



# Santa Barbara County

## *Climate Change Vulnerability Assessment*

*October 2021*



**one**  
**CLIMATE**

*one* COUNTY | *one* FUTURE



# Santa Barbara County Climate Change Vulnerability Assessment

October 2021



**Prepared for**

County of Santa Barbara  
Planning and Development Department  
Long Range Planning Division  
123 East Anapamu Street  
Santa Barbara, CA 93101-2058  
805.568.2000

**Prepared by**

PlaceWorks

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DRAFT

# Santa Barbara County Climate Change Vulnerability Assessment

## Acknowledgements

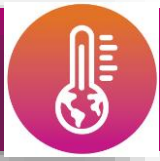
### Santa Barbara County Board of Supervisors

Das Williams	First District
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### Project Team, Planning & Development Department

Whitney Wilkinson	County Project Manager, Senior Planner
David Lackie	Supervising Planner
Julie Harris	Senior Planner
Corina Venegas	Planner II
Yamillet Brizuela	Planner II
Steven Counts-Imara	Planner II (former staff)

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## County of Santa Barbara, Core Team

Kelly Hubbard, JD Saucedo	County Executive Office of Emergency Management
Rob Hazard, Garret Huff	County Fire
Jon Frye, Aurora Zemjanis	County Public Works Department, Water Resources Division
Matt Young	County Water Agency
Ashley Watkins, Garrett Wong, Marissa Hanson-Lopez	County Community Services Department, Sustainability Division
Jason Johnston	County Public Health Department, Environmental Health Services Division
Jeff Lindgren	County Community Services Department, Parks Division
Carlyle Johnston	County Public Works Department, Resource Recovery & Waste Management Division
Selena Evilsizor	County Planning & Development
Will Robertson	County Public Works Department, Transportation Division

## Core Team Advisors

William Siembieda	California Polytechnic State University, San Luis Obispo, Professor Emeritus
Mark Battany	UC Cooperative Extension, Agriculture and Natural Resources

## PlaceWorks Project Team

Tammy L. Seale	Principal, Consultant Project Manager
Eli Krispi	Senior Associate, Assistant Project Manager
Jacqueline Protsman Rohr	Associate
Aaron Pfannenstiel	Principal, Atlas Planning Solutions

# Santa Barbara County Climate Change Vulnerability Assessment

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# Santa Barbara County Climate Change Vulnerability Assessment

## Executive Summary

### Purpose of the Climate Change Vulnerability Assessment

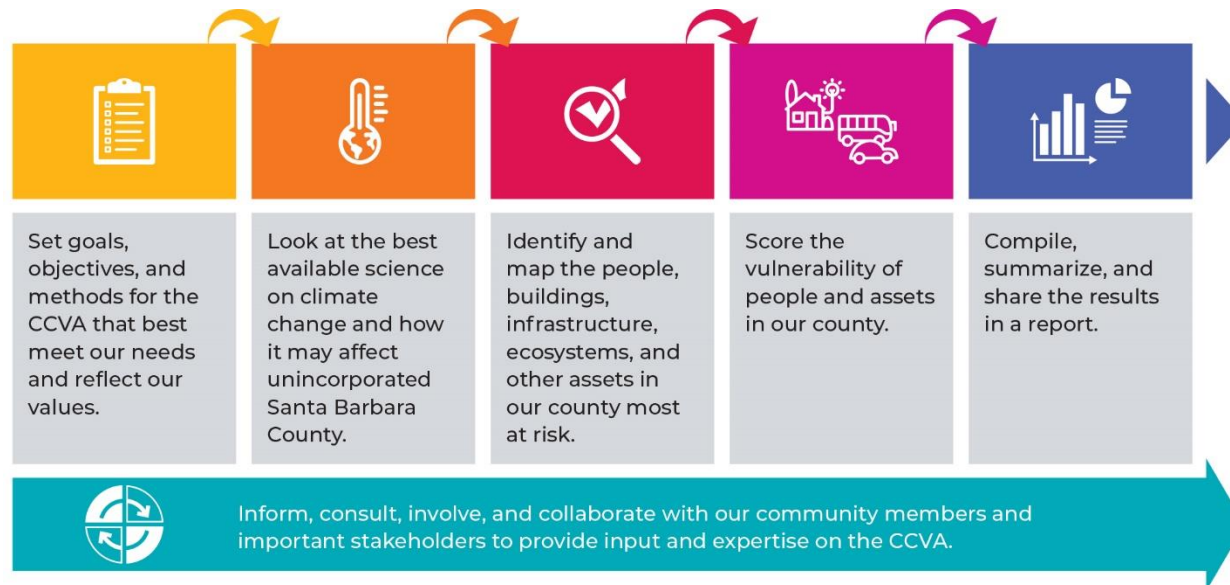
The County of Santa Barbara (County) prepared this Climate Change Vulnerability Assessment (Vulnerability Assessment or CCVA) as the first step to improving regional resiliency by analyzing how climate change may harm the community. The assessment looks at how severe the effects of climate change hazards are likely to be for the county's people and assets and identifies which groups of people and assets face the greatest potential for harm. The County will use these results to prepare an Adaptation Plan and update the Santa Barbara County Seismic Safety and Safety Element to increase resiliency throughout the unincorporated county.

The CCVA is an assessment of the unincorporated areas of the county. The project team evaluated vulnerabilities of populations and assets in unincorporated Santa Barbara County based on current and future hazards associated with climate change. Some of these vulnerabilities are worsened by existing issues in the county, preventing populations and assets from responding and recovering from hazards. The CCVA follows state guidance and relies on local, regional, state, and federal resources; however, it is not a comparison with other counties in the state. The CCVA is a study, not a policy document. The document does not provide project or program solutions to reduce risk and vulnerability caused by current or future climate change hazards.

The Vulnerability Assessment helps Santa Barbara County comply with state laws, identifies the most vulnerable populations and assets in the county, and helps improve the eligibility of the County for grant funding to implement adaptation projects and develop resilience programs. **Figure ES-1** shows the approach used to develop the Vulnerability Assessment.



Figure ES-1. Climate Change Vulnerability Assessment Project Approach



## Frontline Communities

The Vulnerability Assessment includes an analysis of 22 different frontline populations and communities in the unincorporated county. Frontline populations and communities are people who experience the impacts of climate change earlier and/or to a disproportionately severe degree than others in the unincorporated county and are the least able to access resources. A full definition of frontline communities can be found in the County and Subregional Profiles section of the report. The Vulnerability Assessment used US Census data for 15

frontline community indicators in each census block group of the county. The 15 indicators were:

1. Children under 10 years old
2. Senior citizens 65 years or older
3. Senior citizens living alone
4. People living in rental homes
5. Households without access to a vehicle
6. People living in mobile homes
7. Adults without a high school degree
8. Overcrowded households

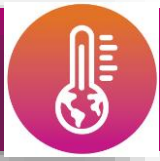


9. Median household income
10. People not identifying as white
11. People with limited English
12. Persons with disabilities
13. The unemployment rate
14. Households spending at least 33 percent of their income on housing (cost-burdened households)
15. People living below the poverty line.

**Table ES-1** shows the block groups in the unincorporated county with the highest concentration of frontline communities. Some populations are not in this table due to lack of surveys or census data but are still included in the Vulnerability Assessment—persons with high pollution burdens, isolated and rural communities, low-resourced people of color, persons living on single-access roads, persons with chronic health problems, and undocumented persons. A more detailed discussion of frontline community can be found in the County and Subregional Profiles section.

**Table ES-1. Block Groups with the Highest Concentration of Frontline Communities**

Block Group Number	Location	Contributing Indicators
002926.3	Isla Vista	Population Renting, Households without a Vehicle, Median Household Income, Population Living Below the Federal Poverty Level
002306.4	Northwest of Santa Maria	Children, Overcrowded Households, Cost-burdened Households
001906.5	Southern Santa Ynez Valley	Seniors Living Alone, Median Household Income, Persons Living In Mobile Homes, Cost-burdened Households
003001.2	Eastern Goleta Valley	Seniors over 65, Population Renting, Population Living in Mobile Homes, Population with Limited English-Speaking Abilities, Cost-burdened Households
00010.1	El Sueno	Seniors over 65, Seniors Living Alone, Population Living in Mobile Homes, Median Household Income, Population Living with Disabilities, Cost-burdened Households
001706.2	West of Carpinteria	Seniors over 65, Population Living in Mobile Homes, Cost-burdened Households



## Method

The Vulnerability Assessment follows the recommended process in the *California Adaptation Planning Guide* (APG). The APG suggests vulnerability assessments follow a four-step process, including the following steps:

1. **Identify Exposure.** Exposure is the presence of people; infrastructure; natural systems; and economic, cultural, and social resources in areas subject to harm from hazardous conditions. A *hazard*, or climate hazard, is an event or physical condition that has the potential to cause types of harm or loss. The project team looked at the exposure of different populations and assets to specific climate change hazards.
2. **Analyze Sensitivity and Potential Impacts.** *Sensitivity* is the level to which changing climate conditions affect a species, natural system, community, government, etc. Potential *impacts* are the effects of a climate change hazard, or the combination of *exposure* and *sensitivity*. The project team first identified which hazard would likely affect particular populations and assets because not all hazards will affect all populations or assets. For example, human health hazards are likely to affect most populations, but they would not affect the structural stability of a bridge or a dam. The project team then evaluated the severity of the impacts from the climate change hazard, to generate an impact score ranging from High (most severe) to Low (least severe).
3. **Evaluate Adaptive Capacity.** *Adaptive capacity* is the ability of people and assets to adjust to potential damage from climate change hazards, to take advantage of existing opportunities such as funding, tools, and resources, or to respond to the impacts of climate change. The project team looked at the adaptive capacity of each population or asset for each applicable identified hazard. As with impact scoring, the project team scored the adaptive capacity of populations or assets ranging from High (more adaptable to a hazard) to Low (least adaptable to a hazard).
4. **Conduct Vulnerability Scoring.** *Vulnerability* is the degree to which populations and assets are susceptible to harm, based on a combination of impact and adaptive capacity for each applicable identified hazard as affected by the level of exposure to changing climate conditions. In accordance with the process in the APG, the project team used the impact and adaptive capacity scoring to identify and prioritize the most vulnerable populations and assets in Santa Barbara County. **Table ES-2** shows how the impact and adaptive capacity scores combine and translate into a vulnerability score.



**Table ES-2. Vulnerability Scoring Matrix**

		IMPACT SCORE		
		Low	Medium	High
ADAPTIVE CAPACITY	Low	V3	V4	V5
	Medium	V2	V3	V4
	High	V1	V2	V3

In some cases, the project team divided up the assets by subregion to provide a more fine-grained evaluation of buildings and infrastructure. The subregions are North County, Cuyama Valley, and South Coast, as shown and described in the County and Subregional Profiles section of the report.

During the assessment process, it was critical to gather information on impacts and adaptive capacity, as well as confirm and revise the vulnerability scores with individual and agency stakeholders through stakeholder interviews core team meetings, Equity Advisory and Outreach Committee meetings, and public workshops, to ensure the Vulnerability Assessment accurately reflects the conditions in the community. The project team participated in several outreach and engagement events throughout the Vulnerability Assessment process, these included the following:

- ❖ 2 Community Workshops – 108 attendees for the first set of workshops and 50 attendees for the second workshop
- ❖ 6 Core Team meetings – County staff from eight different departments and divisions, and two advisors outside of County staff.
- ❖ 9 adaptive capacity meetings – 44 attendees in total
- ❖ 6 stakeholder interviews and meetings
- ❖ 6 Equity Advisory and Outreach Committee meetings

See **Appendix B** for summaries of each of the outreach and engagement efforts. The project team used this information to directly inform the impact and adaptive capacity analyses.

## Climate Stressors

*Climate stressors* are conditions or trends related to climate variability and change – such as decreased precipitation or warmer temperatures – that can exacerbate natural hazards.<sup>1</sup> As greenhouse gas emissions build in the atmosphere and global temperatures continue to rise, primary climate stressors at the local level are likely to become more severe, such as changes in air temperature, precipitation, sea level rise, and ocean acidification. These primary climate stressors can lead to secondary climate stressors. Populations and assets may



already be subject to *non-climate stressors*, or trends unrelated to climate that can exacerbate climate change hazards.<sup>2</sup> For example, populations may face existing financial instability, language or communication barriers, and poor housing quality, which can cause more severe impacts and lower adaptive capacity.

The four primary climate stressors are 1) air temperature changes, 2) precipitation changes, 3) sea level rise, and 4) ocean acidification. Changes in air temperature, precipitation patterns, and sea level directly or indirectly influence the secondary climate stressors; however, sea level rise and ocean acidification are also climate change hazards. The Vulnerability Assessment defines and evaluates the impacts and adaptive capacity created by primary stressors and secondary climate change hazards. **Table ES-3** and **Table ES-4** provide the metrics used to measure the trend in the hazards and the future projections for how the primary climate stressors and secondary climate change hazards are likely to change in the future. An accompanying interactive online map of these hazards is available online through the County's website<sup>i</sup>.

The four primary climate stressors and secondary climate change hazards can also have cascading or compounding effects throughout the county. Cascading hazards are extreme events that link together hazards over days, weeks, or months, resulting in multiplied effects that cause secondary and sometimes tertiary damage, exceeding the damage of the initial hazard event. The destruction caused by the 2017 Thomas Fire and loss of life in the subsequent 2018 Montecito debris flow, followed by the disruption when US-101 closed, is an example of a cascading disaster. The project team considered cascading and compounding hazards as part of the identification of exposures and the impact scoring, as these events can play a significant role in how the county may experience hazards in the future.

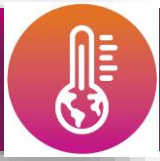
<sup>i</sup> <https://tpc.maps.arcgis.com/apps/webappviewer/index.html?id=eaf5274633b049bf8caefd191006037a>





**Table ES-3. Primary Climate Stressors in Santa Barbara County**

Climate Stressors	Metric	Trend	Projected Changes*
<b>Primary Stressors</b>			
<b>Air Temperature</b>	Minimum temperature	↑	Countywide historic annual average: 43°F +3.2°F by 2030, +4.9°F by 2060, and +7.1°F by 2100
	Maximum temperature	↑	Countywide historic annual average: 68.7°F +3.2°F by 2030, +5.3°F by 2060, and +7.2°F by 2100
<b>Ocean Acidification</b>	Average pH of ocean	↓	Oceans gradually more acidic as the amount of CO <sub>2</sub> in the atmosphere increases.
<b>Precipitation</b>	Annual average precipitation	↑	Countywide historic annual average: 17.6 inches per year +1.7 inches per year (+9%) by 2030, +0.1 inches per year (+1%) by 2060, and +2.8 inches per year (+15%) by 2100
	Seasonality	↑↓	More rain during periods of precipitation, fewer total days with precipitation, increase in year-to-year variability
<b>Sea Level Rise</b>	Inches of sea level rise	↑	+8.4 inches by 2030, +30 inches by 2060 and +79.2 inches by 2100



**Table ES-4. Secondary Climate Change Hazards in Santa Barbara County**

Climate Stressors	Metric	Trend	Projected Changes*
<b>Secondary Stressors - Hazards</b>			
<b>Agricultural Pests and Diseases</b>	Occurrence of pests and diseases	↑	Pests and diseases increase as higher temperature allows for insects to reproduce more rapidly.
<b>Coastal Hazards</b>	Inches of coastal inundation during a 100-year storm	↑	+48.4 inches by 2030, +70 inches by 2060, and +119.2 inches by 2100, including sea level rise.
	Inches of dune and bluff erosion	↑	An average of 623 feet of dune erosion and 177 feet of bluff erosion by 2100.
<b>Drought</b>	Timing and length of drought	↑	Droughts will likely last longer and occur more frequently due to more variability in precipitation extremes.
<b>Extreme Heat</b>	# of extreme heat events per year	↑	Countywide historic annual average: 4 heat events per year +8 heat events per year (+200%) by 2030, +15 heat events per year (+375%) by 2060, and +30 heat events per year (+750%) by 2100.
	Heat wave duration	↑	Countywide historic annual average: 2.3 days +2 days (+87%) by 2030, +3.3 days (+143%) by 2060, and +7.1 days (+308%) by 2100.
<b>Fog</b>	Number of fog days per year	↓	Fog is likely to decrease, although the future of fog is uncertain.
<b>Human Health Hazards</b>	Occurrence of health hazards	↑	Human health hazards increase as temperature allows for insects and other pests to reproduce more rapidly.
<b>Inland Flooding</b>	Areas flooded per year	↑	200-year storms and flooding could occur every 40-50 years by 2100.
<b>Landslides and Debris Flows</b>	Number of landslides or debris flows per year	↑	Landslides and debris flows will likely increase as more precipitation falls during a storm event and hillsides more frequently have burn
<b>Severe Weather</b>	Number of severe weather events per year	↑	Severe weather events likely to increase on average every year.
<b>Wildfire</b>	# of acres burned per year	↑	Countywide historic annual average: 14,608 acres per year +4,457 acres per year (+25%) by 2030, +7,517 acres per year (+41%) by 2060, and +6,044 acres per year (+33%) by 2100.



## Critical Vulnerability Results

The Vulnerability Assessment evaluates the impact and adaptive capacity of 138 populations and assets for each of the relevant 13 hazards. The project team assigned vulnerability scores on a scale of 1 to 5 (as shown in **Table ES-2**) to reflect how susceptible the population or asset is to the harm posed by the hazard. The project team assessed 963 different pairings for vulnerability, 361 of which score as highly or severely vulnerable (V4 or V5). This section summarizes the key vulnerabilities in unincorporated Santa Barbara County.

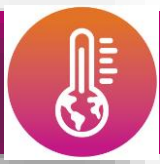
### Populations

The most vulnerable frontline populations are those with limited mobility, limited resources, existing social or economic disparities, and/or those that live in high-risk areas. These communities may have existing conditions that make it more difficult for them to prepare for, respond to, and recover from disasters. Existing resources, for assistance, may be especially limited for frontline populations in the Cuyama Valley subregion, which are isolated from other areas of the county. The County and community-based organizations have several programs that can help these communities, such as the Independent Living Resource Center's Disaster Plan Program, Housing and Homelessness COVID-19 Taskforce, 805UnDOCUFund, CommUnify, weatherization programs,

and evacuation assistance programs.<sup>3</sup> However, the lack of a formal extreme heat plan, isolated and rural portions of the county, health and emergency information distributed in inaccessible languages, and inability to access critical information may prevent frontline populations from adequately responding and recovering from hazardous events.<sup>4</sup>

Of the 22 frontline populations evaluated in the Vulnerability Assessment, 21 were highly or severely vulnerable (scoring V4 or V5) to at least one hazard type. Populations generally are most vulnerable to extreme heat, human health hazards, and wildfire. The most vulnerable frontline populations – those with a high or severe vulnerability score count between six and eight – include the following:

- ❖ Outdoor workers
- ❖ Low-resourced people of color
- ❖ Households in poverty
- ❖ Seniors living alone
- ❖ Persons living on single access roads
- ❖ Persons experiencing homelessness
- ❖ Isolated and rural communities
- ❖ Undocumented persons



## Infrastructure

The most vulnerable infrastructure types are transportation- and water-related infrastructure.

Several major pieces of transportation and transit infrastructure, such as US-101 and single access roads along the South Coast (Hollister Ranch Road, Sandspit Road, Fernald Point Lane, and Edgecliff Lane) are close to the coastline, increasing the likelihood of damage by coastal hazards. Bridges along SR-166, a major inland route, can be damaged by hazards such as landslides, flooding, and wildfire. Many of these routes have multiple uses beyond daily travel, such as bus routes, evacuation routes, and regional economic corridors, which can be disrupted by both coastal and inland hazards in all regions of the county.

Severely vulnerable inland transportation and transit routes include US-101 through the Gaviota Pass, SR-154 through the San Marcos Pass, SR-246 between Buellton and Lompoc, and SR-166 through the Sierra Madre Mountains. In some cases, there are fuel reduction, slope stabilization, coastal armoring, and flood infrastructure projects to protect these routes from climate change hazards; however, these routes may have few or no alternatives for the communities that rely on them, making them highly or severely vulnerable to several hazards.

The Union Pacific Railroad carries both freight and passenger services and is also located along the westernmost and southernmost edges of the county, close to the coastline. Due to the lack of alternative railroads and space to move the railroad inland, the entire railroad through the county is highly or severely vulnerable to coastal hazards. Proximity to floodplains, steeply sloped areas, and high fire hazard zones also makes this asset highly vulnerable to inland flooding, landslides, and wildfire. If one section of the railroad were damaged, the entire line would not be usable until the damage was repaired.

