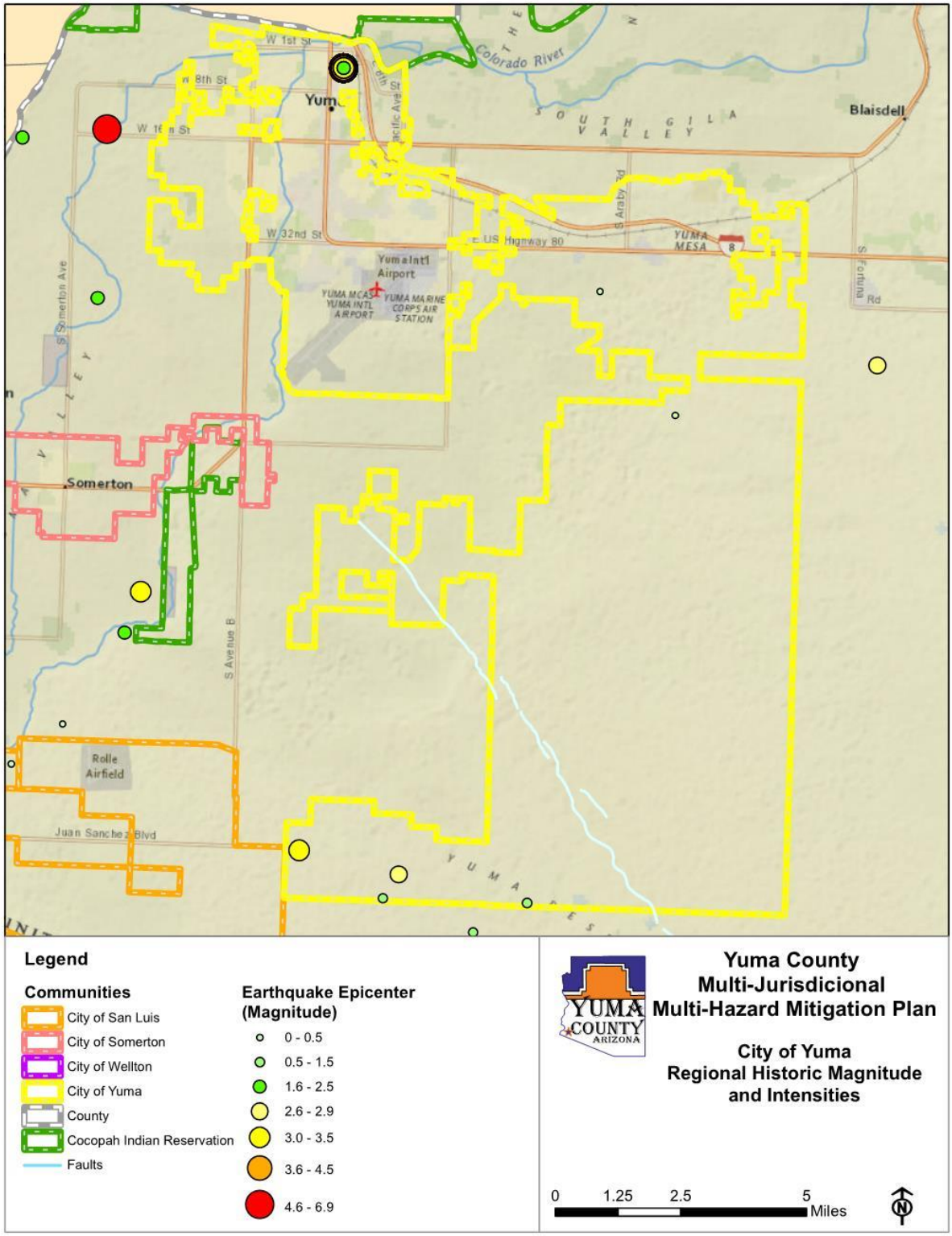

Figure 27. City of Yuma Regional Historic Earthquakes Magnitude and Intensities

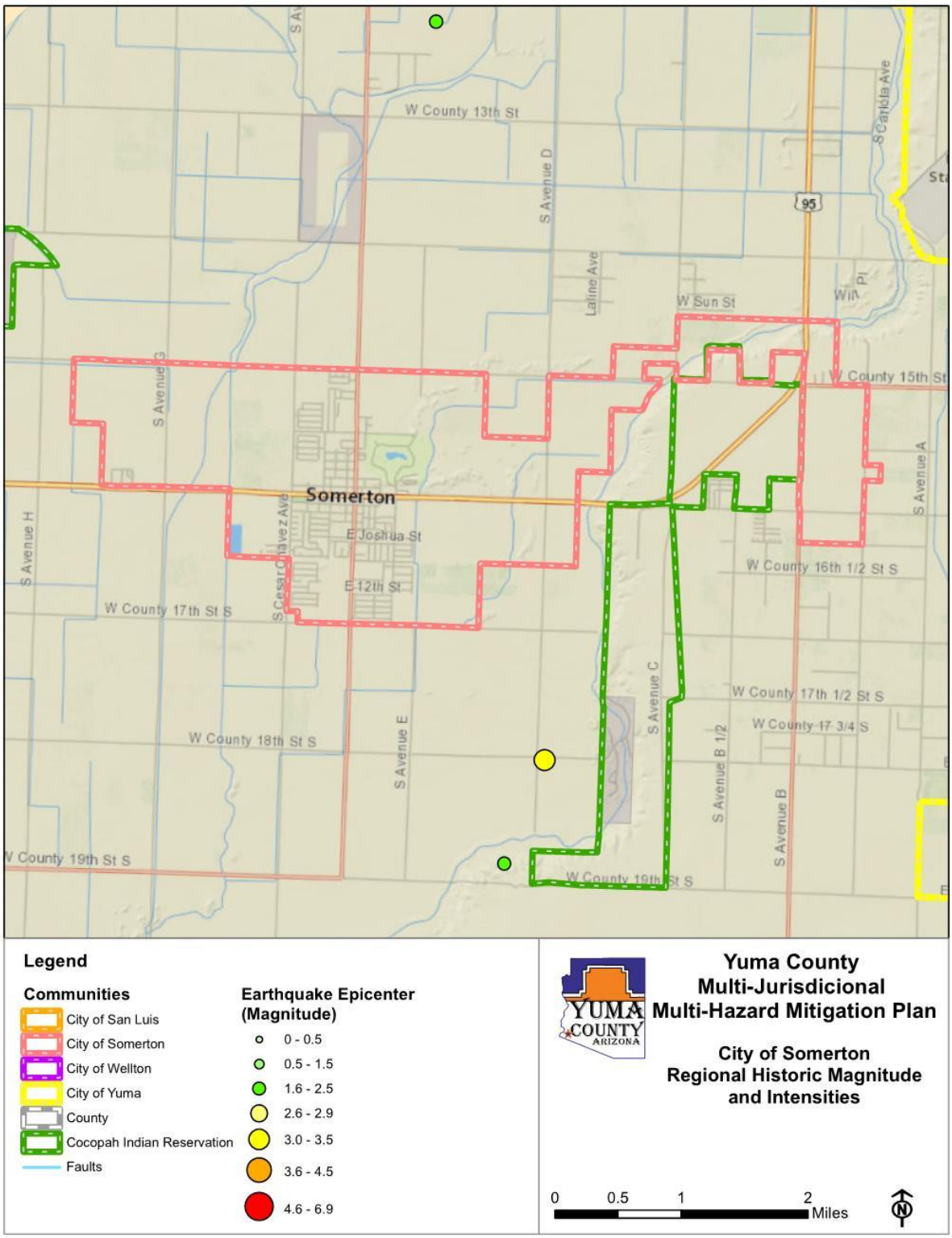

Figure 28. City of Somerton Regional Historic Earthquakes Magnitude and Intensities

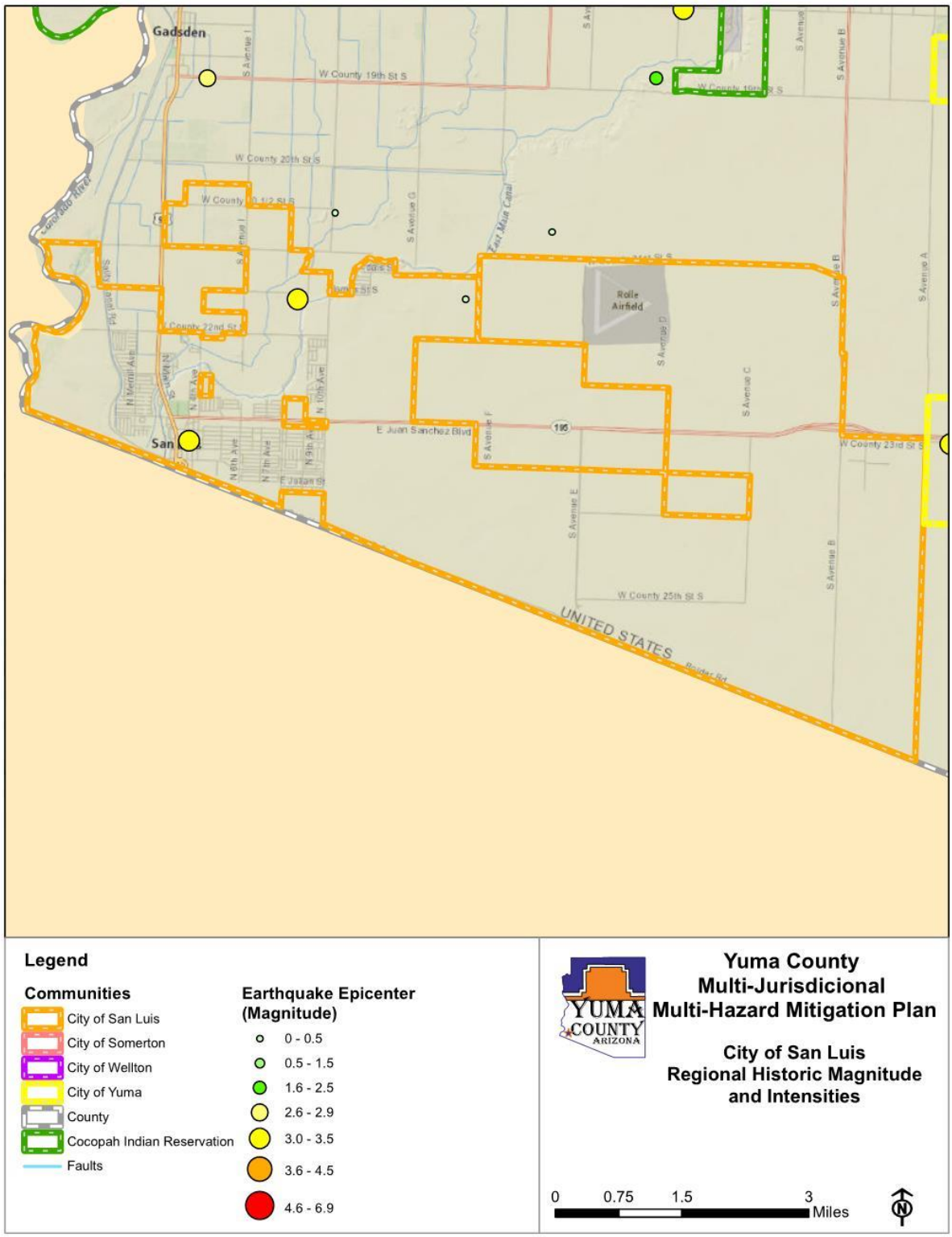

Figure 29. City of San Luis Regional Historic Earthquakes Magnitude and Intensities

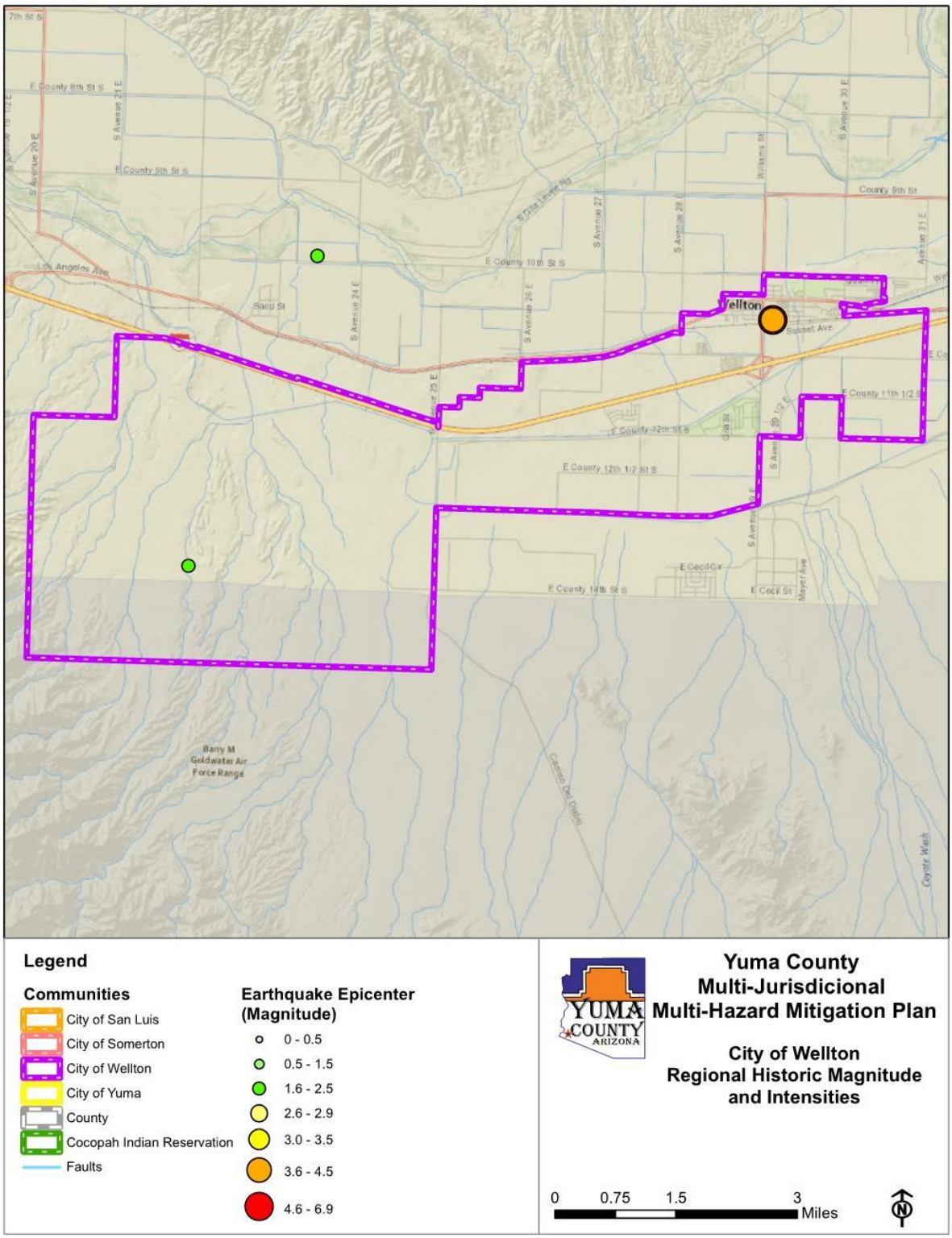

Figure 30. City of Wellton Regional Historic Earthquakes Magnitude and Intensities

