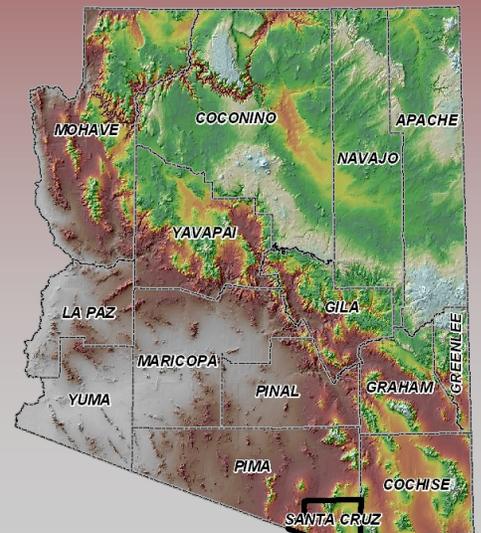




Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan 2018



EXECUTIVE SUMMARY

Across the United States, natural and human-caused disasters have led to increasing levels of death, injury, property damage, and interruption of business and government services. The toll on families and individuals can be immense and damaged businesses cannot contribute to the economy. The time, money and effort to respond to and recover from these emergencies or disasters divert public resources and attention from other important programs and problems. With 43 federal or state declarations, 37 other significant events, and a combined total of over 80 disaster events recorded since 1966, the three jurisdictions within Santa Cruz County, Arizona participating in this planning effort, recognize the consequences of disasters and the need to reduce the impacts of natural and human-caused hazards. The county and jurisdictions also know that with careful selection, mitigation actions in the form of projects and programs can become long-term, cost effective means for reducing the impact of natural and human-caused hazards.

The elected and appointed officials of Santa Cruz County, Nogales and Patagonia demonstrated their commitment to hazard mitigation in 2011-2012 by preparing the first update to the Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan (2011 Plan). The 2011 Plan was updated through a multi-jurisdictional planning effort and was approved by FEMA on October 11, 2011. In order for Santa Cruz County, the City of Nogales, and the Town of Patagonia to remain eligible for certain non-emergency FEMA mitigation grants, the 2011 Plan must be fully updated and receive FEMA approval, prior to the five-year expiration date of October 11, 2016.

In response, the Santa Cruz County Office of Emergency Management (SCCOEM) was able to secure funding through the FEMA Pre-Disaster Mitigation planning grant program and hired JE Fuller/ Hydrology and Geomorphology, Inc. to assist the county and participating jurisdictions with the update process. SCCOEM then reconvened a multi-jurisdictional planning team comprised of veteran and first-time representatives from each participating jurisdiction. The Planning Team met three times during the period of June to September 2017 in a collaborative effort to review, evaluate, and update the 2011 Plan. The Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan (Plan) will continue to guide the county and participating jurisdictions toward greater disaster resistance in full harmony with the character and needs of the community and region.

The Plan has been prepared in compliance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act or the Act), 42 U.S. C. 5165, enacted under Sec. 104 the Disaster Mitigation Act of 2000, (DMA 2000) Public Law 106-390 of October 30, 2000, as implemented at CFR 201.6 and 201.7 dated October 2007. The Plan identifies hazard mitigation measures intended to eliminate or reduce the effects of future disasters throughout the county, and was developed in a joint and cooperative venture by members of the Santa Cruz County Multi-Jurisdictional Planning Team.

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SECTION 1: JURISDICTIONAL ADOPTION AND FEMA APPROVAL

Requirement §201.6(c)(5): *[The local hazard mitigation plan shall include...] Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.*

Requirement §201.6(d)(3): *A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding.*

1.1 DMA 2000 Requirements

1.1.1 General Requirements

This 2018 update of the Santa Cruz 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 natural hazards through mitigation planning¹. The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural 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 as a sub-grantee under the following Hazard Mitigation Assistance (HMA) programs:

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

FEMA, at its discretion, may also require a local mitigation plan under the Repetitive Flood Claims (RFC) program as well.

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. Santa Cruz County and the incorporated communities of Nogales and Patagonia are all included in a FEMA approved multi-jurisdictional hazard mitigation plan. The Plan is the result of an update process

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

performed by the participating jurisdictions to update the current 2011 version of the Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan (2011 Plan).

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 and/or the federal government. The officially participating jurisdictions in the Plan include:

County	Cities	Towns
• Santa Cruz	• City of Nogales	• Town of Patagonia

Each jurisdiction will keep a copy of their official resolution of adoption located in Appendix A of their copy of the Plan.

1.3 FEMA Approval Letter

The Plan was submitted to the Arizona Department of Emergency and Military Affairs – Division of Emergency Management (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]

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SECTION 2: INTRODUCTION

2.1 Plan History

In 2005 and 2006, Santa Cruz County and the incorporated communities of Patagonia and Nogales participated in a mitigation planning process that resulted in the development of the *Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan*, which will be referred to herein as the 2006 Plan. The 2006 Plan received official FEMA approval on March 23, 2006.

In March of 2011, the Santa Cruz County Office of Emergency Management initiated and performed an update planning process with Nogales and Patagonia resulting in the 2011 Plan, which was submitted to FEMA and received official approval in May 2012. The 2011 Plan is currently expired as of May 2017.

The Santa Cruz County Office of Emergency Management successfully obtained a Pre-Disaster Mitigation (PDM) planning grant from FEMA for FY2017 to fund the 5-year update. The planning process was officially kicked off in May 2017 with the selection of JE Fuller/ Hydrology and Geomorphology, Inc. (JE Fuller) to assist with the update process. The first planning team meeting was convened on June 26, 2017.

2.2 Plan Purpose and Authority

The purpose of the Plan is to identify natural hazards and certain human-caused hazards that impact the various jurisdictions located within Santa Cruz 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 2011 Plan listed in Section 2.1.

Santa Cruz County, Nogales, and Patagonia are all political subdivisions of the State of Arizona and are organized under Title 9 (cities/towns) and Title 11 of the Arizona Revised Statutes (ARS). 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. JE Fuller was retained by Santa Cruz County Emergency Management to work in tandem with the Arizona Department of Emergency and Military Affairs (DEMA) to provide consulting services in guiding the planning update process and Plan development.

2.3 General Plan Description

The Plan is generally arranged and formatted to be consistent with the 2010 State of Arizona Multi-Hazard Mitigation Plan (State Plan) and is comprised of the following major sections:

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.

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

Risk Assessment – this section summarizes the identification and profiling of natural and human-caused 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 Plan acronyms and a glossary of definitions.

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SECTION 3: PLANNING PROCESS

§201.6 (b): *Planning process. An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:*

- (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;*
- (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and*
- (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.*

§201.6(c)(1): *[The plan shall include...]* (1) *Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

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

3.1 Update Process Description

As previously discussed, the Santa Cruz County Office of Emergency Management (SSCOEM) applied for and received a PDM planning grant to fund a multi-jurisdictional effort to review and update the 2011 Plan. Once the grant was received, SSCOEM then selected JE Fuller to work in tandem with DEMA and the participating jurisdictions and guide the Plan update process. An initial project coordination meeting between SSCOEM, DEMA and JE Fuller was convened in May 2017 to outline the plan objectives, agency roles, identify initial planning team members, and other administrative tasks. A total of three Planning Team meetings were conducted over the period of June 2017 to August 2017, with supplemental after-meeting coordination through February 2018. All the work required to collect, process, document updated data, and make changes to the Plan was performed during this time. Details regarding updated key contact information and promulgation authorities, the planning team selection, participation, and activities, and public involvement are discussed in the following sections.

3.2 Previous Planning Process Assessment

The first task of preparation for this Plan, was to evaluate the process used to develop the 2011 Plan. This was initially discussed by SSCOEM, DEMA and JE Fuller prior to the planning team kickoff meeting. The 2011 Plan process employed a multi-jurisdictional approach with representation from each participating jurisdiction in larger multi-jurisdictional planning team meetings wherein concepts would be presented and discussed, and work assignments would be made for completion by each jurisdiction. Supplemental follow-up sessions with one or more jurisdictions by both SSCOEM and JE Fuller were also employed on an as-needed basis to assist jurisdictions with completing assignments on schedule. SSCOEM, DEMA and JE Fuller agreed to continue with substantially the same approach due to the success of the 2011 Planning effort in getting to an approved plan both in time and budget. The Plan update process was presented and discussed at the first multi-jurisdictional Planning Team (MJPT) meeting for comment and concurrence of the Plan jurisdictions, with no objections. Several of the MJPT members were familiar with the 2011 Plan development and felt the proposed process would work well and streamline the effort needed to get the work done.

3.3 Primary Point of Contact

Each participating jurisdiction identified a primary point of contact (PPOC) for their respective jurisdiction, as summarized in Table 3-1. The individuals listed will have responsibility for the Plan and its implementation within each jurisdiction.

Table 3-1: List of jurisdictional primary points of contact					
Jurisdiction	Name	Department / Position	Address	Phone	Email
Santa Cruz County (Primary)	Ray Sayre	Office of Emergency Management / Director	2150 N. Congress Dr. Suite 110 Nogales, AZ 85621	520-375-8000	rsayre@santacruzcountyaz.gov
Santa Cruz County (Alternate)	John Hays	Santa Cruz County Flood Control District / Floodplain Coordinator	Gabilondo-Zehentner Building 275 Rio Rico Drive Rio Rico, AZ 85648	520-375-7830	jhays@santacruzcountyaz.gov
City of Nogales	Juan Guerra	Public Works Department / City Engineer	1450 N. Hohokam Drive Nogales, AZ 85621	520-285-5692	jguerra@nogalesaz.gov
Town of Patagonia	David Teel	Administration / Town Manager	310 McKeown Avenue Patagonia, AZ 85624	520-394-2229	patagoniagov@qwestoffice.net

3.4 Planning Teams

Two levels of planning teams were organized for the development of this Plan. The first was a Multi-Jurisdictional Planning Team (Planning Team) that was comprised of one or more representatives from each participating jurisdiction. The second level planning team was the Local Team.

The role of the Planning Team was to work with the planning consultant to perform the coordination, research, and planning element activities required to update the 2011 Plan. Attendance by each participating jurisdiction was required for every Planning Team meeting as the meetings were structured to progress through the planning process. Steps and procedures for updating the 2011 Plan were 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. The Planning Team also had the responsibility of liaison to the Local Planning Team, and were tasked with:

- Conveying information and assignments received at the Planning Team meetings to the Local Planning Team
- Ensuring that all requested assignments were completed fully and returned on a timely basis.
- Arranging for review and official adoption of the Plan.

The function and role of the Local Team was to:

- Provide support and data
- Assist the Planning Team representative in completing each assignment
- Make planning decisions regarding Plan components
- Review the Plan draft documents

3.4.1 Planning Team Assembly

At the beginning of the update process, SCCOEM organized and identified members for the Planning Team by initiating contact with, and extending invitations to all incorporated communities within the county limits, as well as DEMA, the Arizona Department of Water Resources (ADWR), the Arizona Department of Environmental Quality (ADEQ), local fire district chiefs, and JE Fuller. Other entities that were subsequently invited to participate are discussed in Section 3.4.3. The participating members of the Planning Team are summarized in Table 3-2. Returning planning team members are highlighted.

Table 3-2: Multi-jurisdictional planning team participants

Name	Jurisdiction / Organization	Department / Position	Planning Team Role
Adam Amezaga	Rio Rico Fire District	RRFD / Interim Fire Chief	Planning Team participant
Susan Austin	Arizona Department of Emergency and Military Affairs	Emergency Management - Planning Branch / State/Local Mitigation Program Manager	Planning Team participant Project/Grant Manager State reviewer
Nalini Chhetri	Arizona State University	School for Future of Innovation in Society / Assistant Director	Planning Team participant
Jesse Drake	Santa Cruz County	Community Development / Community Development Director & Chief Zoning Inspector	Planning Team participant
Frank Granados	Santa Cruz County / Rio Rico Fire	SCC Office of Emergency Management / Senior Advisor / Emergency Planner	Planning Team participant
Juan Guerra	City of Nogales	Public Works Department - Engineering / City Engineer	Jurisdictional Point of Contact Lead coordinator for LPT Planning Team participant
John Hays	Santa Cruz County	Flood Control District / Floodplain Coordinator	Co-Jurisdictional Point of Contact Lead coordinator for LPT Planning Team participant
Elizardo Jacobs	City of Nogales	Public Works Department - Utilities / Asst Public Works Director	Planning Team participant
Shelly Jacobs	Santa Cruz County	Public Health Emergency Preparedness / Emergency Preparedness & Response Coordinator	Planning Team participant
Nick Mazzone	Arizona Department of Emergency and Military Affairs	Emergency Management - Planning Branch / Mitigation and Recovery Coordinator	Planning Team participant State reviewer
Mike McKearney	City of Nogales	Fire and Medical Department / Fire Chief	Planning Team participant
Elise Moore	JE Fuller/ Hydrology & Geomorphology, Inc.	JE Fuller / Sr Civil Engineer	Planning Team Consultant Preparation and presentation of plan update elements
Scott Ogden	JE Fuller/ Hydrology & Geomorphology, Inc.	JE Fuller / Project Manager / Sr Civil Engineer	Planning Team Lead Consultant Preparation and presentation of plan update elements
Carlos Parra	Nogales Suburban Fire District	NGFD / Fire Chief	Planning Team participant
Genaro Rivera	Tubac Fire District	TFD / Assistant Chief	Planning Team participant
Ray Sayre	Santa Cruz County	Office of Emergency Management / Director of Emergency Management	Co-Jurisdictional Point of Contact Lead coordinator for LPT Planning Team participant
Nancy Selover	Arizona State University	State Climatology Office / State Climatologist	Planning Team participant
Mike Shelton	Arizona Department of Water Resources	Engineering Division / CTP RiskMAP Coordinator	Planning Team participant
David Teel	Town of Patagonia	Administration / Town Manager	Jurisdictional Point of Contact Lead coordinator for LPT Planning Team participant

3.4.2 *Planning Team Activities*

The Planning Team met for the first time on June 26, 2017 to begin the planning process. Two more meetings were convened on about a monthly basis to step through the plan review and update process. Planning Team members used copies of the 2011 Plan for review and reference. Following each

Planning Team meeting, the Point of Contact for each jurisdiction would coordinate with the Local Team as needed to work through the assignments. Table 3-3 summarizes the Planning Team meetings along with a brief list of the agenda items discussed. There are no details of the Local Team meetings.

Table 3-3: Planning meetings convened as part of the plan update process	
Meeting Type, Date, and Location	Meeting Agenda
Planning Team Meeting No. 1 June 26, 2017 Santa Cruz County Emergency Operations Center Nogales, AZ	<ul style="list-style-type: none"> • INITIAL INTRODUCTIONS • DISCUSSION OF SCOPE AND SCHEDULE • DMA2K OVERVIEW AND UPDATE REQUIREMENTS <ul style="list-style-type: none"> ○ General DMA2K Overview ○ Update Requirements (New Crosswalk) ○ Proposed Outline for New Plan • PLANNING PROCESS <ul style="list-style-type: none"> ○ Discussion of Last Planning Process ○ Planning Team Roles and Responsibilities • PUBLIC INVOLVEMENT <ul style="list-style-type: none"> ○ Discuss Past Strategy ○ Formulate New Strategy ○ Additional Invitations • RISK ASSESSMENT <ul style="list-style-type: none"> ○ Hazard List Identification • MITIGATION STRATEGY <ul style="list-style-type: none"> ○ Goals and Objectives • PLAN MAINTENANCE STRATEGY <ul style="list-style-type: none"> ○ Review/Discuss maintenance and monitoring over the last plan cycle ○ Develop New Monitoring Schedule ○ Plan Update Schedule

Table 3-3: Planning meetings convened as part of the plan update process	
Meeting Type, Date, and Location	Meeting Agenda
Planning Team Meeting No. 2 July 24, 2017 Santa Cruz County Emergency Operations Center Nogales, AZ	<ul style="list-style-type: none"> • GENERAL <ul style="list-style-type: none"> ○ Community Descriptions • RISK ASSESSMENT <ul style="list-style-type: none"> ○ Asset Inventory Review/Update ○ Review hazard profile mapping and data for each hazard ○ CPRI Analysis (worksheet) ○ Repetitive Loss Properties ○ Discuss and Profile Development Trends (worksheet) <ul style="list-style-type: none"> ▪ Past Plan Cycle ▪ Future Development • MITIGATION STRATEGY <ul style="list-style-type: none"> ○ Capability Assessment (worksheet) <ul style="list-style-type: none"> ▪ Legal and Regulatory (Codes / Ordinances) ▪ Administrative and Technical Staff Resources ▪ Fiscal Capabilities ○ Existing Mitigation Action/Project Assessment (worksheet) ○ Plans / Manuals / Guidelines / Studies Integration and Incorporation (worksheet) <ul style="list-style-type: none"> ▪ Past Plan Cycle ▪ Future Strategy ○ NFIP Statistics and Compliance (worksheet)
Planning Team Meeting No. 3 August 30, 2017 Santa Cruz County Emergency Operations Center Nogales, AZ	<ul style="list-style-type: none"> • RISK ASSESSMENT <ul style="list-style-type: none"> ○ VA Result Review • MITIGATION STRATEGY <ul style="list-style-type: none"> ○ Action/Project Identification (worksheet) ○ Repetitive Loss Structures Recommendations ○ Implementation Strategy (worksheet) • PLAN MAINTENANCE STRATEGY <ul style="list-style-type: none"> ○ Continued Public Involvement (worksheet) • PROMULGATION PROCESS

3.4.3 Agency/Organizational Participation

The planning process used to develop the 2011 Plan included participation from several agencies and organizations which operate within or have jurisdiction over small and large areas of Santa Cruz County. For this update, a list of known and/or potential stakeholders not already involved in the Planning Team was brainstormed and compiled at the Planning Team Meeting No. 1. The Planning Team concluded that the members of the Local Emergency Planning Committee (LEPC) would best represent the type of organizations and agencies that would have an interest in Santa Cruz County hazard mitigation. Invitations were extended to the LEPC at the July 2017 meeting and via a mass email with attached materials explaining the planning process. A questionnaire prepared as a part of the public involvement outreach (see Section 3.5 for further discussion) was also distributed to the July 2017 LEPC meeting attendees. In addition, a letter of invitation was mailed to all of the adjoining county emergency managers explaining the DMA 2000 planning process and the extension of an invitation for participation. A copy of the invitation letter and list of LEPC members is provided in Appendix B. The questionnaire responses received from the July 2017 LEPC meeting are provided in Appendix C. In addition to the

personal invitations, a broader invitation to all citizens within and near Santa Cruz County was indirectly extended via website postings and press releases, which are discussed more thoroughly in Section 3.5.2. This approach was considered the best way to reach interested non-profits and businesses within the County and provide them an opportunity for participation in the planning process.

An integral part of the planning process also 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, participation in an area association of governments, or participation in a FEMA RiskMAP Discovery study. Examples of those data sets include the FEMA and Santa Cruz County Flood Control District floodplain mapping, NFIP flood insurance statistics, community wildfire protection plans and statewide wildfire risk coverages, severe weather statistics, hazard incident reports, and regional comprehensive plans. The resources obtained, reviewed and compiled into the risk assessment are summarized in Section 3.6 and at the end of each subsection of Section 5.3 of this Plan. Jurisdictions needing these data sets obtained them by requesting them directly from the host agency or organization, downloading information posted to website locations, or engaging consultants.

3.5 Public Involvement

3.5.1 Previous Plan Assessment

The pre-draft public involvement strategy for the 2011 Plan development used:

- Posting of an informational brochure on the Santa Cruz County website.
- Distribution of an informational brochure as an insert with utility bills and newsletters.
- Press releases that were picked up and run in several local newspapers and radio stations
- Standing agenda and discussion items in the publicly announced and attended LEPC meetings.

No pre-draft comments were received during the 2011 Plan process.

The post-draft strategy included the formal council and board of supervisors meeting processes wherein the 2011 Plan was presented and promulgated. The details of the meeting process varied from jurisdiction to jurisdiction, but typically included some form of advertisement of the meeting agenda two to four weeks in advance of the council/board meeting. In most cases, an informal, pre-adoption presentation of the 2011 Plan was made during a working session of the council/board. The final adoption of the resolutions were almost unanimously done as part of a consent agenda at a formal council/board meeting. There were no records of any public comment on the 2011 Plan adoption process.

The Planning Team discussed the prior public involvement actions and concluded that they provided adequate public exposure to the mitigation planning process. The Planning Team also concluded that more web-based technology should be used for the update. Also, since any formal council/board action has a built-in public notification and comment opportunity, the Planning Team chose to continue using this process as one of the post-draft mechanisms for getting the Plan before the public.

3.5.2 Plan Update

Public involvement and input to the planning process was encouraged cooperatively among all of the participating jurisdictions using several venues throughout the course of the pre-draft planning. The planning team discussed various options for pre-draft public involvement including a repeat of using the

press releases/public service announcements, newspaper articles, general public announcements or meetings, council/board briefings at a working session, and web page postings. The following strategy was formulated and implemented:

- A public notice will be posted on all three jurisdictions’ websites
- Preparation of a two page questionnaire as a tool to engage the public with via the LEPC meetings and the county’s website
- Include an agenda item on the next LEPC meeting announcing the mitigation planning and update process and extending an invitation for participation by completing the prepared questionnaire.
- Develop and issue a press release and monitor the media sources to see who runs an article.
- Once the draft plan is ready, the website notices will be revised accordingly and a second press release will be issued. The draft plan itself, will be posted to the Santa Cruz County website for public review and comment prior to final adoption.

All of the notices, postings, and articles encouraged review and comment of the draft Plan by the public. 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. Copies of the pre- and post-draft public notices, web pages, and newspaper notices are provided in Appendix C.

3.6 Reference Documents and Technical Resources

Over the course of the update planning process, numerous other plans, studies, reports, and technical information were obtained and reviewed for incorporation or reference purposes. The majority of sources referenced and researched pertain to the risk assessment and the capabilities assessment. To a lesser extent, the community descriptions and mitigation strategy also included some document or technical information research. Table 3-4 provides a reference listing of the primary documents and technical resources reviewed and used in the Plan. Detailed bibliographic references for the risk assessment are provided at the end of each hazard risk profile in Section 5.3. Other bibliographic references are provided as footnotes.

Referenced Document or Technical Source	Resource Type	Description of Reference and Its Use
Arizona Department of Commerce	Website Data and Community Profiles	Reference for demographic and economic data for the county. Used for community descriptions
Arizona Department of Emergency and Military Affairs	Data and Planning Resource	Resource for state and federal disaster declaration information for Arizona. Also a resource for hazard mitigation planning guidance and documents including the 2013 State of Arizona Hazard Mitigation Plan.
Arizona Department of Water Resources	Technical Resource	Resource for data on drought conditions, statewide drought management (AzGDTF), and dam safety data. Used in risk assessment.
Arizona Geological Survey	Technical Resource	Resource for earthquake, fissure, landslide/mudslide, subsidence, and other geological hazards. Used in the risk assessment.
Arizona Model Local Hazard Mitigation Plan	Hazard Mitigation Plan	Guidance document for preparing and formatting hazard mitigation plans for Arizona.
Arizona State Forestry Department	Data Source	Statewide wildfire hazard profile information. Used in the risk assessment.
Arizona State Land Department	Data Source	Source for statewide GIS coverages (ALRIS). Used in the risk assessment.
Arizona Workforce Informer	Website	Source for employment statistics in Arizona.
Bureau Net (2017)	Website Database	Source for NFIP statistics for Arizona.

Table 3-4: List of resource documents and references reviewed and incorporated in the plan update process

Referenced Document or Technical Source	Resource Type	Description of Reference and Its Use
City of Nogales General Plan	General Plan	Source for history, demographic and development trend data for the city.
Environmental Working Group's Farm Subsidy Database (2017)	Website Database	Source of disaster related agricultural subsidies. Used in the risk assessment.
Federal Emergency Management Agency	Technical and Planning Resource	Resource for HMP guidance (How-To series), floodplain and flooding related NFIP data (mapping, repetitive loss, NFIP statistics), and historic hazard incidents. Used in the risk assessment and mitigation strategy.
HAZUS-MH	Technical Resource	Based data sets within the program were used in the vulnerability analysis.
National Climatic Data Center	Technical Resource	Online resource for weather related data and historic hazard event data. Used in the risk assessment.
National Integrated Drought Information System (2017)	Technical Resource	Source for drought related projections and conditions. Used in the risk assessment.
National Inventory of Dams (2017)	Technical Resource	Database used in the dam failure hazard profiling. Used in the risk assessment.
National Response Center (2017)	Technical Resource	Source of traffic related HAZMAT incidents and rail accidents. Used in the risk assessment.
National Weather Service	Technical Resource	Source for hazard information, data sets, and historic event records. Used in the risk assessment.
National Wildfire Coordination Group (2017)	Technical Resource	Source for historic wildfire hazard information. Used in the risk assessment.
Office of the State Climatologist for Arizona	Website Reference	Reference for weather characteristics for the county. Used for community description.
Santa Cruz County Comprehensive Plan (2016)	Comprehensive Plan	Source for history, demographic and development trend data for the unincorporated county.
Santa Cruz County Flood Control District	Technical Resource	Resource for floodplain, levee, and dam failure data. Used in the risk assessment.
South-Eastern Arizona Governments Association (2017)	GIS and Demographic Data	Source for GIS data and countywide demographic projections and development data.
Standard on Disaster/Emergency Management and Business Continuity Programs (2000)	Standards Document	Used to establish the classification and definitions for the asset inventory. Used in the risk assessment.
State of Arizona MHMP (2013)	Hazard Mitigation Plan	The state plan was used a source of hazard information and the state identified hazards were used as a starting point in the development of the risk assessment.
Town of Patagonia General Plan (2009)	General Plan	Source for history, demographic and development trend data for the city.
USACE Flood Damage Report (1978)	Technical Data	Source of historic flood damages for 1978 flood. Used in the risk assessment.
USACE Flood Damage Report (1994)	Technical Data	Source of historic flood damages for 1993 flood. Used in the risk assessment.
U.S. Forest Service	Technical Data	Source for local wildfire data. Used in the risk assessment.
U.S. Geological Survey	Technical Data	Source for geological hazard data and incident data. Used in the risk assessment.
Western Regional Climate Center	Website Data	Online resource for climate data used in climate discussion of Section 4
World Wildlife Fund (2010)	GIS Data	Terrestrial ecoregions database used in the general county description.

3.7 Plan Integration Into Other Planning Mechanisms

Incorporation and/or integration of the Plan into other planning mechanisms, either by content or reference, enhances a community's ability to perform hazard mitigation by expanding the scope of the Plan's influence. It also helps a community to capitalize on all available mechanisms at their disposal to accomplish hazard mitigation and reduce risk.

3.7.1 Past Plan Incorporation/Integration Assessment

A poll of the participating jurisdictions revealed that success of incorporating the 2011 Plan elements into other planning programs has varied over the past planning cycle. Ways in which the 2011 Plan has been successfully incorporated or referenced into other planning mechanisms by each jurisdiction are summarized in Tables 3-5 through 3-7.

Table 3-5: Plan integration history and future strategy for Nogales	
Plan Integration Over the Past Plan Cycle:	
<ul style="list-style-type: none"> As a part of the NFIP Floodplain Management, the City worked with SCCFCD to have the SCCFCD take control of the floodplain management role within the City boundaries. Coordinated with SCCFCD on improvement of the Nogalitos Detention Basin, which was in conformance with the 2011 Plan goals and objectives for flood reduction. 	
Plan Integration Strategy for Next Five Years:	
Planning Mechanism	Description of Planning Mechanism Opportunity
Nogales General Plan	The City of Nogales General Plan was last updated in 2011 and is the guiding document for growth with elements addressing land use, transportation and circulation, open space/parks, environmental and water resources. Regular review of the General Plan by the planning and zoning group will include referral to the Plan and will provide for updates as conditions warrant.
Five-Year Capital Improvement Program	The City of Nogales is currently developing a new 5-year CIP. Preparation of the CIP for each year will include a review of the Plan for eligible projects or actions that can be implemented as a part of the CIP, and future CIP projects that provide mitigation will be evaluated for inclusion in the Plan.
Community Wildfire Protection Plan	The CWPP is currently referenced in the 2011 Plan and will continue to be a reference in the Plan. When the CWPP is updated in the future, the Plan will be reviewed as part of the CWPP update and new CWPP data will be included in the next Plan update.

Table 3-6: Plan integration history and future strategy for Patagonia

Plan Integration Over the Past Plan Cycle:	
<ul style="list-style-type: none"> • Updated Drought Response Plan to recognize additional trigger mechanisms based on implementation of a 2011 Plan action/project • Worked with FEMA to develop a flood response plan and conducted table top exercise to test plan which was a partial implementation of a 2011 Plan action/project • Performed Community Emergency Response training for approximately 35 residents and used 2011 Plan as background risk information 	
Plan Integration Strategy for Next Five Years:	
Planning Mechanism	Description of Planning Mechanism Opportunity
Patagonia General Plan	The Patagonia General Plan anticipates the potential Town growth and provides guidance on land use, circulation and energy and water resources. Regular review of the plan by P&Z committee will include referral to the Plan and will provide for updates as conditions warrant.
Wildlands Fire Grant application	Preparation of applications for Wildlands Fire Grants will include referral to the Plan and may also direct attention to needed updates and mitigation A/Ps in the Plan
Patagonia Flood Response Plan	Plan preparation and table top exercise established an effective mechanism for testing and updating a significant hazard mitigation effort. Results from these activities may result in additional mitigation A/Ps in the Plan.
Town of Patagonia Drought Preparedness Plan	A drought plan used by the Town to set triggering levels for water conservation measures and to identify potential mitigation opportunities as they arise.

Table 3-7: Plan integration history and future strategy for Santa Cruz County

Plan Integration Strategy for Next Five Years:	
Planning Mechanism	Description of Planning Mechanism Opportunity
Multi-Hazard Emergency Response and Recovery Plan	Multi-Hazard Emergency Response and Recovery Plan. This is a hazardous material general plan that depicts populations at risk, types of hazardous materials being transported, mitigation, and response strategies.
Emergency Response Plan	This is the general Emergency Response Plan for the County that describes jurisdiction, scope of operations, emergency declarations, line of authority, continuity of operations, etc.
Community Wildfire Protection Plan	This is a strategic plan that depicts wildland fuels within the County, populations at risk, predicted routes of fire travel, areas of fuel reduction, protected habitat, etc. The overall strategic plan provides for fuel reduction operations to protect life and property
Development Guidelines	This is a board approved set of building codes that provide for construction guidance. For example, identified regions with high wind loading may require additional roof tie in vs. areas not prone to this hazard.

Plan Integration Over the Past Plan Cycle:

The current Hazard Mitigation Plan was used to update the following plans/ processes:

- Emergency Operations Plan
- Border 2020 Sister City Plan
- Multi-Hazard Emergency Response and Recovery Plan (ESF10)
- State THIRA/ SPR
- LEPC Three-Year Training Plan
- Hazardous materials spill reporting and tracking of hazardous materials incidents
- Simtable purchase and scenario depictions for wildfire, flooding, hazardous materials spills, dam failures for public groups and emergency response agencies
- As a planning document for the three scenarios at the National Emergency Training Center (Integrated Emergency Management Course)
- As a resource for a wildland equipment mitigation grant
- As a core document for an active shooter series of exercises (Tabletop, Seminar, FSE)
- As a core document for the purchase and development of a public alert system

3.6.2 *Five Year Plan Integration/Incorporation Strategy*

With the efficacy of integrating the 2011 Plan during the last cycle in view, the Planning Team identified typical ways to use and incorporate the Plan over the next five-year planning cycle, as follows:

- Use of, or reference to, Plan elements in updates/revisions to codes, ordinances, general and/or comprehensive planning documents, and other long-term strategic plans.
- Integration of defined mitigation A/Ps into capital improvement plans and programming.
- Reference to Plan risk assessments during updates or revisions to land use planning and zoning maps.
- Resource for developing and/or updating emergency operations plans, community wildfire protection plans, emergency response plans, etc.
- Reference during grant application processes.
- Use of the Plan as a resource during LEPC meetings.

Specific opportunities for integrating and/or referencing the Plan into other planning mechanisms over the next five years are summarized by jurisdiction in Tables 3-5 to 3-7. In all cases, the jurisdiction’s PPOC will take responsibility to ensure that the Plan, risk assessment, goals and mitigation strategies are integrated and/or incorporated into the listed planning mechanism by participating in those efforts as they occur.

3.6.3 *Plan Incorporation Process*

Each jurisdiction has particular processes that are followed for officially incorporating and adopting planning documents and tools. Many of the processes and procedures are similar for jurisdictions with comparable government structures.

In general, planning documents prepared by the various departments or divisions of a particular jurisdiction are developed using an appropriate planning process that is overseen and carried out by staff, and often with the aid of consultants. Each planning process is unique to the plan being developed, but all usually involve the formation of a planning or steering committee, and have some level of interagency/stakeholder coordination within the plan’s effective area. Public involvement may also be incorporated when appropriate and depending on the type of plan. New or updated plans are usually developed to a draft stage wherein they are presented to the respective governing body for initial review and comment. Upon resolution and address of all comments, which may take several iterations, the plans are then presented to the governing body for final approval and official adoption.

Integration or reference to the Plan into these various processes will be accomplished by the active participation of the MJPT PPOC representative(s) from each jurisdiction, in the other planning teams or committees to ensure that the Plan risk assessment, goals, and mitigation A/Ps are integrated and/or incorporated into the planning mechanism as appropriate.

Table 3-8 provides a summary of standard operating procedures that each of the participating jurisdictions follow when considering and incorporating official planning mechanisms, and how they apply to integration of the Plan.

Jurisdiction	Description of Plan Integration Standard Operating Procedures
Nogales	<p>The development or update of planning related documents and mechanisms in the City will generally be accomplished using the following steps:</p> <ul style="list-style-type: none"> • At Council direction, conduct initial planning using internal resources to discern feasibility. • Staff would then work with a consultant to develop the plan to draft stage. • The draft plan would be presented to council in work session(s) and public outreach would be performed as needed. <p>The plan would be finalized and formally adopted by the Council during an open public meeting.</p>
Patagonia	<p>Planning documents are prepared by either the relevant department and the Town Manager or the Planning and Zoning Committee. They are then reviewed internally and referred to Town Council for consideration and possible adoption/implementation. The Council consideration process typically involves a public hearing and presentation to receive input from the broader community.</p>
Santa Cruz County	<p>In general, the development of planning documents and tools within the County follow a basic process outlined by the bullets below:</p> <ul style="list-style-type: none"> • Initiation of plan development can be from staff or as a directive from BOS

Jurisdiction	Description of Plan Integration Standard Operating Procedures
	<ul style="list-style-type: none"> • Plan is written by staff and/or consultants • Plan goes through a legal review • Plan goes out for public comment • Work-study session(s) are convened with BOS • Edited plan is presented to BOS for adoption <p>Whenever possible and appropriate, the PPOC for the County will endeavor to make sure the Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan is reviewed and as appropriate, incorporated into future planning documents and mechanisms by active participation in the development or update of those plans and mechanisms.</p>

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SECTION 4: COMMUNITY DESCRIPTIONS

4.1 General

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

4.2 County Overview

4.2.1 Geography

Santa Cruz County is located in south central Arizona, as illustrated by Figure 4-1. It is bordered by Pima County on the north and west, Cochise County on the east and the State of Sonora, Mexico on the south. Two incorporated communities, Nogales and Patagonia, and 15 unincorporated communities are located within the County. The City of Nogales serves as the county seat.

The county encompasses approximately 1,236 square miles and is generally bounded on the east and west by longitudes 110.46 and 111.37 degrees west, and on the south and north between latitudes 31.33 to 31.73 degrees north. Major transportation routes through the area are shown on Figure 4-2 and include Interstate 19, State Highways 82, 83 and 289. A branch line of the Union Pacific Railroad runs parallel to Interstate 19 from Tucson into Mexico. The Nogales International Airport, operated by the County, is located approximately 7 miles northeast of Nogales along State Highway 82.

The topographic characteristics of Santa Cruz County are quite diverse, ranging from the gradually sloping riparian corridor of the Santa Cruz River Valley with its adjoining agricultural areas, to the steeply inclined pine-oak forests located on Mount Wrightson and other parts of the Santa Rita, Tumacácori, and Patagonia mountains, plus numerous other mountain ranges throughout the county. The highest point in the county is Mount Wrightson in the Santa Rita Mountains at 9,453 feet above sea level. The lowest point is Santa Cruz River channel at the Pima County/Santa Cruz County boundary at 3,022. The majority of the County is comprised of high desert plains and foothills that are typical to the Chihuahuan desert.

The primary watercourse within Santa Cruz County is the Santa Cruz River. Other major watercourses within the County include, but are not limited to, the Nogales Wash/Potrero Creek, Peck Canyon, Josephine Canyon and Sonoita Creek. There are also numerous other ephemeral washes and watercourses that primarily convey flood waters. Groundwater extraction is the primary source for both domestic and commercial water consumption.

The geographical characteristics of Santa Cruz County have been mapped into two terrestrial ecoregions², which are depicted in Figure 4-3 and described below:

- **Chihuahuan Desert** – this ecoregion is typical of the high altitude deserts and foothills and is found in much of the southeastern portion of Arizona. Elevations in this zone varies between 3,000 to 4,500 feet. The average temperatures for the Chihuahuan Desert tends to be cooler than the Sonoran Desert (see below) due to the elevation differences. However, like its lower elevation cousin, the summers are hot and dry with mild to cool winters.
- **Sierra Madre Occidental Pine-Oak Forest** – this ecoregion is predominant to mountainous regions in southeast Arizona with elevations generally above 5,000 feet. The average temperatures tend to be cool during the summer and cold in winter.

² URS, 2004, *State of Arizona All Hazard Mitigation Plan*, GIS shapefiles used to generate Figure 5-2.

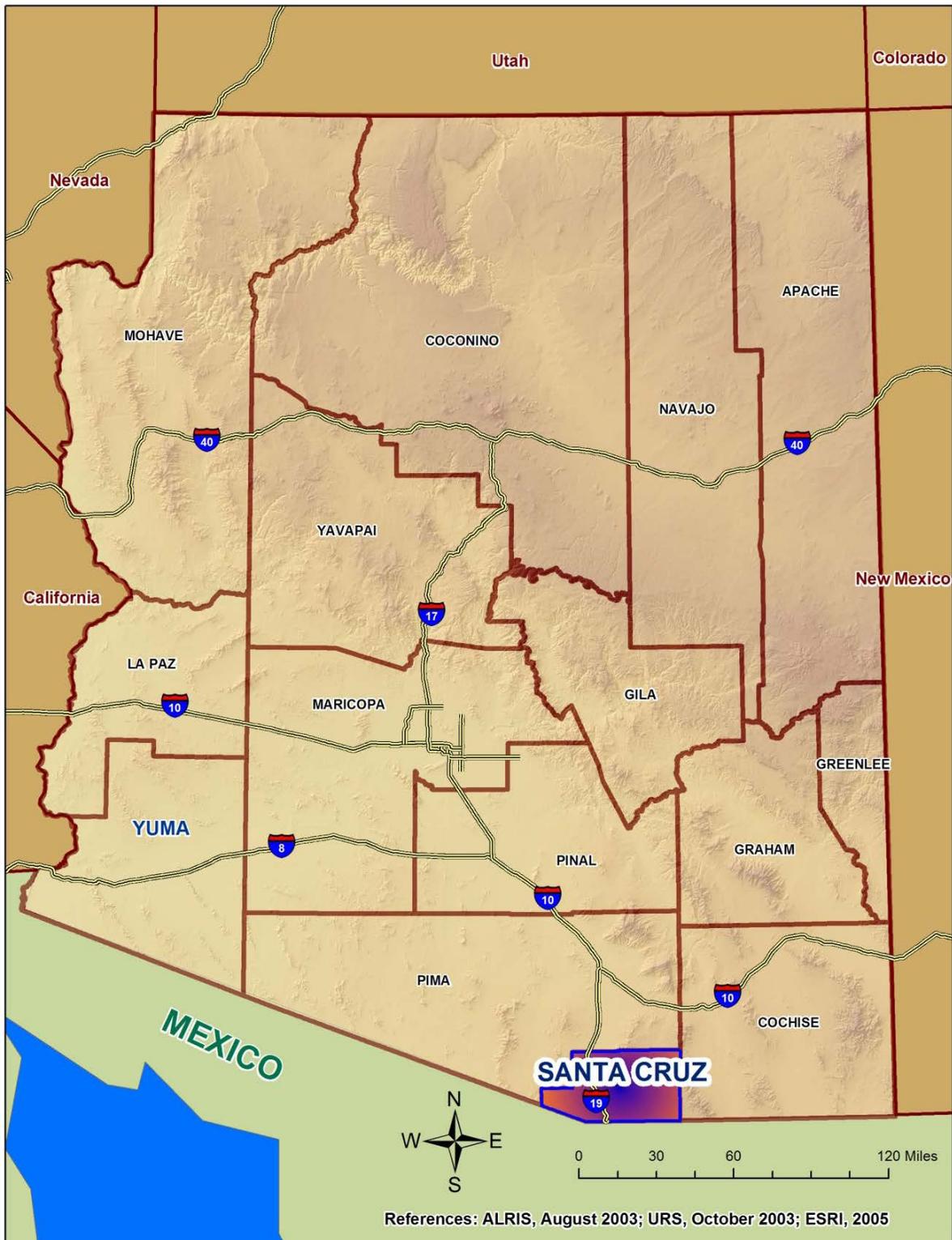


Figure 4-1: Vicinity Map

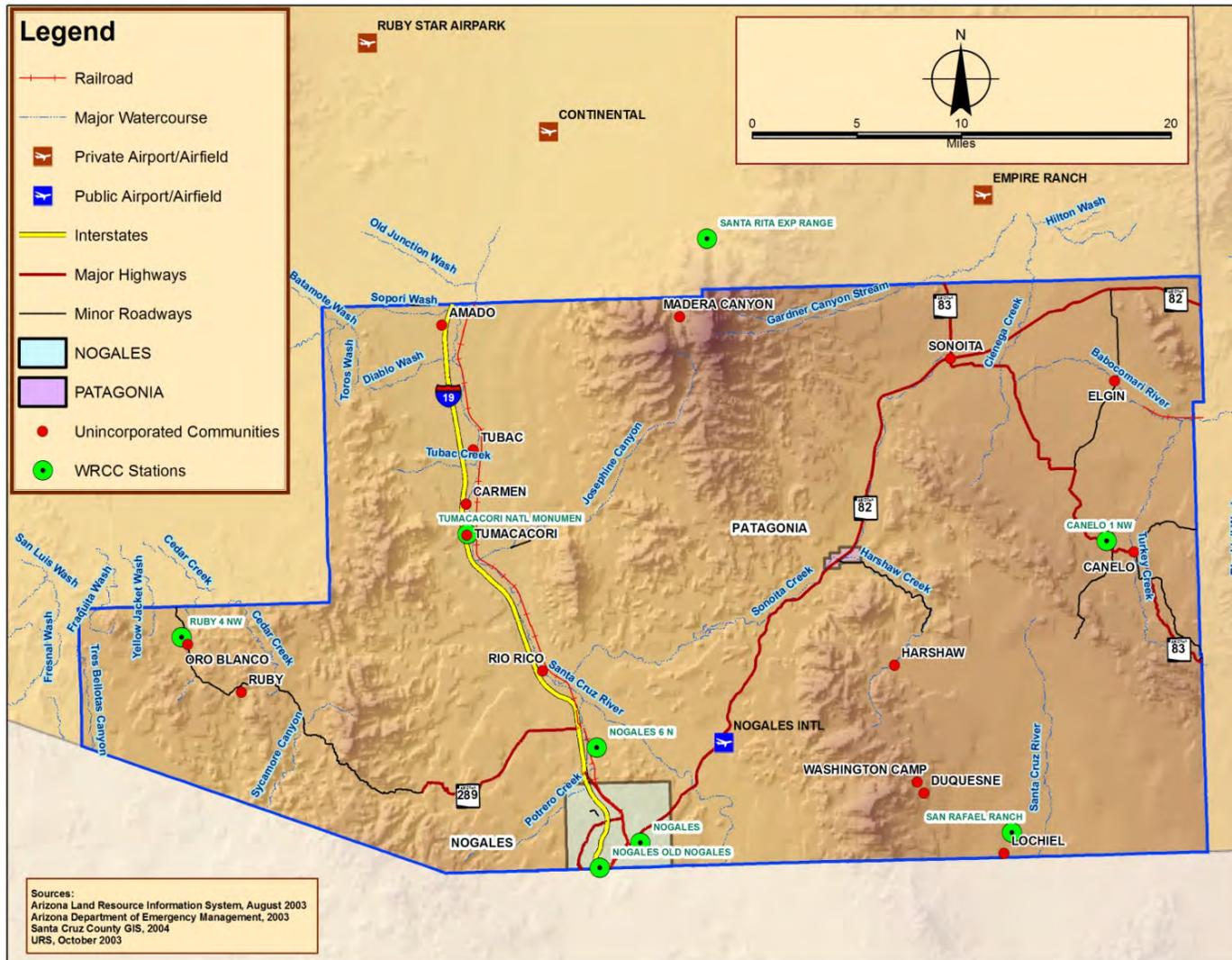


Figure 4-2: Transportation Routes Map



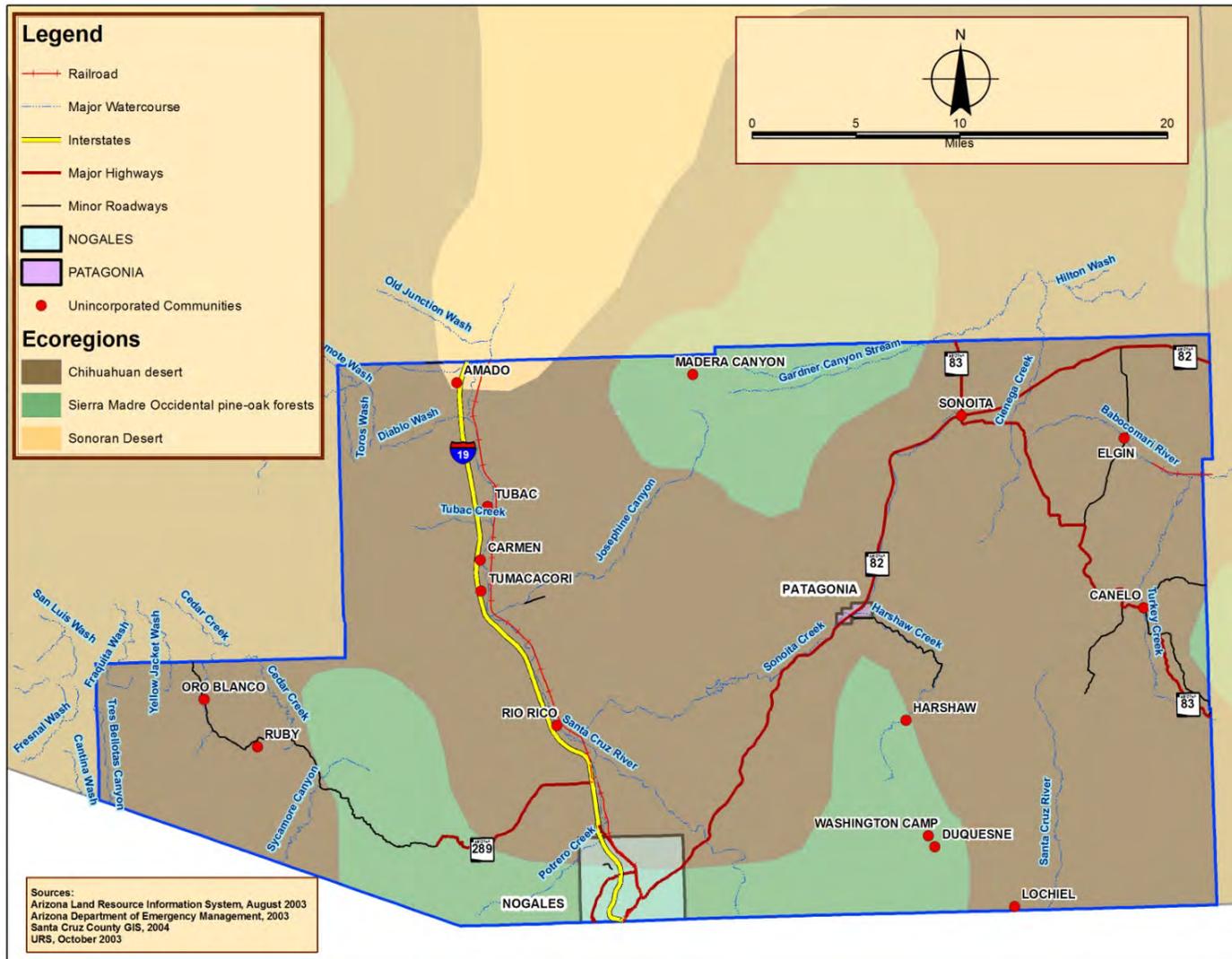


Figure 4-3: Terrestrial Ecoregions Map

4.2.2 *Climate*

For the majority of Santa Cruz County, the climate, when compared to other regions in the State of Arizona is relatively moderate. The region is considered to have mild winters and wet summers, with variation within these regions due to the fluctuation in elevation associated with the forests. Climate statistics for weather stations within Santa Cruz County are produced by the Western Region Climate Center³ and span records dating back to the early 1900's. Locations of reporting stations within or near Santa Cruz County are shown on Figure 4-2.

Average temperatures within Santa Cruz County range from below freezing during the winter months to over 100 degrees Fahrenheit during the hot summer months. The severity of temperatures is highly dependent upon the location, and more importantly the altitude, within the County. For instance, temperature extremes at the top of Mount Wrightson are significantly different from those for the Santa Cruz River Valley. Figure 4-4 presents a graphical depiction of temperature variability and extremes throughout the year for the Nogales 6 N Station, which is situated at an elevation of 3,560 feet in the heart of the Santa Cruz River Valley. Figure 4-5 presents the same temperature variability and extremes throughout the year for the Canelo 1 NW Station, which is situated at an elevation of 5,010 feet in the eastern grassland plain areas of Santa Cruz County.

The Nogales 6 N and Canelo 1 NW Station data are fairly representative of the regions within the County below 5,000 feet in elevation. It is plausible to expect a ten (10) to 20 degree reduction in temperature for areas above 8,000 feet.

Precipitation throughout Santa Cruz County is governed to a great extent by elevation and season of the year. 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 are usually found in the mountainous regions of the central southeastern portions of Arizona. These thunderstorms are often accompanied by strong winds, blowing dust, and infrequent hail storms.

Figures 4-6 and 4-7 present tabular temperature and precipitation statistics for the Nogales 6 N and Canelo 1 NW Stations.