Water and wastewater infrastructure, including the Goleta, and Goleta West Sanitation District facilities, El Estero Water Resource Center, and Santa Barbara Desalination Plant, can be damaged or malfunction due to temporary or permanent coastal flooding by 2060.<sup>5</sup> Pipelines going through steeply sloped areas of the Santa Ynez Mountains can be disrupted by landslides or debris flows. These facilities are large, expensive, and complex systems with little to no redundancy, and therefore rerouting water and wastewater lines if a treatment plant is moved or built can be difficult.

Of the 44 infrastructure types evaluated in the Vulnerability Assessment, 39 were highly or severely vulnerable (scoring V4 or V5) for at least one hazard type. Infrastructure is generally most vulnerable to wildfire, inland flooding, and landslides. The most vulnerable



infrastructure types in the unincorporated county – those with more than four high or severe vulnerability scores – include the following:

- ❖ Railroads
- ❖ Major roads and highways (South Coast & Cuyama Valley)
- ❖ Single access roads (South Coast & North County)
- ❖ Evacuation routes (South Coast & Cuyama Valley)
- ❖ Water and wastewater infrastructure (South Coast)
- ❖ Bicycle routes (South Coast)
- ❖ Bus routes (South Coast & Cuyama Valley)
- ❖ Electrical transmission and distribution lines
- ❖ Flood control infrastructure

### Buildings and Facilities

Throughout the county, the most vulnerable buildings and facilities are homes, residential structures, and residential opportunity sites. In coastal areas along the South Coast, buildings can be damaged or destroyed by coastal hazards. Along bluff tops, they can fall into the ocean along with the bluffs. In inland areas in all subregions of the county, homes can become uninhabitable due to mold and mildew growth from inland flooding, foundation failures from landslides, and damage from severe weather or wildfire. These structures can be retrofitted, upgraded, or raised to prevent damage, but these solutions can be expensive or infeasible for property owners to complete.

Historic buildings and facilities are also highly vulnerable to climate change hazards, which can damage or destroy them, including their historic significance. Not only can retrofits or repairs be expensive, but they can cause these sites to lose their historic significance.

In Cuyama Valley, specifically New Cuyama, schools and commercial buildings are highly vulnerable to inland flooding, extreme heat, and severe weather. These buildings can be damaged, deteriorate more quickly, or cannot function as needed as needed due to high winds, heavy rainfall, and heat waves. Due to the remoteness of the area, there are few alternative buildings and facilities that could meet the demand of the community and building owners may not be able to afford retrofits.

The County and several community-based organizations have weatherization programs that can help owners upgrade buildings and facilities and protect them from a variety of hazards. These programs include Property Assessed Clean Energy Financing, Go Green Financing, tax deductions, and funding through the California Earthquake Commission.

There are also several wildfire reduction and mitigation programs available in certain areas of the county, including defensible space surveys and inspection programs, community chipping programs, and vegetation management programs through the California Vegetation Treatment Program. The Santa Barbara County Fire



Department is also working with CAL FIRE and Santa Barbara County Fire Safe Council to develop and update multiple Community Wildfire Protection Plans and assist with development of a Regional Wildfire Mitigation Program, which will buffer development in the wildland-urban interface, prioritize retrofits, and conduct FireWise training in fire-prone areas.<sup>6</sup>

Of the 26 buildings and facility types evaluated in the Vulnerability Assessment, 12 were highly or severely vulnerable (scoring V4 or V5) for at least one hazard type. Buildings and facilities are generally most vulnerable to inland flooding and wildfire. The most vulnerable building types – those with more than three high or severe vulnerability scores – include the following:

- ❖ Homes, residential structures, and residential opportunity sites
- ❖ Historic buildings and facilities

### Economic Drivers

Agriculture, one of the major economic drivers in the county, is the most vulnerable of all economic drivers due to potential disruptions from most climate change hazards. Drought and extreme heat can increase the water demand on crops and make them more susceptible to pests and diseases. The outdoor workers in agriculture can be harmed by illnesses caused by extreme heat, vector-borne diseases, and smoke from wildfires. The

crops and facilities needed for agricultural operations can be damaged by inland flooding, severe weather, or wildfire, including the transportation routes to carry goods across the region or state. Little can be done to protect crops from many of these hazards, but farm and ranch owners may be able to protect their facilities and workers from some hazardous events. Agritourism is highly dependent on agriculture and therefore is also highly vulnerable to similar hazards.

Several agricultural and outdoor worker programs are in place to help agriculture operators prepare and respond to climate change hazards, including the Ag Pass Program, which allows agriculture owners to get approval to go behind fire lines before events to do essential work; altered work hours to reduce exposure to poor air quality and extreme heat; groundwater sustainability plans to ensure water resources remain available; educational efforts by the University of California (UC) Cooperative Extension and the County Agricultural Commissioner's Office; and research and testing conducted by farmers, ranch and vineyard managers, and UC Cooperative Extension to develop solutions to increase resilience of the agriculture economy.<sup>7</sup>

The next most vulnerable economic sectors are recreation and tourism in coastal and marine areas and on State and federal land. This sector is highly dependent on visitors traveling from other regions in the county and California to participate in outdoor recreation and tourism activities.



Climate change hazards can create unhealthy conditions for outdoor activity or damage recreation and tourism facilities. In coastal areas, coastal hazards are likely to damage or even destroy beaches, reducing the number of outdoor recreation area available along the South Coast. Wildfires and debris flows can destroy the aesthetic beauty of State and federal lands or block the roadways that visitors travel on to locations such as Rincon Beach, Los Padres National Forest, and Lake Cachuma.

Programs for economic drivers outside of agriculture include the Green Business Program, Paycheck Protection Program, Santa Barbara Better Together Fund, and Women's Economic Ventures, which provide funding or education to help local businesses increase resilience.<sup>8,9</sup>

Of the 11 economic drivers evaluated in the Vulnerability Assessment, 8 were highly or severely vulnerable (scoring V4 or V5) for at least one hazard type. Economic drivers are generally most vulnerable to wildfire, coastal storms, and drought. The most vulnerable economic drivers – those with five or more high or severe vulnerability scores – include the following:

- ❖ Agriculture
- ❖ Agritourism
- ❖ State and federal land recreation and tourism
- ❖ Coastal and marine recreation and tourism

## Ecosystems and Natural Resources

The most vulnerable ecosystems in the county are the aquatic ecosystems (e.g., streams, creeks, rivers, and lakes). These ecosystems can be easily disrupted by high temperatures and changes in precipitation that reduce available water and cause harmful algae to grow, changing dissolved oxygen content and nutrient cycling and degrading water quality.<sup>10</sup> Sea level rise may cause these habitats along the coast to become more saline, which can harm the plant and wildlife species that depend on a mixture of both fresh and salt water.<sup>11</sup> These habitats can be restored and protected, but a lack of water may prevent this.

Along the coastline in North County and South Coast, slough and coastal marshes are the most vulnerable ecosystems. These habitats have little space to migrate inland due to buildings and infrastructure in urban areas and may become permanently covered in water due to sea level rise.<sup>12</sup>

Several projects and programs are currently underway to restore and protect the ecosystems and natural resources of Santa Barbara County, including:<sup>13</sup>

- ❖ Arroyo Burro Open Space Restoration
- ❖ Channel Islands Restoration project
- ❖ Coal Oil Point Reserve beach habitat for snowy plovers



- ❖ Fish passage projects and steelhead restoration programs
- ❖ Goleta Slough vulnerability assessment
- ❖ Ice plant removal and oak tree planting at Dangermond Preserve
- ❖ Land Trust restoration at Arroyo Hondo
- ❖ Marine Protected Area establishment along the coastline

Several species or ecosystems may also have capacity to adapt to climate change hazards: such as plants that migrate landward behind seawalls at Hollister Ranch; Devereux Slough migrating inland to North Campus Open Space; raptors that are doing well under current conditions; and meso predators (e.g., skunks, raccoons, crows, and sea gulls).<sup>14</sup>

Of the 12 ecosystems and natural resources evaluated in the Vulnerability Assessment, 11 were highly or severely vulnerable (scoring V4 or V5) for at least one hazard type. Ecosystems and natural resources are generally most vulnerable to coastal storms and drought. The most vulnerable ecosystems – those with four or more high or severe vulnerability scores – include the following:

- ❖ Aquatic
- ❖ Sloughs and coastal marshes
- ❖ Forests
- ❖ Sandy beaches and coastal dunes

### Key Services

Water and wastewater services and public transit access are the most vulnerable key services because of water scarcity and the lack of alternative transportation routes. Water services are highly dependent on surface and groundwater supplies, whose amount or quality can be diminished by drought and coastal hazards. The facilities that support this service can be damaged or destroyed by inland flooding, landslides, and wildfires. Drought conditions can even reduce the amount of water available to process wastewater.

The County is currently supporting efforts of the Groundwater Sustainability Agencies in developing groundwater sustainability plans for the Santa Ynez River Valley Groundwater Basin, San Antonio Groundwater Basin, Carpinteria Groundwater Basin, Cuyama Valley Groundwater Basin, Montecito Groundwater Basin. The Santa Maria and Goleta Groundwater Basins are adjudicated and under stricter control than the other groundwater basins in the county.<sup>15</sup> There are also several programs or projects related to water and wastewater that improve adaptive capacity of this service.<sup>16</sup>

- ❖ Connection of Carpinteria Water District to Ventura County
- ❖ Desalination Plant in Santa Barbara providing water to Montecito





- ❖ Flood protection berms for the Laguna County Sanitation Wastewater Treatment Plant
- ❖ Recycled water in Laguna, Goleta, and Santa Barbara
- ❖ Regional Water Efficiency Program
- ❖ Wastewater treatment plant construction or improvements in Guadalupe and Los Olivos

Electricity service is also highly vulnerable because it is highly dependent on electrical transmission lines and substations functioning properly. During extreme heat conditions, electricity facilities may be overwhelmed by energy demand and reduced efficiency, causing system failures and power outages. During severe weather events, Public Safety Power Shutoffs cause loss of power to residences and businesses. Much of the infrastructure for electrical service is in remote areas that are prone to landslide or fire, making it susceptible to damage from these hazards<sup>17</sup>.

Of the 23 key services evaluated in the Vulnerability Assessment, 15 were highly or severely vulnerable (scoring V4 or V5) for at least one hazard type. Key services are generally most vulnerable to wildfire and landslides and debris flows. The most vulnerable key services – those with four or more high or severe vulnerability scores – include the following:

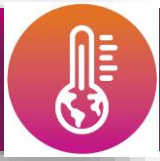
- ❖ Water and wastewater (South Coast, North County, Cuyama Valley)
- ❖ Public transit access (South Coast, Cuyama Valley)
- ❖ Energy delivery (PG&E, SCE)

## Key Findings

The Vulnerability Assessment identifies how the populations and assets of Santa Barbara County are vulnerable to climate change and its associated hazards. Out of the 138 populations and assets analyzed, 106 are highly or severely vulnerable to one or more hazard conditions, as shown in **Appendix D**.

Wildfire and flooding accumulate the most high and severe vulnerabilities of the 13 hazards addressed in the assessment. Moving forward, the County will work with community members and community-based organizations, private businesses, government agencies, and other key partners to address these issues and improve community resilience.

This section provides key findings for 11 distinct categories and how each County department plays an important role in address the vulnerabilities in these categories. **Table ES-3** shows which departments engage in each of the key-finding topics.



The Vulnerability Assessment provides a detailed analysis of the vulnerabilities of populations and assets created or worsened by climate change hazards. The prioritized list of vulnerable populations and assets in this report provides a starting point for increasing resilience in the

unincorporated areas of Santa Barbara County through adaptation, which is the process of making changes in response to current or future conditions to reduce harm and take advantage of new opportunities.<sup>18</sup>

**Table ES-5. County Departments with Responsibilities related to Key-Finding Topics**

Key-Finding Topics	Applicable County Departments
Social Vulnerability	Behavioral Wellness, Community Services Department, Parks Division, Planning & Development Department, Public Health Department, Social Services Department
Coastal Hazards	Community Services Department, General Services Department, Parks Division, Planning & Development Department, Public Works Department
Wildfire	Fire Department, Agricultural Commissioner's Office, Community Services Department, Parks Division, Planning & Development Department, Public Health Department, Public Works Department, County Executive Office of Emergency Management
Agriculture	Agricultural Commissioner's Office, Planning & Development Department, Public Health Department, Public Works Department
Ecosystems	Community Services Department, Fire Department, Parks Division, Planning & Development Department, Public Works Department
Water, Wastewater, Flooding, and Drought	Community Services Department, General Services Department, Parks Division, Planning & Development Department, Public Health Department, Public Works Department, County Executive Office of Emergency Management
The Built Environment	General Services Department, Community Services Department, Fire Department, Parks Division, Planning & Development Department, Public Health Department, Public Works Department
Economic Drivers	Agricultural Commissioner's Office, Community Services Department, Fire Department, Parks Department, Planning & Development Department, Public Health Department, Public Works Department
Emergency Management	Behavioral Wellness, Community Services Department, General Services Department, Parks Department, Planning & Development Department, Public Health Department, Public Works Department, Sheriff, County Executive Office of Emergency Management
Agency and Nonprofit Coordination	Behavioral Wellness, Community Services Department, General Services Department, Parks Division, Planning & Development Department, Public Health Department

# Santa Barbara County Climate Change Vulnerability Assessment



Photo Credit: Mark Bright



Photo Credit: Santa Barbara County Office of Emergency Management

## Introduction

### Purpose of the Climate Change Vulnerability Assessment

A vulnerability assessment is a detailed analysis of how changing climate conditions can harm people, physical structures, and other community assets throughout the county. The County of Santa Barbara (County) prepared this Climate Change Vulnerability Assessment (Vulnerability Assessment or CCVA) as the first step to improving regional resiliency by analyzing how climate change may harm the community.

The assessment looks at how severe the effects of climate change hazards are likely to be for the county's people and assets and identifies which groups of people and assets face the greatest risks. This report summarizes the methods, climate stressors, and results of the Vulnerability Assessment. The County will use these results to prepare an Adaptation Plan and update the Santa Barbara County Seismic Safety and Safety Element to increase resiliency throughout the unincorporated county.

The CCVA is an assessment of the unincorporated areas of the county. The project team evaluated vulnerabilities of populations and assets in unincorporated Santa Barbara County based on current and future hazards associated



with climate change. Some of these vulnerabilities are worsened by existing issues in the county, preventing populations and assets from responding and recovering from hazards. The CCVA follows state guidance and relies on local, regional, state, and federal resources; however, it is not a comparison with other counties in the state. The CCVA is a study, not a policy document. The document does not provide project or program solutions to reduce risk and vulnerability caused by current or future climate change hazards.

The Vulnerability Assessment will also help Santa Barbara County comply with state laws, including Senate Bill (SB) 379, SB 1035, and SB 99.

- ❖ SB 379 is the foundation for adaptation and resiliency in general plan safety elements—it requires local governments to conduct vulnerability assessments as part of their long-range public safety planning efforts and prepare policies that will protect against harm caused by climate change.
- ❖ SB 1035 builds on earlier legislation and requires local governments to review and update their safety elements if needed during an update to their housing element or local hazard mitigation plan, or at least once every eight years. Any revisions should include updated information related to flood hazards, fire hazards, and climate adaptation and resilience.

- ❖ SB 99 requires jurisdictions to review and update the safety element to include information identifying residential developments in hazard areas that do not have at least two emergency evacuation routes.
- ❖ Assembly Bill 747, which will go into effect at the beginning of 2022, focuses on evacuation routes and will require local governments to identify evacuation route capacity, safety, and viability in the safety element or local hazard mitigation plan.

### What is resiliency?

Resiliency is the ability of a community to withstand, recover, and learn from past disasters to strengthen future response and recovery efforts.

### What is adaptation?

Adaptation is the process of making changes in response to current or future conditions, usually to reduce harm and take advantage of new opportunities.

### What is vulnerability?

Vulnerability is the degree to which natural, built, and human systems are susceptible to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt.

Source: California Governor's Office of Emergency Services. 2020. California Adaptation Planning Guide. <https://www.caloes.ca.gov/climate>.



This CCVA will help Santa Barbara County meet these requirements when it next updates the Seismic Safety and Safety Element by analyzing the vulnerability of the County's road networks, which provide evacuation routes, and the vulnerability of single access roads in hazard zones.

In addition to meeting State requirements, the Vulnerability Assessment identifies the most vulnerable populations and assets in the county, which helps prioritize adaptation projects and programs and sets the groundwork for short-term and long-term resiliency planning. This assessment also helps improve the eligibility of the County for grant funding to implement adaptation projects and develop programs to reduce the vulnerabilities created by climate change.



Photo Credit: Mark Bright

## How is resilience defined in Santa Barbara County?

Resilience is the ability to adapt to and recover from challenges, including changes to the natural environment. It is a process that allows communities to absorb shocks to all sectors—in a manner that ensures frontline and vulnerable populations and communities are not disproportionately negatively affected—and to rebound and flourish under changing conditions.

## What does a resilient Santa Barbara look like in the future?

A resilient Santa Barbara County achieves greater self-sufficiency in key resources such as energy and water, and these resources are carbon free. The County and community members integrate efficiency, preparedness, sustainability, and resilience throughout their operations and practices, including decision making.

Source: Core Team meeting, July 9, 2020.