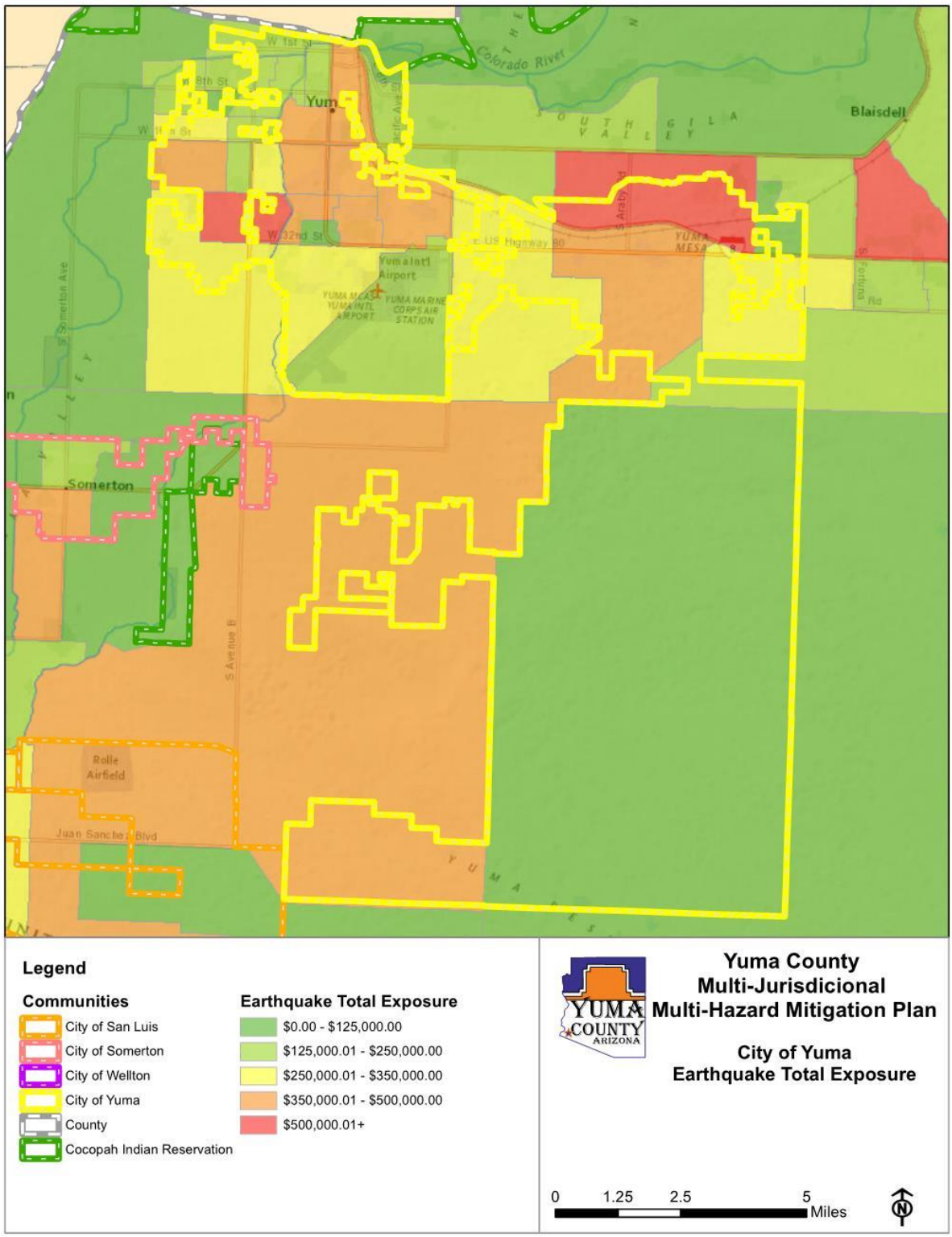

Figure 31. City of Yuma Earthquake Total Exposure

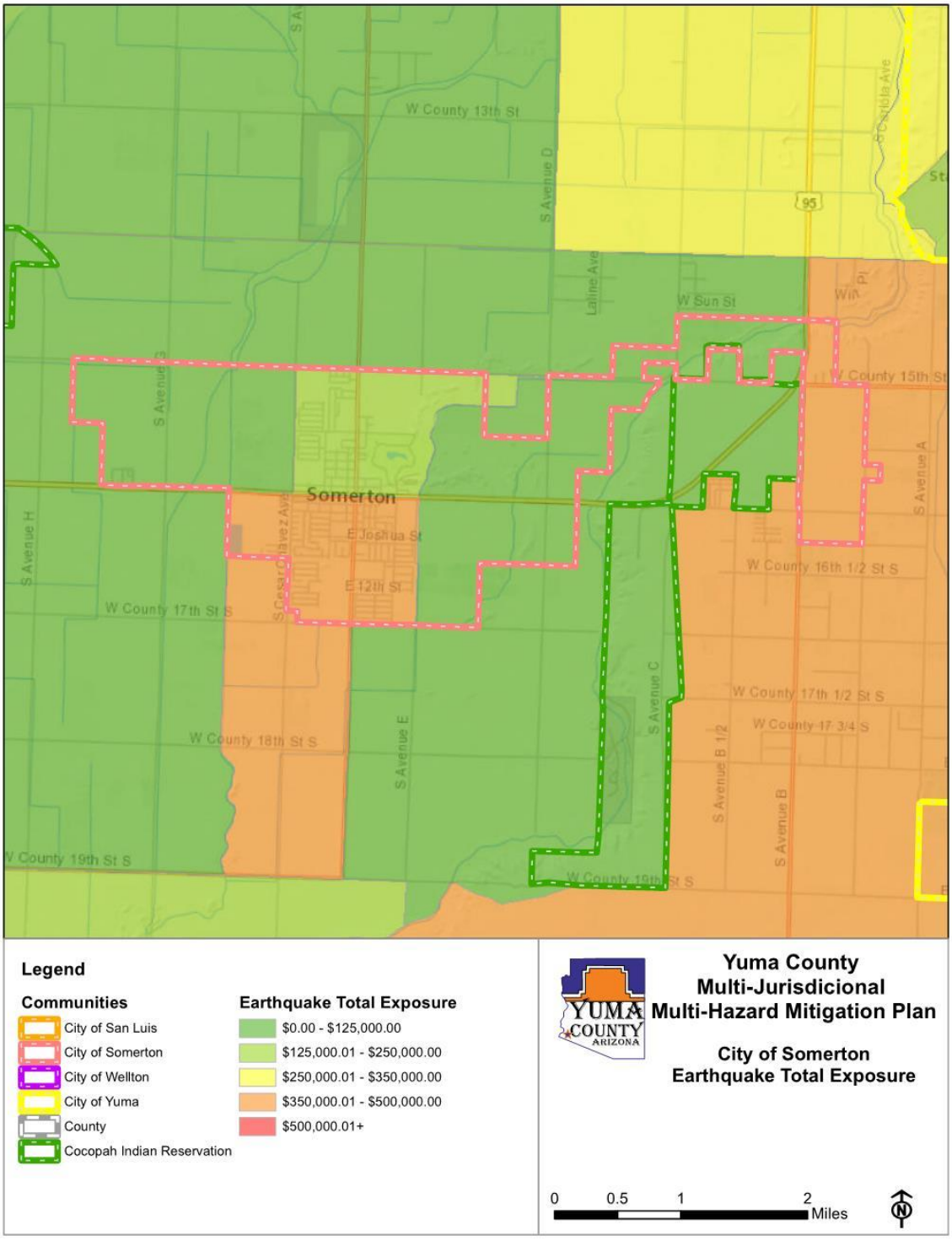

Figure 32. City of Somerton Earthquake Total Exposure

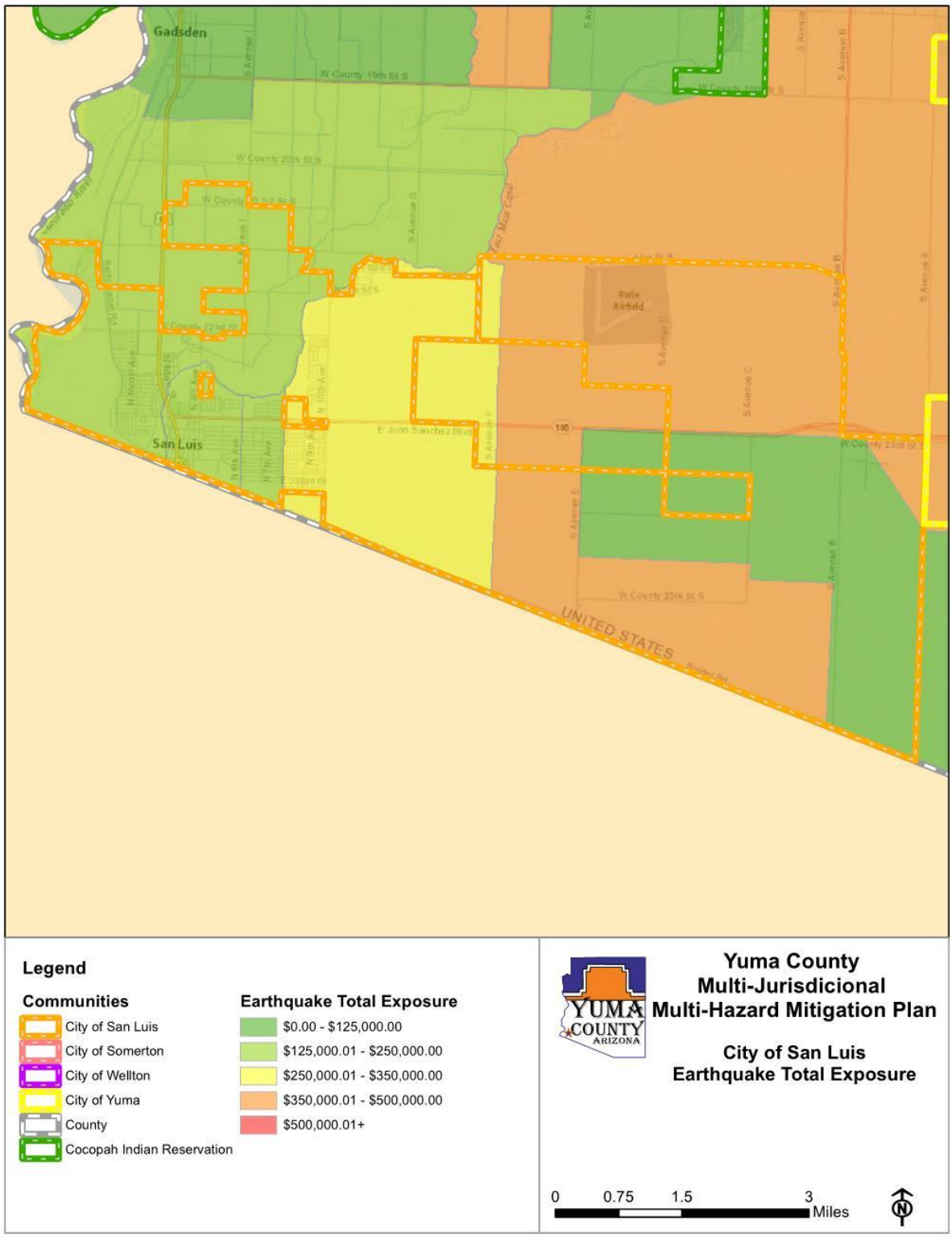

Figure 33. City of San Luis Earthquake Total Exposure

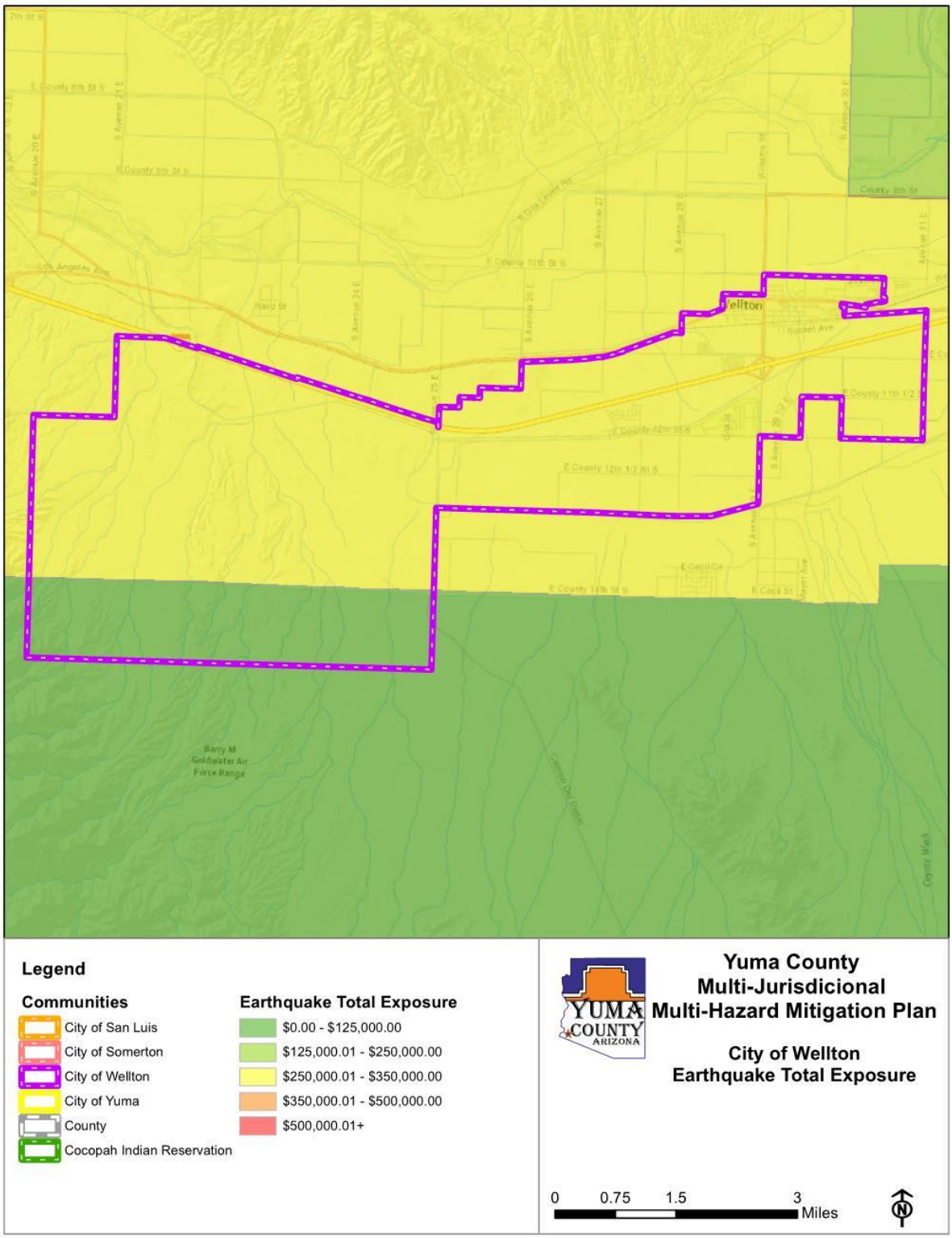

Figure 34. City of Wellton Earthquake Total Exposure

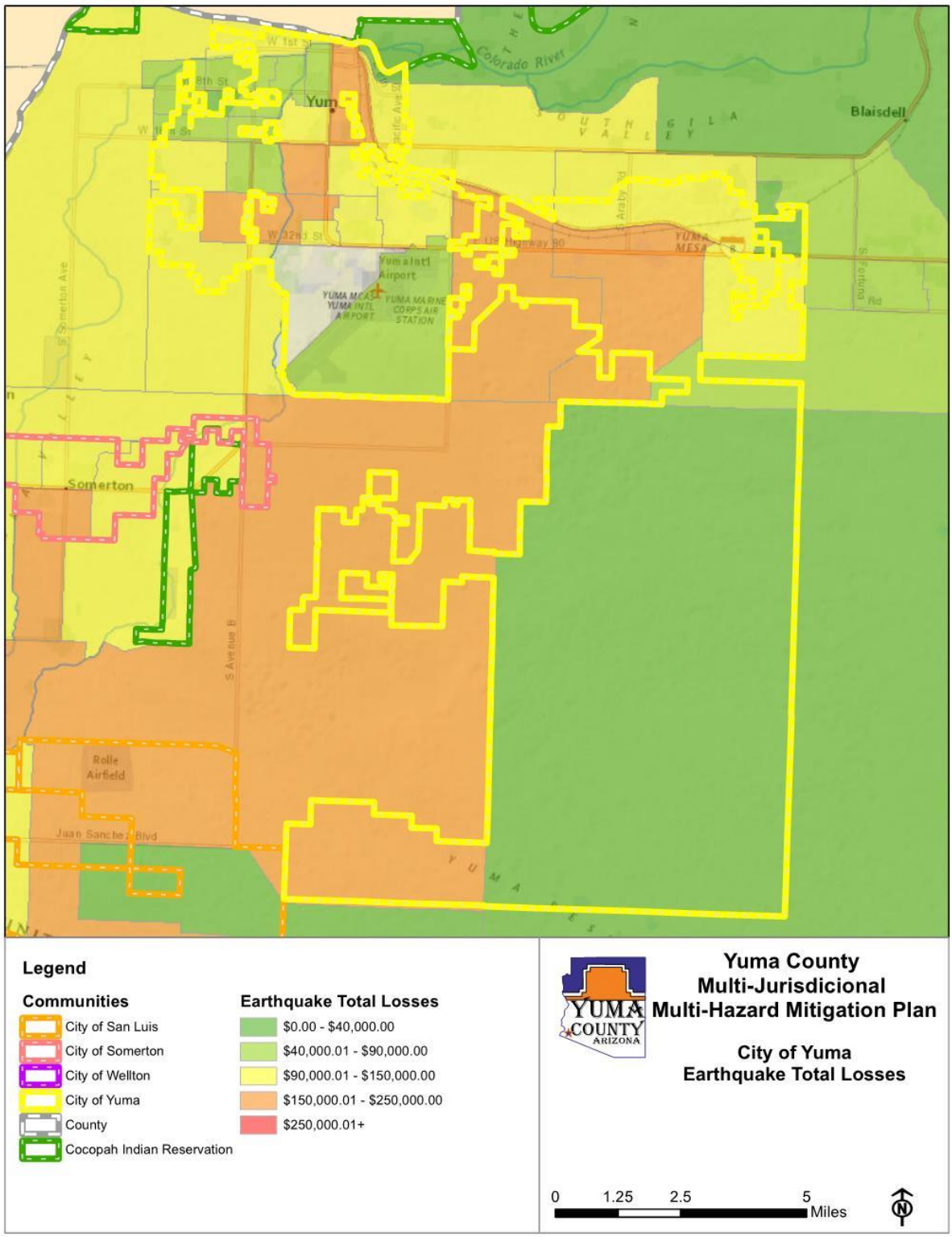

Figure 35. City of Yuma Earthquake Total Losses

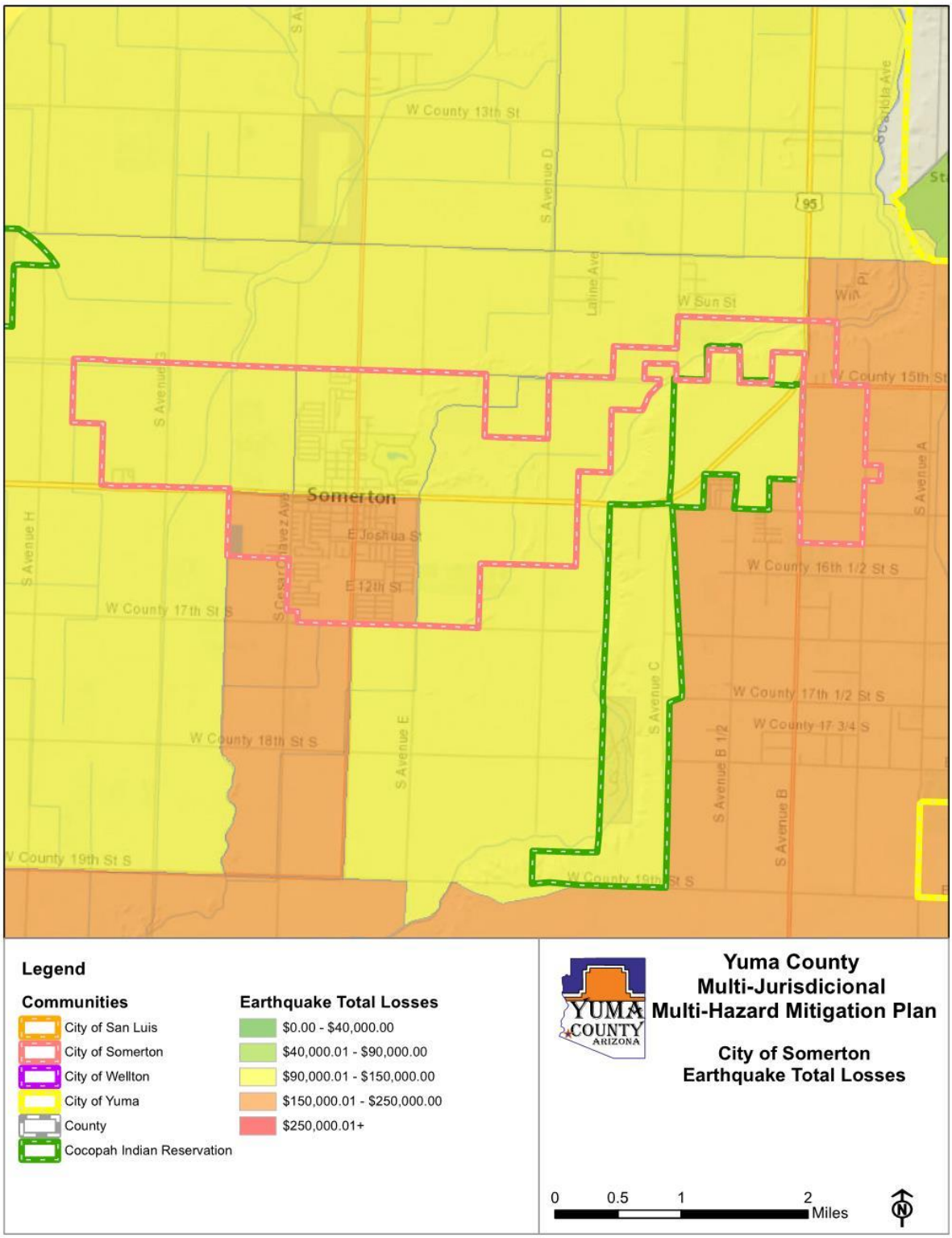

Figure 36. City of Somerton Earthquake Total Losses

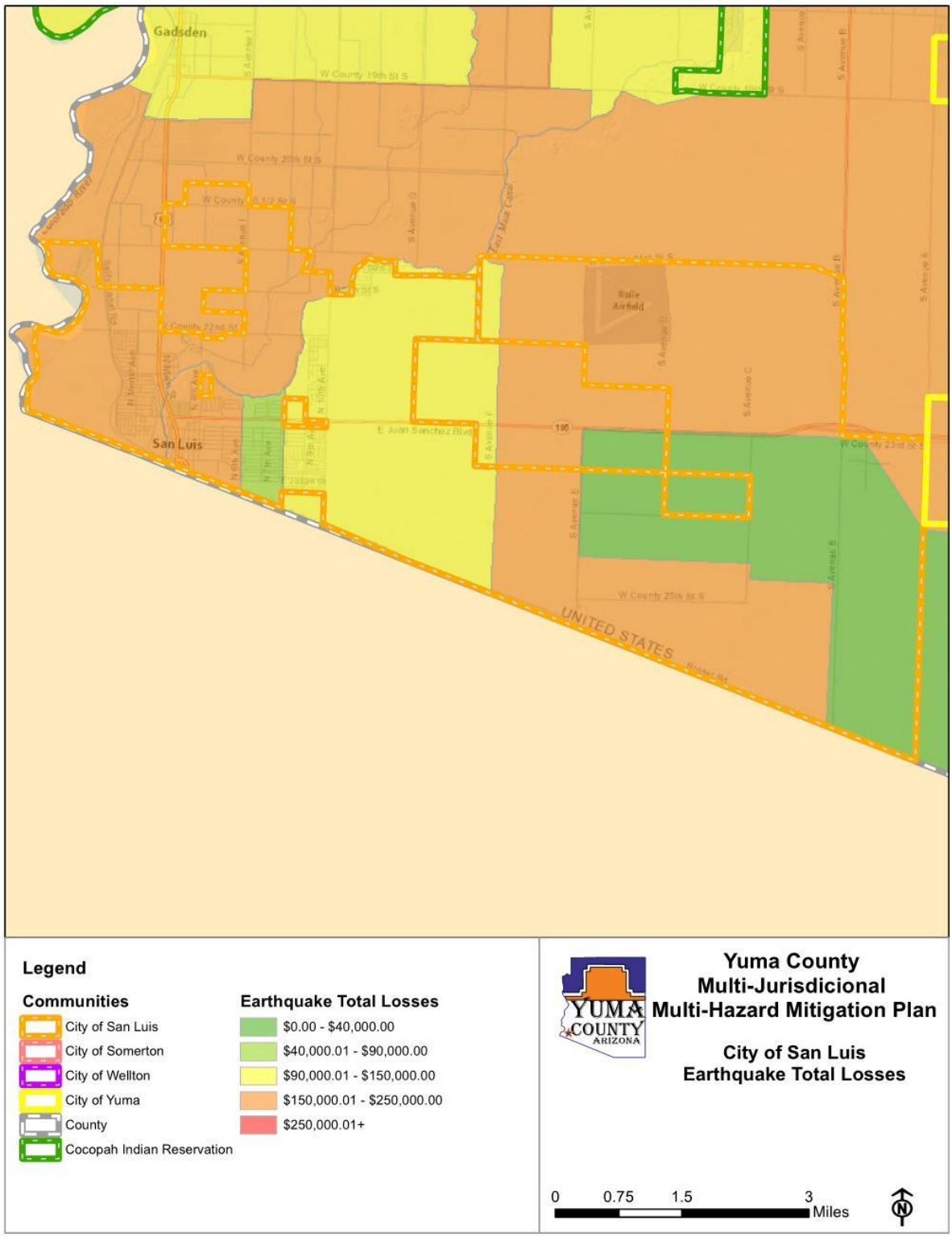

Figure 37. City of San Luis Earthquake Total Losses

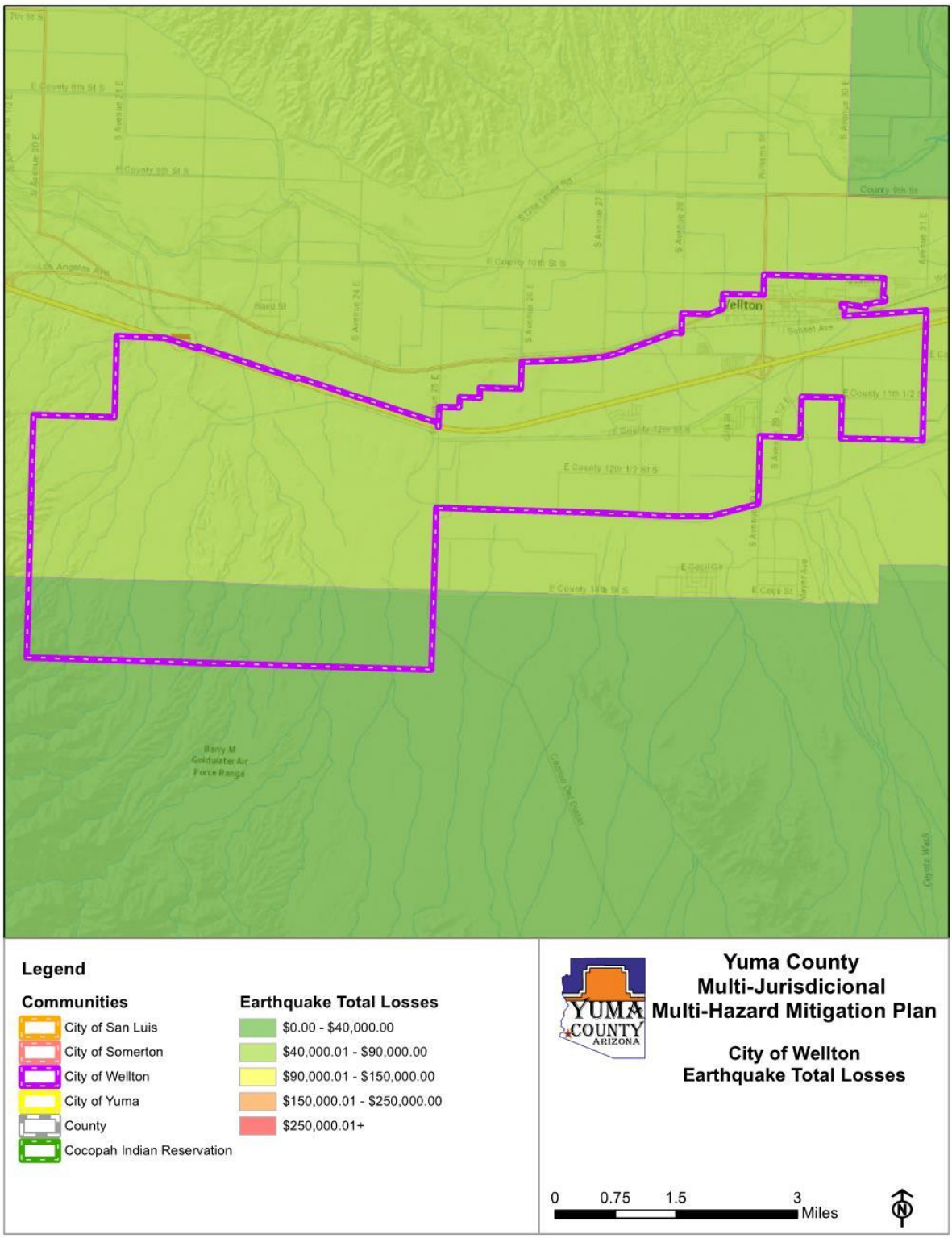

Figure 38. City of Wellton Earthquake Total Losses

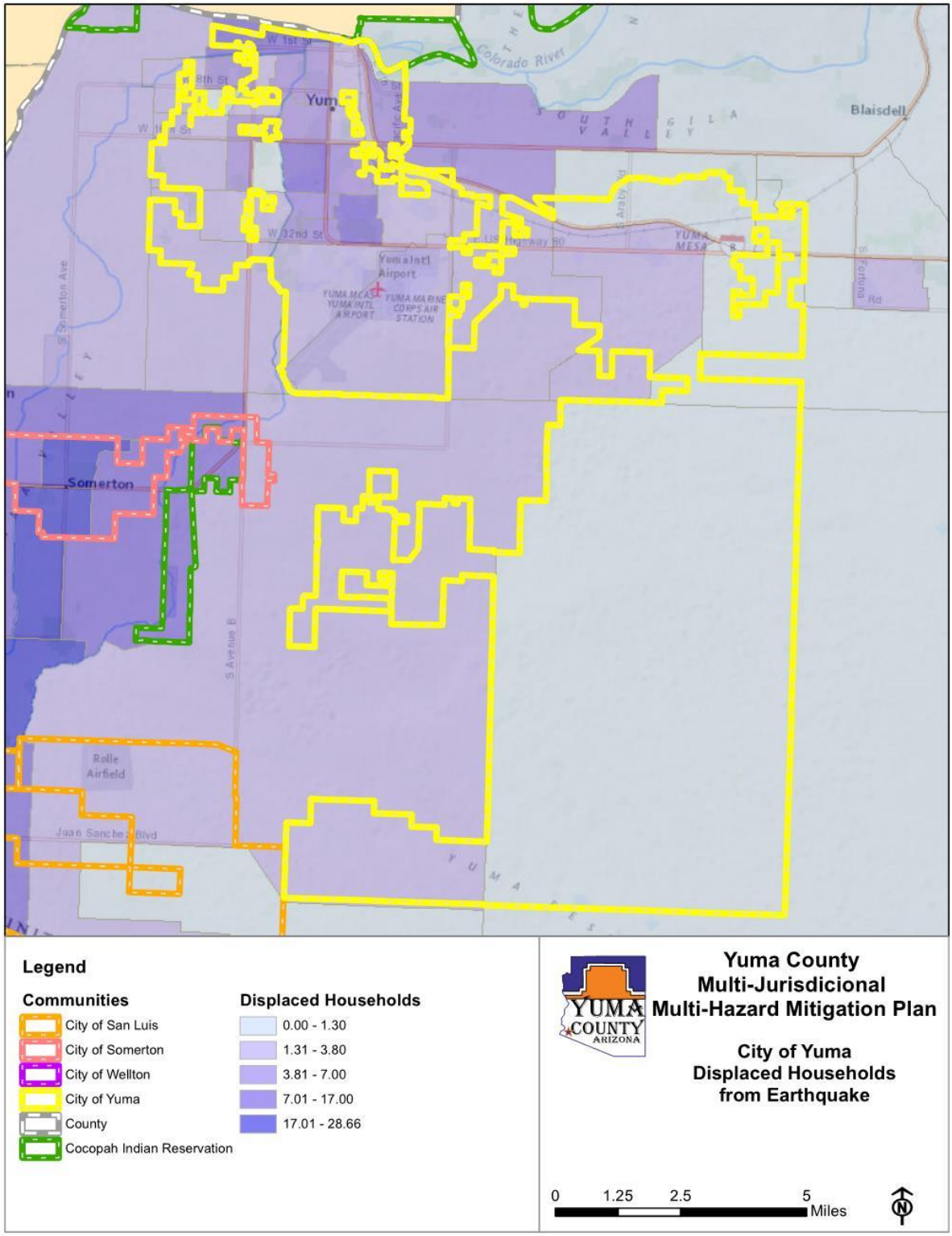

Figure 39. City of Yuma Displaced Households from Earthquake

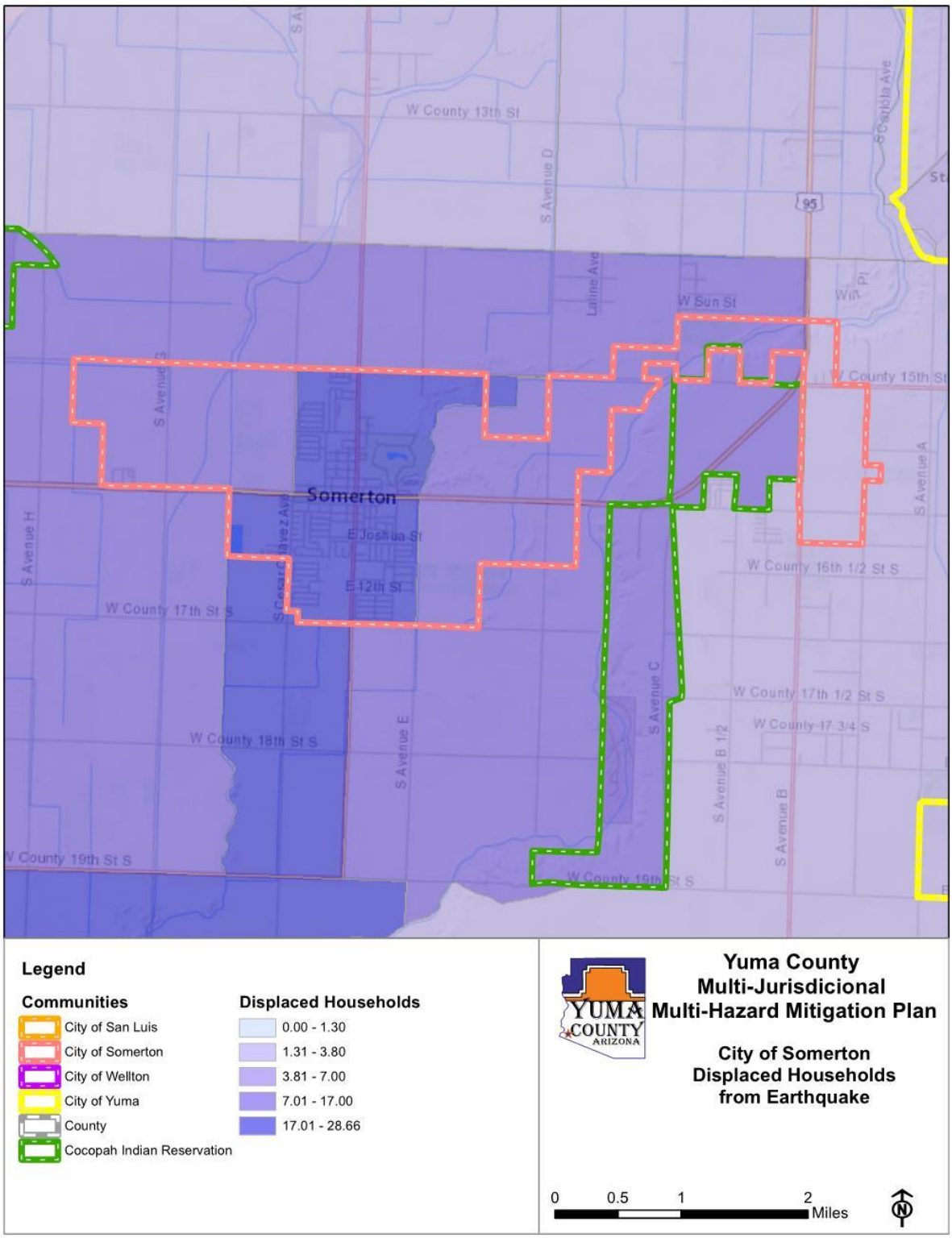

Figure 40. City of Somerton Displaced Households from Earthquake

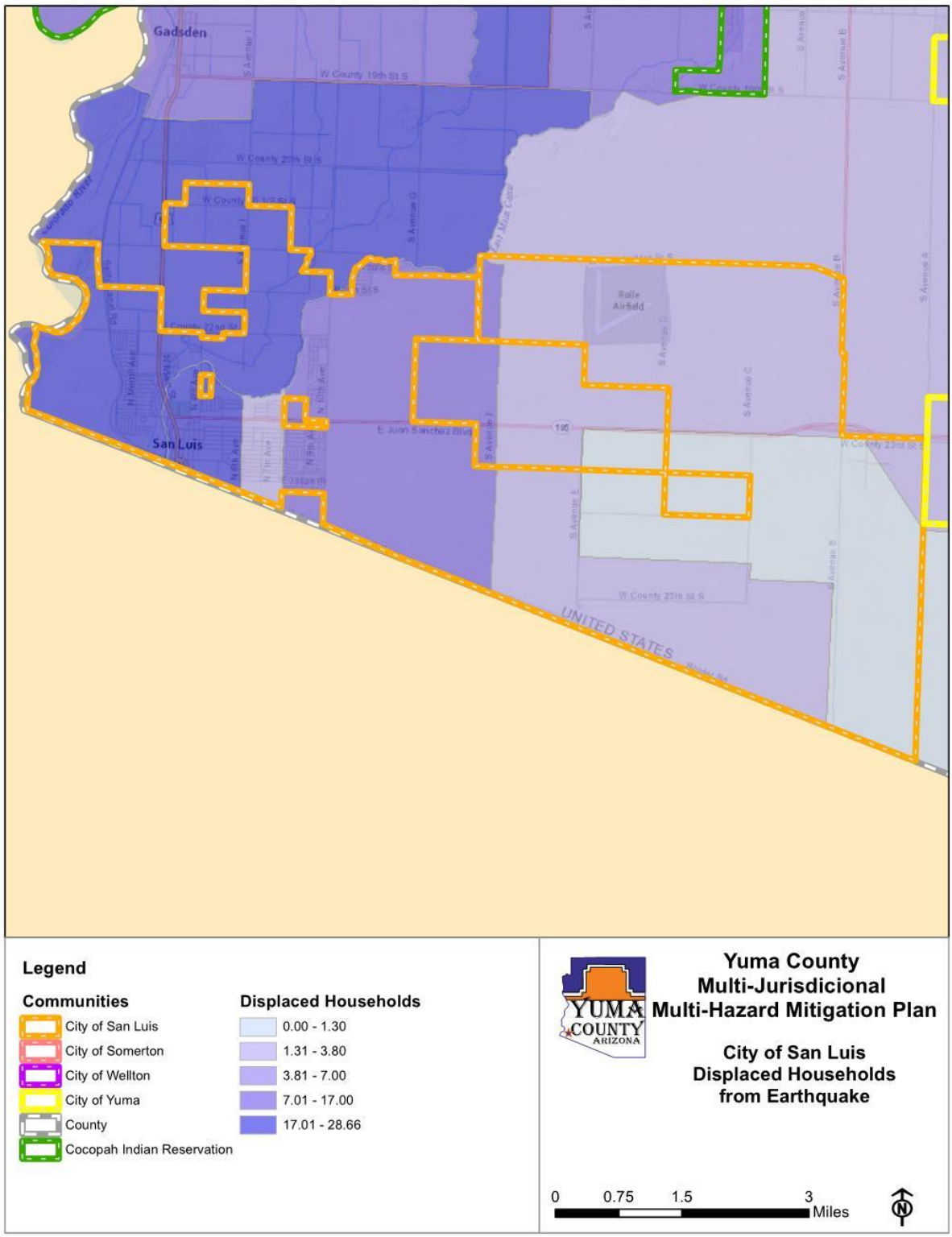

Figure 41. City of San Luis Displaced Households from Earthquake

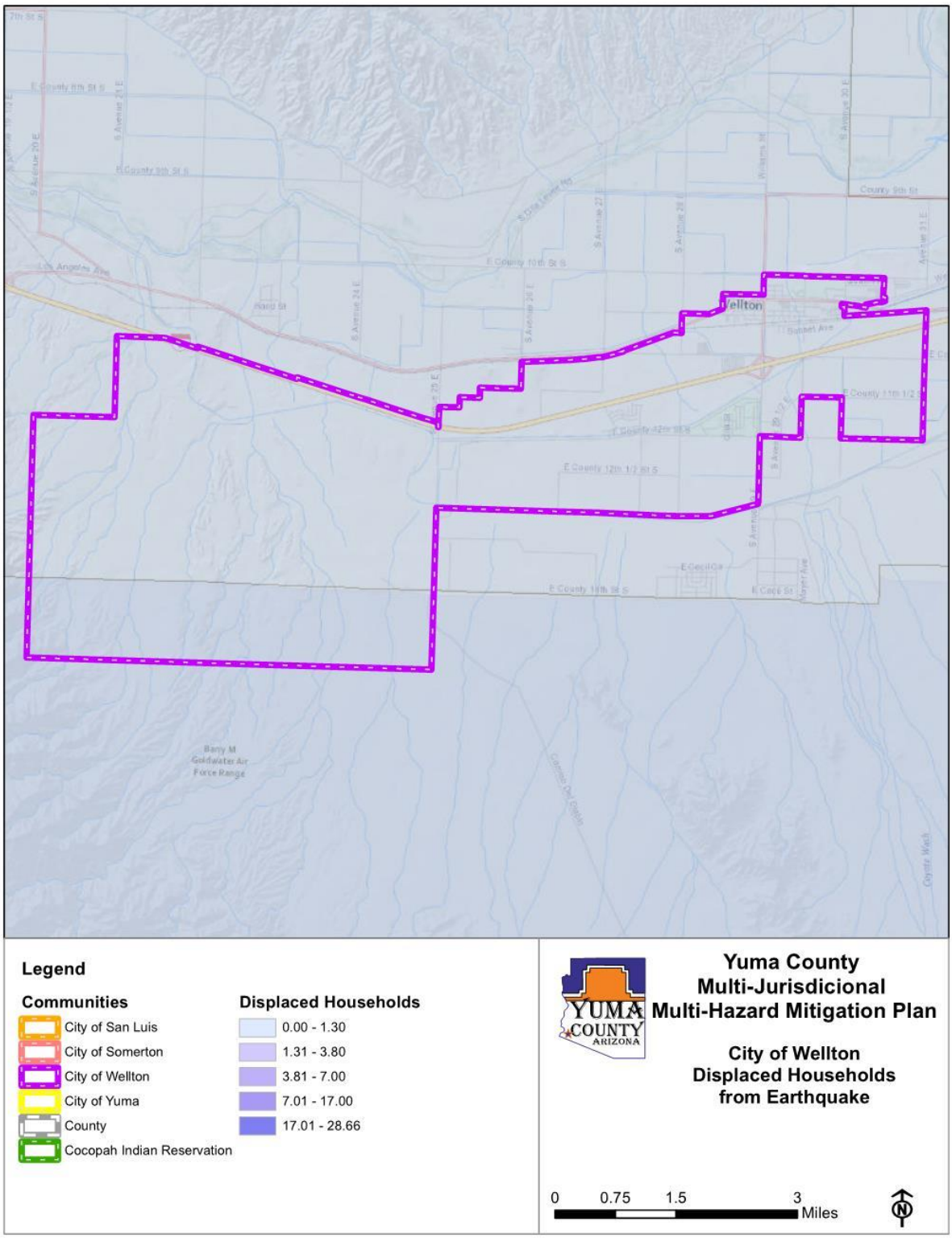

Figure 42. City of Wellton Displaced Households from Earthquake

5.3.3 Extreme Heat (Power Outage)

Description

Extreme heat can be described as temperatures that hover 10°F or more above the average high temperature for a region at least for several weeks, most often occurring during the summer season. A heat wave is a period of excessive heat, which can lead to illness and other stress to vulnerable people and those who experience prolonged exposure to the heat. High humidity, which rarely accompanies heat waves in Yuma County, can make the effects of heat even more harmful. While heat-related illness and death can occur from exposure to intense heat in just one afternoon, heat stress on the body has a cumulative effect. Consequently, the persistence of a heat wave increases the threat to public health.

Extreme heat events are a considerable public health concern and are one of the leading weather-related killers in the United States. Although extreme heat events can occur in May or September, they are most common between June and August when above average temperatures are sustained for a prolonged period. During extended periods of very high temperatures, or high temperatures coupled with high humidity, individuals can suffer a variety of health problems, including heatstroke, heat exhaustion, and heat cramps. Rising temperatures and increased sunlight can also cause more occurrences of freshwater algae blooms. Algae blooms occurs when there is a rapid increase in algae, and can be harmful when humans or animals make contact with the affected water.

NOAA's National Centers for Environmental Information (NCEI – formerly known as National Climatic Data Center [NCDC]) documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce. NCEI receives this information from The National Weather service, who obtains their information from a variety of sources, which include but are not limited to: county, state and federal emergency management officials, local law enforcement officials, skywarn spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public, among others. This database represents the best available data source for a number of hazards profiled in this plan including tornados, hail, lightning, severe storms, and extreme temperature events.

NOAA's Heat Index measures the severity of hot weather by estimating how hot it feels to humans. By combining air temperature and relative humidity, the Heat Index is directly related to skin temperature. The ambient temperature is quantified by examining the relation between relative humidity versus skin temperature. If the relative humidity is higher (or lower) than the base value, the apparent temperature is higher (or lower) than the ambient temperature. Table 9 outlines the common heat disorders associated with apparent temperature values during extreme heat events.

Table 9. Heat Disorders at Apparent Temperature Ranges[34]

Danger Category	Heat Disorders	Apparent Temperature (°F)
I Caution	Fatigue possible with prolonged exposure and physical activity	80-90
II Extreme Caution	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and physical activity	90-105
III Danger	Sunstroke, heat cramps, and heat exhaustion likely; heatstroke possible with prolonged exposure and physical activity	105-130
IV Extreme Danger	Heatstroke or sunstroke imminent	>130

Like extreme cold events, young children, the elderly, outdoor laborers, low-income families, the homeless, and the infirm are the most likely to suffer the negative effects of extreme heat. The National Weather Service initiates alerts based on the Heat Index as shown in Table 10 below.

Table 10. National Weather Service Heat Alerts[35]

Intensity	Detailed Description
Heat Advisory	Typically between 105°F to 110°F (41°C to 43°C) for 3 hours or more during the day and at or above 75°F (24°C) at night.
Excessive Heat Warning	Typically above 105°F (41°C) for 3 hours or more during the day and at or above 80°F (27°C) at night.

Extreme heatwaves often cause power outages which can affect entire regions within a state. Arizona is no stranger to these types of events. A severe outage can bring a community to a standstill; impacting businesses, residential home utilities, and traffic light infrastructure. In the case that backup generators are not present or working, community members may be left without cooling systems and are more likely to suffer from heat-related illnesses. A power outage can also impact critical infrastructure such as hospitals and schools.

History

According to the Arizona Department of Health Services (ADHS), 1,272 people have died from heat exposure in the State due to excessive temperatures from 2005 to 2015.[36] Most of these deaths occurred during the hot summer months of June, July, and August and 38% of deaths were from people who were aged 65 or older.

As previously mentioned, Yuma County experiences high temperatures and sometimes excessive heat wave events more than most areas within the United States. The NCEI historic events database records

[34] Source: NOAA

[35] Source: National Weather Service

[36] Arizona Department of Health Services, 2017, *Mortality and Morbidity from Exposure to Excessive Natural Heat in Arizona, 2005-2015*, http://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/extreme-weather/heat/mortality-morbidity-exposure-excessive-heat-az-2005-2015.pdf

only three excessive heat events in the County. These events occurred on July 29, 2012 and June 28, 2013. Descriptions of these events state that temperatures exceeded 110 degrees.

Probability and Magnitude

There are no commonly accepted return period or non-exceedance probability for defining the risk from extreme heat (such as the 100-year or 1% annual chance of flood). Temperature, taken together with other key climate factors such as humidity and precipitation, is typically described statistically in aggregate over 30 years or more to determine probabilities. Since temperatures vary significantly by day, season, and year, aggregate data is necessary to understand current and future probability of extreme heat events.

Yuma County is one of the hottest cities in the United States. The average temperature over the 30-year period from 1981-2010 was 75.9 degrees.[37] Average summer temperatures range from 89 degrees to just over 94 degrees, with average summer high temperatures ranging from 103 to over 106 degrees. Record high temperatures in Yuma County have reached over 120 degrees.[38] Figure 43 shows the annual average maximum temperatures in the City of Yuma from 1955 to 2018 relative to the 1981 to 2010 30-year average. Figure 44 shows the annual average minimum temperatures in the City of Yuma from 1955 to 2018 relative to the 1981 to 2010 30-year average. Although there are gaps in the data, it is evident that both the average maximum and minimum temperatures have trended upwards in Yuma. Additionally, the 30-year average minimum temperature has increased by approximately one degree from 1971-2000 to 1981-2010, and the maximum temperature has increased by approximately 0.5 degrees.

[37] NOAA, NCEI, Yuma MCAS weather station, https://www.ncdc.noaa.gov/cdo-web/datatools/normals. Accessed March 2018

[38] Prism Climate Group, http://prism.oregonstate.edu/explorer/. Accessed March 2018.

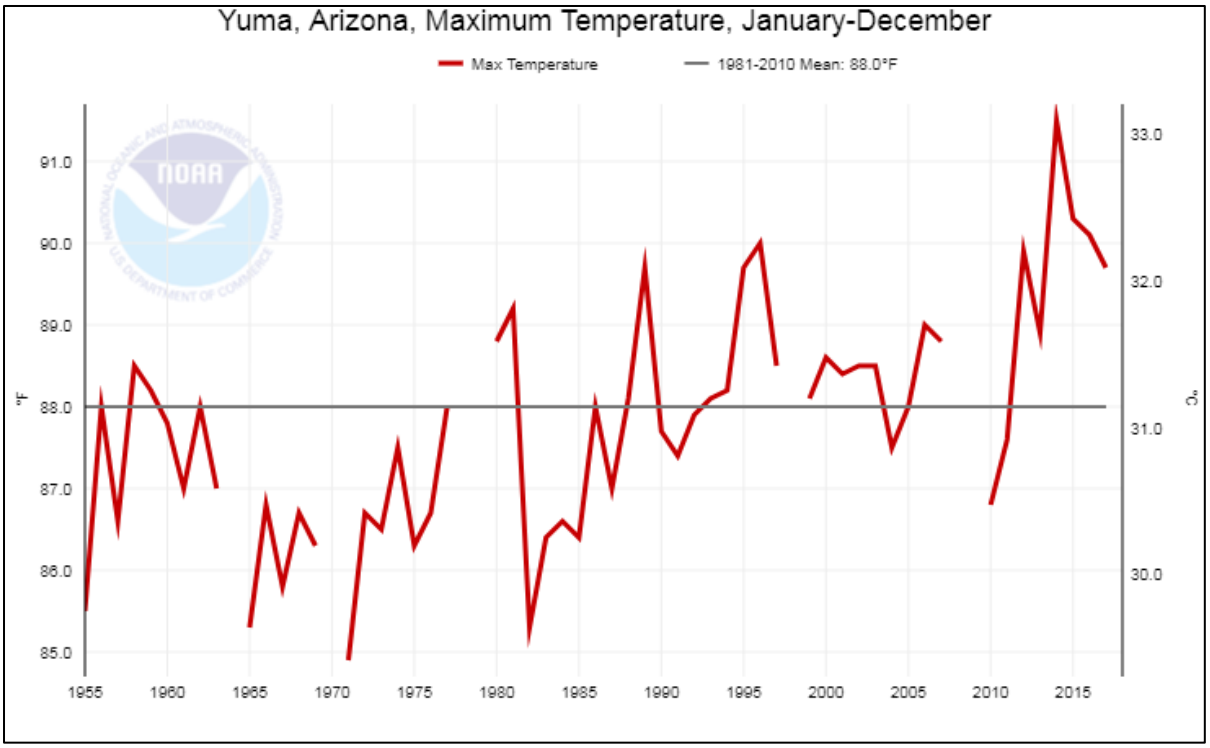

Figure 43. City of Yuma Annual Maximum Temperatures from 1955 to 2010

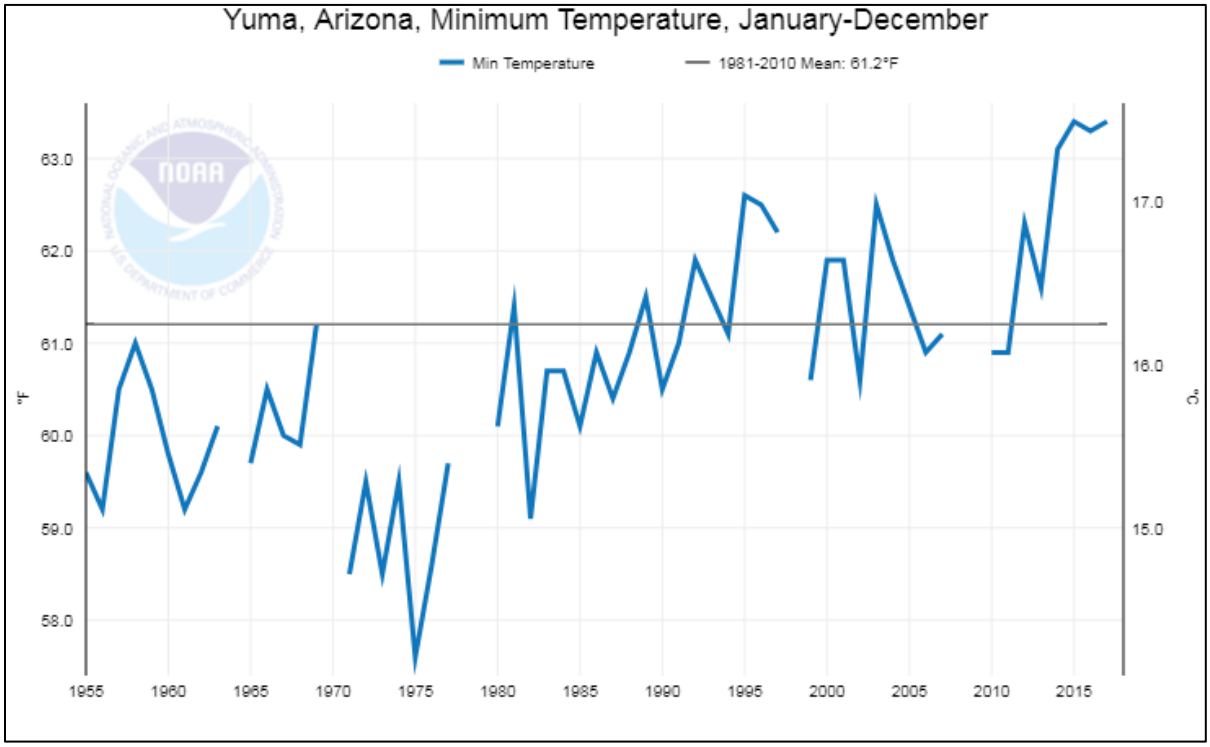

Figure 44. City of Yuma Average Annual Minimum Temperatures, 1955 to 2018

Additionally, maximum temperatures are expected to continue to rise in Arizona and Yuma County. Table 11 shows projections of July average daily maximum temperatures for 2010, 2030, 2060 and 2090 under four climate scenarios of low to high emissions (RCP 2.6 through RCP 8.5). Even under a low emissions scenario, Yuma County July daily maximum temperatures are predicted to rise to 108 degrees by 2030.[39]

Table 11. Arizona July Daily Maximum Temperature Projections

	RCP 2.6				RCP 4.5				RCP 6.0				RCP 8.5			
	2010	2030	2060	2090	2010	2030	2060	2090	2010	2030	2060	2090	2010	2030	2060	2090
Apache	88.5	91.6	90.1	89.8	89.1	91.0	89.2	91.8	87.3	91.0	90.9	97.2	90.5	92.8	93.2	95.4
Cochise	93.2	96.4	94.5	94.5	93.2	95.2	93.9	96.8	93.0	94.8	94.8	101.8	95.0	96.8	97.2	99.7
Coconino	90.0	94.1	93.4	92.8	91.4	92.8	91.9	94.8	89.6	92.8	93.0	98.2	92.3	94.1	95.4	97.7
Gila	94.3	97.9	96.3	96.3	94.8	96.8	95.2	98.6	93.9	96.6	96.6	102.60	96.4	97.9	98.6	101.1
Graham	94.5	97.9	95.9	95.9	95.0	96.8	95.2	98.2	94.3	96.6	96.3	103.3	96.4.0	98.2	98.8	101.3
Greenlee	90.7	94.1	91.9	91.8	91.0	93.0	91.6	94.1	90.5	93.0	92.5	99.9	92.7	94.6	95.2	97.3
La Paz	105.3	109.2	108.7	109.4	106.3	108.3	108.0	110.7	107.2	108.7	108.9	113.5	107.8	108.5	110.3	113.9
Maricopa	104.4	108.5	107.4	108.0	105.4	107.2	106.5	109.8	105.8	107.6	107.4	112.6	106.9	107.4	109.0	112.6
Mohave	97.9	102.6	101.8	101.7	99.7	100.9	100.8	103.5	98.4	101.3	101.7	106.3	100.6	101.8	103.6	106.5
Navajo	90.7	94.3	93.0	92.5	91.6	93.4	91.6	94.6	89.6	93.2	93.4	99.1	92.8	94.8	95.5	97.7
Pima	99.5	103.5	101.8	102.6	100.2	102.2	100.9	104.7	100.4	102.0	101.8	107.8	101.7	102.4	103.8	107.4
Pinal	102.2	106.0	104.4	104.7	102.9	104.7	103.5	106.9	102.7	104.7	104.5	110.5	104.5	105.4	106.5	109.8
Santa Cruz	92.1	95.4	93.4	93.9	92.3	94.1	93.4	96.3	91.9	93.4	93.7	100.0	93.9	95.0	95.9	99.0
Yavapai	94.3	98.4	97.5	97.5	95.5	97.2	96.4	99.7	95.0	97.5	97.2	102.6	96.8	97.9	99.1	102.2
Yuma	104.7	108.7	108.0	108.9	105.4	108.0	107.4	110.1	106.9	108.3	108.3	112.5	106.7	107.4	109.4	113.4

Vulnerability – CPRI Results

Extreme Heat CPRI results for each community are summarized in Table 12 below.

Table 12. Summary of CPRI results by jurisdiction for extreme heat hazard

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Cocopah Tribe	Highly Likely	Limited	<6 hours	<1 week	3.3
San Luis	Unlikely	Critical	<6 hours	<1 week	2.3
Somerton	Highly Likely	Catastrophic	>24 hours	>1 week	3.6
Unincorporated Yuma County	Possibly to Likely	Limited to Critical	12 to 24 hours	<1 week	2.6
Wellton	Likely	Critical	<6 hours	>1 week	3.3
Yuma	Likely	Limited	6 to 24 hours	<24 hours	2.5
				County-wide average CPRI =	**2.9**
				CPRI Min/Max Score = 1.00/4.00	

Vulnerability – Loss Estimations

Although estimated property losses associated with extreme temperature hazards are anticipated to be minimal across the county, extreme heat events do present a significant life and safety threat to the community. Heat casualties are usually caused by lack of adequate air conditioning and/or heat exhaustion. Extreme heat tends to affect the elderly, infirm, homeless, or low-income families the most, as these

[39] Arizona State University and Arizona Department of Health Services, 2015, *Arizona Extreme Weather, Climate and Health Synthesis Report*, http://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/extreme-weather/pubs/climate-and-health-profile-synthesis-report-2015.pdf

populations frequently live on low fixed incomes and cannot afford to run air conditioning on a regular basis. These socially vulnerable populations are often isolated, with no immediate family and/or limited mobility, which makes it more difficult for them to remove themselves from danger. As stated before, NCEI recorded a total of three excessive heat events in Yuma County.

According to the U.S. Census, 20.7% if the County's population is below the poverty level and 16.2% are aged 65 or older. The excessive heat event recorded on July 9, 2012, caused one elderly person to die in his home, but no injuries, property or crop damage were reported.

Because there is no defined geographic boundary for extreme temperature hazards, all of the people and infrastructure within Yuma County are exposed to extreme temperatures. Those with elevated risk and potential loss are the homeless, infirm, elderly, and low income families. Given the lack of historical data and limited likelihood of structural losses in the county resulting from extreme heat, and that placing a dollar amount on the cost of a human life are beyond the scope of the Plan, annualized economic losses for the planning area due to extreme heat is currently considered unquantifiable.

However, due to the regional nature of extreme heat, jurisdictions and Tribes with higher numbers of socially vulnerable residents are expected to experience magnified impacts of extreme temperatures. This includes places with high numbers of elderly residents, low income families, and homeless individuals/outdoor laborers. Additionally, as temperatures continue to rise, the increased stress on the power supply may cause blackouts causing loss of air conditioning when it is needed most. This may increase exposure to extreme heat to populations without back-up generators.

Vulnerability – Development Trends

Extreme heat events are likely to continue to occur in Yuma County. With the exception of the Cocopah Tribe, all jurisdictions have experienced significant population growth over the past decade, and are projected to continue to grow. Increased population will expose more people to extreme heat, increasing Yuma County's risk. Use of air conditioning can help mitigate some exposure to extreme heat. However, increased use of air conditioning due to a growing population may lead to more stress on the energy supply, contributing to power outages. Additionally, the conversion of rural and agricultural land to urban developments may lead to the urban-heat island effect of a once rural area. As urban areas develop, buildings, roads, and other infrastructure replace open land and vegetation. These changes cause urban regions to become warmer than their rural surroundings, forming an "island" of higher temperatures in the landscape. According to the U.S. Environmental Protection Agency (EPA), "Heat islands occur on the surface and in the atmosphere. On a hot, sunny summer day, the sun can heat dry, exposed urban surfaces, such as roofs and pavement, to temperatures 50–90°F (27–50°C) hotter than the air, while shaded or moist surfaces - often in more rural surroundings - remain close to air temperatures."[40]

Sources

Arizona Department of Health Services, 2017, *Mortality and Morbidity from Exposure to Excessive Natural Heat in Arizona, 2005-2015*, http://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/extreme-weather/heat/mortality-morbidity-exposure-excessive-heat-az-2005-2015.pdf

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[40] EPA, *Learn About Heat Islands*, https://www.epa.gov/heat-islands/learn-about-heat-islands. Accessed March 2018

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Profile Maps

No profile maps are provided.

5.3.4 Flooding

Description

For the purpose of this Plan, the hazard of flooding addressed in this section will pertain to floods that result from precipitation/runoff, dam failure, and levee failure related events. The two seasonal atmospheric events that tend to trigger floods in Yuma County are:

- *Tropical Storm Remnants*: Some of the worst flooding tends to occur when the remnants of a hurricane that has been downgraded to a tropical storm or tropical depression enter the State. These events occur infrequently and mostly in the early autumn, and usually bring heavy and intense precipitation over large regions causing severe flooding.
- *Summer Monsoons*: The second atmospheric condition that brings flooding to Arizona is the annual summer monsoon. In mid to late summer the monsoon winds bring humid subtropical air into the State. Solar heating triggers afternoon and evening thunderstorms that can produce extremely intense, short duration bursts of rainfall. The thunderstorm rains are mostly translated into runoff and in some instances, the accumulation of runoff occurs very quickly resulting in a rapidly moving flood wave referred to as a flash flood. Flash floods tend to be very localized and cause significant flooding of local watercourses.

Damaging floods in the County can be primarily categorized as either riverine, sheet flow, or local area flows. Riverine flooding occurs along established watercourses when the bankfull capacity of a wash is exceeded by storm runoff and the overbank areas become inundated. The major riverine watercourses are the Colorado River and the Gila River, which converges with the Colorado River in Yuma. The Colorado River drains watersheds from Wyoming, Utah, Colorado, Nevada, New Mexico and Arizona. The Gila River has a large drainage with the source beginning in western New Mexico on the western slopes of the Continental Divide. There are also areas within the County where the watercourse is broad and generally shallow with ill-defined low flow paths and broad sheet flooding. Local area flooding is often the result of poorly designed or planned development wherein natural flowpaths are altered, blocked or obliterated, and localized ponding and conveyance problems result. Erosion is also often associated with damages due to flooding.

Another source or potential cause of flooding in Yuma County is through dam and levee failure events. Due to the unlikely occurrence of this type of flooding in Yuma County, the Team wanted to recognize these event types and are designated under flooding and not addressed separately. The following is a description and situation of dam and levee failure potential:

- *Dam Failure*: FEMA Dam Safety defines dam failure as a catastrophic type of failure characterized by the sudden, rapid, and uncontrolled release of impounded water or the likelihood of such an uncontrolled release. It is recognized that there are lesser degrees of failure and that any malfunction or abnormality outside the design assumptions and parameters that adversely affect a dam's primary function of impounding water is properly considered a failure. These lesser degrees of failure can progressively lead to, or heighten, the risk of catastrophic failure. There are 6 major dams on the Colorado River that can impact the Colorado River Flood Conditions at Yuma County. All 6 are owned by the Bureau of Reclamation. They are; Glenn Canyon Dam, Hoover Dam, Davis Dam, Parker Dam, Senator Wash Dam, and Imperial Dam. In some cases the dams are operated and maintained by a contracted entity. One such case is the Imperial Dam, which is contracted to Imperial Irrigation District to operate and maintain for the Bureau of Reclamation. In all cases the personnel at each dam follow the Dam Safety Guidelines and Policy set forth by the Bureau of Reclamation. Each of these dams has a written Emergency Action Plan for handling such emergencies as dam failures and/or Colorado River Floods.
- Other River systems affecting the Yuma County area include the Verde, Salt, and Gila Rivers. Flood waters released through these river systems converge on the Gila River and are captured by Painted Rock Dam, southwest of Phoenix. Painted Rock Dam is owned

and operated by the Army Corps of Engineers, Los Angeles District. The Army Corps of Engineers maintain a separate flood operating plan for the Painted Rock Dam on the Gila River.

- *Levee Failure:* FEMA defines levees as man-made structures, usually earthen embankments that are designed and constructed in accordance with sound engineering practices to contain, control or divert the flow of water so as to provide protection from temporary flooding (FEMA, 2009). National flood policy now recognizes the term "levee" to mean only those structures which were designed and constructed according to sound engineering practices, have up to date inspection records and current maintenance plans, and have been certified as to their technical soundness by a professional engineer. FEMA has classified all other structures that impound, divert, and/or otherwise impede the flow of runoff as "non-levee embankments". In Yuma County, these might be comprised of features such as roadway and railway embankments, canals, irrigation ditches and drains, and agricultural dikes.

FEMA urges communities to recognize that all areas downstream of levees and embankments are at some risk of flooding. There are no guarantees that a levee or embankment will not fail or breach if a large quantity of water collects upstream.

Mechanisms for levee failure are similar to those for dam failure. Failure by overtopping could occur due to an inadequate design capacity, sediment deposition and vegetation growth in the channel, subsidence, and/or a runoff that exceeds the design recurrence interval of the levee. Failure by piping could be due to embankment cracking, fissures, animal boroughs, embankment settling, or vegetal root penetrations.

History

Flooding is clearly a major hazard in Yuma County as shown in Table 3. Yuma County has been part of 8 presidential disaster declarations due to flooding. The following incidents represent examples of major flooding that has impacted the County:

- In September 2015, scattered thunderstorms affected community of Yuma as well as surrounding communities such as Somerton during the late afternoon and evening hours on September 8th. Due to elevated moisture values, partially a result of tropical moisture from Hurricane Linda starting to move into southern Arizona, the stronger storms produced very heavy rainfall with peak rain rates in excess of 2 inches per hour. A trained spotter 3 miles northeast of Somerton measured 4.6 inches of rain within 2 hours ending at 1900MST. The heavy rain led to flash flooding in the Yuma area and resulted in the issuance of a Flash Flood Warning at 1802MST. At 2000MST, local broadcast media reported that people were leaving flooded houses south of highway 95 between Joshua Street and Bingham Avenue. The flash flooding took place about 1 mile southeast of the town of Somerton. Fortunately, there were no injuries reported due to the flooding. Property damages are listed at $100,000.
- In August 2013, copious amounts of moisture spread north and into southwest Arizona on August 24th, ahead of dissipating former tropical storm Ivo. This led to a very moist and unstable airmass and scattered thunderstorms developed in the Yuma area during the evening hours. Locally heavy rain occurred, and radar indicated rain rates in excess of one inch per hour at times. The rain led to flooding and flash flooding of streets and washes in communities such as Yuma and the Fortuna Foothills. According to a trained weather spotter 2 miles east of the Fortuna Foothills, there was evidence of major flash flooding across county road 15E about 2 miles south of Interstate 8 during the evening hours. The report from the spotter was actually received around 1100MST on August 25th. Although a Flash Flood Warning was not in effect for the Yuma area during this event, an Urban and Small Stream Flood Advisory had been issued at 1900MST and it continued until 2130MST. No reports of accidents or injuries were received due to the flooding. Property damages are listed at $25,000.

- In March 2010, the City of Yuma had winter storm runoff which caused damage to roads, retention basins, parks, and other public facilities. Damages are listed at $300,000.
- In September 1997, Yuma County prepared for the arrival of Hurricane Nora, which was expected to be the worst rainstorm to ever hit the State of Arizona. By the time Hurricane Nora made its way into Yuma County it had weakened and was downgraded to a tropical storm. The remnants of the hurricane delivered over three inches of rain in a 48-hour period and caused significant problems including downed trees, loss of electrical power, restricted access for emergency crews, and severe flooding problems and wind damage. It is estimated that over $200 million in damages were sustained, with most of the damages occurring to agricultural crops.
- In September 1994, a series of thunderstorms moved through the Yuma area during the early morning hours. Rainfall amounts up to 2.5 inches led to the flooding of four homes about eight miles south of Yuma. Several roads in Somerton and U.S. 95 about eight miles northeast of Yuma were closed due to flooding. Two cars were pushed off U.S. 95 at Fortuna Wash, but the motorists were rescued unharmed. Also, localized strong winds knocked over at least five power poles on County Road 14 in Somerton. The Yuma County Extension Agent estimated crop damages from the flood approaching $1 million, mainly cotton.
- In 1993, heavy rain fell over most of north, central and southeastern Arizona resulting in significant flooding along most major watercourses. In Yuma County, raging flood waters, sediment deposition and extensive bank erosion caused severe damage to public infrastructure and structural damage to private property, agricultural crops and land, economic loss and environmental damage. Water released from dams along the Salt and Verde Rivers converged at Painted Rock Dam, which is a flood control reservoir located in Maricopa County just north of Yuma County. To alleviate upstream flooding, the US Army Corps of Engineers (USACE) began gradually increasing discharges at Painted Rock, with a peak release rate of 27,500-cfs on February 28, 1993. The Gila River system below Painted Rock Dam was unable to handle these discharge amounts and went over its banks in some areas in spite of concentrated flood fighting efforts by several agencies. According to the USACE Flood Damages Report [41], Yuma County had in excess of $130 million in public infrastructure, agricultural, private property, economic and environmental damages. The flooding prompted a federal disaster declaration for almost the entire state
- In 1983, exceedingly large amounts of runoff caused by rapidly melting snow from record snowfalls and late rains resulted in unusually high volumes of water entering the Colorado River basin. These extraordinary amounts of water required the upper reservoirs to release unprecedented volumes of water into the lower Colorado River system. The releases caused the Colorado River to flood low-lying areas, erode riverbanks, and raise adjacent ground water levels. Flood damage to urban and agricultural lands extended 250 miles beginning at Davis Dam to the Mexican border. Groundwater seepage caused surface ponding. Damage to recreational facilities was widespread, affecting beaches, campsites, boat docks, launch sites, and businesses servicing these activities. Septic tank systems and water treatment systems were also damaged. This Presidential declared disaster resulted in $13 million to the city and county of Yuma.
- In 1976, Hurricane Kathleen, which had just been downgraded to a tropical storm status, lashed Yuma with up to 76 mph wind gusts and dropped half of the annual rainfall in one hour. This tropical storm inflicted over $2 million in damages in Yuma.

Probability and Magnitude

Flooding events are typically measured in terms of magnitude and the statistical probability that they will occur. The 1% annual chance flood event is the standard national measurement for flood mitigation and insurance. A 1% annual chance flood, also known as the '100-year flood', has a 1 in 100 chance of

[41] US Army Corps of Engineers, Los Angeles District, 1994, *Flood Damage Report – State of Arizona – Floods of 1993*

being equaled or exceeded in any one year and has an average recurrence interval of 100 years. It is important to note that this recurrence interval is an average; it does not necessarily mean that a flood of such a magnitude will happen exactly every 100 years. Sometimes, only a few years may pass between one 1% annual chance flood and another while two other 1% annual chance floods may be separated by 150 years. The 0.2% annual chance flood event, or the '500-year flood', is another measurement which represents a 0.2% chance (or 1 in 500 chance) of occurring in a given year.

Figure 46 through Figure 50 show the 100-yr and 500-yr flood hazards in relation to the county and the participating communities. This shows that the community most impacted by the 100-yr flood hazard is the City of Wellton. It should be noted that there are also areas in the City of Yuma and the City of San Luis that could be impacted by the 100-yr flood event.

Vulnerability – CPRI Results

Flooding CPRI results for each community are summarized in Table 13 below.

