

# Santa Cruz County Community Wildfire Protection Plan

Prepared For:  
State of Arizona, Department of Forestry and Fire Management

Prepared By:  
Matrix New World Engineering  
Great Ecology  
Southwest Policy Advocates

3.9.2026 Issued for Adoption



**MATRIXNEWORLD**  
A TRUE ENVIRONMENTAL COMPANY



**GREATECOLOGY**  
a TRUE ENVIRONMENTAL company



Page intentionally blank

## **Disclaimers:**

This document is intended for community planning purposes only to aid implementation, prioritization and funding of wildfire protection measures. The analysis herein was used to help prioritize general protection measure locations yet is not to be used to accurately predict future fire behavior or fire events. It is not to be used by entities seeking to support or justify insurance rate increases.

# Contents

- Contents .....iii
- Letter from the Arizona Department of Forestry and Fire Management..... vi
- Acknowledgements ..... vii
- User Guide.....viii
- 1.0 Introduction ..... 1**
- 2.0 Background ..... 2**
  - 2.1 County Context ..... 2
  - 2.2 Communities at Risk ..... 6
  - 2.3 Wildfire Risk Assessment.....12
    - 2.3.1 Fire History..... 12
    - 2.3.2 Physical Conditions of Santa Cruz County .....15
    - 2.3.3 Risk Model & Assessment.....23
    - 2.3.4 Community Scale Fire Model Analysis.....27
- 3.0 Recommendations.....39**
  - 3.1 Fuel Treatment Priorities..... 39
    - 3.1.1 Existing Fuel Treatment Methods & Projects..... 39
    - 3.1.2 Proposed Fuel Treatment Methods.....42
    - 3.1.3 Proposed Fuel Treatment Projects.....51
  - 3.2 Structure Hardening .....71
  - 3.3 Defensible Space..... 76
- 4.0 Additional Community Considerations .....79**
- References..... 85**

# Figures

Figure 1. Santa Cruz County Locator (Santa Cruz County, Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) 2024).....	4
Figure 2. County Land Ownership, Communities & Wildland Urban Interface .....	5
Figure 3. Fire Department Response Areas & Communities at Risk .....	11
Figure 4. County-Wide Fire History (1990-2025) .....	14
Figure 5. County-Wide Vegetation Cover.....	18
Figure 6. County-Wide Topography, Weather Patterns & Hydrology.....	22
Figure 7. Fire Model Input Criteria.....	25
Figure 8. County-Wide Fire Model & Wildland Urban Interface .....	26
Figure 9. Tubac Fire Model.....	28
Figure 10. Rio Rico Fire Model.....	30
Figure 11. Nogales Fire Model.....	32
Figure 12. Patagonia Fire Model.....	35
Figure 13. Sonoita Elgin Fire Model.....	38
Figure 14. Existing & Completed Fuel Reduction & Treatment Projects in Santa Cruz County .....	41
Figure 15. County-Wide Proposed Fuel Treatment Projects.....	53
Figure 16. County-Wide Proposed Fuel Treatment Projects & Vegetation Cover .....	54
Figure 17. Tubac Proposed Fuel Treatment Projects .....	57
Figure 18. Rio Rico Proposed Fuel Treatment Projects .....	60
Figure 19. Nogales Proposed Fuel Treatment Projects.....	63
Figure 20. Patagonia Proposed Fuel Treatment Projects.....	66
Figure 21. Sonoita-Elgin Proposed Fuel Treatment Projects .....	69
Figure 22. Structure Hardening and Defensible Space Zones (National Fire Protection Association 2021).....	71
Figure 23. Structure Hardening Recommendations (National Fire Protection Association 2021) ( National Fire Protection Association 2025).....	73
Figure 24. Firewise Tree Spacing & Pruning Guidelines ( National Fire Protection Association 2025) .....	77
Figure 25. National Fire Protection Association Vegetation Spacing on Slope Guidelines (National Fire Protection Association 2021) .....	78

## Tables

Table 1. Communities of Santa Cruz County, AZ (2020 Census) .....	3
Table 2. Existing Fire Fighting Resources in Place .....	8
Table 3. County-Wide Vegetation Cover by Acreage & Fire Risk .....	19
Table 4. Proposed Fuel Treatment Methods.....	42
Table 5. Tubac Proposed Fuel Treatment Projects.....	58
Table 6. Rio Rico Proposed Fuel Treatment Projects .....	61
Table 7. Nogales Proposed Fuel Treatment Projects.....	64
Table 8. Patagonia Proposed Fuel Treatment Projects .....	67
Table 9. Sonoita-Elgin Proposed Fuel Treatment Projects.....	70
Table 10. Structure Hardening & Defensible Space Zones ( <b>National Fire Protection Association 2025</b> ) ( <b>National Fire Protection Association 2021</b> ).....	72
Table 11. Structure Hardening Recommendations ( <b>National Fire Protection Association 2021</b> ) ( <b>National Fire Protection Association 2025</b> ) .....	74
Table 12. Firewise Recommendations for Defensible Space ( <b>National Fire Protection Association 2025</b> ) ( <b>National Fire Protection Association 2021</b> ).....	78
Table 13. Methods for Establishing Cross-Jurisdictional Partnerships.....	79

## Appendices

Appendix A. Vegetation Communities, Types, and Descriptions	
Appendix B. Fire Modeling Ranking & Comprehensive Input Criteria Methodology	
Appendix C. Stakeholder Engagement Materials	
Appendix D. Fuel Treatment Recommendations by Vegetation Community & Specific Vegetation Type	
Appendix E. Community Fuel Treatment Projects: Using the Online Dashboard for Project Planning	

# Letter from the Arizona Department of Forestry and Fire Management

Dear Santa Cruz County Stakeholders,

This document represents a step forward in protection against wildfire for Santa Cruz County. We have seen first-hand the destruction that fires cause – to the landscape and to communities. At a time when communities face increasing risk, the Community Wildfire Protection Plan (CWPP) becomes both urgent and necessary. To make measurable reductions in the level of risk, Santa Cruz County needs to align around common goals and priorities countywide. Through thoughtful collaboration, the tactics and priorities outlined here have gained consensus among first responders, community stakeholders, and the institutions/organizations implementing wildfire reduction programs.

This CWPP is intended as a planning and assessment tool for agencies and landowners within Santa Cruz County. Some ways in which the CWPP can be used:

- Protect property (structures and landscapes) from wildfire events;
- Understand wildfire risks and priority wildfire reduction projects across Santa Cruz County;
- Build understanding of stakeholders and organizations partnering to protect Santa Cruz County from wildfire; and
- Apply for grants and funding to implement wildfire reduction projects.

The Arizona Department of Forestry and Fire Management is grateful to the individuals and organizations that supported the CWPP development. Over the next ten years, we anticipate fruitful, meaningful collaboration to implement priorities outlined in the following pages. Please reach out to [kgehrke@dffm.az.gov](mailto:kgehrke@dffm.az.gov) with any questions.

Regards,

Karl Gehrke

# Acknowledgements

## Collaborating Organizations:

Department of Forestry and Fire Management, Arizona Department of Transportation, City of Nogales Fire Department; Tubac Fire District; Rio Rico Fire and Medical District; Nogales Fire Department; Patagonia Volunteer Fire & Rescue; Sonoita-Elgin Fire District; Coronado National Forest; Bureau of Land Management; National Park Service; United States Forest Service; Santa Cruz County Emergency Management; Tucson Bird Alliance; Tubac Nature Center.

## Stakeholders:

Representatives from City of Nogales Fire Department; Tubac Fire District; Rio Rico Fire and Medical District; Nogales Fire Department; Patagonia Volunteer Fire & Rescue; Sonoita-Elgin Fire District, Santa Cruz County Emergency Management, United States Forest Service, Bureau of Land Management, local ranchers, vineyard owners, HOA leaders, environmental NGOs, business owners. County of Santa Cruz employees Sobe Castro and Brenda Herrera.

## Meeting Hosts:

United States Forest Service Nogales Ranger District

## Consultants:

Matrix New World Engineering

Southwest Policy Advocates

Great Ecology

# User Guide

User Group	Needs	Key Sections*
<b>Fire Chiefs, Fire Department Leaders</b>	Operational risk intel, cross-jurisdictional planning, project alignment	Entire Document
<b>Emergency Managers</b>	County & community evacuation planning and protocol	Entire Document (Key Section: 4.0 Additional Community Considerations)
<b>General Public, Local Organizations and Media</b>	High level overview and priorities	1.0 Introduction 2.0 Background Recommendations
<b>Homeowners and Landowners</b>	Practical steps to reduce wildfire risk around structures and property	3.2 Structure Hardening 3.3 Defensible Space 3.1.2 Proposed Fuel Treatment Methods
<b>Landowners / Land Managers / Land Agencies</b>	Landscape-scale fuel reduction tactics, cross-jurisdictional planning, project alignment	2.3.2 Physical Conditions 3.1.2 Proposed Fuel Treatment Methods 3.1.3 Proposed Fuel Treatment Projects Appendix A. Vegetation Types, Communities, and Descriptions Appendix D. Fuel Treatment Recommendations by Vegetation Community Appendix E. Using the Online Dashboard for Project Planning
<b>Tubac Residents</b>	Community-specific risks & projects	2.2 Communities at Risk 2.3.4 Community Scale Fire Model Analysis 3.1.3 Proposed Fuel Treatment Projects
<b>Rio Rico Residents</b>	Community-specific risks & projects	2.2 Communities at Risk 2.3.4 Community Scale Fire Model Analysis 3.1.3 Proposed Fuel Treatment Projects
<b>Nogales Residents</b>	Community-specific risks & projects	2.2 Communities at Risk 2.3.4 Community Scale Fire Model Analysis 3.1.3 Proposed Fuel Treatment Projects
<b>Patagonia Residents</b>	Community-specific risks & projects	2.2 Communities at Risk 2.3.4 Community Scale Fire Model Analysis 3.1.3 Proposed Fuel Treatment Projects
<b>Sonoita-Elgin Residents</b>	Community-specific risks & projects	2.2 Communities at Risk 2.3.4 Community Scale Fire Model Analysis 3.1.3 Proposed Fuel Treatment Projects

\*This is not intended to be an exhaustive list. These section lists should be used only as a point of reference to find key information relevant to your needs. Reviewing the document in its entirety is the best course of action to find the most relevant information.

## List of Acronyms and Abbreviations

<b>ADOT</b>	Arizona Department of Transportation
<b>BLM</b>	Bureau of Land Management
<b>CNF</b>	Coronado National Forest
<b>CWDG</b>	Community Wildfire Defense Grants
<b>CWPP</b>	Community Wildfire Protection Plan
<b>DFFM</b>	Department of Forestry and Fire Management
<b>NFD</b>	Nogales Fire Department
<b>NPS</b>	National Park Service
<b>PVFR</b>	Patagonia Volunteer Fire and Rescue
<b>ROS</b>	Rate of Spread
<b>RRMFD</b>	Rio Rico Medical and Fire District
<b>SCCEM</b>	Santa Cruz County Emergency Management
<b>SEFD</b>	Sonoita-Elgin Fire District
<b>SR</b>	State Route
<b>SSVEC</b>	Sulphur Springs Valley Electric Cooperative
<b>TBA</b>	Tucson Bird Alliance
<b>TFD</b>	Tubac Fire District
<b>TNC</b>	Tubac Nature Center
<b>WUI</b>	Wildland Urban Interface
<b>USFS</b>	United States Forest Service
<b>USFWS</b>	United States Fish & Wildlife Service

# 1.0 Introduction

---

The Community Wildfire Protection Plan (CWPP) for Santa Cruz County, Arizona, provides comprehensive guidance to plan for and mitigate wildfire risk. Through robust stakeholder engagement and desktop analysis, this CWPP documents a wide range of existing conditions, risks, and outlines projects aiming to reduce wildfire risk and protect communities. This plan outlines actionable fuel reduction projects and various methods to reduce structural ignitability, create defensible space, and reduce fuel loads that increase wildfire risk. This CWPP provides the most up-to-date fire prevention and risk mitigation guidance for communities, homeowners, and emergency response agencies to implement over the coming years. Though the document does not focus on outlining tactics for the surrounding federal and state agencies, our recommendations in the following sections take these agencies' existing projects and risk reduction tactics into consideration. This document will help clarify objectives, implement programs and policies, and facilitate the creation of cross-jurisdictional partnerships within Santa Cruz County.

Wildfire is an essential ecological process, but invasive grasses and hotter, drier conditions have intensified fire behavior. To mitigate the risk of catastrophic wildfire, counties in Arizona are required to develop wildfire protection plans for communities to collaborate with federal, state, and local wildfire managers. These effects are especially pronounced in the area where human development meets undeveloped wildland, or the Wildland Urban Interface (WUI). The WUI zones surrounding communities and other critical infrastructure determines much of the framework for this CWPP. It is a critical area of prevention and protection where the level of risk to communities is very high; therefore, this CWPP rigorously focuses on WUI areas to prevent wildfire ignition and spread and protect lives and property within Santa Cruz County.

This CWPP has identified five priority communities within Santa Cruz County, each with its own fire department, wherein there are actionable priorities. Each community in the county should use this CWPP as guidance for structure hardening, defensible space, and fuel treatment projects.

The document begins with County background data and risk analysis (Section 2), then outlines tactics and priorities for fuel reduction, structure hardening, and

defensible space creation (Section 3), and provides additional resources/recommendations (Section 4). Please refer to the appendices for background information that shaped this CWPP, such as stakeholder engagement (Appendix C).

## 2.0 Background

---

### 2.1 County Context

As described in Santa Cruz County’s 2024 Multi-Jurisdictional Hazard Mitigation Plan, Santa Cruz County is in southern Arizona, sharing a border with Sonora, Mexico to the south, Pima County to the north and west, and Cochise County to the east (Figure 1). Spanning 1,236 square miles with a population of 47,669 (Census 2020) Santa Cruz County is Arizona’s smallest by land area, and fourth smallest by population (World Population n.d.). The main transportation routes in the county consist of Interstate 19 and State Highways 82, 83, and 289. The county consists of 34.8 percent private lands, 53.8 percent federal lands, and 11.4 percent state lands. Of the federal lands, the majority is held by the U.S Forest Service, Coronado National Forest, with smaller sections held by the Bureau of Land Management and the National Park Service. In neighboring Cochise County is the military’s Fort Huachuca. Of the state lands, much is held in state trust, with a few state parks; namely, Patagonia Lake State Park (Figure 2). These federal, state, and private lands are home to unique ecological communities. With elevations ranging from 3,022 feet within the Santa Cruz River Channel, and rising to 9,453 feet at the top of Mt. Wrightson, vegetation communities range from alpine conifer and oak forest, to woodlands, grasslands, and both Chihuahuan and Sonoran desert basins. Most of the county can be characterized by “high desert plains and foothills typical of the Chihuahuan desert.” (Santa Cruz County, Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) 2024). In the following section, vegetation cover plays a pivotal role in our recommendations for fuel treatments and fire prevention.

With only two incorporated communities, Patagonia & Nogales, the county is home to many other unincorporated communities and census-designated places (CDPs). As of 2020, 19,770 (41.5 percent) of the overall county population reside in Nogales, 804 (1.7 percent) reside in Patagonia, and 27,095 (56.8 percent) reside in

unincorporated communities and census-designated places (Census 2020)(Figure 2) (Table 1).

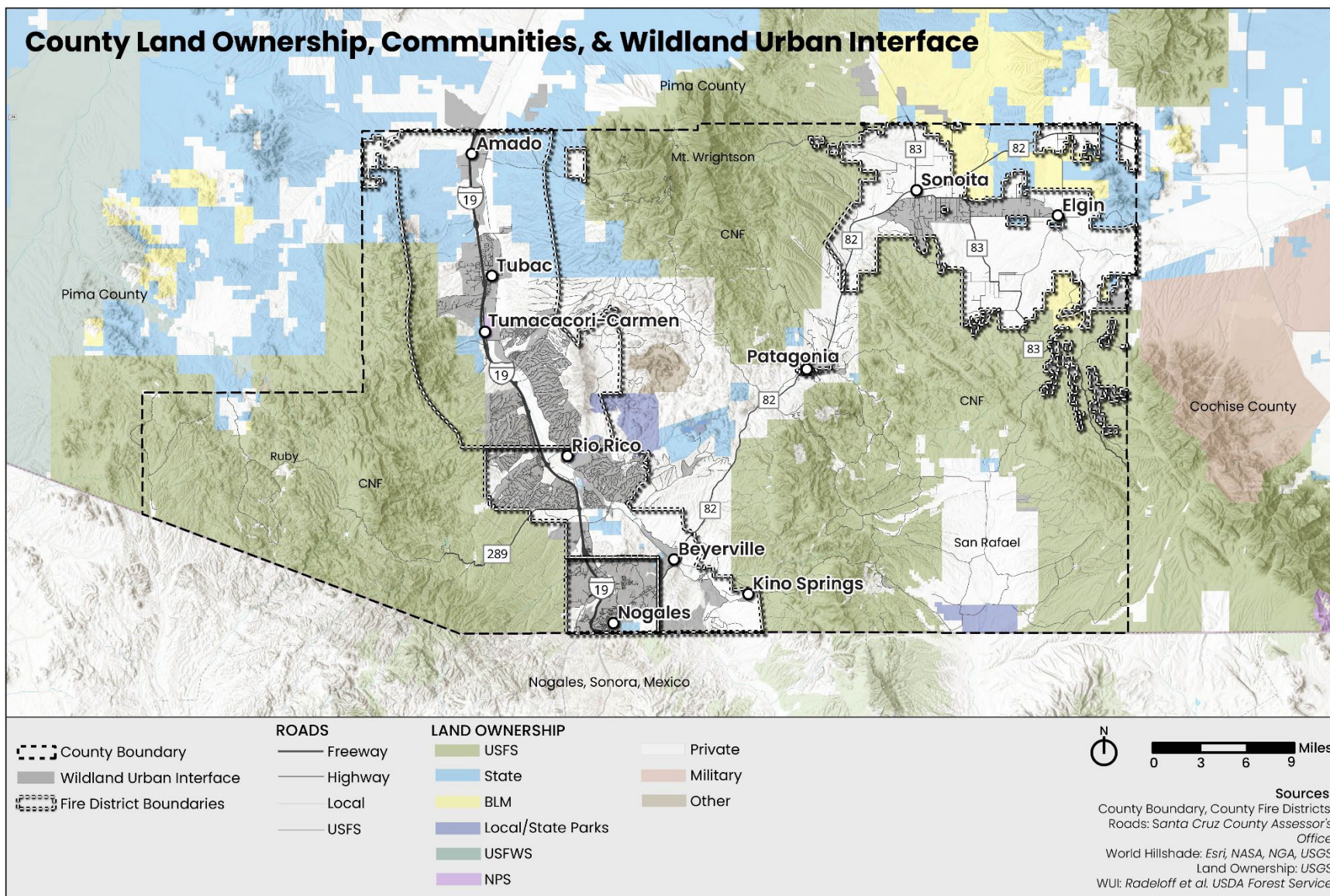
*Table 1. Communities of Santa Cruz County, AZ (2020 Census)*

Name	Incorporated?	2020 Census Population
Nogales	Incorporated City	19,763
Patagonia	Incorporated Town	804
Amado	Unincorporated, CDP	198
Beyerville	Unincorporated, CDP	72
Elgin	Unincorporated, CDP	162
Kino Springs	Unincorporated, CDP	166
Rio Rico	Unincorporated, CDP	20,549
Sonoita	Unincorporated, CDP	803
Tubac	Unincorporated, CDP	1581
Tumacacori-Carmen	Unincorporated, CDP	329
	Other Unincorporated, non-CDPs	3,235
<b>TOTAL COUNTY POPULATION</b>		<b>47,669</b>

Figure 1. Santa Cruz County Locator (Santa Cruz County, Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) 2024)



Figure 2. County Land Ownership, Communities & Wildland Urban Interface



## 2.2 Communities at Risk

The five communities-at-risk that this CWPP addresses are Tubac, Rio Rico, Nogales, Patagonia, and Sonoita-Elgin (Figure 3). As the most populated areas in Santa Cruz County, these towns are the most vulnerable and have the most assets at risk of destruction from wildfire. Each with its own fire department, these five communities will serve as leaders in fire prevention and protection within their jurisdiction and for surrounding communities by engaging in inter-agency cooperation and prevention measures. As documented in

Table 2, County of Santa Cruz fire departments, district and emergency services have teams, equipment and vehicles to support wildfire mitigation efforts.

Table 2. Existing Fire Fighting Resources in Place

Apparatus/ Personnel available in Santa Cruz County	Tubac	Rio Rico	City of Nogales	Patagonia	Sonoita-Elgin	Nogales Ranger District	Santa Cruz County ES
<b>Engine</b>							
Type 1	3	3	2				
Type 3	1	3	2	2	2		
Type 6	3	4	2				
Ladder	1		1				
Water Tender	3	2	1	1	1		
<b>Ambulance</b>							
Wildland 4x4	1			1			
Standard	6	6	6	2			
<b>UTV - Wildland Specific</b>							
Brush Truck			3				
UTV ride on	1		1			3	
UTV ride in				1			
<b>Teams</b>							
REMS Team	1	1	1				
HAZMAT Team		1	1				
Medical Team	1			1			
<b>People</b>							
Wildland Trained/# of Firefighters	36/36	43/50	12	16	20	25	
EMS							
Firefighter 1 and 2					14		
Prevention						6	2
Fire Marshall	Yes	Yes		Yes	Yes		
<b>Notes: Nogales Ranger District allocates resources as needed; Fire districts and/or departments are to be contacted to verify equipment.</b>							

## Tubac

Tubac is located in northwest Santa Cruz County, near the border of Pima County, and includes the smaller community of Amado to the north. Situated at an elevation of roughly 3,200 feet, Tubac covers an area of 11 square miles. Characterized by a mix of retirees, artists, and seasonal visitors, approximately 1,581 residents call Tubac home (2020 Census). The town is bisected east and west by the Santa Cruz River, Interstate 19, and the Union Pacific Railroad. Home to Tumacácori National Historic Park, Tubac Presidio State Historic Park, and Tubac Golf Resort and Spa, this community has many high-value sites at risk from wildfire.

## Rio Rico

Just south of Tubac is Rio Rico. Also bisected by the Santa Cruz River Corridor, Interstate 19, and the Union Pacific Railroad, Rio Rico is the largest community in the county with a population of 20,549 (2020 Census). Rio Rico follows the Santa Cruz River corridor along the east side of neighboring Nogales, with development in the unincorporated community stretching to the US/Mexico border. The Rio Rico fire district includes the smaller communities of Beyerville and Kino Springs. Home to suburban neighborhoods, rural agriculture, and outdoor recreation tourism, Rio Rico is one of the fastest-growing communities in Santa Cruz County. Rio Rico has the largest contingent of industrial warehouses in the county along I-19, mainly used for produce storage.

## Nogales

At the junction of Interstate 19 and State Route 82, Nogales is bordered by the unincorporated community of Rio Rico to the north, Kino Springs to the east, Sonora, Mexico to the south, and the Coronado National Forest to the west. Nogales is Santa Cruz County's only incorporated city. Even though Nogales has slightly less population (19,770 [2020 Census]) than neighboring Rio Rico, the population density is higher due to less land area. As a border community, Nogales serves as one of the major ports of entry between the US and Mexico.

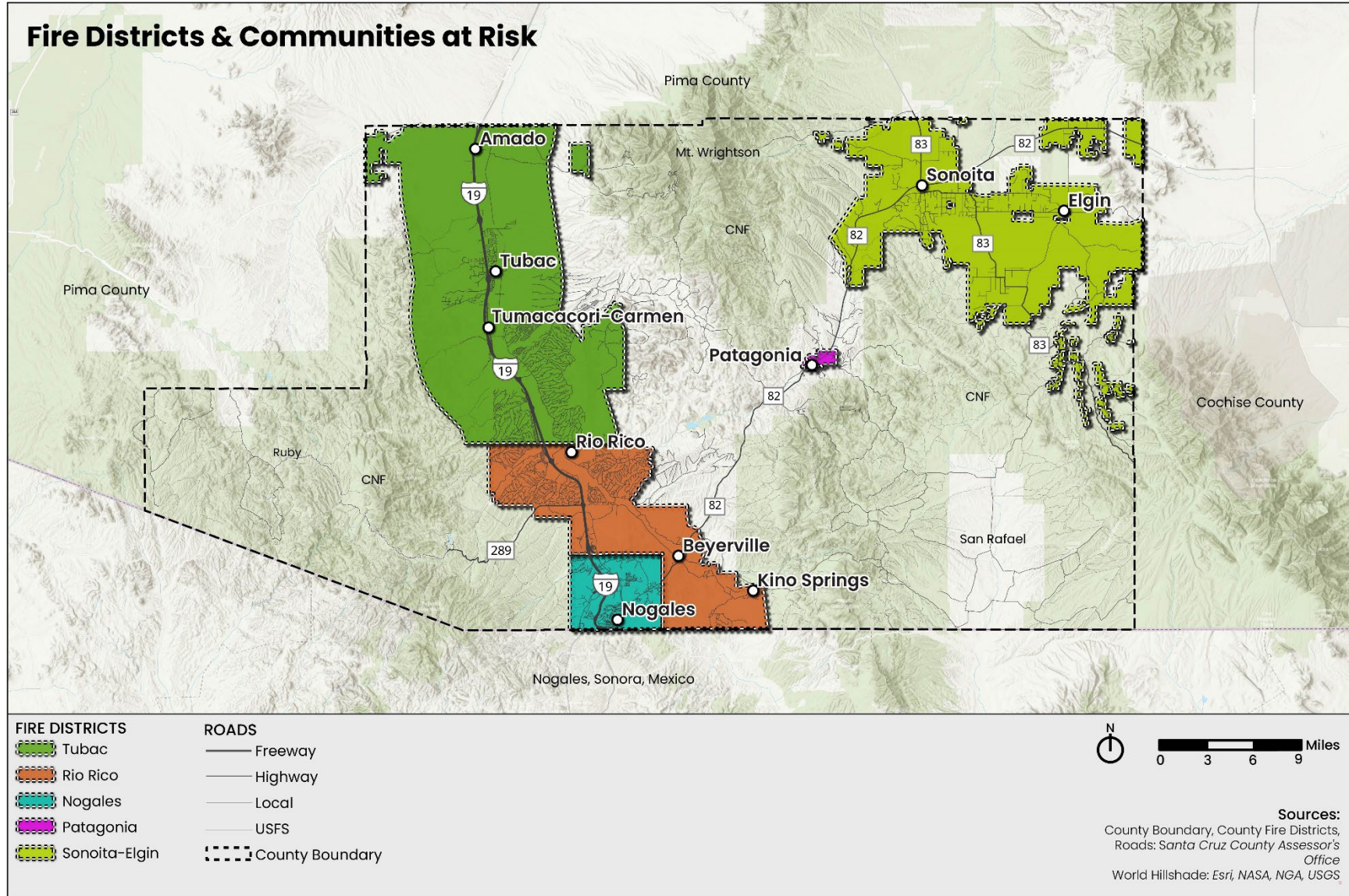
## Patagonia

The smallest of the communities-at-risk in Santa Cruz County, both by land area and population, Patagonia has a population of 804 (2020 Census). Situated at an elevation of about 4,058 ft and spanning roughly 1.29 square miles, Patagonia is located in the geographic center of the county. This historic mining town sits in a narrow valley between the Santa Rita mountains to the north and the Patagonia mountains to the south. State Highway 82 serves as the only paved point of entry in and out of town and is designated as a state scenic highway. Patagonia is home to the Paton Center for Hummingbirds, Patagonia-Sonoita Creek Preserve, and Borderlands Restoration Network. Patagonia attracts tourists and visitors year-round, and in recent years has seen increased commercial traffic from the development of the South32 Hermosa mine south of town on Harshaw Road adjacent to the Coronado National Forest.

## Sonoita-Elgin

In the northeast corner of the county, at the junction of State Routes 82 & 83, are the communities of Sonoita and Elgin. A combined 965 residents (2020 Census) call these communities home. The rolling hills covered in grasslands are ranching country, developed primarily with single-family residential homes on larger parcels. Many residents have horses and other livestock, and Sonoita is home to the Santa Cruz County Fairgrounds. Sonoita-Elgin is also Arizona's wine and spirits country, featuring approximately two dozen wineries, distilleries, meaderies, and breweries. These vineyards and agricultural lands form a rapidly growing industry for the region (Santa Cruz County 2025). The Sonoita-Elgin fire district also includes portions of Canelo, where higher elevation rural areas lead to rugged canyons and forested mountain passes.

Figure 3. Fire Department Response Areas & Communities at Risk



## 2.3 Wildfire Risk Assessment

### 2.3.1 Fire History

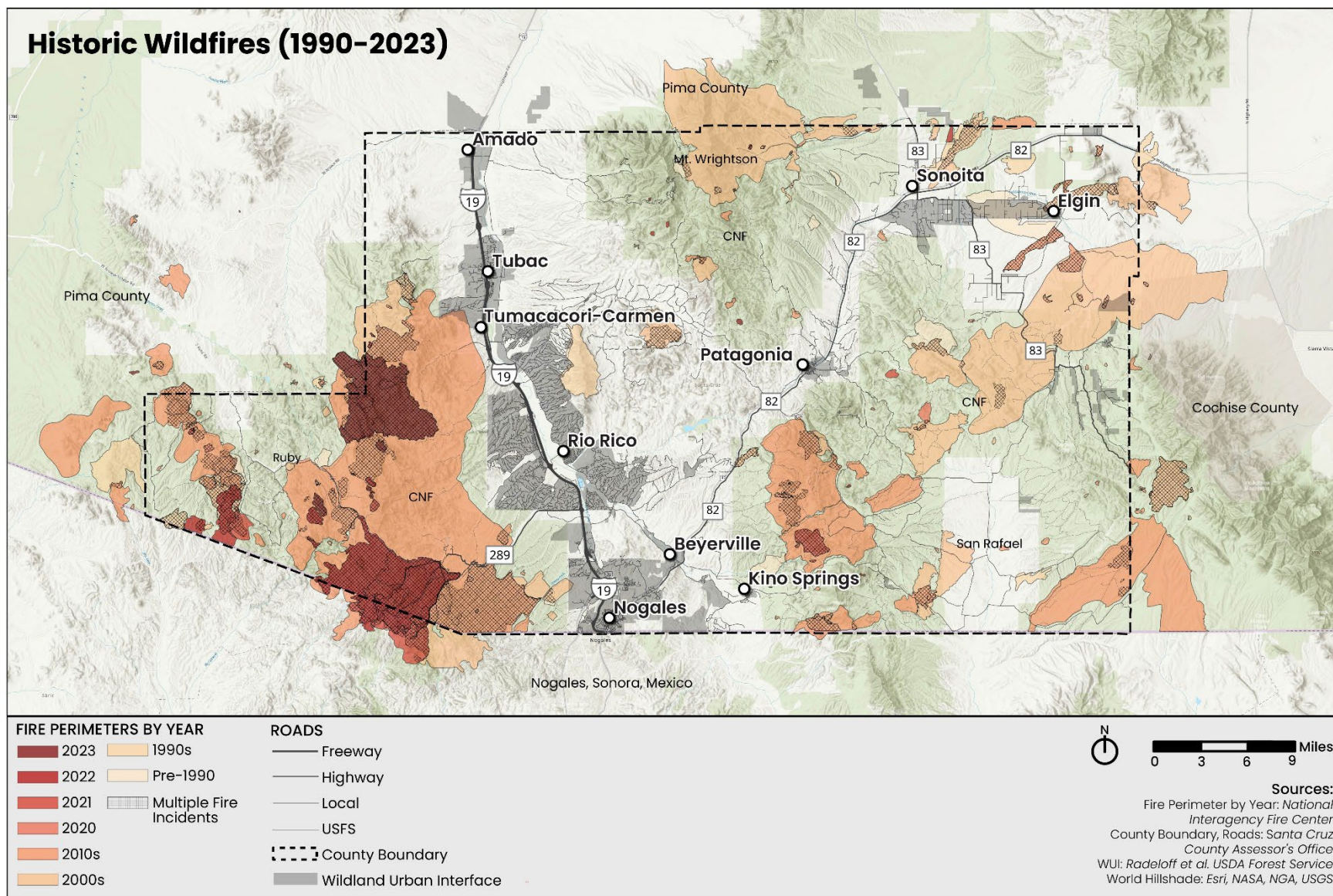
Wildfire has long been a natural and recurring process in the landscapes of the southwestern United States, shaping vegetation structure, fuel continuity, and species composition. In Arizona, the frequency of fire, called the fire cycle, varies with the vegetation community. In the Ponderosa pine community of the Mogollon Rim, a community similar to Santa Cruz County's Santa Rita Mountains, the historic fire cycle was 8–12 years. This natural fire cycle maintained the openness and patchiness of mature pine and oak forests and woodlands in pre-European settlement. Fosburg and Furman (1973) identified four distinct fire types in Arizona based on vegetation community and historic wildfire patterns, including montane forest, pinyon-juniper, and chaparral vegetation. Over the last 150 years, exclusion of natural fires on the landscape combined with fire suppression by humans has disrupted the natural fire cycle patterns, resulting in the accumulation of flammable materials that result in high-severity, catastrophic burns.

In addition, the emerging grass-fire cycle is a new fire pattern occurring in the Sonoran Desert. This grass-fire cycle is driving large-scale, ecosystem-level transformation from patchy desert scrub plant communities to invasive grasslands that lead to more frequent and severe wildfires annually. This is evident in Santa Cruz County, where, like the rest of the southwest deserts, the largest and most notable fires occurred between 2004 and 2021, an order of magnitude larger than during the prior decade. Notably, the 2013 Soldier Basin and 2011 Murphy-Pajarito wildfires burned within Santa Cruz County, and the 2013 Coyote, 2016 Brown, and 2017 Sawmill wildfires burned adjacent to the county. Extents of historic wildfires within Santa Cruz County can be found in [Figure 4](#).

The drivers of fire ignitions are both lightning, which occurs between April and October with the highest number of ignitions in July, and human ignition, which occurs year-round with the highest number of ignitions in June. Increasingly, human-caused ignitions are associated with the increasing number and size of fires. For example, the two largest fires in Arizona history – the 2011 Wallow fire burned 538,049 acres, and the 2002 Rodeo/Chediski wildfire burned 468,638 acres – were

both human-caused. In Santa Cruz County, the human caused, June 2011 Murphy-Pajarito Fire burned 67,000 acres, destroyed the historic Atascosa Lookout tower, and required international firefighting efforts. Human-caused ignitions increase the closer you get to structures, dwellings, cities, and roadways. Population growth in deserts and foothills leads to infrastructure within the wildland-urban interface resulting in an increased risk of catastrophic wildfire. This growth increases the amount of assets at risk of loss from wildfire. The presence of human dwellings adversely impacts wildfire fighting tactics. Dwellings limit the ability to use prescribed burns to reduce flammable vegetation load, as well as divert resources from stopping wildfire spread to protecting structures instead. These effects are especially pronounced in the area where human development meets undeveloped wildland, or the wildland urban interface (WUI).

Figure 4. County-Wide Fire History (1990-2025)



## 2.3.2 Physical Conditions of Santa Cruz County

Santa Cruz County hosts a wide range of topographic and ecological conditions. It occupies portions of the Madrean Archipelago, or “Sky Islands,” as well as the Sonoran basin and range, and the north edge of the Chihuahuan desert ecoregions (Griffith, et al. 2014). These unique conditions highlight the importance of understanding the variation in topography, climate, and vegetation communities within the county to better support wildfire preparation efforts.

### Vegetation Cover

Vegetation communities within Santa Cruz County were identified and classified using data from the U.S. Forest Service’s LANDFIRE program, which provides standardized ecological data. As outlined in **Table 3**, vegetation communities in Santa Cruz County are diverse and are shaped by elevation gradients, precipitation variability, and land use history. Desert shrub and shrubland communities dominate approximately 285,000 acres and around 36 percent of the county and are widespread in the lowlands and arid zones in the southern and western regions of the county. These communities are comprised of creosote brush, mixed desert scrub, and, in more recent years, mesquite shrubland. While the vegetation communities are generally sparse and not highly flammable, the encroachment of invasive grass has markedly increased their potential to support and spread wildfire.

Grassland and steppe vegetation types within the grassland community represent the second-largest vegetation group in Santa Cruz County, covering approximately 179,000 acres, or about 23 percent of the landscape. These communities are primarily located in the central and southern lowlands and are characterized by open prairies dominated by native and non-native grasses. Historically, many native species in these ecosystems were fire-adapted, with periodic wildfires playing a critical role in maintaining ecological health and diversity. In recent decades, however, grasslands have experienced an increase in invasive and exotic grasses, which now cover roughly 41,000 acres, often along roadsides, agricultural fields, and urban edges (Wilder, et al. 2021). Unlike native species, introduced grasses are not adapted to fire and tend to increase fire frequency and intensity due to their fine, continuous fuel structure and rapid regrowth.

Approximately 24,000 acres of riparian habitat are found along the Santa Cruz River and its tributaries, dominated by cottonwood, willow, and mesquite. Riparian vegetation communities concentrate along the banks of the waterways, where groundwater remains accessible for much of the year. However, increased drought for extended periods of time can turn these dense communities into fire-susceptible areas if water flows are not carefully managed.

As elevation increases, many of the mountainous regions in Santa Cruz County are dominated by conifer-hardwood communities of Madrean pine-oak forests, Pinyon Juniper woodlands, and/or Douglas-fir/mixed conifer woodlands. Collectively, woodland communities make up about 141,000 acres (~ 18 percent) of county land and are primarily concentrated in the northern and eastern mountain ranges. These communities are characterized by dense canopies and abundant ladder fuels, which, under dry conditions, can support high-intensity crown fires capable of stand-replacing events that threaten entire ecosystems and nearby communities (Margolis, Swetnam and Allen 2011).

In summary, Santa Cruz County's vegetation is ecologically diverse, with extensive shrubland and grassland dominating the lower elevations, while montane woodlands and forests define higher terrain. Each of these vegetation communities plays a unique role in shaping wildfire behavior by influencing ignition potential, fire intensity, and rates of spread. Fine fuels in grasslands can lead to fast-moving surface fires, whereas dense forested areas may create more intense crown fires. The interface between grasslands and woody vegetation communities can create very dangerous fire conditions, especially during dry and windy weather. The colonization by invasive species has further altered natural fire regimes, increasing both the frequency and severity of wildfires. Understanding this ecological complexity is essential for identifying where risks are greatest and determining the most appropriate management strategies. Effective wildfire planning and long-term resilience depend on a detailed understanding of these vegetation patterns, particularly within the WUI - where lives and property are most at risk.

The following figure (**Figure 5**) depicts the broader vegetation communities within Santa Cruz County. This higher-level vegetation cover classification is what is utilized throughout this CWPP for analyses and recommendation purposes. However, within each of these vegetation communities, there are various vegetation types that have

been mapped by USFS as well. For a more detailed look at vegetation types throughout the county, refer to [Appendix A. Vegetation Communities, Types, and Descriptions](#).

Figure 5. County-Wide Vegetation Cover

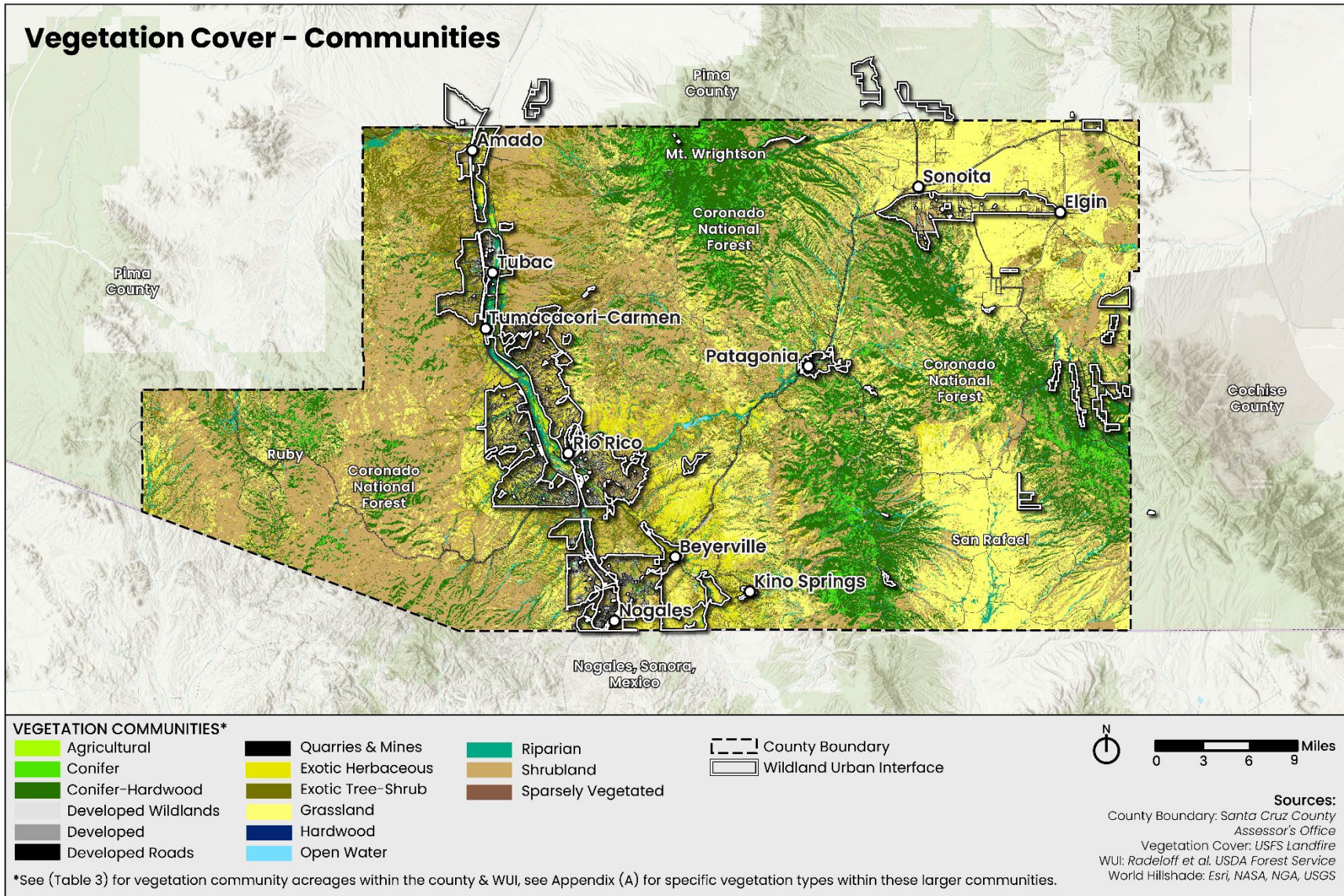


Table 3. County-Wide Vegetation Cover by Acreage & Fire Risk

Vegetation Community	Acres in the County	Percent of County	Acres in the WUI	Percent of WUI	Fire Risk: Ignitability	Fire Risk: Intensity
<b>Shrubland</b>	285,263.1	36.02%	17,078.31	23.85%	high	high
<b>Grassland</b>	179,890.0	22.71%	11,696.43	16.33%	very high	medium*
<b>Conifer-Hardwood</b>	141,590.52	17.88%	2,578.34	3.60%	medium	very high
<b>Exotic Tree /Shrub</b>	67,943.64	8.58%	10,588.54	14.79%	high	high
<b>Exotic Herbaceous</b>	41,256.31	5.21%	7,324.25	10.23%	high	medium
<b>Riparian</b>	24,862.32	3.14%	4,049.28	5.65%	medium	medium
<b>Conifer</b>	23,937.58	3.02%	815.36	1.14%	medium	very high
<b>Developed Roads</b>	15,458.36	1.95%	9,436.43	13.18%	low	low**
<b>Developed Wildlands***</b>	6,653.32	0.84%	5,159.53	7.21%	high	high****
<b>Developed</b>	3,591.32	0.45%	2,484.47	3.47%	low	low
<b>Agriculture</b>	1,005.25	0.13%	286.14	0.40%	low	low
<b>Open Water</b>	249.76	0.03%	10.00	0.01%	N/A	N/A
<b>Sparsely Vegetated</b>	171.47	0.02%	58.61	0.08%	low	low
<b>Quarries &amp; Mines</b>	82.07	0.01%	41.83	0.06%	low	low
<b>Hardwood</b>	17.35	>0.01%	0	0.00%	medium	high
<b>Total</b>	<b>791,972.3</b>		<b>71,607.5</b>			

\*Medium intensity under typical weather conditions, however, wind-driven grassfires pose a serious threat to wildland fire fighters and nearby communities.

\*\* Paved roads themselves have little chance of igniting, however, vehicles on these roads have high chance of igniting the adjacent developed wildlands.

\*\*\* Developed wildlands are those lands and vegetation in close proximity to surrounding developed private property such as homes, neighborhoods, commercial areas and roadways.

\*\*\*\* Intensity of fires in developed wildlands are more intense based on proximity to structure and threat of structural ignitability.

## Climate

The county's climate is moderate compared to the rest of Arizona and is known for having mild winters and often wet, monsoonal summers. The average temperature in Santa Cruz County varies with elevation and ranges from below freezing during

the winter months to over 100°F during the summer months. Precipitation patterns are also dictated by elevation and seasonal changes, with annual precipitation ranging from 11 to 16 inches in lowlands to > 30 inches per year in the mountains. Storm systems from the Pacific Ocean cross the state during the winter months. The North American summer monsoon brings seasonal rains from July through September, often accompanied by strong winds and thunderstorms. Prevailing wind patterns by month in Santa Cruz County can be found in [Figure 6](#).

Peak wildfire season in Santa Cruz typically occurs between the end of winter precipitation and the arrival of summer monsoon rains, generally spanning from late spring through early summer. During this period, lower elevations often experience high temperatures, accelerating the drying of fuels. Extended dry spells further intensify wildfire risk in both grasslands and forested areas by stressing vegetation and increasing the amount of dead and highly flammable material. Early-season monsoon storms can also be erratic, frequently bringing lightning and strong winds without delivering sustained rainfall (Crimmins, et al. 2025). These conditions create a volatile landscape where ignitions can quickly lead to large, fast-moving, and intense wildfires. Understanding these seasonal patterns is essential for anticipating fire conditions and implementing timely mitigation and preparedness strategies.

