

Santa Clara County Community Wildfire Protection Plan

Prepared for
Santa Clara County

Prepared by
SWCA Environmental Consultants

August 2016

SANTA CLARA COUNTY COMMUNITY WILDFIRE PROTECTION PLAN

Prepared for

SANTA CLARA COUNTY FIRE DEPARTMENT
14700 Winchester Blvd, Los Gatos, CA 95032

Prepared by

SWCA ENVIRONMENTAL CONSULTANTS
60 Stone Pine Road
Half Moon Bay, CA, 94019
Telephone: (650) 440-4160
www.swca.com

SWCA Project No. 33985

August 2016

ACKNOWLEDGEMENTS

The Santa Clara County Community Wildfire Protection Plan (CWPP) acknowledges the efforts of the CWPP Core Team, who without their ongoing contributions, expertise and commitment to wildfire preparedness in Santa Clara County, this CWPP would not have been developed.

This page intentionally left blank

SIGNATORY PAGE

(Placeholder)

This page intentionally left blank

EXECUTIVE SUMMARY

Wildfire continues to be a threat to communities across the United States; in the last few years, most western states have experienced the largest wildfires in their histories. Wildfires with a broad range of sizes and locations have destroyed hundreds of homes; the cost to suppress wildfires across the nation typically exceeds one billion dollars annually.

In recognition of this threat, many communities have worked to develop Community Wildfire Protection Plans, bringing together many stakeholders to develop strategies to mitigate the occurrence and effects of wildfire. Several communities in Santa Clara County have developed such plans, demonstrating an awareness and concern for wildfire hazard which should be applauded.

Because wildfires often threaten areas much larger than individual communities, it is critically important that planning for the occurrence of wildfire occurs within communities and between communities. In recognition of the advantages of a broader scope of wildfire preparation, multi-jurisdictional agencies, organizations, and residents have joined together to develop this plan, the Santa Clara County Community Wildfire Protection Plan (CWPP). This larger scale of planning increases the level of coordination and cooperation among stakeholders which can lead to broader and more efficient wildfire risk mitigation measures. For example, the CWPP can serve as the wildfire component within the Safety Element of the Santa Clara County General Plan; can help prioritize and strengthen requests for competitive funding grants to reduce hazardous fuels; and can facilitate the adoption of common standards for defensible space across Santa Clara County. Good ideas can be more readily shared with all communities within the County, greatly facilitating public education outreach efforts.

This CWPP is a countywide strategic plan with goals for creating a safer wildland urban interface community, accompanied by report annexes that address specific issues and projects by jurisdiction and stakeholder organizations to meet the strategic goals.

The purpose of the CWPP is to assist in protecting human life and reducing property loss due to wildfire throughout the planning area. The plan is the result of a community-wide wildland fire protection planning process and the compilation of documents, reports, and data developed by a wide array of contributors. This plan was compiled in 2015-2016 in response to the federal Healthy Forests Restoration Act (HFRA) of 2003. The CWPP meets the requirements of the HFRA by:

- 1) Having been developed collaboratively by multiple agencies at the state and local levels in consultation with federal agencies and other interested parties.¹
- 2) Prioritizing and identifying fuel reduction treatments and recommending the types and methods of treatments to protect at-risk communities and pertinent infrastructure.
- 3) Suggesting multi-party mitigation, monitoring, and outreach.
- 4) Recommending measures and action items that residents and communities can take to reduce the ignitability of structures.

¹ There is limited presence of federal land management agencies in Santa Clara County; Bureau of Land Management and Department of Defense lands.

- 5) Facilitating public information meetings to educate and involve the community to participate in and contribute to the development of the CWPP.

The planning process has served to identify many physical hazards throughout the planning area that could increase the threat of wildfire to communities. The public also has helped to identify community values that it would most like to see protected. By incorporating public and Core Team² input into the recommendations, treatments are tailored specifically for the planning area so that they are sensitive to local residents' concerns. The CWPP emphasizes the importance of collaboration among multi-jurisdictional agencies in order to develop fuels mitigation treatment programs to address wildfire hazards.

Santa Clara County has a very strong team of career and volunteer firefighters, who work arduously and cooperatively to protect the life and property of the citizens, but these resources can be severely stretched if property owners do not take on some of the responsibility of reducing fire hazards in and around their own homes and business properties. Without reduction of fire hazards by property owners before a fire occurs, it may be impossible for firefighters to safely defend structures when wildfire threatens an area. A combination of property owners and community awareness, public education, agency collaboration, and fuel treatments are necessary to fully reduce wildfire risk.

It is important to stress that this document is an initial step in educating the public and treating areas of concern, and should serve as a tool to accomplish these tasks. The CWPP should be treated as a live document to be updated approximately every two years. The plan should be revised to reflect changes, modifications, or new information that may contribute to an updated CWPP. These elements are essential to the success of mitigating wildfire risk throughout the planning area and will be important in maintaining the ideas and priorities of the plan and the communities in the future.

This CWPP is a large document because wildfire affects a very complex array of county and city governments, urban and rural communities, many fire departments and jurisdictions, and a broad range of public and private land conservation and resource management entities with varied missions. Wildfire is a significant risk to public health and safety, economies, infrastructure, and irreplaceable cultural and natural resources. Wildfire behavior is itself highly complex, and mitigation of its risk requires careful and coordinated planning be done by all of these stakeholders. Weaknesses in planning, preparedness, communication, prevention, and operations are readily exploited by fast moving, high intensity wildfire.

The CWPP therefore contains a wealth of information for government, agency, and community planning activities. This plan may serve as the wildfire basis for future updates of Local Hazard Mitigation Plans, providing a much greater level of detail on wildfire issues and solutions than is often found in such plans. It also provides information that may be used by communities as they develop and update their own CWPPs, facilitating this important work by providing "lessons learned" and a wide variety of data gained by others previously engaged in this process.

² Core Team, comprised of representatives of Santa Clara County organizations, serves as CWPP project strategic guidance team.

Santa Clara County will continue to grow and change, and the nature and risk of wildfire will continue to evolve as well. This will occur not only due to local issues, such as new developments near the wildland urban interface, but also because of large-scale factors such as climate change. This CWPP is a critically important part of an ongoing process that will enable the residents of Santa Clara County to meet the current and future challenge of wildfire. The CWPP is presented in two component parts:

1. An overarching strategic section that identifies countywide issues and common strategies.
2. Organizational “annexes” by separate jurisdictions that provide detail and specific tasks to achieve the common strategic section.

This page intentionally left blank

DOCUMENT NAVIGATION

STRATEGIC COUNTYWIDE DOCUMENT

This CWPP document is organized into 7 main chapters that describe overarching county level wildfire risk and hazard and recommendations for improved wildfire preparedness at the county level. This overarching document should be considered a strategic level plan for Community Wildfire Protection.

- **Chapter 1:** provides an overview of the planning area and the planning process for the CWPP.
- **Chapter 2:** outlines community characteristics that relate to wildfire risk and hazard including climate and weather, vegetation, and population.
- **Chapter 3:** describes the fire environment including the description of the Wildland Urban Interface and fire response.
- **Chapter 4:** describes development of the wildfire hazard/risk assessment that is broken down into a county scale, community scale and parcel scale assessment.
- **Chapter 5:** describes existing and proposed community outreach that is integral to improving wildfire preparedness.
- **Chapter 6:** lays out mitigation strategies that could be applied to address wildfire hazard and risk and is broken down into general planning projects, public education and outreach, structural ignitability, fire response capacity and hazardous fuel reduction projects.
- **Chapter 7:** provides recommended monitoring and evaluation strategies to help identify needed updates to the document.
- **Appendixes:** in order to improve the functionality of the main document, some detailed information is provided in separate appendixes and referenced in the text.

AGENCY/COMMUNITY ANNEXES

In addition to the strategic countywide document are individual agency or community level annexes that are organized by jurisdiction. These annexes provide more specific wildfire mitigation projects that were developed through collaboration with the Core Team and the public. These annexes form the legs of the strategic document and provide projects that could be implemented at the community level, but that are tiered to the countywide strategic goals. The annexes can be updated separately from the main document providing greater utility for agencies to make changes to their project lists. For a full list of the Annexes please see the Table of Contents below.

This page intentionally left blank

TABLE OF CONTENTS

1	OVERVIEW OF COMMUNITY WILDFIRE PROTECTION PLAN	1
1.1	Need for Community Wildlife Protection Plan/ CAL FIRE Santa Clara Unit Plan	1
1.1.1	Components of Community Wildfire Protection Plan/ CAL FIRE Santa Clara Unit Plan.....	2
1.1.2	Communities at Risk.....	3
1.1.3	Jurisdictional Complexity	4
1.1.4	Policies, Laws, Ordinances, Codes, Plans, and Programs in Place	8
1.1.5	Federal Measures to Facilitate Wildfire Planning and Preparation	8
1.1.6	State of California Measures to Facilitate Wildfire Planning and Preparation.....	9
1.1.7	Outcomes of a CWPP	10
1.2	CWPP Planning Process	16
1.2.1	Planning Team/Core Team	17
1.2.2	Research Current Conditions	17
1.2.3	Community Outreach.....	19
1.2.4	Stakeholder Organization Outreach.....	21
1.3	Project Area.....	22
1.3.1	Wildland Urban Interface Planning Zones	22
1.4	Organization Involvement.....	23
1.4.1	Signatory Organizations.....	23
1.4.2	Grant Funding Sources	23
2	COMMUNITY CHARACTERISTICS AND DEMOGRAPHICS.....	25
2.1	Location and Geography	25
2.2	Climate and Weather Patterns.....	26
2.3	Vegetation, Land Cover, and Wildlife	30
2.3.1	Vegetation cover for Santa Clara County Grassland	31
2.3.2	Chaparral and Northern Coastal Scrub	32
2.3.3	Oak Woodland	33
2.3.4	Sudden Oak Death	34
2.3.5	Riparian Forest and Scrub.....	34
2.3.6	Conifer Woodland.....	34
2.3.7	Irrigated Agriculture	35
2.3.8	Invasive Non-native Plant Communities	36
2.3.9	Developed	37
2.3.10	Streams and Watersheds	37
2.3.11	Wildlife	39
2.4	Land Use Planning	39
2.4.1	Urban encroachment.....	39
2.4.2	Conversion of Historical Summer Vacation Homes.....	40
2.4.3	Non-permitted Homes.....	41
2.4.4	General Plans/Local Hazard Mitigation Plans.....	41
2.4.5	Santa Clara Valley Habitat Plan	43
2.5	Population	46
2.5.1	Socioeconomic Components.....	46
2.6	Roads and Transportation.....	47
2.7	Adjoining Counties	48

3	WILDLAND URBAN INTERFACE ENVIRONMENT AND FIRE HAZARD	49
3.1	Fire and Land Management Policy and Responsibility	49
3.1.1	State of California	49
3.1.2	City Fire Departments	50
3.1.3	Insurance and Loss Reduction Research Associations	51
3.1.4	Fire Safe Councils	51
3.1.5	Parks, Open Space, and Protected Lands	52
3.1.6	Water Purveyor and Watershed Management Organizations	58
3.1.7	Roads Agencies	58
3.2	Wildland Urban Interface	60
3.2.1	Fire Hazard Severity Zones	60
3.3	Laws, Ordinances, Standards, and Codes for Fire Prevention	63
3.3.1	Land Use Planning	63
3.3.2	Building Codes	63
3.3.3	Research and proposed new standards	64
3.3.4	Wildland Urban Interface Defensible Space	64
3.3.5	Fire Prevention	64
3.3.6	Prescribed Burning	66
3.4	Fire History	68
3.5	Ignition History	70
3.5.1	Locations	70
3.5.2	Cause Types	70
3.5.3	Extreme Fire Behavior Patterns	70
3.6	Fire Regimes	71
3.7	Fire and Response Capabilities	72
3.7.1	Responsible Wildfire Agencies (Federal, State, County, Cities, Districts)	72
3.7.2	Mutual Aid	73
3.7.3	Evacuation Resources	74
3.7.4	Water Availability and Supply	76
3.8	Public Education and Outreach Programs	77
4	WUI HAZARD AND RISK ASSESSMENT	79
4.1	Hazards	79
4.1.1	Flammable Vegetation	79
4.1.2	Flammable Built Environment	79
4.2	Risk	79
4.3	Mitigations	80
4.4	Components of Risk and Hazard	80
4.4.1	Community Vulnerability	80
4.4.2	Evacuation Complexities	81
4.4.3	Structural Vulnerability	81
4.4.4	Critical Infrastructure Vulnerability	82
4.4.5	Community Values at Risk	82
4.5	Overview and Purpose of Hazard and Risk Assessment	84
4.5.1	Identification of Communities at Risk	84
4.6	Risk Assessment Overview	86
4.6.1	Countywide Scale: Composite Fire Risk Analysis	86

4.6.2	Fire Behavior Models	86
4.6.3	Fire Behavior Model Inputs	87
4.6.4	FlamMap outputs	92
4.6.5	Geographic Information System Overlay Process	93
4.6.6	Planning Area Scale: NFPA 1144 WUI Assessments	95
4.7	Parcel Level Hazard/Risk Assessment Model	103
4.8	Parcel Level Risk Assessment Process	103
4.8.1	Test Results of Parcel Level Hazard/Risk Assessment Model	105
4.9	Community Survey, Webinar, and Social Media	106
4.9.1	Community Survey	106
4.9.2	Social Media	108
4.10	Community Workshops	108
4.11	Current Outreach Programs	110
4.11.1	Santa Clara County Fire Department	110
4.11.2	Santa Clara County Fire Safe Council	111
4.11.3	CAL FIRE Santa Clara Unit	112
4.11.4	Fire Department Activities	113
4.12	Firewise Communities	113
4.13	Community Engagement Strategy	113
5	MITIGATION STRATEGIES	115
5.1	Current Public Education and Outreach Programs	115
5.1.1	Santa Clara County Fire Safe Council	115
5.1.2	South Skyline Fire Safe Council	115
5.1.3	Ready, Set, Go!	115
5.1.4	Defensible Space	116
5.2	Current Structural Ignitability Reduction Programs	120
5.2.1	Defensible Space Enforcement	120
5.2.2	Home Ignition Zone Assessments	122
5.3	Response and Evacuation Programs	122
5.3.1	Wildland Urban Interface Pre-Plans and Evacuation Guides	122
5.3.2	Collaboration with Law Enforcement	122
5.3.3	Community Signage	123
5.4	Current Hazardous Fuel Mitigation Programs	123
5.4.1	Santa Clara County Local Hazard Mitigation Plan	123
5.4.2	Fuel Breaks, and Roadside Treatments	124
5.4.3	Larger-scale Treatments	125
5.4.4	Vegetation Management Program	126
5.4.5	Methods and Selection of Fuel Reduction Treatments	126
5.4.6	Fuel Breaks	129
5.5	Priorities, Recommendations, and Action Items	130
5.5.1	General Planning Project Recommendations	130
5.5.2	Recommendations for Public Education and Outreach	130
5.5.3	Recommendations for Actions to Reduce Structural Ignitability	140
5.5.4	Action Items for Homeowners to Reduce Structural Ignitability	145
5.5.5	Recommendations for Community/Firefighter Preparedness	147
5.5.6	Recommendation for Fuels Reduction Projects	152

6	MONITORING AND EVALUATION STRATEGY.....	159
6.1	Identify Timeline and Opportunities for Updating the CWPP.....	160
7	REFERENCES	163

APPENDICES

APPENDIX A.	TOP TEN WAYS TO PROTECT YOUR PROPERTY FROM WILDFIRE
APPENDIX B.	COMMUNITY WORKSHOP NOTES
APPENDIX C.	SIGNATORY AND ADVISORY ORGANIZATIONS AND CORE TEAM LIST
APPENDIX D.	FUNDING SOURCES
APPENDIX E.	GENERAL PLAN POLICIES AND IMPLEMENTATION GUIDELINES TO ADDRESS WILDFIRE HAZARD
APPENDIX F.	CALTRANS VEGETATION MANAGEMENT GUIDELINES
APPENDIX G.	FIRE FIGHTING RESOURCES
APPENDIX H.	SANTA CLARA FUEL MODELS
APPENDIX I.	NATIONAL FIRE PROTECTION ASSOCIATION 1144 WILDFIRE RISK AND HAZARD SEVERITY FORM
APPENDIX J.	DESCRIPTION OF FACTORS INCLUDED IN THE PARCEL LEVEL MODEL
APPENDIX K.	RESULTS OF COMMUNITY SURVEY
APPENDIX L.	DEFENSIBLE SPACE REQUIREMENTS IN THE COUNTY ORDINANCE CODE

ANNEXES

ANNEX 1. SANTA CLARA COUNTY CENTRAL FIRE PROTECTION DISTRICT

- Chapter 1- Lexington Hills
- Chapter 2- Los Altos Hills Area
- Chapter 3- Saratoga Hills
- Chapter 4- East Foothills and rural Milpitas
- Chapter 5- New Almaden

ANNEX 2. SOUTH SANTA CLARA COUNTY FIRE PROTECTION DISTRICT

- Chapter 1- Casa Loma- Uvas
- Chapter 2- Almaden Valley
- Chapter 3- San Martin
- Chapter 4- Rural Morgan Hill
- Chapter 5- West Gilroy
- Chapter 6- East Gilroy

ANNEX 3. CITY OF PALO ALTO

ANNEX 4. LOS ALTOS HILLS COUNTY FIRE PROTECTION DISTRICT

ANNEX 5. SARATOGA FIRE PROTECTION DISTRICT

ANNEX 6. CITY OF SARATOGA

ANNEX 7. CITY OF CUPERTINO

ANNEX 8. TOWN OF MONTE SERENO

ANNEX 9. TOWN OF LOS GATOS

ANNEX 10. CITY OF SAN JOSE

ANNEX 11. CITY OF MORGAN HILL

ANNEX 12. CITY OF GILROY

ANNEX 13. UNINCORPORATED AREAS WITHOUT LOCAL FIRE PROTECTION

- Chapter 1- Mt Hamilton and San Antonio Valley
- Chapter 2- Stanford University

ANNEX 14. SANTA CLARA COUNTY FIRE SAFE COUNCIL

ANNEX 15. SOUTH SKYLINE FIRE SAFE COUNCIL

ANNEX 16. MIDPENINSULA REGIONAL OPEN SPACE DISTRICT

ANNEX 17. OPEN SPACE AREAS AND WATER PURVEYORS

ANNEX 18. SANTA CLARA COUNTY PARKS

LIST OF TABLES

Table 2.1.	Climate Averages for Four County Locations, California.....	30
Table 2.2.	Population Densities of Cities within Santa Clara County	40
Table 4.1.	Results of the Community Risk Assessment at the Planning Area	96
Table 4.2.	Test Homes for Parcel Level Hazard/Risk Assessment Model	105
Table 5.1.	Example of a Phased Approach to Defensible Space	120
Table 5.2.	Summary of Fuels Treatment Methods.....	127
Table 5.3.	General Planning Project Recommendations.....	132
Table 5.4.	Recommendations for Public Outreach and Education	135
Table 5.5.	Recommendations for Reducing Structural Ignitability	141
Table 5.6.	Recommendations for Improving Firefighting Capabilities	148
Table 5.7.	Fuel Reduction Treatment Recommendations.....	153
Table 6.1.	Recommended Monitoring Strategies.....	160

LIST OF FIGURES

Figure 1.1.	Fire hazard severity zones.....	6
Figure 1.2.	Response jurisdictions	7
Figure 1.3.	Evacuation route markers in the Aldercroft Heights neighborhood developed and installed by the local road association.	15
Figure 1.4.	Narrow one-lane roads are common in communities throughout the county, which is a concern for emergency response, as well as evacuation.	18
Figure 1.5.	Community workshop at Redwood Pavilion.	19
Figure 1.6.	Roadside treatments completed by the County Roads and Airports Department in Lexington Hills help provide a buffer to vehicle ignitions, as well as protecting an essential evacuation route.	21
Figure 2.1.	30-year average temperature and precipitation for San Jose, 1981–2010 (Source: Western Regional Climate Center 2016a).	27
Figure 2.2.	Monthly average total precipitation in San Jose (Source: Western Regional Climate Center 2016a).....	27
Figure 2.3.	30-year average temperature and precipitation for Los Gatos, 1981–2010 (Source: Western Regional Climate Center 2016b).	28
Figure 2.4.	Monthly average total precipitation in Los Gatos (Source: Western Regional Climate Center 2016b).	28
Figure 2.5.	Monthly average total precipitation in Wrights (closest station to Summit Road). No temperature data available for period of record (Source: Western Regional Climate Center 2016c).	29
Figure 2.6.	30-year average temperature and precipitation for Mt. Hamilton, 1981–2010 (Source: Western Regional Climate Center 2016d).	29
Figure 2.7.	Monthly average total precipitation in Mt. Hamilton (Source: Western Regional Climate Center 2016d).	30
Figure 2.8.	Watersheds throughout Santa Clara County.....	38
Figure 2.9.	Two slides taken from a promotional film created by a real estate company for the Redwood Estates in 1926 (Source: YouTube).	40
Figure 2.10.	Santa Clara Valley Habitat Plan permit area.	44
Figure 3.1.	Land ownership map showing open space areas throughout the County and beyond County boundaries.	53
Figure 3.2.	WUI areas as designated by state law and local ordinance.	62
Figure 3.3.	Fire preparedness signage is already in place in some areas of the County, but additional signage is recommended.	65
Figure 3.4.	Prescribed fire being used to reduce grass loads on public open space land in the County.....	67
Figure 3.5.	Santa Clara County fire history from 1900 to 2015.....	69
Figure 3.6.	Water storage tanks at the Mountain Winery in Saratoga Hills.....	77
Figure 4.1.	Critical infrastructure.	83
Figure 4.2.	WUI planning areas.	85
Figure 4.3.	Fuel models in the CWPP planning area.	88
Figure 4.4.	Predicted rate of spread using fire behavior modeling.	90
Figure 4.5.	Predicted flame length using fire behavior modeling.	91
Figure 4.6.	Countywide scale composite fire risk/hazard analysis.	94
Figure 4.7.	Cupertino community workshop.....	109

Figure 5.1.	Defensible space (Source: Santa Clara County Fire Safe Council 2016).....	117
Figure 5.2.	Defensible space zones (Source: www.firewise.org).	118
Figure 5.3.	IBHS defensible space guidelines.....	119
Figure 5.4.	Home in WUI on steep slope with wooden fence attached to property.....	146

ACRONYMS AND ABBREVIATIONS

ATV	All-terrain vehicle
BTU	British Thermal Unit
CAL FIRE	California Department of Forestry and Fire Protection
CEQA	California Environmental Quality Act
CERT	Community Emergency Response Team
CFIP	California Forest Improvement Program
CHR	Community Hazard Rating
CMR	Community Mitigation Rating
CVARs	Community Value at Risk
CWPP	Community Wildfire Protection Plan
DHS	Department of Homeland Security
EQ	Earthquake Clearing House
FD	Fire Department
FEMA	Federal Emergency Management Agency
FHSZ	Fire Hazard Severity Zone
FPD	Fire Protection District
FRA	Federal Responsibility Area
FRCC	Fire Regime Condition Class
GHGRF	Green House Gas Reduction Fund
GIS	Geographic Information System
H	High
HFRA	Healthy Forest Restoration Act
HIZ	Home Ignition Zone
HOA	Homeowner Association
IBHS	Insurance Institute for Business & Home Safety
IMMS	Integrated Maintenance Management System
ISO	Insurance Services Office
KML	Keyhole Markup Language
LHMP	Local Hazard Mitigation Plan
LiDAR	Light Detection Ranging
LRA	Local Responsibility Area
M	Medium
MROSD	Midpeninsula Regional Open Space District
NFPA	National Fire Protection Association
NPS	National Park Service
NRCS	Natural Resource Conservation Service
OSA	Santa Clara Valley Open Space Authority
PG&E	Pacific Gas and Electric Company
PMR	Parcel Mitigation Rating
PRC	Public Resources Code
SAF	Society of American Foresters
SCCFD	Santa Clara County Fire Department
SCVHA	Santa Clara Valley Habitat Agency
SCVWD	Santa Clara Valley Water District
SHMP	State Hazard Mitigation Plan
SJWC	San Jose Water Company
SRA	State Responsibility Area
TCS	Total Community Score
VFD	Volunteer Fire Department
VH	Very High
VMP	Vegetation Management Plan
WRCC	Western Regional Climate Center
WUI	Wildland Urban Interface

1 OVERVIEW OF COMMUNITY WILDFIRE PROTECTION PLAN

1.1 NEED FOR COMMUNITY WILDLIFE PROTECTION PLAN/ CAL FIRE SANTA CLARA UNIT PLAN

Fire has been a component of California's natural history for millennia, with fires caused by both lightning and by Native Americans a common occurrence in most parts of the state. In some vegetation types, frequent fires resulted in a mosaic of burned areas of various ages, with the more recently burned areas tending to impede the spread of new fires (Stephens and Sugihara 2006). Many native plant species have adapted to periodic fires. Fire was used by Native Americans for a variety of purposes, as well as by settlers, ranchers, and loggers. There are very few areas in the state that were not, and continue to be, affected by fire.

The influence and effects of fire have changed as attempts were made to suppress it, with the consequent accumulation of more continuous and dense wildland fuels as historic burn mosaics were lost. More continuous fuels have led to larger, more intense wildfires, which are increasingly difficult and expensive to suppress, especially during periods of very dry and/or windy fire weather or episodes of widespread lightning activity, such as those that occurred in northern California in 2008, which started many fires in Santa Clara County. Either condition can quickly overwhelm local, state, and federal firefighting resources.

The combination of increasing development in or near wildlands, the accumulation of wildland fuels, dry fire seasons, and rugged terrain has resulted in significant risk due to wildfire to communities located in or near the wildland urban interface (WUI). Such destructive wildfires may be very large, such as the 273,246-acre Cedar fire in San Diego County that destroyed 2,820 structures with 15 fatalities in 2003. Others can be relatively small, such as the 1,520-acre Tunnel fire (Oakland Hills) in Alameda County, which destroyed 3,380 homes with 25 fatalities in 1991, or the 3,007-acre Croy fire in Santa Clara County, which burned 300 structures in 2002.

California has experienced a WUI fire problem for nearly a century. The 1923 Berkeley Hills fire and 1961 Bel Air fire clarified the disastrous role poorly designed communities with flammable construction and especially wooden shake shingle roofs play in fire losses in developed areas. Localized efforts to address WUI fires met with mixed success. In 1991 the California legislature passed Fire Safe legislation that established the first combined land use, construction, and defensible space standards that applied statewide. Ironically, shortly after the Fire Safe legislation was law, California experienced the Oakland Hills Tunnel fire, the most devastating WUI fire in state history.

Wildfires can also damage watersheds and cause significant erosion and loss of water quality. Sensitive species habitat can be damaged or destroyed, or overrun with invasive species. The economic loss can be enormous as tourism and recreational values are impacted. Social sense of well-being is affected by concern of impact of WUI fires in neighborhoods. Smoke can cause significant safety and health issues, with many sensitive individuals requiring medical treatment.

It has become increasingly apparent that the mitigation of wildfire risk requires much more than a simple reliance on suppression response. Thoughtful planning, conducted as a collaborative effort by the many people and organizations affected by wildfire, is required to develop and implement short- and long-term solutions and strategies. The CWPP process is a means by which many individuals and organizations can come together in a structured format to do this.

While several communities in Santa Clara County have already developed such plans, this is the first effort to develop a CWPP at the county level. It is expected this CWPP will facilitate even broader involvement from many stakeholders in the development of strategies to mitigate common wildfire risk. These strategies can be used by other communities as they develop their own CWPPs in the future, as well as by local governments as they plan for future development through land use planning or promulgate new codes and ordinances for greater resilience to the impact of wildfire.

1.1.1 COMPONENTS OF COMMUNITY WILDFIRE PROTECTION PLAN/CAL FIRE SANTA CLARA UNIT PLAN

Nationally, the 2000 fire season triggered great interest by the federal government in the wildfire issue. In 2003 the U.S. Congress recognized widespread declining forest health and increased wildfire risk nationwide by passing the Healthy Forests Restoration Act (HFRA), and President Bush signed the act into law (Public Law 108–148, 2003). The HFRA was revised in 2009 to address changes to funding and provide a renewed focus on wildfire mitigation (H.R. 4233 - Healthy Forest Restoration Amendments Act of 2009). The HFRA expedites the development and implementation of hazardous fuels reduction projects on federal land and emphasizes the need for federal agencies to work collaboratively with communities. A key component of the HFRA is the development of CWPPs, which facilitates the collaboration between federal agencies and communities in order to develop hazardous fuels reduction projects and place priority on treatment areas identified by communities in a CWPP. A CWPP also allows communities to establish their own definition of the WUI. In addition, communities with an established CWPP are given priority for funding of hazardous fuels reduction projects carried out in accordance with the HFRA.

CWPPs are composed of three minimum requirements, which are intended to foster communication among the public, government entities, and private organizations as they work towards a common vision of wildfire risk mitigation. These requirements are:

1. **Collaboration:** Local and state government representatives, in consultation with federal agencies or other interested groups, must collaboratively develop a CWPP.
2. **Prioritized Fuel Reduction:** A CWPP must identify and prioritize areas for hazardous fuels reduction and treatments; furthermore, the plan must recommend the types and methods of treatment that will protect at-risk communities and their essential infrastructures.
3. **Treatments of Structural Ignitability:** A CWPP must recommend measures that communities and homeowners can take to reduce the ignitability of structures throughout the area addressed by the plan.

The area covered by a CWPP usually includes communities or parts of communities. This CWPP is developed at the Santa Clara County level and therefore addresses these requirements with a greater variety of participants than the community plans that have been previously completed. As a result, information associated with these requirements will be accessible to other communities in the county as they prepare their CWPPs, as well as providing a higher overview of wildfire issues, concerns, and risk reduction solutions throughout the county. The expectation is a set of common countywide strategic goals accompanied with specific target projects at the community level to achieve those goals.

Information from the Santa Clara County CWPP will also assist Santa Clara County and cities in the development of their General Plans and Local Hazard Mitigation Plans (LHMPs). The mandatory Safety Element found in the General Plan, for example, can draw information and guidance directly from the Santa Clara County CWPP. Land use planning that incorporates provisions for fire-resilient design in WUI areas has been shown to dramatically improve public safety and reduce fire losses³. Guidance on this planning process is described in the 2003 edition of *Fire Hazard Planning* (State of California, Governor's Office of Planning and Research, General Plan Technical Advice Series, November 2003, 21 pp.).

CWPPs alone provide no authority to enforce findings and conclusions; their value is in the collaboratively developed information and recommendations that can identify and guide activities that mitigate wildfire risk and hazard. The Santa Clara County CWPP can be used by government entities as a reference to guide land use planning and promulgate codes and ordinances in response to its recommendations.

1.1.2 COMMUNITIES AT RISK

The California Fire Alliance and federal list of communities at risk from wildfires include 14 communities in Santa Clara County: Cupertino, East Foothills, Gilroy, Lexington Hills, Los Altos Hills, Los Gatos, Milpitas, Monte Sereno, Morgan Hill, Palo Alto, San Jose, San Martin, Saratoga and Stanford. Some of these communities have developed a CWPP or Fire Management Plan, such as Lexington Hills, East Foothills, and Palo Alto. The Croy Area CWPP includes parts of Gilroy, Morgan Hill, and San Martin.

Wildland Urban Interface Fire Hazard and Environment

On the national level, following the establishment of the National Fire Plan via Executive Order due to the 2000 national wildfire season, work throughout the country was undertaken to identify areas at high risk from wildfire; this work would be used to identify the location of hazardous fuel reduction projects designed to reduce this risk. Communities across the nation that are considered to have a WUI have been identified; this list was subsequently published in the *Federal Register*.

California law established a classification of fire hazard severity zones (FHSZs) for wildland areas in the 1980s. FHSZ ratings include factors for weather, vegetation type, topography, predicted fire behavior, ember production, and other factors to rank areas for potential likelihood and severity of wildland fires. The FHSZ rating impacts the nature of community design and building construction in State Responsibility Areas (SRAs) (areas that receive wildland fire protection

³ *Megafires: The Case for Mitigation*, Institute for Business and Home Safety, 2008.

directly by the California Department of Forestry and Fire Protection [CAL FIRE]). As a result of the 1991 Oakland Hills Tunnel fire, the legislature also required applying the FHSZ rating system to cities in California with WUI fire areas.

In response, CAL FIRE developed a state list of communities at risk. This work included ranking fuel hazard based on vegetation types and associated fire behavior; assessing the probability of a large, damaging fire; and defining areas with sufficient housing density to create a WUI protection situation. This facilitates the identification of locations most at risk from wildfire and therefore in greatest need of hazardous fuels reduction projects, public education on wildfire risk and fire prevention, and improvements in the ignition resistance of structures.

From this work, as previously noted, 14 communities at risk have been identified. Very high wildfire risk conditions are particularly evident along the eastern side of the county, as well as along the southwestern portion from Los Gatos to Gilroy. Current conditions and patterns of fuels, fire behavior, fire weather, and density of structures indicate that these communities are at a significant risk from damaging wildfire, even during relatively short periods of high fire danger (Figure 1.1). The CWPP process is designed to focus on these areas within the county most at risk from wildfire.

The names of the communities at risk create some confusion about the boundaries defined by the name. For the purposes of this CWPP we define the boundaries of the various communities to include all WUI areas at risk from wildfire in the vicinity of the place name. For example, the Saratoga community at risk includes unincorporated Santa Clara County in the hills adjacent to Saratoga, and the Lexington Hills community at risk is larger geographically than the place defined by the US Census.

1.1.3 JURISDICTIONAL COMPLEXITY

Santa Clara County has a complex arrangement of public and private fire protection organizations that provide preparedness planning and response to wildland fires and other emergencies. These organizations deserve commendation for the level of cooperation and coordination they employ to deliver high level of fire protection to Santa Clara County in a complicated jurisdictional environment. For purposes of wildland fire protection, California law segregates lands within the state into three categories for jurisdictional and financial responsibility (Figure 1.2): 1) Federal Responsibility Areas (FRAs), wherein a federal government agency has jurisdiction for wildland fire protection on federally owned land; 2) SRAs wherein CAL FIRE has jurisdiction for wildland fire protection on all lands within this zone whether public or private ownership; and 3) Local Responsibility Area (LRAs), wherein neither the federal government nor the state have jurisdiction for wildland fire protection. All lands within an incorporated city, whether wildland or not, are designated LRAs by California law. Separate from jurisdiction for wildland fire protection is the jurisdiction for “all hazard” fire/rescue emergencies (structure fires, vehicle fires, vehicle accidents, rescues, medical emergencies, etc.). All hazard response is usually the jurisdictional responsibility of a local government organization. When land development occurs and population increases, a WUI fire protection situation is created. Local government (county, special district, or city) is responsible for delivering all hazard fire protection. Where SRA designated lands are involved, there can be dual, or layered, responsibility for delivering fire protection to the community. This layering occurs in the unincorporated areas of the Central Fire Protection District,

Los Altos Hills County Fire Protection District, and South Santa Clara County Fire Protection District. Additionally, there are private, not for profit volunteer fire companies volunteer fire companies (Spring Valley, Casa Loma, Uvas, and Stevens Creek) in SRA that, while having no governmental jurisdiction, are actively involved in planning and response to emergencies in their communities.

Areas of the east county, portions of Almaden Valley and the Stanford University campus, are not within the normal response jurisdiction of any local fire agency (fire protection district, county service area, or county department (see Figure 1.2). Since these are unincorporated areas, the County Board of Supervisors has ultimate responsibility for provision of local fire protection and administration of building/fire codes. General Plan, local hazard mitigation planning, and land use development are also the responsibility of the County Board of Supervisors. Absent other agreement, the South Santa Clara County Fire Protection District, the Central Fire Protection District, or CAL FIRE will normally respond as a Good Samaritan to all hazard emergencies in these areas with no local government fire organization.

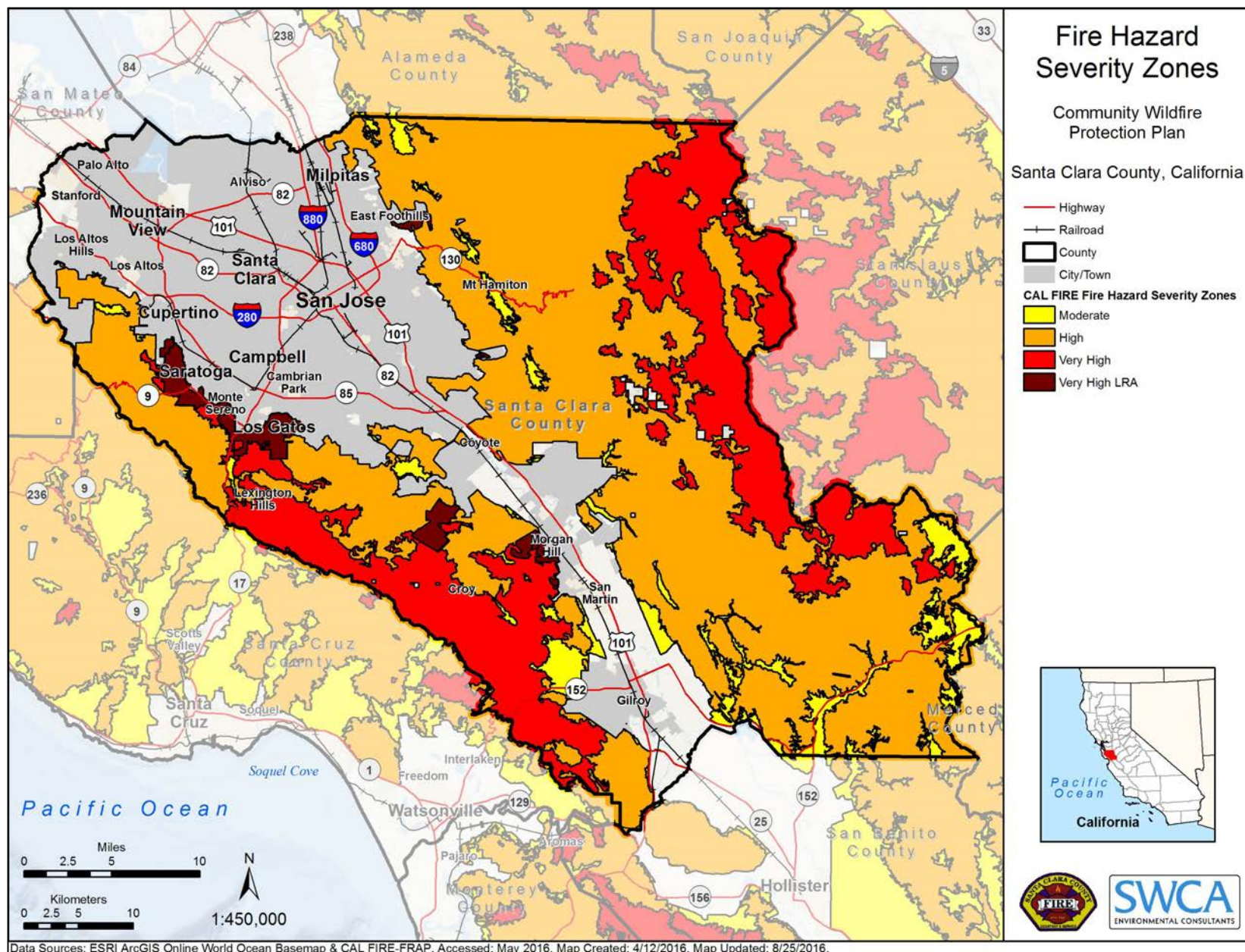


Figure 1.1. Fire hazard severity zones.

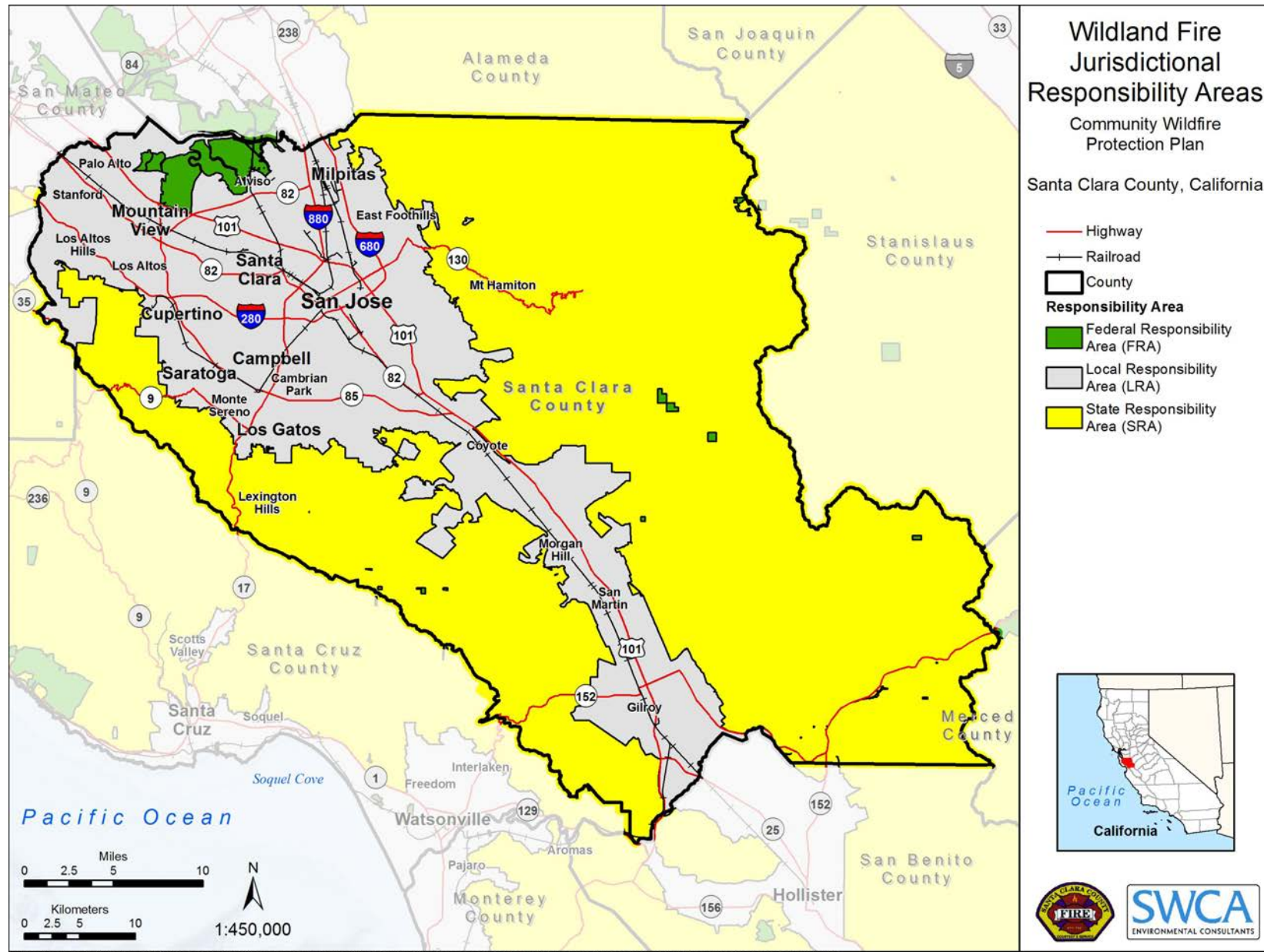


Figure 1.2. Response jurisdictions

1.1.4 POLICIES, LAWS, ORDINANCES, CODES, PLANS, AND PROGRAMS IN PLACE

The complex nature of wildfire management, and the mitigation of risk associated with it, is reflected in the many policies, plans, and laws that have been developed in response.

California state laws and local ordinances at county, city, and district levels address the WUI fire problem. Laws address land use planning and wildfires through various codes. State law related to wildfire, WUI fires, and model building and fire codes are primarily found in the Public Resources Code (PRC), the Health and Safety Code and the Government Code

State law⁴ defines areas in California that are wildland and the responsibility for fire protection related to those lands. Additionally, the probable fire severity of these areas is defined and determined by building codes and fire-resistant design standards that were in place at the time of construction.

Land use planning contains the ultimate long range solution to the WUI fire problem. New communities can be designed to be resilient to the impact of wildland fire when Fire Safe community⁵ components are factored into design. Fire agencies and other stakeholders input into the General Plan process can establish a strong blueprint for a fire-resilient community.

State legislation passed in 2012⁶ directs CAL FIRE to review all proposed subdivisions and amendments to local General Plans and Safety Elements.

1.1.5 FEDERAL MEASURES TO FACILITATE WILDFIRE PLANNING AND PREPARATION

The National Fire Plan established the collaborative approach to be used at all levels to develop risk reduction solution. It was followed by *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: A 10-Year Comprehensive Strategy*, with updates in 2002 and 2006. In 2003, the HFRA was passed into law, which emphasized the development of CWPPs and the implementation of hazardous fuel reduction projects.

In 2014, the final stage of a national strategy for wildfire was issued, entitled *The National Strategy: The Final Phase in the Development of the National Cohesive Wildland Fire Management Strategy*. California is in the Western Region of this plan, which notes that steep terrain, invasive species, access limitations, climate change, heavy fuel loads, and an expanding WUI underlie four broad areas of risk: risk to firefighters and civilian safety, ecological risks, social risks, and economic risks. The solution requires a collaborative effort with many stakeholders to improve landscape resiliency and community adaptation to wildfire.

⁴ Public Resources Code 4125.

⁵ Fire Safe Community Design Standards (Public Resources Code 4290).

⁶ California Government Code Sections 66474.02, 65302, and 65302.5.

1.1.6 STATE OF CALIFORNIA MEASURES TO FACILITATE WILDFIRE PLANNING AND PREPARATION

In similar acknowledgement of the escalating risk of wildfire, the State of California also issued several documents to assist in wildfire planning and preparation, detailed in the following sections.

Statewide Hazard Mitigation Plan

The State of California Multi-Hazard Mitigation Plan, revised in 2013, considers wildfire along with floods and earthquakes to be the three primary hazards faced by California (California Governor's Office of Emergency Services 2013). Chapter 5.4 describes wildfire hazards, vulnerabilities, and risk assessment. The document in particular notes the importance of Senate Bill 1241, which was passed in 2012, and mandates wildfire planning responsibilities by local agencies through requirements regarding:

1. wildfire updates to General Plans;
2. mandatory findings for subdivision approvals in SRAs and very high FHSZs; and
3. California Environmental Quality Act (CEQA) checklist updates for wildfire safety.

As a result, local General Plans must contain a review of local fire hazards; goals, policies, and objectives for protection of the community from wildfire; implementation measures; and reference to any previously adopted fire safety plan that meets Senate Bill 1241's goals.

California Strategic Fire Plan

In 2010, the State Board of Forestry and Fire Protection issued the California Strategic Fire Plan, a statewide fire plan developed in concert between the State Board of Forestry and Fire Protection and CAL FIRE. Goals included improved availability and use of information on hazard and risk assessment, land use planning, development of shared vision in plans such as CWPPs, establishment of fire resistance in assets at risk, shared vision among fire protection jurisdictions and agencies, levels of suppression, and post-fire recovery.

In support of this plan, several policies are noted, including creation of defensible space, improving home fire resistance, fuel hazard reduction that creates resilient landscapes and protects wildland and natural resources, adequate and appropriate fire suppression, and commitment by individuals and communities to wildfire prevention and protection through local planning.