Table 13. Summary of CPRI results by jurisdiction for flooding hazard

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Cocopah Tribe	Highly Likely	Limited	12 to 24 hours	<1 week	3.0
San Luis	Possibly	Limited	6 to 12 hours	<1 week	2.3
Somerton	Likely	Critical	<6 hours	<24 hours	3.1
Unincorporated Yuma County	Likely to Highly Likely	Critical to Catastrophic	6 to 24 hours	<1 week	3.5
Wellton	Possibly	Limited	<6 hours	<1 week	2.4
Yuma	Possibly to Likely	Limited to Critical	6 to 24 hours	<1 week	2.6
				County-wide average CPRI =	**2.8**
				CPRI Min/Max Score = 1.00/4.00	

Vulnerability – Loss Estimations

The most appropriate risk assessment methodology for seismic hazards involves scenario modeling using FEMA's Hazus MH loss estimation software. Hazus is a very useful planning tool because it provides an acceptable means of forecasting flood damage, loss of function of infrastructure, and casualties, among many other factors. There are two types of Hazus analyses, standard and enhanced. A standard Hazus analysis requires no specialized knowledge on the part of the user and leverages the default inventory, hazard, and engineering (damage function) data present in the program. This is also known as an "out of the box" or Level 1 analysis. An enhanced analysis requires the user to have localized knowledge and data in order to provide updated inventory, hazard and/or engineering (damage function) data that overwrites the default data present in the program. Historically, this has been known as a Level 2 (inventory or hazard updates) or Level 3 (engineering updates) Hazus analysis.

The Level 1 Hazus analysis at the county level was utilized for this plan, using Hazus MH Software version 4.0. This analysis includes 2010 census block information along with the 100-year flood depth grid. There are an estimated 79,915 buildings in the county with a total building replacement value (excluding contents) of almost $14 million (2010 dollars). Approximately 95% of the buildings are associated with residential housing. The following Figure 45 shows the flood extent study area.

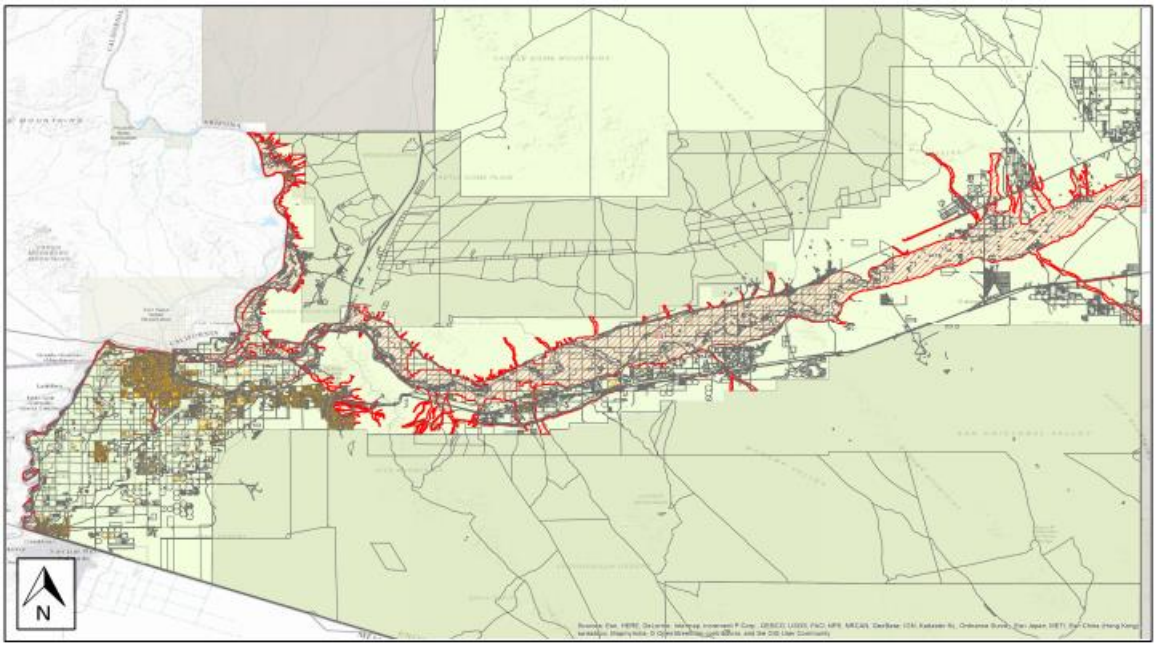


Figure 45. 100-yr Flood Study Region Overview Map

The Hazus analysis estimates that 756 buildings will be at least moderately damaged, and 213 buildings will be completely destroyed. Total building losses are estimated to be over $144 million with just over 72% of the losses being made up of residential occupancies. Figure 46 through Figure 50 include the flood hazard Yuma County and each community faces due to a potential 100-year flood (1% annual chance flood) and a potential 500-year flood (0.2% annual chance flood). All communities are at risk to a 100-year or 500-year flood event, and the City of Wellton is at the highest risk for a 100-year flood event. Figure 51 through Figure 54 include the total estimated losses for each community. Loss estimates demonstrate further analysis of structural losses using the depth of flooding and the types of structures estimates to be impacted by losses. The City of Yuma is shown as having the highest number of estimated losses should a 100-year flood occur.

There are six critical facilities that may be impacted by a 100-yr flood event, as shown in Table 14. Three are located in the City of Yuma, two in Roll (Yuma County), and one in the City of San Luis.

Table 14. Critical Facilities in the 100-yr Floodplain

Facility	City
San Luis West Wastewater Treatment Plant	San Luis
G.W. Carver Elementary School	Yuma
John Morris Recreation Cottage	Yuma
Cocopah Water Tower North	Yuma
Library	Roll
Mohawk Valley Elementary School	Roll

Vulnerability – Repetitive Loss Properties

Repetitive Loss (RL) properties are those NFIP-insured properties that since 1978, have experienced multiple flood losses. FEMA tracks RL properties and in particular to identify Severe RL (SRL) properties. RL properties demonstrate a track record of flooding repeated flooding for a certain location

and are one element of the vulnerability analysis. RL properties are also important to the NFIP, since structures that flood frequently put a strain on the National Flood Insurance Fund. There are no RL or SRL properties in Yuma County.[42]

Vulnerability – Development Trends

With the exception of the Cocopah Tribe, all jurisdictions have experienced significant population growth over the past decade, and are projected to continue to grow. Increased population and development will increase Yuma County's risk to flooding. Countywide, the population is projected to increase by 57% from 2010 to 2040, which raises the chance of development in the floodplain. The City of Yuma is estimated to experience the highest estimated losses from a 100-year flood event, and has a projected population increase of 46% from 2010 to 2040. However, for most Yuma County jurisdictions, adequate planning and regulatory tools are in place to regulate future development. The YCFCD is very proactive in delineating floodplains ahead of development in the less populated areas of the County, and works cooperatively with all incorporated jurisdictions to update and refine existing floodplain mapping as needed.

Sources

Arizona Division of Emergency Management, 2013, State of Arizona Multi-Hazard Mitigation Plan.

FEMA, April 2017, Hazus Estimated Annualized Earthquake Losses for the United States

Profile Maps

Figure 46 – Floodplain Hazard Countywide

Figure 47 – Floodplain Hazard City of Yuma

Figure 48 – Floodplain Hazard City of San Luis

Figure 49 – Floodplain Hazard City of Somerton

Figure 50 – Floodplain Hazard City of Wellton

Figure 51 – Flood Total Losses Yuma

Figure 52 – Flood Total Losses Somerton

Figure 53 – Flood Total Losses Wellton

Figure 54 – Flood Total Losses San Luis

[42] Arizona Department of Emergency and Military Affairs, March 2018

Figure 46. Yuma County Floodplain Hazard Map, 2014

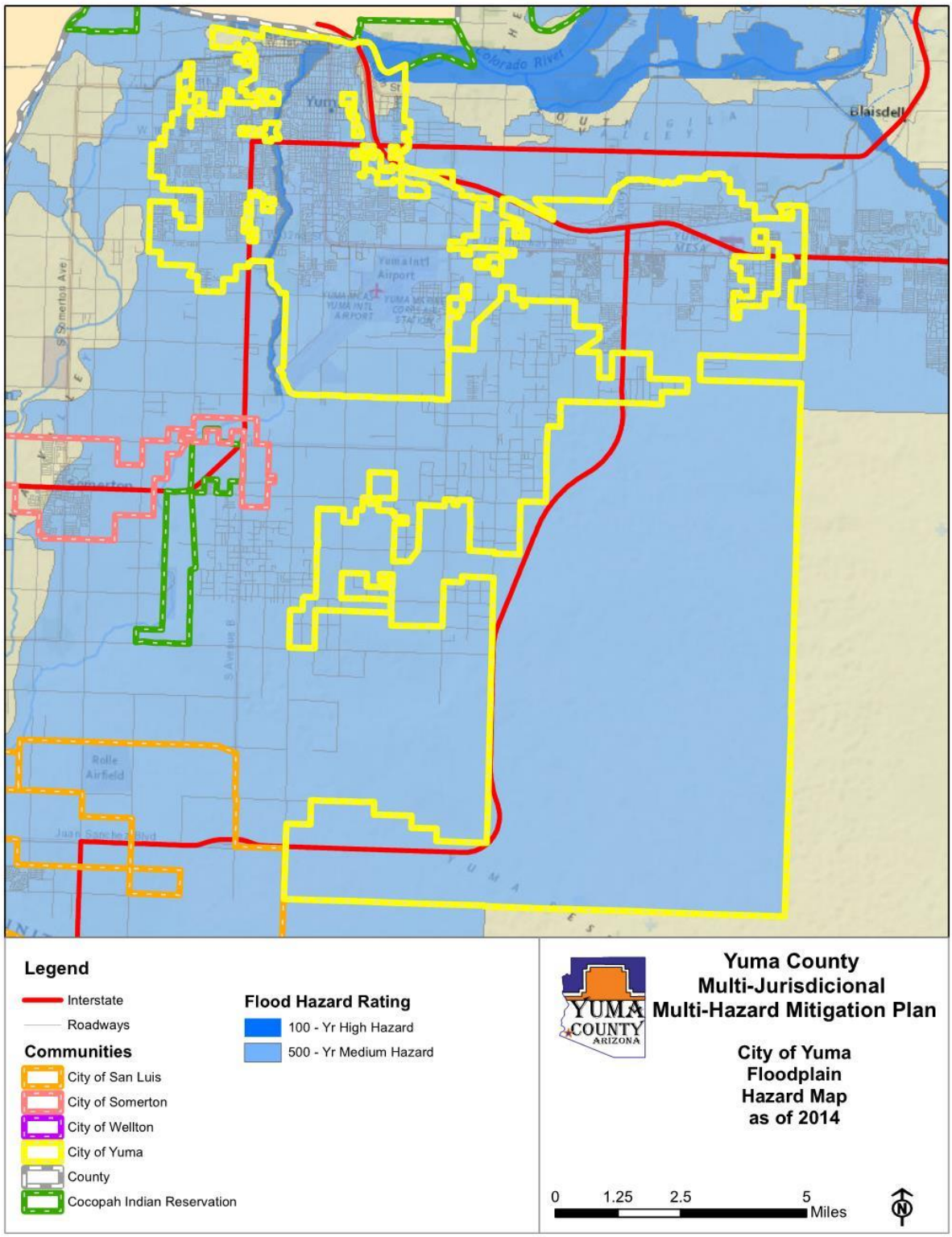


Figure 47. City of Yuma Floodplain Hazard Map, 2014

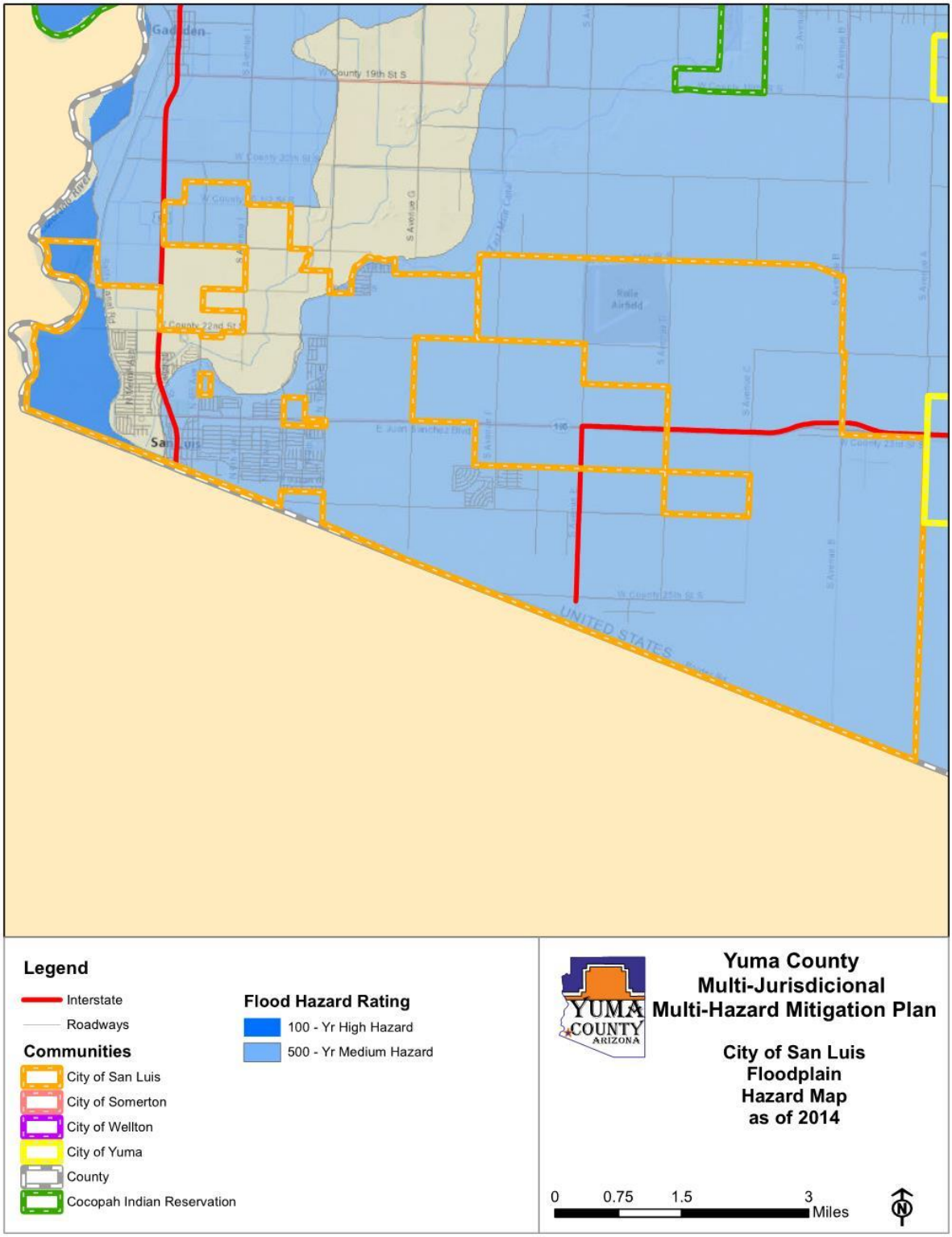


Figure 48. City of San Luis Floodplain Hazard Map, 2014

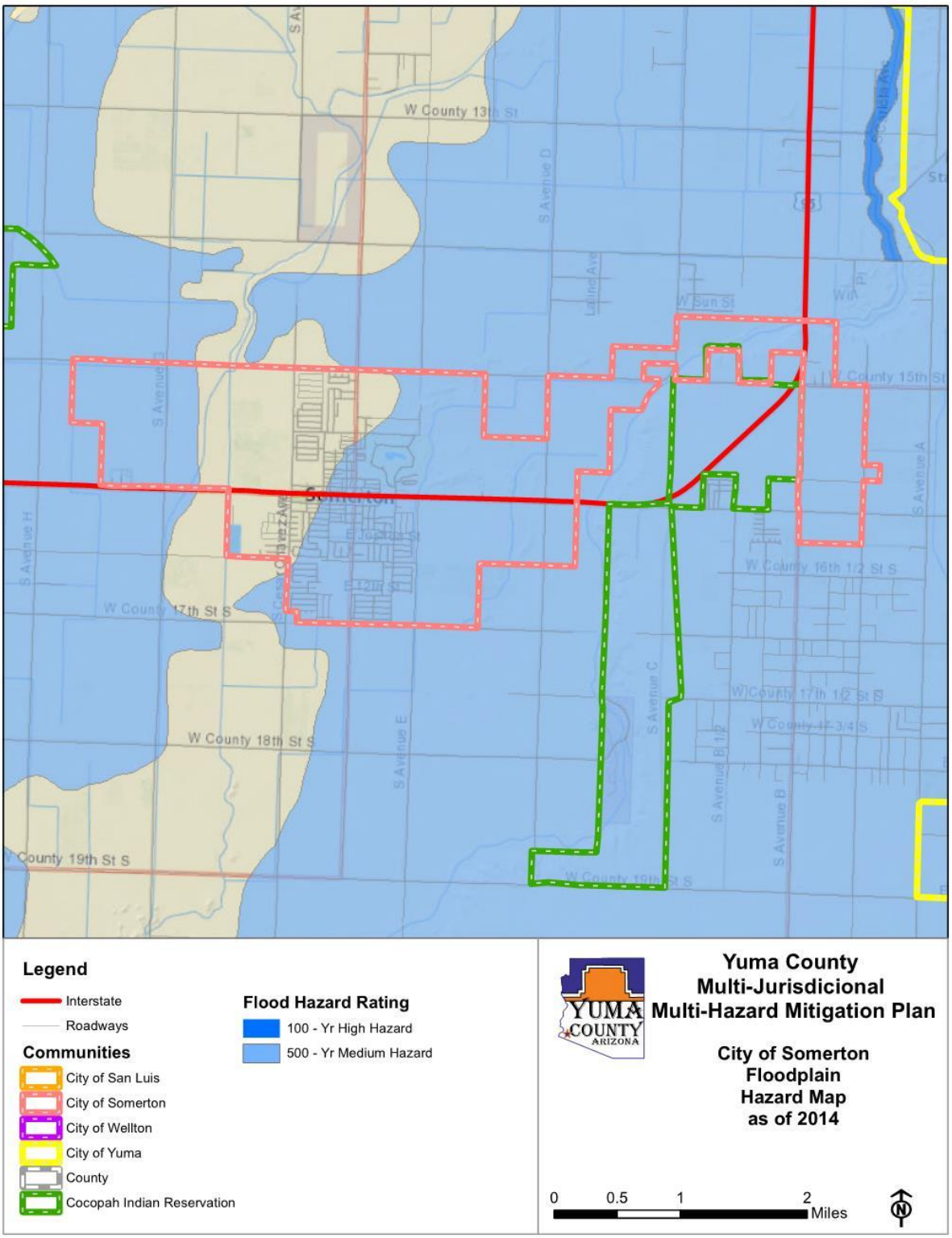


Figure 49. City of Somerton Floodplain Hazard Map, 2014

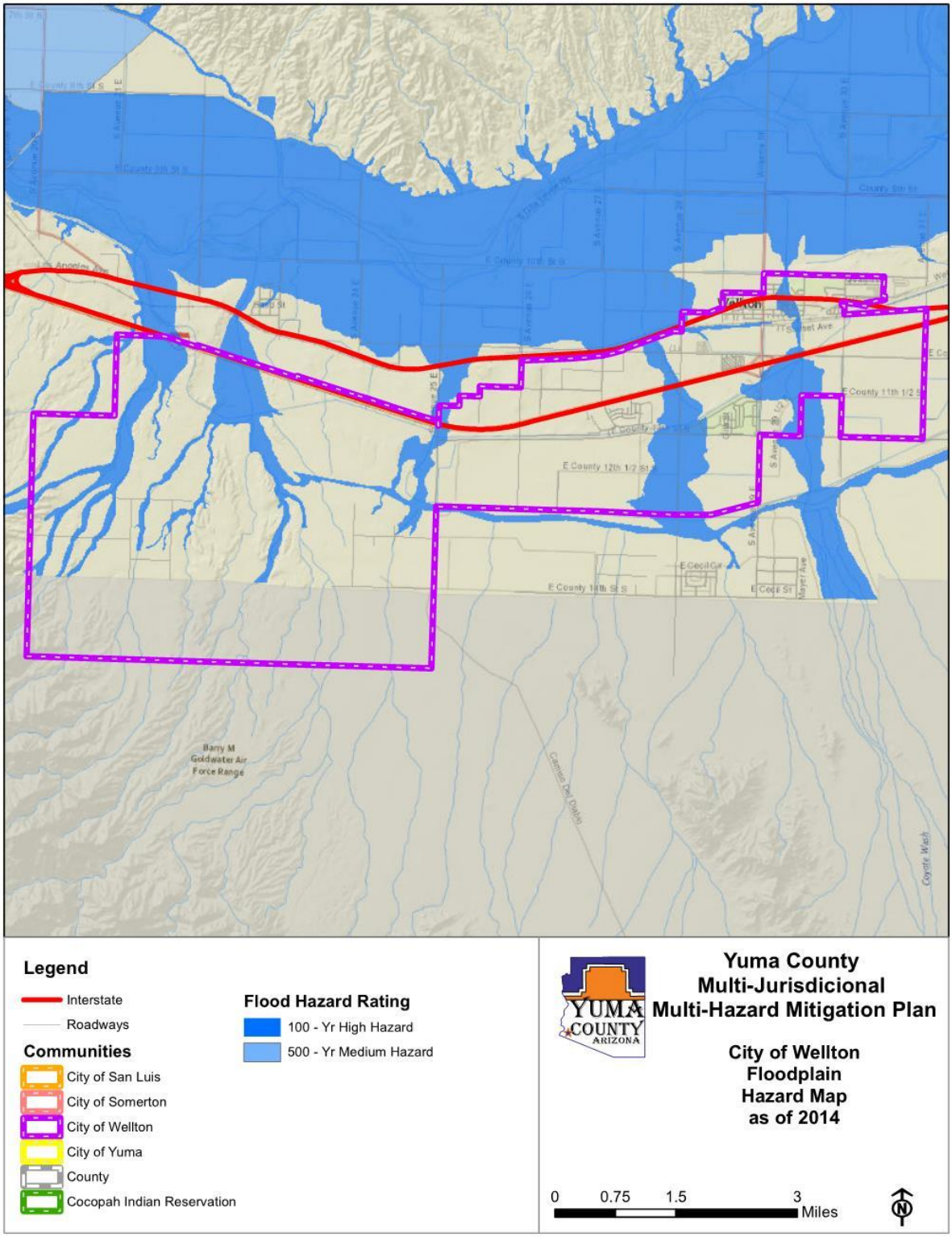


Figure 50. City of Wellton Floodplain Hazard Map, 2014

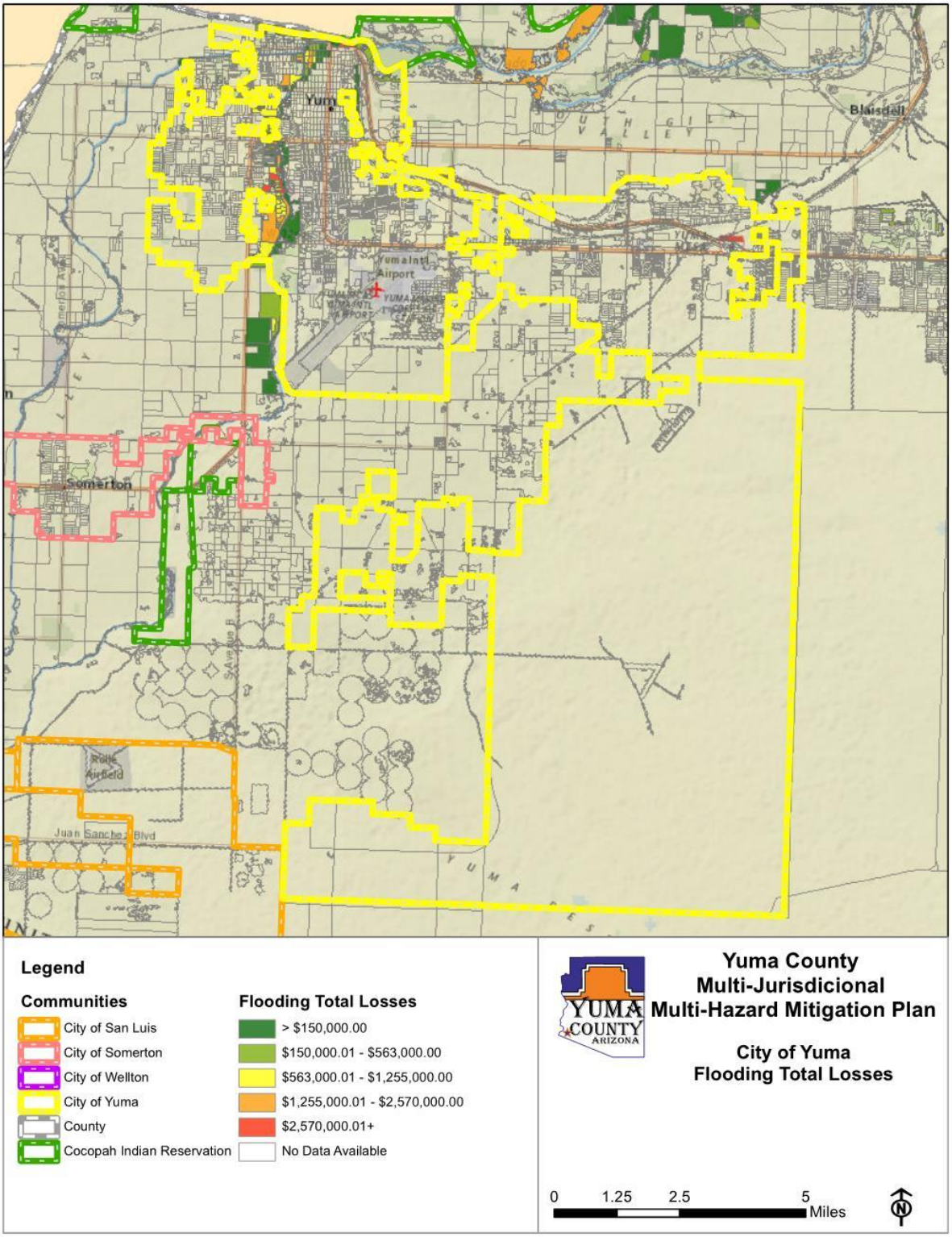


Figure 51. City of Yuma Flooding Total Losses

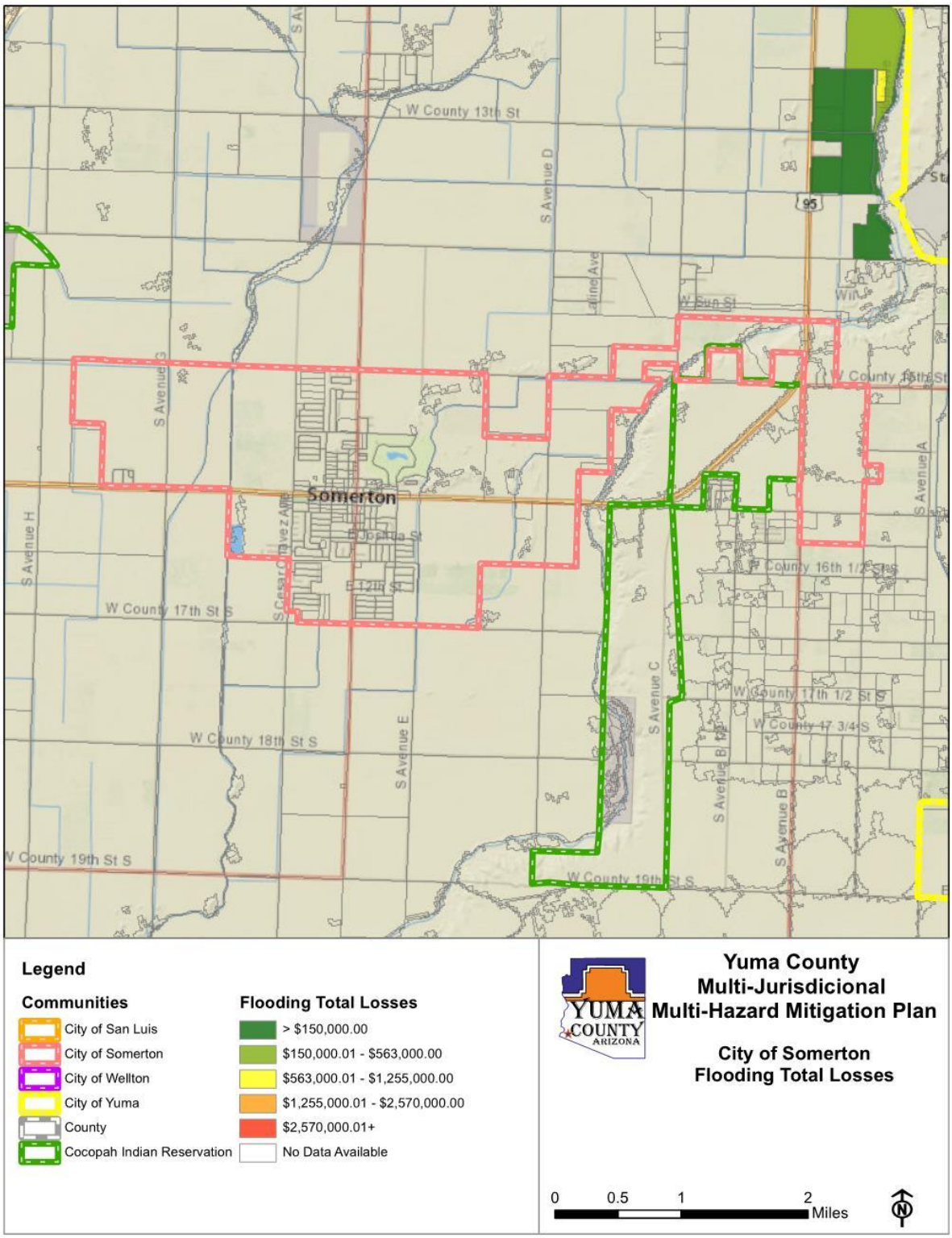


Figure 52. City of Somerton Flooding Total Losses

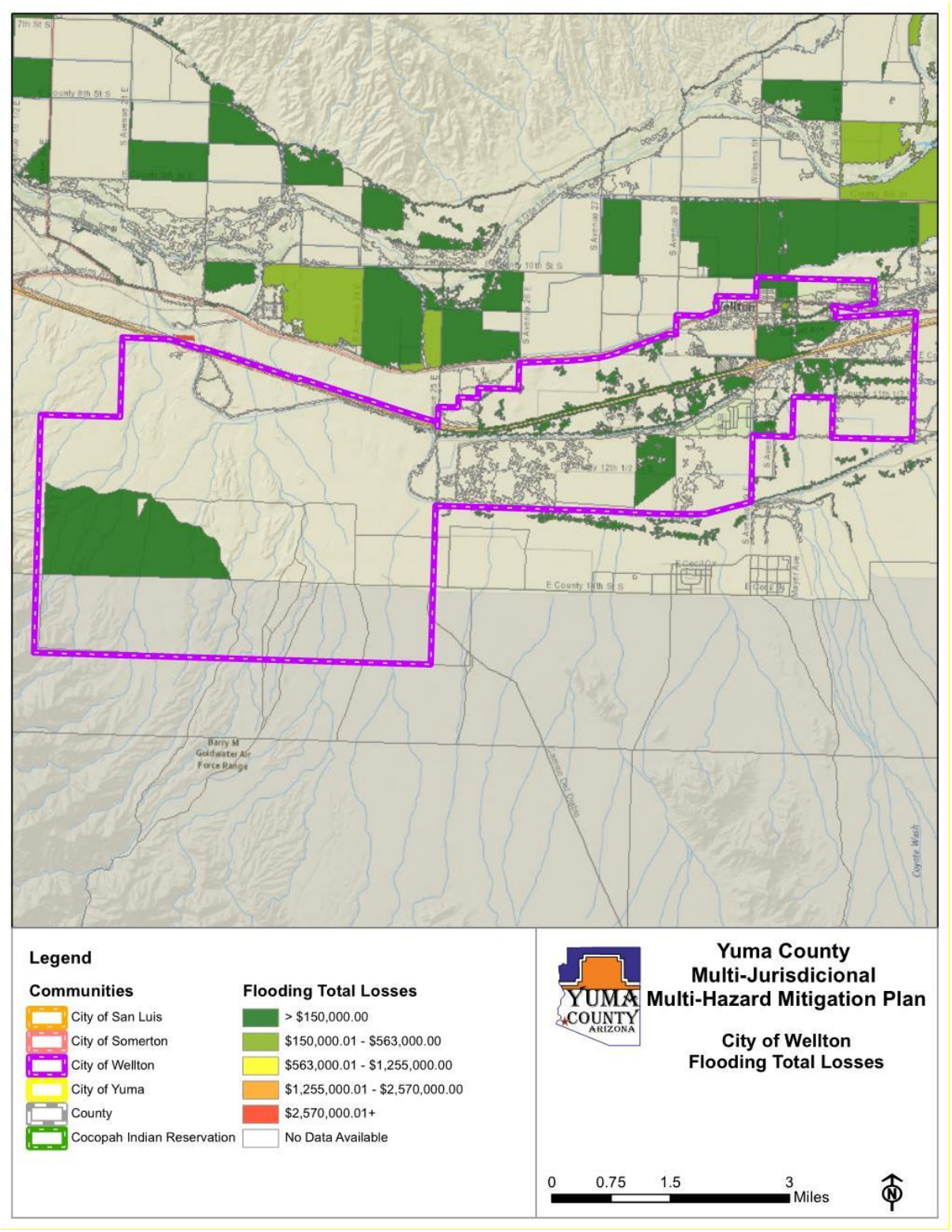


Figure 53. City of Wellton Flooding Total Losses

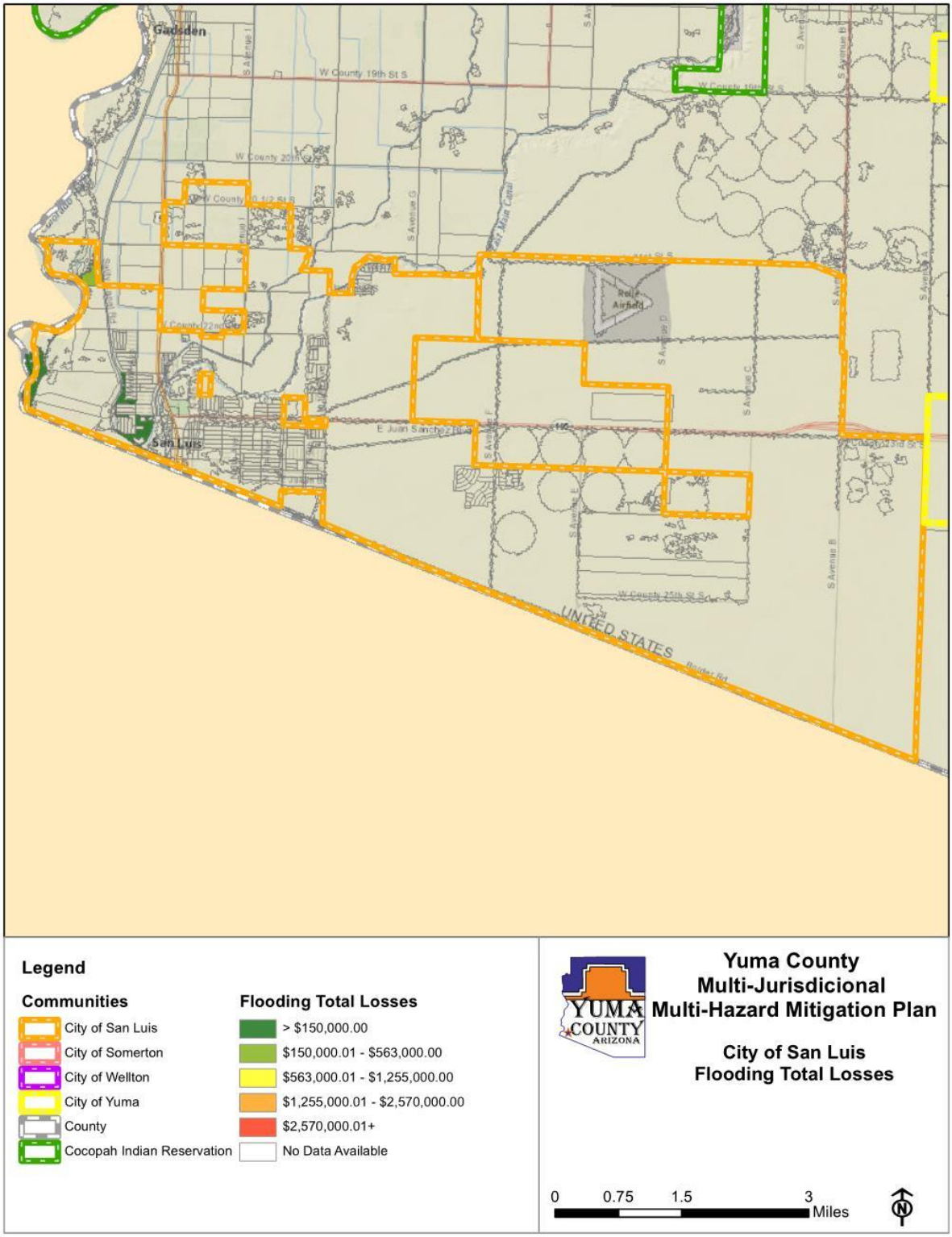


Figure 54. City of San Luis Flooding Total Losses

5.3.5 Severe Wind

Description

The hazard of Severe Wind encompasses all climatic events that produce damaging winds. For Yuma County, Severe Winds usually result from either extreme pressure gradients that usually occur in the spring and early summer months, or from thunderstorms. Thunderstorms can occur year-round and are usually associated with cold fronts in the winter, monsoon activity in the summer, and tropical storms in the late summer or early fall.

Three types of damaging wind related features typically accompany a thunderstorm; 1) downbursts, 2) straight line winds, and infrequently, 3) tornadoes.

Downbursts are columns of air moving rapidly downward through a thunderstorm. When the air reaches the ground, it spreads out in all directions, creating horizontal wind gusts of 80 mph or higher. Downburst winds have been measured as high as 140 mph. Some of the air curls back upward with the potential to generate a new thunderstorm cell. Downbursts are called macrobursts when the diameter is greater than 2.5 miles, and microbursts when the diameter is 2.5 miles or less. They can be either dry or wet downbursts, where the wet downburst contains precipitation that continues all the way down to the ground, while the precipitation in a dry downburst evaporates on the way to the ground, decreasing the air temperature and increasing the air speed. In a microburst the wind speeds are highest near the location where the downdraft reached the surface, and are reduced as they move outward due to the friction of objects at the surface. Typical damage from downbursts includes uprooted trees, downed power lines, mobile homes knocked off their foundations, block walls and fences blown down, and porches and awnings blown off homes.

Straight line winds are developed similar to downbursts, but are usually sustained for greater periods as a thunderstorm reaches the mature stage, traveling parallel to the ground surface at speeds of 75 mph or higher. These winds are frequently responsible for generating dust storms and sand storms, reducing visibility and creating hazardous driving conditions.

A tornado is a rapidly rotating funnel (or vortex) of air that extends toward the ground from a cumulonimbus cloud. Most funnel clouds do not touch the ground, but when the lower tip of the funnel cloud touches the earth, it becomes a tornado and can cause extensive damage. For Yuma County, tornadoes are the least common severe wind to accompany a thunderstorm.

History

According to Table 3, Yuma County has not been included in state and/or federal disaster declaration specifically involving severe wind or dust storm events, but have been connected with flooding events. NCEI records show that there has been a total of 184 events related to High Wind, Thunderstorm Wind, Strong Wind, and Dust Storms. Of these events, 0 death occurred, 12 were injured, property damage was just over $20 million and crop damage was $55,000. The following are examples of documented past events:

- In September 2017, scattered thunderstorms developed in the city of Yuma during the afternoon hours on September 8th, and one of the stronger storms produced gusty and damaging microburst winds estimated to be as high as 70 mph. Gusty microburst winds downed 9 power poles at the Yuma Palms Mall. Some of the downed poles trapped people in their cars; fortunately, no injuries were reported. Total estimated property damage was $87,000 (NCEI, 2018).
- In August 2017, thunderstorms developed to the east of Yuma, and close to the town of Wellton, during the afternoon hours on August 3rd. Some of the stronger storms produced gusty and damaging microburst winds. Five power poles were blown down about 5 miles to the west of Wellton and just north of Interstate 8. At the same time, a trained spotter reported several power poles down slightly further to the west, about 4 miles to the east of the town of Ligurta. The poles were located along Avenue 24. The microburst wind gusts that downed the poles were estimated to be as high as 70 mph. Total estimated property damage was $70,000 (NCEI, 2018).

- In September 2015, scattered thunderstorms developed across southwestern Yuma county during the afternoon hours on September 8th, and some of them affected the downtown Yuma area. Due to elevated moisture and instability values, the stronger storms produced damaging microburst winds with gusts estimated as high as 70 mph. According to a report from a local utility company, damaging microburst winds downed 43 power poles just north of the Yuma International Airport, between Avenues 1E and 3E. A Severe Thunderstorm Warning was not yet in effect, but a Significant Weather Advisory had been issued for the Yuma area when the power poles were blown down. Total estimated property damage was $225,000 (NCEI, 2018).
- In July 2015, strong thunderstorms developed during the afternoon hours along the Interstate 8 corridor and they affected the communities of Roll and Tacna. The storms produced gusty microburst outflow winds that were estimated to be as high as 70 mph. According to a trained weather spotter, the damaging winds led to significant damage to trees, power poles, roofs and buildings in the Roll area. The downed power poles caused a power outage that lasted for several days, according to the Wellton-Mohawk Irrigation District. At a local airfield, at least one small plane suffered substantial damage. Total estimated property damage was $250,000 (NCEI, 2018).
- In August 2014, strong thunderstorms developed across portions of southwest Arizona during the evening hours on August 11th, and some of them affected the community of Fortuna Foothills to the east of Yuma. The stronger storms generated gusty damaging microburst winds in excess of 60 mph. According to trained weather spotter about 2 miles northwest of the Fortuna Foothills, thunderstorm wind gusts measured at 65 mph caused patio roof damage to his home. Additionally, a local broadcast media report indicated that thunderstorms winds caused extensive damage to mobile homes in Fortuna Foothills. Total estimated property damage was $50,000 (NCEI, 2018).
- In May 2012, a low-pressure system moved south into southwestern Arizona during the evening hours on May 7th, and triggered some high-based convection in the Yuma area. Fourteen power poles were downed at County 14th Street and Avenue 2E in the Tierra Mesa subdivision. In addition, fence and barn roof damage was reported near County 16th Street and Avenue A. There was no indication of thunderstorms in the Yuma area overnight, and no lightning was observed. However, the atmospheric conditions allowed the gusty winds to take on the characteristics of a damaging microburst. Total estimated property damage was $120,000 (NCEI, 2018).
- In August 2011, scattered high based thunderstorms developed across southwestern Arizona, including the Yuma area, during the evening hours on August 27th. The storms generated gusty wind in excess of 58 mph which produced some damage across portions of Yuma. Numerous large trees and power poles were blown down across the city. Total estimated property damage was $75,000 (NCEI, 2018).
- In August 2010, severe thunderstorms moved across parts of the city of Yuma, with damaging winds, large hail, and low visibilities due to heavy rain. As reported in the Yuma Sun, the Garden Landscaping Company at 830 South Orange Avenue was mostly destroyed by thunderstorm microburst winds, estimated to be near 75 knots. Damage was also reported at the O.G. RV Resort. Several schools in the Yuma area sustained considerable wind and water damage. Additionally, zero visibility reported in rain along with gusty winds estimated at up to 80 mph. Damage was reported to homes and businesses with numerous trees uprooted. A huge pine tree fell on a house at the corner of 8th Avenue and 10th Street. Entire carports were torn from their foundations. A roof on a home in the 1100 block of Appaloose Lane was completely torn off of its rafters. The ceramic tiles on the top of the entrance to El Charro Cafe, 601 West 8th Street, were severely damaged. The roof of a self-serve car wash collapsed. There were several reports of car windshields broken due to flying debris. At the old Foxworth Galbraith hardward store, entire structures collapsed and lay mangled on the ground where the outdoor lumber section had been. APS reported up to 16,660 customers were without power at the height of the storm. Total property damage was estimated at $11 million (NCEI, 2018).

- In January 2010, Strong winds associated with a line of thunderstorms caused considerable damage to property and some minor injuries. There were Numerous reports of large trees blown down in Yuma. Total property damage was estimated at $400,000 (NCEI, 2018).

- In October 2009, winds increased during the late afternoon hours and caused a power outage to the area of San Luis and Somerton. The outage initially affected 16,000 customers in southern Yuma County. Winds associated with the passage of a sharp cold front gusted to over 30 mph and resulted in a power outage in the Yuma area. The property damage was estimated at $10,000 (NCDC, 2009).

- In August 2009, several downed power poles. Eight people sustained minor injuries after the strong winds damaged numerous mobile homes in Dateland. Sun Country Acres mobile home park, located two miles north of Interstate 8 on Avenue64E, reported that every mobile home in the park was damaged in some way, many having broken windows. Most of the injuries were to the head and back and cuts from broken glass (NCDC, 2008).