## Topography/Hydrology

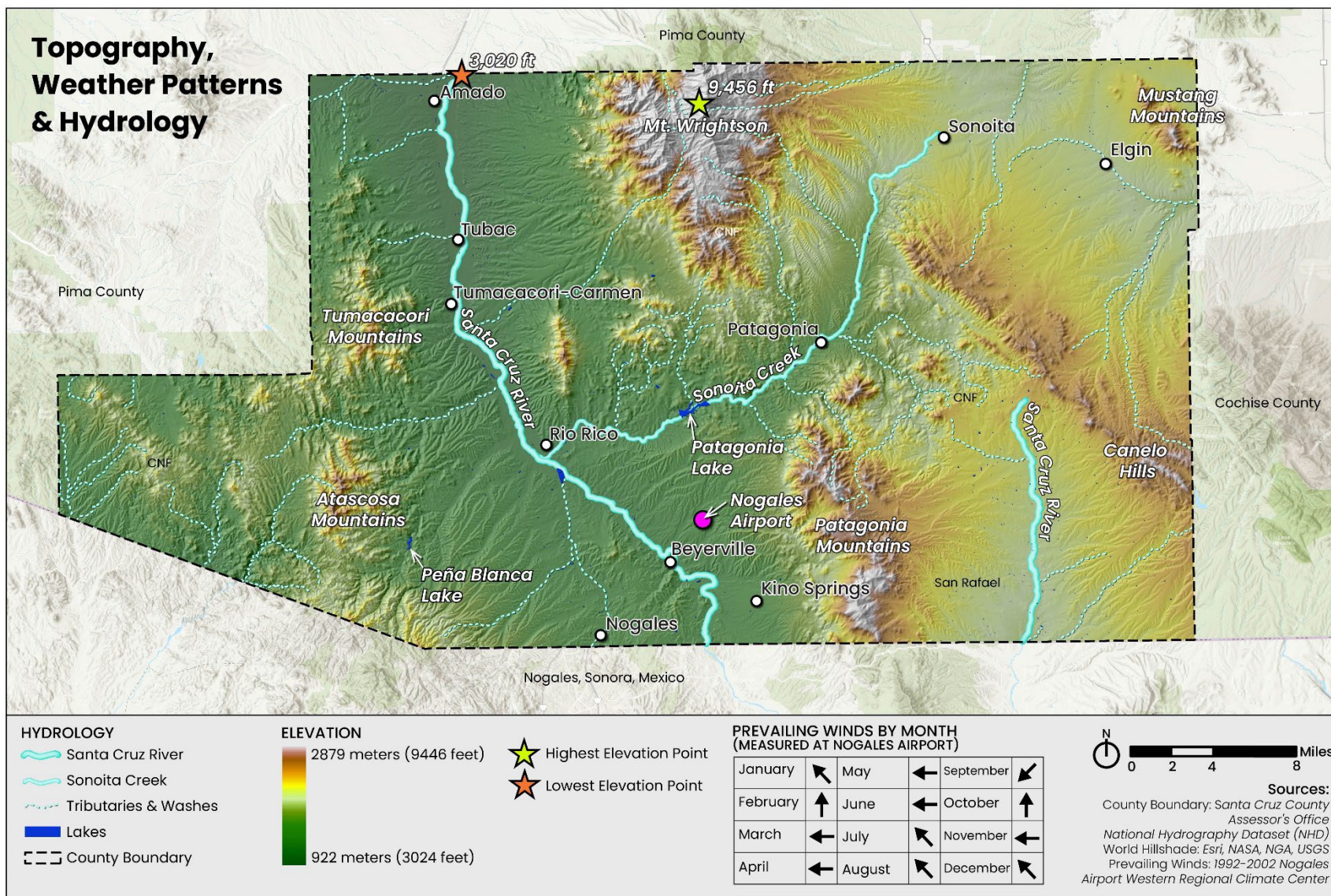
The topography of Santa Cruz County varies significantly, ranging from low-lying areas such as the Santa Cruz and San Rafael Valleys at around 3,000 feet in elevation to mountainous regions like the Santa Rita Mountains, which rise to over 9,000 feet. This terrain is part of the larger Madrean Archipelago, a region defined by isolated, forested mountain ranges surrounded by lowland deserts. These topographic features as shown in [Figure 6](#) create a mosaic of unique ecosystems and microclimates.

The Santa Cruz River serves as the primary waterway, supported by tributaries including Sonoita Creek, Nogales Wash, and Peck Canyon Tributary. Many of these waterways are intermittent and flow only during the rainy season, typically carrying monsoon runoff. Surface water is highly seasonal, resulting in a heavy reliance on groundwater to meet nearly all domestic and commercial water needs.

Elevational diversity and arid climate patterns significantly influence fire risk in the region. Lower elevations, comprised of grasslands and shrublands, tend to dry out quickly, creating the conditions for fast-moving surface fires. In contrast, higher elevations may retain more moisture but support artificially dense forests that, under dry conditions, can generate high-intensity crown fires. Slope and aspect further affect fire behavior. South and west-facing slopes regularly receive more direct sunlight, creating dry, flammable conditions that support rapid fire spread (OSU 2010). Canyons and drainages found within Santa Cruz County also influence fire dynamics, with canyons often acting as chimneys, funneling wind and heat upslope and intensifying fire behavior in surrounding areas (Rizza, Adlam and Berger 2022)). Meanwhile, dried washes and streambeds frequently host dense communities of riparian vegetation that depend on seasonal moisture. When dry, these areas can harbor concentrated fuel loads that contribute to fire severity.

These landscape features also pose significant challenges for wildfire response and management. Steep, rugged, and remote terrain can delay fire-fighting efforts and limit access for fire crews, equipment, and evacuation routes. In some areas, aerial suppression may be the only feasible option. For these reasons, topographic complexity must be a central consideration in fuel treatment planning, risk modeling, and evacuation preparedness.

Figure 6. County-Wide Topography, Weather Patterns & Hydrology



### 2.3.3 Risk Model & Assessment

To better understand and characterize potential wildfire risk across the approximately 1,200 square miles of Santa Cruz County, a geospatial risk model was developed to identify areas of concern. This model was designed to combine key variables that contribute to wildfire danger and intensity, including vegetation type, topography, rate of spread (ROS) of fire, and proximity to the WUI, to create a more detailed perspective of fire risk across the county. This model integrates high-resolution, satellite-derived data to capture vegetation communities and topographic variation across the entire region, providing a highly detailed perspective of how these factors interact and contribute to potential wildfire behavior under different conditions.

Six inputs contributed to the analysis: slope, aspect, vegetation type, vegetation density, proximity to WUI, and rate of spread (Figure 7). The final output of the model is a comprehensive risk analysis map centered on wildfire risk within and around the WUI (Figure 8). The model depicts the relative level of risk across the county if a fire were to ignite under static conditions. By integrating key drivers of fire intensity, spread, and danger, it provides stakeholders with a clear understanding of how those variables interact with both the landscape and the WUI, highlighting areas that warrant immediate attention and management. The levels of risk range from 1 - Lowest risk zones, where a fire would not pose a significant risk, to 7 - the highest risk zones, where the risk of a fire poses a significant risk to the community.

Critically, many of these high-risk areas are not in remote backcountry but instead overlap with or lie adjacent to the WUI, where homes and community assets exist side-by-side with fire-prone vegetation. In these areas, the combination of high fire intensity potential and proximity to infrastructure creates a “flashpoint” for disaster, where the risk to life, property, and emergency response capacity is greatest (D’Evelyn et al. 2022). In contrast, the western third of the county exhibits a much lower wildfire capacity, a pattern that correlates with the presence of flatter terrain and greater distances from the WUI. These areas typically experience slower fire spread, shorter flame lengths, and reduced ignition frequency. These lower-risk zones may also serve a strategic role in fire management, functioning as natural buffers or areas for emergency evacuation.

This tool gives land managers a forward-looking perspective, enabling targeted and strategic landscape management focused on priority zones for fuel reduction, vegetation maintenance, and refined evacuation planning. By clearly identifying where fire behavior is most likely to be extreme and where it poses the greatest threat to people and infrastructure, the model supports evidence-based decision-making that can guide both near-term mitigation actions and long-term resilience planning. It empowers fire agencies, planners, and community stakeholders to allocate resources efficiently, design treatments that maximize impact, and coordinate across jurisdictions.

Figure 7. Fire Model Input Criteria

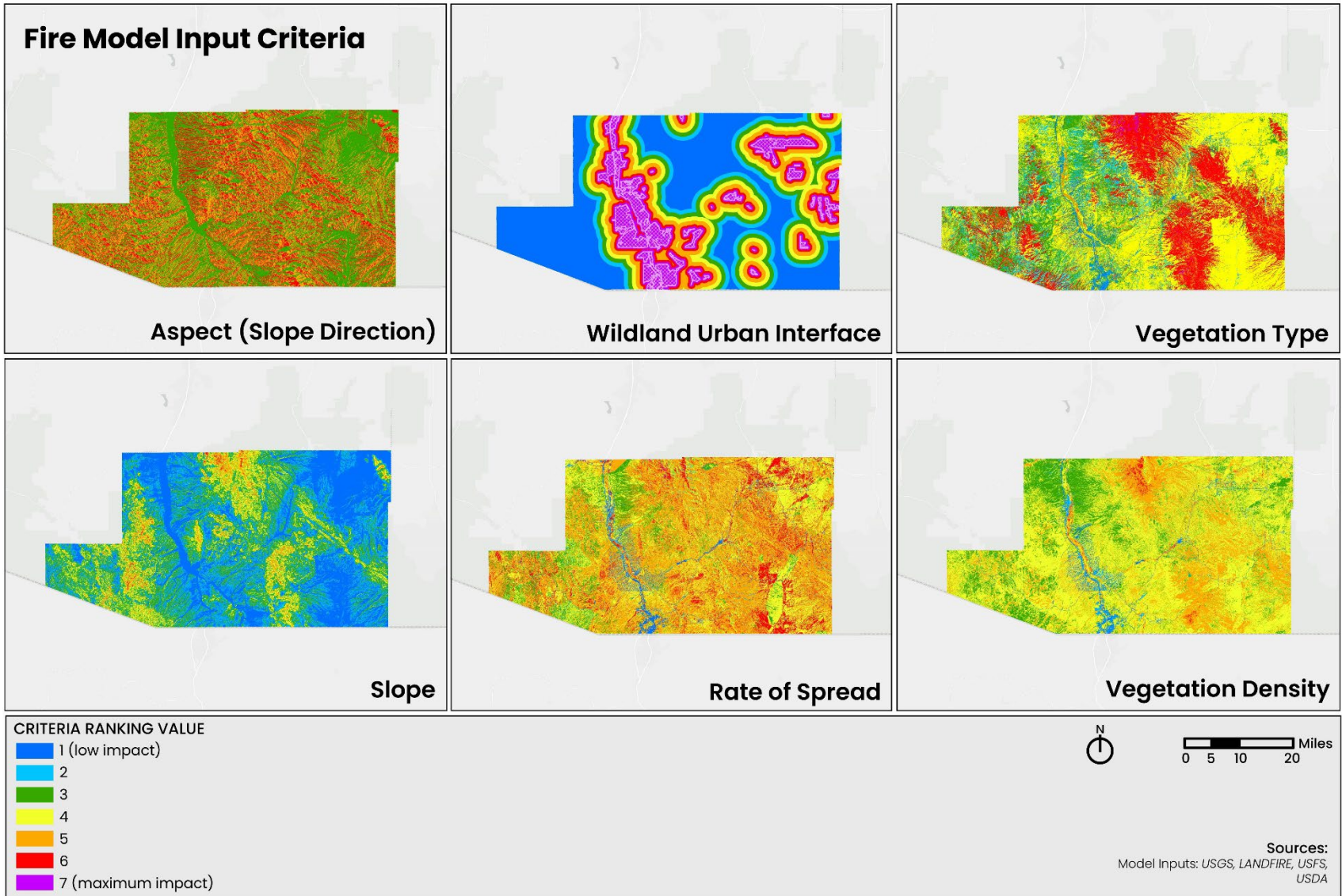
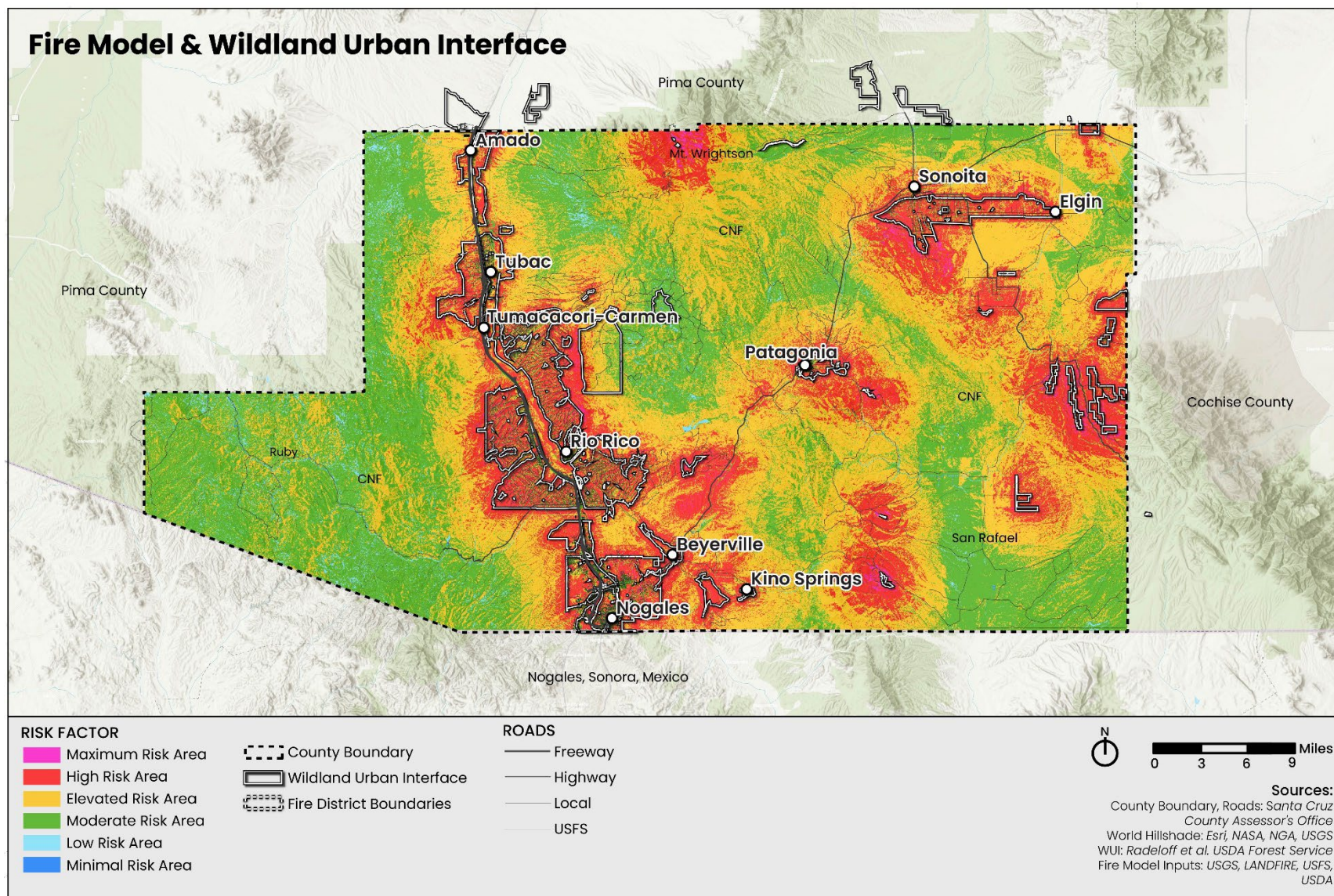


Figure 8. County-Wide Fire Model & Wildland Urban Interface



## 2.3.4 Community Scale Fire Model Analysis

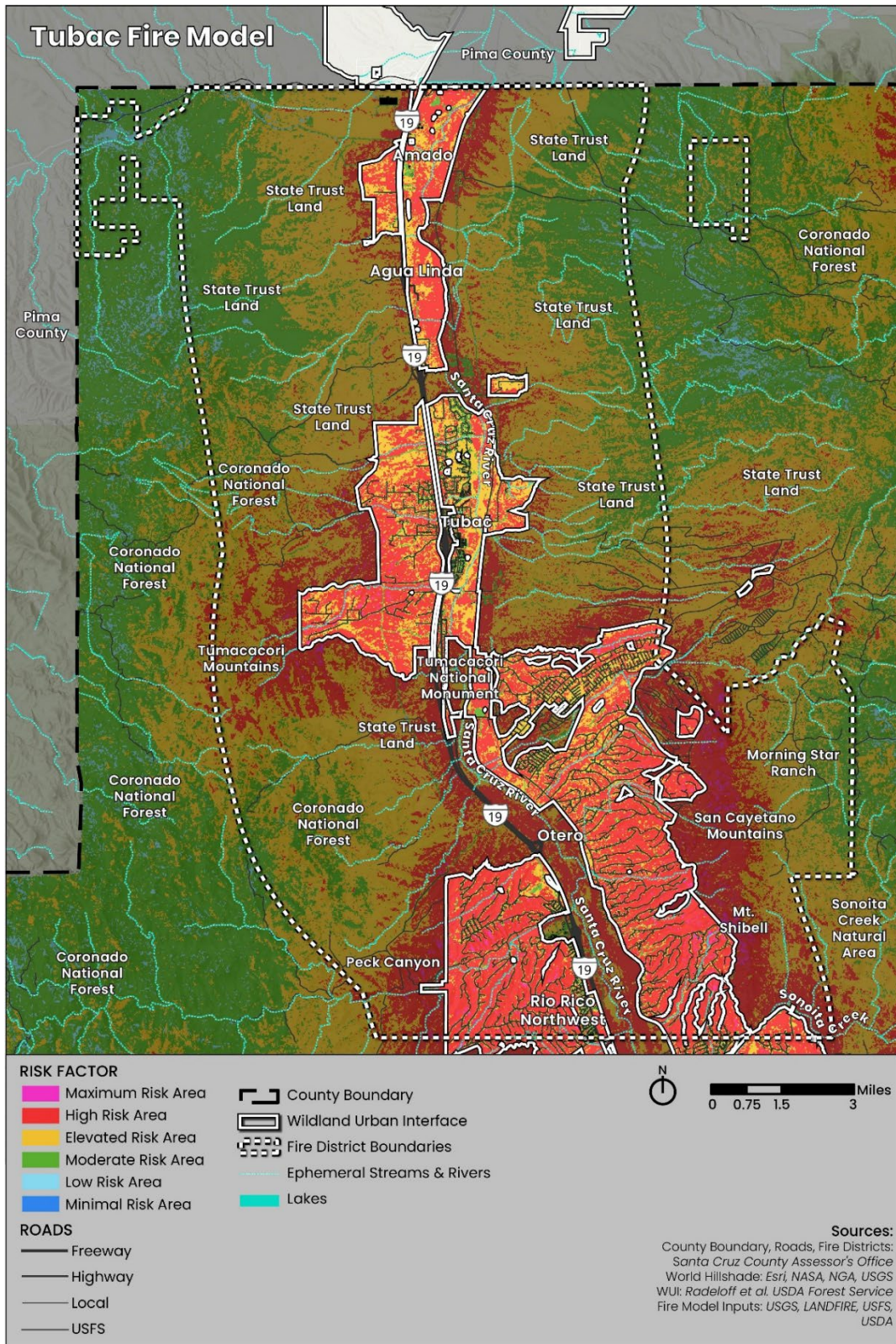
Analyzing fire risk at the community scale is essential for building fire-resilient landscapes. Integrating community-specific details with fire modeling ensures that prevention planning is accurate, actionable, and tailored to each unique community.

### Tubac

Fire risk in Tubac is concentrated around large single-family homes on the hillsides and along the outer residential edges of the WUI. The community fire model shows the highest risk within hillside subdivisions and at the base of washes, where steeper slopes and southwest aspects coincide with denser fuels (**Figure 9**). Along the Santa Cruz River corridor, vegetation density and continuity increase exposure for river-edge parcels. During drought, dry riparian vegetation further elevates hazard levels. Fine-fuels, such as grasses and shrub mosaics, east and west of town may create fast-moving surface fires, while irrigated landscaping may slow surface spread but does little to reduce ember drift or ladder-fuel potential in perimeter plantings. Limited access, including single-entrance cul-de-sacs, frontage road choke points, and limited river crossings, all compound evacuation and response concerns.

Together, these findings point to the most impactful wildfire prevention actions for Tubac to be targeted vegetation management at riparian edges, wash interfaces, and slope breaks, with interventions around structures focused on home hardening and creating a non-combustible defensible space zone. At the community scale, well-marked and maintained evacuation routes will provide safe egress for residents, visitors, and emergency response personnel.

Figure 9. Tubac Fire Model



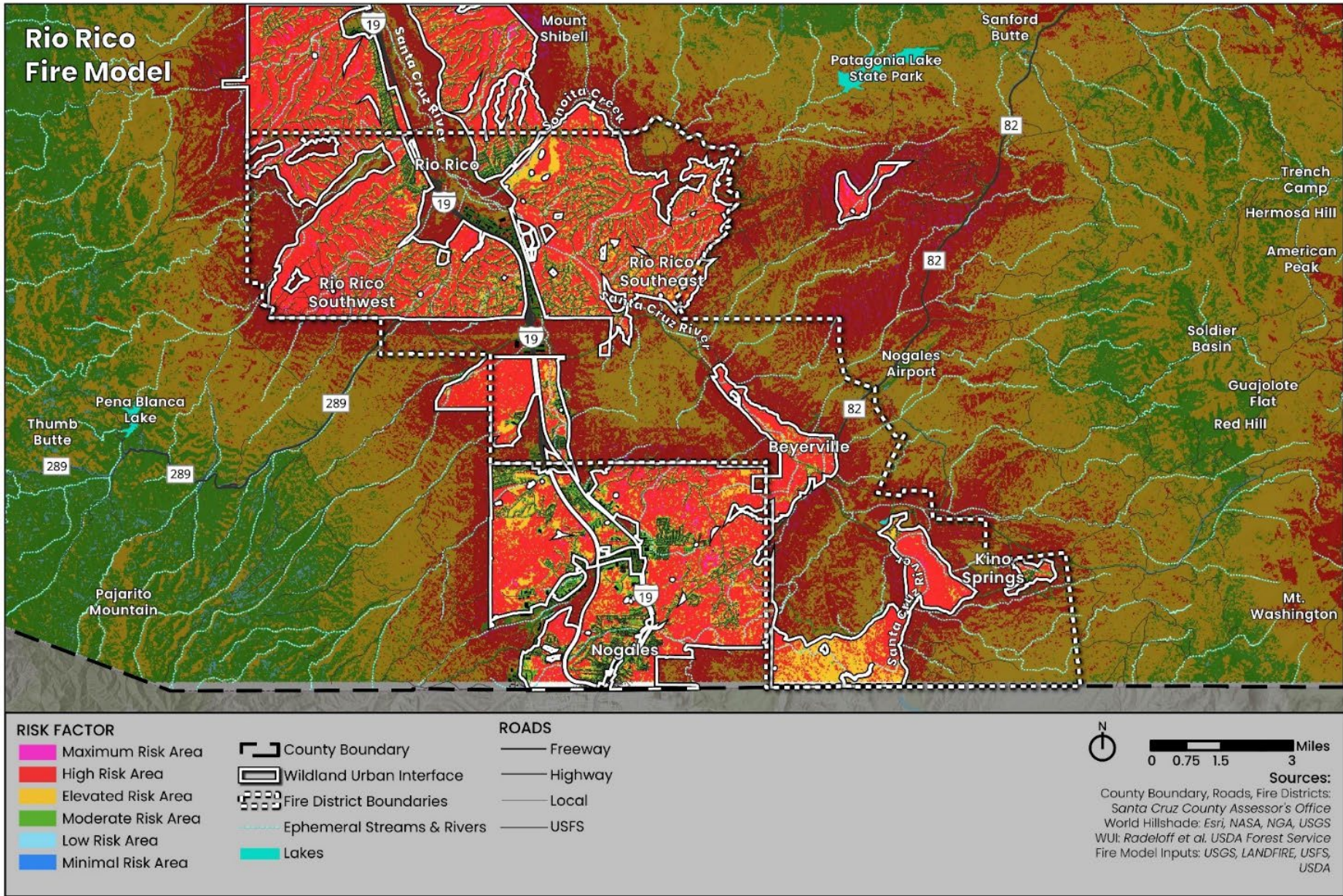
## Rio Rico

Fire risk in Rio Rico is concentrated around the medium to low-density residences within this community that are embedded in foothill vegetation and built along washes with extensive wildland adjacency. The more suburban areas include long residential blocks directly adjacent to the I-19 corridor, often with cul-de-sacs and limited ingress/egress options, while the more rural parcels include outbuildings, propane tanks, wood fencing, and dense ornamental vegetation.

Hillside residential areas on both sides of I-19 are shown as maximum risk and high-risk areas in the following model (**Figure 10**). Here, steeper slopes coincide with dense fuels and south and west-facing aspects that dry more quickly. Seasonal washes thread through many neighborhoods, linking fine fuels to back fences and creating pathways for rapid spread. Much of the inhabited area sits directly adjacent to dense vegetation and steep terrain, which increases fire intensity and complicates suppression. Once ignited, fire can run upslope through these residential areas and spread across parcels due to fuel density and alignment with slopes.

The Santa Cruz River creates a high-value, dense riparian corridor that cuts through the community. Under drought conditions, this dense vegetation can quickly become a dangerous fuel load. If plant available moisture dissipates during an extended drought, this situation creates a dense vegetative zone in the valley between the two slopes where residential infrastructure is densest. The I-19 corridor through the community also increases risk, where highway shoulders, median fires, and vehicle malfunctions create opportunities for fire to jump the roadway and spread outward into the community, taking advantage of the hazardous topographic and ecological conditions that exist here. Limited secondary egress in some tracts, mixed hydrant coverage on outer blocks, and common ember receivers such as wood fencing further compound exposure and reinforce the need for focused defensible space, home hardening, and well-marked evacuation routes.

Figure 10. Rio Rico Fire Model



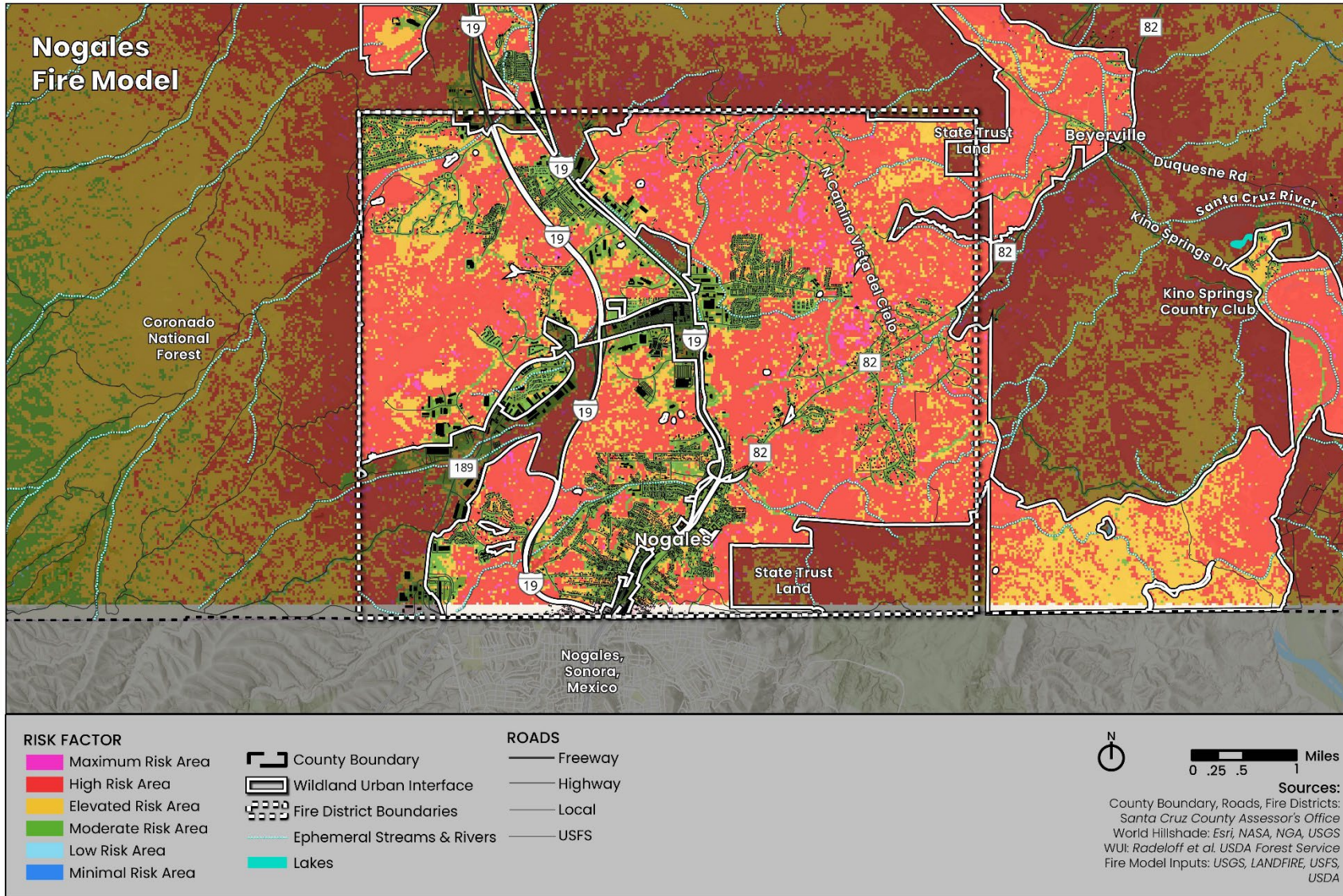
## Nogales

Fire prevention in and around Nogales is critical. As the seat of municipal operations (Figure 11), Nogales hosts important local infrastructure as well as international facilities tied to the ports of entry and border crossing between Arizona and Sonora, Mexico. Although the city is dense, much of its urbanized area is interwoven with wildland and open space. The convergence of roadways, rail lines, and cross-border activity elevates ignition likelihood in and around the community.

Like many regions, Nogales' primary concern is the concentration of homes along the wildland edge, where fire can transition quickly into neighborhoods. The city's varied topography, dense population, and proximity of buildings to canyons and seasonal washes all amplify wildfire risk. Fire modeling points to recurring patterns: canyon-rim neighborhoods on the west and east sides where steeper slopes and warm south and west aspects line up with denser fuels and higher potential rates of spread; riparian segments along the Santa Cruz River and Nogales Wash where back fences meet thick vegetation; outer WUI edges to the north and east where fine fuels reach right up to structures; and drainage slopes that act as ramps, carrying surface fire into the street grid. Together, these features describe a landscape where fire has clear pathways to move rapidly and where people and property are concentrated along those paths.

On the ground, several factors can intensify or moderate what the model shows. During drought, riparian corridors lose moisture, and the cured understory raises hazard beyond baseline expectations. Irrigated parks and landscaping can slow surface fire, but they do little to reduce ember exposure to roofs, vents, wood fencing, and sheds, so structure ignition remains a concern. Invasive grasses and disturbed shoulders accelerate spread compared to native fuels, particularly on warm aspects and along travel corridors. Access constraints in older hillside streets, narrow bridges, and rail crossings can slow response times and complicate evacuations. Hydrant spacing and flow also vary by neighborhood, creating pockets where water supply or longer travel times elevate practical risk of wildfire in these urban neighborhoods.

Figure 11. Nogales Fire Model



## Patagonia

Patagonia is the mountain town of Santa Cruz County, nestled between the Patagonia and Santa Rita ranges with the Coronado National Forest nearby (Figure 12). Sitting in a basin at roughly 4,000 feet above sea level, it centers on a historic main street of locally owned shops, cafés, galleries, and small inns. With a population of about 800, a mix of long-time residents, ranching families, public-lands employees, and recreation visitors keeps activity steady, especially on weekends and holidays.

Patagonia's location puts it at significant risk for hazardous fires. The town is encircled by foothill slopes and dense grasslands capable of fast-moving fire. The Sonoita Creek riparian corridor threads through the town center, and development gives way quickly to foothill slopes that support grassland and shrub communities interspersed with sparse woodlands and a connected drainage network of smaller tributaries. SR 82 serves as both the primary and secondary evacuation corridor.

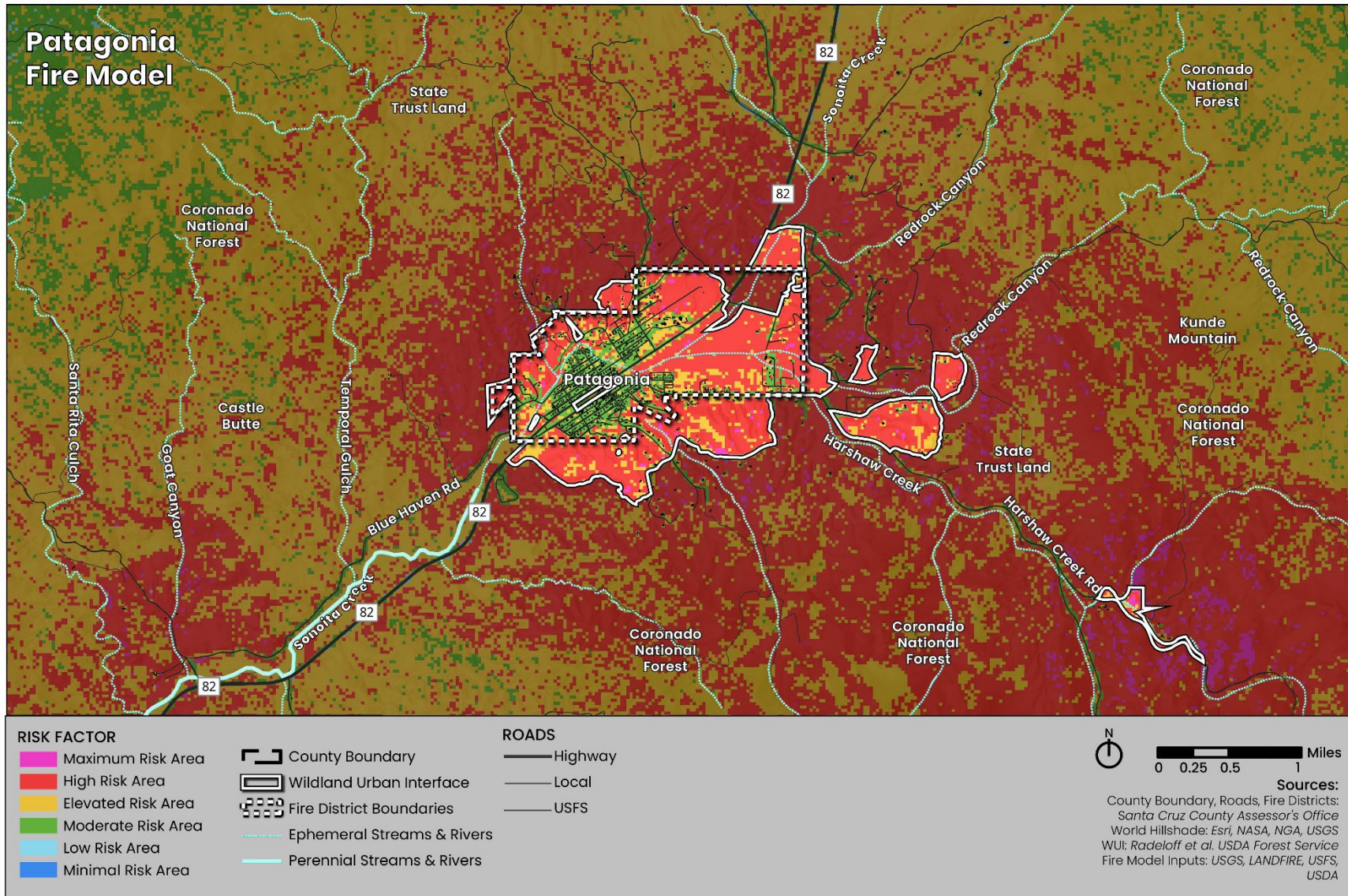
Many residences outside the town core of Patagonia sit on steeper, higher-risk slopes, where the terrain and the shrub-grass mix favor rapid spread and make containment difficult. Smaller neighborhoods branch onto narrow side streets, and a few single-entrance pockets lie near the edge of town. The Sonoita Creek corridor, with continuous riparian vegetation, sits directly adjacent to residential and commercial buildings, creating high potential for fire spread like other communities in the county. The valley also poses a wind risk. It runs southwest to northeast and can function like a wind tunnel, amplifying alignment with slope and increasing rate of spread, which can lead to fast-moving, hard-to-control fires.

To address these risks, work should focus on preparedness and resilience on the southwest and northeast approaches to the town. Creation of corridor-scale shaded fuel breaks along the main evacuation routes that tie into topography and roadway edges, as well as regular mowing of roadsides within and around the community to remove more ignitable fuels like dry grass, are both critical prevention measures. Creation of classic fuel breaks around the most critical defensive points at the perimeter of Patagonia will be key to stopping wildfire from reaching the town core.

Retrofitting historic structures and hardening residential homes with fire prevention measures such as ember-resistant vents and dual-pane windows are methods that will ensure buildings can withstand any threat from wildfire. Creation and maintenance of defensible space on both public and private parcels is critical to protecting structures. These measures should emphasize five-foot non-combustible zones immediately adjacent to buildings, well-maintained landscaping with adequate spacing of plants, and separation of wood fencing from structures, etc.

Evacuation preparedness is also critical and should include designated turnouts, traffic control plans, backup route signage, and both tabletop and full-scale evacuation drills for emergency responders. Finally, post-fire flood planning should include pre-positioned sandbag stations, routine culvert maintenance, and debris-rack installation at key drainages.

Figure 12. Patagonia Fire Model



## Sonoita-Elgin

The communities include vineyards, wineries, and working ranches with variably sized residences interspersed throughout. A population of around 750 people made up of long-time ranch families, vineyard and hospitality workers, and retirees traffic concentrates at the SR 82 and 83 junctions on weekends and during events and is bolstered by wine tourism.

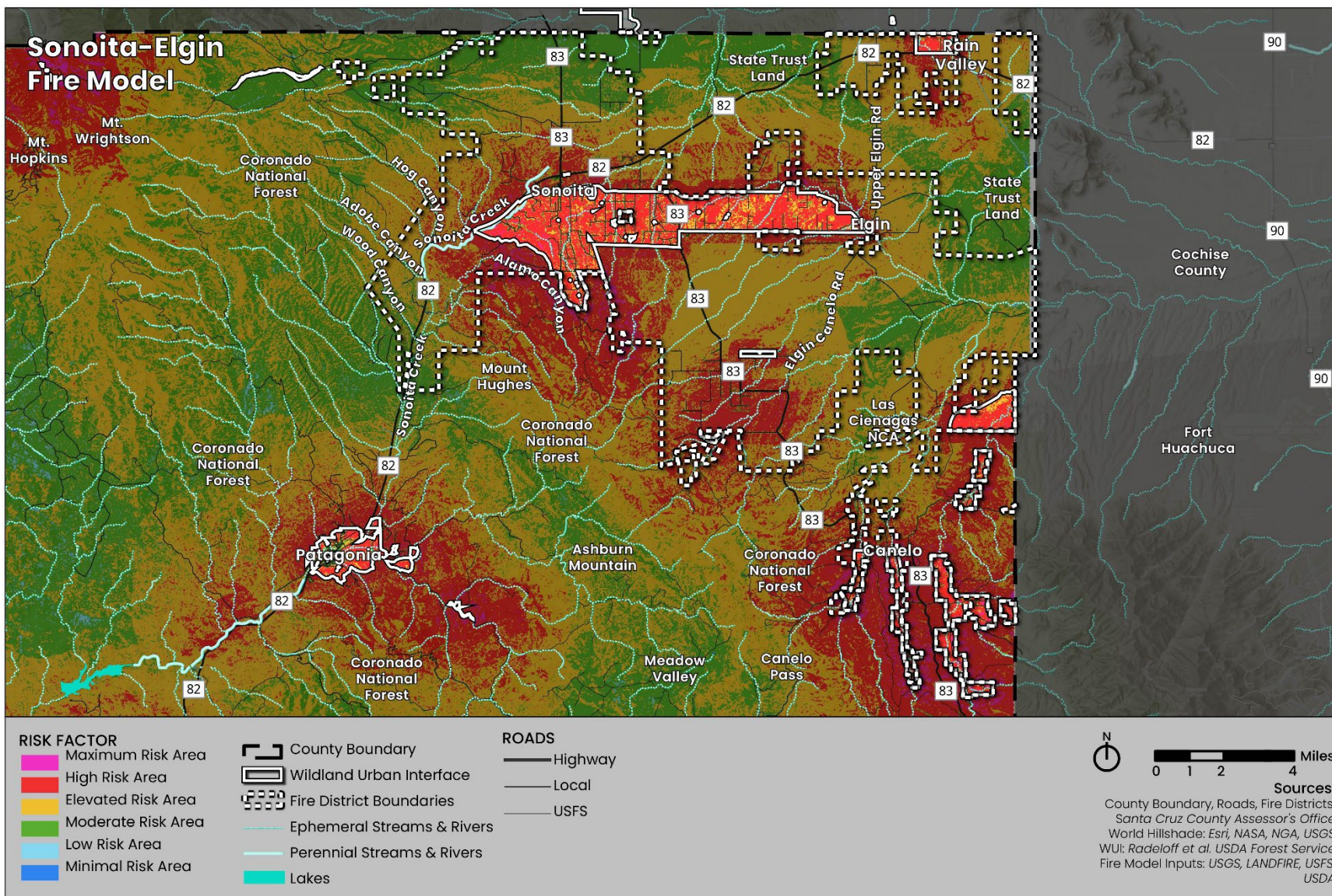
Fire prevention in and around Sonoita-Elgin differs from other communities-at-risk in Santa Cruz County due to the topography, vegetation, and emergency response times across this large geographic area. Located at the junction of SR 82 and SR 83, Sonoita-Elgin is a linked group of rural communities surrounded by rolling grasslands and foothills (Figure 13). The landscape is primarily composed of sprawling grasslands and shrublands that dry quickly and create more ignitable fine fuels. Once ignited, these dry grasses carry fast-moving fire across large, open exposures with little to slow their spread, especially in windy conditions.

Many residences in Sonoita-Elgin are located on rolling hilltops, with ranches and homes abutting open grasslands, so the potential for a quick-moving fire to transition from wildland into developed areas is very high under the right conditions. The mosaic of developed lots across grasslands, interspersed with shrubby fuels, combines to create a very high-risk situation for this community, particularly in a wind-driven wildfire. A grass fire would have an almost uninterrupted pathway to back fences and homes. Wind exposure is another key factor. Open terrain paired with fast-burning grass can push a fire front rapidly toward structures, making suppression difficult and, at times, impossible. These types of wildfires are also the most dangerous situation for emergency response personnel and should be treated with extreme caution. Prevention and early intervention are critical measures here.

Mitigation in Sonoita-Elgin should center on grassland management, since fine fuels drive most fire behavior in this community. Priority actions include seasonal mowing or targeted grazing to keep dry grass heights low, with a particular emphasis around homes and along road edges; coordinated control of invasive grasses will reduce fuel loads and reduce the rate of spread. Establishing green strips or low-fuel landscaping around built environments would be beneficial. Efforts should be made to align shaded fuel breaks with existing roads, fence lines, and ridgelines so they are

easy to maintain, and pair them with regular roadside ignition reduction, such as shoulder clearance and spark-control practices during mowing and grading. At the parcel scale, emphasize a five-foot non-combustible zone around homes and outbuildings. Other home-hardening measures should include ember-resistant vents, dual-pane windows, box eaves, and separation of wood fencing from structures.

Figure 13. Sonoita Elgin Fire Model



## 3.0 Recommendations

---

Community wildfire protection occurs at various scales, from tactics that individual homeowners can deploy to tactics occurring over thousands of acres. At the individual scale, structure hardening, the general term for equipping buildings against fire, can include strategies like fire-resistant Class A roof and ember-resistant vents. Widening out to property-scale tactics, defensible space creation is a powerful method to ensure that areas around buildings are properly maintained to prevent the spread of fire and allow for fire suppression by first responders. Existing resources such as Firewise USA<sup>®</sup>, and Ready-Set-Go, are available to communities and offer thorough explanation and methods for structure hardening and defensible space.

This section expands to the landscape scale, outlining fuel treatment methods to protect large swaths of Santa Cruz County communities. Santa Cruz County's varied landscapes and conditions necessitate multiple strategies to mitigate wildfire risk. Physical conditions that feed a blaze, called 'fuels,' are things like plants or debris. When unmanaged, these fuels can contribute to compound fire severity. Practitioners and fire departments have made strides in addressing existing fuel loads, as described in Section 3.1.1. Building upon county knowledge, input, and resources, Section 3.1.2 outlines proposed fuel treatment methods. Section 3.1.3 describes priority fuel reduction projects, informed by stakeholder engagement, on-the-ground surveys, and desktop analysis. Finally, this plan outlined treatments for structures and areas immediately surrounding structures within the defensible space in Sections 3.2 and 3.3.

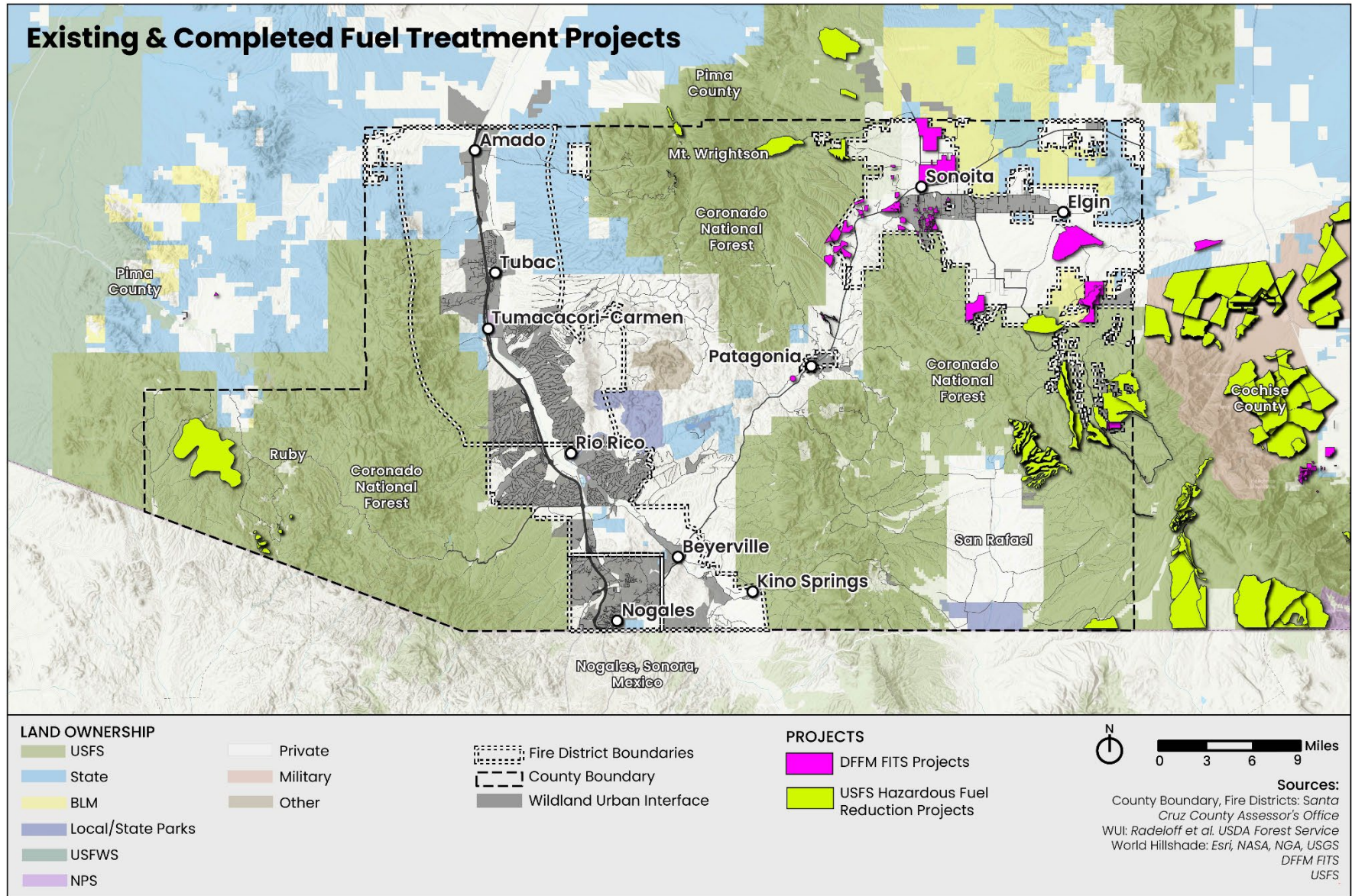
### 3.1 Fuel Treatment Priorities

#### 3.1.1 Existing Fuel Treatment Methods & Projects

Hazardous fuel treatments in Santa Cruz County have occurred sporadically since 2018. Agencies that lead these efforts range from the Nogales and Sierra Vista USFS Ranger Districts of the Coronado National Forest, to Tucson Bird Alliance, to local fire departments. Funding for many of these projects has been from federal or state grants, such as the Community Wildfire Defense Grant. There is a need for an

increase in funding for these types of projects throughout Santa Cruz County. The following figure highlights fuel reduction projects tracked by DFFM's Fire Information Tracking System (FITS) Database, as well as recent hazardous fuel reduction projects completed by the USFS CNF (Arizona Department of Forestry and Fire Management 2025)(Figure 14).