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>

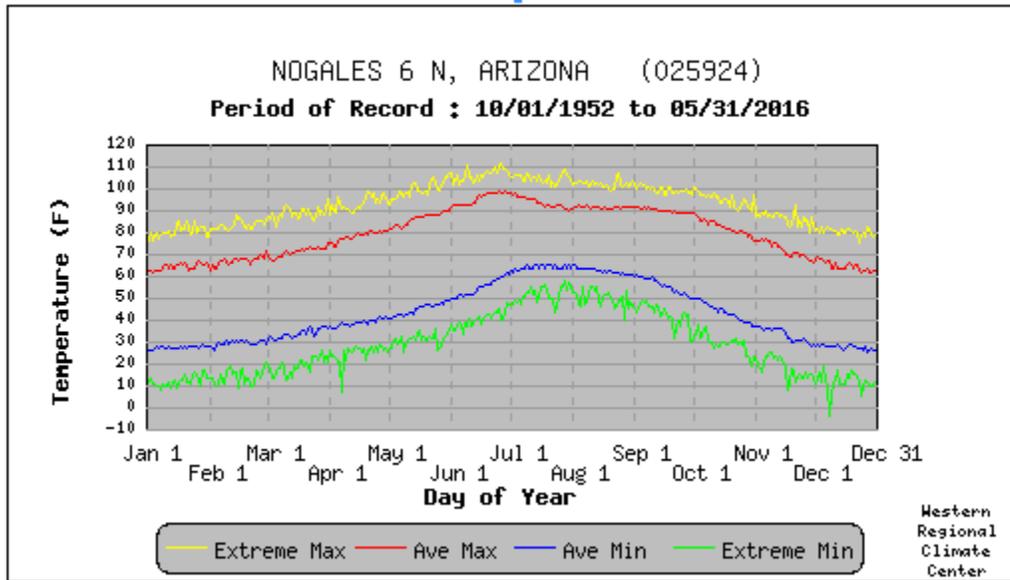


Figure 4-4
 Daily Temperatures and Extremes for Nogales 6N, Arizona

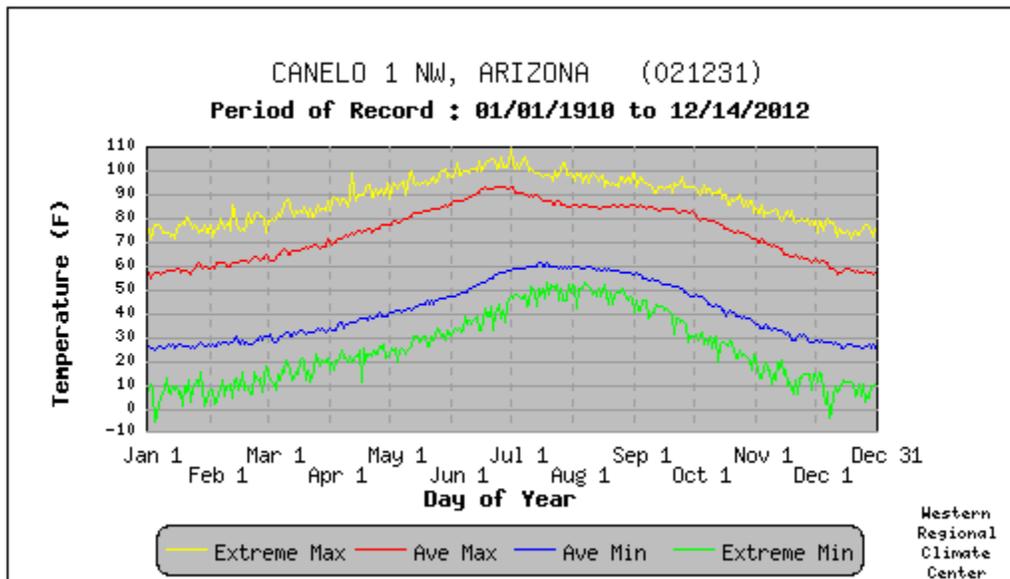


Figure 4-5
 Daily Temperatures and Extremes for Canelo 1 NW, Arizona

NOGALES 6 N, ARIZONA (025924)

Period of Record Monthly Climate Summary

Period of Record : 10/01/1952 to 05/31/2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	64.3	66.7	70.9	78.3	86.3	95.4	94.0	91.9	90.3	82.5	71.8	64.5	79.7
Average Min. Temperature (F)	27.3	29.6	33.8	38.7	45.1	54.6	64.0	62.8	55.7	44.0	33.2	27.6	43.0
Average Total Precipitation (in.)	1.11	0.83	0.84	0.36	0.22	0.45	4.34	3.94	1.59	1.27	0.64	1.39	16.98
Average Total SnowFall (in.)	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3
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% Min. Temp.: 97.7% Precipitation: 99.3% Snowfall: 98.5% Snow Depth: 97.9%
 Check [Station Metadata](#) or [Metadata graphics](#) for more detail about data completeness.

Western Regional Climate Center; wrc@dr.edu

Figure 4-6
Monthly Climate Summary for Nogales 6N, Arizona

CANELO 1 NW, ARIZONA (021231)

Period of Record Monthly Climate Summary

Period of Record : 01/01/1910 to 12/14/2012

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	57.8	61.4	66.3	73.7	81.7	90.4	88.1	85.4	83.7	76.5	65.8	58.1	74.1
Average Min. Temperature (F)	26.1	28.1	31.8	36.8	43.4	52.5	59.7	58.5	52.7	42.0	31.9	26.7	40.9
Average Total Precipitation (in.)	1.29	1.14	0.92	0.44	0.20	0.72	4.49	4.05	1.71	1.02	0.84	1.40	18.21
Average Total SnowFall (in.)	1.5	1.2	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.1	5.2
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.: 78.7% Min. Temp.: 79% Precipitation: 97.3% Snowfall: 96.4% Snow Depth: 95.9%
 Check [Station Metadata](#) or [Metadata graphics](#) for more detail about data completeness.

Western Regional Climate Center; wrc@dr.edu

Figure 4-7
Monthly Climate Summary for Canelo 1 NW, Arizona

4.2.3 *Population*

Santa Cruz County is home to 50,581 residents according to 2016 Census estimates, with the international border City of Nogales being the largest community. All of the communities are located within the Santa Cruz River Valley and are located relatively close to each other. There are 13 other towns and communities located throughout the County, with most situated along Interstate 19 and Highway 82 and many being comprised of only one structure or landmark. The largest of these two communities are Tubac and Rio Rico. Table 4-1 summarizes jurisdictional population estimates for Santa Cruz County, the City of Nogales, and the Town of Patagonia, for 10 year cycles beginning in 1990 and projecting through 2020.

The Santa Cruz County labor force in August 2017 was 18,909 with an unemployment rate of 12.6 percent⁴. Major industries of the County include transportation, services (i.e., tourism), manufacturing and public administration, and retail and wholesale trade.

Land ownership in Santa Cruz County is divided between the U.S. Forest Service and the Bureau of Land Management (54.6), Arizona State Trust Lands (7.8 percent), Local/State/National Parks (0.1 percent) and private ownership (37.5 percent)⁵. Figure 4-8 provides a visual depiction of the land ownership and town or community locations within the county.

Jurisdiction	1990	2000	2010	2016	2020	2025
Santa Cruz County (total)	29,900	40,075	47,420	50,581	53,903	57,404
Cities and Towns						
Nogales	19,595	21,810	20,837	21,955	23,666	25,203
Patagonia	890	985	913	966	1,035	1,103
Unincorporated	n/a	n/a	25,670	27,660	29,202	31,098
Note: Figures for 1990 and 2000(1980 – 2008) Historical Estimates: http://www.azcommerce.com/econinfo/demographics/Population+Estimates.html Figures for 2010 from AZ Dept of Commerce’s Arizona Workforce Informer, as accessed at: http://www.workforce.az.gov/census-data.aspx Figures for 2106: Arizona Office of Economic Opportunity, Population Estimates, 04/24/17: https://population.az.gov/population-estimates Figures for 2020 to 2025: Arizona Office of Economic Opportunity, Population Projections, 04/24/17: https://population.az.gov/population-projections						

4.2.4 *Economy*

The County was formed in 1899 by the 20th Territorial Legislature. The County was named after the Santa Cruz River that flows into Mexico from Arizona before winding back north into Santa Cruz County. Santa Cruz in Spanish means “holy cross”, and was given by Father Kino in the 17th century. The primary areas of growth within Santa Cruz County have occurred along the Santa Cruz River and the major transportation corridors within the County. Most residential growth has occurred within or very near the incorporated City of Nogales and the unincorporated community of Rio Rico. Commercial growth has historically been focused along Interstate 19 or State Highway 82, and to a lesser extent State Highway 83. Agricultural growth has occurred mainly along the Santa Cruz River and Sonoita Creek and has remained relatively stable.

Future growth in the next five years will depend on the region’s ability to climb out of the recession, a change in public perception that violence along the border is not principally occurring in Santa Cruz County, and the continued implementation of the North American Free Trade Agreement (NAFTA). The County has been severely challenged by the economic downturn and the stigma that violence across the border has created. When those factors are coupled with the response nationally to actions taken on the State level regarding immigration reform, the region’s economy was one of the first to be impacted, and the last to recover.

⁴ Arizona Office of Economic Opportunity, 2017, AZSTATS.GOV query at the following URL: <http://azstats.gov/laus-data-query-tool/>

⁵ Arizona State Land Department, Arizona Land Resource Information System (ALRIS), *Ownership-Land*, August 2010.

Recently, the Mariposa Port of Entry was upgraded, and a new level of cross-border freight inspections implemented which resulted in less wait times at the border for commercial vehicles. Improving border efficiencies may have a positive effect on the economy for this area.

The County has identified seven (7) growth areas in its latest comprehensive plan update⁶. All of these areas are located west of the Santa Rita Mountains in recognition of the interest for limited growth in the east. The following is a brief description of each area:

Airport – The Nogales International Airport is located along SR 82, northeast of the City of Nogales. The Airport itself, and the land surrounding it, are ideal locations for industrial and commercial land uses. Development occurring near the airport should be complementary to long-term expansion opportunities at the Airport, including restricting noise-sensitive developments. Industrial growth will continue to be limited by the lack of a major road linking SR 82 and I-19.

Amado – Amado serves as a gateway to the County along the I-19 corridor. The current zoning intensity should remain in the area. Appropriate development activities are neighborhood retail and services and campus commercial.

I-19 Corridor (Rio Rico Drive to Nogales) – The I-19 corridor is a significant residential and commercial area for the County. Warehousing and other industrial and commercial activities occur along both sides of the highway with residential development beyond that. This growth area recognizes the desire of many businesses to be located along a highway to improve their accessibility and visibility.

Kino Springs Village Center – The Kino Springs Village Center is a 2,000 acre master planned development area. It will serve the growing residential and tourism activities there with commercial uses.

Rio Rico Drive East – The growing residential and tourism market in the Rio Rico area will continue to support an increasing amount of commercial development. Grocery stores, large retail and other smaller development are envisioned to be located along Rio Rico Drive, east of I-19.

Ruby Road – Ruby Road is relatively a mid-point between the populations of Nogales and Rio Rico. As growth continues to occur in Rio Rico at a faster rate than in Nogales, the geographic center of the population in the west County will continue to move northward. The area south of Ruby Road is situated to serve both of these population centers. Retail and other commercial activities, including a regional mall or large retail development, would be appropriate uses in this area.

Tubac – The Tubac core area is a tourist destination and also provides services for local residents. This area, located along the east side of I-19, is home to a resort and various retail and commercial businesses. Maintaining the identity of this area is critical, so any new development should respect the current activities. There should be no intensification of existing zoning, and new development should support the tourism core that already exists.

4.2.5 *Development Trends for Unincorporated Santa Cruz County*

Over the 2011 Plan cycle, the majority of development within the areas of Unincorporated Santa Cruz County included the development of medical marijuana fields for the area between Tubac and Amado within the irrigated areas of the Santa Cruz River Valley. The county has also seen the development of new warehouses south of Ruby Road on the east side of I-19.

Anticipated development over the next Plan cycle (5-years) include:

- New winery development in the Sonoita/Elgin region.
- I-19 Corridor warehouse development continuing south of Ruby Road.
- Rex Ranch Guest Ranch property in Amado is proposing to be re-developed.

⁶ Santa Cruz County, 2016, *Santa Cruz County Comprehensive Plan*

- Medical marijuana greenhouse cultivation planned in Amado between I-19 and Santa Cruz River.
- Neighborhood commercial retail development South of Palo Parado between I-19 and W. Frontage Road.
- Mixed-Use Commercial development including med-high density housing, motel, entertainment venue and commercial retail center planned for west side of Frontage Road at Tubac exit.
- Semi-truck parking lot proposed for the southeast corner of E. Frontage Road and Old Tucson Road.

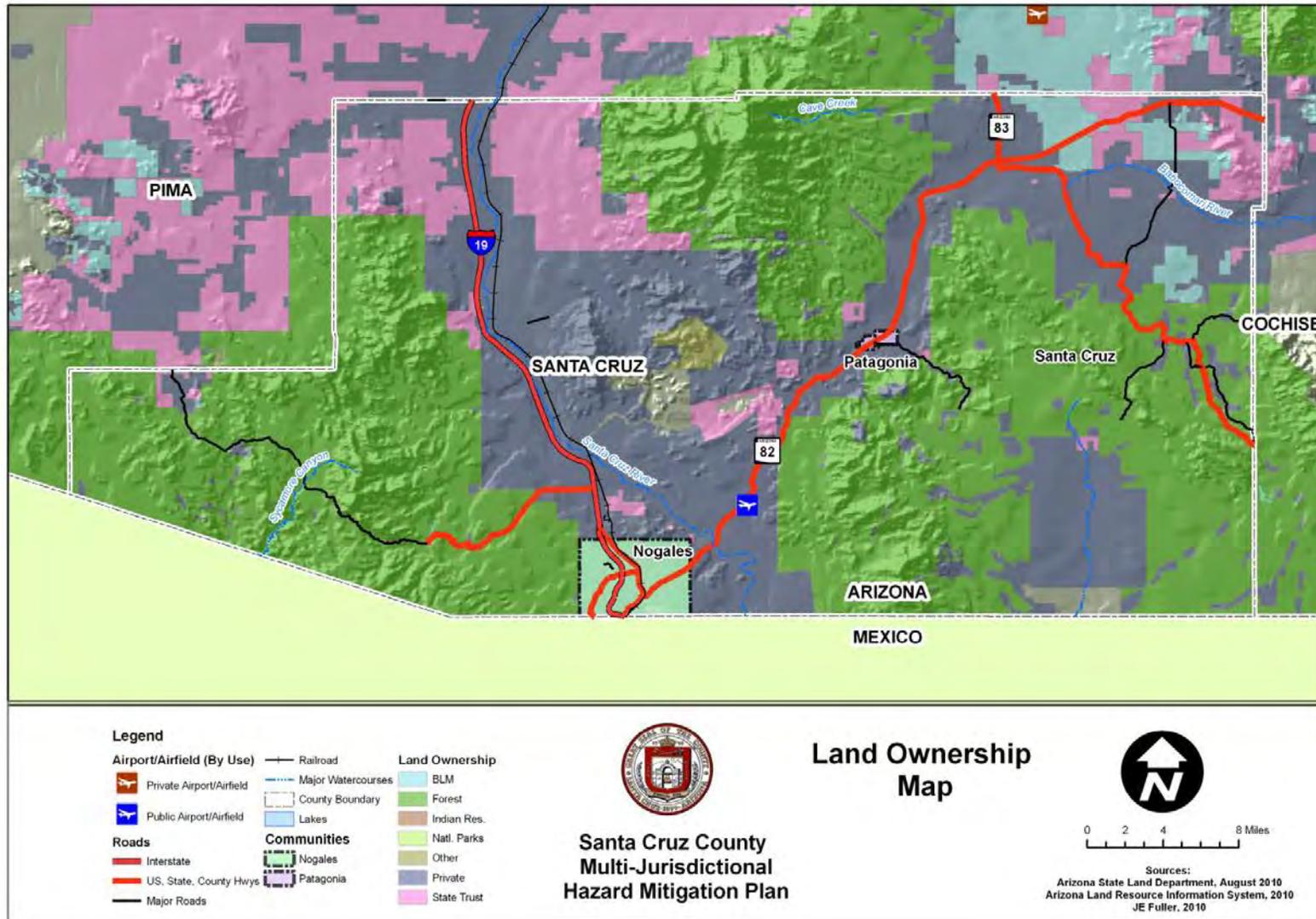


Figure 4-8: 2010 Land Ownership Map for Santa Cruz County

4.3 Jurisdictional Overviews

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

4.3.1 Nogales

General: The City of Nogales is on the international border separating the United States and Mexico as shown in Figure 4-1. The City of Nogales serves as the economic capital and the County seat of Santa Cruz County, the smallest and southernmost of Arizona's counties. Situated at the junction of Interstate 19 and State Road 82 (Patagonia Highway) approximately 67 miles south of Tucson and 179 miles from downtown Phoenix. The city lies within a mountainous setting at an elevation of 3,865 feet.

The centroid of the City is generally located at longitude 110.934 degrees west and latitude 31.340 degrees north and the average elevation is 3,865 feet. The Union Pacific Railroad parallels Interstate 19 and passes through the City. Figure 4-9 shows the land ownership and major transportation routes within the vicinity of Nogales.

Thousands of years ago, before European explorers ever dreamed of sailing across the Atlantic, Nogales was part of a migratory path and trade route much later called El Camino Real (The King's Highway). Much later, regiments of armor-clad Conquistadors forayed north along this very valley in quest of precious metals and gems. Today missions built by the Spanish colonists still dot the valley's landscape.

The Santa Cruz River Valley narrows to its narrowest point in Nogales. In the 1700s and 1800s, settlers in the area were besieged by Apaches raiding herds of well-fed cattle. One local rancher, Pete Kitchen, used to say, "Tucson, Tubac, Tumacácori, to hell," when returning to Nogales from a cattle drive from Tucson.

Nogales is a far more hospitable place today. Where Pete's ranch once was, is now is now the remnants of Soto's PK Outpost, which operated as a restaurant for several years but was damaged by a fire. It's actually one of the original 1853 structures of the old Kitchen homestead. Life on the border would not be complete without the influence of Pancho Villa, whose army occupied Nogales, Mexico in 1914 during the Mexican Revolution. The U.S. military's garrison in Nogales swelled to over 10,000 mostly black soldiers of the highly decorated 25th Regiment mostly detached from Washington, D.C. The military buildup and related business growth attracted many businesses to Nogales, some of which remain today.⁷

Nogales was established in 1880 by Jacob and Isaac Isaacson, who built a trading post along the border. Two years later, Nogales was the site of the first rail connection between Mexico and the United States.

The Census 2010 population for Nogales was 20,837. The civilian labor force in August 2017 was 8,136 with an unemployment rate of 15.5 percent. The major industries significant to the economy of Nogales include: Trade, Transportation, Utilities, Government and Goods Producing.

Development Trends: Development over the past 5 years has been mostly related to warehousing and was in direct response to the recent Mariposa Port of Entry expansion project. Retail businesses have also increased slightly in Nogales, and particularly along the Mariposa Road corridor. In contrast, a significant number of downtown merchants on Morley Avenue and Grand Avenue have closed their stores in the last two years. The Mexican Peso devaluation and the excessive crossing wait time have motivated foreign shoppers to stop buying in Nogales, Arizona.

Based on the recent activity of new commercial/industrial developments, the Warehousing Industry is expected to continue growing in Nogales, AZ in the next five years, and especially along the I-19 corridor and interchanges within the city limits.

⁷ <http://cityofnogales.net/visitors>



Figure 4-9: City of Nogales Land Ownership and Location Map

4.3.2 *Patagonia*

General: Patagonia is approximately 14 miles north of the international border separating the United States and Mexico as shown in Figure 4-2. The Town of Patagonia lies in a narrow valley surrounded by the Santa Rita Mountains to the north and the Patagonia Mountains to the south. Both the town and the mountains take their name from the Patagonia Mine. This Town is on State Road 82 (Patagonia Highway) approximately 61 miles south of Tucson and 174 miles from downtown Phoenix.

The centroid of the Town is generally located at longitude 110.756 degrees west and latitude 31.539 degrees north and the average elevation is 4,044 feet. Figure 4-10 shows the land ownership and major transportation routes within the vicinity of Patagonia.

The founder of Patagonia, Rollin Rice Richardson, was a Pennsylvanian who made his money in oil investments. Richardson purchased the San Rafael de la Zanja land grant in 1880 and three years later went into business with the San Rafael Cattle Company. Rollin founded Patagonia in 1896, and named it after himself. Not much later in 1899 the residents petitioned the postmaster general for a post office, and at that time decided to change the Town's name to Patagonia, after the mountain range that towers over the valley.

Mining was the primary industry of Patagonia residents, since rich ore and other minerals were discovered in the Patagonia Mountains and other surrounding mountain ranges. As Patagonia became a busy hub, other mining towns sprung up around its outskirts: Harshaw, Duquesne, Mowry, and Washington Camp were successful settlements located to the east and southeast. Patagonia eventually became connected through the New Mexico and Arizona Railroad that was built through the center of town. But when the mining industry dropped off, so did the Town's boom days. The last ore was shipped in 1960, and in 1962 the rail line was closed down. The rails were removed and railroad right-of-way was dedicated as a park. The old depot became Town Hall.

The Census 2010 population for Patagonia was 913. The civilian labor force in August 2017 was 317 with an unemployment rate of 8.5 percent. The major industries significant to the economy of Patagonia include: Trade, Transportation, Tourism, Utilities, Government and other Private Service-Providing.

Development Trends: There has been very little development within Patagonia over the last five years. The most significant project was the completion of a water line that extended into a previously un-served area of town, and has sparked some interest in that area for development.

Over the next five years, the town anticipates that limited residential development may occur in the area north and west of the high school.

Currently Arizona Mining, a subsidiary of a Canadian firm, is exploring underground mining sites to mine lead and zinc approximately six miles Southeast of Patagonia which may have an undetermined economic and development impact upon the Town.

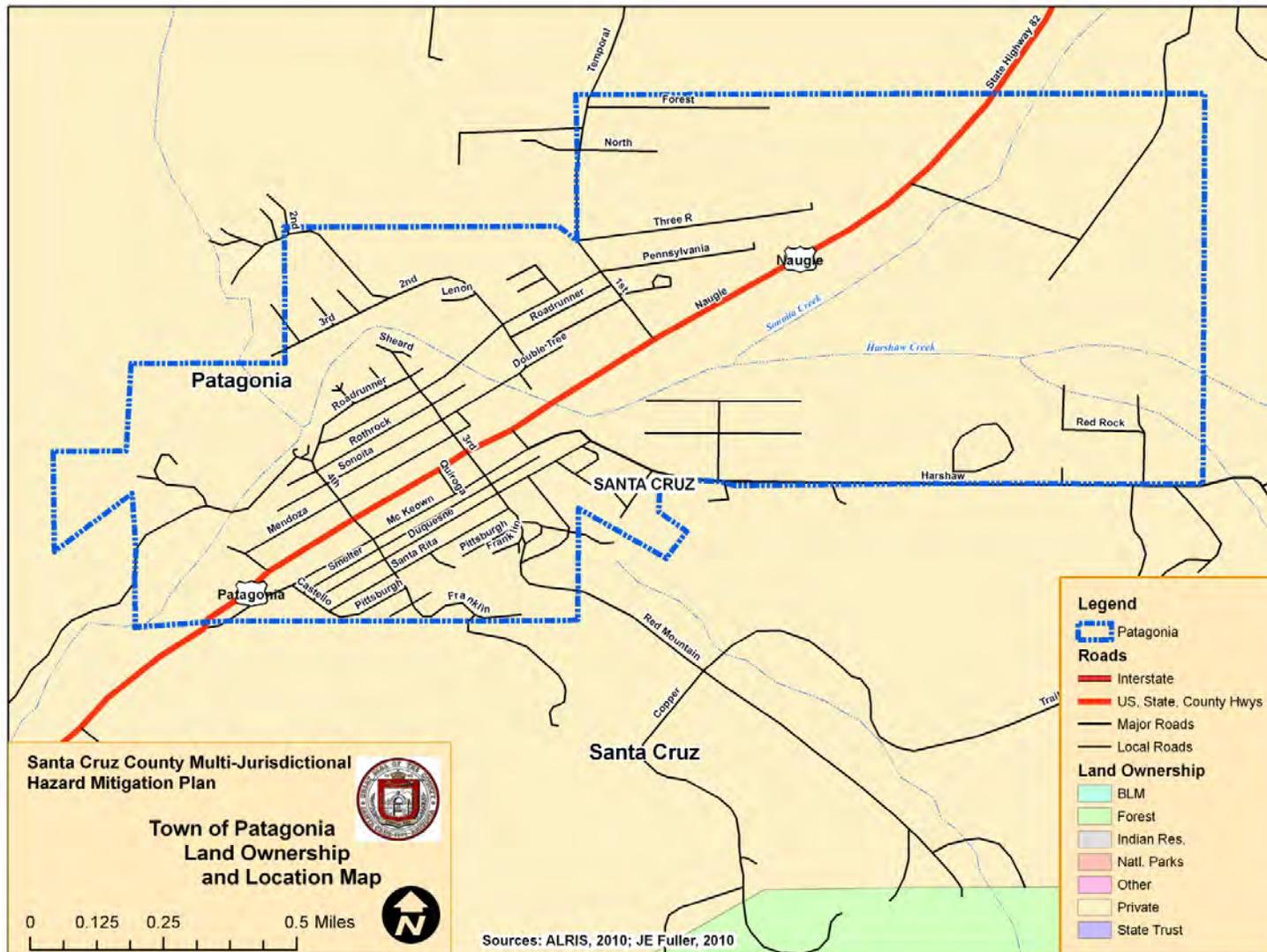


Figure 4-10: Town of Patagonia Land Ownership and Location Map

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SECTION 5: RISK ASSESSMENT

§201.6(c)(2): [The plan shall include...] (2) A **risk assessment** that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards. The risk assessment shall include:

- (i) A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.
- (ii) A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of:
 - (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;
 - (B) An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate;
 - (C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.
- (iii) For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

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 be⁸. 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 Santa Cruz County 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 numerous jurisdictions within the County, and are not often 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 2006 Plan were reviewed by the Planning Team with the goal of refining the list to reflect the hazards that pose the greatest risk to the jurisdictions represented by this Plan. The Planning Team also compared and contrasted the 2006 Plan list to the comprehensive hazard list summarized in the 2013 State Plan⁹ to ensure compatibility with the State Plan. Table 5-1 summarizes the 2011 Plan and 2013 State Plan hazard lists.

⁸ National Fire Protection Association, 2000, *Standard on Disaster/Emergency Management and Business Continuity Programs*, NFPA 1600.

⁹ DEMA, 2013, *State of Arizona Multi-Hazard Mitigation Plan*

Table 5-1: Initial hazard identification lists	
2011 Santa Cruz County Plan Hazard List	2013 State Plan Hazard List
<ul style="list-style-type: none"> • Dam Failure • Drought • Extreme Temperature • Flooding/Flash Flooding • HAZMAT • Severe Wind • Wildfire 	<ul style="list-style-type: none"> • Dam Failure • Disease • Drought • Earthquake • Extreme Heat • Fissure • Flooding/Flash Flooding • HAZMAT • Landslides/Mudslides • Levee Failure • Severe Wind • Subsidence • Terrorism • Wildfires • Winter Storm

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

One tool used in the initial screening process was the historic hazard database referenced in 2011 Plan. With this update, the 2011 Plan database, which separately summarizes declared disaster events versus non-declared events, was augmented to include additional data for events that occurred after the 2011 Plan was completed. Declared event sources included Santa Cruz County Office of Emergency Management (SCCOEM), Arizona Department of Emergency and Military Affairs (DEMA), Federal Emergency Management Agency (FEMA), and the United States Department of Agriculture (USDA). Non-declared sources included Arizona State Land Department (ASLD), National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center (NCDC), United States Geological Survey (USGS), and United States Forest Service (USFS), and the Arizona Geological Survey (AZGS). Both data sets were updated with additional hazard events that have occurred over the last plan cycle. The declared events represent the period of January 1966 to current. The undeclared events are as of January 2017. Three tables are used in this update to summarize the historic hazard events. Table 5-2 summarizes the federal and state disaster declarations that included Santa Cruz County. Table 5-3 summarizes federal and state declarations with data provided by many sources that included fatalities, injuries, and property damages. Table 5-4 summarizes all non-declared hazard events that were considered to be a significant event to the jurisdiction(s). These events may have included:

- 1 or more fatalities
- 1 or more injuries
- Any dollar amount in property or crop damages
- Significant event, as expressed in historical records or according to defined criteria above

Only hazards with a reported event or events are shown in each of the three tables.

Table 5-2: State and Federally Declared Natural Hazard Events That Included Santa Cruz County – April 1973 to August 2016			
2010 State Plan Hazard Categories	No. of Events	Arizona Declared Events That Included Santa Cruz County January 1966 to August 2010	
		Total Expenditures	
		State	Federal
Drought	8	\$211,499	\$413,404
Flooding / Flash Flooding	15	\$42,430,475	\$312,410,163
Wildfire	18	\$5,685,793	\$0
GENERAL NOTES: - Damage Costs are reported as is and no attempt has been made to adjust costs to current dollar values. - Only a portion of the reported expenditures were spent in the subject county.			
Source: DEMA – Recovery Section, January 2017			

Table 5-3: State and Federally Declared Events That Included Santa Cruz County April 1973 to August 2016				
Hazard	No. of Declarations	Recorded Losses		
		Fatalities	Injuries	Damage Costs (\$)
Drought	8	0	0	\$300,413,404
Flooding / Flash Flooding	15	39	1,087	\$1,291,955,000
Wildfire	18	0	0	\$0
Notes: - Damage Costs are reported as is and no attempt has been made to adjust costs to current dollar values. Sources: DEMA, FEMA, USDA, NCDC, NWS,				

Table 5-4: Santa Cruz County Undeclared Historic Hazard Events – August 1930 to August 2016				
Hazard	No. of Records	Recorded Losses		
		Fatalities	Injuries	Damage Costs (\$)
Extreme Temperature	2	21	0	\$0
Flooding	34	9	7	\$747,000
Hazardous Materials Incident	31	0	28	\$256,877
Severe Wind	24	0	0	\$336,800
Wildfire	25	0	30	\$677,000
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 cost do not include the cost of suppression which can be quite substantial. Sources: DEMA, NCDC, NWCG, NWS, USFS				

Detailed historic hazard records are provided in Appendix D.

The culmination of the review and screening process by the Planning Team resulted in a revised list of hazards that will be carried forward in this Plan. The 2011 Plan hazards selected for removal are listed below and include a brief explanation of the reason for removal:

Extreme Temperature – the Planning Team decided that the frequency and relative risk posed by extreme temperatures was very low to the county, and did not warrant keeping this hazard in the list or require any mitigation actions beyond what the jurisdictions are already doing through enforcement of building codes.

Severe Wind – the Planning Team examined the historic occurrences of severe wind events and determined that the probable risk of damages is low for the county. Typical events are very localized and development of further mitigation actions beyond what the jurisdictions are already doing was not warranted.

The Planning Team has selected the following list of hazards for profiling and updating based on the above explanations and screening process. Revised and updated definitions for each hazard are provided in Section 5.3 and in Section 8.2:

- **Dam Failure**
- **Flooding**
- **Wildfire**
- **Drought**
- **HAZMAT**

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. Comparisons between the 2011 Plan and this Plan are made whenever appropriate.

For the purposes of this vulnerability analysis, hazard profile maps were developed for Dam Failure, Flooding, HAZMAT 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/or LOW were used and were subjectively assigned based on the factors discussed in the Probability and Magnitude sections below. Within the context of the county limits, the other hazards do not exhibit significant geographic variability and will not be categorized as such.

Unless otherwise specified in this Plan, the general cutoff date for new hazard profile data and jurisdictional corporate limits is the end of January 2017.

5.2.2 Climate Change

In recent years, FEMA and others have begun to take a harder look at the impacts of climate change on natural hazards and the mitigation planning process. In March 2016, FEMA released new state mitigation planning guidance that will require all state hazard mitigation plans to address climate change beginning with all updates submitted after March 2016¹⁰. FEMA’s National Advisory Council noted that the effects of climate change could manifest as a “threat multiplier”. When considering probabilities of hazard events, it is typical to make the implicit assumption that the past is a prologue for the future; however, trending changes to climate related variables may require broader thinking and projections to develop mitigation actions and projects that account for those changes.

The scope and severity of cause and impacts relating to climate change are still difficult to predict and highly debated. There is, however, a growing body of science and research that indicates a few noticeable trends that should be considered when evaluating natural hazard vulnerability and risk. In 1989, the U.S. Global Change Research Program (USGCRP) was established by Presidential Initiative

¹⁰ FEMA, 2016, *State Mitigation Plan Review Guide*, released March 2016, effective March 2016, FP 302-094-2

and later mandated by Congress in the Global Change Research Act of 1990 with the stated purpose of assisting “the Nation and the world to understand, assess, predict, and respond to human-induced and natural processes of global change.” In May 2014, the USGCRP released the 3rd National Climate Assessment (NCA), which is a comprehensive compilation of the latest body of work and science on the topic of climate change. The NCA results and discussion are divided into regions to focus the discussions and conclusions to a regional perspective. The Southwest region includes the states of Arizona, California, Colorado, Nevada, New Mexico, and Utah. According to Chapter 20 of the NCA¹¹, the Southwest regional climate change impacts noted in the recent research include increased heat, drought, and insect outbreaks that result in more wildfires, declining water supplies, reduced agricultural yields, health impacts in cities due to heat, and flooding and erosion in coastal areas. In its 2014 report, the NCA released the following “Key Messages” for the Southwest Region:

1. Snowpack and streamflow amounts are projected to decline in parts of the Southwest, decreasing surface water supply reliability for cities, agriculture, and ecosystems. The Southwest produces more than half of the nation’s high-value specialty crops, which are irrigation-dependent and particularly vulnerable to extremes of moisture, cold, and heat. Reduced yields from increasing temperatures and increasing competition for scarce water supplies will displace jobs in some rural communities.
2. Increased warming, drought, and insect outbreaks, all caused by or linked to climate change, have increased wildfires and impacts to people and ecosystems in the Southwest. Fire models project more wildfire and increased risks to communities across extensive areas.
3. Flooding and erosion in coastal areas are already occurring even at existing sea levels and damaging some California coastal areas during storms and extreme high tides. Sea level rise is projected to increase as Earth continues to warm, resulting in major damage as wind-driven waves ride upon higher seas and reach farther inland.
4. Projected regional temperature increases, combined with the way cities amplify heat, will pose increased threats and costs to public health in southwestern cities, which are home to more than 90% of the region’s population. Disruptions to urban electricity and water supplies will exacerbate these health problems.

FEMA has established that future changes in probabilities and severity of hazard events influenced by climate change should be addressed during mitigation planning. Accordingly, a brief assessment of the potential effects that current climate change understanding may have on the Plan hazards is provided where appropriate in Section 5.3.

5.2.3 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 Index¹² (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 5-5 summarizes the CPRI risk categories and provides guidance regarding the assignment of values and weighting factors for each category.

¹¹ Garfin, G., G. Franco, H. Blanco, A. Comrie, P. Gonzalez, T. Piechota, R. Smyth, and R. Waskom, 2014, *Ch. 20: Southwest. Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 462-486. doi:10.7930/J08G8HMN

¹² ADEM, 2003, *Arizona Model Local Hazard Mitigation Plan*, prepared by JE Fuller/ Hydrology & Geomorphology, Inc.

Table 5-5: Calculated Priority Risk Index (CPRI) categories and risk levels

CPRI Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Index Value	
Probability	Unlikely	<ul style="list-style-type: none"> ■ Extremely rare with no documented history of occurrences or events. ■ Annual probability of less than 0.001. 	1	45%
	Possible	<ul style="list-style-type: none"> ■ Rare occurrences with at least one documented or anecdotal historic event. ■ Annual probability that is between 0.01 and 0.001. 	2	
	Likely	<ul style="list-style-type: none"> ■ Occasional occurrences with at least two or more documented historic events. ■ Annual probability that is between 0.1 and 0.01. 	3	
	Highly Likely	<ul style="list-style-type: none"> ■ Frequent events with a well documented history of occurrence. ■ Annual probability that is greater than 0.1. 	4	
Magnitude/ Severity	Negligible	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ 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 the project team is assessing the hazard of flooding, and has 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

The CPRI for the flooding hazard would then be:

$$\text{CPRI} = [(3 \times 0.45) + (3 \times 0.30) + (2 \times 0.15) + (1 \times 0.10)]$$

$$\text{CPRI} = 2.65$$

5.2.4 Asset Inventory

A detailed asset inventory was performed for the 2011 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 2011 Plan was reviewed and updated to reflect the current critical and non-critical facilities potentially exposed to hazards. Details of the update are discussed later in this section. The 2013 State Plan defines assets as:

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.

The 2011 Plan asset inventory database was generally categorized into critical and non-critical categories. The working definition for **Critical facilities and infrastructure**, adopted for the 2011 Plan and continuing with this Plan is as follows:

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 categories¹³ 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.
2. **Electrical Power Systems:** Generation stations and transmission and distribution networks that create and supply electricity to end-users.
3. **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.
4. **Banking and Finance Institutions:** Banks, financial service companies, payment systems, investment companies, and securities/commodities exchanges.
5. **Transportation Networks:** Highways, railroads, ports and inland waterways, pipelines, and airports and airways that facilitate the efficient movement of goods and people.
6. **Water Supply Systems:** Sources of water; reservoirs and holding facilities; aqueducts and other transport systems; filtration, cleaning, and treatment systems; pipelines; cooling systems;

¹³ Instituted via Executive Order 13010, which was signed by President Clinton in 1996.

and other delivery mechanisms that provide for domestic and industrial applications, including systems for dealing with water runoff, wastewater, and firefighting.

7. **Government Services:** Capabilities at the federal, state, and local levels of government required to meet the needs for essential services to the public.
8. **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, 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 determining which of the previously identified “non-critical” assets, if any, were deemed critical by the community. The remaining “non-critical” assets were deleted from the database. New facilities were also added as appropriate and available. 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 entered into a GIS geodatabase.

The 2011 Plan used a combination of the Asset Inventory and HAZUS[®]-MH¹⁴ data to represent the critical facilities and general building stock and population for Santa Cruz County jurisdictions. Tools used by the Local Planning Team for the update included GIS data sets, on-line mapping utilities, insurance pool information, county assessors data, and manual data acquisition. Table 5-6 summarizes the facility counts provided by each of the participating jurisdictions in this Plan.

It should be noted that the facility counts summarized in Table 5-6 do not represent a comprehensive inventory of all the category facilities that exist within the county. They do represent the facilities inventoried to-date by each jurisdiction and are considered to be a work-in-progress that is to be expanded and augmented with each Plan cycle.

5.2.5 *Loss Estimations*

In the 2011 Plan, losses were estimated by either quantitative or qualitative methods. Quantitative methods consisted of intersecting hazard map layers with the asset inventory map layer and the HAZUS[®]-MH map layer. Other quantitative methods included statistical methods based on historic data. The loss estimates for this Plan represent the current hazard map layers and asset databases using the procedures discussed below.

Economic loss and human exposure estimates for each of the final hazards identified in Section 5.1 begins with an assessment of the potential exposure of asset inventory structures and human populations to those hazards. Exposure estimates of asset inventory structures identified by each jurisdiction is accomplished by intersecting the asset inventory with the hazard profiles in Section 5.3. Human or population exposures are estimated by intersecting the same hazards with the 2010 Census Data population statistics that have been re-organized into GIS compatible databases and distributed with HAZUS[®]-MH (HAZUS).

¹⁴ U.S. Department of Homeland Security, Federal Emergency Management Agency, HAZUS[®]-MH.

Table 5-6: Asset inventory structure counts by category and jurisdiction as of June 2017

	Communications Infrastructure	Electrical Power Systems	Gas and Oil Facilities	Banking and Finance Institutions	Transportation Networks	Water Supply Systems	Government Services	Emergency Services	Educational ^a	Cultural ^a	Business ^a	Flood Control ^a	Residential ^a	Recreational ^a
County-Wide Totals	11	4	6	8	81	60	36	22	10	0	2	2	0	0
Nogales	2	1	0	5	1	5	14	8	0	0	1	0	0	0
Patagonia	2	0	1	0	0	4	5	2	1	0	1	0	0	0
Unincorporated Santa Cruz County	7	3	5	3	80	51	17	12	9	0	0	2	0	0

NOTES: ^a – Assets listed under these categories have been determined to be critical per the definition of this Plan by the corresponding jurisdiction.

Additional exposure estimates for general residential, commercial, and industrial building stock not specifically identified with the asset inventory, are also accomplished using the HAZUS database, wherein the developers of the HAZUS database have made attempts to correlate building/structure counts to census block data. *It is duly noted that the HAZUS data population statistics may not exactly equate to the current population statistics provided in Section 4.2 due to actual changes in population counts associated with a particular census block, GIS positioning anomalies and the way HAZUS depicts certain census block data. It is also noted that the residential, commercial and industrial building stock estimates for each census block may severely under-predict the actual buildings present due to the substantial growth in the last decade, the general lack of commercial and industrial data for some of the more rural communities and counties, and the disparity of the HAZUS replacement cost estimates for these categories when compared to current market rates. However, without a detailed, site specific structure inventory of these types of buildings, the HAZUS database is still the best available and the results are representative of a general magnitude of population and residential, commercial and industrial facility exposures to the various hazards discussed.* Combining the exposure results from the asset inventory and the HAZUS database provides a fairly comprehensive depiction of the overall exposure of building stock and the two datasets are considered complimentary and not redundant.

Economic losses to structures and facilities are estimated by multiplying the exposed facility replacement cost estimates by an assumed loss to exposure ratio for the hazard. The loss to exposure ratios used in this plan update are summarized by hazard in Section 5.3. It is important to note that the loss to exposure ratios are subjective and the estimates are solely intended to provide an understanding of relative risk from the hazards and potential losses. Real uncertainties are inherent in any loss estimation methodology due to:

- Incomplete scientific knowledge concerning hazards and our ability to predict their effects on the built environment;
- Approximations and simplifications that are necessary for a comprehensive analysis; and,
- Lack of detailed data necessary to implement a viable statistical approach to loss estimations.

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.

5.2.6 *Development Trend Analysis*

The 2011 Plan development trend analysis will require updating to focus on the potential risk associated with projected growth patterns and their intersection with the Plan identified hazards. Anticipated development areas and trends are discussed at the end of Sections 4.2 and 4.3

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 2011 Plan data has been updated, incorporated and/or revised to reflect current conditions and Planning Team changes. County-wide and jurisdiction specific profile maps are provided at the end of the section (if applicable). Also, the maps are not included in the page count.

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5.3.1 *Dam Failure*

Description

The primary risk associated with dam failure in Santa Cruz County is the inundation of downstream facilities and population by the resulting flood wave. Dams within or impacting Santa Cruz County can generally be divided into two groups: (1) storage reservoirs designed to permanently impound water, provide flood protection, and possibly generate power, and (2) single purpose flood retarding structures (FRS) designed to attenuate or reduce flooding by impounding stormwater for relatively short durations of time during flood events. All dams within the county are equipped with an emergency spillway, which provides a designed and protected outlet to convey runoff volumes exceeding the dam's storage capacity during extreme or back-to-back storm events. Dam failures may be caused by a variety of reasons including: seismic events, extreme wave action, leakage and piping, overtopping, material fatigue and spillway erosion.

History

Santa Cruz County has no history of dam failure.

Probability and Magnitude

The probability and magnitude of dam failure discharges vary greatly with each dam and are directly influenced by the type and age of the dam, its operational purpose, storage capacity and height, downstream conditions, and many other factors. There are two sources of data that publish hazard ratings for dams impacting Santa Cruz County. The first is the Arizona Department of Water Resources (ADWR) and the second is the National Inventory of Dams (NID). Hazard ratings from each source are based on either an assessment of the consequence of failure and/or dam safety considerations, and they are not tied to probability of occurrence.

ADWR has regulatory jurisdiction over the non-federal dams impacting the County and is responsible for regulating the safety of these dams, conducting field investigations, and participating in flood mitigation programs with the goal of minimizing the risk for loss of life and property to the citizens of Arizona. ADWR jurisdictional dams are inspected regularly according to downstream hazard potential classification, which follows the NID classification system. High hazard dams are inspected annually, significant hazard dams every three years, and low hazard dams every five years. Via these inspections, ADWR identifies safety deficiencies requiring correction and assigns each dam one of six safety ratings. Examples of safety deficiencies include: lack of an adequate emergency action plan, inability to safely pass the required Inflow Design Flood (IDF), embankment erosion, dam stability, etc. Further descriptions of each safety classification are summarized in Table 5-7.

The NID database contains information on approximately 77,000 dams in the 50 states and Puerto Rico, with approximately 30 characteristics reported for each dam, such as: name, owner, river, nearest community, length, height, average storage, max storage, hazard rating, Emergency Action Plan (EAP), latitude, and longitude.

The NID and ADWR databases provide useful information on the potential hazard posed by dams. Each dam in the NID is assigned one of the following three hazard potential classes based on the potential for loss of life and damage to property should the dam fail (listed in increasing severity): low, significant, or high. The hazard potential classification is based on an evaluation of the probable present and future incremental adverse consequences that would result from the release of water or stored contents due to failure or improper operation of the dam or appurtenances, regardless of the condition of the dam. The ADWR evaluation includes land-use zoning and development projected for the affected area over the 10-year period following the classification of the dam. It is important to note that the hazard potential classification is an assessment of the consequences of failure, but not an evaluation of the probability of failure or improper operation. Table 5-8 summarizes the hazard potential classifications and criteria for dams regulated by the State of Arizona.

Table 5-7: ADWR safety categories	
ADWR Safety Rating	Definition
No Deficiency	Not Applicable
Safety Deficiency	One or more conditions at the dam that impair or adversely affects the safe operation of the dam.
Unsafe Categories	
Category 1: Unsafe Dams with Elevated Risk of Failure	These dams have confirmed safety deficiencies for which there is concern they could fail during a 100-year or smaller flood event. There is an urgent need to repair or remove these dams.
Category 2: Unsafe Dams Requiring Rehabilitation or Removal	These dams have confirmed safety deficiencies and require either repair or removal. These dams are prioritized for repair or removal behind the Category 1 dams.
Category 3: Unsafe Dams with Uncertain Stability during Extreme Events (Requiring Study)	Concrete or masonry dams that have been reclassified to high hazard potential because of downstream development (i.e. hazard creep”). The necessary documentation demonstrating that the dams meet or exceed standard stability criteria for high hazard dams during extreme overtopping and seismic events is lacking. The dams are classified as unsafe pending the results of required studies. Upon completion of these studies, the dams are either removed from the list of unsafe dams or moved to Category 2 and prioritized for repair or removal.
Category 4: Unsafe Dams Pending Evaluation of Flood-Passing Capacity (Requiring Study)	In 1979, the U.S. Army Corps of Engineers established Federal Guidelines for assessing the safe-flood passing capacity of high hazard potential dams (CFR Vol. 44 No. 188). These guidelines established one-half of the “probable maximum flood” (PMF) as the minimum storm which must be safely passed without overtopping and subsequent failure of the dam. Dams unable to safely pass a storm of this size were classified as being in an “unsafe, non-emergency” condition. Prior studies for these earthen dams (mostly performed in the 1980’s) predicted they could not safely pass one-half of the PMF. They were predicted to overtop and fail for flood events ranging from 30 to 46 percent of the PMF. Recent studies both statewide and nationwide have indicated that the science of PMF hydrology as practiced in the 1990’s commonly overestimates the PMF for a given watershed. The ADWR is leading efforts on a statewide update of probably maximum precipitation (PMP) study scheduled for completion in 2011. These dams should be re-evaluated using updated methods to confirm their safety status. Upon completion of these evaluations, they are either removed from the list of unsafe dams or moved to Category 2 and prioritized for repair or removal.
Source: ADWR, 2009.	

Hazard Potential Classification	Loss of Human Life	Economic, Environmental, Lifeline Losses
Low	None expected	Low and generally limited to owner
Significant	None expected	Yes
High	Probable. One or more expected	Yes (but not necessary for this classification)
Note: The hazard potential classification is an assessment of the consequences of failure, but not an evaluation of the probability of failure.		
Source: ADWR and NID 2009		

The NID database includes dams that are either:

- High or Significant hazard potential class dams, or,
- Low hazard potential class dams that exceed 25 feet in height and 15 acre-feet storage, or,
- Low hazard potential class dams that exceed 50 acre-feet storage and 6 feet height.

Based on the two databases, there are five dams that impact Santa Cruz County. Four dams (Kino Springs, Lake Patagonia, Oro Blanco, and Pena Blanca) are located within the county boundary. One dam (Parker Canyon) is located just east of the county line at the southwestern corner of the county. The Oro Blanco and Kino Springs dams are low hazard dams. Lake Patagonia, Pena Blanca and Parker Canyon are identified as high hazard dams. All five are under ADWR jurisdiction. Table 5-9 provides a summary of the high hazard dams in both the ADWR and NID databases.

Hazard Class	SID	NID	Dam Name	ADWR Safety Types	EAP	Inundation Mapping	Nearest Downstream Development	Distance in Miles
High	02.02	AZ00014	Parker Canyon	Safety Deficiency	Yes	Yes	Parker Canyon Road	6.2
	12.05	AZ00028	Pena Blanca	No Deficiency	Yes	Yes	1-19	8.3
	12.06	AZ00029	Lake Patagoni	No Deficiency	Yes	Yes	Rio Rico, I-19 & Railroad	8.2
Sources: NID, ADWR Dam Safety Database (June 2017)								

The magnitude of impacts due to dam failure are usually depicted by mapping the estimated downstream inundation limits based on an assessment of a combination of flow depth and velocity. These limits are typically a critical part of the emergency action plan. All three high hazard dams have emergency action plans showing downstream dam failure inundation limits. For inundation resulting from dam failure, the following two classes of hazard risk are depicted:

HIGH Hazard = Inundation limits due to dam failure

LOW Hazard = All other areas outside the inundation limits

Maps 1A is a county-wide map showing the location and hazard classifications for each dam and the corresponding dam failure inundation limits (if available). Map 1B is more detailed map of the Lake Patagonia and Pena Blanca inundation areas.

The most populated areas of Santa Cruz county are situated downstream of Nogales, Sonora, Mexico. There are several flood control and water storage dams situated within the Sonoran watershed for

Nogales Wash, which if they were to fail, could cause significant flooding at the international border and into Nogales, Arizona. In 2010, the USGS released a report (Norma, L.M., et al, 2010) documenting the impacts of Sonoran detention basins. An excerpt from the report showing a map of the analyzed detention basins is shown in Figure 5-1. No dam safety level evaluations or analyses were performed, but the report did summarize the potential watershed impacts of with and without dam scenarios for various magnitude storms up to the 100-year event. The Planning Team evaluating the magnitude of runoff and concluded that a failure of one or more of the larger detention structures during a 100-year event would likely increase the impact on downstream areas. Without the benefit of detailed technical analyses, the Planning Team chose to depict a dam failure hazard area through Nogales, Arizona and downstream as the equivalent of the 100-year floodplain plus a 75 foot buffer.

Vulnerability – CPRI Results

Dam failure CPRI results for each jurisdiction are summarized in Table 5-10.

Table 5-10: CPRI results by jurisdiction for dam failure

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Nogales	Likely	Catastrophic	< 6 hours	< 6 hours	3.25
Patagonia	Unlikely	Negligible	< 6 hours	< 6 hours	1.45
Unincorporated Santa Cruz County	Unlikely	Catastrophic	< 6 hours	< 24 hours	2.45
County-wide average CPRI =					2.38

Vulnerability – Loss Estimations

The estimation of potential losses due to inundation from a dam failure was accomplished by intersecting the human and facility assets with the inundation limits depicted on Maps 1A and 1B. As stated previously, delineated dam failure inundation limits were readily available for both dams. Therefore, the results of this analysis are expected to underestimate the exposure of people and infrastructure within Santa Cruz County.