- In July 2009, thunderstorm winds created a huge dust storm that affected much of the Yuma area with near zero visibility. Wind speeds were estimated to be over 60 mph, with considerable damage to property. At least one home was damaged, with trees and power lines downed by strong winds. During the peak of the storm, 5,200 customers were without power. The Yuma airport recorded a peak gust of 48 mph just before 5 p.m. A large complex or area of storms moved to the west and into Yuma late on Saturday afternoon. The property damage was estimated at $100,000 (NCDC, 2008).

- In September 2008, Somerton police reported power lines down due to very strong winds from thunderstorms. At the peak of the storm, between 2,500 and 3,000 APS customers were without power. A large tree in the 3300 block of 15th Avenue in The Dunes subdivision was knocked down. Power outages were also reported on the Cocopah Reservation at County 18th Street and Avenue D and in the north end of the city of Yuma. Showers and thunderstorms developed across much of southwest and south-central Arizona. A few storms became severe, with strong winds, hail and very heavy downpours. This event caused $150,000 in property damages (NCDC, 2008).

- In August 2008, trees were uprooted and a semi-trailer was turned over. A peak gust of 57 mph was measured at the Yuma airport. About 1,000 APS customers were left without power due to these thunderstorm winds. Power poles were blown down in the Mohawk area. Strong winds associated with severe thunderstorms affected parts of Yuma late Thursday night and early Friday morning. These storms were part of a huge system that moved through the Phoenix area earlier that night. Damage estimates were at $150,000. (NCDC, 2008)

- In September 2007, numerous trees and as many as 11 power poles reported down due to strong winds. Peak gusts to 84 mph were recorded at the Yuma airport. Arizona Public Service reported about 9,600 people were left without power Sunday morning. Yuma Police responded to more than 120 emergency calls for service, most of which were storm related. Numerous eyewitnesses described the area around the 100 block of West 27th Place as the worst-hit section of town. Condos in that area had considerable roof damage with ceilings collapsing onto living rooms and dining rooms. Large hail and localized flooding was also reported in Yuma. Thunderstorms resulted in considerable damage in portions of Yuma after winds gusted to 84 mph at the Yuma Airport. This event caused $1,500,000 in property damage (NCDC, 2008)

- On August 13, 2001 at approximately 2:25 p.m., the Yuma County Sheriff's Office received a 9-1-1 call stating there had been an accident involving a Sheriff's Office patrol vehicle at milepost 54 on U.S. Highway 95, north of Yuma. Emergency units responded to the scene where they discovered that a single vehicle had traveled off the roadway and rolled over. At that time, the preliminary investigation indicated the vehicle left the roadway and turned over one and one-quarter times. The

driver and sole occupant, Senior Deputy Michael Meyer was still seat-belted in his patrol vehicle when found by motorists who immediately called for assistance. Senior Deputy Meyer was pronounced dead at the accident scene.

Senior Deputy Meyer had been employed by the Sheriff's Office for 4 years and was in charge of the Water Safety Division. Northern Yuma County was a regular patrol assignment for Deputy Meyer who was ever aware of the changing desert conditions. A heavy storm was blowing through the area and it was Senior Deputy Meyer's habit to check the washes and the roads for flooding and damage on such occasions. (http://www.yumacountysheriff.org/index.html)

- In September 1993, the second severe thunderstorm to hit the Yuma area over the Labor Day weekend affected the southeast and east sections. The strong microburst winds destroyed at least three metal warehouses and blew down power lines. As many as 10 recreational vehicles were damaged at an RV resort. Damage to the warehouses was estimated to be at least $1 million. Overall damage estimates are at $5 million (NCDC, 2008)

Probability and Magnitude

Most severe wind events are associated with thunderstorms as previously mentioned. The probability of a severe thunderstorm occurring with high velocity winds increases as the average duration and number of thunderstorm events increases. According to NCEI, 153 thunderstorm wind events have been recorded for Yuma County since 1950 yielding an average of about 2.25 damaging or potentially damaging thunderstorm events per year. Reported damages from wind events associated with thunderstorms since 1950 were over $19.6 million in property damage, or approximately $290,000 per year.

The NWS issues a severe thunderstorm watch when conditions are favorable for the development of severe thunderstorms. The local NWS office considers a thunderstorm severe if it produces hail at least 3/4-inch in diameter, wind of 58 mph or higher, or tornadoes. When a watch is issued for a region, residents are encouraged to continue normal activities but should remain alert for signs of approaching storms, and continue to listen for weather forecasts and statements from the local NWS office. When a severe thunderstorm has been detected by weather radar or one has been reported by trained storm spotters, the local NWS office will issue a severe thunderstorm warning. A severe thunderstorm warning is an urgent message to the affected counties that a severe thunderstorm is imminent. The warning time provided by a severe thunderstorm watch may be on the order of hours, while a severe thunderstorm warning typically provides an hour or less warning time. All of the 153 thunderstorms that have been recorded over the last 68 years would qualify as a severe thunderstorm.

The probability of tornadoes occurring is much less frequent than thunderstorms. For the same 68-year period, NCEI reports only 11 tornadoes, which averages to less than one tornado for every four years. Reported property damages associated with those tornadoes add up to over $280,000.

Tornado damage severity is measured by the Enhanced Fujita Scale. The EF-Scale measures tornado strength and associated damages and classifies tornadoes into six intensity categories, as shown in the following Table 15. The EF scale was revised in 2007 to reflect better examinations of tornado damage surveys, so as to align wind speeds more closely with associated storm damage. This new scale takes into account how most structures are designed, and is thought to be a much more accurate representation of the surface wind speeds in the most violent tornadoes. Most tornadoes last less than 30 minutes, but some last for over an hour. The path of a tornado can range from a few hundred feet to miles. The width of a tornado may range from tens of yards to more than a quarter of a mile.

Table 15. Enhanced Fujita Tornado Scale

Enhanced Fujita Category	Wind Speed	Potential Damage
EF0	65-85 mph	Light damage: Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	86-110 mph	Moderate damage: Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	Considerable damage: Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165 mph	Severe damage: Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200 mph	Devastating damage: Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	>200 mph	Incredible damage: Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yds.); high-rise buildings have significant structural deformation; incredible phenomena will occur.

Table 16. Fujita Tornado Scale[43]

Category	Wind Speed	Description of Damage
F0	40-72 mph	Light damage. Some damage to chimneys; break branches off trees; push over shallow-rooted trees; damage to sign boards.
F1	73-112 mph	Moderate damage. The lower limit is the beginning of hurricane speed. Roof surfaces peeled off; mobile homes pushed off foundations or overturned; moving autos pushed off roads.
F2	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
F3	158-206 mph	Severe damage. Roofs and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown.
F4	207-260 mph	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	261-318 mph	Incredible damage. Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 100-yards; trees debarked.

All of the recorded tornadoes in Yuma County occurred prior to 2006 and are recorded based on the Fujita Scale (Table 16) rather than the Enhanced Fujita Scale. Of the 11 recorded tornadoes, 4 were category F0, 3 were category F1, and 1 was categorized as F2. The only F2 tornado recorded in the history of Yuma County, occurred on August 17, 1959 and caused $250,000 in property damage.

[43] FEMA, 1997

Figure 55 through Figure 59 depict where historical severe wind events and tornado events have occurred as of 2016. The maps show severe wind speed at the time of the event as well as and the Fujita scale when a historical tornado event has occurred. It's clear from looking at this map, that the City of Yuma experiences the highest number of recorded high wind events, along with several areas along Interstate 8. Each community's risk from tornadoes is hard to determine, because historically tornadoes have occurred in random parts of the county.

Vulnerability – CPRI Results

Severe Wind CPRI results for each community are summarized in Table 17 below.

Table 17. Summary of CPRI results by jurisdiction for severe wind

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Cocopah Tribe	Highly Likely	Limited	12 to 24 hours	<24 hours	2.9
San Luis	Likely	Limited	12 to 24 hours	<1 week	2.6
Somerton	Likely	Limited	<6 hours	<6 hours	2.7
Unincorporated Yuma County	Likely to Highly Likely	Critical	6 to 24 hours	<24 hours	3.2
Wellton	Likely	Limited	<6 hours	<6 hours	2.7
Yuma	Likely to Highly Likely	Limited to Critical	<6 hours	<6 hours	3.0
				County-wide average CPRI =	**2.9**
				CPRI Min/Max Score = 1.00/4.00	

Vulnerability – Loss Estimations

Exposure to severe wind events and dust storms is generally the same across the County. Based on the historic record over the last 68 years, it is feasible to expect average annual losses of almost $300,000 (county-wide). It is difficult to estimate losses for individual jurisdictions within the County due to the lack of discrete data.

Vulnerability – Development Trend Analysis

With the exception of the Cocopah Tribe, all jurisdictions have experienced significant population growth over the past decade, and are projected to continue to grow. Countywide, the population is projected to increase by 57% from 2010 to 2040. Future development will expand the exposure of life and property to the damaging effects of severe wind events. Enforcement and/or implementation of modern building codes to regulate new developments can help to mitigate against losses.

Sources

Arizona Division of Emergency Management, 2013, State of Arizona Multi-Hazard Mitigation Plan

NCEI, 2018, Storm Events Database, accessed via the following URL:
https://www.ncdc.noaa.gov/stormevents/

Profile Maps

Figure 55 – Historical Severe Wind & Tornado Countywide

Figure 56 - Historical Severe Wind & Tornado Yuma

Figure 57 - Historical Severe Wind & Tornado San Luis

Figure 58 - Historical Severe Wind & Tornado Somerton

Figure 59 - Historical Severe Wind & Tornado Wellton

Figure 55. Yuma County Severe Wind Map, 2016

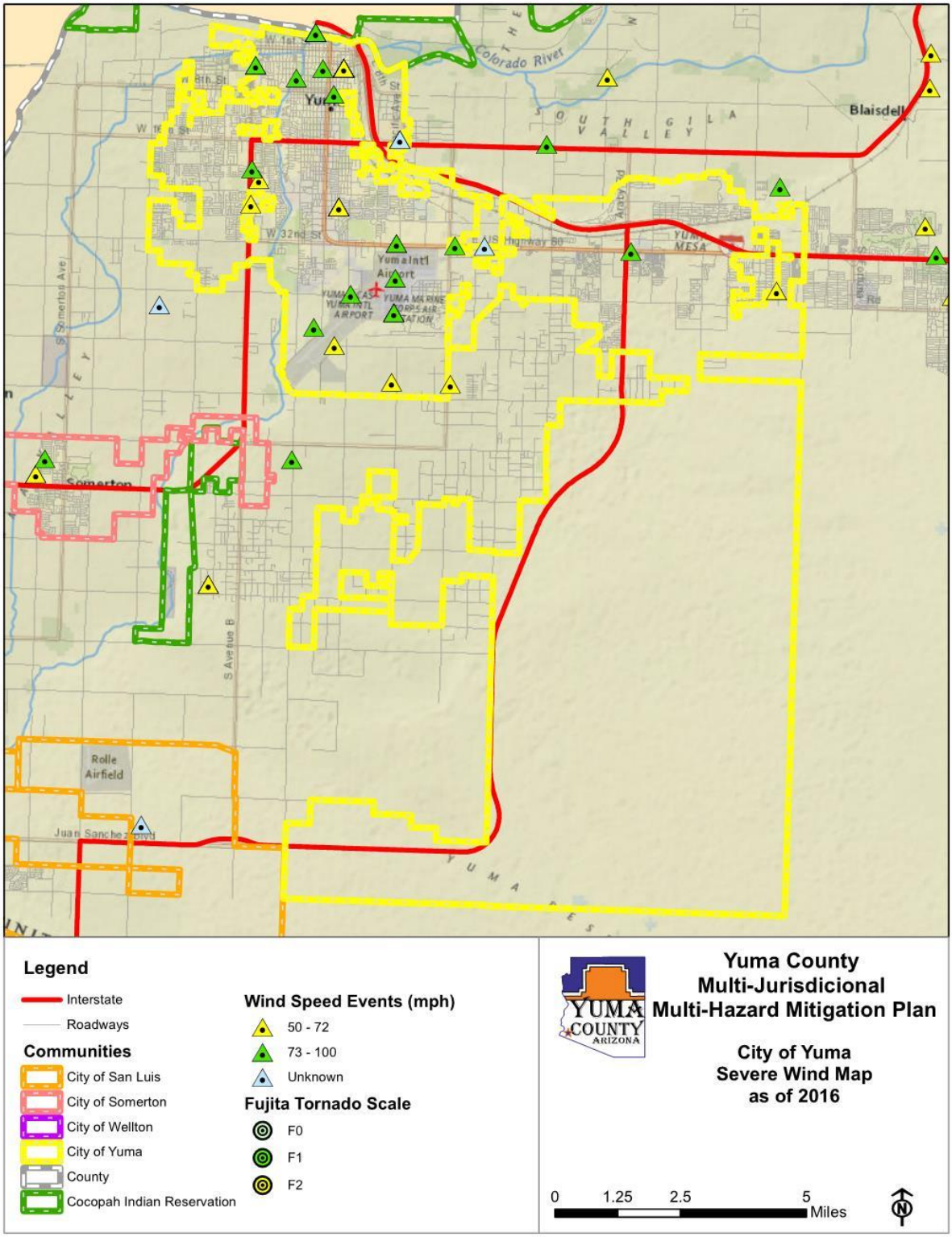


Figure 56. City of Yuma Severe Wind Map, 2016

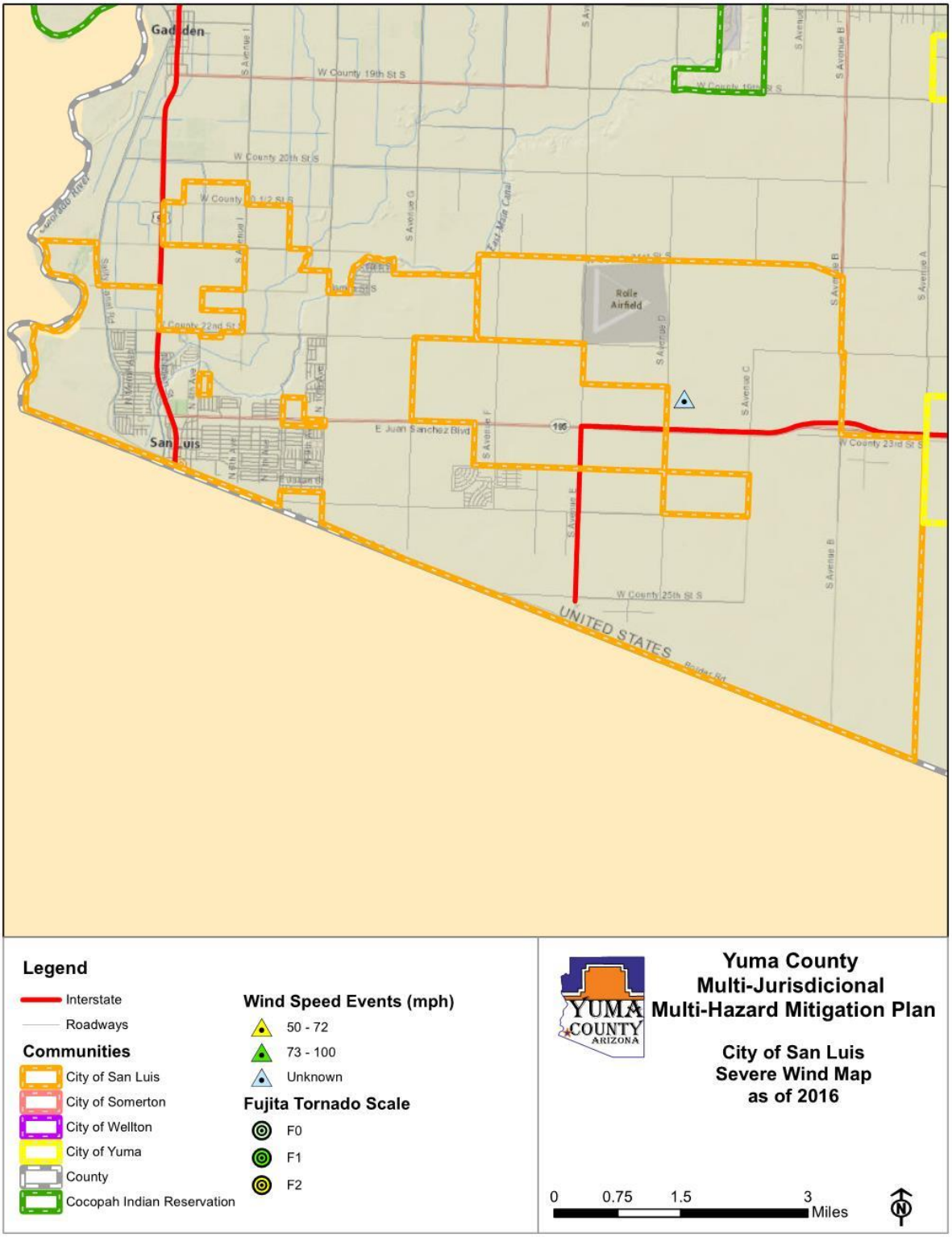


Figure 57. City of San Luis Severe Wind Map, 2016

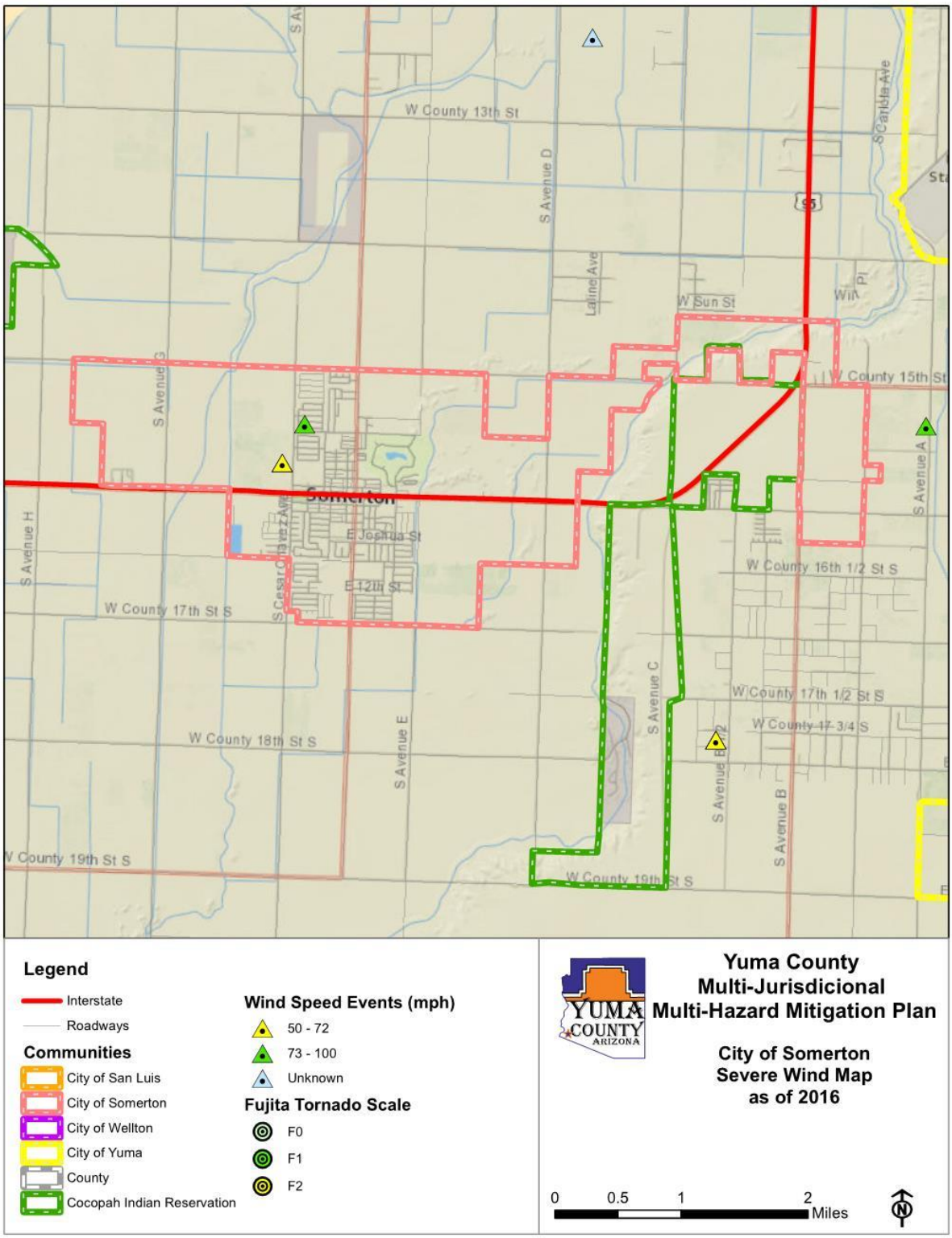


Figure 58. City of Somerton Severe Wind Map, 2016

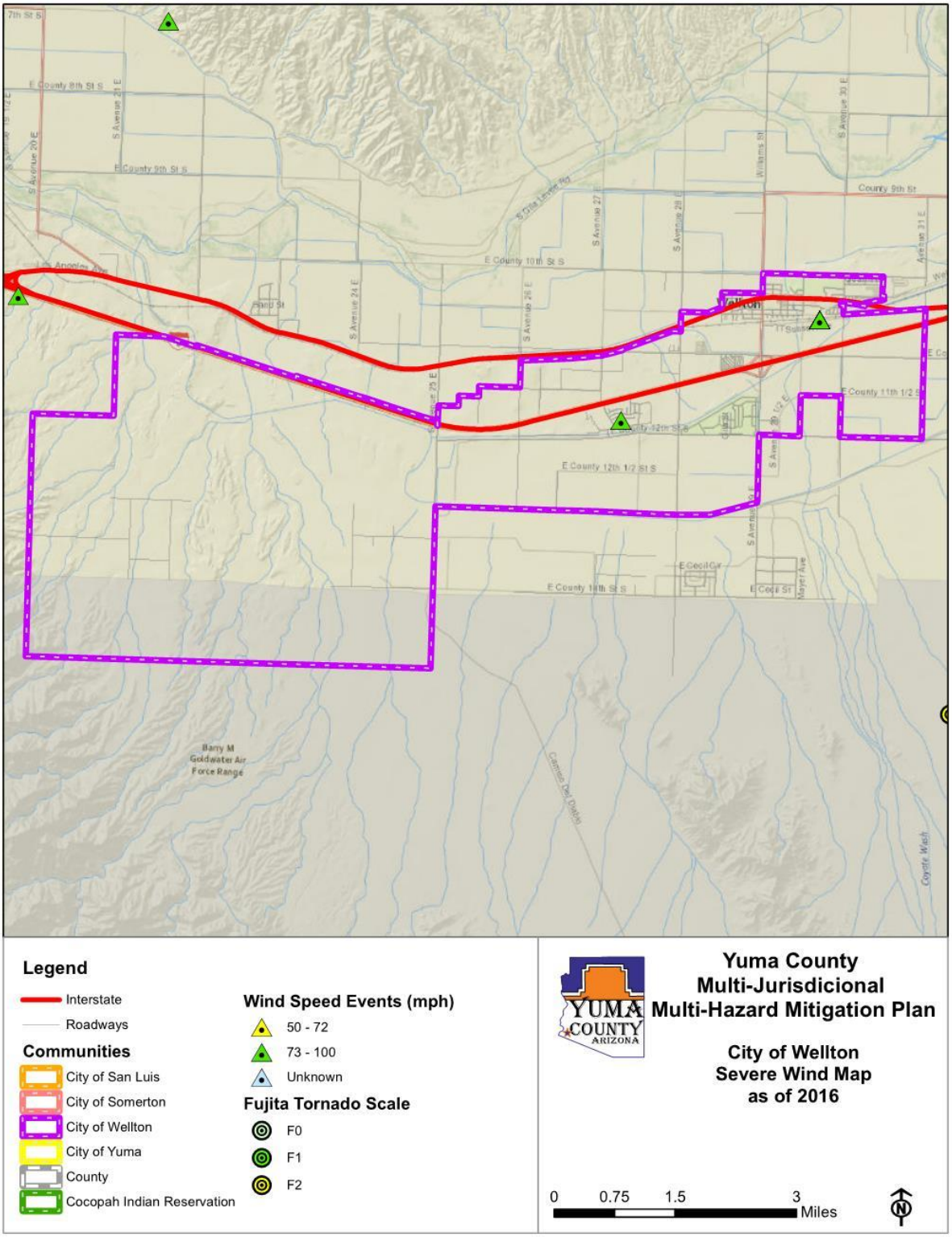


Figure 59. City of Wellton Severe Wind Map, 2016

5.3.6 Wildfire

Description

A wildfire is an uncontrolled fire spreading through wildland vegetative fuels and/or urban interface areas where fuels may include structures. They often begin unnoticed, spread quickly, and are often generating smoke that may fill the area for miles around. Wildfires can be human-caused through acts such as arson or campfires, or can be caused by natural events such as lightning. If not promptly controlled, wildfires may develop into an emergency. Even small fires can threaten lives, resources, and destroy improved properties.

The indirect effects of wildfires can also be catastrophic. In addition to stripping the land of vegetation and destroying forest resources and personal property, large, intense fires can harm the soil and waterways. Soil exposed to intense heat may temporarily lose its capability to absorb moisture and support life. Exposed soils in denuded watersheds erode quickly and are easily transported to rivers and streams thereby enhancing flood potential, harming aquatic life and degrading water quality. Lands stripped of vegetation are also subject to increased landslide hazards.

Wildfire hazards within Yuma County are typically limited to the Colorado and Gila River floodplains and the more densely vegetated areas adjacent to some of the larger ephemeral watercourses. Fires burning through the heavily vegetated floodplain areas can be very difficult to fight, especially in areas where water is not readily available. Increases in development pressure along popular Colorado River locations like Martinez Lake, are expanding the wildland-urban fire interface areas in those locations.

History

The Sonoran Desert vegetation typically found in Yuma County is less dense than other areas of the state. That fact, combined with relative density of urban area, makes wildfire risk within the County relatively low when compared to the more densely forested areas of the state. According to the County's 2010 Community Wildfire Protection Plan (CWPP), 11 wildfire events have occurred causing $2,315,000 in losses. The majority of these wildfires were less than 10 acres. Below is a list and description of historic wildfire events that have occurred in Yuma County:

- In July 2009, a fire in the Martinez Lake area threatened multiple structures on Swede Hill. Because of the high number of people present during the July 4th festivities, no structures were lost. (Draft CWPP, 2010)
- In September 2009, lightning struck a home near highway 95 and 5E, resulting in a structure fire.
- In May 2007, a 426 acre fire burned along the Gila River. It was started by natural causes (BLM, 641403).
- In October 2005, a human-caused fire called the King Valley Fire burned 26,000 acres (FWS, 52471).
- In July 2001, a 61 acre fire occurred in vicinity of canal at the end of 12th Street to 4th Ave Bridge on the east and 22nd Ave on the west. It also spread to Yuma West Wetlands along Colorado River (URS, 2003).
- In April 1992, The Whiterock fire burned 2,400 acres and was human-caused (FWS, 27270).

Interesting to note, $5.8 million have been expended through the Recovery Section of Arizona Division of Emergency Management for response activities of (19) declared wildfire events that included Yuma County as identified in Table 3, however, no damage costs were associated with these events.

Probability and Magnitude

The probability and magnitude of wildfire incidents for Yuma County are influenced by numerous factors including vegetation densities, previous burn history, hydrologic conditions, climatic conditions

such as temperature, humidity, and wind, ignition source (human or natural), topographic aspect and slope, and remoteness of area.

Wildfire hazard areas have been identified by the State of Arizona as a part of the 2003/04 Arizona Wildland Urban Interface Assessment (AWUIA) project (Fisher, 2004). The increasing growth of Arizona's rural populations, urban sprawl, and increasing wildland fuel loads ads to create a mix of situations that is known as the wildland urban interface (WUI). The purpose of the AWUIA was to attempt to conduct an analysis on a statewide basis using a common spatial model, for validation of those communities listed in the federal register as WUI and further identify possible other communities at risk. For Yuma County the results determined that all of the County was in a low hazard area. The Team did not think this accurately portrayed the wildfire conditions in Yuma County.

The wildfire hazards map, included in this profile, depict where historical wildfires have occurred from 1992-2015. The map also shows the magnitude of these historical events. It's clear from looking at this map, that areas on the western side of the county, north of the City of Yuma, have experienced a relatively large number of wildfire events compared to the rest of the county.

The County's CWPP was developed in cooperation with jurisdictions and Tribes throughout the County in order to establish the community's magnitude of risk and a baseline for effective mitigation against wildfire damages in the WUI. Through extensive GIS analysis and research, the CWPP concluded that the City of Yuma and the City of San Luis are at moderate risk for wildfire hazards, and the remaining communities are low. The CWPP rated several areas within the county that are thought have be subject to wildfire hazard. Martinez Lake and Fisher's Landing were rated high, while Hidden Shores Village and the Riverfront RV Park were rated moderate.

Vulnerability – CPRI Results

Wildfire CPRI results for each community are summarized in Table 5-42 below.

Table 18. Summary of CPRI results by jurisdiction for wildfire

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Cocopah Tribe	Likely	Limited	12 to 24 hours	<1 week	2.6
San Luis	Possibly	Negligible	<6 hours	<1 week	2.1
Somerton	Likely	Negligible	<6 hours	<24 hours	2.5
Unincorporated Yuma County	Possibly to Likely	Limited	<6 hours to 12 hours	<24 hours to 1 week	2.6
Wellton	Possibly	Limited	<6 hours	<1 week	2.4
Yuma	Possibly to Likely	Negligible to Limited	<6 hours	<24 hours	2.4
				County-wide average CPRI =	**2.4**
				CPRI Min/Max Score = 1.00/4.00	

Vulnerability – Loss Estimations

Estimating each community's exposure was conducted using the Arizona Wildfire Risk Assessment Portal (AZWRAP). The AZWRAP database has been used as the primary mechanism for the Arizona State Forestry to deploy wildfire risk information and create awareness of wildfire hazards across the state. AZWRAP is comprised of a suite of applications that provide the user access to wildland fire risk assessment data, which was finalized in 2013. By utilizing the wildfire risk index portion of this data, wildfire risk can be seen at the local level for communities within Yuma. Figure 61 through Figure 64 show areas within each of the communities that have been determined to be of low to high risk for wildfire. It can be seen that all participating jurisdictions have areas that are determined to be of very high or even extreme risk from wildfires. The largest portion of extreme risk is seen in the northwestern portion of the City of San Luis.

Additionally, 11 critical facilities were identified to be at risk for wildfire. Seven of these are located in the City of Yuma, one in the City of San Luis, one in the City of Somerton, and two in Yuma

County. The City of Yuma General Services building is located in an extreme wildfire risk area. These results are portrayed in Table 19 below.

Table 19. Critical Facilities at Risk to Wildfire

Facility	Jurisdiction	Wildfire Risk
General Services	Yuma	Extreme
South County Complex	San Luis	Very High
Aztec High School	Yuma	Very High
PrimeCare Urgent Care Facility	Yuma	Very High
DaVita Edge River Dialysis	Yuma	Very High
Adult Probation	Yuma	Very High
North End Community Center	Yuma	Very High
Gadsden Elementary School	Yuma County	High
Cocopah Social Services	Somerton	High
Public Works - Roll Yard	Yuma County	High
Figueroa Treatment Plant	Yuma	High

Vulnerability – Development Trend Analysis

With the exception of the Cocopah Tribe, all jurisdictions have experienced significant population growth over the past decade, and are projected to continue to grow. By its very definition, the WUI represents the fringe of urban development at it intersects with the natural environment. Future development is expected to convert traditionally rural or agricultural areas to urban developments, which may increase the amount of people living in the WUI and increase Yuma County's risk to wildfire. According to the CWPP, the City of Yuma and the City of San Luis are both overall at moderate risk to wildfire, and the City of San Luis has the largest portion of extreme risk compared to other communities. The City of Yuma is projected to experience a 46% increase in population from 2010 to 2040, and the City of San Luis is projected to experience a 160% increase in population from 2010 to 2040.

Sources

Arizona Division of Emergency Management, 2013, State of Arizona Multi-Hazard Mitigation Plan

Yuma County Community Wildfire Protection Plan, 2010, http://www.yumacountyaz.gov/home/showdocument?id=7728

Arizona Department of Forestry and Fire Management, 2013, Arizona Wildfire Risk Assessment Portal, https://arizonawildfirerisk.com/

Profile Maps

Figure 60 – Wildfire Countywide Historical Fires

Figure 61 – Wildfire Risk City of Yuma

Figure 62 – Wildfire Risk City of San Luis

Figure 63 – Wildfire Risk City of Somerton

Figure 64 – Wildfire Risk City of Wellton

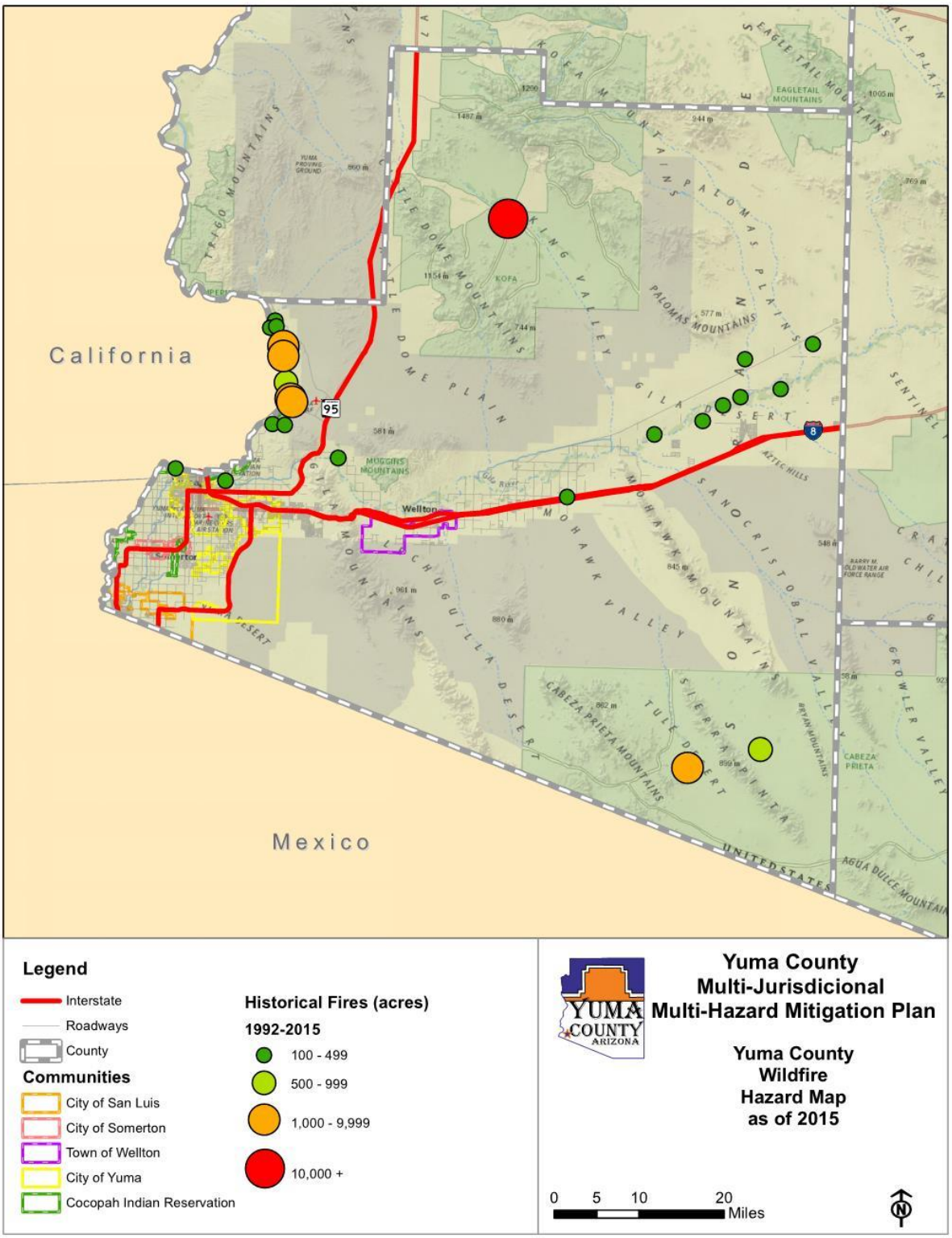


Figure 60. Yuma County Historic Wildfire Map, 2015

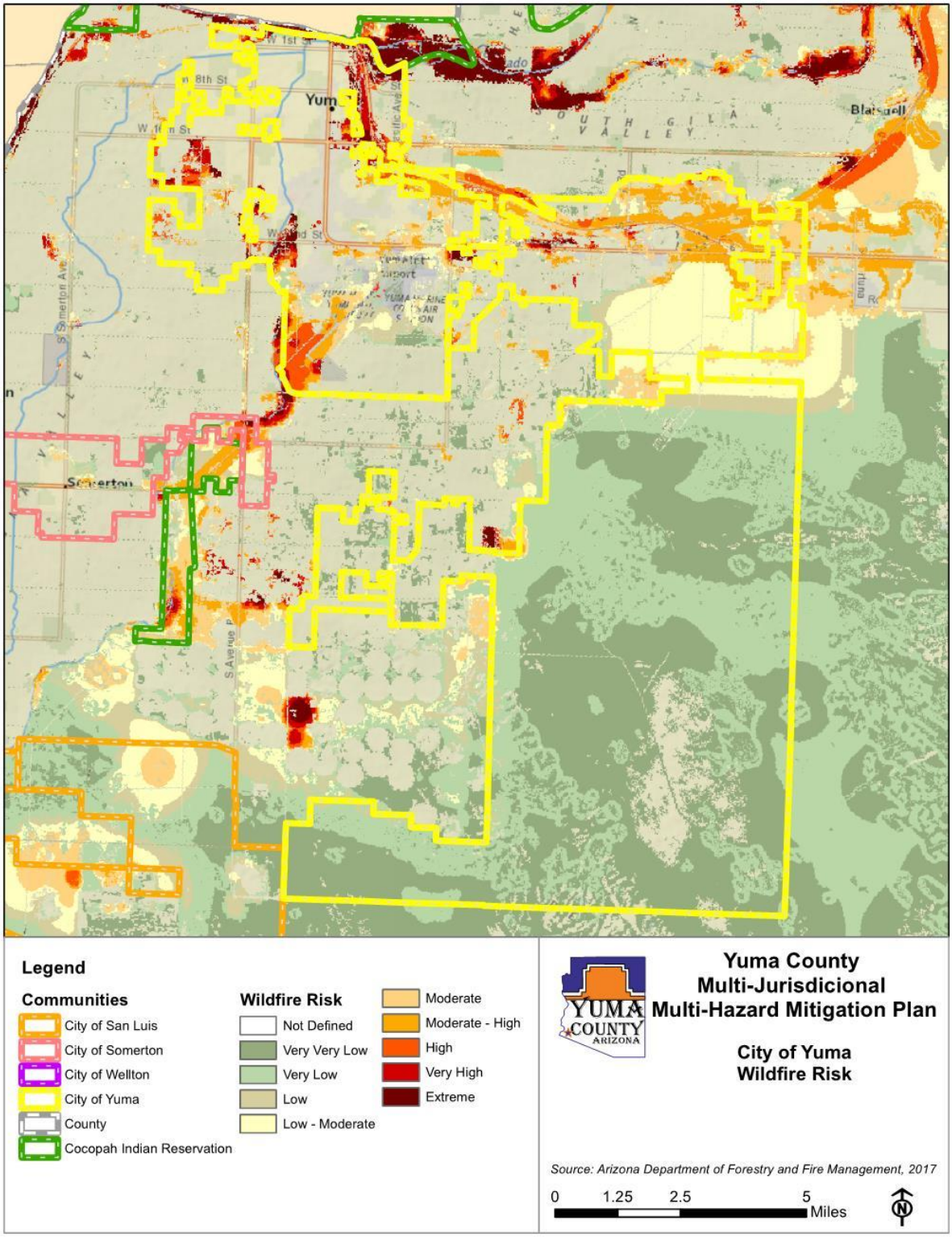


Figure 61. City of Yuma Wildfire Risk

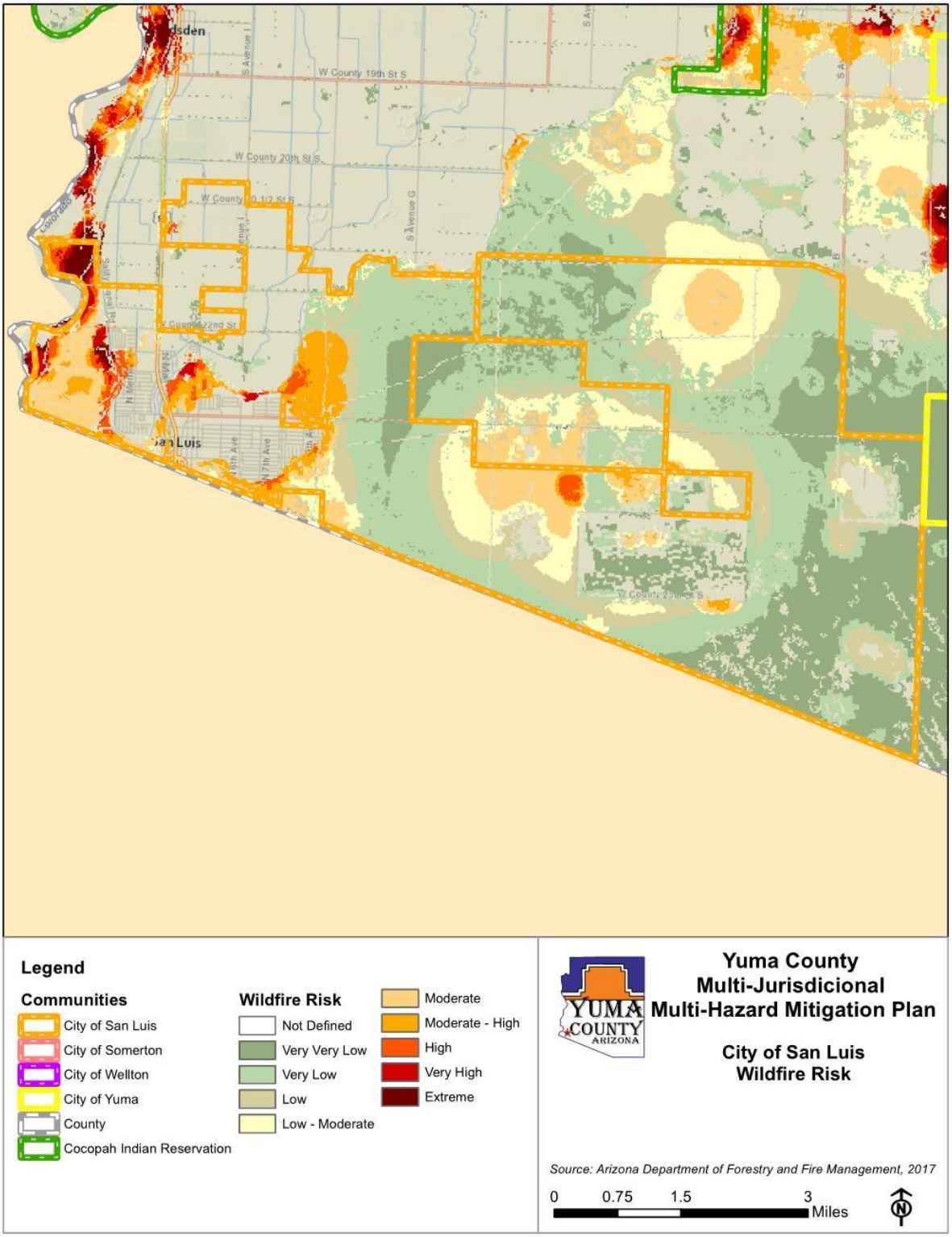


Figure 62. City of San Luis Wildfire Risk

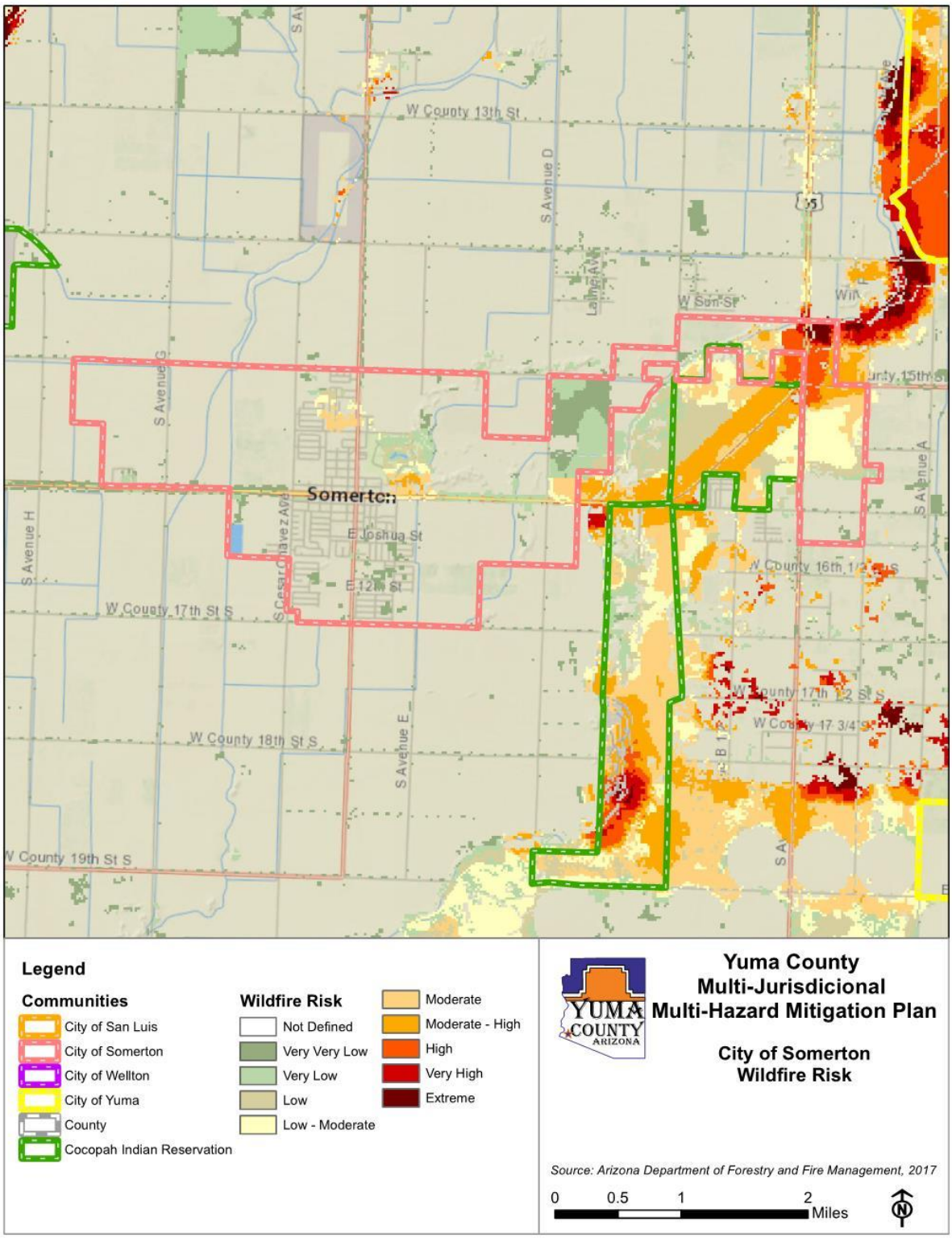


Figure 63. City of Somerton Wildfire Risk

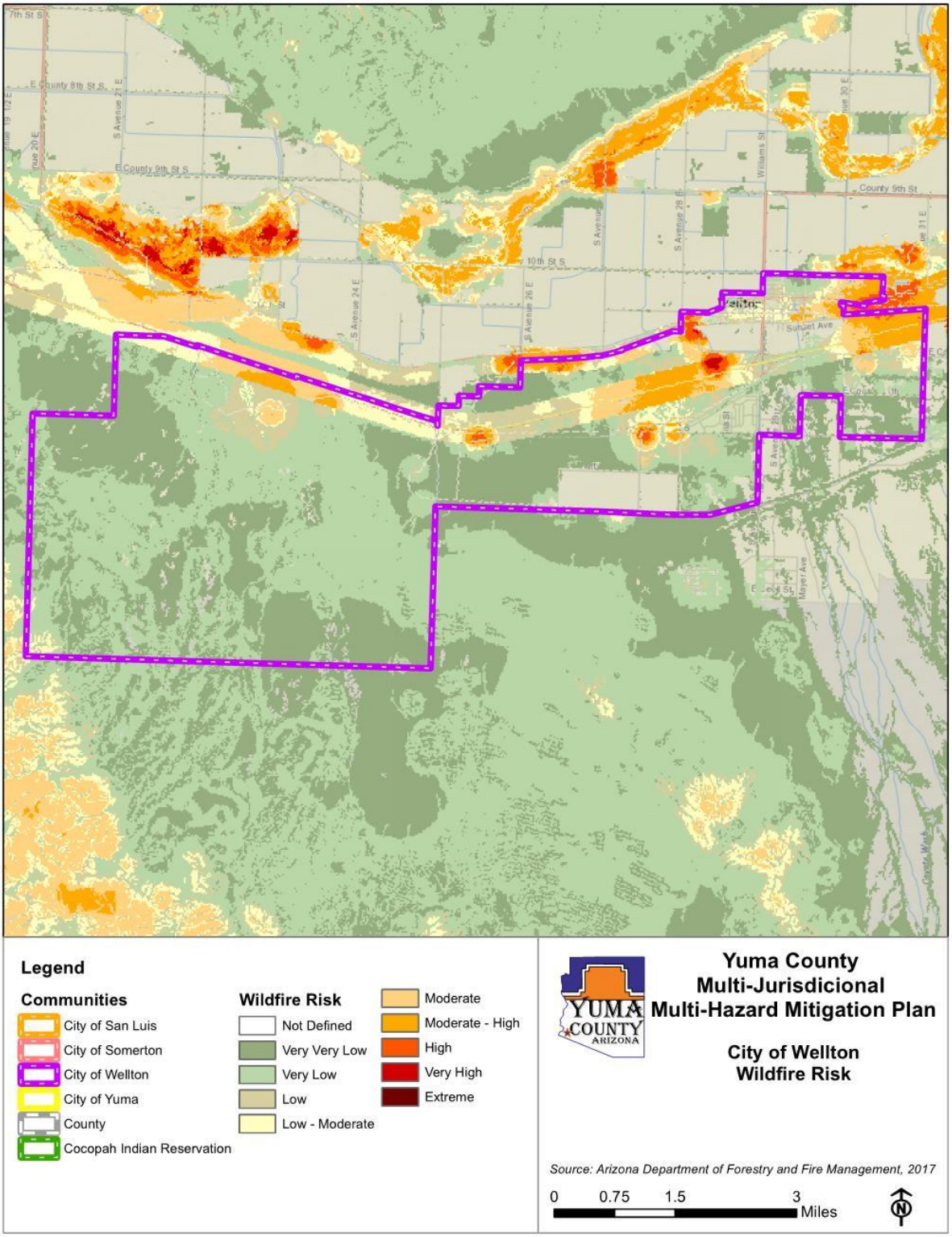


Figure 64. City of Wellton Wildfire Risk

5.4 Risk Assessment Summary

The jurisdictional variability of risk associated with each hazard assessed in Section 5.3 is demonstrated by the various CPRI and loss estimation results. Accordingly, each jurisdiction has varying levels of need regarding the hazards to be mitigated, and may not consider all of the hazards as posing a great risk to their individual communities. Table 20 summarizes each community's overall risk ranking per hazard.