Figure 14. Existing & Completed Fuel Reduction & Treatment Projects in Santa Cruz County



### 3.1.2 Proposed Fuel Treatment Methods

This plan recommends treatment categories and specific methods which address concerns outlined in Section 2 via desktop analysis and expressed by participants during stakeholder engagement (Refer to Appendix C). There are six categories proposed: prescribed fire, mechanical vegetation treatments, invasive species management, grazing, fuel breaks, and chemical treatment. The following table (Table 4) outlines recommended treatment methods and the vegetation types to which they are applicable. For a high-level description of best practices for implementation and maintenance for each fuel treatment method, refer to the sections following the table. Real world application of these fuel treatment methods for specific projects will need to be decided on a case-by-case, and site-specific basis. This table and following descriptions serve simply as a “menu of options” to refer to in the project planning phase.

Practitioners can determine the best fuel treatment methods for a specific project in two ways with this document:

- Refer to **Table 4. Proposed Fuel Treatment Methods**, for an outline of fuel treatment methods and the vegetation communities that they are applicable within.
- Refer to **Appendix D. Fuel Treatment Recommendations by Vegetation Community & Specific Vegetation Type** for a compendium of specific vegetation communities present in Santa Cruz County and learn which fuel treatment methods are applicable.

*Table 4. Proposed Fuel Treatment Methods*

Treatment Method	#	Applicable Vegetation Communities
Prescribed Burn	1A	Conifer, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Shrubland
Burn Piles	1B	Conifer, Conifer-Hardwood, Exotic Tree/Shrub, Riparian
Thinning	2A	Conifer, Conifer-Hardwood, Riparian, Shrubland
Mastication	2B	Conifer, Conifer-Hardwood, Exotic Tree/Shrub, Shrubland
Pruning & Limbing	2C	Conifer, Conifer-Hardwood, Exotic Tree/Shrub, Riparian
Mowing	2D	Exotic Herbaceous, Grassland, Riparian, Shrubland
Invasive Woody Species Management	3A	Conifer, Conifer-Hardwood, Exotic Tree/Shrub, Riparian, Shrubland
Invasive Herbaceous Species Management	3B	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Riparian, Shrubland

Grazing Cows	4A	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Shrubland
Grazing Goats	4B	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Shrubland
Grazing Sheep	4C	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Shrubland
Classic Fuel Break	5A	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Shrubland
Shaded Fuel Break	5B	Conifer, Conifer-Hardwood, Exotic Tree/Shrub, Riparian, Shrubland
Chemical Treatment	6A	Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Riparian, Shrubland

# 1. Prescribed Fire

## 1A. Prescribed Burn

**Implementation:** Prescribed burning is intentionally and carefully applying fire to a specific area under planned weather and fuel conditions. The goal is to reduce the buildup of flammable vegetation—such as dead grass, brush, leaf litter, and small trees—that can contribute to high-intensity wildfires. By removing these excess fuels, prescribed burns help lower the risk, intensity, and spread of future wildfires. This technique mimics natural fire cycles, which many ecosystems depend on to maintain healthy plant communities, control invasive species, and promote regeneration of fire-adapted vegetation. Prescribed burns can also create and maintain fuel breaks, improve wildlife habitat, and prepare sites for reforestation or grazing. Burns should only be conducted by trained fire personnel who carefully monitor weather, moisture levels, and air quality to ensure the fire stays within control lines and meets safety and ecological objectives.

**Maintenance:** When properly planned and executed, prescribed burning is one of the most effective and cost-efficient tools for large-scale fuel reduction and landscape-level wildfire mitigation. However, it requires regulatory approval, community coordination, and skilled implementation to minimize risks such as smoke impacts or escaped fire. As part of an integrated fire management strategy, prescribed burning plays a key role in creating more fire-resilient ecosystems and communities.

## 1B. Burn Piles

**Implementation:** Burn piles are used to dispose of excess vegetation—such as branches, brush, and small trees—by gathering it into contained piles and burning it under controlled conditions. This method is typically employed after thinning, pruning, or other fuel reduction activities to safely eliminate flammable debris. Burn piles are often used in areas where mechanical removal is impractical or where prescribed burning across a larger area isn't feasible due to environmental, legal, or safety constraints. Burn piles allow for targeted fuel reduction in specific zones like forest edges, residential areas, or along access roads. To minimize risk, burn piles are usually ignited during favorable weather conditions—cool temperatures, low wind, and high humidity—and are subject to permits and regulations set by local fire authorities. Professionals ought to ensure burn piles do not become too large or tall such that they might leave soil spots. Proper construction, spacing, and monitoring of burn piles are critical to ensure safety and prevent unintended fire spread, making this an effective but highly controlled fire prevention tool.

**Maintenance:** Burn piles should be located at a distance of more than 600 feet from structures. Snags and downed woody material should be retained in areas where fire resilience is not compromised to preserve crucial habitat for wildlife, such as cavity-nesting birds.

## 2. Mechanical Vegetation Treatments

### 2A. Thinning

**Implementation:** Thinning is a vegetation management technique that involves the selective removal of trees or shrubs to reduce plant density, improve forest health, and lower wildfire risk. By decreasing the number of stems per acre, thinning reduces competition for water, sunlight, and nutrients, allowing remaining vegetation to grow more vigorously and become more resistant to drought, pests, and disease. Thinning is particularly important where dense stands of trees and brush can create hazardous fuel conditions. Thinning, removing smaller, weaker, or overly crowded trees, reduces the likelihood of high-intensity crown fires and helps slow the spread of wildfire. This creates more defensible space and improves conditions for safe firefighting operations.

**Maintenance:** Thinning is often combined with other wildfire mitigation methods, such as pile burning, mastication, or prescribed fire, to address leftover debris and maintain effectiveness over time. When done strategically and with regular maintenance, thinning not only reduces wildfire risk but also improves forest health, promotes biodiversity, and enhances resilience to drought and pests.

## 2B. Mastication

**Implementation:** Mastication involves mechanically grinding, shredding, or chipping live and dead vegetation, including brush, small trees, and undergrowth, into mulch. Typically carried out using specialized equipment such as forestry mulchers, masticators, or brush cutters, which can be mounted on skid steers, excavators, or other heavy machinery. The resulting mulch is left on the ground, forming a layer that can help reduce erosion, retain soil moisture, and suppress the regrowth of non-native and invasive species. This technique allows land managers to selectively treat areas without the need for large-scale tree removal or prescribed burning, making it a preferred option in locations where fire use is restricted or undesirable.

**Maintenance:** Mastication is valued for its efficiency, low soil disturbance, and ability to improve access to forested areas. However, it does not remove root systems, so resprouting may occur depending on the species treated. Long-term success often requires follow-up treatments or integration with other vegetation management methods.

## 2C. Pruning & Limbing

**Implementation:** Pruning and limbing techniques are used to remove specific parts of trees or shrubs. Pruning typically refers to the selective removal of branches, buds, or roots to shape plants, control growth, or remove diseased or dead wood. Limbing specifically involves removing lower branches from the trunk of a tree. This technique is used to reduce ladder fuels, improve visibility and access for people or equipment, and promote the growth of higher canopy trees. By removing limbs up to a certain height, typically the lower third of a tree, land managers can reduce the risk of ground fires climbing into the canopy, thus decreasing the intensity and spread of wildfires. Both techniques are precise and controlled, making them useful in sensitive environments where minimal disturbance is essential. Proper pruning and limbing practices help maintain tree health and structure while reducing ladder fuels. These

techniques can also be employed when preparing areas for other treatment methods, like prescribed burns.

**Maintenance:** Following a pruning and limbing project, appropriate maintenance activities should include removing or mulching the cut debris to prevent buildup of surface fuels, monitoring for regrowth of invasive species, and re-establishing native understory vegetation to stabilize soil and support wildlife. Regular site inspections should be conducted to assess vegetation recovery and ensure that ladder fuels do not reaccumulate, with follow-up treatments like targeted grazing, mowing, or spot herbicide application used as needed to maintain fuel breaks and habitat health.

## 2D. Mowing

**Implementation:** Mowing involves cutting grass, herbaceous plants, and small shrubs close to the ground using mechanical equipment such as rotary mowers, flail mowers, or brush hogs. It is commonly used to maintain open areas, control invasive species, reduce fire hazards, and promote desirable plant communities. Mowing can be applied to a variety of landscapes, including roadsides, utility corridors, pastures, and residential areas. One of the key benefits of mowing is its ability to quickly reduce vegetation height and density, which helps decrease fuel loads in fire-prone regions and improve visibility and access. Timing and frequency are critical to mowing effectiveness, as cutting during certain growth stages can limit seed production and reduce regrowth of undesirable species.

**Maintenance:** While mowing is efficient and cost-effective for managing large areas, it primarily affects above-ground biomass and does not eliminate root systems, allowing some plants to resprout. It may also disturb wildlife habitat or contribute to soil compaction if used excessively. As a result, mowing is often used in combination with other vegetation management strategies to achieve long-term ecological and safety goals.

## 3. Invasive Species Management

As discussed in previous sections, invasive species compound wildfire risk and increase the rate of spread. Removal methods differ for woody and herbaceous species, as described below.

### 3A. Woody Species

**Implementation:** Removal of invasive woody species (such as Tamarisk, Tree of Heaven, Eucalyptus, etc.) will likely require a species-specific treatment prescription for removal of aerial biomass and effective root-kill. Depending on the target species and location of the target population of woody invasives, this may involve various treatment types included in this matrix, as well as treatment of the stump/root system. Root-kill may be achieved by stump-grinding, targeted herbicide application to the exposed cambium, and/or foliar application of herbicide to the resprouting aerial parts of the plant, depending on the target species and preferred treatment prescription.

**Maintenance:** Post-treatment monitoring is vital to ensure that restoration efforts do not inadvertently promote invasive species establishment; in some cases, native plant seeding may be employed to increase competition and enhance ecosystem resistance to invasion.

### 3A. Herbaceous Species

**Implementation:** Treatment of herbaceous species of invasive plants (grasses and forbs) can be accomplished with mowing (preferably prior to seed-set), burning, or grazing. Due to the prolific nature of invasive plant species, the initial removal of biomass will almost always require a follow-up treatment to remove additional germination from the existing seed bank. Early eradication and rapid response to new infestations are preferred. Once a seed bank has been established, long-term annual maintenance will likely be required as a follow-up. This often involves herbicide application, continued burning, and/or grazing. Reduction of the existing seed-bank can be accelerated by several grow-kill cycles of forced germination, or by targeted high-temperature burning to diminish the existing seed-bank in the topsoil.

**Maintenance:** Post-treatment monitoring is vital to ensure that restoration efforts do not inadvertently promote invasive species establishment; in some cases, native plant seeding may be employed to increase competition and enhance ecosystem resistance to invasion.

## 4. Grazing

Grazing is a common practice wherein livestock (cattle, sheep, or goats typically) consume primarily herbaceous vegetation, thereby reducing fuel load. As described below, practitioners can select livestock for fuel reduction grazing based on the fuel type and landscape conditions, wherein that breed might perform particularly well.

### 4A. Cattle

**Implementation:** Cattle grazing is a vegetation and fuel reduction technique used in community wildfire prevention to manage grasses and fine fuels that contribute to rapid fire spread. By consuming large amounts of herbaceous vegetation, cattle reduce the amount and continuity of surface fuels, particularly in grassland, shrubland, and woodland areas surrounding communities. This helps lower the likelihood of ignition and slows the rate at which wildfires can move toward populated areas. Cattle grazing is especially effective at targeting fast-growing, fine fuels like annual grasses, which dry out quickly and are highly flammable. When managed properly—through timing, intensity, and rotation—grazing can maintain vegetation at lower levels throughout the fire season, reducing both fuel loads and the vertical continuity of fuels that contribute to laddering into trees or structures.

**Maintenance:** As a natural and cost-effective method, cattle grazing can complement other fuel reduction strategies such as mechanical thinning or prescribed fire. However, its success depends on careful planning to avoid overgrazing, protect sensitive habitats, and ensure cattle are present during key fuel growth periods. When integrated into a broader wildfire mitigation plan, grazing helps create defensible space around communities while supporting agricultural uses of the land.

### 4B. Goats

**Implementation:** Goat grazing is particularly effective in steep, rugged, or overgrown areas where mechanical equipment is impractical or unsafe. Their ability to browse woody vegetation makes them valuable for reducing ladder fuels that can carry fire from the ground into tree canopies. Unlike cattle, goats prefer a diverse diet and readily consume brushy plants like poison oak, blackberry, and chaparral species, which are common in many fire-prone regions. This makes them especially useful in

the wildland-urban interface, where dense and flammable vegetation often exists near homes and infrastructure. Goats can navigate challenging terrain and reach vegetation that is difficult to treat with traditional methods, making them a versatile tool in community fire mitigation efforts.

**Maintenance:** When managed carefully—with fencing, herders, and grazing schedules—goat grazing can be a low-impact, eco-friendly method of fuel reduction. It often requires repeated treatments to maintain effectiveness, as vegetation will regrow over time. As part of an integrated wildfire prevention strategy, goat grazing helps reduce fuel continuity, enhance defensible space, and lower the risk of catastrophic fire near communities.

#### 4C. Sheep

**Implementation:** Sheep grazing can be used to manage fine fuels such as grasses, forbs, and some low-growing shrubs. Sheep are well-suited for reducing continuous ground vegetation similar to cattle. Their grazing helps lower the height and density of fine fuels, reducing fire intensity and spread—especially in open grasslands, meadows, and transitional zones near communities. While sheep primarily prefer herbaceous plants over woody shrubs, their effectiveness lies in their ability to maintain low fuel levels across large areas when grazing is well-timed and repeated as needed. Strategic use of sheep grazing during the growing season can prevent excessive buildup of dry vegetation before fire season begins. Sheep are often used in rotational grazing systems, which can be tailored to local conditions to achieve optimal fuel reduction without degrading the land.

**Maintenance:** Sheep grazing is a low-impact, cost-effective method that integrates well into broader wildfire mitigation plans, particularly in landscapes where mechanical or chemical treatments are not desirable. With proper management—including fencing, water access, and monitoring—sheep can contribute to long-term vegetation control and the creation of defensible space, helping protect communities from wildfire threats.

## 5. Fuel Breaks

### 5A. Classic Fuel Break

**Implementation:** A classic fuel break is a strategically placed strip of land where vegetation has been modified or removed to slow or stop the spread of wildfire. Fuel breaks may vary in width depending on terrain, vegetation type, and fire behavior potential. Classic fuel breaks can be created through mechanical clearing, prescribed burning, grazing, or chemical treatments. They are often constructed along roads, ridgelines, or property boundaries to take advantage of existing access and natural fire barriers. While they may not stop all wildfires, especially under extreme conditions, fuel breaks are designed to change fire behavior, slowing its spread, lowering flame lengths, and making direct suppression more effective.

**Maintenance:** To remain effective, fuel breaks require regular maintenance to prevent vegetation regrowth and accumulation of dead material. When integrated into a broader fuel management strategy and combined with community preparedness, fuel breaks serve as a valuable tool for protecting infrastructure, natural resources, and human lives in fire-prone landscapes.

### 5B. Shaded Fuel Break

**Implementation:** A shaded fuel break is a type of fuel break where the overstory canopy—typically mature, fire-resistant trees—is retained, while the understory vegetation and ladder fuels (such as shrubs, small trees, and dead material) are selectively removed or thinned. The goal is to reduce the intensity and spread of wildfire without completely clearing the area, allowing for continued ecological function and aesthetic value. Unlike classic fuel breaks that often involve total vegetation removal, shaded fuel breaks maintain a partially shaded environment that can suppress the growth of flammable grass and reduce wind penetration, further slowing fire behavior. They are commonly used in forested areas, especially near communities or along roads and ridgelines, where a more natural appearance is desirable and where retaining tree canopy can help with long-term ecosystem health.

**Maintenance:** Shaded fuel breaks are most effective when integrated into larger wildfire management strategies and regularly maintained to prevent the regrowth of

flammable vegetation. They provide safer conditions for firefighting operations and can serve as anchor points for fire suppression, making them a practical and environmentally sensitive tool in fire-prone landscapes.

## 6. Chemical Treatment

### 6A. Chemical Treatment

**Implementation:** Chemical treatment is a vegetation management method that involves the use of herbicides to control or eliminate unwanted plant species. Herbicides can be applied selectively to target specific plants or broadcast across larger areas, depending on the management goals and site conditions. Chemical treatments are often used in areas where mechanical or manual methods are impractical, such as steep terrain, inaccessible locations, or sites with widespread invasive plant infestations. They can be applied through various methods, including spot-spraying, wicking, aerial application, or soil treatments. When used correctly, herbicides can effectively reduce fine and ladder fuels that contribute to wildfire risk, while minimizing disturbance to the surrounding environment.

**Maintenance:** Proper timing, herbicide selection, and application technique are critical to the success and environmental safety of chemical treatments. These methods are typically used in combination with other vegetation management strategies—such as grazing, prescribed fire, or mechanical thinning—to achieve long-term control and maintain healthy, fire-resilient landscapes. Regulatory compliance and monitoring are essential to ensure that chemical use does not negatively impact water quality, non-target species, or nearby communities.

### 3.1.3 Proposed Fuel Treatment Projects

The previous sections outline how to conduct fuel treatments of varying types. The following sections, at a high-level, outline where in Santa Cruz County these fuel treatments should begin to be applied. Through a combination of stakeholder and collaborator engagement and surveys, desktop analysis, site visits, fire modeling, and research, the project team proposes general areas where Tubac, Rio Rico, Nogales, Patagonia, and Sonoita-Elgin can focus their fuel treatment and the order in which these proposed projects should be prioritized over the years to come. The

areas and their associated fuel treatment recommendations are broad and are meant to serve simply as starting points to kick off more detailed project planning efforts on a local level. When developing plans for each specific project, especially if the area is multi-jurisdictional, collaboration between owners, stakeholders, relevant agencies, fire departments and even neighboring counties is highly encouraged. Wildfires do not adhere to political boundaries, and neither should prevention projects. Some key project partners are highlighted throughout this document and include AZ DFFM, BLM, USFS, NRCS, and Fort Huachuca.

Each community and their fire district or department have five proposed fuel treatment projects outlined in this CWPP, making for twenty-five proposed fuel treatment projects across the county (Figures 15-16).

As of the adoption of this CWPP, Tubac is working toward a grassland and riparian restoration project in the Santa-Cruz River Corridor with partners Tubac Nature Center and Tucson Bird Alliance. Patagonia is also working toward the creation and maintenance of a fuel break on the western edge of town that has received funding through the Community Wildfire Defense Grant Community Wildfire Defense Grant Program (2025).

Figure 15. County-Wide Proposed Fuel Treatment Projects

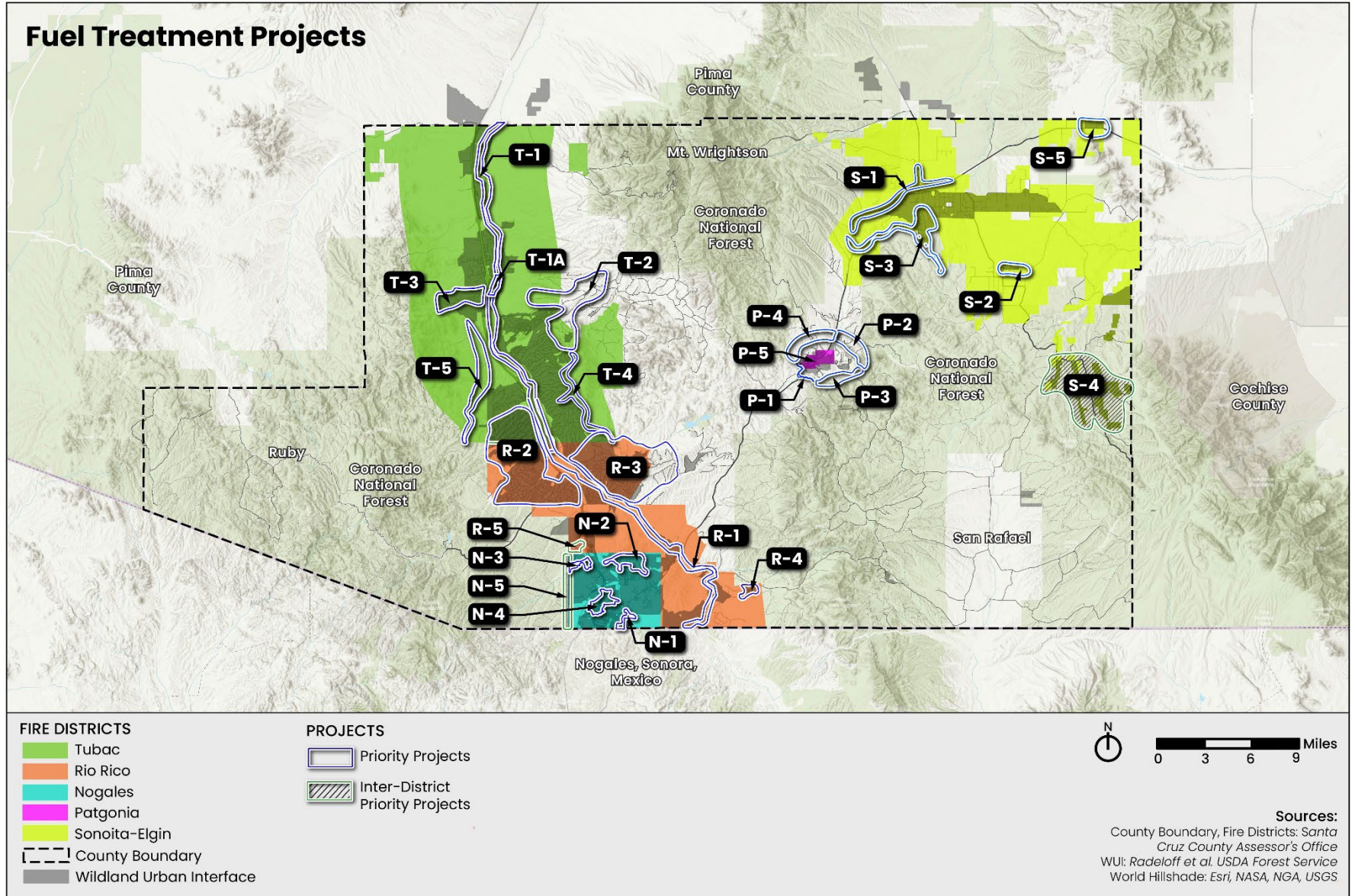
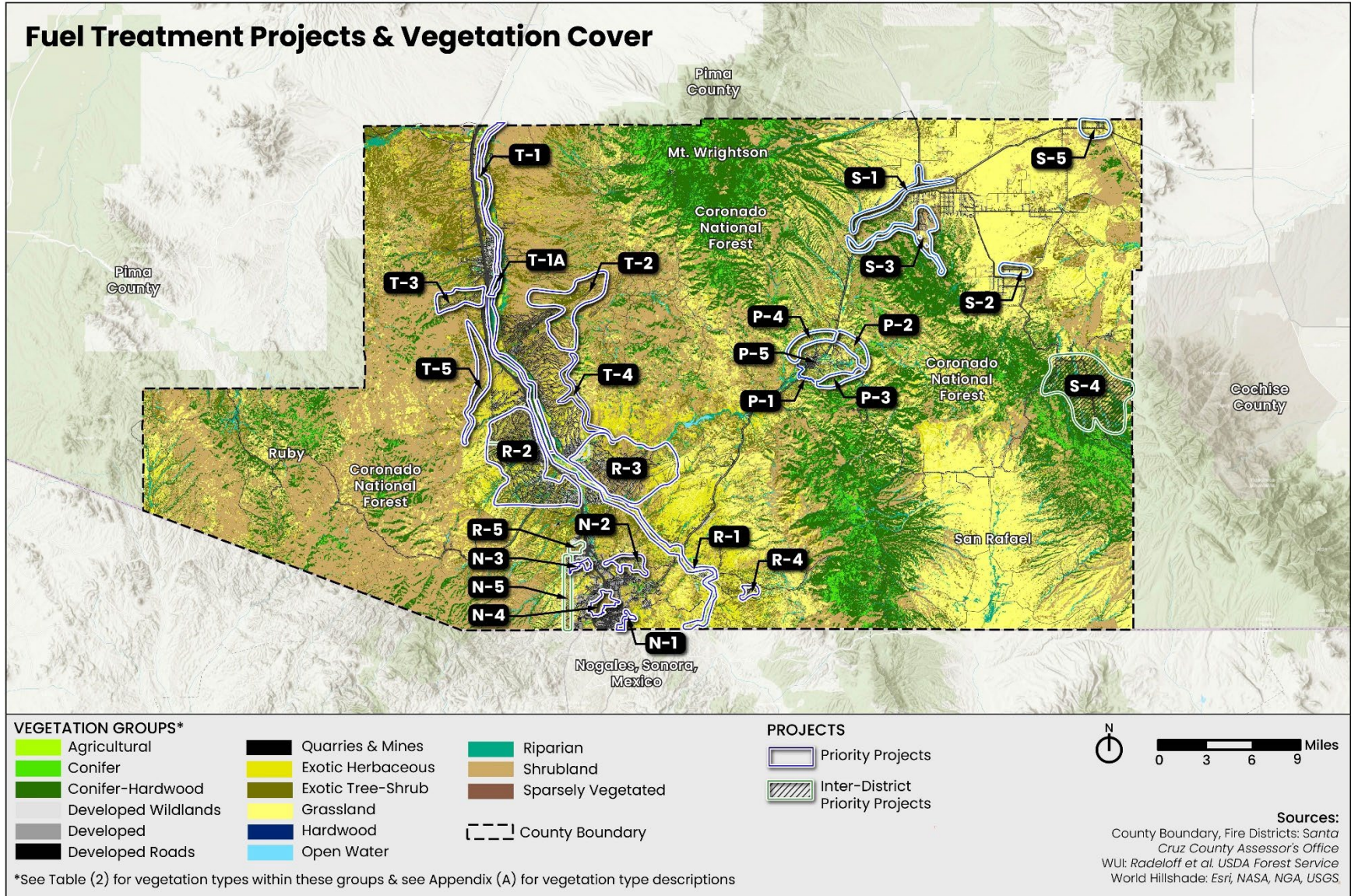


Figure 16. County-Wide Proposed Fuel Treatment Projects & Vegetation Cover



## Tubac

Working with the Tubac Fire District & stakeholders, we have identified the top five priority areas for fuel treatment (Figure 17, Table 5). The fuel treatment priorities in Tubac reflect a landscape where riparian vegetation, steep foothill topography, and expanding residential development intersect. The highest-priority project, **T-1: Santa Cruz River Corridor**, addresses dense riparian vegetation and invasive species that create a continuous fuel bed along the river. This corridor is both a natural fire spread pathway and a zone where ember cast can impact adjacent homes on both sides of the river. Treatments here include mowing, prescribed fire where feasible, invasive species removal, and establishment of defensible space around residential parcels close to the floodplain.

A related initiative, **T-1A**, supports riparian and grassland restoration through coordinated work by Tubac Nature Center and Tucson Bird Alliance. Although not a fuel-treatment project in the traditional sense, the restoration actions will reduce fine fuels, suppress invasive grass recurrence, and create long-term ecological resistance to fire.

The **T-2 East Tubac Community Protection Project** focuses on the WUI neighborhoods east of I-19 where steep slopes, fine grass continuity, and limited access routes increase response challenges. Treatments include thinning, pruning, targeted grazing, and shaded fuel break establishment along ridge lines and road corridors.

In the foothill and canyon environments of Aliso Springs (**T-3**), fuel treatments emphasize removal of ladder fuels, protection of narrow ingress/egress routes, and reduction of woody shrub densities that promote upslope fire runs.

**T-4**, the San Cayetano Foothills Firebreak, proposes a strategic ridgeline fuel break where continuous fuels and topographic alignment produce high-intensity fire potential. Mechanical treatments and periodic maintenance mowing will be essential here.

Finally, **T-5** addresses the long, winding roadway system spanning Calle Benito, Peck Canyon Drive, and Forest Road 4151. These routes form critical response and

evacuation corridors. Treatments prioritize roadside mowing, invasive grass removal, and selective thinning to improve visibility and slow roadside ignitions.

Figure 17. Tubac Proposed Fuel Treatment Projects

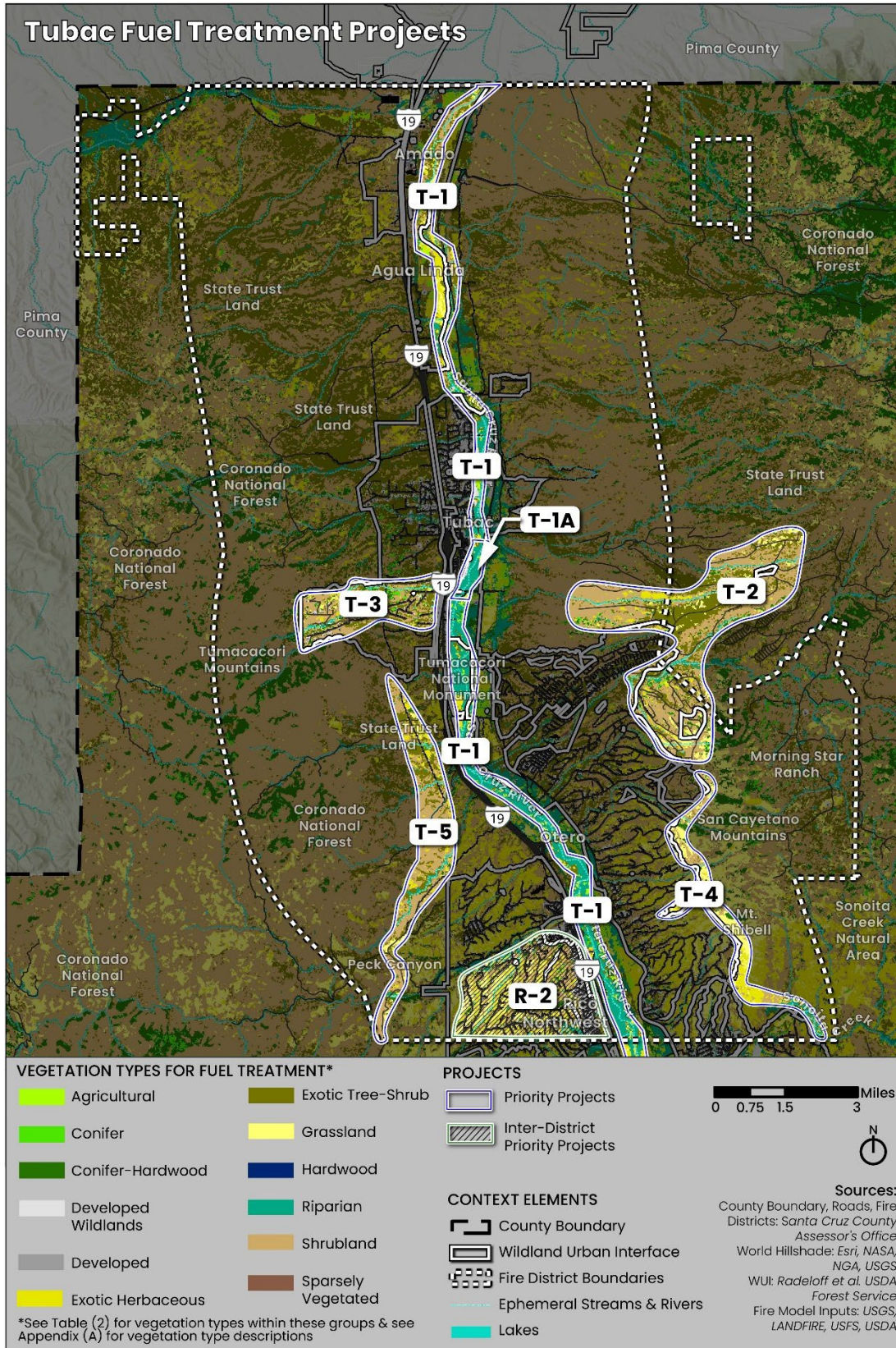


Table 5. Tubac Proposed Fuel Treatment Projects

Community / Fire District	Project Area Name	Project Code	Priority	Applicable Treatments	Treatable Vegetation Communities Present*
Tubac	Santa Cruz River Corridor	T-1	1	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 5A, 5B, 6A, defensible space, structure hardening	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Tubac	TNC & TBA Riparian & Grassland Restoration	T-1A	1	N/A- TNC & TBA to implement measures outlined in restoration plan	N/A- TNC & TBA to implement measures outlined in restoration plan
Tubac	E Tubac Community Protection	T-2	2	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, defensible space, structure hardening	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Tubac	Aliso Springs Community & Canyon	T-3	3	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, defensible space, structure hardening	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Tubac	San Cayetano Foothills Firebreak	T-4	4	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, defensible space, structure hardening	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Tubac	Calle Benito, Peck Canyon Dr, FR4151 to Gasline Rd	T-5	5	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, defensible space	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Rio Rico	**	R-2	**	**	**

\* Refer to the “Proposed Fuel Treatment Methods” section above for descriptions of implementation & maintenance, and Appendix D for treatment methods applicable to each vegetation group & type and Appendix E. Community Fuel Treatment Projects: How to Use the Online Dashboard for Project Planning

\*\* Refer to Table 6. Rio Rico Proposed Fuel Treatment Projects

## Rio Rico

Fuel treatment priorities in Rio Rico focus on its distinctive pattern of dispersed residential development embedded within foothill vegetation and intersected by washes and steep slopes (Figure 18, Table 6). The **R-1 Santa Cruz River Corridor Project** mirrors Tubac's high-priority efforts, targeting heavy riparian vegetation, invasive grass beds, and fuel continuity adjacent to dense housing clusters. Treatments increase defensible space, improve access corridors, and reduce the likelihood that riparian ignitions threaten subdivisions.

The **R-2 NW Rio Rico Community Protection Project**, shared with Tubac, aligns treatment work across jurisdictional boundaries to protect a fast-growing area with high WUI exposure. Here, roadside ignition potential, invasive grasses, and scattered drainages create multiple fire-spread vectors, making this cross-district effort essential.

The **R-3 Sonoita Creek & Community Protection Project** addresses an important tributary corridor lined with dense riparian vegetation and limited access points. Treatments support riparian thinning, removal of ladder fuels, creation of shaded fuel breaks, and widening of defensible space buffers around residential clusters built along hillsides.

In **R-4 Kino Springs**, treatment actions focus on rural residential parcels where ornamental vegetation, unmanaged grasslands, and shrub densities create hazardous continuity between structures and wildland fuels. Recommended approaches emphasize defensible space expansion, pruning, grazing, and targeted invasive species removal.

**R-5**, the inter-district USFS inholding project area, includes rugged terrain and steep slopes that pose substantial challenges to suppression. Treatments here, shared with the Coronado National Forest and Rio Rico Fire District, build connectivity between existing breaks and create anchor points for suppression activities during high-wind, fast-moving fire events.

Figure 18. Rio Rico Proposed Fuel Treatment Projects

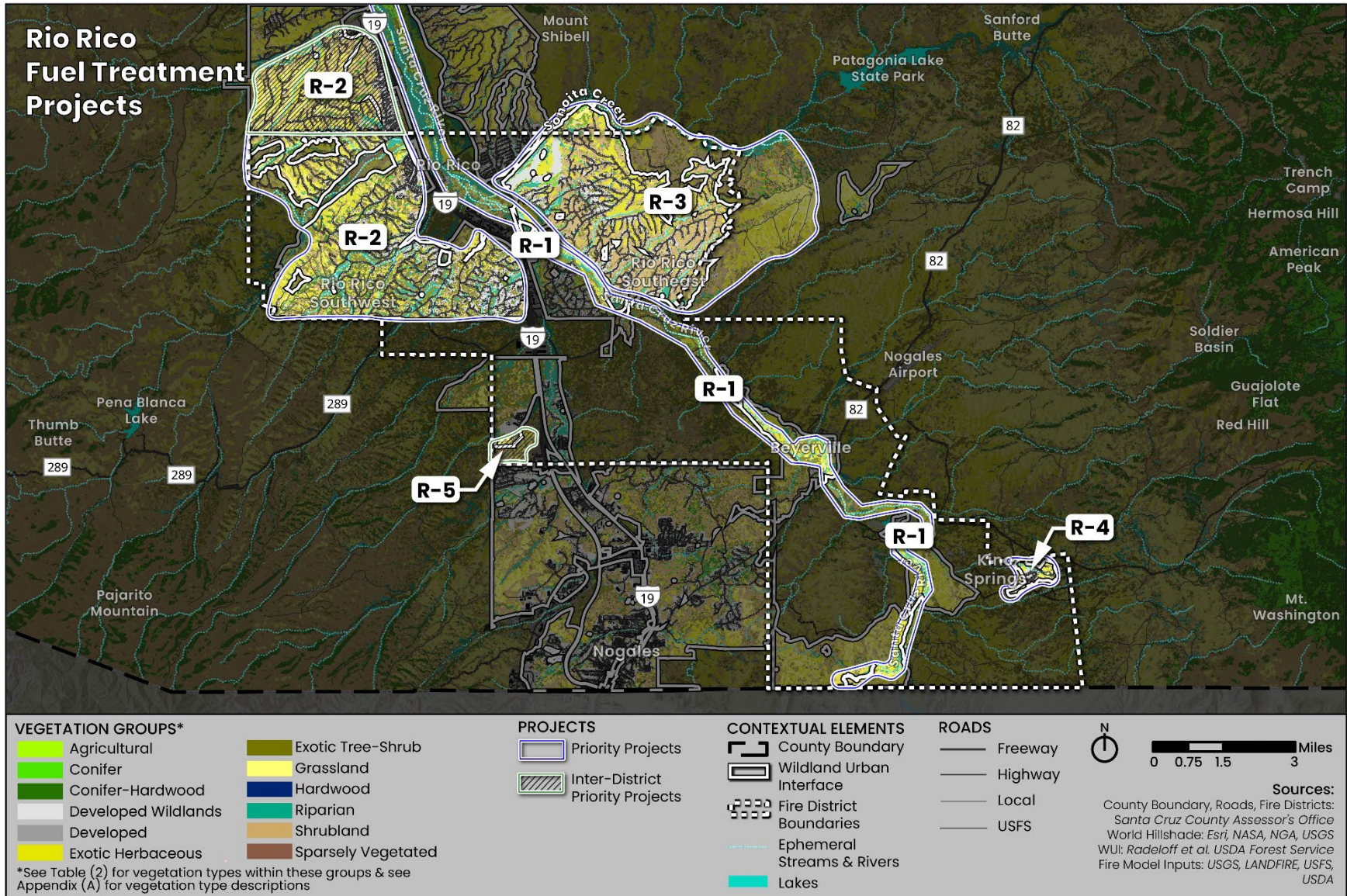


Table 6. Rio Rico Proposed Fuel Treatment Projects

Community / Fire District	Project Area Name	Project Code	Priority	Applicable Treatments*	Treatable Vegetation Communities Present*
Rio Rico	Santa Cruz River Corridor	R-1	1	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 5A, 5B, 6A, defensible space, structure hardening	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Rio Rico & Tubac	NW Rio Rico Community Protection	R-2	2	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, defensible space, structure hardening	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Rio Rico	Sonoita Creek & Community Protection	R-3	3	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, structure hardening, defensible space	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Rio Rico	Kino Springs Community Protection	R-4	4	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, structure hardening, defensible space	Conifer-Hardwood, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Rio Rico	(Inter-district) USFS Inholding	R-5	5	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous

\* Refer to the “Proposed Fuel Treatment Methods” section above for descriptions of implementation & maintenance, and

Appendix D for treatment methods applicable to each vegetation group & type and Appendix E. Community Fuel Treatment Projects: How to Use the Online Dashboard for Project Planning

## Nogales

Nogales faces a complex wildfire risk profile driven by steep canyon topography, dense urban-wildland intermix, and ignition sources associated with major transportation corridors and cross-border activity (Figure 19, Table 7). The highest-priority treatment zone, **N-1: Nogales Wash/Tricky Wash & Border Project**, targets an ignition-prone corridor influenced by highways, rail lines, and seasonal riparian fuel buildup. Treatments will reduce woody vegetation, limit fine-fuel accumulation, and improve defensible space around neighborhoods directly adjacent to the wash.

The **N-2 NE Camino Vista del Cielo Project** mitigates risk to hillside communities perched along steep, southwest-facing slopes. Fuel treatments include ladder-fuel removal, thinning of dense shrublands, establishment of shaded fuel breaks, and driveway-level defensible-space improvements that enhance access and response.

**N-3: Old Golf Course Project** treats a landscape undergoing ecological transition where unmanaged grasses, shrubs, and tree clusters have grown dense on formerly maintained grounds. The open terrain and adjacency to neighborhoods elevate ember and flame-front risks. Treatments emphasize mowing, mastication, grazing, and creation of defensible zones around homes bordering the site.

The **N-4 West 20-ft Control Line / Firebreak Project** extends through inter-agency lands and serves as a critical buffer on the western perimeter of Nogales. This project creates a continuous, maintainable fuel break tying together roadway edges, ridge lines, and natural barriers.

Finally, **N-5**, the inter-district USFS inholding area, addresses complex fuels within rugged, steep terrain. Coordinated treatments with federal partners support strategic fuel breaks and thinning that reduce the risk of high-severity fire entering or leaving the city from these forested slopes.

Figure 19. Nogales Proposed Fuel Treatment Projects

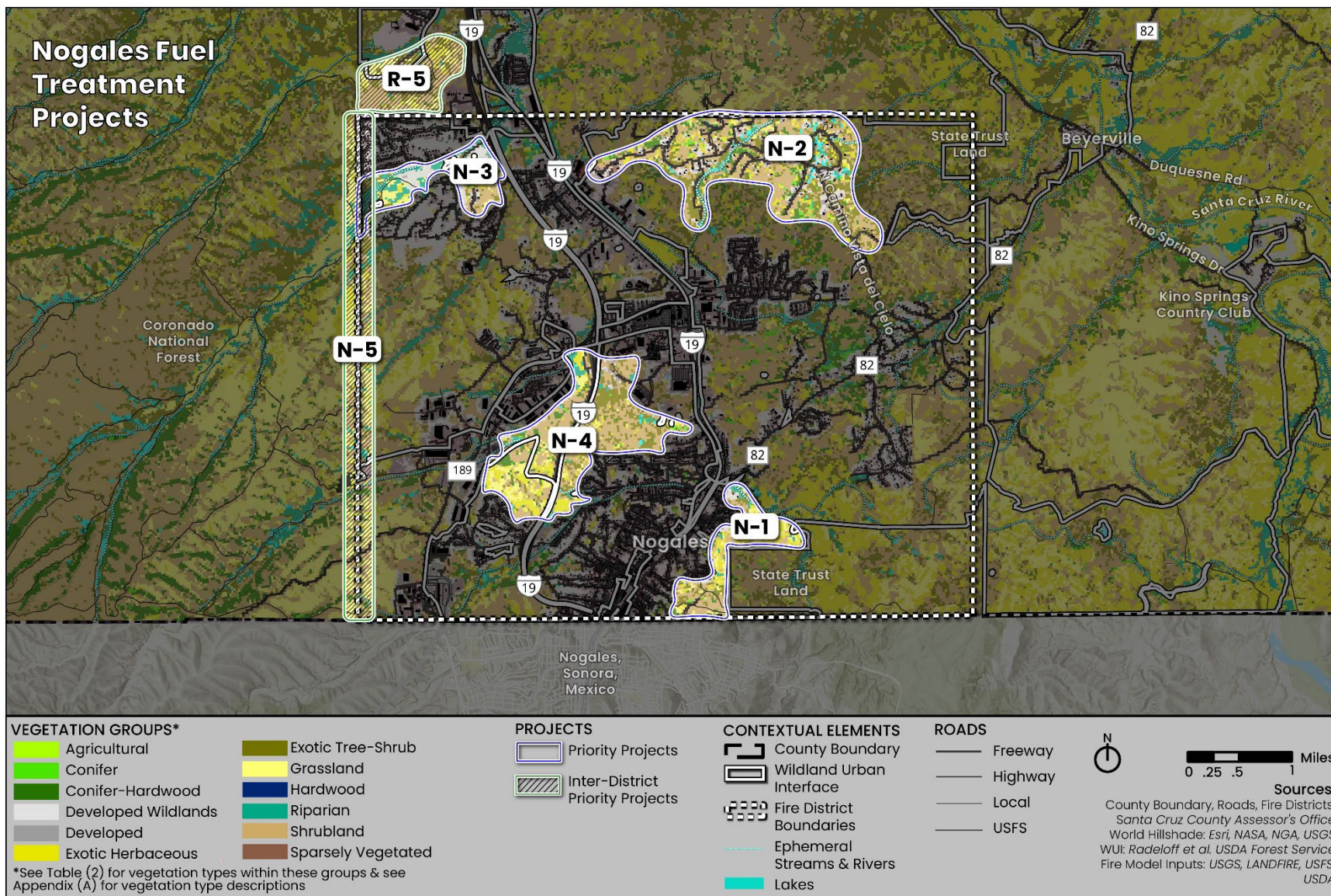


Table 7. Nogales Proposed Fuel Treatment Projects

Community / Fire District	Project Area Name	Project Code	Priority	Applicable Treatments*	Treatable Vegetation Communities Present*
Nogales	Nogales Wash / Tricky Wash & Border	N-1	1	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, defensible space, structure hardening	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Riparian, Shrubland
Nogales	NE Camino Vista del Cielo Community Protection	N-2	2	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, defensible space, structure hardening	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Riparian, Shrubland
Nogales	Old Golf Course	N-3	3	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, defensible space, structure hardening	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Riparian, Shrubland
Nogales	(Inter-Agency) West 20ft Control Line / Firebreak	N-4	4	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, defensible space, structure hardening	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Riparian, Shrubland
Nogales	(Inter-District) USFS Inholding	N-5	5	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, defensible space, structure hardening	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Riparian, Shrubland

\* Refer to the “Proposed Fuel Treatment Methods” section above for descriptions of implementation & maintenance, and

Appendix D for treatment methods applicable to each vegetation group & type and Appendix E. Community Fuel Treatment Projects: How to Use the Online Dashboard for Project Planning

## Patagonia

Patagonia's proposed fuel treatment projects reflect its position in a narrow valley surrounded by steep grassland and shrub-dominated slopes that are prone to rapid, wind-driven fire spread (Figure 20, Table 8). The **P-1 DFFM-CWDG Fuel break** on the western edge of town establishes a primary defensive barrier against fires approaching from high-risk southwest exposures. This project benefits from federal funding and incorporates shaded fuel break design and roadside clearance.