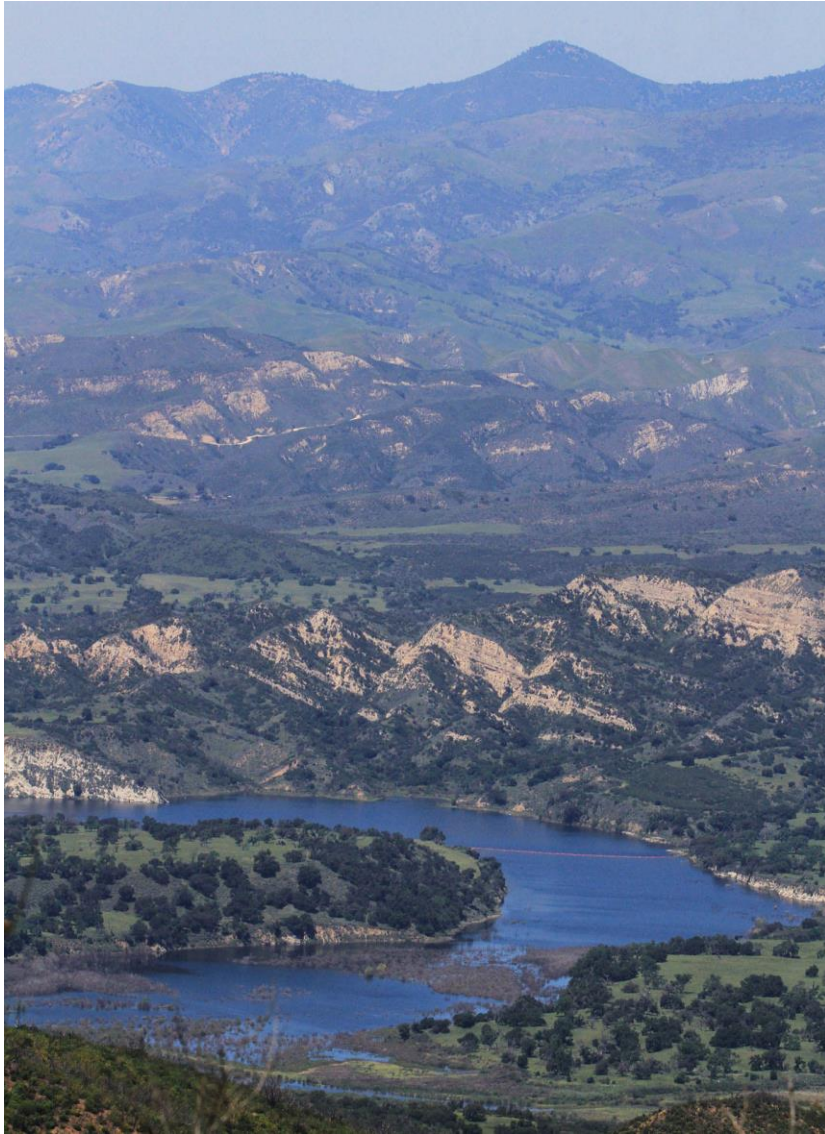


Photo Credit: Mark Bright

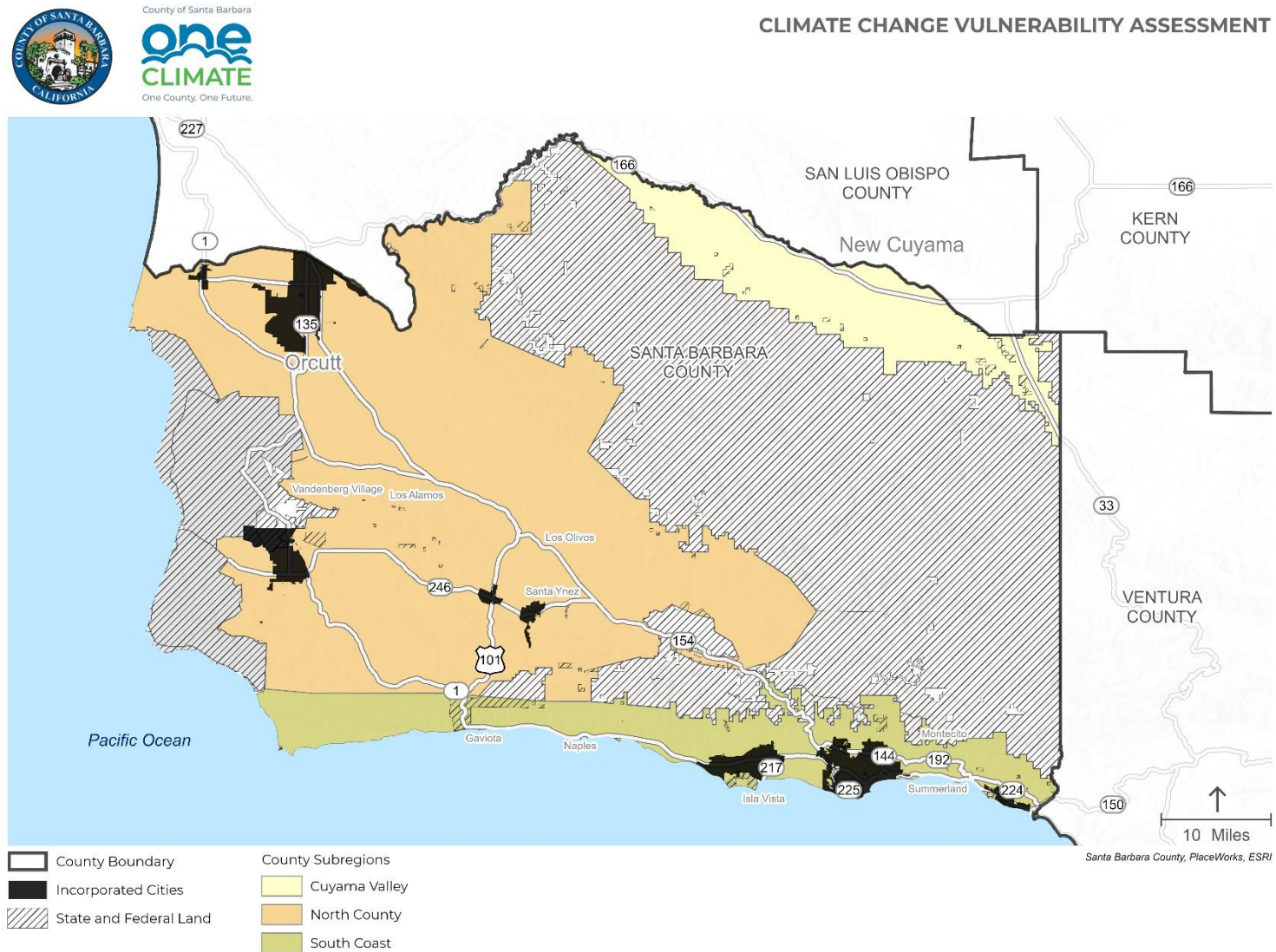
## County and Subregional Profiles

Santa Barbara County is on the central coast of California, north of the Los Angeles region and south of the San Francisco Bay region. San Luis Obispo County borders Santa Barbara County to the north, the Pacific Ocean to the south and west, and Ventura County and Kern County to the east. The coastal areas of Santa Barbara County consist of cliffs and bluffs, dunes and beaches, and coastal communities bordered by agricultural land or mountains. The coastal area of the county extends from the Santa Maria River estuary and Rancho Guadalupe Dune Preserve in the north to Rincon Point in the south. In the southern part of the county, coastal areas turn into mountains and forested areas moving northward and inland. In the northern part of the county, coastal areas turn into the agricultural lands, oak woodlands, and grasslands of the Santa Maria and Santa Ynez valleys. The Los Padres National Forest divides these coastal areas and valleys from the Cuyama Valley, which sits just south of the Caliente Mountain Range.

The following sections describe the topography, demographics and frontline communities, balance of land use and land ownership, and economic drivers of the county. Because of the large geographic area of the unincorporated county, this Vulnerability Assessment divides the county into three subregions, which allows for more detailed descriptions. **Figure 1** shows these subregions—North County, the Cuyama Valley, and the South Coast.



**Figure 1. Project Area Subregions**





## Unincorporated County

Santa Barbara County covers about 3,789 square miles, and according to the California Department of Finance, the unincorporated areas of Santa Barbara County were home to 142,111 people in 2020.<sup>19</sup> They live in 18 census-designated

communities scattered throughout the South Coast, North County, and Cuyama Valley areas—Ballard, Casmalia, Cuyama, Eastern Goleta Valley, Garey, Gaviota, Isla Vista, Los Alamos, Los Olivos, Mission Hills, Montecito, New Cuyama, Orcutt, Santa Ynez, Sisquoc, Summerland, Toro Canyon, and Vandenberg Village. Major population centers are Montecito, Eastern Goleta Valley, Orcutt, and the Santa Ynez Valley. Agriculture, recreation, and tourism land make up a large portion of the unincorporated county. The county includes residential uses scattered throughout the unincorporated areas, with recreation- and tourism-related land uses primarily along the coastline and in the mountain areas of the three subregions.

Various federal, State, and tribal entities own and manage land in the unincorporated county. The US Forest Service manages the Los Padres National Forest, which divides North County and the South Coast from the Cuyama Valley. Along the coastline, the Department of Defense

owns and operates Vandenberg Space Force Base, which is closed to the public. Other federal agencies, such as the Bureau of Land Management and Bureau of Reclamation, manage areas such as Lake Cachuma and other lands scattered throughout the county. Additionally, the California Department of Parks and Recreation manages nine parks or beaches, primarily in the coastal areas. Tribal nations in the county include the Santa Ynez Band of Chumash Mission Indians, the Coastal Band of Chumash Indians, and Barbareño Band of Chumash Indians.

Generally, annual temperature extremes in Santa Barbara County range from an average of 33 degrees Fahrenheit (°F) to 55°F in the winter to an average of 50°F to 80°F in the summer, depending on elevation and proximity to the coastline.<sup>20</sup> The county has a Mediterranean climate, with warm, dry summers and cool, rainy winters. The warmest months of the year are usually August and September, and the coldest months of the year are often December and January. Most of the county receives precipitation in the form of rain, but snow falls in the highest elevations. Average annual rainfall is 18.55 inches, and more rain falls in the Santa Ynez Valley than in the Cuyama Valley.<sup>21</sup> Most precipitation falls between December and March, and little rain falls during the summer months.

The County's primary economic drivers are agriculture and tourism, business support services, healthcare, building and design, technology and innovation, and energy and environmental services.<sup>22</sup> These industries account for 40





percent of employment and 66 percent of new jobs in the county. Agriculture, tourism, and wine employ over 36,000 people and include food production and services industries such as wineries, accommodation, amusement, and recreation industries. Healthcare and business support services—such as graphic design, accounting, advertising, and employment services—employ over 18,000 people each. The building and design include interior design and construction of residential and commercial buildings and accounts for over 16,000 employees. Technology and innovation employ 10,000 people, and energy and environment employ 500 people. Major employers in the county are the County of Santa Barbara, UC Santa Barbara, Cottage Health Organization, Vandenberg Space Force Base, and Santa Maria-Bonita School District.<sup>23</sup>

Santa Barbara County’s primary transportation access is from US Highway 101 (US-101) and State Route (SR-1, which are the primary north-south roads in the region. Other major routes are the Cuyama Highway (SR-166), San Marcos Pass (SR-154), SR-246, SR-135, and Foothill and Cathedral Oaks Roads (SR-192). Santa Barbara Airport and Santa Maria Public Airport provide commercial airport services, Vandenberg Space Force Base has military air

services, and Lompoc Airport and Santa Ynez Airport provide municipal air services.

### Frontline Populations in the Unincorporated County

The unincorporated county is also home to several frontline populations and communities, that is, people or households that live in isolated areas, have high outdoor exposure, are “income constrained,”<sup>ii</sup> have limited mobility or chronic health conditions, live in non-resilient housing, or have limited resources and live in high pollution areas. Many of these populations have characteristics that may fall into multiple frontline population categories. The project team evaluated each population type based on the definitions provided in **Appendix C**, recognizing that populations in multiple frontline population categories have more non-climate stressors that make them more vulnerable to climate change hazards. The project team included an extensive list of frontline populations to cover all of these characteristics. The following frontline populations are included in the CCVA:

- ❖ Children
- ❖ Communities with high pollution burden<sup>iii</sup>
- ❖ Cost-burdened households
- ❖ Households in mobile homes
- ❖ Households in poverty

<sup>ii</sup> Income-constrained communities are populations and households with limited income due to low wages, high housing costs, and/or unemployment.

<sup>iii</sup> Pollution-burdened communities are in the 80th percentile or greater for potential exposure to pollutants and adverse environmental conditions caused by pollution, as defined by CalEnviroScreen.



- ❖ Isolated and rural communities
- ❖ Low-income households
- ❖ Low-resourced ethnic minorities people of color
- ❖ Outdoor workers
- ❖ Overcrowded households
- ❖ Persons experiencing homelessness
- ❖ Persons living on single access roads
- ❖ Persons with chronic health problems
- ❖ Persons with disabilities and access and functional needs
- ❖ Persons with limited English proficiency
- ❖ Persons without a high school degree
- ❖ Persons without access to transportation or telecommunications
- ❖ Renters
- ❖ Senior citizens
- ❖ Senior citizens living alone
- ❖ Unemployed persons
- ❖ Undocumented persons

**Table 1** shows the areas with the highest concentrations of frontline populations in the unincorporated areas of the county. Some of these data overlaps with city boundaries because the data are aggregated to the census block group level. When a block group overlap with a city, the project team focused on the block groups with the majority of residential structures in the unincorporated county.

**Table 1. Block Groups with the Highest Concentration of Frontline Communities**

Block Group Number	Location	Contributing Indicators
002926.3	Isla Vista	Population Renting, Households without a Vehicle, Median Household Income, Population Living Below the Federal Poverty Level
002306.4	Northwest of Santa Maria	Children, Overcrowded Households, Cost-burdened Households
001906.5	Southern Santa Ynez Valley	Seniors Living Alone, Median Household Income, Persons Living In Mobile Homes, Cost-burdened Households
003001.2	Eastern Goleta Valley	Seniors over 65, Population Renting, Population Living in Mobile Homes, Population with Limited English-Speaking Abilities, Cost-burdened Households
00010.1	El Sueno	Seniors over 65, Seniors Living Alone, Population Living in Mobile Homes, Median Household Income, Population Living with Disabilities, Cost-burdened Households
001706.2	West of Carpinteria	Seniors over 65, Population Living in Mobile Homes, Cost-burdened Households

Note: Visit the [interactive online map](#) to view block group locations.



## Frontline Communities and Populations

Frontline communities in unincorporated Santa Barbara County experience the impacts of climate change earlier and/or to a disproportionately severe degree than others in the unincorporated county and are less able to access resources. Residents of frontline communities are often immigrants and refugees, indigenous, and persons of color, and face increased hardship due to socio-economic or environmental pressures. Socio-economic and environmental pressures may include low-income levels, housing cost burdens, high levels of unemployment, disabilities or chronic medical issues, and high levels of exposure to pollutants and climate hazards, among other factors. These are compounded by historical institutionalized and structural inequities that further drive inequality.

County staff, the CCVA core team, and the County's Equity Advisory and Outreach Committee reviewed this definition through a collaboration process to ensure it is appropriate to Santa Barbara County and inclusive of populations and communities most vulnerable to climate change hazards. This definition is consistent with the vulnerable communities definition provided by the California Office of Planning Research's "Defining Vulnerable Communities in the Context of Climate Adaptation."

Source: Climate Change Vulnerability Assessment Core Team Meeting July 9, 2020.

**Table 2** shows the frontline population types included in the US Census or the Santa Barbara County Point in Time Count and in the Vulnerability Assessment by numbers and percentages. Not all populations can be mapped or counted with a high degree of accuracy. Some populations are not in this table due to lack of surveys or census data but are still included in the Vulnerability Assessment. These include —persons with high pollution burdens, isolated and rural communities, low-resourced people of color, persons living on single-access roads, persons with chronic health problems, and undocumented persons.

A full list of frontline populations is in **Appendix C**.



Photo Credit: Mark Bright



**Table 2. Frontline Populations in the Unincorporated County**

Population Type	Population Description	Number of Persons or Households	Percentage of Persons or Households
Persons without a high school degree	Adults (at least 25 years of age) who did not complete high school or receive their GED.	77,300	49%
Unemployed persons	Persons who are actively searching for employment but are unable to find work.	58,500	37%
Households in poverty	Households with an income below the 2020 federal poverty level.	14,920	30%
Cost-burdened households	Households paying over 30 percent of their income toward housing-related expenses.	14,300	29%
Renters	Persons who do not own the household in which they reside.	12,800	26%
Low-income households	Households of four people with an income below \$95,300, which is 160 percent of the very low income as defined by the California Department of Finance.	35,100	22%
Persons without access to transportation or telecommunications	Persons without access to a car, transit, or communication systems.	2,000 without vehicles 20,000 without internet	4% without vehicles 18% without internet
Senior citizens	Individuals 65 years or older.	25,400	16%
Outdoor workers	Persons in industries that require them to be outdoors, such as agriculture, outdoor recreation, construction, and landscaping.	4,500	12%
Households in mobile homes	Households living in prefabricated structures, built in a factory before being transported to the site.	4,700	10%
Children	Persons 10 years of age or younger.	14,140	9%



Population Type	Population Description	Number of Persons or Households	Percentage of Persons or Households
Overcrowded households	Persons living in households with more than 1.0 person per room (including all rooms except bathrooms).	3,900	8%
Senior citizens living alone	Individuals 65 years or older living alone.	5,900	4%
Persons with limited English proficiency	A person 14 years of age or older who speaks a language other than English at home and does not speak English very well.	480	1%
Persons with disabilities and access and functional needs	Persons with a physical condition that limits their movements, senses, or activities, including those with access and functional needs, and persons with psychological conditions.	394	0.25%
Persons experiencing homelessness	Persons experiencing homelessness are individuals with a primary nighttime residence that is in a public or private space not designed for use as a regular sleeping accommodation for human beings.	80	0.05%

Sources: American Community Survey, 2017, ACS 5-year Estimates at Block Level, 2013–2017; Public Health Alliance of Southern California, 2018, Healthy Places Index, <https://map.healthyplacesindex.org/>; Home for Good Santa Barbara County, 2019, 2019 Santa Barbara Point-in-Time Count and Survey.

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**Figure 2** shows the concentrations of frontline populations throughout Santa Barbara County. To determine the frontline community concentrations in **Figure 2**, the CCVA used US Census data for 15 of the 22 frontline populations in each census block group of the county. The US Census does not provide data on all frontline populations included in the CCVA, and therefore **Figure 2** only shows the combined concentrations of 15 populations. The 15 indicators were:

1. Children under 10 years old
2. Senior citizens 65 years or older
3. Senior citizens living alone
4. People living in rental homes
5. Households without access to a vehicle
6. People living in mobile homes
7. Adults without a high school degree
8. Overcrowded households
9. Median household income
10. People not identifying as white
11. People with limited English
12. Persons with disabilities
13. The unemployment rate
14. Households spending at least 33 percent of their income on housing
15. People living below the poverty line.

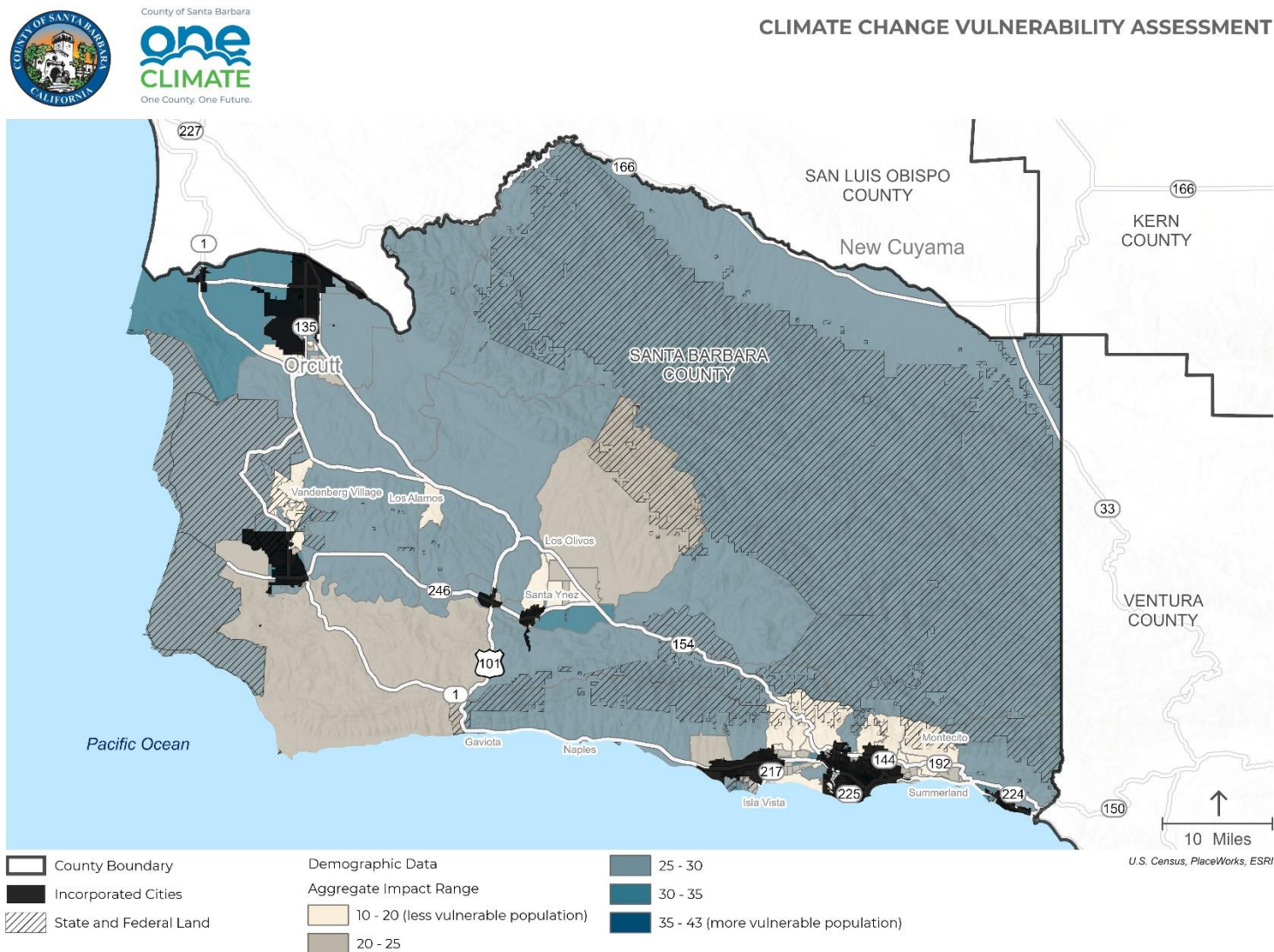
For each frontline community indicator, the block groups received a rank of 1 to 5. Block groups with a rank of 1 have few members of that frontline community compared to other block groups in the county, and those with a rank of 5 have many members compared to other block groups in the county. For each block group, the County aggregated frontline community indicator rankings to create a single score. This score reflects both the percentage of people in any frontline community group as well as the number of different frontline community groups living in each area of Santa Barbara County. The lightest areas of the figure have fewer people in fewer frontline communities, and the darkest areas have many people in several frontline communities.