Table 20. Summary of hazards to be mitigated by each participating jurisdiction

Jurisdiction	Drought	Earthquake	Extreme Heat (Power Outage)	Flooding	Severe Wind / Dust Storms	Wildfire
Cocopah	M	H	H	H	H	H
San Luis	M	H	H	M	H	L
Somerton	M	H	H	M	H	L
Unincorporated Yuma County	M	M	H	M	H	L
Wellton	M	M	M	L	H	L
Yuma	L	H	H	M	M	L

SECTION 6: MITIGATION STRATEGY

The mitigation strategy provides a collection of mitigation actions and projects that will reduce or possibly remove the community's exposure to hazard risks. According to DMA 2000, the primary components of the mitigation strategy are generally categorized into the following:

Goals and Objectives
Capability Assessment
Mitigation Actions/Projects and Implementation Strategy

The entire 2010 Plan mitigation strategy was reviewed and updated by the Planning Team. Specifics of the changes and updates are discussed in the subsections below.

6.1 Hazard Mitigation Goals and Objectives

An assessment of the 2010 goals and objectives was made by the Planning Team with consideration of the following[44]:

- Do the goals and objectives identified in the 2010 Plan reflect the updated risk assessment?
- Did the goals and objectives identified in the 2010 Plan lead to mitigation projects and/or changes and policy that helped the jurisdiction(s) to reduce vulnerability?
- Do the goals and objectives identified in the 2010 Plan support any changes in mitigation priorities?
- Are the goals and objectives identified in the 2010 Plan reflective of current State goals?

As a conclusion to the discussions, the Planning Team chose to continue utilizing the 2010 Mitigation Strategy to help focus the identification and development of new Mitigation Actions / Projects for this 2018 Plan.

Elements of this Mitigation Strategy are:

- **GOAL:** Reduce or eliminate the risk to people and property from natural and human caused hazards.
  - **Objective 1:** Reduce or minimize risks that threaten life and property in the incorporated, unincorporated, and Tribal jurisdictions within Yuma County.
  - **Objective 2:** Reduce risk to critical facilities and infrastructure from natural hazards.
  - **Objective 3:** Promote hazard mitigation throughout the incorporated, unincorporated, and Tribal jurisdictions within Yuma County.
  - **Objective 4:** Increase public awareness of hazards and risks that threaten the incorporated, unincorporated, and Tribal jurisdictions within Yuma County.

6.2 Capability Assessment

An important component of the Mitigation Strategy is a review of each participating jurisdiction's resources in order to identify, evaluate, and enhance the capacity of local resources to mitigate the effects of hazards. The capability assessment is comprised of several components:

[44] FEMA, 2013, *Local Mitigation Planning Handbook*

- ✓ Legal and Regulatory Review – a review of the legal and regulatory capabilities, including ordinances, codes, plans, manuals, guidelines, and technical reports that address hazard mitigation activities.
- ✓ Technical Staff and Personnel – this assessment evaluated and describes the administrative and technical capacity of the jurisdiction's staff and personnel resources.
- ✓ Fiscal Capability – this element summarizes each jurisdiction's fiscal capability to provide the financial resources to implement the mitigation strategy.
- ✓ National Flood Insurance Program (NFIP) Participation – the NFIP contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary for local governments, but the program is promoted by FEMA as a basic first step for implementing and sustaining an effective flood hazard mitigation program, and is a key indicator for measuring local capability as part of this assessment.
- ✓ Prior Mitigation Actions – the final part of the capability assessment is a summary review of prior mitigation actions and/or projects that have been completed over the last five or so years.

The Planning Team reviewed the information provided in the 2010 Plan and decided to simply review and update the content, with only minor edits to the table structures. This assessment will serve as an updated baseline for each communities' mitigation capabilities and helps to identify opportunities for future improvements, should resources become available.

6.2.1 Jurisdictional Capabilities

The following Tables summarize the legal and regulatory mitigation capability for each participating jurisdiction. Three separate tables have been developed for each jurisdiction. The first Table includes a brief listing of current codes, mitigation relevant ordinances, plans, and studies/reports. The second respective Table for each jurisdiction summarize the staff and personnel resources employed by each jurisdiction that serve as a resource for hazard mitigation. Each jurisdiction's third and final Table summarizes the fiscal capability and budgetary tools available to each participating jurisdiction. Each of these three tables are listed below by jurisdiction.

Table 21. Summary of legal and regulatory capabilities for San Luis

Regulatory Tools for Hazard Mitigation	Description	Responsible Department/Agency
CODES	• Uniform Fire Code - NFPA 1: 2003 • National Electrical Code: 2008 • International Property Maintenance Code: 2003 • International Plumbing Code: 2006 • International Mechanical Code: 2006 • International Existing Building Code: 2003 • International Building Code: 2003 • International Residential Code for One and Two-Family Dwellings: 2003	City of San Luis, Planning and Zoning Department Fire Department
ORDINANCES	• Zoning Ordinance • Subdivision Ordinance • Site Plan Review Requirements	City of San Luis, Planning and Zoning Department Public Works Department
PLANS, MANUALS, and/or GUIDELINES	1. City of San Luis General Plan 2. Water System Master Plan 3. Waste Water Master Plan 4. Wellhead Protection Plan 5. YMPO 2003-2026 Regional Transportation Plan	1. City of San Luis P&Z, revisit in 2020 2. City of San Luis Public Works 3. City of San Luis Public Works 4. City of San Luis Public Works 5. YMPO
STUDIES	[Please refer to Yuma County Capability Assessment Table 6-1-5 for available studies that affect this community.]	

Table 22. Summary of technical staff and personnel capabilities for San Luis

Staff/Personnel Resources	☑	Department/Agency - Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	☑	• Planning & Zoning Department personnel • Public Works Department personnel
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	☑	• Planning & Zoning Department personnel • Public Works Department personnel
Planner(s) or engineer(s) with and understanding of natural and/or human-caused hazards	☑	• Planning & Zoning Department personnel • Public Works Department personnel • Fire Department personnel • Police Department personnel
Floodplain Manager	☑	• Yuma County Flood Control District – YCFCD Manager
Surveyors		• James Davey and Associates, Inc. – City Engineer
Staff with education or expertise to assess the community's vulnerability to hazards	☑	• Planning & Zoning Department personnel • Public Works Department personnel • Fire Department personnel • Police Department personnel
Personnel skilled in GIS and/or HAZUS	☑	• James Davey and Associates, Inc. – City Engineer • Planning and Zoning Department – GIS Specialist
Scientists familiar with the hazards of the community		
Emergency manager	☑	
Grant writer(s)	☑	• Economic Development and Grants Coordinator
Others		

Table 23. Summary of fiscal capabilities for San Luis

Financial Resources	Accessible or Eligible to Use (Yes, No, Don't Know)	Comments
Community Development Block Grants	Yes	
Capital Improvements Project funding	Yes	
Authority to levy taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric service	Yes	
Impact fees for homebuyers or new developments/homes	Yes	
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	Yes	
Incur debt through private activity bonds	Yes	

Table 24. Summary of legal and regulatory capabilities for Somerton

Regulatory Tools for Hazard Mitigation	Description	Responsible Department/Agency
CODES	• 2003 International Building Code (IBC Commercial) • 2003 International Residential Code (IRC Residential) • 2003 International Property Maintenance Code (IPMC, Code Enforcement) • 1: Fire Code, 2012 Edition, NFPA 101: Life Safety Code, 2012 Edition • National Electric Code (NEC) • 1994 Uniform Plumbing Code (UPC)	• Fire Department • Community Development Department
ORDINANCES	• Zoning Ordinance Adopted 2015 • Subdivision Ordinance Adopted 2015	• Community Development Department
PLANS, MANUALS, and/or GUIDELINES	• Emergency Response Plan 2006 • City of Somerton General Plan 2010 • Sewer Line Collection System Cleaning and Inspection 2009/2010	• Fire Department • Community Development Department • Public Works Department
STUDIES	[Please refer to Yuma County Capability Assessment Table 6-1-5 for available studies that affect this community.]	Yuma County

Table 25. Summary of technical staff and personnel capabilities for Somerton

Staff/Personnel Resources	☑	Department/Agency - Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	☑	• Community Development Department – Carmen Juarez, Director • Public Works Department – Sam Palacios, Public Works Director
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	☑	• Public Works Department – Sam Palacios, Public Works Director • Engineering Consultant Firm, City Engineer
Planner(s) or engineer(s) with and understanding of natural and/or human-caused hazards	☑	• Public Works Department – Public Works Director • Engineering Consultant Firm
Floodplain Manager	☑	• Sam Palacios, Public Works Director • Engineering Consultant Firm
Surveyors		• Engineering Consultant Firm
Staff with education or expertise to assess the community's vulnerability to hazards	☑	• Public Works Department • Fire Department • Police Department
Personnel skilled in GIS and/or HAZUS	☑	• Community Development Department/Public Works Department
Scientists familiar with the hazards of the community		
Emergency manager	☑	• Paul De Anda, Fire Chief
Grant writer(s)	☑	• Community Development Department – Carmen Juarez, Director • Planning and Zoning Department – Vacant no funding at this time, City Planner
Others		

Table 26. Summary of fiscal capabilities for Somerton

Financial Resources	Accessible or Eligible to Use (Yes, No, Don't Know)	Comments
Community Development Block Grants	Yes	
Capital Improvements Project funding	Yes (When grants are available)	
Authority to levy taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric service	Yes	
Impact fees for homebuyers or new developments/homes	Yes	
Incur debt through general obligation bonds	No	
Incur debt through special tax bonds	No	
Incur debt through private activity bonds	No	

Table 27. Summary of legal and regulatory capabilities for City of Yuma

Regulatory Tools for Hazard Mitigation	Description	Responsible Department/Agency
CODES	1. Adopted IBC 2012 in April 2013 2. Adopted NFPA 1 Fire Code, NFPA 1, in October, 2003	1. Community Development/Building Safety 2. Yuma Fire Department /Community Risk Reduction
ORDINANCES	1. Floodplain, Stormwater, 2. Industrial Waste, 3. Water Emergencies, 4. Zoning Ordinance, 5. Subdivision and Site Plan Review Requirements, 6. Disaster Declaration Ordinance	1. Engineering Department 2. Public Works/Streets 3. Utilities 4. Community Development 5. Community Development 6. City Administration
PLANS, MANUALS, and/or GUIDELINES	• City of Yuma 2012 General Plan • YMPO 2014-2037 Regional Transportation Plan • Construction Standard Detail Drawings • Floodplain Management • Stormwater Management Program	1. Community Development 2. Yuma Metropolitan Planning Organization 3. Engineering Department 4. Engineering Department 5. Engineering Department
STUDIES	[Please refer to Yuma County Capability Assessment Table 6-1-5 for available studies that affect this community.]	

Table 28. Summary of technical staff and personnel capabilities for City of Yuma

Staff/Personnel Resources	☑	Department/Agency - Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	☑	Community Development Department – Laurie Lineberry Engineering Department – Andrew McGarvie
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	☑	Community Development Department – Laurie Lineberry Building Official – Randy Crist
Planner(s) or engineer(s) with and understanding of natural and/or human-caused hazards	☑	Community Development Department – Jennifer Albers Engineering Department – Andrew McGarvie
Floodplain Manager	☑	Engineering Department – Andrew McGarvie
Surveyors		Engineering Department – Andrew McGarvie
Staff with education or expertise to assess the community's vulnerability to hazards	☑	City and County Emergency Management Engineering Department Community Development Department
Personnel skilled in GIS and/or HAZUS	☑	Community Development Department Information Technology Services Department
Scientists familiar with the hazards of the community		Lab WPCF Figueroa
Emergency manager	☑	City and County Emergency Management personnel
Grant writer(s)	☑	Administration Parks and Recreation Department Public Works Department Fire Department
Others		

Table 29. Summary of fiscal capabilities for City of Yuma

Financial Resources	Accessible or Eligible to Use (Yes, No, Don't Know)	Comments
Community Development Block Grants	Yes	
Capital Improvements Project funding	Yes	
Authority to levy taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric service	Yes	Water and Sewer only
Impact fees for homebuyers or new developments/homes	Yes	Fees for new development only
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	Yes	
Other		

Table 30. Summary of legal and regulatory capabilities for Wellton

Regulatory Tools for Hazard Mitigation	Description	Responsible Department/Agency
CODES	• 2009 International Building Code and Related Codes adopted 4/1/14, Ordinance #114 (supersedes previous codes.)	• Town Manager
ORDINANCES	• Town of Wellton Zoning Ordinance adopted 11/20/84, Ordinance #39 (with subsequent amendments). • Uses Yuma County Standards for Subdivisions	• Town Manager
PLANS, MANUALS, and/or GUIDELINES	1. Town of Wellton General Plan 2013-2023 2. Emergency Operations Plans 3. Storm Response Plan 4. Water Emergency Operations Plan 2016 5. Adopted the Arizona Emergency Response Plan on March 19, 1985 and the Water Department Emergency Standard Operating Procedures in July 2014.	1. Town Manager 2. Town Manager/Police Chief 3. Town Manager 4. Town Manager 5. Town Manager
STUDIES	[Please refer to Yuma County Capability Assessment Table 6-1-5 for available studies that affect this community.]	

Table 31. Summary of technical staff and personnel capabilities for Wellton

Staff/Personnel Resources	☑	Department/Agency - Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	☑	• Contract with Consultants as needed.
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	☑	• Town Engineer is appointed by the Town Council on 7/22/70, Ordinance #2 and ARS 9-238.
Planner(s) or engineer(s) with and understanding of natural and/or human-caused hazards	☑	• As directed/appointed by Town of Wellton • Police Chief - received training as a Terrorism Laison Office which includes training on vulnerability assessments for natural and human-caused hazards.
Floodplain Manager	☑	• The Town of Wellton is under the jurisdiction of the Yuma County Flood Plain District.
Surveyors		• Town Manager
Staff with education or expertise to assess the community's vulnerability to hazards	☑	• Town Manager • Police Chief
Personnel skilled in GIS and/or HAZUS	☑	• Mutual Aid
Scientists familiar with the hazards of the community		• As needed by contract.
Emergency manager	☑	• Town of Wellton Chief of Police
Grant writer(s)	☑	• As directed by Town Manager/Council
Others		

Table 32. Summary of fiscal capabilities for Wellton

Financial Resources	Accessible or Eligible to Use (Yes, No, Don't Know)	Comments
Community Development Block Grants	Yes	We are eligible for CDBG funds every other year as outlined in our Method of Distribution developed by WACOG and approved by the Arizona Department of Housing.
Capital Improvements Project funding	Yes	Subject to voter approval.
Authority to levy taxes for specific purposes	Yes	Subject to voter approval.
Fees for water, sewer, gas, or electric service	Yes	
Impact fees for homebuyers or new developments/homes	Yes	
Incur debt through general obligation bonds	Yes	Subject to voter approval
Incur debt through special tax bonds	Yes	
Incur debt through private activity bonds	No	

Table 33. Summary of legal and regulatory capabilities for Unincorporated Yuma County

Regulatory Tools for Hazard Mitigation	Description	Responsible Department/Agency
CODES	• 2012 International Building Code adopted 6/17/2013 • 2012 International Existing Building Code adopted 6/17/2013 • 2003 International Fire Code adopted 5/16/05 • 2012 International Residential Code adopted 6/17/2013 • 2009 International Energy Conservation Code adopted 6/17/2013 • 2012 International Mechanical Code adopted 10/5/2015 • 2012 International Fuel Gas Code adopted 10/5/2015 • 2012 International Plumbing Code adopted 10/5/2015 • 2006 International Code Council Electric Code Administrative Provisions adopted 7-20-09 • 2014 National Electric Code adopted 10/5/2015	• Yuma County Department of Development Services, Building Safety Division
ORDINANCES	• *Yuma County Zoning Ordinance* adopted August 20, 2006 amendments through April 20, 2017 • *Yuma County Subdivision Zoning Ordinance* approved September 15, 2008 with amendments through January 20, 2015	• Yuma County Planning and Zoning
	• *Yuma County Arizona Floodplain Regulations*, Yuma County Flood Control District adopted February 1984, revised March 3, 1997; revised August 2005, August 2006, November 5, 2012 • *Public Works Standards for Yuma County Volume III Guide for Preparation of Drainage Reports and Grading Plan, revised August 2005, August 21,2006*	• Yuma County Flood Control District

Regulatory Tools for Hazard Mitigation	Description	Responsible Department/Agency
PLANS, MANUALS and/or GUIDELINES	• *Yuma County 2020 Comprehensive Plan* adopted March 26, 2012 Amendments through January 17, 2017 • *Master Plan for Yuma County Roads* adopted August 1, 1998 • *Public Works Standards for Yuma County Volume I, Construction Standards* adopted July 18, 1988 • *Public Works Standards Volume II, Specifications* adopted September 7, 1993 • *Public Works Standards Volume III Guide for Preparation of Drainage Reports and Grading Plan* adopted April 1, 1996, updated 2005, August 21, 2006	• Yuma County Planning and Zoning

Table 34. Summary of technical staff and personnel capabilities for Unincorporated Yuma County

Staff/Personnel Resources	☑	Department/Agency - Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	☑	Yuma County Department of Development Services, Engineering Division (County Engineer) and Yuma County Planning and Zoning Division (Planning Director), 2351 W. 26th Street, Yuma AZ 85364, 928-817-5000
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	☑	Yuma County Department of Development Services, Engineering Division (County Engineer) and Building Safety (Chief Building Official) and Yuma County Planning and Zoning Division (Planning Director), 2351 W. 26th Street, Yuma AZ 85364, 928-817-5000
Planner(s) or engineer(s) with and understanding of natural and/or human-caused hazards	☑	Yuma County Department of Development Services, Engineering Division, Building Safety and Flood Control (County Engineer and Chief Building Official) and Yuma County Planning and Zoning Division (Planning Director), 2351 W. 26th Street, Yuma AZ 85364, 928-817-5000
Floodplain Manager	☑	Yuma County Department of Development Services, Engineering Division, Flood Control Manager, 2351 W. 26th Street, Yuma AZ 85364, 928-817-5000
Surveyors		
Staff with education or expertise to assess the community's vulnerability to hazards	☑	Yuma County Department of Development Services, Engineering Division (County Engineer) and Yuma County Planning and Zoning Division (Planning Director), 2351 W. 26th Street, Yuma AZ 85364, 928-817-5000
Personnel skilled in GIS and/or HAZUS	☑	Yuma County Department of Development Services, GIS Division, GIS Supervisor, 2351 W. 26th Street, Yuma AZ 85364, 928-817-5000
Scientists familiar with the hazards of the community		US Department of Agriculture, Yuma County Natural Resources Conservation District, 2450 S. Fourth Avenue, Yuma, AZ 85364 520-726-4707.
Emergency manager	☑	Yuma County Office of Emergency Management 198 So. Main Street, Yuma AZ 85364 928-373-1093
Grant writer(s)	☑	Yuma County Department of Development Services, Grants Section, Community Planning Coordinator and Grants Administrator, 2351 W. 26th Street, Yuma AZ 85364, 928-817-5000
Others		

Table 35. Summary of fiscal capabilities for Unincorporated Yuma County

Financial Resources	Accessible or Eligible to Use (Yes, No, Don't Know)	Comments
Community Development Block Grants	Yes	Only in qualified low income to medium income communities and emergency declaration designated areas.
Capital Improvements Project funding	Yes	
Authority to levy taxes for specific purposes	Yes	For declared emergencies.
Fees for water, sewer, gas, or electric service	No	
Impact fees for homebuyers or new developments/homes	No	
Incur debt through general obligation bonds	Yes	Only through a bond election.
Incur debt through special tax bonds	Yes	
Incur debt through private activity bonds	No	
Withhold spending in hazard-prone areas	Yes	
Other	Yes	Creation of improvement districts and special districts.

Table 36. Summary of legal and regulatory capabilities for Cocopah Indian Tribe

Regulatory Tools for Hazard Mitigation	Description	Responsible Department/Agency
TRIBAL CODES	1. Subject to federal oversight through HUD when using HUD monies 2. Privately owned buildings are largely unregulated. 3. State Historic Preservation Office under Cultural Resource.	• Housing Department • Housing Department • Cultural Resources Manager
TRIBAL ORDINANCES	1. Review and administration through Cocopah Planning Department and Tribal Council 2. Federal EPA enforcement of pesticides 3. BIA Fire Ordinance 4. Site Plan Review – Cocopah Indian Housing & Development Corp	1. Planning 2. Environmental Protection Office 3. Office of Emergency Management/Planning 4. Housing Department
TRIBAL REGULATIONS	NONE	
PLANS, MANUALS and/or GUIDELINES	(SEE TRIBAL ANNEX) • 2012 Long Range Transportation Plan • Cocopah Development Code • Emergency Operations Plan	

Table 37. Summary of technical staff and personnel capabilities for Cocopah Indian Tribe

Staff/Personnel Resources	☑	Department/Agency - Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	☑	• Cocopah Planning Department – Director and Assistant Planner • Cocopah Planning and Business Development – Manager
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	☑	• Outside consultants
Planner(s) or engineer(s) with and understanding of natural and/or human-caused hazards	☑	• Cocopah Environmental Protection Office – Director • Cocopah Office of Emergency Management – Emergency Manager • Cocopah Police Department - Chief
Floodplain Manager	☑	• Cocopah Environmental Protection Office – Director
Surveyors	☑	• Outside consultant

Staff/Personnel Resources	☑	Department/Agency - Position
Staff with education or expertise to assess the community's vulnerability to hazards	☑	• Cocopah Environmental Protection Office – Director • Cocopah Public Works Department – Director • Cocopah Police Department – Chief • Cocopah/Somerton Fire Department – Chief • Cocopah Office of Emergency Management – Emergency Manager
Personnel skilled in GIS and/or HAZUS	☑	• Cocopah Planning Department – Assistant Planner • Cocopah Cultural Resources Office - Manager
Scientists familiar with the hazards of the community	☑	• Cocopah Environmental Protection Office – Director • Cocopah Cultural Resources Office - Manager
Emergency manager	☑	• Cocopah Office of Emergency Management – Emergency Manager
Grant writer(s)	☑	• Each department has responsibilities for grants and reliance on outside consultants.
Others	☑	• Casino Security – Chief of Cocopah Casino Security

Table 38. Summary of fiscal capabilities for Cocopah Indian Tribe

Financial Resources	Accessible or Eligible to Use (Yes, No, Don't Know)	Comments
Community Development Block Grants	Yes	Via Cocopah Indian Housing and Development Corporation
Capital Improvements Project funding	Yes	Tribal Council
Authority to levy taxes for specific purposes	Yes	None Currently levied
Fees for water, sewer, gas, or electric service	Yes	Can charge water and sewer. No gas. APS provides electric power.
Impact fees for homebuyers or new developments/homes	No	
Incur debt through general obligation bonds	No	
Incur debt through special tax bonds	No	
Other	No	
Community Development Block Grants	Yes	Via Cocopah Indian Housing and Development Corporation
Capital Improvements Project funding	Yes	Tribal Council

6.2.2 Historical Mitigation Activities

The Table in Appendix D provides an updated summary, by jurisdiction, of historical mitigation activities completed over previous planning cycles. This section will continue to serve as a record of mitigation successes for the county and its jurisdictions. As part of each Plan update, completed mitigation activities from the previous Plan's (in this case the 2010 A/Ps), will be migrated into this Appendix.

6.2.3 National Flood Insurance Program Participation

Participation in the NFIP is a key element of any community's local floodplain management and flood mitigation strategy. Yuma County and 3 of the 4 incorporated jurisdictions participate in the NFIP at varying levels. The Cocopah Indian Tribe does not currently participate in the NFIP. Joining the NFIP requires the adoption of a floodplain management ordinance that requires jurisdictions to follow established minimum standards set forth by FEMA and the State of Arizona, when developing in the

floodplain. These standards require that all new buildings and substantial improvements to existing buildings will be protected from damage by the 100-year flood, and that new floodplain development will not aggravate existing flood problems or increase damage to other properties. Yuma County and some other communities, have adopted standards that are more stringent than the federal minimum to ensure better flood mitigation practices. As a participant in the NFIP, communities also benefit from having Flood Insurance Rate Maps (FIRM) that map identified flood hazard areas and can be used to assess flood hazard risk, regulate construction practices and set flood insurance rates. FIRMs are also an important source of information to educate residents, government officials and the private sector about the likelihood of flooding in their community. Table 39 summarizes the NFIP status and statistics for each of the jurisdictions and the Cocopah Tribe participating in this Plan.[45]

Table 39. Summary of NFIP status and statistics for Yuma County and participating jurisdictions and Tribe

Jurisdiction	Community ID	NFIP Entry Date	Current Effective Map Date
Yuma County	040099	12/15/1983	1/16/2014
City of Yuma	040102	7/5/1983	1/16/2014
City of Somerton	040114	8/28/2008	NSFHA
Town of Wellton	040112	7/1/2008	1/16/2014
City of San Luis	Not a NFIP participant		
Cocopah Indian Tribe	Not a NFIP participant		

[45] FEMA, Community Status Book Report, Arizona, https://www.fema.gov/cis/AZ.pdf. Accessed March 2018

6.3 Mitigation Actions/Projects and Implementation Strategy

Mitigation actions/projects (A/P) are those activities identified by a jurisdiction, that when implemented, will have the effect of reducing the community's exposure and risk to the particular hazard or hazards being mitigated. The implementation strategy addresses the "*how, when, and by whom*?" questions related to implementing an identified A/P.

The update process for defining the new list of mitigation A/Ps for the Plan was accomplished in three steps. First, an assessment of the actions and projects specified in Section 6 of the 2010 Plan was performed, wherein each jurisdiction and the Cocopah Tribe reviewed and evaluated their jurisdiction or Tribe specific list. Second, a new list of A/Ps for the Plan was developed by combining the carry forward results from the assessment with new identified A/Ps. Third, an implementation strategy for the combined list of A/Ps was formulated. Details of each step and the results of the process are summarized in the following sections.

6.3.1 Previous Mitigation Actions/Projects Assessment

Each jurisdiction and Tribe reviewed and assessed the actions and projects identified in the 2010 Plan. The assessment included evaluating and classifying each of the previously identified A/Ps based on the following criteria:

- Complete
- Ongoing
- In process
- Deferred
- Cancelled / No Longer Applicable

The following table lists these 2010 A/Ps.

Table 40. Past Action Reporting

Jurisdiction	ID No.	Description	Status	Summary
Cocopah Tribe	C-1	Develop Water Management Plan and create Drought Ordinances.	In progress	EPO has been engaging this project and is still ongoing at this time.
Cocopah Tribe	C-2	Provide Emergency back-up power to critical facilities(Police Station and Cocopah Community Center): Emergency generators, secondary feeds, portable generators with standard camlock connections so power can be maintained in emergency shelters and public safety offices.	Complete (police)	The police department has emergency backup power and we are in the process of installing a generator at the community center for emergency sheltering.
Cocopah Tribe	C-3	Provide Fire Breaks in riparian area of West Reservation/Maintain Fire Breaks on North Reservation to minimize damage from wildfires.	Complete Ongoing	This is a ongoing process that once completed, will grow back to have cleared again.
San Luis	SL-1	Complete current updating and continue to up-date family of construction codes (NFPA1, UBC, UMC, UPC,UEC, etc) within appropriate cycles to ensure adequate design of new or remodeled facilities	Continuous and on-going	The City of San Luis Fire Department and the Development Services Division continue to review the 2012 NFPA 1 Uniform Fire Code and other building Codes to insure our codes stay abreast of the current standards and to insure compatibility.
San Luis	SL-2	Evaluate, review, design and construct infrastructure to minimize effects of run-off damage to right-of-ways, roadways, streets, curb and gutters, sidewalks, retention basins and structures.	Complete	phase 2 downtown drainage plan / updated curb/gutter requirements
San Luis	SL-3	Continue to review effects of participation in the National Flood Insurance Program (NFIP), specifically; the costs of insurance and the ability to market/sell property real property within identified area. The anticipated area is among the oldest developed area of the city and may result in the inability of homeowners to sell, refinance or simply occupy residences, based on the costs and availability of flood insurance.	On-going	

Jurisdiction	ID No.	Description	Status	Summary
San Luis	SL-4	Continue involvement with AZ Department of Transportation and US Customs to maintain awareness of product and goods transported through both ports of entry (POE 1 and 2). Continue training and education of personnel and the purchase of appropriate equipment to support emergency response to any incidents or events within the US POEs or the AZ-DOT Inspection Station.	Continuous and on-going	Continue to review commodities and transportation corridors which are within the City of San Luis Fire Department response areas. Continue to maintain equipment and training of personnel who will respond to transportation emergencies which may contain hazardous materials.
San Luis	SL-5	Water Conservation and Public Education: Develop and distribute brochures outlining the advantages of water conservation to City water-users	On Going	Distributed through billing statements.
San Luis	SL-6	Water Rights Acquisition: Assurance of water supply through acquisition of senior Colorado River Water Rights with retirement of agricultural lands	On Going	
San Luis	SL-7	Transportation Planning Agency Coordination: Continue to coordinate and participate with inter-agency transportation planning groups such as the Yuma Metropolitan Planning Organization, Greater Yuma Port Authority, Yuma Marine Corps Air Station, and Arizona Department of Transportation	Continuous and on-going	Coordinated direct access to commercial port of entry, w/ ADOT developed ASH Highway (U.S. Route 195), implementation of an Area Transit bussing system (transportation district) Continued participation in public meetings and pre-construction meetings of major roadway construction projects which enhance population movement, increase traffic counts or may affect emergency response.
San Luis	SL-8	Seismic Building Code Enforcement: Continue to enforce seismic requirements in current building codes	Continuous and on-going	Continue to support strong earthquake construction standards which protect lives and minimize damages of minimal to moderate earthquake events to buildings and property.

Jurisdiction	ID No.	Description	Status	Summary
San Luis	SL-9	Enforcement of Zoning and Building Code Ordinance: Continue to enforce zoning and building codes through current site plan, subdivision, and building permit review processes to reduce the effects of flood, thunderstorm/high wind, earthquake, transportation and other hazards on new buildings and infrastructure	Continuous and on-going	Currently adopting 2018 building code. The Fire Department will continue to participate in building plans review, apply currently adopted Fire Codes to insure best standard of life and building safety. Continue to do regular building inspections of existing buildings and structures and initial inspections for to provide Certificate of Occupancy of new buildings upon construction.
San Luis	SL-10	Wildfire Mitigation Cooperation: Coordinate/cooperate with BLM/BOR wildfire mitigation activities along the Colorado River	Continuous and on-going	The Fire Department has recently completed transition and modifications to existing vehicle to provide a more appropriate brush fire and off-road response. Vehicle has Compressed Air Foam System (CAFS) capabilities and will eventually achieve Type 6 Engine classification.
Somerton	SO-2	Seismic Building Code enforcement to enforce current seismic codes to reduce the effects of earthquake hazards on new and remodeled buildings	In progress	With all the seismic activity in our area , there will be new studies and data that when it comes available we will revise our codes to meet new changes. Updated to 2003 and will be updating to 2018.
Somerton	SO-4	Enforcement of low water use fixture requirements for new residential/commercial buildings in current plumbing codes to reduce the demand on acquiring additional water resources.	In progress	All new construction has low water use fixtures installed verified by building code inspectors. New 2018 code will address.

Jurisdiction	ID No.	Description	Status	Summary
Wellton	W-1	Design and construct overpass over the Union Pacific railroad tracks allowing vehicles, emergency vehicles, and 1st responders to cross at all times. The plan has identified a location and cost estimate. Would assist in evacuation from any type of disaster or hazard.	Cost prohivitive - still on 10 year plan	Appears unlikely that this will ever be possible. Alternative sub-station south of the tracks being explored.
Wellton	W-2	Continual enforcement of zone and building codes through current site plans, subdivision, and building permit review process to reduce the effects of disasters (natural or manmade) as well as other hazards on new buildings and infrastructure.	In-progress	Awaiting the Adoption of 2018 Building codes (2009 currently). 3rd review of adopting. Are doing enforcement.
Wellton	W-3	Post signage in community on roadways within Town limits once designated as truck routes, hazard material routes, or weight limited roadways.	No longer a priority	To potentially be included in new town traffic ordinance.
Wellton	W-4	Adopt Seismic Building Code Enforcement for new and existing residential and commercial developments to minimize structural damages.	In-progess	Awaiting the Adoption 2012 Building codes
Wellton	W-5	Local Area Drainage Study- perform a local area drainage study to determine vulnerability of identified streets to understand and implement drainage needs and improvements.	Ongoing	Requested Grant of CBG Drainage Funds. In design study through County FCD.
Wellton	W-6	Enforcement of Nuisance Abatement Ordinance-continual enforcement of current nuisance abatement ordinance for control of weeds, debris and flammable materials within Town limits.	Pending	On-going enforcement
Wellton	W-7	Traffic Law Enforcement-continue to enforce traffic laws and minimize accidents within Town limits.	Ongoing	Enforcement equip. obtained through GOHS grant
Wellton	W-8	Continued enforcement of low water use fixtures in zoning regulations to minimize loss of water resource.	Ongoing	Recently completed another Water Loss Study.

Jurisdiction	ID No.	Description	Status	Summary
Wellton	W-9	Continued interaction between local, state, county, and federal agencies to ensure cooperation and planning for transportation networks.	Ongoing	Wellton active in YCIPTA and works closely with ADOT. Participating with YMPO
Wellton	W-11	Continued development, design, and compliance of a water conservation plan to reduce the ensure availability of water supply.	Ongoing	Completed water plant renovation. Current program.
Yuma	Y-1	Design and construct stormwater basins, USBR East Main Canal siphon and overshoot and stormwater lift station with discharge forcemain(s) to detain and evacuate 116.8 acre-feet of storm water. Needed to improve storm water drainage collection and disposal in the area from Avenue A to Barbara Avenue and 26th Place	Being lead by County	
Yuma	Y-2	28th Street Storm Drainage – Phase I, II, and III: Storm sewer installation in 28th Street from 8th Avenue to Smucker Park retention Basin. Construction will consist of 72" diameter pipe to 96" diameter pipe and construction of a storm water collection basin. This project will improve storm water drainage collection and disposal in area from Avenue A to Barbara Avenue and 26th Place.	Ongoing	Terminal basin at Smucker Park needs to be constructed first.
Yuma	Y-3	Stormwater NPDES Permit Activities: Two phase project …Phase I completed…Phase II implement action plan and provide documentation to Arizona Department of Environmental Quality	Complete	Revised drainage ordinance in FY14 and identifying Priority Areas with direct connection to river.