The **P-2 East Side Fuel Break** and **P-3 South Side Fuel Break** extend this perimeter strategy, creating a continuous ring of treatments that reinforce community protection from multiple wind-aligned fire pathways. These areas contain steep terrain and limited egress routes; treatments include mechanical thinning, prescribed fire where feasible, invasive species management, and defensible-space maintenance on adjacent parcels.

The **P-4 North Side Fuel Break** addresses the primary drainage and slope corridor north of Patagonia where shrub and grass fuels can channel fire directly toward residential structures. Treatments prioritize ladder-fuel removal, pruning of oak and mixed-conifer stands, and reduction of dense shrubs.

The **P-5 Emergency Management Plan Update Project** supports non-vegetative components of fire mitigation by formalizing evacuation, communications, and coordination protocols. This written plan ensures that physical fuel-reduction efforts are matched by administrative preparedness.

Figure 20. Patagonia Proposed Fuel Treatment Projects

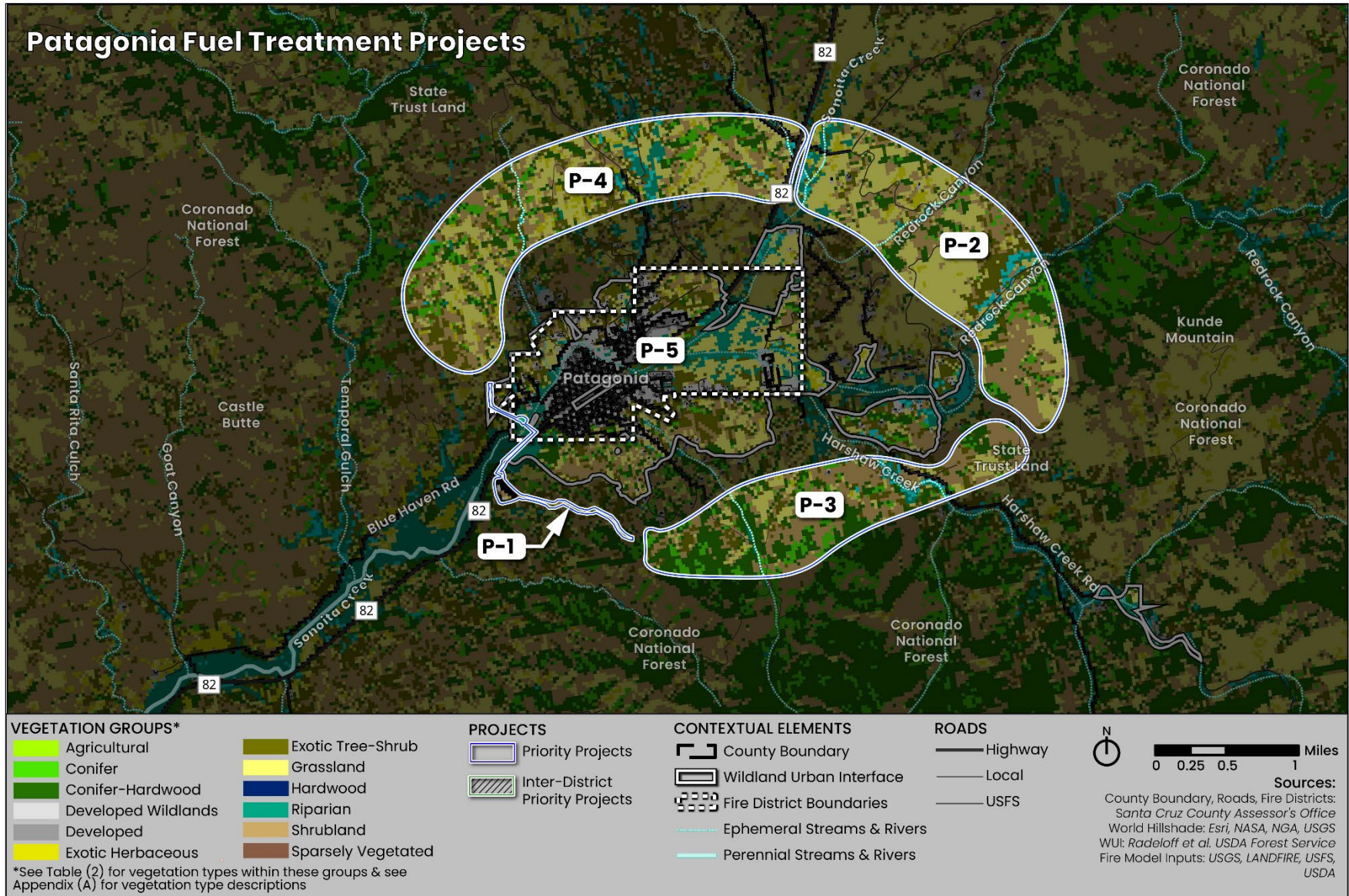


Table 8. Patagonia Proposed Fuel Treatment Projects

Community / Fire District	Project Area Name	Project Code	Priority	Applicable Treatments	Treatable Vegetation Communities Present*
Patagonia	DFFM-CWDG TBA Fuelbreak	P-1	1	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Patagonia	East Side Fuel Break	P-2	2	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, defensible space, structure hardening	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Patagonia	South Side Fuel Break	P-3	3	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, defensible space	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous,
Patagonia	North Side Fuel Break	P-4	4	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, defensible space, structure hardening	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Patagonia	Update Emergency Management Plan	P-5	5	N/A – Collaborative, written plan	N/A – Collaborative, written plan

\* Refer to the “Proposed Fuel Treatment Methods” section above for descriptions of implementation & maintenance, and

Appendix D for treatment methods applicable to each vegetation group & type and Appendix E. Community Fuel Treatment Projects: How to Use the Online Dashboard for Project Planning

## Sonoita-Elgin

The Sonoita-Elgin region is dominated by grasslands that ignite easily, spread rapidly under high winds, and pose serious threats to dispersed ranch-residential communities (Figure 21, Table 9). The **S-1 Hwy 82 & 83 Project** focuses on treating roadside corridors that are known ignition sources due to vehicle malfunctions, sparks, and roadside fuel accumulation. Treatments include recurring mowing, invasive species removal, grazing, and creation of defensible space buffers along residential clusters near these highways.

The **S-2 Hillcrest Drive Community Protection Project** targets a neighborhood positioned on rolling terrain where fire can spread quickly upslope. Treatments emphasize mechanical thinning of shrubs, targeted grazing to reduce fine fuels, and establishment of a community-level shaded fuel break.

**S-3 Hacienda Los Encino Community Protection & Firebreak** proposes defensible-space enhancement and fuel reduction around a cluster of homes surrounded by continuous grasslands. Treatments support safe access and evacuation while protecting critical infrastructure and outbuildings.

The **S-4 Canelo Community Protection Project** addresses high-risk vegetation continuity where shrub-grass mosaics meet forested canyon edges. Treatments aim to reduce ladder fuels, thin woody vegetation, and create tactical anchor points for suppression.

Finally, **S-5 Rain Valley Community Protection Project** focuses on a low-lying basin where wind patterns and topography can accelerate fire spread. Treatments include creating a defensible buffer around residential parcels, roadside fuel reduction, and seasonal grazing to maintain short grass heights.

Figure 21. Sonoita-Elgin Proposed Fuel Treatment Projects

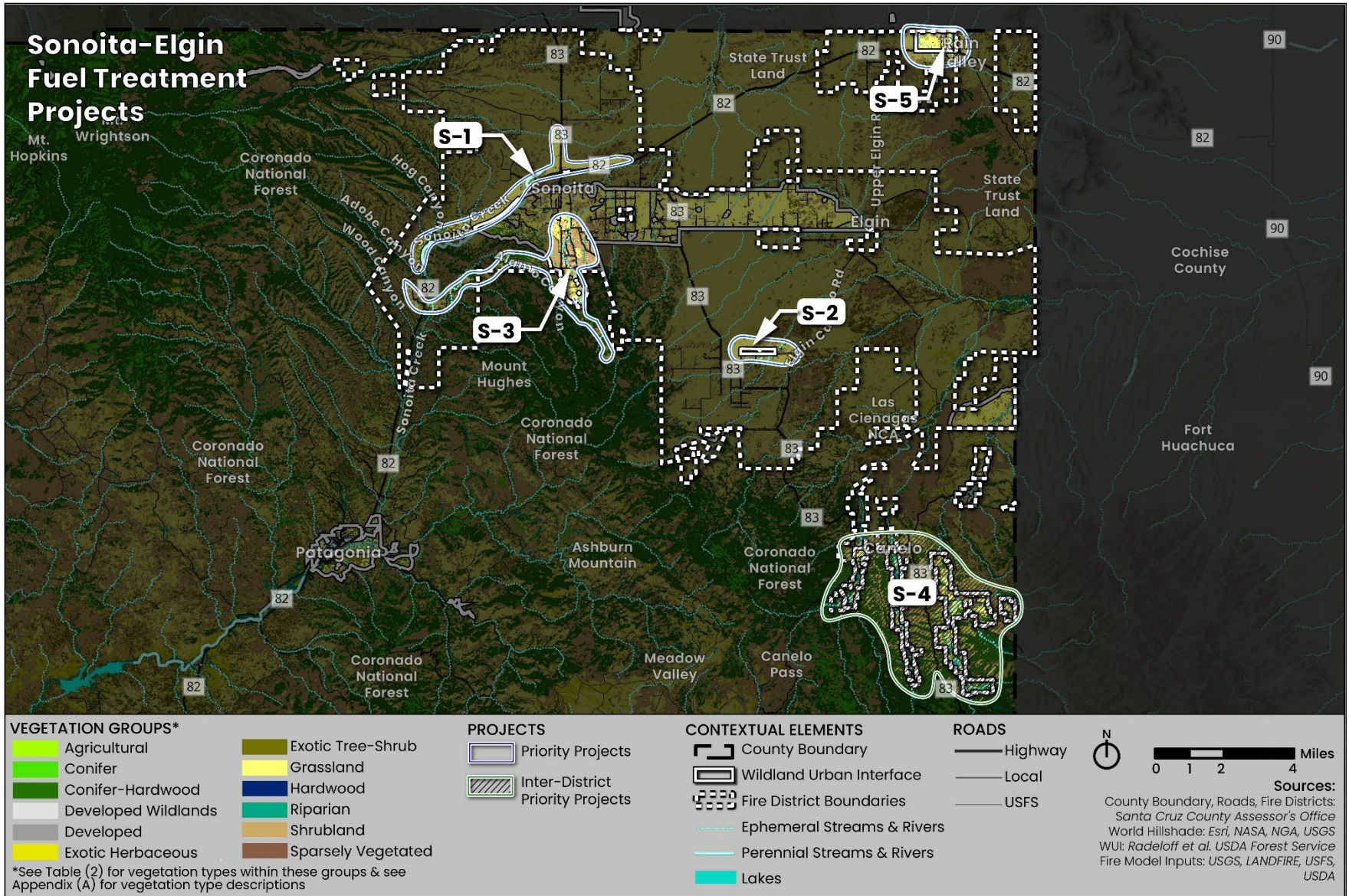


Table 9. Sonoita-Elgin Proposed Fuel Treatment Projects

Community / Fire District	Project Area Name	Project Code	Priority	Applicable Treatments*	Treatable Vegetation Communities Present*
Sonoita-Elgin	HWY 82 & 83	S-1	1	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, structure hardening, defensible space	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Sonoita-Elgin	Hillcrest Dr Community Protection	S-2	2	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, structure hardening, defensible space	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Sonoita-Elgin	Hacienda Los Encino Community Protection & Firebreak	S-3	3	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, structure hardening, defensible space	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Sonoita-Elgin	Canelo Community Protection	S-4	4	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, structure hardening, defensible space	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous
Sonoita-Elgin	Rain Valley Community Protection	S-5	5	1A, 1B, 2A, 2B, 2C, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A, structure hardening, defensible space	Conifer-Hardwood, Conifer, Shrubland, Grassland, Riparian, Exotic Tree/Shrub, Exotic Herbaceous

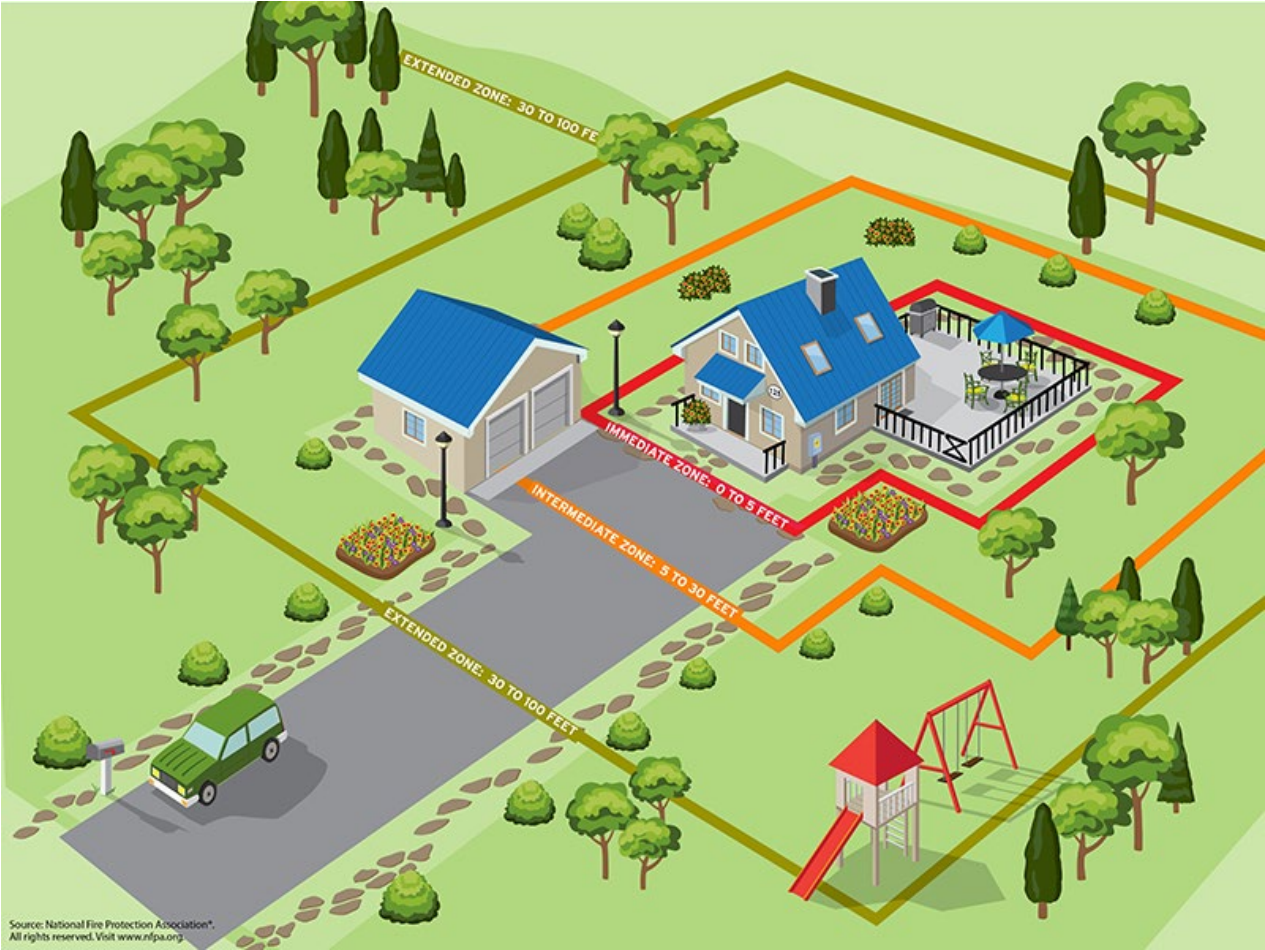
\* Refer to the “Proposed Fuel Treatment Methods” section above for descriptions of implementation & maintenance, and

Appendix D for treatment methods applicable to each vegetation group & type and Appendix E. Community Fuel Treatment Projects: How to Use the Online Dashboard for Project Planning

### 3.2 Structure Hardening

In Santa Cruz County, stakeholders expressed a clear desire for the CWPP to contain information and guidance at the individual and property scales. The recommendations below are sourced directly from a combination of Firewise USA's recommendations ( National Fire Protection Association 2025), and the State of Arizona's "Living with Wildfire, Homeowners' Firewise Guide for Arizona," (Arizona Interagency Coordinating Group 2021). Defensible space guidelines outline landscaping design and maintenance standards in the areas up to 200 feet from structures (Figure 22, Table 10).

Figure 22. Structure Hardening and Defensible Space Zones (National Fire Protection Association 2021)



Structure hardening occurs in zone 1, the immediate zone. Defensible space also occurs in zone 1, zone 2, zone 3, and beyond for up to 200 feet (Table 5. Tubac Proposed Fuel Treatment Projects).

*Table 10. Structure Hardening & Defensible Space Zones ( National Fire Protection Association 2025) (National Fire Protection Association 2021)*

Zone	Name	Distance from Structure	Applicable Fire Prevention
1	Immediate Zone	0-5ft	Structure Hardening & Defensible Space
2	Intermediate Zone	5-30ft	Defensible Space
3	Extended Zone	30-100ft	Defensible Space
	Managed Wildland Zone	100ft-200ft	Defensible Space

## Extent of Participation in Structure Hardening Practices in the County Since 2018

In Santa Cruz County, structure hardening practices have mostly coincided with Firewise practices. Neighborhoods such as Casas Arroyo in Sonoita and ARR-Babo Ranches in Elgin have completed structure hardening through their successful Firewise certification process. Aside from these communities, structure hardening practices among homeowners are difficult to track, but estimates limit these efforts to a small number of proactive landowners. Financial support, technical guidance, and landowner incentives are needed to promote the implementation of structure hardening measures more broadly within Santa Cruz County.

## Recommended Structure Hardening Practices

Every homeowner in Santa Cruz County should be aware of, and implement to the best of their ability, the following recommended structure hardening practices. Homeowners, when planning wildfire risk reduction projects, should start with the house and any structures first. Resilient communities and structures reduce strain on regional emergency response resources. Structure hardening occurs in what NFPA’s Firewise program calls the “immediate zone,” zero to five feet from homes and structures (National Fire Protection Association 2021). Structure hardening focuses on reducing the chances that a flying ember from a wildfire will ignite a home. The following graphic highlights typical areas where homes are most at risk of ignition

from embers, and following table lists practices to reduce this ignitability (Figure 23, Table 11).

Figure 23. Structure Hardening Recommendations (National Fire Protection Association 2021)  
(National Fire Protection Association 2025)



Table 11. Structure Hardening Recommendations (National Fire Protection Association 2021)  
(National Fire Protection Association 2025)

#	Description	Recommendations
1	<b>Wood Roof</b>	Replace wood shake and shingle roofs with fire-resistant types such as composition, metal and tile.*
		Types of Class A fire-rated roofing products offer the best protection. Examples include composite shingles, metal, cement tile, and clay. Inspect shingles/tiles and replace/repair those that are loose or missing to prevent ember penetration.**
2	<b>Roof Opening</b>	Plug openings in roof coverings, such as the open ends of barrel tiles, with non-combustible materials.*
		If gaps exist between the roof covering and the roof deck at the eave or ridge, fill the space with a "bird stop" material.**
3	<b>Roof Debris</b>	Routinely remove plant debris, such as pine needles, leaves, branches and bark, from the roof.*
		Keep roofs clean from leaf litter and pine needles. Remove all tree limbs within 10 feet of the chimney, or that overhang the roof.**
4	<b>Skylights</b>	Replace plastic skylights with types constructed of double-pane glass. One of the panes should be tempered glass. Close skylights if wildfire is threatening.*
		Remove debris next to and on skylights. Glass is a better option than plastic or fiberglass.**
5	<b>Fireplace Chimneys &amp; Spark Arrester</b>	Install an approved spark arrester on chimneys.*
		Remove debris that may accumulate at roof-to-wall intersections. Embers from a fireplace can exit the chimney and could ignite a wildfire. To prevent this, install a spark arrester. When wildfires are approaching close the damper, fireplace screens and glass doors.**
6	<b>Windows</b>	Replace single-pane, non-tempered glass windows with multiple-pane, tempered glass types. Close all windows if wildfire is threatening.*
		Multi-paned tempered glass can help reduce the risk of fracture or collapsing in a wildfire.**
7	<b>Vents</b>	Cover attic, eave and foundation vents with 1/8-inch wire mesh or install new vent types designed to prevent ember entry. If wildfire is threatening, consider covering vent openings with pre-cut plywood or aluminum foil folded several layers thick and stapled.*
		Consider purchasing closure devices for foundation and gable end vents and installing a louver-type dryer vent that stays closed unless the dryer is running. Clean debris from attic vents and install 1/8-inch metal mesh screening. For turbine vents, access the attic and inspect where the vent attaches to the roof and attaches 1/8-inch screening to the roof sheathing. Dormer-face vents should be replaced with a low-profile vent. Ridge vents should be rated for high wind/rain exposure.**
8	<b>Rain Gutters</b>	Keep rain gutters free of plant debris during fire season. Consider using rain gutter covers to reduce maintenance.*
		Metal roof gutters do not ignite, only the debris material that accumulates in them – that's why keeping them clean is so important. Vinyl roof gutters can ignite when the debris material is ignited and flaming gutters can fall from the

#	Description	Recommendations
		roof edge and land next to the house, which is why the immediate zone needs to be clear of flammable materials.**
9	<b>Siding</b>	<p>Fill gaps in siding and trim materials with a good quality caulk and replace poor condition building materials.*</p> <p>Use ignition-resistant building materials on exterior walls. Examples include Stucco, masonry products, plaster, and cement. Seal gaps and crevices. Examine the siding for locations where embers could accumulate or lodge and apply caulking at trim-to-siding locations where it is missing or has failed.**</p>
10	<b>Woodpiles</b>	Move firewood stacks and scrap lumber piles at least 30 feet from the house or other buildings.*
11	<b>Patio Furniture</b>	Place combustible patio furniture, such as lounges, tables and hammocks, inside the house or garage if wildfire is threatening.*
12	<b>Deck Boards</b>	Replace deck boards that are less than one inch thick or that are in poor condition with thicker, good condition boards. Use metal flashing between the deck and the house.*
13	<b>Deck Debris</b>	Remove plant debris from the gaps between deck boards, the gap between the deck and house, and lying on top of the deck.*
14	<b>Porch &amp; Deck Accessories</b>	If wildfire is threatening, remove combustible materials from the porch and deck including newspapers, wicker baskets, door mats, pine cones and dried flower arrangements, and place BBQ propane tanks indoors.*
15	<b>Under the Deck</b>	<p>Remove plant debris, wood piles and other easily ignited materials from under decks. Consider enclosing the open sides of the deck with siding materials that are properly vented or 1/8-inch wire mesh to reduce maintenance and deter ember entry. Do not use wooden lattice to enclose decks.*</p> <p>Never store flammable materials underneath elevated decks/porches. Remove dead vegetation and debris from under decks/porches, and between deck board joints.**</p>
16	<b>Flowerboxes &amp; Planter Beds</b>	Remove wooden flowerboxes from beneath windows if wildfire is threatening. In planter beds, replace wood mulches with noncombustible types (such as crushed stone or gravel**) and remove plant debris, including dried grass and flowers, dead leaves and dead branches from planter beds next to the house, other buildings and next to wooden fences. Replace ornamental junipers with low-growing deciduous shrubs or flowers under irrigation.*
17	<b>Eaves</b>	<p>Cover open eaves with sheathing, such as plywood or fiber-cement board. Use tongue and groove joints or other intricate joint types and don't use butt joints.*</p> <p>Reduce the size and number of embers that pass-through vents in the eaves by covering them with a 1/8-inch metal mesh screening. Inspect soffit vents and maintain as needed.**.</p>
18	<b>Carports</b>	Remove flammable items stored in carports.**.
19	<b>Vehicles</b>	Close vehicle windows. Back into the garage and close the garage door or park away from the house.*
20	<b>Garage</b>	<p>Adjust garage doors to achieve as tight a fit as possible with the door frame. Consider using trim around the garage door opening to reduce the size of gap openings. Close the garage door if wildfire is threatening.*</p> <p>Weather seal the perimeter of garage doors to help keep embers out. Be sure the door is tight fitting so embers</p>

#	Description	Recommendations
		can't slide under the door or in from the sides. If possible, choose a metal or wood core door with metal exterior.**.
21	<b>Garbage Cans &amp; Recycling Bins</b>	Use garbage cans covered with tight fitting lids near the house or other buildings. Move newspaper recycling bins indoors.*
22	<b>Fences</b>	Maintain wooden fences in good condition and create a noncombustible fence section or gate next to the house for at least five feet.* Use non-flammable fencing material (metal or masonry) when attaching directly to the siding. Ensure there's a minimum of at least 5' of noncombustible material where it attaches to the siding. Do not add vines or other types of vegetation to fencing material. Wooden fences can carry flames directly to the house.**

\*= (National Fire Protection Association 2021)

\*\*= ( National Fire Protection Association 2025)

### 3.3 Defensible Space

#### Extent of Participation in Defensible Space Practices in the County Since 2018

Since 2018, fire districts in Santa Cruz County have promoted Firewise standards for defensible space within their communities. Defensible space occurs at an individual landowner level, making it difficult to track countywide participation. However, it is evident that participation has been limited in scope throughout Santa Cruz County. Two homeowner associations, Casas Arroyo in Sonoita and ARR-Babo Ranches in Elgin, have achieved Firewise certification (<https://www.nfpa.org/education-and-research/wildfire/firewise-usa/firewise-usa-sites>). These entities have met all criteria set by the NFPA in relation to defensible space, structure hardening, and evacuation plans.

#### Recommended Defensible Space Practices

Every homeowner in Santa Cruz County should be aware of, and implement to the best of their ability, the following recommended defensible space practices. After assessing and completing structure hardening practices, defensible space practices should be implemented. Defensible space practices occur in three zones: the

immediate zone within five feet of structures, the intermediate zone five to 30 feet from structures, and the extended zone 30 to 100 feet from structures. If a property extends over 100 feet from the structure, defensible space practices should also be implemented beyond the extended zone, in a more limited way, up to 200 feet from the structure. The following graphics and table outline best practices to implement in these zones, and their priority level (Table 12, Figure 24, Figure 25).

Figure 24. Firewise Tree Spacing & Pruning Guidelines (National Fire Protection Association 2025)

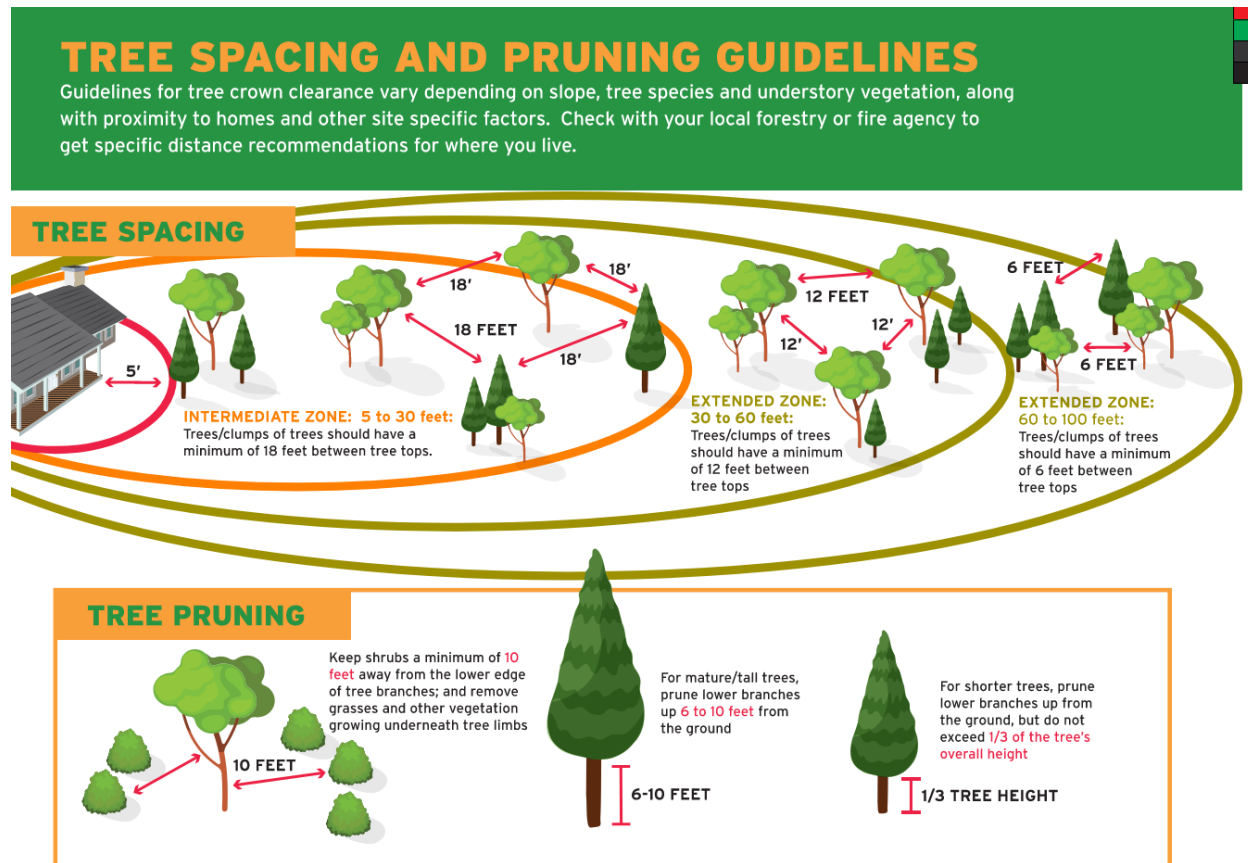
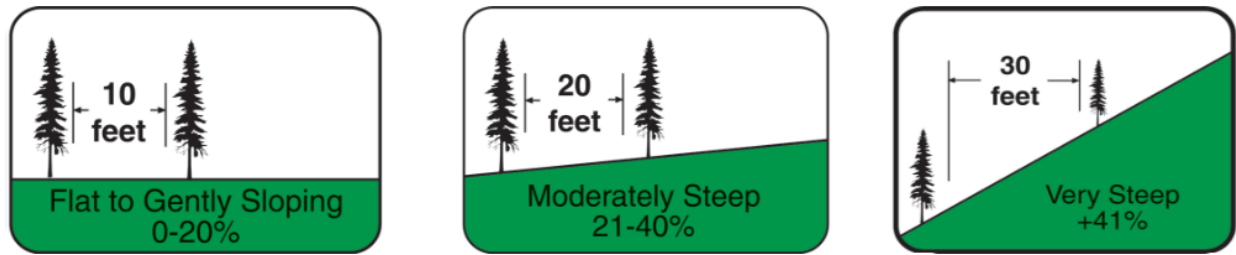


Figure 25. National Fire Protection Association Vegetation Spacing on Slope Guidelines  
(National Fire Protection Association 2021)



**NOTE:** Spacing distances are measured between canopies (outermost branches of a plant), not between trunks or stems.

Table 12. Firewise Recommendations for Defensible Space (National Fire Protection Association 2025) (National Fire Protection Association 2021)

Zone	Priority	Recommendations
Immediate Zone (0-5ft)	Very High	Dead vegetation, dried leaves, pine needles and ground debris accumulation should be frequently removed from this area.
	Very High	Hardscaping components should be installed around the perimeter of the home - keep them free of ground litter/debris. Concrete, stone or gravel walkways are great additions to the Immediate Zone.
	Very High	Remove trees and shrubs from this area; or replace with succulents.
	High	Trim tree limbs that overhang from the Intermediate zone into this area.
	Very High	Wood mulch products should be replaced with non-combustible mulch products such as crushed stone/gravel options.
Intermediate Zone (5-30ft)	Very High	Clear vegetation from under large stationary propane tanks.
	Medium	Create fuel breaks with driveways, walkways/paths, patios, and decks.
	Very High	Keep lawns and native grasses mowed to a height of four inches.
	Very High	Remove ladder fuels (vegetation under trees) so a surface fire cannot reach the crowns. Prune trees up to six to ten feet from the ground; for shorter trees do not exceed 1/3 of the overall tree height (Figure X).
	High	Space trees to have a minimum of eighteen feet between crowns with the distance increasing with the percentage of slope (Figure X).
	Medium	Tree placement should be planned to ensure the mature canopy is no closer than ten feet to the edge of the structure.
	High	Trees and shrubs in this zone should be limited to small clusters of a few each to break up the continuity of the vegetation across the landscape.
	Very High	Water plants, trees and lawns to keep them from becoming dry.
Extended Zone (30-100ft)	Very High	Dispose of heavy accumulations of ground litter/debris.
	Very High	Remove dead plant and tree material.
	High	Remove small conifers growing between mature trees.
	Very High	Remove vegetation adjacent to storage sheds or other outbuildings within this area.

	Medium	Trees 30 to 60 feet from the home should have at least 12 feet between canopy tops. Trees 60 to 100 feet from the home should have at least 6 feet between canopy tops
Beyond the Extended Zone (100–200ft)	Medium	Proper thinning and pruning in this zone will make a significant difference protecting your home structures.
	Medium	Re-sprouting of shrubs will happen and is acceptable. Monitor re-sprouting regularly to guard against the creation of ladder fuels, and thin and grub again when necessary.
	Medium	Any approved method of slash treatment may be acceptable for this zone, including piling and burning, chipping, or lop-and-scatter. Check local ordinances and your local fire department for guidance.
	Medium	The effectiveness of survivable space increases when multiple property owners work together.

## 4.0 Additional Community Considerations

Community Wildfire Protection Plan implementation involves collaboration across many stakeholders. Below are additional topics for consideration and advancement, in tandem with structure hardening tactics, defensible space creation/management, and fuel treatment projects.

### Governance & Partnerships

Successful wildfire protection plans leverage partnerships between private communities, fire departments, residents, and federal and state agencies. These collaborations align plans for efficient land management and the prevention of destructive wildfire. Some proven methods for establishing and maintaining cross-jurisdictional partnerships are listed in **Table 13**.

*Table 13. Methods for Establishing Cross-Jurisdictional Partnerships*

Name	Description	Link for more information
<b>Mutual Aid Agreements</b>	Establish the terms under which one fire district or agency provides resources — personnel, teams, facilities, equipment and supplies — to another fire district or agency	<a href="https://www.usfa.fema.gov/az/nims/mutual-aid.html">https://www.usfa.fema.gov/az/nims/mutual-aid.html</a>

<b>Good Neighbor Authority</b>	Allows the USDA Forest Service to enter into agreements with state forestry agencies to do the critical management work to keep our forests healthy and productive	<a href="https://www.fs.usda.gov/managing-land/farm-bill/gna">https://www.fs.usda.gov/managing-land/farm-bill/gna</a>
<b>Firewise USA ®</b>	The Firewise USA® program provides simple, effective steps to help communities reduce the risk of destruction from wildfire.	<a href="https://www.nfpa.org/education-and-research/wildfire/firewise-usa">https://www.nfpa.org/education-and-research/wildfire/firewise-usa</a>

A Santa Cruz County Fire Safe Council would formalize collaboration among fire districts, HOAs, environmental organizations, federal agencies, business leaders, and local residents. The council would coordinate community fuel-reduction projects, lead annual preparedness campaigns, support neighborhood Firewise certifications, and facilitate resource sharing. Its purpose would be to ensure multi-jurisdictional alignment, expand volunteer capacity, and institutionalize long-term community wildfire resilience. This council could begin as part of the existing monthly Fire Chiefs meeting and expand as needed.

To maximize impact, the county’s five fire departments should continue to discuss potential future shared services via an authority or similar mechanism that may include the establishment of a County Fire Marshal or increase in authority of the County Building Official if deemed appropriate by the departments. A mechanism for authority such as a Fire Marshal would provide unified enforcement for defensible space ordinances, hazard abatement, and burn permit regulation across all jurisdictions in Santa Cruz County. An authority mechanism would bridge municipal and district boundaries, coordinate code compliance efforts, modernize inspection protocols, and ensure a standardized approach to vegetation management requirements. A Fire Marshal could also support grant applications, oversee Firewise implementation, and serve as a centralized authority for cross-agency wildfire preparedness planning.

## Firewise

Countywide adoption of Firewise USA®, Ready-Set-Go, and NFPA wildfire preparedness standards create consistent messaging and expectations for all residents.

Implementation should include bilingual outreach campaigns, homeowner training

workshops, defensible-space support programs, and incentives for voluntary compliance—such as reduced dump fees for green waste or cost-share programs for vent retrofits and hardening materials. A standardized education framework would reinforce the responsibilities of property owners and improve grant eligibility for community-scale projects.

## County and Community Scale Evacuation Planning

While resilience and mitigation are essential, no region can fully prevent wildfires. Clear, well-practiced evacuation protocols are critical at both the county and community scale. At the county level, planning is complex, so public messaging must be simple, consistent, and timed to periods of elevated risk. Communities should receive regular updates and education on evacuation basics, routes, alerts, and reentry. Local, community-scale plans are equally important. They need to account for unique challenges such as single-entrance neighborhoods, roadway pinch points such as narrow bridges and cattleguards, livestock and trailer movement, and limited water supply. A countywide framework is a strong first step, but creation of tailored evacuation plans for each community is a critical next step in wildfire preparedness.

## Recommended County-Level Evacuation Protocols

### **1) Approve a common plan and designate lead agency.**

Adopt a countywide Evacuation Annex that spells out how Fire, Law, and Emergency Management work together in Unified Command, who has authority to issue evacuation levels, and how decisions move from the incident to the public. Publish an organization chart, on-call roster, and contact ladder so there is no confusion during fast-moving fires. This follows FEMA's core planning guidance for building and maintaining emergency operations plans and assigning roles up front. (FEMA 2010) As part of this development, establishing a more robust Community Emergency Response Team (CERT) is recommended either to serve as the lead agency, or simply to aid with evacuation planning and efforts.

### **2) Draw evacuation zones that make sense on the ground.**

Create zones that follow neighborhoods, ridges, drainages, or major roads, so directions are intuitive. Give each zone a short ID residents can remember and

produce a public map with printable sheets. Field-check every boundary with patrol and engine companies before fire season. FEMA's evacuation planning guidance recommends geography that matches how people move and how fire spreads. (FEMA 2010) (DHS 2019)

### **3) Set clear trigger points and when to change levels.**

For each zone, identify photographed, geo-tagged trigger points such as a ridge, bridge, or canyon mouth. Write simple criteria for moving a zone from "warning" to "go" that consider forecast winds, alignment with slope, access limits, and resource availability. Keep these in a short "trigger atlas" for Operations and Planning. This is consistent with FEMA's evacuation and shelter-in-place planning considerations. (DHS 2019) (FEMA 2010)

### **4) Standardize plain-language alert levels and messages.**

Use three simple levels residents already recognize: **Ready, Set, Go**. Pre-approve short, bilingual message templates for each level that include the zone ID, the action, the route, and where to get updates. Send the same message through all channels at the same time: IPAWS Wireless Emergency Alerts and Reverse 911, plus local radio and TV, social, and NOAA Weather Radio. This aligns with IAFC's Ready, Set, Go model and FEMA's best practices for Wireless Emergency Alerts. (FEMA 2010) (DHS 2019)

### **5) Stand up a public Zone Status Board.**

Publish a single county dashboard that shows each zone's status in real time and update it within minutes of any change, so residents, media, and partners see the same picture. Keep a simple history of changes for after-action review. FEMA's planning doctrine emphasizes shared situational awareness and timely public information as a core function of emergency operations. (FEMA 2010)

### **6) Pre-plan routes and traffic controls.**

For each zone, pick primary, alternate routes, and write turn-by-turn sheets. Pre-identify traffic control points, one-way outbound segments, tow staging, and any rail or highway coordination. Cache barricades, cones, and signs at depots so they can be deployed within minutes. FEMA's evacuation planning guidance highlights route identification, traffic management, and interagency coordination as essential elements. (DHS 2019) (FEMA 2010)

### **7) Provide transportation help and accessible evacuation.**

Maintain a confidential registry for people who cannot self-evacuate and refresh it quarterly. Name pick-up points in each zone and tie them to school buses, paratransit, and partner fleets. Plan for access and functional needs by following FEMA's Functional Needs Support Services guidance so that people can evacuate and shelter safely with the services and equipment they rely on. (DHS 2019) (FEMA 2010)

### **8) Designate shelters and animal reception sites.**

Choose primary and secondary shelters outside likely impact areas and prepare site binders with floor plans, intake forms, and supply lists. Identify separate small-animal and large-animal reception sites with veterinary partners and outline a simple large-animal movement plan. FEMA's mass care and FNSS materials provide practical checklists and standards for inclusive sheltering. (DHS 2019) (FEMA 2010)

### **9) Support water, utilities, and critical facilities.**

Map hydrants, alternative water points, and tender shuttle routes for outer tracts. Coordinate with utilities on when to de-energize and how to prioritize restoration for shelters, hospitals, water systems, and communications. Clear culverts and install debris racks on evacuation routes before peak season. These actions reflect FEMA's evacuation and EOP guidance on critical infrastructure support during protective actions. (FEMA 2010) (DHS 2019)

### **10) Engage the public with one consistent message.**

Publish a simple guide that asks residents to know their zone and two ways out, register for alerts, and keep five-minute and thirty-minute go lists. Use the Ready-Set-Go framing for familiarity and clarity across the county. (FEMA 2010) (DHS 2019)

### **11) Train, exercise, and improve.**

Hold a spring meeting for Unified Command and a functional drill before peak season to test notifications, traffic control, and shelter intake. After any activation or exercise, complete an after-action review within 30 days and update zones, triggers, routes, and message templates. FEMA's CPG 101 outlines this cycle of plan, train, exercise, and revise. (FEMA 2010) (DHS 2019)

## Community Level Evacuation Planning

Community evacuation should move from general guidance to clear, written protocols that can be practiced and updated as needed. Each neighborhood should have a protocol that names a primary exit and an alternate. These neighborhood protocols should be developed on a community scale with guidance from each fire department (i.e., Rio Rico, Tubac, Nogales, Sonoita-Elgin, Patagonia). In addition, areas with HOAs or neighborhood associations can develop additional protocol at a smaller scale with more detailed evacuation or shelter in place information if that is deemed appropriate by the fire departments. Where only one exit exists, a one-way outbound plan should be implemented to mitigate any issues with traffic. Santa Cruz County largely consists of residents of retirement age and older, so creating pick-up point protocols for people who cannot self-evacuate, tied to bus or paratransit schedules, including gate access and visible addressing requirements, is necessary. Standardizing shelter and reentry protocols that open shelters outside impact, then return residents in stages once hazards and utilities are addressed.

Community-level evacuation protocols are essential in regions like Santa Cruz County because each community has its own mix of topography, roads, pinch points, fuels, and critical sites that a countywide plan can't capture on its own. Writing simple, one-to-two-page protocols for every community turns broad guidance into clear actions: who calls level changes, which routes are primary and backup, where pick-up points are for people who can't self-evacuate, what trigger cues move a neighborhood from warning to go, and how bilingual messages and door-to-door notifications are handled.

Local protocols also lock in the practical details that decide outcomes—pre-staged traffic kits at known pinch points, gate access and visible addressing, livestock and pet reception, hydrant or tender notes, and post-fire flood checks on bridges and culverts. Most importantly, they can be practiced. Annual tabletop and functional drills surface gaps in routes, signage, and messaging so communities can fix them before fire season, turning a county framework into dependable, street-level readiness.

## References

---

- National Fire Protection Association. 2025. *Preparing Homes for Wildfire*. Accessed October 27, 2025. <https://www.nfpa.org/en/education-and-research/wildfire/preparing-homes-for-wildfire>.
- Andrews, Patricia L., and Richard C. Rothermel. 1982. "Charts for interpreting wildland fire behavior characteristics." *Gen. Tech. Rep. INT-131*. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 21 p.
- Andrews, Patricia L., Collin D. Bevins, and Robert C. Seli. 2008. "BehavePlus fire modeling system, version 4.0: User's Guide." *Gen. Tech. Rep. RMRS-GTR-106 Revised*. Ogden, UT: Department of Agriculture, Forest Service, Rocky Mountain Research Station. 132p.
- Arizona Department of Forestry and Fire Management. 2025. *DFFM FITS Portal*. Accessed October 29, 2025. <https://experience.arcgis.com/experience/7f8a17cdcb2d428a8c0f08025c1dca42/page/Fiscal-Year-Report>.
- AZ DFFM. 2024. "Arizona Dept. of Forestry and Fire Management CWPP Requirements." <https://dffm.az.gov/sites/default/files/media/CWPP%20Development%20Guidence%20Document.pdf>.
- Brewer, Cynthia A. 2015. *Designing Better Maps: A Guide for GIS Users*. Esri Press.
- Butler, B.W, and W.R. Anderson. 2007. "Introduction Influence of Slope on Fire Spread Rate." *USDA Forest Service proceedings*.
- Cally Wilken, Kari Hackney, Megan Ewbank. 2025. *Tubac Riparian and Grassland Evaluation and Restoration Plan*. Tucson, AZ: Tucson Bird Alliance.
- Census. 2020. *United States Census Data*. Accessed 2025. <https://data.census.gov/>.
- Crimmins, Michael A, Hatim M E Geli, Christina Greene Prihodko, Matthew Meko, and Lara. 2025. "Changing Climate, Changing Fire: Understanding Ecosystem-Specific Fire–Climate Dynamics in Arizona and New Mexico." *Earth Interactions*.