Since no common methodology is available for obtaining losses from the exposure values, estimates of the loss-to-exposure ratios were assumed based on the perceived potential for damage. Any storm event, or series of storm events of sufficient magnitude to cause a dam failure scenario, would have potentially catastrophic consequences in the inundation area. Floodwaves from these types of events travel very fast and possess tremendous destructive energy. Accordingly, an average event based loss-to-exposure ratio for the inundation areas with a high hazard rating are estimated to be 0.25. Low rated areas are zero.

It should be noted that the Planning Team recognizes that the probability of a dam failure occurring at multiple (or all) locations at the same time is essentially zero. Accordingly, the loss estimates presented below are intended to serve as a collective evaluation of the potential exposure to dam failure inundation events.

Table 5-11 summarizes estimations of losses to Planning Team identified assets for the dam failure inundation hazard. Table 5-12 summarizes the estimated population exposed to the dam failure inundation hazard. Tables 5-13 through 5-16 summarize exposure and loss estimates to the HAZUS residential, commercial, and industrial building stock for the dam failure inundation hazard. Table 5-13 summarizes the HAZUS based exposure and losses for the entirety of Santa Cruz County. Tables 5-14 through 5-16 summarize jurisdiction specific HAZUS data exposure and loss estimates.

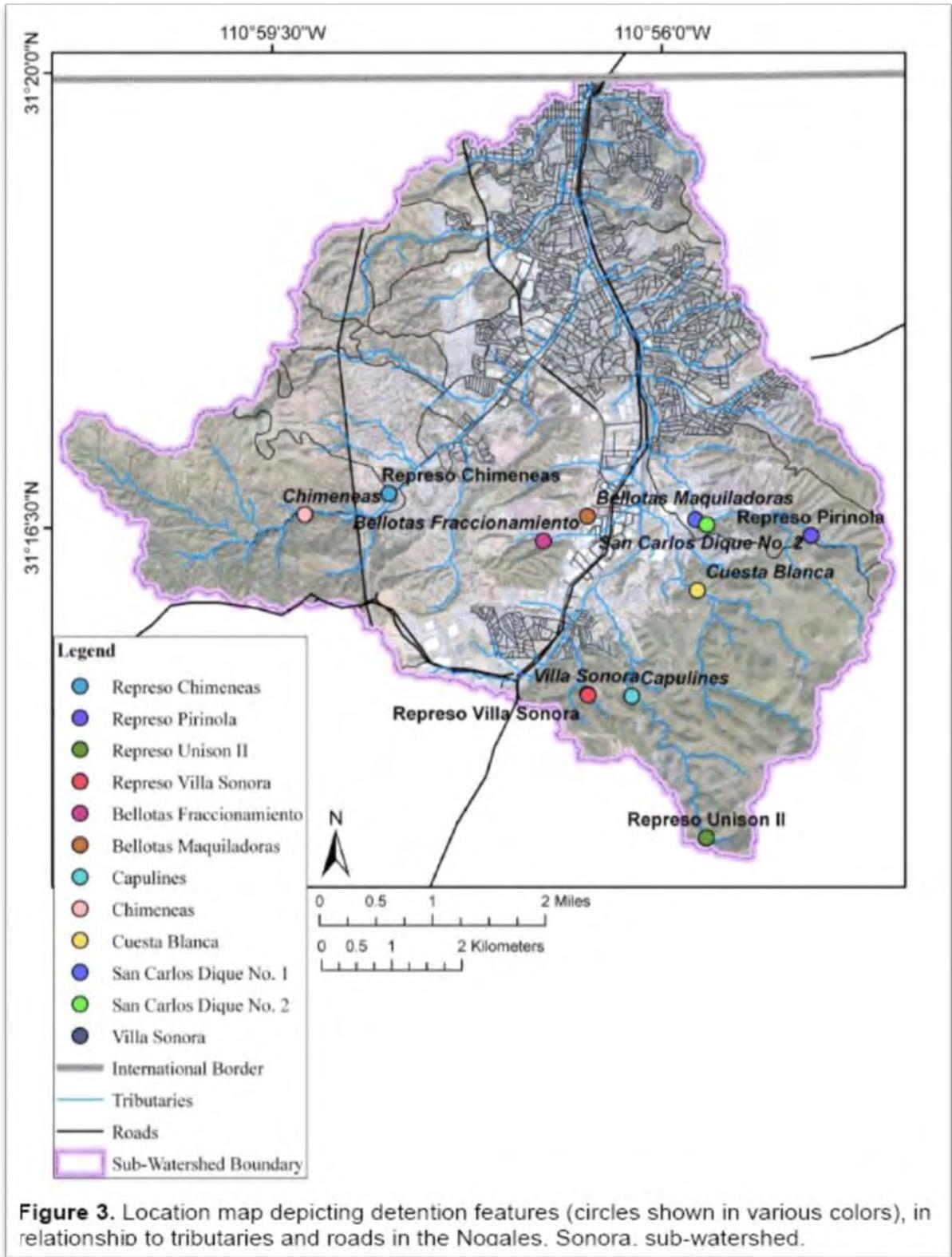


Figure 5-1: Nogales, Sonora Mexico dam locations

Table 5-11: Asset inventory losses due to dam failure flooding					
Community	Total Facilities Reported by Community	Impacted Facilities	Percentage of Total Community Facilities Impacted	Estimated Replacement Cost (x\$1000)	Estimated Structure Loss(x\$1000)
HIGH					
County-Wide Totals	242	55	22.73%	\$151,556	\$37,889
Nogales	37	19	51.35%	\$5,418	\$1,354
Patagonia	16	0	0.00%	\$0	\$0
Unincorporated Santa Cruz	189	36	19.05%	\$146,138	\$36,534

Table 5-12: Population sectors exposed to dam failure flooding						
Community	Total Population	Population Exposed	Percent of Population Exposed	Total Population Over 65	Population Over 65 Exposed	Percent of Population Over 65 Exposed
HIGH						
County-Wide Totals	47,384	4,788	10.10%	6,218	665	10.70%
City of Nogales	20,773	2,940	14.15%	2,863	456	15.93%
Town of Patagonia	890	0	0.00%	201	0	0.00%
Unincorporated	25,721	1,848	7.18%	3,154	209	6.63%

Table 5-13: Santa Cruz County HAZUS building exposure to dam failure

	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		SUMMARY		
Santa Cruz County HAZUS Summary	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Total of All Economic Impact (x\$1000)	Loss-to-Exposure Ratio	Total Estimated Loss (x\$1000)
County-Wide Totals	15,675	\$4,387,978	746	\$1,309,416	197	\$258,243	\$5,955,637		
High Hazard Exposure	1,390	\$357,656	212	\$429,273	31	\$47,961	\$834,889	25%	\$208,722
Santa Cruz County HAZUS Summary	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact			
High Hazard Exposure	08.87%	08.15%	28.47%	32.78%	15.53%	18.57%			

Table 5-14: City of Nogales HAZUS building exposure to dam failure

	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		SUMMARY		
City of Nogales HAZUS Summary	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Total of All Economic Impact (x\$1000)	Loss-to-Exposure Ratio	Total Estimated Loss (x\$1000)
Community-Wide Totals	5,465	\$1,455,650	427	\$866,500	102	\$165,049	\$2,487,199		
High Hazard Exposure	840	\$222,947	167	\$292,741	22	\$32,395	\$548,083	25%	\$137,021
City of Nogales HAZUS Summary	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact			
High Hazard Exposure	15.36%	15.32%	39.11%	33.78%	21.98%	19.63%			



Table 5-15: Town of Patagonia HAZUS building exposure to dam failure									
	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		SUMMARY		
Town of Patagonia HAZUS Summary	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Total of All Economic Impact (x\$1000)	Loss-to-Exposure Ratio	Total Estimated Loss (x\$1000)
Community-Wide Totals	524	\$103,616	11	\$10,726	5	\$1,977	\$116,319		
High Hazard Exposure	0	\$0	0	\$0	0	\$0	\$0	25%	\$0
Town of Patagonia HAZUS Summary	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact			
High Hazard Exposure	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			

Table 5-16: Unincorporated Santa Cruz County HAZUS building exposure to dam failure									
	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		SUMMARY		
Unincorporated Santa Cruz County HAZUS Summary	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Total of All Economic Impact (x\$1000)	Loss-to-Exposure Ratio	Total Estimated Loss (x\$1000)
Community-Wide Totals	9,686	\$2,828,713	308	\$432,189	90	\$91,217	\$3,352,119		
High Hazard Exposure	550	\$134,709	45	\$136,532	8	\$15,565	\$286,807	25%	\$71,702
Unincorporated Santa Cruz County HAZUS Summary	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact			
High Hazard Exposure	05.68%	04.76%	14.72%	31.59%	09.07%	17.06%			

In summary, \$38 million in asset related losses are estimated for dam failure inundation for all the participating jurisdictions in Santa Cruz County. An additional \$137 million in losses to HAZUS defined residential, commercial, and industrial facilities is estimated for all participating Santa Cruz County jurisdictions. Regarding human vulnerability, a total population of 4,788 people, or 10.1% of the total Santa Cruz County population, is potentially exposed to a dam failure inundation event. The potential for deaths and injuries are directly related to the warning time and type of event. Given the magnitude of such an event(s), it is realistic to anticipate at least one death and several injuries. There is also a high probability of population displacement for most of the inhabitants within the inundation limits downstream of the dam(s).

Vulnerability – Development Trend Analysis

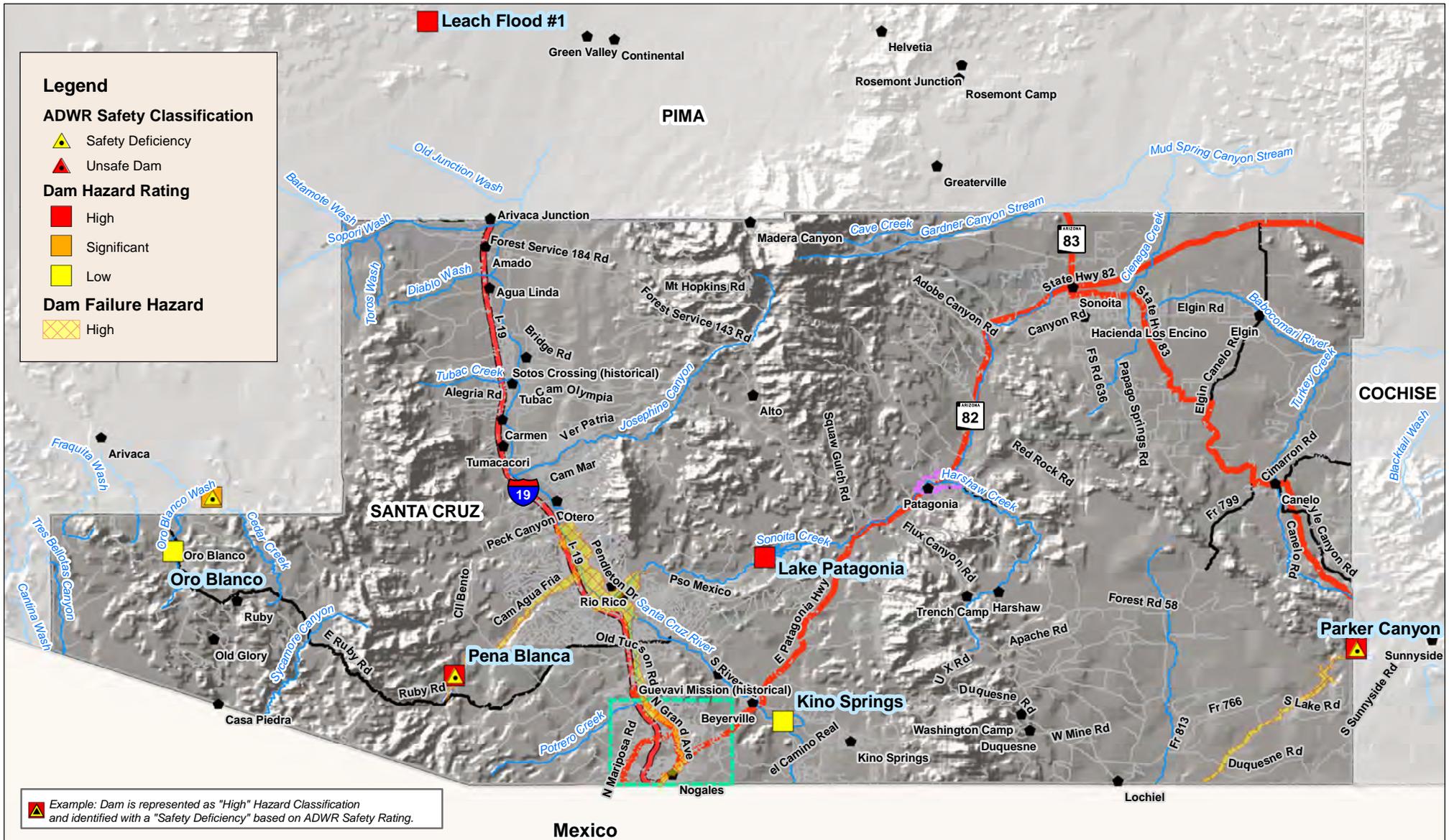
Of the three high hazard dams within the county, a failure of Patagonia Lake would have the greatest impact on new development and potential growth areas identified by Santa Cruz County for the unincorporated area around Rio Rico. Recent improvements to the Patagonia Lake Dam and spillway have increased the dam capacity and potentially the dam failure inundations limits, but have not been analyzed for mapped to-date. Update of these limits should be evaluated to determine the potential dam failure risk for the populated and expanding areas of Rio Rico and a few miles downstream on the Santa Cruz River.

Sources

Arizona Department of Water Resources, 2017, <http://www.azwater.gov/AzDWR/SurfaceWater/DamSafety/default.htm>
Arizona Department of Emergency and Military Affairs, 2013, *State of Arizona Multi-Hazard Mitigation Plan, 2013 Update*
Norman, L.M., et al, 2010, *Nogales Flood Detention Study*, USGS Open File Report 2010-1262.
US Army Corps of Engineers, National Inventory of Dams, 2017, <https://nid.usace.army.mil/>

Profile Maps

- Maps 1A and 1B – Potential Dam Failure Inundation Hazard Maps-Countywide
- Maps 1C – Nogales Dam Failure Inundation Hazard Map
- (No Dam Failure Inundation impact Patagonia so no map is provided)



Legend

ADWR Safety Classification

- Safety Deficiency
- Unsafe Dam

Dam Hazard Rating

- High
- Significant
- Low

Dam Failure Hazard

- High

Example: Dam is represented as "High" Hazard Classification and identified with a "Safety Deficiency" based on ADWR Safety Rating.

The data is derived from the ADWR Dam Safety Database, as of 2010

Legend

Communities

- NOGALES
- PATAGONIA
- County Boundary

Cities, Towns, Places

- Cities, Towns, Places

Roads

- Interstate
- US, State, County Hwys
- Major Roads
- Local Roads

Watercourses

- Watercourses
- Lakes

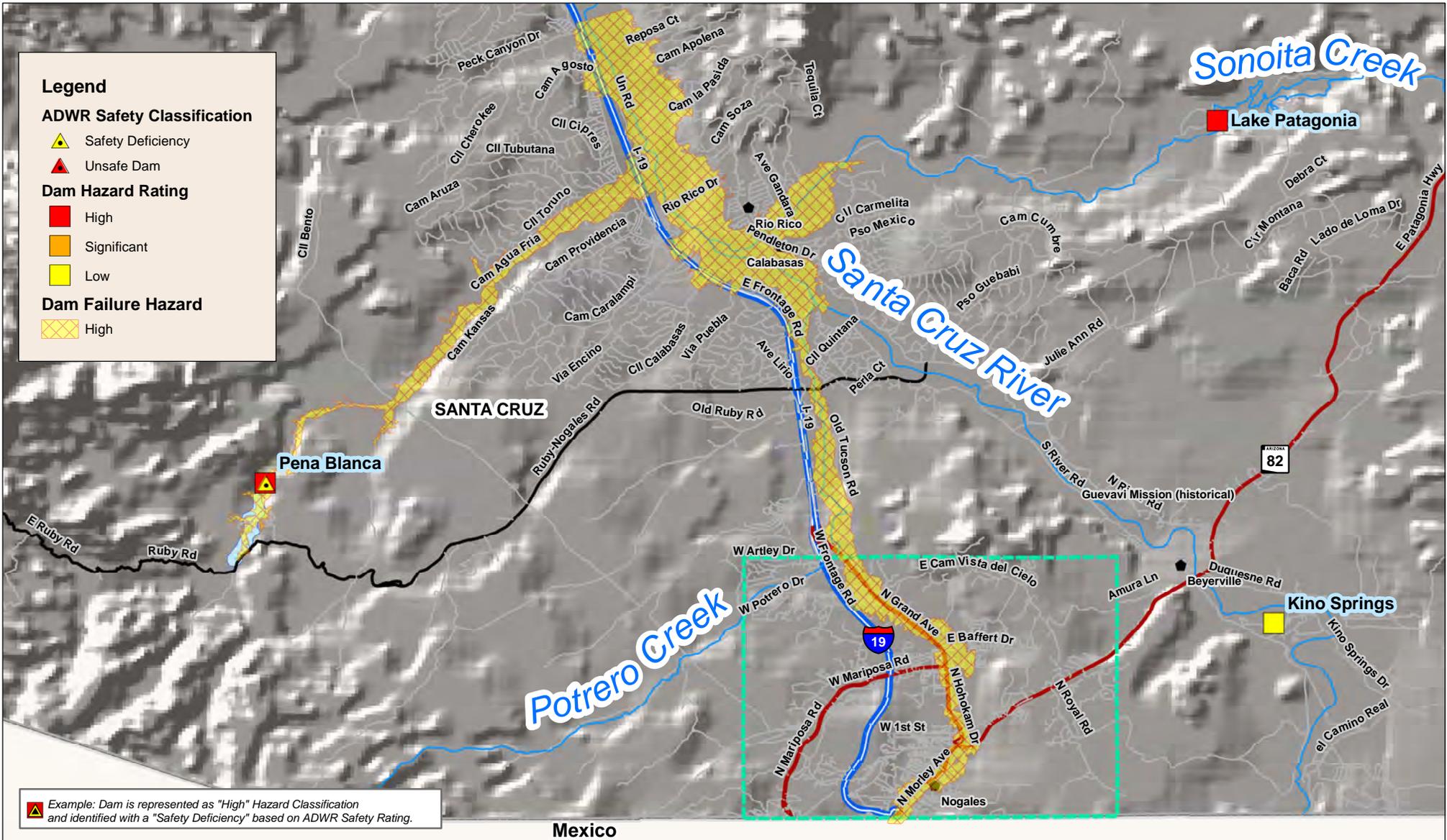
0 2.5 5 10 Miles

Source: FEMA, 2010; ADWR, 2009; NID, 2009; JEF 2011; SCC, 2011; ALRIS, 2010



Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan

Map 1A
Santa Cruz County
Dam Failure Hazard Map
 as of June 2017



Legend

ADWR Safety Classification

- Safety Deficiency
- Unsafe Dam

Dam Hazard Rating

- High
- Significant
- Low

Dam Failure Hazard

- High

Example: Dam is represented as "High" Hazard Classification and identified with a "Safety Deficiency" based on ADWR Safety Rating.

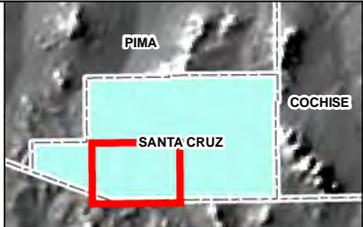
The data is derived from the ADWR Dam Safety Database, as of 2017

Legend

Communities	Cities, Towns, Places	Roads
NOGALES	Watercourses	Interstate
PATAGONIA	Lakes	US, State, County Hwys
County Boundary		Major Roads
		Local Roads

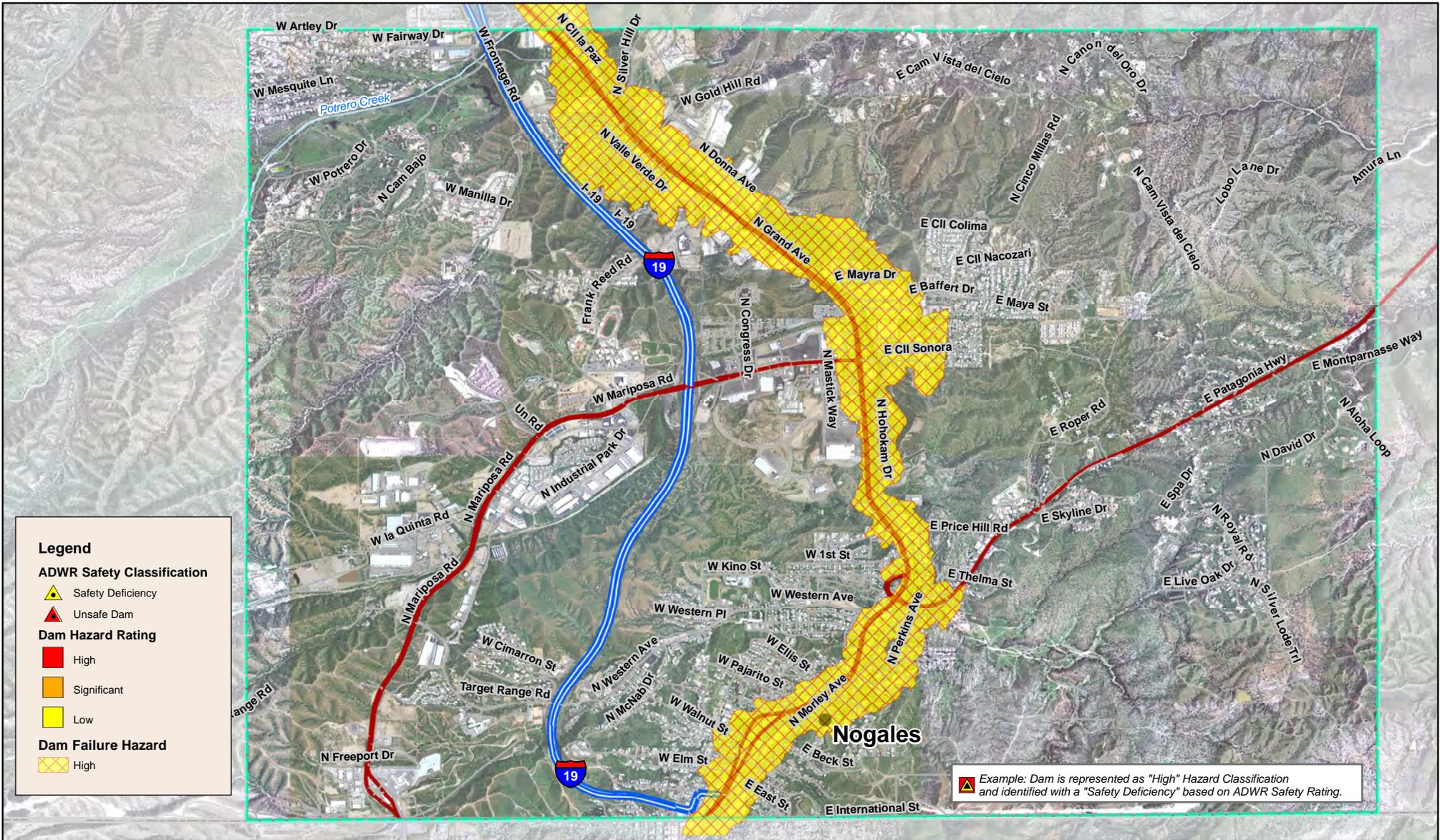
0 0.75 1.5 3 Miles

Source: FEMA, 2017; ADWR, 2017; NID, 2009
JEF 2017; SCC, 2017; ALRIS, 2010



**Santa Cruz County Multi-Jurisdictional
Hazard Mitigation Plan**

Map 1B
Santa Cruz County
Dam Failure Hazard Map
as of June 2017



Legend

ADWR Safety Classification

- Safety Deficiency
- Unsafe Dam

Dam Hazard Rating

- High
- Significant
- Low

Dam Failure Hazard

- High

Example: Dam is represented as "High" Hazard Classification and identified with a "Safety Deficiency" based on ADWR Safety Rating.

Legend

Communities

- NOGALES
- PATAGONIA
- County Boundary

Cities, Towns, Places

- Cities, Towns, Places

Watercourses

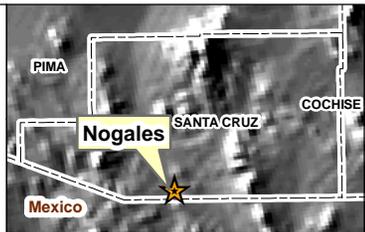
- Watercourses
- Lakes

Roads

- Interstate
- US, State, County Hwys
- Major Roads
- Local Roads

0 0.5 1 Miles

Source: FEMA, 2017; ADWR, 2017; NID, 2009
JEF 2017; SCC, 2017; ALRIS, 2010



Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan

Map 1C

City of Nogales Dam Failure Hazard Map

as of June 2017

5.3.2 *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 21 droughts declared as drought disasters/emergencies and 93 drought events (droughts affecting multiple years are recorded as a distinct event for each year affected) since records have been kept. Santa Cruz County has been included as a primary county or named as a contiguous area in all of the drought declarations. Figures 5-2 and 5-3 depict recent precipitation data from WestMap¹⁵ regarding average county-wide precipitation variances from normal. Between 1849 and 1905, the most prolonged period of drought conditions in 300 years occurred in Arizona (Jacobs, 2003). Another prolonged drought occurred during the period of 1941 to 1965. The period from 1979-1994 appears to have been anomalously wet, while the rest of the historical records shows that dry conditions are most likely the normal condition for the county. The current drought cycle (between 1998 and 2013),

¹⁵ WestMap Climate Analysis & Mapping Toolbox, 2017, accessed at: https://cefa.dri.edu/Westmap/Westmap_home.php

there have been more months with below normal precipitation than months with above normal precipitation. The latest trends over the last five years appear to be moving towards the normal.

Probability and Magnitude

There is 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 expected conditions for the very near future.

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 the U.S. Drought Portal¹⁶ 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 5-4, is a weekly map depicting the current status of drought in the western U.S. and is developed and maintained by the National Drought Mitigation Center. The USSDO, shown in Figure 5-5, is a six month projection of potential drought conditions developed by the National Weather Service’s Climate Prediction Center.

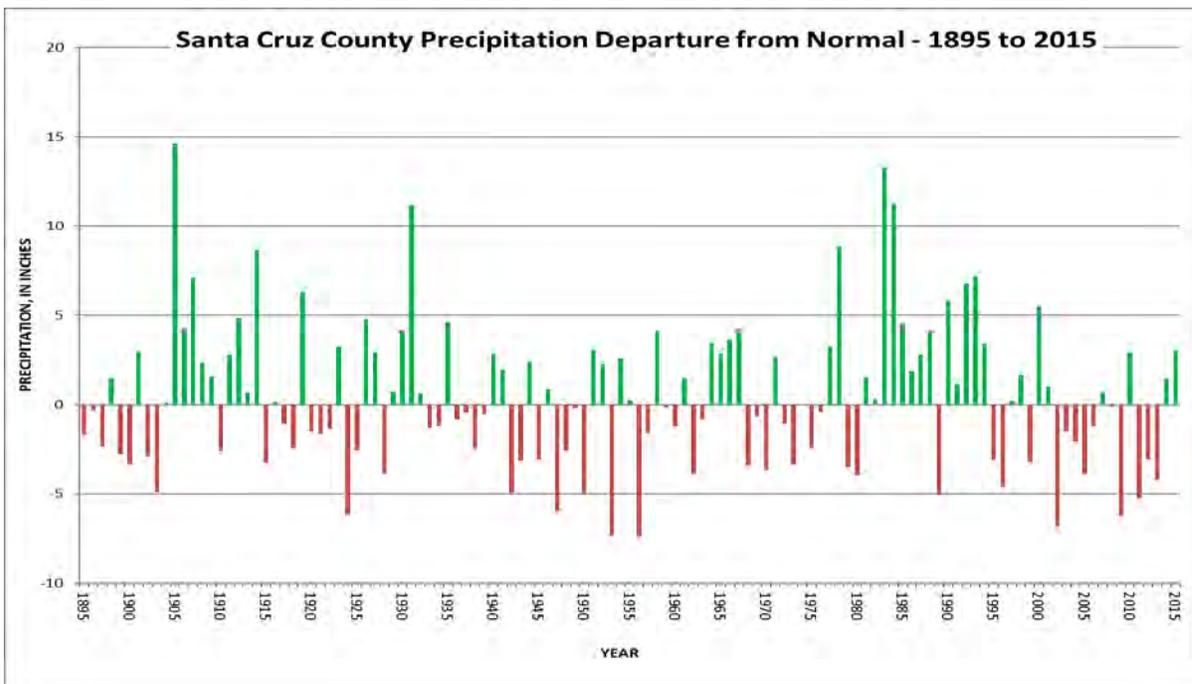


Figure 5-2: Average precipitation variances from a normal based on 1895 to 2015 period.

¹⁶ NIDIS U.S. Drought Portal website is located at: <http://droughtmonitor.unl.edu/Home.aspx>

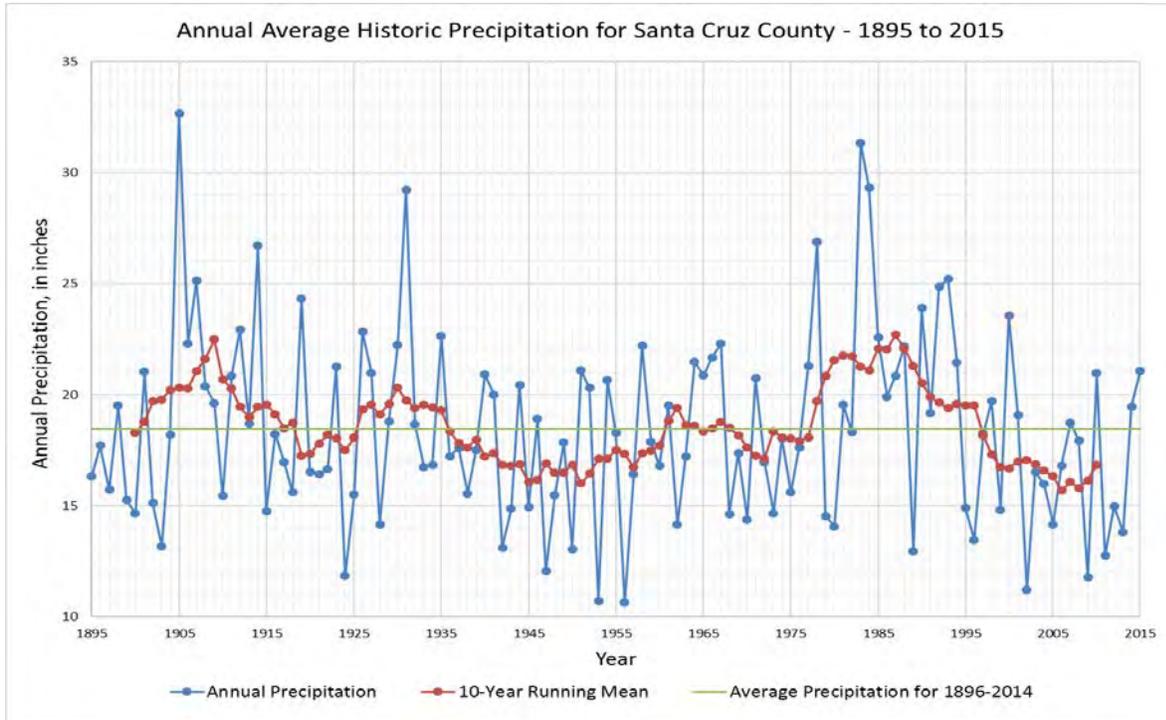
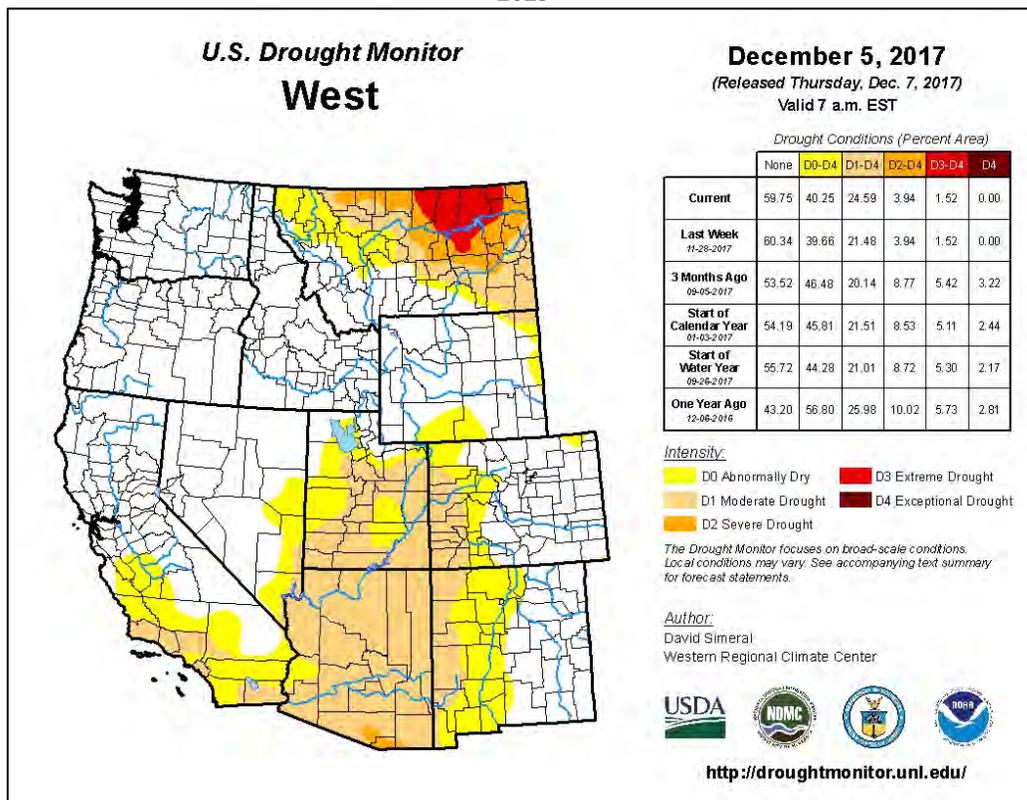
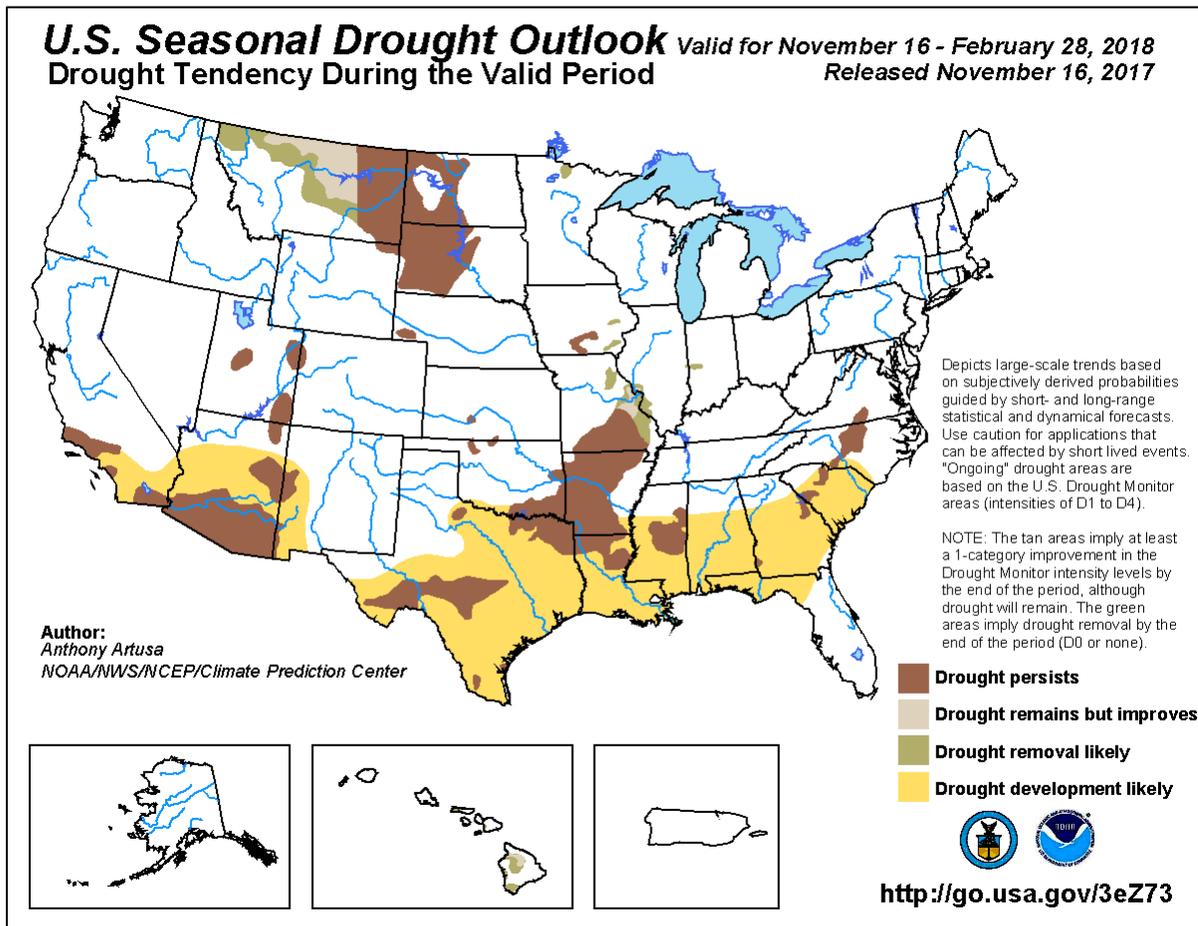


Figure 5-3: Historic annual precipitation for Santa Cruz County with running 10-year mean for 1895 to 2015



Source: <http://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?West>

Figure 5-4: U.S. Drought Monitor Map for December 5, 2017

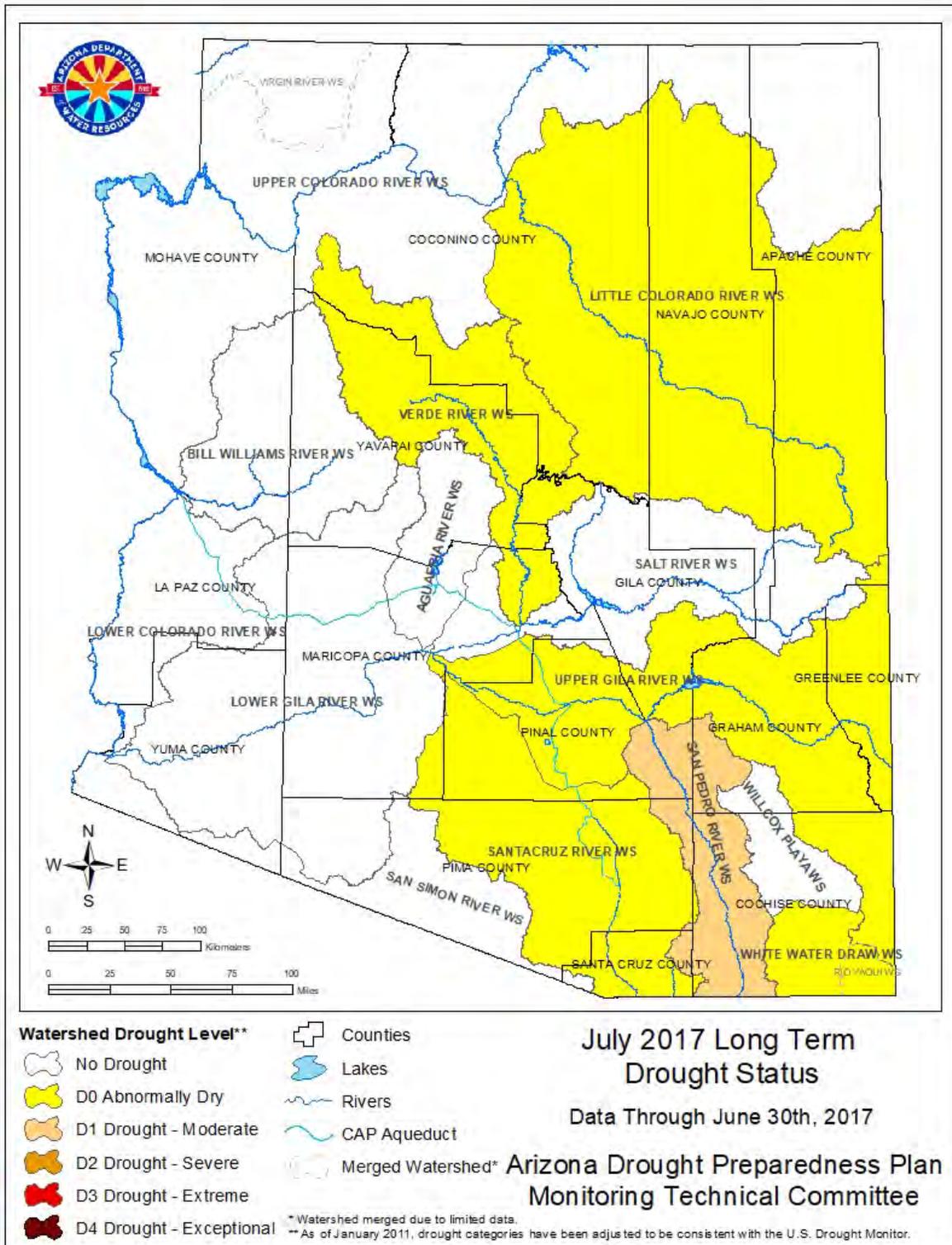


Source: http://www.cpc.ncep.noaa.gov/products/expert_assessment/season_drought.png

Figure 5-5: U.S. Seasonal Drought Outlook, November 2017 to February 2018

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 (PDSI) 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.

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. Twice a year this interagency group reports to the governor on the 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 defers to the USDM (see Figure 5-4) for the short-term drought status and uses a combination of the Standardized Precipitation Index (SPI), evaporation and streamflow for the long-term drought status. Figure 5-6 presents the most current long term maps available for Arizona as of the writing of this plan.



Source: https://static.sustainability.asu.edu/sosMS/uploads/sites/26/2017/10/19123537/July17_LT_DroughtMap_WS.jpg

Figure 5-6: Arizona long term drought status map as of July 2017

The current drought maps are in general agreement that Santa Cruz County is currently experiencing a moderate to severe drought condition for the short term and in a moderate drought condition for the long term. Figure 5-5 indicates that the drought conditions are likely to improve and ease the impact for Santa Cruz County over the next few months.

Vulnerability – CPRI Results

Drought CPRI results for each community are summarized in Table 5-17 below.

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Nogales	Likely	Critical	> 24 hours	> 1 week	2.80
Patagonia	Possible	Critical	> 24 hours	> 1 week	2.35
Unincorporated Santa Cruz County	Highly Likely	Limited	> 24 hours	> 1 week	2.95
County-wide average CPRI =					2.70

Vulnerability – Loss Estimations

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

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

The Santa Cruz County farming and ranching industries are directly affected by extended drought conditions. The primary sources of water for irrigated farming are the Santa Cruz River, including groundwater that is sustained by this watercourse along the valley floor. Rangeland ranching is dependent upon groundwater and captured rainfall runoff via stock tanks and rain catchments. Extended drought conditions reduce rangeland grasses and other fodder. Stock tank water levels and replenishment are also significantly reduced. This forces ranchers to feed more hay and to truck in water to sustain their rangeland herds. The expense of these activities forces ranchers to drastically reduce herd sizes, flooding the markets with excess animals and tumbling livestock prices. Then supplies in following years are drastically reduced due to lack of rangeland and water and prices soar. These expenses are translated into the Santa Cruz County economy as a two-fold hardship. First, as an economic hardship for merchants and retailers that provide goods and services to the ranching community. Second, as increased costs due to a reduced supply in ranching commodities.

From 1995 to 2016, Santa Cruz County farmers and ranchers received \$1.21 million in disaster related assistance funding from the U.S Department of Agriculture (USDA) (EWG, 2017). The majority of those funds were received during the time period of 2000 to 2005 and are associated with livestock assistance and aid. The 2000-2005 time period also corresponds to the most severe period of the recent drought cycle for Santa Cruz County. During the last plan cycle (2012-2016), county ranchers received approximately \$371,000 in aid.

Other drought impacts include:

- Increased pumping costs due to lowering of groundwater levels
- Costs to expand water infrastructure to compensate for reduced yields or to develop alternative water sources
- Intangible costs associated with lost tourism revenues, and impacts to wildlife habitat and animals.

Typically, these impacts are translated into the general economy in the form of higher food and agricultural goods prices and increased utility costs.

Sustained drought conditions will also have secondary impacts by increasing risks associated with hazards such as fissures, flooding, subsidence 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 decrease the interception of rainfall and increase the flooding hazard. Subsidence and fissure conditions are aggravated when lean surface water supplies force the pumping of more groundwater to supply the demand without the benefit of recharge from normal rainfall.

Vulnerability – Development Trends

Growth in Santa Cruz County over the past five years has been very small and is not anticipated to increase significantly over the next five years. Requirements for additional surface and ground water supplies is therefore expected to be minimal. It is also 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. However, 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.

Patagonia recently updated its drought preparedness plan by adding in water conservation triggers.

Sources

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

Environmental Working Group's Farm Subsidy Database, 2017,

http://farm.ewg.org/progdetail.php?fips=04011&progcode=total_dis

Federal Emergency Management Agency, 1997, *Multi-Hazard Identification and Risk Assessment – A Cornerstone of the National Mitigation Strategy*.

Jacobs, Katharine and Morehouse, Barbara. June 11-13, 2003. "Improved Drought Planning for Arizona," from Conference on Water, Climate, and Uncertainty: Implications for Western Water Law, Policy and Management

http://www.water.az.gov/gdtf/content/files/06262003/Improved_Drought_Planning_for_AZ_6-17.pdf

National Integrated Drought Information System, 2017, *National Integrated Drought Information System Implementation Plan*, NOAA.

NIDIS U.S. Drought Portal website is located at:

<http://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?West>

NOAA, NWS, Climate Prediction Center, 2017, website located at:

http://www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html

Profile Maps – No profile maps are provided.

5.3.4 Flood / Flash Flood

Description

For the purpose of this Plan, the hazard of flooding addressed in this section will pertain to floods that result from precipitation/runoff related events. Other flooding due to dam or levee failures will not be addressed in this plan. The three seasonal atmospheric events that tend to trigger floods in Santa Cruz 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.
- *Winter Rains:* Winter brings the threat of low intensity; but long duration rains covering large areas that cause extensive flooding and erosion, particularly when combined with snowmelt.
- *Summer Monsoons:* A third 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 include riverine, sheet, alluvial fan, and local area flooding. Riverine flooding occurs along established watercourses when the bankfull capacity of a watercourse is exceeded by storm runoff or snowmelt and the overbank areas become inundated. Sheet flooding occurs in regionally low areas with little topographic relief that generate floodplains over a mile wide. Alluvial fan flooding is generally located on piedmont areas near the base of the local mountains and are characterized by multiple, highly unstable flowpaths that can rapidly change during flooding events. 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 major flood hazard comes as a secondary impact of wildfires in the form of dramatically increased runoff from ordinary rainfall events that occur on newly burned watersheds. Denuding of the vegetative canopy and forest floor vegetation, and development of hydrophobic soils are the primary factors that contribute to the increased runoff. Canopy and floor level brushes and grasses intercept and store a significant volume of rainfall during a storm event. They also add to the overall watershed roughness which generally attenuates the ultimate peak discharges. Soils in a wildfire burn area can be rendered hydrophobic, which according the NRCS is the development of a thin layer of nearly impervious soil at or below the mineral soil surface that is the result of a waxy substance derived from plant material burned during a hot fire. The waxy substance penetrates into the soil as a gas and solidifies after it cools, forming a waxy coating around soil particles. Hydrophobic soils, in combination with a denuded watershed, will significantly increase the runoff potential, turning a routine annual rainfall event into a raging flood with drastically increased potential for soil erosion and mud and debris flows.

History

Flooding is clearly a major hazard in Santa Cruz County as shown in Tables 5-2 through 5-4. Santa Cruz County has been part of 15 disaster declarations for flooding, with three of those declarations occurring in the past ten years. There have been at least 34 other non-declared events of reported flooding incidents that met the thresholds outlined in Section 5.1, ten of which occurred in the last five years. The following incidents represent examples of major flooding that has impacted the County:

- During January and February 1993, winter rain flooding damage occurred from winter storms associated with the El Nino phenomenon. These storms flooded watersheds throughout Arizona by dumping excessive rainfall amounts that saturated soils and increased runoff. Warm temperature snowmelt exacerbated the situation over large areas. Erosion caused tremendous damage and some communities along normally dry washes were devastated. Stream flow velocities and runoff volumes exceeded historic highs. Many flood prevention channels and retention reservoirs were filled to capacity and so water was diverted to the emergency spillways or the reservoirs were breached, causing extensive damage in some cases (e.g., Painted Rock Reservoir spillway). Ultimately, the President declared a major federal disaster that freed federal funds for both public and private property losses for all of Arizona's fifteen counties. Damages were widespread and significant, impacting over 100 communities. Statewide total public and private damages exceeded \$400 million and eight deaths and 112 injuries were reported to the Red Cross (FEMA, April 1, 1993; ADEM, March, 1998) Santa Cruz County damages were primarily associated with flows and erosion in the Santa Cruz River, Nogales Wash, Peck Canyon Creek, Western Wash and other minor tributaries. Public damages reported through FEMA, FHWA and SBA amounted to approximately \$1.4 million. The Tubac Country Club sustained over \$100,000 in damages from the Santa Cruz River flooding.
- In August 1994, a devastating severe thunderstorm caused wind damage and flash flooding in both eastern Pima and Santa Cruz counties. Considerable flooding occurred in Santa Cruz County with thunderstorms around Nogales causing extensive flooding and heavy runoff. In some places, at least three inches of rain fell in the afternoon and early evening hours. The Santa Cruz river was reported flowing, and the Nogales Wash was nearly bankfull. A Mexican woman and her two children were drowned when their pickup truck was caught in flood waters on Cinco de Febrero Street in Nogales, Sonora. The bodies were swept downstream, two miles north of the border, where they were found near the Chula Vista subdivision. Many homes and businesses were flooded, but no estimates of damage were made and no evacuations were necessary (Green Valley News and Sun, circ:7,500).
- In August 2007, the Nogales Wash Emergency was declared when portions of downtown Nogales experienced flash flooding. Extensive damage occurred to the concrete lining of Nogales Wash in the City of Nogales. City officials estimated damage at \$10 million on the U.S. side of the border. Scattered thunderstorms across Southeast Arizona caused hail and wind damage in Tucson and flash flooding in Nogales. (ADEM, 2008)
- In July 2008, Nogales Wash 2008 Emergency was declared – Heavy rainfall on the Mexican side of the border caused flash flooding in the city of Nogales, Arizona. This was caused by a damaged portion of the underground Nogales Wash. Local emergency management reported that water burst through the underground wash onto the surface just across the International Border. The border wall acted as a dam, keeping most of the flooding on the Mexican side. However, some water did flow through the port of entry into downtown Nogales, Arizona. Several businesses in the downtown business district experienced flooding and two illegal immigrants found two days later in the underground wash are also believed to have drowned due to this flooding. In addition, three illegal immigrants in an underground flood channel beneath the international border were rescued. Slow moving thunderstorms developed in a very moist environment across Southeast Arizona resulting in areas of flash flooding.(ADEM, 2008; NCDC,2010)
- In August 2010, the Monsoon 2010 Flooding Emergency was declared: On July 19, 2010, through July 29, 2010, a series of potent monsoon thunderstorms causing high winds and flash floods damaged many locations in southeastern Arizona. The heavy rains resulted in unusually strong flooding events and caused extreme peril to public health and safety in two primary areas: Wards Canyon in Greenlee County and the Nogales Wash in Santa Cruz County. On July 29, 2010 both the Town of Clifton and Greenlee County declared a state of emergency for this event, followed on July 30, 2010 by Santa Cruz County, stating that this

monsoon event has created a situation above and beyond their capabilities and they are requesting assistance from the State. These water flows caused extensive \$500,000 in damages to public infrastructure and threatened resources that provide essential life services to Greenlee and Santa Cruz residents, primarily roads and sewer lines.(ADEM, 2010)

- In September 2014, flash flooding in Nogales occurred late in the evening as Ephraim Wash flooded over Washington Avenue, with 2 homes flooded and several families evacuated off of Western Avenue. Nogales Wash also overtopped its banks from Doe Street downstream to Chula Vista Lane. In addition, concrete slabs within the wash were damaged, leaving the International Outfall Interceptor (IOI) that carries 9-12 million gallons of raw sewage from Sonora, Mexico to Rio Rico, exposed. In Rio Rico, Sonoita Creek flooded Pendleton Drive. Flooding was associated with precipitation associated with Tropical Depression Odile with widespread heavy rain falling in Cochise, Santa Cruz and southeast Graham Counties. From the afternoon of September 17th into the early morning hours of September 18th, rainfall amounts of 1 to 3 inches were common with locally heavier amounts of 4 to 6 inches reported.