Jurisdiction	ID No.	Description	Status	Summary
Yuma	Y-4	Del Oro Estates: Construct underground drainage collection system with surface inlets for Del Oro Estates. Construct outfall drain from Del Oro to Victoria Meadows Detention Basin. Del Oro Estates has no provisions for storm water removal and is virtually flat having been designed for on-site storm water disposal. This project will afford flooding protection for residents and remove storm water from City streets.	Ongoing	Engineering study complete.
Yuma	Y-6	Extend Storm Sewer/Arena Drive, 9th Street, 10th Street. And 10th Street from Arena Drive to 13th Avenue. Include inlet structures. Storm water from 13th Avenue is supposed to be channeled in 10th Street, 9th Place, and Arena Drive then conveyed by surface to the existing inlets at 9th Street and Arena Drive. Such is not the case. Even moderately small storms create overland flow that quickly jumps curbs and creates erosion problems across private property.	Ongoing	Engineering and planning complete. Funding needed.
Yuma	Y-7	Stormwater Pumping Structure Conversions to Automated Lift Station: Tierra Kino & Suncrest Estates subdivisions. Telemetry for all storm water pump station locations. There is a need to monitor and control the condition of storm water pump stations.	Ongoing	Work may include replacing pumps, controls, and SCADA systems.
Yuma	Y-8	Enforce low water use fixture requirements for new residential/commercial buildings. The city has adopted the IRC and the IPC both of which have provisions for low flow fixtures in both commercial and residential structures. The codes limit the amount of the water that can flow from fixtures such as toilets, sinks, and shower heads.	Ongoing	Applicable to new construction

Jurisdiction	ID No.	Description	Status	Summary
Yuma	Y-9	Continue to enforce current Zone D1 seismic requirements in residential and commercial building codes. Continue to inspect all requirements for seismic to include liquefaction mitigation, seismic construction requirements, and seismic bracing for all equipment and piping in buildings.	Ongoing	2012 Building Code adopted per the International Code Council.
Yuma	Y-10	Continue to enforce zoning and building codes through current site plan, subdivision, and building permit review processes to reduce the effects of flood, thunderstorm/high wind, earthquake, and other hazards on new buildings and infrastructure	Ongoing	2012 Building Code adopted per the International Code Council
Yuma	Y-11	Clear and remove dense stands of salt-cedar and re-establish native riparian vegetation along the Colorado River to produce a natural park area and mitigate the effects of wildland fires. Costs reflect vegetation removal and replacement only.	Ongoing	Ongoing maintenance at both East and West Wetlands. Reduction of riverfront fires down 80 percent since mitigation efforts began in 2002. The majority of the West Wetlands has been eradicated of salt cedar and non-native vegetation and all work at West Wetlands requiring an ACOE 404 permit has been completed. We are currently working on eradicating the last remaining large stand of non-native vegetation from a 28-acre parcel of West Wetlands located between the boat ramp and the 4th Avenue Bridge and anticipate this work being completed in 2019. Ongoing maintenance to prevent re-growth of non-native vegetation is ongoing at East Wetlands
Yuma	Y-12	Continue to provide earthquake safety awareness to the community on an annual basis through booths at fairs,	Ongoing	Yuma Fire continues to do public Education

Jurisdiction	ID No.	Description	Status	Summary
		brochures, Channel 73 public service announcements, and utility bill inserts.		
Yuma	Y-13	Encourage the use of xeriscape landscaping in new and existing developments through impact fee incentives and public education through the "Use Water Wisely" Program.	Ongoing	The City adopted an update to the Landscaping Ordinance in 2017 that encourages the right plant in the right place. The Landscaping code requires xeriscape design to minimize water use within the City of Yuma.
Yuma County	YC-1	Design and construct a new storm water a basin, Smucker Park Detention Basin. New construction of this planned detention basin for the Yuma Mesa area will store the 100-year discharge. This basin is needed to mitigate the damage and reduce uncontrolled runoff that currently flows down the West Mesa Area to the Yuma Valley resulting in flooding of surrounding areas. Design is complete and is in state permitting process.	On-going	District and City of Yuma entered into an IGA to complete the project
Yuma County	YC-4	This project is located in the La Jolla Subdivision. Project will provide drainage improvements, catch basin and storm water pipeline to drain this neighborhood. Storm water presently ponds in the street and requires removal by water trucks.	Complete	
Yuma County	YC-5	Develop and implement a Flood/Waterway Education and Public Outreach campaign to encourage citizen awareness to mitigate the damages of floods via the use of internet, public meetings, brochures, etc.	Ongoing	Letters sent to property owners affected by 2014 Flood Insurance Rate Map Updates.
Yuma County	YC-6	Attend related technical conferences and relay new information to stakeholders	Ongoing	Staff attended Emergency Management Training, Arid Region Conference, CRS & BW12 training

Jurisdiction	ID No.	Description	Status	Summary
Yuma County	YC-7	Fund annual State Floodplain regulations and develop technical and review standards for floodplain related topics	Ongoing	$5,000 annual contribution submitted to State Standards Work Group
Yuma County	YC-8	Document Flood Damage after flood events to further mitigate ongoing efforts by identification of potential and actual hazard areas; will also be used in public outreach and education campaign as well as provide historical reference for future mitigation efforts	Ongoing	Localized flooding photographed in the Foothills and Yuma Area Annual Assessment Report is prepared
Yuma County	YC-9	Design and construct additional Groundwater Wells to mitigate and lower the groundwater levels during sustained flooding of the Colorado River and along the west Yuma Mesa.	Ongoing	Coordination with YCWUA and USBR for operation and maintenance of Yuma Valley facilities
Yuma County	YC-10	Participate in Community Assistance Program and other state and federal programs when they benefit Yuma County.	Ongoing	District coordinates with ADWR regarding Flood Insurance Regulations and assists Wellton and Somerton with NFIP
Yuma County	YC-12	Design and construct Business 8 Drainage Improvements are needed to drain ponding along roadway.	On hold	Limited community interest
Yuma County	YC-14	Virginia Ave/24th Street Storm Drain Improvements is an extension of the 28th Street Storm drain System.	Remove	City does not have plans to extend Smucker Park system for several years (20+)
Yuma County	YC-15	Design and re-construct Engler Avenue Basin Pump Station to drain this basin to the East Mesa Outfall System mitigating damage to surrounding area and thus reducing detention times below 5 days.	Remove	Project is not cost effective
Yuma County	YC-16	Phoenix and Mesa St. within the Yuma East area. On site drainage has been filled in by the owners. Design will provide alternatives to address the storm water ponding.	On hold	Study completed. Not in 5 yr CIP.
Yuma County	YC-17	Design and then renovate the Gadsden Area Drainage to provide storm water facilities, to mitigate the effects of existing storm water ponds occurring within roadway or adjacent properties	Ongoing	Completed system constructed. Land has been purchased for regional basin

Jurisdiction	ID No.	Description	Status	Summary
Yuma County	YC-21	Public education campaign to encourage citizens to conserve water	On-going	Yuma County Area Agriculture Council/YCOEM uses public events on a regular basis to pass out flyers and speak to community members about issues to include water preservation.
Yuma County	YC-22	Continue to ensure that Yuma County residents are safe from flooding by meeting the NFIP requirements for development within a Special Flood Hazard Area through enforcement of the Floodplain Ordinance.	On-going	
Yuma County	YC-23	Continue to coordinate and participate with inter-agency transportation planning groups such as the Yuma Metropolitan Planning Organization, Greater Yuma Port Authority, Yuma Marine Corps Air Station, and Arizona Department of Transportation	On-going	MOU has been completed.
Yuma County	YC-24	Develop and implement a public education and awareness campaign for county residents to mitigate damages caused by these specified incidents via the use of internet, brochures, website, community presentations and forums and other media	On-going	Participate in Great Arizona Shake-Out annually. YCOEM has monthly community tabletop exercises which include seismic events, and we also use public events on a regular basis to pass out flyers and speak to community members about issues to include earthquake preparedness.
Yuma County	YC-25	Continue to enforce zoning and building codes through current site plan, subdivision, and building permit review processes to reduce the effects of flood, thunderstorm/high wind, earthquake, transportation and other hazards on new buildings and infrastructure	On-going	Adopted 2012 Building Codes June 2013, include provisions for the mitigation of earthquake, flood and wind events. Currently moving towards 2018 IRC/IBC.

Jurisdiction	ID No.	Description	Status	Summary
Yuma County	YC-26	Continue to require county residents to acquire burn permits to mitigate against the potential for wildland fires.	On-going	Continue enforcing provisions of 2003 International Fire Code including permit requirements for open burning The open burn permitting program via ADEQ to the Yuma County Health department and delegated to Yuma Rural/Metro fire department The open burn program has numerous preventions steps built into it and one of these steps is to prevention wild land fires as stated. 2010 adopted Community Wild Fire Protection Plan.
Yuma County	YC-27	Continue to enforce building code low water use fixture requirements for new residential and commercial buildings.	On-going	2018 code update will address. Adopted 2012 International Building Code June 2013 require low flow fixture installation
Yuma County	YC-28	Continued enforcement of development restricted areas relative to the MCAS and the MCAS Auxiliary Field II as identified in the Joint Land Use Plan.	On-going	Yuma Regional development plan addresses this. No joint land-use plan anymore. Applications are reviewed for conformance with current Arizona Revised Statutes and Zoning Ordinance. All actions involving land use permits are cleared to uphold proper airspace operations of the military

Jurisdiction	ID No.	Description	Status	Summary
Yuma County	YC-29	Develop and implement a public education and awareness campaign for county residents to mitigate damages caused by these specified incidents via the use of internet, brochures, website, community presentations and forums and other media	On-going	Local Fire departments provide preventative and preparedness training. YCOEM has monthly community tabletop exercises which include wildfire, storm related issues, and seismic events, and we also use public events on a regular basis to pass out flyers and speak to community members about issues to include Drought Earthquake Wildfire Transportation Flooding Severe Wind preparedness

6.3.2 New Mitigation Actions / Projects and Implementation Strategy

Upon completion of the assessment summarized in Section 6.3.1, each jurisdiction developed new A/Ps in conjunction with the updated mitigation strategy, results of the vulnerability analysis and capability assessment, public survey results, and the Planning Team's institutional knowledge of hazard mitigation needs in the community.

For each A/P, the following elements were identified:

- **ID No.** – a unique alpha-numeric identification number for the A/P.
- **Mitigation Action / Project Description** – a brief description of the A/P including a supporting statement that tells the "what" and "why" reason for the A/P.
- **Hazard(s) Mitigated** – a list of the hazard or hazards mitigated by action.
- **Estimated Costs** – concept level cost estimates that may be a dollar amount or estimated as staff time.
- **Priority Ranking** – unless otherwise noted below, each A/P was assigned a priority ranking of either "High", "Medium", or "Low".
- **Primary Agency / Job Title Responsible for Implementation** –the agency, department, office, or other entity and corresponding job title that will have responsibility for the A/P and its implementation.
- **Anticipated Completion Date** – best available estimates for implementation
- **Status** – new, in-progress, or on-going

Once the full list of A/Ps was identified, jurisdictions were then asked to help to prioritize each A/P. During the final Mitigation Strategy Workshop, Planning Team members were presented with ideas and tools relating to A/P prioritization. FEMA's STAPLEE method was included in these discussions, as was the need to ensure A/P costs versus benefits were considered when prioritizing the new A/Ps.

After Planning Team discussions about the pros and cons on various methods, it was decided that a simple priority ranking of either "High", "Medium", or "Low" would be utilized. The assignments were subjectively made using a straightforward process that assessed how well the A/P satisfied the following considerations:

- A favorable benefit versus cost evaluation, wherein the perceived direct and indirect benefits outweighed the project cost.
- A direct beneficial impact on the ability to protect life and/or property from natural hazards.
- A mitigation solution with a long-term effectiveness

The following table lists all A/Ps identified by the Planning Team to be included in this 2018 Plan update.

Table 41. Past Action Reporting

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
Cocopah Tribe	2018.01	Concrete lining of piping/bury canal system (East & West Reservation)	Flooding	$$$	High	OEM	2023	New
Cocopah Tribe	2018.02	Fortify police department (secure entry system) - West Reservation	Multi-hazard	$$	High	Police / OEM	2023	New
Cocopah Tribe	2018.03	Fortify emergency operations center (secure entry system) - Rio Colorado Golf Course	Multi-hazard	$$	High	Police / OEM	2023	New
Cocopah Tribe	2018.04	Upgrade emergency operations command unit communication technology	Multi-hazard	$$$	High	OEM	2023	New
Cocopah Tribe	2018.05	Conduct HazMat and fire training, equip personnel, & coordination exercises.	Multi-hazard	$	Medium	SCFD / Police / OEM	2023	New
Cocopah Tribe	2018.06	Increasing radio capacity through YRCS communication system	Multi-hazard	$$	Medium	OEM / Police	2023	New
Cocopah Tribe	2018.07	Enhance ability of Tribe to investigate structural / wildland fires	Wildfire	$	Low	Police / Fire	2023	New
Cocopah Tribe	2018.08	Purchase AEDs for police vehicles	Multi-hazard	$	High	Police	2023	New

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
Cocopah Tribe	2018.09	Purchase alternate vehicles such as UTV to aid in remote response	Multi-hazard	$$	Medium	Police	2023	New
Cocopah Tribe	2018.10	Secure utility sites (water, sewer lift stations).	Multi-hazard	$$	High	Public Works	2023	New
Cocopah Tribe	2018.11	Enhance ability to maintain overgrowth along roadways	Multi-hazard	$	High	EPO / manpower	2023	New
Cocopah Tribe	C-2	Provide Emergency back-up power to critical facility (Cocopah Community Center): Emergency generators, secondary feeds, portable generators with standard camlock connections so power can be maintained in emergency shelters and public safety offices.	Multi-hazard	$$	High	OEM, SCFD	2023	On-going
Cocopah Tribe	C-3	Maintain Fire Breaks on North Reservation and in riparian area of West Reservation to minimize damage from wildfires. Continue to identify other areas for treatment and maintenance.	Wildfire	$	High	BIA / EPO / manpower	2023	On-going
Cocopah Tribe	2018.12	Evaluate feasibility to implement animal population control measures	Other	$	Low	Police	2023	New

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
Cocopah Tribe	2018.13	Prewire critical facilities with transfer switches to ease installations of temporary backup generators	Multi-hazard	$$	High	OEM	2023	New
Cocopah Tribe	2018.14	Backup power for Cocopah Hotel Resort to serve as community disaster shelter	Multi-hazard	$$	High	OEM	2023	New
Cocopah Tribe	2018.15	Install lighting in the employee parking lot area	Multi-hazard	$$	Medium	OEM	2023	New
San Luis	2018.01	Improve interoperability, technology use, and communications with U.S. and Mexico (radio, 911, video, etc).	Multi-hazard	$$	High	Fire / Police / IT	2023	New
San Luis	2018.02	Coordinate with Federal agencies to mitigate delays of border crossings, improve EM access, enhance commerce, and streamline crossing by expanding facilities/infrastructure.	Multi-hazard	$	Medium	Public Works / Fire / Police	2023	New
San Luis	2018.03	Conduct HazMat and police training & coordination exercises.	Multi-hazard	$	High	Fire / Police	2023	New
San Luis	2018.04	Support border 2020 mission & goals.	Multi-hazard	$$	Low	Fire / Police	2023	New

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
San Luis	2018.05	Coordinate with local/state/Federal/Mexico on improving regional air quality.	Multi-hazard	$	Medium	Development Services / Public Works	2023	New
San Luis	2018.06	Development of multiple-area cooling stations.	Extreme Heat	$	Medium	Fire / Yuma County Public Health	2023	New
San Luis	2018.07	Water system reliability and redundancy improvements.	Extreme Heat	$$$	High	Public Works	2023	New
San Luis	2018.08	Secure utility sites (water, sewer lift stations).	Multi-hazard	$$	Medium	Public Works / IT / Police	2023	New
San Luis	2018.09	Conduct an egress / supply routes assessment.	Multi-hazard	$	Medium	Public Works / Fire	2023	New
San Luis	2018.10	Develop community specific emergency plans.	Multi-hazard	$	High	Fire / Police / Public Works / City Administration	2023	New
San Luis	2018.11	Increase public safety response by identifying alternate facilities to ensure continuity.	Multi-hazard	$	Medium	Police / Fire / IT	2023	New
San Luis	2018.12	Increase public awareness and community outreach to include multi-hazard planning.	Multi-hazard	$	Medium	Fire / Police	2023	New
San Luis	2018.13	Work on maximizing local emergency broadcast system participation.	Multi-hazard	$	Medium	Yuma County EM / City Administration / PIO / Fire / Police	2023	New
San Luis	SL-1	Complete current updating and continue to up-date family of construction codes (NFPA1, UBC, UMC, UPC,UEC, etc) within	-	-	-	Development Services / Fire	-	On-going

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
		appropriate cycles to ensure adequate design of new or remodeled facilities						
San Luis	SL-3	Continue to review effects of participation in the National Flood Insurance Program (NFIP), specifically; the costs of insurance and the ability to market/sell property real property within identified area. The anticipated area is among the oldest developed area of the city and may result in the inability of homeowners to sell, refinance or simply occupy residences, based on the costs and availability of flood insurance.	-	-	-	Development Services / City Administration	-	On-going
San Luis	SL-4	Continue involvement with AZ Department of Transportation and US Customs to maintain awareness of product and goods transported through both ports of entry (POE 1 and 2). Continue training and education of personnel and the purchase of	-	-	-	Fire	-	On-going

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
		appropriate equipment to support emergency response to any incidents or events within the US POEs or the AZ-DOT Inspection Station.						
San Luis	SL-5	Water Conservation and Public Education: Develop and distribute brochures outlining the advantages of water conservation to City water-users	-	-	-	Public Works	-	On-going
San Luis	SL-6	Water Rights Acquisition: Assurance of water supply through acquisition of senior Colorado River Water Rights with retirement of agricultural lands	-	-	-	Public Works	-	On-going
San Luis	SL-7	Transportation Planning Agency Coordination: Continue to coordinate and participate with inter-agency transportation planning groups such as the Yuma Metropolitan Planning Organization, Greater Yuma Port Authority, Yuma Marine Corps	-	-	-	Development Services / Public Works / Fire Department	-	On-going

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
		Air Station, and Arizona Department of Transportation						
San Luis	SL-8	Seismic Building Code Enforcement: Continue to enforce seismic requirements in current building codes	-	-	-	Development Services / Public Works / Fire Department	-	On-going
San Luis	SL-9	Enforcement of Zoning and Building Code Ordinance: Continue to enforce zoning and building codes through current site plan, subdivision, and building permit review processes to reduce the effects of flood, thunderstorm/high wind, earthquake, transportation and other hazards on new buildings and infrastructure	-	-	-	Development Services / Public Works / Fire Department	-	On-going
San Luis	SL-10	Wildfire Mitigation Cooperation: Coordinate/cooperate with BLM/BOR wildfire mitigation activities along the Colorado River	-	-	-	Development Services / Public Works / Fire Department	-	On-going

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
Somerton	2018.01	South drainage tie-in design and implementation	Flooding	$$	High	Public Works / Yuma County Flood District	2023	New
Somerton	2018.02	Installation of air conditioning in recreation center (cooling center & shelter)	Extreme Heat	$$	High	Parks and Rec	2023	New
Somerton	2018.03	Installation of back-up power for recreation center (shelter) and City Hall (continuity of operations)	Multi-hazard	$$	High	Public Works / Community Development	2023	New
Somerton	2018.04	Install lift station and water well generator	Drought	$$	Medium	Public Works	2023	New
Somerton	2018.05	Extend water supply to residential and commercial areas (currently well water)	Multi-hazard	$$$	Medium	Public Works	2023	New
Somerton	2018.06	Removal of remaining asbestos water lines	Multi-hazard	$$	Low	Public Works	2023	New
Somerton	2018.07	Enhance code enforcement for outdated electrical systems	Multi-hazard	$$	Low	Community Development	2023	New
Somerton	2018.08	Coordinate existing septic systems to hook into City sewer infrastructure	Multi-hazard	$$	Low	Community Development / Public Works	2023	New
Somerton	2018.09	Upgrade emergency operations center (technology - phones, computers, network)	Multi-hazard	$$	High	Police	2023	New

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
Somerton	2018.10	Conduct HazMat and fire training & coordination exercises.	Multi-hazard	$	Low	Fire	2023	New
Somerton	2018.11	Develop additional fire station on eastern side (in coordination with San Luis)	Multi-hazard	$$$	Medium	Fire	2023	New
Somerton	2018.12	Purchase mobile police command post.	Multi-hazard	$$$	Medium	Police	2023	New
Somerton	2018.13	Water Rights Acquisition: Assurance of water supply through acquisition of senior Colorado River Water Rights with retirement of agricultural lands	Drought	$$$	Low	Community Development	2023	New
Somerton	2018.14	Secure utility sites (water, sewer lift stations).	Multi-hazard	$$	High	Public Works	2023	New
Somerton	2018.15	Expansion of existing radio tower from 80' to 100'	Multi-hazard	$$	Medium	Public Works	2023	New
Somerton	2018.16	Prewire critical facilities with transfer switches to ease installations of temporary backup generators	Multi-hazard	$$	Medium	Community Development	2023	New
Somerton	2018.17	Update Emergency Operations Plan	Multi-hazard	$	Medium	Fire / Police	2023	New
Somerton	2018.18	Seismic Building Code enforcement to enforce current	-	-	On-going	Community Development	-	On-going

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
		seismic codes to reduce the effects of earthquake hazards on new and remodeled buildings						
Somerton	2018.19	Enforcement of low water use fixture requirements for new residential/commercial buildings in current plumbing codes to reduce the demand on acquiring additional water resources.	-	-	On-going	Community Development	-	On-going
Wellton	2018.01	Compete installation/linkage of back-up generator system to water system.	Multi-hazard	$$	High	Town Administration	2019	New
Wellton	2018.02	Fire station expansion and improvements.	Multi-hazard	$$$	High	Fire	2020	New
Wellton	2018.03	Conduct HazMat and fire training & coordination exercises.	Multi-hazard	$	Medium	Fire	2019	New
Wellton	2018.04	Standardize ratio of officers to accommodate growing population.	Multi-hazard	$$	Low	Police	2023	New
Wellton	2018.05	Maintain open communications with State to receive funding for future road improvements/paving/maintenance.	Multi-hazard	$	Medium	Town Administration	2023	New

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
Wellton	2018.06	Install charcoal filters on oversized water lines to remain in compliance.	Multi-hazard	$$	High	Water	2019	New
Wellton	2018.07	Develop combined Town municipal facility.	Multi-hazard	$$$	Low	Town Administration / Police / Fire / Utility	2023	New
Wellton	2018.08	Develop sub-stations for police, fire, and other government services south of the railroad track.	Multi-hazard	$$$	Low	Town Administration	2023	New
Wellton	W-2	Continual enforcement of zone and building codes through current site plans, subdivision, and building permit review process to reduce the effects of disasters (natural or manmade) as well as other hazards on new buildings and infrastructure.	-	-	-	Town Code Enforcement Officer	-	On-going
Wellton	W-4	Adopt Seismic Building Code Enforcement for new and existing residential and commercial developments to minimize structural damages.	-	-	-	Town Administration / Code Enforcement Officer /Planning & Zoning.	2019	In Process
Wellton	W-5	Local Area Drainage Study- perform local area drainage studies to determine vulnerability of identified streets	-	-	-	Yuma County Flood District / Town Public Works / Highway Dept	-	On-going

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
		to understand and implement drainage needs and improvements.						
Wellton	W-6	Enforcement of Nuisance Abatement Ordinance-continual enforcement of current nuisance abatement ordinance for control of weeds, debris and flammable materials within Town limits.	-	-	-	Police	-	On-going
Wellton	W-7	Traffic Law Enforcement-continue to enforce traffic laws and minimize accidents within Town limits.	-	-	-	Police	-	On-going
Wellton	W-9	Continued interaction between local, state, county, and federal agencies to ensure cooperation and planning for transportation networks.	-	-	-	Town Administration / County of Yuma	-	On-going
Wellton	W-11	Continued development, design, and compliance of a water conservation plan to reduce the ensure availability of water supply.	-	-	-	AZ Dept of Water Resources / Public Works	-	On-going
Yuma	2018.01	Acquire mobile rehab (cooling) facility.	Extreme Heat	$$	Medium	Police	2023	New

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
Yuma	2018.02	Identify/inventory backup power sources for fixed City locations.	Multi-hazard	$	High	Fire	2023	New
Yuma	2018.03	Continued implementation of emergency preparedness public outreach.	-	-	-	Fire	-	On-going
Yuma	Y-10	Continue to enforce zoning and building codes through current site plan, subdivision, and building permit review processes to reduce the effects of flood, thunderstorm/high wind, earthquake, and other hazards on new buildings and infrastructure	-	-	-	Community Development	-	On-going
Yuma	Y-11	Clear and remove dense stands of salt-cedar and re-establish native riparian vegetation along the Colorado River to produce a natural park area and mitigate the effects of wildland fires.	-	-	-	Yuma Crossing National Heritage Area - Project Manager	-	On-going
Yuma	Y-8	Enforce low water use fixture requirements for new residential/commercial buildings. The city has adopted the IRC and the IPC both of which have provisions for low	-	-	-	Community Development	-	On-going

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
		flow fixtures in both commercial and residential structures. The codes limit the amount of the water that can flow from fixtures such as toilets, sinks, and shower heads.						
Yuma	Y-9	Continue to enforce current Zone D1 seismic requirements in residential and commercial building codes. Continue to inspect all requirements for seismic to include liquefaction mitigation, seismic construction requirements, and seismic bracing for all equipment and piping in buildings.	-	-	-	Community Development	-	On-going
Yuma	Y-13	Encourage the use of xeriscape landscaping in new and existing developments through impact fee incentives and public education through the "The Right Plant in the Right Place" Program.	-	-	-	Community Development	-	On-going

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
Yuma	Y-7	Stormwater Pumping Structure Conversions to Automated Lift Station: Tierra Kino & Suncrest Estates subdivisions. Telemetry for all storm water pump station locations. There is a need to monitor and control the condition of storm water pump stations.	-	-	-	Community Development	-	On-going
Yuma	2018.04	Virginia Drive Retention Basin: Construct retention basin at northeast corner of Virginia Drive and 28th Street. Install new curb inlets to intercept on street runoff into retention basin. This project will reduce on street flooding that occurs during periods of heavy rainfall.	Flooding	$$		Community Development	2020	New
Yuma	Y-2	28th Street Storm Drainage – Phase I, II, and III: Storm sewer installation in 28th Street from 8th Avenue to Smucker Park Retention Basin. Construction will consist of 72” diameter pipe to 96” diameter pipe and construction of a storm water	-	-	-	Community Development	-	On-going

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
		collection basin. This project will improve storm water drainage collection and disposal in area from Avenue A to Barbara Avenue and 26th Place.						
Yuma	Y-4	Del Oro Estates: Construct underground drainage collection system with surface inlets for Del Oro Estates. Construct outfall drain from Del Oro to Victoria Meadows Detention Basin. Del Oro Estates has no provisions for storm water removal and is virtually flat having been designed for on-site storm water disposal. This project will afford flooding protection for residents and remove storm water from City streets.	-	-	-	Community Development	-	On-going

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
Yuma	Y-6	Extend Storm Sewer/Arena Drive, 9th Street, 10th Street. And 10th Street from Arena Drive to 13th Avenue. Include inlet structures. Storm water from 13th Avenue is supposed to be channeled in 10th Street, 9th Place, and Arena Drive then conveyed by surface to the existing inlets at 9th Street and Arena Drive. Such is not the case. Even moderately small storms create overland flow that quickly jumps curbs and creates erosion problems across private property.	-	-	-	Community Development	-	On-going
Yuma	Y-12	Continue to provide earthquake safety awareness to the community on an annual basis through booths at fairs, brochures, Channel 73 public service announcements, and utility bill inserts.	-	-	-	Community Development	-	On-going
Yuma County	2018.01	Inspect county critical facilities to evaluate vulnerabilities to	Multi-hazard	$	Medium	Facility Management	2023	New

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
		hazards and necessary upgrades to key infrastructure						
Yuma County	2018.02	Survey county facilities to evaluate back-up power availability and needs to install	Multi-hazard	$	High	Facility Management	2023	New
Yuma County	2018.03	Install power transfer switches for critical infrastructure	Multi-hazard	$$	High	Facility Management	2023	New
Yuma County	2018.04	Construction of new public works East County facility	Multi-hazard	$3.5 M	Medium	Public Works / Facility Management	2023	New
Yuma County	2018.05	East County low flow crossing construction / improvements (White Wing, Bearagon)	Multi-hazard	$150 K	Medium	Public Works / Flood District	2023	New
Yuma County	2018.06	Encouragement of community-driven risk reduction efforts to mitigate wildfire (combustible green waste) risk	Wildfire	$	Medium	Development Services / Administration	2023	New
Yuma County	2018.07	Closed PODS expansion	Multi-hazard	$$	High	Health	2023	New
Yuma County	2018.08	Development of an access and functional needs evacuation assistance program	Multi-hazard	$	Medium	Health	2023	New
Yuma County	2018.09	Construction of new or expansion of existing facility to serve as a multi-purpose facility to house EOC	Multi-hazard	$$$	Low	Facility Management / Emergency Management	2023	New

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
Yuma County	2018.10	Update technology and equipment for existing EOC	Multi-hazard	$$	High	ITS / Emergency Management	2023	New
Yuma County	2018.11	Complete COOP plan for Yuma County	Multi-hazard	$	High	Emergency Management / Administration	2023	New
Yuma County	2018.12	Support and facilitate coordination with water districts to locate resources for necessary upgrades and maintenance to infrastructure	Drought	$	Low	Public Works / ID	2023	New
Yuma County	2018.13	Water Rights Acquisition: Assurance of water supply through acquisition of senior Colorado River Water Rights with retirement of agricultural lands	Drought	$$$	High	Administration / BOS	2023	New
Yuma County	2018.14	Public education campaign focused on informing the public about the risks posed by dam failure/release flooding	Flooding	$	Low	Emergency Management / PIO	2023	New

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
Yuma County	YC-1	Design and construct a new storm water a basin, Smucker Park Detention Basin. New construction of this planned detention basin for the Yuma Mesa area will store the 100-year discharge. This basin is needed to mitigate the damage and reduce uncontrolled runoff that currently flows down the West Mesa Area to the Yuma Valley resulting in flooding of surrounding areas. Design is complete and is in state permitting process. Future phases to extend the storm lines to the basin will be programmed upon completion.	-	$10M	-	Development Services	2019	On-going
Yuma County	YC-21	Public education campaign to encourage citizens to conserve water	-	-	-	Emergency Management	-	On-going
Yuma County	YC-22	Continue to ensure that Yuma County residents are safe from flooding by meeting the NFIP requirements for development within a Special Flood Hazard	-	-	-	Development Services	-	On-going

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
		Area through enforcement of the Floodplain Ordinance.						
Yuma County	YC-23	Continue to coordinate and participate with inter-agency transportation planning groups such as the Yuma Metropolitan Planning Organization, Greater Yuma Port Authority, Yuma Marine Corps Air Station, and Arizona Department of Transportation	-	-	-	Development Services	-	On-going
Yuma County	YC-24	Develop and implement a public education and awareness campaign for county residents to mitigate damages caused by these specified incidents via the use of internet, brochures, website, community presentations and forums and other media	-	-	-	Emergency Management	-	On-going
Yuma County	YC-25	Continue to enforce zoning and building codes through current site plan, subdivision, and building permit review processes to reduce the effects of flood,	-	-	-	Development Services	-	On-going

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
		thunderstorm/high wind, earthquake, transportation and other hazards on new buildings and infrastructure						
Yuma County	YC-26	Continue to require county residents to acquire burn permits to mitigate against the potential for wildland fires.	-	-	-	Development Services / Rural Metro	-	On-going
Yuma County	YC-27	Continue to enforce building code low water use fixture requirements for new residential and commercial buildings.	-	-	-	Development Services	-	On-going
Yuma County	YC-28	Continued enforcement of development restricted areas relative to the MCAS and the MCAS Auxiliary Field II as identified in the Joint Land Use Plan.	-	-	-	Development Services	-	On-going
Yuma County	YC-29	Develop and implement a public education and awareness campaign for county residents to mitigate damages caused by these specified incidents via the use of internet, brochures, website, community	-	-	-	Development Services / Emergency Management	-	On-going

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
		presentations and forums and other media						
Yuma County	2018.15	SW Somerton Area Drainage Improvements: Phase I will address the need to provide a discharge system to the existing basins.	Flooding	$3.6 M	Medium	Development Services	2021	New / On-going
Yuma County	2018.16	Wellton Area Drainage Improvements: Phase I is the near term priorities, Helen Street Retention Basin, Maybele Street Retention Basin, and Arizona Avenue/San Jose Avenue Storm Drain. Phase II is the Coyote Wash Channelization.	Flooding	$4.4 M	Medium	Development Services	2022	New / On-going
Yuma County	2018.17	Far West Drainage System: The Foothills Master Drainage Plan Update addresses the needs of the Foothills area. This phase will construct the storm drain system into the Far West Basin.	Flooding	$4M	Medium	Development Services	2019	New / On-going

Jurisdiction	ID No.	Description	Hazard(s) Mitigated	Estimated Cost	Priority Ranking	Primary Agency/Job Title Responsible for Implementation	Anticipated Completion Date	Status
Yuma County	2018.18	Pump Station installations at Retention basins: Existing detentions are located within the City of Yuma, Somerton and San Luis. This project proposes to install storm sewer pump stations to drain the basin to an outfall line (river or drain)	Flooding	$240 K	Medium	Development Services	2019	New / On-going
Yuma County	2018.19	San Luis Area Drainage Improvements: The storm drain trunk lines were construction concurrently with ADOT's Main Street reconstruction. Phase II extends the storm lines to the east.	Flooding	$315 K	Medium	Development Services	2018	New / On-going
Yuma County	2018.20	Gadsden - San Luis Outfall and Basin Discharges: An initial study would look at the cost effectiveness of the Rio Sonora basins and then consider an outfall system for growth between San Luis and Gadsden.	Flooding	$4M	Medium	Development Services	2023	New / On-going

6.3.3 Potential Funding Sources

The following information relates to potential mitigation project funding sources to be evaluated by the plan's participating jurisdictions and Tribe:

Hazard Mitigation Grant Program
POC: FEMA Region IX and State Hazard Mitigation Officer
Website: https://www.fema.gov/hazard-mitigation-grant-program

Pre-Disaster Mitigation Grant Program
POC: FEMA Region IX and State Hazard Mitigation Officer
Website: https://www.fema.gov/pre-disaster-mitigation-grant-program

Flood Mitigation Assistance Grant Program
POC: FEMA Region IX and State Hazard Mitigation Officer
Website: https://www.fema.gov/flood-mitigation-assistance-grant-program

Emergency Management Performance Grant Program
POC: FEMA Region IX
Website: https://www.fema.gov/emergency-management-performance-grant-program

All adopting participants of this HMP were informed about potential funding sources for implementing mitigation actions and projects.

SECTION 7: PLAN MAINTENANCE PROCEDURES

According to the DMA 2000 requirements, each plan must define and document processes or mechanisms for maintaining and updating the hazard mitigation plan within the established five-year planning cycle. Elements of this plan maintenance section include:

Monitoring and Evaluating the Plan

Updating the Plan

Implementing the Plan by Incorporation into Other Planning Mechanisms

Continued Public Involvement

Yuma County, the Cocopah Tribe, and the participating jurisdictions recognize that this hazard mitigation plan is intended to be a "living" document with regularly scheduled monitoring, evaluation, and updating.

As part of the 2018 Plan update process, the Planning Team recognized the need for improvement to the Plan monitoring and evaluation process. The results of those discussions are outlined in the following sections and the plan maintenance strategy.

7.1 Monitoring and Evaluation

The Planning Team has established the following monitoring and evaluation procedures:

- **Schedule** – The Plan shall be reviewed on at least an annual basis and following a major disaster. The County EM will contact the Tribe and each jurisdiction's point of contact or the City/Town Manager/Clerk to coordinate the Plan review.
- **Review Content** – The content and scope of the Plan review and evaluation will address the following questions:
    - ***Hazard Identification:*** *Have the risks and hazards changed?*
    - ***Goals and objectives:*** *Are the goals and objectives still able to address current and expected conditions?*
    - ***Mitigation Projects and Actions:*** *Has the project been completed? If not complete but started, what has been completed? What remains to be done? Are there changes to the scope of work?*

Each jurisdiction will review the Plan as it relates to their community and document responses to the above questions in the form of an informal memorandum. During the annual review process, each jurisdiction may present their review findings to the Planning Team to discuss concerns or successes. Documentation of the annual review will include a compilation of the memorandums generated by each jurisdiction plus any notes on discussions and conclusions. Copies of the annual review report are included in Appendix E.

7.2 Plan Update

According to DMA 2000, the Plan requires updating and approval from FEMA every five years. The plan update will adhere to that set schedule using the following procedure:

- ✓ Approximately one year prior to the plan expiration date, the Planning Team, or their designated planning consultant, will perform an update to the Plan and planning process and will revise the appropriate or affected portions of the plan and produce a revised plan document.
- ✓ The revised Plan document will be presented before the respective councils and boards for an official concurrence/adoption of the changes.
- ✓ The revised plan will be submitted to DEMA and FEMA for review, comment and approval.

7.3 Incorporation Into Existing Planning Mechanisms

Incorporation of the Plan into other planning mechanisms, either by content or reference, enhances a community's ability to perform natural hazard mitigation by expanding the scope of the Plan's influence. A poll of the participating jurisdictions revealed that methods for utilizing and/or incorporating the 2010 Plan elements over the past planning cycle into other planning programs has varied. Ways in which the 2010 Plan has been successfully incorporated or referenced into other planning mechanisms for each jurisdiction are summarized below:

Yuma County

- The County utilized the Plan as a blueprint when conducting yearly CIP planning activities.

Cocopah Tribe

- The Tribe utilized the Plan as a 'roadmap' for implementing mitigation projects.

City of San Luis

- The risk and vulnerability assessment helped the City focus on mitigating roadway flooding and led to updating the City Fire Code (2012).

City of Somerton

- The City referred to the Plan as part of their annual planning and budgeting processes.

Town of Wellton

- The Town utilized the previous Plan as part of their annual planning exercises, to identify opportunities to align mitigation project implementation into other related efforts.

City of Yuma

- The City referenced the previous Plan as part of their annual CIP efforts, to identify opportunities to implement mitigation projects.

Ways in which the 2018 Plan will be incorporated or referenced into other planning mechanisms for each Plan participant are summarized below:

Yuma County

- The County will continue to utilize the Plan as in input into their yearly CIP planning activities. Additionally, elements will be leveraged as they conduct the pending update to their COOP and any other Emergency Management planning.

Cocopah Tribe

- The Tribe plans to integrate the HIRA as they update their EOP in the near future.
- As mentioned with the past Plan, the Tribe plans to continue to reference the Plan to serve as their mitigation 'roadmap' going forward.

City of San Luis

- The City plans to integrate portions of and content from the 2018 HMP into their updated General Plan. Mitigation Actions will also help the City when prioritizing projects in the General Plan and as they look to update building codes.

City of Somerton

- The City will integrate use of this Plan into their annual CIP process and when evaluating on-going grant and loan applications.

Town of Wellton

- The Town is anticipating Administrative leadership changes and hopes this updated Plan can serve as a blueprint to implementing mitigation projects for future administrations.

City of Yuma

- The City plans to continue Plan integration into future CIP efforts.

Typical ways to use and incorporate the Plan over the next five-year planning cycle, discussed by the Planning Team, included:

- Use of, or reference to, Plan elements in updates to general and comprehensive planning documents, codes, and ordinances.
- Addition of defined mitigation A/Ps to capital improvement programming.
- Inclusion of Plan elements into development and retrofitting planning and practices.
- Resource for developing and/or updating emergency operations plans, community wildfire protection plans, emergency response plans, etc.
- Make use of the annual evaluations to keep the Plan awareness elevated and that stakeholders are still identified.

The Plan will continue to function as a standalone document subject to its own review and revision schedule presented in Sections 7.1 and 7.2. The Plan will also serve as a reference for other mitigation and land planning needs of the Plan participants. Whenever possible, Plan participants will endeavor to incorporate the risk assessment results and mitigation actions and projects identified in the Plan, into existing and future planning mechanisms. Specific incorporation of the Plan risk assessment elements into the natural resources and safety elements of each jurisdictions' general plans (county comprehensive plan) and development review processes, adding or revising building codes, adding or changing zoning and subdivision ordinances, and incorporating mitigation goals and strategies into general and/or comprehensive plans, will help to ensure hazard mitigated future development.

7.4 Continued Public Involvement

The Planning Team reviewed the subject of continued public involvement as was documented in the 2010 Plan and discussed the challenges and successes regarding the identified continued public involvement strategy. It was noted that public education and outreach relating to the hazards faced by communities was an on-going effort. Some of the participating jurisdictions specifically identified mitigation actions / projects relating to these public education and outreach efforts. Additional details relating to these on-going and new efforts can be found in Section 6.

This left the subject of how best to involve the public going forward with this updated Plan? It was decided that the Plan's annual review process would be expanded upon to include a larger component relating to continued public involvement of the Plan, and most importantly of the identified mitigation actions / projects.

Following the yearly plan review and monitoring meetings, meeting minutes and/or a summary report of progress on mitigation actions / projects will be produced and posted on the County website. Public questions relating to the yearly meeting and ideas for additional mitigation actions / projects will also be solicited.

SECTION 8: PLAN TOOLS

8.1 Acronyms

A/P.....Mitigation Action/Project
ADEM .....Arizona Division of Emergency Management
ADEQ .....Arizona Department of Environmental Quality
ADWR .....Arizona Department of Water Resources
AGFD .....Arizona Game and Fish Department
ARS .....Arizona Revised Statutes
ASCE .....American Society of Civil Engineers
ASERC .....Arizona State Emergency Response Commission
ASLD .....Arizona State Land Department
ASU .....Arizona State University
AZDEQ .....Arizona Department of Environmental Quality
AZGS .....Arizona Geological Survey
BLM .....Bureau of Land Management
CAP .....Central Arizona Project
CAP .....Community Assistance Program
CFR .....Code of Federal Regulations
CRS .....Community Rating System
CWPP .....Community Wildfire Protection Plan
DEMA .....Arizona Department of Emergency and Military Affairs
DFIRM .....Digital Flood Insurance Rate
DMA 2000 .....Disaster Mitigation Act of 2000
DOT .....Department of Transportation
EHS .....Extremely Hazardous Substance
EPA .....Environmental Protection Agency
EPCRA .....Emergency Planning and Community Right to Know Act
FEMA .....Federal Emergency Management Agency
FMA .....Flood Mitigation Assistance Grant Program
GIS .....Geographic Information System
HAZMAT .....Hazardous Material
HAZUS-99 .....Hazards United States1999
HAZUS-MH .....Hazards United States Multi-Hazard
IFCI .....International Fire Code Institute
LEPC .....Local Emergency Planning Committee
MJHMP .....Multi-Jurisdictional Hazard Mitigation Plan
MMI .....Modified Mercalli Intensity
NCDC .....National Climate Data Center
NDMC .....National Drought Mitigation Center
NESDIS .....National Environmental Satellite, Data and Information Service
NFIP .....National Flood Insurance Program
NFPA .....National Fire Protection Association
NHC .....National Hurricane Center
NIBS .....National Institute of Building Services
NID .....National Inventory of Dams
NIST .....National Institute of Standards and Technology
NSF .....National Science Foundation
NOAA .....National Oceanic and Atmospheric Administration
NRC .....National Response Center
NWS .....National Weather Service
PSDI .....Palmer Drought Severity Index
RL .....Repetitive Loss
SARA .....Superfund Amendments and Reauthorization Act

SRLP .....Severe Repetitive Loss Properties
SRL .....Severe Repetitive Loss
UBC .....Uniform Building Code
USACE .....United States Army Corps of Engineers
USDA .....United States Department of Agriculture
USFS .....United States Forest Service
USGS .....United States Geological Survey
VA .....Vulnerability Analysis
WUI .....Wildland Urban Interface
YCFCD.....Yuma County Flood Control District

8.2 Definitions

The following terms and definitions are provided for reference and are taken from the 2013 State Plan with a few minor modifications.

ARIZONA HAZARDS

Dam Failure
A dam failure is a catastrophic type of failure characterized by the sudden, rapid and uncontrolled release of impounded water. Dam failures are typically due to either overtopping or piping and can result from a variety of causes including natural events such as floods, landslides or earthquakes, deterioration of foundation or compositional materials, penetration by vegetative roots or animal burrows, fissures or improper design and construction. Such a failure presents a significant potential for a disaster as significant loss of life and property would be expected in addition to the possible loss of power and water resources.

Drought
A drought is a deficiency of precipitation over on extended period of time, resulting in water shortage for some activity, group or environmental sector. "Severe" to "extreme" drought conditions endanger livestock and crops, significantly reduce surface and ground water supplies, increase the potential risk for wildland fires, increase the potential for dust storms, and cause significant economic loss. Humid areas are more vulnerable than arid areas. Drought may not be constant or predictable and does not begin or end on any schedule. Short term droughts are less impacting due to the reliance on irrigation and groundwater in arid environments.

Earthquake
An earthquake is a naturally-induced shaking of the ground, caused by the fracture and sliding of rock within the Earth's crust. The magnitude is determined by the dimensions of the rupturing fracture (fault) and the amount of displacement that takes place. The larger the fault surface and displacement, the greater the energy. In addition to deforming the rock near the fault, this energy produces the shaking and a variety of seismic waves that radiate throughout the Earth. Earthquake magnitude is measured using the Richter Scale and earthquake intensity is measured using the Modified Mercalli Intensity Scale.

Fissure
Earth fissures are tension cracks that open as the result of subsidence due to severe overdrafts (i.e., pumping) of groundwater, and occur about the margins of alluvial basins, near exposed or shallow buried bedrock, or over zones of differential land subsidence. As the ground slowly settles, cracks form at depth and propagate towards the surface, hundreds of feet above. Individual fissures range in length from hundreds of feet to several miles, and from less than an inch to several feet wide. Rainstorms can erode fissure walls rapidly causing them to widen and lengthen suddenly and dangerously, forming gullies five to 15- feet wide and tens of feet deep.

Flooding

Flooding is an overflowing of water onto normally dry land and is one of the most significant and costly of natural disasters. Flooding tends to occur in Arizona during anomalous years of prolonged, regional rainfall (typical of an El Nino year), and is typified by increased humidity and high summer temperatures.

Flash flooding is caused excessive rain falling in a small area in a short time and is a critical hazard in Arizona. Flash floods are usually associated with summer monsoon thunderstorms or the remnants of a tropical storm. Several factors contribute to flash flooding: rainfall intensity and duration, topography, soil conditions, and ground cover. Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area and can occur within a few minutes or hours of excessive rainfall, or a quick release from a dam or levee failure. Thunderstorms produce flash flooding, often far from the actual storm and at night when natural warnings may not be noticed.

Landslide / Mudslide

Landslides like avalanches are massive downward and outward movements of slope-forming materials. The term landslide is restricted to movement of rock and soil and includes a broad range of velocities. Slow movements, although rarely a threat to life, can destroy buildings or break buried utility lines. A landslide occurs when a portion of a hill slope becomes too weak to support its own weight. The weakness is generally initiated when rainfall or some other source of water increases the water content of the slope, reducing the shear strength of the materials. A mud slide is a type of landslide referred to as a flow. Flows are landslides that behave like fluids: mud flows involve wet mud and debris.

Levee Failure / Breach

Levee failures are typically due to either overtopping or erosive piping and can result from a variety of causes including natural events such as floods, hurricane/tropical storms, or earthquakes, deterioration of foundation or compositional materials, penetration by vegetative roots or animal burrows, fissures, or improper design, construction and maintenance. A levee breach is the opening formed by the erosion of levee material and can form suddenly or gradually depending on the hydraulic conditions at the time of failure and the type of material comprising the levee.

Severe Wind

Thunderstorms are characterized as violent storms that typically are associated with high winds, dust storms, heavy rainfall, hail, lightning strikes, and/or tornadoes. The unpredictability of thunderstorms, particularly their formation and rapid movement to new locations heightens the possibility of floods. Thunderstorms, dust/sand storms and the like are most prevalent in Arizona during the monsoon season, which is a seasonal shift in the winds that causes an increase in humidity capable of fueling thunderstorms. The monsoon season in Arizona typically is from late-June or early-July through mid-September.

Tornadoes are violently rotating columns of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds in excess of 250 mph. Damage paths can exceed a mile wide and 50 miles long. The damage from tornadoes is due to high winds. The Fujita Scale of Tornado Intensity measures tornado / high wind intensity and damage.

Tropical Storms are storms in which the maximum sustained surface wind ranges from 39-73 mph. Tropical storms are associated with heavy rain and high winds. High intensity rainfall in short periods is typical. A tropical storm is classified as a hurricane when its sustained winds reach or exceed 74 mph. These storms are medium to large in size and are capable of producing dangerous winds, torrential rains, and flooding, all of which may result in tremendous property damage and loss of life, primarily in coastal populated areas. The effects are typically most dangerous before a hurricane makes landfall, when most damage occurs. However, Arizona has experienced a number of tropical storms that caused extensive flooding and wind damage.