*Photo Credit: Mark Bright*



Figure 2. Frontline Community Concentrations in Santa Barbara County





## North County

The North County subregion is the largest of the three subregions. It covers the northern county coastline, the Santa Maria Valley, Lompoc Valley, and the Santa Ynez Valley. San Luis Obispo County borders this subregion to the

north, the Los Padres National Forest to the east, Cachuma Lake Recreation Area and the Santa Ynez Mountains to the south, and Vandenberg Space Force Base and the Pacific Ocean to the west. Approximately 68,500 people live in the unincorporated areas of this subregion, and the majority live in population centers such as Santa Ynez, Los Olivos, Los Alamos, Vandenberg Village, Mission Hills, and Orcutt. Agriculture and open space land uses comprise the majority of the land within the North County subregion, and the population centers consist of residential and commercial uses. Major open space areas are Rancho Guadalupe Dunes Preserve, Los Flores Ranch Park, and Cachuma Lake Reservoir.

In North County, primary landowners are the Department of Defense, the US Forest Service, the US Bureau of Reclamation, and the California Department of Parks and Recreation. With the exception of Vandenberg Space Force Base, their lands are open to public use for recreation and tourism. The Santa Ynez Band of Chumash

Mission Indians governs the Santa Ynez Reservation, which includes the Chumash Casino Resort.

Annual temperatures in the North County subregion range widely depending on the elevation and proximity to the ocean. The temperatures in Los Alamos, near the center of the subregion, range from 38°F at night to 73°F during the day and rarely drop below 30°F or exceed 82°F.<sup>24</sup> An extreme heat day in North County is approximately 88.7°F.<sup>25</sup> The warmest months of the year are July through September, and the coldest months are December through February. Precipitation typically falls between October and May, and the average annual rainfall is 16.7 inches per year; however, there is significant interannual variability depending on drought conditions.<sup>26</sup>

The primary economic drivers of the North County subregion are agriculture, recreation, and tourism, including the Chumash Casino. This subregion has abundant agricultural land that includes strawberries, vineyards, livestock, and row crops. Several population centers draw visitors from around California with their wine industry. North County is also bordered by beaches, parks, and open space, which bring people from around the region to participate in outdoor activities such as hiking, bicycling, and horseback riding. Major employers in this subregion are Vandenberg Space Force Base, Chumash Casino, and the Santa Marina-Bonita School District.<sup>27</sup>





North County has floodplains that cross the subregion along rivers, including the Santa Maria River, San Antonio Creek, and Santa Ynez River, and create flood hazards for communities that border these waterways in the Santa Maria and Santa Ynez Valleys. In the steeper and heavily vegetated areas of North County, fire hazards and landslide susceptibility are high. The subregion also faces water restrictions during droughts, which are exacerbated by extreme heat days that require additional water to irrigate agricultural lands.

The primary transportation routes in the subregion are US-101 and SR-1, and secondary transportation routes include SR-246, SR-135, SR-154, and SR-166. The Union Pacific Railroad provides passenger and freight transit services along the western edge of North County. Santa Maria Airport is the only commercial airport in the subregion; Lompoc City Airport and Santa Ynez Airport provide municipal services, and Vandenberg Space Force Base provides military air services.

**Table 3** shows the frontline populations and communities in the CCVA with available information from US Census data, reports, or studies. The following list identifies the issues and the areas where frontline communities live and work. Pollution-burdened communities are in the 80th percentile or greater for potential exposure to pollutants and adverse environmental conditions caused by pollution, as defined by CalEnviroScreen.<sup>28</sup>

- ❖ Pollution-burdened communities<sup>29</sup>
  - **Groundwater contamination:** Southern Santa Maria Valley, Orcutt, Garey, Sisquoc, areas between Guadalupe and Santa Maria.
  - **Drinking water contamination:** Santa Ynez Valley, Foxen Canyon, Purisima Hills, Garey, Sisquoc, Santa Rita Hills, Los Olivos, Los Alamos.
  - **Hazardous waste storage:** Casmalia, Vandenberg Village, Garey, Sisquoc.
  - **Pesticide exposure:** Santa Maria Valley, Santa Rita Hills, areas surrounding Lompoc.
- ❖ **Isolated and rural communities:** Garey, Sisquoc, Casmalia, Betteravia, Los Alamos, Santa Rita Hills, Vandenberg Village, Mission Hills, Paradise Road.
- ❖ **Persons living on single-access roads:** southern Orcutt, Vandenberg Village, Mission Hills, Santa Rita Hills, White Hills, Cebada Canyon, Santa Ynez Valley, Los Olivos, north of Buellton, Paradise Road.



**Table 3. Frontline Populations and Communities in North County Subregion**

Population Type	Number of Persons or Households	Percentage of Persons or Households
Persons without a high school degree	33,300	49%
Unemployed persons	21,700	32%
Cost-burdened households	4,900	22%
Low-income households	11,500	17%
Renters	4,000	17%
Senior citizens	11,700	17%
Households in poverty	3,400	15%
Children	8,000	12%
Households in mobile homes	2,000	9%
Overcrowded households	1,600	7%
Persons without access to transportation	3,800	6%
Outdoor workers	2,700	4%
Senior citizens living alone	2,350	3%
Persons with limited English proficiency	360	2%
Persons with disabilities and access and functional needs	200	0.3%
Persons experiencing homelessness	12	0.02%

Sources: American Community Survey, 2017, ACS 5-year Estimates at Block Level, 2013–2017; Public Health Alliance of Southern California, 2018, Healthy Places Index, <https://map.healthyplacesindex.org/>; Home for Good Santa Barbara County, 2019, 2019 Santa Barbara Point-in-Time Count and Survey.

Notes: See Table 2 for population descriptions.



### Cuyama Valley

The Cuyama Valley subregion covers the northeastern section of the county, north of Los Padres National Forest. San Luis Obispo County and Kern County border this subregion to the north and west; Ballinger

Canyon, Ventura County, and Kern County to the east; and Los Padres National Forest to the southwest.

Approximately 941 people live in this subregion, the majority in the population centers of New Cuyama, Cuyama, and Ventucopa. Agriculture, open space, and oil and gas extraction make up the majority of land uses in the Cuyama Valley subregion. Major open space areas are Ballinger Canyon and the Los Padres National Forest.

In the Cuyama Valley, primary public agency landowners are the Bureau of Land Management and the US Forest Service. Most of the remaining land has private owners who use it for agriculture or oil and gas extraction.

The range of annual temperatures in the Cuyama Valley subregion depends on the elevation. New Cuyama, the central community, ranges from 33°F at night to 95°F



during the day.<sup>30</sup> An extreme heat day in Cuyama Valley is approximately 101.3 °F.<sup>31</sup> The warmest months of the year are June through August, and the coldest months of the year are December through February. Precipitation typically falls from December through March, and the average annual rainfall is 7.2 inches per year; however, there is significant interannual variability depending on drought conditions.<sup>32</sup>

The primary economic drivers of the Cuyama Valley subregion are agriculture, recreation, and tourism. The subregion has abundant agricultural land that grows carrots, alfalfa, olives, and row crops that rely heavily on groundwater because of the arid climate. The Cuyama Valley borders the Los Padres National Forest, Carrizo Plains, and the Caliente Mountains, which draw visitors from around the region to participate in outdoor activities such as hiking, bicycling, and horseback riding. Major employers in the region are agricultural lands and the Cuyama Joint Unified School District.

The Cuyama Valley is an isolated subregion due to only one major transportation route, SR-166. This subregion also experiences the hottest temperatures in the county and is heavily dependent on groundwater from the Cuyama Valley Groundwater Basin. The mountain areas to the north and south of the subregion are in areas of high wildfire and landslide susceptibility. These hazards, in addition to flooding along the Cuyama River, have

historically shut down SR-166, isolating the community from the movement of goods, services, and people.

The primary transportation route is SR-166, with SR-33 providing secondary access through Ventura County. The only roadways providing north-south access through the subregion are forest roads in Los Padres National Forest, which are most often gated and limit access to other subregions. There are no airports or railways in this subregion.

**Table 4** shows the frontline populations and communities in the CCVA with available information from US Census data, reports, or studies. The following list provides areas where other frontline communities live and work.

- ❖ **Pollution-burdened communities:**<sup>33</sup> Nearly all communities in the subregion are burdened with groundwater contamination, drinking water contamination, and pesticide exposure.
- ❖ **Isolated and rural communities:** The entire subregion is an isolated and rural community.
- ❖ **Persons living on single access roads:** Persons living off of Wasioja Road.



**Table 4. Frontline Populations and Communities in the Cuyama Valley Subregion**

Population Type	Number of Persons or Households	Percentage of Persons or Households
Persons without a high school degree	450	48%
Low-income households	430	46%
Unemployed persons	390	41%
Renters	120	34%
Households in poverty	100	30%
Cost-burdened households	80	25%
Senior citizens	210	22%
Households in mobile homes	80	22%
Outdoor workers	190	20%
Children	120	13%
Overcrowded households	20	6%
Senior citizens living alone	30	3%
Persons without access to transportation	3	1%
Persons with limited English proficiency	3	0.9%
Persons with disabilities and access and functional needs	4	0.4%
Persons experiencing homelessness	0	0%

Sources: American Community Survey, 2017, ACS 5-year Estimates at Block Level, 2013–2017; Public Health Alliance of Southern California, 2018, Healthy Places Index, <https://map.healthyplacesindex.org/>; Home for Good Santa Barbara County, 2019, 2019 Santa Barbara Point-in-Time Count and Survey.

Note: See Table 2 for population descriptions.



### South Coast

The South Coast subregion is the southernmost of the three subregions and covers the southern county coastline. The Santa Ynez Mountains border this subregion to the north, Ventura County to the east, the Pacific Ocean to the south, and Point Conception and the Pacific Ocean to the west. Approximately 86,900 people live in unincorporated areas of this subregion, and the majority live in population centers such as Montecito, Eastern Goleta Valley, Isla Vista, Hope Ranch, Summerland, Toro Canyon, and Mission Canyon. The majority of land uses are residential, commercial, and recreation and tourism. Major recreation and tourism areas are the sandy beaches along the coast and the foothills of the Santa Ynez Mountains, including Goleta Beach, Rincon Beach, San Marcos Foothills, Gaviota Beach, and El Capitan Beach. Agriculture occurs throughout the subregion in the Carpinteria Valley, Goleta Valley, and along the Gaviota Coast.

In the South Coast, primary landowners are the US Forest Service, California Department of Parks and Recreation, University of California, and incorporated jurisdictions. Many of these lands are open to public use for recreation and tourism. The South Coast also includes four Marine Protected Areas: Point Conception State Marine Reserve, Kashitayit State Marine Conservation Area, Naples State



Marine Conservation Area, and Campus Point State Marine Conservation Area.<sup>34</sup>

Annual temperatures in the South Coast subregion range widely depending on the elevation and proximity to the ocean. Temperatures in Montecito, a central community in the subregion, range from 42°F at night to 78°F during the day, and temperatures rarely drop below 34°F or exceed 84°F.<sup>35</sup> An extreme heat day in South Coast is approximately 87°F.<sup>36</sup> The warmest months of the year are July through September, and the coldest months are December through February. Precipitation typically falls between October and May, and the average annual rainfall is 21.8 inches per year; however, there is significant interannual variability depending on drought conditions.<sup>37</sup>

The primary economic drivers of the South Coast subregion are recreation and tourism, business support services, healthcare, education, building and design, technology and innovation, and energy production. The population centers in this subregion draw people from around the world to participate in outdoor recreation and tourism activities. Due to its proximity to UC Santa Barbara, this subregion also supports several technology and innovation companies. Major employers include UC Santa Barbara, County of Santa Barbara, Cottage Health Organization, Santa Barbara Unified School District, Sansum Clinic, City of Santa Barbara, and Santa Barbara City College.<sup>38</sup>

The primary transportation route in the subregion is US-101, and SR-154 and SR-192 provide secondary connections outside of the region. The Union Pacific Railroad provides passenger and freight transit services along the southern edge of South Coast. Santa Barbara Municipal Airport is the only airport in the subregion.

The South Coast is currently prone to hazards such as wildfires and debris flows, which can block US-101 and the Union Pacific Railroad, the major transportation routes in the county. Coastal flooding and bluff erosion already occur along beaches, coastal cliffs, and estuarine habitats, temporarily shrinking beaches and changing water conditions and causing permanent loss of land along the bluff tops. Though temperatures tend to remain cooler in this subregion than elsewhere in the county, in recent years extreme heat events have increased, harming the populations and economic drivers in the subregion.

**Table 5** shows the frontline populations and communities in the CCVA with available information from US Census data, reports, or studies. The following list provides areas where other frontline communities live and work.

- ❖ Pollution-burdened communities<sup>39</sup>
  - **Groundwater contamination:** Tajiguas, El Capitan, Naples, and other areas of the Gaviota coastline.
  - **Drinking water contamination:** Santa Ynez Mountains, Toro Canyon, and Summerland.



- **Hazardous waste storage:** Gaviota, Lento, Tajiguas, El Capitan, and Naples.
- **Pesticide exposure:** Conception, Hollister Ranch.
- ❖ **Isolated and rural communities:** Hollister Ranch, Arroyo Quemado, Refugio Road, and San Marcos Trout Club.
- ❖ **Persons living on single access roads:** Sudden Peak and Oak Mountain, Hollister Ranch, Las Lieges Canyon, Las Varas Canyon, Glen Annie Canyon, San Pedro Canyon, Wylie Canyon, El Sueno, west of Hope Ranch, Hidden Valley, Mission Canyon, Montecito south of Highway 101, Toro Canyon, north of Sandyland Cove, and Shepard Mesa.

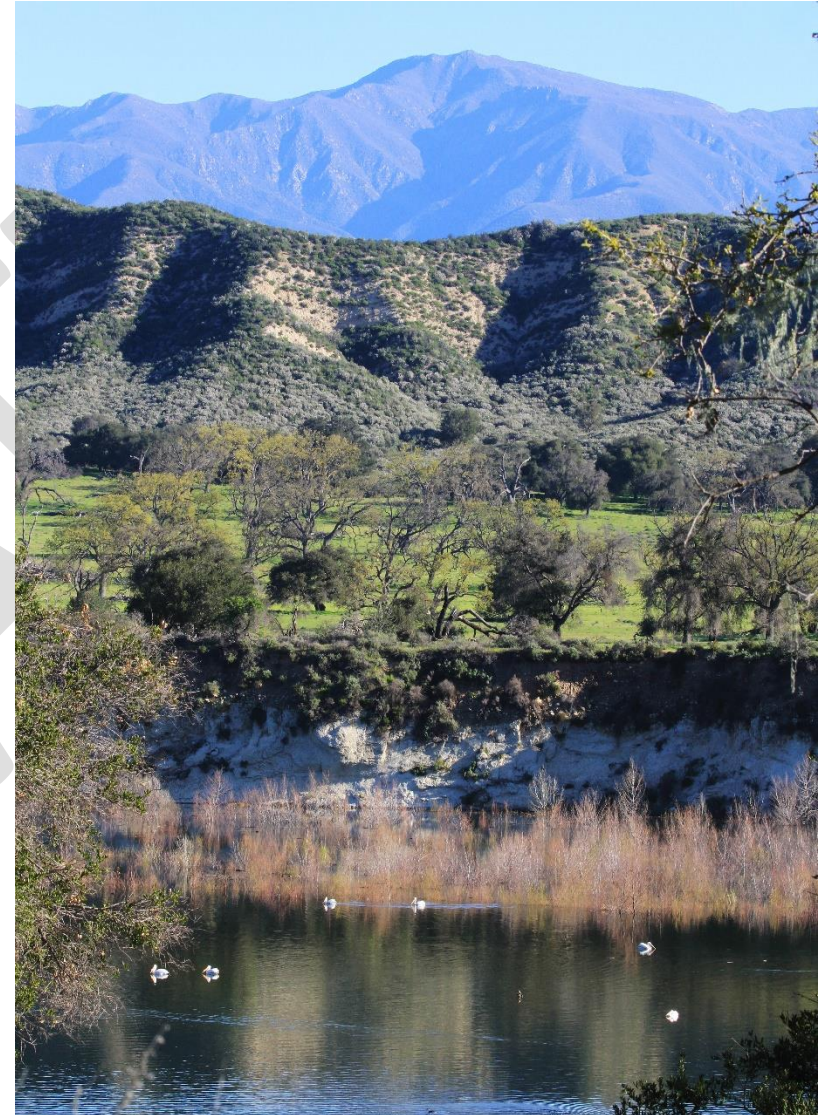


Photo Credit: Mark Bright



**Table 5. Frontline Populations and Communities in the South Coast Subregion**

Population Type	Number of Persons or Households	Percentage of Persons or Households
Persons without a high school degree	43,500	50%
Households in poverty	11,400	43%
Unemployed persons	36,400	42%
Cost-burdened households	9,300	35%
Renters	8,700	33%
Low-income households	23,200	27%
Senior citizens	13,500	16%
Households in mobile homes	2,700	10%
Overcrowded households	2,400	9%
Children	6,000	7%
Persons without access to transportation or telecommunications	1,600	6%
Senior citizens living alone	3,500	4%
Outdoor workers	1,700	2%
Persons with limited English proficiency	120	0.5%
Persons with disabilities and access and functional needs	200	0.2%
Persons experiencing homelessness	70	0.1%

Sources: American Community Survey, 2017, ACS 5-year Estimates at Block Level, 2013–2017; Public Health Alliance of Southern California, 2018, Healthy Places Index, <https://map.healthyplacesindex.org/>; Home for Good Santa Barbara County, 2019, 2019 Santa Barbara Point-in-Time Count and Survey.

Notes: See Table 2 for population descriptions.



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# Santa Barbara County Climate Change Vulnerability Assessment



Photo Credit: Mark Bright



Photo Credit: Mark Bright

## Method

### Adaptation Planning Guide Method

The Vulnerability Assessment follows the recommended process in the *California Adaptation Planning Guide* (APG).<sup>40</sup> This document was recently updated by the California Office of Emergency Services and provides the steps for local governments to identify and reduce climate change hazards. The APG suggests that vulnerability assessments follow a four-step process, which is shown in **Figure 3** and is described in this section.

**Figure 3. California Adaptation Planning Guide Vulnerability Assessment Method**

Step 1. Identify Exposure

Step 2. Analyze Sensitivity and Potential Impacts

Step 3. Evaluate Adaptive Capacity

Step 4. Conduct Vulnerability Scoring



**Identify Exposure:** In a vulnerability assessment, *exposure* is the presence of people; infrastructure; natural systems; and economic, cultural, and social resources in areas subject to harm. A *hazard*, or climate hazard, is an event or physical condition that has the potential to cause types of harm or loss. To prepare the Vulnerability Assessment, the project team looked at the exposure of different populations and assets to specific climate change hazards. This step included confirming applicable hazards in the county, describing historical hazards, identifying new hazards, describing how hazards are expected to change, and mapping the hazard-prone areas.

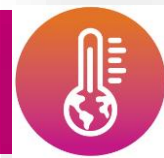
**Analyze Sensitivity and Potential Impacts:** *Sensitivity* is defined as the level to which changing climate conditions affect a species, natural system, community, government, etc. Potential *impacts* are the effects of a climate change hazard, or the combination of *exposure* and *sensitivity*. For example, suppose an increase in extreme heat events is the hazard. In that case, the greater risk of heat-related illness in susceptible persons is the exposure, and the sensitivity is the degree of the impact from the exposure. Each population and asset in Santa Barbara County are likely to experience different impacts. In this Vulnerability Assessment, the project team assessed the sensitivities and potential impacts to each population or asset from each applicable climate change hazard.

**Evaluate Adaptive Capacity:** *Adaptive capacity* is the ability of people and assets to adjust to potential damage from climate change hazards, to take advantage of existing opportunities such as funding, tools, and resources, or to respond to the impacts of climate change. The project team looked at the adaptive capacity of each population or asset for each applicable identified hazard.

**Conduct Vulnerability Scoring:** *Vulnerability* is defined as the combination of impact and adaptive capacity as affected by the level of exposure to changing climate conditions. In accordance with the process in the APG, the project team used the impact and adaptive capacity scoring to identify and prioritize the most vulnerable populations and assets in Santa Barbara County.

## Vulnerability Assessment Process

The project team selected hazards, frontline populations, and assets that the “core team” reviewed and refined for use in the Vulnerability Assessment based on the APG’s recommended process. The Equity Advisory and Outreach Committee reviewed and provided feedback on the frontline populations and communities, including the unique impacts and adaptive capacity of these populations.