Numerous other flood related incidents are summarized in the historic hazard database provided in Appendix D.

Nogales Wash and the International Outfall Interceptor – A major source of flooding and flood damages (both historic and projected) is Nogales Wash, which is the main surface water drainage for the Ambos [both] Nogales watershed. The International Outfall Interceptor (IOI) is the infrastructure that conveys wastewater from Sonora, Mexico and Nogales, Arizona to the Nogales International Wastewater Treatment Plant (NIWTP) located approximately 8.5 miles from the border in Rio Rico. The U.S. International Boundary and Water Commission (IBWC) and the City of Nogales are co-owners of the Nogales International Wastewater Treatment Plant (NIWTP), which provides treatment of sewage for both Nogales, Arizona, and Nogales, Sonora, Mexico.

The Nogales Wash Channel was constructed by the IBWC in the early 1930s and flows northward through Nogales, Sonora into Nogales, Arizona. Nogales Wash is a covered concrete channel for its first 0.80 miles as it enters Arizona. The wash daylights just south of the Morley Avenue Bridge in downtown Nogales and continues as a concrete channel for another 0.6 miles past the Patagonia overpass near the City of Nogales Public Works Building and North Detention Road.

A 2008 inspection of the Nogales Wash covered channel by the Army Corp of Engineers concluded: “The walls and roof deck of the covered channel are in good condition, but due to the severe scouring and rebar exposure in the invert, the overall structural stability of the box section has been compromised and its performance under current imposed loads is very unpredictable and a hazardous condition.” In addition, the concrete lining downstream of Morley Avenue is degrading and has frequently failed during past flooding events, and with those failures, the IOI is then vulnerable to erosion and failure, with the potential to release millions of gallons per day of raw sewage directly into the wash.

The following are a few flood related major incidents that have occurred in the past 10-15 years:

- In August 2007, severe flooding resulted in the concrete bottom of the Nogales Wash channel being removed south of the Patagonia overpass. The channel floor damages were very near the IOI alignment. Had the alignment been impacted, it would have resulted in the discharge of 10-12 million gallons per day of raw sewage into the Nogales Wash. A hollow cavity was also found behind the west channel bank lining, next to floor damages, that extended to within approximately 20 feet of the railroad tracks. Given the state of emergency, the city closed the railroad for 14 days to make the repairs, which was a significant loss of revenue and commerce. Two concrete panels approximately 400 feet downstream were later found to be damaged and required repairs as well.
- In October 2010, the U.S. Border Patrol informed the City of Nogales, Arizona that a hole and pieces of concrete were noticed at the manhole adjacent to the international fence, between the Morley Avenue Pedestrian Port of Entry and the DeConcini Port of Entry. Subsequent inspections led to the discovery that the International Outfall Interceptor (IOI) had failed at the border. During repair and

replacement, it was discovered that the invert of the IOI near the border had disintegrated due to scour by sediment-laden storm water introduced in Sonora.

- In July 2017, flooding of Nogales Wash eroded the concrete lining around an IOI manhole, displacing the manhole and shearing the IOI pipe below the flood water line. The damage pipe released untreated wastewater into Nogales Wash. The City of Nogales and Santa Cruz County both signed a declaration of emergency and the Governor’s Office responded with a declared State of Emergency for Santa Cruz County.

Probability and Magnitude

For the purposes of this Plan, the probability and magnitude of flood hazards in Santa Cruz County jurisdictions are primarily based on the 1% (100-year) and 0.2% (500-year) probability floodplains delineated on FEMA Flood Insurance Rate Maps (FIRMs), plus the provisional floodplain delineations used for in-house purposes by the Santa Cruz County Flood Control District. The effective date for the current digital FIRM (DFIRM) maps is December 2, 2011. The current National Flood Hazard Layer (NFHL) digital database for Santa Cruz County was downloaded from FEMA’s servers in April 2017. The NFHL files and the Planning Team delineated provisional floodplains were used as a basis for depicting the flood hazard in this Plan.

Two designations of flood hazard are used. Any “A” zone is designated as a high hazard area. Medium flood hazard areas are all “Shaded X” zones. All “A” zones (e.g. – A, A1-99, AE, AH, AO, etc.) represent areas with a 1% probability of being flooded at a depth of one-foot or greater in any given year. All “Shaded X” zones represent areas with a 0.2% probability of being flooded at a depth of one-foot or greater in any given year. These two storms are often referred to as the 100-year and 500-year storm, respectively. High and medium hazard designations were also assigned to the non-FEMA areas by the Planning Team based on the anticipated level of flood hazard posed.

Maps 2A show the flood hazard areas for the entire county. Maps 2B and 2C show the flood hazard areas for Nogales and Patagonia, respectively.

Vulnerability – CPRI Results

Flooding CPRI results for each community are summarized in Table 5-19 below.

Table 5-19: CPRI results by jurisdiction for flooding

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Nogales	Highly Likely	Critical	< 6 hours	< 24 hours	3.50
Patagonia	Highly Likely	Catastrophic	< 6 hours	< 24 hours	3.80
Unincorporated Santa Cruz County	Highly Likely	Critical	< 6 hours	< 1 week	3.60
County-wide average CPRI =					3.63

Vulnerability – Loss Estimations

The estimation of potential exposure to high and medium flood hazards was accomplished by intersecting the human and critical facility assets with the flood hazard limits depicted on Map 2A. Loss estimates to all facilities located within the high and medium flood hazard areas were made based on loss estimation tables published by FEMA (FEMA, 2001). Most of the assets located within high hazard flood areas will be subject to three feet or less of flooding. Using the FEMA tables, it is assumed that all structural assets located within the high hazard areas will have a loss-to-exposure ratio of 0.20 (or 20%). No losses are estimated for assets located in the medium hazard areas. Table 5-20 summarizes the Planning Team identified critical facilities potentially exposed to high and medium flood hazards, and the corresponding estimates of losses. Table 5-21 summarizes population sectors exposed to the high and medium flood hazards. HAZUS residential, commercial and industrial exposures and loss estimates to high and medium flood hazards are summarized in Tables 5-22 through 5-25.

Table 5-20: Asset inventory exposure to high and medium hazard flooding and corresponding loss estimates					
Community	Total Facilities Reported by Community	Impacted Facilities	Percentage of Total Community Facilities Impacted	Estimated Replacement Cost (x\$1000)	Estimated Structure Loss (x\$1000)
HIGH					
County-Wide Totals	242	103	42.56%	\$300,439	\$60,088
Nogales	37	13	35.14%	\$471	\$94
Patagonia	16	11	68.75%	\$2,472	\$494
Unincorporated Santa Cruz	189	79	41.80%	\$297,495	\$59,499
MEDIUM					
County-Wide Totals	242	15	6.20%	\$74,821	\$0
Nogales	37	7	18.92%	\$6,993	\$0
Patagonia	16	1	6.25%	\$6,500	\$0
Unincorporated Santa Cruz	189	7	3.70%	\$61,328	\$0

Table 5-21: Population sectors exposed to high and medium hazard flooding						
Community	Total Population	Population Exposed	Percent of Population Exposed	Total Population Over 65	Population Over 65 Exposed	Percent of Population Over 65 Exposed
HIGH						
County-Wide Totals	47,384	18,973	40.04%	6,218	2,783	44.75%
City of Nogales	20,773	9,242	44.49%	2,863	1,327	46.34%
Town of Patagonia	890	701	78.75%	201	157	77.88%
Unincorporated	25,721	9,030	35.11%	3,154	1,299	41.19%
MEDIUM						
County-Wide Totals	47,384	926	1.95%	6,218	163	2.62%
City of Nogales	20,773	677	3.26%	2,863	106	3.69%
Town of Patagonia	890	12	1.40%	201	3	1.60%
Unincorporated	25,721	237	0.92%	3,154	54	1.70%

Table 5-22: Santa Cruz County HAZUS building exposure to flooding

	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		SUMMARY		
Santa Cruz County HAZUS Summary	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Total of All Economic Impact (x\$1000)	Loss-to-Exposure Ratio	Total Estimated Loss (x\$1000)
County-Wide Totals	15,675	\$4,387,978	746	\$1,309,416	197	\$258,243	\$5,955,637		
High Hazard Exposure	6,295	\$1,714,374	510	\$985,565	100	\$134,316	\$2,834,255	20%	\$566,851
Medium Hazard Exposure	339	\$86,303	38	\$86,471	7	\$10,364	\$183,138	0%	\$0
Santa Cruz County HAZUS Summary	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact			
High Hazard Exposure	40.16%	39.07%	68.34%	75.27%	50.73%	52.01%			
Medium Hazard Exposure	02.16%	01.97%	05.15%	06.60%	03.60%	04.01%			

Table 5-23: City of Nogales HAZUS building exposure to flooding

	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		SUMMARY		
City of Nogales HAZUS Summary	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Total of All Economic Impact (x\$1000)	Loss-to-Exposure Ratio	Total Estimated Loss (x\$1000)
Community-Wide Totals	5,465	\$1,455,650	427	\$866,500	102	\$165,049	\$2,487,199		
High Hazard Exposure	2,428	\$656,709	350	\$680,069	60	\$95,978	\$1,432,756	20%	\$286,551
Medium Hazard Exposure	190	\$44,475	26	\$62,769	5	\$8,171	\$115,415	0%	\$0
City of Nogales HAZUS Summary	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact			
High Hazard Exposure	44.44%	45.11%	81.91%	78.48%	58.30%	58.15%			
Medium Hazard Exposure	03.48%	03.06%	06.18%	07.24%	05.02%	04.95%			

	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		SUMMARY		
Town of Patagonia HAZUS Summary	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Total of All Economic Impact (x\$1000)	Loss-to-Exposure Ratio	Total Estimated Loss (x\$1000)
Community-Wide Totals	524	\$103,616	11	\$10,726	5	\$1,977	\$116,319		
High Hazard Exposure	412	\$82,607	10	\$10,340	5	\$1,977	\$94,924	20%	\$18,985
Medium Hazard Exposure	8	\$1,580	0	\$24	0	\$0	\$1,604	0%	\$0
Town of Patagonia HAZUS Summary	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact			
High Hazard Exposure	78.64%	79.72%	95.21%	96.40%	100.0%	100.0%			
Medium Hazard Exposure	01.54%	01.52%	0.29%	0.22%	0.0%	0.0%			

	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		SUMMARY		
Unincorporated Santa Cruz County HAZUS Summary	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Total of All Economic Impact (x\$1000)	Loss-to-Exposure Ratio	Total Estimated Loss (x\$1000)
Community-Wide Totals	9,686	\$2,828,713	308	\$432,189	90	\$91,217	\$3,352,119		
High Hazard Exposure	3,454	\$975,058	150	\$295,156	36	\$36,360	\$1,306,575	20%	\$261,315
Medium Hazard Exposure	141	\$40,248	12	\$23,678	2	\$2,194	\$66,120	0%	\$0
Unincorporated Santa Cruz County HAZUS Summary	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact			
High Hazard Exposure	35.66%	34.47%	48.56%	68.29%	39.46%	39.86%			
Medium Hazard Exposure	01.45%	01.42%	03.89%	05.48%	02.20%	02.40%			

In summary, \$60 million in asset related high flood hazard losses are estimated for all the participating jurisdictions in Santa Cruz County. An additional \$566.8 million in high hazard flood losses to HAZUS defined residential, commercial, and industrial facilities is estimated for all participating Santa Cruz County jurisdictions. Regarding human vulnerability, a total population of 18,973 people, or 40.0% of the total population, is potentially exposed to a high hazard flood event. A total population of 926 people, or 1.95% of the total population, is potentially exposed to a medium hazard flood event. Based on the historic record, multiple deaths and injuries are plausible and a substantial portion of the exposed population is subject to displacement depending on the event magnitude.

It is duly noted that the loss and exposure numbers presented above represent a comprehensive evaluation of the County as a whole. It is unlikely that a storm event would occur that would flood all of the delineated high and medium flood hazard areas at the same time. Accordingly, actual event based losses and exposure are likely to be only a fraction of those summarized above. Furthermore, it should be noted that any flood event that exposes assets or population to a medium hazard will also expose assets and populations to the high hazard flood zone. That is, the 100-year floodplain would be entirely inundated during a 500-year flood.

Vulnerability – Repetitive Loss Properties

Repetitive Loss (RL) properties are those NFIP-insured properties that since 1978, have experienced multiple flood losses. FEMA tracks RL property statistics, and in particular to identify Severe RL (SRL) properties. RL properties demonstrate a track record of 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. FEMA records accessed and reported on by ADWR, indicate that there are four (4) identified RL properties in Santa Cruz County, and that all are located within Nogales and account for a total of over \$92,978 in associated building and contents value payments. None of the payments have occurred within the last five years. Table 5-27 summarizes the RL property characteristics by jurisdiction.

Table 5-27: Repetitive Loss property statistics for Santa Cruz County jurisdictions

Jurisdiction	No. of Properties	No. of Properties Mitigated	Total Payments
Nogales	4	0	\$92,978
Patagonia	0	0	\$0
Unincorporated Santa Cruz County	0	0	\$0

Source: ADWR (data as of May 31, 2017)

It is duly noted that all three of the RL properties listed for Unincorporated Santa Cruz County are disputed by the Santa Cruz County Flood Control District, as the FEMA data cannot be verified. The same is true for a couple of the properties listed for Nogales.

Vulnerability – Development Trends

Most floodprone properties in Santa Cruz County pre-date the planning jurisdictions’ entry into the NFIP and were constructed prior to current floodplain management practices. The development of new properties or substantial re-development of existing structures is now subject to regulatory review procedures implemented by each jurisdiction. New development, adequate planning and regulatory tools are in place to regulate future development. For many areas within the county, challenges for the management of new growth include the need for master drainage planning and additional floodplain delineations to identify and map the flood hazards within the growth areas where no mapping currently exists.

Most of the new growth areas identified by the County, Nogales and Patagonia are not located within a currently delineated high hazard flood area, and will be required to build to the standards set forth in the current county floodplain ordinance.

Sources

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

FEMA, 2001, Understanding Your Risks; Identifying Hazards and Estimating Losses, FEMA Document No. 386-2.

NOAA, National Weather Service Forecast Office – Tucson, 2017, website data accessed via the following URL: <http://www.wrh.noaa.gov/twc/hydro/floodhis.php>

Santa Cruz County Office of Emergency Management, 2016 (DRAFT), Nogales Wash Emergency Response Plan, Version 2016.

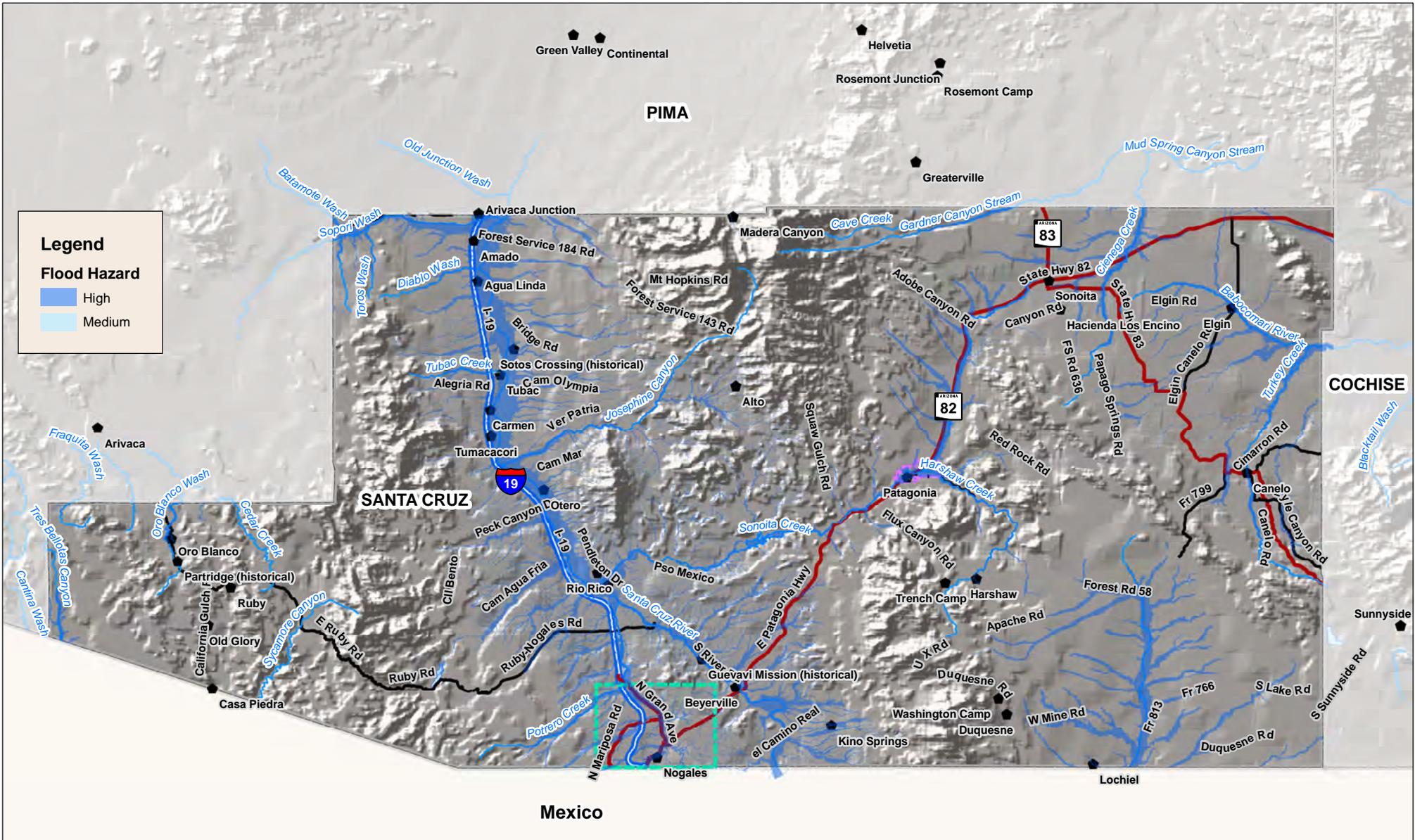
U.S. Department of Commerce, National Climatic Data Center, 2017, Storm Events Database, accessed via the following URL: <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

U.S. Army Corps of Engineers, Los Angeles District, 1994, Flood Damage Report, State of Arizona, Floods of 1993.

Profile Maps

Maps 2A– County-Wide Flood Hazard Map

Maps 2B and 2C – Nogales and Patagonia Flood Hazard Maps



Legend

Flood Hazard

- High
- Medium

Legend

Communities

- NOGALES
- PATAGONIA
- County Boundary

Cities, Towns, Places

- Cities, Towns, Places
- Watercourses
- Lakes

Roads

- Interstate
- US, State, County Hwys
- Major Roads

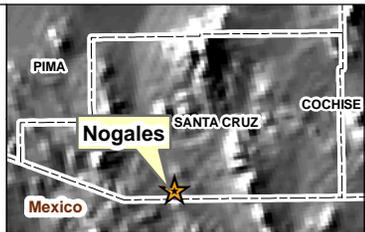
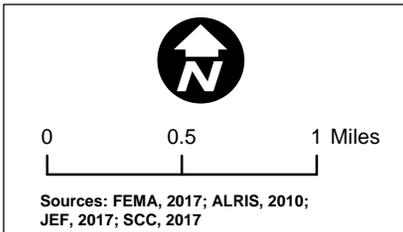
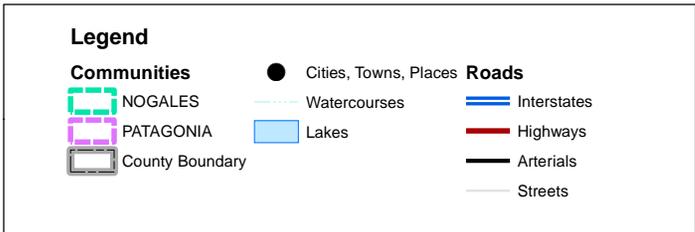
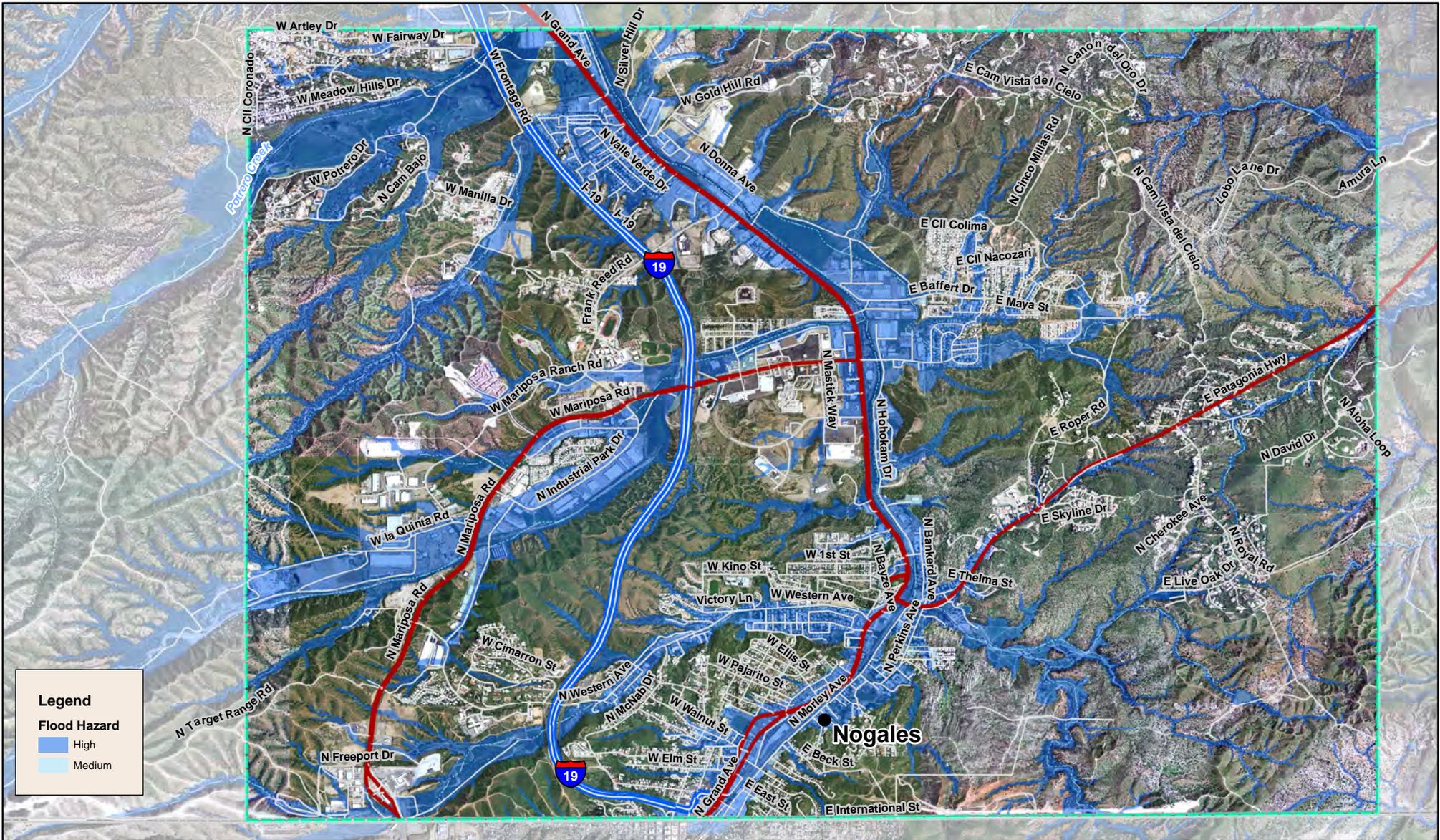
0 2.5 5 10 Miles

Sources: FEMA, 2017; ALRIS, 2010; JEF, 2017; SCC, 2017



Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan





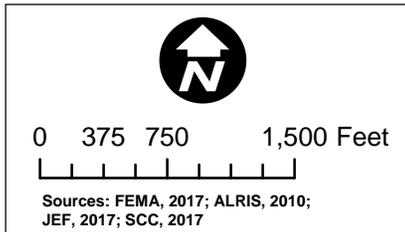
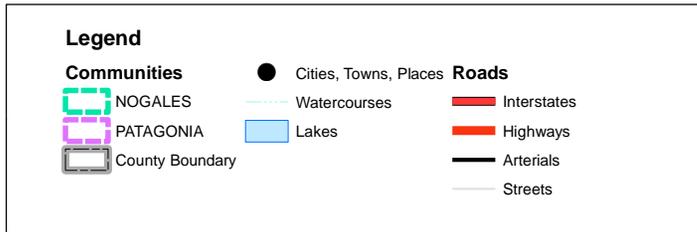
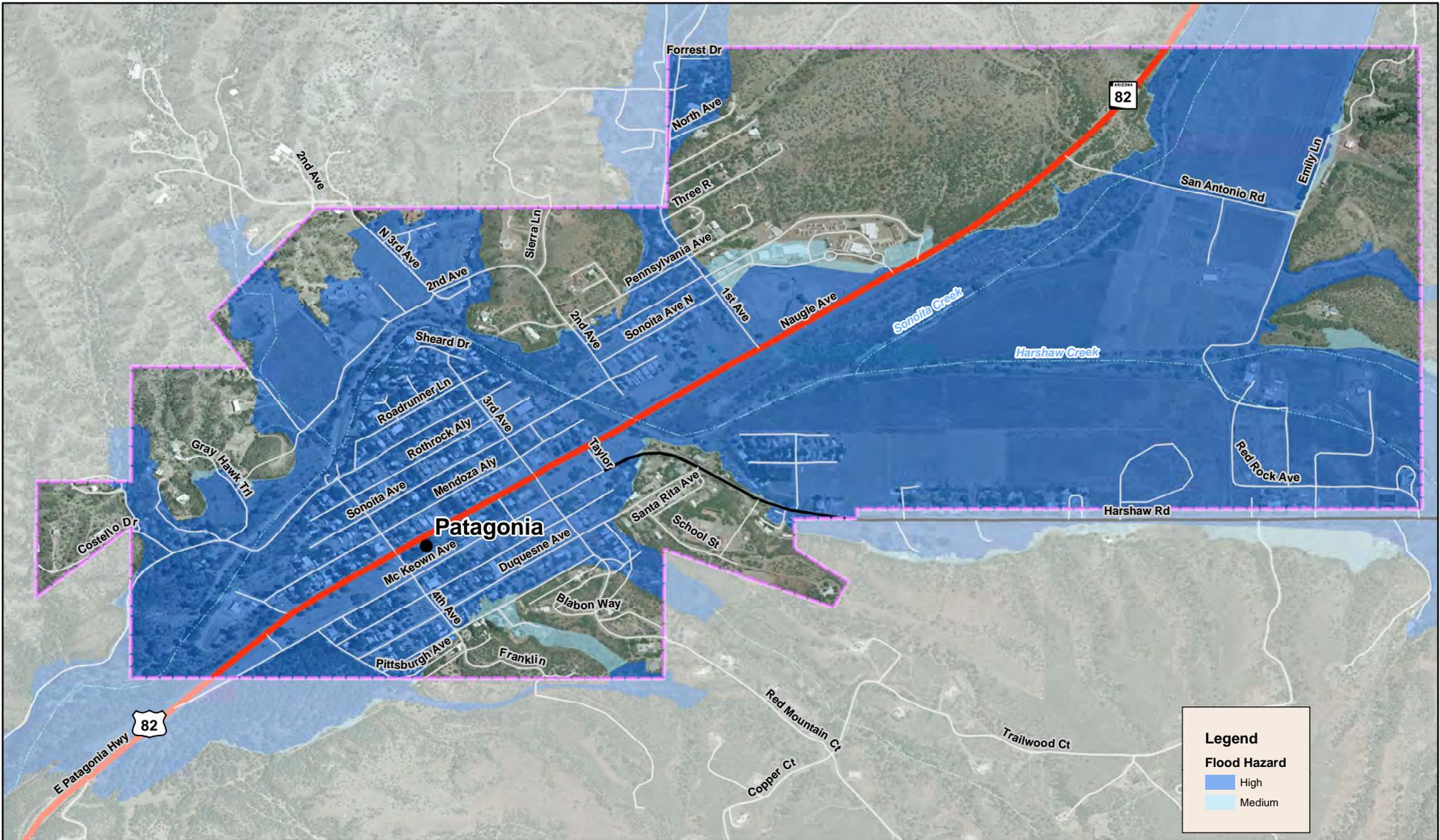
Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan

Map 2B

City of Nogales

Flood Hazard Map

as of June 2017



Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan

Map 2C
Town of Patagonia
Flood
Hazard Map
 as of June 2017

5.3.5 *Hazardous Materials Incidents*

Description

The threat of exposure to Hazardous Materials (HAZMAT) in our modern society is prevalent nationwide and throughout Santa Cruz County. HAZMAT incidents can occur from either point source spills or from transportation related accidents. In Santa Cruz County, the primary areas of risk associated with HAZMAT incidents are located near or along Tier II facilities, major roads and rail lines, and pipelines that transport hazardous substances. These substances may be highly toxic, reactive, corrosive, flammable, explosive, radioactive or infectious, with potential to contaminate air, soil, and water resources and pose a serious risk to life, health, environment and property. HAZMAT incidents can result in the evacuation of a few people, a specific facility, or an entire neighborhood(s) depending on the size and magnitude of the release and environmental conditions.

The Arizona State Emergency Response Commission (AZSERC), established by Arizona Law (Arizona Revised Statutes-Title 26, Chapter 2, Article 3) is tasked with the implementation of the Emergency Planning and Community Right to Know Act (EPCRA) in Arizona. Local Emergency Planning Committees (LEPC) are appointed by AZSERC, as required by EPCRA, first to design, then to regularly review and update a comprehensive emergency plan for an emergency planning district. There are 15 LEPC's in Arizona – one in each county.

State statutes and Sections 311 and 312 of EPCRA set forth hazardous chemical storage reporting requirements and thresholds for facilities possessing hazardous materials. The legislation requires that facilities storing or producing hazardous materials in quantities that exceed a defined Threshold Planning Quantity (TPQ), submit an annual chemical inventory report (Tier II Hazardous Chemical Inventory Form) to AZSERC, the appropriate LEPC, and local fire department, by March 1 of each year. Facilities holding an Extremely Hazardous Substance (EHS) at quantities exceeding the Threshold Planning Quantities (TPQ) must provide the notifications as well as a representative to participate in the county emergency planning process.

For the purposes of this Plan, the Planning Team chose to focus only on those HAZMAT facilities and chemicals that are classified by the Environmental Protection Agency (EPA) as extremely hazardous substances (EHS) Typical EHS materials transported and stored routinely in the county include chlorine gas, sulphuric acid, and hydrogen.

History

According the Good Neighbor Environmental Board (GNEB, 2007), the Nogales port of entry receives the most significant number of hazardous waste shipments in Arizona, with many of the loads originating in Baja California. Truckers and shippers choose to route the hazardous waste to the Nogales port of entry to avoid the more stringent requirements at the California ports of entry.

The National Response Center (NRC) maintains a database of transportation related HAZMAT incidents that are reported or called into the system. A query of the that database for the period of January 1990 through July 2010 revealed a total of 42 HAZMAT incidents that involved an EPA identified extremely hazardous substance (EHS) that were located in the Santa Cruz County-Sonora Mexico border area. The following are a few select incidents reported in or near Santa Cruz County:

- Date unknown, rail cars carrying sulfuric acid at San Lazaro, Sonora, by the Santa Cruz River, derailed spilling approximately 25,000 to 30,000 gallons of sulfuric acid into river waters (GNEB, 2007).
- On January 9, 1993, a tank car that had been in Mexico for over a year was relocated to the Nogales Rail Yard and was believed to be empty. A valve on the tank car was found open and releasing anhydrous ammonia (NRC, 2010).
- On February 11, 1993, over 30 fifty gallon barrels of sulfuric acid, caustic soda, and other unknown materials were dumped onto the Jehovah's Witness' church property (NRC, 2010).

- On November 3 and 4, 1993, a tank car filled with ammonium sulfide started leaking due to a faulty manway gasket. The tank car was located in the Nogales Rail Yard near the border.
- On August 2, 1994, a Mexican train derailed near Mascarenas, Mexico spilling sulfuric acid (NRC, 2010).
- On January 23, 1998, a high pressure refrigeration line broke for unknown reasons and released anhydrous ammonia into the air near the international border in Nogales, Arizona (NRC, 2010).
- On September 25, 1999, a chlorinator on Nogales Wash started releasing chlorine gas for unknown reasons in Nogales, Arizona (NRC, 2010).
- On June 26, 2002, ammonia was released from a tractor trailer at the port of entry in Nogales, AZ. The release was caused by an open valve and the tractor trailer was traveling from Mexico to the U.S. (NRC, 2010)
- On September 14, 2005, sulfuric acid was released from a Union Pacific railcar due to unknown causes near Rio Rico (NRC, 2010).
- On August 10, 2012, two uncontrolled rail cars derailed at the international border interchange gate during shoving operation. One car was an empty tanker with residual sulfuric acid but no release occurred. (NRC, 2017).
- On December 24, 2013, hydrogen cyanamide was spilled to the ground from an improperly loaded truck at the Tubac exit off of I-19. Clean up was completed the following day and the site was cleared. (NRC, 2017)

Details of all the incidents are included in Appendix D.

Probability and Magnitude

There are no known statistical analyses that estimate the probability for HAZMAT incidents involving EHS materials for Santa Cruz County. Typically, the magnitude of impact from a HAZMAT incident can be projected by using models such as ALOHA and CAMEO with assumed incident characteristics such as chemical type and source amount, spill location and amount, release time and rate, surface type, temperature, humidity, wind direction and speed, chemical stability factors. Those modeling efforts, however, are beyond the scope of this Plan.

For the purpose of this Plan, the Planning Team chose to establish two (2) hazard classifications, High and Medium, for profiling EHS hazards. High hazard exposure areas are assumed to be located within a one-mile radius or buffer of any Tier II EHS facility, roadway and railway transportation corridor where EHS materials are known to be stored or transported on a somewhat regular basis. Similarly, the medium hazard exposure areas are assumed to be located within a second one-mile wide band that is offset from the High hazard area. All other areas are considered to be Low hazard.

Map 3A show the HAZMAT hazard areas for the entire county. Maps 3B and 3C show the HAZMAT hazard areas for Nogales and Patagonia, respectively.

Vulnerability – CPRI Results

HAZMAT CPRI results for each community are summarized in Table 5-28 below.

Table 5-28: CPRI results by jurisdiction for HAZMAT					
Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Nogales	Likely	Catastrophic	< 6 hours	< 1 week	3.45
Patagonia	Possibly	Limited	< 6 hours	< 24 hours	2.30
Unincorporated Santa Cruz County	Likely	Limited	< 6 hours	< 1 week	2.85
County-wide average CPRI =					2.87

Vulnerability – Loss Estimations



The estimation of potential exposure to high and medium HAZMAT hazards was accomplished by intersecting the human and critical facility assets with the HAZMAT hazard limits depicted on Map 3A. Table 5-29 summarizes the Planning Team identified critical facilities potentially exposed to high and medium HAZMAT hazards, and the corresponding estimates of losses. Table 5-30 summarizes population sectors exposed to the high and medium HAZMAT hazards. HAZUS residential, commercial and industrial exposures and loss estimates to high and medium HAZMAT hazards are summarized in Tables 5-31 through 5-34.

In summary, \$724 million and \$27 million in county-wide assets are exposed for high and medium HAZMAT hazards, for all the participating jurisdictions in Santa Cruz County. An additional \$4.8 billion and \$750 million in high and medium flood hazard exposure of HAZUS defined residential, commercial, and industrial facilities is estimated for all participating Santa Cruz County jurisdictions. Regarding human vulnerability, a total population of 36,890 people, or 77.9% of the total population, is potentially exposed to a high hazard HAZMAT event. A total population of 7,219 people, or 15.2% of the total population, is potentially exposed to a medium hazard HAZMAT event. It is recognized that EHS incidents typically occur in a single localized area and do not impact an entire county or community at one time. These numbers are intended to represent the collective community or county-wide exposure. Actual losses for an individual incident are likely to be only a fraction of the numbers presented here. Because of the nature of this hazard, structural damage is highly unlikely and decontamination costs related to replacements cost would only be a small fraction.

Vulnerability – Development Trends

As the vulnerability analysis indicates, much of Santa Cruz County is exposed to some level of EHS threat. That exposure will only worsen as development increases, and especially as warehousing facilities expand in and around Nogales. It may be advantageous to pursue designating certain roadways as EHS corridors to limit the exposure, and establishing buffer zones along corridors known to be frequent EHS transport routes. Development of high-density population land uses such as schools, nursing homes, apartment complexes, etc., should be discouraged within these zones.

EHS facilities that have potential for critical or catastrophic HAZMAT releases should be located on flat topography and take advantage of positive and protect against negative climate and microclimate conditions; utilize shading from excessive sun in warm climate and/or other best management practices.

Sources

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

Good Neighbor Environmental Board, 2007, *Environmental Protection and Border Security on the U.S.-Mexico Border*.

JE Fuller/ Hydrology and Geomorphology, 2006, *Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan*.

JE Fuller/ Hydrology and Geomorphology, 2011, *Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan*.

U.S. Coast Guard, National Response Center, incident reports posted at: <http://www.nrc.uscg.mil/>

U.S. Department of Transportation, 1996, *North American Emergency Response Guidebook*

Profile Maps

Maps 3A – County-Wide Hazardous Materials Hazard Map

Maps 3B and 3C– Community Wide Hazardous Materials Hazard Maps

Table 5-29: Asset inventory exposure to high and medium hazard HAZMAT and corresponding loss estimates

Community	Total Facilities Reported by Community	Impacted Facilities	Percentage of Total Community Facilities Impacted	Estimated Replacement Cost	Estimated Structure Loss
HIGH					
County-Wide Totals	242	202	83.47%	\$723,520	\$0
Nogales	37	35	94.59%	\$7,776	\$0
Patagonia	16	16	100.00%	\$9,498	\$0
Unincorporated Santa Cruz	189	151	79.89%	\$706,246	\$0
MEDIUM					
County-Wide Totals	242	20	8.26%	\$27,180	\$0
Nogales	37	2	5.41%	\$0	\$0
Patagonia	16	0	0.00%	\$0	\$0
Unincorporated Santa Cruz	189	18	9.52%	\$27,180	\$0

Table 5-30: Population sectors exposed to high and medium hazard HAZMAT

Community	Total Population	Population Exposed	Percent of Population Exposed	Total Population Over 65	Population Over 65 Exposed	Percent of Population Over 65 Exposed
HIGH						
County-Wide Totals	47,384	36,890	77.85%	6,218	5,061	81.39%
City of Nogales	20,773	20,188	97.18%	2,863	2,815	98.31%
Town of Patagonia	890	890	100.00%	201	201	100.00%
Unincorporated	25,721	15,812	61.47%	3,154	2,045	64.84%
MEDIUM						
County-Wide Totals	47,384	7,219	15.24%	6,218	721	11.59%
City of Nogales	20,773	585	2.82%	2,863	48	1.69%
Town of Patagonia	890	0	0.00%	201	0	0.00%
Unincorporated	25,721	6,635	25.80%	3,154	672	21.31%

Table 5-31: Santa Cruz County HAZUS building exposure to HAZMAT

	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		SUMMARY		
Santa Cruz County HAZUS Summary	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Total of All Economic Impact (x\$1000)	Loss-to-Exposure Ratio	Total Estimated Loss (x\$1000)
County-Wide Totals	15,675	\$4,387,978	746	\$1,309,416	197	\$258,243	\$5,955,637		
High Hazard Exposure	11,852	\$3,313,383	660	\$1,216,868	165	\$231,250	\$4,761,501	%	\$0
Medium Hazard Exposure	2,426	\$687,959	50	\$48,289	19	\$12,255	\$748,503	%	\$0
Santa Cruz County HAZUS Summary	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact			
High Hazard Exposure	75.61%	75.51%	88.41%	92.93%	83.60%	89.55%			
Medium Hazard Exposure	15.48%	15.68%	06.69%	03.69%	09.69%	04.75%			

Table 5-32: City of Nogales HAZUS building exposure to HAZMAT

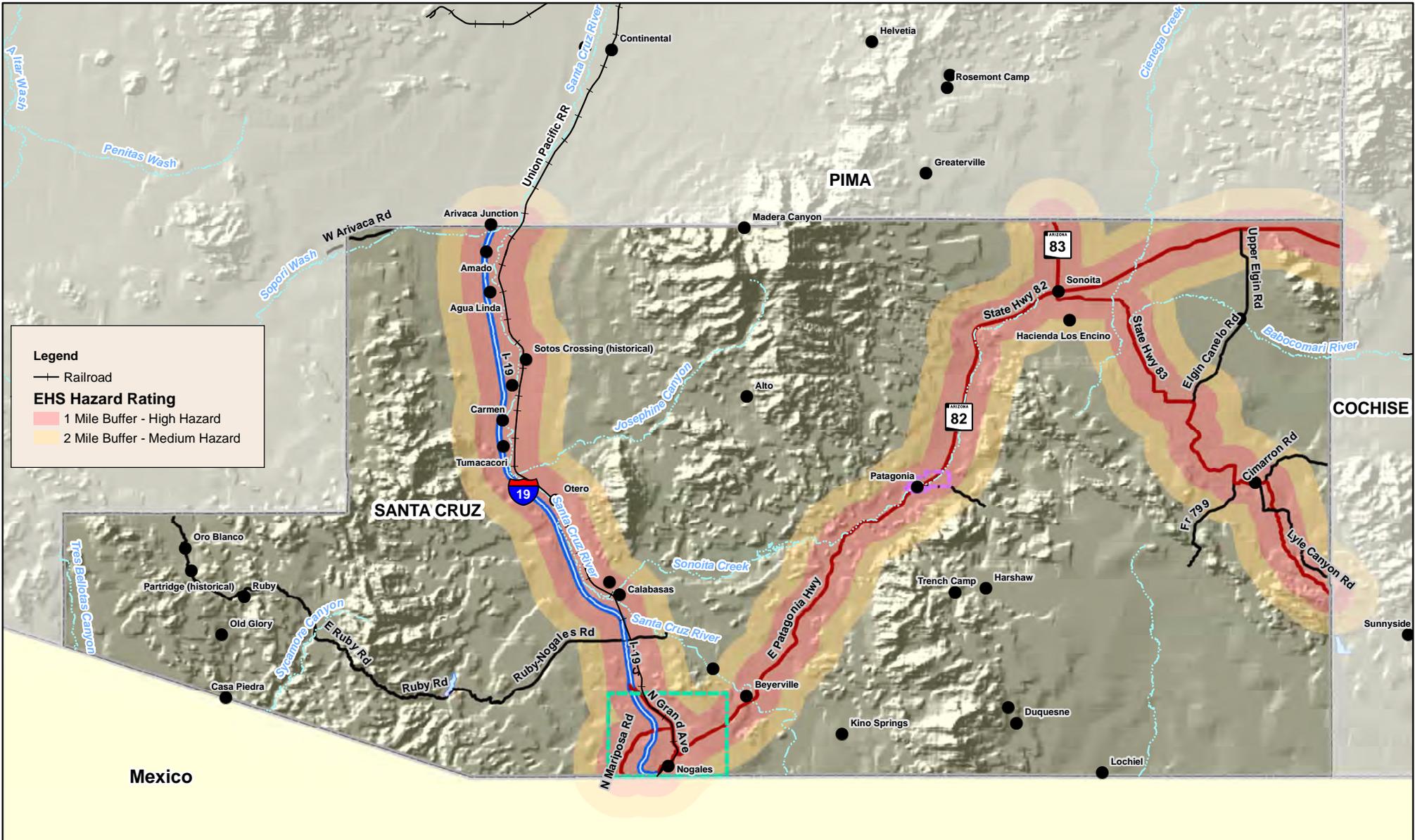
	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		SUMMARY		
City of Nogales HAZUS Summary	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Total of All Economic Impact (x\$1000)	Loss-to-Exposure Ratio	Total Estimated Loss (x\$1000)
Community-Wide Totals	5,465	\$1,455,650	427	\$866,500	102	\$165,049	\$2,487,199		
High Hazard Exposure	5,316	\$1,399,836	417	\$843,560	98	\$161,516	\$2,404,912	%	\$0
Medium Hazard Exposure	148	\$55,814	11	\$22,940	4	\$3,533	\$82,287	%	\$0
City of Nogales HAZUS Summary	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact			
High Hazard Exposure	97.28%	96.17%	97.52%	97.35%	95.79%	97.86%			
Medium Hazard Exposure	02.72%	03.83%	02.48%	02.65%	04.21%	02.14%			

Table 5-33: Town of Patagonia HAZUS building exposure to HAZMAT

	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		SUMMARY		
Town of Patagonia HAZUS Summary	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Total of All Economic Impact (x\$1000)	Loss-to-Exposure Ratio	Total Estimated Loss (x\$1000)
Community-Wide Totals	524	\$103,616	11	\$10,726	5	\$1,977	\$116,319		
High Hazard Exposure	524	\$103,616	11	\$10,726	5	\$1,977	\$116,319	%	\$0
Medium Hazard Exposure	0	\$0	0	\$0	0	\$0	\$0	%	\$0
Town of Patagonia HAZUS Summary	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact			
High Hazard Exposure	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			
Medium Hazard Exposure	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			

Table 5-34: Unincorporated Santa Cruz County HAZUS building exposure to HAZMAT

	RESIDENTIAL		COMMERCIAL		INDUSTRIAL		SUMMARY		
Unincorporated Santa Cruz County HAZUS Summary	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Building Count	Potential Economic Impact (x\$1000)	Total of All Economic Impact (x\$1000)	Loss-to-Exposure Ratio	Total Estimated Loss (x\$1000)
Community-Wide Totals	9,686	\$2,828,713	308	\$432,189	90	\$91,217	\$3,352,119		
High Hazard Exposure	6,011	\$1,809,931	232	\$362,581	62	\$67,757	\$2,240,270	%	\$0
Medium Hazard Exposure	2,278	\$632,146	39	\$25,349	15	\$8,722	\$666,217	%	\$0
Unincorporated Santa Cruz County HAZUS Summary	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact	% Building Count	% Potential Economic Impact			
High Hazard Exposure	62.06%	63.98%	75.37%	83.89%	68.90%	74.28%			
Medium Hazard Exposure	23.52%	22.35%	12.78%	05.87%	16.42%	09.56%			



Legend

—+— Railroad

EHS Hazard Rating

- 1 Mile Buffer - High Hazard
- 2 Mile Buffer - Medium Hazard

Legend

Communities	● Cities, Towns, Places	Roads
 NOGALES	— Watercourses	 Interstate
 PATAGONIA	 Lakes	 US, State, County Hwys
 County Boundary		 Major Roads

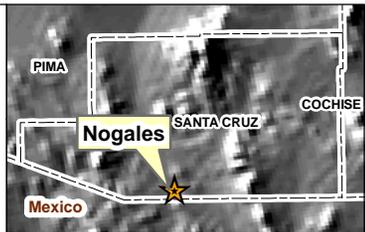
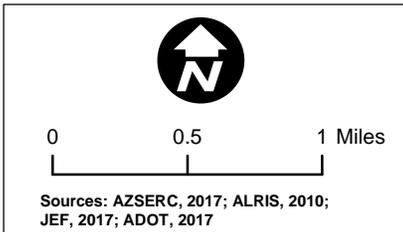
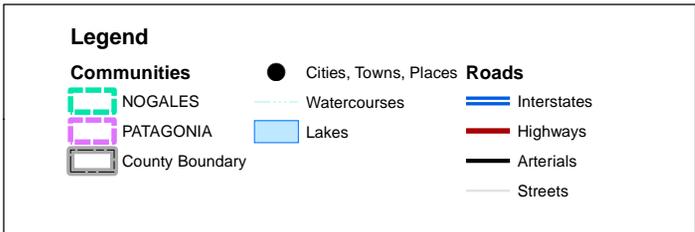
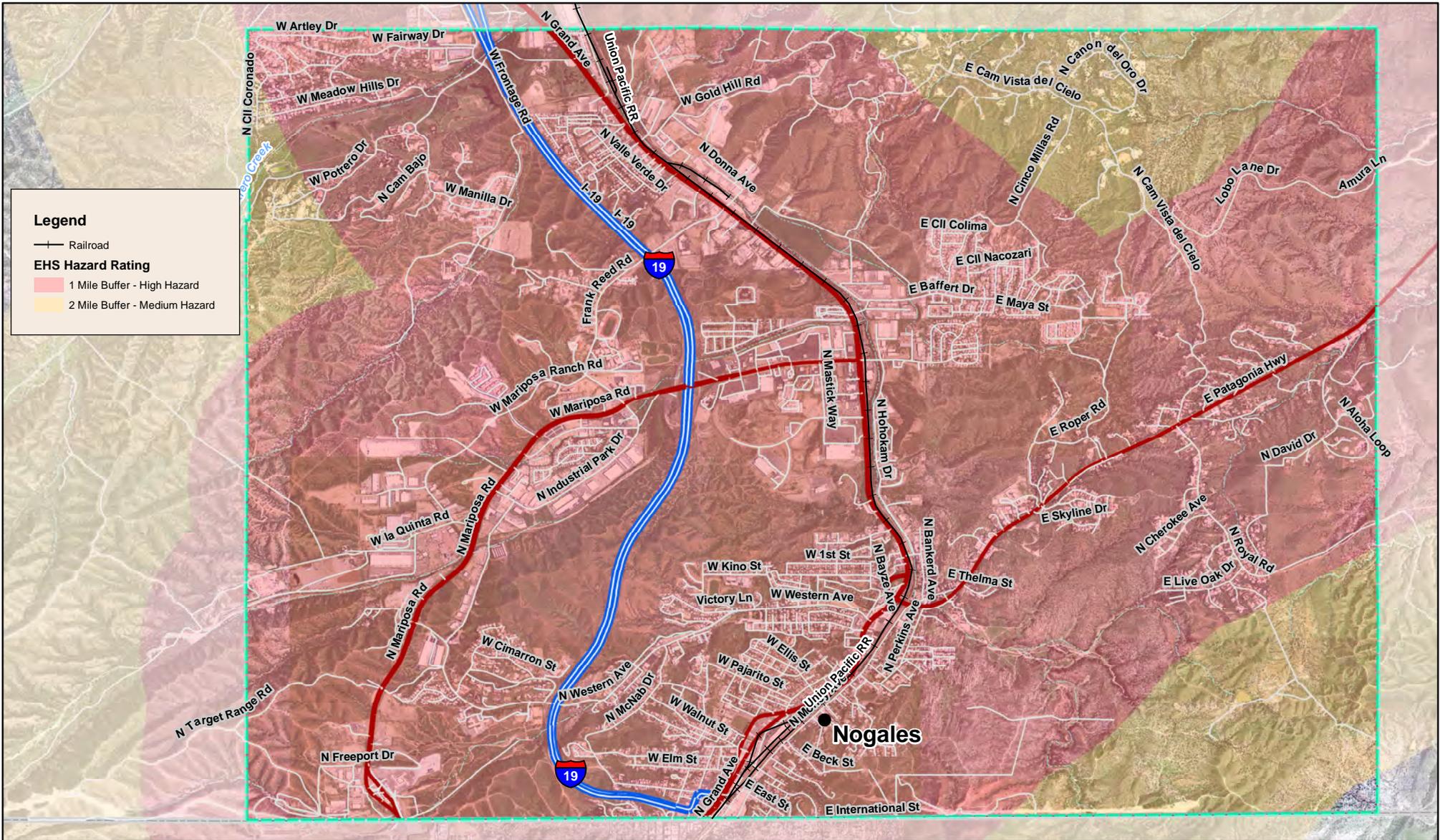

 0 2.5 5 10 Miles
 Sources: AZSERC, 2017; ALRIS, 2010; JEF, 2017; ADOT, 2017



Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan

Map 3A
Santa Cruz County Hazardous Materials Hazard Map
 as of June 2017

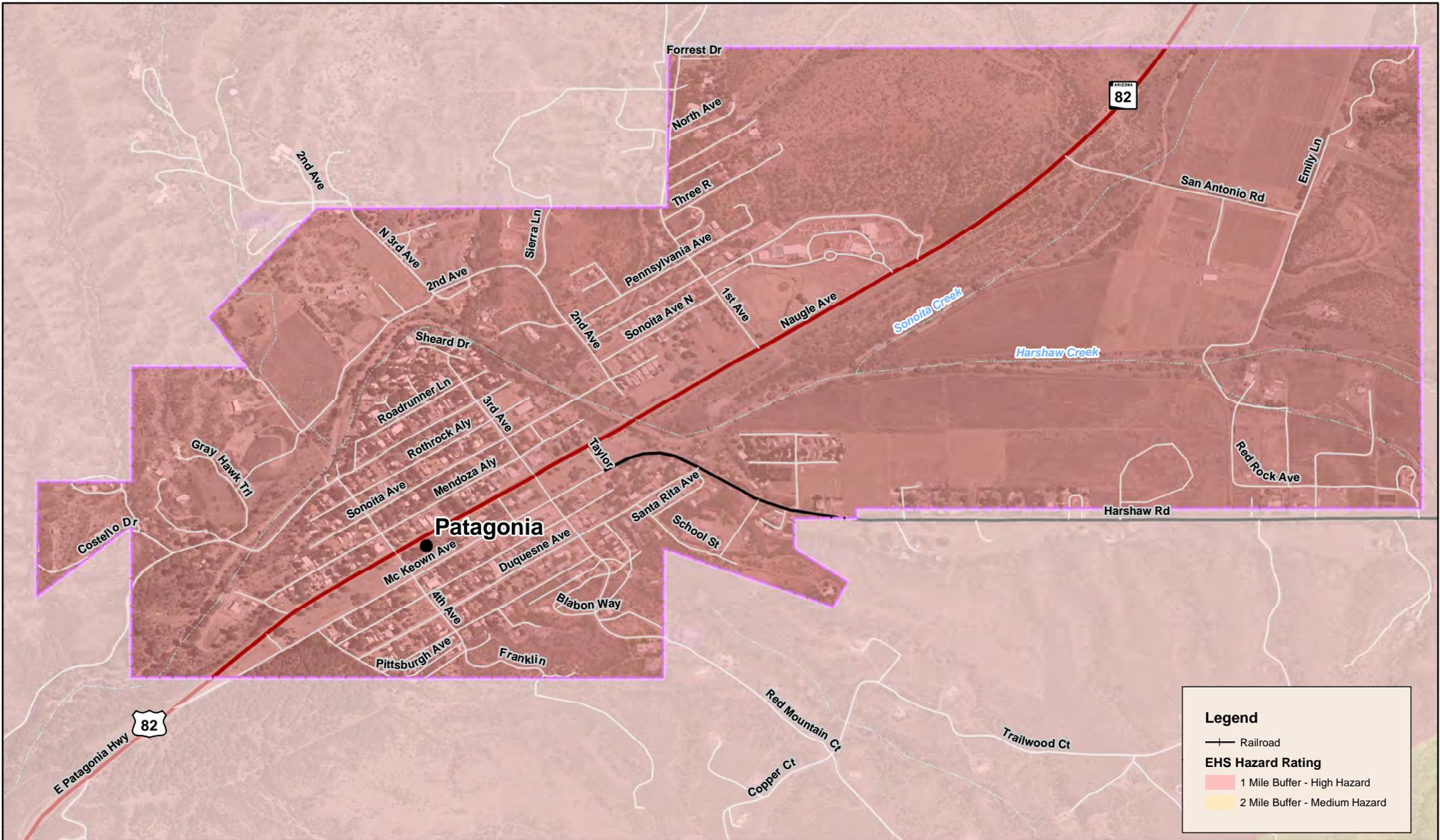




Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan

Map 3B

City of Nogales
EHS/Hazardous Materials
Hazard Map
as of June 2017



Legend

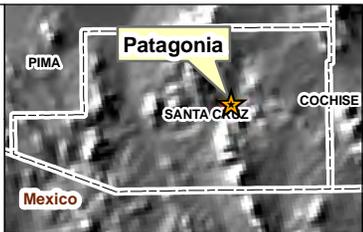
- +— Railroad
- EHS Hazard Rating**
 - 1 Mile Buffer - High Hazard
 - 2 Mile Buffer - Medium Hazard

Legend

Communities	● Cities, Towns, Places	Roads
NOGALES	Watercourses	Interstates
PATAGONIA	Lakes	Highways
County Boundary		Arterials
		Streets

0 400 800 1,600 Feet

Sources: AZSERC, 2017; ALRIS, 2010; JEF, 2017; ADOT, 2017



Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan

Map 3C

Town of Patagonia
EHS/Hazardous Materials
Hazard Map
as of June 2017

5.3.7 *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 usually signaled by dense 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 grow into an emergency or disaster. Even small fires can threaten lives, resources, and destroy improved properties.