DHS, Department of Homeland Security. 2019. "Planning Considerations: Evacuation and Shelter-in-Place."

FEMA. 2010. "Developing and Maintaining Emergency Operations Plans."

Griffith, Glenn E, James M Omernik, Colleen Burch Johnson, and Dale S Turner. 2014. "Ecoregions of Arizona ."

2003. *H.R. 1904 Healthy Forests Restoration Act of 2003.*

<https://www.congress.gov/bill/108th-congress/house-bill/1904>.

Kumar, Mukesh, Shu Li, Phu Nguyen, and Tirtha Banerjee. 2022. "Examining the existing definitions of wildland-urban interface for California." *Ecosphere*.

Mahmoud, Hussam, and Akshat Chulahwat. 2018. "Unraveling the Complexity of Wildland Urban Interface Fires." *Scientific Reports*. doi:10.1038/s41598-018-27215-5.

Margolis, Ellis Q., Thomas W. Swetnam, and Craig D. Allen. 2011. "Historical Stand-Replacing Fire in Upper Montane Forests of the Madrean Sky Islands and Mogollon Plateau, Southwestern USA." *Fire Ecology*.

McClure, Emma J., Jonathan D. Coop, Christopher H. Guiterman, Ellis Q. Margolis, and Sean A. Parks. 2024. "Contemporary fires are less frequent but more severe in dry conifer forests of the southwestern United States." *Communications Earth & Environment*.

National Fire Protection Association. 2021. "Living With Wildfire: Homeowners' Firewise Guide for Arizona."

OSU, Oregon State University. 2010. "Reducing Fire Risk on Your Forest Property." A *Pacific Northwest Extension Publication*.

Rizza, Jon, Christopher Adlam, and Carrie Berger. 2022. "Prescribed Fire basics: Fire behavior ." *OSU Extension Program*.

Roberts, Melanie E., Andrew A. Rawlinson, and Ziyuan Wang. 2021. "Ember risk modelling for improved wildfire risk management in the peri-urban fringes." *Environmental Modelling & Software*.

Santa Cruz County, AZ. 2025. <https://www.santacruzcountyaz.gov/252/Sonoita-Elgin>.

Santa Cruz County, AZ. 2024. "Multi-Jurisdictional Hazard Mitigation Plan (MJHMP)."

US Forest Service. 2009. "Descriptions provided to TNC and LANDFIRE by NatureServe."

US Forest Service. 2009. "LANDFIRE Data Dictionary."

US Forest Service; Missoula Fire Sciences Laboratory. n.d. *FlamMap: Fire Behavior Mapping and Analysis Program*. Accessed August 10, 2025.

<https://research.fs.usda.gov/firelab/products/dataandtools/flammap>.

Villarreal, Miguel L., Sandra L. Haire, Jose M. Iniguez, Citlali Cortés Montaña, and Citlali Cortés Montaña. 2019. "Distant neighbors: recent wildfire patterns of the Madrean Sky Islands of southwestern United States and northwestern Mexico." *Fire Ecology*.

Wilder, Benjamin T., Catherine S. Jarnevich, Elizabeth Baldwin, Joseph S. Black, Kim A. Franklin, and Perry Grissom. 2021. "Grassification and Fast-Evolving Fire Connectivity and Risk in the Sonoran Desert, United States." *Frontiers in Ecology and Evolution*.

World Population, Review. n.d. Accessed 2025.

<https://worldpopulationreview.com/us-counties/arizona>.

# Appendix A. Vegetation Communities, Types, and Descriptions



Vegetation Community	Vegetation Type	Vegetation Name	Acreage in Santa Cruz County
<b>Agricultural</b>	Agricultural-Close Grown Crop	Western Warm Temperate Close Grown Crop	245.53
	Agricultural-Fallow/Idle Cropland	Western Warm Temperate Fallow/Idle Cropland	5.56
	Agricultural-Orchard	Western Warm Temperate Orchard	65.39
	Agricultural-Pasture and Hayland	Western Warm Temperate Pasture and Hayland	653.19
	Agricultural-Row Crop	Western Warm Temperate Row Crop	23.80
	Agricultural-Row Crop-Close Grown Crop	Western Warm Temperate Row Crop - Close Grown Crop	10.23
	Agricultural-Wheat	Western Warm Temperate Wheat	1.56
<b>Conifer</b>	Douglas-fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland	Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland	3266.39
	Juniper Woodland and Savanna	Madrean Juniper Savanna	471.04
	Pinyon-Juniper Woodland	Madrean Pinyon-Juniper Woodland	19958.84
	Ponderosa Pine Forest, Woodland and Savanna	Southern Rocky Mountain Ponderosa Pine Woodland	241.30
<b>Conifer-Hardwood</b>	Conifer-Oak Forest and Woodland	Madrean Lower Montane Pine-Oak Forest and Woodland	6810.11
		Madrean Upper Montane Conifer-Oak Forest and Woodland	814.65
	Juniper-Oak	Madrean Encinal	133965.75
<b>Developed Wildlands</b>	Developed-Upland Deciduous Forest	Western Warm Temperate Urban Deciduous Forest	43.59
		Western Warm Temperate Developed Deciduous Forest	57.82
	Developed-Upland Evergreen Forest	Western Warm Temperate Urban Evergreen Forest	112.76
		Western Warm Temperate Developed Evergreen Forest	187.04
	Developed-Upland Herbaceous	Western Warm Temperate Urban Herbaceous	825.77
		Western Warm Temperate Developed Herbaceous	559.78
	Developed-Upland Shrubland	Western Warm Temperate Urban Shrubland	2401.03

		Western Warm Temperate Developed Shrubland	2465.53
<b>Developed</b>	Developed-High Intensity	Developed-High Intensity	533.32
	Developed-Low Intensity	Developed-Low Intensity	2014.05
	Developed-Medium Intensity	Developed-Medium Intensity	1043.95
<b>Developed-Roads</b>	Developed-Roads	Developed-Roads	15458.36
<b>Exotic Herbaceous</b>	Introduced Perennial Grassland and Forbland	North American Warm Desert Ruderal & Planted Grassland	41256.31
<b>Exotic Tree-Shrub</b>	Introduced Upland Vegetation-Shrub	North American Warm Desert Ruderal & Planted Scrub	67943.64
<b>Grassland</b>	Grassland	Chihuahuan Sandy Plains Semi-Desert Grassland	0.44
		Chihuahuan Loamy Plains Desert Grassland	377.86
	Grassland and Steppe	Apacherian-Chihuahuan Semi-Desert Grassland	179511.72
<b>Hardwood</b>	Aspen Forest, Woodland, and Parkland	Rocky Mountain Aspen Forest and Woodland	17.35
<b>Open Water</b>	Open Water	Open Water	249.76
<b>Quarries-Strip Mines-Gravel Pits-Well and Wind Pads</b>	Quarries-Strip Mines-Gravel Pits-Well and Wind Pads	Quarries-Strip Mines-Gravel Pits-Well and Wind Pads	82.07
<b>Riparian</b>	Depressional Wetland	Chihuahuan-Sonoran Desert Bottomland and Swale Grassland	2156.39
	Introduced Herbaceous Wetland Vegetation	Western North American Ruderal Wet Meadow & Marsh	390.98
	Introduced Riparian Vegetation	Interior West Ruderal Riparian Forest	5.12
		Interior West Ruderal Riparian Scrub	195.93
	Introduced Woody Wetland Vegetation	Western North American Ruderal Wet Shrubland	162.80
	Western Herbaceous Wetland	North American Warm Desert Cienega	2906.77
		North American Warm Desert Riparian Herbaceous	2179.08
	Western Riparian Woodland and Shrubland	North American Warm Desert Riparian Woodland	1714.26
		North American Warm Desert Lower Montane Riparian Woodland	5565.56
		North American Warm Desert Riparian Mesquite Bosque Woodland	852.46
North American Warm Desert Wash Woodland		44.48	

		North American Warm Desert Riparian Shrubland	2968.37
		North American Warm Desert Lower Montane Riparian Shrubland	3900.01
		North American Warm Desert Riparian Mesquite Bosque Shrubland	1808.11
		North American Warm Desert Wash Shrubland	12.01
<b>Shrubland</b>	Chaparral	Mogollon Chaparral	42780.42
	Creosotebush Desert Scrub	Sonora-Mojave Creosotebush-White Bursage Desert Scrub	63232.55
	Deciduous Shrubland	Rocky Mountain Gambel Oak-Mixed Montane Shrubland	261.32
	Desert Scrub	Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	0.22
		Sonoran Mid-Elevation Desert Scrub	861.13
		Chihuahuan Mixed Desert and Thornscrub	109102.10
		Sonoran Paloverde-Mixed Cacti Desert Scrub	9118.18
	Grassland and Steppe	Apacherian-Chihuahuan Semi-Desert Shrub-Steppe	51144.44
	Salt Desert Scrub	Chihuahuan Mixed Salt Desert Scrub	2.00
Succulent Desert Scrub	Chihuahuan Succulent Desert Scrub	8760.78	
<b>Sparsely Vegetated</b>	Sparse Vegetation	North American Warm Desert Bedrock Cliff and Outcrop	56.71
		North American Warm Desert Pavement	66.28
		North American Warm Desert Playa	48.48
			<b>791972.43 acres</b>

# **Appendix B. Fire Modeling Ranking & Comprehensive Input Criteria Methodology**

## About the Model

The risk model was developed using two primary Geographic Information systems (GIS) software platforms: Esri's ArcGIS Pro and the U.S. Forest Service's fire analysis software, FlamMap. The model follows a geospatial workflow known as a weighted overlay. This analysis method is used to address multi-criteria problems, such as suitability or risk assessment. Weighted overlay analyses combine several different variables, ranking each on a common scale before integrating them as criteria within the model. Each criterion can be equally weighted or assigned greater influence based on its relative importance, allowing the analysis to reflect the varying impact of differing factors on overall fire risk in this case.

## Input criteria

To fully capture drivers of wildfire risk on the landscape, 6 variables were selected after careful review. Each variable contributes significantly to the level of potential damage a wildfire could have if it started. All data was sourced from well-known entities, including the USFS and U.S. Geological Survey (USGS) databases.

Existing Vegetation type (EVT) data sourced from the USFS LANDFIRE program provides group and species-level detail at a 30x30-meter resolution for the entire county. The species classification follows the NatureServe ecological system framework, offering a detailed and structured organization for ecological communities (USGS and USFS 2023). In addition, vegetation cover was also derived from the Landfire database. Existing vegetation cover (EVC) is produced through a combination of satellite imagery, field plot data, and environmental variables that are used to estimate percent cover across each 30-meter pixel on the landscape. Landfire integrates thousands of vegetation records from sources such as the USFS Forest Inventory and Analysis (FIA) program and other partner databases, providing real canopy cover measurements by vegetation type. The final EVC raster expresses percent cover of live vegetation within each 30-meter cell, binned into 10m intervals. Both raster datasets are updated annually, ensuring access to the most current data for the region.

Implementing the FlamMap fire behavior software designed by USFS Fire Science Laboratory, a rate of spread raster was created for Santa Cruz County. Given specific

inputs, the software computes potential fire behavior across an entire landscape under constant conditions. Using grided inputs for topography, surface and canopy fuels, and user-specified wind and fuel moisture, it applies Rothermel's surface spread equations and crown fire models to each cell independently. The outputs include raster maps such as rate of spread, flame length, Fireline intensity, and crown fire activity. As part of model development, FLamMap was implemented to generate a rate of spread model for Santa Cruz County under drought conditions. To align the model inputs with real-world conditions, weather station data across the county were reviewed to determine average wind speed and direction during historical season drought periods. Fuel moisture values were derived from the wildland fire assessment system (WFAS) to align climatic inputs. The final output produced an average rate of spread raster under representative historical drought conditions.

Topographic variables include Slope and aspect, both sourced from the US Geological Survey database. A 30-meter resolution Digital Elevation Model (DEM) raster was processed in ArcGIS Pro. Outputs were derived from the DEM by analyzing the rate and direction of elevation change between each cell and its neighbors. ArcGIS calculates the slope as the steepest angle of elevation change and the aspect as the compass direction that the slope faces (the direction of steepest descent).

## Data processing

To integrate this data into the final risk model, the 6 input variables must be ranked on a unified scale. For this wildfire risk model, our risk ranking sits on a scale from 1: the lowest level of risk, to 7: the highest level of risk. A 1-7 scale provides enough categories to show meaningful variation in risk while remaining simple and easy to interpret. It balances detail and clarity, avoiding false precision that can come from overly fine scales. This range also aligns well with standard hazard rating systems and color map gradients, making results more intuitive to communicate with stakeholders (Brewer 2015).

EVT rankings were assigned based on species composition and the degree to which those species contribute to wildfire behavior and burn intensity. EVC rankings were assigned based on the percentage density, with the risk value increasing as the vegetation cover percentage increases. The highest percentage cover received the highest risk rankings, as continuous vegetation cover promotes the spread of wildfire. The rate of spread was ranked by speed, with the fastest fires ( $>100$  ft/min) assigned the highest risk ratings and the slowest ( $<1$  ft/min) the lowest. This approach aligns with the BehavePlus modeling framework (Andrews and Rothermel, Charts for interpreting wildland fire behavior characteristics 1982), which relates increased rates of spread to greater fireline intensity, flame length, and suppression difficulty, key indicators of operational risk. This approach aligns with the BehavePlus modeling framework (Andrews and Rothermel 1982), which relates increased rates of spread to greater fireline intensity, flame length, and suppression difficulty, key indicators of operational risk.

Proximity to the Wildland Urban Interface (WUI) was divided into buffered distance intervals of 500 to 1000 meters, with risk rankings increasing as distance to the WUI decreased. The lowest risk zones were defined as areas more than 5,000 meters from WUI boundaries, while the highest risk zones (rank 7) encompassed areas within 0–500 meters. This ranking reflects the heightened threat that fires near the WUI pose to structures and residents due to the increased likelihood of ember travel and fire spread into developed areas. Research has shown that ember density, a key driver of ignition probability, decreases exponentially with distance from vegetation, with most structural losses occurring within a few hundred meters of the fire edge (Mahmoud and Chulahwat 2018)).

Slope values were divided into intervals between 0 and 60 degrees, with rankings based on their influence on fire behavior and suppression difficulty. The lowest slopes (1) ranged from 0–5°, while the highest risk slopes (7) exceeded 60°. Steeper slopes increase flame tilt and preheating of fuels, resulting in faster rates of spread and greater suppression challenges, consistent with experimental findings by Butler and Anderson 2007, who observed rapid acceleration of fire spread above approximately 25° due to enhanced convective heating and flame attachment to the surface. Aspect rankings were determined by how slope orientation affects temperature, fuel moisture, and ignition potential in southern Arizona. South to southwest-facing slopes were ranked highest because they receive the spot direct solar radiation, producing the hottest and driest conditions that promote faster fuel curing and higher ignition risk. East and west-facing slopes were assigned moderate rankings as they experience significant sun exposure but typically retain slightly more moisture. North-facing slopes were ranked lowest due to their cooler conditions, which reduces ignition probability.

Each Criterion raster was processed in ArcGIS Pro using the reclassification tool to assign each class its assigned risk value, creating 6 unified output rasters with values from 1–7. These reclassified rasters were then weighted against each other in the weighted overlay model. To emphasize the most critical factors, the proximity to the WUI was assigned a weight of 30% prioritizing areas near structures and people as most significant within the model. ROS was weighted at 25%, the speed of a potential ignited fire represents the greatest danger to WUI safety and protection. Vegetation density, slope, and aspect were each weighted at 10%, as these factors collectively influence local fuel continuity, fire spread potential, and site-specific burn behavior.

# Appendix C. Stakeholder Engagement Materials

# Santa Cruz County CWPP Stakeholder and Collaborator Engagement Summary

## Overview

---

From April to October 2025, Santa Cruz County conducted extensive stakeholder engagement to develop its first Community Wildfire Protection Plan (CWPP). Led by Great Ecology, Matrix New World, and Southwest Policy Advocates, the process included three key stakeholder meetings, multiple community open houses, and targeted one on one outreach to collaborators across sectors.

## Stakeholder Meetings

---

- **June 2, 2025 (Kickoff):** Held at Tubac Fire Station #2 with 20 emergency response officials. Topics included fire risks, fuel reduction, evacuation coordination, and mapping needs. Key gaps identified: enforcement authority, financial support for vulnerable populations, and ecological concerns around fuel breaks.
- **July 22, 2025:** Focused on updated maps, structure hardening, and defensible space. Stakeholders reviewed community-specific maps and began identifying priority projects.
- **September 9, 2025:** Final input meeting. Stakeholders reviewed fire modeling, refined priority areas, and discussed mitigation strategies. Emphasis placed on integrating survey data, site visits, and scientific research.

## Community Engagement

---

One on one meetings with designated fire professionals to review on the ground priority projects as well as specific outreach to collaborators across Santa Cruz County. Open houses were held in October across Sonoita-Elgin, Patagonia, Nogales, Rio Rico, and Tubac. These events aimed to gather public input and share draft maps and project ideas. Outreach was announced and coordinated via email

(MailChimp), social media (Facebook), and local press (Nogales International, Patagonia Times).

## Collaborators and Stakeholders

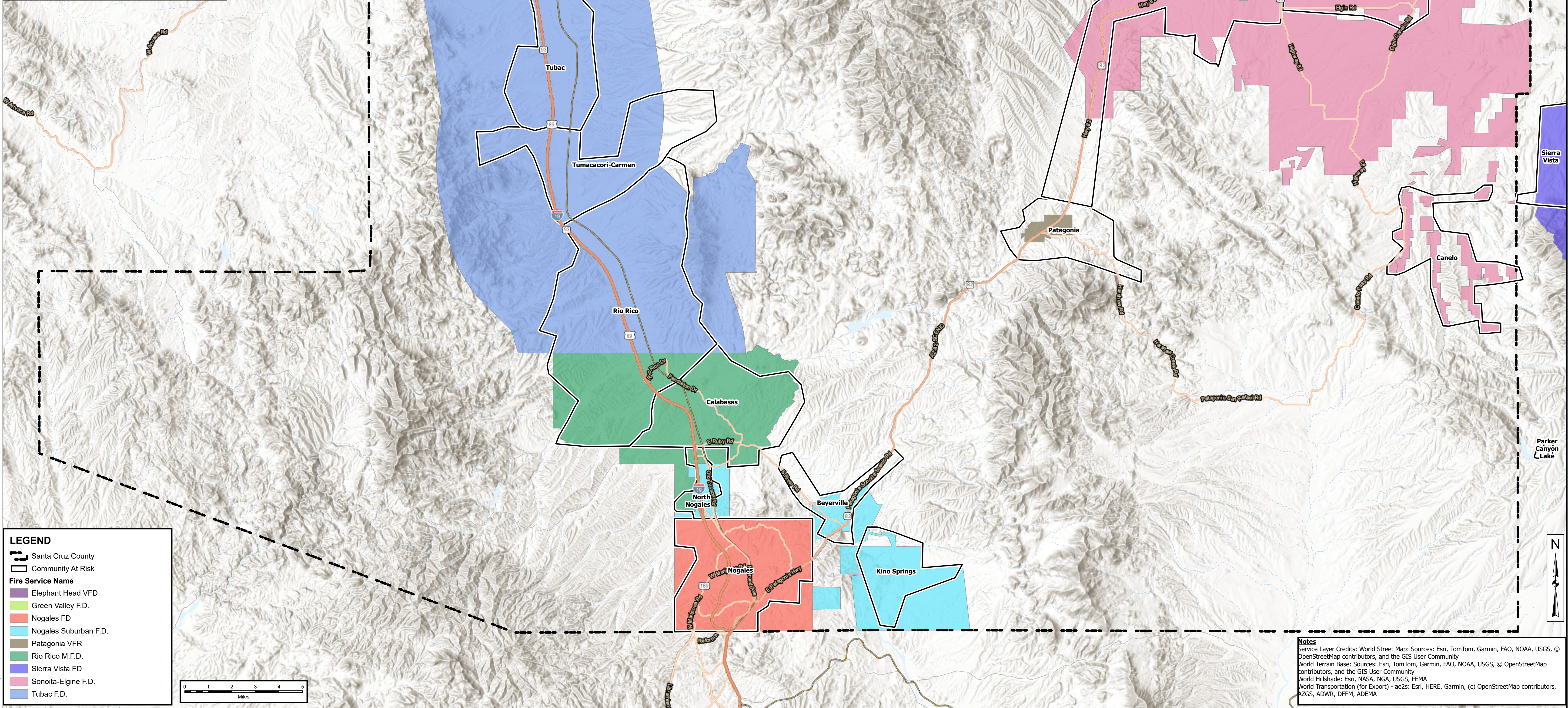
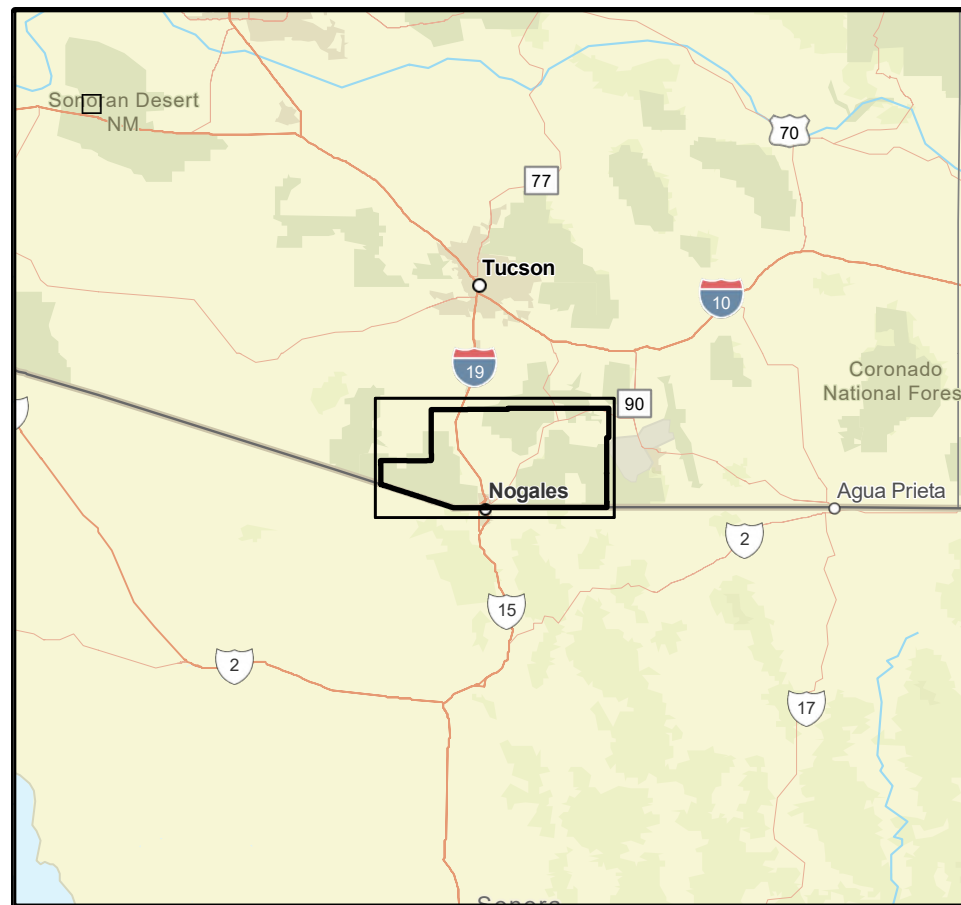
---

- **Stakeholders:** 36 emergency management professionals from local, state, and federal agencies.
- **Collaborators:** Over 52 individuals and organizations including wineries, conservation groups, ranchers, and landowners.

## Focused Discussions

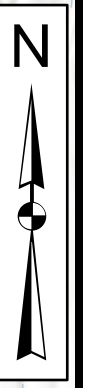
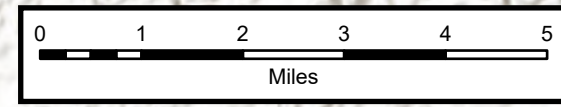
---

- High-risk landscapes and vulnerable communities (e.g., Santa Cruz River, City of Nogales, Town of Patagonia and surrounding preserves, Sonoita Creek).
- Possible need for a County Fire Marshal and improved enforcement mechanisms.
- Evacuation signage and route planning.
- Emphasis on public education, structure hardening, and defensible space support programs.
- Concerns about ecological impacts of fuel reduction and maintenance.
- Integration of local wildfire history, community feedback, and scientific modeling into CWPP framework.



**LEGEND**

- Santa Cruz County
- Community At Risk
- Fire Service Name**
- Elephant Head VFD
- Green Valley F.D.
- Nogales FD
- Kino Springs
- North Nogales
- Rio Rico M.F.D.
- Tubac F.D.
- Patagonia VFR
- Sierra Vista FD
- Sonoita-Elgin F.D.
- Rain Valley



**Notes**  
 Service Layer Credits: World Street Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community  
 World Terrain Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community  
 World Hillshade: Esri, NASA, NGA, USGS, FEMA  
 World Transportation (for Export) - ae2s: Esri, HERE, Garmin, (c) OpenStreetMap contributors, AZGS, ADWR, DFFM, ADEMA

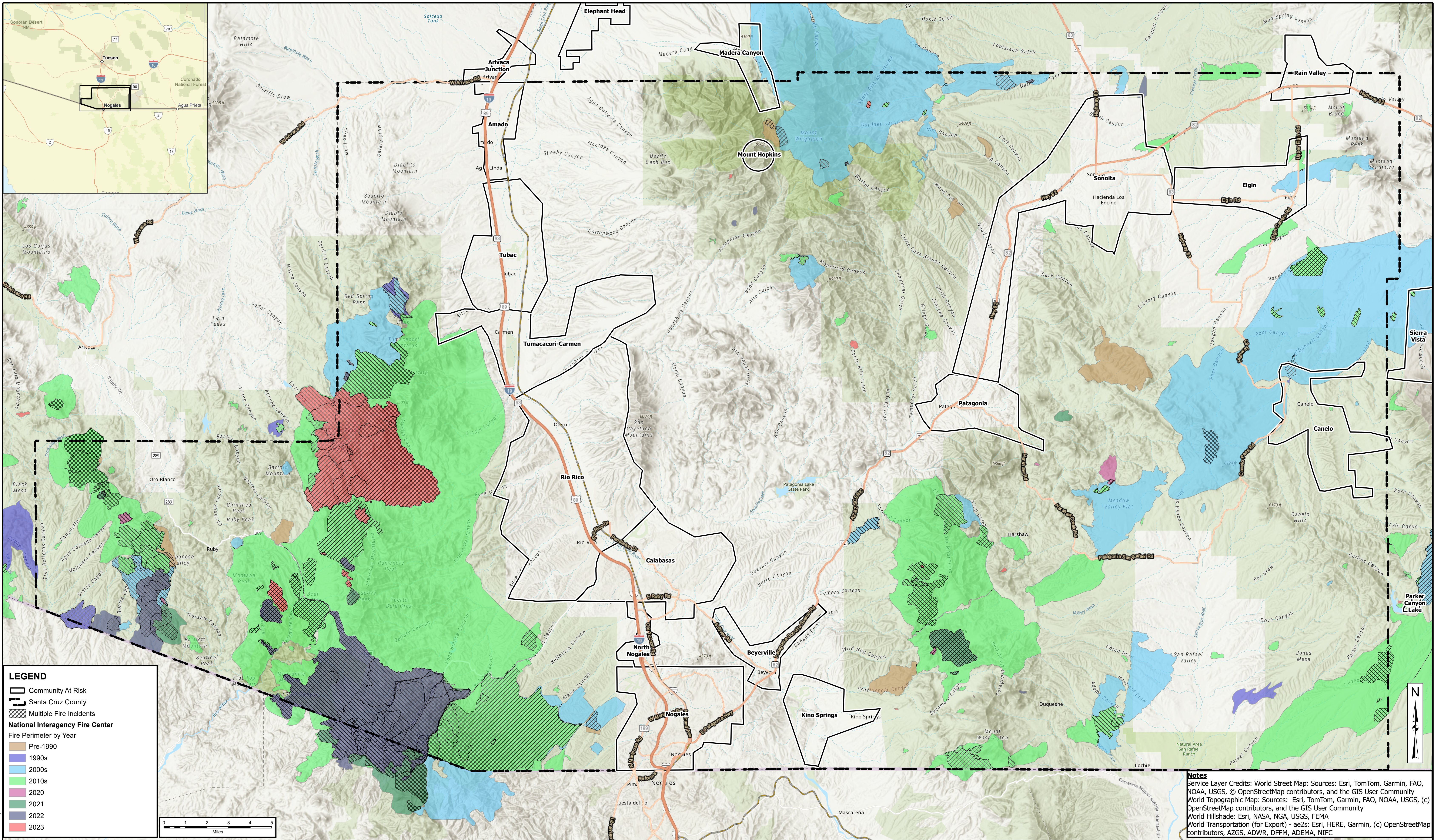
**PROJECT NUMBER:** 25-0084  
**CLIENT:** Arizona Department of Fire and Forest Management  
**DESIGNER:** Matrix New World  
 Great Ecology  
 Southwest Policy Advocates  
**DATE:** 0514/2025

# Fire Service Areas

## Santa Cruz Community Wildfire Protection Plan

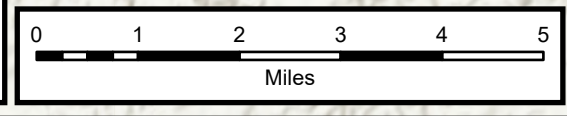
### Santa Cruz County, Arizona





**LEGEND**

- Community At Risk
- Santa Cruz County
- Multiple Fire Incidents
- National Interagency Fire Center**
- Fire Perimeter by Year**
- Pre-1990
- 1990s
- 2000s
- 2010s
- 2020
- 2021
- 2022
- 2023



**Notes**  
 Service Layer Credits: World Street Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community  
 World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community  
 World Hillshade: Esri, NASA, NGA, USGS, FEMA  
 World Transportation (for Export) - ae2s: Esri, HERE, Garmin, (c) OpenStreetMap contributors, AZGS, ADWR, DFFM, ADEMA, NIFC

PROJECT NUMBER: 25-0084  
 CLIENT: Arizona Department of Fire and Forest Management  
 DESIGNER: Matrix New World  
 Great Ecology  
 Southwest Policy Advocates  
 DATE: 0514/2025

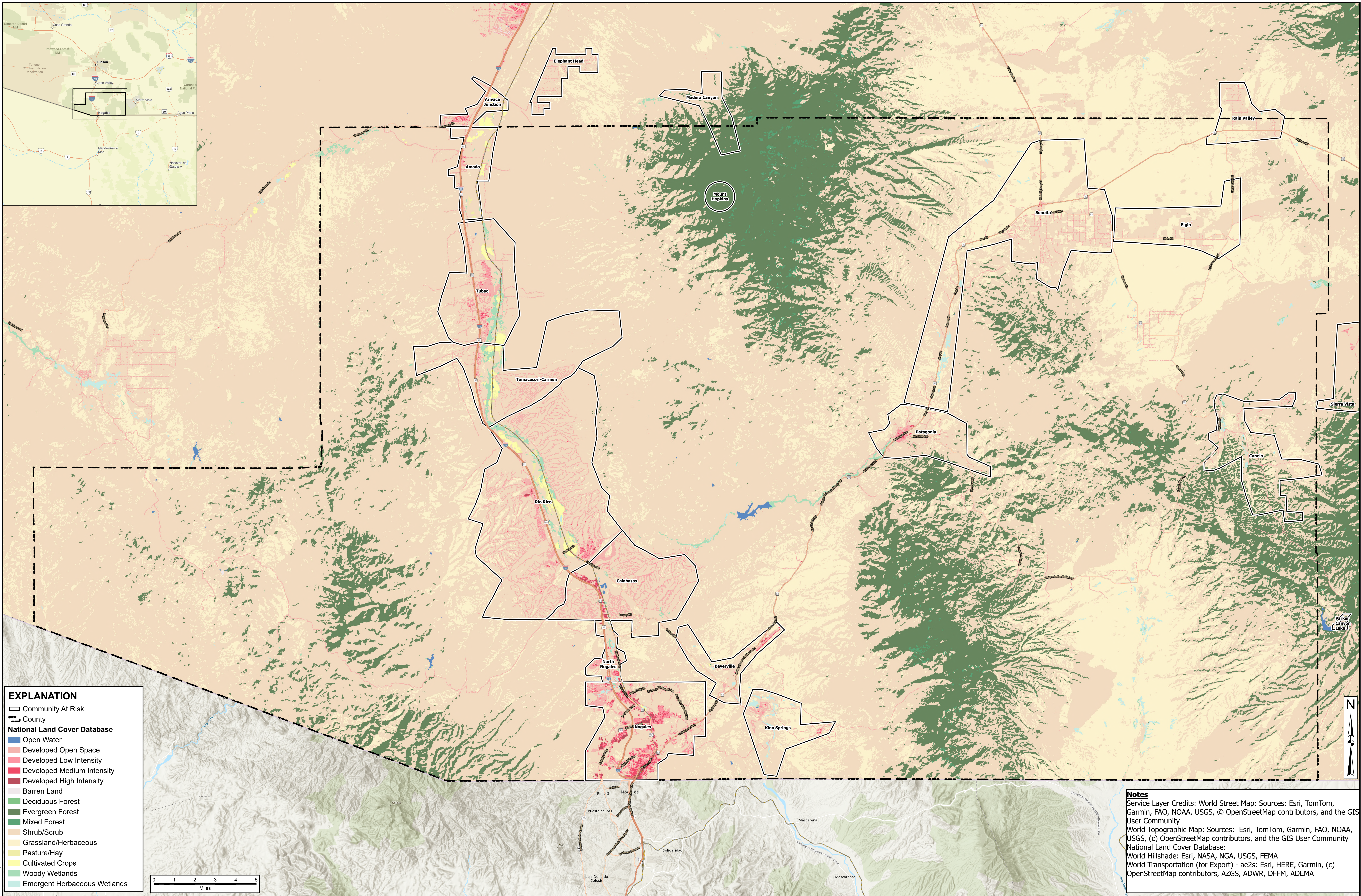
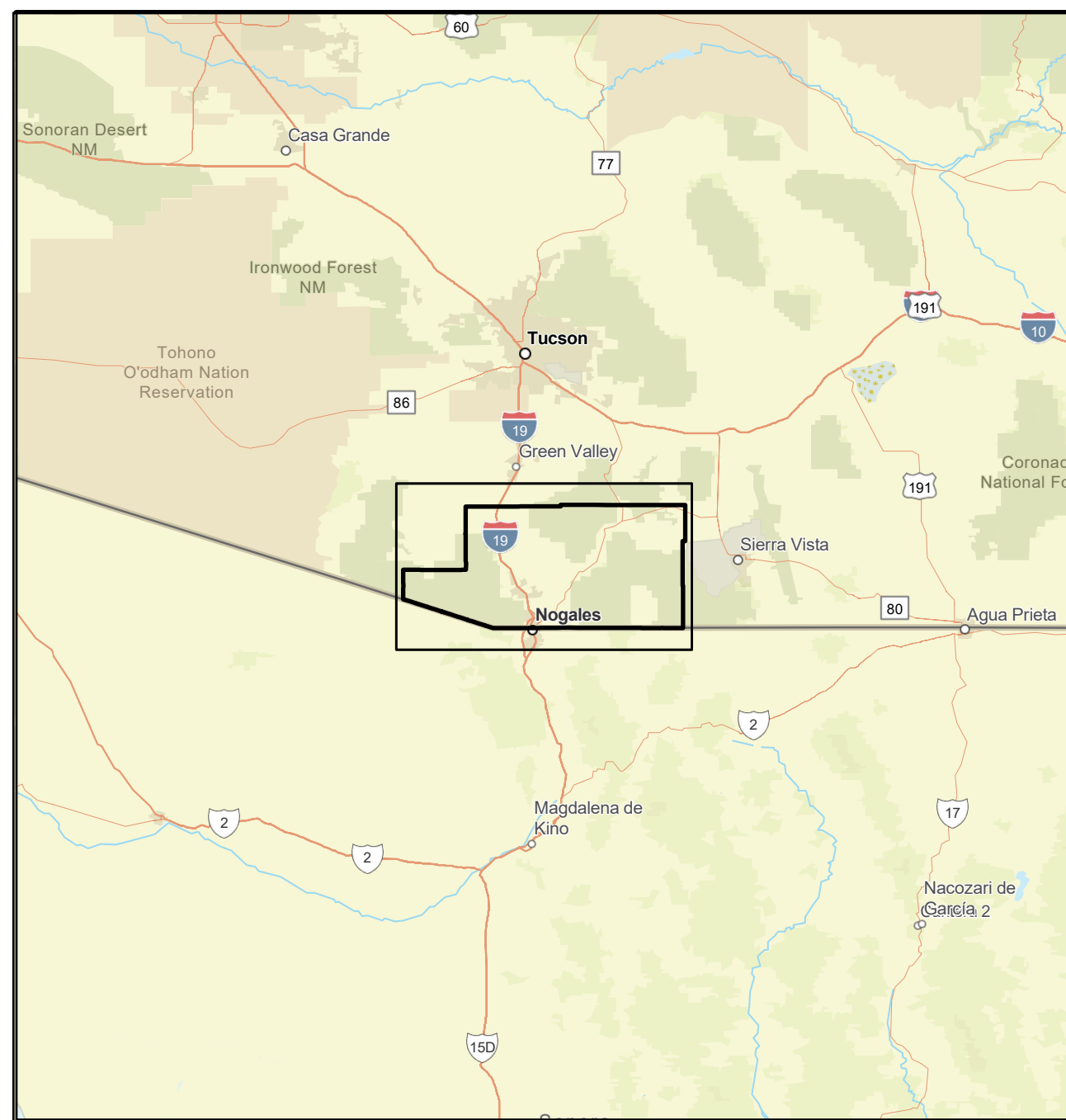
# Historic Wildfire Perimeters - Grouped by Decade

## Santa Cruz Community Wildfire Protection Plan

### Santa Cruz County, Arizona

**MATRIXNEWORLD**  
 A TRUE ENVIRONMENTAL COMPANY

**GREATecology**  
 a TRUE ENVIRONMENTAL COMPANY



**EXPLANATION**

- Community At Risk
- County

**National Land Cover Database**

- Open Water
- Developed Open Space
- Developed Low Intensity
- Developed Medium Intensity
- Developed High Intensity
- Barren Land
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

**Notes**

Service Layer Credits: World Street Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community  
 World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community  
 National Land Cover Database:  
 World Hillshade: Esri, NASA, NGA, USGS, FEMA  
 World Transportation (for Export) - ae2s: Esri, HERE, Garmin, (c) OpenStreetMap contributors, AZGS, ADWR, DFFM, ADEMA

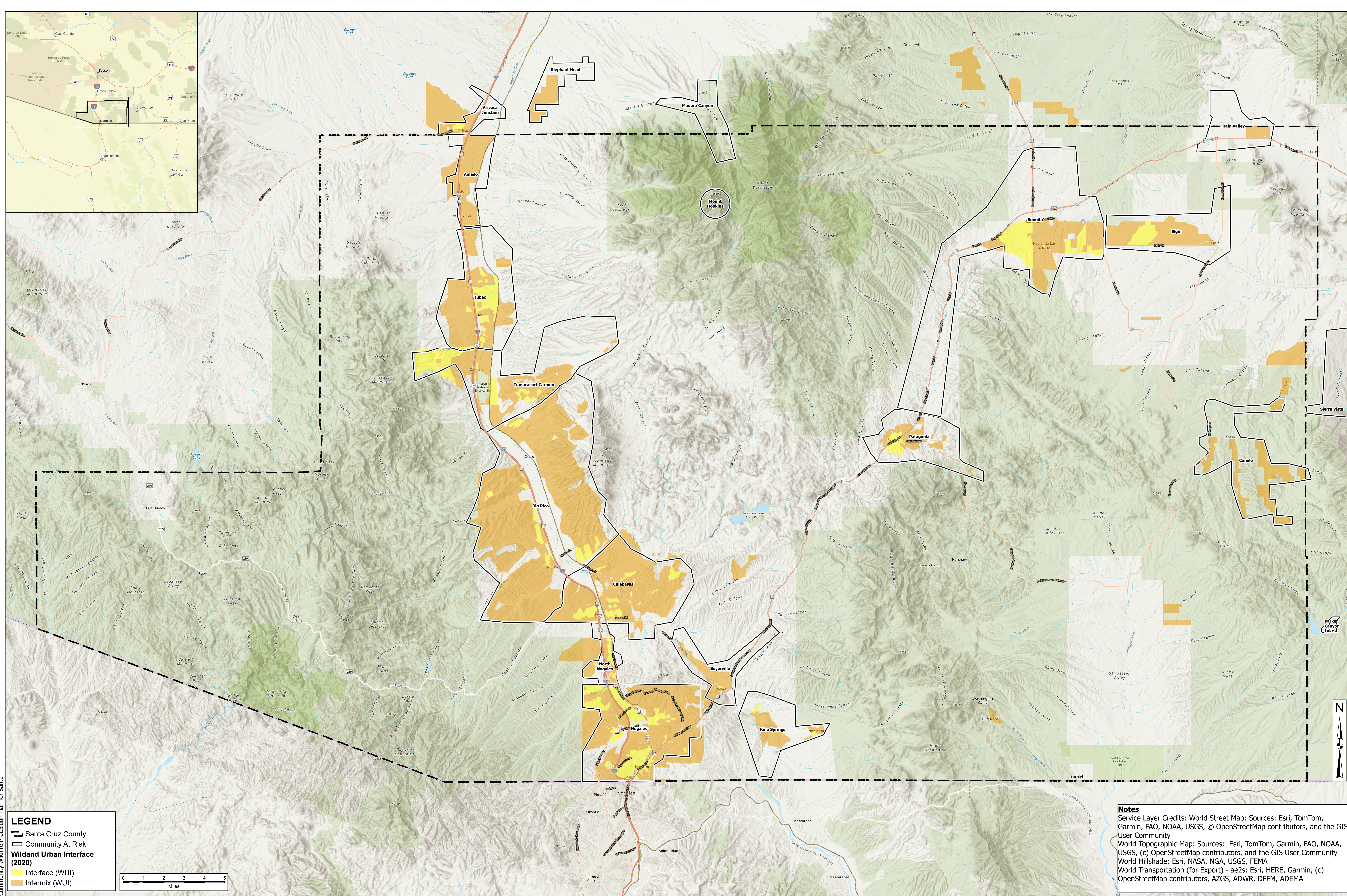
**PROJECT NUMBER:** 25-0084  
**CLIENT:** Arizona Department of Fire and Forest Management  
**DESIGNER:** Matrix New World  
 Great Ecology  
 Southwest Policy Advocates  
**DATE:** 0514/2025

# Land Use / Land Cover

Santa Cruz Community Wildfire Protection Plan  
 Santa Cruz County, Arizona



Path: S:\MyDocs\SGCPR\2025\25-0084 Community Wildfire Protection Plan for Santa Cruz County



**LEGEND**

- Santa Cruz County
- Community At Risk
- Wildland Urban Interface (2020)**
- Interface (WUI)
- Intermix (WUI)

0 1 2 3 4 5  
Miles

**Notes**  
 Service Layer Credits: World Street Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community  
 World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community  
 World Hillshade: Esri, NASA, NGA, USGS, FEMA  
 World Transportation (for Export) - ae2s: Esri, HERE, Garmin, (c) OpenStreetMap contributors, AZGS, ADWR, DFFM, ADEMA

**PROJECT NUMBER:** 25-0084  
**CLIENT:** Arizona Department of Fire and Forest Management  
**DESIGNER:** Matrix New World  
 Great Ecology  
 Southwest Policy Advocates  
**DATE:** 0514/2025

# Wildland Urban Interface (2020)

Santa Cruz Community Wildfire Protection Plan  
 Santa Cruz County, Arizona

**MATRIXNEWORLD**  
 A TRUE ENVIRONMENTAL COMPANY

**GREATecology**  
 A TRUE ENVIRONMENTAL COMPANY

Southwest Policy Advocates

Path: S:\MyDocs\SGC\PRJ\2025\25-0084 Community Wildfire Protection Plan for Santa

# Commonly Used Fuel Modification & Treatment Tactics

## Specific Landscape Types & Fire Protection Interventions

### Riparian Areas

Federal, state, or private lands



#### Tactics:

- Majority of riparian areas that fall within the WUI boundary avoided unless deemed a fuel hazard
- Some removal of the deciduous & shrubby vegetative overstory emphasizing removal and control of Tamarisk and other invasive tree
- Cut/ thin from October 15–March 31 to protect nesting migratory birds.
- Fine fuels may be maintained by cool-season low-intensity prescribed fire.
- Treatments will emphasize nonnative species.
- Snags > 8 inches may be retained.

### Grassland Fire Breaks

Within 0.5 mile of private land



#### Tactics:

- Maintain and create grassland firebreaks via mowing, chopping, & mastications to 4".
- Slash may be burned, removed, masticated or turned.
- Chemicals may be used on private land.
- Retain presettlement (historic) trees. Potentially remove other new trees that are encroaching.
- Determine necessary width and length of firebreak to protect adjacent areas.

### Desert Scrub / Shrub

Federal, state, or private lands



#### Tactics:

- Minimal intervention needed for fuel reduction
- Little to no fuel modification treatments have been identified as necessary to provide protection for desert scrub /shrub from wildland fire.
- Wildland fire growth within these areas will be monitored for private property, ecological, and cultural threats before initiating suppression.
- Agency and fire district policy will determine suppression response.

### Oak/Pinyon/Juniper Shrublands

Within or adjacent to WUI



#### Tactics:

- Retain habitat function.
- For fuel breaks, woodland and shrub trees <8 inches drc thinned or burned to 15 feet between trees, stumps cut to below 4".
- Mechanically treat understory.
- Thin adjacent habitat to 25–30 feet between trees.
- For non-fuel breaks, leave trees >10 drc unless spacing requires.
- Emphasis placed on removing: Catclaw, Tamarisk, Snakeweed, Burroweed, Burro Brush, Rabbitbrush, and Thread-leaved Groundsel.

### Evergreen/ Mixed Forest

Within or adjacent to WUI



#### Tactics for areas not up against structures:

- For tactics adjacent to structures, refer to defensible space & structure hardening poster.
- Thin select areas of forest to create planned, and efficient shaded fuel breaks.
- Shaded fuel breaks allow fire burning into them to be more readily controlled.
- Thin to 20–80 trees per acre on private lands with random spacing favoring clumps of trees.
- Leave larger trees, remove ladder fuels.
- Hand-thin and pile; inaccessible areas may be treated with periodic prescribed fire.