The core team is made up of County staff from various departments and advisors to the County who have expertise in climate change hazards or specific assets. The core team reviewed materials and provided input at all key phases of the vulnerability assessment process. The project team divided some assets, such as community centers, parks and open space, and bus routes, into the subregions to provide a more detailed analysis. **Appendix C** provides a full list of the populations and assets in the Vulnerability Assessment. Throughout this process, the project team, with support from the core team, assessed the impact, adaptive capacity, and vulnerability scores to provide local knowledge and additional accuracy for the assessment. **Appendix D** provides a detailed list of vulnerability scores for all populations and assets.

### Applicability Review

The project team first identified which hazards would likely affect particular populations and assets because not all hazards will affect all populations or assets. For example, human health hazards are likely to impact most populations, but they would not affect the structural stability of a bridge or a dam. The outcome of this step was a matrix that identified the likelihood of a population or asset exposure to a hazard, which helped evaluate the impact and adaptive capacity. The results of this step formed the foundation for the Vulnerability Assessment, which developed a separate vulnerability score for each population or asset and hazard pairing.

### Identifying When Impacts Are Likely

The Vulnerability Assessment includes projections for the years 2030, 2060, and 2100 to identify how climate change hazards are likely to affect the county in the early century, midcentury, and late century. When available, the project team used these projections to identify how soon and how severe populations and assets could experience impacts. The project team gave higher impact scores to populations and assets that will be exposed to a hazard in 2030 and lower scores to populations and assets that will not be exposed to hazards until 2100.

The project team marked the hazard as applicable to the population or asset if the hazard directly or indirectly affects a population or asset. Direct impacts affect physical assets, health, or immediate operations, which can lead to indirect impacts on the broader system or community, including asset types in a different category. For example, severe weather can *directly* damage electrical transmission lines and cause power outages, which can *indirectly* impact persons with chronic illnesses who depend on electricity for life support systems. Therefore, the project team marked both electrical transmission lines and persons with chronic illnesses who depend on life support systems as being potentially affected by severe weather, the project team evaluated them for their susceptibility to severe weather in the Vulnerability Assessment.



This is where the project team considered cascading effects in the analysis. Cascading or compounding climate change effects means one climate change hazard leads to another, and the effects can “cascade” into a disaster. The Thomas Fire and related events are a recent prominent example in Santa Barbara County. Higher temperatures and lack of precipitation led to increased wildfire risks, which eventually resulted in the Thomas Fire, which spread quickly due to strong winds. The large burn area could not absorb a subsequent extreme rainfall event, which led to a devastating debris flow in Montecito. The debris flow killed 23 people, damaged or destroyed over 400 homes, and blocked major transportation corridors for many days, including US-101 and the Union Pacific Railroad. **Figure 4** shows an example of these cascading effects.

Human health hazards also have cascading effects, such as rendering workers unable to work and visitors unable to travel to an area, that harm both economic drivers and key community services. The project team accounted for these when developing the applicability matrix, during the assessment process, and while summarizing the vulnerability results.

The ultimate goal of the Vulnerability Assessment is to assess vulnerabilities in our community and to inform the Safety and Seismic Safety Element update, which will identify and prioritize measures that will increase resiliency. These measures are intended to lessen the severity of cascading and compounding effects that would otherwise lead to more frequent and/or more severe disasters.

**Figure 4. Example of Cascading Effects**





## Hazards and Disasters

*Hazards* are the potential occurrence of a specific natural or human-induced physical event that may cause loss of life or injury or damage or loss of property, infrastructure, livelihoods, services, ecosystems, and environmental resources. A *disaster* is when hazard events interact with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response.

Source: IPCC. 2014. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pp.

### Assessing Impact

To assess the potential impacts of climate change hazards on populations and assets, the project team considered various questions to ensure that the assessment broadly covers the range of potential harm. The questions below address physical or other impacts, the length of the impact, how soon the impact is likely to occur, and the number of people or assets likely to be directly or indirectly harmed. They also allowed the project team to account for both direct and indirect impacts:

- ❖ What type of potential impacts may occur?
- ❖ Could the potential impacts cause physical injury or damage? If not, is there a risk of behavioral or mental harm, loss of economic activity, or other nonphysical harm?

- ❖ Direct or indirect harm could affect how many people or assets?
- ❖ How soon would the impacts happen, and how long would the impacts persist after the exposure?
- ❖ Is there a substantial chance of death or widespread destruction?

Based on the impact evaluation results, the project team ranked each population and asset as high, medium, or low for each relevant hazard. For some assets, the project team broke scores into subregional levels to anticipate significant regional variability in climate impacts. An impact is considered a negative condition, so a higher impact score means a higher potential for harm to a population or asset. A lower impact score means a lower potential for harm to a population or asset. **Table 6** provides more detail about what each score will mean.



**Table 6. Rubric for Impact Scoring**

IMPACT SCORE	MEANING FOR PEOPLE AND ECOSYSTEMS	MEANING FOR BUILDINGS AND INFRASTRUCTURE, SERVICES, AND ECONOMIC DRIVERS
<b>Low Impact</b>	Community members may not notice any change. If noticed, effect would be minor with only occasional disruptions.	Damage, interruption in service, or impact on the local economy is small or intermittent enough to go mostly unnoticed. If noticed, effects are only minor.
<b>Medium Impact</b>	There is a noticeable impact to the community. Quality of life may decline. Impacts may be chronic and, at times, substantial.	Damage, service interruptions, and other impacts are clearly evident. Impacts may be chronic and occasionally substantial.
<b>High Impact</b>	The well-being of the community declines significantly. The community's current lifestyle and behavior may no longer be possible. There is a severe risk of widespread injury or death to people or of significant or total ecosystem loss.	Buildings, infrastructure, and services often or always cannot function as intended or needed to meet community demand. Large sections of the economy experience major hardships or are not feasible.

### Assessing Adaptive Capacity

The project team next evaluated the adaptive capacity of the individual populations and assets for each relevant hazard. Following a process similar to the one used to analyze impacts, the project team considered various questions to help ensure that the adaptive capacity assessment covered the full ability of a population or asset to resist and recover from harm, given current programs and conditions. Examples of these questions are:

- ❖ Are there existing programs, policies, or funding to provide assistance, reverse or repair damage, or restore or adapt resources or assets?
- ❖ Are there existing barriers that limit response of recovery? Are they financial limitations, political challenges, lack of access to technology or other resources, or others?
- ❖ Do known alternatives exist in or near Santa Barbara County that community members can use? Are there existing redundant resources that the County can bring online in case of failure or loss of function in primary resources?

The project team relied on information provided at the nine adaptive capacity meetings with the core team and technical advisors, a community workshop, Equity Advisory and Outreach Committee meetings, and stakeholder interviews to assess adaptive capacity. The Outreach and Engagement section later in this chapter



summarizes the engagement process. County staff and community members shared dozens of existing projects, plans, programs, funding sources, and community-led efforts to help residents, businesses, and the agriculture community prepare for and respond to climate change hazards. See **Appendix B** for an extensive list of efforts to increase adaptive capacity in the county.

Based on the adaptive capacity evaluation results, the project team ranked each population or asset as low, medium, or high. As with impact scoring, the project team scored the adaptive capacity of populations or assets in different regions of Santa Barbara County differently. Adaptive capacity is considered a positive attribute, so a higher adaptive capacity score means a population or asset may be more adaptable to the hazard. A lower adaptive capacity score means a population or asset may have a harder time adjusting to the changing conditions. For example, during a Public Safety Power Shutoff event a person with solar panels and backup battery system for their home has a higher adaptive capacity than a person without solar panels and a backup battery system, because they would be able to maintain electrical service in their home even if the electrical grid was turned off. A higher adaptive capacity score means a population or asset is currently more resilient to climate change hazards.

**Table 7** provides more detail about what each score means.

**Table 7. Rubric for Adaptive Capacity Scoring**

ADAPTIVE CAPACITY SCORE	MEANING
<b>High Adaptive Capacity</b>	Adaptation solutions are feasible for most or all sensitivities. There may be occasional or small-scale challenges to implementing adaptation methods, but populations and assets can adapt with little or no effort. Many alternatives exist in the area that can provide similar services.
<b>Medium Adaptive Capacity</b>	Some adaptation methods are available, but not always feasible. Adapting may create significant challenges for some sensitivities. Some alternatives exist in the jurisdiction area that can provide similar services.
<b>Low Adaptive Capacity</b>	Adaptive solutions are available, but they are not used because of cost, technological, or other resource constraints, and/or they are not supported by decision-makers or the community. Alternatives that provide similar services may not exist. Some assets may not have feasible means to adapt.



### Thomas Fire and Debris Flow Adaptive Capacity

In the days after the 1/9 Debris Flow, the community came together and worked with the County to provide assistance and develop solutions that would aid recovery. One example is a group of local residents formed the Partnership for Resilient Communities, a nonprofit organization focused on safety and resiliency in support of, and to augment public sector efforts in Santa Barbara County. Among other activities, this group was able to permit and install debris nets in 5 canyons struck by the debris flow with the intent to reduce further risk to downslope communities. Another group formed called the Santa Barbara Bucket Brigade, formed as a grassroots network of 3,000 volunteers focused on assisting property owners dig their homes out of mud and debris, find lost belongings, clean up open spaces, and help restore trails and walking paths. The County recognized that homeowners wanting to rebuild may face altered properties and time-consuming permit processes to rebuild their homes in a timely manner. The “Like-for-Like” Ordinance provisions in the Montecito Land Use Development Code were adopted by the County Board of Supervisors later that year to allow homeowners to avoid time-consuming land use permits, design reviews, and potential appeals. A streamlined process is available to homeowners if they choose to rebuild disaster-damaged homes in the same manner (including size and design), yet with additional flexibility to elevate rebuilt structures of the same design to a safer level and relocate further away from flood plains. The actions of local entities during recovery efforts associated with the 1/9 Debris Flow demonstrate the communities adaptive capacity and ability to build resilience in response to local disasters.

### Vulnerability Scoring

The project team used the impact and adaptive capacity scores (previous two steps) for each population and asset for each relevant hazard to determine the vulnerability score. The vulnerability (V) score reflects how susceptible the population or asset is to harm from a particular hazard. After completing this initial scoring, the project team adjusted the impact and adaptive capacity scores (and by extension, the vulnerability scores) in response to feedback from the core team and other stakeholders. It

was critical to confirm and revise these scores with individual and agency stakeholders through core team meetings, Equity Advisory and Outreach Committee meetings, and workshops, to ensure the Vulnerability Assessment accurately reflects the conditions in the community.

Vulnerability is assessed on a scale of 1 to 5 (V1 through V5), as shown on **Figure 5. Table 8** shows how impact and adaptive capacity scores combine and translate into a vulnerability score.



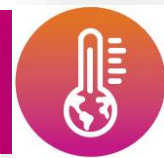


Figure 5. Vulnerability Scale

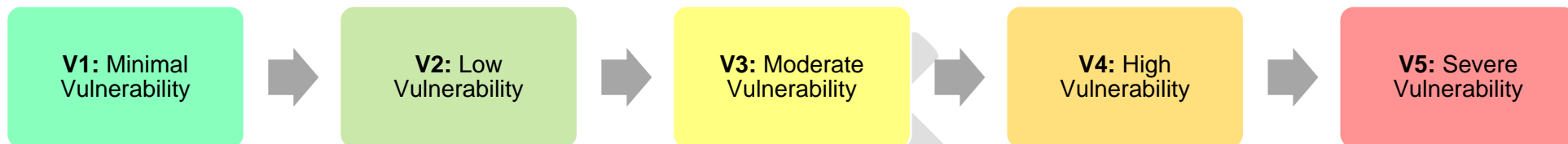


Table 8. Vulnerability Scoring Matrix

		IMPACT SCORE		
		Low	Medium	High
ADAPTIVE CAPACITY	Low	V3	V4	V5
	Medium	V2	V3	V4
	High	V1	V2	V3

### Data Sources

The Vulnerability Assessment is based on the best available science and information, with data from scholarly research and local, regional, State, and federal data to determine impact and adaptive capacity scores and support vulnerability conclusions. These data supplemented the information received during the outreach and engagement process. A complete list of the sources used for the Vulnerability Assessment is in **Appendix A**.

The project team relied on an extensive body of scientific research that analyzes and summarizes how climate change may affect people and community assets. In most cases, this research was not conducted in Santa Barbara County, but the results are applicable and relevant. Much of this research is peer reviewed to ensure greater accuracy, and it includes studies published in academic journals such as the *Proceedings of the National Academy of Science*, *Geophysical Research Letters*, and *Climate Change*. The project team corroborated this information with websites and publications from scientific and academic institutions, government organizations, and credible local and national sources.

The project team relied on publications from community-based and nonprofit organizations to support assessment of the vulnerability of frontline populations. These included *Mapping Resilience: A Blueprint for Thriving in the Face of Climate Disasters*, *Guide to Equitable Community-Driven Climate Preparedness Planning*, and resources from the Community Environmental Council.

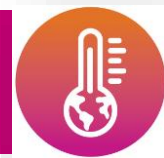


Over 20 different sources at local and regional scales were used to describe impacts and evaluate the current capacity of the County to address these impacts with existing resources. These plans, assessments, and reports included the Santa Barbara County Coastal Resiliency Project, the Santa Barbara County Multi-jurisdictional Hazard Mitigation Plan, the Santa Barbara Council of Government's Multi-Modal Climate Change Vulnerability Assessment, the Santa Barbara County Coastal Ecosystem Vulnerability Assessment, and newly published materials from the County of Santa Barbara Fire Department and Santa Barbara County Association of Governments. Other data included a range of Geographic Information System (GIS) datasets showing both hazards and assets. These resources described populations and assets, described hazards and potential impacts, and provided an overview of adaptive capacity for County departments or specific assets.

### **The Santa Barbara Area Coastal Ecosystem Vulnerability Assessment**

The Santa Barbara Area Coastal Ecosystem Vulnerability Assessment (SBA CEVA) is a multidisciplinary research project that investigates future changes to southern Santa Barbara County climate, beaches, watersheds, wetland habitats, and beach ecosystems. The main objective is to provide information that assists the cities of Santa Barbara, Carpinteria, and Goleta; the County of Santa Barbara; and UC Santa Barbara with climate adaptation planning using a clear focus on coastal ecosystems.

Led by California Sea Grant, SBA CEVA was developed from the work of three of the state's leading ecological and climatological research programs: UCSB's Santa Barbara Coastal Long-Term Ecological Research (LTER) Program; the UCSD Scripps Institution of Oceanography and their activities within the California and Nevada Applications Program Regional Integrated Science and Assessment; the California 4th Climate Assessment; the Southwest Climate Science Center Program; and USGS Coastal Storm Modeling System with accompanying coastal change monitoring program. Watershed models were developed by researchers at Northeastern University in collaboration with the Santa Barbara Coastal LTER.



Where local and regional data were not available, the project team used data from state and federal agencies, including published reports and datasets. These data include information from five federal agencies and seven California agencies. Key State resources included the following guidance documents, reports, and tools.

- ❖ The State's APG and "Fourth Climate Change Assessment," including the "Central Coast Regional Report," provided extensive information about climate-related hazards and vulnerabilities, as did federal reports such as the "National Climate Assessment." Cal-Adapt, a web-based tool developed by the California Energy Commission, provided highly specific information about historical climate conditions and future climate projections for air temperature, precipitation, extreme heat, drought, severe weather, and wildfire.
- ❖ CoSMoS, a web-based GIS tool developed by the US Geographical Survey, provided county-specific spatial data on current and projected sea-level rise and associated coastal storms and dune and bluff erosion.

## Outreach and Engagement

The project team conducted or attended a series of meetings, workshops, and interviews to ensure the Vulnerability Assessment reflected the experiences of community members in Santa Barbara County. This engagement expanded the analysis to include and respond to the local experience, knowledge, and expertise of residents, County staff, and other community stakeholders. Engaging community partners prior to conducting the Vulnerability Assessment improved the analysis and supported the identification of community successes and lessons learned from community members and business owners. Outreach activities included community workshops, core team meetings, adaptive capacity meetings, Equity Advisory and Outreach Committee meetings, and stakeholder interviews. The following list summarizes each of these outreach activities. **Appendix B** gives more details about each of the outreach and engagement activities.

- ❖ **Community Workshops:** The project team hosted two community workshops on December 9, 2020, and one workshop on February 25, 2021. The first set of community workshops raised awareness about the One Climate Initiative<sup>iv</sup> and the Vulnerability

<sup>iv</sup> The One Climate Initiative is a countywide initiative led by the County of Santa Barbara to reaffirm its commitment to address climate change. It will serve as a unifying brand and messaging platform for several major efforts launching in 2020 and beyond. The projects under the One Climate Initiative include the Safety Element and Adaptation Plan, 2030 Climate Action Plan, Active Transportation Plan, and the Community Choice Energy Launch.



Assessment. The project team shared an in-depth overview of the Vulnerability Assessment process and next steps to initiate the analysis. The project team held a midday and evening workshop with the same agenda on the same day. The February community workshop focused more on the Vulnerability Assessment and solicited feedback from the community about impacts from hazards and the adaptive capacity of residents and businesses in the county. The project team provided short presentations with Mentimeter polls in both workshops, followed by small group discussions. Both workshops were in both English and Spanish, and a County-certified translator reviewed all Spanish materials and interpreted during the workshops. Approximately 108 people attended both community workshops on December 9, and approximately 50 people attended the second community workshop on February 25.

- ❖ **Equity Advisory and Outreach Committee Meetings:** The project team attended six Equity Advisory and Outreach Committee meetings throughout the Vulnerability Assessment process. Members of this committee represent community-based organizations that represent or advocate for frontline communities in Santa Barbara County. At these meetings, the project team asked about which frontline populations and hazards to include in the assessment, potential impacts to those populations, and their adaptive capacity.

Committee members also notified community members about upcoming workshops and other outreach events conducted as part of the Vulnerability Assessment.

- ❖ **Core Team Meetings:** The project team held six core team meetings from June 2020 to July 2021 for the core team to review and provide feedback on the content, methods, and results of the Vulnerability Assessment. The core team includes County staff from eight different departments as well as advisors from University of California Cooperative Extension and California Polytechnic State University, San Luis Obispo. Core team members offered local knowledge on how their departments have experienced and responded to disasters and shared important resources to include in the Vulnerability Assessment. These meetings occurred at key phases of the Vulnerability Assessment, and the project incorporated the core team's comments and feedback into the list of hazards, population and asset profiles, assessment methodology, climate stressors list, and assessment results.
- ❖ **Adaptive Capacity Meetings:** The project team held nine adaptive capacity meetings in December 2020 to learn about the current capabilities, tools, programs, and funding available to help the County and community prepare for, respond to, and recover from climate change hazards. The project team divided the adaptive capacity meetings by



specific topics—social vulnerability; coastal hazards; wildfire; agriculture; ecosystems; water, wastewater, and drought; flooding and severe weather; the built environment; and economic drivers. Each meeting included members from the core team, community-based organizations, and academic experts (44 attendees in total), that provided information on the County’s current ability to adapt to climate change hazards and local knowledge of the area in social, built, natural, economic, and cultural systems.

- ❖ **Stakeholder Interviews and Meetings:** The project team completed six stakeholder interviews and meetings between April 20, 2021, and July 1, 2021, during the impact and adaptive capacity evaluation phase of the Vulnerability Assessment. Stakeholder groups included 350 Santa Barbara, Independent Living Resource Center, Santa Ynez Band of Chumash Indians, County Agriculture Advisory Committee, Santa Barbara County Green Business Program, and Southern California Gas Company. The goal of these interviews and meetings was to have more in-depth conversations with individuals or small groups to better understand their experience or expertise relevant to the Vulnerability Assessment. Stakeholder groups provided information about the people they represent, the assets they manage, and the resources their organizations provide to community members and businesses.

### Climate Resilience Roundtables

The Community Environmental Council, guided by a steering committee of local climate leaders and community partners, held a series of Climate Resilience Roundtables that examined Santa Barbara County’s climate threats and explored ways to protect and strengthen communities in the face of climate change. These roundtables were designed as community-listening and idea-generating sessions organized around the key climate threats to our region: increased wildfire, sea level rise, extreme heat, drought, more intense storms, and decreasing snowpack and water supply. Roundtable participants considered these threats through the lens of public and mental health, social justice, economic impacts, infrastructure vulnerabilities, and natural systems and working lands. There were over 580 participants in the series who attended one or more of the five roundtables that took place over 15 months from 2019 through 2021. Participants represented government agencies, community-based organizations, social justice and environmental advocates, grass-roots leaders, elected officials, climate practitioners, and frontline workers impacted by climate change. They featured the personal stories of frontline community members describing how health is impacted by the changing climate. Collectively, these events generated over 700 bold ideas and produced a final Community Solutions Matrix and a set of top-rated resilience ideas.