The California Strategic Fire Plan's several objectives are as follows: the state will produce tools such as updates to the CAL FIRE very high FHSZ maps, fire history, and data on values and assets at risk; assist government bodies in the development of a comprehensive set of wildland and WUI protection policies; identify minimum key components necessary to achieve a fire safe community; coordinate CAL FIRE Unit Fire Plans with CWPPs; improve regulatory effectiveness, compliance monitoring, and reporting pursuant to PRC 4290 and 4291; and participate in public education efforts concerning regulation, prevention measures, and preplanning.

CAL FIRE Santa Clara Unit Fire Plan

The Santa Clara Unit of CAL FIRE provides fire protection to many areas within Santa Clara County, as well as to Contra Costa, Alameda, and the western portions of San Joaquin and Stanislaus counties. The 2015 CAL FIRE Santa Clara Unit Fire Plan uses the Seven Strategic Goals and Fire Plan Framework identified in the California Strategic Fire Plan and translates them into work to be done within its area of responsibility. Tactically, the Santa Clara Unit has an objective of keeping all wildland fires to 10 acres or less. Strategically, the primary goal of wildland fire protection in the unit is to safeguard the wide ranges of values found within the unit from the effects of wildfire.

The Santa Clara Unit employs multiple programs to accomplish this goal, including development of pre-fire management tactics, fire prevention, a defensible space inspection (LE-100) program for fire safe clearance around structures, information and education programs, and the Vegetation Management Program (VMP) to reduce hazardous fuels and achieve natural resource management goals within an SRA.

Local Hazard Mitigation Plan

In 2005, the Association of Bay Area Governments adopted *Taming Natural Disasters: A Multi-Jurisdictional Local Government Hazard Mitigation Plan for the San Francisco Bay Area*. This plan addresses methods to mitigate the risk from several types of hazards on eight commitment areas (infrastructure, health, housing, economy, government services, education, environment, and land use). The 2005 plan was updated in 2010 with the participation of 116 cities, counties, and special districts. This update was supported by numerous regional and sub-regional workshops, forums, and public outreach campaigns, and further enhanced both the consistency in approach to hazard mitigation planning and the participation rate of local jurisdictions.

In response, Association of Bay Area Governments counties, including Santa Clara County, have developed an LHMP as an annex to the Association of Bay Area Governments plan. The LHMP also has mitigation strategies for several of these commitment areas.

Many of the mitigation strategies identified have been, or can be, used in CWPPs, and the responsible entities are also identified. Items include ensuring reliable sources of water for existing and new developments, developing defensible space programs, providing adequate access roads that meet California Fire Code standards, tying public education on defensible space with a defensible space ordinance and field enforcement, adopting or amending California Building and Fire Codes, and expanding VMPs.

1.1.7 OUTCOMES OF A CWPP

Building Collaboration

The underlying theme of these various plans, and in particular CWPPs, is collaboration among the many stakeholders affected by wildfire. Chief among the components of collaboration is public education to provide not only information concerning the risk of wildfire but also to let stakeholders know about opportunities to participate in the management and mitigation of wildfire risk. CWPPs are often referred to as “living documents” because of the importance of revisiting and updating these documents periodically as new issues arise and results from recommendations

in the CWPP, such as hazard reduction projects, develop. The value of the CWPP is ultimately to provide a framework for collaboration between the public, governments, agencies, and other entities affected by wildfire, so that they can discuss and jointly develop solutions and strategies for its management and mitigation. Specific CWPP topics requiring a collaborative effort include:

Risk Assessment

The purpose of developing the risk assessment model described in this document in Section 4 is to create a unique tool for evaluating the risk of wildland fires to communities within the WUI areas of the planning area. Although many definitions exist for hazard and risk, for the purpose of this document these definitions (that are consistent with state hazard mitigation planning and state standards) include:

- **Risk = Hazard – Mitigations**
- **Risk** is essentially a measurement of the potential consequences of the hazard occurring, in this case a wildfire burning through the WUI community.
- **Hazards** are those existing bio-physical factors that, when combined, present a threat.
- **Mitigations** are actions taken to reduce the hazard or risk in order to reduce the unwanted consequences of the WUI fire.

The risk assessment is twofold and combines a geographic information system (GIS) model of hazard and risk (Composite Risk/Hazard Assessment) and an on-the-ground assessment of community hazards and values at risk.

From these assessments, land use managers, fire officials, planners, and others can begin to prepare strategies and methods for reducing the threat of wildfire, as well as work with community members to educate them about methods for reducing the damaging consequences of fire. The fuels reduction treatments can be implemented on both private and public land, so community members have the opportunity to actively apply the treatments on their properties, as well as recommend treatments on public land and private land that they use or care about.

Insurance Implications in Wildland Urban Interface Areas

Insurance companies are reducing their exposure to catastrophic losses. It is commonplace for California property owners in WUI areas to be denied insurance coverage from their preferred provider, including renewals of existing policies. Property owners are left with a search for a willing insurance company or at last resort turning to the California FAIR Plan⁷, which will assure coverage, but at extraordinary premiums.

Insurance companies often rely upon organizations such as Insurance Services Office, Inc. (ISO) to assist in the evaluation of risk, such as from wildfire. For example, ISO/Verisk Analytics uses a program called FireLine to provide scores used to analyze wildfire risk at the individual address level. Scores are derived from three components: fuel, slope, and firefighter access.

⁷ California FAIR Plan Property Insurance: cfpnet.com.

There are a number of important implications for homeowners in WUI areas in the County:

Fire insurance policies will be issued or denied based on factors evaluated by insurance companies, evidenced by the fact that many insurance companies in the County are denying coverage in WUI areas. The result of this action by the major insurance companies have reduced the capacity of the industry to accommodate the market demand and the price of coverage is rising as a direct result. There are insurance companies that are taking on this risk by charging higher rates, reducing fire peril coverage, and or increasing the deductibles. This results in the consumer taking on more risk by paying more and having higher deductibles. Alternatively, some homeowners find they cannot afford coverage if they can find it and forego obtaining fire insurance policies entirely.

Fuel and access can be modified as a result of projects identified in a CWPP and therefore affect insurance policies and premiums. Properties currently insured in the WUI are inspected periodically for defensible space, site hygiene and maintenance. Upon inspection if there are issues raised, the policyholder is informed and required to make changes prior to the next renewal. Because many insurance companies are no longer taking on new business in these WUI areas, a lapse in policy as a result of a failed insurance inspection can be a significant vulnerability to homeowners, providing motivation for good property hygiene, defensible space and structural maintenance.

Areas identified by insurance companies as exposed to wildfire risk should be noted by stakeholders as another source of information, which can also be used to identify and prioritize risk reduction work.

Mitigation Strategies

The CWPP process identifies many types of mitigation strategies, including hazardous fuel modification, defensible space, signage, public education prevention messages, improved road access, water supply, and building materials and design. It should be noted that while all mitigation strategies will be useful, some will be a more important factor in preventing destruction of a home.

An examination of the factors leading to an assignment of extreme risk to a parcel or area can help identify which ones provided the most weight to the rating and, therefore, which factors are in most need of mitigation strategies. For example, the presence or absence of a wood roof is often a determining factor in home survivorship during wildfire incidents, and therefore this factor is given much weight in the development of risk score ratings.

Policies, Codes, and Ordinance Changes

Mitigation strategies must include monitoring and follow-up, and often require the development of codes, ordinances, and enforcement. Codes and ordinances help define the type and level of work needed to mitigate wildfire risk. A policy of creation of defensible space needs to have a definition of the amount of vegetation clearance. As noted in the state's General Guidelines for Creating Defensible Space (2006), this definition can change periodically, as was the case with the revision of PRC 4291, which increased the defensible space distance from 30 to 100 feet.

Outreach and Education

The CWPP process is designed to enhance outreach and education on the wildfire situation to the general public, local governments and agencies that may be unaware of the steps they can take to mitigate the risk of wildfire. The collaborative effort encouraged during the construction, review, and approval of a CWPP continues into the future as lessons learned from activities identified in the Santa Clara County CWPP are translated into more specific activities at the community and city level. Outreach increases the number of partners in this work; education promotes a more common understanding of the causes and nature of wildfire risk and increases general knowledge of the best practices to mitigate it.

Collaboration on outreach is important because each entity involved in mitigating the risk of wildfire has a different role and can provide a different approach to messaging. For example, CAL FIRE inspectors wear uniforms, actively educate property owners on importance of defensible space, and additionally have the authority to issue citations to property owners who do not clear their defensible space. However, they cannot require someone to clear defensible space based on changes recommended in the latest science if the current code does not reflect those changes, nor can they require property owners to clear defensible space for their neighbor whose home is near the property line. Fire Safe Council coordinators have the flexibility to address these limitations by providing non-threatening guidance to residents who are out of compliance, encouraging adoption of cutting-edge recommendations that are not yet codified, and assisting in outreach to neighbors to encourage voluntary participation in community-wide defensible space strategies.

Structural Ignitability

As noted in the 2015 CAL FIRE Santa Clara Unit Fire Plan, page 14, “in some instances due to the size, speed, and intensity of the fire, or the building materials and surrounding vegetation, structures can ignite and potentially be destroyed before emergency responders can arrive. In order for a structure to survive it must be able to avoid ignition.”

Structural ignitability, and responsibility of property owners in reducing this risk factor, is discussed in detail by Cohen (2008). Cohen notes that “the continued focus on fire suppression largely to the exclusion of alternatives that address home ignition potential suggests a persistent inappropriate framing of the WUI fire problem in terms of the fire exclusion paradigm.”

Reinhardt et al. (2008) state that “destruction (of homes) in the WUI is primarily a result of the flammability of the residential areas themselves, rather than the flammability of the adjacent wildlands.” The dwelling’s materials and design within 100 feet determine home ignition potential (also referred to as the home ignition zone). Therefore, if large flames are not causing home ignition, then the cause is often relatively low intensity flames contacting the base of the home, and/or direct firebrand ignitions. Consequently, Cohen believes that the presence or absence of fuels in the immediate surroundings of the home, and its construction materials, will determine ignition potential. Therefore, the authority and responsibility for reducing structural ignition potential of existing buildings belongs to the property owner. Fire agencies can help educate property owners on the need and methods for reducing structural ignition potential.

Community design and WUI building code standards adopted by local agencies can serve to reduce ignitability of new structures. However, code revisions tend to lag a long time behind research

findings, and new codes generally do not apply to older structures. This is why the public education component of CWPPs is so vital to the mitigation of wildfire risk. An ideal goal to reduce structural ignitability is to educate and facilitate the voluntary modification of existing buildings to comply with both current WUI building codes, as well as the latest recommendations from fire science experts.

Emergency Response and Evacuation

During wildfire events, the routes emergency responders take to the fire are often the same routes being used by residents fleeing from the fire. Other residents may be trying to return to their homes for children or pets. Roads may be too narrow to accommodate two-way traffic of responders and evacuees. Routes may be blocked by fallen trees, spot fires, smoke, downed power lines, traffic congestion, or vehicle accidents. Road names and home addresses may be too indistinct to locate, confusing, or missing. Safe areas and evacuation centers may be unknown to residents, or if there are multiple centers, uncertainty within a family separated by the fire may occur over which one should be used.

Evacuation may be urgent, confusing and disorderly, particularly in “No Notice” events during the early part of wildfire response where information about the fire is limited. Law enforcement officers may not be readily available in sufficient numbers, and incident management may be juggling both fire suppression and life safety without enough resources to accomplish both.

The possibility of fatal entrapments exists, and therefore planning for the sudden occurrence of a fire under extreme conditions is a vital part of plans developed by local jurisdictions, as well as families. The CWPP will describe many actions that will improve the ability of firefighters to more quickly and efficiently access areas threatened by fire, as well as mobilize law enforcement to assist in providing the public with methods for safer evacuation.

Particular attention must be paid during the development of a CWPP to the location of locked gates, which will slow, and possibly block, the use of evacuation routes. Likewise, overgrown evacuation routes with high fuel loading near the road edge may be unusable due to intense heat and long flame lengths, falling trees and power poles, or other hazards that an active fire can create and may lead to fatal results. The CWPP should designate certain roads as evacuation routes and contain a clear description of responsibilities and procedures to unlock gates during evacuations, and prioritize preparing those routes for use during an active fire by implementing roadside fuel reduction projects.

Prioritize Fuel Reduction

CWPPs provide stakeholders not only the opportunity to identify fuel reduction projects but also to assign priorities to them. While it is true that communities with an established CWPP are given priority for federal funding of hazardous fuels reduction projects carried out in accordance with the HFRA, a collaboratively developed list of such projects is simply more efficient in terms of planning, funding, and execution given the large amount of fuels reduction that could be done across Santa Clara County. Speaking with one voice will carry more weight in the competitive environment of funding for wildfire hazard and fuel reduction projects; collaboration for projects should include Fire Safe Councils at the state, county, and community levels.

The purpose of any fuels reduction treatment is to protect life and property by reducing the potential for and outcome of catastrophic wildfire, as well as to restore landscapes to a sustainable and healthy condition. Moderating extreme fire behavior, reducing structural ignitability, creating defensible space, providing safe evacuation routes (Figure 1.3), and maintaining all roads for firefighting access are methods of fuels reduction likely to be used around communities located in a WUI zone. Use of multiple treatment methods often magnifies the benefits.

It should be noted this CWPP is a countywide policy level document. Therefore, fuel reduction projects will be described in general detail; more specific projects will be essentially “legs” to the CWPP, as jurisdictions identify and tailor projects to their specific needs over the coming years and as part of the CWPP update process.

Fuel reduction projects may have the potential to impact the environment both during implementation, as well as through longer-term maintenance of the projects. The protection of sensitive habitats, and the use of CEQA to analyze potential site-specific effects, will be part of the work done within this more specific “leg” of the process.



Figure 1.3. Evacuation route markers in the Aldercroft Heights neighborhood developed and installed by the local road association.

1.2 CWPP PLANNING PROCESS

The Society of American Foresters (SAF), in collaboration with the National Association of Counties and the National Association of State Foresters, developed a guide entitled *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (SAF 2004) to provide communities with a clear process to use in developing a CWPP. The guide outlines eight steps for developing a CWPP and has been followed in preparing the Santa Clara County CWPP:

Step One: Convene Decision-makers. Form a Core Team made up of representatives from the appropriate local governments, local fire authorities, and state agencies responsible for forest management.

Step Two: Involve Federal Agencies. Identify and engage local federal representatives and contact and involve other land management agencies as appropriate.

Step Three: Engage Interested Parties. Contact and encourage active involvement in plan development from a broad range of interested organizations and stakeholders.

Step Four: Establish a Community Base Map. Work with partners to establish a base map(s) defining the community's WUI and showing inhabited areas at risk, wildland areas that contain critical human infrastructure, and wildland areas at risk for large-scale fire disturbance.

Step Five: Develop a Community Risk Assessment. Work with partners to develop a community risk assessment that considers fuel hazards; risk of wildfire occurrence; homes, businesses, and essential infrastructure at risk; other Community Values at Risk (CVARs); and local preparedness capability. Rate the level of risk for each factor and incorporate this information into the base map as appropriate.

Step Six: Establish Community Priorities and Recommendations. Use the base map and community risk assessment to facilitate a collaborative community discussion that leads to the identification of local priorities for treating fuels, reducing structural ignitability (Appendix A), and other issues of interest, such as improving fire response capability. Clearly indicate whether priority projects are directly related to the protection of communities and essential infrastructure or to reducing wildfire risks to other community values.⁸

Step Seven: Develop an Action Plan and Assessment Strategy. Consider developing a detailed implementation strategy to accompany the CWPP (detailed in annexes to the CWPP), as well as a⁹ monitoring plan that will ensure its long-term success.

Step Eight: Finalize Community Wildfire Protection Plan. Finalize the CWPP and communicate the results to community and key partners.

⁸ Detailed project planning and prioritization should be completed at the direction of the Core Team during revisions of jurisdictional annexes and updates to the strategic document. The scale of the Santa Clara County CWPP did not allow for the detail necessary for project-specific planning and it is acknowledged by Core Team members that this work will be completed over the coming years as the CWPP is revisited or as specific project funding allows.

1.2.1 PLANNING TEAM/CORE TEAM

The Core Team reflects the variety of stakeholders affected by wildfire. Members include:

- Ken Kehmna Fire Chief, Santa Clara County Fire Department
- John Justice Deputy Chief, Santa Clara County Fire Department
- Tom Lausten Area Superintendent, Midpeninsula Regional Open Space District (MROSD)
- Mark Roberts Fire Captain, San Jose Fire Department
- Doug Schenk GIS Analyst, Santa Clara County
- Ed Orre Unit Forester, CAL FIRE
- Anne Rosinski Senior Engineer Geologist, California Geological Survey
- Jim Wollbrinck Manager Security and Business Resiliency, San Jose Water Company
- Randy Houston Water Maintenance Manager, San Jose Water Company
- Gary Sanchez Director, Santa Clara Fire Safe Council; Agent, State Farm Insurance
- Patty Ciesla Programs Manager, Santa Clara Fire Safe Council
- Derek Neumann Field Operation Manager, Open Space Authority
- Dwight Good Fire Marshal, CAL FIRE/Morgan Hill
- Rick Parfitt Resident, Lexington Hills
- Robert Durr Lieutenant, Santa Clara County Sheriff's Department
- Jeffrey McCoy Administrative Sergeant, Santa Clara County Sheriff's Department

1.2.2 RESEARCH CURRENT CONDITIONS

The CWPPs that have been developed in the last few years, such as the Lexington Hills, East Foothills, and Croy CWPPs, and the Palo Alto Fire Management Plan, describe in detail the conditions found in these specific areas. The detailed conditions described in these documents can also represent to a significant degree current conditions in other areas within the county that have not developed a CWPP. The CAL FIRE Santa Clara Unit Fire Plan addresses wildfire conditions, patterns, and suggested mitigations in the SRA of the county.

General findings and recommendations in these plans include:

- Wildfires will reoccur in areas where vulnerable and valuable assets exist.
- Firefighting resources are significant, but access to specialized resources such as hand crews are limited.
- Reliable sources of water for fire suppression need to be ensured.
- Diverse construction types include high hazard residences.

- Narrow roads (Figure 1.4), unmarked dead-ends, and lack of turnarounds are a concern.
- Evacuation of some areas is a concern.
- Fuel reduction is key to reducing risk, with a commitment to long-term maintenance.
- Reducing structural ignitability is key to reducing loss of life, injury, and property damages.
- Community education and outreach about the importance of defensible space and community mitigations is a critical need.

Because these findings and recommendations are present in previous planning documents, an examination of which of these issues have been effectively addressed, and which have tended to be more difficult to resolve, would be a valuable undertaking by the Core Team and others to ensure that this CWPP builds on, and enhances, previous and future wildfire risk mitigation work. This CWPP can also focus on the issues that have been more difficult to resolve, using its broader stakeholder coalition to provide more emphasis and support for resolution of such issues. The Core Team should consider these issues during future CWPP revisions and updates.



Figure 1.4. Narrow one-lane roads are common in communities throughout the county, which is a concern for emergency response, as well as evacuation.

1.2.3 COMMUNITY OUTREACH

Using social media, such as Facebook, and other outreach means, several community workshops were held to make presentations and to discuss the wildfire situation in Santa Clara County and to provide an opportunity for the public and other stakeholders to present their concerns and thoughts on wildfire risk mitigation.

Community Workshops

The first round of workshops occurred in Morgan Hill (February 17, 2016), San Jose East Foothills (February 18, 2016), Cupertino (February 22, 2016), and Redwood Estates (February 23, 2016), followed by a second round of workshops in Milpitas (May 2, 2016), Morgan Hill (May 3, 2016), Redwood Estates (May 4, 2016) (Figure 1.5), and Cupertino (May 10, 2016). These meetings will be followed by a public review period of the draft CWPP from May 2 to 16, 2016.



Figure 1.5. Community workshop at Redwood Pavilion.

Notes from the community workshops are included in Appendix B. The following bulleted list outlines some of the main concerns that residents voiced during the workshops:

- Enforcement of codes are needed to ensure defensible space and weed abatement requirements are followed.
- Narrow roads and poor access putting property at risk.
- Improvements to hydrant network and available water supply are needed.
- Pre-attack planning needed to identify evacuation concerns.

- Fuel loading on public lands is too high and more fuel treatments are needed.
- Sustainability of fuel treatment is a problem, need more regular maintenance.
- Evacuation routes for some communities are blocked by locked gates.
- Evacuation routes for some communities are on poorly maintained roads sometimes unpassable without 4 × 4 drive vehicles.
- Prescribed burning is supported and encouraged where ecologically appropriate on public lands.
- Need a central location for wildfire preparedness information/literature that is tailored to the community.
- Building codes are hard to navigate and some place unreasonable restrictions on property development.
- New development is occurring in areas that have limited water supply, putting residents at risk.
- Roads agencies (California Department of Transportation [Caltrans], County Roads and Airports, etc.) need to be a partner in fuel treatment actions.
- Communities support development of Firewise Communities status.
- Residents support the assertion that roof retrofits are needed throughout the country to remove all wood shake shingle roofs.
- Tree mortality is a significant problem throughout the County and there needs to be an easier way to deal with tree removal.
- Roadside thinning is needed in many neighborhoods in order to improve access and evacuation route viability.
- Public land managers need to work with adjacent private property owners to ensure appropriate defensible space can be implemented across property lines.
- Major highways (e.g., Highway 17) are a source of ignitions and should be a major focus of roadside fuel treatments (Figure 1.6).
- Engagement of adjacent counties is critical for wildfire preparedness, fuel treatment development, and evacuation planning.
- More unified planning by agencies is needed.
- Maintenance and improvements to private roads to improve ingress and egress is a concern throughout the County.
- Defensible space and plant flammability could be tackled through education of landscape companies.
- Insurance companies are pulling out of some WUI areas.



Figure 1.6. Roadside treatments completed by the County Roads and Airports Department in Lexington Hills help provide a buffer to vehicle ignitions, as well as protecting an essential evacuation route.

Community Survey

A custom community survey was developed for the CWPP in order to gather the perspectives of Santa Clara County residents on wildfire risk and hazard within their community. The objective of the survey was to ensure that the Core Team had a clear idea of the range and prevalence of activities and concerns across the county. Responses from the survey help identify areas of particular concern to residents, ascertain residents' priorities for actions to reduce wildfire hazard, identify mitigation activities residents are undertaking, and determine what tools residents need in order to undertake further mitigation actions.

The results of the survey are presented in Section 4.9.1.

Social Media

A Facebook profile was developed for the CWPP in order to inform the public about upcoming events, review periods, and announcements, and to provide an avenue through which the public could provide additional input. The Facebook page has 132 followers.

1.2.4 STAKEHOLDER ORGANIZATION OUTREACH

The value of any CWPP depends on its identification and outreach to the many stakeholders affected by wildfire. The Core Team represents a broad cross section of such organizations; a variety of means was used to notify and provide invitation to stakeholders to participate in this process.

The Core Team is itself the nucleus of stakeholder outreach via the many contacts possessed by members of this team, both to inform stakeholders and to bring stakeholder concerns and ideas to

the Core Team as it developed the CWPP. In support of this process, the Core Team met on December 1, 2015, and January 28, February 24, April 4, May 10, and June 20th, 2016. In addition, a workshop was convened on May 9, 2016, to provide an opportunity for agency representatives to discuss project ideas and fuel treatment locations with the CWPP Team.

A contact list for Core Team members is included in Appendix C. These Core Team representatives were selected by the Santa Clara County Fire Department and the CWPP Team to represent the key agencies involved in fire management in the county. During the CWPP planning process it was identified that law enforcement involvement was integral to the development of mitigation measures for hazard and risk reduction, particularly evacuation. As such, two sheriff department representatives were encouraged to join the Core Team. Other agencies that were not part of the Core Team but could contribute important information to the document were invited to attend the agency workshop on May 9, 2016.

It should be noted that engagement of stakeholders did vary during the planning process as schedules prevented some Core Team members attending all meetings. It is also acknowledged by the Core Team that future revisions to the CWPP should include additional collaboration from some under-represented entities who have a responsibility for fuel reduction and/or fire management in the County. The lack of participation by these entities weakens the application of the CWPP in terms of implementation of recommended projects. The Core Team committed to improving participation moving forward as outlined in Table 5.3 in Section 6. Furthermore, continued engagement by the Core Team is necessary in order to move forward specific project recommendations that have been developed at a conceptual level in this document and annexes. It is anticipated this will occur over the coming months and years as this live document is reviewed and revised.

1.3 PROJECT AREA

This CWPP is developed at the Santa Clara County, rather than community or city, level. It integrates information from the CAL FIRE Santa Clara Unit Fire Plan and Santa Clara County community CWPPs developed in the last few years, provides new information on the wildfire situation at the County level, and describes risk reduction strategies identified and prioritized by many community stakeholders, which can be applicable at both a countywide and local scale. The Santa Clara County CWPP can also be used to coordinate risk reduction planning with other neighboring counties threatened by wildfire, such as Santa Cruz, San Mateo, Alameda, San Benito, and other counties, with which Santa Clara County shares contiguous wildland fuels and similar wildfire issue.

1.3.1 WILDLAND URBAN INTERFACE PLANNING ZONES

The WUI is composed of both interface and intermix communities and is defined as areas where human habitation and development meet at the edge of, or are inserted in the interior of areas dominated by, wildland fuels (U.S. Department of the Interior and U.S. Department of Agriculture 2001:752–753). Interface areas include housing developments that meet or are in the vicinity of continuous vegetation and consist of less than 50% vegetation. Intermix areas are those areas where structures are scattered throughout a wildland area of greater than 50% continuous vegetation and fuels and meet or exceed a minimum of one house per 40 acres. Depending on the

surrounding fuel conditions, topography, and present structures, wildland areas of up to 1.5 miles from structures may be included in the WUI (Stewart et al. 2007).

The WUI creates an environment in which fire can move readily between structural and vegetative fuels, increasing the potential for wildland fire ignitions and the corresponding potential loss of life and property. Human encroachment upon wildland ecosystems within recent decades is increasing the extent of the WUI in Santa Clara County and is therefore placing people and structures at risk and having a significant influence on wildland fire management practices. Combined with the collective effects of aggressive suppression policies, resource management practices, land use patterns, climate change, invasive species infestation and insect and disease infestations, the expansion of the WUI into areas with high fire risk has created an urgent need to modify land use, fire management practices, and policies and to understand and manage fire risk effectively in the WUI (Pyne 2001; Stephens and Ruth 2005).

A CWPP offers the opportunity for collaboration of policy makers and land managers to establish a definition and a boundary for the local WUI; to better understand the unique resources, fuels, topography, and climatic and structural characteristics of the area; and to prioritize and plan fuels treatments and community mitigations to mitigate for fire risks. At least 50% of all funds appropriated for projects under the HFRA must be used within the WUI area.

1.4 ORGANIZATION INVOLVEMENT

This CWPP is designed to be a strategic policy level document that is signed by designated signatory organizations, with each specific organization's strategies and projects as separate "legs." The CWPP policy level document fosters a long term WUI strategy and describes guiding principles at the county level, while at the same time allowing organizations to do periodic updates and develop policies, ordinances, and fuel projects without requiring all CWPP signatories to sign off on the local plans. A long-term goal of the CWPP is the adoption of strategic goals into the Safety Element of city and county General Plans and LHMPs, giving more weight to the CWPP's recommendations, such as code changes and ordinances.

1.4.1 SIGNATORY ORGANIZATIONS

Signatory organizations and advisory organizations included in project development are listed in Appendix C.

1.4.2 GRANT FUNDING SOURCES

Support for this work comes from a wide variety of sources listed in Appendix D.

This page intentionally left blank

2 COMMUNITY CHARACTERISTICS AND DEMOGRAPHICS

2.1 LOCATION AND GEOGRAPHY

The County of Santa Clara, also referred to as “Silicon Valley”, is unique because of its combination of physical attractiveness and economic diversity. With its numerous natural amenities and one of the highest standards of living in the country, the county has long been considered one of the best areas in the United States in which to live and work. (County of Santa Clara 2016)

Santa Clara County encompasses 835,449 acres (1,305 square miles), is located at the southern end of the San Francisco Bay (Santa Clara County General Plan 2015), and comprises the fertile Santa Clara Valley, which is fringed on the east by the Diablo Range and on the west by the Santa Cruz Mountains. The northwestern portion of the county comprises the Baylands, salt evaporation ponds, salt marsh, and wetlands. The county enjoys a Mediterranean climate, staying temperate year round, staying warm and dry through late spring, summer, and early fall. Precipitation ranges from an average 12 inches in downtown San Jose to more than 60 inches in the Santa Cruz Mountains. The Santa Clara Valley is generally divided into two geographic regions, the North Valley and the South Valley. The predominantly urban North Valley houses approximately 90% of the county’s residents and 13 of its 15 cities (Santa Clara Valley Habitat Agency 2012). The South Valley is primarily rural, with the exception of Morgan Hill, Gilroy, San Martin (unincorporated community), and scattered low-density residential areas.

Until the mid-twentieth century, orchards and other agriculture dominated the area, but in recent decades the valley has been transformed into “Silicon Valley,” a global center for high-tech development resulting from the 1990s internet boom. Since that time the county has seen extensive population growth, focused mostly in the North Valley cities of Campbell, Cupertino, Los Altos, Los Altos Hills, Los Gatos, Milpitas, Monte Sereno, Mountain View, Palo Alto, Santa Clara, Saratoga, and Sunnyvale; nearly 92% of the county population lives in its cities (U.S. Census Bureau 2014). The county has the largest population of any of the nine Bay Area counties, and it provides more than 25% of all jobs in the Bay Area (Santa Clara Valley Habitat Agency 2012).

Although the population is expected to continue to grow, the rate of growth is projected to slow (Santa Clara Valley Habitat Agency 2012). Recognizing the population boom in the 1970s, Santa Clara County implemented policies to help curtail potential sprawl and protect the county’s natural resources. Policies were enacted that focused growth inside of cities, controlling sprawl into unincorporated areas of the county. At the same time, the MROSD, Santa Clara County Parks, and the Santa Clara Valley Open Space Authority began acquiring undeveloped land in the foothills for a permanent greenbelt of wildlands.

Santa Clara County’s General Plan includes many measures to address land use issues involving the rural unincorporated areas of the county over which Santa Clara County has direct land use authority. Policy direction is to maintain the scenic rural character of these areas and to promote conservation and productive use of their natural resources for agriculture, ranching, watershed, public recreation, and wildlife habitat (Santa Clara Valley Habitat Agency 2012).

The county has a rich culture and many community facilities and attractions that serve the residents and attract visitors, including museums and art galleries, performing arts venues, educational facilities, cultural and recreational opportunities, vineyards, orchards, and abundant natural resources.

2.2 CLIMATE AND WEATHER PATTERNS

Santa Clara County has a Mediterranean climate, with most precipitation occurring during the winter months and virtually no precipitation from spring through autumn (Santa Clara Valley Habitat Agency 2012). Annual rainfall averages are variable, depending on topography and local orographic and rain shadow effects; due to the large extent of the County weather data is shown in Figure 2.1–Figure 2.7, and Table 2.1 from various communities. The Santa Cruz Mountains typically have the highest precipitation totals (40–60 inches/year) compared to the relatively dry Santa Clara Valley where the city of San Jose has average totals of 12 inches. The Diablo range, though drier than the Santa Cruz Mountains, experiences greater precipitation than the adjacent valley, with totals ranging from 20 to 30 inches a year, especially at higher elevations. Various microclimates also occur in the county; for example, canyon areas of north-facing hill slopes and streams with less direct sunlight will have lower evapotranspiration, greater ambient soil moisture, and generally more moderate cooler temperatures due to higher moisture content and greater shading (Santa Clara Valley Habitat Agency 2012).

The topography of Santa Clara County, coupled with the proximity to the Pacific Ocean, greatly influences wind patterns. The prevailing flow along the Santa Clara Valley is roughly parallel to the valley's northwest-southeast axis. During the afternoon and early evening, a north-northwesterly sea breeze often extends up Santa Clara Valley, while a light south-southeasterly drainage flow often occurs during late evening and early morning (Santa Clara Valley Habitat Agency 2012). In summer a convergence zone is sometimes observed in the southern end of the Santa Clara Valley between Gilroy and Morgan Hill, when air flowing from the Monterey Bay through the Pajaro Gap gets channeled northward into the south end of the Santa Clara Valley and meets with the prevailing north-northwesterly winds (Santa Clara Valley Habitat Agency 2012). Spring and summer sees the greatest wind speeds, with sometimes strong afternoon and evening winds on summer days. Summer "Diablo Winds" can carry hot, dry air from the Central Valley over the Diablo Range and flow across Santa Clara Valley and then upslope over the Santa Cruz Mountains from a northerly direction towards the Monterey Bay. These winds drove both the Lexington Fire and the Summit Fire.

The United States is experiencing a cycle of the highest average temperatures in recorded history. California shares this phenomenon and is also suffering through an extended 4-year drought pattern that is creating a dramatic change in the health of native vegetation. Tree mortality from drought stress and pests such as bark beetles and the pathogen that causes Sudden Oak Death have increased significantly. Westerling (2016) notes that western forest wildfire activity increased abruptly in the 1980s and appears to be strongly associated with warming and earlier spring snowmelt.

Although this research focused on lightning-caused fires on western federal lands, widespread changes in the patterns and amounts of precipitation will influence wildland fuel availability and wildfire activity in many areas. An increase in wildfire activity, such as due to longer fire seasons

or due to higher rates of fire spread and intensity as a result of changes in fuel types, will spread more thinly the limited number of fire suppression personnel available for structure protection, further highlighting the importance of pre-fire preparation, such as structural defensibility.

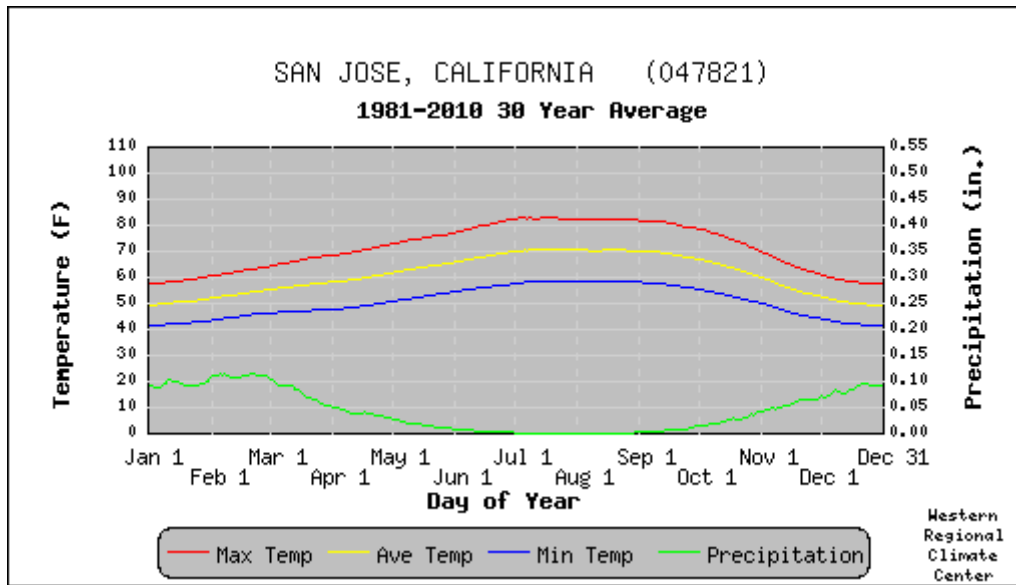


Figure 2.1. 30-year average temperature and precipitation for San Jose, 1981–2010 (Source: Western Regional Climate Center 2016a).

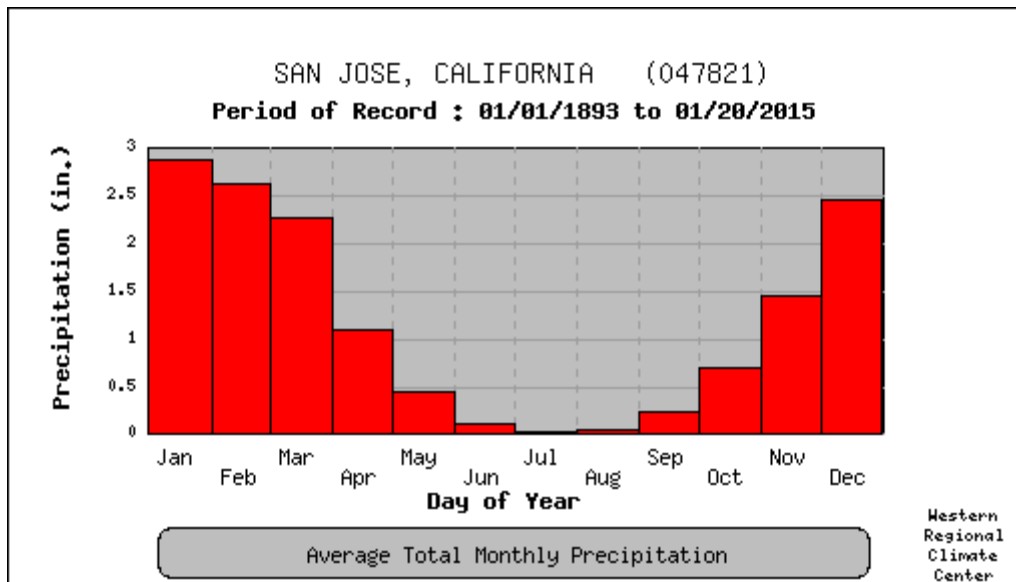


Figure 2.2. Monthly average total precipitation in San Jose (Source: Western Regional Climate Center 2016a).

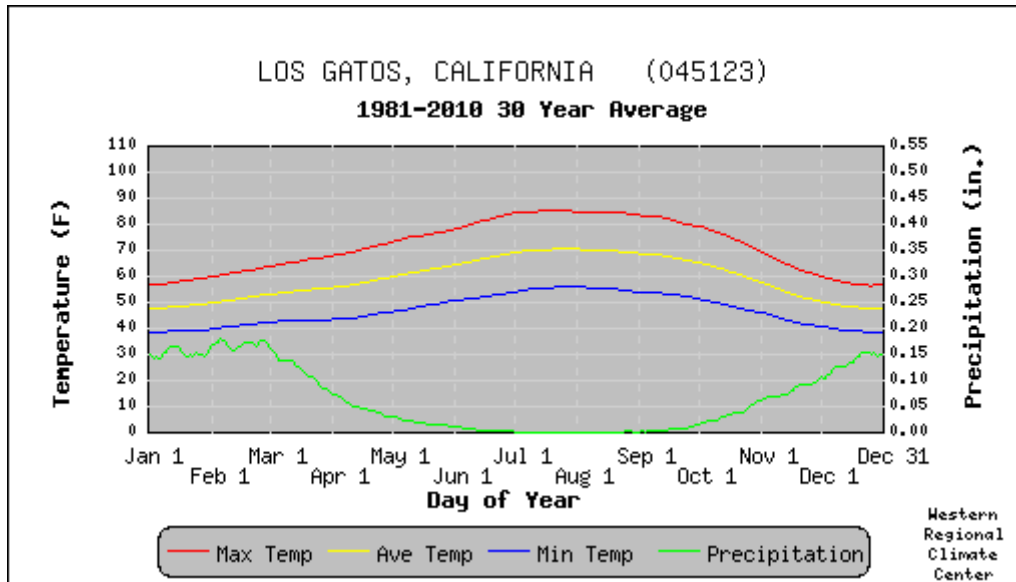


Figure 2.3. 30-year average temperature and precipitation for Los Gatos, 1981–2010 (Source: Western Regional Climate Center 2016b).

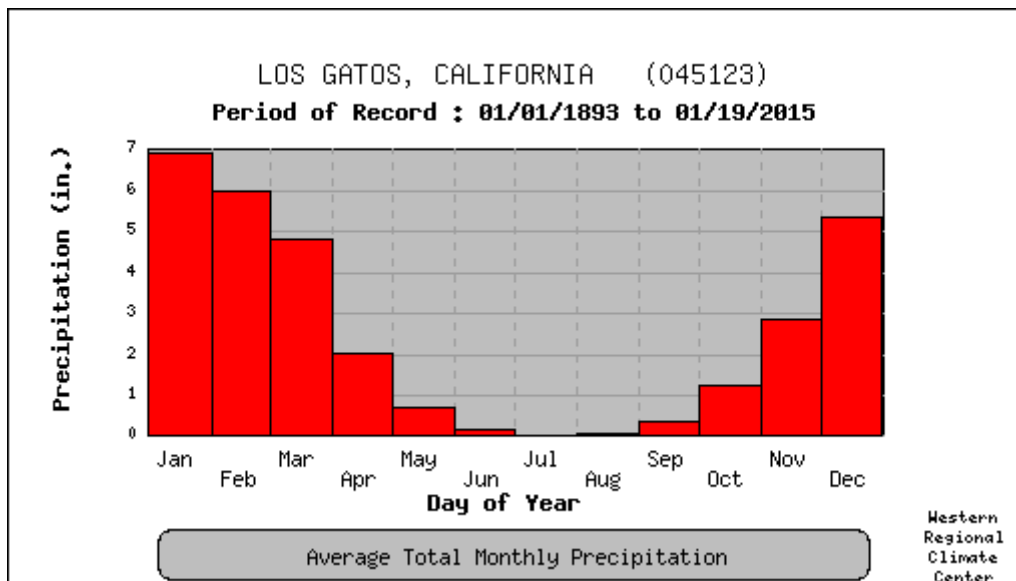


Figure 2.4. Monthly average total precipitation in Los Gatos (Source: Western Regional Climate Center 2016b).

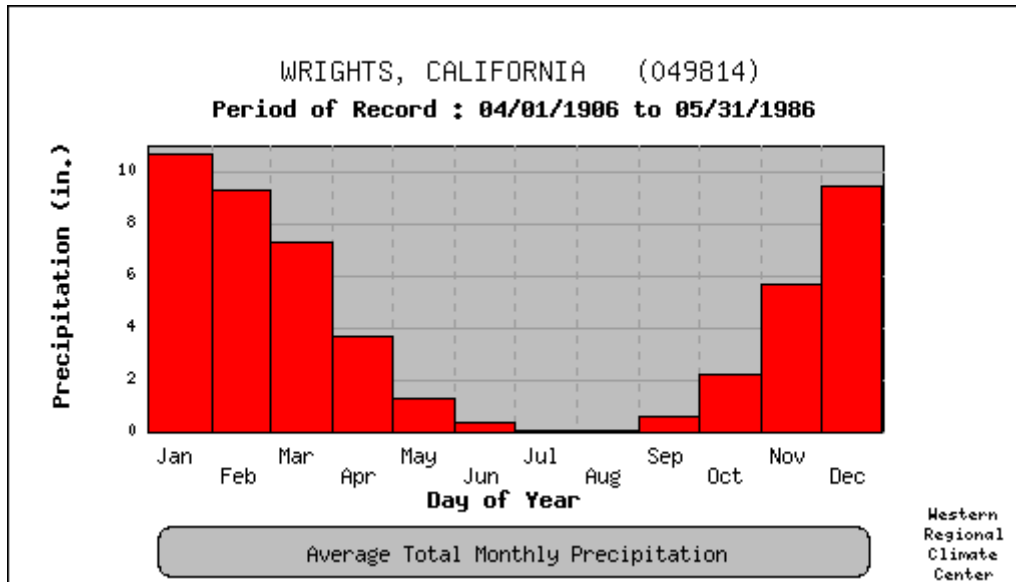


Figure 2.5. Monthly average total precipitation in Wrights (closest station to Summit Road). No temperature data available for period of record (Source: Western Regional Climate Center 2016c).

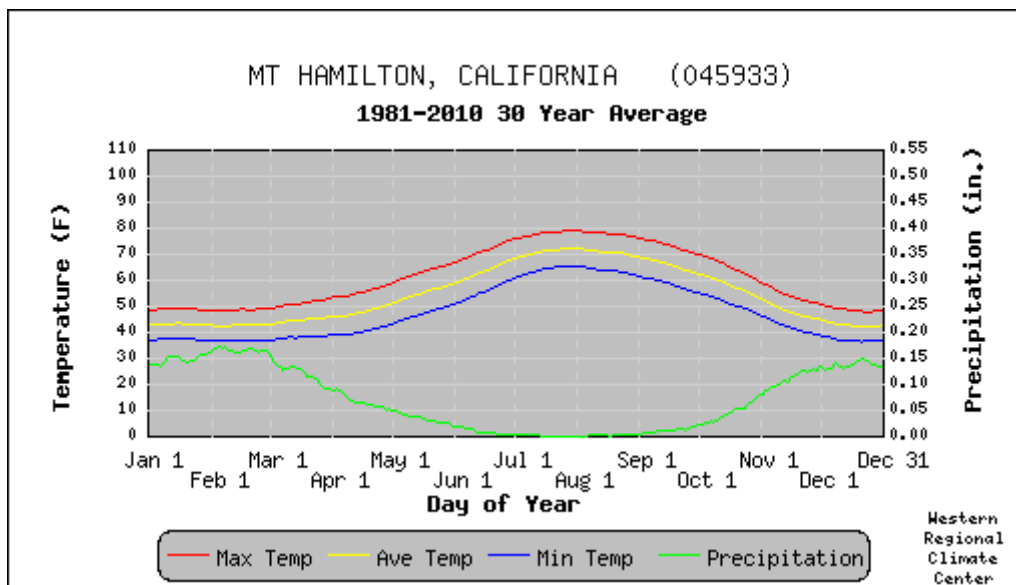


Figure 2.6. 30-year average temperature and precipitation for Mt. Hamilton, 1981–2010 (Source: Western Regional Climate Center 2016d).

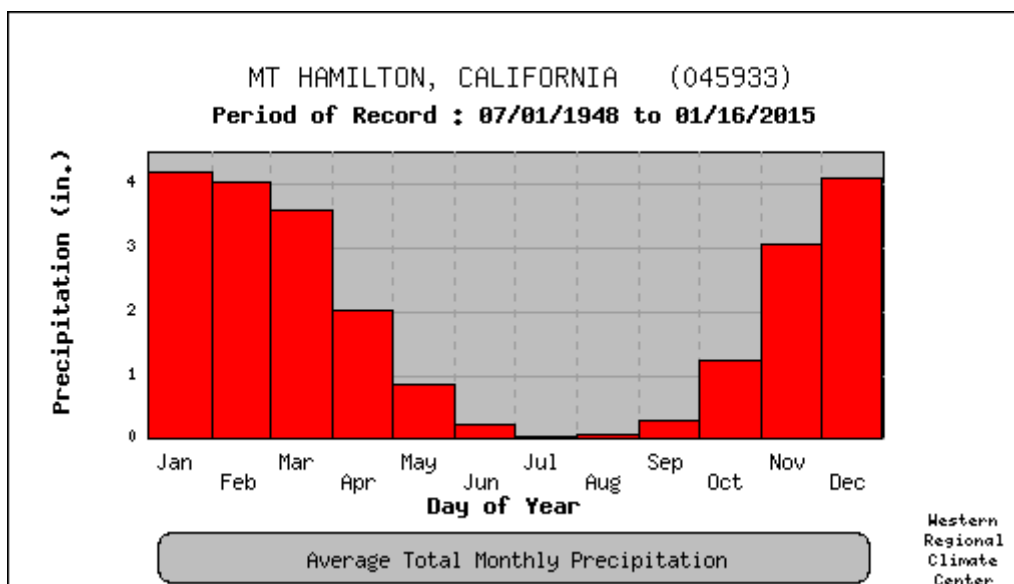


Figure 2.7. Monthly average total precipitation in Mt. Hamilton (Source: Western Regional Climate Center 2016d).