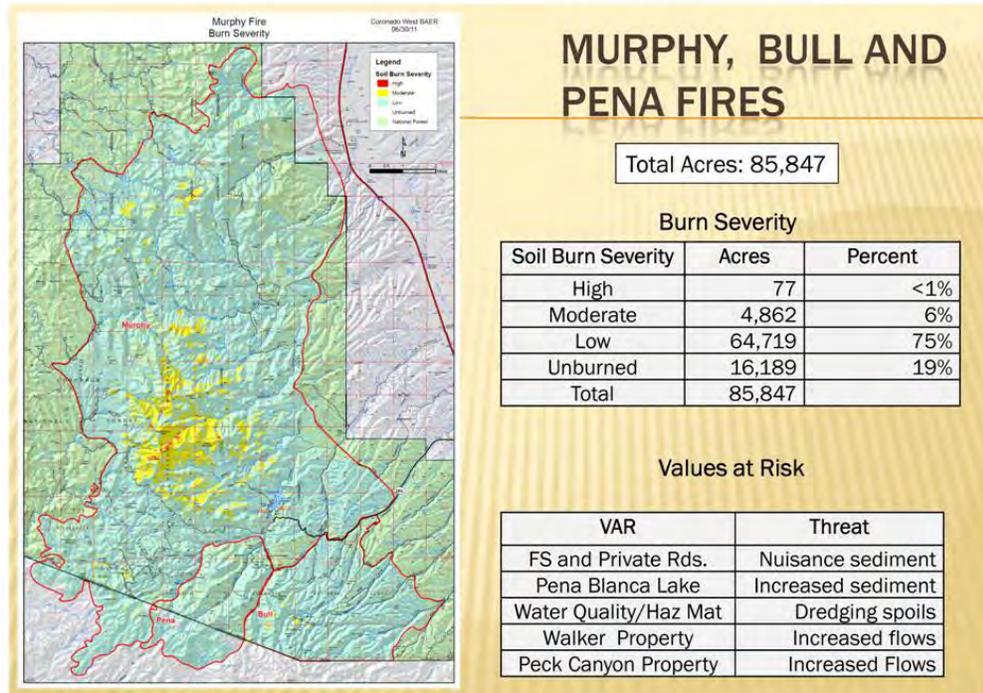
The indirect effects of wildfires can also be catastrophic. In addition to stripping the land of vegetation and destroying forest resources and personal property, large, intense fires can harm the soil, waterways and the land itself. Soil exposed to intense heat may temporarily lose its capability to 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.

History

For the period of 1980 to 2008, data compiled by the Arizona Department of Forestry Division for the 2013 State Plan update indicates that at least 80 wildfires greater than 100 acres in size, have occurred in all of Santa Cruz County. According to the National Wildfire Coordination Group (NWCG, 2017), there have been eight fires larger than 10,000 acres, that have burned within Santa Cruz County during the period of 2002 to 2017. Several are described below along with other significant fires, in chronological order:

- In April of 2002, the Ryan fire was started by a campfire in Coronado National Forest at Canelo Hill on April 29th and continued through May 4th. The fire burned 38,800 acres with estimated total firefighting cost of 1.2 million dollars. The fire burned one house and several outbuildings causing \$90,000 in damages (NCDC, 2004).
- In July of 2005, the Florida Fire was a lightning caused fire that started on July 7, 2005 in the Santa Rita Mountains about 25 miles south of the City of Tucson. The fire burned a total of 23,183 acres, injured 13 firefighters and was contained on July 21, 2005 at 6 pm MST. At the peak of the fire there were 986 personnel, and the total cost to suppress the fire was \$8.1 million (NCDC, 2010).
- In May of 2009, the Elgin Fire – the cause of the fire is under investigation and burned an area 1 mile northeast of Elgin, Arizona. The fire started May 2, 2009 and was controlled May 7, 2009, and burned 1,420 acres with over \$335,000 in fire suppression costs. Three out building were destroyed (GACC, 2010).
- In May of 2009, the Canelo Fire – a human caused fire that burned an area 10 miles south of Sonoita, Arizona. The fire started May 5, 2009 and was controlled May 16, 2009, and burned 4,025 acres with over \$1,730,976 in fire suppression costs. The fire destroyed 3 homes and 5 other buildings (GACC, 2010).

Murphy Complex Fire – In May of 2011, the Murphy Fire Complex (Murphy, Bull and Pena Fires) was ignited by human causes and burned approximately 85,847 acres, with the Murphy Fire accounting for 68,078 acres. The burned area is generally located 5 miles east of Arivaca and 4 miles west of Tubac. The fire started on May 30, 2011 and was controlled on June 15, 2011, with suppression costs estimated at over \$5.7 million. Figure 5-9 is a map prepared by the BAER Team indicating the burn severity and overall limits of the fires. The only damage reported was the complete destruction of the Atascosa Lookout House which is the primary feature of a site listed with the National Register of Historic Places. Areas identified by the BAER Team and SCCFCD to be at post-fire flooding risk include the Calabasas School, an El Paso Natural Gas line, several local ranches in the area, Pena Blanca Lake, the Atascosa Lookout and Trail (InciWeb, 2011).



Source: USFS BAER Team as posted on InciWeb at: <http://www.inciweb.org/incident/map/2268/0/>

Figure 5-7: Murphy Complex Fire Burn Severity Map

The Planning Team recognized that the declared disaster and historic hazard data collected and summarized in Section 5.1 does not adequately reflect the true cost of a wildfire. Particularly, the cost of wildfire suppression efforts to prevent structure and human loss. For example, the 2008 Alamo Fire did not result in any structure losses, however, the suppression costs exceeded \$1.4 million. Furthermore, the County, State, Forest Service, and other agencies spend millions of dollars every year in wildfire mitigation in fuel treatment projects.

Probability and Magnitude

The probability and magnitude of wildfire incidents for Santa Cruz 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. The primary source used for mapping wildfire hazard in Santa Cruz County was recently developed as a part of the West Wide Wildfire Risk Assessment (WWWRA) (Sanborn Map Company, 2013) for the western U.S. Data and information from the WWWRA is hosted by the Arizona State Forestry and Fire Management Department on its Arizona Wildfire Risk Assessment Portal (AZ WRAP).

The wildfire hazard data used in this update are derived from the Fire Threat Index (FTI) data distributed with the WWWRA. The FTI is a raster based depiction, compiled to a 30-meter resolution, that reflects the likelihood of one acre burning with the fire location starting at the grid location. The calculation process integrates the probability of an acre igniting and the expected final fire size into a single measure of wildland fire susceptibility. The assessed fire size is based on the rate of spread in four weather percentile categories.

The key inputs and intermediate data used in the wildfire model to produce the Wildfire Threat layer are:

- Probability of fire occurrence, derived from:

- Historic fire locations and fire occurrence areas.
- Weather influence zones derived from historic weather observations categorized into weather percentile categories
- Fire behavior (rate of spread) derived from:
 - Surface fuels
 - Canopy closure
 - Canopy characteristics
 - Topography
- Fire suppression effectiveness, derived from
- Historic fire sizes
- Historic protection organization

The FTI is calculated using the above variables to derive a number between 0 and 1. The WWRA has ranked the FTI into nine divisions that describe the probability as ranging from Very, Very Low to Extreme. The results of the FTI data were plotted on workmaps and reviewed by the planning team for relevance and applicability. In some cases, the planning team felt that minor adjustments to the FTI assessments were warranted to subjectively correct areas that the team felt the wildfire threat index was either underpredicting or overpredicting the hazard. In particular, increases in the FTI were made along the Santa Cruz River floodplain to reflect the heavy vegetation density in the floodplain, and in the foothill areas west of I-19 and north of Rio Rico. The Town of Patagonia also made slight adjustments to increase the FTI for several areas near the town. No other adjustments were made.

Map 4A indicates the FTI hazards for the greater Santa Cruz County. Maps 4B and 4C represent the incorporated boundaries of Nogales and Patagonia.

Climate Change Impacts

One of the “Key Messages” from the NCA report (Garfin, et.al., 2014) is the projection that wildfire risk and incidents within the Southwest region will likely increase due to climate change. Reduced precipitation, increased temperatures and longer, more severe periods of drought all factor into the assessment. In a paper produced by Northern Arizona University’s Ecological Restoration Institute (Kent, 2015), the author noted that fire-climate relationships described for the recent past, may not hold true for future projections due to expected shifts in vegetation type, and hence fuel characteristics, created by the influence of climate variations.

Response to this amplification of current wildfire risk will likely include a greater need for vegetation management planning and greater enforcement of wildland urban interface best building practices. Incorporation of climate change impacts into the CWPP is also something the county and participating jurisdictions should consider.

Vulnerability – CPRI Results

Wildfire CPRI results for each community are summarized in Table 5-38 below.

Participating Jurisdiction	Probability	Magnitude/ Severity	Warning Time	Duration	CPRI Score
Nogales	Highly Likely	Critical	< 6 hours	< 24 hours	3.50
Patagonia	Highly Likely	Critical	< 6 hours	> 1 week	3.70
Unincorporated Santa Cruz County	Highly Likely	Limited	< 6 hours	> 1 week	3.40
County-wide average CPRI =					3.53

Vulnerability – Loss Estimations

All of the 2011 Plan data and tables have been revised and only exposure estimates are provided for this Plan. The potential exposure of population, residential structures, and critical facilities and infrastructure (CFI) to the various FTI hazard categories was estimated using GIS tools. The first step was to intersect the human and facility asset coverages with the adjusted FTI hazard limits depicted on Map 4A. The FTI initially assigned to the HAZUS census block data was taken as the mean value plus one standard deviation of all the values in the block. This provides a value that conservatively represents the upper range of FTI values contained within the census block area. The CFI was directly intersected with the FTI to assign a hazard classification to each facility. The resulting estimate of exposure to population and residential structures are summarized in Figure 5-10 and Figure 5-11, respectively. The exposure of CFI to the various levels of wildfire hazard are summarized in Figure 5-12.

Wildfire risk associated with the High, Very High, and Extreme FTI hazards are primarily located within the Unincorporated Santa Cruz County area. The wildfire risk for Nogales and Patagonia are relatively low to moderate exposure.

The majority of economic loss associated with wildfires has historically been in the firefight costs, which can become substantial with large fires. For example, a Type 1 fire-fight crew costs about \$1 million per day. Typically, deaths and injuries not related to firefighting activities are rare. However, it is feasible to assume that at least one death and/or injury may be plausible. There is also a very high probability of population displacement during a wildfire event, and especially in the urban wildland interface areas.

It is duly noted that the exposure numbers presented above represent a comprehensive evaluation of the County as a whole. It is unlikely that a wildfire would impact all of the county at the same time. Actual event based losses and exposure are likely to be only a fraction of those summarized above.

Vulnerability – Development Trend Analysis

By its very definition, the wildland urban interface, or WUI, represents the fringe of urban development as it intersects with the natural environment. As previously discussed, wildfire risks are significant for a sizeable portion of the county. Any future development will only increase the WUI areas and expand the potential exposure of structures to wildfire hazards. The Sonoita Elgin Community Wildfire Protection Plan addresses mitigation opportunities for existing and future WUI areas within the boundaries of that plan, and provides recommended guidelines for safe building and land-use practices in wildfire hazard areas. Identification of WUI boundaries for other populated places within the county would provide more strategic targeting of mitigation needs and efforts.

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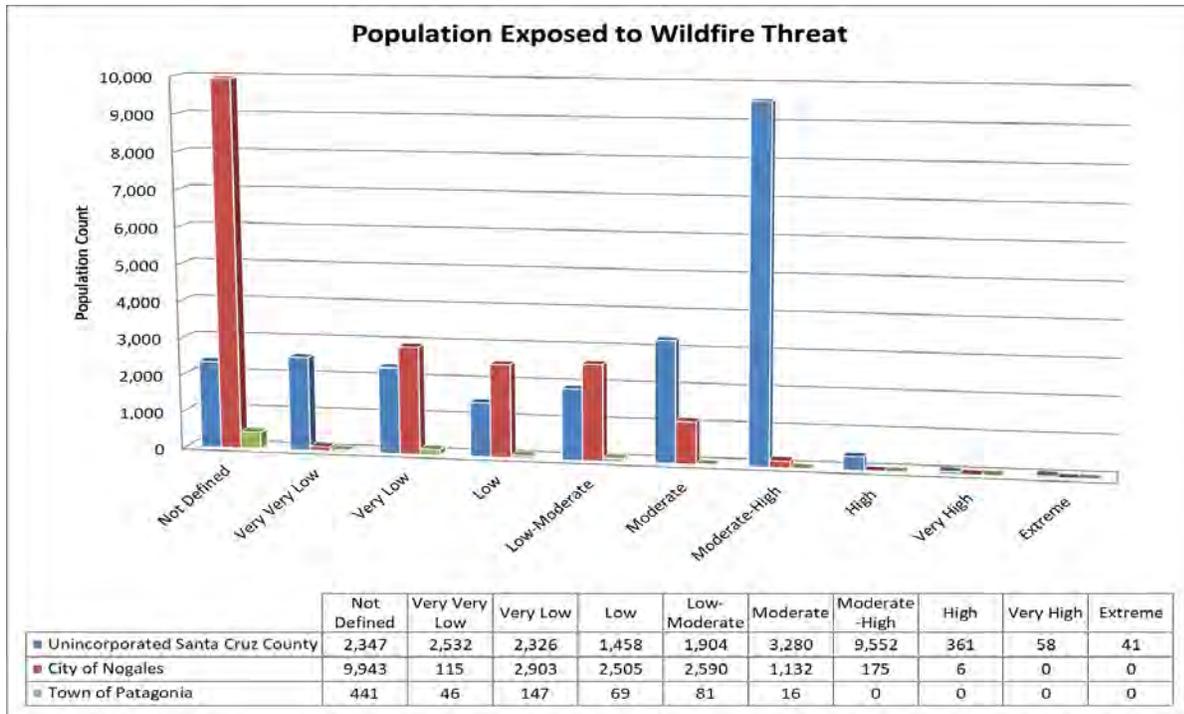


Figure 5-8: Population Exposure to Wildfire Threat

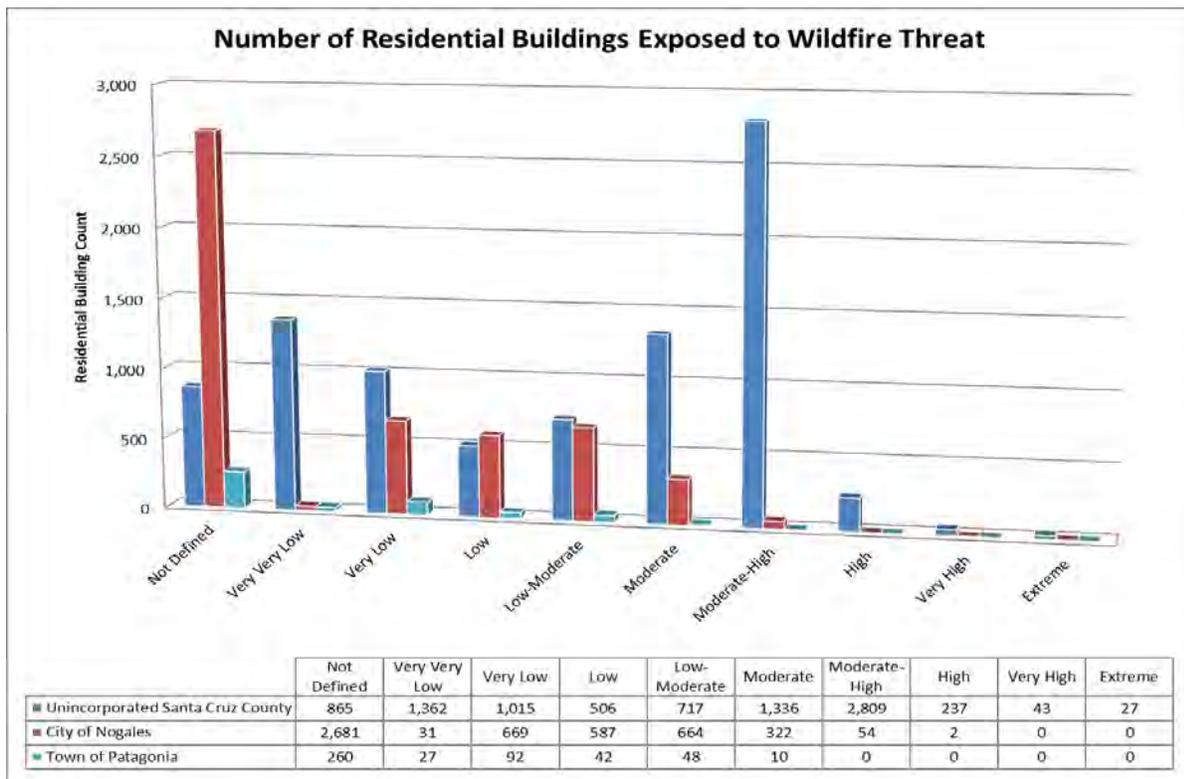


Figure 5-9: Residential Building Exposure to Wildfire Threat

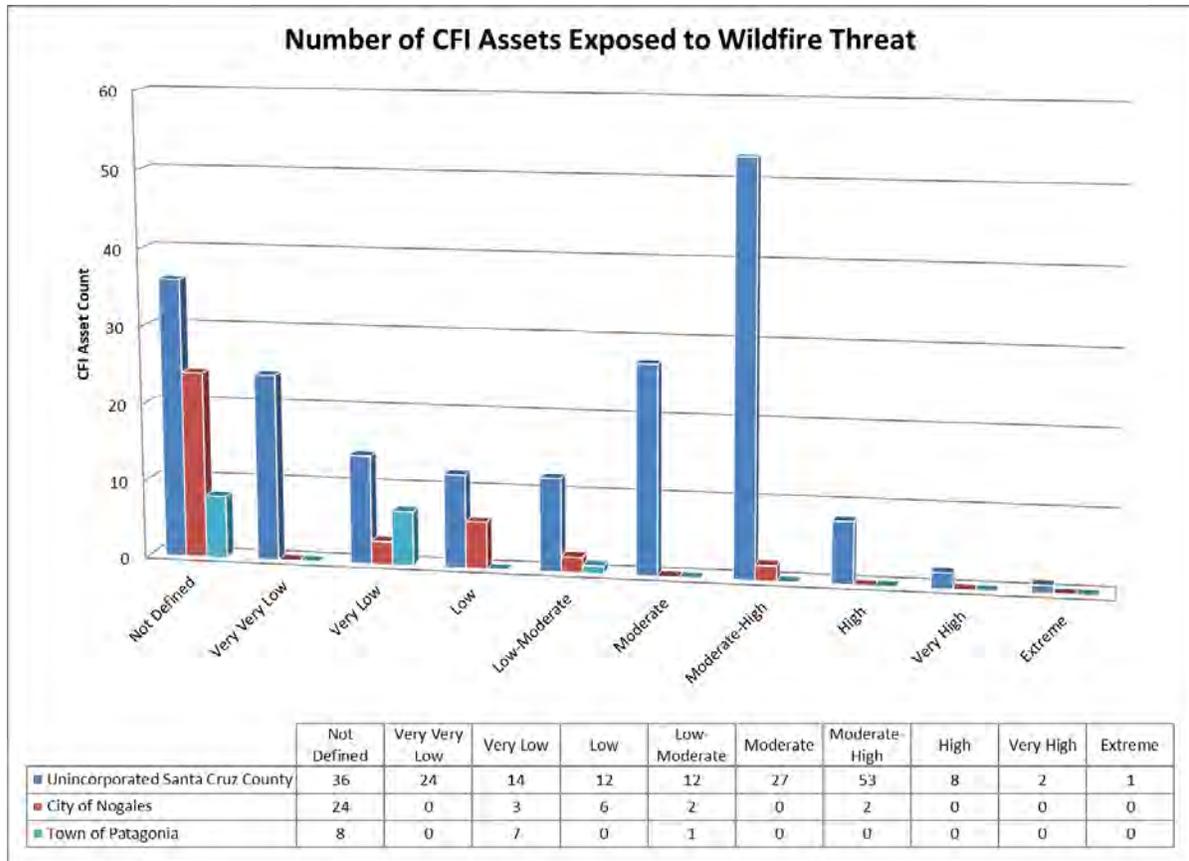


Figure 5-10: Total CFI Exposure to Wildfire Threat

National Fire and Aviation Management Web Applications; Online at: <https://fam.nwcg.gov/fam-web/>

Sanborn Map Company, 2013, West Wide Wildfire Risk Assessment - Final Report. Prepared for the Oregon Department of Forestry, Western Forestry Leadership Coalition, Council of Western State Foresters. Funded by the USDA Forest Service. GIS data available through the Arizona Department of Forestry and Fire Management’s Arizona Wildfire Risk Assessment Portal (AZ WRAP) at: <https://www.arizonawildfirerisk.com/>

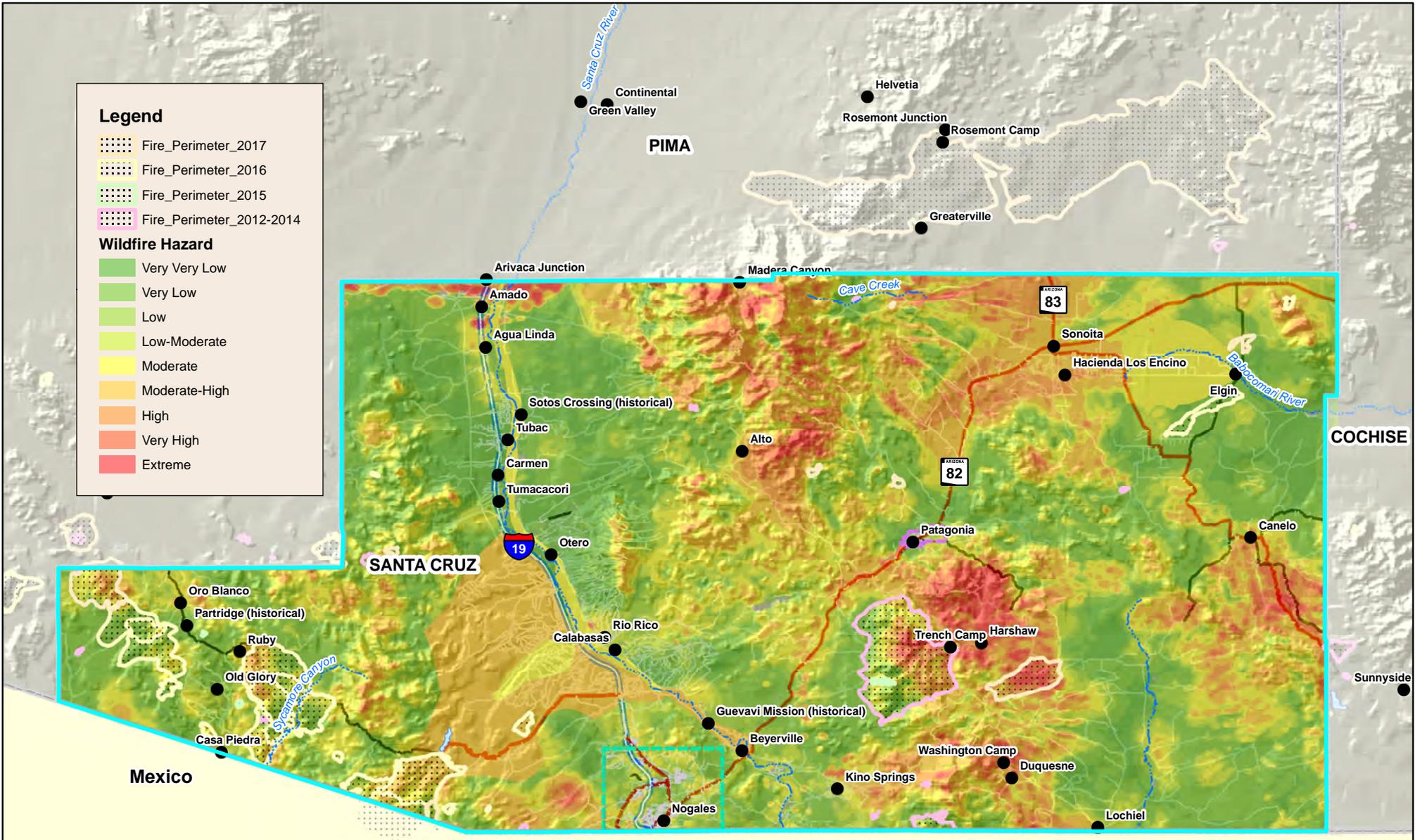
Sonoran Institute, University of Arizona Remote Sensing Center, 2008, *Santa Cruz River Riparian Vegetation Mapping Project Santa Cruz County, Arizona.*

White, Seth, 2004, *Bridging the Worlds of Fire Managers and Researchers: Lessons and Opportunities From the Wildland Fire Workshops*, USDA Forest Service, General Technical Report PNW-GTR-599, March 2004

Profile Maps

Maps 4A – County-Wide Wildfire Hazard Map

Maps 4B and 4C – Nogales and Patagonia Wildfire Hazard Maps



Legend

- Fire_Perimeter_2017
- Fire_Perimeter_2016
- Fire_Perimeter_2015
- Fire_Perimeter_2012-2014

Wildfire Hazard

- Very Very Low
- Very Low
- Low
- Low-Moderate
- Moderate
- Moderate-High
- High
- Very High
- Extreme

Legend

- Cities, Towns, Places

Communities

- NOGALES
- PATAGONIA
- Lakes
- County Boundary
- Watercourses

Roads

- Interstate
- Major Highways
- Major Roads
- Local Roads

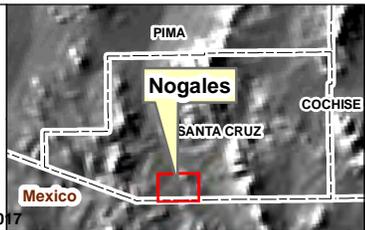
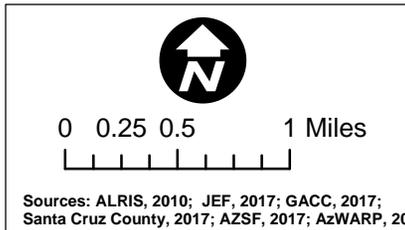
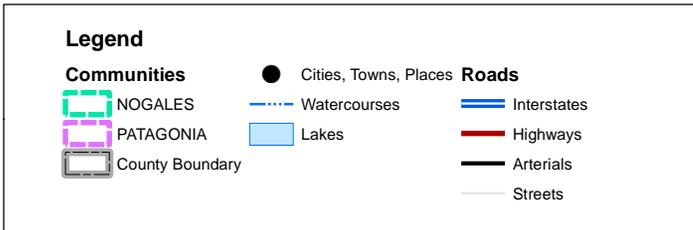
0 2.5 5 10 Miles

Sources: ALRIS, 2010; JEF, 2017; GACC, 2017; Santa Cruz County, 2017; AZSF, 2017; AzWARP, 2017



**Santa Cruz County Multi-Jurisdictional
Hazard Mitigation Plan**

**Map 4A
Santa Cruz County
Wildfire
Hazard Map
as of June 2017**



Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan

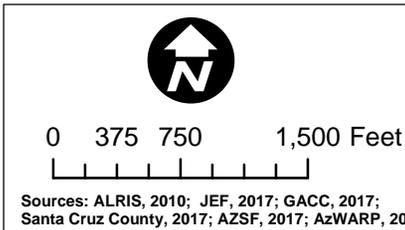
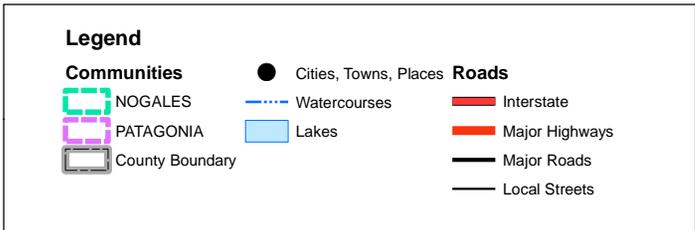
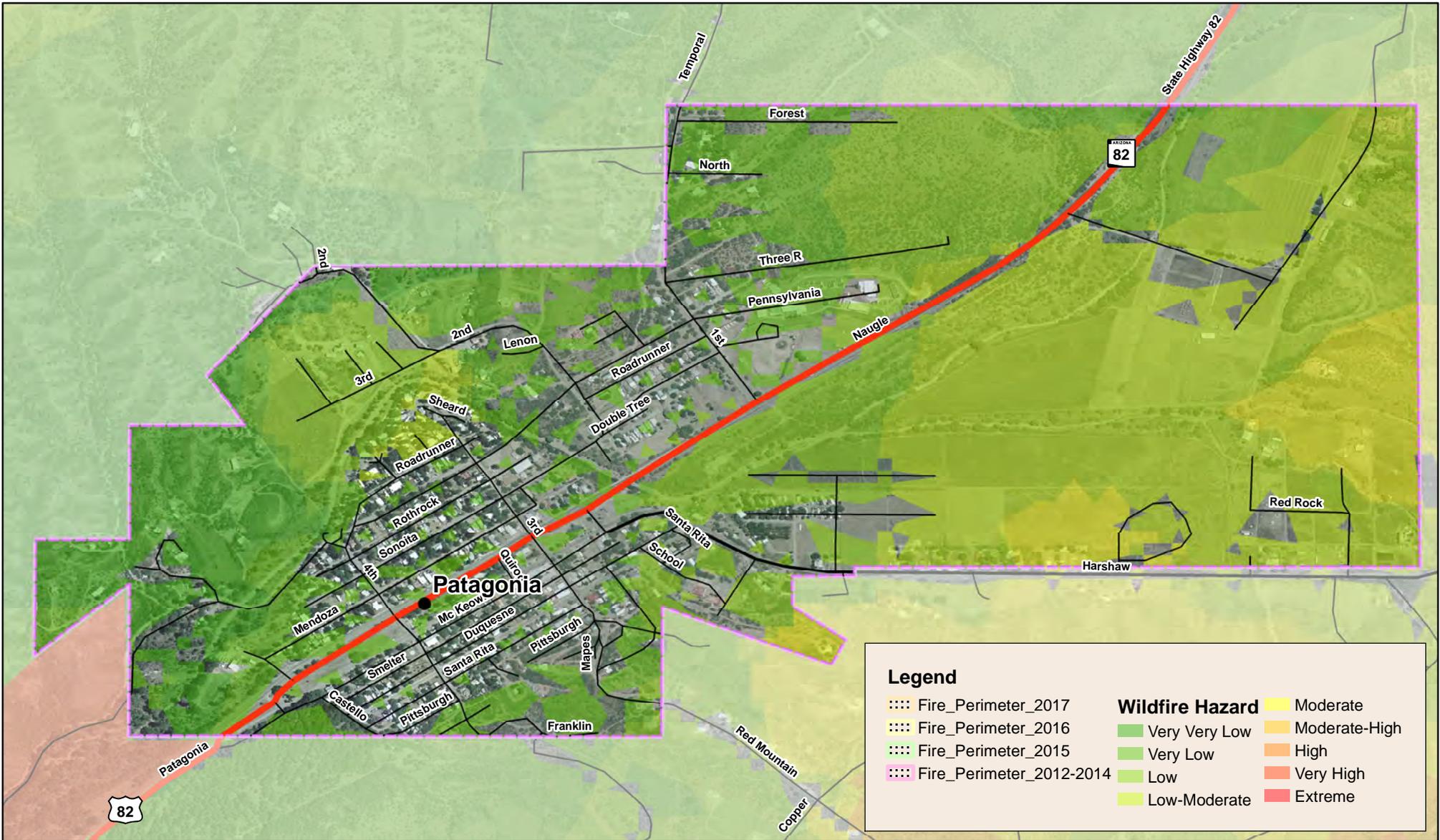
Map 5B

City of Nogales

Wildfire

Hazard Map

as of June 2017



Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan

Map 5C

Town of Patagonia

Wildfire Hazard Map

as of June 2017

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 5-39 summarizes the hazards selected for mitigation by each jurisdiction and will be the basis for each jurisdictions mitigation strategy.

Table 5-39: Hazards to be mitigated by each participating jurisdiction

Jurisdiction	Dam Failure	Drought	Flooding	HAZMAT	Wildfire
Unincorporated Santa Cruz County	x	x	x	x	x
Nogales	x	x	x	x	x
Patagonia		x	x	x	x

SECTION 6: MITIGATION STRATEGY

§201.6(c)(3): [The plan shall include...] (3) A **mitigation strategy** that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools. This section shall include:

- (i) A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
- (ii) A section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.
- (iii) An action plan describing how the actions identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.
- (iv) For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

The mitigation strategy provides the “what, when, and how” of actions 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 2011 Plan mitigation strategy was reviewed and updated by the Planning Team, including the addition or augmentation of the section describing National Flood Insurance Program (NFIP) compliance. Specifics of the changes and updates are discussed in the subsections below.

6.1 Hazard Mitigation Goals and Objectives

The 2011 Plan goals and objectives were developed using the 2010 State Plan¹⁷ goals and objectives as a starting point. Each jurisdiction then edited and modified those goals and objectives to fit the mitigation planning vision for their community. An assessment of those goals and objectives by the Planning Team was made with consideration of the following¹⁸:

- Do the goals and objectives identified in the 2011 Plan reflect the updated risk assessment?
- Did the goals and objectives identified in the 2011 Plan lead to mitigation projects and/or changes to policy that helped the jurisdiction(s) to reduce vulnerability?
- Do the goals and objectives identified in the 2011 Plan support any changes in mitigation priorities?
- Are the goals and objectives identified in the 2011 Plan reflective of current State goals?

After much discussion and comparison of the 2011 Plan goals and objectives to the 2013 State Plan, the planning team felt the 2011 Plan goals and objectives adequately reflected the continuing mitigation goals of the Planning Team and chose to retain the goals and objectives list without change, as presented below:

Goal 1. Promote disaster-resistant future development.

Objective 1.A Update, develop, and support the community’s general plans, ordinances, and codes to limit development in hazard areas, or build to standards that will prevent or reduce damage.

Objective 1.B Adopt and support codes that protect assets and new development in hazard areas.

¹⁷ State of Arizona, 2004, *State of Arizona All Hazard Mitigation Plan*, prepared by URS.

¹⁸ FEMA, 2008, *Local Multi-Hazard Mitigation Planning Guidance*

Goal 2. Promote public understanding, support, and demand for hazard mitigation.

- Objective 2.A Educate the public to increase awareness of hazards and opportunities for mitigation actions.
- Objective 2.B Promote partnerships between the state, counties, local and tribal governments to identify, prioritize, and implement mitigation actions.
- Objective 2.C Promote hazard mitigation in the business, residential, and agricultural community.
- Objective 2.D Monitor and publicize the effectiveness of mitigation actions implemented community wide.

Goal 3. Build and support local capacity and commitment to become less vulnerable to hazards.

- Objective 3.A Improve existing capabilities to warn the public of emergency situations.
- Objective 3.B Develop programs to enhance the safety of the residents of each community during an emergency.

Goal 4. Improve hazard mitigation coordination and communication with federal, state, local, and tribal governments.

- Objective 4.A Establish and maintain a close working relationship with state agencies and local and tribal governments.

Goal 5. Reduce the potential level of damage and losses to people, existing and future critical facilities/infrastructure, buildings and structures, and other community assets due to floods.

- Objective 5.A Implement policies, procedures and regulations which reduce the potential exposure to flood hazards.
- Objective 5.B Decrease vulnerability of community assets, especially critical facilities located in the 100-year floodplain.
- Objective 5.C Improve coordination with state and federal flood-related agencies.
- Objective 5.D Maintain compliance with the National Flood Insurance Program (NFIP) requirements.
- Objective 5.E Promote changes in current regulations to facilitate hazard mitigation.

Goal 6. Reduce the potential level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to wildland fires.

- Objective 6.A Develop a comprehensive approach to reducing the level of damage and losses due to wildland fires.
- Objective 6.B Protect life, improved property, and natural resources with vulnerability to the effects of wildland fires.
- Objective 6.C Improve coordination and support existing efforts to mitigate wildland fire hazards.
- Objective 6.D Educate the public about wildland fire dangers and mitigation measures.
- Objective 6.E Promote changes in current regulations to facilitate hazard mitigation.

Goal 7. Reduce the potential level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to Dam Failure.

- Objective 7.A Develop a comprehensive approach to reducing the level of damage and losses due to dam failure.
- Objective 7.B Protect life, improved property, and natural resources with vulnerability to the effects of dam failure.
- Objective 7.C Educate the public about dam failure dangers and mitigation measures.

Goal 8. Reduce the potential level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to drought.

- Objective 8.A Develop a comprehensive approach to reducing the level of damage and losses due to drought.
- Objective 8.B Protect existing assets with vulnerability to the effects of drought.
- Objective 8.C Coordinate with and support existing efforts to mitigate drought (e.g., Arizona Governor's Arizona Drought Task Force).
- Objective 8.D Promote water conservation and education.

Goal 9. Reduce the potential level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to hazardous materials incidents.

- Objective 9.A Develop a comprehensive approach to reducing the level of damage and losses due to hazardous materials incidents.
- Objective 9.B Protect existing assets with vulnerability to the effects of hazardous materials incidents.
- Objective 9.C Educate the public and public safety officials about hazardous materials dangers and mitigation measures.

Goal 10. Reduce the potential level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to Severe Weather.

- Objective 10.A Develop a comprehensive approach to reducing the level of damage and losses due to severe weather.
- Objective 10.B Protect life, improved property, and natural resources with vulnerability to the effects of severe weather.
- Objective 10.C Educate the public about severe weather dangers and mitigation measures.

Goal 11. Reduce the potential level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to other natural hazards.

- Objective 11.A Develop a comprehensive approach to reducing the level of damage and losses due to other natural hazards.
- Objective 11.B Protect life, improved property, and natural resources with vulnerability to the effects of other natural hazards.

Goal 12. Reduce the potential level of damage and losses to people, existing and future critical facilities/infrastructure, and other community assets due to other human caused hazards.

- Objective 12.A Develop a comprehensive approach to reducing the level of damage and losses due to other human caused hazards.
- Objective 12.B Protect life, improved property, and natural resources with vulnerability to the effects of other human caused hazards.

6.2 Capability Assessment

While not required by DMA 2000, 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:

- ✓ 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.

For this update, the Planning Team reviewed the information provided in Section 6.2 of the 2011 Plan and updated data in the tables of Section 6.2.1 as appropriate. The Planning Team also chose to remove and not update Section 6.2.2 and Tables 6.4 and 6.5 for this Plan. The 2011 Plan Section 6.2.3 is renamed to Section 6.2.2 herein and has been augmented to summarize more detail of each jurisdiction's participation in the NFIP program.

6.2.1 Jurisdictional Capabilities

Tables 6-1-1 through 6-1-3 summarize the legal and regulatory mitigation capability for each participating jurisdiction. Information provided includes a brief listing of current codes, mitigation relevant ordinances, plans, and studies/reports. Tables 6-2-1 through 6-2-3 summarize the staff and personnel resources employed by each jurisdiction that serve as a resource for hazard mitigation. Tables 6-3-1 through 6-3-3 summarize the fiscal capability and budgetary tools available to each participating jurisdiction. Each of these three tables are listed below by jurisdiction.

Table 6-1-1: Legal and regulatory capabilities for Santa Cruz County

Regulatory Tools for Hazard Mitigation	Description	Responsible Department/Agency
CODES	<ul style="list-style-type: none"> • All adopted by Ordinance No. 2013-03 • International Building Code 2012 Edition • International Building Code Standards 2012 Edition • International Residential Code 2012 Edition • International Mechanical Code 2012 Edition • International Plumbing Code 2012 Edition • International Fire Code 2012 Edition • International Fuel and Gas Code 2012 Edition • National Electric Code 2011 Edition • Uniform Building Code 1997 Edition Appendix Chapter 33 • Uniform Code for the Abatement of Dangerous Buildings 1997 Edition • International Code Council Electrical Code 2012 • Administrative Provisions 	<ul style="list-style-type: none"> • Community Development • Fire Districts as applicable
ORDINANCES	<ul style="list-style-type: none"> • Santa Cruz County Ordinance No. 3A adopted in 1973 (with subsequent amendments) known as the Zoning and Development Code. • Santa Cruz County Floodplain and Erosion Hazard Management Ordinance, No. 2001-03, adopted May 1, 2001, effective, June 1, 2001. In accordance with the requirements of ARS 48-3601 through 48-3627, and 44 CFR Parts 59, 60, 65, and 70. 	<ul style="list-style-type: none"> • Community Development • Flood Control District

Table 6-1-1: Legal and regulatory capabilities for Santa Cruz County

Regulatory Tools for Hazard Mitigation	Description	Responsible Department/Agency
PLANS, MANUALS, and/or GUIDELINES	<p><u>Santa Cruz County Plans:</u></p> <ul style="list-style-type: none"> • Santa Cruz County 2016 Comprehensive Plan (5/2016) - A plan to guide growth and development, and generally promote public health, safety, convenience and welfare. Pursuant to Title 11, Article 2 • Flood Control District Standards - Floodplain and erosion hazard management guidelines and requirements to manage development within these hazard areas within the unincorporated areas of the County. • State Standards for Floodplain Management. <p><u>Multi-Jurisdictional or Regional Plans:</u></p> <ul style="list-style-type: none"> • 2010 Unified Santa Cruz County/ Nogales Transportation Plan (4/2010) • Santa Cruz County Emergency Response and Recovery Plan (2004) - A plan that addresses the consequences of any emergency/disaster in which there is a need for County response and recovery assistance, and the methods the County will use to mobilize resources and conduct response and recovery activities. • Bi-National Prevention and Emergency Response Plan (2005) - A mitigation and emergency response plan focused on addressing border related issues and bi-national disaster prevention and response. • Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan (2011) 	<ul style="list-style-type: none"> • Community Development • Flood Control District • Arizona Department of Water Resources • Public Works • Emergency Management • City of Nogales • IBWC

Table 6-2-1: Technical staff and personnel capabilities for Santa Cruz County

Staff/Personnel Resources	<input checked="" type="checkbox"/>	Department/Agency – Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Community Development – Planning Division • Public Works • Flood Control District
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Community Development – Building Division – Certified Building Inspectors • Public Works
Planner(s) or engineer(s) with and understanding of natural and/or human-caused hazards	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Flood Control District • Emergency Services
Floodplain Manager	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Flood Control District – Certified Floodplain Manager
Surveyors		<ul style="list-style-type: none"> • None
Staff with education or expertise to assess the community’s vulnerability to hazards	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Flood Control District – Certified Floodplain Manager • Emergency Services

Staff/Personnel Resources	<input checked="" type="checkbox"/>	Department/Agency – Position
Personnel skilled in GIS and/or HAZUS	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Community Development – Planning Division – GIS Analyst • Flood Control District – Certified Floodplain Manager
Scientists familiar with the hazards of the community	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Flood Control District – Certified Floodplain Manager
Emergency Manager	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Emergency Services
Grant writer(s)	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Community Development • Public Works • Flood Control District • Administrative Services Department • Emergency Services
Others	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Community Development – Planning Division • Public Works • Flood Control District

Financial Resources	Accessible or Eligible to Use (Yes, No, Don't Know)	Comments
Community Development Block Grants	Yes	In rotation with Nogales and Patagonia
Capital Improvements Project funding	Yes	As available
Authority to levee taxes for specific purposes	Yes	Either statutory or through vote of the taxpayers
Fees for water, sewer, gas, or electric service	No	
Impact fees for homebuyers or new developments/homes	Yes	None at this time
Incur debt through general obligation bonds	Yes	Subject to County bond limit
Incur debt through special tax bonds	Yes	Special assessments through Flood Control District possible.