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DRAFT

# Santa Barbara County Climate Change Vulnerability Assessment



Photo Credit: Mark Bright



Photo Credit: Mark Bright

## Climate Stressors

*Climate stressors* are a condition or trend related to climate variability and change—such as decreased precipitation or warmer temperatures—that can exacerbate natural hazards.<sup>41</sup> Climate stressors fall into two categories: primary climate stressors and secondary climate stressors.

As greenhouse gas emissions build in the atmosphere and global temperatures continue to rise, primary climate stressors at the local level are likely to become more severe, such as changes in air temperature, precipitation, sea level rise, and ocean acidification. These primary climate stressors can lead to secondary climate stressors or *hazards*, which are events or physical conditions that have the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural losses, damage to the environment, interruption of business, and other types of harm or loss. These hazards can harm populations and assets in Santa Barbara County, and in many cases, already cause harm. Populations and assets may already be subject to *non-climate stressors*, or trends unrelated to climate that can exacerbate climate change hazards.<sup>42</sup>



## Climate Scenarios

The Vulnerability Assessment is based on accurate and up-to-date information, including the State Cal-Adapt database, the California Adaptation Planning Guide, and the California Fourth Climate Change Assessment. Many projections of climate change hazards rely on multiple scenarios that reflect different levels of global greenhouse gas (GHG) emissions and atmospheric GHG concentrations. The Intergovernmental Panel on Climate Change, an organization that represents the global scientific community, uses Representative Concentration Pathways (RCP) or climate scenarios. RCPs are labeled with numbers that refer to the increase in the amount of energy that reaches each square meter of Earth's surface under that scenario. The four RCPs are:

- ❖ **RCP 2.6.** Under this scenario, global GHG emissions peak around 2020 and then decline quickly.
- ❖ **RCP 4.5.** Under this scenario, global GHG emissions peak around 2040 and then decline.
- ❖ **RCP 6.** Global emissions continue to rise until the middle of the century.
- ❖ **RCP 8.5.** Global emissions continue to rise until at least the end of the century.<sup>43</sup>

### Intergovernmental Panel on Climate Change (IPCC)

The IPCC recently released “The Physical Science Basis” of the Sixth Assessment Report that updates global climate change projections for the near-term, mid-term, and long-term based on greenhouse gas emission trends from the past decade. It moves away from using RCPs, instead using five different scenarios called “shared socioeconomic pathways,” which consider socioeconomic trends underlying each scenario. This Vulnerability Assessment does not use these updated projections because at time of writing they are not available at a local scale. However, the IPCC report does reaffirm the use of projections comparable to RCP 8.5 as the suggested emission scenario to use for Cal-Adapt data.

Source: IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.

The Cal-Adapt database, which provides California-specific climate change hazard projections, uses RCP 4.5 for a low emissions scenario and RCP 8.5 for a high emissions scenario. The Governor's Office of Planning and Research's *Planning and Investing for a Resilient California* recommends using RCP 8.5 for analyses considering





impacts through 2050, because there are minimal differences between emission scenarios for the first half of the century. It also recommends using RCP 8.5 for late-century projections for a more conservative and risk-adverse approach.<sup>44</sup> The recently updated California APG follows these recommendations. The project team input the RCP 8.5 GHG emission scenario to global climate models on the Cal-Adapt database and other resources.

In accordance with Cal-Adapt guidance and best practices, the project team modeled future conditions in Santa Barbara County using an average of multiple climate models to ensure the accuracy of climate projections and to the extent that data from multiple models are available. The project team used averages of the CanESM2 (average), CNRM-CS5 (cooler/wetter), HadGEM2-ES (warm/drier), and MIROC5 (complement) models where possible, as recommended by state guidance.<sup>v</sup>

The following sections describe the four primary climate stressors, ten secondary climate stressors, and the compounding or cascading effects that may happen in Santa Barbara County. Each climate stressor includes trends and projected changes and, where available, the project team divided projections into the three subregions—North County, Cuyama Valley, and South Coast (see **Figure 1**). In each subregion, the project team

selected a centralized, unincorporated, census-designated place to gather projection data—Los Alamos for North County, New Cuyama for the Cuyama Valley, and Montecito for the South Coast—because it illustrates general trends in its subregion. Some locations in the subregions may see higher or lower projections.

### Uncertainty

Like any forecast, there is some uncertainty in the projections of climate change hazards. Climate change is caused by GHG emissions, and therefore changes in the amount of emissions in the near term compared to the distant future will have a larger effect on the severity of climate change effects. These uncertainties depend partly on factors such as population levels, economic activities, government policies, and personal behavior. Scenarios with low probability and high severity may occur due to interannual variability that could result in more severe impacts than those evaluated in this report. However, by using an average of the most accurate models, the project team used the most likely projections of climate change hazards.

<sup>v</sup> Technical studies by the California Energy Commission identify these four models as “priority models” for the state because they are the most accurate for California’s climate conditions. Data produced by these four and six other suitable models are available from the Cal-Adapt website.



### Mapping Climate Stressors

Where spatial data are available, the Climate Change Vulnerability Assessment Report includes maps of the projected changes in primary and secondary climate stressors in the years 2030, 2060, and 2100. The project team also created a dynamic online mapping tool that allows users to zoom into specific areas of the county to view spatial climate stressor data. The tool includes all of the hazard spatial data used in the Vulnerability Assessment and data for the concentrations of frontline communities. This mapping tool is available on the project website, here.

<https://sbcopad.maps.arcgis.com/apps/webappviewer/index.html?id=afb3d5a8c194454bb5ab16885000cfa3>.

### Primary Climate Stressors

In Santa Barbara County, the four primary climate stressors are 1) air temperature changes, 2) precipitation changes, 3) sea level rise, and 4) ocean acidification. These stressors are direct effects of a rise in global temperatures due to increases in GHG levels in the atmosphere.

Changes in air temperature, precipitation patterns, and sea level directly or indirectly influence the secondary climate stressors; however, sea level rise and ocean acidification are also climate change hazards. The next sections define each primary stressor, describe the metric to measure the trend in the stressor, and provide

projections to explain how the stressor may change in the future.



### Air Temperature

Projections for air temperature in Santa Barbara County show a substantial rise during the next century, compared to historical levels, as global temperatures continue to increase.<sup>45</sup> Annual average minimum and maximum temperatures are the metrics for measuring changes in air temperature.

- ❖ Historically, Santa Barbara County's countywide annual average minimum temperature was 43°F. Projections show an increase of 3.4°F by 2030, 5.1°F by 2060, and 7.3°F by 2100.<sup>46</sup>
- ❖ Projections show a similar upward trend in the countywide annual average maximum temperature. The historical temperature of 68.7°F is projected to increase 3.3°F by 2030, 5.4°F by 2060, and 7.4°F by 2100.<sup>47</sup>



**Table 9** shows the annual average minimum temperature change countywide and in the three subregions,<sup>vi</sup> and **Table 10** shows the annual average maximum temperature change. Projections show an increase in annual average temperatures. Note that these projections are averages and do not illustrate extreme heat days. **Figures 6** through **8** show the projected annual average maximum temperatures in 2030, 2060, and 2100 compared to historical baseline conditions (1961 to 1990). As shown in Figures 6 and 7, maximum temperatures are likely to increase gradually in early and midcentury, with the highest temperatures in the Santa Ynez Valley and Cuyama Valley. **Figure 8** shows that maximum temperatures are expected to increase more rapidly toward the end of century, with the maximum average annual temperature over 80°F throughout the county. This increase in average maximum temperature will cause or worsen hazards throughout the county, such as agricultural pests and diseases, extreme heat, decreased fog, human health hazards, and wildfire. The next sections discuss these secondary hazards created by higher air temperatures in more detail.

**Table 9. Historical and Projected Annual Average Minimum Temperature (°F), RCP 8.5**

Subregion	Historical	2030	2060	2100
Countywide	43.0	46.4	48.1	50.3
North County	43.8	47.1	48.9	51.1
Cuyama Valley	40.7	44.7	46.7	49.0
South Coast	46.8	49.9	51.6	53.7

Source: California Energy Commission. 2018. "Annual Averages." <https://cal-adapt.org/tools/annual-averages/>.

Note: Projections are an average of the four State-recommended climate models (HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5), averaged for 2030-2050, 2050-2070, and 2070-2099.

**Table 10. Historical and Projected Annual Average Maximum Temperature (°F), RCP 8.5**

Subregion	Historical	2030	2060	2100
Countywide	68.7	72.0	74.1	76.0
North County	68.7	71.6	73.7	75.6
Cuyama Valley	73.6	77.8	80.1	82.1
South Coast	67.8	70.8	72.6	74.5

Source: California Energy Commission. 2018. "Annual Averages." <https://cal-adapt.org/tools/annual-averages/>.

Note: Projections are an average of the four State-recommended climate models (HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5), averaged for 2030-2050, 2050-2070, and 2070-2099.

<sup>vi</sup> To download data from Cal-Adapt.org, the project team used unincorporated communities in the three subregions that are central to the subregion. These locations include Los Alamos for North County, Cuyama for Cuyama Valley, and Montecito for South Coast.



Figure 6. Projected High Temperatures in 2030

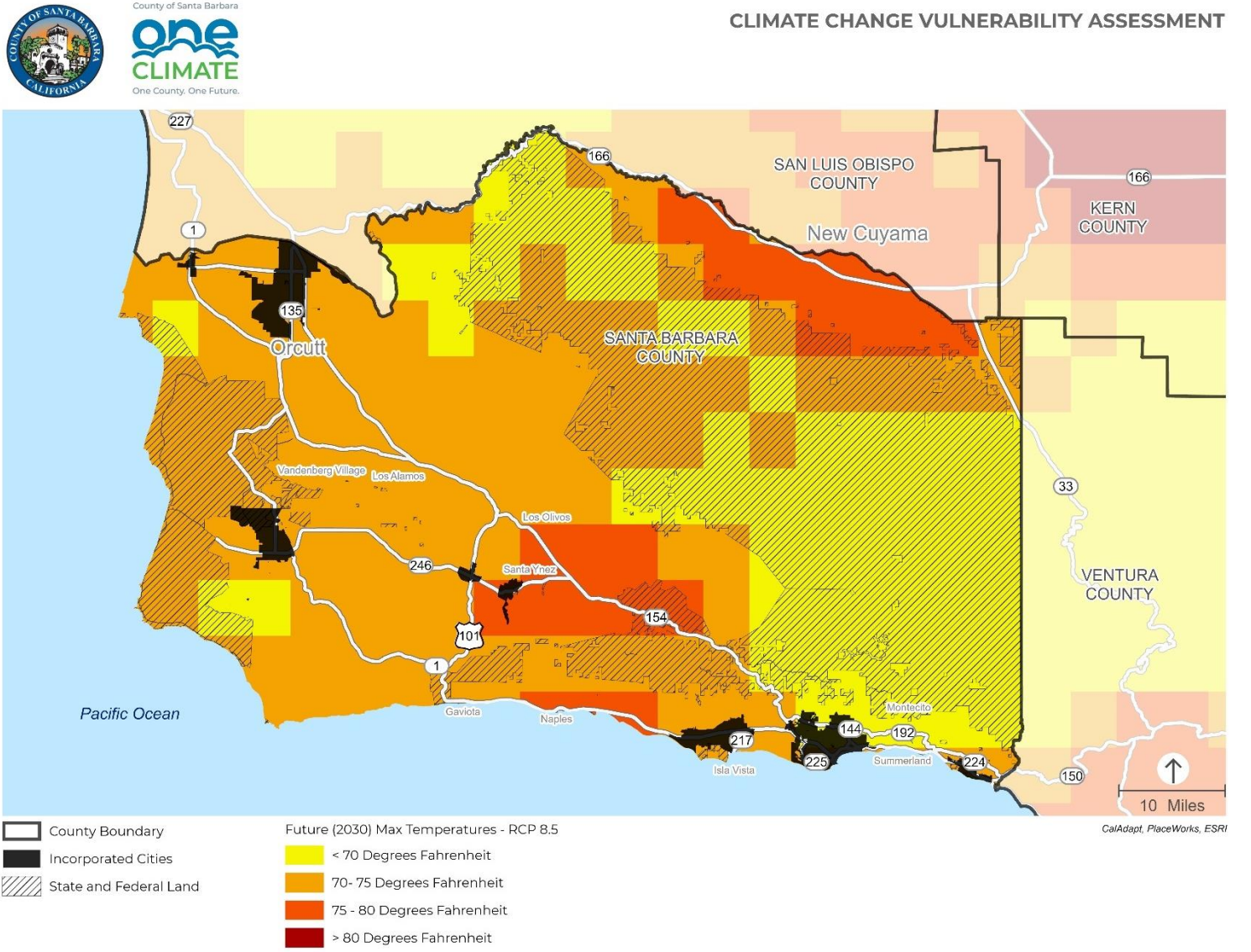




Figure 7. Projected High Temperatures in 2060

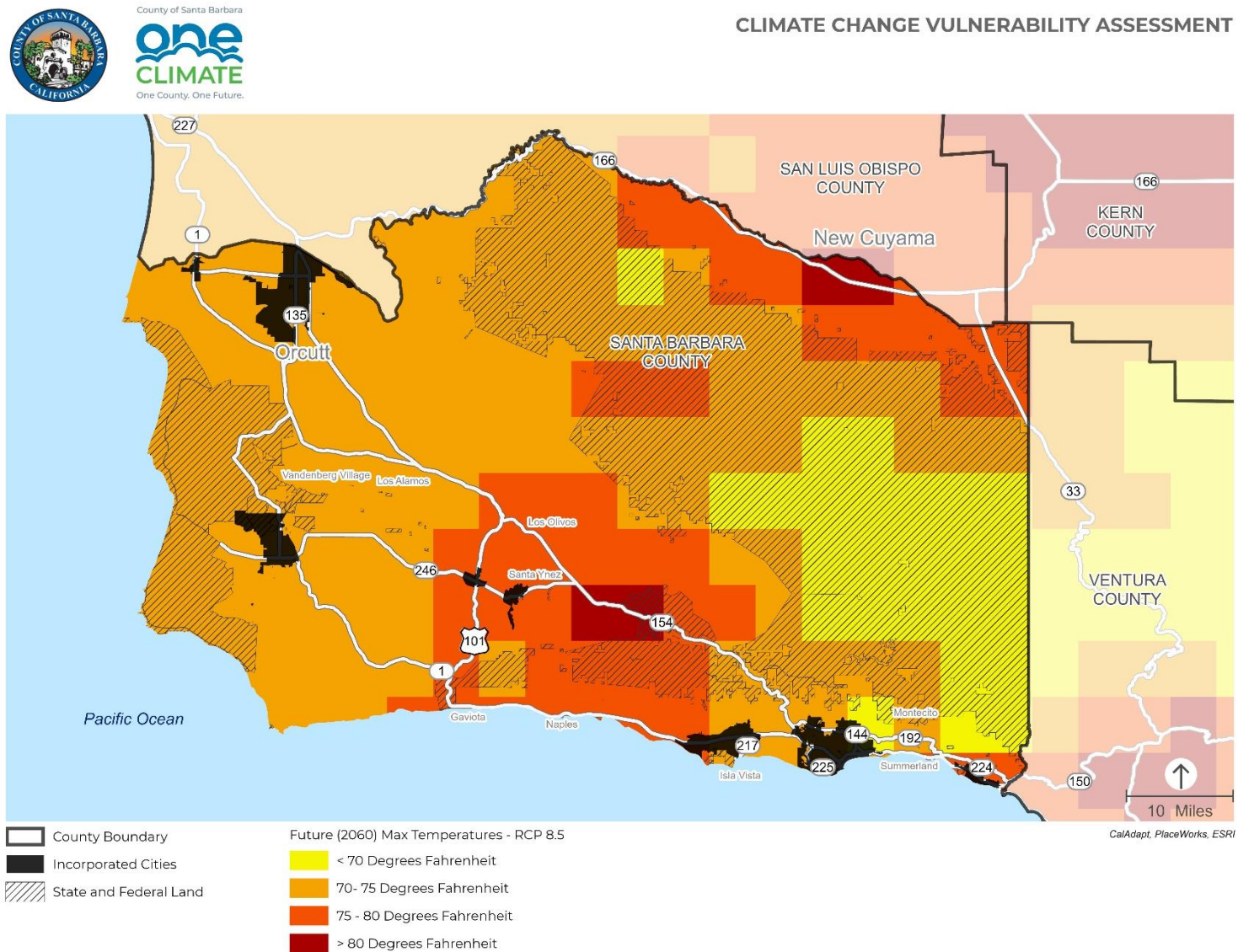
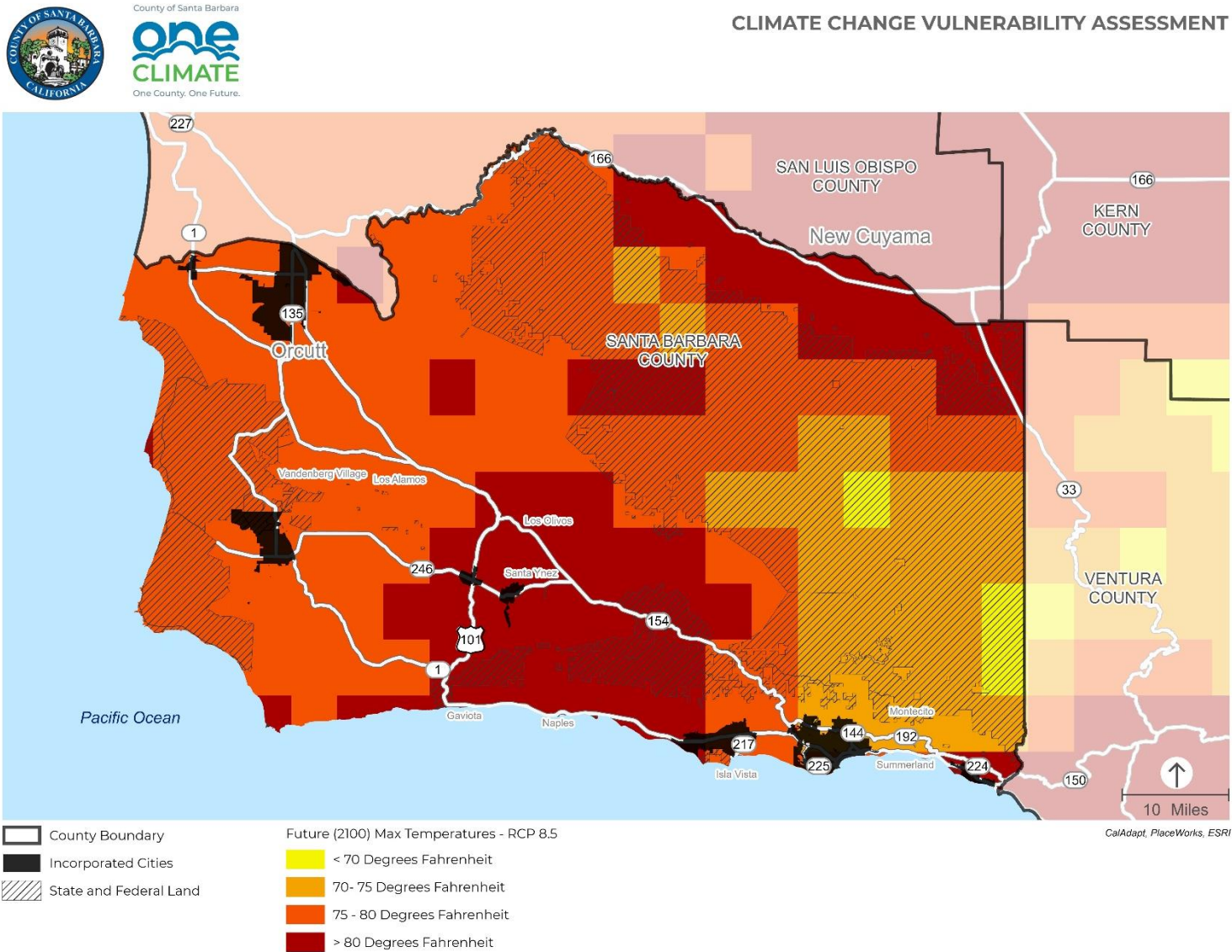




Figure 8. Projected High Temperatures in 2100





## Precipitation

Two distinct metrics measure precipitation: 1) annual average precipitation and 2) seasonality. Countywide historical annual average precipitation was 17.6 inches per year. Projections show a fluctuation in precipitation by 2.8 inches per year by 2030, 1.2 inches per year by 2060, and 3.9 inches per year by 2100.<sup>48</sup> **Table 11** shows the expected annual average precipitation change countywide and in the three subregions. Changes in average precipitation due to climate change are also expected to vary substantially in different regions of the county. For instance, the eastern areas of the county in the Los Padres National Forest are projected to see increased annual averages, and the areas in the Santa Maria Valley and the Cuyama Valley will likely see a decrease in annual average precipitation. Although there will likely be a slight increase in precipitation throughout the 21st century, the seasonality may change (i.e., timing during a given year). There will likely be more rain during periods of precipitation (e.g., storms with higher rainfall totals), fewer total days with precipitation, and an increase in year-to-year variability. This means that more rain may fall during fewer storms throughout the year.