Table 2.1. Climate Averages for Four County Locations, California

Climate Measure	San Jose	Los Gatos	Wrights*	Mt Hamilton
Annual high Temperature	70.8°F	71.3°F	64.8°F	61.4°F
Annual low temperature	48.9°F	46°F	49.6°F	47.1°F
Average temperature	59.8°F	58.6°F	57.2°F	54.3°F
Average annual precipitation	14.58 inches	26.9 inches	46.32 inches	23.63 inches

°F = degrees Fahrenheit.

Source: Western Regional Climate Center 2016 (period of record 1893–2012).

*Wrights is closest station to Summit Road.

2.3 VEGETATION, LAND COVER, AND WILDLIFE

Santa Clara County represents the extremes of the Bay Area region. Due to the variation in topography and soil diversity within the county, there is a wide array of natural community types and subsequently very diverse flora and fauna. The following vegetation descriptions are taken from the Santa Clara Valley Habitat Plan that provides a comprehensive account of the vegetation and habitat within the county (Santa Clara Valley Habitat Agency 2012).

2.3.1 **VEGETATION COVER FOR SANTA CLARA COUNTY GRASSLAND**

Grassland in Santa Clara County consists of herbaceous vegetation dominated by grasses and forbs. Grassland in the county includes the following land cover types:

- **California annual grassland (non-native)** – found in valley bottoms, lower elevations on the eastern side of the county, and on ridges on dry south- and west-facing slopes.
- **Non-serpentine native grassland (native)** – patchily distributed in the county and generally occurs as small patches within the larger annual grassland complex.
- **Serpentine bunchgrass grassland (native)** – occurs on ultramafic soils derived from serpentinite, limited in extent in the county.
- **Serpentine rock outcrop/barrens (native)** – exposures of serpentine bedrock that typically lack soil and are sparsely vegetated, limited in extent in the county.
- **Serpentine seep** – dry areas where water penetrates the surface and creates a small wetland habitat that supports wetland vegetation.
- **Rock outcrop (non-serpentine)** – rare in the county.

Available research on the distribution of grasslands historically indicates that human use of fire may have had a profound impact on the historic distribution and extent of grasslands. Prior to European settlement, Native American burning helped shape native perennial grasslands in Santa Clara County. Keeley (2002) suggests that dense scrub or chaparral had little value to Native Americans, so they used periodic burning to clear shrubs and provide habitat for fire-tolerant native grasses. Keeley (2002) also implies that the current mosaic of grassland is likely a result of historic vegetation management that favored open grasslands over chaparral. Following European settlement, the combination of livestock grazing, drought, and spread of aggressive grasses and herbs dramatically reduced the abundance of native grasses and the extent of native grasslands throughout California (Bartolome et al. 2007).

Periodic fire is an important influence on the grassland community. Historically and prehistorically, fires from both lightning strikes and human ignition kept woody vegetation from invading grassland (where the soil conditions are appropriate) and converting it to coastal scrub or oak woodland. Prehistoric burning promoted a spatially patchy grasslands in a mosaic with woody vegetation (Keeley 2002). Prior to Native American occupancy and their frequent burning, Ford and Hayes (2007) speculate that many of the grasslands within the range of coyotebrush (*Baccharis pilularis*) would have been brushlands. It is believed that in the absence of frequent extensive fire and moderate or higher intensity livestock grazing, much of the grassland will succeed to northern coastal scrub and eventually mixed woodland, except on the hottest south-facing slopes and shallow soils (Santa Clara Valley Habitat Agency, 2012).

Prescribed burning is considered an important management tool in grasslands and other natural communities (Santa Clara Valley Habitat Agency, 2012); however, such burning is becoming increasingly difficult to implement due to cost, safety concerns from expanding urban and rural development, and difficulty obtaining permits because of air quality concerns. It has not been feasible in most places to burn frequently enough to control the spread of woody species into existing grassland or to reduce the cover of woody vegetation within grasslands because of the

natural resistance and resilience of the woody plants to a single burn (Ford and Hayes 2007). Livestock grazing has continued on most rangelands in Santa Clara County and is regarded as generally beneficial in maintaining suitable habitat conditions for many special-status grassland-dependent species.

Grassland is considered a fire-tolerant community, since the low-intensity prescribed fire moves so quickly that the fire burns only above the lower few centimeters of material, leaving much unburned or only charred on the ground. Immediately following a grassland fire, areas typically see an increase in annual forb germination and flowering and an increase in overall productivity in response to the light and nutrients made available by the removal of the thatch layer during the following growing season (Harrison et al. 2003). In grasslands that are already dominated by non-native annual grasses, non-natives may increase their dominance following fire by outcompeting natives for the newly available space and light. Native grasses may increase their dominance in serpentine grasslands following fire through the same mechanism (Harrison et al. 2003).

2.3.2 CHAPARRAL AND NORTHERN COASTAL SCRUB

Chaparral shrub communities are found in rocky, porous, nutrient-deficient soils and steep slopes throughout Santa Clara County and are dominated by densely packed evergreen woody shrubs, 1.5 to 4 meters tall. Dominant shrubs in this community in Santa Clara County are chamise (*Adenostoma fasciculatum*), manzanita (*Arctostaphylos* spp.), scrub oak (*Quercus berberidifolia*), and ceanothus (*Ceanothus* spp.).

Northern coastal scrub is characterized by low shrubs that are generally more flexible with higher moisture content and thinner stems than the stiff shrubs of chaparral. The plants range from 0.5 to 2 m tall interspersed with openings favored by native bunch grasses. Common plants of coastal scrub include California sagebrush (*Artemisia californica*), coyote brush (*Baccharis pilularis*), sticky monkey-flower (*Mimulus aurantiacus*), golden yarrow (*Eriophyllum confertifolium*) California melic grass (*Melica californica*).

Native Americans frequently burned shrublands to encourage grass and forb development (Keeley 2002). Plants in the chaparral and northern coastal scrub communities have evolved to persist despite period wildfire; some of the species are dependent on periodic fire for regeneration (Holland 1986; Hanes 1988; Schoenherr 1992). Some chaparral species have fire adaptations such as peeling bark or volatile oils that promote fire (Schoenherr 1992) species like manzanita and ceanothus have adapted to frequent fire by resprouting from basal burls or woody root crowns. Other species have seeds that require fire to initiate growth (U.S. Fish and Wildlife Service 2002; Rundel and Gustavson 2005).

Fire occurrence that is too frequent is also known to lead to the elimination of these communities altogether and promote invasive non-native weeds such as star thistle (*Centaurea solstitialis*) and annual grasses.

Despite the adaptations of many plants to periodic fire intervals, the notion that chaparral “needs to burn” is strongly disputed by some researchers. Several examples of old growth chaparral can be found in Henry Coe State Park and in other areas in the Hamilton Range.

Chaparral is an important refuge for certain sensitive animals; for example, the dusky-footed woodrat (*Neotoma fuscipes*) is a species of special concern in the county, primarily because encroachment by development into the wildlands reduces the amount of suitable habitat available to this small mammal. The wrentit (*Chamaea fasciata*) is a unique bird that depends on the chaparral for its home. It may be the most sedentary bird species in North America, with an average dispersal distance from natal nest to breeding spot of about 0.25 mile (Cornell Lab of Ornithology 2016).

Depending on the specific site, shrublands can have persistent boundaries with grasslands and adjacent woodlands. Herbivory by wildlife such as brush rabbits (*Sylvilagus bachmani*) creates a “scurry line” along the edge of shrubs that tends to prevent either grass or shrub seedlings from reaching maturity. Similarly, white-tailed deer (*Odocoileus virginianus*) tend to favor succulent new growth of many shrub and tree species, and occupy the edges of woodlands while seeking cover, which can reduce sapling success in competing with and overtopping chaparral shrubs.

Sprawl of human habitation in chaparral and shrub communities poses a great threat to both these plant communities and habitable structures. Similar to the various woodlands and forests, buildup of fuel over many years increases the risk of catastrophic fire (U.S. Fish and Wildlife Service 2002). Severe topsoil erosion is also a problem after intense fires, particularly if they burn hot enough to kill the burls and lignotubers of woody chaparral plants (Schoenherr 1992).

2.3.3 OAK WOODLAND

Oak woodlands are a common cover type found in Santa Clara County. A number of oak-dominated woodlands can occur:

- **Valley oak woodland** – common in the valley floors but also along ridge tops.
- **Mixed oak woodland and forest** – most geographically widespread of all oak woodlands in the county.
- **Coast live oak woodland and forest** – commonly found abutting grassland areas.
- **Blue oak woodland** – present in scattered locations mostly in the low to mid-elevation hills on dry or well-drained north- or northeast-facing slopes.
- **Foothill pine-oak woodland** – often occurs along valley floors within chaparral communities in the eastern foothills and also adjacent to other oak land cover types and on serpentine soils.
- **Mixed evergreen forest** – occurs on the west side of the Santa Clara Valley, usually on north-facing slopes.

Oak-dominated woodlands are thought to have been more prevalent in Santa Clara County historically and have become fragmented as a result of urban development and agricultural uses (Grossinger et al. 2006).

Oak woodland is a fire-adapted ecosystem, and fire has likely played a large role in maintaining this community type in the study area. Fire creates the vegetation structure and composition typical of oak woodlands, and this natural community has experienced frequent, low-severity fires that

maintain woodland or savannah conditions. In the absence of fire, the low or open understory that characterizes this land cover type can be lost. Depending on site characteristics closed canopy oak forests can be replaced by shade-tolerant species and conifers if oaks cannot regenerate and compete as shade encroaches. Soil drought may also play a role in maintaining open tree canopy in dry woodland habitat.

Mixed evergreen forests on the northern slopes of the Santa Cruz Mountains are being heavily impacted by drought, Sudden Oak Death, and bark beetle infestations, resulting in widespread die off of certain oak species, tanoak (*Notholithocarpus densiflorus*), and Douglas fir (*Pseudotsuga menziesii*) that leaves large openings in the woodlands, full of hazardous fuels where sunlight penetrates and dries out the ground.

2.3.4 SUDDEN OAK DEATH

A recent influence on oak woodlands is Sudden Oak Death. The disease, first identified in 1995, has since spread to 12 counties and killed hundreds of thousands of oaks. Research indicates that members of the black oak family such as coast live oaks (*Quercus agrifolia*) and black oaks (*Q. velutina*), as well as tanoak, appear to be the most susceptible to this disease (Rizzo et al. 2003). Sudden Oak Death is caused by the water mold pathogen *Phytophthora ramorum* (*P. ramorum*) and is a serious threat to oak woodlands and mixed evergreen forests in northern California. The pathogen can kill adult oaks and madrone (*Arbutus menziesii*); California bay (*Umbellularia californica*), buckeye (*Aesculus californica*), and maple (*Acer* spp.) host the pathogen without being killed by it. Members of the white oak family such as blue oak (*Quercus douglasii*) and valley oak (*Q. lobata*) have not shown symptoms of the pathogen.

2.3.5 RIPARIAN FOREST AND SCRUB

Riparian areas of Santa Clara County are broken down into the following:

- **Willow riparian forests, woodland, and scrub** – occur in or along margins of active channels on intermittent and perennial streams.
- **Central Californian sycamore alluvial woodland** – generally present on broad floodplains and terraces along Coyote Creek and Pacheco Creek.
- **Mixed riparian woodland and forest** – occur in or along margins of active channels on intermittent and perennial streams.

These vegetation types are found in association with riverine watercourses along streambanks and floodplains and surrounding open water bodies. Much of the existing stream network has been largely developed with human intervention and creation of canals and ditches.

2.3.6 CONIFER WOODLAND

There are three conifer-dominated vegetation communities that occur in Santa Clara County (Santa Clara Valley Habitat Agency 2012):

- **Redwood forest** – coast redwood (*Sequoia sempervirens*) occurring primarily in the Santa Cruz Mountains. Adjacent cover types are mixed oak woodland and mixed evergreen woodland. Occurs in areas that receive substantial rainfall >35 inches per year. Redwood-dominated overstory and tanoak (*Notholithocarpus densiflorus*), madrone, and California bay understory trees; hazelnut (*Corylus cornuta* var. *californica*), thimbleberry (*Rubus parviflorus*), and black huckleberry (*Vaccinium ovatum*) in the shrub layer. In riparian areas, California bay and bigleaf maple (*Acer macrophyllum*) are common, California nutmeg (*Torreya californica*) may occur, and ferns such as sword fern (*Polystichum munitum*) often form a dense layer.
- **Ponderosa pine (*Pinus ponderosa*) woodland** – restricted distribution within the county, only occurring on three high elevation ridges in Henry W. Coe State Park—Pine Ridge, Middle Ridge, and Blue Ridge—and extending downslope into north-facing canyons and valleys.
- **Knobcone pine (*Pinus attenuata*) woodland** – consists of dense stands of knobcone pines that regenerate following fire. Uncommon in the county, occurring only in the Santa Cruz Mountains on ridge top sites, often on serpentine-derived soils. Knobcone pine is an obligate fire-climax species—fire is required to melt the resin that seals the cones, releasing the seed, and fire also creates the bare mineral soil required for the seeds to germinate. Stands of knobcone pine are therefore even-aged, dating back to the last stand-replacing fire.

Prior to European settlement, the Santa Clara Valley supported a mosaic of plant and wildlife communities and the upland regions were heavily forested with redwoods and pine and oak woodlands. In the mid to late 1800s, the foothill forests and woodlands were heavily thinned to support regional population growth.

A major factor influencing the distribution of conifer-dominated land cover types is fire intensity and frequency. The combination of logging and burning at the end of the nineteenth century resulted in the conversion of conifer-dominated forests (redwood and Douglas fir) in the Santa Cruz Mountains to grassland or chaparral and oak-dominated woodlands. Periodic stand-replacing fire is required for the regeneration of knobcone pine woodland.

2.3.7 IRRIGATED AGRICULTURE

This cover type encompasses all areas where the native vegetation has been removed for irrigated agriculture (not including rangeland). The cover types included are:

- **Orchards** – apricot, prunes, and walnuts predominantly.
- **Vineyards** – occur throughout the county but predominantly in the southern portion.
- **Agriculture (developed)** – i.e., greenhouses, nurseries, Christmas tree farms; occurs in small patches throughout the county.
- **Grain, row crops, hay, and pasture** – abundant throughout the Santa Clara Valley south of San Jose.

Father Junípero Serra gave Santa Clara Valley its name when he consecrated the Mission Santa Clara de Asís in 1777 (National Park Service 2006). The establishment of the mission also heralded the beginning of large-scale agriculture in the Santa Clara Valley. Soon, the Guadalupe River dam (located near Mission Santa Clara) was constructed for irrigation of wheat, corn, bean, and other crops. Fruit trees and grapes were also cultivated.

Population growth in the county has been continuous since 1850. In order to facilitate the sustained growth in 1870, Los Gatos Creek was diverted to meet water demands for agriculture. Improved access to railroads also led to increased agricultural production in the county at that time. Agricultural products included carrots, almonds, tomatoes, prunes, apricots, plums, walnuts, cherries, pears, grapes, and lumber for the world market (National Park Service 2006). The rural nature of the Santa Clara Valley lasted through World War II, after which time the amount of cultivated lands was reduced to make room for urban expansion.

2.3.8 *INVASIVE NON-NATIVE PLANT COMMUNITIES*

In addition to native grasslands, shrublands, and woodlands, Santa Clara County contains plant communities of species that are not native but exist outside agricultural or developed areas. Scattered non-native escaped plants are not likely to significantly change fire behavior or affect other natural resource values. However, some species can dominate or even completely take over areas, excluding natural vegetation and changing fuel characteristics. Examples of non-native plant communities and invasive species of concern for wildfire include:

- Grassland: wild oats (*Avena* spp.), yellow star thistle, curly dock (*Rumex crispus*)
- Rock outcrops: fennel (*Foeniculum vulgare*), broom species (*Bromus* spp.), cotoneaster (*Cotoneaster* spp.), jubota grass (*Cortaderia jubata*)
- Seeps and riparian: poison hemlock (*Conium maculatum*), teasel (*Dipsacus* spp.), jubota grass, arundo (*Arundo* spp.), Himalayan blackberry (*Rubus armeniacus*), black locust (*Robinia pseudoacacia*)
- Shrublands: French broom (*Genista monspessulana*), Scotch broom (*Cytisus scoparius*), gorse (*Ulex* spp.), fennel
- Mixed oak woodland: Ivy (*Hedera* spp.), locust, privet (*Ligustrum* spp.), acacia (*Acacia* spp.)
- Valley oak woodlands: milk thistle (*Silybum marianum*)
- Mixed evergreen: periwinkle (*Vinca* spp.), English ivy (*Hedera helix*)
- Replacement woodlands: blue gum eucalyptus (*Eucalyptus globulus*), acacia, tree-of-heaven (*Ailanthus altissima*)

Several invasive, non-native plant species are found in riverine land covers within the study area. One of the most prevalent is giant reed (*Arundo donax*), which is often found in large pure stands.

Other invasive, non-native plants potentially found in the study area include blue gum eucalyptus, acacia, fennel, periwinkle, French broom, black locust, English ivy, Algerian ivy (*Hedera canariensis*), cape ivy (*Delairea odorata*), Himalayan blackberry, weeds, curly dock, thistle, blackwood acacia (*Acacia melanoxylon*), tree-of-heaven, glossy privet (*Ligustrum lucidum*), fig, and poison hemlock.

2.3.9 DEVELOPED

A large portion of Santa Clara County is composed of developed lands. Developed land cover types include:

- Urban-suburban
- Rural-residential
- Barren
- Landfill
- Golf courses/urban parks
- Ornamental woodland

Vegetation found in the urban-suburban land cover type is usually in the form of landscaped residences, planted street trees (e.g., elm [*Ulmus* spp.], ash [*Fraxinus* spp.], sweet gum [*Liquidambar* spp.], pine [*Pinus* spp.], palm [*Arecaceae*]), blue gum eucalyptus, Monterey pine (*Pinus radiata*), and parklands. Most of the vegetation is composed of non-native or cultivated plant species. The major urban-suburban area in the study area is San Jose, located in the northern portion of the Santa Clara Valley. Other urban-suburban areas include areas within Morgan Hill and Gilroy.

2.3.10 STREAMS AND WATERSHEDS

Major streams in the County include the San Francisquito, Matadero, Adobe, Permanente, and Stevens Creeks in the Lower Peninsula watershed to the north; Saratoga, San Tomas Aquino, and Los Gatos Creek in the West Valley watershed; and Coyote Creek, Guadalupe River, Uvas Creek, Llagas Creek, Pajaro River, Pacheco Creek, and their various tributaries. Major watersheds in the County are shown in Figure 2.8.

Visit Santa Clara Valley Water District website for more information on watersheds and creeks in the County: <http://www.valleywater.org/Services/WatershedInformation.aspx>

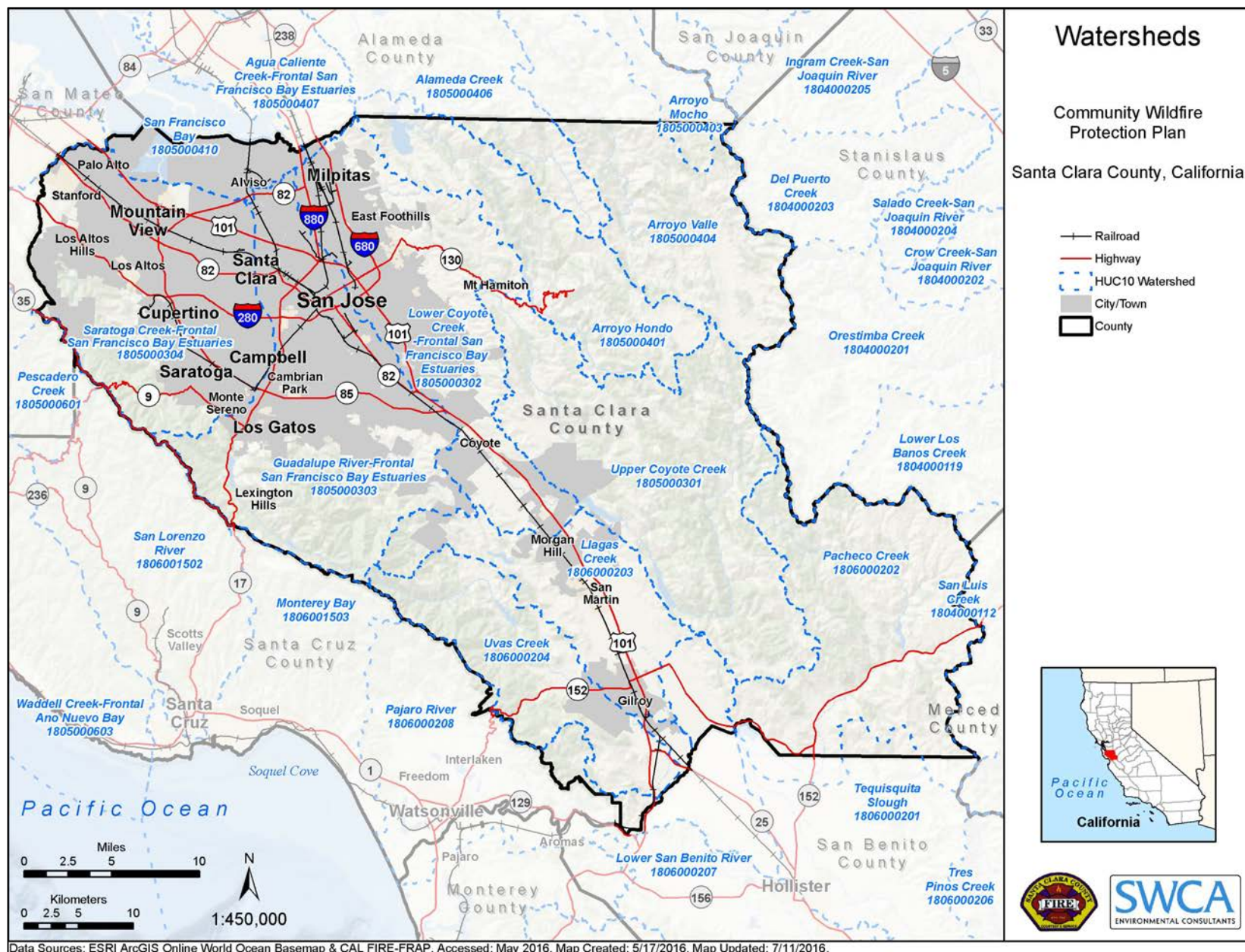


Figure 2.8. Watersheds throughout Santa Clara County.

2.3.11 WILDLIFE

Wildfire management is an important component of wildlife management because of the impacts, both adverse and beneficial, that wildfire can have on wildlife habitat. The focus of most wildlife management is on the preservation of biodiversity and healthy functioning ecosystems; fire management and the application of prescribed fire can play an integral part in the preservation of biodiversity.

Projects to reduce wildfire risk that involve physical changes to the landscape such as creating fuel breaks or modifying vegetation types can have positive or negative impacts on wildlife. These impacts should be evaluated when projects are proposed and plans to implement the projects are developed.

2.4 LAND USE PLANNING

2.4.1 URBAN ENCROACHMENT

Santa Clara County has been a leader in urban planning for decades, starting with the adoption in the early 1970s of the Countywide Urban Development Policies and the use of city USA boundaries. In the 1990s, Santa Clara County and interested cities worked together to adopt urban growth boundaries for several cities, delineating areas intended for future urbanization (Santa Clara Local Area Formation Commission 2015). Though strong efforts have been implemented by many county cities to prevent geographic expansion, many have still accommodated substantial residential growth. The city of Milpitas's population increased by 43% between 1990 and 2015, with no increase in land area, the city of Sunnyvale's population increased by 26% with a less than 5% increase in land area, and the City of Santa Clara by 29% with no increase in land area (Santa Clara Local Area Formation Commission 2015). Table 2.2 shows the population densities of the county's cities.

The WUI is closely inter-related to urban sprawl, which, according to the American Planning Association is characterized by low-density residential and commercial development at the urban fringe (Santa Clara Local Area Formation Commission 2015). Sprawl is often contrasted with "smart growth," which is generally defined as focusing moderate to higher density development near existing infrastructure, especially transit. Smart growth has been promoted throughout the county to counter the effects of urban sprawl on the county's natural resources; this in turn helps to prevent the expansion of the WUI. Because of the economic draw of the Santa Clara Valley, however, reduced expansion has led to housing production being out of pace with the expansive job market. As a result, commuting through the WUI from distant housing in areas such as Santa Cruz County brings wildfire-related concerns with motorist entrapment on highways and increased evacuation concerns due to congestion of arterial roads in the Santa Cruz Mountains.

Table 2.2. Population Densities of Cities within Santa Clara County

Jurisdiction	Population	City Square Miles	Residents per Square Mile
Campbell	41,857	6.09	6,873
Cupertino	59,756	11.32	5,279
Gilroy	53,000	16.56	3,200
Los Altos	30,036	6.52	4,607
Los Altos Hills	8,341	9.00	927
Los Gatos	30,505	11.39	2,678
Milpitas	72,606	13.56	5,354
Monte Sereno	3,451	1.61	2,143
Morgan Hill	41,779	12.91	3,236
Mountain View	77,914	12.20	6,386
Palo Alto	66,912	25.96	2,578
San Jose	1,016,479	180.67	5,626
Santa Clara	120,973	18.18	6,654
Saratoga	30,799	12.78	2,410
Sunnyvale	148,028	22.88	6,470

Source: Department of Finance 2015 Population Estimates, Santa Clara Local Area Formation Commission 2015 City Area Estimates.

2.4.2 CONVERSION OF HISTORICAL SUMMER VACATION HOMES

A large number of homes, particularly in the Lexington Basin, originated as summer homes that were built in the last century, that are now being used as full-time residences. Redwood Estates, for example, was established as a summer home community in the mid-1920s designed for wealthy Bay Area residents to escape to the cooler Santa Cruz Mountains during the summer.

Figure 2.9 shows two still captures taken from a real estate promotional video for Redwood Estates filmed in 1926.

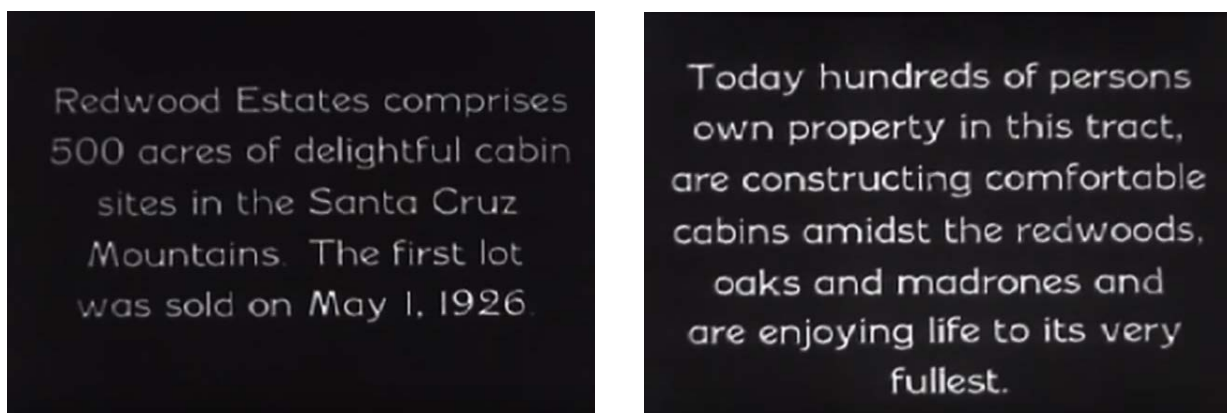


Figure 2.9. Two slides taken from a promotional film created by a real estate company for the Redwood Estates in 1926 (Source: YouTube).

The implication of this twentieth century summer home development to wildfire management is that many of these homes were built in the WUI before WUI codes were enacted and many have structural ignitability issues related to construction materials and close adjacency to neighboring properties.

2.4.3 NON-PERMITTED HOMES

In addition, many homes have been built on parcels without planning permission and as such are not documented in county assessor records, particularly in remote areas in the Lexington Hills and Croy area. This has been an increasing problem in the last decade.

It has become even more alarming as these homes are often combined with cannabis cultivation operations that rely on gas-powered electrical generators to run wells, lights, fans, and other agricultural equipment. Due to the quasi-legal status of these operations, few have been constructed by licensed contractors and many are very deficient in safety considerations. The social culture surrounding these operations is also attractive to people who prepare hash oil and other cannabis derivatives or synthesize methamphetamine. These operations require use of hazardous chemicals that can be highly explosive, such as butane and acetone. Several wildfires have been started by bad wiring, careless use and storage of gasses, and other hazardous activities.

These inhabited and agricultural/industrial structures are a concern for emergency responders, who may legitimately fear for their safety when approaching or entering illegal facilities. In addition, the roads leading to these structures are often substandard, unmarked, and blocked by locked gates without fire access keys. All of these factors create serious concerns around the issue of notifying residents and workers and effectively conducting mandatory evacuations.

2.4.4 GENERAL PLANS/LOCAL HAZARD MITIGATION PLANS

Santa Clara County and Individual City General Plans

The Santa Clara General Plan (Santa Clara County 1994) and individual city General Plans provide a general overview of wildfire hazard in terms of emergency response and direction for local and county hazard planning. The purpose of the General Plan is to guide land use changes in a manner that provides for proper and safe community development. Several “elements” in the General Plan (e.g., safety, housing, circulation, and open space) have a direct relationship to the WUI fire problem. The General Plan can serve to reduce the threat of natural or human-caused disasters by directing land use policies for hazard prone areas (i.e., proper community design, open space land use, and reducing population in areas prone to wildfire). Its policies can direct government agencies to carry out community and agency education programs, alerting citizens and staff as to what to do in the event of an emergency.

The Santa Clara County General Plan identifies that much of the mountainous areas of Santa Clara County are considered “high or extreme fire hazard areas,” due to a variety of factors, including:

- climatic factors, such as rainfall, humidity, and wind patterns;
- volume of naturally occurring “fuel” for fires, such as brush, dead trees, and grasses that ignite easily and burn hotly;
- steepness of slopes; and
- inaccessibility and lack of available water supplies for fire suppression.

The following four areas are identified as the main concerns related to wildfire hazard that need to be addressed through policy and planning:

- access issues;
- water supply;
- building requirements; and
- defensible space.

In order to address these concerns, the General Plan identified a series of policies and implementation (also found on page P-23 of General Plan Book B) shown in Appendix E.

Similarly, city General Plans contain information on the wildfire situation and hazard, although the level of detail varies among cities. The Los Gatos 2020 General Plan, for example, lists wildfire-related goals in its Safety Element that are associated with planning for both fire safety and fire risk reduction. These, in turn, are further developed into general policies and actions, many of which are directly related to issues, concerns, and action items developed in greater detail in the CWPP.

Cities within Santa Clara County also have an LHMP, which is an annex to the County's LHMP. The various city LHMPs, following a standard template, discuss the local nature of various hazards, values at risk from these hazards, and actions to take to mitigate this risk. The CWPP is designed to provide more detailed information to these city plans on wildfire mitigation and prevention strategies and hazard reduction projects that have been developed, and will continue to be developed, at a countywide level in a collaborative, interagency, and interdisciplinary process.

2.4.5 *SANTA CLARA VALLEY HABITAT PLAN*

The Santa Clara Valley Habitat Agency is responsible for administering and implementing the Santa Clara Valley Habitat Plan, a federally approved Habitat Conservation Plan and state approved Natural Communities Conservation Plan. The Habitat Plan provides for the protection and recovery of 18 plant and animal species of special conservation concern e.g., species listed by the federal or state government as threatened or endangered. The jurisdictions participating in the Habitat Plan include the cities of Gilroy, Morgan Hill and San Jose, Santa Clara County, the Santa Clara Valley Transportation Authority and the Santa Clara Valley Water District. Permits are required for discretionary projects affecting habitat and species covered by the Habitat Plan. Fees are collected to compensate for impacts on covered species and habitats. The fees in turn, are used to acquire properties with equivalent habitat to compensate for the losses. These properties become part of the conservation reserve system that will eventually encompass over 46,000 acres of oak woodland, serpentine grassland, annual grassland and other habitat types.

The area covered by the conservation plan is shown in Figure 2.10.

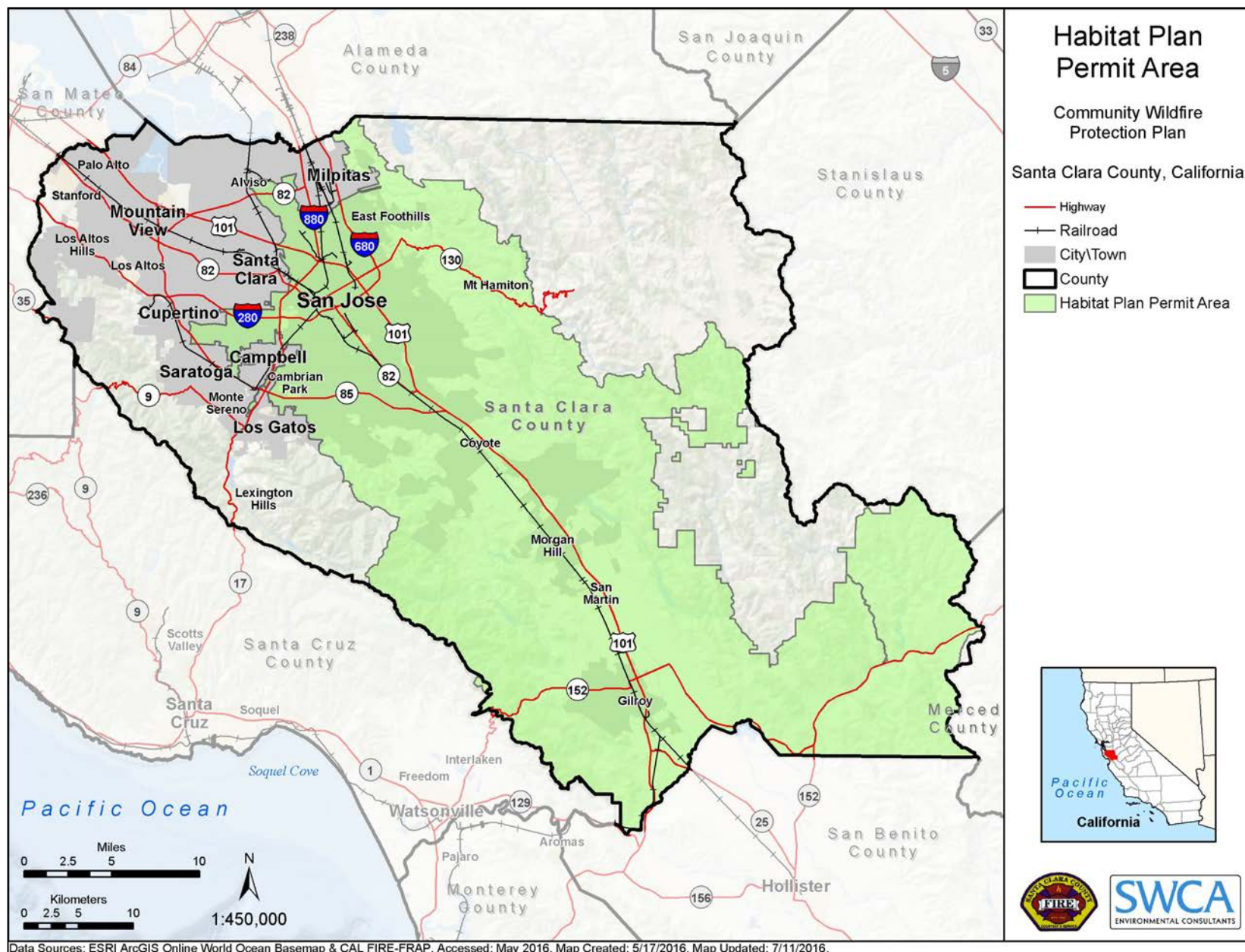


Figure 2.10. Santa Clara Valley Habitat Plan permit area.

The Habitat Plan acknowledges the potential negative impacts of wildfire and associated suppression activities on nearly all of the wildlife and plant species designated for protection. It also acknowledges the potential impacts of measures undertaken to reduce wildfire risks on the same species and their habitats. There is a need to find a balance between habitat management to reduce wildfire risk and preservation of habitat qualities that benefit the protected species. There is also a need to inform wildfire suppression organizations about the resources to be protected in the event of a fire on a conservation reserve.

The Santa Clara Valley Habitat Agency has prepared guidelines for fuel treatments that incorporate the Habitat Plan's requirements for protecting covered habitats and species (Harris 2016). The guidelines will be used to plan fuel treatments within conservation reserves. They may also be used to plan fuel treatments outside of reserves or to place conditions on discretionary projects if fuel reduction is proposed as part of the project. The following projects may be subject to the permit requirements of the Habitat Plan:

- Land development within the Habitat Plan boundaries requiring discretionary approval from participating jurisdictions.
- Vegetation management projects subject to environmental analysis pursuant to the CEQA.
- Vegetation management that is a covered activity under the Habitat Plan such as management within county parks and land managed by the Santa Clara Valley Open Space Authority.

Fuel treatments proposed by the CWPP may be subject to the Habitat Plan permit requirements if they are funded by public agencies such as CAL FIRE or otherwise require discretionary permits from participating jurisdictions. In these cases, planning those treatments to be consistent with the Habitat Agency's guidelines would be advisable. It is the intent of this CWPP that if and when fuel treatments are planned within the conservation plan area and/or within habitats or potentially affecting species covered by the Habitat Plan that those treatments will conform to the degree possible to the recommendations of the Habitat Agency's guidelines (Harris 2016).

The ultimate spatial distribution of conservation reserves cannot be anticipated at this time. The likelihood that a property will be acquired will depend not only on the habitat involved but also on the willingness of the property owner to sell or grant a conservation easement. Some properties, such as some county parks and land owned by the Santa Clara Valley Open Space Authority, have already been enrolled in the conservation reserve system and other properties are currently under consideration for acquisition.

The Habitat Agency intends to aggressively pursue implementing fuel treatments within its conservation reserves. Most County Parks are already being effectively managed to reduce fuels, primarily through grazing and use of prescribed fire, though some, including Mount Madonna and Sanborn Parks, have been identified by the public and Core Team as needing additional fuel management. Depending on where reserves are located there may be opportunities to incorporate them into community fuel breaks planned under the CWPP. This can be facilitated by continued active involvement by the Habitat Agency in the CWPP implementation phase.

2.5 POPULATION

According to Census estimates (U.S. Census Bureau 2014), the population of Santa Clara County is 1,894,605 people, with a 6.3% increase in population from 2010 to 2014. Population density is 1,451 persons per square mile. As of July 2014, there were an estimated 614,714 households in the county, with an average 2.94 persons per household. Almost half (47.3%) of the population aged 25 years or older hold a Bachelor's degree or higher; the tech industry is a considerable employer and draw to the area. According to a 2014 report by the U.S. Conference of Mayors, Santa Clara County was reported to have the highest median household income in the nation at \$93,854, compared to \$51,939 nationally (U.S. Census Bureau 2014; U.S. Conference of Mayors 2014).

2.5.1 SOCIOECONOMIC COMPONENTS

Historical, Cultural, or Local Icons

There are 107 properties and districts listed on the National Register of Historic Places in Santa Clara County, including five National Historic Landmarks (National Register of Historic Places 2016). Many of these sites are located in the urban areas of the county, but some are located within the WUI, for example, Paul Masson Mountain Winery in Saratoga (built in 1901), the Picchetti Brothers winery southwest of Cupertino (built between 1880 and 1920), and Villa Montalvo in Saratoga (built in 1912). The Lick Observatory, opened in 1888, is located on Mt. Hamilton and operated by the University of California.

Important Economic or Employment Locations

During 2015, total jobs grew by 4.2% in Santa Clara County, as compared to 4.6% in San Francisco-San Mateo, and 2.8% in the East Bay. The pace of annual growth rate was 3.1% in California and 1.9% in the United States (Bay Area News Group 2016). The technology industry is a major employer in the county with more than 6,500 high technology companies, including many of the largest tech companies in the world, among them hardware manufacturers AMD, Cisco Systems, and Intel; computer and consumer electronics companies Apple Inc. and Hewlett-Packard; and internet companies eBay, Facebook, Google, and Yahoo. Most of what is considered to be Silicon Valley is located within Santa Clara County (California Employment Development Department 2016). Many employees of these large tech-based companies choose to locate their homes in the Santa Clara foothills. This has an impact on the WUI due to increased construction pressures and values at risk in the wildland areas and unique concerns such as gated entrances and vegetated landscaping and screening.

Commuter Patterns

With a mean travel time to work of 25.6 minutes (U.S. Census Bureau, 2014), a large majority of the population likely work within the county. However, Santa Clara County also attracts a large number of commuters. Among workers in Santa Clara County, 280,000 live outside the county (Santa Clara Weekly 2015). A 2013 Census Bureau report states that Santa Clara County has among the highest number of commuters (208,965) coming from another county in the nation. Reports in 2013 were that 64,696 workers commute in from Alameda County, 50,215 from San Mateo County, 17,215 from Santa Cruz County, 11,526 from Contra Costa County, and 19,087 from San Francisco County (U.S. Census Bureau 2013). Conversely, 109,287 residents of Santa

Clara County leave the county for work, with 41,522 going to San Mateo County, 38,339 to Alameda County, and 9,570 to San Francisco County (U.S. Census Bureau 2013). Commuter traffic is a huge concern for residents, particularly related to evacuation and ignition concerns along major commuter routes like Highway 17.

2.6 ROADS AND TRANSPORTATION

As outlined in the Santa Clara County General Plan, an adequate transportation system is essential to the county's economy, environment, and overall quality of life (Santa Clara County 1994). The Transportation section of the General Plan provides measures to reduce congestion in the county, improve air quality, encourage compact urban development, and improve social and economic well-being. Specific to the CWPP, roads and transportation are important for evacuation purposes and emergency response, but they also contribute to patterns of ignition, as they bring people in contact with the wildlands. Santa Clara County is currently updating the Circulation and Mobility Element of the General Plan, which will provide updates and policies to support and implement road improvements to the county's expressways and unincorporated road system. Emergency response would be a component of those updates, highlighting the importance of Core Team engagement with County Planners for future revisions. Santa Clara County's main airport is Norman Y. Mineta San Jose International Airport with numerous international connections. Santa Clara Train Station is served by Caltrans and provides service throughout Santa Clara Valley and the Bay Area. The San Jose Diridon Station is the transit hub for Santa Clara County/Silicon Valley. This station serves Altamont Commuter Express (ACE), Amtrak Capitol Corridor, Amtrak Coast Starlight, VTA, Light Rail, Highway 17 Express) and Monterey-San Jose Express. The Santa Clara Valley Transportation Authority operates the regional light rail system connecting towns throughout the valley.

Santa Clara County has an extensive freeway system and separate expressways. The expressways are maintained as county roads, not by Caltrans. The major state highways in the county are U.S. Route 101 that runs through the center of the valley, State Route 17 that runs from San Jose through the Santa Cruz Mountains to Santa Cruz, Interstate 280 that connects San Jose to San Francisco, Interstate 880 that connects San Jose with Oakland to the north, Interstate 680 that connects San Jose to communities to the northeast and State Route 85 (West Valley Freeway) that connects south San Jose to Mountain View and all the West Valley Cities.

There are many arterial roads and highways that are critical to transportation in the WUI. These include Skyline/Highway 35, Summit Road, Junipero Serra Blvd/Foothill Expressway, Blossom Hill Road, Almaden Road, Old Monterey Highway, Page Mill Road, Stevens Canyon Road, Highway 9, Highway 17, Old Santa Cruz Highway, Watsonville Road, Hecker Pass/Highway 152 West, Pacheco Pass/Highway 152 East, and Mt. Hamilton Road/Highway 130. Many subdivisions in the county are located within a private road network. Maintenance of these private roads is a concern for emergency response because poorly maintained roads, steep grades, and unsurfaced routes may be inaccessible to some emergency apparatuses. Some of these communities have a road committee that provides oversight of road conditions.

Rural areas such as Croy and in the Hamilton Range have critical access routes for residents that are on private land and maintenance and improvements are the responsibility of the landowner. Inholdings with access easements on these roads may have limited influence on improving road

conditions or opening locked gates for alternate escape routes if no road association or agreement exists.

2.7 ADJOINING COUNTIES

Santa Clara County shares borders with San Mateo County to the west, Alameda County to the north, Stanislaus and Merced Counties to the east, San Benito County to the south, and Santa Cruz County to the southwest. Many residents of those adjoining counties travel into Santa Clara County for work and leisure, and a large number of residents reside very close to the county boundary and as such wildfire concerns are shared across those county boundaries. Although this document is a countywide CWPP and risk assessment analysis was completed only for lands within the Santa Clara County boundary, the Core Team recognizes that fire does not stop at jurisdictional boundaries. The Core Team is concerned about management of fire and fuels in those boundary areas. Project recommendations included in Section 5 are designed to address specific concerns of both Santa Clara County residents and residents who live close to the county boundary.

3 WILDLAND URBAN INTERFACE ENVIRONMENT AND FIRE HAZARD

3.1 FIRE AND LAND MANAGEMENT POLICY AND RESPONSIBILITY

SRAs are areas in which “CAL FIRE has legal and financial responsibility for wildland fire protections and where CAL FIRE administers fire hazard classifications and building standard regulations” (California Governor’s Office of Emergency Services 2013:246). SRAs are county unincorporated areas, are not federally owned, have wildland vegetative cover, have watershed/range/forest value, and have housing densities not exceeding three per acre (California Governor’s Office of Emergency Services 2013). There are areas in Santa Clara County that are classified SRAs that also are within the boundaries of a fire protection district (e.g., Saratoga, Central, and South Santa Clara County fire protection districts). In these instances, jurisdiction is shared between the fire district and CAL FIRE. LRAs include land within incorporated cities, cultivated agricultural lands, lands not meeting criteria for SRAs or Federal Responsibility Areas. LRA fire protection is usually performed by city fire departments, fire protection districts, county fire departments, or CAL FIRE under contract to local government. LRAs may include flammable vegetation and the WUI. The local government agency has financial and jurisdictional responsibility for improvement and WUI fire protection (California Governor’s Office of Emergency Services 2013).

3.1.1 STATE OF CALIFORNIA

California Department of Forestry and Fire Protection (CAL FIRE)

CAL FIRE assumes fire protection responsibilities on SRAs¹⁰. In conjunction with this responsibility, the Santa Clara Unit conducts defensible space (LE-100) inspections to educate and enforce property owners on compliance with Section 4291 of the PRC. Under this section, all structures located with the SRA will have clearance of up to 100 feet of flammable vegetation. Otherwise, the Santa Clara Unit has delegated the enforcement of the latest California Building Code standards (California Code of Regulations Title 24, Part 2) to the local authority.

CAL FIRE’s mission also includes protecting California’s resources, including the health of the state’s woodlands and forests. The Board of Forestry and Fire Protection is a government-appointed body within CAL FIRE. It is responsible for developing the general forest policy of the state, determining the guidance policies of CAL FIRE, and representing the state’s interest in federal forestland in California. Together, the Board and the Department work to carry out the California Legislature’s mandate to protect and enhance the state’s unique forest and wildland resources.