Subsidence

Land subsidence in Arizona is primarily attributed to substantial groundwater withdrawal from aquifers in sedimentary basins. As the water is removed, the sedimentary layers consolidate resulting in a general lowering of the corresponding ground surface. Subsidence frequently results in regional bowl-shaped depressions, with loss of elevation greatest in the center and decreasing towards the perimeter. Subsidence can measurably change or reverse basin gradients causing expensive localized flooding and adverse impacts or even rupture to long-baseline infrastructure such as canals, sewer systems, gas lines and roads. Earth fissures are the most spectacular and destructive manifestation of subsidence-related phenomena.

Wildfire
Wildfire is a rapid, persistent chemical reaction that releases heat and light, especially the exothermic combination of a combustible substance with oxygen. Wildfires present a significant potential for disaster in the southwest, a region of relatively high temperatures, low humidity, low precipitation, and during the spring moderately strong daytime winds. Combine these severe burning conditions with people or lightning and the stage is set for the occurrence of large, destructive wildfires.

Winter Storm
Winter storms bring heavy snowfall and frequently have freezing rain and sleet. Sleet is defined as pellets of ice composed of frozen or mostly frozen raindrops or refrozen partially melted snowflakes. These pellets of ice usually bounce after hitting the ground or other hard surfaces. Freezing rain begins as snow at higher altitudes and melts completely on its way down while passing through a layer of air above freezing temperature, then encounters a layer below freezing at lower level to become supercooled, freezing upon impact of any object it then encounters. Because freeing rain hits the ground as a rain droplet, it conforms to the shape of the ground, making one thick layer of ice. Snow is generally formed directly from the freezing of airborne water vapor into ice crystals that often agglomerates into snowflakes. Average annual snowfall in Arizona varies with geographic location and elevation, and can range from trace amounts to hundreds of inches. Severe snow storms can affect transportation, emergency services, utilities, agriculture and basic subsistence supply to isolated communities. In extreme cases, snowloads can cause significant structural damage to under-designed buildings.

GENERAL PLAN TERMS

Asset
Any natural or human-caused feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.

Building
A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.

Critical Facilities and Infrastructure
Systems or facilities whose incapacity or destruction would have a debilitating impact on the defense or economic security of the nation. The Critical Infrastructure Assurance Office (CIAO) defines eight categories of critical infrastructure, as follows:

Telecommunications infrastructure: Telephone, data services, and Internet communications, which have become essential to continuity of business, industry, government, and military operations.

Electrical power systems: Generation stations and transmission and distribution networks that create and supply electricity to end-users.

Gas and oil facilities: Production and holding facilities for natural gas, crude and refined petroleum, and petroleum-derived fuels, as well as the refining and processing facilities for these fuels.

Banking and finance institutions: Banks, financial service companies, payment systems, investment companies, and securities/commodities exchanges.

Transportation networks: Highways, railroads, ports and inland waterways, pipelines, and airports and airways that facilitate the efficient movement of goods and people.

Water supply systems: Sources of water; reservoirs and holding facilities; aqueducts and other transport systems; filtration, cleaning, and treatment systems; pipelines; cooling systems; and other delivery mechanisms that provide for domestic and industrial applications, including systems for dealing with water runoff, wastewater, and firefighting.

Government services: Capabilities at the federal, state, and local levels of government required to meet the needs for essential services to the public.

Emergency services: Medical, police, fire, and rescue systems.

Disaster Mitigation Act of 2000 (DMA2K)
A law signed by the President on October 30, 2000 that encourages and rewards local and state pre-disaster planning, promotes sustainability as a strategy for disaster resistance, and is intended to integrate state and local planning with the aim of strengthening statewide mitigation planning.

Emergency Preparedness and Response (EPR) Directorate
One of five major Department of Homeland Security Directorates which builds upon the formerly independent Federal Emergency Management Agency (FEMA). EPR is responsible for preparing for natural and human-caused disasters through a comprehensive, risk-based emergency management program of preparedness, prevention, response, and recovery. This work incorporates the concept of disaster-resistant communities, including providing federal support for local governments that promote structures and communities that reduce the chances of being hit by disasters.

Emergency Response Plan
A document that contains information on the actions that may be taken by a governmental jurisdiction to protect people and property before, during, and after a disaster.

Federal Emergency Management Agency (FEMA)
Formerly independent agency created in 1978 to provide a single point of accountability for all Federal activities related to disaster mitigation and emergency preparedness, response and recovery. As of March 2003, FEMA is a part of the Department of Homeland Security's Emergency Preparedness and Response (EPR) Directorate.

Flood Insurance Rate Map (FIRM)
Map of a community, prepared by FEMA that shows the special flood hazard areas and the risk premium zones applicable to the community.

Frequency
A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1% chance – its probability – of happening in any given year. The reliability of this information varies depending on the kind of hazard being considered.

Geographic Information Systems (GIS)
A computer software application that relates physical features on the earth to a database to be used for mapping and analysis.

Hazard
A source of potential danger or adverse condition. Hazards include both natural and human-caused events. A natural event is a hazard when it has the potential to harm people or property and may include events such as floods, earthquakes, tornadoes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. Human-caused hazard events originate from human activity and may include technological hazards and terrorism. Technological hazards arise from human activities and are assumed to be accidental and/or have unintended consequences (e.g., manufacture, storage and use of hazardous materials). While no single definition of terrorism exists, the Code of Federal Regulations defines terrorism as "…unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives."

Hazard Event
A specific occurrence of a particular type of hazard.

Hazard Identification
The process of identifying hazards that threaten an area.

Hazard Mitigation
Cost effective measures taken to reduce or eliminate long-term risk associated with hazards and their effects.

Hazard Profile
A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent.

HAZUS
A GIS-based nationally standardized earthquake, flood and high wind event loss estimation tool developed by FEMA.

Lateral Spreading
The lateral displacement of large, surficial blocks of soil as a result of liquefaction in a subsurface layer.

Mitigate
To cause to become less harsh or hostile; to make less severe or painful. Mitigation activities are actions taken to eliminate or reduce the probability of the event, or reduce its severity of consequences, either prior to or following a disaster/emergency.

Mitigation Plan
A systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards typically present in a defined geographic area, including a description of actions to minimize future vulnerability to hazards.

100-Hundred Year Floodplain
Also referred to as the Base Flood Elevation (BFE) and Special Flood Hazard Area (SFHA). An area within a floodplain having a 1% or greater chance of flood occurrence in any given year.

Planning
The act or process of making or carrying out plans; the establishment of goals, policies, and procedures for a social or economic unit.

Probability
A statistical measure of the likelihood that a hazard event will occur.

Promulgation
To make public and put into action the Hazard Mitigation Plan via formal adoption and/or approval by the governing body of the respective community or jurisdiction (i.e. – Town or City Council, County Board of Directors, etc.).

Q3 Data
The Q3 Flood Data product is a digital representation of certain features of FEMA's Flood Insurance Rate Map (FIRM) product, intended for use with desktop mapping and Geographic Information Systems technology. The digital Q3 Flood Data are created by scanning the effective FIRM paper maps and digitizing selected features and lines. The digital Q3 Flood Data are designed to serve FEMA's needs for disaster response activities, National Flood Insurance Program activities, risk assessment, and floodplain management.

Repetitive Loss Property
A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least $1,000 each have been paid within any 10 year period since 1978.

Risk
The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage beyond a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Substantial Damage
Damage of any origin sustained by a structure in a Special Flood Hazard Area whereby the cost of restoring the structure to its before-damaged condition would equal or exceeds 50% of the market value of the structure before the damage.

Vulnerability
Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power–if an electric substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct effects.

Vulnerability Analysis
The extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability analysis should address impacts of hazard events on the existing and future built environment.

Vulnerable Populations
Any segment of the population that is more vulnerable to the effects of hazards because of things such as lack of mobility, sensitivity to environmental factors, or physical abilities. These populations can include, but are not limited to, senior citizens and school children.

Goals
General guidelines that explain what you want to achieve. Goals are usually broad statements with long-term perspective.

Objectives
Defined strategies or implementation steps intended to attain the identified goals. Objectives are specific, measurable, and have a defined time horizon.

Actions/Projects
Specific actions or projects that help achieve goals and objectives.

Implementation Strategy
A comprehensive strategy that describes how the mitigation actions will be implemented.

GENERAL HAZARD TERMS

Fujita Scale of Tornado Intensity
Rates tornadoes with numeric values from F0 to F5 based on tornado winds peed and damage sustained. An F0 indicates minimal damage such as broken tree limbs or signs, while an F5 indicates severe damage sustained.

Liquefaction
The phenomenon that occurs when ground shaking (earthquake) causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength.

Modified Mercalli Intensity Scale
The Modified Mercalli Intensity Scale is commonly used in the United States by seismologists seeking information on the severity of earthquake effects. Intensity ratings are expressed as Roman numerals between I at the low end and XII at the high end. The Intensity Scale differs from the Richter Magnitude Scale in that the effects of any one earthquake vary greatly from place to place, so there may be many Intensity values (e.g.: IV, VII) measured from one earthquake. Each earthquake, on the other hand, should have just one Magnitude, although the several methods of estimating it will yield slightly different values (e.g.: 6.1, 6.3).

Monsoon
A monsoon is any wind that reverses its direction seasonally. In the Southwestern U.S., for most of the year the winds blow from the west/northwest. Arizona is located on the fringe of the Mexican Monsoon which during the summer months turns the winds to a more south/southeast direction and brings moisture from the Pacific Ocean, Gulf of California, and Gulf of Mexico. This moisture often leads to thunderstorms in the higher mountains and Mogollon Rim, with air cooled from these storms often moving from the high country to the deserts, leading to further thunderstorm activity in the desert. A common misuse of the term monsoon is to refer to individual thunderstorms as monsoons.

Richter Magnitude Scale
A logarithmic scale devised by seismologist C.F. Richter in 1935 to express the total amount of energy released by an earthquake. While the scale has no upper limit, values are typically between 1 and 9, and each increase of 1 represents a 32-fold increase in released energy.

APPENDIXES

APPENDIX A: OFFICIAL RESOLUTION OF ADOPTION

APPENDIX B: PLANNING PROCESS DOCUMENTATION

Michael Baker INTERNATIONAL

We Make a Difference

Yuma County Multi-Jurisdiction Hazard Mitigation Plan
Project Kick-Off Meeting

When and Where
Yuma County Health Department (auditorium west entrance), 2200 W 28th St, Yuma
April 3rd, 2017, 2:00 PM – 4:00 PM

Agenda

1. Welcome and Introductions
2. Project Overview/Purpose (Hazard mitigation overview, Benefits to Adoptees)
3. Project Schedule
4. Participation Requirements
5. Hazards to Profile / Calculated Priority Risk Index (CPRI) Exercise
6. 5-Year Plan Review
7. CIKR (Critical Infrastructure and Key Resources)
8. Capability Assessment Update
9. Mitigation Strategy
10. Data request (future growth/development, hazard studies, hazard mapping, historical events)
11. Public Outreach
12. Additional Questions?

Action Items

1. Provide relevant data/studies/reports to Mike (mgarner@mbakerintl.com / 720.514.1105)
2. Update your jurisdictions on this project
3. Identify public outreach tools that you will utilize as part of this plan

Michael Baker
INTERNATIONAL

We Make a Difference

Yuma County Multi-Jurisdiction Hazard Mitigation Plan
HMP Risk Assessment Meeting

When and Where
Yuma County Health Department (auditorium west entrance), 2200 W 28th St, Yuma
December 7, 2017, 9:00 AM – 10:30 AM (LEPC)
December 7, 2017, 10:30 AM – 12:00 PM (HMP Planning Team)

Agenda

1. Welcome and Introductions
2. Project Overview/Purpose
3. Risk and Vulnerability Assessment
4. Mitigation Strategy
5. Public Outreach
6. Additional Questions?

Action Items

1. Review draft Risk Assessment Chapter – send edits/comments to Mike (mgarner@mbakerintl.com / 720.514.1105) by xxx
2. Complete final hazard ranking survey (to be distributed after RA comment period ends)
3. Assist with public outreach
4. Start initial inter-jurisdictional discussions relating to Mitigation Strategy Workshop (date TBD – early 2018)

Michael Baker INTERNATIONAL

We Make a Difference

Yuma County Multi-Jurisdiction Hazard Mitigation Plan
HMP Planning Team Meeting

When and Where:
WebEx: https://meetings.mbakercorp.com/orion/joinmeeting.do?MeetingKey=998892780
Call-In: 571-209-6390, Access Code: 998 892 780
April 3, 2018, 10:00 – 12:00 AM

Agenda

1. Welcome and Introductions
2. Project Overview / Purpose
3. Risk and Vulnerability Assessment & Community Profiles
4. Risk Assessment Summary
5. Public Survey 1 Results
6. Mitigation Strategy
    a. Goals/Objective Review
    b. Public Survey 2 Results
    c. Review of FEMA guidance
7. Plan Maintenance / Implementation
8. Post Meeting Follow-up
9. Additional Questions?

Action Items

1. Complete final hazard ranking survey (to be emailed after this meeting)
2. Provide status updates to past mitigation actions (to be emailed after this meeting)
3. Complete plan maintenance / integration survey (to be emailed in a few weeks)
4. Begin development of new mitigation actions (to be finalized during up-coming workshops)

2929 N. Central Avenue., Suite 800 | Phoenix Plaza Tower II
Phoenix, AZ 85012 | Office: 602.279.1234

Michael Baker INTERNATIONAL

We Make a Difference

Yuma County Multi-Jurisdiction Hazard Mitigation Plan
HMP Planning Team Meeting

When and Where:
May 7 – 16, 2018
Individual meetings located at each jurisdiction

Agenda

Listed below are the main goals of the workshop:

1. Report on the status of your previous plan's mitigation projects/actions.
2. Develop your new mitigation projects/actions
3. Rank / prioritize your new mitigation projects/actions
4. Discuss planned integration of this new plan into future planning efforts/operations/etc

APPENDIX C: PUBLIC INVOLVEMENT RECORDS

- Emergency Management
CERT Application
+ Emergency Assistance Information
Events and Training Calendar
EXTREME HEAT WEATHER ALERT
Federal Emergency Management Agencies
Forms & Docs
Hazard Mitigation Plan Update
Miscellaneous/LEPC Minutes
Useful links
Preparedness

Hazard Mitigation Plan Update

Welcome to the project website for the **Yuma County Multi-jurisdictional Hazard Mitigation Plan (HMP) Update**. Please check back often for project updates and postings. This website will be discontinued after the project is completed.

NEWS

No results found.

EVENTS

No results found.

What is Hazard Mitigation?

The term "Hazard Mitigation" describes actions that can help reduce or eliminate long-term risks caused by hazards, such as floods, wildfires, landslides, tornadoes, and earthquakes. As the costs of disaster impacts continue to rise, governments and citizens must find ways to reduce hazard risks to our communities. Efforts made to reduce hazard risks are easily made compatible with other community goals; safer communities are more attractive to employers as well as residents. As communities plan for new development and improvements to existing infrastructure, mitigation can and should be an important component of the planning effort.

While mitigation activities can and should be taken before a disaster event has the chance to occur, after disasters hazard mitigation is essential. Oftentimes after disasters, repairs and reconstruction are often completed in such a way as to simply restore damaged property to pre-disaster conditions. These efforts may "get things back to normal", but the replication of pre-disaster conditions often results in a repetitive cycle of damage, reconstruction, and repeated damage. Hazard mitigation breaks this repetitive cycle by producing less vulnerable conditions through post-disaster repairs and reconstruction. The implementation of such hazard mitigation actions now by state and local governments means building stronger, safer and smarter communities that will be able to reduce future injuries and damages.

About the Project

Yuma County created its previous Mitigation Plan in accordance with the requirements of the **Federal Stafford Act, the National Flood Insurance Act, and 44 Code of Federal Regulations (CFR).** The last plan was approved by FEMA in 2010, and was adopted by the County Board of Supervisors and municipalities within Yuma County. These plans must be updated and approved by FEMA every five years.

Yuma County and its participating jurisdictions (the Cities of San Luis, Somerton, and Yuma; Town of Wellton), the Cocopah Tribe, and other agencies and organizations are now in the process of updating the County-wide Hazard Mitigation Plan and expect to have it approved by FEMA in 2018.

Plan participants will benefit from this project by:

- **Ensuring eligibility for all sources of hazard mitigation funds made available through FEMA.**
- Increasing public awareness and understanding of vulnerabilities as well as support for specific actions to reduce losses from future natural disaster.
- Ensuring community policies, programs, and goals are compatible with reducing vulnerability to all hazards and identifying those that are incompatible.
- Building partnerships with diverse stakeholders increasing opportunities to leverage data and resources in reducing workloads as well as achieving shared community objectives.
- Expanding the understanding of potential risk reduction measures to include: local plans and regulations; structure and infrastructure projects; natural systems protection; education and awareness programs; and other tools.
- Informing the development, prioritization, and implementation of mitigation projects. Benefits accrue over the life of these projects as losses are avoided from each subsequent hazard event.

Project Outreach and Communications

The Yuma County Office of Emergency Services is leading this project for the County and wants to ensure that all community stakeholders and citizens have an opportunity to be involved in this planning process. All project information and messaging will be posted utilizing this webpage and updates will also be communicated via the Yuma County Emergency Management website.

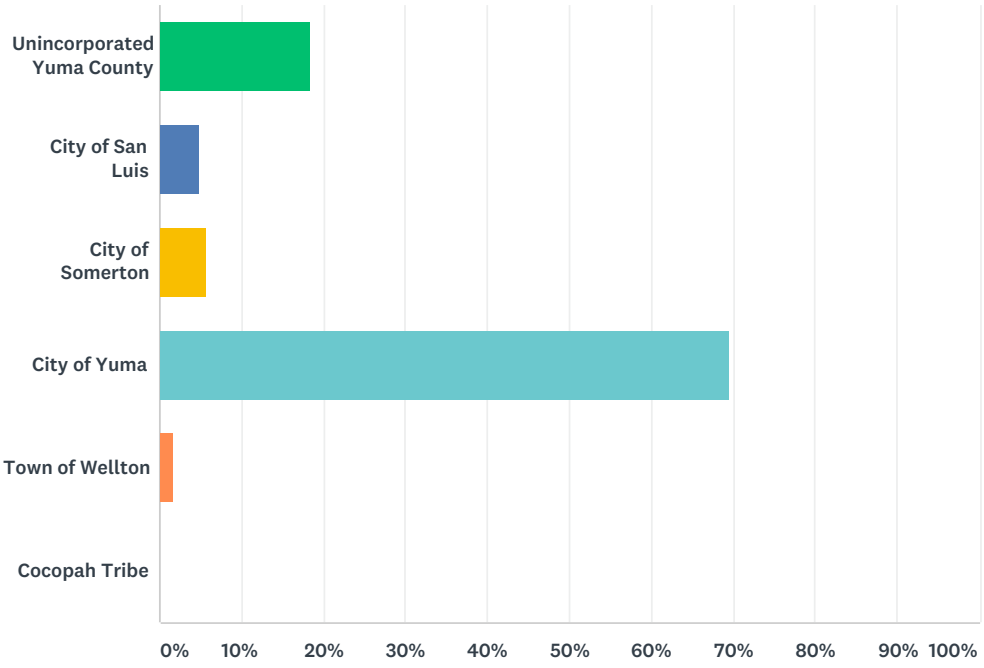
Stay tuned for upcoming opportunities to participate in this important planning process!

Surveys

Surveys will be utilized throughout the planning process to engage both the Hazard Mitigation Planning Team and the general public. Links to these surveys will be posted below as they become available.

Q1 Which of the participating jurisdictions do you live in?

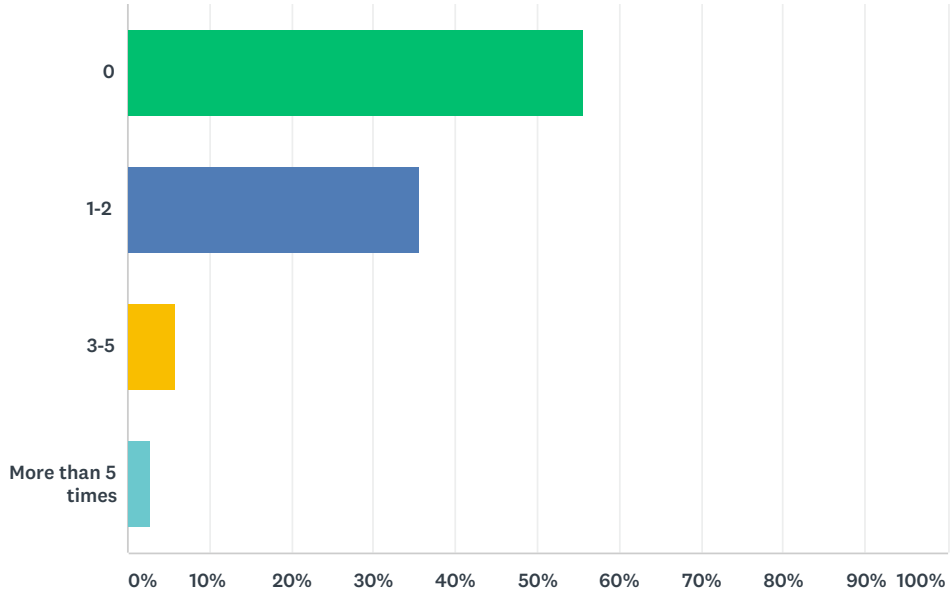
Answered: 508 Skipped: -1



ANSWER CHOICES	RESPONSES	
Unincorporated Yuma County	18.50%	94
City of San Luis	4.72%	24
City of Somerton	5.71%	29
City of Yuma	69.49%	353
Town of Wellton	1.57%	8
Cocopah Tribe	0.00%	0
TOTAL		508

Q2 How many times has a natural hazard majorly impacted your daily life in the last five years?

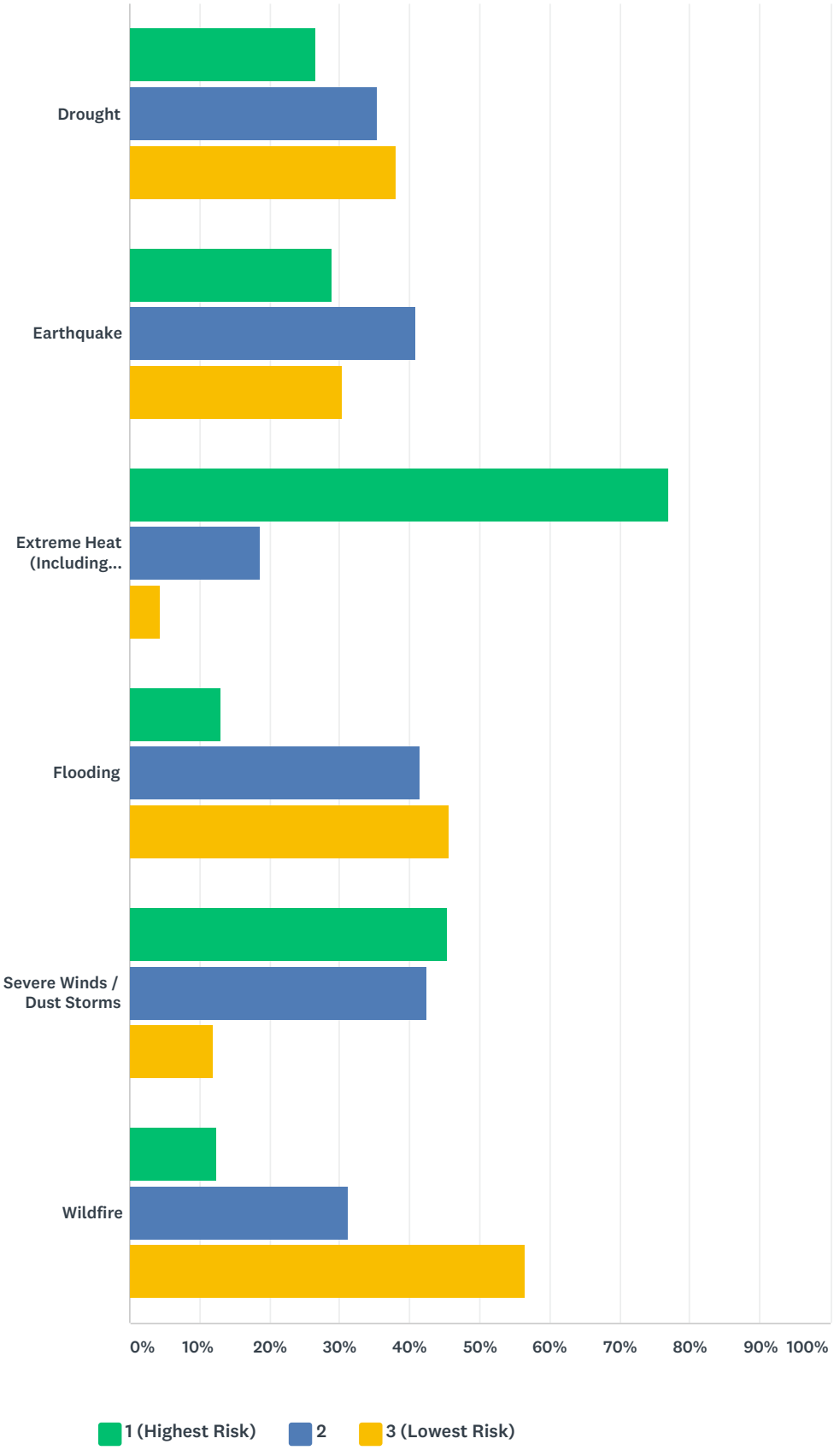
Answered: 508 Skipped: -1



ANSWER CHOICES	RESPONSES	
0	55.71%	283
1-2	35.63%	181
3-5	5.91%	30
More than 5 times	2.76%	14
TOTAL		508

Q3 Please rank the following hazards based on the overall risk that they present.

Answered: 508 Skipped: -1

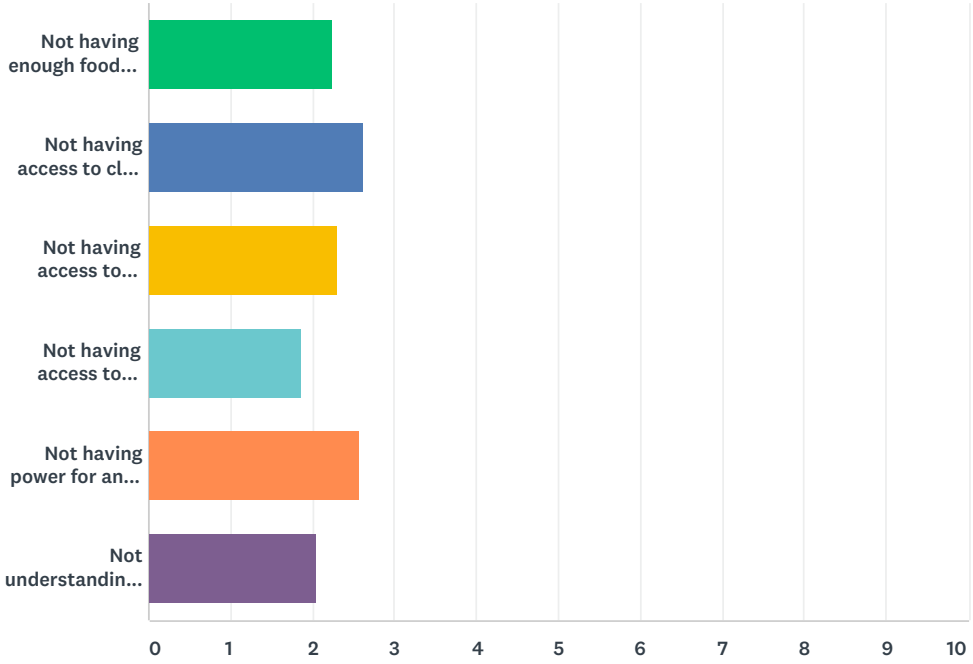


	1 (HIGHEST RISK)	2	3 (LOWEST RISK)	TOTAL
Drought	26.57% 135	35.43% 180	37.99% 193	 508

Earthquake	28.94% 147	40.75% 207	30.31% 154	508
Extreme Heat (Including Power Outages)	76.97% 391	18.70% 95	4.33% 22	508
Flooding	12.99% 66	41.34% 210	45.67% 232	508
Severe Winds / Dust Storms	45.47% 231	42.52% 216	12.01% 61	508
Wildfire	12.40% 63	31.10% 158	56.50% 287	508

Q4 How concerned are you about the following scenarios?

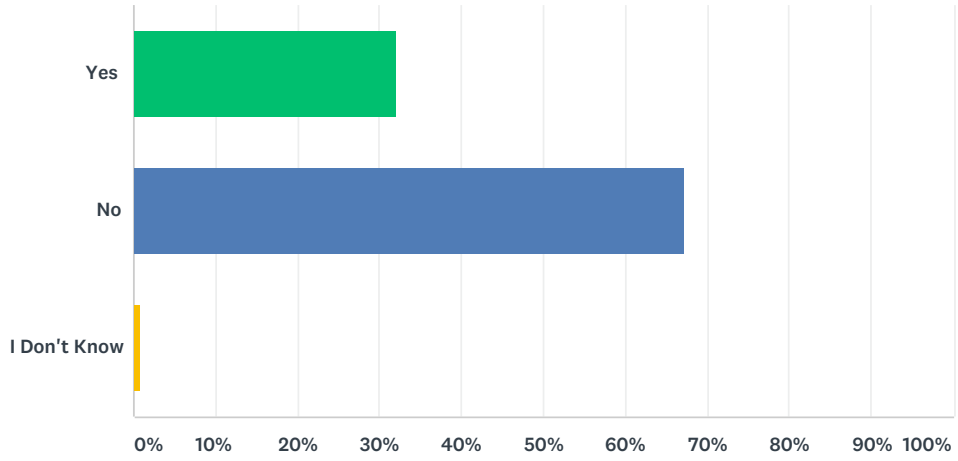
Answered: 508 Skipped: -1



	NOT CONCERNED	SOMEWHAT CONCERNED	EXTREMELY CONCERNED	I DON'T KNOW/NO OPINION	TOTAL	WEIGHTE AVERAG
Not having enough food during a disaster	13.98% 71	49.61% 252	34.65% 176	1.77% 9	508	2.
Not having access to clean water during a disaster	5.54% 28	28.12% 142	64.95% 328	1.39% 7	505	2.
Not having access to medications during a disaster	18.34% 93	35.50% 180	43.59% 221	2.56% 13	507	2.
Not having access to transportation in the event of an evacuation	39.33% 199	36.17% 183	23.12% 117	1.38% 7	506	1.
Not having power for an extended period of time	5.72% 29	30.97% 157	62.72% 318	0.59% 3	507	2.
Not understanding/hearing warning sirens or other warning messages	30.69% 155	37.82% 191	28.71% 145	2.77% 14	505	2.

Q5 Do you have a preparedness kit?

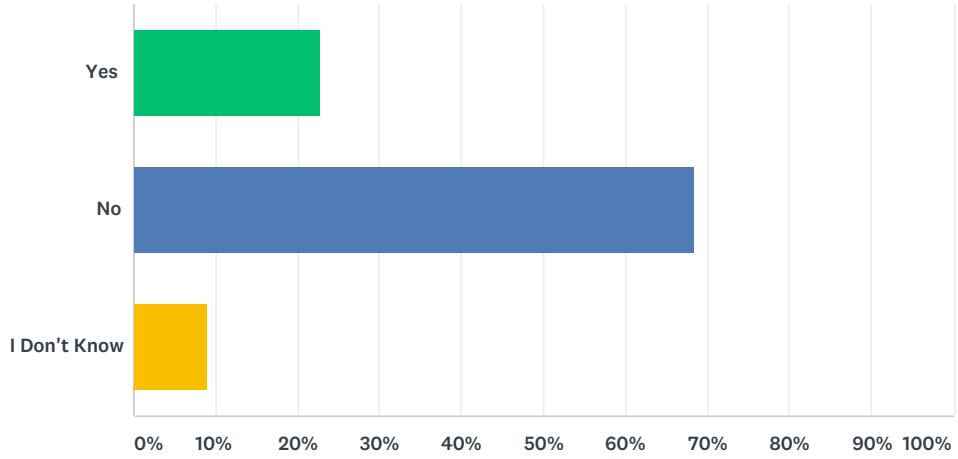
Answered: 502 Skipped: 5



ANSWER CHOICES	RESPONSES	
Yes	32.07%	161
No	67.13%	337
I Don't Know	0.80%	4
TOTAL		502

Q6 Have you taken any actions to make your home or neighborhood more resistant to hazards?

Answered: 506 Skipped: 1



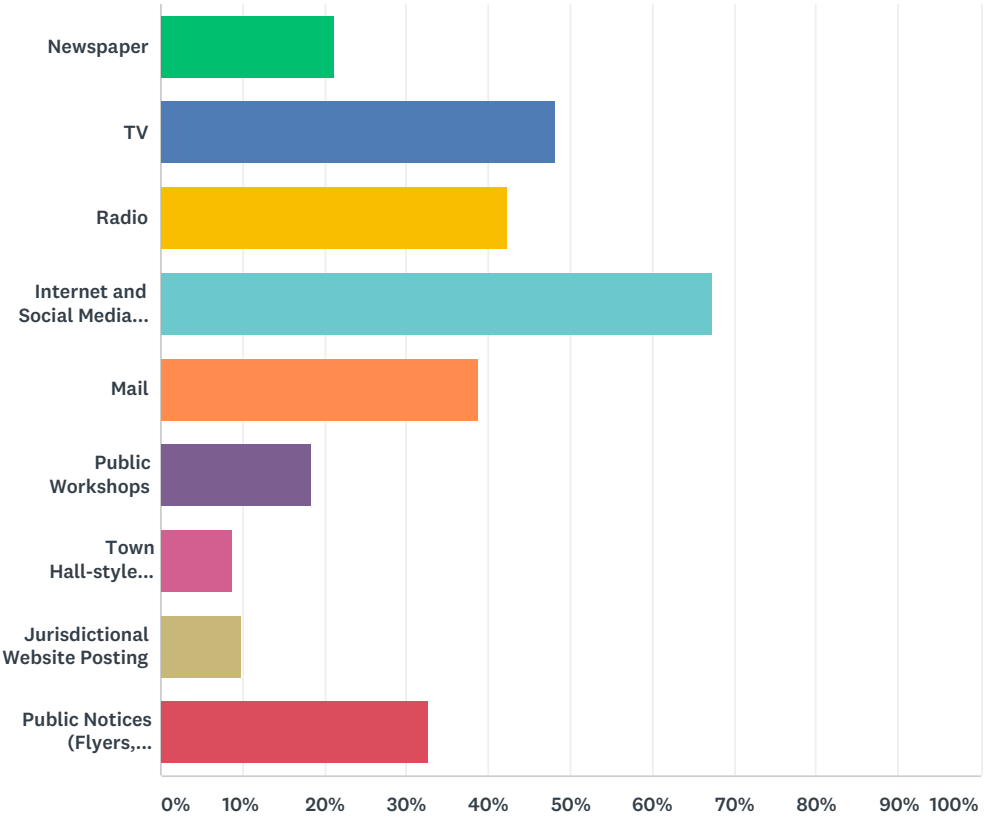
ANSWER CHOICES	RESPONSES	
Yes	22.73%	115
No	68.38%	346
I Don't Know	8.89%	45
TOTAL		506

Q7 Do you have any ideas for projects or actions that you would like to see the county or its jurisdictions implement to reduce your community's risk from natural disaster events?

Answered: 239 Skipped: 268

Q8 What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards (you may select more than one)?

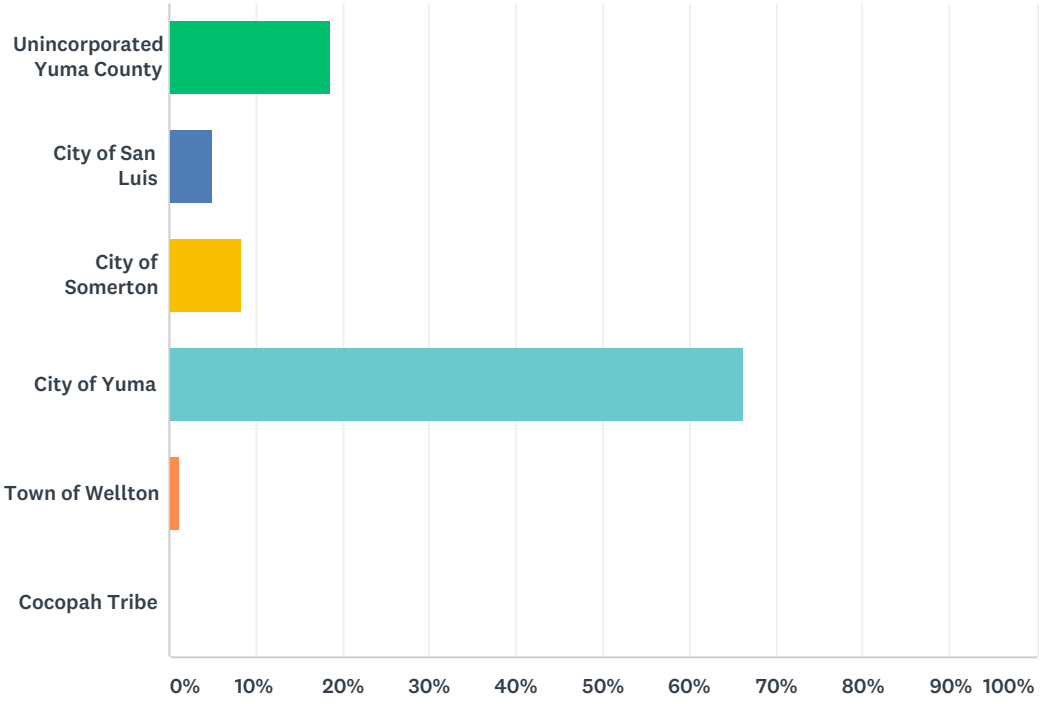
Answered: 497 Skipped: 10



ANSWER CHOICES	RESPONSES	
Newspaper	21.13%	105
TV	48.09%	239
Radio	42.25%	210
Internet and Social Media (Twitter, Facebook)	67.40%	335
Mail	38.63%	192
Public Workshops	18.51%	92
Town Hall-style Meetings	8.85%	44
Jurisdictional Website Posting	9.86%	49
Public Notices (Flyers, Postings, etc.)	32.60%	162
Total Respondents: 497		

Q1 What jurisdiction do you live in?

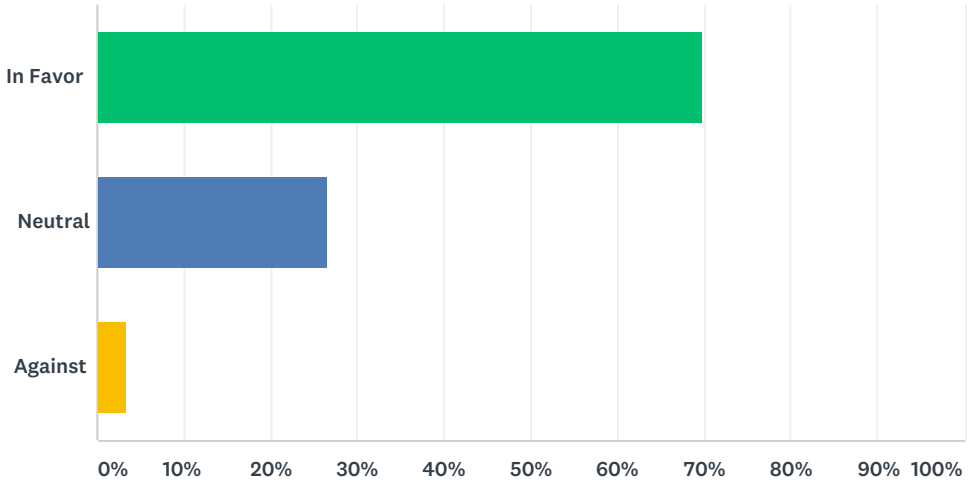
Answered: 449 Skipped: 0



ANSWER CHOICES	RESPONSES	
Unincorporated Yuma County	18.71%	84
City of San Luis	5.12%	23
City of Somerton	8.46%	38
City of Yuma	66.37%	298
Town of Wellton	1.34%	6
Cocopah Tribe	0.00%	0
TOTAL		449

Q2 Local Planning and Regulations-Building Codes-Local Zoning and Land Use Codes-Identification/Mapping of Hazard Areas-Stormwater Management Planning

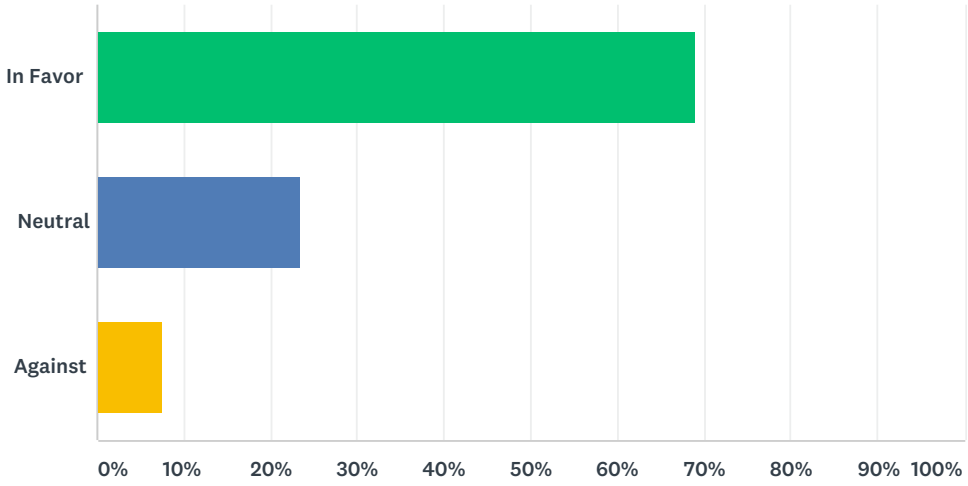
Answered: 443 Skipped: 6



ANSWER CHOICES	RESPONSES	
In Favor	69.98%	310
Neutral	26.64%	118
Against	3.39%	15
TOTAL		443

Q3 Structure and Infrastructure Projects-Construct Tornado Safe Rooms-Improve Drainage to Reduce Flood Threats-Retrofit Buildings to Higher Code Standards-Acquire and Demolish Structures in Hazard-prone Areas

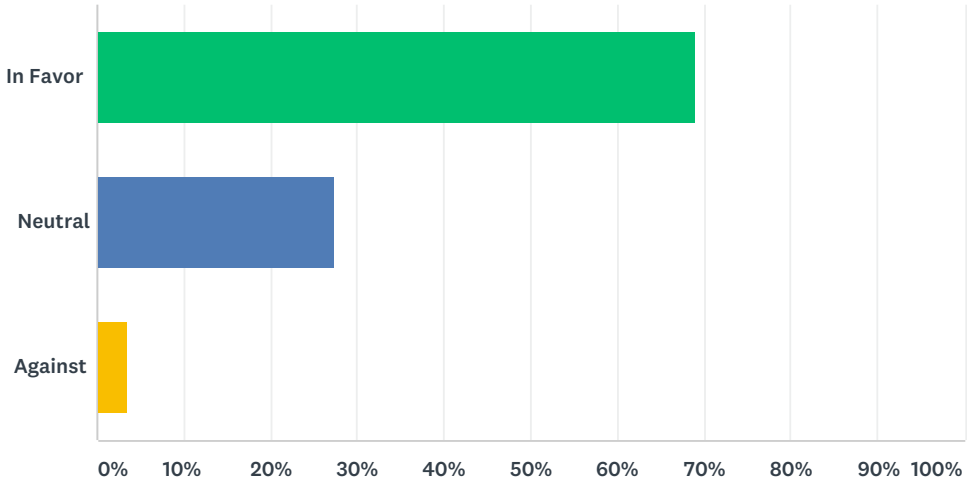
Answered: 443 Skipped: 6



ANSWER CHOICES	RESPONSES	
In Favor	69.07%	306
Neutral	23.48%	104
Against	7.45%	33
TOTAL		443

Q4 Natural Systems Protection-Implement Erosion Control Measures-Create Defensible Space Regulations-Protect and Preserve Natural Areasx

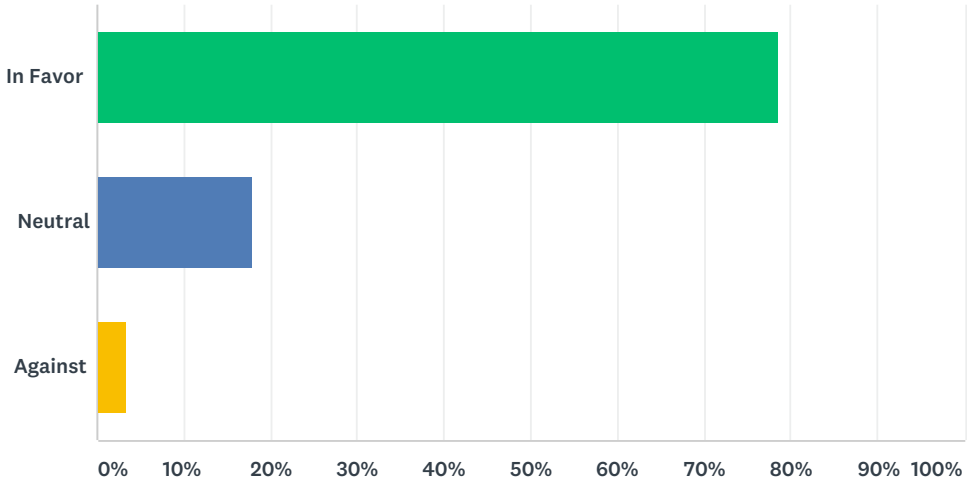
Answered: 445 Skipped: 4



ANSWER CHOICES	RESPONSES	
In Favor	68.99%	307
Neutral	27.42%	122
Against	3.60%	16
TOTAL		445

Q5 Education and Awareness Programs-Incentivize Drought Tolerant Landscaping-Host Informational Workshops and Events-Educate the Public about Risks

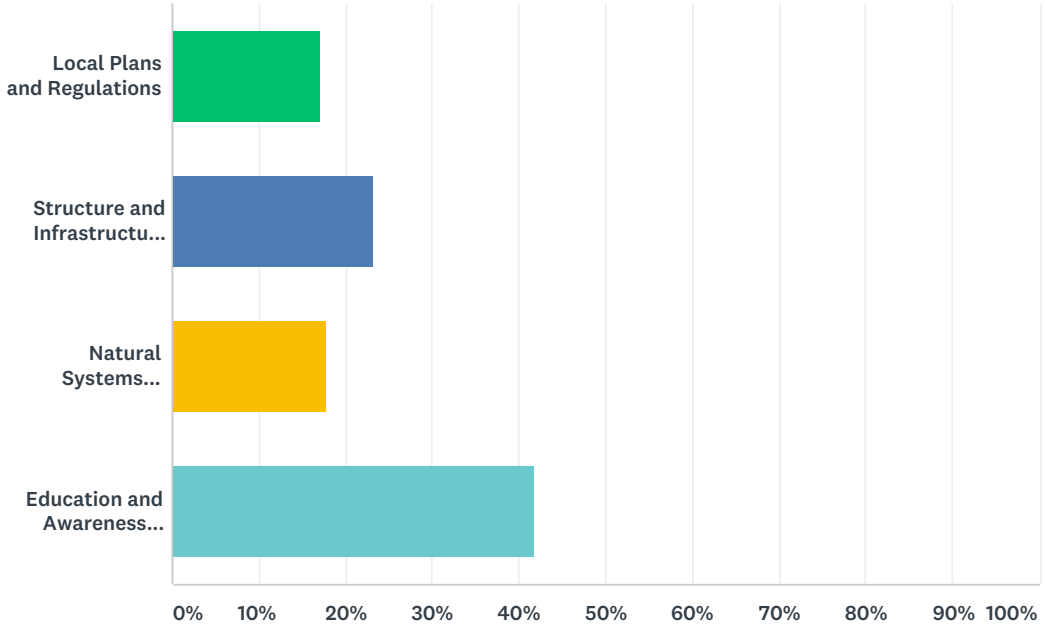
Answered: 444 Skipped: 5



ANSWER CHOICES	RESPONSES	
In Favor	78.60%	349
Neutral	18.02%	80
Against	3.38%	15
TOTAL		444

Q6 Which of the above four categories are you most supportive of?