**Figure 9** through **Figure 11** show the projected precipitation levels in 2030, 2060, and 2100 compared to historical baseline conditions (1961 to 1990). These figures show a gradual increase in average annual precipitation in North County and South Coast, with larger increases in annual average precipitation in the Los Padres National Forest. Based on these projections, the Cuyama Valley will likely experience little variation in annual average precipitation compared to historical baseline conditions, even though the subregion may experience considerable variation in totals year-to-year. Changes in precipitation patterns can, directly and indirectly, cause or worsen hazards in the county, such as drought, inland and coastal flooding, landslides, severe weather, and wildfire. The next section discusses these secondary hazards in more detail.

**Table 11. Historical and Projected Annual Average Precipitation (in/yr), RCP 8.5**

Subregion	Historical	2030	2060	2100
Countywide	17.6	20.4	18.8	21.5
North County	16.7	19.2	17.6	19.7
Cuyama Valley	7.2	7.7	6.9	8.4
South Coast	21.8	25.5	23.9	27.9

Source: California Energy Commission. 2018. "Annual Averages". <https://cal-adapt.org/tools/annual-averages/>.

Note: Projections are an average of the four State-recommended climate models (HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5), averaged for 2030-2050, 2050-2070, and 2070-2099.



Figure 9. Projected Precipitation Levels in 2030

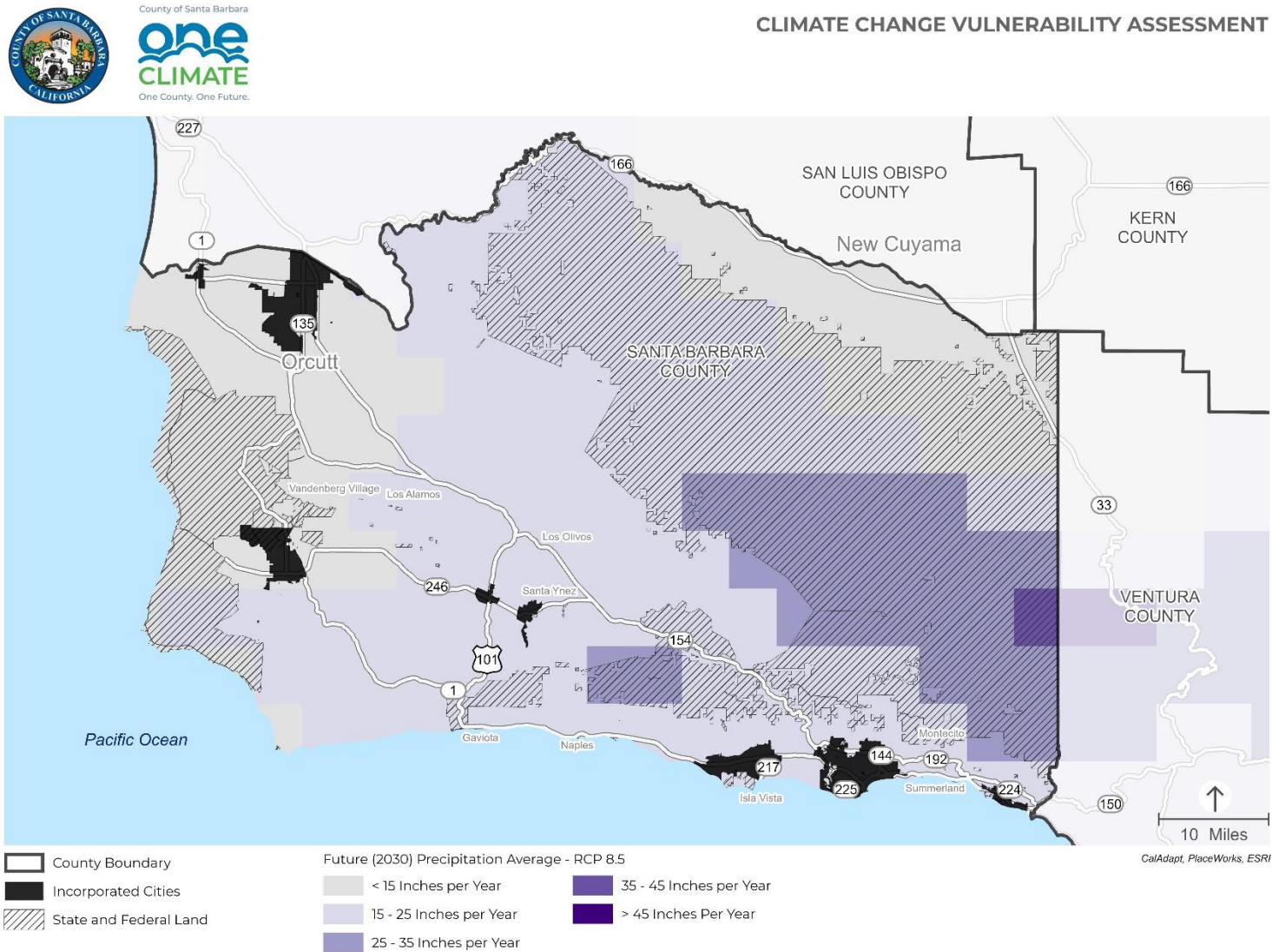






Figure 10. Projected Precipitation Levels in 2060

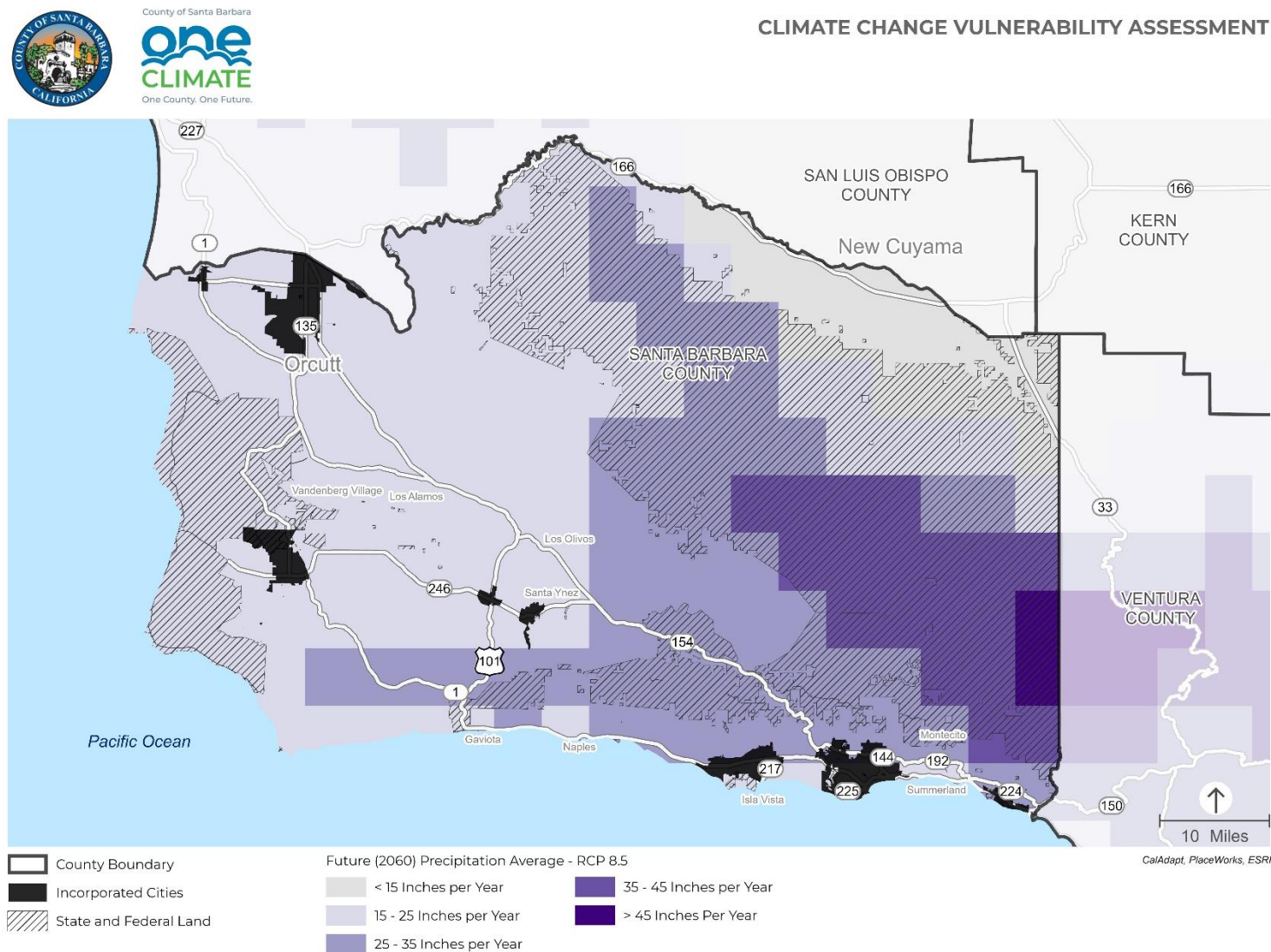
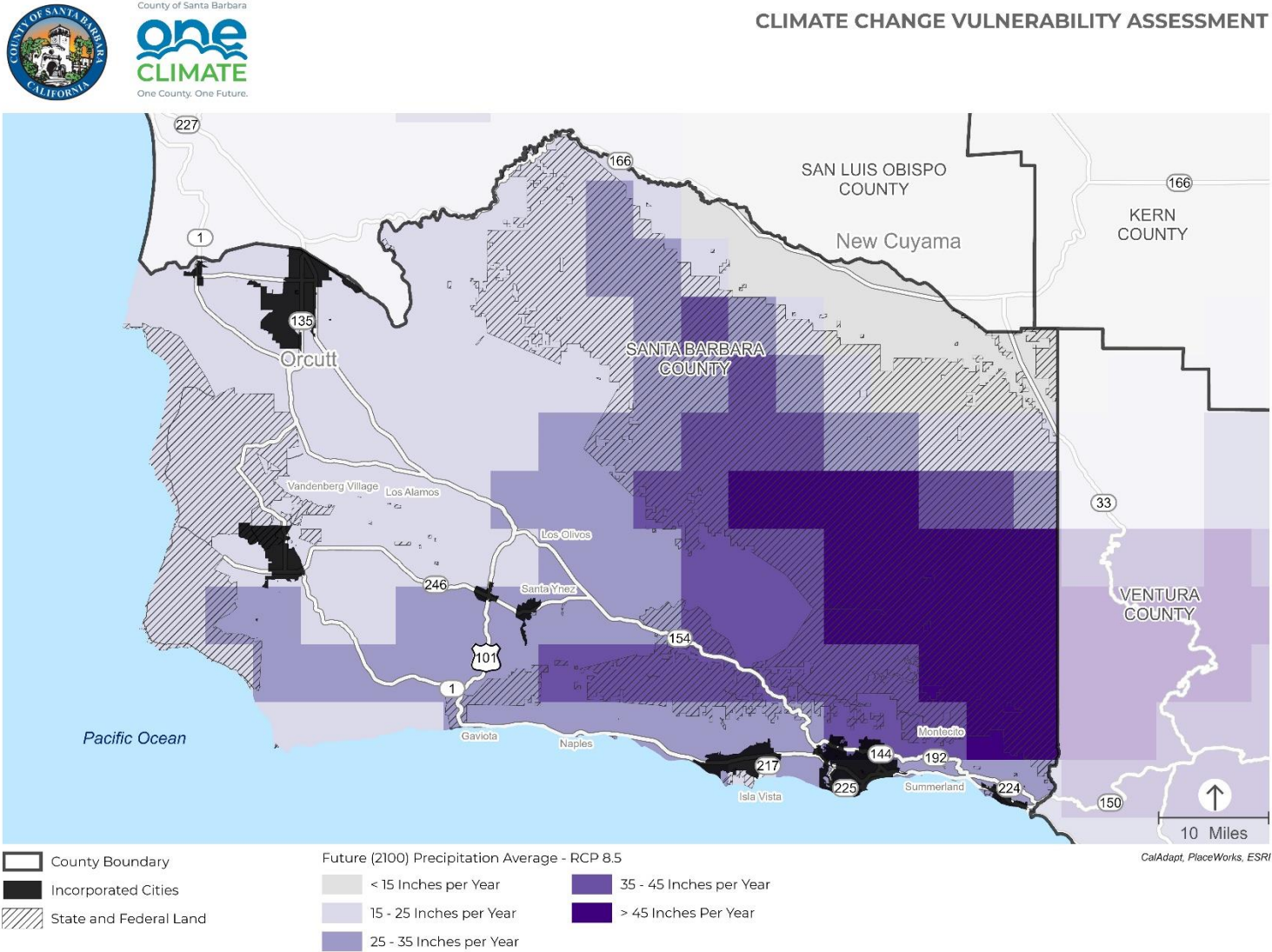




Figure 11. Projected Precipitation Levels in 2100





### Sea Level Rise

Sea level rise is one of the direct results of climate change. As global temperatures rise, glaciers and other ice near the north and south poles melt. As this water flows into the ocean, sea levels increase across the globe. High average temperatures can also cause ocean water to expand, causing further rises in sea levels. Sea level rise is a gradual process, taking place over years or decades, but unlike many other hazards, it is a chronic and permanent issue. Sea level rise is measured in inches and occurs at different rates in other regions of the United States and the world. In southern California, sea level rise is more rapid than the global average,<sup>49</sup> and guidance from the California Coastal Commission suggests that, in most places, sea levels will increase 6 to 10 inches by 2030, 13 to 23 inches by 2050, and 41 to 83 inches by 2100.<sup>50</sup> However, sea levels could also rise faster than these projections. **Table 12** shows the sea level rise projections from two different sources for the Santa Barbara County coastline: the County of Santa Barbara Coastal Resiliency Project, completed in 2017 and adopted by the Board of Supervisors, and the Ocean Protection Council's sea level rise guidance published in 2018.

**Table 12. Sea Level Rise Projections for Santa Barbara County (in)**

Source	2030	2060	2100
Coastal Resiliency Project	10.2	27.2	60.2
Ocean Protection Council	8.4	30.0	79.2

Sources: County of Santa Barbara. 2017. County of Santa Barbara Coastal Resiliency Project: Sea Level Rise & Coastal Hazards Vulnerability Assessment; Ocean Protection Council. 2018. State of California Sea-Level Rise Guidance – 2018 Update. [https://opc.ca.gov/webmaster/ftp/pdf/agenda\\_items/20180314/Item\\_3\\_Exhibit-A\\_OPC\\_SLR\\_Guidance-rd3.pdf](https://opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item_3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf).

The Climate Change Vulnerability Assessment uses the Ocean Protection Council's projections to be consistent with the most up-to-date sea level rise projections for the California coastline. **Figures 12** through **14** show the projected areas permanently inundated by sea level rise in North County in 2030, 2060, and 2100 compared to baseline historical conditions (year 2000). **Figures 15** through **17** show the expected areas permanently inundated by sea level rise in South Coast in 2030, 2060, and 2100 compared to year 2000 conditions. Secondary hazards caused by sea level rise, such as coastal hazards and dune and bluff erosion, are discussed in more detail under "Secondary Climate Stressors" on page 32. Sea level rise can also exacerbate non-climate-related hazards, such as tsunamis, which can travel farther inland with the rise in sea levels.