The Board is charged with protecting the forest resources of all the wildland areas of California that are not under federal jurisdiction. These resources include major commercial and non-commercial stands of timber, areas reserved for parks and recreation, the woodland, brush-range

9 2013 State of California Multi-Hazard Mitigation Plan

¹⁰ Public Resources Code 4125.

watersheds, and all such lands in private and state ownership that contribute to California's forest resource wealth.

CAL FIRE's Environmental Protection and Regulations Program strives to provide protection to the resources of the state, through its several sub-program areas, to ensure that: state and federal environmental laws are observed; forested landscapes are managed wisely; the State's varied biological resources are enhanced; that water quality is protected and maintained; the State's archeological and historical resources are protected; California's wildlands are managed to minimize and offset climate change effects; the State's vast woody biomass resource is efficiently utilized; and regulations are developed, where necessary, that provide furtherance of the CAL FIRE's mission—to protect the environment.

CAL FIRE enforces the Forest Practice Act laws that regulate logging on privately owned lands in California. This ensures that logging is done in a manner that will preserve and protect our fish, wildlife, forests, and streams. Additional rules enacted by the State Board of Forestry and Fire Protection are also enforced to protect these resources.

Santa Clara County Fire Department

Established in 1947, the Santa Clara County Fire Department has fire and life safety code responsibilities for the communities of Campbell, Cupertino, Los Altos, Los Altos Hills, Los Gatos, Monte Sereno, Saratoga, and all of unincorporated County area. The Fire Chief of the Santa Clara County Fire Department is the County Fire Marshal.

All planned construction projects within the seven cities and towns and the entire unincorporated areas of the County are submitted to the local planning and building departments. Each of these jurisdictions forward the proposed development and building permit applications to Santa Clara County Fire Department's Fire Prevention Division for our review and comments. Prior to the issuance of building permits by the communities served, projects must meet all fire department requirements, including meeting California Building Code Chapter 7A requirements for buildings located in in any Fire Hazard Severity Zone within State Responsibility Areas or any Wildland-Urban Interface Fire Area to resist the intrusion of flames or boring embers projected by a vegetation fire. New development also must meet appropriate fire apparatus access and water supply requirements.

Every spring the Santa Clara County Fire Department sends defensible space letters to all residents within the jurisdiction living in locally identified Wildland-Urban Interface Areas and within the SRA of the District. Local engine companies perform field inspections, with follow up inspections from the Fire Prevention Division. Enforcement of defensible space is performed in coordination with each community's code enforcement program.

3.1.2 CITY FIRE DEPARTMENTS

Santa Clara County contains 15 cities (Campbell, Cupertino, Gilroy, Los Altos, Los Altos Hills, Los Gatos, Milpitas, Monte Sereno, Morgan Hill, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale). Most of these communities are also considered to be at risk from wildfire. City fire departments typically work within a mutual aid framework to respond to emergencies in various jurisdictions as the incident evolves. The Milpitas Fire Department, for

example, is able to respond to a wide variety of incidents, as well as enforcing fire and life safety codes, similar to the functions of other city fire departments.

3.1.3 INSURANCE AND LOSS REDUCTION RESEARCH ASSOCIATIONS

The insurance and fire prevention industries have committed significant resources to studying wildfires and structural ignitions. Their cutting-edge research findings help drive the adoption or modification of new building codes.

National Fire Protection Association

The National Fire Protection Association (NFPA) is a global nonprofit organization devoted to eliminating death, injury, property and economic loss due to fire, electrical and related hazards. Its 300 codes and standards are designed to minimize the risk and effects of fire by establishing criteria for building, processing, design, service, and installation around the world.

The NFPA develops easy-to-use educational programs, tools, and resources for all ages and audiences, including Fire Prevention Week, an annual campaign that addresses a specific fire safety theme. The NFPA's Firewise Communities program encourages local solutions for wildfire safety by involving homeowners, community leaders, planners, developers, firefighters, and others in the effort to protect people and property from wildfire risks.

The NFPA is a premier resource for fire data analysis, research, and analysis. The Fire Analysis and Research division conducts investigations of fire incidents and produces a wide range of annual reports and special studies on all aspects of the nation's fire problem.

Insurance Institute for Business and Home Safety

The Insurance Institute for Business & Home Safety (IBHS) is an independent, nonprofit, scientific research and communications organization supported solely by property insurers and reinsurers. The IBHS's building safety research leads to real-world solutions for home and business owners, helping to create more resilient communities. Its mission is to conduct objective, scientific research to identify and promote the most effective ways to strengthen homes, businesses, and communities against natural disasters and other causes of loss.

The IBHS conducts laboratory and field experiments in structural ignitability and has helped develop new guidelines for defensible space zones to emphasize ember resistance and a "home ignition zone."

3.1.4 FIRE SAFE COUNCILS

Santa Clara County Fire Safe Council

The Santa Clara County Fire Safe Council is a non-profit 501(c)(3) organization that was chartered in 2001 and works countywide with a variety of partners at the federal, state, and local levels. Communities served by the Fire Safe Council include the designated Communities at Risk: Stanford, Palo Alto, Los Altos Hills, Cupertino, Saratoga, Monte Sereno, Los Gatos, Lexington Hills, San Jose, Morgan Hill, Gilroy, East Foothills, and Milpitas, as well as parts of the region near the named communities listed that are also WUI areas with values at risk. The Santa Clara

County Fire Safe Council partners with agencies, jurisdictions, or organizations that share in its mission, which is “mobilizing the people of Santa Clara County to protect their homes, communities and environment from wildfires.”

The Santa Clara County Fire Safe Council, as a non-government organization, has no legal authority or responsibility to enforce laws or policies adopted by agencies having jurisdiction. The Fire Safe Council serves its communities in four active program areas: Planning, Community Outreach and Education, Hazardous Fuel Reduction, and Fundraising. Funding for the Fire Safe Council’s work is provided by federal, state, and other grants, as well as by the county, cities, fire agencies, and other community partners and individuals. The Council builds its work plan around implementing recommended programs and projects in this CWPP (see Section 6).

The Santa Clara County Fire Safe Council works cooperatively in the region served by the South Skyline Fire Safe Council to support and enhance its work.

South Skyline Fire Safe Council

The South Skyline Fire Safe Council serves communities within San Mateo, Santa Cruz, and Santa Clara Counties, generally along Skyline Boulevard (California Highway 35). The area served in Santa Clara County is from Page Mill Road to Black Road, above Palo Alto, Saratoga, and the western edges of Lexington Hills. Its mission is to “provide education and outreach programs for fire prevention and preparedness to all South Skyline residents within the Council area in order to prevent the loss of lives and reduce losses of personal and public property and natural resources from wildfire.” The South Skyline Fire Safe Council is funded through donations and in-kind contributions of time from a committed group of volunteers.

3.1.5 *PARKS, OPEN SPACE, AND PROTECTED LANDS*

Figure 3.1 shows the open space areas throughout the County.

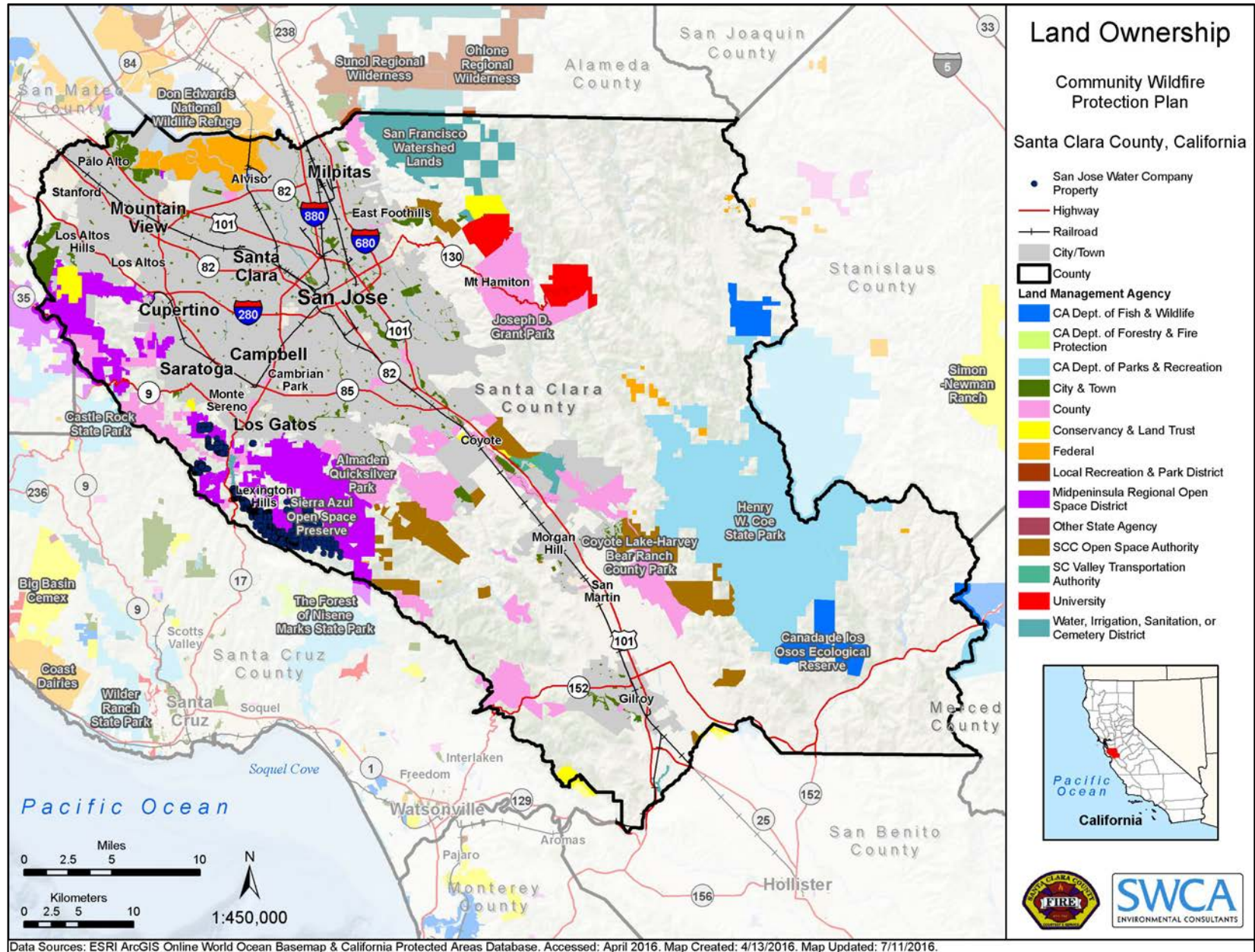


Figure 3.1. Land ownership map showing open space areas throughout the County and beyond County boundaries.

US Fish and Wildlife Service

Don Edwards National Wildlife Refuge is a federally managed property located on the southern end of San Francisco Bay. The refuge comprises a 30,000-acre oasis for millions of migratory birds and endangered species. The refuge, created in 1974, was largely the result of grassroots efforts by the local community to protect the San Francisco Bay ecosystem.

California Department of Parks and Recreation

The California Department of Parks and Recreation manages 280 units. Two of these units are located in Santa Clara County: Martial Cottle State Park, comprising 256 acres of farmland (managed by Santa Clara County Parks Department,) and Henry W. Coe State Park. The Coe unit is the largest state park in northern California at 89,164 acres. It also contains 22,000 acres of designated wilderness; in September 2007, the wilderness area was burned by the 47,760-acre Lick fire. Started by burning debris, the fire cost more than \$10 million to suppress and destroyed several structures.

The Coe unit has a highly diverse mixture of vegetation types, ranging from grassland to chaparral to ponderosa pine. Fire is a significant part of the natural history of this area, and in recognition of this, park management has a very active prescribed fire program. For example, in November, 2015, a 630-acre prescribed fire was ignited, with about 300 acres treated within a few days. The prescribed fire was conducted with the support of personnel from California State Parks, CAL FIRE, San Jose City Fire, San Jose State University, and the approval of the Bay Area Air Quality District, illustrating the broad support such programs require.

California Department of Fish and Wildlife

The California Department of Fish and Wildlife manages over one million acres of fish and wildlife habitat in 711 properties around the state, with habitats from every major ecosystem in the state. Within Santa Clara County, the agency manages the 5,800-acre Cañada de los Osos Ecological Reserve, near Henry W. Coe State Park. The property, formally known as the Stevenson Ranch, was acquired by the Nature Conservancy in 2000 and sold to the agency in 2001. The unit has a mix of grasslands, oak and montane woodland, chaparral, and riparian and wetland habitats. Prescription grazing and burning may be employed if the need is determined to exist.

University California Natural Reserve System

The University of California Natural Reserve System encompasses 39 sites covering 756,000 acres of protected natural area throughout California, which is the largest university-administered reserve system in the world. Within Santa Clara County, the Blue Oak Ranch Reserve is located on the slopes of Mt. Hamilton. Covering 3,259 acres, four plant communities are found in the reserve, which are becoming rare in California: valley oak woodland, blue oak woodland, wildflower fields, and native perennial grassland. The Blue Oak Ranch Reserve contains a rich variety of plant families, more than 130 species of birds, and many species of terrestrial and aquatic animals, including the rare river otter (*Lontra canadensis*). Prescribed fire may play a role in facilitating valley oak regeneration, which has become rare.

Santa Clara County Department of Parks and Recreation

Formed in 1956, the Santa Clara Department of Parks and Recreation oversees regional parks usually larger than local neighborhood or community parks, often more than 200 acres. The county park system has expanded to 29 regional parks covering almost 48,000 acres since its first parkland, the 400-acre Stevens Creek County Park, was acquired in 1924. Parklands of significant size in the WUI include:

- Ed Levin County Park
- Joseph D. Grant
- Motorcycle & Field Sports
- Anderson Lake
- Coyote Lake Harvey Bear Ranch
- Mt. Madonna
- Uvas Reservoir
- Uvas Canyon
- Calero
- Almaden Quicksilver
- Santa Teresa
- Lexington Reservoir
- Villa Montalvo
- Sanborn
- Stevens Creek
- Rancho San Antonio

Santa Clara Valley Open Space Authority

The Santa Clara Valley Open Space Authority is an independent special district and not part of county government. Its purpose is to preserve key portions of the natural environment using a variety of tools, including land and easement acquisition, as well as participating in planning and conservation activities. Established in 1993 by the state legislature and Governor Wilson, its jurisdiction is all of Santa Clara County, except Gilroy and lands and communities within the boundaries of the MROSD. The Santa Clara Valley Open Space Authority currently protects approximately 16,000 acres and has three open space preserves that are open to the public:

- Coyote Valley Open Space Preserve
- Rancho Cañada del Oro Open Space Preserve
- Sierra Vista Open Space Preserve

The Santa Clara Valley Open Space Authority participates with the cities of Milpitas, Santa Clara, San Jose, Campbell, and Morgan Hill.

Midpeninsula Regional Open Space District

Founded in 1972, the MROSD is a regional greenbelt system, covering over 60,000 acres in 26 open space preserves in three counties. The district manages a wide variety of vegetation, including chaparral, oak woodlands, fir and redwood forests, riparian corridors, grasslands, and wetlands. Preserve size ranges from 55 to 18,831 acres, with over 220 miles of trails. The Sierra Azul area southeast of Los Gatos is the largest unit in the district. The following preserves are located in Santa Clara County:

- Bear Creek Redwoods Open Space Preserve
- Coal Creek Open Space Preserve
- El Sereno Open Space Preserve
- Foothills Open Space Preserve
- Fremont Older Open Space Preserve
- Los Trancos Open Space Preserve
- Monte Bello Open Space Preserve
- Picchetti Ranch Open Space Preserve
- Rancho San Antonio Open Space Preserve
- Saratoga Gap Open Space Preserve
- Sierra Azul Open Space Preserve
- St Joseph's Hill Open Space Preserve

City Parks and Open Space

Several cities own large parks and open space areas with unmaintained natural wildland environments, including:

- Palo Alto Foothills Park and Arastradero Preserve
- Palo Alto Baylands
- City of San Jose Alum Rock Park

Regional Trail Corridors and Urban Open Space Parks

WUI is a term used to describe human development that is surrounded by natural wildland environment. In Santa Clara County there also exists the converse arrangement: natural wildland environments that remain but have become enveloped by the urban environment. This includes regional trails, creek corridors, and pocket parks that have unmaintained areas with open space characteristics.

There are several long recreational trails that generally follow creek corridors or the South Bay shoreline within Santa Clara County. These trails are typically paved and used for both recreation and commuting by bicycle. When next to creeks, the trail corridor width and natural environment creates areas with WUI characteristics. Creeks are also favored sites for homeless people to establish encampments, which brings risk of wildfire from warming fires and cooking stoves to these areas.

Not all parks within the urban areas of Santa Clara County are maintained with lawns, gardens, hardscapes, or other fire-resistant landscaping. Some parks have areas that are left natural and unmanicured, which creates wildland characteristics and resultant risks of vegetation fires in dry grass, shrubs, and trees that can throw firebrands and threaten adjacent structures.

These ribbons of wildland/creek/trail corridors, as well as urban parks with unmaintained open space characteristics, are often outside designated WUIs or FHSZs, which can complicate things.

A partial list of regional trails with wildland characteristics include:

- Bay Trail
- Penitencia Creek Trail
- Guadalupe River Parkway
- Coyote Creek Trail
- Calero/Los Alamitos Creek Trails
- Los Gatos Creek Trail

See the City of San Jose's list of urban trails at:
<http://www.sanjoseca.gov/index.aspx?NID=2700>

and Santa Clara County's regional trails system at:
https://www.sccgov.org/sites/parks/PlansProjects/Documents/AlignmentStatus_August18_2015.pdf

A partial list of urban parks with unmaintained natural areas include:

- Hellyer
- Communications Hill
- Martial Cottle
- Lake Cunningham
- Vasona
- Guadalupe River
- Las Animas Veterans Park
- Christmas Hill Park
- Dennis Debell Uvas Creek Preserve
- Byrne Preserve`

3.1.6 WATER PURVEYOR AND WATERSHED MANAGEMENT ORGANIZATIONS

Wildfire can cause serious degradation of both watershed management infrastructure and water quality. Burned watersheds can result in greater runoff, erosion, and sedimentation, with a loss of water quality and increased cost of water treatment. Since heavier amounts of vegetation will burn more severely than lighter wildland fuels, allowing an accumulation of untreated wildland fuels to occur in watersheds and riparian areas can lead to a loss of water quality and significant environmental degradation, which can be very expensive to repair. As is the case with homeowners, risk mitigation is dependent on fuels treatment performed before a wildfire occurs and cannot rely solely on the timely arrival of fire suppression resources.

San Jose Water Company

Founded in 1866, the San Jose Water Company is an investor-owned public utility, serving over one million people in the San Jose metropolitan area. It provides groundwater from more than 100 wells for 40% of its supply and purchases treated water from the Santa Clara Valley Water District for 50% of its supply. An additional 10% of its supply comes from its watershed in the Santa Cruz Mountains, treated at two water treatment plants.

The San Jose Water Company owns extensive watershed lands in the WUI, including upper Los Gatos Creek and a tributary of Saratoga Creek.

Santa Clara Valley Water District

Founded in 1929, the Santa Clara Valley Water District contains 10 reservoirs that impound water from storm runoff, as well importing water from the Sierra Nevada and pumping water from aquifers. The water district manages about 275 miles of creeks in Santa Clara County, or about one-third of the county's 800 miles of creeks and rivers. In partnership with cities and Santa Clara County Parks Department, the water district also provides open space and recreational opportunities at many of its reservoirs and creeks.

San Francisco Public Utilities Commission

The San Francisco Public Utilities Commission-owned watershed lands include the Alameda Watershed, with 13,000 acres in north eastern Santa Clara County.

See <http://www.sfwater.org/index.aspx?page=198>.

3.1.7 ROADS AGENCIES

Generally roads are maintained primarily to serve the transportation needs of the public, however road rights-of-way include the vegetation adjacent to the pavement, which could be considered a type of wildland to be managed for wildfire prevention. Roadsides are frequently the site of ignition for wildfires, and evacuees may need to use the roadways to leave the area even if the vegetation on both sides of the road is on fire.

In addition, due to the critical importance of roads for providing ingress for firefighting apparatuses while simultaneously evacuating the public, certain factors such as width, grade, and turning radius need to be addressed.

State Highways/Caltrans

Caltrans has specific vegetation management protocols that are found in the Maintenance Manual, (Chapter C2: <http://www.dot.ca.gov/hq/maint/manual/maintman.htm>). Each district prepares an annual plan for vegetation control (VegCon Plan). The VegCon Plan is part of the Integrated Maintenance Management System (IMMS). This plan will be derived from segment specific decisions that should consider fire risk management, safety, aesthetics, stormwater runoff, environmental laws, and community concerns. The plan is prepared each spring and is the reference document for planning and scheduling maintenance operations and for budget planning.

Additional details on Caltrans vegetation management protocols are provided in Appendix F.

County Roads and Airports

The County's Roads and Airports Department operates and maintains 635 miles of rural and urban roadways in unincorporated areas (<https://www.sccgov.org/sites/rda/about/Pages/standards.aspx>).

County Roads Standard Specifications state that erosion control and highway planting shall conform to the provisions in Section 20 "Erosion Control and Highway Planting" of the most current edition of the State Standard Specifications.

County Agriculture Weed Abatement

The mission of the Santa Clara County Department of Agriculture Weed Abatement Program is to protect lives, property, and the environment by providing education and hazard abatement for the communities served. The purpose of the Weed Abatement Program is to prevent fire hazards created by vegetative growth and the accumulation of combustible debris through voluntary compliance.

See weed abatement standards at <https://www.sccgov.org/sites/wap/Pages/standards.aspx>.

The Department of Agriculture's Weed Abatement Program inspects parcels that have been declared a public nuisance and included in the program throughout the year. Abatement work is ordered by an inspector on properties when the minimum fire safety standards have not been satisfied or if the owner has requested that the county contractor perform the necessary work. The abatement charges for any work performed by the contractor and a county administrative fee are included on your property tax statement as a special assessment.

Municipal Roads Departments

Cities with significant road maintenance responsibility in the WUI include Palo Alto, Los Altos Hills, Cupertino, Saratoga, Los Gatos, Monte Sereno, San Jose, Morgan Hill, Gilroy, and Milpitas.

3.2 WILDLAND URBAN INTERFACE

3.2.1 FIRE HAZARD SEVERITY ZONES

CAL FIRE developed the FHSZ rating system in 1973 for agency use in determining resource allocation. FHSZ is a science-based system used to assess wildland areas that scores vegetation, topography, weather, crown fire potential, ember production, and probability of fire occurrence. Possible FHSZ ratings are very high, high, or moderate.

There are areas of very high, high, and moderate FHSZs in the SRAs/unincorporated areas of Santa Clara County, as well as the LRA (see Figure 1.1).

In 1981, California law¹¹ required formal adoption of FHSZ rankings for all SRAs in order to “reduce the potential intensity of uncontrolled fire that threaten to destroy resources, life or property.” In 1992, following the Oakland Hills Tunnel fire, the FHSZ rating mandate was extended to include LRAs. CAL FIRE performs the rating analysis in LRAs and submits its recommendation to the city. The city can choose to adopt the recommendation, modify it, or reject it. There are very high FHSZ areas within cities in the county. It should be noted that for LRAs, the hazard rating actually adopted by local governments may be different from that recommended by the state. Therefore, three layers of hazard are used in this CWPP: CAL FIRE FHSZ recommended (SRA and LRA), FHSZ adopted (SRA and LRA), and locally identified and adopted WUI.

Additionally, the 2013 State of California Multi-Hazard Mitigation Plan notes that Santa Clara County is designated as a high wildfire hazard ranking in LHMPs (California Governor’s Office of Emergency Services 2013). The document also notes that the county is designated as high to very high for FHSZs for SRAs.

On September 20, 2005, the California Building Standards Commission approved the Office of the State Fire Marshal’s emergency regulations amending the California Code of Regulations, Title 24, Part 2, known as the 2007 California Building Code. The following is taken from the California Building Code:

701A.3.2 New Buildings Located in Any Fire Hazard Severity Zone. New buildings located in any Fire Hazard Severity Zone within State Responsibility Areas, any Local Agency Very-High Fire Hazard Severity Zone, or any Wildland-Urban Interface Fire Area designated by the enforcing agency for which an application for a building permit is submitted on or after January 1, 2008, shall comply with all sections of this chapter. New buildings located in any Fire Hazard Severity Zone shall comply with one of the following:

1. State Responsibility Areas.

New buildings located in any Fire Hazard Severity Zone within State Responsibility Areas, for which an application for a building permit is submitted on or after January 1, 2008, shall comply with all sections of this chapter.

¹¹ Public Resources Code 4202

2. Local Agency Very-High Fire Hazard Severity Zone.

New buildings located in any Local Agency Very High Fire Hazard Severity Zone for which an application for a building permit is submitted on or after July 1, 2008, shall comply with all sections of this chapter.

3. Wildland-Urban Interface Fire Area designated by the enforcing agency.

New buildings located in any Wildland-Urban Interface Fire Area designated by the enforcing agency for which an application for a building permit is submitted on or after January 1, 2008, shall comply with all sections of this chapter.

Objective of WUI Fire Area Building Standards

The broad objective of the WUI fire area building standards is to establish minimum standards for materials and material assemblies and provide a reasonable level of exterior wildfire exposure protection for buildings in WUI fire areas. The use of ignition-resistant materials and design to resist the intrusion of flame or burning embers projected by a vegetation fire (wildfire exposure) will prove to be the most prudent effort California has made to mitigate the losses resulting from the state's repeating cycle of WUI fire disasters. CAL FIRE and the Office of the State Fire Marshal revised the mandatory effective date for those areas where local government has responsibility for wildland fire protection (LRAs) to July 1, 2008, to enable local government agencies more time to review and accept the FHSZ maps that will be presented to them formally after the new year.

Adopted WUI Zones (SRAs/LRAs)

At the national level, identification of WUI communities was initiated following the establishment of the National Fire Plan in 2000, with federal, state, and local agencies involved with this process. Delineation of the location of the WUI is a basic step in the identification of areas at most risk from wildfire, which can trigger requirements for the mandatory use of codes associated with building materials and defensible space.

This CWPP follows the pattern of using the adopted WUI areas in the plan development. The Croy CWPP notes that it is entirely within WUI, as well as in SRAs. Additionally, all of the Croy CWPP is within a very high FHSZ. Therefore, if development increases in the Croy area WUI, for example, more residences will be exposed to wildfire risk and therefore be in need of targeted hazard reduction activities and code enforcement to mitigate this risk. Conversely, deficiencies in this mitigation process, including the adoption and enforcement of new and existing fire codes, as well as adjustments in the delineation of the WUI as the result of changing vegetation and community development patterns over time, will likely result in the increasing loss of homes. Figure 3.2 shows the designated WUI areas used in plan development.

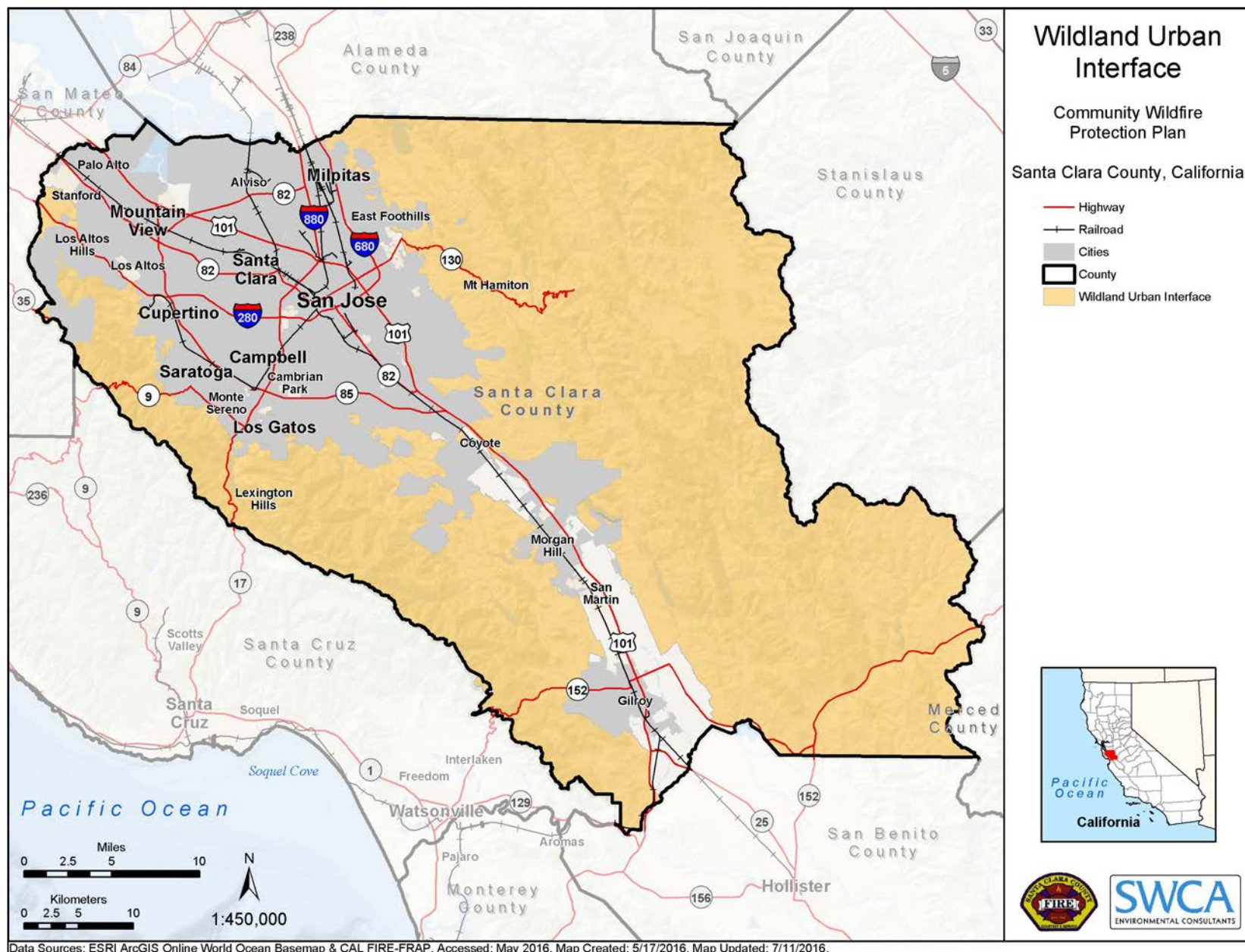


Figure 3.2. WUI areas as designated by state law and local ordinance.

3.3 LAWS, ORDINANCES, STANDARDS, AND CODES FOR FIRE PREVENTION

3.3.1 LAND USE PLANNING

The Santa Clara County Department of Planning and Development provides four areas of service: public information, planning, development review, and zoning enforcement. Its primary function is to plan and regulate land use and development within the unincorporated areas of Santa Clara County. It manages the county's General Plan; the Safety Element within this plan is associated with the mitigation of wildfire risk.

In conjunction with the planning process, the Santa Clara County Office of the County Fire Marshal provides education, plan review, inspection, and code enforcement for the county regarding fire issues. The Fire Marshal is also the Chief of the Santa Clara County Fire Department and is responsible for fire prevention activities in most unincorporated areas of the county. The Fire Marshal's office also reviews and inspects applications for burn permits in unincorporated WUI portions of the county.

Authority for the Fire Marshal is derived from Section A33-47 of the County Code and Section 101 of the California Fire Code. The County Fire Marshal has the authority to make and enforce such rules and regulations for the prevention and control of fire and fire hazards.

3.3.2 BUILDING CODES

As noted by CAL FIRE, California's building codes have two parts relevant to wildfire:

- remove flammable vegetation from around the building; and
- construct the building of fire resistant material.

With regard to clearance, the law requires that homeowners conduct fuels modification to 100 feet or to the property line if this distance is less than 100 feet. This provides both defensible space for firefighters in which to work and protection for the home.

With regard to building codes, standards have been developed to improve the resistance of buildings to ignition from airborne embers. New buildings located in any FHSZ within SRAs (building permit submitted after January 1, 2008), in any LRA-very high FHSZ (building permit submitted after July 1, 2008), or in any WUI fire area designated by the enforcing agency (building permit submitted after January 1, 2008) will comply with all sections of California Code of Regulations Title 24, Part 2, 701A.3.2 (New Buildings Located in Any Fire Hazard Severity Zone).

For LRAs, in which local government has responsibility for wildland fire protection, CAL FIRE provides recommendations for very high FHSZs. Local government, in turn, uses these recommendations to designate very high FHSZs within its jurisdiction. Local government may exclude fire protection requirements prompted by the map designation and may adopt, modify, or deny the very high FHSZ recommendation.

Taken together, these building codes are intended to improve the resilience of a building to ignition from either direct flame contact or from airborne embers. In incidents in which the rate of wildfire spread, and the number of homes at risk from the wildfire, exceeds suppression capacity, this resilience may determine whether the building survives.

3.3.3 RESEARCH AND PROPOSED NEW STANDARDS

IBHS laboratory and field experiments in structural ignitability have helped develop new evidence-based guidelines for defensible space zones to emphasize ember resistance and a “home ignition zone” including a 5-foot non-combustible zone next to the structure. The new guidelines are not yet incorporated into any codes or policies; however, some education and outreach programs are encouraging their voluntary adoption.

3.3.4 WILDLAND URBAN INTERFACE DEFENSIBLE SPACE

The definition of defensible space via state and local codes, its maintenance by homeowners, and enforcement by fire agencies as needed is a common part of wildfire risk mitigation. The California State Board of Forestry issued *General Guidelines for Creating Defensible Space* in 2008, following a change in PRC 4291 that expanded defensible space clearance requirements from 30 to 100 feet around buildings and structures in SRAs.

The guidelines note some aspects about WUI defensible space that are often overlooked:

- Greater defensible space may be needed due to local conditions, such as slope and fuel density.
- Fuel reduction has more to do with disrupting fuel continuity so that the spread of fire is impeded, rather than creating a denuded zone around a home. For example, pruning the lower limbs of trees creates a break between ground fuels and tree canopies, reducing the chances that a fire will move from a ground fire to a crown fire.
- Communities may wish to develop defensible space areas that are greater than 100 feet for even better protection; the code only sets a minimum distance.
- Defensible space also provides a safer environment in which firefighters can work. This environment is more than vegetation clearance; defensible space also involves emergency vehicle access, water supply, and clear street signs and addresses. All of these factors, and many more identified by previous community-level CWPPs, by their presence or absence affects the usefulness of defensible space in structure protection.
- Vegetation fuel reduction projects require compliance with all federal, state, or local environmental protection laws.

3.3.5 FIRE PREVENTION

The prevention of wildfires is a common theme among fire agencies at the federal, state, and local levels. Several methods are generally employed in support of fire prevention programs, including:

- Vegetation management programs are designed to modify fire behavior, which may involve establishing reduced fuel zones, such as fuel breaks and prescribed fire units, to impede the spread of a wildfire and to facilitate access by suppression resources to threatened areas.
- Analysis identifies historic ignition patterns and causes, combined with public education efforts to encourage more care by the public, such as in the use of campfires and cigarettes.
- Fire danger conditions, such as high, very high, or extreme, are often posted on signs throughout an area (Figure 3.3), as well as announced on local news and other social media methods.
- Measures are taken to prevent, detect, and suppress wildfires as early as possible. During periods of high fire danger, fire organizations typically proactively promulgate strategies to reduce ignitions, such as smoking and campfire bans in specific high hazard areas, and adjust fire agency work schedules to increase patrols and hours or days of coverage.
- Volunteers are used to augment fire prevention work. CAL FIRE has used the Volunteers in Prevention program since 1980 to enlist citizens in many fire prevention tasks, including delivering classroom presentations, contacting homeowners about the importance of defensible space, and providing information to the public and media during emergencies. All 21 CAL FIRE units employ this program; Santa Clara County was one of the seven counties targeted for this program, with an objective of a reduction of human-caused wildfires by 10%.



Figure 3.3. Fire preparedness signage is already in place in some areas of the County, but additional signage is recommended.

3.3.6 *PRESCRIBED BURNING*

Although the focus of wildfire risk mitigation is often on the reduction and removal of vegetation, and the prevention and suppression of wildfire, fire under the right circumstances can be not only a useful tool to reduce hazardous amounts of fuel but also an important factor in wildland ecosystems. Many fire and resource management agencies at the local, state, and federal levels include the use of fire in their programs (Figure 3.4).

The use of prescribed fire has several requirements to be successful, including:

- Planning documents include approval authority, burn objectives, preparation requirements, weather and fuels conditions under which the burn will be performed, operational responsibilities, contingency planning in the event of an escape, and post-burn monitoring to document the attainment of burn objectives and other potential fire effects, such as the occurrence of invasive species.
- Specific attention must to be given to smoke management and weather forecasts concerning smoke direction and atmospheric mixing patterns. Review of prescribed burn plans and smoke management techniques need to be performed by the Bay Area Air Quality Management District. Consultation between the agencies involved with the burn and the air district needs to occur early in the planning cycle, especially with regard to identification of suitable weather periods for the burn to be conducted. Conditions suitable for the fire agency may not be suitable from the perspective of the air district.
- Public education and outreach is vital given the frequent concern by the public over smoke, risk of escape, and post-fire appearance of the burn unit. It is unlikely that all of the public will support the prescribed fire program, but outreach conducted through social media and on-site visits to the post-burn areas as they recover can develop a broad base of support, especially if the fire has stimulated the occurrence of desirable species considered to be rare.



Figure 3.4. Prescribed fire being used to reduce grass loads on public open space land in the County.

More typically, hazardous fuels are managed with a variety of tools, including goats, disking, hand cutting and piling, herbicides, mowing, and weed whips. As is the case with prescribed fire, the need remains to define the objectives of the treatment, measurement to document that the objectives were met, and follow-up monitoring to discover any unexpected deleterious effects on natural resources.

CAL FIRE also has a longstanding cost share program, the VMP that can use prescribed fire and mechanical methods to treat wildland fuels. Private landowners can contract with CAL FIRE to use these tools for hazard reduction and resource management objectives.

Santa Clara County possesses many natural and cultural attributes that are highly valued by the communities. Fuels management programs must be planned and conducted to preserve sensitive resource values while mitigating the risk to them and WUI communities. This is especially true for parks and open space areas enjoyed by so many residents, which are home to a wide variety of plants and wildlife.

3.4 FIRE HISTORY

Santa Clara County has experienced large and destructive fires in the last several years. These include the 1985 Lexington fire, which burned 37 homes, 4,200 acres, and caused \$7 million in damage; the 2002 Croy fire, which burned 3,127 acres, 31 homes, caused 13 injuries, and cost \$7.5 million to suppress; the 2008 Summit fire which burned 35 homes, 4,270 acres, caused 16 injuries, and cost \$16 million to suppress; and the 2009 Loma Prieta fire which burned 669 acres, cost 2.7 to suppress, involved 1,742 firefighters, destroyed one residence and caused four injuries . High fire danger conditions that can support very active fire behavior may be relatively uncommon, but when such conditions occur, they have significant destructive potential. For example, The Summit fire spread by high winds even after six inches of rain had occurred twelve days earlier. Figure 3.5 shows the fire history for the project area.

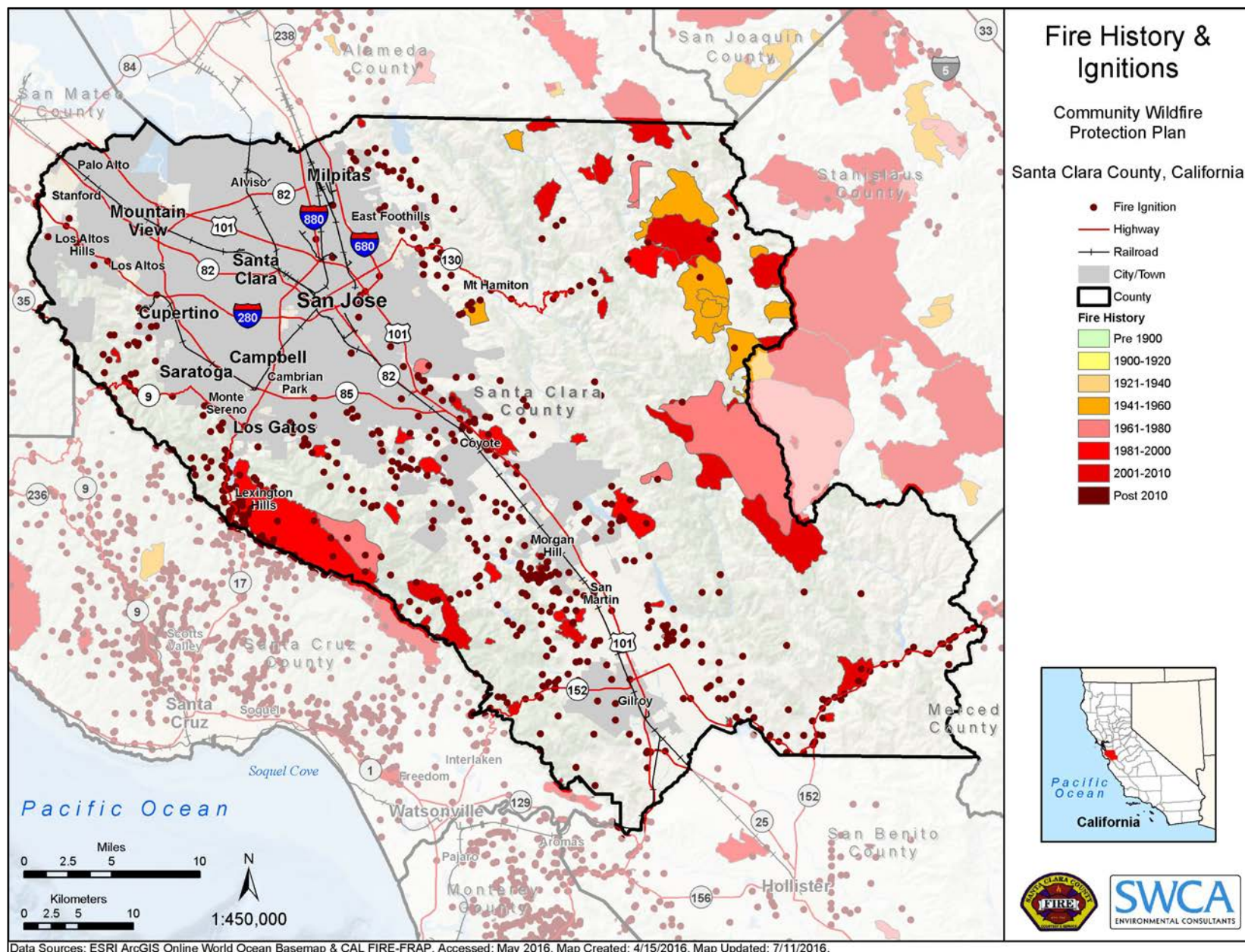


Figure 3.5. Santa Clara County fire history from 1900 to 2015.

3.5 IGNITION HISTORY

An indication of the amount of fire activity in the county relative to the other types of incidents is indicated by the response calls of the Santa Clara County Fire Department. Calls for service in 2015 with regard to fire numbered 540, or 3% of the total. By comparison, Emergency Medical Service calls numbered 10,889, or 62% of the total. Figure 3.5 shows the recorded ignition history for the project area from 1900 to 2015. This dataset contains wildland fires that occurred on SRAs. Only fires whose latitude and longitude could be determined are included. This means that the number of ignition points in this dataset will typically be lower than the absolute number of incidents that occurred.

3.5.1 LOCATIONS

Because lightning is a rare occurrence in the county, wildfires tend to be associated with human locations. Roadsides, power lines, trails, railroads, and other developments can show a concentrated pattern of ignition locations. Because of this pattern, public education fire prevention work may be focused on both types of ignitions, such as campfires or smoking, as well as at specific locations known to have a history of such ignitions. Although the 1985 fire was arson caused, arson is a relatively small source of ignitions, but given the possibility of individuals setting fires under high fire danger conditions, consequences can be catastrophic.

3.5.2 CAUSE TYPES

The Santa Clara Unit of CAL FIRE, which covers an area greater than Santa Clara County, had 174 fires within its Direct Protection Area in 2014. Several categories (playing with fire, 2% of total ignitions; debris burning, 6%; and smoking, 3%) likely reflect the benefits of public education about wildfire prevention. The largest category (undetermined, 44%) illustrates the uncertainty often associated with determining fire cause.

In 2014, no lightning-caused fires occurred in the county. This is typical of coastal areas, with most wildfires associated with human activity. Two of the larger causes of fire in 2014 were vehicles (15%) and electrical power (11%). The latter is especially problematic during periods of high wind activity, with the co-occurrence of such winds causing downed power lines with arcing and rapid rates of spread from the ignition site. Note: 2008 saw an unprecedented amount of dry lightning in Northern California, including the coastal mountain areas of Santa Cruz. On June 21, 2008 lightning ignited the Hummingbird fire that burned 794 acres southwest of Morgan Hill, west of Gilroy and San Martin and threatened 1200 homes.

3.5.3 EXTREME FIRE BEHAVIOR PATTERNS

The largest wildfires in Santa Clara County, much like other coastal counties such as San Diego, Santa Barbara, and Los Angeles, tend to be associated with east wind conditions, also referred to as Santa Ana winds in southern California and Diablo winds in the Bay Area. Such winds tend to be stronger in southern California, in part because topography and orientation of canyons also channels these winds and increases their strength, but also as they are associated with high pressure systems over Sierras and concurrent lows off the coast.

The presence of very low relative humidity, warm to hot temperatures, and strong winds, along with continuous wildland vegetation and moderate to steep topography, can quickly lead to disastrous wildfire behavior even if conditions persist for only a few hours. Spotting behavior is especially active because low relative humidity causes extremely dry, receptive fuels to occur, with spot fires often igniting more than a mile in front of the fire itself.

Suppression operations are further complicated in high winds because air tankers cannot fly safely, winds disperse retardant before it hits the ground, and/or smoke obscures the location of the fire. Therefore, while relatively rare, extreme fire behavior patterns can cause the vast majority of damage and cost associated with the fire season. Moreover, failure to plan and prepare for this type of fire behavior leaves virtually no time to correct defensible space or communication deficiencies.

3.6 FIRE REGIMES

Fire regimes are associated with both the fire cycle and fire behavior of various vegetation types, and the nature of these patterns prior to the onset of wildfire suppression as a reference baseline.

For example, yellow pine forests in the Sierra Nevada are considered to have had a relatively frequent fire cycle historically, perhaps less than 10 to 20 years between fires, and fire behavior that tended to thin understory trees but generally leaving mature trees unharmed. The onset of fire suppression has altered the fire regime, as wildland fuels accumulated in the absence of fire; as fires became less frequent, they also became more intense because of accumulated fuels, damaging and killing even the mature trees.

Associated with the fire regime concept is the Fire Regime Condition Class (FRCC), which indicates the degree of departure from historic characteristics. On a scale of 1 to 3, FRCC ratings are assigned to areas, with a rating of 1 indicating that the area's fire regime is considered to be within its historic range, a rating of 2 indicating moderate alteration, and a rating of 3 indicating substantial alteration because of several missed fire cycles due to suppression. Areas with an FRCC rating of 3 may lack the resilience to recover from wildfire because of unnatural fire severity.