Table 6-1-2: Legal and regulatory capabilities for Nogales

Regulatory Tools for Hazard Mitigation	Description	Responsible Department/Agency
CODES	<ul style="list-style-type: none"> • 2012 International Building Code • 2012 International Residential Code • 2012 International Code for Existing Buildings • 2012 International Fuel and Gas Code • 2012 International Plumbing Code • 2012 International Mechanical Code • 2012 International Fire Code • 2011 National Electric Code • 2010 ADA Standards for Accessible Design • City of Nogales Development Standards Code • 1997 Uniform Code for the Abatement of Dangerous Buildings 	<ul style="list-style-type: none"> • Building and Fire Departments
ORDINANCES	<ul style="list-style-type: none"> • City of Nogales Flood Damage Prevention Ordinance No. 19-N (7/1987) - Floodplain hazard management guidelines and requirements to manage development within these hazard areas within the City of Nogales. • City Zoning Ordinance • City Subdivision Ordinance • Under Santa Cruz County Floodplain and Erosion Hazard Management Ordinance. 	<ul style="list-style-type: none"> • City of Nogales Public Works Department • Santa Cruz County Flood Control
PLANS, MANUALS, and/or GUIDELINES	<ul style="list-style-type: none"> • City of Nogales General Plan (12/2010) - A plan to guide growth and development, and generally promote public health, safety, convenience and welfare for the City of Nogales through the year 2020. • City of Nogales Hazard Mitigation Plan (2000) - A multi-hazard mitigation plan developed to address the City's vulnerability to primarily flood hazards and document mitigation alternatives and implementation strategies. • City of Nogales, Water and Wastewater System Master Plan. (2/2002) - A plan to define master water and wastewater expansion and growth. • Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan (2011) 	<ul style="list-style-type: none"> • Planning and Zoning Department

Table 6-1-2: Legal and regulatory capabilities for Nogales

Regulatory Tools for Hazard Mitigation	Description	Responsible Department/Agency
STUDIES	<ul style="list-style-type: none"> • Ambos Nogales Binational Air Quality Study, Citizens Summary (1999) - A summary of air quality issues impacting the border and port of entry areas within the Ambos Nogales area. • Plan of Action for Improving Air Quality in Ambos Nogales (6/2005) – Ambos Nogales Air Quality Task Force • City of Nogales Stormwater Management Plan, Phase I Report (1999) - A stormwater management plan prepared to address flooding and flood related issues within floodprone areas of the City. • Reconnaissance Level Flood Control Study for Ephriam Wash at Nogales, Arizona (1982) - A reconnaissance level study to determine feasible drainage solutions to flooding of Ephriam Wash through the City of Nogales. <p>Drainage Design Report for International Sanitary Sewer Improvement Project, Escalada Canyon/East Street Improvements (2000) - A drainage design report prepared to document flooding characteristics within Escalada Canyon Wash and the corresponding stabilization improvements to protect the sewer line upgrades. Water Adequacy Study for the City of Nogales (5/1992) - A study to establish the water sources available to the City to demonstrate 100-year adequacy to Arizona Department of Water Resources (ADWR).</p>	<ul style="list-style-type: none"> • ADEQ, Arizona Water Resources and Santa Cruz County Flood Control

Staff/Personnel Resources	<input checked="" type="checkbox"/>	Department/Agency - Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	<input checked="" type="checkbox"/>	• Planning & Zoning Director and City Engineer
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	<input checked="" type="checkbox"/>	• Planning & Zoning Director, Utilities Director and City Engineer
Planner(s) or engineer(s) with and understanding of natural and/or human-caused hazards		
Floodplain Manager	<input checked="" type="checkbox"/>	• Administered by Santa Cruz County
Surveyors		
Staff with education or expertise to assess the community's vulnerability to hazards	<input checked="" type="checkbox"/>	• Defers to Santa Cruz County
Personnel skilled in GIS and/or HAZUS	<input checked="" type="checkbox"/>	• Public Works (GIS)/ City Engineer and Utilities Director
Scientists familiar with the hazards of the community		
Emergency Manager	<input checked="" type="checkbox"/>	• City Emergency Manager
Grant writer(s)	<input checked="" type="checkbox"/>	• City Grant Writer (Consultants)

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 levee taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric service	Yes	Water and Sewer
Impact fees for homebuyers or new developments/homes	Yes	Sewer Impact fees & Kino Springs
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	Don't Know	

Table 6-1-3: Legal and regulatory capabilities for Patagonia

Regulatory Tools for Hazard Mitigation	Description	Responsible Department/Agency
CODES	<ul style="list-style-type: none"> • Because Santa Cruz County performs plan review and building inspection services in Patagonia under an IGA, the Town has adopted the same building codes that Santa Cruz County uses. • Town Code Chapter 7 – Building (last amended 2/27/2013) • Town Code Chapter 13 - Flood Damage Prevention (Revised Ordinance #03-6 6/03 as amended by Ordinance 2016-02) • 2012 IBC Codes 	<ul style="list-style-type: none"> • Administration/Town Manager • Santa Cruz County
ORDINANCES	<ul style="list-style-type: none"> • The Town is zoned for general use. No zoning codes. There are restrictions on non-residential development. 	<ul style="list-style-type: none"> • Administration/Town Manager
PLANS, MANUALS, and/or GUIDELINES	<ul style="list-style-type: none"> • Town of Patagonia Solid Waste Facility Plan, Volumes 1 and 2. (12/2000) - Permitting document for the Town’s landfill. • Town of Patagonia Landfill SWPPP (5/2003) - Stormwater pollution prevention plan for the landfill. • Town of Patagonia General Plan (04/09) - A plan to guide growth and development , and generally promote public health, safety, convenience and welfare. • Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan (2011) • Minor Amendment to the Patagonia General Plan (08/2013). • Patagonia Flood Response Plan (2016) • Town of Patagonia Drought Preparedness Plan (2017) 	<ul style="list-style-type: none"> • Administration/Town Manager
STUDIES	<ul style="list-style-type: none"> • Preliminary Engineering report- Municipal Water System. 2007 	<ul style="list-style-type: none"> • Administration/Town Manager • Water and Sewer Department

Staff/Personnel Resources	<input checked="" type="checkbox"/>	Department/Agency - Position
Planner(s) or engineer(s) with knowledge of land development and land management practices	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Administration – Town Manager • Town Engineer
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure		(IGA w/ Santa Cruz County)
Planner(s) or engineer(s) with and understanding of natural and/or human-caused hazards	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Administration – Town Manager
Floodplain Manager	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Administration – Town Manager
Surveyors		
Staff with education or expertise to assess the community’s vulnerability to hazards	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Administration – Town Manager • Marshal’s Office – Town Marshal • Fire Department – Fire Chief
Personnel skilled in GIS and/or HAZUS		
Scientists familiar with the hazards of the community		
Emergency Manager	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Administration – Town Manager
Grant writer(s)	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> • Administration – Town Manager

Financial Resources	Accessible or Eligible to Use (Yes, No, Don’t Know)	Comments
Community Development Block Grants	Yes	5 year cycle
Capital Improvements Project funding	Yes	CIP planning in process
Authority to levee taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric service	Yes	Monthly billing
Impact fees for homebuyers or new developments/homes	No	
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	No	

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. Santa Cruz County, Nogales and Patagonia all participate in the NFIP at varying levels.

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. Santa Cruz County 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 6-4 summarizes the NFIP status and statistics for each of the jurisdictions participating in this Plan.

Jurisdiction	Community ID	NFIP Entry Date	Current Effective Map Date	Number of Policies	Amount of Coverage (x \$1,000)	Floodplain Management Role
Santa Cruz County (Unincorporated)	040090	8/1/1980	12/2/2011	345	\$57,469.3	The Santa Cruz County Flood Control District manages floodplains for unincorporated areas of the County.
Nogales	040091	4/15/1981	12/2/2011	251	\$10,396.3	Santa Cruz County Flood Control District dependent community. County manages floodplains within city limits using the county ordinance.
Patagonia	040092	3/18/1980	12/2/2011	55	\$86,159.5	Town manages floodplains within Town limits with assistance from the Santa Cruz County Flood Control District.

Sources: Policy Statistics - <http://bsa.nfipstat.fema.gov/reports/1011.htm> (4/13/17); NFIP Status - http://bsa.nfipstat.fema.gov/comm_status/index.html (4/13/17)

Each of the participating jurisdictions performed an overall assessment of their participation in the NFIP program by responding to the following questions:

- Question 1:** Describe your jurisdiction’s current floodplain management / regulation process for construction of new or substantially improved development within your jurisdiction.
- Question 2:** Describe the status and/or validity of the current floodplain hazard mapping for your jurisdiction.
- Question 3:** Describe any community assistance activities (e.g. – help with obtaining Elevation Certificates, flood hazard identification assistance, flood insurance acquisition guidance, public involvement activities, etc.)

Question 4: Describe identified needs in your floodplain management program. This could include things like updating the floodplain management code/regulation, establishing written review procedures, modifying or adding flood hazard area mapping, etc.

Responses were provided by all jurisdictions regardless of their participation status in the NFIP program. Table 6-5 summarizes the responses provided by each of the currently participating jurisdictions

Participating Jurisdiction	Responses to Questions 1-4	
Santa Cruz County	Q1	The Santa Cruz County Flood Control District manages floodplains for the unincorporated areas of the county and also within the City of Nogales limits using the Santa Cruz County Floodplain and Erosion Hazard Management Ordinance No. 2001-03. Any construction of new or substantially improved development within the Unincorporated County and City of Nogales limits is required to obtain a Flood Hazard Information Sheet from the SCCFCD to check if the new development is within a Special Flood Hazard Area (SFHA). All development within the SFHA is required to apply for and obtain a floodplain use permit.
	Q2	Much of the current FEMA mapping in Santa Cruz County is sufficient and current. The Santa Cruz County Flood Control District has been pro-active to update and correct insufficient or incorrect flood hazard mapping, and also maintains an in-house set of supplemental maps that are used to regulate development in areas currently not delineated on FEMA DFIRMs. As funds permit, the County will continue to update and convert approximate zones to detailed SFHAs.
	Q3	The Santa Cruz County Flood Control District provides assistance to County and City of Nogales residents in several ways: <ul style="list-style-type: none"> • Maintains a library of NFIP related brochures and public documents • Provides information and links on the SCCFCD website • Provide over-the-counter assistance to residents requesting help with determining flood hazard status/classification for properties and structures. • Regular participation in public involvement activities and reports to County Supervisors and City of Nogales Council members.
	Q4	None to report
Nogales	Q1	District dependent community. County manages floodplains within City limits using the County ordinance. The City of Nogales Building Permit Department has in place standard operating procedures (SOP) to request new developers to comply with the Santa Cruz County Floodplain and Erosion Hazard Management Ordinance No. 2001-03. Through the SOP, any construction of new or substantially improved development within the City limits is required to obtain a Flood Hazard Information Sheet from the SCCFCD to check if the new development is within a Flood Hazard Zone to be required a floodplain use permit.
	Q2	As a county dependent community, the determination of mapping accuracy is deferred to the Santa Cruz County Flood Control District.
	Q3	As a county dependent community, all community assistance is deferred to the Santa Cruz County Flood Control District.

Table 6-5: NFIP program assessment for Santa Cruz County and participating jurisdictions		
Participating Jurisdiction	Responses to Questions 1-4	
	Q4	None to report
Patagonia	Q1	Applications are referred to County for verification of floodplain status, then returned to town manager for final approval or denial.
	Q2	Flood plain map is from 2011, there are some current questions about its accuracy. There has been one map revision.
	Q3	Elevation certificates are referred to county for initiation. Referrals too private carriers are regularly made for individuals seeking flood insurance.
	Q4	Flood plain management code needs update. Map review is desired as well.

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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 process for defining the 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 2011 Plan was performed, wherein each jurisdiction reviewed and evaluated their jurisdiction 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 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

The Planning Team and Local Planning Team for each jurisdiction reviewed and assessed the actions and projects listed in Tables 5-5 and 5-6 of their corresponding 2006 Plans. The assessment included evaluating and classifying each of the previously identified A/Ps based on the following criteria:

<i>STATUS</i>		<i>DISPOSITION</i>	
Classification	Explanation Requirement:	Classification	Explanation Requirement:
“No Action”	Reason for no progress	“Keep”	None required
“In Progress”	What progress has been made	“Revise”	Revised components
“Complete”	Date of completion and final cost of project (if applicable)	“Delete”	Reason(s) for exclusion.

Any A/P with a disposition classification of “Keep” or “Revise” was carried forward to become part of the A/P list for the Plan. All A/Ps identified for deletion were removed and are not included in this Plan. The results of the assessment for each of the 2011 Plan A/Ps is summarized by jurisdiction in Tables 6-6-1 through 6-6-3.

Table 6-6-1: Santa Cruz County assessment of previous plan cycle mitigation actions/projects

ID	Description	<ul style="list-style-type: none"> • Lead Agency • Proposed Cost • Proposed Comp Date 	Status	Disposition	Explanation
1	Develop and implement a Flood Control District Records Data Base using a system of record keeping, both electronic and hard copy, that will conform with all Federal and State requirements, with appropriate documents accessible to the GIS and Public.	<ul style="list-style-type: none"> • Santa Cruz County FCD • \$50,000 • FY 2016 	No Action	Keep	No Progress, need input from IT Department.
2	Support efforts by the City of Nogales and the USACE to reconstruct and rehabilitate the covered tunnels dating from 1936 for the purpose of conveying floodwaters from Nogales, Sonora through Nogales, Arizona. Currently the covered tunnels are in a state of serious disrepair and distress.	<ul style="list-style-type: none"> • Santa Cruz County FCD/ City of Nogales • \$200 million • FY 2020 	No Action	Keep	No Progress. Complicated by Infrastructure ownership dispute.
3	Develop a drainage master plan for Santa Cruz County to identify areas of flood problems which require detailed analysis, design and projects to address.	<ul style="list-style-type: none"> • Santa Cruz County FCD • \$600,000 • FY 2017 	No Action	Revise	Potential funding was used for other priorities. Revise to watershed specific plans.
4	Develop a drought mitigation plan for Santa Cruz County as directed by the Governor's Drought Mitigation Task Force.	<ul style="list-style-type: none"> • Office of Emergency Mgmt • \$250,000 • FY 2013 	No Action	Keep	No progress
5	Coordinate among law enforcement and transportation departments to increase enforcement of HAZMAT transportation codes and regulations	<ul style="list-style-type: none"> • LEPC • \$20,000 • FY 2013 	In Progress	Revise	We are currently tracking all spills via a County spill report portal on our website. We have a three-year plan for haz mat training approved by ADEQ with a workshop each quarter. AZDOT attends our LEPC meetings
6	Develop, implement and enforce a watershed/watercourse specific erosion hazard ordinance to protect existing and future critical assets and infrastructure. To include identification and mapping of erosion hazards in Santa Cruz County.	<ul style="list-style-type: none"> • Santa Cruz County FCD • \$300,000 • FY 2016 	No Action	Keep	Potential Funding was used for other priorities
7	Develop and fund a program dedicated to purchasing floodprone lands within Santa Cruz County which are deemed too hazardous for human occupation.	<ul style="list-style-type: none"> • Santa Cruz County FCD • \$20 million • FY 2050 	No Action	Keep	Economic climate has not been right to pursue.

Table 6-6-1: Santa Cruz County assessment of previous plan cycle mitigation actions/projects

ID	Description	Lead Agency Proposed Cost Proposed Comp Date	Status	Disposition	Explanation
8	Develop and implement policies and procedures designed to mitigate and limit increased flooding potential that occur with moderate to severe wildland fires.	<ul style="list-style-type: none"> • Santa Cruz County FCD • \$25,000 • FY 2016 	In Progress	Keep	Standard has been developed but has not been adopted or incorporated into the Ordinance yet.
9	Install additional in-stream, weather, and precipitation gauges in watersheds impacting Santa Cruz County. To include website development and remote access for public agencies.	<ul style="list-style-type: none"> • Santa Cruz County FCD • \$500,000 • On-going 	In Progress	Keep	Two new stations have been installed at the SCR and SR82 and at the SCR and Palo Parado Bridge.
10	Outside contractor/professionals to review existing Santa Cruz County Floodplain and Erosion Hazard Management Ordinance to better address local hazards and needs, and protect existing and future critical assets. Project should not decrease level of protection current ordinance provides.	<ul style="list-style-type: none"> • Santa Cruz County FCD • \$25,000 • FY 2013 	No Action	Delete	No longer considered a priority. Previous Ordinance update unable to proceed.
11	Develop and implement Firewise program throughout the County.	<ul style="list-style-type: none"> • Fire Districts / Emergency Management • \$40,000 • On-going 	No Action	Keep	All available funds under SCC EM Outside Professional Services are projected to be used to upgrade the microwave project for the Santa Cruz County Interoperable Radio Channel. We will try to fund this CWPP in 2018 2019
12	Develop a sheltering plan in the event of power outages	<ul style="list-style-type: none"> • Emergency Management • \$15,000 • FY 2016 	No Progress	Delete	UNS has completed a second tie-in to the power supply for the County and we still have back-up generating capacity from the Nogales Power Plant
13	Review and update building code anchoring and tie-down requirements	<ul style="list-style-type: none"> • Chief Building Official • \$10,000 • FY 2016 	No Progress	Delete	No longer considered a priority.

Table 6-6-2: Nogales assessment of previous plan cycle mitigation actions/projects

ID	Description	<ul style="list-style-type: none"> • Lead Agency • Proposed Cost • Proposed Comp Date 	Status	Disposition	Explanation
1	Work with USACE and IBWC to widen and stabilize the banks of Nogales Wash through improving the tunneled portions and through slope paving or retaining wall sides for the wash.	<ul style="list-style-type: none"> • Engineering Dept • \$100 million • 2012 	No Action	Revise	SCCFCD is lead on this and the City will be a cooperating stakeholder. Still valid – just no money. Extend completion date and keep seeking funding
2	Coordinate with ADOT for the planning and construction of bridges at Grand Avenue/Potrero intersection and other locations to provide emergency access from one side of Nogales Wash to the other in times of flooding. The bridges would also provide access across the railroad.	<ul style="list-style-type: none"> • Engineering Dept • Staff Time • As needed 	In Progress	Keep	Applied for grants several times during the past plan cycle, with no success. Will continue to apply for grants and pursue funding for the projects.
3	Review and update the annex of the City’s emergency response plan that deals with evacuation of the city in the event of a disaster or event that causes a mass influx of people from Mexico. Would also address planning for influx of American residents as a result of outside disaster.	<ul style="list-style-type: none"> • Fire Dept / Fire Prevention Chief Also include Police, Public Works, Engineering Depts. • Staff Time • Annually 	Complete	Delete	Annex E “Evacuation” was updated to reflect the potential of mass influx from Mexico.
4	Review and update the annex of the City’s emergency response plan that deals with neighborhoods and home owners associations within the wildland fire/urban interface including instruction materials.	<ul style="list-style-type: none"> • Fire Department • Staff Time • Annually 	Complete	Delete	The “Major Fire” section of the EOP, pg. 160, list communication methods and instructions to residents in the event of a WUI incident.
5	Complete improvements to the Al Harrison and Ephraim Basins to provide adequate flood capacity and drainage.	<ul style="list-style-type: none"> • Engineering Dept • Staff time & \$10,000 • FY 2012 	In Progress	Revise	Al Harrison basin is completed and only the Ephraim Basins remain. SCCFCD will be the lead on the Ephraim Basin design and construction and City will participate as stakeholder.
6	Review and update the annex of the City’s emergency response plan that deals with contamination of the Santa Cruz River and associated water supply by hazardous materials.	<ul style="list-style-type: none"> • Fire Dept • Staff Time • Annually 	In Progress	Revise (adopt separate plan)	The “Haz-Mat” section of the EOP does not specifically address contamination of the Santa Cruz River. The Draft Nogales Wash EOP currently under review at the city and county does address these needs.

Table 6-6-2: Nogales assessment of previous plan cycle mitigation actions/projects

ID	Description	<ul style="list-style-type: none"> • Lead Agency • Proposed Cost • Proposed Comp Date 	Status	Disposition	Explanation
7	Coordinate among law enforcement and transportation departments to increase enforcement of HAZMAT transportation codes and regulations. Review and update the current annex in the city's emergency response plan.	<ul style="list-style-type: none"> • Fire Dept • Staff Time • Annually 	Complete	Delete	Haz-Mat Transportation compliance is carried out by the FHWA, CBP, DPS and ADOT and code and regulation enforcement coordination for the City is done by the Police Dept.
8	Maintain compliance with NFIP regulations by referring all new or substantially improved development located in the FEMA floodplain to the Santa Cruz County Flood Control District for review and approval. The city also performs review of all grading plans for compliance with drainage standards.	<ul style="list-style-type: none"> • Building Dept, Fire Dept, Engineering Dept • Staff Time • Ongoing-As needed 	Complete	Keep	The Santa Cruz County Flood Control District reviews all projects in the FEMA floodplain.

Table 6-6-3: Patagonia assessment of previous plan cycle mitigation actions/projects

ID	Description	<ul style="list-style-type: none"> • Lead Agency • Proposed Cost • Proposed Comp Date 	Status	Disposition	Explanation
1	Develop a Community Fire Protection Plan for neighborhoods and home owner's associations within the wildland fire/urban interface including instruction materials.	<ul style="list-style-type: none"> • Administration / Town Manager, Fire Department / Chief • Staff Time • 2012 	in progress	revise	ongoing
2	<i>Prepare a plan to identify key personnel and resources, and prioritize operations activities to perform in the event of natural or human caused disasters or emergencies.</i>	<ul style="list-style-type: none"> • Administration / Town Manager • Staff Time • 2012 	in progress	revise	ongoing
3	Coordinate among law enforcement and transportation departments to increase enforcement of HAZMAT transportation codes and regulations on a quarterly basis. Include training for local law enforcement/fire personnel.	<ul style="list-style-type: none"> • Town Marshall • \$5000 • 2012 	no action	keep	none

Table 6-6-3: Patagonia assessment of previous plan cycle mitigation actions/projects

ID	Description	<ul style="list-style-type: none"> • Lead Agency • Proposed Cost • Proposed Comp Date 	Status	Disposition	Explanation
4	Evaluate existing drainage and flooding conditions within the Town and identify flood hazard mitigation needs/projects.	<ul style="list-style-type: none"> • Administration / Town Manager • flood and flow committee • Ongoing 	in progress	revise	Sonoita Creek watershed plan completed, follow-up underway
5	Develop a drought mitigation plan for the Town of Patagonia	<ul style="list-style-type: none"> • Administration / Town Manager • Staff Time • 2012 	complete	delete	adopted in 2016
6	Support part-time road crew to perform roadside wildfire fuel reduction along county roads in the interface.	<ul style="list-style-type: none"> • Public Works / Director, Fire Department / Chief • Ongoing • Ongoing 	in progress	revise	this is a continuing program
7	<i>Purchase equipment to meet international border and associated terrorism related law enforcement needs including; computers, in-car cameras, radios.</i>	<ul style="list-style-type: none"> • Town Marshall • Ongoing • Ongoing 	in progress	revise	have radios and computers, seeking funds for cameras
8	Construct an all-weather bridge or culvert crossing of Tributary A as shown on the Town's FIRM panel, to provide emergency access to northern part of Town, which is located north of Sonoita Creek and Tributary A.	<ul style="list-style-type: none"> • Administration / Town Manager • \$400,000 • Unknown 	no action	keep	no funding
9	Protect existing wells and storage reservoirs and main connection to improve capacity, reliability and redundancy of existing Town water system.	<ul style="list-style-type: none"> • Administration / Town Manager • \$750,000 • 2012 	in progress	revise	wells have been floodproofed
10	Dredge the Sonoita Creek main channel at Fairlawn Manor to improve flood conveyance capacity.	<ul style="list-style-type: none"> • Administration / Town Manager • \$200,000 • Pending on grants 	no action	keep	objection from nature conservancy

Table 6-6-3: Patagonia assessment of previous plan cycle mitigation actions/projects

ID	Description	<ul style="list-style-type: none"> • Lead Agency • Proposed Cost • Proposed Comp Date 	Status	Disposition	Explanation
11	Increase security against sabotage/vandalism at critical town facilities including, but not limited to, water reservoirs, wastewater treatment facility, schools and other public facilities.	<ul style="list-style-type: none"> • Marshal's Office • Ongoing • Ongoing 	in progress	revise	ongoing process
12	Maintain IGA with Santa Cruz County for Enforcement of floodplain management requirements in accordance with the NFIP, including regulating all and substantially improved construction in floodplains to reduce the losses to property and people	<ul style="list-style-type: none"> • Administration / Town Manager • Staff • Ongoing 	in progress	revise	working on CRS

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6.3.2 *New Mitigation Actions / Projects and Implementation Strategy*

Upon completion of the assessment summarized in Section 6.3.1, each jurisdiction’s planning team developed new A/Ps using the goals and objectives, results of the vulnerability analysis and capability assessment, and the planning team’s institutional knowledge of hazard mitigation needs in the community. The A/Ps can be generally classified as either structural or non-structural. Structural A/Ps typify a traditional “bricks and mortar” approach where physical improvements are provided to effect the mitigation goals. Examples may include forest thinning, channels, culverts, bridges, detention basins, dams, emergency structures, and structural augmentations of existing facilities. Non-structural A/Ps deal more with policy, ordinance, regulation and administrative actions or changes, buy-out programs, and legislative actions. For each A/P, the following elements were identified:

- **ID No.** – a unique alpha-numeric identification number for the A/P.
- **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 the A/P.
- **Community Assets Mitigated** – a brief descriptor to qualify the type of assets (existing, new, or both) that the proposed mitigation A/P addresses.
- **Estimated Costs** – concept level cost estimates that may be a dollar amount or estimated as staff time.

Once the full list of A/Ps was completed to the satisfaction of the Local Planning Team, the team then developed the implementation strategy for those A/Ps. The implementation strategy addresses the “*priority, how, when, and by whom?*” questions related to the execution and completion of an identified A/P. Specific elements identified as a part of the implementation strategy included:

- **Priority Ranking** – each A/P was assigned a priority ranking of either “High”, “Medium”, or “Low”. The assignments were subjectively made using a simple 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
- **Planning Mechanism(s) for Implementation** – where applicable, a list of current planning mechanisms or processes under which the A/P will be implemented. Examples could include CIPs, General Plans, Area Drainage Master Plans, etc.
- **Anticipated Completion Date** – a realistic and general timeframe for completing the A/P. Examples may include a specific target date, a timeframe contingent upon other processes, or recurring timeframes.
- **Primary Agency and 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.
- **Funding Source** – the source or sources of anticipated funding for the A/P.

Tables 6-7-1 through 6-7-3 summarize the current mitigation A/P and implementation strategy for each participating Plan jurisdiction. Projects listed in *italics font* are recognized as being more response and recovery oriented, but are considered to be a significant part of the overall hazard management goals of the community.

Table 6-7-1: Mitigation actions and projects and implementation strategy for Santa Cruz County

Mitigation Action/Project					Implementation Strategy				
ID No.	Description	Hazard(s) Mitigated	Community Assets Mitigated (Ex/New)	Estimated Cost	Priority Ranking	Planning Mechanism(s) for Implementation	Anticipated Completion Date	Primary Agency / Job Title Responsible for Implementation	Funding Source(s)
1	Develop and implement a Flood Control District Records Data Base using a system of record keeping, both electronic and hard copy that will conform with all Federal and State requirements, with appropriate documents accessible to the GIS and Public.	Flood, Dam Failure	Both	Staff Time	High	Activity in progress by GIS Staff.	Within the next 5-years	Flood Control District, IT	Flood Control, County General Fund
2	Provide technical support to efforts by the City of Nogales and the USACE to reconstruct and rehabilitate the covered tunnels dating from 1936 for the purpose of conveying floodwaters from Nogales, Sonora through Nogales, Arizona. Currently the covered tunnels are in a state of serious disrepair and distress.	Flood	Both	Staff Time	High		Ongoing	Flood Control District	Flood Control District
3	Develop watershed specific drainage master plans for Santa Cruz County to identify areas of flood problems which require detailed analysis, design and projects to address.	Flood, Dam Failure	Both	\$500,000	Medium		Within the next 5-years	Flood Control District	Flood Control
4	Develop a drought mitigation plan for Santa Cruz County as directed by the Governor's Drought Mitigation Task Force.	Drought	Both	Staff Time	Low	Part of EOP as ESF	2019	Emergency Management	General Fund
5	<i>Continue tracking all HAZMAT spills via a spill report portal on the County's website, implement the current three-year plan for HAZMAT training approved by ADEQ with a workshop each quarter, and coordinate with AZDOT via regular LEPC meetings.</i>	HAZMAT	Both	Staff Time	High	<i>County Website and tracking via Emergency Management. Quarterly LEPC meetings</i>	<i>Annual</i>	<i>Emergency Management</i>	<i>HMPEG Grant for training and staff time for tracking of spills.</i>
6	Develop, implement and enforce a watershed/watercourse specific erosion hazard ordinance to protect existing and future critical assets and infrastructure. To include identification and mapping of erosion hazards in Santa Cruz County.	Flood	Both	\$500,000	Low	Engineering Study/ GIS Staff	Within the next 5-years	Flood Control	Flood Control

Table 6-7-1: Mitigation actions and projects and implementation strategy for Santa Cruz County									
Mitigation Action/Project					Implementation Strategy				
ID No.	Description	Hazard(s) Mitigated	Community Assets Mitigated (Ex/New)	Estimated Cost	Priority Ranking	Planning Mechanism(s) for Implementation	Anticipated Completion Date	Primary Agency / Job Title Responsible for Implementation	Funding Source(s)
7	Develop a program dedicated to purchasing flood prone lands within Santa Cruz County which are deemed too hazardous for human occupation and identify a budget and funding source.	Flood / Dam Failure	Both	Staff Time	High		Within the next 5-years	Santa Cruz County, Flood Control	Flood Control
8	Develop and implement policies and procedures designed to mitigate and limit increased flooding potential that occur with moderate to severe wildland fires.	Flood / Dam Failure	Both	Staff Time	Medium	Wildfire Protection Zone Standard for Flood Control	Within the next 5-years	Flood Control	Flood Control
9	Install additional in-stream, weather, and precipitation gauges in watersheds impacting Santa Cruz County. To include website development and remote access for public agencies.	Flood / Dam Failure	Both	\$12,000 to \$14,000 per location	Medium	District is working on as it can	Within the next 5-years	Flood Control	Flood Control
10	Perform regular vegetation management within rights-of-way areas of county maintained road to minimize ignition potential for roadside fire starts.	Wildfire	Both	\$5,000	Medium	Roadside Maintenance Program	Ongoing annual basis	Public Works / Road Maintenance	General Fund
11	Develop a Community Wildfire Preparedness Plan and provide annual public preparedness briefing in advance of fire season. The preparedness planning will include training fire managers on Simtable and allow loan of the simulator for training other fire and volunteer personnel.	Wildfire	Both	\$30,000	Medium	Community Wildfire Preparedness Plan	August 2018 March 2018	Emergency Management	General Fund under Emergency Management
12	Educate public on wildfire hazards during annual public preparedness briefings in advance of fire season. Contact FEMA and request Firewise brochures for distribution at the meetings	Wildfire	Both	\$500 for brochures and Staff Time	Medium	Community Wildfire Preparedness Plan	March 2018	Emergency Management	General Fund under Emergency Management
13	<i>Re-Write Nogales Wash Emergency Response Plan</i>	<i>Flood HAZMAT Dam Failure</i>	<i>Both</i>	<i>\$10,000</i>	<i>Medium</i>	<i>70% complete with County Staff, outside contract for final draft is in place</i>	<i>March 2018</i>	<i>Emergency Management</i>	<i>EPA Region IX Grant</i>

Table 6-7-1: Mitigation actions and projects and implementation strategy for Santa Cruz County

Mitigation Action/Project					Implementation Strategy				
ID No.	Description	Hazard(s) Mitigated	Community Assets Mitigated (Ex/New)	Estimated Cost	Priority Ranking	Planning Mechanism(s) for Implementation	Anticipated Completion Date	Primary Agency / Job Title Responsible for Implementation	Funding Source(s)
14	Educate public on drought hazards through distribution and explanation of drought brochures during the annual fire season community wildfire preparedness briefings. Also have brochures available for public at Emergency Management office and postings.	Drought	Both	\$200 and Staff Time	Low		March 2018	Emergency Management	Emergency Management General Fund

Table 6-7-2: Mitigation actions and projects and implementation strategy for Nogales

Mitigation Action/Project					Implementation Strategy				
ID No.	Description	Hazard(s) Mitigated	Community Assets Mitigated (Ex/New)	Estimated Cost	Priority Ranking	Planning Mechanism(s) for Implementation	Anticipated Completion Date	Primary Agency / Job Title Responsible for Implementation	Funding Source(s)
1	Coordinate as a stakeholder with SCCFCD, USACE and IBWC in pursuing support and funds to widen and stabilize Nogales Wash through improving/repairing the tunneled portions and through slope paving or retaining wall sides for the wash.	Flood, HAZMAT, Dam Failure	Both	Staff time	High	None	Ongoing as lead by SCCFCD	Engineering Dept/ City Engineer	General Fund
2	Coordinate as a stakeholder community with SCCFCD on the design and construction the Ephraim Basin to reduce flood risk and flood hazards in Ephraim Canyon. The project is currently estimated to cost \$7.1 million.	Flood	Both	Staff time	High	None	Ongoing as lead by SCCFCD	Engineering Dept/ City Engineer	General Fund
3	<i>Work with Santa Cruz County OEM to complete and implement the Nogales Wash EOP that deals with contamination of the Santa Cruz River and associated water supply by hazardous materials and IOI breakage spills.</i>	HAZMAT	Both	Staff time	Medium	Nogales Wash EOP	Within 2-years	Fire Dept/ Fire Chief	General Fund

Table 6-7-2: Mitigation actions and projects and implementation strategy for Nogales

Mitigation Action/Project					Implementation Strategy				
ID No.	Description	Hazard(s) Mitigated	Community Assets Mitigated (Ex/New)	Estimated Cost	Priority Ranking	Planning Mechanism(s) for Implementation	Anticipated Completion Date	Primary Agency / Job Title Responsible for Implementation	Funding Source(s)
4	Maintain compliance with NFIP regulations by referring all new or substantially improved development plans located in the FEMA floodplain to the Santa Cruz County Flood Control District for review and approval. The city also performs review of all grading plans for compliance with drainage standards.	Flood	New	Staff time	High	Floodplain Ordinance	Ongoing – As Needed	Building Safety/ Building Director Engineering Dept/ City Engineer	General Funds
5	Coordinate with ADOT to pursue grants for the planning and construction of bridges at Grand Avenue/Potrero intersection and other locations to provide emergency access from one side of Nogales Wash to the other in times of flooding. The bridges would also provide access across the railroad.	Flood, Dam Failure	Both	Staff time	Medium	None	Annually until successful	Engineering Dept/ City Engineer	General Funds
6	Conduct a search to identify and apply for grant opportunities to establish a repair and replacement program for low income families to install low water use fixtures in all qualifying homes.	Drought	Both	Staff time	Medium	None	Within the next 5-years	Water Dept/ Director	Enterprise Fund
7	Research, develop and implement a drought management plan following guidance provided by the AZ Governor’s Drought Task Force and the Arizona Drought Management Plan.	Drought	Both	Staff time plus \$15,000	High	None	2023	Water Dept/ Director	Enterprise Fund
8	Research and apply for fuels reduction grants to reduce the fuel loads on public lands within the city boundaries and on private lands under partnering agreements.	Wildfire	Both	Staff time	High	Community Wildfire Protection Plan	Within 2-years. Attempts will continue of unsuccessful	Fire Dept/ Fire Chief	General Funds, Grants
9	Conduct a public education campaign to raise awareness of wildfire hazards using printed materials, social media, the City’s website, PSA’s, and attendance at community fairs and events.	Wildfire	Both	Staff Time	High	None	Ongoing - Annual	Fire Dept/ Fire Chief	General Fund

Table 6-7-2: Mitigation actions and projects and implementation strategy for Nogales

Mitigation Action/Project					Implementation Strategy				
ID No.	Description	Hazard(s) Mitigated	Community Assets Mitigated (Ex/New)	Estimated Cost	Priority Ranking	Planning Mechanism(s) for Implementation	Anticipated Completion Date	Primary Agency / Job Title Responsible for Implementation	Funding Source(s)
10	Offer an assessment of wildfire risk during regular fire safety inspections for private residences to assist with identifying potential wildfire risk and to make recommendations for possible mitigation. For commercial inspections, take more active role in enforcing fuel reduction outside of commercial properties as a part of the fire safety inspections.	Wildfire	Both	Staff time	High	IFC 2012 (for commercial enforcement)	Ongoing - Annual	Fire Dept/ Fire Chief	General Fund, License Fees
11	Coordinate with flood management official of Nogales, Sonora, CILA, IBWC, and SCCFDC on dam inundation keeping dam safety and dam failure inundation mapping current for dams located on the Mexico side of the Ambos Nogales area.	Dam Failure	Both	Staff time	Low	None	Ongoing – As Needed	Engineering Dept/ City Engineer	General Fund

Table 6-7-3: Mitigation actions and projects and implementation strategy for Patagonia

Mitigation Action/Project					Implementation Strategy				
ID No.	Description	Hazard(s) Mitigated	Community Assets Mitigated (Ex/New)	Estimated Cost	Priority Ranking	Planning Mechanism(s) for Implementation	Anticipated Completion Date	Primary Agency / Job Title Responsible for Implementation	Funding Source(s)
1	Review and update as necessary, the Community Fire Protection Plan and instructional materials to address changes and growth of neighborhoods and homeowners associations within the wildland fire/urban interface.	Wildfire	Both	Staff Time	High	Fire Coordination	Ongoing	Fire Co.	General Fund
2	<i>Monitor and update as needed the plan identifying key personnel and resources, and prioritizing operational activities to perform in the event of natural or human caused disasters or emergencies.</i>	All	Both	Staff Time	Medium	Previous HMP	Ongoing	Town Manager	General Fund

Mitigation Action/Project					Implementation Strategy				
ID No.	Description	Hazard(s) Mitigated	Community Assets Mitigated (Ex/New)	Estimated Cost	Priority Ranking	Planning Mechanism(s) for Implementation	Anticipated Completion Date	Primary Agency / Job Title Responsible for Implementation	Funding Source(s)
3	Coordinate among law enforcement and transportation departments to increase enforcement of HAZMAT transportation codes and regulations on a quarterly basis. Include training for local law enforcement/fire personnel.	HAZMAT	Both	Staff Time	Medium	Border 2020 Program	Ongoing	Marshal's Office	General Fund
4	Use the results of the Phase I Sonoita Creek Watershed Management Plan to identify specific flood hazard mitigation projects for implementation and potential grant funding.	Flood	Both	Staff Time	High	Flood and Flow Committee	Ongoing	Flood and Flow Committee	Volunteer Time
5	Support part-time road crew to perform roadside wildfire fuel reduction along local roads in the wildland fire urban interface.	Wildfire	Both	Staff Time	High	Dept Of Corrections Notices.	Ongoing	Public Works Dept.	HURF Funding
6	<i>Purchase in-car cameras to meet international border and associated terrorism related law enforcement needs.</i>	<i>All</i>	<i>Both</i>	<i>\$20,000</i>	<i>Medium</i>	<i>Border 2020 Program</i>	<i>2019</i>	<i>Marshal's Office</i>	<i>Grant</i>
7	Construct an all-weather bridge or culvert crossing of Tributary A as shown on the Town's FIRM panel, to provide emergency access to northern part of Town, which is located north of Sonoita Creek and Tributary A.	Flood	Both	\$100,000	Low	General Plan	Within the next 5-years depending on funding	Public Works	Grant In Aid
8	Dredge the main channel of Sonoita Creek at Fairlawn Manor to improve flood conveyance capacity.	Flood	Both	\$100,000	Medium	Flood and Flow Committee	Within the next 5-years depending on funding	Public Works	Grant
9	Increase security against sabotage/vandalism at critical town facilities including, but not limited to, water reservoirs, wastewater treatment facility, schools and other public facilities.	Terrorism, Sabotage, Vandalism	Existing	Staff Time	High	Homeland Security Notices	Ongoing	Marshal's Office	General Fund

Mitigation Action/Project					Implementation Strategy				
ID No.	Description	Hazard(s) Mitigated	Community Assets Mitigated (Ex/New)	Estimated Cost	Priority Ranking	Planning Mechanism(s) for Implementation	Anticipated Completion Date	Primary Agency / Job Title Responsible for Implementation	Funding Source(s)
10	Maintain IGA with Santa Cruz County for enforcement of floodplain management requirements in accordance with the NFIP, including regulating all and substantially improved construction in floodplains to reduce the losses to property and people.	Flood	Both	Staff Time	High	CRS Application	Ongoing	Building Inspector	Permit Fees
11	Conduct a search to identify grant opportunities to establish a repair and replacement program for low income families to install low water use fixtures in all qualifying homes.	Drought	Both	Staff Time	Medium	Watershed Mgmt. Plan	2029	Town Manager	General Fund
12	Monitor water levels in the Town's two municipal wells and the Palmer Drought Severity Index on a monthly basis to inform decision makers on actionable measures in the Town's Drought Plan	Drought	Both	Staff Time	Very High	Done	Ongoing	Water Dept Staff	General Fund

SECTION 7: PLAN MAINTENANCE PROCEDURES

§201.6(c)(4): [The plan shall include...] (4) A **plan maintenance process** that includes:

- (i) A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
- (ii) A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.
- (iii) Discussion on how the community will continue public participation in the plan maintenance process.

§201.6(d)(3): Plans must be reviewed, revised if appropriate, and resubmitted for approval within five years in order to continue to be eligible for HMGP project grant funding.

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**
- Continued Public Participation**

The following sections provide a description of the past plan maintenance procedures and activities, and documents the proposed procedures and schedule for the next planning cycle.

7.1 Monitoring and Evaluation

7.1.1 Past Plan Cycle

Santa Cruz County, Nogales and Patagonia recognize that this hazard mitigation plan is intended to be a “living” document with regularly scheduled monitoring, evaluation, and updating. Section 7.1 of the 2011 Plan outlined a schedule of specific activities for annual evaluations of the 2011 Plan. A poll of the Planning Team regarding the past execution of the plan maintenance strategy was taken and the following tasks were accomplished:

- The 2011 Plan was reviewed twice during the period.
- The 2011 Plan has been reviewed by county agencies when considering applications for mitigation grants.

The Planning Team discussed ways to improve on the Plan review and maintenance process over the next five years. The results of those discussions are outlined in the following sections.

7.1.2 Proposed Schedule and Scope

Having a multi-jurisdictional plan can aid in the plan monitoring and evaluation through the consolidation of information for all participating jurisdictions into one document. The Planning Team reviewed the current DMA 2000 rules and October 2011 FEMA guidance document and discussed a strategy for performing the required monitoring and evaluation of the Plan over the next 5-year cycle. The Planning Team has established the following monitoring and evaluation procedures:

- **Schedule** – The Plan shall be reviewed on at least an annual basis as an agenda item on a Local Emergency Planning Committee (LEPC) and/or the Planning Team meeting. The LEPC includes representation from Santa Cruz County, Nogales and Patagonia. In addition, the Santa Cruz County Office of Emergency Management will take the lead to send out an email to each jurisdiction via the jurisdiction’s PPOC on or around the date of Plan adoption, requesting a review of the Plan.

- **Review Content** – Within the email request distributed by the Santa Cruz County Office of Emergency Management, each of the jurisdictions will be asked to provide responses to 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:** *For each mitigation action/project summarized in Section 6.3.2:*
 - *Has there been activity on the project – Yes or No?*
 - *If Yes, briefly describe what has been done and the current status of the action/project.*
- **Documentation** – Each jurisdiction will review and evaluate the Plan as it relates to their community and document responses to the above questions in the form of an email. Responsibility for this review and response will lie with the JPOC, or his/her appointed representative, for each jurisdiction. The Santa Cruz County Office of Emergency Management will archive email responses by printing and filing with the Plan for incorporation during the next Plan update. Any hard copies will be 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 updates will adhere to that set schedule using the following procedure:

- ✓ One year prior to the plan expiration date, the County EM Director will reconvene the Planning Team to review and assess the materials accumulated in Appendix E.
- ✓ The Planning Team will update and/or revise the appropriate or affected portions of the plan and produce a revised plan document.
- ✓ The revised plan will be submitted to DEMA and FEMA for review, comment and approval.
- ✓ The revised plan document will be presented before the respective councils and boards for an official concurrence/adoption of the changes.

7.3 Continued Public Involvement

The Planning Team reviewed Section 7.4, and particularly Table 7-1, of the 2011 Plan and discussed the challenges and successes regarding the identified continued public involvement strategy. All of the participating jurisdictions were successful to varying degrees, in their efforts to elevate hazard mitigation awareness in the general public and community on an ongoing basis. Santa Cruz County, Nogales and Patagonia remain committed to keeping the public informed about the hazards that impact their jurisdictions and mitigation planning efforts, actions and projects. Table 7-1 summarizes successful public involvement efforts previously conducted by the participating jurisdictions, and proposed activities for public involvement and dissemination of information that shall be pursued whenever possible and appropriate.

Jurisdiction	Public Involvement Activity or Opportunity	
	PAST	PROPOSED
Santa Cruz County	<ul style="list-style-type: none"> • Flood safety and mitigation outreach by the Santa Cruz County Flood Control District included: <ul style="list-style-type: none"> ○ Page in the phone book community pages. ○ Website ○ Booth at the County Fair (every year for the past 10 years) ○ 28+ public meetings regarding the new floodplain maps ○ Meetings at the request of various organizations and clubs (Lions Club, Rotary Club, Tubac Valley Country Club HOA, Residents of Rio Rio, etc) ○ Presentation at schools (San Cayetano Elementary Career Day, Desert Shadows Middle School 6th grade science classes) ○ Yearly mailings of services provided, information and forms to lenders, real estate agents, insurance agents, and contractors in Santa Cruz County. ○ Articles in the local newspaper. ○ Interviews with the local Fox TV station out of Tucson on Floodplain Mapping project. • Fire Prevention Presentations by various Fire Districts • Participated in the Public Safety Day held annually in Rio Rico on the first week of October 	<ul style="list-style-type: none"> • Flood safety and mitigation outreach by the Santa Cruz County Flood Control District to include: <ul style="list-style-type: none"> ○ Page in the phone book community pages. ○ Website ○ Booth at the County Fair ○ Public meetings held for the purpose of disseminating floodplain information to residents, various organizations and clubs, and schools ○ Yearly mailings of services provided, information and forms to lenders, real estate agents, insurance agents, and contractors in Santa Cruz County. ○ Use of local media outlets. • Fire Prevention Presentations by various Fire Districts throughout the year. • Continue participation in the Public Safety Day held annually in Rio Rico on the first week of October • Provide a copy of the monitoring and evaluation memorandum (see Section 7.1) to the County Board of Supervisors for their information.
Nogales	<ul style="list-style-type: none"> • Conducted annual “Day of the Children” presentations during the March-April timeframe. 	<ul style="list-style-type: none"> • Continue to make annual “Day of the Children” presentations during the March-April timeframe. • Provide a copy of the monitoring and evaluation memorandum (see Section 7.1) to the Town Council for their information.
Patagonia	<ul style="list-style-type: none"> • Presentation of Firewise program by the Patagonia Fire Department, at the Patagonia Fall Festival held annually the 2nd week of October. 	<ul style="list-style-type: none"> • Continue to present Firewise program by the Patagonia Fire Department, at the Patagonia Fall Festival held annually the 2nd week of October. • Provide a copy of the monitoring and evaluation memorandum (see Section 7.1) to the Town Council for their information.

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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
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
FCDMC	Flood Control District of Santa Cruz County
FEMA	Federal Emergency Management Agency
FMA	Flood Mitigation Assistance Grant Program
GIS	Geographic Information System
HAZMAT	Hazardous Material
HAZUS-99	Hazards United States 1999
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
NWCG	National Wildfire Coordination Group
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
SRP	Salt River Project
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

8.2 Definitions

The following terms and definitions are provided for reference and are taken from the 2010 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 an 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 freezing 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.

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 speed 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.

Appendix A

Official Resolution of Adoption

Appendix B

Planning Process Documentation

SANTA CRUZ COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN - 2017 UPDATE



DATE: June 1, 2017
TO: Interested Agencies and Organizations Within or Near Santa Cruz County
FROM: The Santa Cruz County Multi-Jurisdictional Planning Team
RE: Invitation of Participation

In 2011-2012, Santa Cruz County, the City of Nogales, and the Town of Patagonia conducted a year-long, multi-hazard mitigation planning effort that resulted in the update of the then current 2006 multi-jurisdictional hazard mitigation plan. The updated plan (2011 Plan) was prepared in compliance with federal regulations set forth by the Disaster Mitigation Act of 2000 (DMA2K), which requires local, county, tribal and state governments to develop a multi-hazard mitigation plan for their respective jurisdiction in order to be eligible to receive certain hazard mitigation and public assistance funds. The 2011 Plan was submitted to the Federal Emergency Management Agency (FEMA) and approved in June 2012. The 2011 Plan is set to expire in June 2017.

Santa Cruz County and the incorporated communities of Nogales and Patagonia have organized a planning team and have begun an effort to review and update the 2011 Plan. Each participating jurisdiction is a stakeholder in the Plan and the updated document will ultimately be resubmitted to the Arizona Department of Emergency and Military Affairs (DEMA) and FEMA for review and approval. Once an "Approved Pending Adoption" notice is received from FEMA, the Plan will then be formally adopted by each jurisdiction to complete the approval process.

The goal of this mitigation planning effort is to reduce or eliminate long-term risk to life and property from natural hazard events. Mitigation is not how we respond to natural disasters like floods and wildfires, but rather how we as a community can lessen or prevent the impact of such things in the first place. The mitigation planning process involves identifying and profiling the natural hazards most likely to occur in a community, assessing vulnerability to these hazards, and establishing goals, actions, and projects that mitigate the associated risks. The development of this mitigation plan will also ensure continued eligibility on the part of the county and communities for non-emergency, federal hazard mitigation grants.

As a prominent organization in Santa Cruz County, you are invited to attend the upcoming planning team meetings as a representative of the community at large. Public input on the mitigation planning process is important. Residents and community stakeholders are encouraged to educate themselves about the existing plan and offer comments on the update. The planning team anticipates having a plan draft in late 2017, at which time the public will be provided the opportunity to review the plan and comment.