## Fire Protection Interventions Applicable Across Different Landscapes

### Undeveloped Private Parcels

More than 2 acres



#### Tactics:

- Remove ladder fuels by pruning the lower third of trees or shrubs up to a maximum of 8 feet; remove and destroy dead trees
- Focus intervention in areas greater than 20% slope, stream beds, & channels.
- Hand-thin and pile; inaccessible areas may be treated with periodic prescribed fire.
- Remove debris from channels, and place slash and debris in strategic locations to prevent erosion by retaining runoff.

### Vegetation Removal

Federal, state, or private lands



#### Tactics:

- Reduce stem density, canopy, and excessive fuel loading by cutting below the root collar November–January.
- Focus on Tamarisk
- Mechanical whole-tree extraction
- Low-volume oil-based herbicide
- Prescribed burning
- Disturbed areas revegetated with natives

### Grazing

Federal, state, or private lands



#### Tactics:

- Livestock grazing on federal and private lands reduces grassland and shrubland fuels.
- Avoid creeping of certain woody plants by chaining, hand removal, herbicide.
- For smaller properties, "goat on a rope" is viable as well as smaller quantities and types of livestock.
- Prevent overgrazing & soil loss.

### Prescribed Fire

Federal, state or private lands



#### Tactics:

- Prescribed fire can be used as a tool to accomplish specific resource management objectives in accordance with FS and BLM standards and guides.
- Slash, jack piles, and down logs when more than 600 feet from private property may be burned.

### Selective Thinning & Removal

Federal, state or private lands



#### Tactics:

- Any thinning or removal of species in a landscape needs to be thoroughly vetted to ensure sustainability & to plan for minimizing chances of encroachment of invasive, or type conversion to MORE flammable species.
- If it is the best method for the particular landscape type a focus on removal of invasive & non-native species is key.
- Calculating the ideal spacing between vegetation structures (shrubs, trees, etc.) is also crucial.
- Retaining larger trees & clearing smaller ladder fuels is typically the best route.

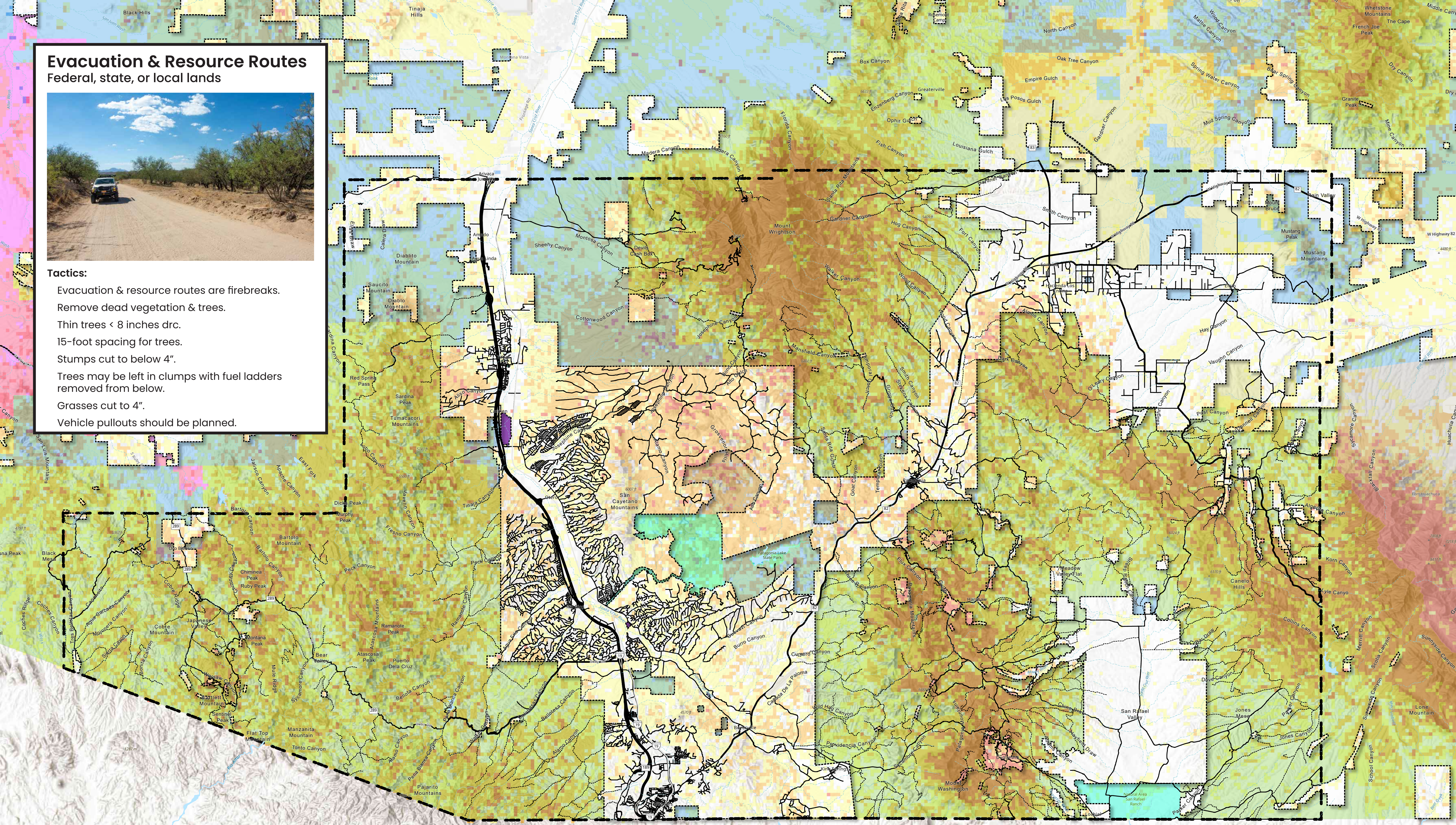
# Evacuation & Resource Routes

## Federal, state, or local lands



### Tactics:

- Evacuation & resource routes are firebreaks.
- Remove dead vegetation & trees.
- Thin trees < 8 inches drc.
- 15-foot spacing for trees.
- Stumps cut to below 4".
- Trees may be left in clumps with fuel ladders removed from below.
- Grasses cut to 4".
- Vehicle pullouts should be planned.



### Landuse / Landcover Legend

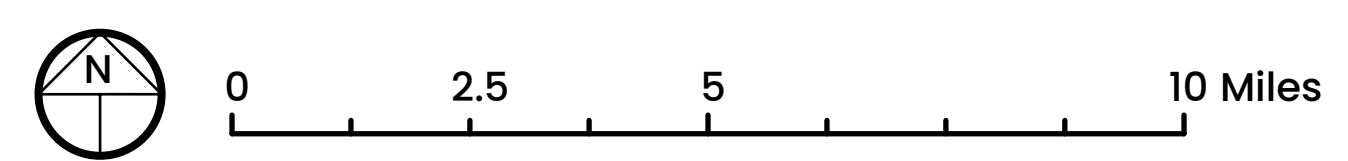
- Santa Cruz County Boundary
- US Fish & Wildlife Service Lands
- Private Lands
- US Forest Service (USFS) Lands
- State Lands
- Bureau of Land Management (BLM) Lands

### Roads Legend

- Highway
- Main Roads
- Local Roads
- USFS Roads

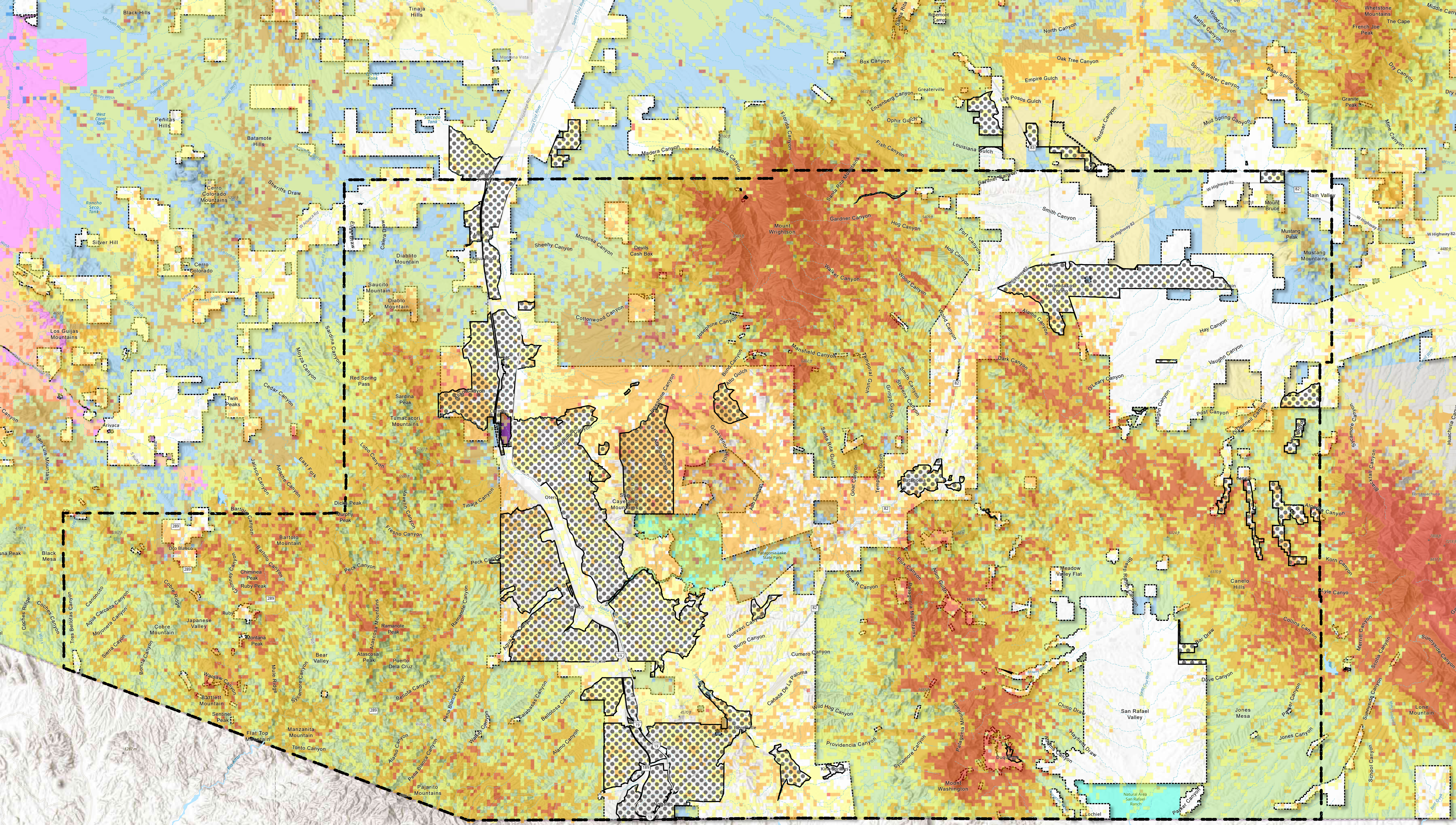
# Roads, Potential Evacuation Routes, Wildfire Risk & Land Ownership

Santa Cruz County CWPP Development  
7/22/2025 Stakeholder Engagement Meeting



**Sources**  
Esri, NASA, NGA, USGS, FEMA, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, Funding for this project provided by USDA Forest Service, Fire Modeling Institute, which is part of the Rocky Mountain Research Station, Fire, Fuel and Smoke Science Program. Funding also provided by USDA Forest Service, Fire and Aviation Management. Pyrologix, LLC provided fire modeling support under contract with the USDA Forest Service, Fire Modeling Institute. Author Information: Gregory K. Dillon/USDA Forest Service, Rocky Mountain Research Station/https://orcid.org/0009-0006-6304-650X





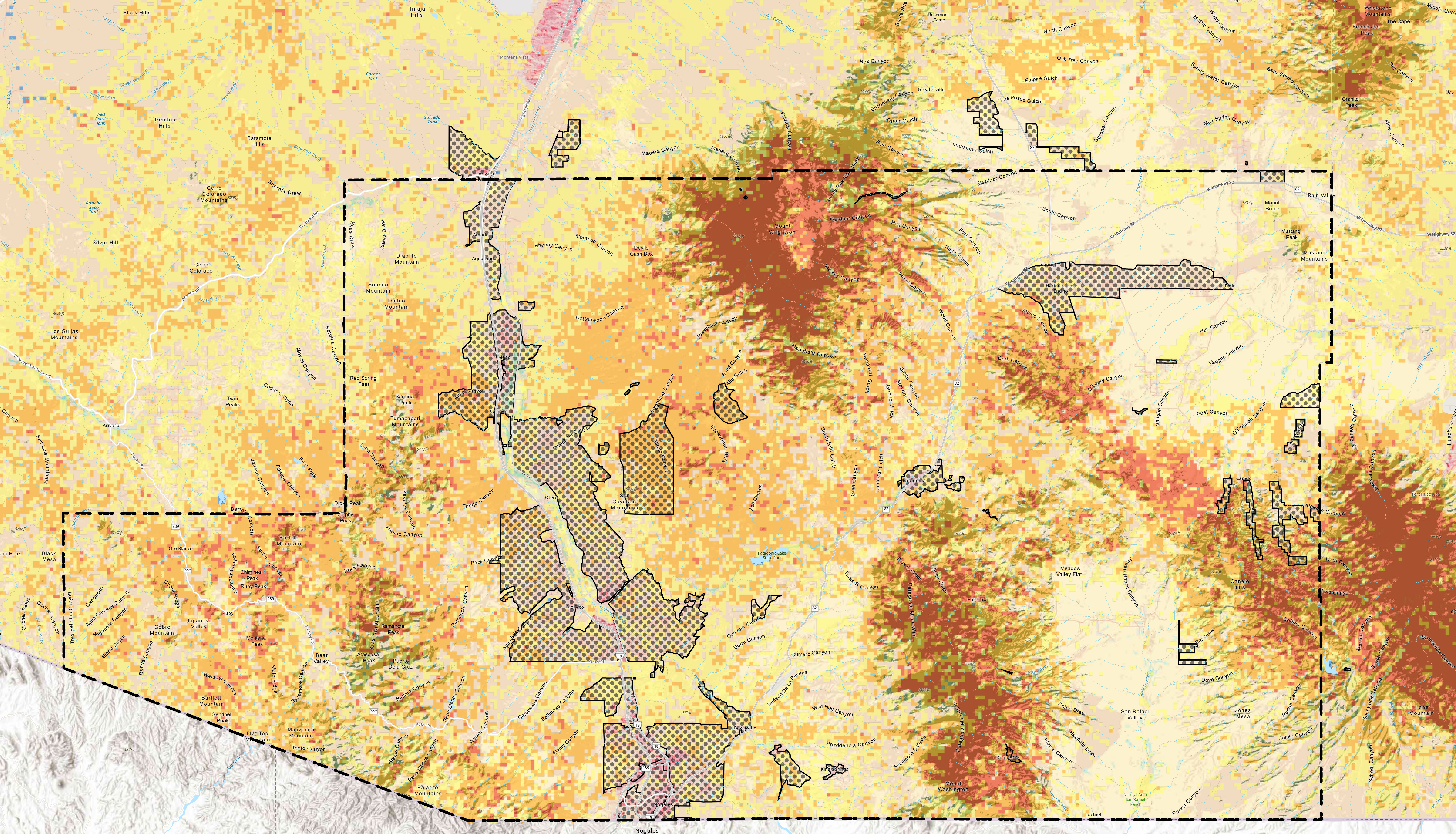
<b>Land Ownership Legend</b> Santa Cruz County Boundary Private Lands US Forest Service (USFS) Lands State Lands Bureau of Land Management (BLM) Lands		<b>Fire Risk Legend</b> Wildland Urban Interface Very High Risk of Wildfire High Risk of Wildfire Moderate Risk of Wildfire		US Fish & Wildlife Service Lands Local or State Park Land National Park Lands Other / Misc. Lands	
---	--	---	--	--	--

**Sources**  
 Esri, NASA, NGA, USGS, FEMA, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, Funding for this project provided by USDA Forest Service, Fire Modeling Institute, which is part of the Rocky Mountain Research Station, Fire, Fuel and Smoke Science Program. Funding also provided by USDA Forest Service, Fire and Aviation Management. Pyrologix, LLC provided fire modeling support under contract with the USDA Forest Service, Fire Modeling Institute. Author Information: Gregory K. Dillon/USDA Forest Service, Rocky Mountain Research Station/https://orcid.org/0009-0006-6304-650X

# Land Ownership & Wildfire Risk

Santa Cruz County CWPP Development  
 7/22/2025 Stakeholder Engagement Meeting

 GREATECOLOGY a TRUE ENVIRONMENTAL COMPANY	 MATRIXNEWORLD A TRUE ENVIRONMENTAL COMPANY	
--	---	--

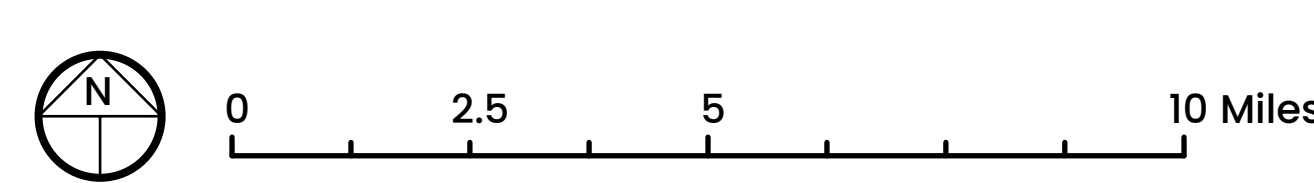


**Landuse / Landcover Legend**

- Santa Cruz County Boundary
- Developed - High Intensity
- Developed - Medium Intensity
- Developed - Medium Intensity
- Open Water
- Evergreen Forest
- Mixed Forest
- Scrub Shrub
- Grassland/ Herbaceous
- Woody Wetlands

**Fire Risk Legend**

- Wildland Urban Interface
- Very High Risk of Wildfire
- High Risk of Wildfire
- Moderate Risk of Wildfire



**Landuse / Landcover & Wildfire Risk**

Santa Cruz County CWPP Development  
7/22/2025 Stakeholder Engagement Meeting

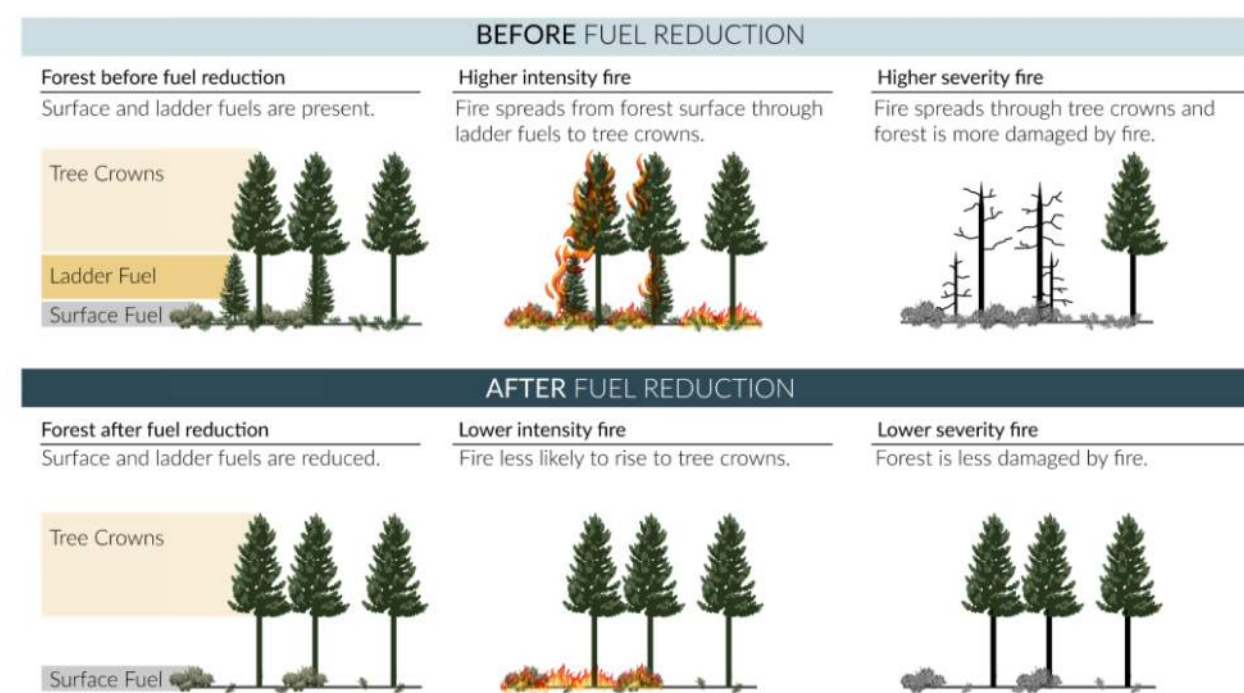
**Sources**  
 Esri, NASA, NGA, USGS, FEMA, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenstreetMap contributors, and the GIS User Community, Funding for this project provided by USDA Forest Service, Fire Modeling Institute, which is part of the Rocky Mountain Research Station, Fire, Fuel and Smoke Science Program. Funding also provided by USDA Forest Service, Fire and Aviation Management. Pyrologix, LLC provided fire modeling support under contract with the USDA Forest Service, Fire Modeling Institute. Author Information: Gregory K. Dillon/USDA Forest Service, Rocky Mountain Research Station/https://orcid.org/0009-0006-6304-650X

## Defensible Space Tactics



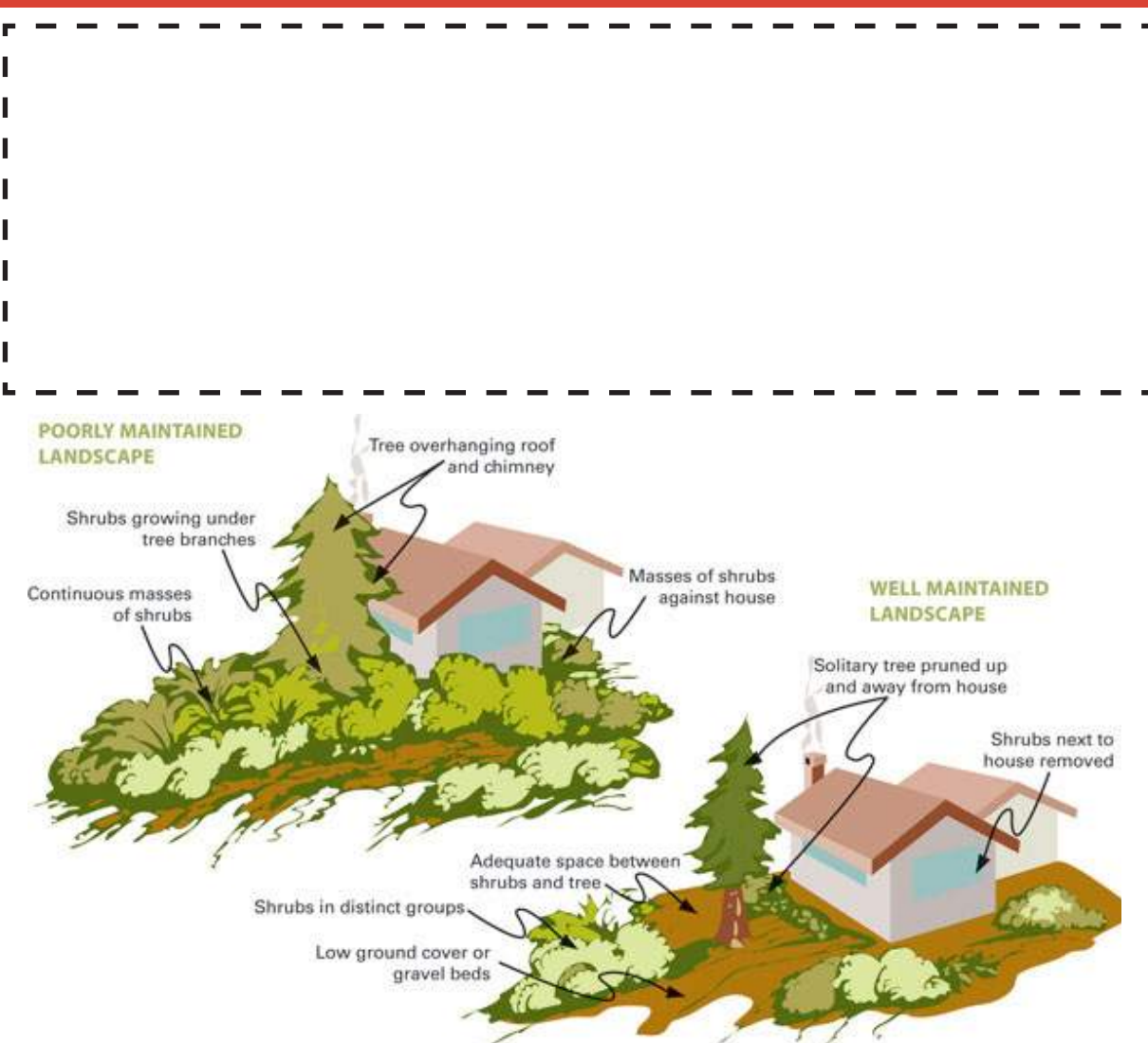
### Zone 4 100-600 ft from home

- Remove ladder fuels & dead vegetation.
- Maximum density of trees (whichever is greater: 60 BA at 80-100 trees/acre or average density of 100 trees/acre).
- Grasses and forbs may be cut with a mower to 4-inches.



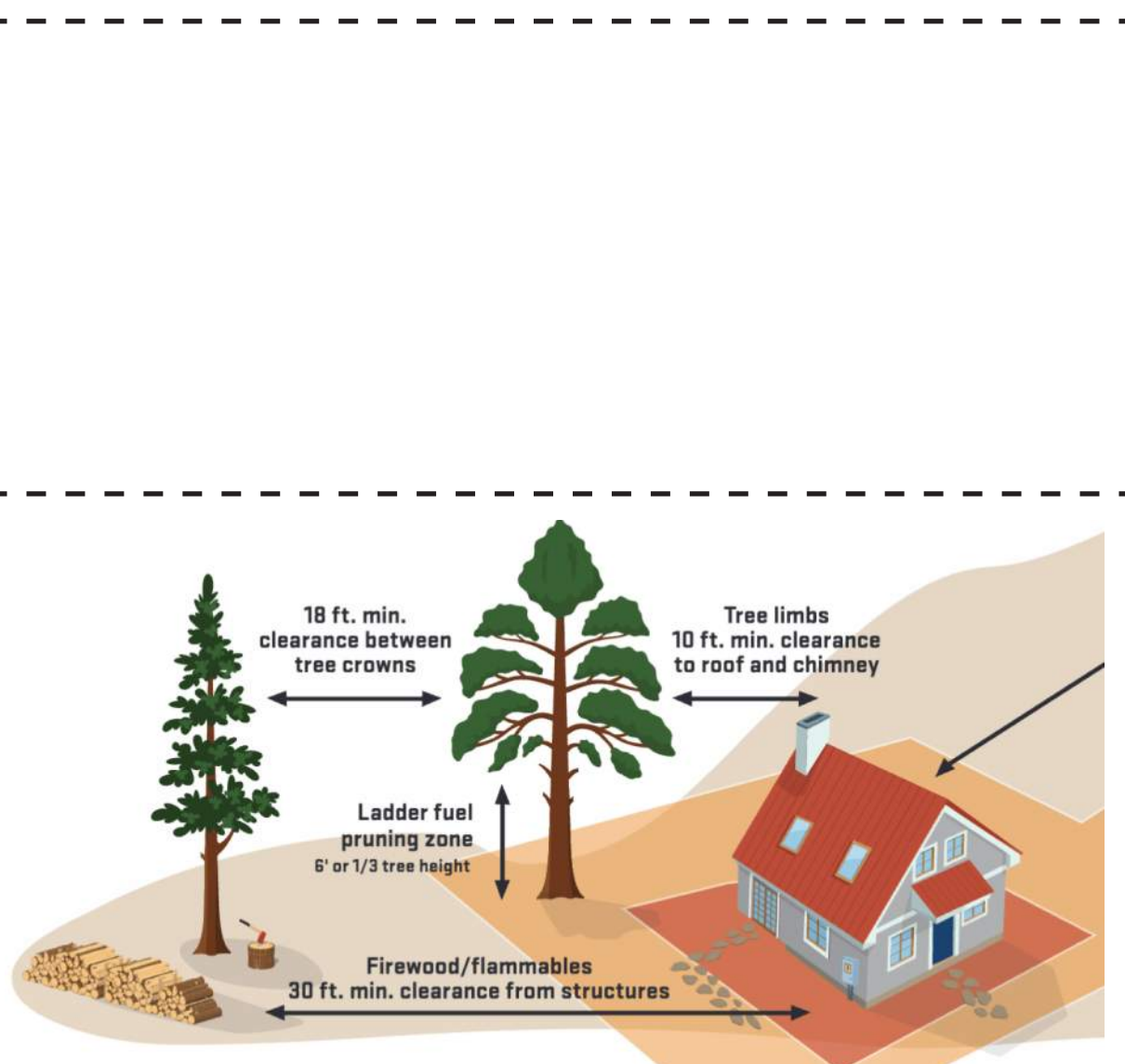
### Zone 1 0-10ft from home

- Remove ladder fuels by pruning the lower third of trees or shrubs up to a maximum of 8 feet. Remove and destroy insect-infested, diseased, and dead trees and shrubs.
- Grasses and forbs may be cut with a mower to 4-inches.
- Remove dead plant material from ground.
- Prune tree limbs overhanging roof.
- Remove branches within 10 feet of chimney.
- Remove flammable debris from gutters and roof surfaces.
- Reduce natural flammable material 2-4 feet above the ground.



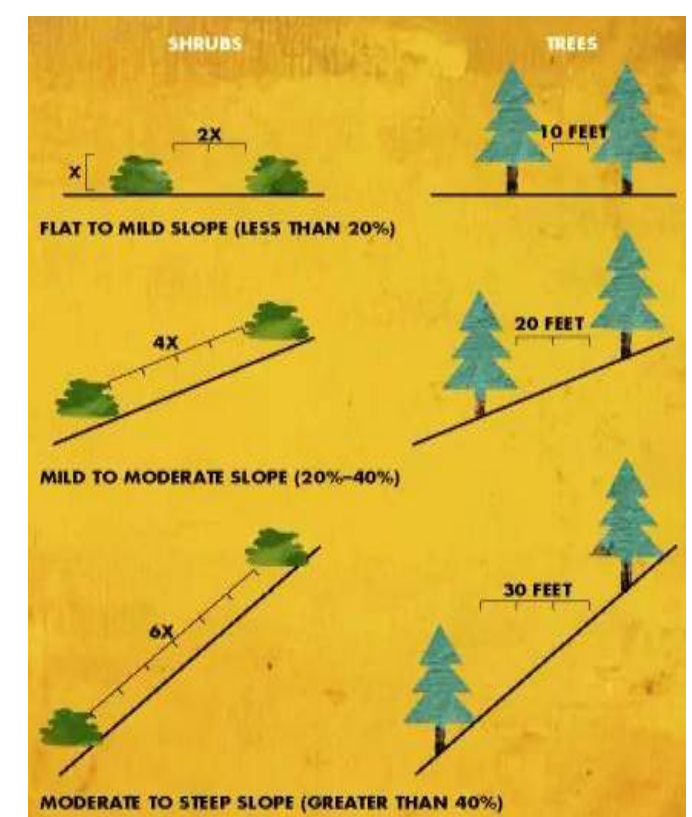
### Zone 2 10-30 ft from home

- Remove ladder fuels & dead vegetation.
- Create separation between trees, tree crowns, and other plants based on fuel type, density, slope, and other topographical features.
- Reduce continuity of fuels by creating a clear space around brush or planting groups.
- Grasses and forbs may be cut with a mower to 4-inches.
- Control soil erosion from small water flow channels by use of rock or noncombustible velocity-reducing structures.
- Remove all leaf litter to a depth of 1 inch.

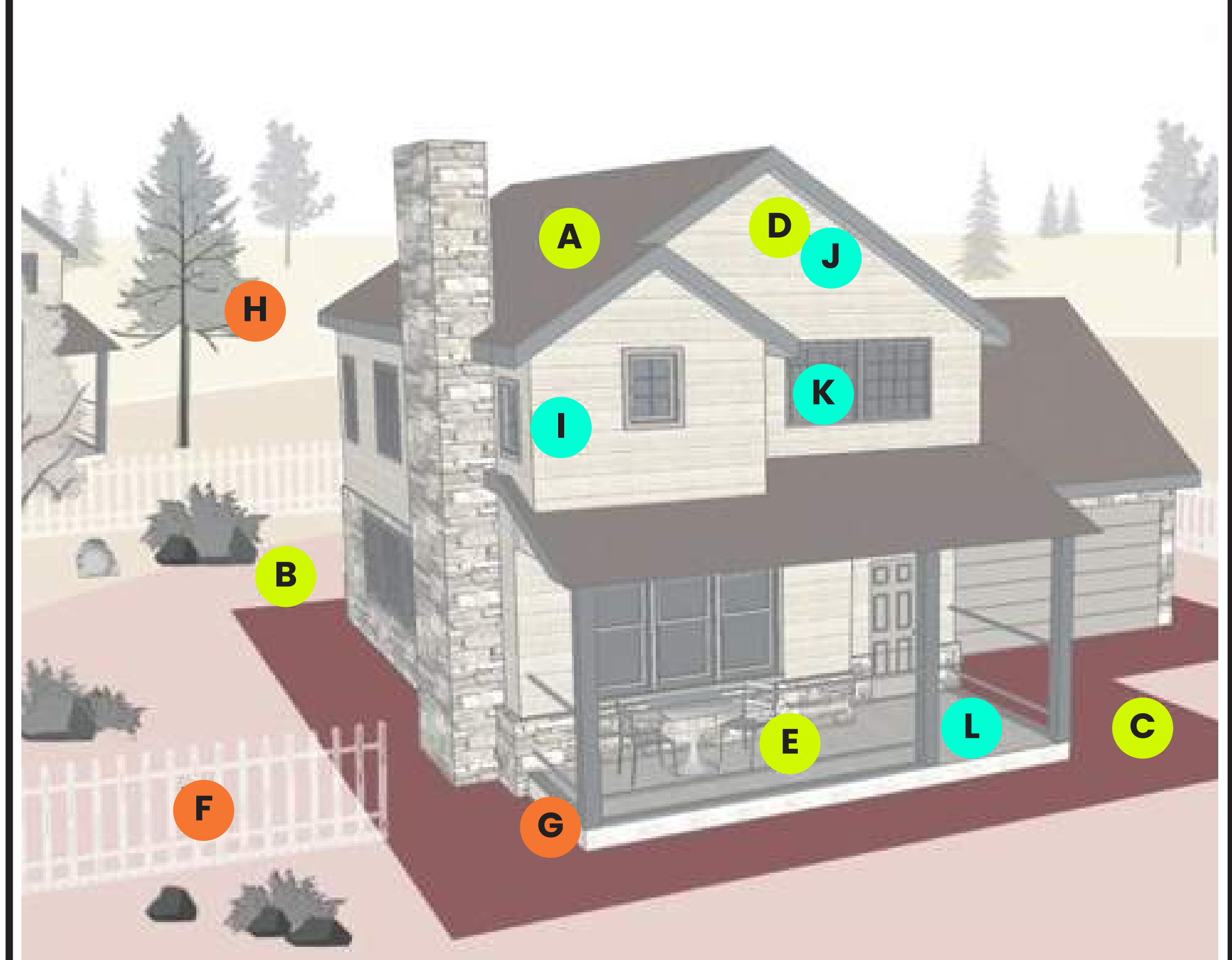


### Zone 3 30-100ft from home

- For natural areas, thin selectively and remove highly flammable vegetation.
- Carefully space trees; choose Firewise plants.



## Structure Hardening Tactics



### 1st Priority

A	Roof	Install a Class A-rated roof such as asphalt fiberglass shingles or metal panels.	\$\$\$
B	Roof & Yard Debris	Clear leaves, pine needles and other flammable material from the roof, gutters, and areas around fences.	DIY
C	Buffer Zone	Clear vegetation and other combustible materials to create a 10ft buffer zone around the home.	\$\$
D	Vents	Install flame and ember resistant vents.	\$
E	Deck	Remove vegetation, firewood, and other combustible materials from on top and under decks.	DIY

### 2nd Priority

F	Fencing	Replace wood or plastic fences attached to the home with noncombustible metal fencing.	\$\$
G	Enclose Decks	Enclose low decks and areas under bay windows with mesh screening or ventilated noncombustible material.	\$
H	Trees	Remove branches that overhang the roof and gutters.	\$

### 3rd Priority

I	Siding	Replace at least the lower foot of wood or vinyl siding with fiber cement, stucco, brick, or stone siding.	\$\$
J	Eaves	Enclose open eaves with noncombustible soffit material.	\$\$
K	Windows	Use dual-paned, tempered glass in windows & doors.	\$\$\$
L	Deck Surface	Replace wooden decking with fire-rated composite material, metal, or lightweight concrete.	\$\$\$

# Community Break Out Groups – Table of Information for Priority Areas

## Santa Cruz County Community Wildfire Protection Plan

### Stakeholder Meeting 3- 9/9/2025

\*Predefined priority area that needs confirmation / revision

## **NOGALES**

Priority Area	Describe existing conditions	Describe fire prevention tactics & mitigations needed in this area	Describe difficulty level of fire prevention implementation (low, medium, or high & why?)	Rank all priority areas: highest to lowest priority (i.e. 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , etc.)
<b>A*</b>	Vegetation dumped along interface, rolling hills to north, dense desert scrub vegetation	WUI treatment badly needed, homeowner education on illegal dumping, possible enforcement actions	Low	
<b>B*</b>	Disturbed land, former golf course, dense vegetation, WUI interface	Homeowner diligence, vegetation removal along homes, thinning & brush removal	Low	
<b>C*</b>	Unkempt & overgrown lots, invasive vegetation, Mesquite, cactus	Owner participation in vegetation removal, especially along roads & washes	Medium	
<b>D*</b>	Steep hills & valleys, dense invasive vegetation, homes throughout hills	Owner participation in hand removal of vegetation	High	
<b>E*</b>	Large homes, rolling hills, grasses & scrub vegetation along roads, tall grasses, large vacant south lot with overgrown vegetation & semi-riparian areas	Vegetation thinning or removal, Rx burns, homeowner participation & diligence around properties	Medium	
<b>F*</b>	Dense & overgrown native riparian vegetation, desert scrub upland, some grass	Could be used to create a fire break, needs ground truthing	Low	
<b>G*</b>	Overgrown, dense desert riparian vegetation, some grass		Out of area homeowners of vacant land makes mitigation difficult	
<b>H*</b>	Overgrown, dense desert riparian vegetation, some grass		Out of area homeowners of vacant land makes mitigation difficult	
<b>I*</b>	Overgrown, dense desert riparian vegetation, some grass		Out of area homeowners of vacant land makes mitigation difficult	
<b>J*</b>	Overgrown, dense desert riparian vegetation, some grass		Out of area homeowners of vacant land makes mitigation difficult	

Priority Area	Describe existing conditions	Describe fire prevention tactics & mitigations needed in this area	Describe difficulty level of fire prevention implementation (low, medium, or high & why?)	Rank all priority areas: highest to lowest priority (i.e. 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , etc.)
K				
L				
M				
N				

Priority Area	Describe existing conditions	Describe fire prevention tactics & mitigations needed in this area	Describe difficulty level of fire prevention implementation (low, medium, or high & why?)	Rank all priority areas: highest to lowest priority (i.e. 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , etc.)
O				
P				
Q				
R				

# Community Break Out Groups – Table of Information for Priority Areas

## Santa Cruz County Community Wildfire Protection Plan

### Stakeholder Meeting 3- 9/9/2025

\*Predefined priority area that needs confirmation / revision

## **RIO RICO**

Priority Area	Describe existing conditions	Describe fire prevention tactics & mitigations needed in this area	Describe difficulty level of fire prevention implementation (low, medium, or high & why?)	Rank all priority areas: highest to lowest priority (i.e. 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , etc.)
<b>A*</b>	Santa Cruz River corridor; desert riparian habitat with effluent dependent water flow & thick bosque of cottonwood, Mesquite & infrequent flooding	Thinning, partnerships with environmental groups, property owners, & cattlemen	High	
<b>B*</b>	Rolling hills, dense vegetation, large homeowner lots, overgrown lots on south side of hills, non native landscaping	Homeowner diligence, education, assistance, clearing along roads	Medium	
<b>C*</b>	Rolling hills, dense vegetation along south side of hills, large lots, non native landscaping, Ruby Rd (289) provides fire break	Homeowner diligence, education, assistance, clearing along roads	Medium	
<b>D*</b>	Large, unbuilt lots, scattered housing, below ground infrastructure, unkempt native & non native vegetation, disturbed landscapes	WUI property owners coordinate with adjacent public lands owners for thinning & brush clearing	Medium	
<b>E*</b>	Large parcels & ranches, many houses on hills, dirt roads, Sonoita Creek fire break to the north, dense desert vegetation, Joshua Trees, Mesquite, some grass	Harden Sonoita Creek firebreak, add fire breaks, homeowner diligence, assistance, clearing along roads	High	
<b>F*</b>	Large parcels & ranches, many houses on hills, dirt roads, Sonoita Creek fire break to the north, dense desert vegetation, Joshua Trees, Mesquite, some grass	Harden Sonoita Creek firebreak, add fire breaks, homeowner diligence, assistance, clearing along roads	High	

Priority Area	Describe existing conditions	Describe fire prevention tactics & mitigations needed in this area	Describe difficulty level of fire prevention implementation (low, medium, or high & why?)	Rank all priority areas: highest to lowest priority (i.e. 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , etc.)
<b>G*</b>	Dense & overgrown riparian vegetation (invasives), warehouses, some areas of wash channelized with concrete	De-brushing handwork along wash	High	
<b>H*</b>	Large parcels & ranches, many houses on hills, dirt roads, Sonoita Creek fire break to the north, dense desert vegetation, Joshua Trees, Mesquite, some grass	Harden Sonoita Creek firebreak, add fire breaks, homeowner diligence, assistance, clearing along roads	High	
<b>I</b>				
<b>J</b>				
<b>K</b>				

Priority Area	Describe existing conditions	Describe fire prevention tactics & mitigations needed in this area	Describe difficulty level of fire prevention implementation (low, medium, or high & why?)	Rank all priority areas: highest to lowest priority (i.e. 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , etc.)
L				
M				
N				
O				

# Community Break Out Groups – Table of Information for Priority Areas

## Santa Cruz County Community Wildfire Protection Plan

### Stakeholder Meeting 3- 9/9/2025

\*Predefined priority area that needs confirmation / revision

## **TUBAC**

Priority Area	Describe existing conditions	Describe fire prevention tactics & mitigations needed in this area	Describe difficulty level of fire prevention implementation (low, medium, or high & why?)	Rank all priority areas: highest to lowest priority (i.e. 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , etc.)
<b>A*</b>	Aliso Springs; surrounded by CNF, fracture land ownership, high grass & mesquite	Property owners & HOAS get involved, brush work, defensible space at WUI	High	
<b>B*</b>	Santa Cruz River corridor; desert riparian habitat with effluent dependent water flow & thick bosque of cottonwood, Mesquite & infrequent flooding	Thinning, partnerships with environmental groups, property owners, & cattlemen	High	
<b>C*</b>	Santa Cruz River corridor; desert riparian habitat with effluent dependent water flow & thick bosque of cottonwood, Mesquite & infrequent flooding	Thinning, partnerships with environmental groups, property owners, & cattlemen	High	
<b>D*</b>	Santa Cruz River corridor; desert riparian habitat with effluent dependent water flow & thick bosque of cottonwood, Mesquite & infrequent flooding	Thinning, partnerships with environmental groups, property owners, & cattlemen	High	
<b>E</b>				

Priority Area	Describe existing conditions	Describe fire prevention tactics & mitigations needed in this area	Describe difficulty level of fire prevention implementation (low, medium, or high & why?)	Rank all priority areas: highest to lowest priority (i.e. 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , etc.)
F				
G				
H				
I				

Priority Area	Describe existing conditions	Describe fire prevention tactics & mitigations needed in this area	Describe difficulty level of fire prevention implementation (low, medium, or high & why?)	Rank all priority areas: highest to lowest priority (i.e. 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , etc.)
J				
K				
L				
M				

# Community Break Out Groups – Table of Information for Priority Areas

Santa Cruz County Community Wildfire Protection Plan

Stakeholder Meeting 3- 9/9/2025

## SONOITA-ELGIN

Priority Area	Describe existing conditions	Describe fire prevention tactics & mitigations needed in this area	Describe difficulty level of fire prevention implementation (low, medium, or high & why?)	Rank all priority areas: highest to lowest priority (i.e. 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , etc.)
<b>A</b>				
<b>B</b>				
<b>C</b>				

Priority Area	Describe existing conditions	Describe fire prevention tactics & mitigations needed in this area	Describe difficulty level of fire prevention implementation (low, medium, or high & why?)	Rank all priority areas: highest to lowest priority (i.e. 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , etc.)
D				
E				
F				
G				