The fire regime in Santa Clara County is considered to have had a moderate fire cycle, with woodlands and forests burning more on the order of 30 to 100 years between fires, affected by site factors such as aspect and position on slope (i.e., upper portion of ridge vs. riparian). The county is generally rated as FRCC 2, indicating some effect on the fire cycle due to fire suppression, but not enough to trigger a risk of loss of ecosystem integrity. Woodlands and shrublands, for example, can be expected to recover following fire, although invasive species may pose a threat in specific areas.

Invasive species in particular can cause a significant shift in the pattern and behavior of wildfires (Klinger et al. 2006). Replacement of woody vegetation by non-native annual grasses, for example, provides a continuous fuel layer of easily combustible fine fuels. This conversion of fuel type, along with other factors such as drought, climate change, and an increasing population which can lead to more human-caused wildfires, can set up a cycle of increasingly frequent wildfires, with a higher risk to public safety, ecosystem integrity, and structures.

3.7 FIRE AND RESPONSE CAPABILITIES

California contains many federal, state, and local fire protection organizations that are well integrated through a variety of mutual aid and fire protection agreements, and are coordinated by organizations such as the California Wildfire Coordinating Group, the Northern and Southern California Geographic Area Coordination Centers, and FIREScope. Agencies such as California Emergency Management, U.S. Forest Service Region 5, and CAL FIRE form the basis for a very substantial wildfire response capacity that can be deployed in wildfire situations throughout the state. California contains what many regard as the strongest wildfire suppression capability in the nation.

3.7.1 RESPONSIBLE WILDFIRE AGENCIES (FEDERAL, STATE, COUNTY, CITIES, DISTRICTS)

- CAL FIRE's Santa Clara Unit covers several counties, including Contra Costa, Alameda, Santa Clara, and the western portions of Stanislaus and San Joaquin Counties. The Santa Clara Unit has auto-aid or cooperative agreements with several local fire protection entities, including the South Santa Clara County Fire District, Santa Clara Fire Department, Gilroy Fire Department, Palo Alto Fire Department, Milpitas Fire Department, San Jose Fire Department, and Morgan Hill Fire Department. The unit is responsible for 1.3 million acres of direct protection area, with a population of 5.5 million people.
- The unit has 12 fire stations (15 engines), one helitack base (one helicopter), and three bulldozers with transport. Four of the unit's battalions are located in Santa Clara County: Battalion One (Morgan Hill), Battalion Two (San Jose), Battalion Three (West Santa Clara County), and Battalion Seven (South Santa Clara County Fire District and Morgan Hill Fire Department).
- Additional CAL FIRE resources located in adjoining counties provide direct wildfire protection in Santa Clara County. The CAL FIRE San Mateo-Santa Cruz Unit to the west has fire stations on the county line near Highways 17, 35 and 9 and is the primary source of fire agency hand crew resources used in Santa Clara County. The CAL FIRE San Benito-Monterey Unit also has fire stations close to the county in Hollister and Aromas, as well as the Hollister Air Attack Base that supports Santa Clara County with fixed wing air tankers and air tactical aircraft. Additional CAL FIRE ground and air resources are available to assist in the county SRA wildland areas.
- There are no federally designated communities at risk within the unit because of the absence of federally managed land with habitable structures. There are, however, 1,327 communities on the California Communities at Risk list, which is managed by the California Fire Alliance. Within Santa Clara County, these include Palo Alto, Stanford, Los Altos Hills, Cupertino, Saratoga, Monte Sereno, Los Gatos, Lexington Hills, San Jose, Morgan Hill, San Martin, Gilroy, East Foothills, and Milpitas. The Santa Clara County Fire Department provides fire protection in the communities of Campbell, Cupertino, Los Altos, Los Altos Hills, Los Gatos, Monte Sereno, Saratoga, and approximately 70 square miles of unincorporated County area. The total response service area covers about 130 square miles with a population of approximately 225,000. The department has 300 employees staffing community education, prevention, investigation, operations,

emergency management, maintenance, and administration. County Fire has three battalions consisting of 15 stations, with 20 front-line and 5 reserve engines. In addition, for wildfire response, the department has five type 3, three type 6 engines and one water tender. Daily emergency response staffing consists of 66 employees, augmented with 30 volunteer firefighters. During fire season, the daily staffing is increased by three to staff a type 3 engine in the north battalion. Additionally, depending on weather, burn indices and red flag warnings, daily operational staffing may be increased to 94 personnel as conditions warrant.

- The cities of Palo Alto, San Jose, Morgan Hill, and Gilroy (all with WUI designated areas) provide their own fire departments, which manage a wide variety of emergency incidents. The San Jose Fire Department, for example, encompasses 33 fire stations that respond to approximately 83,000 calls for service annually. The Palo Alto Fire Department staffs six fire engines, plus a wildland engine company from July to October. The Gilroy Fire Department, with three stations, responded to more than 5,200 calls for service in 2015 in residential, commercial, industrial, and agricultural areas. The Morgan Hill Fire Department, with two stations, is assisted by a local CAL FIRE station located in Morgan Hill.
- Several volunteer fire companies participate in wildfire activities in Santa Clara County. These include the Uvas Volunteer Fire Department (Morgan Hill), the Casa Loma Volunteer Fire Association (Croy area), the Loma Prieta Volunteer Fire and Rescue (Summit area of Lexington Hills) the Spring Valley Volunteer Fire Department (San Jose/Milpitas), and the Stevens Creek Volunteer Fire Department (Cupertino). Volunteer fire companies are private, not for profit-public benefit organizations that provide service to their neighborhoods. Local jurisdictional authority for fire protection resides with a county agency as follows: County of Santa Clara (Spring Valley), South Santa Clara County Fire Protection District (Casa Loma and Uvas), Santa Clara County/Central Fire Protection District (Stevens Creek), and Santa Cruz County (Loma Prieta). The County of Santa Clara provides some fiscal and insurance support for these volunteer fire companies.
- Santa Cruz County Fire Department, Alameda County Fire Department, San Mateo County Fire Department, and other local government fire agencies in adjoining counties are frequently first responders to wildfires in Santa Clara County due to proximity and concern for mutual threat.
- All fire agencies in Santa Clara County participate countywide automatic and/or mutual aid plans for response to incidents outside their own jurisdictions. The County also participates in the California Fire Service and Rescue Emergency Mutual Aid System, which provides a practical and flexible pattern for the orderly development and operation of mutual aid on a voluntary basis between cities, cities and counties, fire districts, special districts, county fire departments, and applicable state agencies.

3.7.2 *MUTUAL AID*

The wildland fire community is well known for its development of mutual aid agreements at the federal, state, and local levels. Such automatic aid agreements allow for closest forces to respond to an incident as quickly as possible regardless of jurisdiction. Such agreements may also describe how reimbursement will be conducted; state resources responding to wildfires on federal lands

may have their associated costs reimbursed by the responsible federal agency, and the reverse is true for federal resources suppressing a wildfire on state lands.

An example of mutual aid within Santa Clara County is that provided by the South Santa Clara County Fire District. The District is an all-risk emergency response agency. It has automatic aid agreements with Morgan Hill Fire Department, Gilroy Fire Department, Pajaro Valley Fire Protection District, Hollister Fire Department, and San Jose Fire Department. There are many similar agreements across the United States, providing a network of response capabilities for many types of incidents.

For information on fire-fighting resources, including air attack and hand crew resources, please see Appendix G.

3.7.3 *EVACUATION RESOURCES*

Previous CWPPs developed for communities within the county have noted the difficulty of access and egress of many areas. Terrain, dense vegetation, narrow roads, locked gates, and limited access due to overhanging branches and bridges too weak to support heavy firefighting equipment complicate both planning for emergency response and the actual execution of operations. Since the most dangerous wildfires tend to occur during dry, windy conditions, with rapid fire growth, these factors can cause a dangerous delay in both response by firefighting resources and evacuation by the public, as well as traffic jams on narrow roads.

Law Enforcement

Wildfire response may necessitate the involvement of law enforcement agencies to provide for the safety of life and property during evacuation. Firefighters prioritize protecting human life and will urge people to evacuate from areas threatened by wildfire to reduce the risk of loss of life.

Under California law, the responsibility for evacuation rests with law enforcement. Firefighters do not have the legal authority to order persons to leave their property or to close public roads. Close coordination between law enforcement and fire agencies in planning and implementing evacuations is critical. Most frequently the task is under jurisdiction of the sheriff, who also coordinates all law enforcement mutual aid.

The evacuation process is described in *Santa Clara County Local Fire Service and Rescue Mutual Aid Plan Appendix 13 – Protective Action Guidelines* (revised 2008). A fire checklist is provided that outlines steps to be taken by law enforcement personnel during a wildland fire incident, including situation assessment, establishment of liaison with fire command, and emergency duties to which personnel may be deployed. Duties may include security to prevent looting, perimeter control, evacuation notifications, and maintenance of access route for emergency traffic.

Santa Clara County has also developed the *Operational Area Emergency Operations Plan* (2008), which describes the purpose and history of the statewide mutual aid program. The statewide mutual aid system includes several specific mutual aid systems for fire, rescue, and law enforcement services. As emergency incidents escalate in size and complexity, mutual aid agreements facilitate the acquisition of increased levels of staff in support of various components of the incident, including law enforcement responsibilities.

Due to the wildfire and roadside ignition history in Lexington Hills and the high commute traffic volumes on Highway 17 between Los Gatos and Santa Cruz, compounded by very narrow alternative roads, additional coordination between Santa Cruz County law enforcement agencies and Santa Clara is needed. The county line creates challenges because not only are two County Sheriff's and County Roads Departments involved, but the California Highway Patrol and Caltrans have district boundaries at the county line. Local municipal police departments from Los Gatos and Scotts Valley (Santa Cruz County) may also be engaged in evacuation efforts in the Highway 17 corridor.

Community Emergency Response Teams

Developed by the Federal Emergency Management Agency (FEMA), Community Emergency Response Teams (CERT) assist professional responders in a variety of emergency situations. Training modules are required to be a member of a CERT. FEMA IS-317, Introduction to CERT, provides an online opportunity to learn about the program. To become a CERT volunteer, specific classroom training must be completed. Training may be offered through entities such as emergency management, fire management, or law enforcement agencies. Modules include such topics as animal response, emergency communications, traffic and crowd management, and flood response. Information on the CERT program is available at FEMA.Gov/community-emergency-response-teams.

Road Systems

Roads in the WUI vary in characteristics, but are sometimes unpaved. Private driveways can be mistaken for roads, turnarounds and pullouts are limited, and dead-ends provide particularly dangerous situations for evacuations. Signage can be missing, indistinct, or at risk of combustion. Confusing signage, impeded access due to narrow roads or overhanging vegetation, and the possibility of long driveways being mistaken for evacuation routes were cited in community CWPPs.

People

The safe and efficient evacuation of people from wildfire requires several factors, including:

- Emergency notification methods: Emergency Alert System, email and telephone, television, and public address systems on emergency vehicles. Specifically, Santa Clara County has recently established AlertSCC to provide information and instructions on incidents such as wildfire, as well as post-disaster information on shelters. The system is offered to residents by Santa Clara County and 15 constituent cities. The development of social networking sites such as Facebook, Nextdoor, and Twitter, as well as locally maintained blogs and email distribution lists, is another set of resources that have become highly valued during wildfires in nearby communities. These channels were used with very positive response in the recent Soberanes Fire in Big Sur and Carmel Valley.
- Preplanning by the public about how to evacuate and where to go: Locked gates, poor or missing signage, and conflicts with emergency vehicles driving into the community versus the public trying to leave complicate evacuation. Uncertainty about where to find temporary refuge can cause families to become separated and delay reunions. Some individuals without transportation or with limited mobility may be accidentally left behind.

- Public awareness: These two items will fail to occur throughout communities at risk if the residents are unaware of notification methods, 1) the need for preplanning and 2) what elements preplanning should include. Therefore, public education and outreach on these topics should be part of all efforts conducted by agencies such as fire departments in a wide variety of venues. Given the wide variety of communities, languages, and cultures found within the county, and its broad range of urban to rural settings, a “one size fits all” public awareness program will miss portions of the public.

Horses, Livestock, and Animals

Many rural homes also have horses and other large animals and livestock, and pets are common in homes throughout the county. Evacuation planning often neglects to describe how animals will be evacuated and where they will be taken. The loading of horses, for example, during a fire and smoke situation, and transport of stock vehicles down narrow roads under stressful situations, can be very difficult. Public education could emphasize the need to practice loading horses quickly, for example.

There is also a need to pre-identify where animals can be taken, such as county fairgrounds, for large animal shelter. Similarly, locations where small animals such as dogs and cats picked up in the fire area should also be pre-identified, as well as the lead agencies, such as humane societies, coordinating this work.

The County is fortunate to have the Santa Clara County Large Animal Evacuation Team, which is a volunteer resource of the Office of Emergency Services and available upon request by first responders responsible for emergency incidents. Volunteers are kept up to date with training sessions, including the ICS 100, IS 700, and IS 800 courses. Information on the Santa Clara County Large Animal Evacuation Team is available on its website (<http://www.scclaet.org>), including the necessary criteria to be a member. A useful document on the website is entitled What Do I Do With My Horse in Fire, Flood, and/or Earthquake?

Other resources for animal evacuation can be found at:

- <https://www.bayequest.info/static/evacuation.htm>
- <http://www.bayequest.info/evacuation.htm>
- <http://www.equineevac.org/volunteer.shtml>
- <https://www.sccgov.org/sites/oes/BeforeDisaster/Pages/Caring-for-Livestock---Other-Large-Animals.aspx>

3.7.4 WATER AVAILABILITY AND SUPPLY

Water supply is variable around the county and may be provided by hydrants, wells, cisterns, and reservoirs. However, many fire planning documents developed by various entities in the county on the wildfire issue commonly cite water availability as a concern. The 2010 Multi-Jurisdictional Local Hazard Mitigation Plan for the San Francisco Bay Area, for example, calls for the development of “a coordinated approach between fire jurisdictions and water supply agencies to identify needed improvements to the water distribution system, initially focusing on areas of highest wildfire hazard” (Association of Bay Area Governments, page 1-24). All new structures

in the County are required to have a reliable water supply, whether by a water purveyor or private tanks (Figure 3.6).

Compatibility of cistern connections to fire apparatuses and vegetation clearance to allow fire apparatus to access cisterns are other common water supply issues. However, as was noted previously, homes are more likely to survive a wildfire due to existing fire-resistant building materials and designs, and vegetation clearance around the dwelling, than by a reliance on suppression resources. However, it must be noted that a lack of access to water supply, and roads which are too narrow to allow transport of water by fire apparatus to structures threatened by wildfire, will complicate the suppression of wildfire and the protection of structures.



Figure 3.6. Water storage tanks at the Mountain Winery in Saratoga Hills.

3.8 PUBLIC EDUCATION AND OUTREACH PROGRAMS

Santa Clara County has two very active Fire Safe Councils—the Santa Clara County Fire Safe Council and South Skyline Fire Safe Council that serve at the county and local levels. The websites of the councils contain descriptions of hazard reduction projects accomplished to date, as well as ongoing and future work. The websites do vary in the level of detail provided to the user, as well as the information posted. Some are quite specific on how homeowners can participate in chipping programs, for example. Information on programs such as Ready, Set, Go! To inform homeowners about evacuation preparation also varies among the sites (see www.sccfiresafe.org for an overview).

The fire protection organizations and districts within the county also provide valuable information on fire safety. The CAL FIRE Santa Clara Unit provides public education via school presentations and community meetings, informational flyers, radio and television spots, and one on one contacts

with homeowners. Defensible space (LE-100) inspections are conducted by the unit within SRAs to ensure that homeowners are aware of, and comply with, requirements under Section 4291 of the PRC to have a 100-foot clearance of flammable vegetation around all structures.

The Santa Clara County Fire Department provides services to the cities of Campbell, Cupertino, Los Altos, Los Altos Hills County Fire District, Los Gatos, Monte Sereno, and Saratoga. Its Community Education Services provides public assistance with both specific fire safety topics, as well as helping individuals, communities, and organizations connect to other agencies that can help them. Other local fire departments within the county, such as the Gilroy Fire Department, also have public education programs.

Public education and outreach programs are a common factor in virtually every agency and organization involved with the wildfire issue. One benefit that might be derived from the Santa Clara County CWPP is a comparison of the various messages and methods used to conduct these programs to more commonly use the ones that have been most effective with both general and specific audiences, and to ensure that the quality and quantity of information provided by the various entities meet consistent standards.

4 WUI HAZARD AND RISK ASSESSMENT

There are several components to evaluating hazard and risk from WUI fires. “Hazards” are those existing bio-physical factors that, when combined, present a threat. “Risk” is a measurement of the potential consequences resulting from the hazard occurring. “Mitigations” are actions taken to reduce the hazard or risk in order to reduce the unwanted consequences of the WUI fire. The purpose of the study is to determine what factors are present that create a hazard and how to reduce risk. In this study, the hazard is the flammable vegetation and flammable buildings co-existing in an environment susceptible to extreme fire behavior. To evaluate the “Risk Score” for a particular community or parcel, we measure hazard minus mitigations ($\text{Hazard} - \text{Mitigations} = \text{Risk}$), which will provide an estimate of the expected impact of a WUI fire occurring.

4.1 HAZARDS

4.1.1 *FLAMMABLE VEGETATION*

Native flammable vegetation: California’s Mediterranean climate provides growing conditions for plants that are able to sustain long dry summers. Native plant species either are annuals that grow during wet winter and spring then die in summer or perennials with high oil content in order to withstand these annual summer droughts year after year. Many of these plants are also “fire adapted,” meaning they expect natural fire to be part of their lifecycle and are resilient. The dead annuals and high oil content perennial plants are typically very flammable during late spring, summer, and fall. The burning intensity of these plants is directly related to ambient weather conditions and local topography.

Flammable ornamental vegetation: Several non-native plant species used in ornamental plantings share drought-tolerant plant characteristics of native plants and can be very flammable. These ornamentals may be as hazardous or even more hazardous than native species in areas that have weather conditions conducive to wildland fire. Similar to flammable native plants, burning conditions of flammable ornamental plants is directly related to ambient weather conditions.

4.1.2 *FLAMMABLE BUILT ENVIRONMENT*

Buildings in the WUI area are also a type of burnable “fuel.” WUI fires, by definition, burn more than vegetation. They endanger people and livestock, and burn homes, businesses, critical infrastructure, and other built improvements. These burning buildings are not just “victims” of the WUI fire, they also contribute dramatically to fire spread. When buildings ignite they burn for an extended period of time and produce massive amount of radiant heat and windblown embers that blow downwind and ignite more vegetation and other buildings.

4.2 RISK

Risk is a measurement of the consequences of a WUI fire occurring and the resultant damage. Risk can include loss of buildings (homes and businesses) and critical infrastructure, impact to socioeconomic factors, or loss of environmentally sensitive species that are not fire adapted. Loss of some features (such as historic sites or critical infrastructure) is deemed unacceptable and merits extraordinary mitigations to reduce risk.

4.3 MITIGATIONS

Many methods are available to mitigate the available burnable fuel hazard, whether buildings or native or ornamental vegetation. Mitigations typically refer to reducing the amount of hazardous vegetation available to burn or the expected intensity of the fire when it does burn. Providing defensible space around structures is one example of reducing the hazard through the mitigation effort of removing and/or thinning of flammable vegetation. Structural mitigations include replacing wooden shake shingle roofs or preventing embers from entering attics through improved vent systems.

4.4 COMPONENTS OF RISK AND HAZARD

4.4.1 COMMUNITY VULNERABILITY

Community vulnerability is a measurement of bio-physical and socioeconomic conditions.

Bio-physical relates to flammable vegetation and buildings, weather, topography, road, and water systems. These factors help determine the level and nature of hazard that exists. Various mitigation methods can be applied to reduce the hazard and make the community safer.

- **Flammable vegetation:** Reducing the loading of hazardous fuels should reduce fire intensity. This can be achieved through communitywide defensible space compliance, proper landscape plantings and maintenance of open space or common owned lands in planned unit developments, and community fuel breaks.
- **Road systems:** Less expensive road system improvements by simple actions such as posting clear road signs, evacuation routes, and addresses can reduce injury. Tourist areas should have very clear signage for road names, evacuation routes, and identification of safe zones. Road systems surfaces are expensive and complicated to improve, widen, pave, and straighten roads. Adding secondary access to dead end/single access roads and road surface improvements may require long-term planning and financing. Coordination with land use planning agencies can help facilitate these improvements when new subdivisions or development occurs.
- **Water systems:** Water availability can have a significant effect on firefighters being able to suppress fires and protect buildings. Community water systems with proper volume in storage is ideal, followed by fire department accessible water tank storage on each parcel, and lastly with scattered water tanks throughout the community. If firefighters must shuttle water back and forth, success rates drop dramatically.
- **Property hygiene:** Property hygiene refers to the presence of clutter, debris piles, firewood stacks, lumber, or other flammables within the 100-foot defensible space zone. If the community characteristics are for generally poor hygiene, the risk of fire spreading is greater. Good hygiene reduces fire spread.

Socioeconomic conditions are circumstances related to the population of WUI areas including residents, visitors, businesses, and livestock.

- **Sense of well-being lost:** Following WUI fire where the community is seriously affected, tourist areas may lose customers for years if visitors believe area is unsafe or scenic beauty is damaged.
- **Community involvement:** When members of the community engage in Fire Safe Councils, Community Emergency Response Team (CERT), or other neighborhood programs, it enhances public education and understanding of the hazard and mitigations to reduce risk.
- **Commercial and retail properties:** Impacts well beyond the loss of the building result when businesses burn. Employees lose jobs, tax revenue is lost, and customers are disadvantaged (sometimes seriously if this was the only service in the area, like the sole grocery store for several miles). It is common for businesses to never return due to economic losses suffered by owners.
- **Critical infrastructure:** Losses of critical infrastructure may have impacts well outside the fire area. For example, a small fire that burns microwave or cellular communications towers may impact customers several miles away. Some communications sites are critical for coordinating public safety other vital services. Electrical grid transmission lines frequently cross wildland areas and fires adjacent to them can cause catastrophic power failures.

4.4.2 *EVACUATION COMPLEXITIES*

Safe and proper evacuation of people (residents, workers, and visitors), pets, and livestock is a very critical component of WUI fires. Confusing road networks without good signage, narrow roads that do not allow two-way traffic, and dead end roads have contributed to injuries and fatalities of public and responders during WUI fires. Evacuations are the jurisdictional responsibility of law enforcement with assistance from fire and other agencies.

Most WUI fires require immediate “No Notice” evacuations, meaning little or no warning time exists between fire origin and the need for evacuation. There is likely a shortage of public safety responders to assist in the evacuation during early stages of a fire. Notification will be through Reverse 9-1-1 type phone calls or other mass notification systems, and people will need to plan and conduct their own self-evacuation. Careless populations, schools, rest homes, or other non-ambulatory facilities may require significant assistance in evacuation; planning to accommodate these facilities is crucial.

Coordination with Red Cross for shelter for evacuees is important. Many Red Cross shelters do not allow pets, so additional consideration for pet accommodation is necessary.

Livestock presents special evacuation considerations to provide access to livestock trailers entering the fire area while others are trying to evacuate. In addition, there will be a need for a temporary housing location for evacuated livestock and pets.

4.4.3 *STRUCTURAL VULNERABILITY*

Structures are vulnerable to damage from WUI fires from several sources. Defensible space compliance is very effective in reducing ignition from direct flame contact and radiant heat ignition from burning vegetation.

Most structure ignitions are from flying embers landing on flammable components of the building and setting the building on fire. The single most vulnerable area for flying ember caused ignition is wooden roofs and wooden siding. Flammable vegetation burning adjacent to structures and igniting the building through direct flame contact is the second most common source of ignition. The third source is from radiant heat from burning (vegetation or other burning buildings) close to the structure.

Burning structures can be the most significant flying ember and radiant heat generator. Embers can ignite neighboring structures, or if closer than 30 feet the radiant heat is likely to ignite the adjacent building.

Ignition-resistant building materials and assemblies similar to recommendations in current WUI building codes are most effective in reducing structural ignitions from flying embers and direct flame contact. In California, buildings built in designated SRA and WUI areas after 2008 are required to be built in accordance with California Building Code Chapter 7A, which is designed to prevent ember intrusion into the building envelope (especially attic) and ignition-resistant materials covering outside areas. Older buildings can be retrofitted to approach the same ignition resistance.

Ornamental landscape, particularly in foundation plantings, can expose buildings to ignition. Many ornamental plants are very flammable especially when in flower beds with flammable mulches, which serve as a receptive bed for flying embers. Plants ignite and expose siding and under eave area to direct flame contact.

4.4.4 *CRITICAL INFRASTRUCTURE VULNERABILITY*

Critical infrastructure is defined as electrical substations and transmission facilities; cellular, television, radio, and telecommunication sites; railroad structures; highway structures; navigation and coordination facilities; and other sites that are crucial to providing and coordinating essential services. Many of these sites are located on vulnerable ridges or mountaintops. Losses are not just the cost of replacing physical facility, but the cost associated with loss of the service, which can be significantly more than the facility costs. Figure 4.1 shows the critical infrastructure for the CWPP area. More detailed descriptions of critical infrastructure are provided in the individual annexes.

4.4.5 *COMMUNITY VALUES AT RISK*

Every community has features that are significant to that community but may not be important to others. Schools, day care facilities, and other sites that require special attention during evacuation are very susceptible to WUI fires, whether it is something like the only grocery store for miles or the local community cultural icon. Loss of the grocery store inconveniences everyone in the community, not just the business owner. The icon may not be a historical landmark but is very special to the social fabric of the community. Identifying these local important sites and providing special planning or mitigations to avoid losses is crucial to community identity.

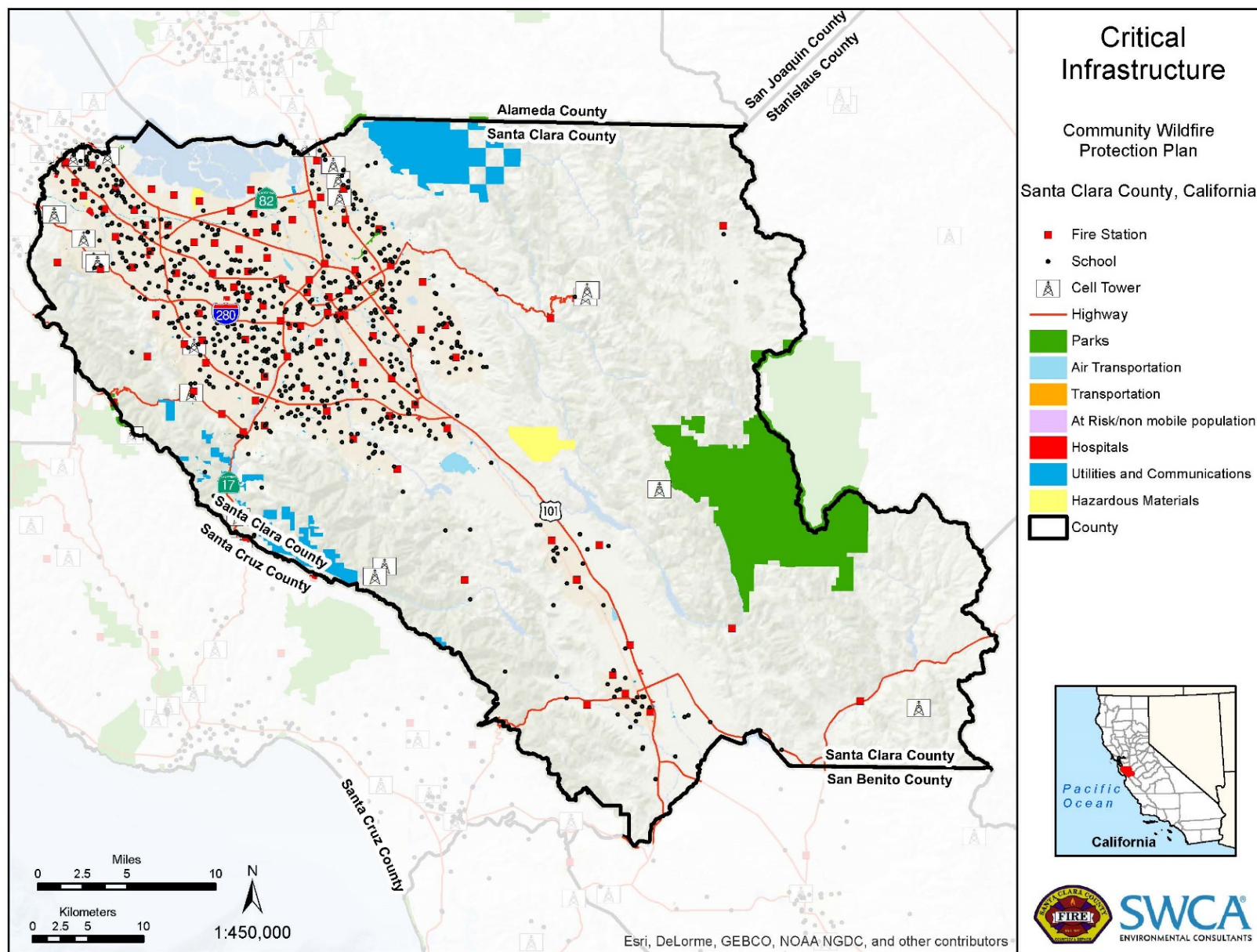


Figure 4.1. Critical infrastructure.

4.5 OVERVIEW AND PURPOSE OF HAZARD AND RISK ASSESSMENT

The purpose of hazard and risk assessment is to measure the potential impact of a WUI fire and what current and possible mitigations may have on the resultant risk. Understanding the probable impact of a WUI fire through examination of existing flammables (vegetation and buildings), weather patterns, and topography that influences fire behavior is essential to identifying the best mitigations to reduce risk. Various WUI fire mitigation methods are available; therefore, the hazard/risk model allows a means to evaluate the community and an individual parcel's vulnerability to the hazard and the effect of mitigation options to reduce the vulnerability.

The model measures several factors that lead to hazard rating and evaluates mitigation factors at the community and parcel level. Evaluating the community, as well as the individual parcel, is essential in determining the total WUI risk. A low overall community hazard rating can be compromised by an outlier individual parcel that has a high hazard/risk score (i.e. the only home with a shake shingle roof in a WUI community). Likewise, a parcel with good mitigations for a low hazard score may still be a high risk if the overall community has a high hazard score (i.e. poor road network or overall poor defensible space compliance). Property owners and agencies can use the assessment model to maximize the effectiveness in reducing overall community and parcel risk by comparing different mitigation techniques.

4.5.1 IDENTIFICATION OF COMMUNITIES AT RISK

Communities at risk were developed based on the California Communities at Risk list, which identifies the following 14 communities.

- Cupertino
- East Foothill
- Gilroy
- Lexington Hills
- Los Alto Hills
- Los Gatos
- Milpitas
- Morgan Hill
- Monte Sereno
- Palo Alto
- San Jose
- San Martin
- Saratoga
- Stanford

The CWPP Core Team developed WUI planning areas based on this list (Figure 4.2).

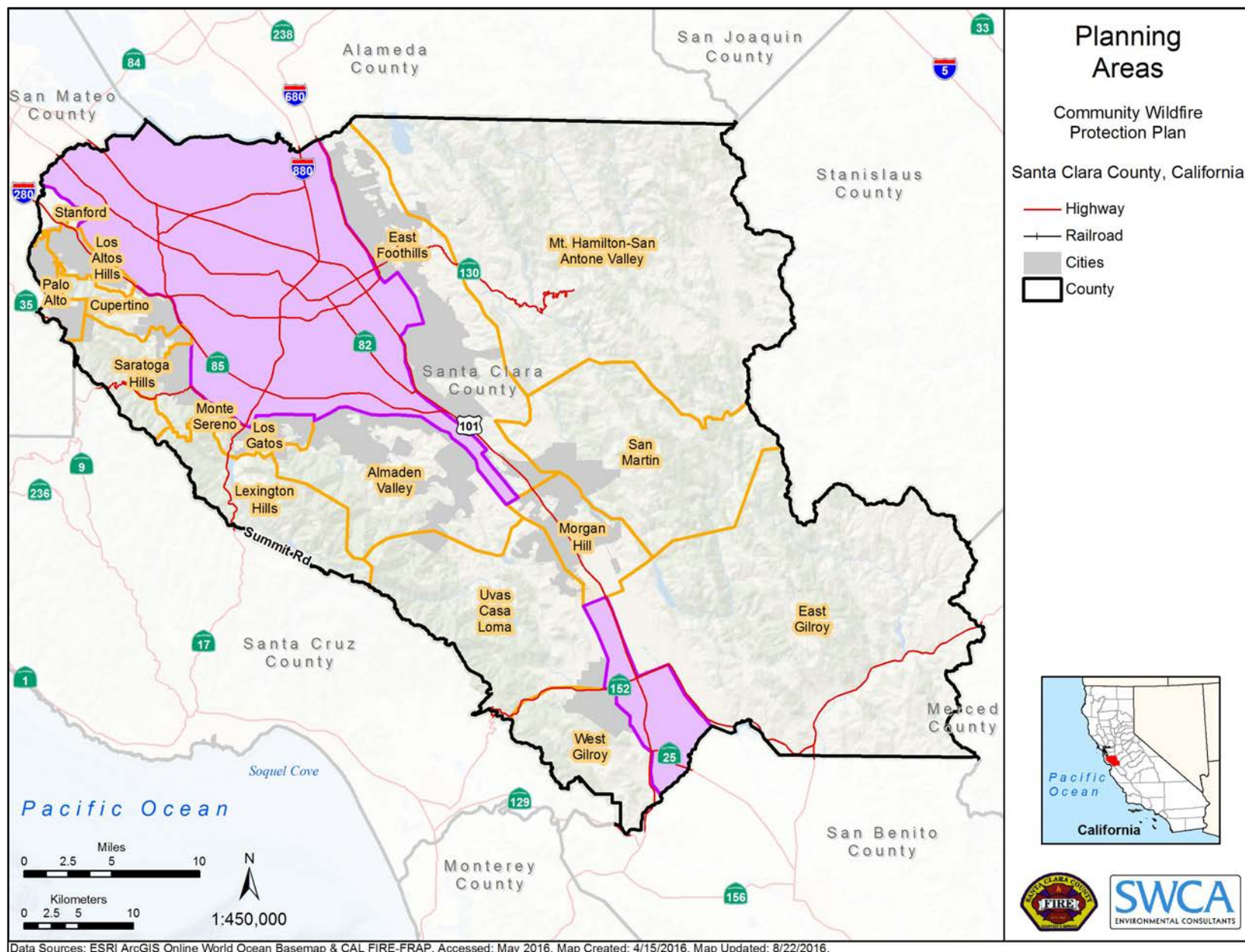


Figure 4.2. WUI planning areas.

4.6 RISK ASSESSMENT OVERVIEW

The risk assessment component of this CWPP was completed in three phases:

1. A countywide scale composite Fire Risk Analysis using fire behavior modeling.
2. A planning area scale on-the-ground assessment of WUI communities using the National Fire Protection Association (NFPA) 1144 Wildland Fire Hazard and Risk Severity Form.
3. A parcel scale risk assessment.

Each of these assessments provides increasing levels of detail from a county scale, to a planning area scale to a parcel level scale, which therefore provides Santa Clara County with a comprehensive assessment of wildfire risk and hazard.

4.6.1 COUNTYWIDE SCALE: COMPOSITE FIRE RISK ANALYSIS

The wildland fire environment consists of three factors that influence the spread of wildfire: fuels, topography, and weather. Understanding how these factors interact to produce a range of fire behavior is fundamental to determining treatment strategies and priorities in the WUI. In the wildland environment, vegetation is synonymous with fuels. When sufficient fuels for continued combustion are present, the level of risk for those residing in the WUI is heightened. Fire spreads in three ways: 1) surface fire spread—the flaming front remains on the ground surface (in grasses, shrubs, small trees, etc.) and resistance to control is comparatively low; 2) crown fire—the surface fire “ladders” up into the upper levels of the forest canopy and spreads through the tops (or crowns) independent of or along with the surface fire, and when sustained is often beyond the capabilities of suppression resources; and 3) spotting—embers are lifted and carried with the wind ahead of the main fire and ignite in receptive fuels; if embers are plentiful and/or long range (>0.5 mile), resistance to control can be very high. Spotting is often the greatest concern to communities in the path of a wildland fire. In areas where homes are situated close to timber fuels and/or denser shrubs and trees, potential spotting from woody fuels to adjacent fuels should be acknowledged.

Treating fuels in the WUI can lessen the risk of intense or extreme fire behavior. Studies and observations of fires burning in areas where fuel treatments have occurred have shown that the fire either remains on or drops to the surface, thus avoiding destructive crown fire. Also, treating fuels decreases spotting potential and increases the ability to detect and suppress any spot fires that do occur. Fuels mitigation efforts therefore should be focused specifically where these critical conditions could develop in or near communities at risk.

Because of the significant variation in weather, topography, and fuels in Santa Clara County, the risk assessment was run using regional weather inputs to take into account these variabilities.

4.6.2 FIRE BEHAVIOR MODELS

For this plan, an assessment of fire behavior has been carried out using well-established fire behavior models: FARSITE, FlamMap, BehavePlus, and FireFamily Plus, as well as ArcGIS Desktop Spatial Analyst tools. Data used in the Composite Risk/Hazard Assessment is largely obtained from LANDFIRE.

LANDFIRE

LANDFIRE is a national remote sensing project that provides land managers a data source for all inputs needed for FARSITE, FlamMap, and other fire behavior models. The database is managed by the U.S. Forest Service and the U.S. Department of the Interior and is widely used throughout the United States for land management planning. More information can be obtained from <http://www.landfire.gov>.

FARSITE

FARSITE is a computer model based on Rothermel's spread equations (Rothermel 1983); the model also incorporates crown fire models. FARSITE uses spatial data on fuels, canopy cover, crown bulk density, canopy base height, canopy height, aspect, slope, elevation, wind, and weather to model fire behavior across a landscape. In essence, FARSITE is a spatial and temporal fire behavior model. FARSITE is used to generate fuel moisture and landscape files as inputs for FlamMap. Information on fire behavior models can be obtained from <http://www.fire.org>.

FlamMap

Like FARSITE, FlamMap uses a spatial component for its inputs but only provides fire behavior predictions for a single set of weather inputs. In essence, FlamMap gives fire behavior predictions across a landscape for a snapshot of time; however, FlamMap does not predict fire spread across the landscape. FlamMap has been used for the Santa Clara County CWPP to predict fire behavior across the landscape under extreme (worst case) weather scenarios.

BehavePlus

Also using Rothermel's (1983) equations, BehavePlus is a multifaceted fire behavior model and has been used to determine fuel moisture in this process.

4.6.3 FIRE BEHAVIOR MODEL INPUTS

Fuels

The fuels in the planning area are classified using Scott and Burgan's (2005) Standard Fire Behavior Fuel Model classification system (Appendix H, Figure 4.3). This classification system is based on the Rothermel surface fire spread equations, and each vegetation and litter type is broken down into 40 fuel models. The general classification of fuels is by fire-carrying fuel type (Scott and Burgan 2005):

(NB) Nonburnable	(TU) Timber-Understory
(GR) Grass	(TL) Timber Litter
(GS) Grass-Shrub	(SB) Slash-Blowdown
(SH) Shrub	

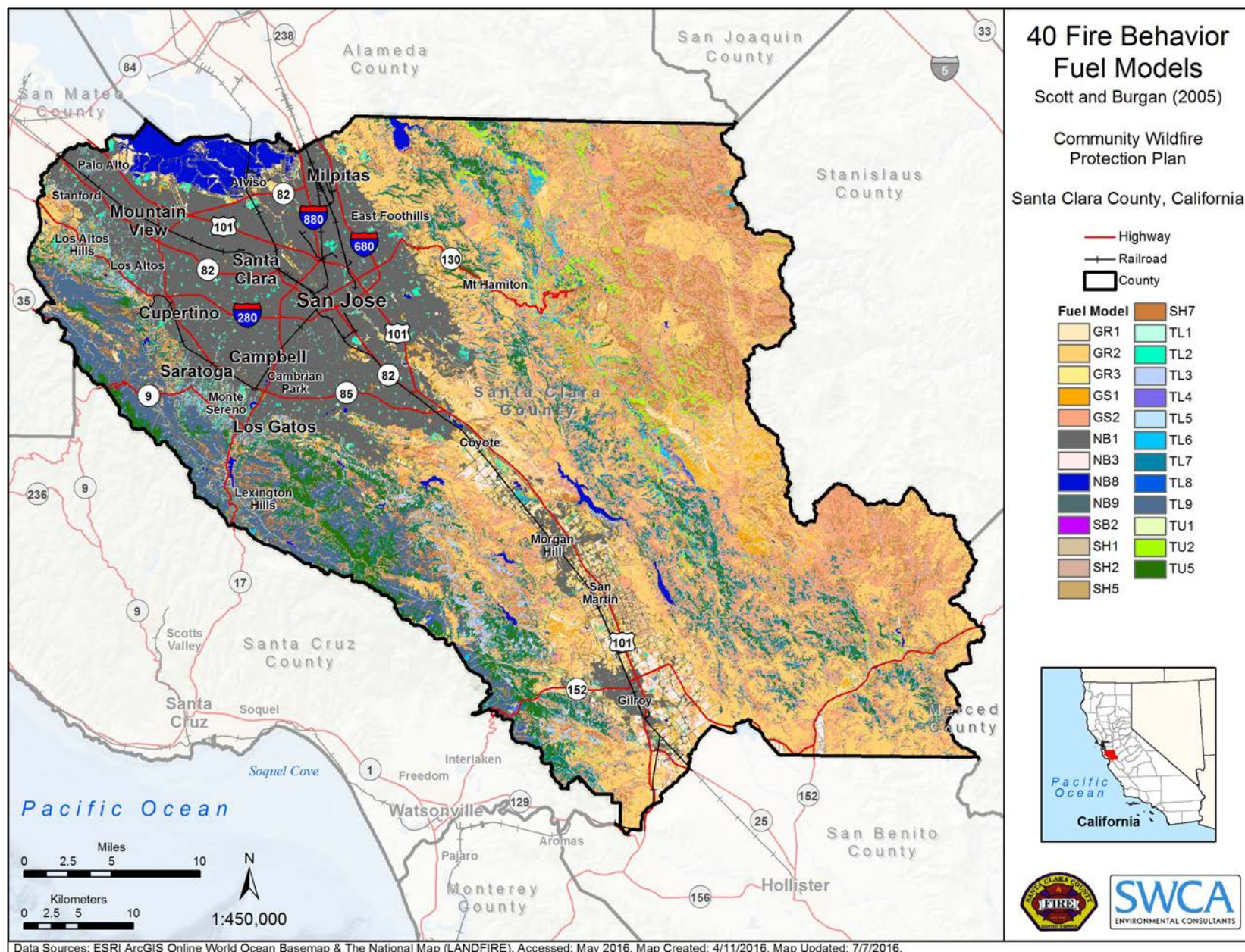


Figure 4.3. Fuel models in the CWPP planning area.

It is important to note that under current fire behavior methodologies, fire behavior simulations run throughout wildland vegetation with urban areas classified as “Non Burnable” under both the 13 Anderson (1982) fire models and the 40 Scott and Burgan (2005) fire models. Research is currently being done to model wildfire in the WUI, and these methodologies require high resolution imagery, 3D Light Detection and Ranging (LiDAR) data, and comprehensive ground surveying of structural materials and defensible space. In the absence of these data, it is possible to model flame height, crown fire activity, and rate of spread in the vegetation surrounding the WUI using FLAMMAP. Figures of predicted rate of spread and flame length are shown below (Figure 4.4 and Figure 4.5).

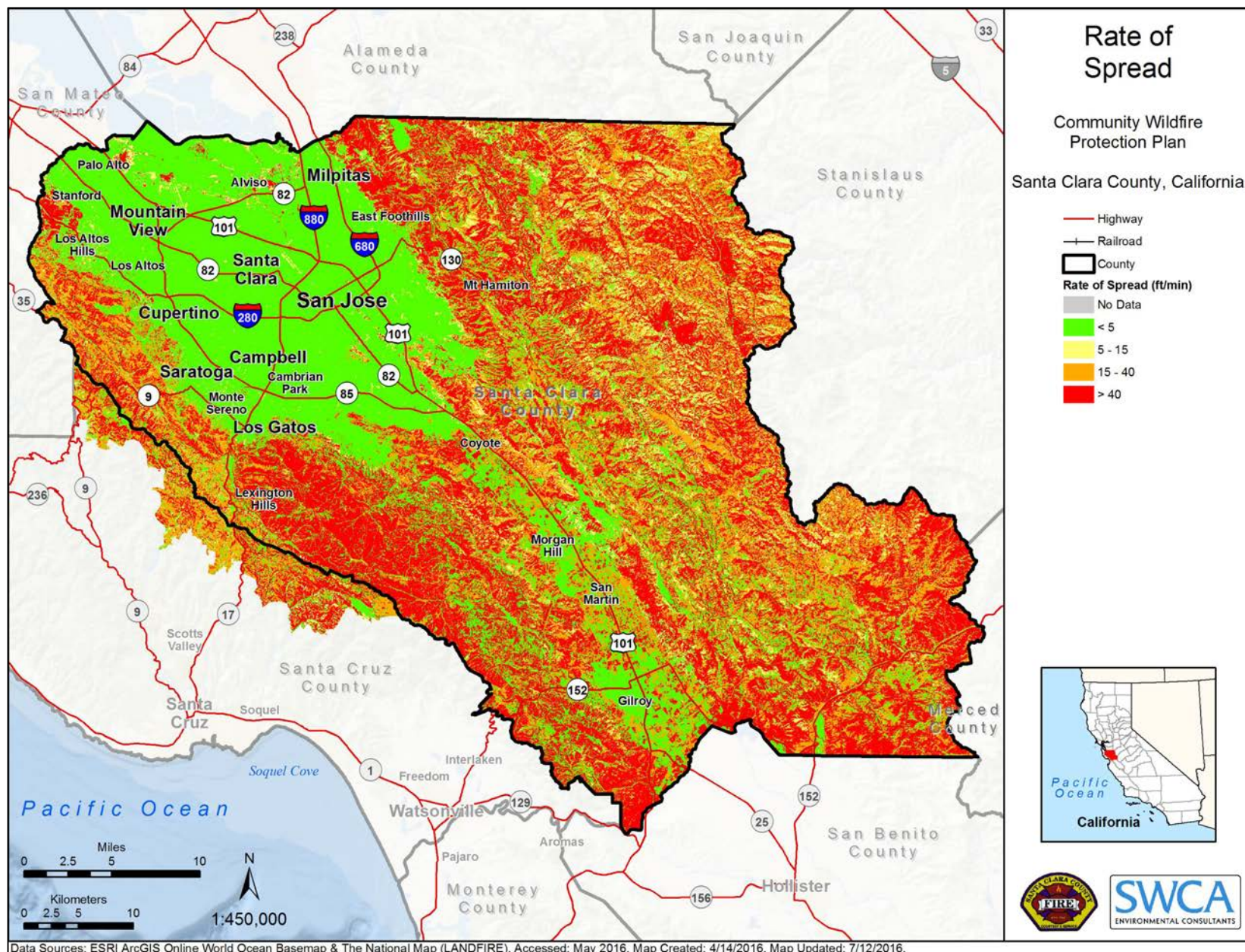


Figure 4.4. Predicted rate of spread using fire behavior modeling.