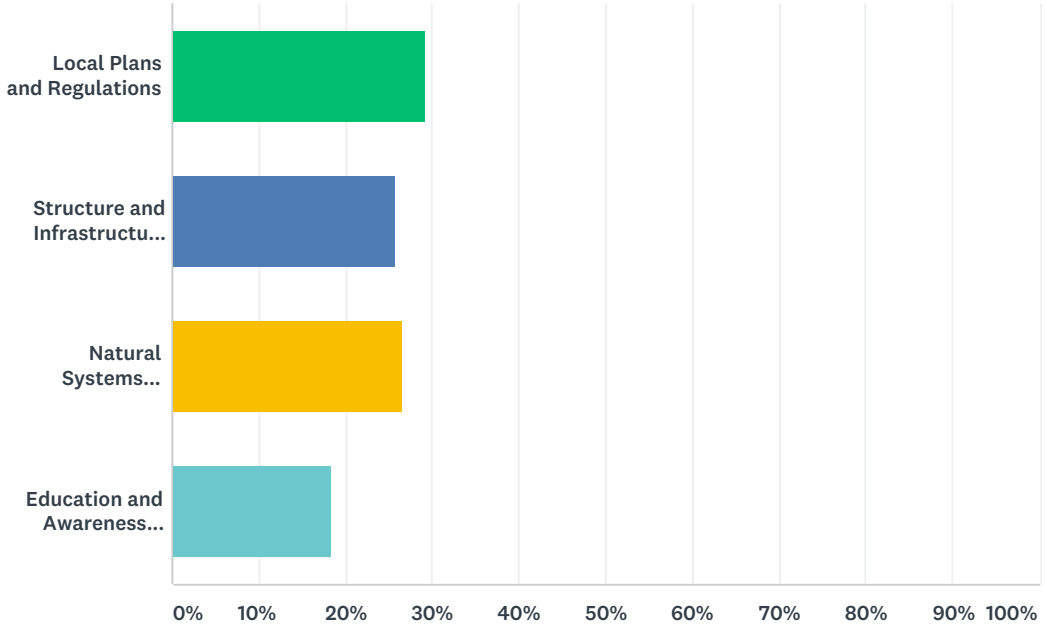
Answered: 443 Skipped: 6



ANSWER CHOICES	RESPONSES	
Local Plans and Regulations	17.16%	76
Structure and Infrastructure Projects	23.25%	103
Natural Systems Protection	17.83%	79
Education and Awareness Programs	41.76%	185
TOTAL		443

Q7 Which of the above four categories are you least supportive of?

Answered: 423 Skipped: 26



ANSWER CHOICES	RESPONSES	
Local Plans and Regulations	29.31%	124
Structure and Infrastructure Projects	25.77%	109
Natural Systems Protection	26.48%	112
Education and Awareness Programs	18.44%	78
TOTAL		423

Q8 Please share your top idea for a specific mitigation project or action that you would like to see implemented by your government, should funding be available.

Answered: 142 Skipped: 307

Q9 Please share any additional comments or information, relating to mitigation strategies for natural hazards, that you would like your jurisdiction to receive. If you would like to be contacted regarding your comments, please include contact information as appropriate.

Answered: 89 Skipped: 360

APPENDIX D: HISTORICAL HAZARD MITIGATION PROJECTS

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Cocopah Tribe	C-4		Analyze strength of water towers on North and West Reservation to determine the amount of sheer force they can withstand sheer forces during a large earthquake.	Complete	FY 2014	This information was in the original document when built.
Cocopah Tribe	C-5		Provide Emergency Shut-off Valves in main Water Lines so adequate pressure can be maintained in undamaged system for fire fighting.	Complete	2012	
Cocopah Tribe	C-6		Elevate Ground Level Transformers for sewer transfer stations so they will continue operating in event of flood.	Complete	2012	
San Luis	12.A.2	Water Conservation Public Education	Develop and distribute brochures outlining the advantages of water conservation to City water-users	Complete, Ongoing		Initial program for public education brochures was done. Will continue to utilize brochures and municipal utility billing inserts, electronic billboard, website and media to encourage water conservation.
San Luis	12.A.1	Water Rights Acquisition	Assurance of water supply through acquisition of senior Colorado River Water Rights with retirement of agricultural lands	Complete, Ongoing		After the inaugural push to obtain water rights of retired/developed agricultural lands, City of San Luis Public Works, Utility and Development

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
						Services Departments continue to pursue water rights to supplement municipal water allocation.
San Luis	13.A.2	Well Site Video	Provide wireless video cameras and transmitters for seven (7) Well Sites to mitigate vandalism	Complete	2007	Cameras have been installed at identified locations.
San Luis	13.A.1	Wastewater Treatment Plant Video	Provide wireless video cameras and transmitters for two (2) Wastewater Treatment Plant Sites for mitigation of vandalism	Complete	2007	Cameras have been installed.
San Luis	8.A.2	Well Site Lighting	Provide additional lighting at all Well Sites for added security	Complete	2006	Lighting has been installed.
San Luis	8.B.1	Upgrade Well Site chlorine buildings	Provide more secure entrance to all chlorine buildings to mitigate potential HAZMAT incidents due to illegal entry	Complete	2006	Security measures have been improved to provide enhanced security in identified locations.
San Luis	5.B.1	Portable Pumps	Provide two (2) additional 6" portable pumps for mitigation of flooding due to heavy rainfall and wastewater emergencies.			1 6” portable and two smaller pumps have been purchased to allow for the timely removal of accumulated rainfall and run-off during thunderstorms and other identified removal applications of wastewater events.

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
San Luis	9.C.1	Transportation Planning Agency Coordination	Continue to coordinate and participate with inter-agency transportation planning groups such as the Yuma Metropolitan Planning Organization, Greater Yuma Port Authority, Yuma Marine Corps Air Station, and Arizona Department of Transportation	Ongoing		The City of San Luis continues to participate in transportation planning groups to insure awareness and input regarding transportation issues within corporate boundaries; AZ highway 195, LPOE 2, Rolle Airfield (Aux 4), etc.
San Luis	7.C.1	Seismic Building Code Enforcement	Continue to enforce seismic requirements in current building codes	Ongoing		Building Officials continue to enforce family of codes associated with new construction and appropriate remodeling or change of use.
San Luis	1.A.1	Enforcement of Zoning and Building Code Ordinances	Continue to enforce zoning and building codes through current site plan, subdivision, and building permit review processes to reduce the effects of flood, thunderstorm/high wind, earthquake, transportation and other hazards on new buildings and infrastructure	Ongoing		The City of San Luis Fire and Development Services Departments have adopted a new family of codes (NFPA 1, UBC, UMC, UPC, etc) to insure new construction projects continue to be built to the latest standards to reduce effects of floods, thunderstorms/high wind, earthquake and other hazards.

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
San Luis	6.C.1	Wildfire Mitigation Cooperation	Coordinate/cooperate with BLM/BOR wildfire mitigation activities along the Colorado River	Ongoing		The City of San Luis Fire Department continues to work with BLM/BOR regarding the potential of wildfire events along the Colorado River. SLFD has budgeted for and is in the process of purchasing a slip-in unit for mounting to allow active firefighting efforts in previously un-accessible locations. Projected costs of this unit is $ 15, 000.
Somerton	7.A.1	Relocation to New Public Safety Facility	Relocate police and fire departments to a new joint-use facility that is seismic Zone 4 compliant. New facility will also include an emergency operations center.	Complete	2006	This project was completed in 2006 and we have operated the EOC during this year for storm flooding conditions.
Somerton	9.A.1	Transportation Study	Finalize current Small Area Transportation Study currently underway, to identify areas concern. Study is funded by ADOT	Complete	2006	
Somerton	8.A.1	Enforcement of the NFPA101 and UFC	Enforcement of the NFPA101 and UFC that requires HAZMAT placarding on fixed site facilities	In progress		The team decided not to identify hazardous materials as a hazard for the 2010 plan..
Somerton	8.A.2	Commodity Flow Study	Hire a consultant to perform a commodity flow study to determine volume and	No action		No funding for this project at this or in the future

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
			frequency of HAZMAT's being transported through the City of Somerton			
Somerton	1.A.1	Enforcement of Zoning and Building Code Ordinances	Continue to enforce zoning and building codes through current site plan, subdivision, and building permit review processes to reduce the effects of flood, thunderstorm/high wind, earthquake, transportation and other hazards on new buildings and infrastructure	In progress		This is an ongoing project.
Somerton	7.C.1	Seismic Building Code Enforcement	Continue to enforce current seismic building codes to reduce the effects earthquake hazards on new buildings and infrastructure	In progress		With all of the seismic activity in our area, there will be new studies and new data that when it comes available we will revise our codes to meet the new changes.
Somerton	5.B.3	Somerton Avenue Storm Drain	Proposed flood control drain pipe to be installed in Somerton Avenue between Fern Street and Highway 95. Drain pipe will be tied to existing drain in Highway 95 that outfalls to a retention basin	No action		No funding for this project.
Somerton	11.A.1	Water Conservation Plan Adoption	Formally adopt the Water Conservation Plan for the City of Somerton	Complete	2008	Adopted by resolution in 2008.

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Somerton	11.A.2	Enforcement of Low Water-Use Fixture Requirements	Enforce low water use fixture requirements for new residential/commercial buildings in current plumbing codes	In progress		All new construction have low water use fixtures installed, verified by building code inspector.
Somerton	5.B.2	State Avenue Storm Drain	Proposed flood control drain pipe to be installed in State Avenue between Spring Street and Highway 95. Drain pipe will be tied to existing drain in Highway 95 that outfalls to a retention basin	Complete		Future project as funding comes available.
Somerton	5.B.1	Congress Avenue Storm Drain	Proposed flood control drain pipe to be installed in Congress Avenue between Cano Street and Highway 95. Drain pipe will be tied to existing drain in Highway 95 that outfalls to a retention basin	Complete		As funding becomes available.
Somerton	SO-1		Enforcement of Zoning and Building codes to reduce the effects of flood, thunderstorm/high wind and earthquake.	Complete	Prior to 2018	All new construction must meet current standards and is verified by building code inspectors
Somerton	SO-3		Water Conservation Plan Adoption to conserve water as a community to maintain water supply availability.	Complete	2000	Adopted by Resolution in 2000

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Somerton	SO-5		Proposed State Ave storm drain pipe to be installed in State Ave between Spring Street and Hwy. 95. Drain pipe will be tied to existing drain in Hwy. 95 that outfalls to a retention basin to prevent flooding.	Complete	Prior to 2018	
Somerton	SO-6		Proposed flood control drain pipe to be installed in Congress Avenue between Cano Street and Highway 95. Drain pipe will be tied to existing drain in Highway 95 that outfalls to a retention basin to distribute flow and prevent flooding.	Complete	Prior to 2018	
Wellton	1.A.1	Enforcement of Zoning and Building Code Ordinances	Continue to enforce zoning and building codes through current site plan, subdivision, and building permit review processes to reduce the effects of flood, thunderstorm/high wind, earthquake, transportation and other hazards on new buildings and infrastructure	Ongoing		The Town has since updated it's building code and also has appointed a Code Enforcement Officer. This is a continual project in nature.
Wellton	7.A.1	Seismic Building Code Compliance	Continue to require compliance with Zone 3 Seismic building codes for	Ongoing		The Town ensures that contracted Engineers build and design structures that are

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
			new residential and commercial developments.			designed to meet current earthquake regulations.
Wellton	12.A.2	Enforce Low Water-Use Fixture	Continue to enforce low water-use fixture requirements in current plumbing codes	Ongoing		The Town is in process of drafting an ordinance to enforce low water use fixtures in commercial buildings.
Wellton	9.C.1	Inter-Agency Coordination	Continue to coordinate and participate with inter-agency transportation planning groups such as the Yuma County Highway Department and Arizona Department of Transportation.	Ongoing		Town of Wellton participates in the YMPO (Yuma Metro Planning Org.) for transportation planning. One project is subsidizing the YCAT transport system. Also participates in the Yuma Co Fllod District and works with other local and state agencies as needed.
Wellton	5.B.1	Local Area Drainage Study	Perform a local area drainage study to determine the vulnerability of Oakland and San Jose Avenues from Dome Street to Jessie Street to determine the need for drainage improvements in the area.	Pending		The Town is pending funds from the Yuma County Flood District for this project. Once completed, delete.
Wellton	5.B.2	Update Current FEMA Delineated Floodplain Mapping	Submit a formal request to the Yuma County Flood Control District to perform the necessary studies and analysis to update/revise the currently delineated	Pending approval from FEMA. Completed		The Town worked with the Yuma County Flood District to complete a flood plan study and altered the flood plain layout. Pending FEMA approval. Once approved, delete program.

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
			floodplains so that they reflect actual conditions			
Wellton	6.A.1	Enforcement of Nuisance Abatement Ordinance	Continue to enforce current nuisance abatement ordinance for the control of weeds, debris and other flammable materials within the Town limits	Ongoing		The Town PD identifies and evaluates hazard and nuisance abatement every 6 months. Violations are addressed as identified. This is a continuous program.
Wellton	8.C.1	Zoning Mapping Analysis and Update	Analyze and update current zoning maps to regulate land-use elements involving HAZMAT usage, dispensing and storage.	Ongoing		The Town received $150,000.00 grant from Az Dept Transportation to evaluate transportation and land use. The Town will also update/add this to it's General Plan when updated.
Wellton	5.A.1	Adopt Formal Floodplain Regulations	Coordinate with, formally adopt, and regulate to new Yuma County Floodplain Regulations	Ongoing		The Yuma County Flood District administers this and updates as needed..
Wellton	8.A.1	HAZMAT Public Education	Promote awareness to hazardous materials transport and handling within the Town of Wellton	Ongoing		The Planning Team decided not to identify hazardous materials as hazard for this 2010 plan. The focus is directed to natural hazards.

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Wellton	9.D.1	Traffic Law Enforcement	Continue to enforce traffic laws within the Town limits	Ongoing		The Town Police dept has increased the size of the agency and vehicle fleet to address traffic problems as they are discovered/observed. The vehicles have more equipment and are equipped with both moving and stationary radar for enforcement. This is also a continuous project.
Wellton	12.A.1	Prepare a Water Conservation Plan	Develop and formally adopt a Water Conservation Plan per recommendations from the Arizona Department of Water Resources	Complete	2005	The Town adopted a water rate with a conservation plan built into it back in 2005. This has proven to be effective
Wellton	8.A.2	HAZMAT Route Signage	Post signs along the Town designated HAZMAT routes to safely guide transport of materials through the Town	No action		The Town is attempting to designate routes within Town limits for truck routes, hazard material routes and will post signs one any routes are identified and approved by ordinance. Once funding and ordinance approved, signs can be posted and project deleted.
Wellton	W-10		Adopt formal Floodplain regulations to reduce flooding issues within the community.	Complete	Prior to 2018	Recently completed a Water Loss Study

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Yuma	5.B.1	28th Street Storm Drainage	Storm sewer installation in 28th St. from 8th Ave. to Smucker Park Retention Basin. Three phase project. YCFCD Master Plan	In progress		All 3 phases are design complete. Phase 1 (basin) is being reviewed by the Arizona Department of Water Quality, because it will cause the construction of a jurisdictional dam within a Seismic Zone 4 area, which has never been accomplished previously in the State of Arizona. Construction anticipated to commence Fall 2010. Upstream Phases 2 & 3 construction to follow completion of Phase 1.
Yuma	12.A.2	Low Water-Use Fixture Requirements	Enforce low water use fixture requirements for new residential/commercial buildings.	Currently enforcing		The city has adopted the IRC and the IPC both of which have provisions for low flow fixtures in both commercial and residential structures. The codes limit the amount of water that can flow from fixtures such as toilets sinks and showers heads.
Yuma	9.C.1	Transportation Accident Mitigation	Continue to coordinate and participate with inter-agency transportation planning groups such as the Yuma Metropolitan Planning Organization, Greater Yuma Port Authority, Yuma Marine Corps Air Station, and	No action		The City of Yuma has chosen not to mitigate against Transportation related accidents, due to the desire of focusing on the natural hazards.

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
			Arizona Department of Transportation.			
Yuma	6.B.1	Riverfront Park Development	Clear and remove dense stands of salt-cedar and re-establish native riparian vegetation along the Colorado River to produce a natural park area and mitigate the effects of wildland fire. Costs reflect vegetation removal and replacement only.	In progress		Ongoing project
Yuma	7.A.1	Earthquake Safety Education	Continue to provide earthquake safety awareness to the community on an annual basis through booths at fairs, brochures, Channel 73 public service announcements, and utility bill inserts.	In progress		Ongoing project
Yuma	12.A.1	Water Conservation Planning	Encourage the use of xeriscape landscaping in new and existing developments through impact fee incentives and public education through the “Use Water Wisely” Program	In progress		Ongoing & active activity

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Yuma	8.A.1	LEPC Participation	Continue to serve an active role in community planning and facility management where EHS materials are concerned.	No action		City of Yuma has chosen not to mitigate against HAZMAT incidents, due to the desire of focusing on natural hazards.
Yuma	5.B.4	Hacienda Retention Basins	4 phase project to excavate existing materials and replace with landscaping	Complete	2004-2005	
Yuma	5.B.5	Hacienda Estates Storm Force Main	4 underground pipes and pump stations from retention basins to west line of subdivision	Complete	2004-2005	
Yuma	5.B.14	4th Street Storm Sewer	Construct collection system from 9th Avenue to basin site at the southeast corner of the Avenue A intersection with 4th Street. Conjunction with YCFCD Storm Drainage Plan	Complete	2004-2005	
Yuma	5.B.2	8th Avenue Storm Sewer Extension	Install 3000 L.F.- 48" storm sewer and appurtenances/planning context YCFCD West Yuma Mesa Master Plan. Design phase	No action		Upstream project tied to full completion of ID 5.B.1
Yuma	8.A.3	HAZMAT Commodity Flow Study	Hire a consultant to perform a commodity flow study for the major transportation corridors within the City of Yuma to include rail, air, roadways, and waterways.	No action		COY has chosen not to mitigate against HAZMAT incidents since they are human caused and do not meet the criteria of this plan.

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Yuma	5.B.9	Ext. Storm Sewer/Arena Dr/9th to 10th	Extend existing storm sewer	In progress		Project in design phase
Yuma	5.B.6	Storm Water NPDES permit	2 phase project. Phase 1 completed. Phase II implement action plan and provide documentation to Arizona Department of Environmental Quality	In progress		Mandated activity by the USEPA
Yuma	5.B.7	6th Place Storm Sewer	In accordance with YCFCD Master Plan Construct 1750 linear feet of 24"to 36" storm drain and appurtenances.	Complete		
Yuma	7.C.1	Seismic Building Code Enforcement	Continue to enforce current Zone D1 seismic requirements in residential and commercial building codes.	Currently enforcing		Currently the city has the 2003 IRC and IBC codes adopted and we inspect all requirements for seismic. This includes liquefaction mitigation, seismic construction requirements and seismic bracing for all equipment and piping in buildings.
Yuma	5.B.10	Area Detention Basin-Victoria Meadows	Construction completed by YCFCD 02/03. City to construct storm drain lines and provide basin landscaping/dust suppression features	Complete	2003	
Yuma	5.B.16	The Manors Storm Sewer System	Design, construct and inspect storm sewer to drain La Mesa Manors 1 and 2, Desert View and La Mesa Park	No action		Lack of funding to design & construct upper reach drainage to existing YCFCD main drainline.

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
			subdivisions/Conform to YCFCD East Mesa Storm sewer Outfall Plan/Multi phase project			
Yuma	1.A.3	Enforcement of Zoning and Building Code Ordinances	Continue to enforce zoning and building codes through current site plan, subdivision, and building permit review processes to reduce the effects of flood, thunderstorm/high wind, earthquake, transportation and other hazards on new buildings and infrastructure	Currently enforcing		The city has adopted the ICC family of codes to include the IBC, IRC,IEBC,IMPC,NEC,IPC,IMC,IFGC. We perform plan review, issue permits and perform all required inspections. We also enforce property maintenance codes for existing buildings to be sure they are in safe conditions.
Yuma	5.B.8	Fix alley drainage 4th Ave. and Ave A	2 phase project; design and construction	In progress		Phase 1 completed at a cost of $188,992. Phase 2 design to commence when funding is available
Yuma	5.B.11	Storm Pump Station Telemetry	Monitor and control condition of storm water pump stations (11)	No action		No progress due to lack of funding
Yuma	5.B.12	4th Avenue drainage upgrade	Replacement of East-West drain lines beneath 4th Avenue	Complete		
Yuma	5.B.13	Araby Road Drainage improvements	Replace drainage spillways with curb inlets and piping to storm water basins	Complete		
Yuma	5.B.15	Storm Water Lift Station Improvements	Install ductile iron piping in four lift station locations, Reagan School, 20th Street,	No action		Project cancelled. If necessary, will be undertaken as an O&M activity.

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
			McKinly Street and 16th Street			
Yuma	8.A.2	Area Service Highway Project Participation	Coordinate/cooperate with the implementation of the proposed GYPA Area Service Highway and Commercial Port of Entry project	Complete	2010	Area Service Highway has been completed and is in use. Commercial Port of Entry is complete in the United States And awaiting computers and office furnishings for the facility in Mexico. Opening anticipated Summer 2010.
Yuma	Y-5		Storm water Basin Evacuation: 15th Street Basin at 45th Avenue and Storm water Basin Evacuation: 16th Street at 46th Avenue. Design, construct and inspect improvements to Cibola Heights Subdivision basin drainage and landscaping. The Developer of this subdivision did not complete basin improvements, to properly provide the City with a fully operational and aesthetically acceptable site	Complete	FY 2014	Cibola Heights basin improvements completed in FY 2014.
Yuma County	1.A.1, 5.A.1, 5.B.1,5.D.1	FCD-District Regulations	Maintain Compliance with National Flood Insurance Program to reduce the effects of flood hazards on	In Progress but currently compliant		Wrap and combine into existing project 1.A.2

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
			new buildings and infrastructure			
Yuma County	1.A.2	FCD-State Regulations	Fund annual State Floodplain regulations and develop technical and review standards for floodplain related topics	In progress		Ongoing annual appropriation
Yuma County	1.A.2, 1.B.2	Regulation Review and Update	Update Emergency Operations Plan	In progress		This is a response plan and not a mitigation effort.
Yuma County	1.A.3	Enforcement of Zoning and Building Code Ordinances	Continue to enforce zoning and building codes through current site plan, subdivision, and building permit review processes to reduce the effects of flood, thunderstorm/high wind, earthquake, transportation and other hazards on new buildings and infrastructure	In progress		Ongoing annual appropriation
Yuma County	1.B.1	FCD-FIRM	Review, Support, and Adopt FEMA approved FIRM to reduce the effects of flood hazards on new buildings and infrastructure throughout unmapped portions of the county	Complete		Ongoing to adopt future revisions
Yuma County	12.A.1	Low Water Use Fixtures	Continue to enforce building code low water use fixture	In progress		Ongoing annual appropriation

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
			requirements for new residential and commercial buildings.			
Yuma County	12.A.2	Drought Conservation Public Education	Public education campaign to encourage citizens to conserve water	No action		No action taken these past years, will re-evaluate and possibly proceed in 2011
Yuma County	2.A.1	FCD-Public Outreach	Develop and implement a Flood/Waterway Education and Public Outreach campaign to encourage citizen awareness to mitigate the damages of floods via the use of internet, public meetings, brochures, etc.	In progress		On-going annual effort; Sent letters to 100 property owners advising grandfather status of Flood Insurance
Yuma County	2.A.1, 2.B.2, 2.C.3, 2.D.2	Public Education Campaign	Conduct Employee Training on the Emergency Response Plan	No action		This is a response plan and not a mitigation effort.
Yuma County	2.B.1, 4.A.1	FCD-IGA Administration	Implement Master IGA's with Yuma City	Complete		Amendments to reflect connections are complete
Yuma County	2.B.1,2.C.1	Communication Network Needs	Communication Network Needs Analysis	Complete	2006	
Yuma County	2.D.1	FCD-Flood Documentation	Document Flood Damage after flood events to further mitigate ongoing efforts by identification of potential and actual hazard areas; will also be used in public outreach and education campaign as well as provide	In progress		Ongoing annual appropriation

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
			historical reference for future mitigation efforts			
Yuma County	3.B.1	Develop Evacuation Plans	Prepare an Updated Emergency Disaster Preparedness Plan	No action		This is a response plan and not a mitigation effort and are not included in this mitigation plan
Yuma County	3.C.1	FCD-Staff Education	Attend related technical conferences and relay new information to stakeholders	In progress		Ongoing annual appropriation
Yuma County	4.A.2	Yuma-West Yuma Mesa O&M	West Yuma Mesa Operation and Maintenance Plan	No action		This project became the responsibility of City of Yuma
Yuma County	5.B.10	Yuma-Tierra Kino & Del Oro Drainage Improvements	Construct new stormdrain and do drainage improvements at Tierra Kino & Del Oro to provide stormdrain to subdivisions and mobile home parks with limited drainage, mitigating flooding in this area.	Phase II complete in 2010		Future priority
Yuma County	5.B.11	FCD-Drainage Ditch Bypass	Yuma Valley Drainage Ditch Discharge Bypass – Design and construct new bypass that increased the capacity of the Yuma Valley Drainage System allowing more stormwater to be discharges into the system.	Complete		Improvements constructed

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Yuma County	5.B.12	Yuma-28th Street System	This project is located in the La Jolla Subdivision. Project will provide drainage improvements, catch basin and storm water pipeline to drain this neighborhood. Storm water presently ponds in the street and requires removal by water trucks.	In progress		Project is being developed
Yuma County	5.B.13	YC-Mesa Del Sol Retention Basin Channel	Mesa Del Sol Retention Basin Channel – Evaluation of basin shows adequate storage for subdivision.	No action		No programmed funding
Yuma County	5.B.14	Yuma-28th Street Outfall	28th Street Outfall Lines New Construction - The 28th Street Outfall Lines will be the drainage outfalls that convey stormwater to Smucker Park. These outfalls are needed to mitigate the damage and reduce uncontrolled runoff that currently flows down the West Mesa Area to the Yuma Valley resulting in flooding of surrounding areas. Design is complete. Construction is waiting Smucker Park Construction.	In progress		Delete this entry as this project is the second phase of 5.B.33

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Yuma County	5.B.15	Yuma-Kofa High Basin	Design and construct Kofa High School Detention Basin Improvements to provide overflow storage for 32nd Street and overflow from Smucker Park Basin.	In progress		Wrapped into Smucker Basin and City improvements
Yuma County	5.B.16	Yuma-Castle Dome Drainage Improvements	Castle Dome Drainage Improvement Plan providing drainage and runoff storage for Castle Dome Drive has been constructed as part of regional development.	Complete		
Yuma County	5.B.17	Yuma-Virginia Ave/24th St Drainage Improvements	Virginia Ave/24th Street Storm Drain Improvements is an extension of the 28th Street Stormdrain System.	In progress		Combine and wrap into 5.B.33 Project as future phase
Yuma County	5.B.18	Yuma-La Mesa Manor Drainage Improvements	La Mesa Manor Storm Drain is part of the East Mesa Stormdrain system and drains the La Mesa Manor area. - Complete	Complete	2002	
Yuma County	5.B.19	Yuma-Engler Avenue Basin Pump Station	Design and re-construct of Engler Avenue Basin Pump Station to drain this basin to the East Mesa Outfall System mitigating damage to surrounding area and thus reducing detention times below 5 days.	In progress		Design completed, construction programmed

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Yuma County	5.B.2	YC-Avenue 64 Crossing	Perform erosion control mitigation efforts such as planting, rip rap, bank stabilization, etc. at the Avenue 64E/Gila River Bridge to mitigate and protect a vital Gila River Crossing from erosion due to meander migration.	In progress		Project funding tabled to future FY
Yuma County	5.B.20	YC-Quartz & Amber St. Erosion Control Plan	Quartz & Amber St. Erosion Control Plan has been evaluated and sufficient storm storage is available.	In progress		Sufficient storm storage is available.
Yuma County	5.B.21	YC- Phoenix & Mesa St. Drainage Improvements	Phoenix and Mesa St. within the Yuma East area. On site drainage has been filled in by the owners. Design will provide alternatives to address the storm water ponding.	In progress		Alternatives identified
Yuma County	5.B.22	Gadsden-Drainage Improvements	Design and then renovate the Gadsden Area Drainage to provide storm water facilities, to mitigate the effects of existing storm water ponds occurring within roadway or adjacent properties	In progress		Master Drainage Plan complete, improvements to be prioritized

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Yuma County	5.B.23	Somerton-Cano St. Drainage Improvements	Design and then renovate the Somerton Area Drainage improvements to mitigate storm damage and provide storm water facilities which will mitigate the effects of existing storm water ponds occurring on the roadway or on adjacent properties	In progress		Drainage Plan approved, improvements to be prioritized
Yuma County	5.B.24	FCD-Riebe	Riebe Avenue Storm Drain and Basin New Construction – Riebe Avenue Storm Drain and Basin collects and stores stormwater from the 8th Street and Avenue C area. This regional basin can also be used for in-line storage for the Avenue C system. Construction was complete in 2004.	Complete	2004	Project has been constructed
Yuma County	5.B.25	Yuma-Giss Parkway	Giss Parkway Drainage Improvements	In progress		FCD has been tracking Giss Parkway underpass flooding in the Flood Control Assessment Report so we put it in our Mitigation Plan. FCD dropped it out of the Mitigation Plan because it is a City/ADOT project and we are limited to ten projects.

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Yuma County	5.B.26	FCD-East Main Canal Extention ADS	Design and construct East Main Canal Extension Area Drainage Plan which is a portion of the Yuma Valley drainage study. With the overall Yuma Valley drainage study being updated this year, this work will be completed.	No action		Incorporated into the Yuma Valley drainage study
Yuma County	5.B.27	YC-Mapping	Perform topographic mapping of Flood Control District to complete drainage studies that will mitigate effects of storms and run off and for Floodplain studies	In progress, previous years phases complete		Ongoing effort to upgrade mapping as necessary for drainage studies
Yuma County	5.B.28	FCD-East Mesa ADS	East Mesa Area Drainage Study – Area Drainage Study. This study looked at the drainage needs for the area between Avenue 3E and Avenue 11E. H&H was performed and needs identified.	Complete		
Yuma County	5.B.29	Yuma-12th Ave/Arena Drive Drainage Improvements	12th Avenue/Arena Drive Storm Drain	No action		Currently, this project is not Yuma County's priority. The city is under design.

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Yuma County	5.B.3	FCD-Fortuna Wash Banks	Bank stabilization of the Fortuna Wash area is proposed to prevent bank subsidence from riverine erosion. This mitigates damage to homes in the area. Phase I is scheduled to be constructed this year and will improve conditions for 9 homes, two bridges, and the Foothills Blvd storm drain system.	In progress		Project design complete, phase I is scheduled to be constructed
Yuma County	5.B.31	Somerton-Capital St. Drainage Improvements	Design and construct new drainage improvements at Capital Street in Somerton to drain two residential streets where the houses are built below street level, thus mitigating flooding.	In progress		Combine and wrap into Somerton area drainage Master Drainage Plan approved, improvements to be prioritized
Yuma County	5.B.32	Yuma-18th St. Drainage Improvements	18th Street Drainage Improvements was road improvements to drain ponding into an existing retention basin.	Complete		
Yuma County	5.B.33	Yuma-Smucker Park	Design and construct a new storm water a basin, Smucker Park Detention Basin. New construction - This planned detention basin for the Yuma Mesa area will store the 100-year discharge.	In progress		Project has been delayed due to extended design requirements

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
			This basin is needed to mitigate the damage and reduce uncontrolled runoff that currently flows down the West Mesa Area to the Yuma Valley resulting in flooding of surrounding areas. Design is complete and is in state permitting process.			
Yuma County	5.B.34	Yuma-3rd Place Drainage Improvements	3rd Place Drainage Improvements New construction is needed to drain a residential area with homes at or below street grade.	In progress		Incorporated into the Avenue C project
Yuma County	5.B.35	San Luis-Merrill Street Drainage Improvements	Design and reconstruction of San Luis area Merrill Street Basin Drainage Improvements to mitigate effects of runoff on surrounding properties and provide a stormwater outfall to drain retention basins	In progress		Construction contract has been awarded
Yuma County	5.B.36	Yuma-B8 Drainage Improvements	Business 8 Drainage Improvements are needed to drain ponding along roadway.	Ave 2 ½ E Phase programmed in 2010		Future priority
Yuma County	5.B.37	Yuma-Crane/Poppy	New construction of stormdrain improvements at Crane/Poppy Storm Drain to	Complete	2004	

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
		Drainage Improvements	drain a residential area with homes at or below street level, thus mitigating flooding.			
Yuma County	5.B.4	FCD-Gila River	Gila River Obstruction Removal and Channel Restoration is a watershed improvement project. The Gila River has been overgrown with invasive Salt Cedars which plug the overbank area of the Gila River resulting in reduced capacity and damage to the natural habitat.	No action		Project has been on hold pending Bureau of Reclamation securing funding
Yuma County	5.B.5	FCD-Groundwater Wells	Design and construct additional Groundwater Wells to mitigate and lower the groundwater levels during sustained flooding of the Colorado River and along the west Yuma Mesa.	No action		Additional wells dependent on need and capacity of Conduit
Yuma County	5.B.6	Yuma-Floodplain Mapping	East Main Canal Floodplain Delineation to reduce the effects of flood hazards on new buildings and infrastructure along the East Main Canal	In progress		This Project is associated with 4.A.2; combine projects
Yuma County	5.B.7	FCD-Colorado River Mapping	Colorado River Floodplain Delineation to accurately report flood hazard for	Complete		Colorado River flood improvements certified by Bureau of Reclamation

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
			buildings and infrastructure in the Gila and Yuma Valleys			
Yuma County	5.B.8	Yuma-East Drain Extension Canal Improvements	East Drain Extension Canal Enlargement was construction of new culverts along the east drain extension canal to increase capacity for drainage.	Complete		
Yuma County	5.B.9	YC-Foothills Drainage Channel Improvements	Construct two box culverts at the Foothills Drainage on 48th Street and perform Channel & Bank Erosion Mitigation to ncrease capacity of channel thus reducing the effects of flooding in surrounding areas	Complete	2010	
Yuma County	5.C.1	FCD-CRS	Participate in Community Assistance Program, , and other state and federal programs when they benefit Yuma County.	No action		Future priority
Yuma County	6.B.1	Burn Permit Enforcement	Continue to require county residents to acquire burn permits to mitigate against the potential for wildland fires.	In progress		Ongoing annual appropriation
Yuma County	7.A.1, 2.C.2	Earthquake Mitigation Plan	Develop Earthquake Mitigation Plan	No action		Will be part of countywide all hazards community awareness and public outreach campaign.

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Yuma County	8.A.1	HAZMAT Corridor Mitigation Planning	Continue to coordinate and cooperate with inter-agency transportation planning groups such as YMPO and GYPA.	No action		This is a response plan and not a mitigation effort. Haz Mat incidents are manmade and not included in this mitigation plan
Yuma County	8.A.2	HAZMAT Evacuation and Detour Routes	Use County GIS resources to develop evacuation and detour routing plans.	No action		This is a response plan and not a mitigation effort. Haz Mat incidents are manmade and not included in this mitigation plan
Yuma County	9.C.1	Inter-Agency Transportation Planning	Continue to coordinate and participate with inter-agency transportation planning groups such as the Yuma Metropolitan Planning Organization, Greater Yuma Port Authority, Yuma Marine Corps Air Station, and Arizona Department of Transportation	In progress		Ongoing annual occurrence
Yuma County	9.D.1	Runway Protection Zone Enforcement	Continued enforcement of development restricted areas relative to the MCAS and the MCAS Auxiliary Field II as identified in the Joint Land Use Plan.	In progress		Ongoing annual appropriation
Yuma County	YC-11		Review, Support, and Adopt FEMA approved FIRM to reduce the effects of flood hazards on new buildings and infrastructure throughout	Complete, FIRM update effective Jan-2014	2011	Yuma County has an automatic adoption clause in its Floodplain Regulations. District has mapped portions of the Gila River system

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
			unmapped portions of the county			
Yuma County	YC-13		Construct new storm drain and do drainage improvements at Tierra Kino & Del Oro to provide storm drain to subdivisions and mobile home parks with limited drainage, mitigating flooding in this area.	Complete	2015	City constructed storm drain for Casa Manana. System completed.
Yuma County	YC-18		Design and then renovate the Somerton Area Drainage improvements to mitigate storm damage and provide storm water facilities which will mitigate the effects of existing storm water ponds occurring on the roadway or on adjacent properties	Complete	2015	NW System completed.
Yuma County	YC-19		3rd Place Drainage Improvements New construction is needed to drain a residential area with homes at or below street grade.	Complete	2015	Completed. System constructed with Ave. C reconstruction.

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Yuma County	YC-2		Bank stabilization of the Fortuna Wash area is proposed to prevent bank subsidence from riverine erosion. This mitigates damage to homes in the area. Phase I is scheduled to be constructed this year and will improve conditions for 9 homes, two bridges, and the Foothills Blvd storm drain system.	Complete	2010	
Yuma County	YC-20		Design and reconstruction of San Luis area Merrill Street Basin Drainage Improvements to mitigate effects of runoff on surrounding properties and provide a stormwater outfall to drain retention basins	Complete	2015	Completed. System constructed.
Yuma County	YC-3		Perform erosion control mitigation efforts such as planting, rip rap, bank stabilization, etc. at the Avenue 64E/Gila River Bridge to mitigate and protect a vital Gila River Crossing from erosion due to meander migration.	Complete	2015	

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Yuma County	YC-30	Avenue 64E bridge over Gila River	Construct a new bridge to cross the Gila River		1982	
Yuma County	YC-31	Avenue 45E and 20E bridge over the Gila River	Construct two new bridges to cross the Gila River		1982	
Yuma County	YC-32	Avenue 2E Railroad Overpass	Construct a new railroad overpass to replace an at grade crossing		1982	
Yuma County	YC-33	Yuma Mesa Conduit Agreement	Contract signed with the Bureau of Reclamation to utilize the Yuma Mesa Conduit to transport storm water to the Colorado River		1983	
Yuma County	YC-34	Groundwater wells	Install four groundwater wells, and conduit connections, within the urban area of the City of Yuma to address elevated groundwater from the 1983 Colorado River flood		1985	
Yuma County	YC-35	26th Street Pipeline and connection to the Mesa conduit	Construct a drainage and stormwater pipeline to connect groundwater and stormwater pumps within the Yuma Valley to Conduit		1990	
Yuma County	YC-36	Avenue C Groundwater and Storm sewer line	Construct a drainage and stormwater pipeline to connect groundwater and stormwater pumps within		1990	

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
			the Yuma Valley to Colorado River			
Yuma County	YC-37	West Main Canal Groundwater and Stormwater conduit	Construct a drainage and stormwater pipeline to connect groundwater and stormwater pumps within the Yuma Valley to Conduit		1991	
Yuma County	YC-38	Ave 40E bridge over Gila River	Construct new bridge to provide emergency access and accommodate the 100 yr flood		1993	
Yuma County	YC-39	Ave 64E bridge over Gila River	Extend existing bridge to provide emergency access and accommodate the 100 yr flood		1993	
Yuma County	YC-40	Yuma Valley Drainage System	Signed agreement with Yuma County Water Users and Bureau of Reclamation for the use of the Valley drain system for disposal of stormwater to the Colorado River		1993	
Yuma County	YC-41	Yuma Mesa Hazard Elimination Project	Reconstruct and widen over 35 narrow irrigation crossings		1990-1994	
Yuma County	YC-42	Railroad crossing safety improvements	Installed automatic gates with flashers at 21 at grade roadway/train crossings		1976-1997	

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Yuma County	YC-43	B-8 Storm Drainage System	Construct a storm sewer system for State Business Route 8		1998	
Yuma County	YC-44	Martinez Lake Sheriff substation	Construct a new Sheriff Colorado River administrative and emergency first aid substation		1998	
Yuma County	YC-45	Groundwater drainage well power lines	Install and extend WAPA electrical power to service all groundwater/storm water pumping facilities (replaced APS service)		1999	
Yuma County	YC-46	Project Impact	Project Impact			
Yuma County	YC-47	Foothills Blvd, I-8 to 48th Street	Reconstruct Foothills Blvd to 5 lanes, new traffic signals (3), curb & gutter, sidewalk, and storm water outfall to Fortuna Wash		2001	
Yuma County	YC-48	New County Public Works Facility	Relocate County Public Works facility from the valley to the mesa due to it's location and responsibility as a first responder		2002	
Yuma County	YC-49	Old Highway 80 safety project	Install over 50,000 lin. ft of roadside guardrail at slope embankments and culvert crossings, Liguerta to Wellton Pass		2002	

Jurisdiction	ID No.	Name	Description	Status	Completion Date	Summary
Yuma County	YC-50	East Mesa Storm Sewer System	Construct 4 new detention basins, collection system with storm sewer trunk lines/pump stations to discharge to the Colorado River		1995-2000	
Yuma County	YC-51	Co. 8th Str, Ave B to Ave C Ave C, 12 - 8th Street	Reconstruct Co. 8th Street and Avenue C to 5 lanes, new traffic signal, curb & gutter, sidewalk, storm water system and construct Reibe Avenue basin.		2005	
Yuma County	YC-52	Somerton Avenue and Co. 8th Street realignment	Reconstructed roadway curve to current design criteria		2007	
Yuma County	YC-53	Yuma County Bridge Replacement Program	Reconstruct approximately 70 bridges, majority were timber, with concrete or steel structures		1976-2010	

APPENDIX E: ANNUAL PLAN REVIEW REPORTS