# Community Break Out Groups – Table of Information for Priority Areas

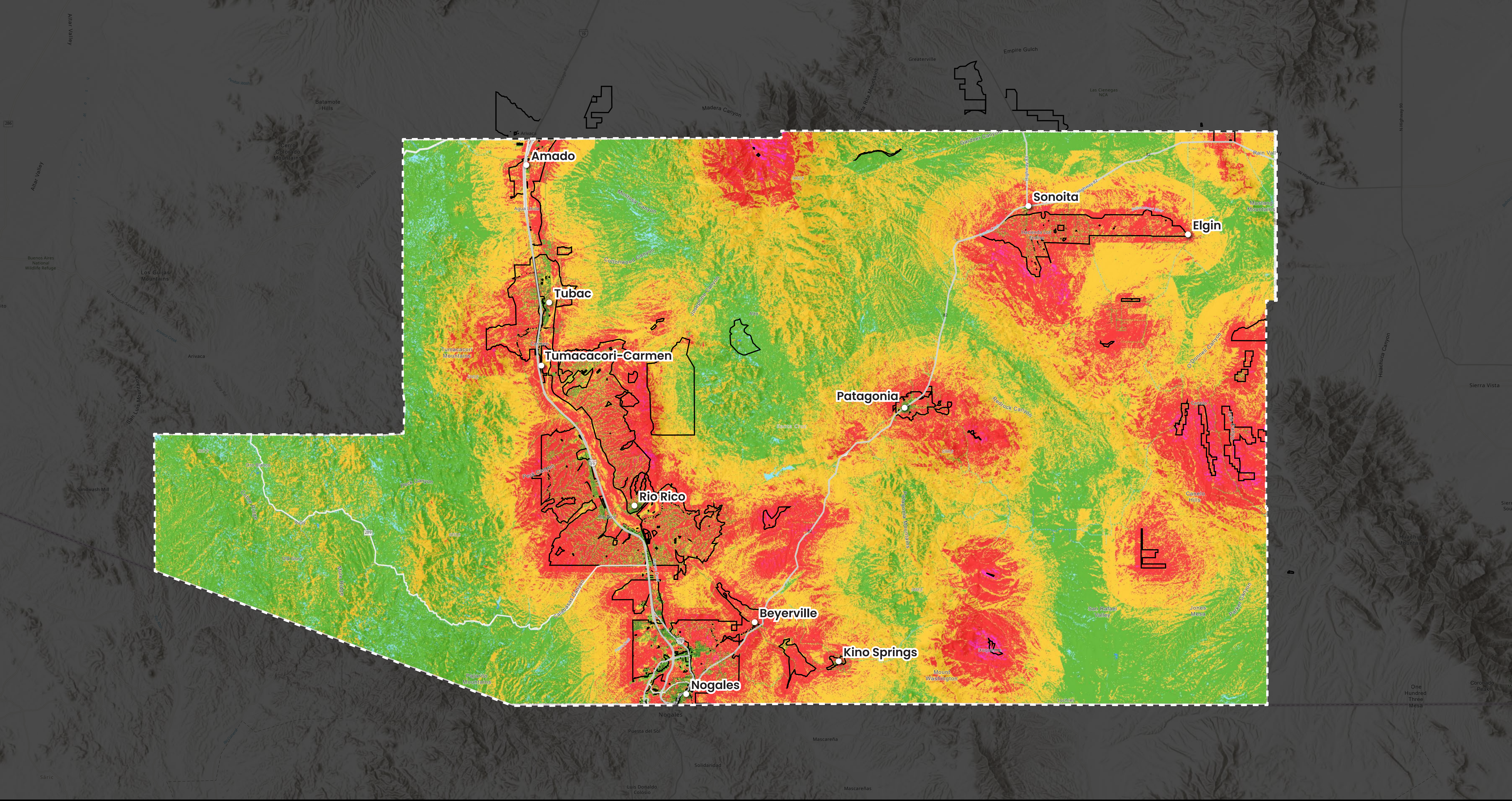
Santa Cruz County Community Wildfire Protection Plan

Stakeholder Meeting 3- 9/9/2025

## PATAGONIA

Priority Area	Describe existing conditions	Describe fire prevention tactics & mitigations needed in this area	Describe difficulty level of fire prevention implementation (low, medium, or high & why?)	Rank all priority areas: highest to lowest priority (i.e. 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , etc.)
<b>A</b>				
<b>B</b>				
<b>C</b>				

Priority Area	Describe existing conditions	Describe fire prevention tactics & mitigations needed in this area	Describe difficulty level of fire prevention implementation (low, medium, or high & why?)	Rank all priority areas: highest to lowest priority (i.e. 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , etc.)
D				
E				
F				
G				



**Sources & Notes**

Service Layer Credits: World Topographic Map:  
 Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community  
 Communities At Risk (CAR): DFFM  
 World Hillshade: Esri, NASA, NGA, USGS  
 Local Parks:  
 Firewise Communities: National Fire Protection Association, DFFM,

**Comments**

**Legend**

**Worst Case Scenario Fire Conditions Model**

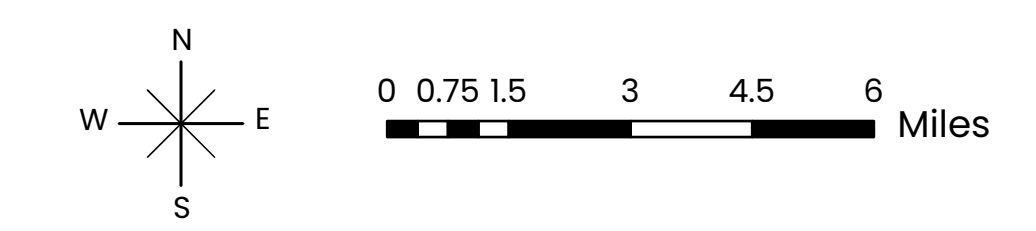
- Maximum Risk Area
- High Risk Area
- Elevated Risk Area
- Moderate Risk Area
- Low Risk Area
- Minimal Risk Area

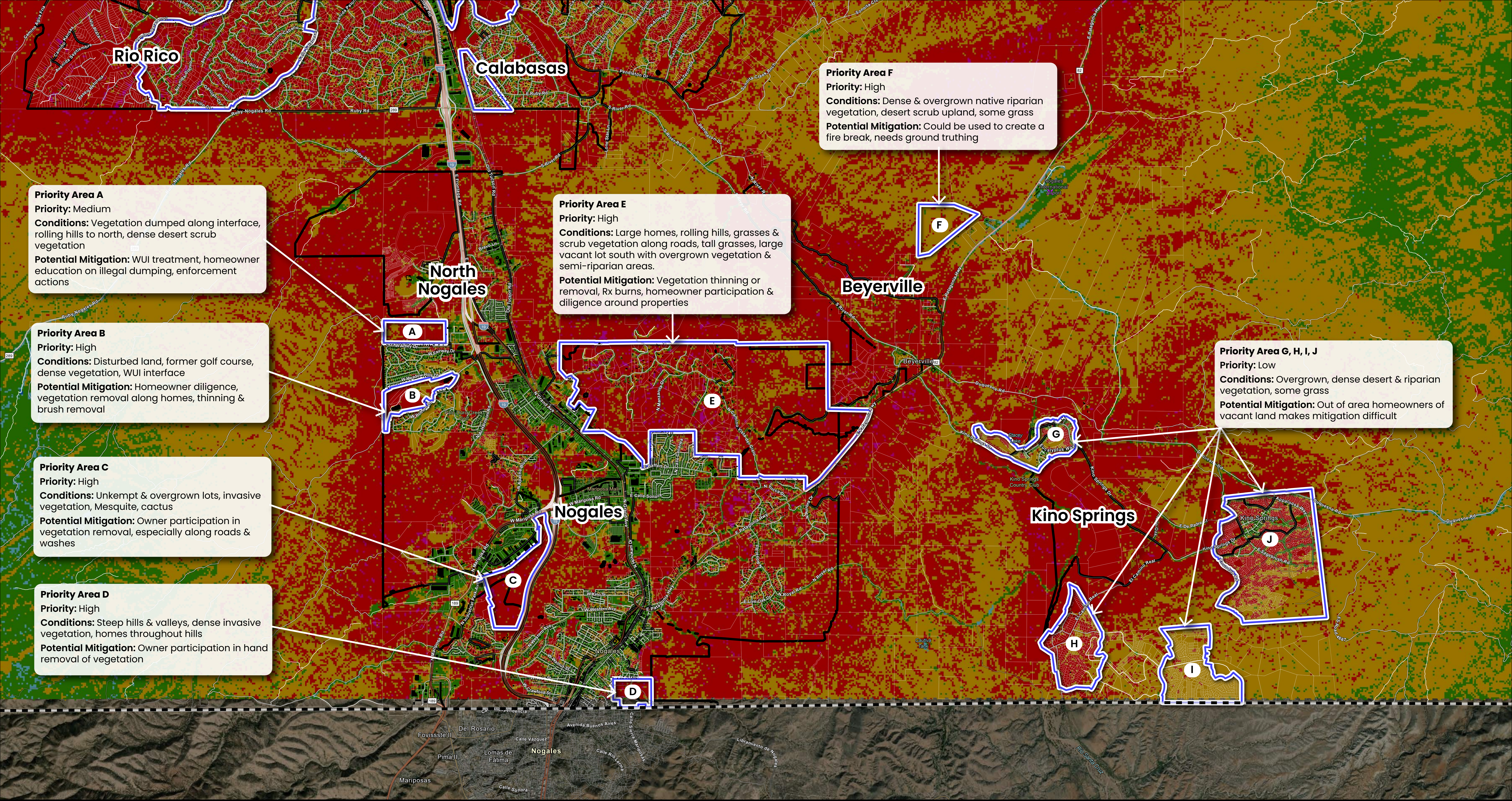
- Santa Cruz County
- WUI Boundary
- Buildings
- City / Town Point

# County Wide Fire Model

## Santa Cruz County CWPP Development

9/9/2025 Stakeholder Meeting 3





**Sources & Notes**

Service Layer Credits: Hybrid Reference Layer:  
 Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

City Points:  
 World Imagery: Earthstar Geographics  
 Communities At Risk (CAR): DFFM  
 Firewise Communities: National Fire Protection Association, DFFM,

**Comments**

**Legend**

Santa Cruz County	Worst Case Scenario Fire Conditions Model
WUI Boundary	Maximum Risk Area
Parcel Boundaries	High Risk Area
Buildings	Elevated Risk Area
Priority Zones	Moderate Risk Area
Draft Boundaries	WUI Low Risk Area
Roads	Minimal Risk Area
Freeway	
Highway	
Local	
USFS	

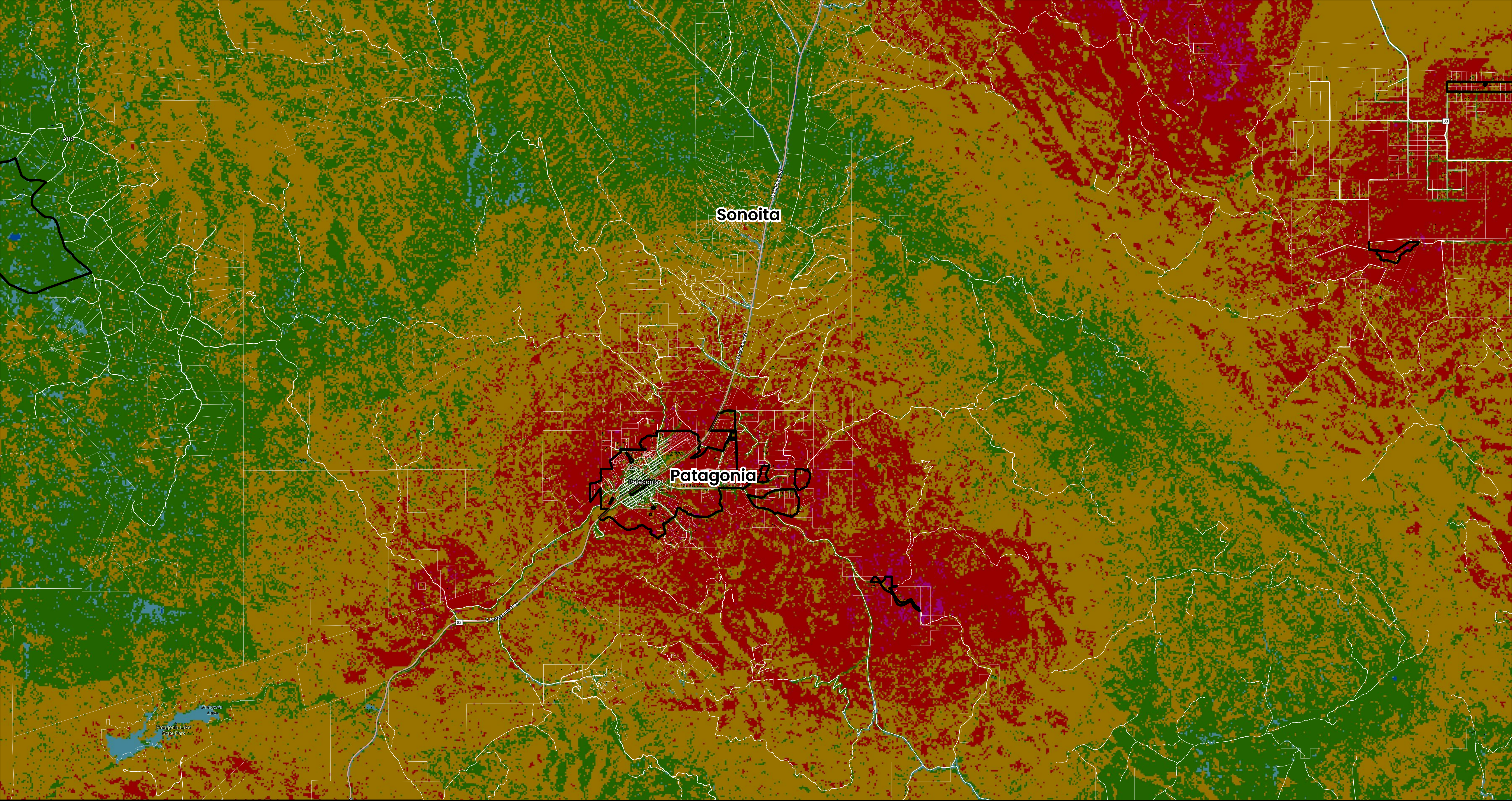
**Map Review & Priority Areas Checklist:**

1. Mark out where fire prevention projects have occurred or are in progress.
2. Review draft priority area boundaries with fire modeling underneath.
3. Determine if draft boundaries & prioritization are still accurate. If not, redraw the boundary on the map and update the priority in the table.
4. Determine if any other priority areas should be added based on the fire modeling. If so, draw the new boundary on the map and label it with the appropriate letter.
5. For each priority area boundary, fill in the associated table with a description of: existing conditions, treatment tactics, difficulty of implementation, and rank each area in terms of highest to lowest priority.

**Nogales Priority Areas**  
 Santa Cruz County CWPP Development  
 9/9/2025 Stakeholder Meeting 3

0 0.2 0.4 0.8 1.2 1.6 Miles

**GREATecology** a TRUE ENVIRONMENTAL company  
**MATRIXNEWORLD** A TRUE ENVIRONMENTAL COMPANY  
 Southwest Policy Advocates



**Sources & Notes**

Service Layer Credits: Hybrid Reference Layer:  
 Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

City Points:  
 Communities At Risk (CAR): DFFM  
 World Imagery: Maxar  
 Firewise Communities: National Fire Protection Association, DFFM,

**Comments**

**Legend**

Santa Cruz County	Maximum Risk Area
WUI Boundary	High Risk Area
Parcel Boundaries	Elevated Risk Area
Buildings	Moderate Risk Area
<b>Roads</b>	WUI Low Risk Area
Freeway	Minimal Risk Area
Highway	
Local	
USFS	

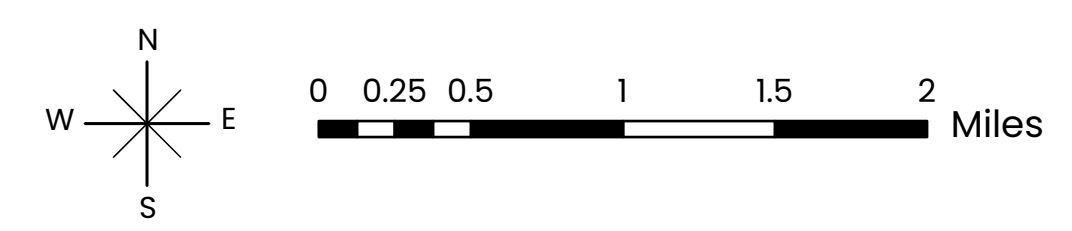
**Map Review & Priority Areas Checklist:**

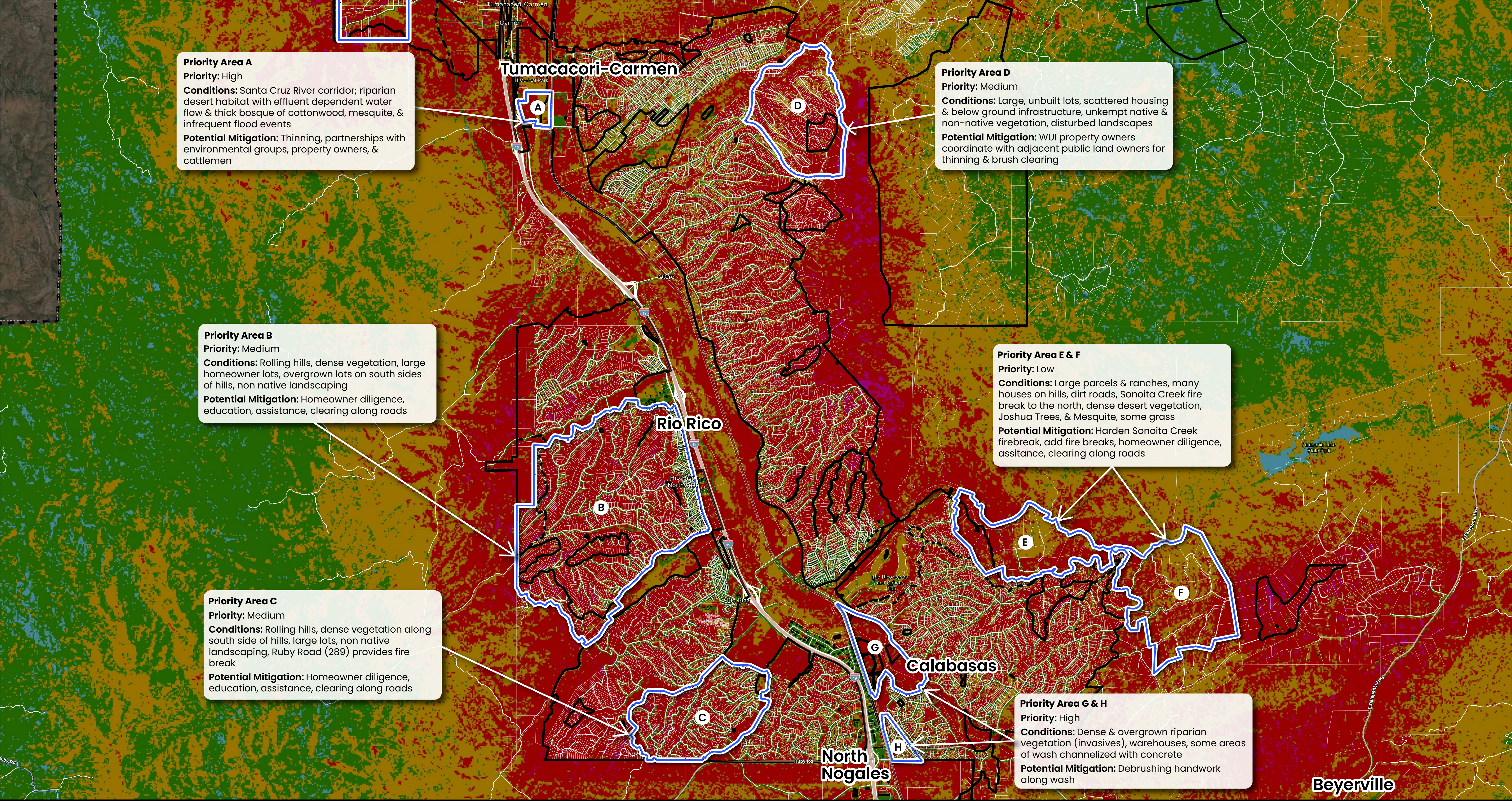
1. Mark out where fire prevention projects have occurred or are in progress.
2. Choose around 5 priority areas based on the fire modeling & 2007 CWPP. Draw the boundaries on the map and label them with letters (A, B, C... etc.)
3. For each priority area boundary, fill in the associated table with a description of: existing conditions, treatment tactics, difficulty of implementation, and rank each area in terms of highest to lowest priority.

# Patagonia Priority Areas

Santa Cruz County CWPP Development

9/9/2025 Stakeholder Meeting 3





**Priority Area A**  
**Priority:** High  
**Conditions:** Santa Cruz River corridor; riparian desert habitat with effluent dependent water flow & thick bosque of cottonwood, mesquite, & infrequent flood events  
**Potential Mitigation:** Thinning, partnerships with environmental groups, property owners, & cattlemen

**Priority Area D**  
**Priority:** Medium  
**Conditions:** Large, unbuilt lots, scattered housing & below ground infrastructure, unkempt native & non-native vegetation, disturbed landscapes  
**Potential Mitigation:** WUI property owners coordinate with adjacent public land owners for thinning & brush clearing

**Priority Area B**  
**Priority:** Medium  
**Conditions:** Rolling hills, dense vegetation, large homeowner lots, overgrown lots on south sides of hills, non native landscaping  
**Potential Mitigation:** Homeowner diligence, education, assistance, clearing along roads

**Priority Area E & F**  
**Priority:** Low  
**Conditions:** Large parcels & ranches, many houses on hills, dirt roads, Sonoita Creek fire break to the north, dense desert vegetation, Joshua Trees, & Mesquite, some grass  
**Potential Mitigation:** Harden Sonoita Creek firebreak, add fire breaks, homeowner diligence, assistance, clearing along roads

**Priority Area C**  
**Priority:** Medium  
**Conditions:** Rolling hills, dense vegetation along south side of hills, large lots, non native landscaping, Ruby Road (289) provides fire break  
**Potential Mitigation:** Homeowner diligence, education, assistance, clearing along roads

**Priority Area G & H**  
**Priority:** High  
**Conditions:** Dense & overgrown riparian vegetation (invasives), warehouses, some areas of wash channelized with concrete  
**Potential Mitigation:** Debrushing handwork along wash

**Sources & Notes**  
 Service Layer Credits: Hybrid Reference Layer:  
 Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community  
 City Points:  
 Communities At Risk (CAR): DFFM  
 World Imagery: Maxar  
 Firewise Communities: National Fire Protection Association, DFFM,

**Comments**

**Legend**

<ul style="list-style-type: none"> <li> Santa Cruz County</li> <li> WUI Boundary</li> <li> Parcel Boundaries</li> <li> Buildings</li> <li><b>Priority Zones</b></li> <li> Draft Boundaries</li> <li><b>Roads</b></li> <li> Freeway</li> <li> Highway</li> <li> Local USFS</li> </ul>	<p><b>Worst Case Scenario Fire Conditions Model</b></p> <ul style="list-style-type: none"> <li> Maximum Risk Area</li> <li> High Risk Area</li> <li> Elevated Risk Area</li> <li> Moderate Risk Area</li> <li> WUI Low Risk Area</li> <li> Minimal Risk Area</li> </ul>
--	---

**Map Review & Priority Areas Checklist:**

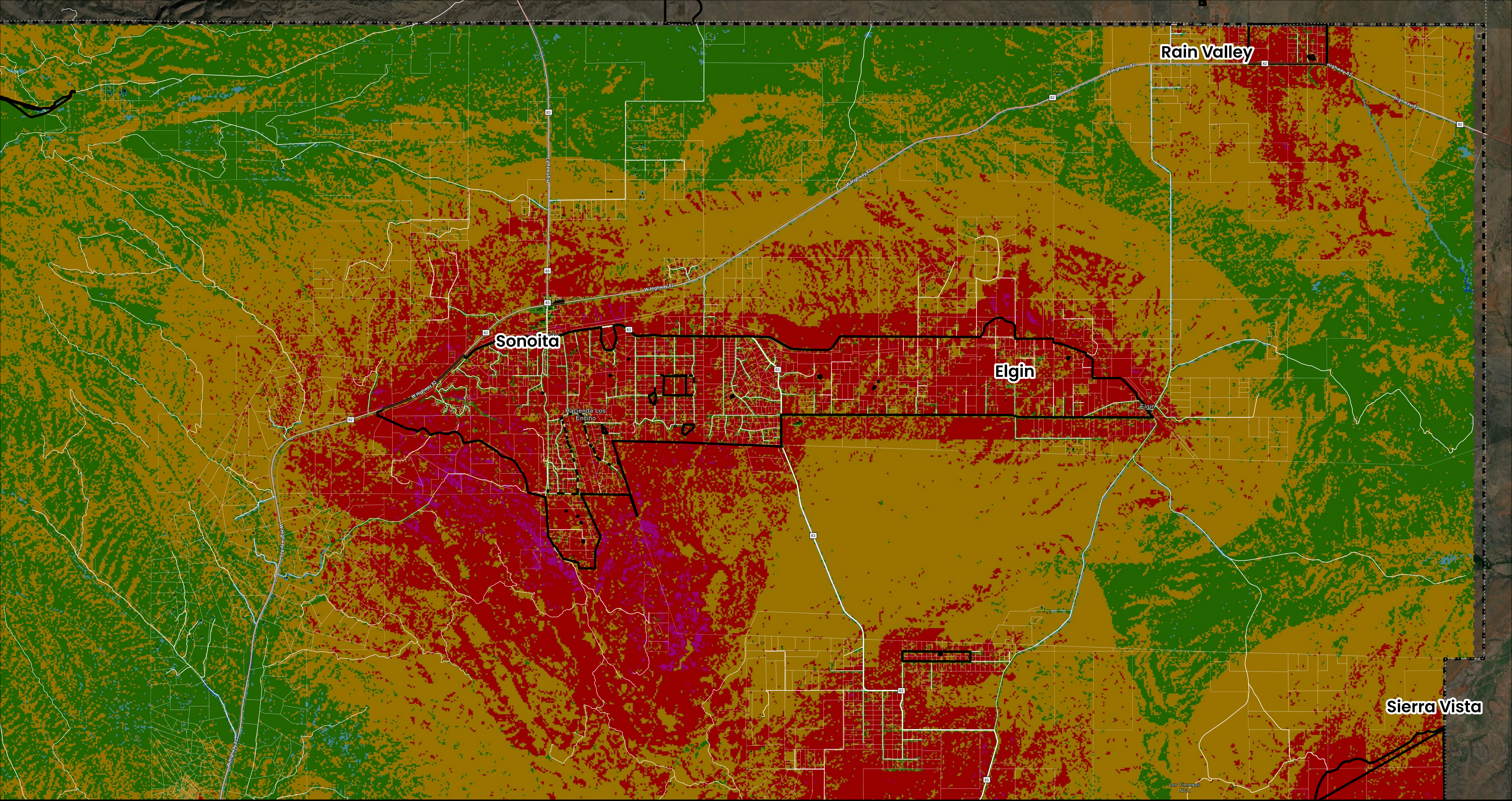
1. Mark out where fire prevention projects have occurred.
2. Review draft priority area boundaries with fire modeling underneath.
3. Determine if draft boundaries & prioritization are still accurate. If not, redraw the boundary on the map and update the priority in the table.
4. Determine if any other priority areas should be added based on the fire modeling. If so, draw the new boundary on the map and label it with the appropriate letter.
5. For each priority area boundary, fill in the associated table with a description of: existing conditions, treatment tactics, difficulty of implementation, and rank each area in terms of highest to lowest priority.

# Rio Rico Priority Areas

## Santa Cruz County CWPP Development

9/9/2025 Stakeholder Meeting 3





**Sources & Notes**

Service Layer Credits: Hybrid Reference Layer:  
 Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

City Points:  
 World Imagery: Earthstar Geographics  
 Communities At Risk (CAR): DFFM  
 Firewise Communities: National Fire Protection Association, DFFM,

**Comments**

**Legend**

Santa Cruz County	Maximum Risk Area
WUI Boundary	High Risk Area
Parcel Boundaries	Elevated Risk Area
Buildings	Moderate Risk Area
<b>Roads</b>	WUI Low Risk Area
Freeway	Minimal Risk Area
Highway	
Local	
USFS	

**Worst Case Scenario Fire Conditions Model**

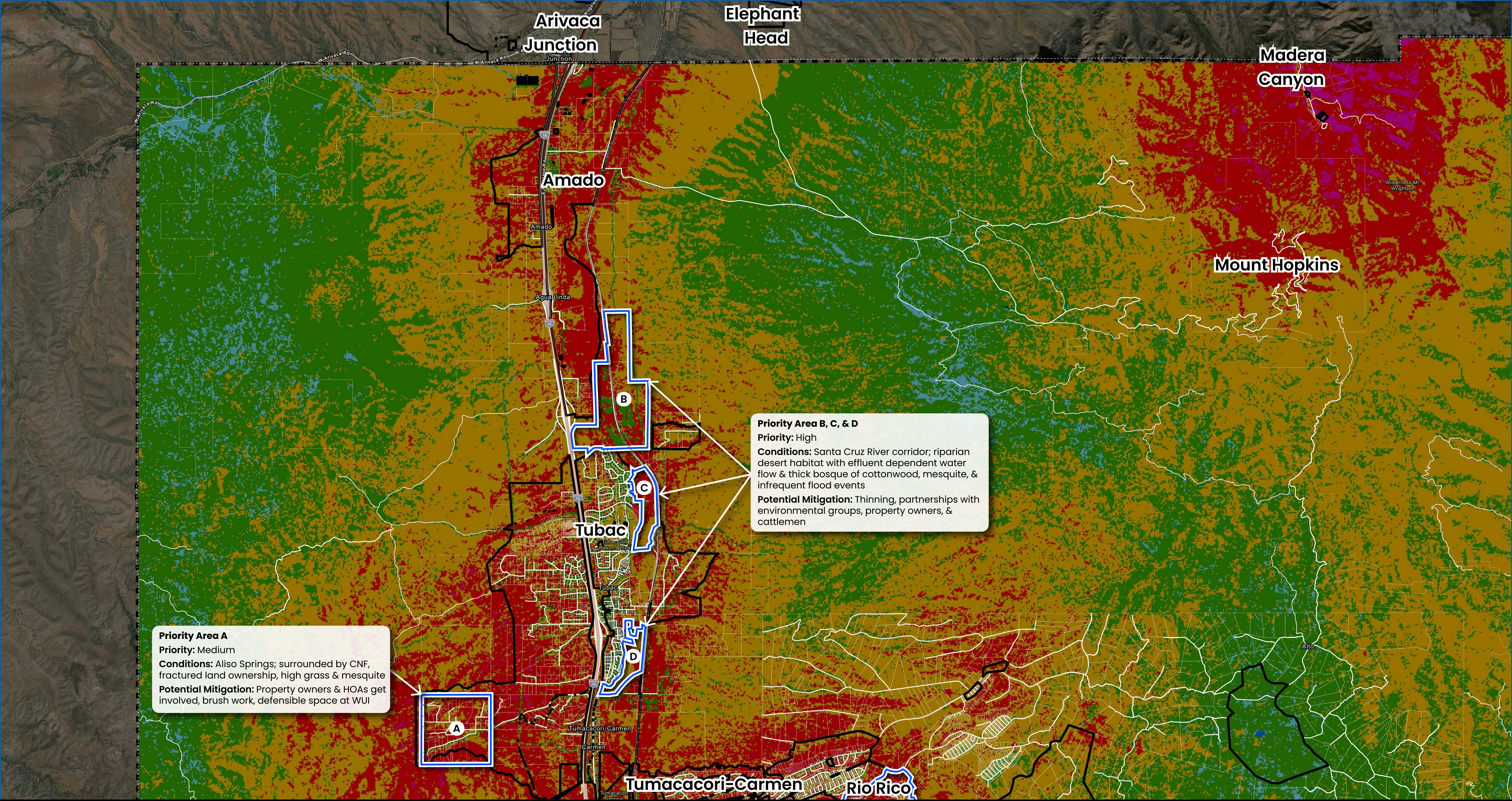
**Map Review & Priority Areas Checklist:**

1. Mark out where fire prevention projects have occurred or are in progress.
2. Choose around 5 priority areas based on the fire modeling & 2007 CWPP. Draw the boundaries on the map and label them with letters (A, B, C... etc.)
3. For each priority area boundary, fill in the associated table with a description of: existing conditions, treatment tactics, difficulty of implementation, and rank each area in terms of highest to lowest priority.

# Sonoita-Elgin Priority Areas

## Santa Cruz County CWPP Development

9/9/2025 Stakeholder Meeting 3



**Sources & Notes**

Service Layer Credits: Communities At Risk (CAR): DFFM  
 World Imagery: Maxar  
 Firewise Communities: National Fire Protection Association, DFFM,

**Comments**

**Legend**

Santa Cruz County	Maximum Risk Area
WUI Boundary	High Risk Area
Parcel Boundaries	Elevated Risk Area
Buildings	Moderate Risk Area
<b>Priority Zones</b>	WUI Low Risk Area
Draft Boundaries	Minimal Risk Area
<b>Roads</b>	
Freeway	
Highway	
Local	
USFS	

**Map Review & Priority Areas Checklist:**

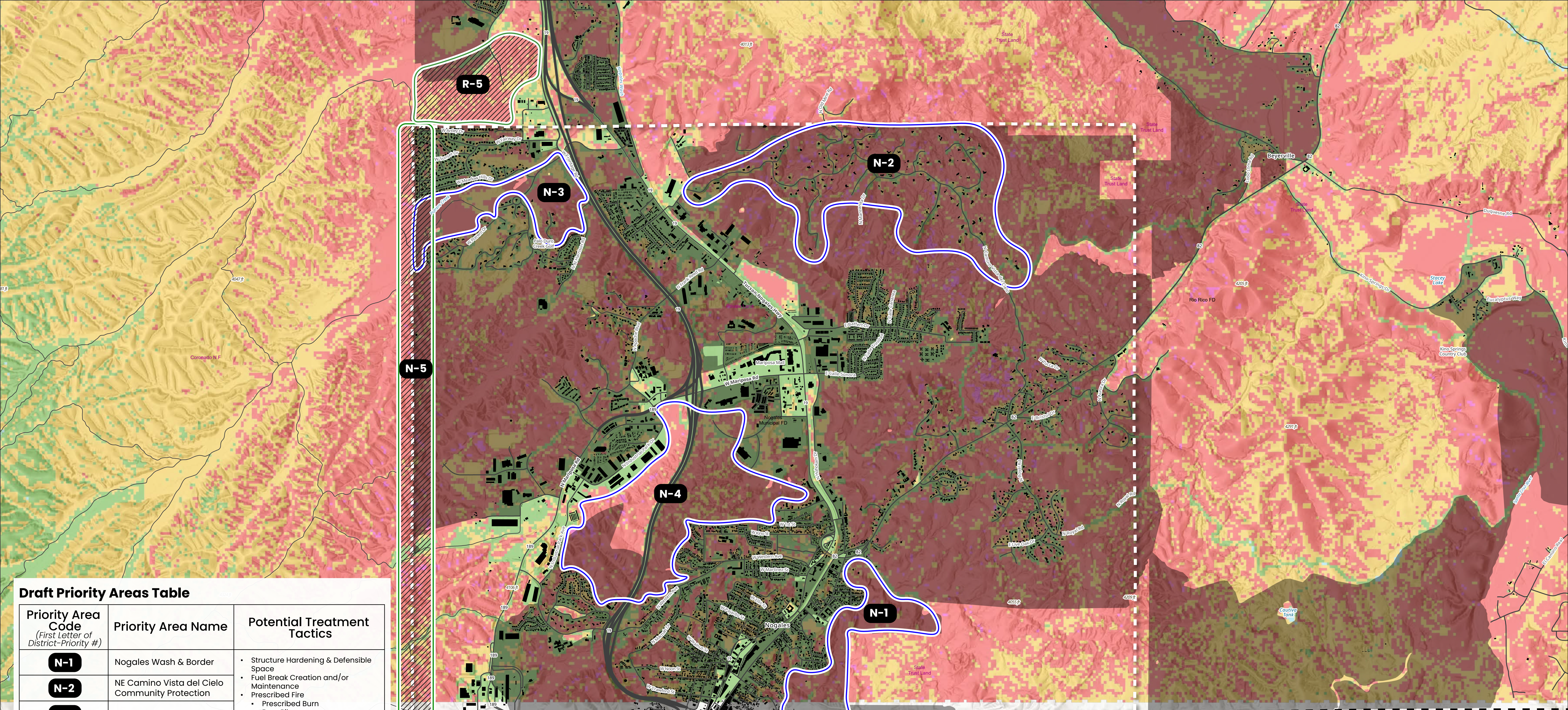
1. Mark out where fire prevention projects have occurred or are in progress.
2. Review draft priority area boundaries with fire modeling underneath.
3. Determine if draft boundaries & prioritization are still accurate. If not, redraw the boundary on the map and update the priority in the table.
4. Determine if any other priority areas should be added based on the fire modeling. If so, draw the new boundary on the map and label it with the appropriate letter.
5. For each priority area boundary, fill in the associated table with a description of: existing conditions, treatment tactics, difficulty of implementation, and rank each area in terms of highest to lowest priority.

**Tubac Priority Areas**

Santa Cruz County CWPP Development

9/9/2025 Stakeholder Meeting 3





**Draft Priority Areas Table**

Priority Area Code <i>(First Letter of District-Priority #)</i>	Priority Area Name	Potential Treatment Tactics
<b>N-1</b>	Nogales Wash & Border	<ul style="list-style-type: none"> <li>Structure Hardening &amp; Defensible Space</li> <li>Fuel Break Creation and/or Maintenance</li> <li>Prescribed Fire                             <ul style="list-style-type: none"> <li>Prescribed Burn</li> <li>Burn Piles</li> </ul> </li> <li>Mechanical Vegetation Treatments                             <ul style="list-style-type: none"> <li>Thinning</li> <li>Mowing</li> <li>Mastication</li> <li>Limbing</li> </ul> </li> <li>Invasive Species Management / Removal</li> <li>Grazing</li> <li>Evacuation &amp; Resource Route Creation and/or Maintenance</li> </ul>
<b>N-2</b>	NE Camino Vista del Cielo Community Protection	
<b>N-3</b>	Old Golf Course	
<b>N-4</b>	Open Lots E&W of I-19	
<b>N-5</b>	(Inter-Agency) West 20' Control Line / Firebreak	
<b>R-5</b>	(Inter-District) USFS Inholding	

**Sources & Notes**

Service Layer Credits: World Topographic Map:  
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community  
County Boundary Line:  
Fire Districts: Santa Cruz County Fire Districts, Santa Cruz County Assessor's Office  
National Land Cover Database:  
World Hillshade: Esri, NASA, NGA, USGS, FEMA,

**Disclaimer**

The draft priority zone boundaries indicated on this map are **general approximations of potential** project areas. They are meant to be expanded or refined with future planning.  
  
The draft priority zone boundaries indicated on this map will likely change as the CWPP develops and with future meetings with fire chiefs to solidify priorities.  
  
As the CWPP is developed, a more comprehensive assignment of treatment tactics will be applied to finalized priority areas.

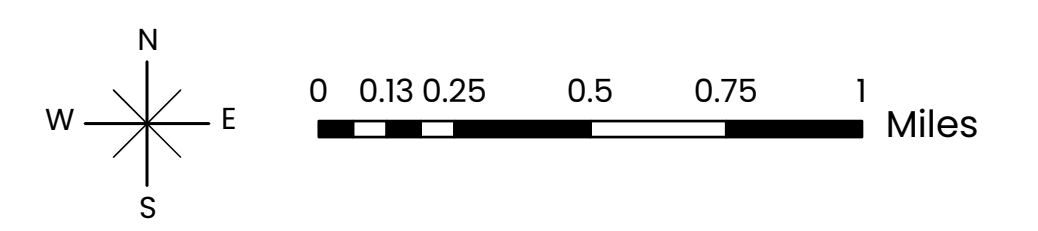
**Legend**

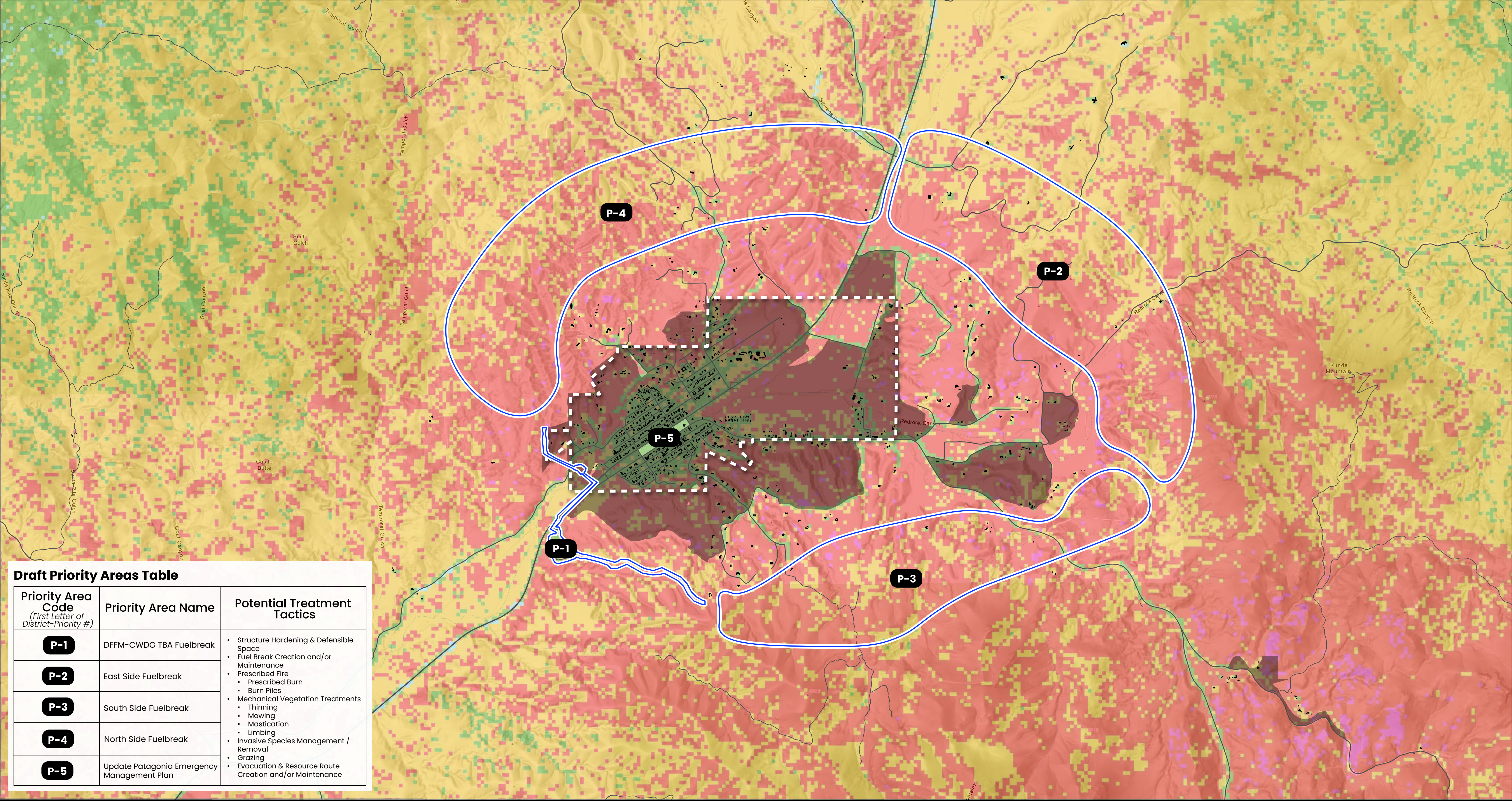
County Boundary	Maximum	Draft Priority Zones <i>(determined at individual district meetings or stakeholder meeting 3, with feedback from stakeholder meeting 3 incorporated)</i>
Fire District Boundary	High	Draft Inter-District or Inter-Agency Priority Zones <i>(priorities that overlap jurisdictions)</i>
Freeway Roads	Elevated	
Highway Roads	Moderate	
Local Roads	Low	
USFS Roads	Minimal	
WUI		

# Nogales Priority Areas

## Santa Cruz County CWPP Development

### Community Meeting





**Draft Priority Areas Table**

Priority Area Code (First Letter of District-Priority #)	Priority Area Name	Potential Treatment Tactics
<b>P-1</b>	DFFM-CWDG TBA Fuelbreak	<ul style="list-style-type: none"> <li>• Structure Hardening &amp; Defensible Space</li> <li>• Fuel Break Creation and/or Maintenance</li> <li>• Prescribed Fire               <ul style="list-style-type: none"> <li>• Prescribed Burn</li> <li>• Burn Piles</li> </ul> </li> <li>• Mechanical Vegetation Treatments               <ul style="list-style-type: none"> <li>• Thinning</li> <li>• Mowing</li> <li>• Mastication</li> <li>• Limbing</li> </ul> </li> <li>• Invasive Species Management / Removal</li> <li>• Grazing</li> <li>• Evacuation &amp; Resource Route Creation and/or Maintenance</li> </ul>
<b>P-2</b>	East Side Fuelbreak	
<b>P-3</b>	South Side Fuelbreak	
<b>P-4</b>	North Side Fuelbreak	
<b>P-5</b>	Update Patagonia Emergency Management Plan	

**Sources & Notes**

Service Layer Credits: World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

County Boundary Line:  
 Fire Districts: Santa Cruz County Fire Districts, Santa Cruz County Assessor's Office  
 National Land Cover Database:  
 World Hillshade: Esri, NASA, NGA, USGS, FEMA,

**Disclaimer**

The draft priority zone boundaries indicated on this map are **general approximations of potential project areas**. They are meant to be expanded or refined with future planning.

The draft priority zone boundaries indicated on this map will likely change as the CWPP develops and with future meetings with fire chiefs to solidify priorities.

As the CWPP is developed, a more comprehensive assignment of treatment tactics will be applied to finalized priority areas.