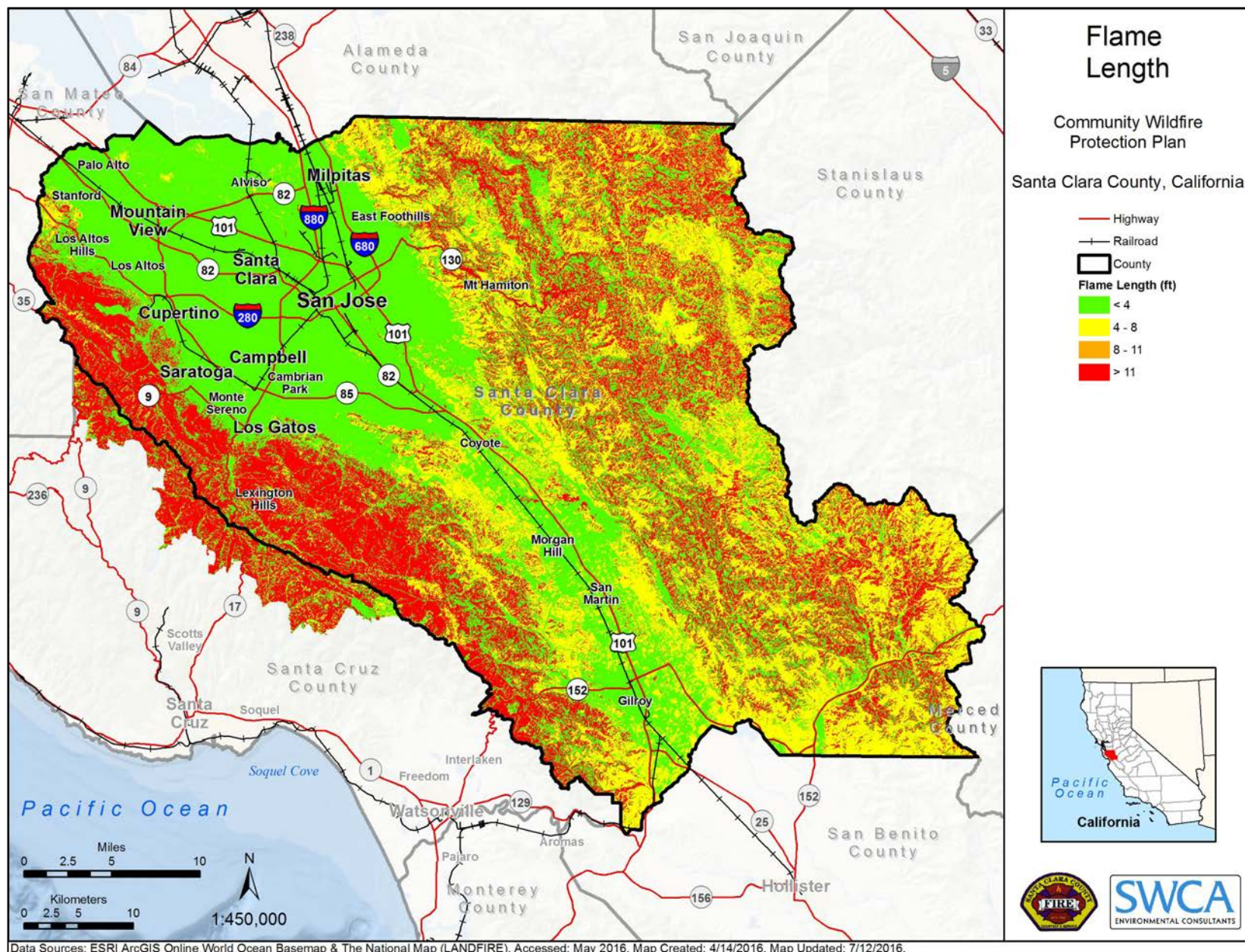


Figure 4.5. Predicted flame length using fire behavior modeling.

Topography

Topography is important in determining fire behavior. Steepness of slope, aspect (direction the slope faces), elevation, and landscape features can all affect fuels, local weather (by channeling winds and affecting local temperatures), and rate of spread of wildfire.

Weather

Of the three fire behavior components, weather is the most likely to fluctuate. Accurately predicting fire weather remains a challenge for forecasters, particularly during drought conditions. As summer winds and rising temperatures dry fuels, conditions can deteriorate rapidly, creating an environment that is susceptible to wildland fire. Fine fuels (grass and leaf litter) can cure rapidly, making them highly flammable in as little as 1 hour following light precipitation. Low live fuel moistures of shrubs and trees can significantly contribute to fire behavior in the form of crowning and torching.

One of the critical inputs for FlamMap is fuel moisture files. For this purpose weather data have been obtained from FAMWEB (National Wildfire Coordinating Group 2012), a fire weather database maintained by the National Wildfire Coordinating Group. Remote automated weather stations were selected that would best represent each of the four geographic areas.

Using an additional fire program (FireFamily Plus) with the remote automated weather station data, weather files that included prevailing wind direction and 20-foot wind speed were created. Fuel moisture files were then developed for downed (1-, 10-, and 100-hour) and live herbaceous and live woody fuels. These files represent weather inputs in FlamMap; 95 to 100 percentile weather is used to predict the most extreme scenarios for fire behavior.

4.6.4 FLAMMAP OUTPUTS

The following is a discussion of the fire behavior outputs from FlamMap.

Flame Length

Figure 4.5 illustrates the flame length classifications for the planning area. Flame lengths are determined by fuels, weather, and topography. Flame length is a particularly important component of the risk assessment because it relates to potential crown fire (particularly important in timber areas) and suppression tactics. Direct attack by hand lines is usually limited to flame lengths less than 4 feet. In excess of 4 feet, indirect suppression is the dominant tactic. Suppression using engines and heavy equipment will move from direct to indirect with flame lengths in excess of 8 feet.

Fireline Intensity

Fireline intensity describes the rate of energy released by the flaming front and is measured in British Thermal Units per foot, per second (BTU/ft/sec). This is a good measure of intensity, and suppression activities are planned according to it. The expected fireline intensity throughout the planning area is similar in pattern to predicted flame length, as fireline intensity is a function of flame length.

Rate of Spread

The Rate of Spread of a fire is the relative activity of a fire in extending its horizontal dimensions. It is expressed as a rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area. Usually it is expressed in chains or acres per hour for a specific period in the fire's history. Figure 4.4 illustrates the rate of spread classifications for the planning area.

Crown Fire Potential

Crown fire activity in the planning area is confined to shrub and timber fuels; surface fire activity occurs in the grassland fuels.

Fire Occurrence/Density of Ignitions

Fire occurrence density has been determined by performing a density analysis on fire start locations with ArcGIS Desktop Spatial Analyst (based on Fire History data shown in Figure 3.5 in Section 3.4). The density analysis has been performed over a 5-mile search radius. The fire occurrence density is used to provide information on areas where human- and lightning-ignited fires are prevalent and hence could be more prone to fire in the future.

4.6.5 GEOGRAPHIC INFORMATION SYSTEM OVERLAY PROCESS

The fire behavior parameters described above and the fire occurrence density maps are placed into a GIS Weighted Overlay Model, which “stacks” each geographically aligned dataset and evaluates an output value derived from each cell value of the overlaid dataset in combination with the weighted assessment. The resulting dataset contains only values 1 through 4 (1 = low, 2 = medium, 3 = high, 4 = extreme) to denote fire risk. This ranking shows the relative fire risk of each cell based on the input parameters.

Figure 4.6 is the final composite risk assessment for the planning area; it combines all the fire behavior parameters described above. The risk assessment classifies the County planning area into low, moderate, high, and extreme risk categories. The risk assessment has also been developed on a planning area scale. Maps are provided in the individual planning area Annexes.

Much of the western part of the County is rated as extreme risk/hazard in this assessment. The eastern foothills and valley areas have more varying topography and aspect, which combine to create a patchwork of vegetation types and fuel conditions that result in low through extreme risk/hazard.

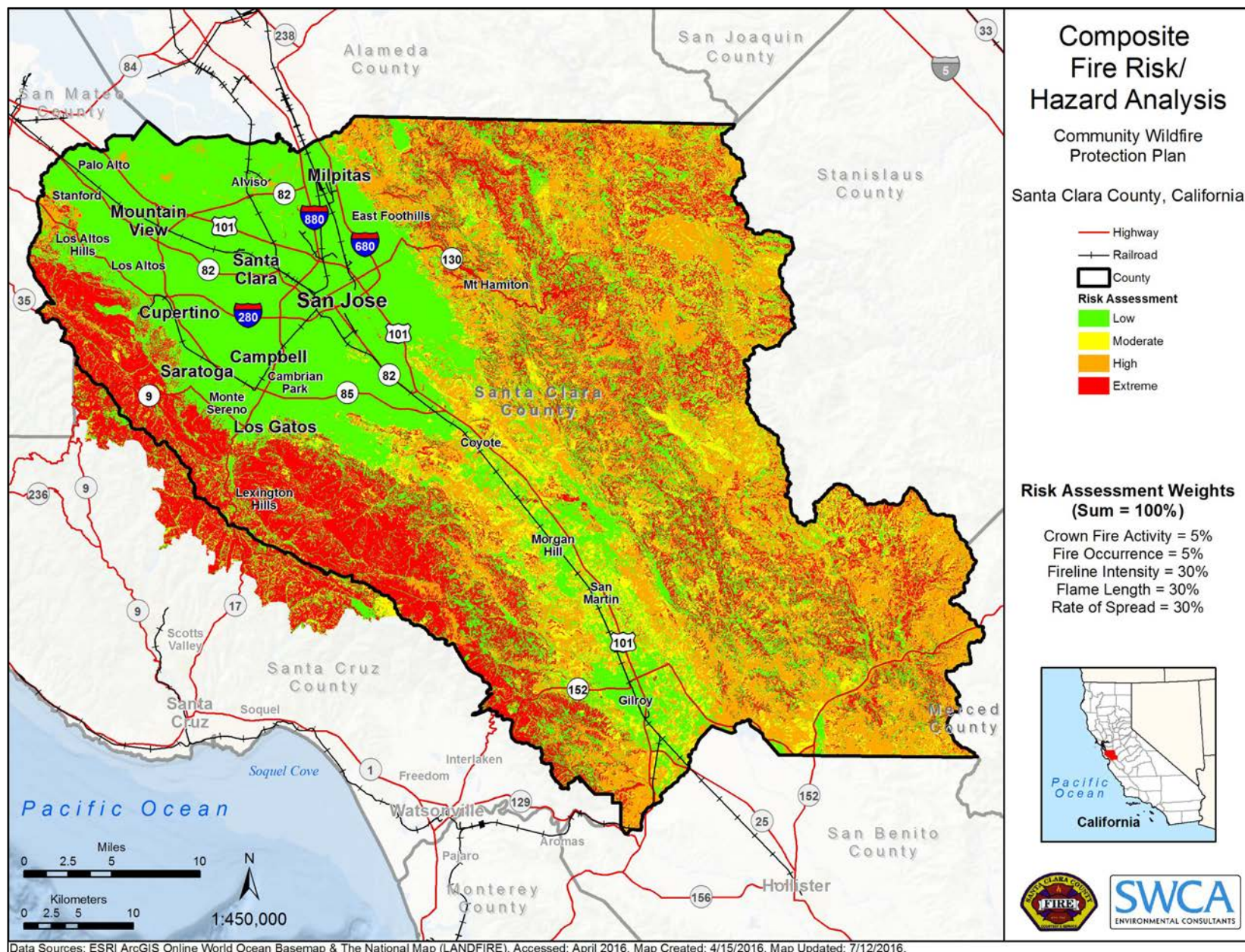


Figure 4.6. Countywide scale composite fire risk/hazard analysis.

4.6.6 PLANNING AREA SCALE: NFPA 1144 WUI ASSESSMENTS

As part of the planning process, the Core Team identified several areas within the planning area boundary that are considered at the greatest risk from wildfire (Figure 4.2). In order to properly assess the hazards in and around these communities, a series of field days was implemented to carry out community assessments.

The assessments were conducted in January and February 2016 with assistance from fire agency staff. The community assessment was carried out using the NFPA Wildland Fire Risk and Hazard Severity Form 1144 (Appendix I). This form is based on the NFPA Standard for Reducing Structure Ignition Hazards from Wildland Fire 2013 Edition. The NFPA standard focuses on individual structure hazards and requires a spatial approach to assessing and mitigating wildfire hazards around existing structures. It also includes ignition-resistant requirements for new construction and is used by planners and developers in areas that are threatened by wildfire and is commonly applied in the development of Firewise Communities (for more information, see www.firewise.org).

The assessments were carried out at the scale of the planning area, with some exceptions where a number of communities within a single planning area exhibited very different hazard features—for example, in the Lexington Hills. Each individual planning area is described in the associated annexes to this document. Each area was rated based on conditions within the community and immediately surrounding structures, including access, adjacent vegetation (fuels), defensible space, adjacent topography, roof and building characteristics, available fire protection, and placement of utilities. Each score was given a corresponding adjective rating of low, moderate, high, or extreme. An example of the assessment form used in this plan can be found in Appendix I. The purpose of the community WUI assessment and subsequent hazard ratings is to identify fire hazard and risks and prioritize areas requiring mitigation and more detailed planning. These assessments should not be seen as tactical pre-suppression or triage plans. The community assessment helps to drive the recommendations for mitigation of structural ignitability, community preparedness, and public education. The assessment also helps to prioritize areas for fuels treatment based on the hazard rating.

The hazard ratings from the community assessment are provided in Table 4.1. This table also includes a summary of the positive and negative attributes of a community as they relate to wildfire risk.

It should be noted that the community assessments are general in nature and are carried out at the community level, not at the parcel or neighborhood level. For more information at the community level, please refer to the appropriate annex. Individual parcel level assessments are not part of this CWPP, just the methodology to conduct those assessments. The parcel level WUI fire risk assessment model provided with this CWPP allows for a micro-level evaluation of site (parcel) hazard and risk. In addition, property owners can make determinations regarding the importance of certain hazard mitigations they can undertake to reduce risk to their property. It is an action item within the CWPP's recommendations that implementation of the parcel level assessment be done as a future project.

Table 4.1. Results of the Community Risk Assessment at the Planning Area

Community/WUI Planning Area	NFPA 1144 Risk Rating	Composite GIS Risk Rating	Positive	Negative
Palo Alto	103 (High)	Moderate	<ul style="list-style-type: none"> • Surfaced roads and adequate width and turnaround. • Low slope in most areas, some steep sections. • Adjacent wildland to west and north are grass and managed every year by the City of Palo Alto. • Mixed construction- stucco and wood. • Large lot size reducing adjacency issues. • Adequate water supply via hydrants. • Organized homeowner association (HOA) to deliver strong safety message and take action. • Good visible house markers. • Well signposted. • Irrigated lawns and landscaping. • New construction, 7A compliant. • Most homes have Class A roofs. • Community that is active in Santa Clara County Fire Safe Council 	<ul style="list-style-type: none"> • Landscaping concerns due to density of thick junipers and pines in close proximity to homes. • Wildlands to the south are heavy untreated brush. • Power lines above ground. • Homes old enough that there is no requirement for interior sprinklers. • Older homes with single paned windows prone to breaking in wildfire. • Presence of some wood shake roofs put homes and neighborhoods at risk.
Stanford	68 (Moderate)	Moderate	<ul style="list-style-type: none"> • Adjacent fuels are light. • Surfaced roads and adequate width and turnaround. • Low slope in most areas, some steep sections. • Adjacent wildland to west and north are grass and managed every year by the City of Palo Alto. • Mixed construction- stucco and wood. • Large lot size reducing adjacency issues. • Adequate water supply via hydrants. • Organized HOA to deliver strong safety message and take action. • Good visible house markers. • Well signposted. • Irrigated lawns and landscaping. • New construction, 7A compliant. • Most homes have Class A roofs. 	<ul style="list-style-type: none"> • >30 feet of defensible space around most homes, but <100 feet around many. • Landscaping has some junipers and pines but lower levels than adjacent Palo Alto. • Power lines are above ground. • Homes old enough that there is no requirement for interior sprinklers. • Older homes with single paned windows prone to breaking in wildfire. • Presence of some wood shake roofs put homes and neighborhoods at risk.

Community/WUI Planning Area	NFPA 1144 Risk Rating	Composite GIS Risk Rating	Positive	Negative
Los Altos Hills	88 (High)	Moderate-High	<ul style="list-style-type: none"> Los Altos Hills County Fire District jurisdiction. Good separation of adjacent structures, larger lot sizes. New construction, 7A compliant. Hydrants in most but not all areas. Surfaced roads primarily. Limited recent fire history. Open space areas could serve as shelter-in-place in event of evacuation. 	<ul style="list-style-type: none"> Heavy concentration of eucalyptus trees—treatment program available. >30 feet of defensible space around most homes, but <100 feet around many. Some areas have poor yard hygiene. Mix of construction types. Building construction includes wood siding, wooden decks, and fences that can act as fuses from vegetation to homes. Single lane, narrow roads in some areas. Some private roads with poor road maintenance and limited turn around for fire apparatuses. Narrow gates. Many old structures with wood shake roofs/siding. Heavy fuel loading adjacent to homes as a result of thick underbrush and continuity of tree crowns. CVAR: farm, retirement homes, open space areas, community horse barn.
Cupertino	81 (High)	Moderate – Extreme	<ul style="list-style-type: none"> Surfaced roads but some steep routes. Good visible house markers. Well signposted. Surfaced, maintained roads. Reasonable water supply via hydrants but low pressure in some areas. Irrigated lawns and landscaping. Under Santa Clara County Fire Department jurisdiction. HOAs for some subdivisions that can facilitate community organizing. New construction, 7A compliant. 	<ul style="list-style-type: none"> Some heavy fuel loading adjacent to homes as a result of thick underbrush and continuity of tree crowns. Thick fuels in canyon. >30 feet of defensible space around most homes, but <100 feet around many. Steep grades and varied topography. Building construction includes wood siding, wooden decks, and fences that can act as fuses from vegetation to homes. Adjacency of some residential structures. Some homes >5 miles from fire response could result in slow response time. Some gated dead-end roads. Single lane, narrow roads. Wood shake roofs present. Propane tanks above ground. Number of wineries and CVAR. Heavy population density. Some homes have limited set-back from slope.

Community/WUI Planning Area	NFPA 1144 Risk Rating	Composite GIS Risk Rating	Positive	Negative
Saratoga	90 (High)	Moderate-Extreme	<ul style="list-style-type: none"> • Surfaced roads but some steep routes. • Good visible house markers. • Well signposted; however, some signposting needs to be reflective. • Surfaced, maintained roads. • Irrigated lawns and landscaping. • Under Santa Clara County Fire Department jurisdiction. • HOAs for some subdivisions that can facilitate community organizing. • New construction, 7A compliant. • Community that is active in Santa Clara County Fire Safe Council 	<ul style="list-style-type: none"> • Some homes >5 miles from fire response could result in slow response time. • Long windy road with steep grade. • Many dead end roads. • Reasonable water supply via hydrants in lower elevation areas, but hydrants needed at higher elevations. Encourage water tanks outside of urban service area. Some non-standard hydrants are present but need to ensure compatibility with fire department apparatuses. • >30 feet of defensible space around most homes, but <100 feet around many. • Some heavy fuel loading adjacent to homes as a result of thick underbrush, continuity of tree crowns and dead downed fuels. • Thick fuels in canyon. • Building construction includes wood siding, wooden decks, and fences that can act as fuses from vegetation to homes. • Poor roof construction, wood shake roofs present. • Cultural values at risk- Saratoga old town part of WUI, Montalvo Arts Center. • Mountain winery and concert venue—potential for large number of people to be present—mitigations have been made. • Some homes have limited setback from slope.
Monte Sereno	71 (High)	Moderate-Extreme	<ul style="list-style-type: none"> • New construction, 7A compliant. • Property owners have implemented some defensible space work and fuel reduction. • Good access on lower slopes. • Good proximity to emergency responders. • Well maintained, surfaced roads. • Irrigated lawns and landscaping. • Reasonable roofing construction. • Under Santa Clara County Fire Department jurisdiction. 	<ul style="list-style-type: none"> • One way in and out. • Long windy road with steep grade. • Confusing road layout. • Limited turn around space for fire access and/or narrow driveways. • Heavy fuel loading adjacent to homes as a result of thick underbrush and continuity of tree crowns. • Reasonable water supply via hydrants in lower elevation areas, but hydrants needed at higher elevations. Encourage water tanks outside of urban service area. • Building construction includes wood siding, wooden decks, and fences that can act as fuses from vegetation to homes. • Some homes have limited setback from slope. • >30 feet of defensible space around most homes, but <100 feet around many.

Community/WUI Planning Area	NFPA 1144 Risk Rating	Composite GIS Risk Rating	Positive	Negative
Los Gatos	89 (High)	Moderate-Extreme	<ul style="list-style-type: none"> • Many newer 7A compliant homes. • Good signposting, though some non-reflective. • Less than 5 miles from fire response. • Good yard hygiene for most homes, landscaped yards. • Many larger lots with good separation between structures. • Number of open space areas to break continuity. • Good visible house markers. • Reasonable water supply via hydrants but low pressure in some areas. • HOAs for some subdivisions that can facilitate community organizing. 	<ul style="list-style-type: none"> • Lots of new development. • CVAR: wineries, retirement homes, Sacred Heart Novitiate. • Very narrow, steep, and windy roads and driveways. • No turnaround on many roads and driveways. • Heavy fuel loading adjacent to homes as a result of thick underbrush and continuity of tree crowns. • Topographic concerns, steep grades. • Poor roof materials, some wood shake. • >30 feet of defensible space around most homes, but <100 feet around many. • Mix of construction types. Building construction includes wood siding, wooden decks, and fences that can act as fuses from vegetation to homes. • Narrow or no staging area for apparatuses, would block evacuation routes. • Many dead end spurs.
Redwood Estates	93 (High)	High-Extreme	<ul style="list-style-type: none"> • Good signage for most roads and marked evacuation routes on signs and road. • Well organized community, active in Santa Clara County Fire Safe Council. • HOA assists with community organizing. • Less than 5 miles from fire response. • Good access to Highway 17 for rapid evacuation. 	<ul style="list-style-type: none"> • Private roads. • Very narrow roads, hard to navigate if unfamiliar with area. • CVAR: store, post office, restaurant pavilion/ community center. • Lot of dead-end spurs. • Older construction but many remodels. • Two main access routes (Summit Road and Highway 17) but access still concern due to potential traffic load in event of closure of either main arteries. • >30 feet of defensible space around most homes, but <100 feet around many. • Mix of construction types. Building construction includes wood siding, wooden decks, and fences that can act as fuses from vegetation to homes. There are small lot sizes with homes < 30ft apart. • Narrow or no staging area for apparatuses, would block evacuation routes. • Heavy fuel loading adjacent to homes as a result of thick underbrush, continuity of tree crowns, tree mortality and dead downed fuels. • Topographic concerns, steep grades. • Poor roof materials, some wood shake.

Community/WUI Planning Area	NFPA 1144 Risk Rating	Composite GIS Risk Rating	Positive	Negative
Summit Road	88 (High)	High-Extreme	<ul style="list-style-type: none"> Fuel break work has been done in some areas. Active Santa Clara County Fire Safe Council and South Skyline Fire Safe Council projects. Signage present regarding fire prevention. New construction, 7A compliant. Surfaced and maintained road. Good separation of adjacent structures, larger lot sizes. Signposting to visible and reflective. 	<ul style="list-style-type: none"> No hydrants, but wells available. Drafting is a possibility but need to ensure that option is compatible with fire department apparatuses and equipment. Poor ingress-egress, narrow, windy road evacuation planning needed. Hazard trees. Narrow road. Topographic concerns of ridge top and steep slopes. Few passing places on road. Tree mortality concerns— Sudden Oak Death, bark beetle. Mix of construction types. Building construction includes wood siding, wooden decks, and fences that can act as fuses from vegetation to homes. Open space areas adjacent to residential areas with dense forest and heavy fuel loading. Some homes >5 miles from fire response could result in slow response time. Geologic/seismic concerns. Wood shake roofs present. Aboveground utilities including propane tanks. CVAR: wineries, Christmas tree farms.
Chemeketa Park	131 (Extreme)	High-Extreme	<ul style="list-style-type: none"> Signposting has been updated. Water supply available (Chemeketa Water Mutual), but rustic. Redwood is dominant fuel but lots of needle cast and fuel accumulation. High humidity area due to aspect and elevation. Community that is active in Santa Clara County Fire Safe Council 	<ul style="list-style-type: none"> Very narrow roads, hard to navigate if unfamiliar with area. One ingress/egress point to community. Non-surfaced roads. Defensible space < 30 feet around structure. Topographic concerns, steep grades. Homes have limited setback from slope. Most homes have unrated roofs. Combustible siding and deck. Extreme difficulty accessing area with large fire apparatuses. No turn around spaces. Many homes built not to code. Poor property maintenance. Continuous vegetation. Aboveground utilities and propane tanks. Structure adjacency issues. Private roads, poorly maintained.

Community/WUI Planning Area	NFPA 1144 Risk Rating	Composite GIS Risk Rating	Positive	Negative
Aldercroft Heights	116 (Extreme)	High-Extreme	<ul style="list-style-type: none"> • Good signposting and evacuation route marked. • Community that is active in Santa Clara County Fire Safe Council. • Active fuel treatments throughout community, e.g., road brushed. • Good yard hygiene for most properties. • Evacuation route provided with bridge, not rated for engines but facilitates evacuation by residents. • Some newer 7A compliant homes. • Less than 5 miles from fire response. 	<ul style="list-style-type: none"> • Water supply is limited— Sistine to water tank • Extreme difficulty accessing area with large fire apparatuses. • Aboveground utilities and propane tanks. • Private road and water but managed by associations. • Very narrow, steep and windy roads and driveways. • No setback from slope for most homes. • CVAR: cell sites. • Mix of construction types. Building construction includes wood siding, wooden decks, and fences that can act as fuses from vegetation to homes. • Narrow or no staging area for apparatuses, would block evacuation routes. • Evacuation drills needed. • No turnaround. • High elevation, steep vegetated slopes with highly flammable shrub component. • Many homes defensible space < 30 feet around structure. • Poor roof materials, some wood shake. • Topographic concerns, steep grades. • Many dead end spurs.
Morgan Hill (including Holiday Lake Estates and Jackson Oaks)	83 (High)	Moderate-High	<ul style="list-style-type: none"> • Firewise sign. • Active community in Santa Clara County Fire Safe Council and fire prevention activities. • Open space areas break continuity and active fuel programs. • Surfaced and maintained roads. • Mostly good yard hygiene and maintenance of property • Morgan Hills City Water hydrant system. • Good signage, some non-reflective. • Weed abatement projects in effect. • HOA assists with community organizing. • Majority below ground utilities. 	<ul style="list-style-type: none"> • Dry flammable vegetation type adjacent to homes and below homes on slopes. • Popular with visitors, potential large numbers during summer months. • One road in and out, evacuation concerns. • Narrow roads within residential areas may have limited turnaround space. • Small lots, limited separation between structures. • Some steep driveways. • Some dead-end spurs. • Some wood shake roofs. • One Engine Company close, but other resources are at some distance. • Topographic concerns— significant slope and limited setback for many homes. • Single access subdivisions. • >30 feet of defensible space around most homes, but <100 feet around many due to small lots. • Mix of construction types. Building construction includes wood siding, wooden decks, and fences that can act as fuses from vegetation to homes.

Community/WUI Planning Area	NFPA 1144 Risk Rating	Composite GIS Risk Rating	Positive	Negative
Gilroy	50 (Moderate)	Low-High	<ul style="list-style-type: none"> • Light fuels. • Open space: Henry Coe Range. • Rolling hills and less extreme grades. • Large lots and good separation. • Good defensible space around most homes, some <100 feet. • Good access. • Maintained roads and plentiful turnaround space. • Good signage. • Low fire occurrence. • Hydrants available but density is low. 	<ul style="list-style-type: none"> • Livestock evacuation concerns. • Gated properties could impede access to emergency responders. • Mix of construction types. Building construction includes wood siding, wooden decks, and fences that can act as fuses from vegetation to homes. • CVAR: farms, grazing, orchards, vineyards, commercial property. • Some poorly rated roof materials. • Some homes > 5 miles from organized fire response. • Aboveground utilities. • Some oil and gas infrastructure.
Milpitas and East Foot Hills area	68 (Moderate)	Low-High	<ul style="list-style-type: none"> • Good fire response resources from San Jose Fire Department and CAL FIRE. • Roadside fuel treatments in progress. • Large open space areas break up residential areas. • Good yard hygiene for most homes, landscaped yards. • Non-continuous light fuels. • Sparse population in more rural areas. • Grazing helps in fuel reduction in some areas where appropriate. 	<ul style="list-style-type: none"> • Diverse WUI, from distinct interface with heavily urban area to scattered residences in an intermix. Different planning needed for each type. • Scenic road ways may increase ignition potential—Ignition concerns related to Sierra Road—fireworks etc. • CVAR: Grand View Restaurant, Lick Observatory, Copernicus Peak communications site, Alum Rock Park. • >30 feet of defensible space around most homes, but <100 feet around many. • Mix of construction types. Building construction includes wood siding, wooden decks, and fences that can act as fuses from vegetation to homes. • Wood shake roofs and older construction in some areas. • Many dead-end spur roads. • Topographic concerns, rolling hills and some steep slopes. • Grassland fuels that are highly dynamic and impacted by seasonal climate fluctuations. • Flashy shrub fuels present on slopes below homes. • Slow response times to some more remote homes in the valley. • Improvements to road networks needed. • No distinct neighborhood associations to use to develop common interest for neighborhood level interactions for Firewise or CERT.

Note: some areas were broken down into smaller communities to show variations in hazards.

4.7 PARCEL LEVEL HAZARD/RISK ASSESSMENT MODEL

The parcel level hazard and risk assessment is a project that the County will be moving forward as funds become available. The highest risk areas will be targeted first. The County will work with stakeholders to identify the most efficient and effective procedure for completing parcel level assessments across the County. This process is likely to take several years. The narrative provided here describes the model and the process that can be used to complete parcel level assessments.

The parcel level hazard and risk assessment model has four major components:

1. **Community hazard assessment** examines the current and expected WUI conditions. Factors examined include FHSZ rating, weather conditions of assessment area, history of serious fires, fire ignition patterns and sources, parcel sizes, road network, evacuation factors, available water supply, presence of flammable vegetation, and other factors.
2. **Community mitigations** include community average of year building built (as it relates to whether the structure was built under more stringent WUI building codes), communitywide compliance with defensible space provisions, general property hygiene and community fuel breaks or other fire defense projects, community involvement in fire prevention education and outreach, and other factors.
3. **Parcel mitigations** include primary land use (residential, commercial, infrastructure), year buildings on the parcel were built, setback distance to nearby structures, roof type, siding materials, window type, venting systems, deck materials and ember resistance, defensible space compliance, property hygiene, special needs for evacuation, and other factors.
4. **Special adjustments** include certain parcel level factors such as historical or irreplaceable structures, cultural icons, facilities “too important” to lose, rare/endangered species not fire adapted, or other situations that highlight critical importance of mitigating that parcel.

Properly analyzing these factors also requires identification of WUI fire protection capacity, land management practices, jurisdictions, existing laws, ordinances, regulations, policies, and practices.

The parcel level risk assessment model was developed with the intention that over time a database of assessment data will be built for the County using the model as a framework. In lieu of a full dataset at this time, the model was tested using sample data from across the county. The results illustrate how the model will identify risk spatially and the potential of the model to aid in prioritization of parcel mitigations for risk reduction. For descriptions of each risk factor included in the model please see Appendix J.

4.8 PARCEL LEVEL RISK ASSESSMENT PROCESS

Community hazard – Structural risk assessments are conducted by first examining and scoring the community level hazard. Fire response organizations identify a community of common characteristics and community of interest by creating a GIS polygon that includes all parcels within the community. For GIS analysis and application of Assessors Parcel data, parcels must be fully included or fully excluded from the polygon. Scoring factor evaluations by fire agency personnel

are based on this community polygon. Scores are given for the characteristics of each rating factor:¹² For Descriptions of each rating factor used in the model please refer to Appendix J.

- FHSZ
- Average parcel size
- Distance from flammable vegetation
- Extreme wind patterns
- Ignition history
- Serious fire history
- Road network
- Evacuation time to safe area
- Water supply

Community mitigations – Communitywide mitigations efforts will reduce the hazard score for the entire community. Each mitigation method has a different impact score.

- Average year built
- Fuel modifications/fuel breaks
- Communitywide defensible space compliance
- Average communitywide property hygiene
- Community involvement in Santa Clara County Fire Safe Council/public education programs
- Community recognition as Firewise Community

Parcel mitigations – Parcel owners can significantly improve survivability for their properties by mitigations under their control. The parcel score includes the community hazard score because the parcel cannot separate itself from the surrounding hazard. It is possible for a parcel to have a very good parcel mitigation score, but have a poor overall score because the community has a high hazard rating (poor road network, lack of water, or poor communitywide defensible space compliance can adversely affect the parcel). Conversely, a community can have a good hazard score and the individual parcel can have a poor score; this could be a home with shake shingle roof in a WUI community where all other roofs are non-flammable.

- Property land use
- Year built
- Distance (set back) from nearest adjoining structures
- Roof materials

¹² Other ratings factors (e.g., response time) can be added if deemed important.

- Siding materials
- Exterior window type
- Venting types/screen size
- Deck floor materials, under deck storage, and ember resistance to underdeck area
- Flammable deck/patio furniture
- Defensible space compliance
- Ember/mulch bed proximity
- Property hygiene
- Evacuation assistance need
- Special adjustments for historical, cultural, or local icon(s)
- Special status species

4.8.1 TEST RESULTS OF PARCEL LEVEL HAZARD/RISK ASSESSMENT MODEL

The model was tested for six homes across Santa Clara County (Table 4.2). The score comprises of the four ratings, community hazard rating (CHR), community mitigation rating (CMR), total community score (TCS), and parcel mitigation rating (PMR). It is important to note that the scores can be negative (i.e., negative mitigation = increased hazard due to property maintenance). A negative score will increase the overall risk result of the model. As the general premise of the model is $\text{Fire Risk} = \text{Hazard} - \text{Observed Mitigations}$; if the observed mitigations are negative the overall fire risk will be higher.

Table 4.2. Test Homes for Parcel Level Hazard/Risk Assessment Model

APN	Address_Num	Address_Street	CHR	CMR	TCS	C_RISK	PMR	Special	Overall	Overall_Risk
55822002	1	Street Address 1	417	-11	428	Extreme	-283	0	711	Extreme
55839041	2	Street Address 2	94	-3	97	High Risk	-311	0	408	Extreme
54441012	3	Street Address 3	111	42	69	Moderate	118	0	-49	Moderate
33630014	4	Street Address 4	41	40	1	Low Risk	105	0	-104	Low Risk
18248011	5	Street Address 5	65	50	15	Moderate	143	0	-128	Low Risk
34256035	6	Street Address 6	65	26	39	Moderate	-233	0	272	Extreme

A major benefit of this model is that the model itself is calculated in a spreadsheet (such as Microsoft Excel), the results of which can then be transferred into ArcGIS using simple “join to table” function. The parcel can then be symbolized to show overall risk. Community Outreach Strategy

Community Outreach is intended to bring awareness of the community of the CWPP process and invite their involvement. Engaging interested parties is critical in the CWPP process; substantive input from the public will ensure that the final document reflects the highest priorities of the local community. A key element in the CWPP process is the meaningful discussions it generates among community members regarding their priorities for local fire protection and forest management (SAF 2004).

The Santa Clara County Fire Department Fire Prevention Bureau, CAL FIRE, municipal fire departments, resource management agencies and Fire Safe councils have been actively engaging communities throughout the county in wildfire prevention education and outreach (see Section 6.3). These current, ongoing programs span CERT programs, free chipping services, distribution of educational material and appearances at local events. In addition, several fire departments have embraced the One Less Spark Fire Prevention campaign, which offers a series of public service announcements aimed at fire prevention. As part of these outreach programs, physical reminders of wildfire prevention and fire safety are provided through signage throughout the county. Signs are used to inform the local population of extreme fire danger and alert them on current conditions. Local media are also engaged in public outreach for wildfire prevention in the area, with local television news stations (KTVU, for example), and local radio stations (KCBS, for example) covering many wildfire issues, particularly during periods of heightened fire risk.

Public involvement in the CWPP planning process has been encouraged through a range of media outlined below.

4.9 COMMUNITY SURVEY, WEBINAR, AND SOCIAL MEDIA

4.9.1 COMMUNITY SURVEY

In order to gather information from the community, an online survey portal was developed with a custom survey designed to gather public attitudes towards wildfire protection and perceived priorities. Dr. Sarah McCaffrey, a U.S. Forest Service Social Scientist, worked with the Core Team to craft questions to tease out attitudes regarding risk perception. The questions helped to identify barriers to taking actions that bolster fire safety, defined what services might best assist the community, and what the communities think of current services and programs. Since community perceptions and needs vary by locality, the survey was geo-tagged to assist agencies on the Core Team in developing more targeted services and programs.

The online survey was also distributed to all Core Team representatives and made available on the Santa Clara County and Fire Safe Council websites. Paper copies were distributed at the second round community workshops, to one of the homeowner associations engaged in the CWPP process, and to the Core Team. The survey and an analysis of the findings are presented in detail in Appendix K. The results of the survey are summarized below. These results have been used to develop mitigation recommendations described in Chapter 6 and in the accompanying annexes to this document, and can be used to develop future project priorities by the community and the local, state, and federal agencies.

Preliminary Survey Results

The following section provides summary analysis of the community survey. This analysis is based upon 87 responses. Much of these findings address results obtained from Lexington Hills residents, who comprised the majority of responses.

- Overall respondents showed high levels of concern about wildfire in the area, with 95% overall indicating they were moderately to extremely concerned.
- Risk to infrastructure is seen as high by residents living in the Lexington Hills with equal significance in addressing critical infrastructure issues.
- Lexington Hills residents have less sense that they can control their risk, which may reflect concerns relating to infrastructure and hazards on Highway 17 voiced by many residents.
- There is a clear sense that it is not easy to reduce personal wildfire risk.
- Approximately half of residents feel that the County is adequately prepared but would like more done.
- Approximately $\frac{3}{4}$ of residents feel overall that they are adequately or well prepared for wildfire.
- In relation to mitigation measures applied on personal property- $\frac{3}{4}$ of respondents have carried out vegetation actions within the last 6 months – those activities that require more frequent maintenance (removing dead veg) have larger portions who had completed that maintenance within the past 6 months. In terms of structural resistance – almost all have (or intend to replace) fire resistance roofs, $\frac{1}{5}$ of people are not sure whether eaves are screened, and majority who either have not yet done and/or are not planning on doing a) fire resistant siding, b) boxing eaves and c) enclosing underside of decks.
- A large portion of respondents have had a risk assessment completed, with 68% having been completed by the Fire Department.
- Most people understand the role of embers in home destruction.
- Most people do not feel their household needs to make changes for the community to be better protected, but the vast majority agree that the community as a whole needs to take more action.
- Relating to barriers to action:
 - Almost 90% of people agree that they know how to manage vegetation and 60% agree that they know how to make structural changes.
 - Only 1% agree with the statement that preparation is not needed due to insurance (which undermines the notion that insurance is a reason why people don't mitigate).
 - Cost is an issue for approximately one-third.
 - Approximately one-quarter indicate that physical abilities are a barrier to action.
 - Lack of time is a barrier for roughly 30%.
 - Aesthetics is not a barrier as only 5% agree with the statement.
- Approximately 60% of people have a disaster plan – but it is not written down – a higher proportion of Lexington Hills residents have non-written disaster plans.
- Approximately 40% of people have identified a family meeting location- with 50% of Lexington Hills residents.

- Several items indicate that evacuation is a much bigger concern for Lexington Hills residents.
- Respondents had a positive feeling towards fire agencies.
- In relation to mitigation actions to prioritize:
 - High priority is placed on vegetation management on public lands (76%) with lowest priority on prescribed burning. Eastern county residents placed higher priority on grazing and mechanical thinning than western county residents.
 - Helping private property owner mitigate fire risk is a high priority (70%)
 - Animal issues are a high priority for roughly one-third with more emphasis on pets in the western county and more on livestock in eastern county.
 - Protection of values other than homes is higher priority for non LH, in general and for historic structures.
 - Protection of critical infrastructure is high priority for 66% of all respondents.
 - A larger % of non-Lexington Hills residents find a number of activities very acceptable including retrofit ordinances (29% vs. 11), training landscape contractors (55% vs. 30%), and development restrictions (32% vs. 17.5%).

4.9.2 SOCIAL MEDIA

A Facebook page was developed for the CWPP (entitled Santa Clara County Community Wildfire Protection Plan), and the page received 135 “likes.” The page includes a description of the planning process and links to the online community survey and other relevant pages for the communities. The page has also been used to announce the two rounds of community workshops to gather input on the plan. The profile page is located here:

- <https://www.facebook.com/SantaClaraCountyCWPP/>.

4.10 COMMUNITY WORKSHOPS

Due to the varied natural, social composition, and geographic distribution of communities within Santa Clara County, a total of eight community workshops were hosted across the county over two rounds.

The first round of community workshops was held from February 17 to 23, 2016, and focused on the following areas:

February 17 – Morgan Hills, Gilroy, and South County Areas

Hiram Room,
Morgan Hill Community Center,
17000 Monterey Road
Morgan Hill 10

February 18 – East Foothills

Berryessa Community Center
3050 Berryessa Road
San Jose

February 22 – Cupertino, Saratoga, and Los Altos Hills (Figure 4.7)

Cupertino Community Hall
10350 Torre Avenue
Cupertino

February 23 – Monte Sereno, Los Gatos, and Lexington Hills

Pavilion at Redwood Estates
21450 Madrone Drive
Los Gatos



Figure 4.7. Cupertino community workshop.

The goal of the first round of meetings was to introduce the communities to the CWPP planning process, present the community base maps, identify threats and risks to the area, solicit project ideas, and develop a list of CVARs. The workshops comprised a PowerPoint presentation, plus a series of large format maps that allowed attendees to locate areas of interest and review proposed projects. Additionally, flip charts were used to document ideas and comments that were not geographically based. Input was encouraged by requesting that participants mark up the maps with project ideas. Attendees were invited to meet and discuss the project with agency stakeholders who were also in attendance. Attendees of the meeting were informed on how to provide input through the survey and through the project's Facebook page.

A number of press releases were submitted to publicize the community workshop and inform the public of the planning process. Flyers and posters advertising the meetings were also produced and distributed by the Core Team. Other opportunities to engage specific communities were taken. For example, an article inviting community members of the Lexington Hills was distributed through an electronic and mailed newsletter, and a member of the consulting team attended the annual pancake breakfast for the Spring Valley Volunteer Fire Department. Informational flyers were also distributed at the community workshops, which provided information on the planning process and outreach efforts. A sign-in sheet was distributed at each gathering to collect contact information for residents interested in receiving future project information. As a follow up to the first round of

meetings, pdf versions of all project maps were made available with a solicitation that residents provide annotations to those maps and submit them back to the Core Team. These requests were provided through various channels.

A second round of community workshops was scheduled in May 2016. The second round of workshops was timed to coincide with the release of the draft document. These workshops were publicized through the same channels as the first workshop, including press releases, electronic and hard-copy newsletters. In addition, email list serves were used to inform communities of the workshops. The public was encouraged to review the document and provide comment.

Dates and locations are shown below:

May 2nd – East Foothills

Milpitas Senior Center Auditorium
40 N Milpitas Blvd,
Milpitas

May 3rd – Morgan Hills, Gilroy, and South County Areas

Hiram Room,
Morgan Hill Community Center,
17000 Monterey Road
Morgan Hill

May 3rd – Monte Sereno, Los Gatos, and Lexington Hills

Pavilion at Redwood Estates
21450 Madrone Drive
Los Gatos

May 9th – Cupertino, Saratoga, and Los Altos Hills

Cupertino Community Hall
10350 Torre Avenue
Cupertino

An additional workshop was held for resource management agencies only so these entities could provide specific projects and perspective.

4.11 CURRENT OUTREACH PROGRAMS

4.11.1 SANTA CLARA COUNTY FIRE DEPARTMENT

The Santa Clara County Fire Department offers a comprehensive community education service program throughout the District and within the following seven cities and towns: Campbell, Cupertino, Los Altos, Los Altos Hills, Los Gatos, Monte Sereno, and Saratoga. The Community Education Office is staffed with six full-time employees and is delivered through specially trained department personnel and volunteer firefighters. Programs provided include community preparedness, wildland urban intermix/interface preparedness, and CPR.

The Community Education Office helps residents locate programs and services that will help keep them safe, reduce fires and injuries, and improve overall health and wellness. The Community Education Office functions as an information and referral service connecting individuals, organizations, and community audiences to agencies located within Santa Clara County.

The Santa Clara County Fire Department provides WUI inspections to property owners who live in a hillside community in order to provide information on actions property owners can take to minimize fire hazards and maximize fire resistance. For more information on property assessment, please contact the Fire Prevention Division at (408) 378-4010 or visit the website at:

- <http://www.sccfd.org/community-outreach-safety-education/community-outreach-safety-education-overview>.

Community Emergency Response Teams – The CERT program educates participants about emergency preparedness and provides basic disaster response training to assist others when first responders might not be immediately available to help. Some of the trainings include learning first aid, using a fire extinguisher, and organizing resources. A number of training opportunities are available throughout the county and current information can be found at:

- www.sccfd.org/news-events.

4.11.2 SANTA CLARA COUNTY FIRE SAFE COUNCIL

The Santa Clara County Fire Safe Council works actively in the community and offers a wide range of education and outreach programs as outlined on its website (<http://www.sccfiresafe.org/>). Below are example education and outreach programs that are available to county residents:

Youth education: The council offers youth targeted wildfire prevention activities and Smokey Bear visits.

Living with fire in Santa Clara County: The Santa Clara County Fire Safe Council provides access to a 20-page homeowner's guide for fire mitigation activities.

100 feet of defensible space: The council provides information regarding defensible space parameters for home defense.

Making your home fire safe: The council provides links to relevant literature and defensible space programs such as Firewise.

Home ignition zone assessments: Council consultants provide on-site risk assessments and provide guidance for actions to reduce vulnerabilities.

Defensible space chipping programs: The Santa Clara County Fire Safe Council has agreements, contributions, and federal grants for:

1. a defensible space chipping program for eligible residents, and
2. a special needs assistance program for seniors and/or others with physical and financial limitations that prevent them from preparing for chipping.

The Santa Clara County Fire Safe Council has a spring chipping program to dispose of brush that has been cleared 100 feet from permanent structures and/or 30 feet from any roadside or driveway used for evacuation purposes. For more information visit:

- <http://www.sccfiresafe.org/santa-clara-county-fuel-reduction-programs>.

Older adults: The council provides fire safe tips for older adults living in the WUI.

Environment: The council lists information sources regarding wildfires importance in the environment, fire safe planting, and native plants.

Tree and landscape contractor workshops: Workshops to educate professionals who implement defensible space clearing projects.

Website and Facebook updates: The Fire Safe Council is prepared to push information about active wildfires to communities at risk to help spread evacuation warnings if needed.

Additional details on outreach programs are listed in the Fire Safe Council Annex.

For more information on these and other programs, please visit:

- <http://www.sccfiresafe.org/education-outreach>.