If you are interested in attending the planning team meetings as a participant or just as an observer, please contact the following:

Ray Sayre - Director of Emergency Management
Santa Cruz County Office of Emergency Management
Email: rsayre@santacruzcountyaz.gov
Phone: 520-375-8000

LEPC DISTRIBUTION LIST
FEBRUARY 2017

Agosttini	Joe		Customs	NEW 2015/2016
AlaTorre	Luis		El Herald newspaper	
Amezaga	Adam		RRFD	NAME CHANGE
ARCADIS US, INC			ARCADIS	
Arias	Carlos		Proteccion Civil/Estado	NEW 2017
Arriola	Jose		SCC Health Dept	
Ashcraft Chief	John		PFD	
Bear	Courtney		Pima OEM	
Beltran	Miguel			
Bender	Cheryl		Red Cross	
Bermudez	Roy		NPD	
Beyerle	William		NFD	
Blake	Scott		ASU Student	
Bodey	John		SEFD	
Bohler	Chris		Carondelet Hospital	
Bracker	Bruce Supervisor		BOS	
Bravo-Clouzet	Raquel		ADHS	
Brennan	Rich		Facility	
Brown	Steve		F.L. Whipple Observatory	
Bruhn	Anthony		DPS	
Brunkow	Matthew		Century Link	
Caid Chief	Les		RRFD	
Calderon	Susan		Facility	
Canizales	Eduardo		Bomberos Nogales, Sonora	
Canizales	Eduardo		Bomberos Nogales, Sonora	
Carstensen	Joshua		TFD	
Casal	Mariana		ADHS - OBH	
Castillo	Gerardo		SCC Sheriff	
Castro	Gerry		NFD	
Ceballos	Juan		NFD	
Chaboya	Louie		TFD	
Chaboya	Louie		TFD	
Chavez	Marcela		United Way	
Clarke	Steve		Unisource	

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Coleman	Jim		PFD
Colunga Capt	Rudy		NFD
Conger	Patrice		TFD
Coppola	Manuel		Nogales International
Correa	Javier		DHS
Coss	Victor		SCC Sheriff
Criswell	Steve		Facility/Smithsonian
Cupp	Joey		Pilot Travel Centers
David	Suzanne		SEABHS
Davis	Ron Deputy		Patagonia Marshall
De La Ossa	Javier		SCC Sheriff
Deisner	Patrick		Facility
Dent	Nicolette		ADHS
DeWolf Chief	Joseph		SEFD
Diaz	Sergio		Nogales Sonora Bomberos
DoPadre	Joe		ADOT
Doyle Mayor	John		City of Nogales
Drozd	Kenneth		NOAA
Eckhoff-Meade	Linda		Carondelet Hospital
Enciso	Mark		DPS
Eriksen	Sandra		SCCOEM
Eriksen	Sandra		SCCOEM
Erly	Sreven		ADHS
Escobar	Gilbert		NFD
Espinoza	Sandra		Pima OEM
Estrada Sheriff	Tony		SCC Sheriff
Figueroa	Agustin		Cemex
Fillian	Robert		Amerigas
Flores	Al		RRFD
Fragoso	Issac C.		DPS
Fuentes	Ramon Alberto		El Heraldo Newspaper
Fuentes	Ruben		SCC Sheriff
Gallardo	Roy		Facility
Gamma	Carmyn		Heritage Propane

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Garay	Victor		Bomberos Nogales, Sonora
Garlant	Martin		
Gastelum	Connie		Seago
Gomez	Jesus		NFD
Godshall	Katherine		CBP
Gonzalez	Ciro		
Granados	Frank		TFD
Greer	Monetter		Facility
Grimm	Ryan		USBP
Guerrero	Ben		TFD
Guevara	Roberto		UNISOURCE
Guy	Damian		Union Pacific
Guzman	Alex		AZDOT
Hardwick	Ruth		RRFD
Harris	Teresa		Carondelet Hospital
Hayes	Bradley		Border Patrol/Sonoita
Heredia	Rudy		City of Nogales Public Works
Hernandez	Veronica		NPD
Hernandez	Manuel		Nogales Sonora Bomberos
Higuera	Julie		SCC Health Dept
Hughes	Scott		Facility
Ibarra	Cosme		DPS
Isakson Mayor	Ike		PFD
Jacobs	Shelly		SCC Health Dept
Jimenez	Brian		DPS
Jimenez	Carlos		NPD
Jimenez	Roy		NPD
Jones	Mark		RRFD
Keeley Chief	Kevin		TFD
Kincade	Mark		Cemex
Kissinger	John		City of Nogales
Knapheide	Debra		Carondelet Hospital
Lammers	Caroline		AT&T
Larkins	Christopher		

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Light	John		IBWC
Lindsey	Mike		TFD
Lopez	Sam		Facility
Lopez	Leo		NFD
Lopez	Mauricio		TFD
Lopez	Mauricio		TFD
Lunderville	Melisa		SCC Valley USD #35
Luzania	Rosa		SCC Health Dept
Lynn	Judy		AZDEMA
Maldonado	Jerry		SCC Sheriff
Maldonado	Ricardo		SCC Health Dept
Marquez	John		SCC Sheriff
Martinez	Bennie		TFD
Martinez	Gabriel		Mariposa CHC
Massie	Carol		UPS
Matas	Randall		ADEQ
McClendon	Jeanette		Home Depot
McKearney	Mike Chief		NFD
McNichols	Kevin		AZ DPS
Mendoza	Pedro		TFD
Mendoza	Pedro		TFD
Miller	Darrell		TFD
Molera Supervisor	Rudy		SCCBOS
Mondragon Sgt.	Diana		DPS
Monteverde	Alvaro		ADOT
Mora	Dara		Liberty Water Utilities
Morales	Roberto		SCC Sheriff
Nirschel	Chris		Cal Portland
Nogales Sonora	Bomberos		
Noriega	Rene		Private
Nunn	Ronald		Border Patrol
Ortega	Shirley		Holy Cross Hospital
Freeman	Joshua		Facility
Pacheco	Juventino		Border Patrol

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Parada	Cesar		City of Nogales
Parra Chief	Carlos		NSFD
Parra Chief	Carlos		NSFD
Padilla	Billy		Cal Portland
Parra	Chucky		NSFD
Pascal	Fortin		Smithsonian
Patterson	Mark		Border Patrol
Patterson Marshal	Joe		Patagonia Marshall
Patterson Marshal	Joe		Patagonia Marshall
Patton	Joe		Red Cross
Peña	Oscar		SCC Sheriff
Pereira Dr.	Eladio		Mariposa CHC
Perry	Michael		AT&T Red Mountain
Portillo	Manuel		News/Newspaper & Radio
Prentice	Kathe		SEFD
Protección Civil	Nogales		Protección Civil
Pullis	Jay		CBP/DHS
Ragsdale	Lynn		AT&T
Randolph	Gail		Mariposa CHC
Reyes	Pedro		NSFD
Rivera	Genaro		TFD
Rivera	Genaro		TFD
Rivera	Carlos		SCC
Robbins	Peter		Private
Rodriguez	Raoul		SCC Sheriff
Rodriguez	Aida		SCC Sheriff
Romero	Adriana		BORDER ECO/RED CROSS
Rosas	Oscar		AZDOT
Ruiz Supervisor	Manuel		SCCBOS
Sanchez	Dina		Carondelet Hospital
Sanchez Chief	William		NFD
Sanz	Vicente		Proteccion Civil/Nogales
Sayre	Ray		OEM Director
Sayre	Ray		OEM Director

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Seaney	James		Carondelet Hospital
Seguin	Robin		Facility
Serino	Charlie		DPS
Sheeley	John		TFD
Sicurello	Ed		Mariposa CHC
Sink	Laura		SEFD
Smigaj	Gary		Heritage Propane
Snide	Heather S		CBP
Soria	Jose		DHS
South	Mark		TFD
Sparling	Martha		City of Nogales
Stoklos	Gregory		TFD
Summerfield	Laura		TFD
Thompson	Robert		NPD
Tiffin	Lawrence		Tiffin Aviation
Troy	Totty		US Border Patrol
U.S. Consul			Consul
Van Boerum Chief	Scott		Arivaca Fire District
Vejar	Emmanuel		CBP
Velasco	Mireya		County Attorney
Velasco	Mireya		CERT/Red Cross
Velasquez	Alfredo		SCC School Supt.
Waldron	Larry		TEP
White	Alan		DHS
Woodhouse	Murphy		Nogales International

Appendix C

Public Involvement Records

The following was provided as a press release that was distributed to the Nogales International newspaper on July 7, 2017.

Public Input Invited

Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan Update Begins

Hazard mitigation planning is the process used to identify risks and vulnerabilities associated with natural disasters and to develop long-term strategies for protecting people and property in future hazard events. The process results in a mitigation plan that offers a strategy for breaking the cycle of disaster damage, reconstruction, and repeated damage and a framework for developing feasible and cost-effective mitigation projects. Under the Disaster Mitigation Act of 2000 (Public Law 106-390), local and tribal governments are required to develop and maintain a FEMA approved hazard mitigation plan as a condition of eligibility for receiving certain non-emergency federal hazard mitigation grants.

A multi-jurisdictional planning team comprised of representatives from Santa Cruz County, the City of Nogales, the Town of Patagonia, and local fire districts, will be meeting regularly to review, revise and update the current hazard mitigation plan, with specific attention to:

- Natural hazards that may impact or have impacted the community
- Profiles of the most relevant hazards
- Vulnerability assessment to the identified hazards
- Goals and objectives for hazard risk reduction/elimination
- Mitigation actions/projects to achieve the stated goals and objectives
- Plan maintenance strategy for the next 5-year cycle

An updated draft of the plan is expected in October 2017. For additional information, please visit <http://santacruzcountyaz.gov/229/Office-of-Emergency-Management> or contact:

Ray Sayre
Santa Cruz County Office of Emergency Management
(520) 375-8000
rsayre@santacruzcountyaz.gov

SANTA CRUZ COUNTY

Birthplace of Arizona's History

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Popular Links

- Community Emergency Response Team
- Local Emergency Planning Committee
- Haz Mat Spill Reporting
- LEPC Plan
- Santa Cruz County Alerts
- 2011 Multi-Jurisdictional Hazard Mitigation Plan
- Hazard Mitigation Plan Questionnaire



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Home > Government > Departments > Office of Emergency Management

Office of Emergency Management

Alerts

● There are no alerts at this time.

Community Emergency Response Team

Get information regarding the Emergency Management Office of Santa Cruz.

Local Emergency Planning Committee

The Santa Cruz County LEPC is a committee which serves the population that works, lives and visits in Santa Cruz County, Arizona.

Haz Mat Spill Reporting

Haz Mat Spill Reporting

LEPC Plan

Current LEPC Hazardous Materials Emergency Response and Recovery Plan for website

Santa Cruz County Alerts

The Santa Cruz County Alerts is a centralized alerting system. Existing landlines are automatically included in the system. However, mobile devices are not included and require opt-in from the owner. This system allows the public to sign up to receive alerts on their mobile device such as: weather alerts, emergencies (such as hazardous material spills, major road closures, power outages, etc), Air Quality advisories, Boil Water advisories.

2011 Multi-Jurisdictional Hazard Mitigation Plan

Hazard Mitigation Plan Questionnaire

Hazard Mitigation Plan Questionnaire

Contact Us

Ray Sayre
Director of Emergency Management

2150 N. Congress Drive
Suite 110
Nogales, AZ 85621

Ph: 520-375-8000
Fx: 520-375-8001

[Staff Directory](#)

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- Ordinances
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- City Of Nogales Sales Tax Code
- Finance Payment Processing Notice
- PVB Public Notice and Application
- 2017 Holiday Residential Waste Collection Schedule
- Santa Cruz County Emergency Management**

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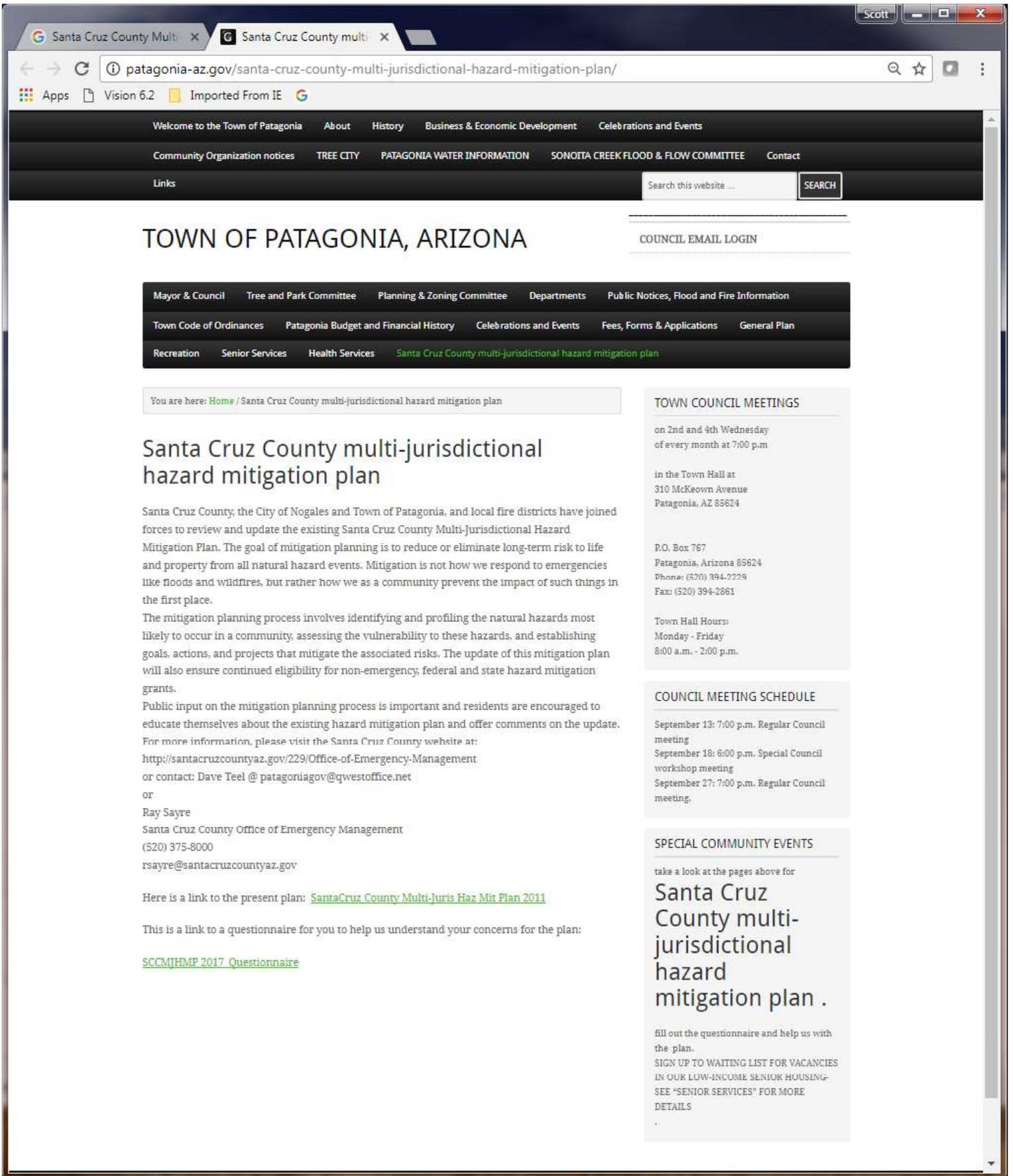
Border Wait Times

City of Nogales, Arizona
777 N. Grand Avenue
Nogales, AZ 85621
(520)287-6571

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TOWN OF PATAGONIA, ARIZONA

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- Mayor & Council
- Tree and Park Committee
- Planning & Zoning Committee
- Departments
- Public Notices, Flood and Fire Information
- Town Code of Ordinances
- Patagonia Budget and Financial History
- Celebrations and Events
- Fees, Forms & Applications
- General Plan
- Recreation
- Senior Services
- Health Services
- [Santa Cruz County multi-jurisdictional hazard mitigation plan](#)

You are here: [Home](#) / Santa Cruz County multi-jurisdictional hazard mitigation plan

Santa Cruz County multi-jurisdictional hazard mitigation plan

Santa Cruz County, the City of Nogales and Town of Patagonia, and local fire districts have joined forces to review and update the existing Santa Cruz County Multi-Jurisdictional Hazard Mitigation Plan. The goal of mitigation planning is to reduce or eliminate long-term risk to life and property from all natural hazard events. Mitigation is not how we respond to emergencies like floods and wildfires, but rather how we as a community prevent the impact of such things in the first place.

The mitigation planning process involves identifying and profiling the natural hazards most likely to occur in a community, assessing the vulnerability to these hazards, and establishing goals, actions, and projects that mitigate the associated risks. The update of this mitigation plan will also ensure continued eligibility for non-emergency, federal and state hazard mitigation grants.

Public input on the mitigation planning process is important and residents are encouraged to educate themselves about the existing hazard mitigation plan and offer comments on the update.

For more information, please visit the Santa Cruz County website at: <http://santacruzcountyaz.gov/229/Office-of-Emergency-Management> or contact: Dave Teel @ patagoniagov@qwestoffice.net

or

Ray Sayre
Santa Cruz County Office of Emergency Management
(520) 375-8000
rsayre@santacruzcountyaz.gov

Here is a link to the present plan: [SantaCruz County Multi-Juris Haz Mit Plan 2011](#)

This is a link to a questionnaire for you to help us understand your concerns for the plan:

[SCCMJHMP 2017 Questionnaire](#)

TOWN COUNCIL MEETINGS

on 2nd and 4th Wednesday
of every month at 7:00 p.m.

in the Town Hall at
310 McKeown Avenue
Patagonia, AZ 85624

P.O. Box 767
Patagonia, Arizona 85624
Phone: (520) 394-2229
Fax: (520) 394-2861

Town Hall Hours:
Monday - Friday
8:00 a.m. - 2:00 p.m.

COUNCIL MEETING SCHEDULE

September 13: 7:00 p.m. Regular Council meeting
September 18: 6:00 p.m. Special Council workshop meeting
September 27: 7:00 p.m. Regular Council meeting.

SPECIAL COMMUNITY EVENTS

take a look at the pages above for

Santa Cruz County multi-jurisdictional hazard mitigation plan .

fill out the questionnaire and help us with the plan.

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Santa Cruz County Hazard Mitigation Questionnaire

1) Which of the following types of natural disasters have you or someone in your household experienced in the past 20 years within Santa Cruz County? (Please check all that apply)

<input type="checkbox"/> Dam/ Levee Failure	<input type="checkbox"/> Hazardous Materials Incidents
<input type="checkbox"/> Drought	<input type="checkbox"/> Severe Winds (tornado, thunderstorm winds, dust storms, etc.)
<input type="checkbox"/> Extreme Temperatures (Heat and / or Cold)	<input type="checkbox"/> Wildfire
<input type="checkbox"/> Flood / Flash Flood	<input type="checkbox"/> Other (Please specify)

2) Please select a level that represents your opinion of the likelihood that Dam / Levee Failure will cause damage to buildings and property, or harm to residents in your community. *

<input type="radio"/> Very High	<input type="radio"/> Low
<input type="radio"/> High	<input type="radio"/> Very Low
<input type="radio"/> Medium	

3) Please select a level that represents your opinion of the likelihood that Drought will cause damage to buildings and property, or harm to residents in your community. *

<input type="radio"/> Very High	<input type="radio"/> Low
<input type="radio"/> High	<input type="radio"/> Very Low
<input type="radio"/> Medium	

4) Please select a level that represents your opinion of the likelihood that Extreme Temperatures (Heat and / or Cold) will cause damage to buildings and property, or harm to residents in your community. *

<input type="radio"/> Very High	<input type="radio"/> Low
<input type="radio"/> High	<input type="radio"/> Very Low
<input type="radio"/> Medium	

5) Please select a level that represents your opinion of the likelihood that Flood / Flash Flood will cause damage to buildings and property, or harm to residents in your community. *

<input type="radio"/> Very High	<input type="radio"/> Low
<input type="radio"/> High	<input type="radio"/> Very Low
<input type="radio"/> Medium	

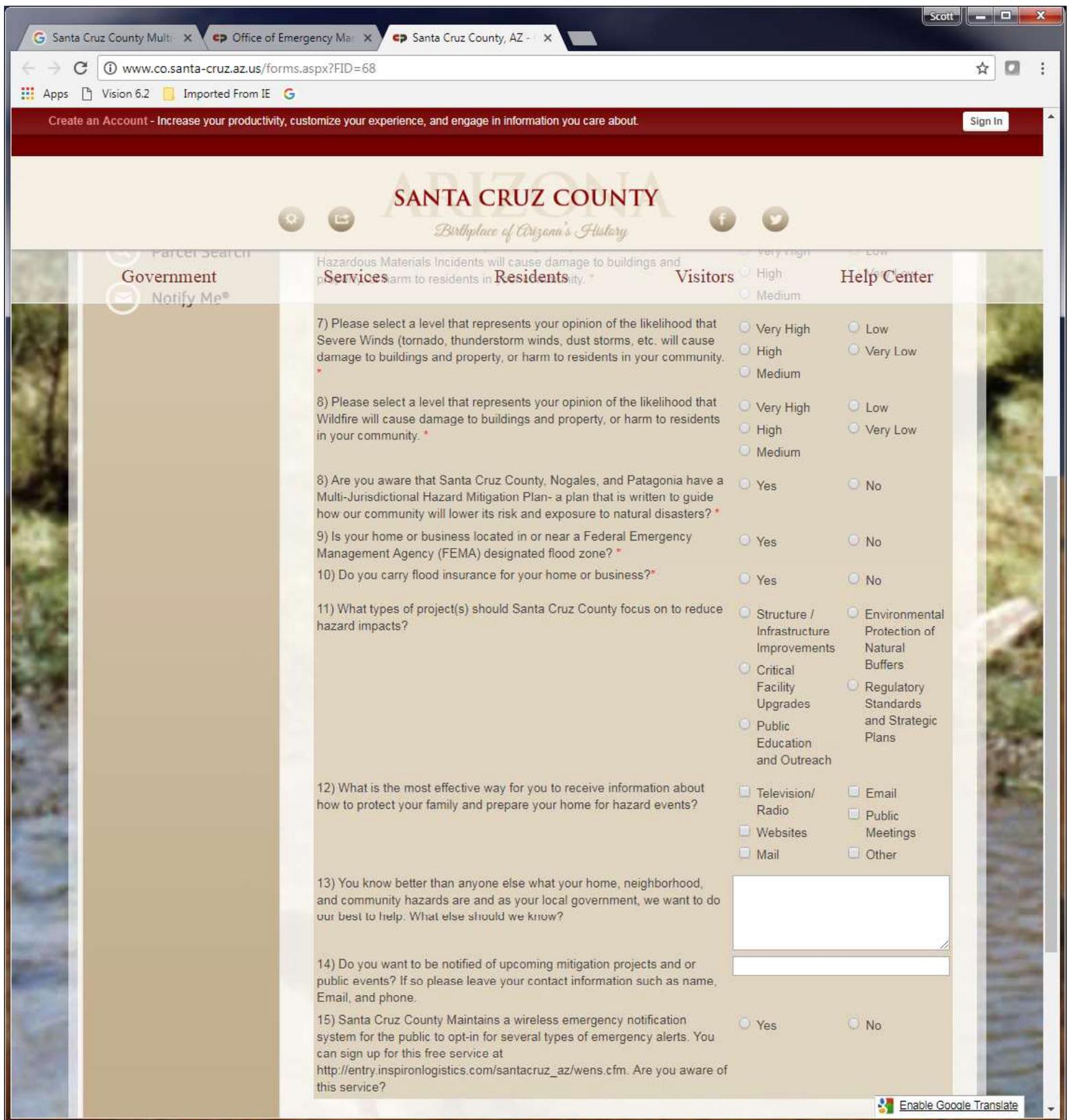
6) Please select a level that represents your opinion of the likelihood that Hazardous Materials Incidents will cause damage to buildings and property, or harm to residents in your community. *

<input type="radio"/> Very High	<input type="radio"/> Low
<input type="radio"/> High	<input type="radio"/> Very Low
<input type="radio"/> Medium	

7) Please select a level that represents your opinion of the likelihood that Severe Winds (tornado, thunderstorm winds, dust storms, etc.) will cause damage to buildings and property, or harm to residents in your community.

<input type="radio"/> Very High	<input type="radio"/> Low
<input type="radio"/> High	<input type="radio"/> Very Low
<input type="radio"/> Medium	

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COPIES OF QUESTIONNAIRES RECEIVED ARE MAINTAINED IN A FILE AT THE SANTA CRUZ COUNTY OFFICE OF EMERGENCY MANAGEMENT. PLEASE CONTACT THE SCC EMERGENCY MANAGER TO REQUEST A TIME TO REVIEW THE QUESTIONNAIRES IF SO DESIRED.

Appendix D

Detailed Historic Hazard Records

**State and Federally Declared Events That Included Santa Cruz County
April 1973 to August 2016**

Hazard	No. of Declarations	Recorded Losses		
		Fatalities	Injuries	Damage Costs (\$)
Drought	8	0	0	\$300,413,404
Dam Failure	0	0	0	\$0
Earthquake	0	0	0	\$0
Extreme Heat	0	0	0	\$0
Fissure	0	0	0	\$0
Flooding / Flash Flooding	15	39	1087	\$1,291,955,000
Landslide / Mudslide	0	0	0	\$0
Levee Failure	0	0	0	\$0
Severe Wind	0	0	0	\$0
Subsidence	0	0	0	\$0
Wildfire	18	0	0	\$0
Winter Storm	0	0	0	\$0

Notes:
- Damage Costs are reported as is and no attempt has been made to adjust costs to current dollar values. Sources: DEMA, FEMA, USDA, NCDC, NWS,

State of Arizona Declaration			Federal Presidential Declaration					
Date	Hazard	State PCA No.	Expenditures	Date	ID	Expenditures	Counties Affected	Description
4/28/1973	Wildfire		\$36,718				Statewide	
1/7/1974	Service Interruption		\$199,028				Statewide	Energy Shortage
4/22/1975	Wildfire		\$8,923				Statewide	
9/2/1977	Infestation						Statewide	Cotton Crop Pesticide Application
10/9/1977	Tropical Storm / Hurricane		\$298,422	11/04/77	540-DR		Pima, Pinal, Santa Cruz	DR-540: Tropical Storm Heather caused four days of heavy rains and severe flooding in the Santa Cruz and San Pedro Rivers. The greatest destruction was along the Santa Cruz between Nogales and Marana, where peak discharge occurred. Four-day rainfall amounts ranged from 4 to 14 inches, exceeding average annual precipitation amounts in some places. 700 people were evacuated from their homes, and severe damage occurred to crops, livestock, water supplies, and property. Property damage in Pima, Pinal, and Santa Cruz Counties was an estimated \$15.2 million
3/2/1978	Flooding		\$485,718	03/04/78	550-DR	\$67,122,627	Statewide	Warm temperatures accompanied by heavy rain filled reservoirs behind all of the dams on the Salt and Verde Rivers and forced large volumes of runoff to be released. This was the largest flow of water down the Salt since 1891. The released water overflowed the channel and flooded residential areas and farmlands. During the same period storm fronts passing over the state caused flash flooding and destruction. 9.53 inches of rainfall occurred on Mt Lemmon. Overflows of the Gila River flooded Duncan and 1000-2000 acres of farmland in Safford Valley. The Rillito Creek, Pantano and Tanque Verde Creeks in Tucson were near bankfull. Total damage was approximately \$65.9 million, of which \$37 million was attributed to Maricopa County alone. Thousands of homes were damaged and 116 homes were destroyed. More than 7,000 people had to be sheltered and four people lost their lives. For Maricopa County - the storm centered over the mountains north and east of Phoenix, 35 miles north at Rock Springs. Extrapolation of intensity-probability data: 5.73 in/ 24 hr. equates to a 400 yr. storm. Main source of flooding due to Verde River with runoff volume exceeding reservoir storage capacity above Bartlett Dam. Flooding also occurred along irrigation canals on north side of metro area, and along tributaries of the Gila River and Queen Creek. 1 death-countywide. Total damage costs: \$37 million: \$3.1 million-residential, \$16 million-public, \$4 million-agriculture, \$7.8 million-industrial, \$0.75 million-commercial. "Flood Damage Report, 28 February-6 March 1978 on the storm and floods in Maricopa County, Arizona", U.S. Army Corps of Engineers, Los Angeles District, FCDMC Library #802.024.
4/21/1978	Wildfire		\$11,528				Statewide	
11/30/1978	Prison Problem		\$425				Statewide	Prison Break
12/16/1978	Flooding		\$1,909,498	12/21/78	570-DR	\$113,561,122	Statewide	Following the spring flooding, Arizona was hit hard again in December 16th-20th. Total precipitation ranged from less than 1 inch in the northeastern and far southwestern portions of Arizona to nearly 10 inches in the Mazatzal Mountains northeast of Phoenix. A large area of the central mountains received over 5 inches. The main stems of the Gila, Salt, Verde, Agua Fria, Bill Williams, and Little Colorado Rivers, as well as a number of major tributaries, experienced especially large discharges. The flooding areas with the most significant damages included the Little Hollywood District near Safford and major portions of Duncan, Clifton, Winslow, and Williams. Damages were estimated at \$39,850,000. 10 people die and thousands are left homeless. Severe damage to roads and bridges. For Maricopa County, 4 deaths, \$16.3 million-public and \$5 million-agriculture losses estimated. ["Flood Damage Report, Phoenix Metropolitan Area, December 1978 Flood", November 1979, U.S. Army Corps of Engineers, FCDMC Library #802.027]
4/16/1979	Wildfire		\$204,207				Statewide	
6/2/1980	Wildfire		\$298,845				Statewide	
6/16/1980	Wildfire						Statewide	AZ Executive Order 81-5: [Terminating the Declaration of a State of Emergency of June 16, 1980 (caused by a severe forest and grassland fire contingency) and returning all unexpended funds authorized by A.R.S. § 35-192 to the General Fund.
8/21/1980	Flooding	29454	\$102,319				Santa Cruz	Very heavy rains in the area and upstream on the Santa Cruz River in Mexico caused considerable flood damage to mobile homes, houses, commercial buildings and streets in Santa Cruz County
6/26/1981	Wildfire						Statewide	Fire suppression assistance
6/30/1981	Wildfire		\$256,904				Statewide	
6/30/1982	Wildfire		\$492,635				Statewide	
3/6/1983	Flooding		\$104,335				Santa Cruz	
9/28/1983	Tropical Storm / Hurricane		\$863,283	10/05/83		\$13,446,148	Mohave, Apache, Yavapai, Gila, Graham, Greenlee, Pinal, Pima, Santa Cruz, Cochise, Navajo	The autumn floods of 1983. Tropical storm remains, including those from Hurricane Octave, caused heavy rain over Arizona during a 10-hour period. Southeast Arizona and Yavapai and Mohave Counties are particularly hard hit. Severe flooding occurred in Tucson, Clifton and Safford. Fourteen fatalities and 975 injuries were attributed to the flooding. At least 1000 Arizonans were left temporarily homeless. Damage estimated at \$370 million in today's value (2001). Record water levels in the Santa Cruz, Gila, San Pedro and San Francisco Rivers contributed to heavy flooding statewide. Greenlee County was hit hard. Damages in Clifton alone were over \$20 million where approximately 41 businesses were destroyed and over 231 homes and 57 businesses suffered major damages. The Corps constructed an emergency dike in the Winkelman Flats area to try and protect 112 homes. There were floodfight activities at Florence to protect a sewage treatment plant and at Safford to protect critical arterial bridge embankment from severe damage. Damages in Santa Cruz Count occurred primarily from flows and erosion in the Santa Cruz River, Nogales Wash, Peck Canyon Creek, Western Wash, and other minor tributaries. Total public and privated damages in Santa Cruz County were estimated to exceed \$1.5 million (USACE, 1994).
6/27/1986	Nogales Dump Site	31590	\$40,000				Santa Cruz	Nogales Dump Site.
3/17/1990	Wildfire	EUFIR					Statewide	Wildland fire contingency
10/5/1990	Health Emergency	EUZ902 33149	\$336,667				Santa Cruz	Nogales Health Emergency
1/8/1993	Flooding	93003	\$30,072,157	01/19/93	977-DR	\$104,069,362	Statewide	During January and February 1993, winter rain flooding damage occurred from winter storms associated with the El Nino phenomenon. These storms flooded watersheds throughout Arizona by dumping excessive rainfall amounts that saturated soils and increased runoff. Warm temperature snowmelt exacerbated the situation over large areas. Erosion caused tremendous damage and some communities along normally dry washes were devastated. Stream flow velocities and runoff volumes exceeded historic highs. Many flood prevention channels and retention reservoirs were filled to capacity and so water was diverted to the emergency spillways or the reservoirs were breached, causing extensive damage in some cases (e.g., Painted Rock Reservoir spillway). Ultimately, the President declared a major federal disaster that freed federal funds for both public and private property losses for all of Arizona's fifteen counties. Damages were widespread and significant, impacting over 100 communities. Total public and private damages exceeded \$400 million and eight deaths and 112 injuries were reported to the Red Cross (FEMA, April 1, 1993; ADEM, March, 1998).
1/20/1993	Infestation	99001	\$177,702				Statewide	Red Imported Fire Ant Emergency
9/9/1993	Wildfire	94002	\$200,000				Statewide	Statewide wildfire suppression - State Land Department
3/23/1994	Public Health & Safety	94003	\$21,622				Santa Cruz	

State of Arizona Declaration		Damage Estimates				Sources		Hazard
Date	Hazard	Fatalities	Injuries	Property	Crop/Livestock	Total	Look Up	
4/28/1973	Wildfire					\$0	ADEM, 2008	Wildfire
1/7/1974	Service Interruption					\$0	ADEM, 2008	
4/22/1975	Wildfire					\$0	ADEM, 2008	Wildfire
9/2/1977	Infestation					\$0	ADEM, 2008	Infestation
10/9/1977	Tropical Storm / Hurricane			\$15,200,000		\$15,200,000	ADEM, 2008; Tucson NWS, 2008 at http://www.wrh.noaa.gov/twc/hydro/floodhis.php	Flooding / Flash Flooding
3/2/1978	Flooding	4		\$65,900,000		\$65,900,000	ADEM, 2008; Tucson NWS, 2008 at http://www.wrh.noaa.gov/twc/hydro/floodhis.php ; AFMA Flood Happens, Fall 2003	Flooding / Flash Flooding
4/21/1978	Wildfire					\$0	ADEM, 2008	Wildfire
11/30/1978	Prison Problem					\$0	ADEM, 2008	Prison Disturbance
12/16/1978	Flooding	10		\$39,850,000		\$39,850,000	ADEM, 2008; Tucson NWS, 2008 at http://www.wrh.noaa.gov/twc/hydro/floodhis.php ; AFMA Flood Happens, Fall 2003	Flooding / Flash Flooding
4/16/1979	Wildfire					\$0	ADEM, 2008	Wildfire
6/2/1980	Wildfire					\$0	ADEM, 2008	Wildfire
6/16/1980	Wildfire					\$0	ADEM, 2008	Wildfire
8/21/1980	Flooding					\$0	ADEM, 2008; NCDC, 2010	Flooding
6/26/1981	Wildfire					\$0	ADEM, 2008	Wildfire
6/30/1981	Wildfire					\$0	ADEM, 2008	Wildfire
6/30/1982	Wildfire					\$0	ADEM, 2008	Wildfire
3/6/1983	Flooding					\$0	ADEM, 2008	Flooding / Flash Flooding
9/28/1983	Tropical Storm / Hurricane	14	975	\$370,000,000		\$370,000,000	ADEM, 2008; NCDC, 2010	Flooding / Flash Flooding
6/27/1986	Nogales Dump Site					\$0	ADEM, 2008	Hazardous Materials Incident
3/17/1990	Wildfire					\$0	ADEM, 2008	Wildfire
10/5/1990	Health Emergency					\$0	ADEM, 2008	Public Health and Safety
1/8/1993	Flooding	8	112	\$330,000,000	\$70,000,000	\$400,000,000	ADEM, 2008; NCDC, 2010	Flooding / Flash Flooding
1/20/1993	Infestation					\$0	ADEM, 2008	Infestation
9/9/1993	Wildfire					\$0	ADEM, 2008	Wildfire
3/23/1994	Public Health & Safety					\$0	ADEM, 2008	Public Health and Safety

State of Arizona Declaration				Federal Presidential Declaration				
Date	Hazard	State PCA No.	Expenditures	Date	ID	Expenditures	Counties Affected	Description
6/30/1994	Wildfire						Statewide	AZ Executive Order 94-9: In Accordance with Established Emergency Procedures declare a state of emergency in Apache, Cochise, Coconino, Gila, Graham, Greenlee, LaPaz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai and Yuma counties due to wildfire conditions pursuant to A.R.S. § 37-623.02 effective June 30, 1994.
8/30/1994	Flooding	95002	\$139,440				Santa Cruz	A devastating severe thunderstorm occurred just northeast of downtown Tucson, Arizona between approximately 225 and 330 pm. Along with wind damage, flash flooding occurred in both eastern Pima and Santa Cruz counties. Normally dry washes in the Pantano Wash area were running with two feet of water in some places. City streets were considerably flooded, especially between Broadway and Grant. A vehicle became stranded in one of the underpasses and eventually the car was totally under water...but no one was injured. Washes were running over and streets were like rivers. Considerable flooding also occurred in Santa Cruz County as well, from an entirely different storm during the warning period (from local storm report). Thunderstorms around Nogales caused extensive flooding and heavy runoff. In some places, at least three inches of rain fell in the afternoon and early evening hours. The Santa Cruz river was reported flowing, and the Nogales Wash was nearly bankfull. A Mexican woman and her two children were drowned when their pickup truck was caught in flood waters on Cinco de Febrero Street in Nogales, Sonora. The bodies were swept downstream, two miles north of the border, where they were found near the Chula Vista subdivision. Many homes and businesses were flooded, but no estimates of damage were made and no evacuations were necessary (Green Valley News and Sun, circ:7,500).
10/14/1994	Wildfire	95003	\$600,000				Statewide	Statewide wildfire suppression - State Land Department
3/13/1996	Infestation	96003	\$796,456				Statewide	Wheat (karnal bunt)
3/17/1996	Wildfire	EUZSLD					Statewide	Wildland fires statewide
5/16/1996	Wildfire	96004	\$1,000,729				Statewide	Statewide wildfire suppression - State Land Department
6/7/1996	Drought	96005	\$211,499				Statewide	
9/24/1997	Tropical Storm / Hurricane	98002	\$2,318,259				Statewide	Hurricane Nora - \$200 million property damage. An estimated \$150 to \$200 million in damage was sustained by crops throughout Yuma County due mainly to flooded crops. About \$30 to \$40 million was to lemon trees. The heavy rain was attributed to Tropical Storm Nora. Flooding from Hurricane Nora results in the breaching of Narrows Dam. The calculated 24-hour, 100-year rainfall amount in NW Maricopa County was exceeded at six ALERT measuring sites. 3 to 5 inches of rain which fell from Nora led to some flash flooding in portions of northwest Maricopa County. Two earthen dams gave way in Aguila and caused widespread flooding. One dike was located seven miles east of Aguila and the second in the center of the Martori Farms complex. Half of the cotton crop was lost at Martori Farms, as well as 300 to 500 acres of melons. Up to five feet of water filled Aguila. About 40 people were evacuated from the hardest hit area of the town. Water flowing down the Sols Wash was so high that the Sols Wash Bridge in Wickenburg was closed for more than two hours. There was some flooding below Sols Wash in the streets around Coffinger Park. Several houses in the area were flooded. Highway 71 west of Wickenburg and Highway 95 north were closed due to high water from the storm.
5/6/1999	Wildfire	99004	\$4,894				Statewide	Statewide wildland fire emergency
6/23/1999	Drought	99006					Statewide	PCA 99006, Statewide Drought Emergency, Declared June 23, 1999: Lack of precipitation had significantly reduced surface and ground water supplies and stream flows. The drought continues to endanger crops, property and livestock of the citizens of Arizona. This proclamation has been extended to June 23, 2003, as this is still a threatening situation. USDA Programs offer Arizona Ranchers Drought Relief, (Phoenix) - Federal officials this week announced three programs designed to ease the impact of Arizona's drought on the state's ranching industry and the state's natural resources. Gov. Jane Dee Hull in June issued a drought declaration for the state, initiating a federal review process that culminated in the U.S. Department of Agriculture's determination that Arizona agriculture could qualify for drought assistance. The following are brief descriptions of the three assistance packages for which Arizona ranchers may qualify: Those ranching operations that earlier this year reduced herd sizes in response to poor pasture conditions and lack of water due to the drought can receive capital gains tax deferral if those herds are replaced within two years, according to the Internal Revenue Service. It is recommended that businesses consult their tax specialist or the IRS for further details. For more information, contact Joe Lane, Associate Director of Animal Services Division, at (602) 542-3629. The USDA Natural Resource Conservation Service has received an initial \$6 million through its Emergency Watershed Program (EWP) to treat short- and long-term damage to rangeland and cropland due to drought. Ranchers and farmers can receive financial assistance to implement recovery measures that will retard runoff and reduce the threat of future flooding and erosion hazards. For more information, contact Mike Sommerville, State Conservationist, at (602) 280-8810. The USDA Farm Services Agency has emergency drought assistance loans available. For more information, contact George Arredondo, USDA/FSA State Executive Director, at (602) 640-5200. Arizona's dry winter and low snowpack mostly impacted the state's ranching industry due to poor pasture conditions. Summer rains have improved rangelands throughout Arizona. According to the USDA Arizona Agricultural Statistics Service, as of Aug. 15, range and pasture condition was reported as 6 percent poor, 21 percent fair, 39 percent good, and 34 percent excellent. As much as 99 percent of Arizona's crops are irrigated, generally mitigating short-term drought impacts.
8/13/1999	Drought			08/13/99	USDA		Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai	GLICKMAN DECLARES PENNSYLVANIA, 13 ARIZONA COUNTIES AS DISASTER AREAS AND ANNOUNCES ADDITIONAL DROUGHT ASSISTANCE Release No. 0334.99, WASHINGTON, August 13, 1999 Agriculture Secretary Dan Glickman today declared all of Pennsylvania and 13 counties in Arizona as agricultural disaster areas due to drought. The declaration makes farmers in those areas and all contiguous counties eligible for emergency low-interest loans and other assistance to help cover losses from the drought. In Arizona, today's disaster declaration applies to Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, and Yuvapai Counties. Also eligible, because they are contiguous, are La Paz and Yuma Counties. Glickman has already declared all or part of Arizona, Connecticut, Maryland, New Jersey, New Mexico, New York, Ohio, Pennsylvania, Virginia, and West Virginia as disaster areas. Due to the close proximity to these states, certain counties in California, Delaware, Indiana, Kentucky, Massachusetts, Michigan, Nevada, Rhode Island, Vermont, and Utah also qualify for emergency loan assistance.
8/27/1999	Flooding	20003	\$921,206				Santa Cruz	Santa Cruz County Flash Flood Emergency
7/21/2000	Drought			07/21/00	USDA		Apache, Cochise, Graham, Greenlee, Pima, Pinal, Santa Cruz, Gila, Maricopa, Navajo, Yuma	GLICKMAN DECLARES 7 ARIZONA COUNTIES AGRICULTURAL DISASTER AREAS: Washington, July 17, 2000 - Agriculture Secretary Dan Glickman today declared seven of Arizona's 15 counties as agricultural disaster areas due to drought, making farmers in those areas and 12 neighboring counties, including counties in Utah, New Mexico and Colorado, eligible for emergency low-interest loans. "Farmers and ranchers in Arizona are experiencing real difficulties this year due to drought," said Glickman. "USDA emergency low-interest loans are available to help producers to cover some of their losses." Glickman's disaster declaration covers 7 of Arizona's 15 counties: Apache, Cochise, Graham, Greenlee, Pima, Pinal and Santa Cruz. Four other contiguous Arizona counties also are covered by the declaration (Gila, Maricopa, Navajo and Yuma) and therefore are eligible for the same benefits. Other contiguous counties in New Mexico are Canon, Cibola, Grant, Hidalgo, McKinley, and San Juan counties. San Juan county in Utah and Montezuma county in Colorado are included in the declaration as contiguous counties. This designation makes qualified family-sized farm operators in both primary and contiguous counties eligible for emergency low-interest loans from USDA. Farmers in eligible counties have eight months to apply for the loans. Each loan application is considered on its own merits, taking into account the extent of losses, security available, repayment ability, and other eligibility requirements. USDA previously approved emergency haying and grazing on Conservation Reserve Program acreage, providing assistance to approved producers whose pastures have been decimated by drought. For further information, farmers may contact their local Farm Service Agency offices or visit website: http://www.fsa.usda.gov/pas/disaster/assistance1.htm .
10/17/2000	Tropical Storm / Hurricane	21103	\$3,215				Santa Cruz	Tropical Storm Olivia - Residents in Patagonia were landlocked due to flooding of the Harshaw Creek and Sonoita Creek. The Old Tucson Road flooded due to high water rises along the Nogales wash. Also, 800 feet of South River Road flooded along the Santa Cruz River.
9/12/2001	Terrorism	22002	\$3,070,329	9/12/2001			Statewide	September Terrorism Incident, Declared September 12, 2001: Terrorist attacks inflicted in various locations across the United States posed significant threat to the citizens of this country causing us to heighten the level of security throughout the State of Arizona. This proclamation has been extended to November 12, 2002.

State of Arizona Declaration		Damage Estimates				Sources		Hazard
Date	Hazard	Fatalities	Injuries	Property	Crop/Livestock	Total	Look Up	Look Up
6/30/1994	Wildfire					\$0	ADEM, 2008	Wildfire
8/30/1994	Flooding	3				\$0	http://www.wrh.noaa.gov/twc/hydro/floodhis.php#AUG191994	Flooding / Flash Flooding
10/14/1994	Wildfire					\$0	ADEM, 2008	Wildfire
3/13/1996	Infestation					\$0	ADEM, 2008	Infestation
3/17/1996	Wildfire					\$0	ADEM, 2008	Wildfire
5/16/1996	Wildfire					\$0	ADEM, 2008	Wildfire
6/7/1996	Drought					\$0	ADEM, 2008	Drought
9/24/1997	Tropical Storm / Hurricane			\$200,000,000	\$175,000,000	\$375,000,000	ADEM, 2008; NCDC, 2010	Flooding / Flash Flooding
5/6/1999	Wildfire					\$0	ADEM, 2008	Wildfire
6/23/1999	Drought					\$0	ADEM, 2008	Drought
8/13/1999	Drought					\$0	ADEM, 2008	Drought
8/27/1999	Flooding					\$0	ADEM, 2008	Flooding / Flash Flooding
7/21/2000	Drought					\$0	ADEM, 2008	Drought
10/17/2000	Tropical Storm / Hurricane			\$5,000		\$5,000	ADEM, 2008; NCDC, 2010	Flooding / Flash Flooding
9/12/2001	Terrorism					\$0	ADEM, 2008	Terrorism

State of Arizona Declaration				Federal Presidential Declaration					
Date	Hazard	State PCA No.	Expenditures	Date	ID	Expenditures	Counties Affected	Description	
10/16/2001	Terrorism	22003	\$7,324				Statewide	Military Airport Security	
5/18/2002	Disease						Statewide	the Arizona Game and Fish Department placed an emergency ban on the importation of live hoofed animals (e.g., deer and elk) into Arizona due to a fear of Chronic Wasting Disease (CWD). CWD is a disease closely related to "mad cow disease" in cattle and scrapie in domestic sheep and goats but affects deer and elk.	
7/11/2002	Drought			07/11/02	USDA		Statewide	VENEMAN ANNOUNCES EXPANSION OF CRP EMERGENCY HAYING AND GRAZING PROGRAM FOR WEATHER-STRICKEN STATES, WASHINGTON, July 11, 2002 - Agriculture Secretary Ann M. Veneman today approved 18 states for Conservation Reserve Program emergency haying and grazing statewide, making all CRP participants in these states basically eligible for this emergency measure. Veneman also said USDA will waive rental reduction fees to encourage donation of hay to farmers and ranchers in immediate need. "Drought and severe weather conditions have depleted hay stocks and grazing lands across the country," said Veneman. "This approval provides immediate relief to livestock producers and encourages donations of hay to producers who need immediate assistance." The 18 approved states are: Arizona, Colorado, Georgia, Idaho, Kansas, Minnesota, Montana, Nebraska, New Mexico, North Carolina, North Dakota, Oklahoma, South Carolina, South Dakota, Texas, Utah, Virginia and Wyoming. ARIZONA FARMERS FACING CATASTROPHE ... Arizona officials are saying that the losses from the livestock industry alone last year will be upward of \$300 million. ...	
5/2/2003	Wildfire	23003	\$2,378,020				Statewide	Forest Health Emergency - As a result of the on-going drought conditions the forests within our state have been infested with the Pine Bark Beetle. This proclamation will expedite the clearing of dead, dying and diseased trees and other vegetation that interfere with emergency response and evacuation needs.	
9/23/2004	Infestation	25003	\$197,421				La Paz, Pima, Santa Cruz, Yuma	Mediterranean Fruit Fly Emergency	
8/15/2005	Border Security	26001	\$1,492,758				Cochise, Pima, Santa Cruz, Yuma	Border Security Emergency	
2/22/2006	Wildfire	26006	\$192,390				Statewide	On February 22, 2006, the Governor declared an emergency due to the driest winter in recorded history coupled with above average temperatures and the earliest recorded start to a wildfire season. The entire state was threatened by extreme wildfire hazards. The 2006 state wildfire suppression resources strategy required additional financial support. The declaration provided \$200,000 for pre-suppression resources to the Arizona State Land Department, Office of State Forester and the Arizona Division of Emergency Management.	
6/23/2006	Infestation	26008	\$567,257				Cochise, Maricopa, Pima, Pinal, Santa Cruz, Yuma	Glassy-winged sharpshooter infestation - The Glassy-Winged Sharpshooter is a known vector of Xyella fastidiosa, a bacteria that causes plant diseases such as Pierce's disease of grapes, almond leaf scorch, alfalfa dwarf, oleander leaf scorch, and citrus variegated chlorosis, that threaten the viability of wine, citrus and other agricultural and horticultural industries as well as public landscapes. The Glassy-Winged has been detected in Arizona in a small isolated location in the city of Sierra Vista, Cochise County. The Arizona Department of Agriculture has been placing detection traps, monitoring and eradicating the Sharpshooter.	
8/28/2007	Flooding	28001	\$131,052				Santa Cruz	Nogales Wash Emergency - Portions of downtown Nogales experienced flash flooding. Extensive damage occurred to the Nogales Wash, which is a concrete wash that flows through the city of Nogales. City officials estimated damage at \$10 million on the U.S. side of the border. Scattered thunderstorms across Southeast Arizona caused hail and wind damage in Tucson and flash flooding in Nogales.	
7/15/2008	Flooding	29001	\$203,681				Santa Cruz	Nogales Wash 2008 Emergency - Heavy rainfall on the Mexican side of the border caused flash flooding in the city of Nogales, Arizona. This was caused by a damaged portion of the underground Nogales Wash. Local emergency management reported that water burst through the underground wash onto the surface just across the International Border. The border wall acted as a dam, keeping most of the flooding on the Mexican side. However, some water did flow through the port of entry into downtown Nogales, Arizona. Several businesses in the downtown business district experienced flooding and two illegal immigrants found two days later in the underground wash are also believed to have drowned due to this flooding. In addition, three illegal immigrants in an underground flood channel beneath the international border were rescued. Slow moving thunderstorms developed in a very moist environment across Southeast Arizona resulting in areas of flash flooding.	
1/21/2010	Winter Storm	20102	\$4,497,895	3/18/2010	1888-DR	\$14,210,904	Apache, Coconino, Gila, Greenlee, La Paz, Maricopa, Mohave, Navajo, Yavapai, Hopi, Tibe, Navajo Nation	About 10 inches of snow occurred in Northern Greenlee County around Rose Peak and Hannagan Meadow. A strong Pacific winter storm produced moderate valley rain and mountain snow to much of southeast Arizona. Heavy snow combined with strong winds to produce significant blowing and drifting at the higher elevations. Strong gusty winds also affected many valley locations during the evening hours of the 19th and the early morning hours of the 20th. Six inches of snow fell at 6700 feet 6 miles south of Prescott. A strong winter storm hit northern Arizona with widespread snow and rain. Heavy snow fell along the Eastern Mogollon Rim. Snowfall totals for this one storm include: Clints Well 16 inches, Heber 13 inches, Clay Springs 14 to 15 inches, and Forest Lakes 16 inches. The second in a series of strong Pacific storms moved across northern Arizona with widespread heavy precipitation. The snow level dropped down to between 5000 and 5500 feet elevation by the storm moved east. The Governor Jan Brewer signed a Declaration of Emergency and released \$200,000 to pay for emergency responses and recovery expenses from the weather events. Declared that a State of Emergency in Apache, Coconino, Gila, Greenlee, La Paz, Maricopa, Mohave, Navajo, and Yavapai Counties due to the 2010 Winter Storm beginning January 21, 2010. President Obama approved the Governor's request for Emergency Declaration in support of life and property-saving operations on Hopi Tribe and Navajo Nation lands within Apache, Coconino and Navajo counties. Isolation of some communities and rough terrain, compounded with snow accumulations, has complicated delivery of assistance like fuel, food and medical provisions. An additional \$1 million was approved by Governor Brewer to cover state-share costs. Response efforts for the Hopi Tribe and Navajo Nation were named Operation Winter Storm and pooled the resources of federal, state and local agencies. Over nine days, 42,500 meals, 21,780 gallons of water, 279 cots, 5,475 blankets and over 800 wood bundles were delivered by air and ground transport.	
8/4/2010	Flooding	11003	\$379,996	10/4/2010	1940-DR		Greenlee, Santa Cruz	Monsoon 2010 Flooding Emergency: On July 19, 2010, through July 29, 2010, a series of potent monsoon thunderstorms causing high winds and flash floods damaged many locations in southeastern Arizona. The heavy rains resulted in unusually strong flooding events and caused extreme peril to public health and safety in two primary areas: Wards Canyon in Greenlee County and the Nogales Wash in Santa Cruz County. On July 29, 2010 both the Town of Clifton and Greenlee County declared a state of emergency for this event, followed on July 30, 2010 by Santa Cruz County, stating that this monsoon event has created a situation above and beyond their capabilities and they are requesting assistance from the State. These water flows caused extensive damages to public infrastructure and threatened resources that provide essential life services to Greenlee and Santa Cruz residents, primarily roads and sewer lines.	
7/3/2011	Drought	99006			E.O. 2007-1	\$94,441	Santa Cruz	5 counties (Apache, Cochise, Greenlee, and Santa Cruz) designated as primary natural disaster areas and 4 counties (Gila, Navajo, Pima and Pinal) named as contiguous disaster counties due to losses caused by drought, wildfires, and high winds	
3/5/2015	Drought	99006			E.O. 2007-	\$318,963	Apache, Cochise, Coconino, Graham, La Paz, Maricopa, Mohave, Pinal, Santa Cruz, Pima	WASHINGTON, March 4, 2015 - The U.S. Department of Agriculture (USDA) has designated Greenlee, Navajo, Pima and Yavapai counties in Arizona as primary natural disaster areas due to damages and losses caused by a recent drought. "Our hearts go out to those Arizona farmers and ranchers affected by recent natural disasters," said Agriculture Secretary Tom Vilsack. "President Obama and I are committed to ensuring that agriculture remains a bright spot in our nation's economy by sustaining the successes of America's farmers, ranchers, and rural communities through these difficult times. We're also telling Arizona producers that USDA stands with you and your communities when severe weather and natural disasters threaten to disrupt your livelihood." Farmers and ranchers in the following counties in Arizona also qualify for natural disaster assistance because their counties are contiguous. Those counties are: Apache, Graham, Pinal, Cochise, La Paz, Santa Cruz, Coconino, Maricopa, Yuma, Gila, Mohave. Farmers and ranchers in the following counties in New Mexico and Utah also qualify for natural disaster assistance because their counties are contiguous.	