**Legend**

- County Boundary
- Fire District Boundary
- Freeway Roads
- Highway Roads
- Local Roads
- USFS Roads
- WUI

**Risk Model**

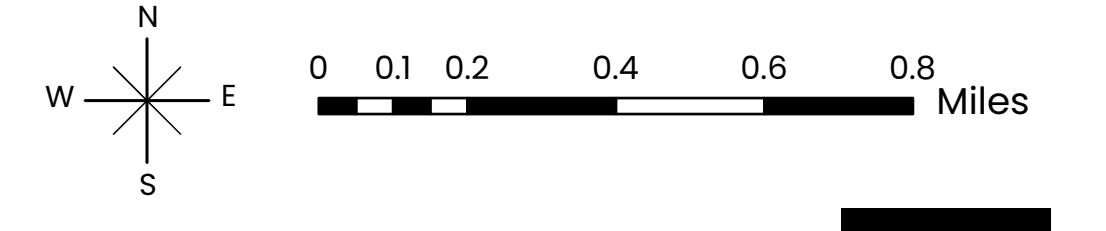
- Maximum
- High
- Elevated
- Moderate
- Low
- Minimal

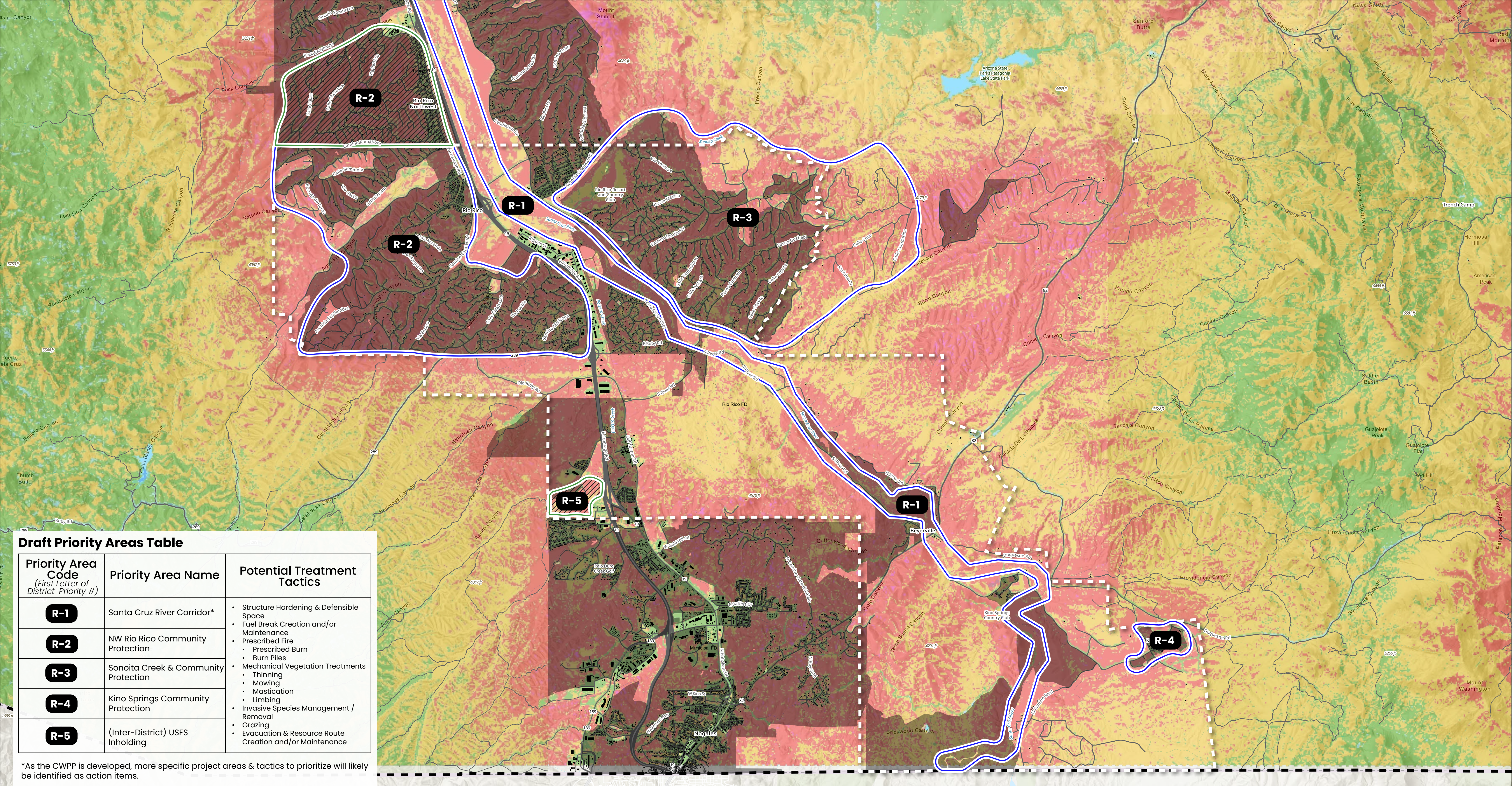
- Draft Priority Zones  
(determined at individual district meetings or stakeholder meeting 3, with feedback from stakeholder meeting 3 incorporated)
- Draft Inter-District or Inter-Agency Priority Zones  
(priorities that overlap jurisdictions)

# Patagonia Priority Areas

## Santa Cruz County CWPP Development

Community Meeting





**Draft Priority Areas Table**

Priority Area Code (First Letter of District-Priority #)	Priority Area Name	Potential Treatment Tactics
<b>R-1</b>	Santa Cruz River Corridor*	<ul style="list-style-type: none"> <li>Structure Hardening &amp; Defensible Space</li> <li>Fuel Break Creation and/or Maintenance</li> <li>Prescribed Fire               <ul style="list-style-type: none"> <li>Prescribed Burn</li> <li>Burn Piles</li> </ul> </li> </ul>
<b>R-2</b>	NW Rio Rico Community Protection	<ul style="list-style-type: none"> <li>Mechanical Vegetation Treatments               <ul style="list-style-type: none"> <li>Thinning</li> <li>Mowing</li> <li>Mastication</li> <li>Limbing</li> </ul> </li> <li>Invasive Species Management / Removal</li> <li>Grazing</li> <li>Evacuation &amp; Resource Route Creation and/or Maintenance</li> </ul>
<b>R-3</b>	Sonoita Creek & Community Protection	
<b>R-4</b>	Kino Springs Community Protection	
<b>R-5</b>	(Inter-District) USFS Inholding	

\*As the CWPP is developed, more specific project areas & tactics to prioritize will likely be identified as action items.

**Sources & Notes**

Service Layer Credits: World Topographic Map:  
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

County Boundary Line:  
Fire Districts: Santa Cruz County Fire Districts, Santa Cruz County Assessor's Office

National Land Cover Database:  
World Hillshade: Esri, NASA, NGA, USGS,

**Disclaimer**

The draft priority zone boundaries indicated on this map are **general approximations of potential project areas**. They are meant to be expanded or refined with future planning.

The draft priority zone boundaries indicated on this map will likely change as the CWPP develops and with future meetings with fire chiefs to solidify priorities.

As the CWPP is developed, a more comprehensive assignment of treatment tactics will be applied to finalized priority areas.

**Legend**

- County Boundary
- Fire District Boundary
- Freeway Roads
- Highway Roads
- Local Roads
- USFS Roads
- WUI

**Risk Model**

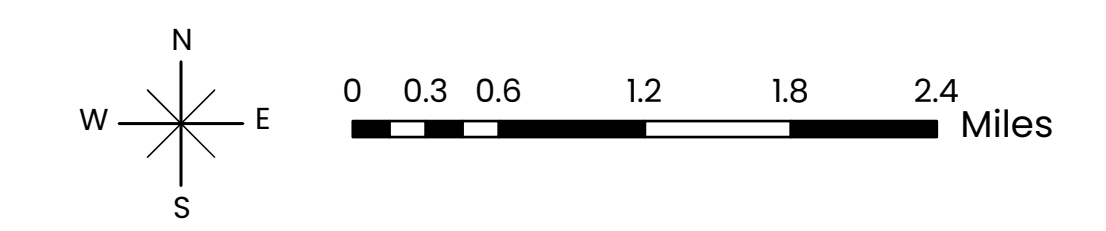
- Maximum
- High
- Elevated
- Moderate
- Low
- Minimal

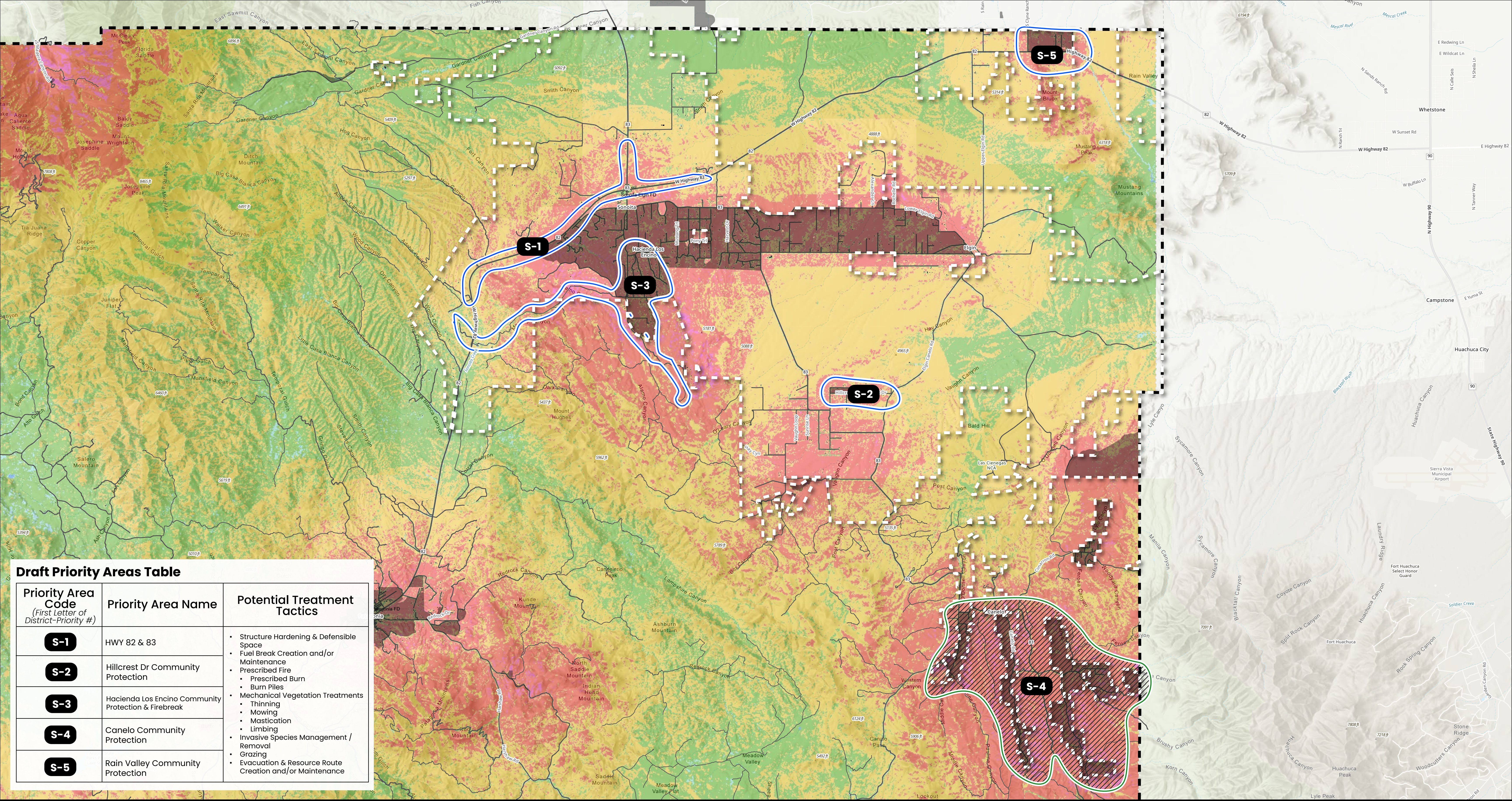
- Draft Priority Zones (determined at individual district meetings or stakeholder meeting 3, with feedback from stakeholder meeting 3 incorporated)
- Draft Inter-District or Inter-Agency Priority Zones (priorities that overlap jurisdictions)

# Rio Rico Priority Areas

## Santa Cruz County CWPP Development

### Community Meeting





**Draft Priority Areas Table**

Priority Area Code (First Letter of District-Priority #)	Priority Area Name	Potential Treatment Tactics
<b>S-1</b>	HWY 82 & 83	<ul style="list-style-type: none"> <li>Structure Hardening &amp; Defensible Space</li> <li>Fuel Break Creation and/or Maintenance</li> <li>Prescribed Fire               <ul style="list-style-type: none"> <li>Prescribed Burn</li> <li>Burn Piles</li> </ul> </li> </ul>
<b>S-2</b>	Hillcrest Dr Community Protection	<ul style="list-style-type: none"> <li>Mechanical Vegetation Treatments               <ul style="list-style-type: none"> <li>Thinning</li> <li>Mowing</li> <li>Mastication</li> <li>Limbing</li> </ul> </li> <li>Invasive Species Management / Removal</li> <li>Grazing</li> <li>Evacuation &amp; Resource Route Creation and/or Maintenance</li> </ul>
<b>S-3</b>	Hacienda Los Encino Community Protection & Firebreak	
<b>S-4</b>	Canelo Community Protection	
<b>S-5</b>	Rain Valley Community Protection	

**Sources & Notes**

Service Layer Credits: World Topographic Map:  
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

County Boundary Line:  
Fire Districts: Santa Cruz County Fire Districts, Santa Cruz County Assessor's Office

National Land Cover Database:  
World Hillshade: Esri, NASA, NGA, USGS,

**Disclaimer**

The draft priority zone boundaries indicated on this map are **general approximations of potential project areas**. They are meant to be expanded or refined with future planning.

The draft priority zone boundaries indicated on this map will likely change as the CWPP develops and with future meetings with fire chiefs to solidify priorities.

As the CWPP is developed, a more comprehensive assignment of treatment tactics will be applied to finalized priority areas.

**Legend**

- County Boundary
- Fire District Boundary
- Freeway Roads
- Highway Roads
- Local Roads
- USFS Roads
- WUI

**Risk Model**

- Maximum
- High
- Elevated
- Moderate
- Low
- Minimal

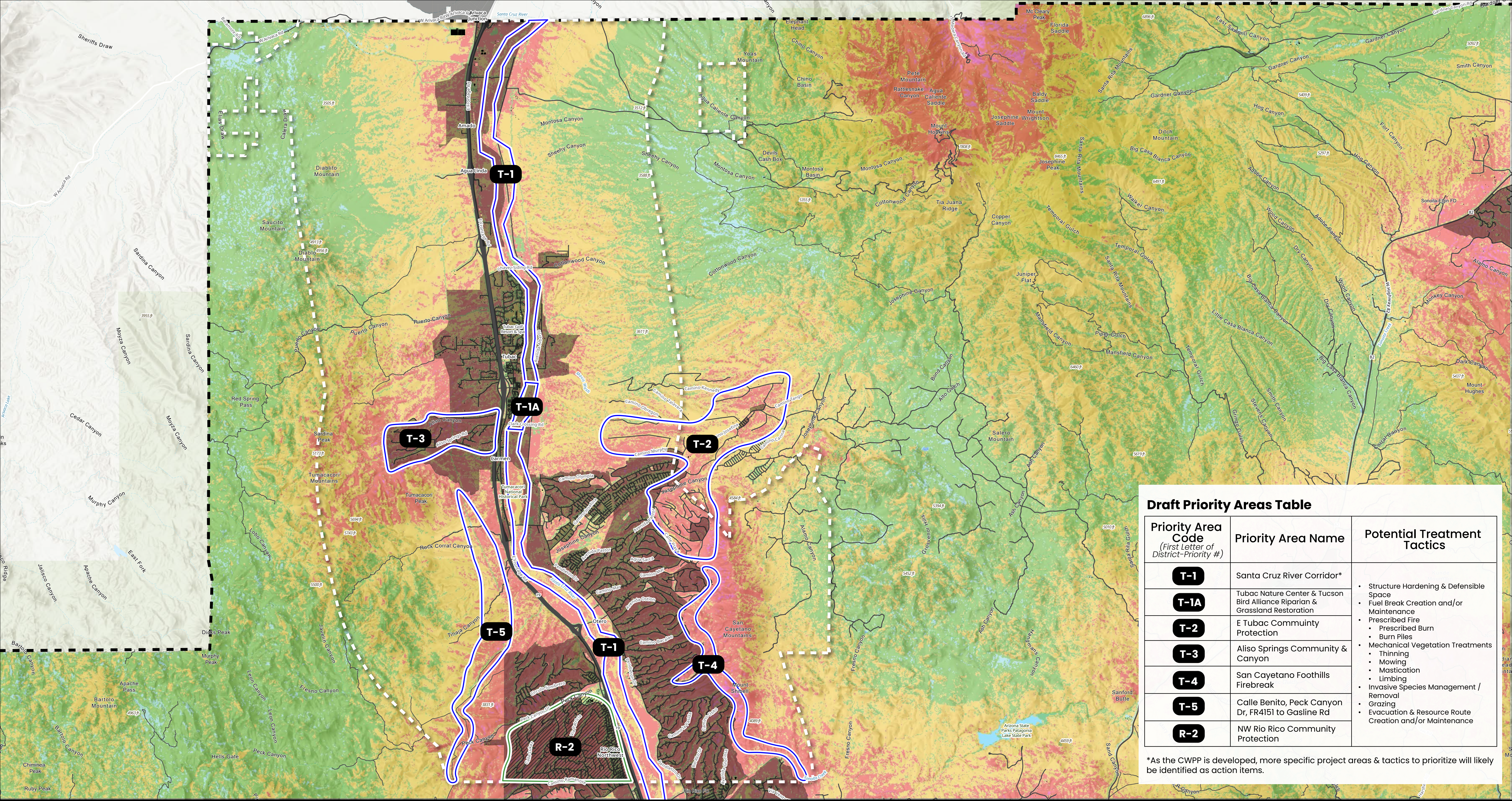
- Draft Priority Zones  
(determined at individual district meetings or stakeholder meeting 3, with feedback from stakeholder meeting 3 incorporated)
- Draft Inter-District or Inter-Agency Priority Zones  
(priorities that overlap jurisdictions)

# Sonoita-Elgin Priority Areas

## Santa Cruz County CWPP Development

Community Meeting





Priority Area Code (First Letter of District-Priority #)	Priority Area Name	Potential Treatment Tactics
<b>T-1</b>	Santa Cruz River Corridor*	<ul style="list-style-type: none"> <li>Structure Hardening &amp; Defensible Space</li> <li>Fuel Break Creation and/or Maintenance</li> <li>Prescribed Fire               <ul style="list-style-type: none"> <li>Prescribed Burn</li> <li>Burn Piles</li> </ul> </li> <li>Mechanical Vegetation Treatments               <ul style="list-style-type: none"> <li>Thinning</li> <li>Mowing</li> <li>Mastication</li> <li>Limbing</li> </ul> </li> <li>Invasive Species Management / Removal</li> <li>Grazing</li> <li>Evacuation &amp; Resource Route Creation and/or Maintenance</li> </ul>
<b>T-1A</b>	Tubac Nature Center & Tucson Bird Alliance Riparian & Grassland Restoration	
<b>T-2</b>	E Tubac Community Protection	
<b>T-3</b>	Aliso Springs Community & Canyon	
<b>T-4</b>	San Cayetano Foothills Firebreak	
<b>T-5</b>	Calle Benito, Peck Canyon Dr, FR4151 to Gasline Rd	
<b>R-2</b>	NW Rio Rico Community Protection	

\*As the CWPP is developed, more specific project areas & tactics to prioritize will likely be identified as action items.

**Sources & Notes**

Service Layer Credits: World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

County Boundary Line:  
 Fire Districts: Santa Cruz County Fire Districts, Santa Cruz County Assessor's Office

National Land Cover Database:  
 World Hillshade: Esri, NASA, NGA, USGS, FEMA,

**Disclaimer**

The draft priority zone boundaries indicated on this map are **general approximations of potential project areas**. They are meant to be expanded or refined with future planning.

The draft priority zone boundaries indicated on this map will likely change as the CWPP develops and with future meetings with fire chiefs to solidify priorities.

As the CWPP is developed, a more comprehensive assignment of treatment tactics will be applied to finalized priority areas.

**Legend**

- County Boundary (dashed line)
- Fire District Boundary (dotted line)
- Freeway Roads (thick solid line)
- Highway Roads (solid line)
- Local Roads (thin solid line)
- USFS Roads (dashed line)
- WUI (shaded area)

**Risk Model**

- Maximum (dark red)
- High (red)
- Elevated (orange)
- Moderate (yellow-green)
- Low (light green)
- Minimal (blue)

- Draft Priority Zones (blue outline) (determined at individual district meetings or stakeholder meeting 3, with feedback from stakeholder meeting 3 incorporated)
- Draft Inter-District or Inter-Agency Priority Zones (hatched outline) (priorities that overlap jurisdictions)

# Tubac Priority Areas

## Santa Cruz County CWPP Development

### Community Meeting

0 0.42 0.85 1.7 2.55 3.4 Miles

a TRUE ENVIRONMENTAL company     A TRUE ENVIRONMENTAL COMPANY

# **Appendix D. Fuel Treatment Recommendations by Vegetation Community & Specific Vegetation Type**

<b>Treatment Method</b>	<b>#</b>	<b>Applicable Vegetation Communities</b>
Prescribed Burn	1A	Conifer, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Shrubland
Burn Piles	1B	Conifer, Conifer-Hardwood, Exotic Tree/Shrub, Riparian
Thinning	2A	Conifer, Conifer-Hardwood, Riparian, Shrubland
Mastication	2B	Conifer, Conifer-Hardwood, Exotic Tree/Shrub, Shrubland
Pruning & Limbing	2C	Conifer, Conifer-Hardwood, Exotic Tree/Shrub, Riparian
Mowing	2D	Exotic Herbaceous, Grassland, Riparian, Shrubland
Invasive Woody Species Management	3A	Conifer, Conifer-Hardwood, Exotic Tree/Shrub, Riparian, Shrubland
Invasive Herbaceous Species Management	3B	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Riparian, Shrubland
Grazing Cows	4A	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Shrubland
Grazing Goats	4B	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Shrubland
Grazing Sheep	4C	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Shrubland
Classic Fuel Break	5A	Conifer, Conifer-Hardwood, Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Shrubland
Shaded Fuel Break	5B	Conifer, Conifer-Hardwood, Exotic Tree/Shrub, Riparian, Shrubland
Chemical Treatment	6A	Exotic Herbaceous, Exotic Tree/Shrub, Grassland, Riparian, Shrubland

## **Vegetation Type**

Grassland and Steppe

Introduced Upland Vegetation-Shrub

Desert Scrub

Introduced Perennial Grassland and Forbland

Creosotebush Desert Scrub

Developed-Upland Shrubland

Western Riparian Woodland and Shrubland

Juniper-Oak

Developed-Upland Herbaceous

Pinyon-Juniper Woodland

Chaparral

Succulent Desert Scrub

Developed-Upland Evergreen Forest

Developed-Upland Deciduous Forest

Introduced Riparian Vegetation

Introduced Woody Wetland Vegetation

Juniper Woodland and Savanna

Grassland

Deciduous Shrubland

Douglas-fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland

Salt Desert Scrub

Conifer-Oak Forest and Woodland

## **Applicable Treatments**

1A, 2A, 2D, 3B, 4A, 4B, 4C, 5A, 6A

1A, 1B, 2B, 2C, 3A, 3B, 4A, 4B, 4C, 5A, 6A

2A, 2B, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 6A

1A, 2D, 3B, 4A, 4B, 4C, 5A, 6A

2A, 2B, 2D, 3A, 3B, 4B, 4C, 5A, 5B

2A, 2B, 2D, 3A, 3B, 4B, 4C, 5B

1B, 2A, 2C, 3A, 3B, 5B

1B, 2A, 2B, 2C, 3A, 3B, 4B, 5B

2D, 3B, 4B, 4C, 6A

1B, 2A, 2B, 2C, 3A, 3B, 4B, 5B

2A, 2B, 3A, 3B, 4B, 4C, 5A, 6A

2B, 2D, 3B, 4A, 4C, 5A

1B, 2A, 2B, 2C, 3A, 5B

1B, 2A, 2B, 2C, 3A, 4B, 5B

1B, 2A, 2C, 2D, 3A, 3B, 5B, 6A

2A, 2C, 2D, 3A, 3B, 5B, 6A

1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B, 4C, 5A

1A, 2D, 3B, 4A, 4B, 4C, 5A

1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B, 4C, 5A, 6A

1B, 2A, 2B, 2C, 3A, 3B, 4A, 4B, 4C, 5B

1A, 2B, 2D, 3A, 4B

1B, 2A, 2B, 2C, 3A, 3B, 4A, 4B, 4C, 5B

**Vegetation Group**

Conifer

Conifer-Hardwood

Exotic Herbaceous

Exotic Tree/Shrub

Grassland

Riparian

Shrubland

Developed

Sparsely Vegetated

Developed-High Intensity

Developed-Low Intensity

Developed-Medium Intensity

Developed Roads

Open Water

Quarries-Strip Mines-Gravel Pits-Well and Wind Pads

**Applicable Treatments**

1A, 1B, 2A, 2B, 2C, 3A, 3B, 4A, 4B, 4C, 5A, 5B

1B, 2A, 2B, 2C, 3A, 3B, 4A, 4B, 4C, 5A, 5B

1A, 2D, 3B, 4A, 4B, 4C, 5A, 6A

1A, 1B, 2B, 2C, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A

1A, 2A, 2D, 3B, 4A, 4B, 4C, 5A, 6A

1B, 2A, 2C, 2D, 3A, 3B, 5B, 6A

1A, 2A, 2B, 2D, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 6A

defensible space

n/a

structure hardening &amp; defensible space

structure hardening &amp; defensible space

structure hardening &amp; defensible space

n/a

n/a

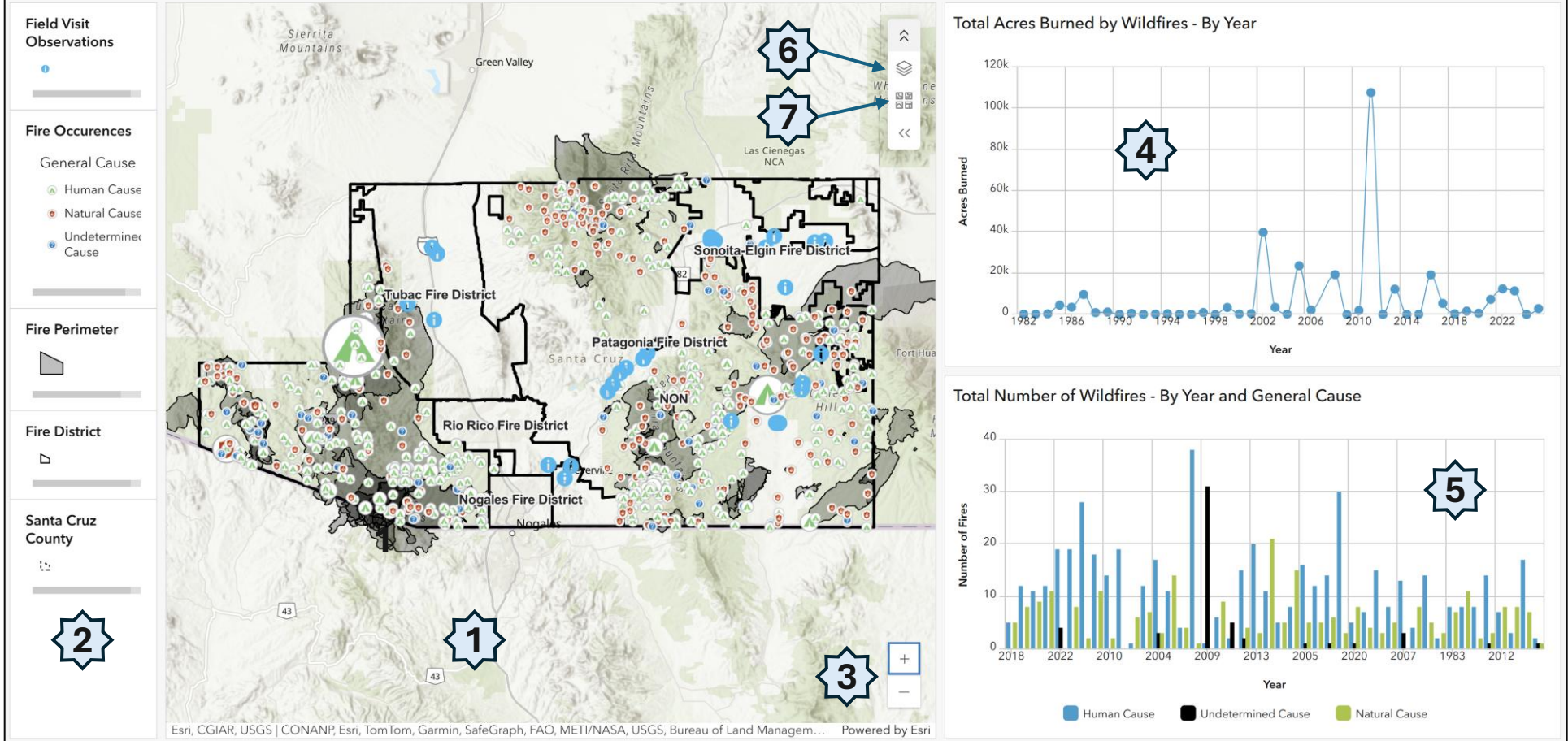
n/a

Recommended Fuel Treatment by Tactic in the WUI, Communities at Risk, & Adjacent Lands

Treatment Category	1	2	3	4	5	6												
Treatment Type	Prescribed Fire			Mechanical Vegetation Treatments			Invasive Species Management			Grazing			Fuel Breaks			Chemical		
Treatment Subcategory	1A	1B	2A	2B	2C	2D	3A	3B	4A	4B	4C	5A	5B	6A				
Specific Treatment Tactic	Prescribed Burn	Burn Piles	Thinning	Mastication	Pruning & Limbing	Mowing	Woody	Herbaceous	Cows	Goats	Sheep	Classic Fuel Break	Shaded Fuel Break					
<b>Treatment Description</b>	Prescribed burning is intentionally and carefully applying fire to a specific area under planned weather and fuel conditions. The goal is to reduce the buildup of flammable vegetation—such as dead grass, brush, leaf litter, and small trees—that can contribute to high-intensity wildfires. By removing these excess fuels, prescribed burning helps lower the risk, intensity, and spread of future wildfires. This technique mimics natural fire cycles, which many ecosystems depend on to maintain healthy plant communities, control invasive species, and promote regeneration of fire-adapted vegetation. Prescribed burns can also create and maintain fuel breaks, improve wildlife habitat, and prepare sites for reforestation or grazing. Burns are often used in areas where mechanical removal is impractical or where prescribed burning across a larger area isn't feasible due to environmental, legal, or safety constraints. Burn piles allow for targeted fuel reduction in specific zones like forest edges, residential areas, or along access roads. To minimize risk, burn piles are usually ignited during favorable weather conditions—cool temperatures, low wind, and high humidity—and are subject to permits and safety protocols. Burn piles often use a combination of mechanical removal (such as mulching or chipping) and prescribed burning to reduce fuel load and improve site conditions for future vegetation growth.	Burn piles are used to dispose of excess vegetation—such as branches, brush, and small trees—by gathering it into contained piles and burning it under controlled conditions. This method is typically employed after thinning, pruning, or other fuel reduction activities to safely eliminate flammable debris. Burn piles are often used in areas where mechanical removal is impractical or where prescribed burning across a larger area isn't feasible due to environmental, legal, or safety constraints. Burn piles allow for targeted fuel reduction in specific zones like forest edges, residential areas, or along access roads. To minimize risk, burn piles are usually ignited during favorable weather conditions—cool temperatures, low wind, and high humidity—and are subject to permits and safety protocols. Burn piles often use a combination of mechanical removal (such as mulching or chipping) and prescribed burning to reduce fuel load and improve site conditions for future vegetation growth.	Thinning is a vegetation management technique that involves the selective removal of trees or shrubs to reduce plant density, improve forest health, and lower wildfire risk. By decreasing the number of stems per acre, thinning reduces competition for water, sunlight, and nutrients, allowing remaining vegetation to grow more vigorously and become more resistant to drought, pests, and disease. Thinning is particularly important where dense stands of trees and brush can create hazardous fuel conditions. By removing smaller, weaker, or overly crowded trees—especially ladder fuels—thinning reduces the likelihood of high-intensity crown fires and helps slow the spread of wildfires. This creates more defensible space and improves conditions for safe access roads. Thinning is a preferred option in locations where fire use is restricted or undesirable.	Mastication involves mechanically grinding, shredding, or chipping live and dead vegetation, including brush, small trees, and undergrowth, into mulch. Typically carried out using specialized equipment such as forestry mulchers, masticators, or brush cutters, which can be mounted on skid steers, excavators, or other heavy machinery. The resulting mulch is left on the ground, forming a layer that can help reduce erosion, retain soil moisture, and suppress the regrowth of non-native and invasive species. This technique allows land managers to selectively treat areas without the need for large-scale tree removal or prescribed burning, making it a preferred option in locations where fire use is restricted or undesirable.	Pruning and limbing techniques are used to remove specific parts of trees or shrubs. Pruning typically refers to the selective removal of branches, buds, or roots to shape plants, control growth, or remove diseased or dead wood. Limbing specifically involves removing lower branches from the trunk of a tree. This technique is used to reduce ladder fuels, improve visibility and access for people or equipment, and promote the growth of higher canopy trees. By removing limbs up to a certain height, typically the lower third of a tree, land managers can reduce the risk of ground fire climbing into the canopy, thus decreasing the intensity and spread of wildfires. Both techniques are precise and controlled, making them useful in sensitive environments where minimal disturbance is required or undesirable.	Mowing involves cutting grasses, herbaceous plants, and small shrubs close to the ground using mechanical equipment such as rotary mowers, flail mowers, or brush hogs. It is commonly used to maintain open areas, control invasive species, reduce fire hazards, and promote desirable plant communities. Mowing can be applied on a variety of landscapes, including roadsides, utility corridors, pastures, and residential areas. One of the key benefits of mowing is its ability to quickly reduce vegetation height and density, which helps decrease fuel loads in fire-prone regions and improve visibility and access. Timing and frequency are critical to mowing effectiveness, as cutting during certain growth stages can limit seed production and reduce regrowth of exotic herbaceous species.	Removal of woody invasive species (such as Tamarisk, Tree of Heaven, Eucalyptus, etc.) will likely require a species-specific treatment prescription for removal of aerial biomass and effective root-kill. Depending on the target species and location of the target population of woody invasives, this may involve various treatment types included in this matrix, as well as treatment of the stump/root system. Root-kill may be achieved by stump-grinding, targeted herbicide application to the exposed cambium, and/or foliar application of herbicides to the respiring aerial parts of the plant, depending on the target species and preferred treatment prescription.	Treatment of herbaceous species of invasive plants (grasses and forbs) can be accomplished with mowing (preferably prior to seed-set), burning, or grazing. Due to the prolific nature of invasive plant species, the initial removal of biomass will almost always require a follow-up treatment to remove additional germination from the existing seed-bank. Early eradication and rapid response to new infestations is preferred. Once a seed-bank has been established, long-term annual maintenance will likely be required as a follow-up. This often involves herbicide application, continued burning and/or grazing. Reduction of the existing seed-bank can be accelerated by several grow-kill cycle of forced germination, or by targeted high-temperature burning to reduce the seed-bank.	Grazing by cattle is a vegetation and fuel reduction technique used in community wildfire prevention to manage grasses and the fuels that contribute to rapid fire spread. By consuming large amounts of herbaceous vegetation, cattle reduce the amount and continuity of surface fuels, particularly in grasslands, shrublands, and woodland areas surrounding communities. This helps lower the likelihood of ignition and slows the rate at which wildfires can move toward populated areas. Cattle grazing is especially effective at targeting fast-growing, fine fuels like annual grasses, which dry out quickly and are highly flammable. When managed properly—through timing, intensity, and rotation—grazing can maintain vegetation at lower levels of fuel load, reducing the risk of catastrophic fire events.	Grazing by goats is particularly effective in steep, rugged, or overgrown areas where mechanical equipment is impractical or unsafe. Their ability to browse woody vegetation makes them valuable for reducing ladder fuels that can carry fire from the ground into tree canopies. Unlike cattle, goats prefer a diverse diet and readily consume woody plants like poison oak, blackberry, and chaparral species, which are common in many fire-prone regions. This makes them especially useful in the wildland-urban interface, where dense and flammable vegetation often exists near homes and infrastructure. Goats can navigate challenging terrain and reach vegetation that is difficult to treat with traditional methods, making them a versatile tool for fuel reduction.	Grazing by sheep can be used to manage fine fuels such as grasses, forbs, and some low-growing shrubs. Sheep are well-suited for reducing continuous ground vegetation similar to cattle. Their grazing helps lower the height and density of fine fuels, reducing fire intensity and spread—especially in open grasslands, meadows, and transitional zones near communities. While sheep primarily prefer herbaceous plants over woody shrubs, their effectiveness lies in their ability to maintain low fuel levels across large areas when grazing is well-timed and repeated as needed. Strategic use of sheep grazing during the growing season can prevent excessive buildup of dry vegetation before fire season begins. Sheep are often used in rotational grazing systems, where they are moved between pastures to prevent overgrazing and maintain vegetation health.	A classic fuel break is a strategically placed strip of land where vegetation has been modified or removed to slow or stop the spread of wildfire. Fuel breaks may vary in width depending on terrain, vegetation type, and fire behavior potential. Classic fuel breaks can be created through mechanical clearing, prescribed burning, grazing, or chemical treatments. They are often constructed along roads, firelines, or property boundaries to take advantage of existing access and natural fire barriers. While they may not stop all wildfires, especially under extreme conditions, fuel breaks are designed to change fire behavior—slowing its spread, lowering flame length, and making direct suppression more effective.	A shaded fuel break is a type of fuel break where the overstory canopy—typically mature, fire-resistant trees—is retained, while the understory vegetation and ladder fuels (such as shrubs, small trees, and dead material) are selectively removed or thinned. The goal is to reduce the intensity and spread of wildfire without completely clearing the area, allowing for continued ecological function and aesthetic value. Unlike classic fuel breaks that often involve total vegetation removal, shaded fuel breaks maintain a partially shaded environment that can suppress the growth of flammable grasses and reduce wind penetration, further slowing fire behavior. They are commonly used in forested areas, especially near communities or along roads and riparian corridors, where maintaining ecological and aesthetic values is a priority.	Chemical treatment is a vegetation management method that involves the use of herbicides to control or eliminate unwanted plant species. Herbicides can be applied selectively to target specific plants or broadcast across larger areas, depending on the management goals and site conditions. Chemical treatments are often used in areas where mechanical or manual methods are impractical, such as steep terrain, inaccessible locations, or sites with widespread invasive plant infestations. They can be applied through various methods, including spot-spraying, aerial application, or soil treatments. When used correctly, herbicides can effectively reduce fire and ladder fuels that contribute to wildfire risk, while minimizing disturbance to the exotic herbaceous species.				
<b>Applicable Landscape Type Groups</b>	Exotic Herbaceous Exotic Tree-Shrub Grassland Shrubland Grassland and Steppe Introduced Upland Vegetation-Shrub Western Riparian Woodland and Shrubland Juniper-Oak Pinyon-Juniper Woodland Developed-Upland Shrubland Juniper-Woodland and Savanna Salt Desert Scrub	Conifer-Hardwood Exotic Tree-Shrub Riparian Shrubland	Grassland and Steppe Desert Scrub Creosotebush Desert Scrub Developed-Upland Shrubland Western Riparian Woodland and Shrubland Juniper-Oak Pinyon-Juniper Woodland Chaparral Succulent Desert Scrub Developed-Upland Evergreen Forest Developed-Upland Deciduous Forest Juniper-Woodland and Savanna Conifer-Oak Forest and Woodland	Introduced Upland Vegetation-Shrub Desert Scrub Creosotebush Desert Scrub Developed-Upland Shrubland Western Riparian Woodland and Shrubland Juniper-Oak Pinyon-Juniper Woodland Chaparral Succulent Desert Scrub Developed-Upland Evergreen Forest Developed-Upland Deciduous Forest Juniper-Woodland and Savanna Douglas-Fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland Douglas-Fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland Salt Desert Scrub	Introduced Upland Vegetation-Shrub Western Riparian Woodland and Shrubland Juniper-Oak Pinyon-Juniper Woodland Developed-Upland Shrubland Western Riparian Woodland and Shrubland Juniper-Oak Pinyon-Juniper Woodland Chaparral Succulent Desert Scrub Developed-Upland Evergreen Forest Developed-Upland Deciduous Forest Juniper-Woodland and Savanna Douglas-Fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland Conifer-Oak Forest and Woodland	Grassland and Steppe Desert Scrub Creosotebush Desert Scrub Developed-Upland Shrubland Juniper-Oak Pinyon-Juniper Woodland Chaparral Succulent Desert Scrub Developed-Upland Evergreen Forest Developed-Upland Deciduous Forest Juniper-Woodland and Savanna Douglas-Fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland Conifer-Oak Forest and Woodland	Grassland and Steppe Desert Scrub Creosotebush Desert Scrub Developed-Upland Shrubland Western Riparian Woodland and Shrubland Juniper-Oak Pinyon-Juniper Woodland Chaparral Succulent Desert Scrub Developed-Upland Evergreen Forest Developed-Upland Deciduous Forest Juniper-Woodland and Savanna Douglas-Fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland Conifer-Oak Forest and Woodland	Grassland and Steppe Desert Scrub Creosotebush Desert Scrub Developed-Upland Shrubland Western Riparian Woodland and Shrubland Juniper-Oak Pinyon-Juniper Woodland Chaparral Succulent Desert Scrub Developed-Upland Evergreen Forest Developed-Upland Deciduous Forest Juniper-Woodland and Savanna Douglas-Fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland Conifer-Oak Forest and Woodland	Grassland and Steppe Desert Scrub Creosotebush Desert Scrub Developed-Upland Shrubland Western Riparian Woodland and Shrubland Juniper-Oak Pinyon-Juniper Woodland Chaparral Succulent Desert Scrub Developed-Upland Evergreen Forest Developed-Upland Deciduous Forest Juniper-Woodland and Savanna Douglas-Fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland Conifer-Oak Forest and Woodland	Grassland and Steppe Desert Scrub Creosotebush Desert Scrub Developed-Upland Shrubland Western Riparian Woodland and Shrubland Juniper-Oak Pinyon-Juniper Woodland Chaparral Succulent Desert Scrub Developed-Upland Evergreen Forest Developed-Upland Deciduous Forest Juniper-Woodland and Savanna Douglas-Fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland Conifer-Oak Forest and Woodland	Grassland and Steppe Desert Scrub Creosotebush Desert Scrub Developed-Upland Shrubland Western Riparian Woodland and Shrubland Juniper-Oak Pinyon-Juniper Woodland Chaparral Succulent Desert Scrub Developed-Upland Evergreen Forest Developed-Upland Deciduous Forest Juniper-Woodland and Savanna Douglas-Fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland Conifer-Oak Forest and Woodland	Grassland and Steppe Desert Scrub Creosotebush Desert Scrub Developed-Upland Shrubland Western Riparian Woodland and Shrubland Juniper-Oak Pinyon-Juniper Woodland Chaparral Succulent Desert Scrub Developed-Upland Evergreen Forest Developed-Upland Deciduous Forest Juniper-Woodland and Savanna Douglas-Fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland Conifer-Oak Forest and Woodland	Grassland and Steppe Desert Scrub Creosotebush Desert Scrub Developed-Upland Shrubland Western Riparian Woodland and Shrubland Juniper-Oak Pinyon-Juniper Woodland Chaparral Succulent Desert Scrub Developed-Upland Evergreen Forest Developed-Upland Deciduous Forest Juniper-Woodland and Savanna Douglas-Fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland Conifer-Oak Forest and Woodland	Grassland and Steppe Desert Scrub Creosotebush Desert Scrub Developed-Upland Shrubland Western Riparian Woodland and Shrubland Juniper-Oak Pinyon-Juniper Woodland Chaparral Succulent Desert Scrub Developed-Upland Evergreen Forest Developed-Upland Deciduous Forest Juniper-Woodland and Savanna Douglas-Fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland Conifer-Oak Forest and Woodland	Grassland and Steppe Desert Scrub Creosotebush Desert Scrub Developed-Upland Shrubland Western Riparian Woodland and Shrubland Juniper-Oak Pinyon-Juniper Woodland Chaparral Succulent Desert Scrub Developed-Upland Evergreen Forest Developed-Upland Deciduous Forest Juniper-Woodland and Savanna Douglas-Fir-Ponderosa Pine-Lodgepole Pine Forest and Woodland Conifer-Oak Forest and Woodland			
<b>Maintenance Description</b>	When properly planned and executed, prescribed burning is one of the most effective and cost-efficient tools for large-scale fuel reduction and landscape-level wildfire mitigation. However, it requires regulatory approval, community coordination, and skilled implementation to minimize risks such as smoke impacts or escaped fire. As part of an integrated fire management strategy, prescribed burning plays a key role in creating more fire-resilient ecosystems and communities.	Burn piles should be located at a distance of more than 500 feet from private property, signs and downed woody material should be retained in areas where fire resilience is not compromised to preserve crucial habitat for wildlife, such as cavity-nesting birds.	Thinning is often combined with other wildfire mitigation methods, such as pile burning, mastication, or prescribed fire, to address leftover debris and maintain effectiveness over time. When done strategically and with regular maintenance, thinning not only reduces wildfire risk but also improves forest health, promotes biodiversity, and enhances resilience to drought and pests.	Mastication is valued for its efficiency, low soil disturbance, and ability to improve access to forested areas. However, it does not remove root systems, so regrowth may occur depending on the species treated. Long-term success often requires follow-up treatments or integration with other vegetation management methods.	Following pruning and limbing projects, appropriate maintenance activities should include removing or mulching the cut debris to prevent buildup of surface fuels, monitoring for regrowth of invasive species, and re-establishing native understory vegetation to stabilize soil and support wildlife. Regular site inspections should be conducted to assess vegetation recovery and ensure that ladder fuels do not reaccumulate, with follow-up treatments like targeted grazing, mowing, or spot herbicide application used as needed.	Mowing is efficient and cost-effective for managing large areas, but it primarily affects above-ground biomass and does not eliminate root systems, allowing some plants to regrow. It may also disturb wildlife habitat or contribute to soil compaction if used excessively. As a result, mowing is often used in combination with other vegetation management strategies to achieve long-term ecological and safety goals.	Post-treatment monitoring is vital to ensure that restoration efforts do not inadvertently promote invasive species establishment; in some cases, native plant seeding may be employed to increase competition and enhance ecosystem resilience to invasion.	As a natural and cost-effective method, cattle grazing can complement other fuel reduction strategies such as mechanical thinning or prescribed fire. However, its success depends on careful planning to avoid overgrazing, protect sensitive habitats, and ensure cattle are present during key fuel growth periods. When integrated into a broader wildfire mitigation plan, grazing helps create defensible space around communities while supporting agricultural uses of the land.	When managed carefully with fencing, herders, and grazing schedules, goat grazing can be a low-impact, eco-friendly method of fuel reduction. It often requires repeated treatments are not desirable. With proper management—including fencing, water access, and monitoring—sheep can contribute to long-term vegetation control and the creation of defensible space, helping protect communities from wildfire threats.	Sheep grazing is a low-impact, cost-effective method that integrates well into broader wildfire mitigation plans, particularly in landscapes where mechanical or chemical treatments are not desirable. With proper management—including fencing, water access, and monitoring—sheep can contribute to long-term vegetation control and the creation of defensible space, helping protect communities from wildfire threats.	To remain effective, fuel breaks require regular maintenance to prevent vegetation regrowth and accumulation of dead material. When integrated into a broader fuel management strategy and combined with community preparedness, fuel breaks serve as a valuable tool for protecting infrastructure, natural resources, and human lives in fire-prone landscapes.	Shaded fuel breaks are most effective when integrated into larger wildfire management strategies and regularly maintained to prevent the regrowth of flammable vegetation. They provide safer conditions for firefighting operations and can serve as anchor points for fire suppression, making them a practical and environmentally sensitive tool in fire-prone landscapes.	Proper timing, herbicide selection, and application technique are critical to the success and environmental safety of chemical treatments. These methods are typically used in combination with other vegetation management strategies—such as grazing, prescribed fire, or mechanical thinning—to achieve long-term control and maintain healthy, fire-resilient landscapes. Regulatory compliance and monitoring are essential to ensure that chemical use does not negatively impact water quality, non-target species, or					

# **Appendix E. Community Fuel Treatment Projects: How to Use the Online Dashboard for Project Planning**

# Santa Cruz Community Wildfire Protection Plan - Fire History and Mitigation Projects



1 Map Window

2 Map Legend – Visible Data Layers

3 Zoom In – Zoom Out

4 Graph Showing Acres Burned per Year (values adjust for zoom level)

5 Graph Showing Number of Wildfires per Year (values adjust for zoom level)

6 Available Layers List (layers can be turned on or off)

7 Available Basemaps for Map (Esri curated basemaps)

[Santa Cruz CWPP GIS Dashboard Link](#)