4.11.3 CAL FIRE SANTA CLARA UNIT

The Santa Clara Unit of CAL FIRE provides services to assist in fire prevention. CAL FIRE has a long history of providing fire prevention, fire safety, and natural resource protection education to the citizens and visitors of California. CAL FIRE's Fire Prevention Education programs are spread statewide and come in the form of social media campaigns, school programs, fair exhibits, posters, flyers and thousands of other printed materials, radio and television spots, internet communications, community meetings, and one-on-one contacts with those who live, work, and recreate in wildland areas (CAL FIRE 2016).

Below are example education and outreach programs that are available to Santa Clara County residents:

Information on the Ready, Set, Go! Program: <http://www.readyforwildfire.org/>

National Fire Prevention Week programs: Held annually in October (October 9–15 in 2016), <http://www.nfpa.org/fpw>.

Community Fact Sheets for fire prevention:
http://calfire.ca.gov/communications/communications_factsheets

Children focused activities: http://calfire.ca.gov/communications/communications_justforkids

PreventWildfireCA.org programs and literature: <http://www.preventwildfireca.org/>

4.11.4 FIRE DEPARTMENT ACTIVITIES

Most fire departments (both county and municipal) within Santa Clara County offer fire prevention activities such as station open houses throughout the year in order to engage the local community in the workings of the department and in fire safety and prevention measures. Fire department websites may also offer links to other non-fire agencies that provide information on wildfire preparedness. For example, the American Red Cross (<http://www.redcross.org>) offers a Wild Fire Safety Checklist, while Pacific Gas and Electric Company (PG&E) (<http://pge.com>) has developed a Wildfire Safety page.

4.12 FIREWISE COMMUNITIES

Although many residents are familiar with Firewise Communities and the fire management agencies have already implemented Firewise workshops in the past, many others could benefit from greater exposure to this program. Workshops demonstrating and explaining Firewise Communities principles have been suggested to increase homeowner understanding of home protection from wildfire. One goal is for communities to apply to become a Firewise Community, recognized in the state as a shining example for fire prevention. Information about the program is available at <http://www.firewise.org/usa/index.htm>. The Jackson Oaks community in Morgan Hill is working to obtain Firewise certification. Greater participation by other communities in the county in the Firewise Communities program could improve local understanding of wildfire and, in turn, improve protection and preparedness.

4.13 COMMUNITY ENGAGEMENT STRATEGY

The community outreach strategy provides a way to quantify improvements in community resiliency over time. The strategy includes a way to track the success of community outreach. Follow-up communication with stakeholder affiliations will foster formal and informal collaboration regarding priorities and project nomination.

There are six strategic goals for improving community education and outreach. For each strategic goal a strategy is identified to quantify the success of the project:

Goal	Outreach Strategy to Gauge Success
Educate citizens on how to achieve contemporary WUI code compliance in retrofits/cost: benefit ratio. Provide workshops and/or demonstration site.	Number of workshops and demonstration sites focusing on WUI code compliance and retrofit opportunities. Reduction in scored risk due to structural mitigation measures taken.
Analyze playing with fire ignitions and focus education programs at vicinity schools.	Assess number of ignitions near schools, report on number of presentations at and/or focused on ignitions caused by playing with matches.
Fire agencies establish partnership with San Jose State University (or other colleges) for student intern programs for GIS, plans, weather, environmental reviews, etc.	Collaborative projects, attendance at joint meetings between San Jose State University, number of interns addressing GIS, plans, weather, environmental reviews, etc.
Provide webinars for homeowners to learn about fire safe communities and property.	Number of webinars about fire safe communities and property, and number of viewers.
Some individual communities (for example Jackson Oaks in Morgan Hill) identified a project to establish and support a new Firewise Community	Count the number of Firewise Communities in the county when the CWPP is next updated.
Provide regular CWPP updates and opportunities for agency/community input.	Note the number of organizations, emergency response agencies and resource management agencies, homeowner associates, individual homeowners, and geographic distribution of projects engaged in next CWPP update.

The Fire Safe Council provides a natural framework to facilitate collaboration between fire agencies, land managers, and communities in fuel reduction activities, wildfire mitigation projects, and community education and outreach. Many members of the Core Team are already active participants in this organization. This organization embraces all homeowners, landowners, organizations and agencies in their effort to reduce damage from wildfire and thus their goal is aligned with those expressed in the CWPP. The existing and ongoing community outreach and education programs of the Fire Safe Council and fire agencies throughout the county are tested, well supported, and successful. However, improvements and growth in these programs can bring even greater success.

5 MITIGATION STRATEGIES

Wildfire risk mitigation strategies, followed by the promulgation of associated codes and ordinances, along with public education on these topics, in combination with follow-up inspections and enforcement, are needed to optimize wildfire mitigation work. This CWPP will help provide a countywide overview of what elements this process should contain. It can recognize communities and cities around Santa Clara County that have an effective program and help identify locations in which such a program is deficient or absent. This chapter identifies mitigation strategies for reducing wildfire risk and hazard to Santa Clara County residents.

5.1 CURRENT PUBLIC EDUCATION AND OUTREACH PROGRAMS

5.1.1 SANTA CLARA COUNTY FIRE SAFE COUNCIL

The Santa Clara County Fire Safe Council's education and outreach programs work to motivate and educate individuals, public and private agencies and companies that share a common, vested interest in preventing and reducing losses from wildfires.

Santa Clara County Fire Safe Council programs and projects are focused on protecting the 14 designated communities at risk; it works actively in the community and offers education and outreach programs as outlined on its website (<http://www.sccfiresafe.org>) Target audiences for outreach include adult and youth residents in the WUI, youth in schools and outdoor education programs, landscaping and tree contractors, businesses and civic organizations with ties to interests at risk from wildfire.

Section 6.3.2 provides more education and outreach programs that are available to county residents.

5.1.2 SOUTH SKYLINE FIRE SAFE COUNCIL

The primary activities of the South Skyline Fire Safe Council are to encourage and assist homeowners to prepare for wildfires, reduce hazardous fuels along roads and trails, coordinate with other fire prevention agencies, and provide fundraising (<http://www.southskylinefiresafe.org>). Section 6.3.3 provides more education and outreach programs that are available to Santa Clara County residents.

5.1.3 READY, SET, GO!

The Ready, Set, Go! Program, which is managed by the International Association of Fire Chiefs, was launched in 2011 at the WUI Conference. The program seeks to develop and improve the dialogue between fire departments and residents, providing teaching tools for residents who live in high risk wildfire areas—and the WUI—on how to best prepare themselves and their properties against fire threats (Ready, Set, Go! 2016).

The tenets of Ready, Set, Go! As included on the website (<http://www.wildlandfirersg.org>) are:

Ready – Take personal responsibility and prepare long before the threat of a wildland fire so your home is ready in case of a fire. Create defensible space by clearing brush away from your home. Use fire-resistant landscaping and harden your home with fire-safe construction measures. Assemble emergency supplies and belongings in a safe place. Plan escape routes and make sure all those residing within the home know the plan of action.

Set – Pack your emergency items. Stay aware of the latest news and information on the fire from local media, your local fire department, and public safety.

Go – Follow your personal wildland fire action plan. Doing so will not only support your safety, but will allow firefighters to best maneuver resources to combat the fire.

5.1.4 *DEFENSIBLE SPACE*

Defensible space is perhaps the fastest, most cost-effective, and most efficacious means of reducing the risk of loss of life and property. The various fire agencies throughout the county have already laid a strong foundation for effective wildfire mitigation by working with county residents regarding wildland fire safety and prevention. Although fire agencies can be valuable in providing guidance and assistance, creating defensible space is the responsibility of the individual homeowner.

The Santa Clara County Fire Department and CAL FIRE provide defensible space recommendations on their websites at:

- <http://www.sccfiresafe.org/education-outreach/100-feet-defensible-space>
- http://www.fire.ca.gov/communications/communications_firesafety_100feet

A defensible space of 100 feet is required by California State law. Figure 5.1 provides a brief synopsis on the 100-foot defensible space requirement for California residents living in the WUI.

100' DEFENSIBLE SPACE

Make Your Home FIRE SAFE

Trees spaced to reduce fire spread

Trees trimmed at least 10' from chimney

Lower tree limbs removed to reduce "fire ladder"

Space plants and shrubs to prevent fire from spreading

30' 70' (or to property line)

a

b

or

1 30 ft 2 Reduced Fuel Zone 70 ft

1 30 ft 2 Reduced Fuel Zone 70 ft

Santa Clara County FireSafe Council
(408) 975-9591 • www.SCCFireSafe.org

The Santa Clara County FireSafe Council is a non-profit organization composed of individuals, public and private agencies and companies that share a common, vested interest in preventing and reducing losses from wildfires

Why 100 Feet?

Following these simple steps can dramatically increase the chance of your home surviving a wildfire!

A Defensible Space of 100 feet around your home is required by law.¹ The goal is to protect your home while providing a safe area for firefighters.

1 "Lean, Clean and Green Zone."

– Clearing an area of 30 feet immediately surrounding your home is critical. This area requires the greatest reduction in flammable vegetation.

2 "Reduced Fuel Zone."

– The fuel reduction zone in the remaining 70 feet (or to property line) will depend on the steepness of your property and the vegetation.

Spacing between plants improves the chance of stopping a wildfire before it destroys your home. You have two options in this area:

- a** Create horizontal and vertical spacing between plants. The amount of space will depend on how steep the slope is and the size of the plants.
- b** Large trees do not have to be cut and removed as long as all of the plants beneath them are removed. This eliminates a vertical "fire ladder."

When clearing vegetation, use care when operating equipment such as lawnmowers. One small spark may start a fire; a string trimmer is much safer.

Remove all build-up of needles and leaves from your roof and gutters. Keep tree limbs trimmed at least 10 feet from any chimneys and remove dead limbs that hang over your home or garage. The law also requires a screen over your chimney outlet of not more than 1/2 inch mesh.

1. These regulations affect most of the grass, brush, and timber-covered private lands in the State. Some fire department jurisdictions may have additional requirements. Some activities may require permits for tree removal. Also, some activities may require special procedures for: 1) threatened and endangered species; 2) avoiding erosion; and 3) protection of water quality. Check with local officials if in doubt. Current regulations allow an insurance company to require additional clearance. The area to be treated does not extend beyond your property. The State Board of Forestry and Fire Protection has approved Guidelines to assist you in complying with the new law. Contact your local CAL FIRE office for more details.

Reprinted with permission
July 2007

Figure 5.1. Defensible space (Source: Santa Clara County Fire Safe Council 2016).

Effective defensible space consists of an essentially fuel-free zone adjacent to the home, a treated secondary zone that is thinned and cleaned of surface fuels, and (if the parcel is large enough) a transitional third zone that is basically a managed wildland area. These components work together in a proven and predictable manner. Zone 1 keeps fire from burning directly to the home; Zone 2 reduces the adjacent fire intensity and the likelihood of torching, crown fire, and ember production; and Zone 3 does the same at a broader scale, keeping the fire intensity lower by maintaining a more natural, historic condition (Figure 5.2).

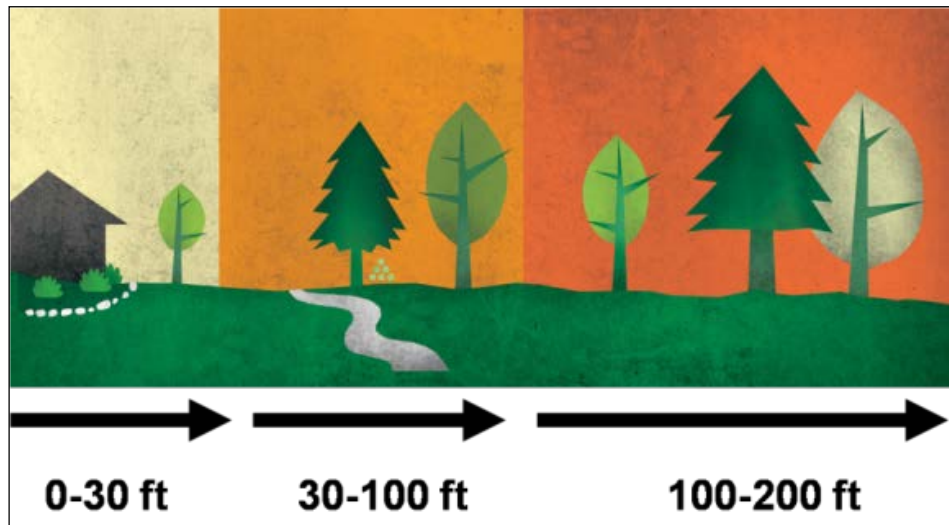


Figure 5.2. Defensible space zones (Source: www.firewise.org).

The Insurance Institute for Home and Business Safety at disastersafety.org provides a recommendation for a 0- to 5-foot non-combustible zone. This recommendation is reflected in defensible space guidelines provided in Appendix A of this document and is shown in Figure 5.3 below.



Figure 5.3. IBHS defensible space guidelines.

It should be emphasized that defensible space is just that—an area that allows firefighters to work effectively and with some degree of safety to defend structures. While defensible space may increase a home’s chance of surviving a fire on its own, a structure’s survival is not guaranteed, with or without firefighter protection. Nevertheless, when these principles are consistently applied across a neighborhood, everybody benefits.

Specific recommendations should be based on the particular hazards adjacent to a structure such as slope steepness and fuel type. Local fire authorities or CAL FIRE should be contacted if a professional assessment seems warranted. Firewise guidelines are an excellent resource, but creating defensible space does not have to be an overwhelming process. Assisting neighbors may be essential in many cases. Homeowners should consider assisting the elderly, sharing ladders for gutter cleaning, and assisting neighbors with large thinning needs. Adopting a phased approach can make the process more manageable and encourage maintenance (Table 5.1).

Table 5.1. Example of a Phased Approach to Defensible Space

Year	Project	Actions
1	Basic yard cleanup (annual)	Dispose of clutter in the yard and under porches. Remove dead branches from yard. Mow and rake. Clean off roofs and gutters. Remove combustible vegetation near structures. Coordinate disposal as a neighborhood or community. Post 4-inch reflective address numbers visible from road.
2	Understory thinning near structures	Repeat basic yard cleanup. Limb trees up to 6–10 feet. Trim branches back 15 feet from chimneys. Trim or cut down brush. Remove young trees that can carry fire into forest canopy. Coordinate disposal as a neighborhood or community.
3	Understory thinning on private property along roads and drainages	Limb trees up to 6–10 feet. Trim or cut down brush. Remove young trees that can carry fire into forest canopy. Coordinate disposal as a neighborhood or community.
4	Overstory treatments on private property	Evaluate the need to thin mature or diseased trees. Prioritize and coordinate tree removal within neighborhoods to increase cost effectiveness.
5	Restart defensible space Treatment cycle	Continue the annual basic yard cleanup. Evaluate need to revisit past efforts or catch those that were bypassed.

5.2 CURRENT STRUCTURAL IGNITABILITY REDUCTION PROGRAMS

5.2.1 DEFENSIBLE SPACE ENFORCEMENT

The Santa Clara County Fire Department carries out defensible space assessments of homes within their jurisdiction that fall within the designated WUI of the communities they serve. The assessments are carried out on a rotation. The department sends mailings to each identified residence prior to fire season, announcing the measures that the resident should take in implementing defensible space practices. State law requires a defensible space of 100 feet around homes and all accessory structures in the very high FHSZ and on all identified properties in the SRA. The Santa Clara County Fire Chiefs Association has developed a list of required and recommended preventative measures that are included in the mailing:

Enforced Safety Measures:

- A. Create 100 feet of defensible space around home. To accomplish this, create a Green Zone by clearing flammable vegetation 30 feet around structures. Additionally create a Reduced Fuel Zone for remaining 70 feet or to your property line.
- B. Clear ornamental shrubs and trees of dead leaves and branches.
- C. Remove all pine needles and leaves from roofs, eaves, and rain gutters.
- D. Trim tree limbs 10 feet from chimneys or stovepipes and remove dead limbs that hang over rooftops.
- E. Cover chimney outlets or flues with a ½-inch mesh spark arrestor.
- F. Post a clearly visible house address, using at least 4-inch high numbers, for easy identification.

Additional Recommended Measures:

- Trees 18 feet or taller should be limbed up 6 feet from the ground.
- Stack woodpiles a minimum of 30 feet from buildings, fences, and combustible materials.
- Clear vegetation and other flammable materials from underneath decks. Enclose elevated decks with fire resistive materials.
- If you have any trees near power lines, please contact PG&E at 1-800-PGE-5000 for a free inspection. State law requires vegetation clearance from electrical lines. For more information, visit <http://www.PGE.com>. In most cases, PG&E will remove the tree at no cost to you.
- The Santa Clara County Fire Safe Council offers defensible space chipping Programs to assist homeowners, including special programs for qualified low-income seniors and disabled homeowners. For more information, visit <http://www.sccfiresafe.org>.

Santa Clara County fire personnel carry out the inspections beginning in the spring each year. For those properties that are non-compliant, the department will advise the property owner that work is necessary in order to be in compliance with the applicable regulations. Residents who are unable to complete the measures due to physical disabilities, etc., are asked to contact the department. The resident is welcomed to complete the necessary work him or herself or use a contractor. Follow-up inspections are completed early summer on those properties that did not meet the Enforced Safety Regulations (see above) during the first inspection. If residents do not comply with items A, B, C, and D of the Enforced Safety Regulations, the compliance work is completed by an authorized contractor of the relevant municipality, and the charges for the service are applied to the next property tax bill for the property.

5.2.2 HOME IGNITION ZONE ASSESSMENTS

The Santa Clara County Fire Safe Council offers on-site assessments of structural ignitability and home ignition zone vulnerabilities to residents in its service area. This program brings consultants to see the home and yard in person and to go over checklists and recommendations to reduce the risk of the structure being ignited from flying embers, as well as flames in the yard and neighboring structures.

The assessment is based on NFPA's 1144 Standard for Reducing Structure Ignition Hazards from Wildland Fire.

5.3 RESPONSE AND EVACUATION PROGRAMS

5.3.1 WILDLAND URBAN INTERFACE PRE-PLANS AND EVACUATION GUIDES

The 2015 CAL FIRE Santa Clara Unit Fire Plan identifies a number of pre-fire projects within the county for the period of 2015–2018 (CAL FIRE 2015: Appendix A). The Santa Clara County CWPP was identified as a project for 2016. Pre-fire projects include VMPs at Henry Coe, defensible space projects for Santa Clara County communities at risk, and defensible space and fuel break projects for the Santa Cruz Mountains. Further the pre-fire projects include a Santa Clara Unit Incident Pre Attack and Evacuation Plan.

Pre-response and evacuation planning is identified in the CAL FIRE Santa Clara Unit Fire Plan (CAL FIRE 2015) for a number of communities and open space areas, including Pacheco Pass, Henry Coe Park, Mt. Hamilton, Lexington Basin, Saratoga, Los Altos, Stevens Canyon, and Montevina Road. Collaborative work has also been underway with the South Skyline Fire Safe Council in Santa Cruz County along Skyline Road (Highway 35) including fuel modification work to maintain an evacuation route between Santa Clara and Santa Cruz Counties.

The goal of the pre-response and evacuation plans would be to provide new personnel, CAL FIRE Emergency Command Center staff and incident management teams with the location of strategic control points and access into remote SRA land.

Many communities have already been the focus of pre-planning efforts, including the Holiday Lakes/Jackson Oaks communities where a pre-response and evacuation plan was completed in January 2016.

CAL FIRE highlights the importance of working in cooperation with the Santa Clara County Fire Safe Council, local law enforcement, and other local cooperators to develop evacuation plans and fire plans for communities at risk susceptible to a major incident.

5.3.2 COLLABORATION WITH LAW ENFORCEMENT

Collaboration with law enforcement is integral in fire management in the county as highlighted in the CAL FIRE Santa Clara Unit Fire Plan (CAL FIRE 2015:44). Two members of the County Sheriff's Department are included on the Core Team to provide input on law enforcement issues, such as citations, fire investigations, evacuation, and processing criminal complaints.

5.3.3 COMMUNITY SIGNAGE

Fire prevention signs can be useful media through which to share with the public the current fire danger. Sign messages should be adjusted regularly to reflect seasonal changes and deliver fresh messages. Signs are currently located at:

- The CAL FIRE Alma Helitack Base on Santa Cruz Highway
- Dunne Hill Fire Station
- Strategic locations in Morgan Hill
- Summit Road/Loma Prieta

5.4 CURRENT HAZARDOUS FUEL MITIGATION PROGRAMS

5.4.1 SANTA CLARA COUNTY LOCAL HAZARD MITIGATION PLAN

The Santa Clara County LHMP was updated in 2011 (Santa Clara County 2011). This countywide CWPP was identified in Chapter 7 of the LHMP as a mitigation objective for Santa Clara County. The following information was taken and modified from the revised LHMP.

Chapter 4 of the LHMP provides information on the wildfire hazard, including fire hazard threat zones. The LHMP identifies the WUI as one of the most significant threats in Santa Clara County. The plan notes that the California Fire Alliance “Communities at Risk List” identifies the communities of Cupertino, East Foothills, Gilroy, Lexington Hills, Los Altos Hills, Los Gatos, Milpitas, Monte Sereno, Morgan Hill, Palo Alto, San Jose, San Martin, Saratoga, and Stanford at high risk of damage from wildfire. The LHMP includes annexes for each community. Wildfire hazard is identified consistently in these annexes as a primary hazard concern for each community.

Primary mitigation actions identified in the LHMP for WUI mitigation areas included:

- Develop the county-wide CWPP:
 - Create defensible programs on a county-wide basis.
 - Organize and mobilize the volunteer workforce for wildfire mitigation projects.
- Implement a county-wide public education campaign.
- Address the needs of individual homeowners, e.g., grants to replace roofs and free chipping services.
- Prepare tactical information database and accurate maps ready for Incident Commanders to access when necessary, e.g., evacuation planning.
- Establish a county-wide Wildfire Mitigation Task Force to study the problem and coordinate efforts.
- Establish a cohesive funding strategy.
- Consider road improvement as a potential mitigation project to be scoped for evacuation and emergency response access.

- Research and evaluate best practices.
- Address open space with a county-wide strategy. For example, address a 5- to 10-year plan for fire breaks in these areas. Integrate the LHMP with the Open Space District.

This CWPP is designed to support the General Plan and the LHMP, providing additional detailed assessment of wildfire threat and mitigation strategies. One of the main purposes of this CWPP is to provide information that can be incorporated into the General Plan and LHMPs when these documents are revised, with particular use in the Safety Element.

Fuels should be modified with a strategic approach across the project area to reduce the threat that high intensity wildfires pose to lives, property, and other values. Pursuant to these objectives, the CWPP contains recommendations developed in the context of existing and planned fuels management projects. These recommendations initially focus on areas adjacent to structures (defensible space), then near community boundaries (fuel breaks, cleanup of adjacent open spaces), and finally in the wildlands beyond community boundaries (larger-scale forest health and restoration treatments). A common focus of fuels treatment is to reduce brush, diseased trees, dead fuels, and immature trees in favor of healthy, more mature trees and shrubs.

While not necessarily at odds with one another, the emphasis of each of these treatment types is different. Proximate to structures, the recommendations focus on reducing fire intensity consistent with Fire Safe and code standards. Further into open space areas, treatments will tend to emphasize the restoration of historic conditions and general forest health. Cooperators in fuels management should include federal, state, and local agencies, as well as interested members of the public.

Fire management cannot be a one-size-fits-all endeavor; this plan is designed to be flexible. Treatment approaches and methods will be site-specific and should be adapted to best meet the needs of the landowner and the resources available. Moreover, each treatment recommendation should address protection of CVARs, protection of people, critical infrastructure, cultural icons, economic engines, and threatened and endangered species. It is the intent of this plan to be an evolving document that will incorporate additional areas of the CWPP planning area as they change in risk category over time.

5.4.2 FUEL BREAKS, AND ROADSIDE TREATMENTS

After defensible space, the next location priority for fuels treatments is where the community meets the wildland. This may be the outer margins of a town or an area adjacent to open spaces such as a park. Fuel breaks are strips of land where natural vegetation fuels have been modified or reduced to limit the fire's ability to spread rapidly and generate large amounts of embers.

Fuel modifications can include removing dead trees, branches, and downed logs; reducing the amount of deep duff such as needles, leaves, and twigs; mowing or plowing grasses; and pruning or thinning living trees and shrubs. Fuel breaks can be underneath trees where they are called shaded fuel breaks, or out in the sunlight, such as through chaparral, shrublands, or grasslands.

Fuel breaks are typically at least 75 feet wide and can be as much as 200 feet wide, however they retain some vegetation within the fuel break and its habitat values. They should not be confused

with fire breaks, which are areas where vegetation and organic matter are removed down to mineral soil.

Fuel breaks may be created to provide options for suppression resources, opportunities to introduce prescribed fire, or to create a zone where crown fire will be forced to the ground where it is more easily contained.

In some cases, fuel breaks may be created by treating vegetation along roadsides where the road is located on a ridge or other geographic feature that helps interrupt wildfire growth. The road surface is included in the width of the fuel break, which can be on one or both sides of the road.

Another type of roadside treatment is evacuation route clearance and thinning. This treatment generally is more modest than a fuel break and is used in locations where fire may easily cross the road, such as where the road traverses a slope, or where homes, fencing and other features prevent full-width fuel break clearing.

Evacuation route treatments include removing weak trees that lean into or over the road, pruning branches high and wide enough to ensure fire engine and truck passage, and then mowing grasses, removing or thinning shrubs and small trees, removing dead branches, trees and logs, and removing low branches on larger living trees to clear ladder fuels next to the road. Where roads are narrow, bulges and turnouts are cleared to help provided places to pass. Generally evacuation route treatments extend 6 to 30 feet from both road edges.

Evacuation route treatments make the road safer to use during a wildfire, even when it is burning next to the road, by keeping flame lengths low and the fire on the ground instead of in the crown of the trees, which reduces heat, and by reducing the likelihood of burning trees and utility poles falling into and blocking the roadway. They also help responding fire apparatuses pass evacuating residents.

Evacuation routes that have been treated are also less likely to be sites of fire starts from vehicle fires, sparking trailer chains, burning cigarettes, or similar causes.

The Fire Safe Council has a robust fuel break and evacuation route vegetation treatment program that it coordinates with private landowners, parks and open space managers, and roads departments. Funding for these treatments comes from federal, state, county, and local sources, as well as road associations, utilities, and other corporate or private grants. CAL FIRE also provides in-kind support through the use of conservation/fire crews to provide manual treatments at low cost, which extends grant funds to treat more ground.

5.4.3 *LARGER-SCALE TREATMENTS*

Farther away from WUI communities, the emphasis of treatments often becomes broader. While reducing the buildup of hazardous fuels remains important, other objectives are often included, such as restoration of historic conditions and forest health. Wildfires frequently burn across jurisdictional boundaries, sometimes on landscape scales. As such, these larger treatments need to be coordinated on a strategic level. This requires coordination between projects and jurisdictions, as is currently occurring throughout Santa Clara County and with adjacent counties. Land managers have carried out numerous fuels reduction projects across the planning area and region

and have ongoing projects planned on public lands that are designed to reduce hazardous fuels to protect communities and resources (see Annexes).

5.4.4 *VEGETATION MANAGEMENT PROGRAM*

CAL FIRE's VMP is a formal cost-sharing program that applies prescribed fire and various mechanical treatment methods to reduce wildland hazardous fuels and to achieve other natural resource management goals within SRAs (CAL FIRE 2015). The Santa Clara Unit has a long history of partnering under such agreements with local landowners to reduce hazardous fuels, improve range and wildlife habitat, and maintain natural ecosystems dependent upon periodic fires. Vegetation management focuses on the volume, structure, and distribution of vegetation on a landscape. Fuel treatments mainly focus on only the surface and ladder fuels.

The Santa Clara Unit currently has several VMP projects in the planning and operational stages. These projects have range, watershed, and wildlife habitat improvement as the primary goals—for example, the Isabel Ranch, Henry Coe State Park, and Grant Ranch County Park and other eastern Santa Clara County burns (CAL FIRE 2015).

The CAL FIRE Santa Clara Unit Fire Plan identifies the following priority areas for VMP projects:

- VMP projects where property owners meet the criteria for a cost share agreement and have a signed agreement with CAL FIRE;
- areas with high hazardous fuel loading near WUI zones;
- areas with no recent fire history;
- areas with protected species requiring burning for habitat improvement; and
- areas needing improvement to range capacity or hydrologic production.

5.4.5 *METHODS AND SELECTION OF FUEL REDUCTION TREATMENTS*

Strategic timing and placement of fuels treatments is critical for effective fuels management practices and should be prescribed based on the conditions of each particular treatment area. Some examples of this would be to place fuel breaks in areas where the fuels are heavier and in the path of prevailing winds and to mow grasses just before they cure and become flammable. Also, burning during the hotter end of the prescription is important since hotter fires are typically more effective at reducing heavy fuels and shrub growth. In areas where the vegetation is sparse and not continuous, fuels treatments may not be necessary to create a defensible area where firefighters can work. In this situation, where the amount of fuel to carry a fire is minimal, it is best to leave the site in its current condition to avoid the introduction of exotic species.

Several fuel reduction treatment methods are commonly used, including manual treatments, mechanized treatments, and prescribed fire (Table 5.2). This brief synopsis of treatment options is provided for general knowledge; specific projects will require further planning. The appropriate treatment method and cost will vary depending on factors such as the following:

- Diameter of materials
- Proximity to structures
- Acreage of project
- Fuel costs
- Steepness of slope
- Area accessibility
- Density of fuels
- Project objectives

It is imperative that long-term monitoring and maintenance of all treatments is implemented. Post-treatment rehabilitation such as seeding with native plants and erosion control may be necessary.

Table 5.2. Summary of Fuels Treatment Methods

Treatment	Comments
Machine mowing	Appropriate for large, flat, grassy areas on relatively flat terrain.
Brush mastication	Brush species (oak in particular) tend to re-sprout vigorously after mechanical treatment. Frequent maintenance of treatments are typically necessary. Mastication tends to be less expensive than manual (chainsaw) treatment and eliminates disposal issues.
Timber mastication	Materials up to 10 inches in diameter and slopes up to 30% can be treated. Eliminates disposal issues. Environmental impact of residue being left on site is still being studied.
Feller-buncher	Mechanical treatment on slopes more than 30% or of materials more than 10 inches in diameter may require a feller-buncher rather than a masticator. Costs tend to be considerably higher than masticator.
Manual treatment with chipping or pile burning	Utilizing hand crews cutting with chain-saws. Requires chipping, hauling, pile burning of slash in cases where lop and scatter is inappropriate. Pile burning must comply with smoke management policy.
Prescribed fire	Can be very cost effective. Ecologically beneficial. Can be used as training opportunities for firefighters. Prescribed fires help local populations get familiar with fire and foster trust and support. May require manual or mechanical pretreatment. Carries risk of escape, which may be unacceptable in some WUI areas. Unreliable scheduling due to weather and smoke management constraints.
Thinning and prescribed fire combined	Can be used in areas where fuel loading is too high to implement prescribed fire without pretreatment. Ecologically beneficial. Can create fuel breaks to reduce risk of escape.

Mechanized Treatments

Mechanized treatments include mowing, mastication (ground-up timber into small pieces), and whole tree felling. These treatments allow for more precision than prescribed fire and are often more cost effective than manual treatment.

Mowing, including all-terrain vehicle (ATV) and tractor-pulled mower decks, can effectively reduce grass fuels adjacent to structures and along highway rights-of-way and fence lines. For heavier fuels, a number of different masticating machines can be used, including drum- or blade-type masticating heads mounted on machines and ranging in size from a small skid-steer to large front-end loaders. Some masticators are capable of grinding standing timber up to 10 inches in diameter. Other masticators are more effective for use in brush or surface fuels. Mowing and mastication do not actually reduce the amount of on-site biomass, but alter the fuel arrangement to a less combustible profile.

In existing fuel break areas maintenance is crucial especially in areas of encroaching shrubs or trees. In extreme risk areas more intensive fuels treatments may be necessary to keep the fire on the ground surface and reduce flame lengths. Within the fuel break, shrubs should be removed, and the branches of trees should be pruned from the ground surface to a height of 4 to 8 feet, depending on the height of the fuel below the canopy, and thinned with a spacing of at least two to three times the height of the trees to avoid movement of an active fire into the canopy.

Mechanical shears mounted on feller bunchers are used for whole tree removal. The stems are typically hauled off-site for utilization while the limbs are discarded. The discarded material may be masticated, chipped, or burned in order to reduce the wildfire hazard and to speed the recycling of nutrients.

Manual Treatments

Manual treatment refers to crew-implemented cutting with chainsaws. Although it can be more expensive than mechanized treatment, crews can access many areas that are too steep or otherwise inaccessible with machines. Treatments can often be implemented with more precision than prescribed fire or mechanized methods allow. Merchantable materials and firewood can be removed while non-merchantable materials are often lopped and scattered, chipped, or piled and burned on site. Care should be exercised to not increase the fire hazard by failing to remove or treat discarded material in a site-appropriate manner.

Prescribed Burning

Prescribed burning is also a useful tool to reduce the threat of extreme fire behavior by removing excessive standing plant material, litter, and woody debris while limiting the encroachment of shrubby vegetation. Where possible, prescribed fire could occur on public lands since fire is ecologically beneficial when applied to fire-adapted vegetation communities and wildlife habitat.

Prescribed burning should only be implemented by properly qualified personnel. All prescribed fire operations will be conducted in accordance with federal and state laws and regulations. Public safety would be the primary consideration in the design of any prescribed burn plan so as to not negatively impact the WUI. Pre-fire vegetation sampling would be carried out during planning to ensure resource protection. The areas to be burned would occur within fuel breaks or appropriate fire lines. Agency use of prescribed fire on public lands would be carried out within the confines of the agency's fire management planning documents and would require individual prescribed burn plans that are developed for specific burn units and consider smoke management concerns and sensitive receptors within the WUI.

Following any type of fuels reduction treatment, post-treatment monitoring should continue to ensure that management actions continue to be effective throughout the fire season. Vegetation can change rapidly in response to drought or moisture from year to year and during the course of the season, so fuels treatments should be adjusted accordingly.

Thinning and Prescribed Fire Combined

Combining thinning and prescribed fire can be the most effective treatment (Graham et al. 2004). In forests where fire exclusion or disease has created a buildup of hazardous fuels, prescribed fire cannot be safely applied and pre-burn thinning is required. The subsequent use of fire can further reduce residual fuels and reintroduce this ecologically imperative process.

Management of Non-native Plants

Fuel treatment approaches should always consider the potential for introduction or proliferation of invasive non-native species as a result of management actions. Several non-native plants present significant fire hazards and will spread in fuel reduction areas when other vegetation is removed. When feasible fuel reduction projects should attempt to permanently remove scotch and French broom, eucalyptus trees and acacia trees. Eradication can be achieved by manual pulling and/or herbicide use followed up with long term monitoring of the seed bank and re-sprouts.

5.4.6 FUEL BREAKS

Fire behavior in the CWPP planning area has been modeled using FlamMap (Section 4.6.4). This assessment provides estimates of flame length and rate of spread; the information should be used by land managers when prescribing treatments. Land managers are cautioned, however, that fuel breaks will not always stop a fire under extreme fire behavior or strong winds; these should only be seen as a mitigating measure and not a fail-safe method for fire containment.

Within a fuel break, shrubs should be removed where they would generate high severity fire behavior. It is not possible to provide a standard treatment prescription for the entire landscape because fuel break dimensions should be based on the local fuel conditions and prevailing weather patterns. For example, in some areas, clearing an area too wide could open the landscape to strong winds that could generate more intense fire behavior and/or create wind throw.

Strategic placement of fuel breaks is critical to prevent fire from moving from wildland fuels into adjacent neighborhoods. A fuel break of 100 to 300 feet in shrubland should modify fire behavior significantly enough to allow suppression by firefighters. It is important to note, however, that shrub fuels are often replaced by grassland fuels in shrubland fuel breaks; flame lengths and rates of spread could be faster in these grassland fuels, but fireline intensity (heat produced per fireline foot per second) will be reduced, allowing more effective suppression. For effective management of most fuels, fuel breaks should be prescribed based on the conditions in each particular treatment area. Some examples of this would be to place fuel breaks in areas where fuels are heavier or in areas with easy access for fire crews. In areas where the vegetation is discontinuous, fuel treatments may not be necessary. In this situation it is best to leave the site in its current condition to avoid the introduction of more flammable, exotic species, which may respond readily following disturbance.

Sustainability Challenge

Well-managed fuels reduction projects often result in ecological benefits to wildlife and watershed health. Simultaneously, planning and resource management efforts should occur when possible while reducing fuels to ensure that the land remains viable for multiple uses in the long term.

Fuel break and fuel treatment utility is contingent upon regular maintenance, as regrowth in a treated area can quickly reduce its effectiveness. Input provided during public outreach activities identified a need for maintenance of existing fuel breaks that have become overgrown. Maintenance of existing breaks could be more cost efficient than installation of new features.

The effectiveness of any fuels reduction treatment will increase over time with a maintenance and monitoring plan. Monitoring will also ensure that objectives are being met in a cost-effective manner. For information on monitoring and sustainability for CWPP projects, please see Section 6.

5.5 PRIORITIES, RECOMMENDATIONS, AND ACTION ITEMS

This section outlines recommended projects for mitigation of fire risk at a strategic countywide level. These projects could be implemented or adopted across the county and multiple jurisdictions. They are designed to be general in nature in order to allow for them to be applied across multiple jurisdictions for agencies that may have very different goals and missions. Since many recommend large-scale actions, they should be considered long-term goals used to help direct fire management over a period of years to possibly decades. More specific goals are provided in the individual agency annexes. Some of these agency goals may tier from these strategic level recommendations.

5.5.1 GENERAL PLANNING PROJECT RECOMMENDATIONS

Table 5.3 describes general planning projects that could be applied countywide to assist in the mitigation of wildfire hazard and risk.

5.5.2 RECOMMENDATIONS FOR PUBLIC EDUCATION AND OUTREACH

Needs for public education and outreach have been emphasized throughout the Santa Clara County CWPP process by all participating parties. The Core Team has consistently commented on the need for better education of the public for fire preparedness, and discussions with community members during public outreach have indicated that, although most people are aware of the danger of wildland fire in their community, many could be better informed of effective mitigation options. Many long-time residents of the county have grown up with wildfire; however, it is important to continually raise awareness of fire risk and improve fire education (Winter and Fried 2000; McCaffrey 2004).

As discussed further in Section 6.4, the Firewise Communities program and other similar fire prevention outreach programs provide extensive educational literature on fire prevention activities that homeowners and communities can engage in to reduce their wildfire risk and hazard. Other methods to improve public education could include using existing signage to indicate fire danger level (low, moderate, high, extreme); increasing awareness about fire department response and fire department resource needs; providing workshops at demonstration sites showing Firewise

Communities landscaping techniques or fuels treatment projects; organizing community cleanups to remove green waste; publicizing availability of government funds for thinning; and, most importantly, improving communication between homeowners and local land management agencies to improve and build trust, particularly since the implementation of fuel treatments and better maintenance of existing treatments has been identified repeatedly by the public as a needed action to reduce risk and often the public are ill-informed of the hazard mitigation actions that land managers are applying in areas adjacent to homes. Table 5.4 provides strategic level recommendations for public education and outreach that can be applied at the county level and tiered from for agencies and communities (Annexes).

Table 5.3. General Planning Project Recommendations

ID	Project Description	Method	Timeline for Action	Priority (1,2,3)	Monitoring/Sustainability	Resources/Funding Sources Available
GP1	Ensure project sustainability.	<ul style="list-style-type: none"> Have a target date for updating the datasets used in the risk assessment model and re-running the model. Establish trigger points for updating CWPP. Use Mello-Roos Community Facility Districts for new subdivision for sustainable hazardous fuel maintenance. 	Annually	1	Establish annual oversight of the CWPP and project status. Get buy-in from Core Team members for long term commitment to CWPP review.	Refer to Appendix D
GP2	Form a task force to do parcel level inspection work to enhance model; utilize portable data collection and ARCGIS as analysis tools.	<ul style="list-style-type: none"> Must have agency link to be accepted by the public. Agency responsibility would fall to the County Fire Department. Carryout parcel level assessments to enhance risk assessment model components at a finer scale. Add data to model and re-run as necessary. 	2 years	1	Set target number of parcels to be assessed each year. Review number of parcels assessed each year at annual CWPP meeting.	Refer to Appendix D
GP3	Use a countywide standard and method for continued data gathering and risk analysis.	<ul style="list-style-type: none"> Conduct funding to purchase a commercial application such as Fulcrum that provides a standard data collection platform that could be used on a smart phone. 	2 years	1	Annual review of progress as part of Core Team.	Refer to Appendix D

ID	Project Description	Method	Timeline for Action	Priority (1,2,3)	Monitoring/Sustainability	Resources/Funding Sources Available
GP4	Improve partnerships across county boundaries.	<ul style="list-style-type: none"> • Work with adjacent counties where there are shared risks and shared resources to ensure defensible space requirements (Appendix L) and egress routes are both implemented maintained on both sides of the county line. • Work with Santa Cruz County to establish a Santa Cruz County Fire Safe Council. • Increase partnerships with Santa Cruz agencies and other adjacent county agencies, and use existing relationships with the Santa Clara County Fire Safe Council. • Provide community workshops that address cross-jurisdictional boundary concerns. 	Next 2 years	1	Revisit success within a year by assessing project partnerships established across county boundaries	Refer to Appendix D
GP5	Add hyperspectral and LiDAR imaging to periodic aerial photography flights.	<ul style="list-style-type: none"> • Work in conjunction with the County Assessor or other agency that acquires aerial photography of county and add additional sensing cameras to flights to acquire analysis data. • Hyperspectral and LiDAR can provide in depth identification and analysis of hazards and risks. 	1–3 years	1	Periodic new flights to update data sets.	Grants: FEMA, Department of Homeland Security SRA, GHGR
GP6	Continue support for and possible expansion of the Early Warning Wildfire Detection Camera System.	<ul style="list-style-type: none"> • Review current established systems and assess public support. • Install additional systems as support increases. • Identify highest risk areas and most suitable vegetation and terrain for installation. 	1–5 years	1	The technology for early warning detection cameras is continually being developed. All future plans should be adjusted as appropriate based on planned improvements to the system.	Ongoing funding is available from Verizon, CAL FIRE in Sacramento (the Loma Prieta Tower), University of California Lick/Santa Cruz, and several local homeowner associations

ID	Project Description	Method	Timeline for Action	Priority (1,2,3)	Monitoring/Sustainability	Resources/Funding Sources Available
GP7	The CWPP serves as the wildfire component of LHMP and General Plan Safety and other element amendments.	<ul style="list-style-type: none"> • Work with county and city planning to identify timeline for incorporation. • Aim to have the CWPP incorporated into the Safety Element of the General Plan when the safety element is next revised. Getting it into the General Plan is equivalent to getting the CWPP adopted. 	Next 5 years	2	The Core Group of stakeholders would need to ensure that the document is kept relevant in that time and position it for incorporation.	Refer to Appendix D
GP 8	Ensure ongoing refinement of mitigation strategies	<ul style="list-style-type: none"> • Convene working groups at the community level to review and refine <ul style="list-style-type: none"> * mitigations maps * fuels treatment project specifications and priorities * other mitigation projects and programs details and priorities 	Upon adoption of final CWPP	1	Form local CWPP review teams and establish local review process	Refer to Appendix D
GP 9	Increase stakeholder involvement in future revisions to the CWPP and annexes and encourage more long term participation and commitment by stakeholders and entities tasked with emergency management and resource management.	<ul style="list-style-type: none"> • Determine which entities were under-represented in current CWPP planning process and seek commitment from those entities in future revisions to the CWPP. • Establish a schedule for CWPP updates- i.e. annually for annexes and every 5 years for strategic document. 	Immediate review of collaboration and annual meeting of stakeholders	1	Form County wide CWPP review team and establish an annual review process	Refer to Appendix D

Table 5.4. Recommendations for Public Outreach and Education

ID	Project	Presented by	Target Date	Priority	Resources Needed	Serves to
EO1	Educate citizens on how to achieve contemporary WUI code compliance in retrofits/cost: benefit ratio. Provide workshops and/or demonstration site.	Fire Safe Councils, County Fire, CAL FIRE	Within 2 years	1	<ul style="list-style-type: none"> Workshop expenses, personnel Workshop venues Demonstration site Strategize on avenues for engaging the public. Be opportunistic- engage residents following a local wildfire or at existing well-attended events- i.e. annual BBQ, Pancake Breakfasts, Open days offered by Fire Departments. 	<p>Increase compliance with County code.</p> <p>Reduce fire risk level for individual parcels and community as a whole.</p>
EO2	Analyze playing with fire ignitions and focus education programs at vicinity schools.	County Fire, CAL FIRE, municipal fire departments, Fire Safe Council	Within 1 year	1	<ul style="list-style-type: none"> School liaison Materials for presentations Personnel Video processing, could utilize You Tube platform Could be a college student project 	<p>Adds to existing programs provided by County Fire and Fire Safe Council targeted at school age children.</p> <p>Reduces number of ignitions.</p>
EO3	Organize a community group made up of residents and agency personnel to develop materials and communicate relevant defensible space messages. Could coordinate with fire departments or Fire Safe Council. Possibility to coordinate actual implementation of defensible space and slash clear-up with the local Eagle Scout group or high school volunteers.	Fire Safe Council, fire departments, local residents, Eagle Scouts, High School Community Volunteer Program	Within a year	1	<ul style="list-style-type: none"> Funding to help cover costs of materials (green waste removal or chipper) and participation. People trained in defensible space practices. 	<p>Engage diverse stakeholders in reaching out to community members and encourage defensible space practices.</p> <p>Empower homeowners to make affordable and effective changes to reduce the vulnerability of individual homes.</p> <p>Melds fuel reduction project with outreach and education program.</p>

ID	Project	Presented by	Target Date	Priority	Resources Needed	Serves to
EO4	Media involvement. Develop a local newspaper column that provides fire safety information, promotional information for volunteer fire departments, fire announcements, and emergency planning.	Agency Public Information Officers, Emergency Manager, Commission	Within 1 year	1	<ul style="list-style-type: none"> Columns, information, and articles to be provided by fire departments, city, county, state representatives. 	Protect communities and infrastructure through increasing public awareness and providing a channel for information regarding emergency fire response.
EO5	Emergency preparedness meetings. Use American Red Cross volunteers and other preparedness experts. Attend community functions and hold special meetings to provide guidance for creating household emergency plans. Use Ready, Set, Go! program.	American Red Cross, city, county, state personnel, Fire Safe Council	Within 1 year	1	<ul style="list-style-type: none"> Written materials- could use existing literature. 	Improve preparedness by facilitating the communication between family members and neighbors about what procedures to follow in the event of a wildfire.
EO6	Work with Caltrans to install or utilize existing electronic message signs on major highways to notify public of extreme fire danger.	County, Caltrans	Within 1 year	1	<ul style="list-style-type: none"> Funds for new sign installing and/or maintenance of existing signs. 	Inform residents, commuters and tourists of extreme fire danger in order to reduce accidental ignitions and encourage pre-planning.
EO7	Plan livestock evacuation routes and inform communities. Work with emergency management officials to plan evacuation routes for residents with livestock and then hold community meetings to disseminate to the public.	Emergency management officials, livestock agencies/ civic groups	Within 2 years	1	<ul style="list-style-type: none"> GIS software or maps- coordinate with EQ Clearing House- GIS sharing. 	Protect communities, livestock and infrastructure through increased awareness.