State of Arizona Declaration		Damage Estimates				Sources		Hazard
Date	Hazard	Fatalities	Injuries	Property	Crop/Livestock	Total	Look Up	Look Up
10/16/2001	Terrorism					\$0	ADEM, 2008	Terrorism
5/18/2002	Disease					\$0	ADEM, 2008	Disease
7/11/2002	Drought				\$300,000,000	\$300,000,000	ADEM, 2008	Drought
5/2/2003	Wildfire					\$0	ADEM, 2008	Wildfire
9/23/2004	Infestation					\$0	ADEM, 2008	Infestation
8/15/2005	Border Security					\$0	ADEM, 2008	Border Security
2/22/2006	Wildfire					\$0	ADEM, 2008	Wildfire
6/23/2006	Infestation					\$0	ADEM, 2008	Infestation
8/28/2007	Flooding			\$10,000,000		\$10,000,000	ADEM, 2008	Flooding / Flash Flooding
7/15/2008	Flooding			\$600,000		\$600,000	ADEM, 2008, NCDC, 2010	Flooding / Flash Flooding
1/21/2010	Winter Storm			\$14,900,000		\$14,900,000	ADEM, 2010 FEMA, 2010	Flooding / Flash Flooding
8/4/2010	Flooding			\$500,000		\$500,000	ADEM, 2010	Flooding / Flash Flooding
7/3/2011	Drought			\$94,441		\$94,441	EWG, 2017	Drought
3/5/2015	Drought			\$318,963		\$318,963	Newspaper - USDA	Drought

State of Arizona Declaration		Federal Presidential Declaration						
Date	Hazard	State PCA No.	Expenditures	Date	ID	Expenditures	Counties Affected	Description
8/10/2016	Drought	99006			E.O. 2007-10		Apache, Cochise, Gila, Graham, Greenlee, Maricopa, Navajo, Pima, Pinal, Santa Cruz and Yuma	WASHINGTON, Aug 11, 2016 — The U.S. Department of Agriculture (USDA) has designated Cochise, Graham, Pima, and Santa Cruz counties in Arizona as primary natural disaster areas due to damages and losses caused by a recent drought. "Our hearts go out to those Arizona farmers and ranchers affected by recent natural disasters," said Agriculture Secretary Tom Vilsack. "President Obama and I are committed to ensuring that agriculture remains a bright spot in our nation's economy by sustaining the successes of America's farmers, ranchers, and rural communities through these difficult times. We're also telling Arizona producers that USDA stands with you and your communities when severe weather and natural disasters threaten to disrupt your livelihood." Farmers and ranchers in Apache, Gila, Greenlee, Maricopa, Navajo, Pinal, and Yuma counties in Arizona also qualify for natural disaster assistance because their counties are contiguous.

State of Arizona Declaration				Damage Estimates			Hazard	
Date	Hazard	Fatalities	Injuries	Property	Crop/Livestock	Total	Sources	Look Up
8/10/2016	Drought							Drought

**Santa Cruz County Undeclared Events
September 1960 to January 2011**

Hazard	No. of Records	Recorded Losses		
		Fatalities	Injuries	Damage Costs (\$)
Dam Failure	0	0	0	\$0
Drought	0	0	0	\$0
Earthquake	0	0	0	\$0
Extreme Temperature	2	21	0	\$0
Fissure	0	0	0	\$0
Flooding	34	9	7	\$747,000
Hazardous Materials Incident	31	0	28	\$256,877
Landslide/Mudslide	0	0	0	\$0
Levee Failure	0	0	0	\$0
Severe Wind	24	0	0	\$336,800
Subsidence	0	0	0	\$0
Transportation Accident	4	2	3	\$0
Wildfire	25	0	30	\$677,000
Winter Storm	2	0	0	\$530,000

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 cost do not include the cost of suppression which can be quite substantial. Sources: ADEM, NCDC, NWCG, NWS, USFS

Date	Hazard	Description	Location
8/1/1930	Flooding	Unusually heavy rains on the mountains south and west of Nogales on the 1st, 7th, and 8th caused small stream flooding. Due to rushing waters and accumulated water and mud, four deaths occurred in Nogales, Sonora, Mexico. In Nogales, Arizona many adobe buildings collapsed, and damage to stores and residences occurred. Total damage was estimated at \$20,000	
7/8/1932	Flooding	Floodwater rushing down from the Mexican watershed of Sonora inundated the two border cities of Nogales to a depth of four feet, crumbling adobe buildings, flooding homes and businesses, overturning and demolishing automobiles, and tearing down the international boundary fence. Damage was estimated at \$75,000	
3/29/1990	Hazardous Materials Incident	STOVE IN RESIDENCE CAUSED A MINOR EXPLOSION Hazardous Material Involved: NATURAL GAS. Amount: UNKNOWN AMOUNT Remedial Action: FIRE WAS PUT OUT	NOGALES - 3602 TUCSON-NOGALES HWY
5/19/1992	Hazardous Materials Incident	ABOVE GROUND STORAGE TANK/VALVE FAILURE	NOGALES
5/29/1992	Transportation Accident	GRADE CROSSING FATALITY	KINO
9/9/1992	Transportation Accident	CALLER REPORTED TWO ILLEGAL ALIENS THAT WERE INJURED WHILE ATTEMPTING TO RIDE LOCAL FREIGHT TRAIN	NOGALES - Southern Pacific RR
1/9/1993	Hazardous Materials Incident	VALE ON A TANK CAR/VALVE WAS OPEN TANK CAR WAS BELIEVED TO HAVE BEEN SHIPPED EMPTY--CAR HAD BEEN IN MEXICO FOR OVER A YEAR Hazardous Material Involved: AMMONIA, ANHYDROUS. Amount: UNKNOWN AMOUNT Remedial Action: HAZ MAT TECHNICIAN ENROUTE TO LOCATION/FD SECURED VALVE CALLER STATES NO PAPERWORK WAS WITH CARS AND S.P. IS NOT CLAIMING CARS	NOGALES
1/12/1993	Flooding	Roads and structures flooded.	
11/4/1993	Hazardous Materials Incident	UNKNOWN SOURCE ON TANK CAR/UNKNOWN CAUSE/SUSPECTED LEAKY GASKET Hazardous Material Involved: AMMONIUM SULFIDE. Amount: UNKNOWN AMOUNT Remedial Action: HAZMAT TEAMS ON SCENE. Evacuated 200 people.	NOGALES - Southern Pacific Yard
11/4/1993	Hazardous Materials Incident	UNKNOWN SOURCE ON TANK CAR/UNKNOWN CAUSE/SUSPECTED LEAKY GASKET Hazardous Material Involved: AMMONIUM SULFIDE. Amount: UNKNOWN AMOUNT Remedial Action: HAZMAT TEAMS ON SCENE	NOGALES
11/4/1993	Hazardous Materials Incident	TANK CAR NO.GATX18676//LEAKED DUE TO A MAN WAY GASKET FAILURE THIS IS AN UPDATE TO REPORT 206397 Hazardous Material Involved: AMMONIUM SULFIDE. Amount: UNKNOWN AMOUNT Remedial Action: MAN WAY GASKET WAS REPAIRED	NOGALES Train Yard
11/4/1993	Hazardous Materials Incident	TANK CAR NO.GATX18676//LEAKED DUE TO A MAN WAY GASKET FAILURE THIS IS AN UPDATE TO REPORT 206397 Hazardous Material Involved: AMMONIUM SULFIDE. Amount: UNKNOWN AMOUNT Remedial Action: MAN WAY GASKET WAS REPAIRED	NOGALES

Date	Hazard	Fatalities	Injuries	Damage Estimates		Total	Data Source
				Property	Crop/Livestock		
8/1/1930	Flooding		4	\$20,000		\$20,000	NWS Tucson, 2005
7/8/1932	Flooding			\$75,000		\$75,000	
3/29/1990	Hazardous Materials Incident		1			\$0	NRC, August 2004
5/19/1992	Hazardous Materials Incident			AZ		\$0	URS, October 2003
5/29/1992	Transportation Accident	1				\$0	NRC, August 2004
9/9/1992	Transportation Accident		2			\$0	NRC, August 2004
1/9/1993	Hazardous Materials Incident			AZ		\$0	NRC, August 2004
1/12/1993	Flooding			\$50,000		\$50,000	NCDC, August 2004
11/4/1993	Hazardous Materials Incident		1			\$0	NRC, August 2004
11/4/1993	Hazardous Materials Incident		1	AZ	\$85,628	\$85,628	NRC, August 2004
11/4/1993	Hazardous Materials Incident		1			\$0	NRC, August 2004
11/4/1993	Hazardous Materials Incident		1	AZ		\$0	NRC, August 2004

Date	Hazard	Description	Location
8/21/1994	Flooding	Thunderstorms around Nogales caused extensive flooding and heavy runoff. In some places, at least three inches of rain fell in the afternoon and early evening hours. The Santa Cruz river was reported flowing, and the Nogales Wash was nearly bankfull. A Mexican woman and her two children were drowned when their pickup truck was caught in flood waters on Cinco de Febrero Street in Nogales, Sonora. The bodies were swept downstream, two miles north of the border, where they were found near the Chula Vista subdivision. Many homes and businesses were flooded, but no estimates of damage were made and no evacuations were necessary. The cost for the State to respond was \$139,441.	
7/18/1995	Hazardous Materials Incident	40 FT MOBILE REEFER UNIT/EMPLOYEE FRACTURED PIPE ON UNIT Hazardous Material Involved: AMMONIA, ANHYDROUS. Amount: UNKNOWN AMOUNT Remedial Action: AREA WAS FOGGED/PIPE PLUGGED. Evacuated 50 people.	NOGALES - 123 Old Tucson Nogales
7/18/1995	Hazardous Materials Incident	40 FT MOBILE REEFER UNIT/EMPLOYEE FRACTURED PIPE ON UNIT Hazardous Material Involved: AMMONIA, ANHYDROUS. Amount: UNKNOWN AMOUNT Remedial Action: AREA WAS FOGGED/PIPE PLUGGED	NOGALES
6/26/1996	Lightning	Two people struck by lightning 3 miles south of Tucson International Airport. Minor injuries, no deaths. 3 mi. S of TUCSON.	
1/28/1997	Hazardous Materials Incident	2 CONTAINERS OF PESTICIDE IN A TRACTOR TRAILER / THE PESTICIDE WAS PUT IN THE TRAILER WITH A LOAD OF WOOD AND WAS SUPPOSED TO DISSIPATE Hazardous Material Involved: METHYL BROMIDE. Amount: UNKNOWN AMOUNT Remedial Action: THE CALLER STATES THAT TWO 10 OUNCE CANS WERE IN THE TRAILER / THE TRAILER WAS VENTILATED FOR 24 HOURS AND THEN OFFLOADED AS RECOMMENDED	NOGALES - US Customs Bldg.
1/28/1997	Hazardous Materials Incident	2 CONTAINERS OF PESTICIDE IN A TRACTOR TRAILER / THE PESTICIDE WAS PUT IN THE TRAILER WITH A LOAD OF WOOD AND WAS SUPPOSED TO DISSIPATE Hazardous Material Involved: METHYL BROMIDE. Amount: UNKNOWN AMOUNT Remedial Action: THE CALLER STATES THAT TWO 10 OUNCE CANS WERE IN THE TRAILER / THE TRAILER WAS VENTILATED FOR 24 HOURS AND THEN OFFLOADED AS RECOMMENDED	NOGALES
5/18/1997	Severe Wind	A tin roof was blown off a shed.	TUBAC
7/17/1997	Flooding	Nogales wash overflowed its banks. Several vehicles had to be pulled out of the wash. Several minor injuries were reported	NOGALES
7/23/1997	Hazardous Materials Incident	ILLEGAL DUMPING OF HAZARDOUS WASTE AT THE COUNTY LANDFILL. Hazardous Material Involved: NITRIC ACID. Amount: UNKNOWN AMOUNT Remedial Action: THE SCENE WAS SECURED/THE CHEMICALS WERE SECURED AND REPACKAGE/A CONTRACTOR WILL DO THE CLEANUP ON SEPT 08. Evacuated six people.	RIO RICO - Landfill
8/12/1997	Flooding	The Mia Casa mobile home park in the west portion of Nogales was flooded with water 3-4 feet deep. Damage to a few cars and several homes.	NOGALES

Date	Hazard	Fatalities	Injuries	Damage Estimates		Total	Data Source
				Property	Crop/Livestock		
8/21/1994	Flooding		3			\$0	URS, October 2003 NWS Tucson, 2005
7/18/1995	Hazardous Materials Incident		2			\$0	NRC, August 2004
7/18/1995	Hazardous Materials Incident		2	AZ	\$85,621	\$85,621	NRC, August 2004
6/26/1996	Lightning		2			\$0	NCDC, August 2004
1/28/1997	Hazardous Materials Incident		2			\$0	NRC, August 2004
1/28/1997	Hazardous Materials Incident		2	AZ		\$0	NRC, August 2004
5/18/1997	Severe Wind			\$500		\$500	NCDC, August 2004
7/17/1997	Flooding		3			\$0	NCDC, August 2004
7/23/1997	Hazardous Materials Incident		1			\$0	NRC, August 2004
8/12/1997	Flooding			\$5,000		\$5,000	NCDC, August 2004

Date	Hazard	Description	Location
10/1/1997	Flooding	Thunderstorms dumped between 2-3 inches of rain over the western portion of Nogales causing flash flooding that damaged about 100 homes and 30 businesses. The flooding forced the evacuation of 150 residents from their homes. The floodwaters carried 5 vehicles down Western Avenue, the most heavily damaged street. 150 people were displaced.	NOGALES
1/22/1998	Hazardous Materials Incident	HIGH PRESSURE REFRIGERATION LINE / UNKNOWN REASONS CALLER DIDN'T NOTIFY MEXICAN AUTHORITIES AS WIND DIRECTION WAS TO NORTH Hazardous Material Involved: AMMONIA, ANHYDROUS. Amount: UNKNOWN AMOUNT Remedial Action: LEAK LOCATED, AREA ISOLATED, ISOLATED LEAK WITH VALVING AT FACILITY FACTORY PERSONNEL EVACUATED FROM BUILDING FOR A PERIOD OF 2.5 HOURS	NOGALES
3/19/1998	Transportation Accident	FREIGHT TRAIN TRAVELING SOUTH STRUCK A PEDESTRIAN AT A GRADE CROSSING WITH GATES AND LIGHTS (UNKNOWN IF OPERATIONAL)	Nogales
7/21/1998	Flooding	2-3 feet of water flooded the Monta Carlo neighborhood damaging many houses. The Nogales sheriff also reported flooding of South River Road and along highway 82 in Nogales.	NOGALES
8/28/1998	Severe Wind	Two distinct lines of severe thunderstorms swept through much of southeast Arizona from the northeast during the mid-afternoon to early evening hours. A high school student from Rincon High School in Tucson was injured from flying debris and taken to a local hospital. Numerous reports of trees blow down were received, some up to 2 feet in diameter. Eighteen power poles on the southwest side of Tucson were blown down leaving more than 20,000 customers without power and causing the evacuation of about 200 people from homes and businesses along West Ajo Way due to downed power lines. One of the downed power poles sparked a roof fire at Moreliana Fruit Bars causing an estimated \$85000 of damage. A roof was blown off a trailer and a 20 foot tree blown onto a truck near Fort Thomas. Several reports of roof damage in Tucson were received. Winds blew a shed away and a 15 foot tree down in Benson. A wind gust to 64 mph was recorded at the University of Arizona. Power outages were reported in Rio Rico. Winds also measured at 61 knots.	RIO RICO
5/21/1999	Transportation Accident	A NORTHBOUND LOCAL FREIGHT TRAIN STRUCK AND KILLED A TRESPASSER	Nogales
9/25/1999	Hazardous Materials Incident	CHLORINATOR / CAUSE UNKNOWN Hazardous Material Involved: CHLORINE. Amount: 5 POUND(S) Remedial Action: TRYING TO REMOVE PRODUCT FROM CONTAINER. Necessary to evacuate 600 people.	NOGALES - 9N. Grand Ave.
10/11/2000	Flooding	system was able to tap into moisture from the remnants of Tropical Storm Olivia which resulted in large amounts of rain and flooding. Early morning on the 11th, deep convection (with -65 to -70C cloud tops) developed. Isolated thunderstorms exploded across southeast Arizona. The low level center of	HARSHAW
10/11/2000	Flooding	out. Deep upper level trough over Nevada on the 10th moved over southeast Arizona through the 12th. The system was able to tap into moisture from the remnants of Tropical Storm Olivia which resulted in large amounts of rain and flooding. Early morning on the 11th, deep convection (with -65 to -70C cloud tops) developed. Isolated thunderstorms exploded across southeast Arizona. The low level center of Olivia passed through Cochise county	NOGALES
10/22/2000	Flooding	Residents in Patagonia were landlocked due to flooding of the Harshaw Creek and Sonoita Creek. The Old Tucson Road flooded due to high water rises along the Nogales wash. Also, 800 feet of South River Road flooded along the Santa Cruz River.	
8/4/2001	Hail	Santa Cruz dispatch reported severe thunderstorm producing 1.75 inch diameter hail denting a police squadron car. 5 mi. N of RIO RICO.	
8/5/2001	Severe Wind	Damaging winds from a severe thunderstorm ripped roofs off of 12 homes in the Rio Rico area.	RIO RICO

Date	Hazard	Fatalities	Injuries	Damage Estimates		Total	Data Source
				Property	Crop/Livestock		
10/1/1997	Flooding			\$30,000		\$30,000	NCDC, August 2004
1/22/1998	Hazardous Materials Incident				\$85,628	\$85,628	NRC, August 2004
3/19/1998	Transportation Accident		1			\$0	NRC, August 2004
7/21/1998	Flooding			\$30,000		\$30,000	NCDC, August 2004
8/28/1998	Severe Wind			\$500		\$500	NCDC, August 2004
5/21/1999	Transportation Accident		1			\$0	NRC, August 2004
9/25/1999	Hazardous Materials Incident		12			\$0	NRC, August 2004
10/11/2000	Flooding			\$5,000		\$5,000	NCDC, August 2004
10/11/2000	Flooding			\$5,000		\$5,000	NCDC, August 2004
10/22/2000	Flooding			\$5,000		\$5,000	NCDC, August 2004
8/4/2001	Hail			\$5,000		\$5,000	NCDC, August 2004
8/5/2001	Severe Wind			\$120,000		\$120,000	NCDC, August 2004

Date	Hazard	Description	Location
4/29/2002	Wildfire	The Ryan fire was started by a campfire in Coronado National Forest at Canelo Hill on April 29th and continued through May 4th. The fire burned 38,800 acres with estimated total fire fighting cost of 1.2 million dollars. The fire burned one house and several outbuildings.	CANELO
6/14/2002	Wildfire	West Dome Fire - the cause of the fire is under investigation that burned an area 5 miles northwest of Huachuca City, Arizona. The fire started June 14, 2002 and was controlled June 17, 2002, and burned a total of 930 acres with over \$50,000 in fire suppression costs.	
7/14/2002	Severe Wind	A severe thunderstorm produced strong winds that knocked down a sign in the town of Patagonia. Most residents and spotters reported hail size of a half of an inch. The storm total precipitations for spotters ranged from .40 to 1.7 inches.	PATAGONIA
7/26/2002	Flooding	Thunderstorms produced heavy rainfall across the Nogales area. The Nogales wash rose 7 to 8 feet, with 3 to 4 feet out of its banks. Reports from officials stated some bank erosion occurred. Rushing water also washed cars into a fence along the Mexico border.	NOGALES
5/11/2003	Wildfire	A Bar Fire - a human caused fire that burned an area 17 miles southeast of Sonoita, Arizona. The fire started May 11, 2003 and was controlled May 14, 2003, and burned a total of 487 acres with over \$587,000 in fire suppression costs.	
5/15/2003	Wildfire	Red Rock Fire - a human caused fire that burned an area 10 miles south of Sonoita, AZ; 5 miles east of Patagonia, AZ. The fire started May 15, 2003 and was controlled May 18, 2003, and burned a total of 2,763 acres with over \$794,414 in fire suppression costs.	
7/13/2003	Severe Wind	A severe thunderstorm moved east across the town of Rio Rico. A spotter recorded 70 mph wind gust and several homes with roof damage due to the strong winds.	RIO RICO
7/23/2003	Flooding	A severe thunderstorm developed over Tubac during the evening, which produced large hail and flash flooding. A spotter reported 1.75 inch diameter in size hail at 630 pm MST. This storm also produced 1.75 to 2.10 inches of precipitation in the Palo Parado Estates and Tubac Country Club respectively. Most washes experienced heavy flow rates based on high water marks. The Tubac was had 5 feet of water and the Puerto Canyon was over topped banks along East Frontier Road and Camino Esplendido. Camino Esplendido had 5.5-6.0 feet of water crossing the road with damage to three properties. One house had 2-3 inches of water in the garage, but had no substantial damage. Another home had considerable damage with the water inside the house.	TUBAC
7/29/2003	Severe Wind	A severe thunderstorm near the town of Elgin produced damaging winds during the afternoon. A spotter reported roof damage due to the strong winds. Winds reported at 51 knots.	ELGIN
8/18/2003	Flooding	A strong thunderstorm produced heavy rain and moved northwest over the Sonoita area, mainly affecting areas on the east side of the Santa Rita Mountains. A car was trapped along Casa Blanca road between Highway 82 and Casa Blanca Wash due to flooded road.	

Date	Hazard	Fatalities	Injuries	Damage Estimates		Total	Data Source
				Property	Crop/Livestock		
4/29/2002	Wildfire			\$90,000		\$90,000	NCDC, August 2004
6/14/2002	Wildfire					\$0	GACC, 2010
7/14/2002	Severe Wind			\$300		\$300	NCDC, August 2004
7/26/2002	Flooding			\$30,000		\$30,000	NCDC, August 2004
5/11/2003	Wildfire					\$0	GACC, 2010
5/15/2003	Wildfire					\$0	GACC, 2010
7/13/2003	Severe Wind			\$5,000		\$5,000	NCDC, August 2004
7/23/2003	Flooding			\$30,000		\$30,000	NCDC, August 2004
7/29/2003	Severe Wind			\$5,000		\$5,000	NCDC, August 2004
8/18/2003	Flooding			\$24,000		\$24,000	NCDC, August 2004

Date	Hazard	Description	Location
7/14/2004	Flooding	A county official reported that the Vereda Neblina Road was washed out and was impassable. A weakening upper level disturbance over Northern Chihuahua, Mexico moved into Southeast Arizona where plenty of moisture was already in place due to tropical storm Blas. Precipitable water was almost double the normal level for mid-July thanks to these features. An upper air sounding from late morning showed an increase in the east wind shear causing the initial storms to train. This led to the flooding of areas in Santa Cruz county.	RIO RICO
7/16/2004	Flooding	Law enforcement reported that a vehicle was stuck in the Nogales wash. The vehicle became stuck when the driver tried to cross a roadway that was flooded by the wash.	NOGALES
7/26/2004	Flooding	A wall of water swept a woman and two teenage girls off their feet and washed them downstream. The two girls were rescued by local officials, however the woman could not be saved.	NOGALES
8/13/2004	Flooding	Significant rain fell in the town of Rio Rico causing significant street flooding as well as homes being flooded and property being ruined. High water flowed down the streets, causing them to be impassable. 7 homes were flooded, some with damage. The force of the water also knocked a block wall down along one backyard.	RIO RICO
9/7/2004	Hazardous Materials Incident	REPORTING A MATERIAL RELEASE FROM A SCIENCE THERMOMETER THAT WAS DROPPED ON THE FLOOR. - - UNKNOWN AMOUNT OF MERCURY RELEASED WITH THIS FIXED INCIDENT.- -	RIO RICO
11/15/2004	Hazardous Materials Incident	CALLER STATED THAT A CAR RAN OVER A METER RISER AND BROKE THE METER SETUP AND RELEASED NATURAL GAS WHICH CAUSED THE CAR, TELEPHONE PEDAL STOOD, 2 GAS METER SET UPS CATCH ON FIRE AND DAMAGE TO THE SKIRT OF A NEAR BY TRAILER. - - UNKNOWN AMOUNT OF NATURAL GAS RELEASED WITH THIS PIPELINE INCIDENT.- -	NOGALES
5/14/2005	Wildfire	Salero Fire - a human caused fire that burned an area called San Luis Baca Land Grant. The fire started May 14, 2005 and was controlled May 20, 2005, and burned a total of 1,650 acres with over \$100,000 in fire suppression costs.	
5/20/2005	Extreme Temperature	A strong high pressure ridge across Arizona caused extreme heat across the desert Southwest. The heat was extreme from May 20, 2005 until May 26, 2005, with the hottest days being May 20th thru 23rd. Throughout this heat wave several bodies, some identified and some not, were found in the desert	AZZ032>035 C
7/2/2005	Extreme Temperature	A strong ridge of high pressure across Arizona caused extreme heat in the desert Southwest with temperatures above seasonal normals. The extreme heat lasted for the first two weeks of July with some of the hottest days being over the Fourth of July weekend. Throughout this heat wave several bodies,	AZZ032 - 034>0
7/7/2005	Wildfire	burned a total of 23,183 acres, injured 13 firefighters and was contained on July 21, 2005 at 6 pm MST. At the peak of the fire there were 986 personnel and the total cost to suppress the fire was 8.1 million dollars. Below is a few of the dates when main events occurred with this fire. July 9, 2005 - Some	Santa Cruz County

Date	Hazard	Fatalities	Injuries	Damage Estimates		Total	Data Source
				Property	Crop/Livestock		
7/14/2004	Flooding			\$3,000		\$3,000	NCDC, January 2006
7/16/2004	Flooding			\$5,000		\$5,000	NCDC, January 2006
7/26/2004	Flooding		1 2			\$0	NCDC, January 2006
8/13/2004	Flooding			\$20,000		\$20,000	NCDC, January 2006
9/7/2004	Hazardous Materials Incident					\$0	NRC 2008, 734383
11/15/2004	Hazardous Materials Incident					\$0	NRC 2008, 741398
5/14/2005	Wildfire					\$0	GACC, 2010
5/20/2005	Extreme Temperature	12				\$0	NCDC, April 2010
7/2/2005	Extreme Temperature	9				\$0	NCDC, April 2010
7/7/2005	Wildfire		13			\$0	NCDC, April 2010

Date	Hazard	Description	Location
7/7/2005	Wildfire	The Florida Fire was a lightning caused fire that started on July 7, 2005 in the Santa Rita Mountains about 25 miles south of the City of Tucson. The fire burned a total of 23,183 acres, injured 13 firefighters and was contained on July 21, 2005 at 6 pm MST. At the peak of the fire there were 986 personnel, and the total cost to suppress the fire was 8.1 million dollars. Below is a few of the dates when main events occurred with this fire. July 9, 2005 - Some trails leading to the fire area are closed. July 11, 2005 - All public access to Madera Canyon Recreation area was restricted. July 13, 2005 - At 10 am	AZZ034 Santa
7/20/2005	Severe Wind	Strong thunderstorm winds near the Town of Patagonia caused a several hundred pound storage shed to be damaged when blown across a yard. Also shingles were torn off several roofs in a neighborhood.	Patagonia
8/8/2005	Flooding	A mudslide and flooding event occurred in Madera Canyon after significant rainfall. This area is flood prone due to the fire that occurred only a month before. Large boulders and trees were moved with the mud and water down the mountain, doing damage to one residence. No one was injured.	Madera Canyon
8/16/2005	Hazardous Materials Incident	RAW SEWAGE RELEASED FROM BROKEN SEWER LINES DUE TO SEWER LINES BROKE FROM AGE. - - UNKNOWN AMOUNT OF RAW SEWAGE RELEASED WITH THIS PIPELINE INCIDENT.- -	NOGALES
8/23/2005	Flooding	Two miles south of the Town of Amado a berm failed and caused two to three feet of water to run through a local farm, causing damage to crops and equipment in the field.	Amado - 2 miles south
9/14/2005	Hazardous Materials Incident	THE MATERIAL RELEASED FROM A TANK CAR DUE TO UNKNOWN CAUSES AT THIS TIME. - - UNKNOWN AMOUNT OF SULFURIC ACID RELEASED WITH THIS RAILROAD INCIDENT.- -	RIO RICO
3/14/2006	Hazardous Materials Incident	SANTA CRUZ RIVER. APPROX 90-100 GALLONS OF DIESEL RELEASED FROM THE TRACTOR'S SADDLE TANK AND A FUEL TANK FOR THE TRAILER'S GENERATOR INTO THE WATER. TRUCK WAS HAULING A LOAD OF VEGETABLES - - 100 GALLON(S) OF OIL, FUEL: NO. 2-D RELEASED WITH THIS MOBILE INCIDENT.- -	RIO RICO
4/25/2006	Hazardous Materials Incident	JET FUEL SPILLED ONTO A SOIL SURFACE FROM AN 40 FOOT LONG BY 60 FOOT WIDE UNMANNED AIRCRAFT IN A REMOTE DESERT AREA. - - 174 GALLON(S) OF JET FUEL: JP-5 (KEROSENE, HEAVY) RELEASED WITH THIS AIRCRAFT INCIDENT.- -	RIO RICO
4/25/2006	Hazardous Materials Incident	//////////WEB REPORT//////////DURING A ROUTINE PATROL, A PREDATOR B (MQ 9) UAV IMPACTED THE GROUND 30 MILES NORTHWEST OF NOGALES, AZ, OR APPROXIMATELY N31 34.137, W 110 56.484. - - UNKNOWN AMOUNT OF JET FUEL RELEASED WITH THIS AIRCRAFT INCIDENT.- -	NOGALES
5/18/2006	Hazardous Materials Incident	THE CALLER REPORTED FOUR EMPLOYEES THAT WORKED AT A WAREHOUSE WHICH STORES GRAPES GOT SICK DUE TO UNKNOWN REASONS. AS THE FIRE DEPARTMENT ENTERED THE WAREHOUSE, THEIR FIRST LEL READING WAS TWO, ON THEIR SECOND READING THE LEL READING WAS 35. THE FIRE DEPARTMENT WAS UNABLE TO IDENTIFY THE SOURCE OF THIS INCIDENT. - - UNKNOWN AMOUNT OF UNKNOWN MATERIAL RELEASED WITH THIS FIXED INCIDENT.- -	NOGALES
7/25/2006	Flooding	At 1600 MST a trained spotter in the Community of Tubac reported that the washes were running very high and that about 2 inches of rain had fallen in that area. Again around 1600 MST the Santa Cruz County Flood Control Official reported flooding in the Community of Tumacacori. The official reported that a box culvert had overtopped near the frontage road of Interstate 19. A private residence had one foot of water enter the home and the visitor center at the Tumacacori National Monument also had a foot of water flood their property. Additionally, at 1640 MST the Santa Cruz County Flood Control Official reported that 8 inches of water was flowing over Interstate 19 at the Chavez Siding Road exit. Two vehicles were reported to be stuck in the flood water at the underpass located near the same exit.	Rio Rico

Date	Hazard	Fatalities	Injuries	Damage Estimates		Total	Data Source
				Property	Crop/Livestock		
7/7/2005	Wildfire	<u>Cruz Co.</u>	13			\$0	NCDC, April 2010
7/20/2005	Severe Wind			\$6,000		\$6,000	NCDC, April 2010
8/8/2005	Flooding			\$30,000		\$30,000	NCDC, January 2006
8/16/2005	Hazardous Materials Incident					\$0	NRC 2008, 769453
8/23/2005	Flooding			\$5,000	\$5,000	\$10,000	NCDC, April 2010
9/14/2005	Hazardous Materials Incident					\$0	NRC 2008, 772513
3/14/2006	Hazardous Materials Incident					\$0	NRC 2008, 790909
4/25/2006	Hazardous Materials Incident					\$0	NRC 2008, 796253
4/25/2006	Hazardous Materials Incident					\$0	NRC 2008, 798267
5/18/2006	Hazardous Materials Incident					\$0	NRC 2008, 797659
7/25/2006	Flooding			\$20,000		\$20,000	NCDC, April 2010

Date	Hazard	Description	Location
8/17/2006	Hazardous Materials Incident	CALLER STATED THAT MARIJUANA AND (4) 1 OUNCE BOTTLES OF UNKNOWN CHEMICAL LABELED (ETHYLEIC ETHER) WRITTEN IN SPANISH WAS FOUND IN A CANYON BY BOARDER PATROL. - - 4 LITER(S) OF ETHYLEIC ETHER RELEASED WITH THIS FIXED INCIDENT.- -	RIO RICO
12/7/2006	Hazardous Materials Incident	THE PRODUCT INTO THE US. THE CALLER HAD VERY LIMITED INFORMATION. HE DID NOT KNOW IF THERE WAS SHEEN ON THE WATER OR WHAT EXACTLY HAS HAPPENED. - - UNKNOWN AMOUNT OF GASOLINE: AUTOMOTIVE (UNLEADED) RELEASED WITH THIS FIXED INCIDENT.- -	NOGALES
6/23/2007	Wildfire	Frontera Fire - the cause of the fire is under investigation that burned an area half mile north of the Mexico border, south of Arivaca, Arizona. The fire started June 23, 2007 and was controlled June 25, 2007, and burned 350 acres with over \$125,000 in fire suppression costs.	
7/17/2007	Severe Wind	Several trees were knocked down in the downtown area of Nogales due to strong winds from a strong thunderstorm. EPISODE NARRATIVE: Ample monsoonal moisture combined with daytime heating caused strong thunderstorms over Santa Cruz County.	Nogales
8/9/2007	Severe Wind	A severe thunderstorm near Sonoita caused several downed power lines and damage to two residences. An isolated severe thunderstorm across Santa Cruz county caused damage in the Sonoita area.	Sonoita
8/14/2007	Flooding	Seven illegal immigrants were saved by the U.S. border patrol in the Nogales wash in the City of Nogales from flash flooding. A severe thunderstorm occurred across the Oro Valley area in Eastern Pima County. Flash flooding also occurred in the City of Nogales were seven illegal border crossers were swept away by running flood waters.	Nogales
4/18/2008	Wildfire	Alamo Fire - a human caused fire that burned an area 13 miles west of Nogales, Arizona. The fire started April 18, 2008 and was controlled April 28, 2008, and burned a total of 5,070 acres with over \$1,478,000 in fire suppression costs.	
4/23/2008	Wildfire	Beehive Fire - a human caused fire that burned an area 18 miles northwest of Nogales, Arizona. The fire started April 23, 2008 and was controlled April 30, 2008, and burned 325 acres with over \$867,500 in fire suppression costs.	
6/23/2008	Wildfire	Nuevo Fire - a human caused fire that burned an area 17 miles northwest of Nogales, Arizona. The fire started June 23, 2008 and was controlled June 29, 2008, and burned 1,533 acres with over \$416,434 in fire suppression costs.	
8/19/2008	Severe Wind	A trained spotter reported roof damage to their residence due to wind from a thunderstorm. An isolated severe thunderstorm over Nogales produced localized wind damage.	Nogales
8/26/2008	Hazardous Materials Incident	A DISCHARGE OF AN UNIDENTIFIED PETROLEUM PRODUCT AND POSSIBLY ALSO A PAINT PRODUCT HAS DISCHARGED ONTO THE ROAD. THE SOURCE IS UNKNOWN	TUMACACORI
2/12/2009	Hazardous Materials Incident	CALLER IS REPORTING A DIESEL DISCHARGE FROM A DELIVERY TRUCK TO THE GROUND DUE TO UNKNOWN CAUSES.	MATAGONIA
3/25/2009	Wildfire	Montana Fire - a human caused fire that burned an area 10 miles southeast of Arivaca, Arizona, north of Bear Valley Ranch and Sycamore Canyon. The fire started March 25, 2009 and was controlled April 6, 2009, and burned 2,400 acres with over \$400,000 in fire suppression costs.	
4/9/2009	Hazardous Materials Incident	DIESEL FUEL SPILLED FROM A TRACTOR TRAILER TRUCK'S FUEL TANK. THE TRUCK FELL FROM A MAINTENANCE JACK, RUPTURING BOTH FUEL TANKS. THE FUEL HAS SEEPED THROUGH CRACKS IN THE ASPHALT AND HAS CONTAMINATED THE SUBSURFACE.	NOGALES
4/21/2009	Wildfire	Fish Fire - a human caused fire that burned an area 6 miles northwest of Sonoita, Arizona. The fire started April 21, 2009 and was controlled April 23, 2009, and burned 1,050 acres with over \$120,000 in fire suppression costs.	
5/2/2009	Wildfire	Elgin Fire - the cause of the fire is under investigation that burned an area 1 mile northeast of Elgin, Arizona. The fire started May 2, 2009 and was controlled May 7, 2009, and burned 1,420 acres with over \$335,000 in fire suppression costs. Three out building were destroyed.	

Date	Hazard	Fatalities	Injuries	Damage Estimates		Total	Data Source
				Property	Crop/Livestock		
8/17/2006	Hazardous Materials Incident					\$0	NRC 2008, 808178
12/7/2006	Hazardous Materials Incident					\$0	NRC 2008, 820324
6/23/2007	Wildfire					\$0	GACC, 2010
7/17/2007	Severe Wind			\$3,000		\$3,000	NCDC, April 2010
8/9/2007	Severe Wind			\$25,000		\$25,000	NCDC, April 2010
8/14/2007	Flooding		1			\$0	NCDC, April 2010
4/18/2008	Wildfire					\$0	GACC, 2010
4/23/2008	Wildfire					\$0	GACC, 2010
6/23/2008	Wildfire		1			\$0	GACC, 2010
8/19/2008	Severe Wind			\$3,000		\$3,000	NCDC, April 2010
8/26/2008	Hazardous Materials Incident					\$0	NRC, 881974
2/12/2009	Hazardous Materials Incident					\$0	NRC, 2010; 897950
3/25/2009	Wildfire					\$0	GACC, 2010
4/9/2009	Hazardous Materials Incident					\$0	NRC, 2010;902353
4/21/2009	Wildfire					\$0	GACC, 2010
5/2/2009	Wildfire					\$0	GACC, 2010

Date	Hazard	Description	Location
5/5/2009	Wildfire	Wildfire burned near 5,000 acres near Fort Huachuca in Santa Cruz County. The fire burned at least four homes and six private vehicles near the west gate entrance. One injury was reported due to burns from the fire. A brush fire burned more than 5,000 acres and at least four homes in a subdivision near Fort Huachuca's West Gate. One person suffered burn injuries related to the fire. Dry westerly flow brought dry conditions to Santa Cruz County, with winds gusting to near 25 mph.	AZZ034 Santa C
5/5/2009	Wildfire	Canelo Fire - a human caused fire that burned an area 10 miles south of Sonoita, Arizona. The fire started May 5, 2009 and was controlled May 16, 2009, and burned 4,025 acres with over \$1,730,976 in fire suppression costs. The fire destroyed 3 homes and 5 other buildings.	
6/11/2009	Wildfire	Lochiel Fire - a human caused fire that burned an area in San Rafael Valley, 15 miles south of Patagonia, Arizona. The fire started June 11, 2009 and was controlled June 16, 2009, and burned 2,800 acres with over \$200,000 in fire suppression costs.	
6/23/2009	Wildfire	Ruby Fire - the cause of the fire is under investigation that burned an area 7 miles southeast of Arivaca, Arizona. The fire started June 23, 2009 and was controlled July 1, 2009, and burned 130 acres with over \$50,000 in fire suppression costs.	
6/30/2009	Severe Wind	Severe thunderstorm outflow winds estimated at 60 mph blew down a large tree near downtown Nogales. High pressure aloft remained near the Four Corners region, resulting in a continued east to northeast flow aloft over southeast Arizona. Plentiful moisture again led to scattered afternoon and evening thunderstorms. With boundary layer moisture still somewhat drier, thunderstorms were again able to produce strong to severe downburst or microburst winds.	Nogales
11/12/2009	Hazardous Materials Incident	CALLER IS REPORTING THAT THERE WAS A RELEASE OF DRILLING MUD INTO A STEAM THAT LEADS TO CALIFORNIA GULCH. THE CALLER BELIEVES IT IS DUE TO AN EXPLORATORY DRILLING IN THE AREA FOR SILVER OR COPPER DEPOSITS.	NOGALES
1/11/2010	Wildfire	Apache Fire - a human caused fire that burned an area 15 miles NW of Nogales. The fire started January 11, 2010 and was controlled January 15, 2011, and burned 336 acres with over \$25,000 in fire suppression costs.	
1/11/2010	Wildfire	Black Peak Fire - a human caused fire that burned an area 6 miles S. of Arivaca. The fire started January 11, 2010 and was controlled January 15, 2011, and burned 898 acres with over \$60,000 in fire suppression costs.	
3/17/2010	Hazardous Materials Incident	CALLER STATED THAT A FORK LIFT DRIVER DROVE INTO A GAP BETWEEN A LOADING DOCK AND A BOBTAIL. THE FORKLIFT FELL AND PINNED THE DRIVER. THE BATTERY UNIT ON THE FORKLIFT RELEASED SULFURIC ACID ONTO THE FORKLIFT DRIVER, BURNING HIM. HE WAS TAKEN TO THE HOSPITAL.	RIO RICO
4/30/2010	Hazardous Materials Incident	CALLER STATED THERE WAS A TANKER TRUCK ROLL OVER ACCIDENT WHICH RESULTED IN A SPILL OF DIESEL AND A SERIOUS INJURY TO THE DRIVER. CALLER STATED THE SPILL CAME FROM THE CARGO OF THE TANKER TRUCK AND THE SADDLE TANK.	RIO RICA
5/16/2010	Wildfire	Fraguita Fire - a fire of unknown cause that burned an area 5 miles south of Arivaca. The fire started May 16, 2010 and was controlled May 25, 2010, and burned 1,914 acres with over \$165,000 in fire suppression costs.	
5/26/2010	Hazardous Materials Incident	CALLER IS REPORTING A FREIGHT TRAIN STRIKING A TRESPASSER RESULTING IN A FATALITY.	AMADO
7/17/2010	Severe Wind	Severe thunderstorm winds impacted much of Santa Cruz County. Law enforcement reported a tree was downed by the winds near the intersection of State Highway 82 and Duquesne Road. A trained spotter measured a wind gust of 60 mph near Rio Rico, and another trained spotter measured a wind gust of 58 mph at Nogales.	
7/19/2010	Severe Wind	A severe thunderstorm microburst produced damaging winds in Rio Rico. A portion of a home's roof was blown off, and brought down a power line as it landed in Rio Rico Drive. Thunderstorm winds also blew down several dying trees between the Santa Cruz River bridge and the railroad tracks, and blew down a cyprus tree onto the roof of a home on East Rio Rico Drive. Winds were measured on a neighbor's anemometer at 75 mph.	

Date	Hazard	Fatalities	Injuries	Damage Estimates		Total	Data Source
				Property	Crop/Livestock		
5/5/2009	Wildfire	<u>Santa Cruz County</u>	1	\$560,000		\$560,000	NCDC, April 2010
5/5/2009	Wildfire		2			\$0	GACC, 2010
6/11/2009	Wildfire					\$0	GACC, 2010
6/23/2009	Wildfire					\$0	GACC, 2010
6/30/2009	Severe Wind			\$5,000		\$5,000	NCDC, April 2010
11/12/2009	Hazardous Materials Incident					\$0	NRC, 2010; 923327
1/11/2010	Wildfire					\$0	GACC, 2011
1/11/2010	Wildfire					\$0	GACC, 2011
3/17/2010	Hazardous Materials Incident		1			\$0	NRC, 2010; 934320
4/30/2010	Hazardous Materials Incident		1			\$0	NRC, 2010; 938632
5/16/2010	Wildfire					\$0	GACC, 2011
5/26/2010	Hazardous Materials Incident					\$0	NRC, 2010; 941772
7/17/2010	Severe Wind			\$2,000	\$0	\$2,000	NCDC, 2011
7/19/2010	Severe Wind			\$25,000	\$0	\$25,000	NCDC, 2011

Date	Hazard	Description	Location
7/30/2010	Flooding	Flash flooding from rainfall south of the International Border resulting in the Nogales Wash rising 7 feet in 15 minutes. This caused some damage to the bank protection including three concrete panels in the wash. Part of Old Tucson Road, which parallels the wash, was partially eroded.	Nogales
8/15/2010	Hail	An owner of a grape vineyard in Elgin reported hail for 15 minutes with the largest being golf ball size (1.75). Damage to the vineyard was extensive, with nearly all the 2010 grape crop lost. Crop losses at this one vineyard were estimated at six tons which translated to between 10 and 15 thousand dollars, ultimately resulting in a loss of wine valued at 100 to 150 thousand dollars. Extensive damage was also sustained at other vineyards in area. Hail also dented vehicles and broke their windows.	Elgin
8/15/2010	Severe Wind	Just before and during the storm, an owner of a grape vineyard in Elgin reported an estimate of at least 60 mph winds. Damage was limited to farm structures and not dwellings.	Elgin
8/21/2010	Flooding	Very heavy rain in Nogales, Sonora caused the Nogales Wash to rise 7 feet in less than one hour. The wash rose above flood stage, causing erosion to one roadway in Nogales, Arizona.	Nogales
1/27/2011	Wildfire	Jelks Fire - a human caused fire that burned an area Southeast of Sonoita. The fire started January 27, 2011 and was controlled January 28, 2011, and burned 716 acres with over \$5,000 in fire suppression costs.	
2/2/2011	Winter Storm	<p>The Upper Santa Cruz River Valley experienced numerous issues with broken water pipes as temperatures dipped into the upper single digits to mid teens. Robert Bracker Elementary School in Nogales was canceled due to broken pipes. An underground water line ruptured in the Monte Carlo neighborhood, where the road had to be dug up to replace the line. Also, an air release valve on a 16 inch pipeline that feeds the city water system from the Santa Cruz River burst, blasting water into the air. The Nogales Fire Department also responded to a two car collision caused by icy roads on Target Range Road. Four people were involved and two were injured and taken to the Holy Cross Hospital. In Patagonia, an elderly resident had to be evacuated to her sister's house after the pipes in the ceiling burst causing drywall to fall. Also, ranchers near Sonoita reported a water pump bursting causing a cattle tank with thousands of gallons of water to drain out. Several communities across the Upper San Pedro River Valley suffered from frozen and burst water pipes as temperatures dropped into the single digits to low teens. In addition, 4500 Sierra Vista Southwest Gas customers lost their natural gas flow. Most of the damage was at Fort Huachuca where over 400 homes suffered from broken water pipes with more than 100 homes sustaining damage. About 40 outpost buildings had ceilings collapse due to broken water pipes. Sierra Vista Fire Department also responded to several fire calls related to space heaters and candles.</p> <p>In Benson, the city received over 100 calls regarding burst water pipes. The San Pedro Terrace Apartments on Pearl Street and the Desert Road Inn suffered damage from burst pipes and had to be evacuated. Residents and guests were transported to Sierra Vista hotels. A water pipe burst in the Benson Middle School Library ceiling causing damage to the ceiling, carpets, and shelves. Books on the shelves sustained light damage. The Benson Visitors and Community Center, Benson Public Library, and Cochise College Benson Center also sustained damage.</p> <p>The St. David School District reported damage to one boiler, the main fire raiser for the sprinkler system, broken pipes in the weight-room wall and one drinking fountain. School did not have to be canceled.</p>	UPPER SANTA CRUZ RIVER AND ALTAR VALLEYS

Date	Hazard	Fatalities	Injuries	Damage Estimates		Total	Data Source
				Property	Crop/Livestock		
7/30/2010	Flooding			\$100,000	\$0	\$100,000	NCDC, 2011
8/15/2010	Hail			\$10,000	\$75,000	\$85,000	NCDC, 2011
8/15/2010	Severe Wind			\$1,000		\$1,000	NCDC, 2011
8/21/2010	Flooding			\$2,000		\$2,000	NCDC, 2011
1/27/2011	Wildfire					\$0	GACC, 2011
2/2/2011	Winter Storm			\$500,000		\$500,000	NCDC, 2017; Broadcast Media

Appendix E

Plan Maintenance Review Memorandums