ID	Project	Presented by	Target Date	Priority	Resources Needed	Serves to
EO8	Provide webinars for homeowners to learn about Fire Safe communities and property.	County Fire, CAL FIRE, municipal fire departments, Fire Safe Councils	Within 2 years	2	<ul style="list-style-type: none"> Workshop expenses Personnel Workshop venues Video processing Could be a college student project 	<p>Increase reach for public education and outreach.</p> <p>Provide access to information to residents who don't typically attend in-person meetings or workshops.</p> <p>Provide a consistent and standard message to residents.</p> <p>Improve individual adoption of action sot reduce structural ignitability.</p>
EO9	<p>Targeted wildfire info workshops.</p> <p>Review existing programs (Ready, Set, Go!; Firewise) for suitability of existing fire prevention workshops and where necessary fund development of unique adapted presentations to highlight how a fire might affect particular groups in the community.</p>	Active local residents, Fire Safe Council	Within 1 year	1	<ul style="list-style-type: none"> Funding for research, writing, and presentation of detailed information on how large-scale wildfire would affect the target audience and the measures that could be taken to reduce the threat. 	
EO9.1	<p>Targeted wildfire education materials.</p> <p>Review existing programs (Ready, Set, Go!; Firewise) for suitability of existing fire prevention materials and where necessary fund development of unique adapted materials to highlight how a fire might affect particular groups in the community.</p>	Active local residents, Fire Safe Council	Within 1 year	1	<ul style="list-style-type: none"> Flyers could be sent out with utility bills or other community mailings. Consider "Simtable" use for visualizing various emergency scenarios for residents/HOA leaders and agency personnel. 	<p>Deliver a clear and consistent message that impacts of wildfire are far-reaching and that it is in the best interest of a diverse set of stakeholders to become involved in planning and preparing for fire.</p> <p>Bring cutting-edge research findings and recommendations into outreach materials to supplement requirements as in adopted codes.</p>

ID	Project	Presented by	Target Date	Priority	Resources Needed	Serves to
EO10	<p>Insurance Service Office informational meetings:</p> <p>Invite Insurance Services Office representatives to speak to groups regarding ways to improve insurance ratings in the community.</p>	Insurance Services Office in conjunction with local volunteer fire departments	Within 2 years	2	<ul style="list-style-type: none"> Resources provided by Insurance Services Office. Venue provided by fire department. 	Communities can learn how to improve their insurance ratings, which will reduce insurance costs in their community by implementing wildfire prevention measures.
EO11	<p>Increase signage/replace or augment existing signage.</p> <p>Use existing signage to spread seasonally adjusted fire prevention message along highways and in public open space areas (trailheads, info kiosks) to reduce human ignitions.</p> <p>Promote the use of existing electronic signs at firehouses and other locales to display fire prevention information, safety messages, and fire danger rating linked to safety actions.</p>	County Fire	Within 2 years	2	<ul style="list-style-type: none"> Mostly existing signs and posting sites, people to post and update signs. Replace, or augment the existing Smokey Bear signs with electronic Fire Danger Warning Signs that are solar powered, LED displays (visible day & night), and accessible and programmable through an internet website. 	Protect communities and infrastructure by raising awareness of local citizens and those traveling in the area about actions that can prevent fire.
EO12	<p>Promote and increase the use of prescribed burning as a fuels reduction method.</p> <p>Gain public support for using prescribed burns to reduce fuel loads and to improve ecosystem health through a pilot burn project and demonstration site.</p> <p>Consider developing informational material for distribution at natural areas or via email distribution lists.</p>	CAL FIRE/ Midpeninsula/ Santa Clara Valley Open Space Authority	Within 2 years	2	<ul style="list-style-type: none"> Prescribed burn prescription, type-6 engines, hand crews, equipment. Research and costs of producing¹, printing, and distributing paper informational flyer. 	Protect communities and infrastructure by reducing fuel loads.

ID	Project	Presented by	Target Date	Priority	Resources Needed	Serves to
EO13	<p>Implement Firewise Communities programs.</p> <p>Work with communities to participate in Firewise Communities and prepare for fire events. Hold Firewise booths at local events for example during the October Fire Awareness Week each year.</p>	Fire Safe Council, CAL FIRE, County Fire	Within 2 years	2	<ul style="list-style-type: none"> Firewise Communities educational materials. 	Protect communities and infrastructure through increased awareness and defensible space.
EO14	<p>Fire agencies establish partnership with San Jose State University (or other colleges) for student intern programs for GIS, plans, weather, environmental reviews, etc.</p> <p>GIS work should be in conjunction with the EQ Clearinghouse and Exchange Core.</p>	County Fire Department	Within 2 years	3	<ul style="list-style-type: none"> Admin costs Liaison 	<p>Provides resources for agencies to implement projects in the CWPP.</p> <p>Improves technical capabilities of Agencies to run fire modelling programs and train staff in modelling protocols.</p> <p>Engages students in real-life training opportunities.</p> <p>Assist Fire Safe Council with GIS needs</p>

5.5.3 *RECOMMENDATIONS FOR ACTIONS TO REDUCE STRUCTURAL IGNITABILITY*

Table 5.5 provides a list of strategic level recommendations to reduce structural ignitability that should be implemented throughout Santa Clara County. Reduction of structural ignitability depends largely on public education that provides homeowners the information they need to take responsibility for protecting their own properties. It is important to note that no two properties are the same. Homeowners and communities are encouraged to research which treatments would have the most effect for their properties. Owners of properties on steep slopes, for example, should be aware that when constructing defensible space they have to factor in slope and topography, which could require extensions to the conventional 30/100-foot recommendations. A number of educational programs are now available to homeowners through programs like Ready, Set, Go! (<http://www.wildlandfirersg.org>) and Firewise (Appendix A) contains a simplified list of steps to take to protect property from wildfire by reducing structural ignitability, developed by the IBHS (<http://www.disastersafety.org>).

Table 5.5. Recommendations for Reducing Structural Ignitability

ID	Project	Presented by	Programs Available	Description	Priority (1-3)	Timeline
SI1	Retrofit/Eliminate flammable roofs	County Planning in conjunction with County Fire and municipalities	FEMA grants	Require elimination of all flammable roofs through attrition or time deadline	1	By 2030
SI2	Identify all WUI areas (including FHSZ VH, H, and M in LRA and SRA); standardize regulations/standards/codes in all WUI areas	County Fire and municipalities		Make all WUI building codes, defensible space and other prevention regulations standard across all jurisdictions. Data Should be shared via the EQ Clearinghouse and Exchange Core	1	2020
SI3	Encourage/require retrofit to achieve contemporary WUI codes when remodeling beyond 50 %	County Planning (through General Plan and Fire Safety Elements) in conjunction with County Fire and municipalities.		Require or encourage gradual updating of existing structures to the standards identified in the most contemporary WUI codes though remodels or owner interest Acknowledge that some codes cannot be met on existing parcels.	2	Adopt ordinances by 2020
SI4	Adopt common defensible space standards throughout the county	County Fire, CAL FIRE, Municipal Fire Departments		Make all WUI building codes, defensible space and other prevention regulations standard across all jurisdictions	1	Next 3 years
SI5	Adopt landscape guidelines for recommended plant landscape materials	Fire Safe Councils to lead	Research Firewise plants suitable for the region. Develop plant list, poster materials and research demonstration site. Firewise Communities USA: www.firewise.org	Educate property owners, landscape firms and landscape architects in appropriate ornamental plantings, mulches, and landscape design/ maintenance in WUI areas.	3	Next 2 years

ID	Project	Presented by	Programs Available	Description	Priority (1-3)	Timeline
SI6	<p>Develop landscape contractor maintenance program for "Right Plant--Right Place" and maintenance</p> <p>Consider consulting with the California Native Plant Society and wildlife biologists to create an area that is sensitive-plant and animal friendly. These practices include no heavy pesticide use, limiting soil erosion, and a focus on using native plants.</p>	Fire Safe Councils to lead	Firewise Communities USA: www.firewise.org	Educate property owners, landscape firms and landscape architects in appropriate ornamental plantings, mulches, and landscape design/ maintenance in WUI areas.	2	Next 2 years
SI7	<p>Promote Firewise Community recognition program countywide; consider SCL amendments to Fire wise; partner with CERT and Neighborhood Watch.</p> <p>NOTE: Linked to EO 13</p>	Fire Safe Councils to lead in conjunction with Santa Clara County Fire Department, Municipal Fire Departments	Firewise Communities USA: www.firewise.org	Educate and outreach to bring communities into Firewise recognition programs.	2	Next 3 years
SI8	Interactive tool for citizens to use on line, ID their property and what hazard/risks exist and mitigations they can apply to improve their survivability	Santa Clara County Fire Department with revised Interra contract	Interra	<p>Pursue funding to increase contract provisions with Interra to provide public facing tool.</p> <p>Simplify tool and provide easy to follow instructions.</p> <p>Could develop YouTube informational video.</p>	1	Next 3 years
SI9	<p>Create a countywide defensible space ordinance for parcels below certain size acreage (parcel size: i.e. 2 acres?) to address unmaintained vacant lot concerns.</p> <p>Could be tied to County weed abatement program</p>	Santa Clara County Fire Department, Municipal Fire Departments, CAL FIRE		<p>To assure defensible space in WUI will be maintained; require property clear or agencies will clear and assess property owner.</p> <p>Link to enforcement of weed abatement.</p>	1	Next 2 years

ID	Project	Presented by	Programs Available	Description	Priority (1-3)	Timeline
SI10	Public education program for embers and problems associated with embers, property hygiene, defensible space	County Fire, Municipal Fire Departments, CAL FIRE, Fire Safe Councils	Ready, Set, Go! Program: www.wildlandfirer.org . Institute for Business and Home Safety NFPA: www.nfpa.org , Fire Adapted Communities	Educate property owners on best methods to reduce ember intrusion. Could utilize you tube informational video of college student project.	1	Next 2 years
SI11	Implement spring community yard clean-up days. In combination with Fire Safe Council chipper program.	County Fire, Municipal Fire Departments, CAL FIRE, Fire Safe Councils	Fire Safe Council chipping program Ready, Set, Go CAL FIRE	A community led day of yard clean-up with fire mitigation in mind would encourage large numbers within the community to carry-out mitigation measures and implementation of defensible space.	2	Next 2 years
SI12	Assess and improve accessibility to property Weekend program to inform homeowners about emergency response access	Fire departments, Fire Marshal		Inform homeowners about the importance of keeping driveways accessible to fire trucks and emergency responders.	1	Within 1 year
SI13	Consider and explore potential for development of a certificate of compliance program for home owners that implement and maintain Defensible Space. Work with Insurance companies to determine if such a program could be viable.	County Fire, Insurance industry	No known existing program.	Insurance companies carry out assessments of policy holder properties to ensure defensible space parameters have been met. There may be a possibility to combine the assessments carried out by County Fire and CAL FIRE with insurance standards in order to incentivize defensible space practices in the WUI.	3	Next 5 years

ID	Project	Presented by	Programs Available	Description	Priority (1-3)	Timeline
SI 14	<p>Develop building/general contractor education program for "Reducing Structural Ignitability."</p> <p>Consider consulting with Santa Clara County Contractors and California State Fire Marshal to create an educational program for contractors doing new construction and remodeling on how to reduce structural ignitability.</p>	Fire Safe Councils to lead	<p>California State Fire Marshal's Office: Firewise Communities USA:</p> <p>www.firewise.org</p>	Educate property owners, architects and contractors in appropriate building designs/ maintenance in WUI areas.	2	Next 2 years

Below is a list of action items that could be implemented by all Santa Clara County residents. The list is broken into items based on cost/effort.

5.5.4 ACTION ITEMS FOR HOMEOWNERS TO REDUCE STRUCTURAL IGNITABILITY

Low or No Cost Investment (<\$50)

- ✓ Regularly check fire extinguishers and have a 100-foot hose available to wet perimeter.
- ✓ Maintain defensible space for 30 feet around home. Work with neighbors to provide adequate fuels mitigation in the event of overlapping property boundaries.
- ✓ Make every effort to keep lawn mowed and green during fire season.
- ✓ Screen vents with non-combustible meshing with mesh opening not to exceed nominal 1/4-inch size.
- ✓ Ensure that house numbers are easily viewed from the street.
- ✓ Keep wooden fence perimeters free of dry leaves and combustible materials. If possible, non-combustible material should link the house and the fence (Figure 5.4).
- ✓ Keep gutters free of vegetative litter. Gutters can act as collecting points for fire brands and ashes.
- ✓ Store combustible materials (firewood, propane tanks, grills) away from the house; in shed, if available.
- ✓ Clear out materials from under decks and/or stacked against the structure. Stack firewood at least 30 feet from the home, if possible.
- ✓ Reduce your workload by considering local weather patterns. Determine the prevailing wind direction in your area and work from that edge of your property first before working around to cover the entire area.
- ✓ Seal up any gaps in roofing material and enclose gaps that could allow fire brands to enter under the roof tiles or shingles.
- ✓ Remove flammable materials from around propane tanks.



Figure 5.4. Home in WUI on steep slope with wooden fence attached to property.

Minimal Investment (<\$250)

- ✓ When landscaping in the Home Ignition Zone (HIZ) (approximately 30 feet around the property), select non-combustible plants, lawn furniture, and landscaping material. Combustible plant material like junipers and ornamental conifers should be pruned and kept away from siding. If possible, trees should be planted in islands and no closer than 10 feet to the house. Tree crowns should have a spacing of at least 18 feet when within the HIZ. Vegetation at the greatest distance from the structure and closest to wildland fuels should be carefully trimmed and pruned to reduce ladder fuels, and density should be reduced with approximately 6-foot spacing between trees crowns (Figure 5.3).
- ✓ Box in eaves, attic ventilation, and crawl spaces with non-combustible material.
- ✓ Work on mitigating hazards on adjoining structures. Sheds, garages, barns, etc., can act as ignition points to your home.
- ✓ Enclose open space underneath permanently located manufactured homes using non-combustible skirting.
- ✓ Clear and thin vegetation along driveways and access roads so they can act as a safe evacuation route and allow emergency responders to access the home.
- ✓ Purchase or use a National Oceanic and Atmospheric Administration weather alert radio to hear fire weather announcements.

Moderate to High Investment (>\$250)

- ✓ Construct a non-combustible wall or barrier between your property and wildland fuels. This could be particularly effective at mitigating the effect of radiant heat and fire spread where 30 feet of defensible space is not available around the structure.
- ✓ Construct or retrofit overhanging projections with heavy timber that is less combustible.
- ✓ Replace exterior windows and skylights with tempered glass or multilayered glazed panels.
- ✓ Invest in updating your roof to non-combustible construction. Look for materials that have been treated and given a fire-resistant roof classification of Class A. Wood materials are highly combustible unless they have gone through a pressure-impregnation fire-retardant process.
- ✓ Construct a gravel turnaround in your driveway to improve access and mobilization of fire responders.
- ✓ Treat construction materials with fire-retardant chemicals.
- ✓ Install a roof irrigation system.
- ✓ Replace wood or vinyl siding with nonflammable materials.
- ✓ Relocate propane tanks underground.

5.5.5 RECOMMENDATIONS FOR COMMUNITY/FIREFIGHTER PREPAREDNESS

Educating the public to reduce its dependence on fire departments for fire protection is essential because these resources are often stretched thin during fire season and many residences are located at some distance from emergency response. Table 5.6 provides strategic level recommendations for improving firefighting capabilities. Many of these recommendations are general in nature because they are applicable across departments. Departments should work together in implementing these actions and provide feedback to other fire chiefs on funding and grant successes, this way each department benefits from a lessons learned approach.

Table 5.6. Recommendations for Improving Firefighting Capabilities

ID	Project Description	Fire Department/Agency	Benefits of the Project to the community	Timeline	Priority (1-3)	Resources/funding sources available
FC1	Review minimum requirement of 5,000 gallon of water storage at single parcel developments where no community water system exists. Incorporate map component and utilize EQ Clearing House GIS Exchange Core.	County Fire/CAL FIRE/Fire Safe Councils/Municipal Fire Departments	Alleviates public and agency concern for limited water supply in remote areas. Improve fire-fighting capability. Enhances firefighter safety. Enhances protection of life and property.	2 years	2	Requires local fire code and land development amendments
FC2	Define Safe Refuge Areas and establish maintenance program in WUI areas where fire behavior and evacuation timing is problematic. Incorporate map component and utilize EQ Clearing House GIS Exchange Core.	County Fire/CAL FIRE/Fire Safe Councils/Municipal Fire Departments, MERC and other groups that maintain evacuation centers.	Provides safety measure for residents of rural areas in event that evacuation is limited. Provides for firefighter safety by creating escape route.	2 year	1	Grants: SRA, FEMA, CA Fire Safe Council, DHS
FC3	Identify carless population/evacuation assistance needed locations. Establish registry in cooperation with emergency management agencies. Incorporate map component and utilize EQ Clearing House GIS Exchange Core.	County Fire/CAL FIRE/Fire Safe Councils/Municipal Fire Departments Emergency Management Agencies	Aids in safe evacuation of residents, those with evacuation assistance needs	2 year	1	FEMA, DHS

ID	Project Description	Fire Department/Agency	Benefits of the Project to the community	Timeline	Priority (1-3)	Resources/funding sources available
FC4	Require evacuation time modeling for all WUI areas. Establish benchmark s time standard for evacuation. Requires amendment to planning conditions and/or land use ordinances.	County Fire/CAL FIRE/Fire Safe Councils/Municipal Fire Departments	Existing road networks are set and would be extremely costly to mitigate. Modelling evacuation would help fire response agencies pre-plan for evacuations. Helps identify areas where additional mitigation measures are needed to facilitate safe evacuation.	1 year	1	Developers fund studies for new developments. County Fire seek funding to fund studies of existing communities.
FC5	Develop WUI preplans and accompanying evacuation plans for all WUI areas in Santa Clara County using standardized format.	County Fire/CAL FIRE/Fire Safe Councils/Municipal Fire Departments	Helps fire response agencies pre-plan for evacuations. Helps identify areas where mitigation measures are needed to facilitate safe evacuation. Helps establish consistent model across all agencies.	1 year	1	Grants: SRA, FEMA, CA Fire Safe Council, DHS
FC6	Create secondary accesses in communities that have single access and poor road systems. Require major coordination with planning agencies and governing bodies for land use changes or retrofit requirements.	County Fire/CAL FIRE/Fire Safe Councils/Municipal Fire Departments Land Use Planning agencies Governing bodies	Alleviates evacuation concerns of residents living in areas with poor ingress/egress. Provides for improved response capabilities and reduces risk that responding emergency vehicles will conflict with evacuation of residents.	2 years	1	Homeowner Associations, Road Associations, County Service Areas
FC7	Obtain additional helicopters/air resources for suppression.	County Fire/CAL FIRE/Fire Safe Councils/Municipal Fire Departments	Provides back-up to on-the-ground resources. Improves suppression capabilities in inaccessible areas where use of ground resources would threaten firefighter safety. Improves response time to aid in protection of life and property.	5 years	2	Refer to Appendix D

ID	Project Description	Fire Department/Agency	Benefits of the Project to the community	Timeline	Priority (1-3)	Resources/funding sources available
FC8	Where road systems are antiquated and do not provide for proper evacuation or two way flow, require removal of obstructions or upgrade to minimum 2 lanes road system over time.	County Planning	Alleviates evacuation concerns of residents living in areas with poor ingress/egress. Provides for improved response capabilities and reduces risk that responding emergency vehicles will conflict with evacuation of residents.	2 years	1	Homeowner Associations, Road Associations, County Service Areas
FC9	Where possible encourage setting up water sources with multiple uses (e.g. fire suppression and wildlife water, cattle water, etc.).	Fire Safe Councils working with communities.	Provides for use of livestock and wildlife water tanks that could be utilized for fire protection.	1 year	3	Refer to Appendix D
FC10	Investigate potential for use of drones to assess and monitor wildfire.	County Fire	Drones could be a useful tool for the monitoring of wildfire in areas with limited access but future research is needed to fully assess their utility and application. The fire departments could launch a pilot study to determine effectiveness of the tool.	Within 3 years	3	Refer to Appendix D
FC11	Investigate and potentially install Fire Detection Robots to alert departments of a fire start in remote areas.	County Fire	Uses technology for single-tree wildfire detection solution that help forestry agencies and fire protection professionals manage the risks of fire damage cost-effectively.	Within 2 years	1	Private companies provide robotic technology i.e.: Insight Robotics http://www.insightrobotics.com/solutions/wildfire-detection Wildland Detection Systems http://www.wildlandsystems.com/ Fire Alert MK1 http://vigilys.com/technology/firealert/

ID	Project Description	Fire Department/Agency	Benefits of the Project to the community	Timeline	Priority (1-3)	Resources/funding sources available
FC12	Implement County wide program to replace existing house number markers with reflective markers that meet consistent standard.	County Fire	Improves fire response times and assists out-of-town responders who are not familiar with the local area, especially at night. Would need funding to implement program. Could consider private contributions.	Within 1 year	1	Santa Clara County Fire Safe Council
FC13	Develop a coordinated approach between fire jurisdictions and water supply agencies to identify needed improvements to the water distribution system, initially focusing on areas of highest wildfire hazard.	County Fire, CAL FIRE, Fire Safe Council, San Jose Water and other local water purveyors	Improve fire-fighting response if water is more readily available or closest locations could be identified on a GIS map on a tablet/computer.	Within 2 years	1	County Fire
FC14	Where possible encourage sharing of water sources in areas where residential water supplies may be low or non-existent during periods of drought or when wells/springs have run dry.	fire agencies, local community organizations, local water purveyors	Encouragement and assistance from Fire Safe Council can provide a catalyst for action. Example: Loma Prieta Fire Department is providing small grants to home owners to purchase and install additional water tanks on private residential lots where a reliable supply of water exists. These tanks then provide water for adjacent properties where a well or spring may be seasonal or dry	1-5 years	1	County Fire
FC15	Add large capacity water storage tanks and hydrants where open space and park agencies establish trail head parking areas, operating facilities such as horse stables and camping areas.	County Fire, CAL FIRE, open space organizations	Alleviates public and agency concern for limited water supply in remote areas.	Within 5 years	3	County Fire NRCS, SRA fees, GHGR grants

5.5.6 RECOMMENDATION FOR FUELS REDUCTION PROJECTS

The purpose of any fuels reduction treatment is to protect life and property by reducing the potential for catastrophic wildfire, as well as to restore landscapes to a sustainable and healthy condition. Fuels should be modified with a strategic approach across the planning area to reduce the threat that high intensity wildfires pose to lives, property, and other values. Pursuant to these objectives, recommendations have been developed in the context of existing and planned fuels management projects.

Table 5.7 summarizes the types of treatments recommended throughout the planning area. The majority of the treatments are focused on high or extreme risk areas, as defined by the Composite Risk/Hazard Assessment, Core Team collaboration, and public input. Many of these treatment recommendations are general across the communities because similar conditions and concerns were raised for all communities that border wildland areas. Table 5.7 addresses the requirement for an action plan and assessment strategy by providing monitoring guidelines and a timeline for implementation. This timeline is obviously dependent on available funding and resources, as well as environmental compliance parameters for treatments on public lands.

The treatment list is by no means exhaustive and should be considered purely a sample of required projects for the future management of the planning area. Many projects may be eligible for grant funds available from federal and/or state sources. For a list of funding sources please refer to Appendix D.

Fire management cannot be a one-size-fits-all endeavor; this plan is designed to be flexible. Treatment approaches and methods will be site-specific and should be adapted to best meet the needs of the landowner and the resources available. Moreover each treatment recommendation should address protection of CVARs, particularly the protection of threatened and endangered species. It is the intent of this plan to be an evolving document that will incorporate additional areas of the CWPP planning area as they change in risk category over time.

Table 5.7. Fuel Reduction Treatment Recommendations

ID	Project Description	Location and Responsible Party	Method	Serves to:	Timeline for Action	Priority (1,2,3)	Monitoring	Resources/funding sources available
FR1	Incorporate trails into fire defense system where practical.	Santa Clara County and other SF Bay area counties. MROSD; County Parks, Open Space Authority, CA State Parks, Palo Alto Parks, San Jose Parks, and other municipal park agencies.	Strategic plan to incorporate fire defense improvements on open space properties. Detailed analysis would be needed in development of treatment location to ensure protection of natural resources. Should incorporate a map component and use the Earthquake Clearinghouse exchange core to facilitate project development.	Provide access when fires occur to reduce spread. Enhance Community fire defense.	Ongoing-LONG RANGE	1	Regular monitoring to determine project success in reducing fuel loading and enhanced access.	Grants: SRA, CA Fire Safe Council; CFIP; NRCS, FEMA, GHGRF Fund sustainability efforts through the property owner/manager, or local/state agency that is the responsible party.
FR2	Evaluate existing fire roads for use as fuel breaks/fuel reduction areas as appropriate.	Open Space Authority, MROSD, , State Parks, County Parks, Palo Alto Parks, San Jose Parks, and other municipal parks that bound up to the WUI.	Maintain road width trails for fire and park patrol vehicles where possible to facilitate access. Use trails as fuel breaks. Should incorporate a map component and use the Earthquake Clearinghouse exchange core to facilitate project development.	Protect life and property by improving access for emergency vehicles to open space areas and WUI areas adjacent to open space.	Within 2 years	1	Regular maintenance schedule should be implemented to ensure clearance levels are maintained.	Refer to Appendix D

ID	Project Description	Location and Responsible Party	Method	Serves to:	Timeline for Action	Priority (1,2,3)	Monitoring	Resources/funding sources available
FR3	Encourage continued grazing in parks and open space for grass/light fuel maintenance.	County Parks, MROSD, Open Space Authority, State Parks, water company/district properties	Utilize browsing as fuel reduction and maintenance technique, especially adjacent to WUI areas.	Reduce fuel loading of fine fuels that could increase wildfire spread to WUI areas.	Ongoing	2	Regular monitoring needed to ensure against environmental damage and invasive species.	Grants: SRA, CA Fire Safe Council; CFIP; NRCS, FEMA, GHGRF
FR4	Encourage use of prescribed fires where ecologically sound and feasible.	All jurisdictions where appropriate	Utilize prescribed burn planning that follows agency and regulator protocols. Closely follow plan prescriptions.	Reduce fuel loading of fine fuels and understory species to mitigate potential for intense fire behavior in the event of an unplanned ignition.	Ongoing	1	Regular monitoring needed to ensure against environmental damage and invasive species into burned areas. Monitoring to determine project success in reducing fuel loading.	Grants: CAL FIRE VMP program, SRA, CA Fire Safe Council, CFIP, NRCS
FR5	Land management agencies partner for clarity of prescribed fire use that is complementary to Greenhouse Gas Reduction plan of CA Air Resources Board.	MROSD; County Parks, Open Space Authority, CA State Parks, Palo Alto Parks, San Jose Parks, and other municipal park agencies; private rangeland owners	Establish prescribed burning program in partnership with Bay Area Air Quality Management District. Develop prescribed burning community of interest/council.	Open dialogue with APCD Educate public Encourage landowners Provide expertise	ongoing	3	Regular monitoring to determine project success in reducing fuel loading through prescribed burning.	Grants: CAL FIRE VMP program, SRA, CA Fire Safe Council, CFIP, NRCS

ID	Project Description	Location and Responsible Party	Method	Serves to:	Timeline for Action	Priority (1,2,3)	Monitoring	Resources/funding sources available
FR6	Adopt common power line clearance standards for WUI in LRA and SRA.	County in conjunction with utility companies.	<p>Compare power line clearance ordinances in all local WUI jurisdictions.</p> <p>Coordinate with power utility providers to understand impacts and legal pathways.</p> <p>Where necessary adopt local ordinances consistent with intent of CA Public Resources Code sections.</p> <p>Utilize EQ Clearing House exchange core to facilitate project development.</p>	<p>Reduce fuel loading around critical utility infrastructure.</p> <p>Reduce potential for fire starts from downed lines and line strikes.</p>	Within 2 years	1	Regular maintenance schedule should be implemented to ensure clearance levels are maintained.	<p>CA Public Resources Code and Office of Administrative Law for guidance.</p> <p>Funding needs to be determined after impact assessment</p>
FR7	Develop roadside fuel treatment program, including suite of methods available and sustainability mechanism.	All jurisdictions where appropriate;;; Caltrans, County and city road agencies; private road associations, PG&E, cable and phone companies	<p>Determine suite of treatment methods allowed and restriction for roadside hazard reduction including mowing, mastication, chemical, plantings, mulching, etc.</p> <p>Develop treatment plan and rotation schedule for roadside treatments, focusing of primary evacuation or access/egress corridors.</p>	Reduce fuel loading around roads and highways to ensure safe passage of vehicles in event of evacuation and reduce unplanned ignitions from vehicles and highway users.	Within 2 years	1	<p>Regular maintenance schedule should be implemented to ensure clearance levels are maintained.</p> <p>Develop standards for road crews.</p>	Grants: SRA, CA Fire Safe Council; CFIP; NRCS, FEMA, GHGRF

ID	Project Description	Location and Responsible Party	Method	Serves to:	Timeline for Action	Priority (1,2,3)	Monitoring	Resources/funding sources available
FR7			Develop map that highlights critical routes. Track with the Earthquake Clearinghouse exchange core.					
FR8	Develop list of fuel treatment methodologies with cost per acre/day (other metric) that can be used for hazardous fuel treatment.	Fire Safe Council	Educational tool for land /property owners re: various methods, techniques, and cost for various fuel treatments. Cost estimator for project management and grant applications. Pros/cons/restrictions on use of various techniques.	Provide residents with a usable list that helps them to prioritize treatments and plan their defensible space projects.	Within 1 year	1	Monitor effectiveness of different treatment approaches and implement adaptive approach for updating the list depending on uptake of various methods.	NPS, U.S. Forest Service, CAL FIRE, PG&E resources of techniques in use and cost/benefit
FR9	Establish assistance program for hazardous fuel reduction for physically or fiscally challenged parcels.	Throughout all jurisdictions in the County	Identify barriers to achieving parcel level defensible space and establish assistance program of resources: education, consulting, guidance, people, and funding. Establish subsidy or other assistance programs.	Ensure that individual properties with poor property hygiene do not put adjoining properties at risk in event of wildfire. For residents who are not capable of implementing good property hygiene.	Within 2 years	2	Establish levels of participation by assistance type	Grants: SRA, CA Fire Safe Council; CFIP; NRCS, FEMA, GHGRF

ID	Project Description	Location and Responsible Party	Method	Serves to:	Timeline for Action	Priority (1,2,3)	Monitoring	Resources/funding sources available
FR10	Develop agency partnership to establish creation of hand crew for fire hazard reduction- need not be a fire crew.	County Fire, CAL FIRE, County Sheriff, CCC,	Establish a local based crew for use in fire defense improvement work throughout the county. Can be through private resources, contract with CCC, or Sheriff.	Primary purpose is to carry out CWPP objectives	Within 3 years	2	Monitor cost effectiveness through benefit cost ratio approach	Grants: SRA, CA Fire Safe Council; CFIP; NRCS, FEMA, GHGRF
FR11	Create Sustainable programs for creating defensible space at the parcel level.	Home Owner, Fire Safe Councils, Home Owner Associations, Local fire Departments, Administrators for SRA fee distributions, etc.	Example projects - Curbside green waste pickup programs, community chipping piles, drive-up chipping, on site chipping.	Ensure that defensible space actions are sustained in all communities	Within 1 year	1	Regular maintenance schedule should be implemented to ensure clearance levels are maintained.	Grants: SRA, CA Fire Safe Council; CFIP; NRCS, FEMA, GHGRF
FR12	Integrate LHMP with all Parks and open space areas.	County Planning	Outlined in LHMP as a primary WUI mitigation action. Refer to LHMP. Chapter 7, page 7-10.	Address open space areas with a countywide strategy in order to protect life safety.	Within 5 years	2	Annual review of status	County funding

Proposed fuel treatments on private and public lands in the planning area are described and illustrated in the CWPP Annexes. Note that any potential treatments included in this document and annexes are conceptual and have not been field verified for viability and in some cases would have to undergo the environmental compliance process to assess their impacts on natural and cultural resources. The best type of fuels treatment for each area would be determined during this process, which incorporates thorough public scoping.

Note: Although fuel treatments are designed to help to mitigate high intensity fire behavior and allow firefighters access for suppression efforts, no fuel treatments suggested here can be 100% guaranteed to protect life and property, particularly when environmental conditions are primed to create catastrophic fire behavior.

6 MONITORING AND EVALUATION STRATEGY

All stakeholders and signatories to this CWPP desire worthwhile outcomes. We also know that risk reduction work on the ground, for the most part, is often not attainable in a few months—or even years. The amount of money and effort invested in implementing a plan such as this requires that there be a means to describe, quantitatively or qualitatively, if the goals and objectives expressed in this plan (and other approved plans within Santa Clara County) are being accomplished according to expectations.

This section will present a suite of *recommended* CWPP monitoring strategies intended to help track progress, evaluate work accomplished, and assist planners in adaptive management.

Strategies outlined in this section take into account several variables:

- Do the priorities identified for treatment reflect the goals stated in the plan? For example, do projects for fuels reduction along public roads meet objectives for safe evacuation routes in identified high risk areas? Monitoring protocols can help address this question.
- Can there be ecological consequences associated with fuels work? We may be concerned about soil movement and/or invasive species encroachment post-treatment. Relatively cost-effective monitoring may help clarify changes.
- Vegetation will grow back. Thus, fuel break maintenance and fuels modification in both the home ignition zone and at the landscape scale all require periodic assessment. Monitoring these changes can help decision makers identify appropriate treatment intervals.
- What can a monitoring plan do to assist the Core Team/decision makers in assessing the extent to which the CWPP prevention and outreach program objectives are being met? Tracking program benefits in a qualitative way can increase understanding and support from communities.
- As the CWPP evolves over time, there may be a need to track changes in policy, codes, requirements, stakeholder changes, and levels of preparedness. These can be significant for any future revisions and/or addendums to the CWPP.

Table 7.1 identifies recommended monitoring strategies, both quantifiable and non-quantifiable, for assessing the progress of the CWPP action plan. It must be emphasized that these strategies are 1) not exhaustive (new strategies and protocols can evolve with new CWPP action items) and 2) dependent on available funds and personnel to implement them.

Table 6.1. Recommended Monitoring Strategies

Strategy	Task/Tool	Lead	Remarks
Photo record (documents pre- and post-fuels reduction work, evacuation routes, workshops, classes, field trips, changes in open space, treatment type, etc.)	Establish field global positioning system (GPS) location; photo points of cardinal directions; keep photos protected in archival location	Core Team member	Relatively low cost; repeatable over time; used for programs, and tracking objectives
Number of acres treated (by fuel type, treatment method)	GPS/GIS/fire behavior prediction system	Core Team member	Evaluating costs, potential fire behavior
Number of home ignition zones/defensible space treated to reduce structural ignitability	GPS	Home-owner	Structure protection
Number of residents/citizens participating in any CWPP projects and events	Meetings, media interviews, articles	Core Team member	Evaluate culture change objective
Number of homeowner contacts (brochures, flyers, posters, etc.)	Visits, phone	Agency representative	Evaluate objective
Number of jobs created	Contracts and grants	Core Team member	Evaluate local job growth
Education outreach: number, kinds of involvement	Workshops, classes, field trips, signage	Core Team member	Evaluate objectives
Emergency management: changes in agency response capacity	Collaboration	Agency representative	Evaluate mutual aid
Codes and policy changes affecting CWPP	Qualitative	Core Team	CWPP changes
Number of stakeholders	Added or dropped	Core Team	CWPP changes
Wildfire acres burned, human injuries/fatalities, infrastructure loss, environmental damage, suppression and rehabilitation costs	Wildfire records	Core Team	Compare with 5- or 10-year average

6.1 IDENTIFY TIMELINE AND OPPORTUNITIES FOR UPDATING THE CWPP

The CWPP, as an evolving document, will be reviewed annually by the Core Team. The Core Team should decide the most effective way to accomplish this task, given the varying interests represented and personnel time constraints. An example would be canvassing each member for input, generating a list of priority recommendations. Topics may include, but not be limited to, action items and priorities, budgets, changes in agency policies, laws and ordinances affecting safety and fire management operations, new fuels projects, and other modifications to the existing CWPP.

The CWPP review could include a meeting open to the public and affected CWPP municipalities and jurisdictions. Recommendations would be presented, input solicited, and results in the form of documented changes will be attached as amendments to the CWPP.

A primary purpose of the CWPP review and update will be to engage additional parties and stakeholders in the CWPP planning process. Many stakeholders may not have been identified during the first iteration of this Santa Clara County CWPP. Annual reviews and updates provide for engagement of additional entities so that the document can serve a wider network of land management agencies and provide opportunities for increased collaboration across the County. The CWPP Core Team should continue to outreach to interested stakeholders and invite them to be part of the Core Team.

A formal revision to this CWPP should be made on the fifth anniversary of signing and every 5 years following.

This page intentionally left blank

7 REFERENCES

- Bartolome, J.W., M.P. McClaren, B.H. Allen-Diaz, J. Dunne, L.D. Ford, R.B. Standiford, N.K. McDougald, and L.C. Forero. 2002. Effects of fire and browsing on regeneration of blue oak. In R.B. Standiford, D. McCreary, and K.L. Purcell (technical coordinators), *Proceedings of the Fifth Symposium on Oak Woodlands: Oaks in California's Changing Landscape*. October 22–25, 2001, San Diego, California. (General Technical Report PSW-GTR-184.) Albany, California: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.
- Bay Area News Group. 2016. Santa Clara County job market weaker in 2015 than first thought. Available at: <http://www.santacruzsentinel.com/article/zz/20160304/NEWS/160307481>. Accessed February 2016.
- California Department of Forestry and Fire Protection (CAL FIRE). 2015. *Santa Clara Unit Fire Plan*. Available at: <http://cdfdata.fire.ca.gov/pub/fireplan/fpupload/fpppdf1535.pdf>. Accessed March 2016.
- California Employment Development Department 2016. Employment by Industry Data. Available at: <http://www.labormarketinfo.edd.ca.gov/data/employment-by-industry.html>. Accessed February 2016.
- California Governor's Office of Emergency Services. 2013. *2013 State of California Multi-Hazard Mitigation Plan*. Mather, California: California Governor's Office of Emergency Services.
- California Public Resource Code Section 4251-4290. Available at: <http://www.leginfo.ca.gov/cgi-bin/displaycode?section=prc&group=04001-05000&file=4251-4290>. Accessed July 2016.
- California Public Resource Code Section 4291-4299. Available at: <http://www.leginfo.ca.gov/cgi-bin/displaycode?section=prc&group=04001-05000&file=4291-4299>. Accessed July 2016.
- Cohen, J. 2008. The Wildland-Urban Interface Fire Problem: a Consequence of the Fire Exclusion Paradigm. *Forest History Today*, Fall 2008:20—26.
- Cohen, J.D., and B.W. Butler. 1996. Modeling Potential Structure Ignitions from Flame Radiation Exposure with Implications for Wildland/Urban Interface Fire Management. 13th Fire and Forest Meteorology Conference. Lorne, Australia.
- Cornell Lab of Ornithology. 2016. Wrentit. All About Birds website. Available at: <https://www.allaboutbirds.org/guide/Wrentit/lifehistory>. Accessed July 2016.
- County of Santa Clara. 2016. About the County. Available at: <https://www.sccgov.org/sites/scc/pages/about-the-county.aspx>. Accessed February 2016.
- Ford, L.D. and G.F. Hayes. 2007. Northern Coastal Scrub and Coastal Prairie. Pp. 180–207 in M.G. Barbour, T. Keeler-Wolf, and A. Schoenherr (Eds.) *Terrestrial Vegetation of California*, Third Ed. Berkeley, California: University of California Press.
- Graham, R.T., McCaffrey, S., Jain, T.B., 2004. Science Basis for Changing Forest Structure to Modify Wildfire Behavior And severity. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Gen. Tech. Rep. RMRS-GTR-120.

- Grossinger, R.M., R.A. Aaskevold, C.J. Striplen, E. Brewster, S. Pearce, K.N. Larned, L.J. McKee, and J.N. Collins. 2006. *Coyote Creek Watershed Historical Ecology Study: Condition, Landscape Change, and Restoration Potential in the Eastern Santa Clara Valley, California*. (SFEI Publication 426.) San Francisco Estuary Institute, Oakland, California. Prepared for the Santa Clara Valley Water District.
- Hanes, T.L. 1988. California chaparral. Pages 417–469 in M. G. Barbour and J. Major (eds.), *Terrestrial Vegetation of California*. Sacramento, California: California Native Plant Society.
- Harris, R.R. 2016. Wild Fire Management in Protected Habitats: Santa Clara Valley, California—Guidelines for Reducing Fire Hazard and Minimizing Environmental Impacts of Fuel Reduction Projects and Fire Suppression.
- Harrison, S., B.D. Inouye, and H.D. Safford. 2003. Ecological heterogeneity in the effects of grazing and fire on grassland diversity. *Conservation Biology* 17(3):837–845.
- Holland, R.F. 1986. *Preliminary Descriptions of the Terrestrial Vegetation of California*. Sacramento, California: California Resources Agency, Department of Fish and Game.
- Keeley, J. E. 2002. Fire management of California shrubland landscapes. *Environmental Management* 29:395–408.
- Klinger, R.C., M. Brooks, and J. Randall. 2006. Fire and Invasive Species. Pages 499-519 in: N.G. Sugihara, J.W. van Wagtendonk, J. Fites-Kaufman, K.E. Shaffer, and A.E. Thode, editors. *Fire in California's Ecosystems*. University of California Press, Berkeley, California, U.S.A.
- LANDFIRE. 2012. LANDFIRE 2012 Update. Available online at http://www.landfire.gov/lf_130.php. Accessed May 2016.
- McCaffrey, S.M. 2004. Fighting fire with education: what is the best way to reach out to homeowners? *Journal of Forestry* 102:12–19.
- National Fire Protection Association. 2013. 1144: Standard for Reducing Structure Ignition Hazards from Wildland Fire. Available at: <http://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards?mode=code&code=1144&tab=about>. Accessed July 2016.
- National Wildfire Coordinating Group. Interagency Wildland Fire weather Station Standards and Guidelines. Available electronically at: <http://raws.fam.nwcg.gov/nfdrs/WeatherStationStandards.pdf>. Accessed May 2016.
- National Park Service. 2006. *Santa Clara County: California's Historic Silicon Valley: Early History*. Available at: <http://www.cr.nps.gov/nr/travel/santaclara/history.htm>. Accessed February 2016.
- National Register of Historic Places. 2016. Santa Clara County Properties. Available at: <https://www.nps.gov/nr/nrlist.htm>. Accessed February 2016.
- Pyne, S.J. 2001. *Fire: A Brief History*. University of Washington Press, Seattle.
- Ready, Set, Go! 2016. Ready, Set, Go! Available at: <http://www.wildlandfirersg.org/>. Accessed February 2016.

- Reinhardt, E., R Keane, D. Calkin, and J. Cohen. 2008. Objectives and considerations for wildland fuel treatment in forested ecosystems of the interior western United States. 2008. *Forest Ecology and Management* 256: 1997- 2006.
- Rizzo, D.M., and M. Garbelotto. 2003. Sudden oak death: endangering California and Oregon forest ecosystems. *Frontiers in Ecology and the Environment* 1(4):197–204.
- Rothermel, R. C. 1983. How to predict the spread and intensity of forest and range fires. USDA Forest Service. General Technical Report INT-143. June 1983. Available at: http://www.fs.fed.us/rm/pubs_int/int_gtr143.pdf. Accessed May 2016.
- Rundel, P.W. and R. Gustafson. 2005. *Introduction to the Plant Life of Southern California*. (California Natural History Guide Series No. 85.). Berkeley and Los Angeles, California: University of California Press.
- Santa Clara County Fire Safe Council. 2016. 100' Defensible Space, Make your home fire safe. Available at: http://www.sccfiresafe.org/images/attachments/education/Why_100_Feet.pdf. Accessed March 2016.
- Santa Clara County. 1994. *Santa Clara County General Plan*. Available at: <https://www.sccgov.org/sites/dpd/PlansOrdinances/GP/Pages/GP.aspx>. Accessed February 2016.
- . 2011. *Santa Clara County Local Hazard Mitigation Plan*. Available at: <https://www.sccgov.org/sites/oes/PlansPublications/Pages/LHMP.aspx>. Accessed February 2016.
- Santa Clara Local Area Formation Commission. 2015. Service Reviews, 22. Focus Area: Sprawl Prevention/Infill Development. Available at: <http://www.santaclaralafco.org/>. Accessed February 2016.
- Santa Clara Valley Habitat Agency 2012. *Final Santa Clara Valley Habitat Plan*. Available at: <http://scv-habitatagency.org/178/Final-Habitat-Plan>. Accessed February 2016.
- Santa Clara Weekly. Milestones. Available at: <http://www.santaclaraweekly.com/2015/Issue-27/milestones.html>. Accessed May 2016.
- Schoenherr, A.A. 1992. *A Natural History of California*. (California Natural History Guide 56.). Berkeley, California: University of California Press.
- Scott, Joe H.; Burgan, Robert E. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.
- Society of American Foresters, 2004. Preparing a Community Wildfire Protection Plan. A Handbook for Wildland Urban Interface Communities. Available at: <https://www.safnet.org/lp/cwpphandbook.pdf>. Accessed January 2016.
- Stephens, S.L. and N.G. Sugihara. 2006. Fire Management and Policy Since European Settlement. Pages 431-443 in: N.G. Sugihara, J.W. van Wagtenonk, J. Fites-Kaufman, K.E. Shaffer, and A.E. Thode, editors. *Fire in California's Ecosystems*. University of California Press, Berkeley, California, U.S.A.

- Stephens S.L., and L.W. Ruth. 2005. Federal forest fire policy in the United States. *Ecological Applications* 15:532–542.
- Stewart, S.I., V.C. Radeloff, R.B. Hammer, and T.J. Hawbaker. 2007. Defining the Wildland Urban Interface. *Journal of Forestry* 105:201—207.
- U.S. Census Bureau. 2013. Census Bureau Newsroom Report. Census Bureau Reports 209,000 workers commute into Santa Clara County, California each day. Available at: <https://www.census.gov/newsroom/press-releases/2013/cb13-r23.html>. Accessed February 2016.
- . 2014. Santa Clara County Quick Facts. Available at: <http://www.census.gov/quickfacts/table/PST045215/06085>. Accessed February 2016.
- U.S. Conference of Mayors. 2014. Available at: <http://www.usmayors.org/metroeconomies/2014/08/report.pdf>. Accessed February 2016.
- U.S. Fish and Wildlife Service. 2002. *Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California*. Portland, Oregon: U.S. Fish and Wildlife Service Region 1.
- Westerling, A.... 2016. Increasing Western U.S. Forest Wildfire Activity: Sensitivity to Changes in the Timing of Spring. *Philosophical Transactions of the Royal Society B* 371:20150178.
- Western Regional Climate Center. 2016a. Historical Climate Summary for San Jose. Available at: <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7821>. Accessed February 2016.
- . 2016b. Historical Climate Summary for Los Gatos, CA. Available at: <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5123>. Accessed February 2016.
- . 2016c. Historical Climate Summary for Wright, CA. Available at: <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca9814>. Accessed February 2016.
- . 2016d. Historical Climate Summary for Mt. Hamilton, CA. Available at: <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5933>. Accessed February 2016.
- . 2000. Homeowner perspectives on fire hazard, responsibility, and management strategies at the wildland-urban interface. *Society and Natural Resources* 13:33–49.