Figure 12. Sea Level Rise Inundation in North County by 2030

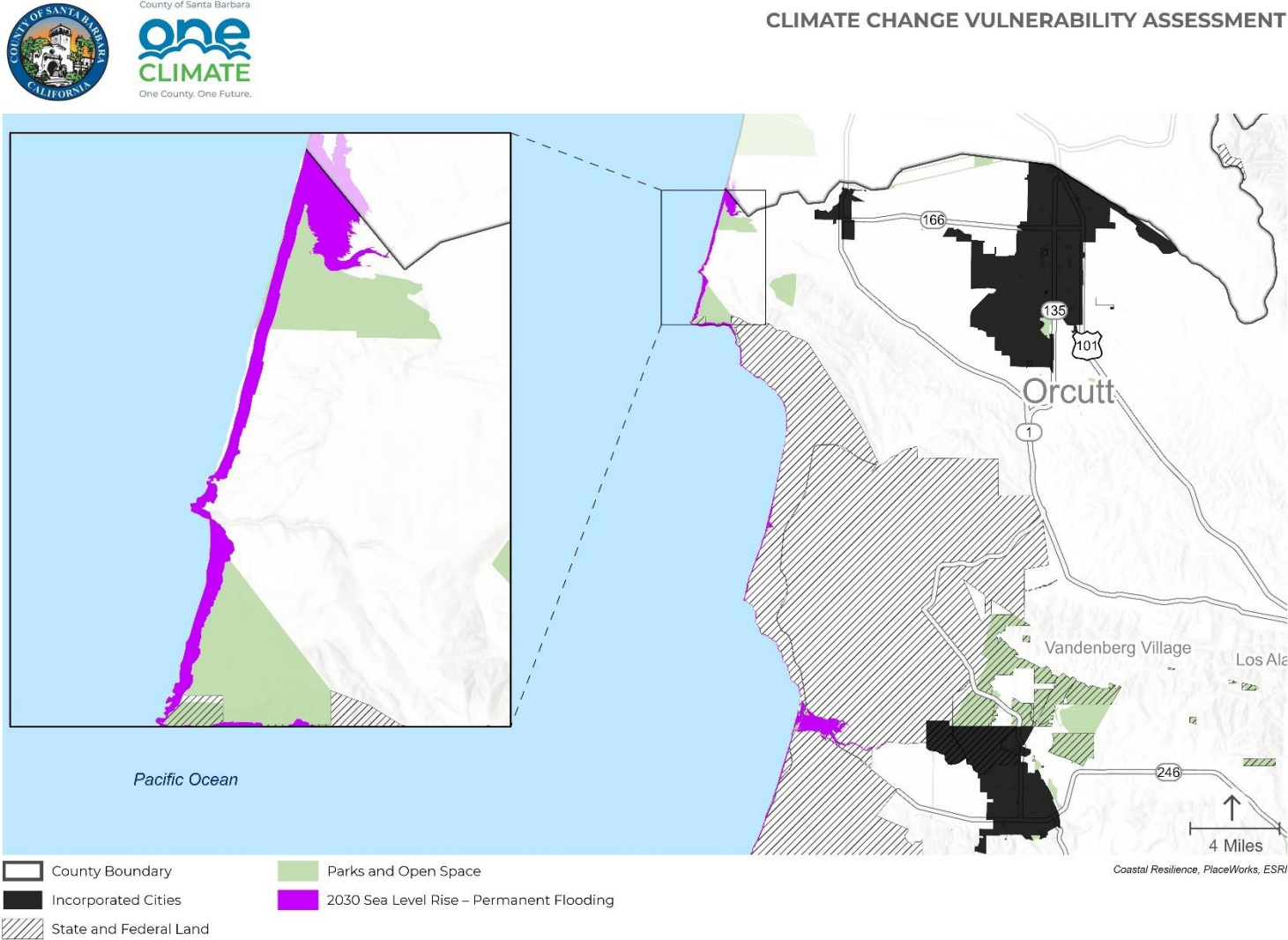




Figure 13. Sea Level Rise Inundation in North County by 2060

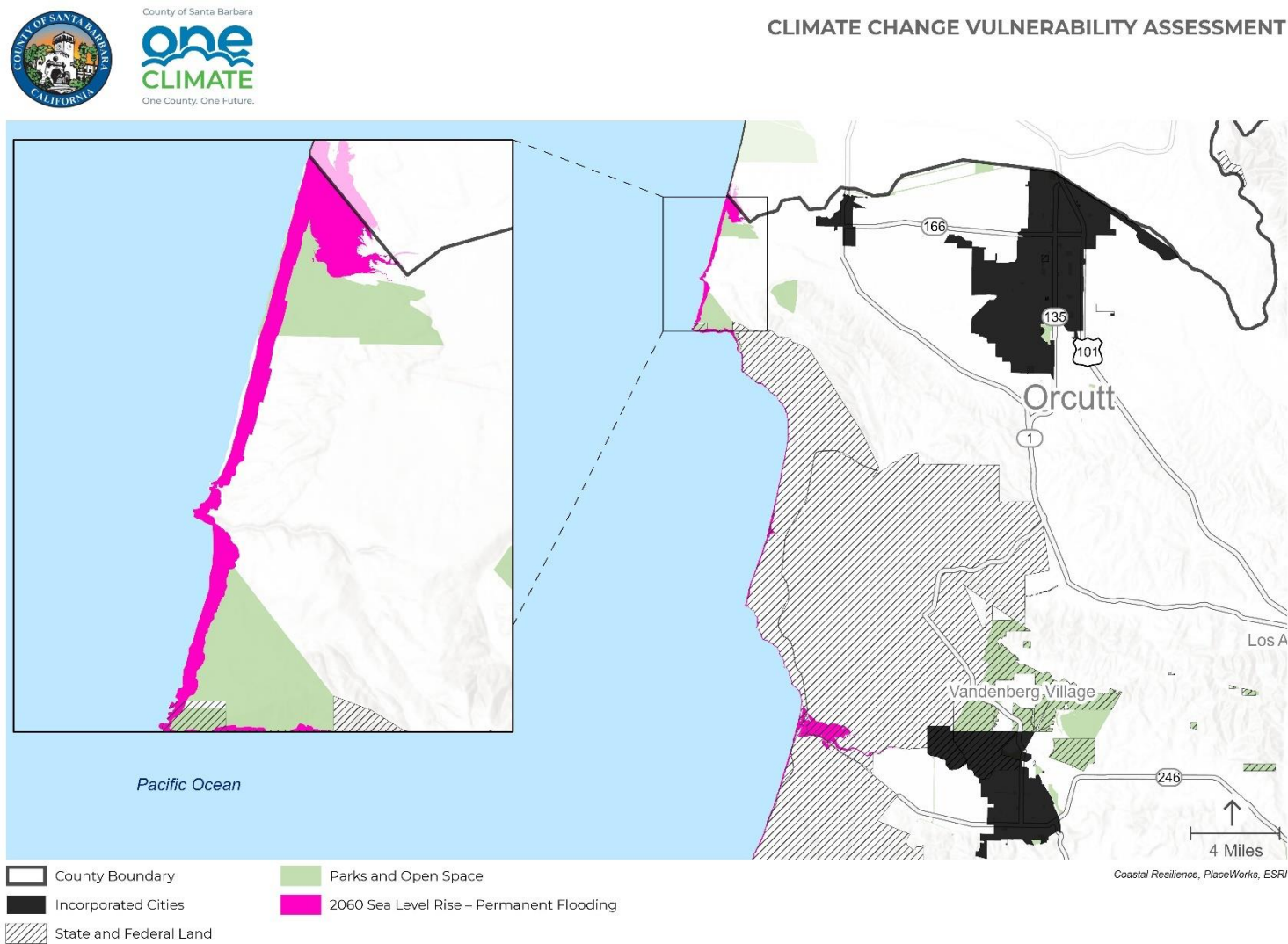




Figure 14. Sea Level Rise Inundation in North County by 2100

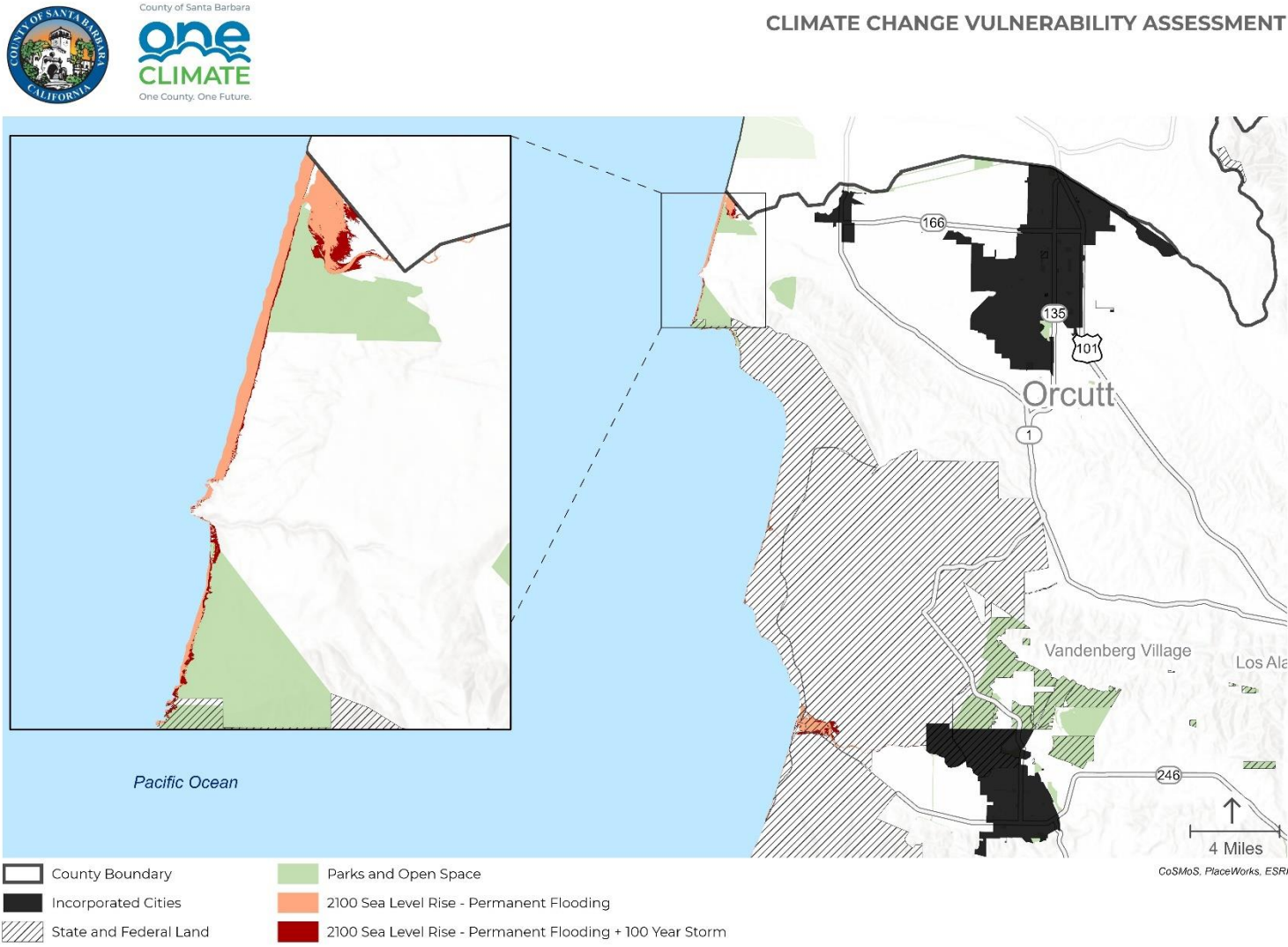




Figure 15. Sea Level Rise Inundation on the South Coast by 2030

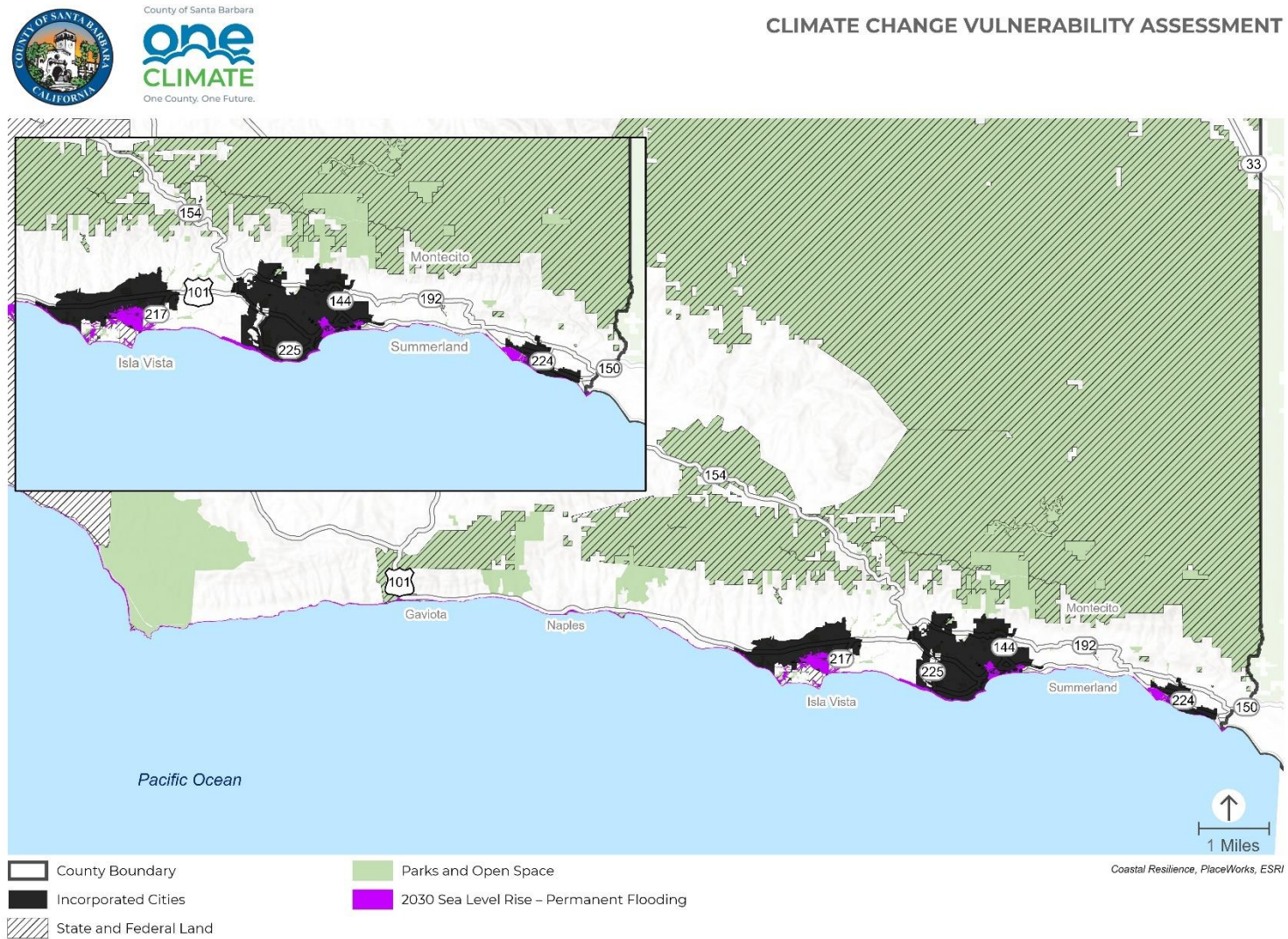




Figure 16. Sea Level Rise Inundation on the South Coast by 2060

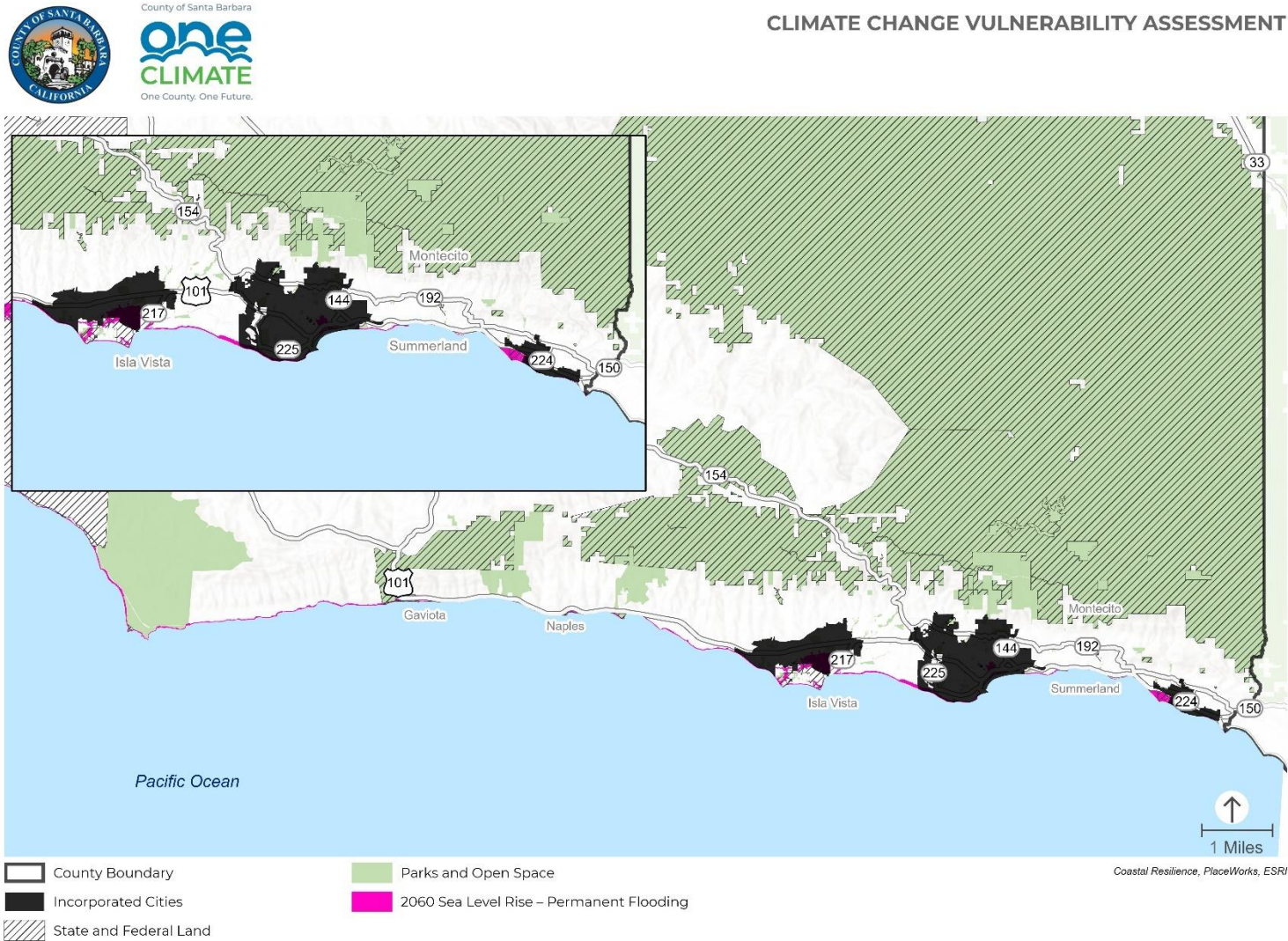
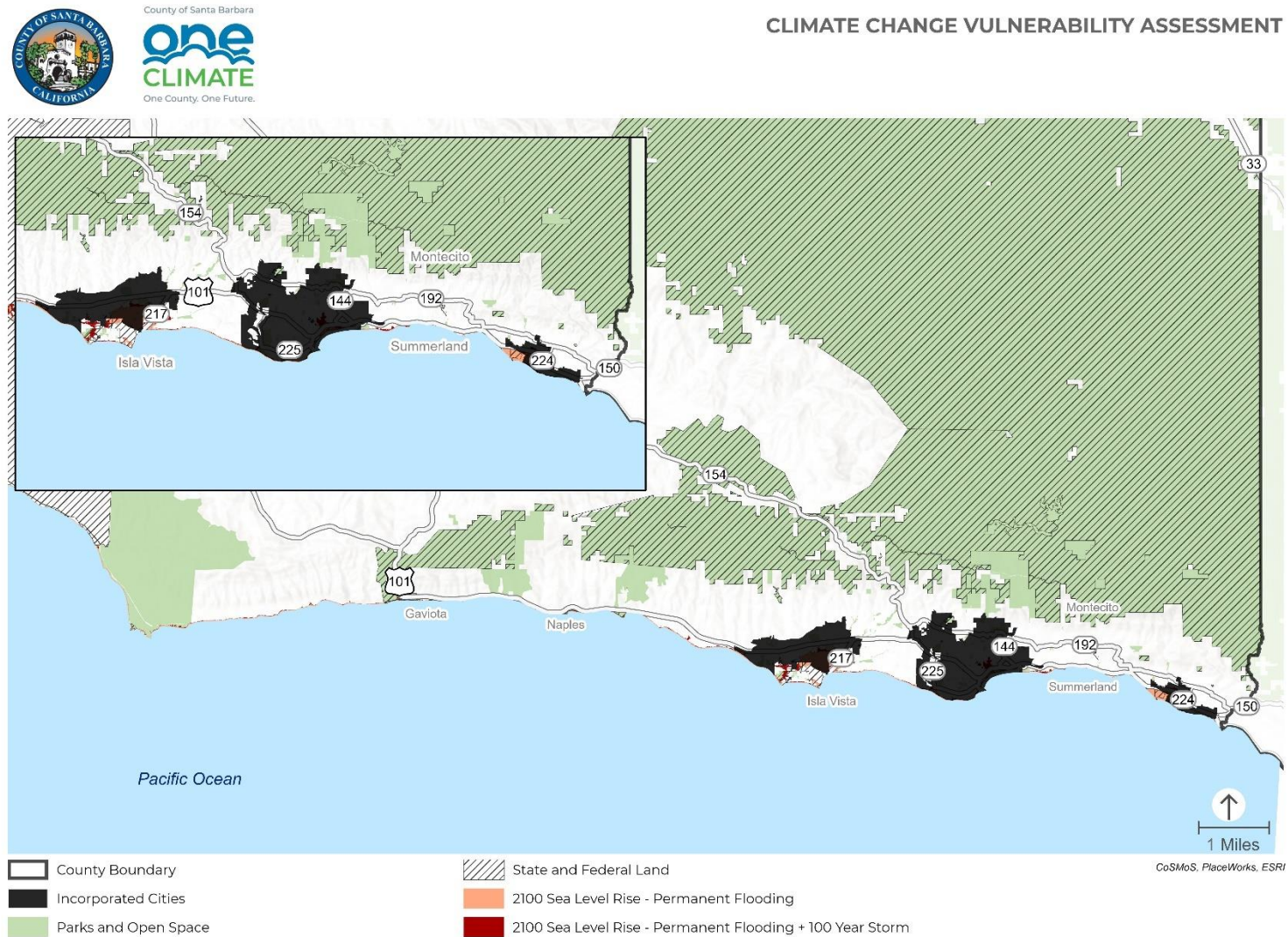






Figure 17. Sea Level Rise Inundation on the South Coast by 2100





### Sea Level Rise and the CoSMoS Model

Sea level rise projections include detailed data of coastal flooding that consider multiple factors. Sea level rise is the permanent rise in higher high tide levels that inundate land. Coastal flooding is the temporary inundation of land due to wave runup, storm surge, king tides, and other seasonal effects. As sea levels rise, coastal flooding is expected to worsen. The projections from the Coastal Storm Modeling System (CoSMoS) include the extent of flooding, the flood depth, flood-prone low-lying areas, emergent groundwater, maximum wave runup, discharge from nearby rivers and creeks, and evolved future topography. For more information on sea level rise, please visit Our Coast Our Future, [here](https://ourcoastourfuture.org/).

<https://ourcoastourfuture.org/>

form shells and similar parts. Since 1988 oceans have decreased in pH by 0.05, correlating closely with the increase of carbon dioxide in the atmosphere.<sup>52</sup> Ocean acidification could cause a decline in the biodiversity of ecosystems as ocean water becomes more acidic and calcifying species cannot survive. This could impact the county's local fishing industry and economy as well as coastal and marine recreation and tourism.

### Secondary Climate Stressors

As described above, primary climate stressors can contribute to the formation of secondary climate stressors or hazards. This section defines 10 distinct climate change hazards, the metric used to measure the trend in the hazards, and future projections for how the hazards are likely to change in the future. The sections below describe these 10 secondary climate stressor or climate change hazards in more detail, including:



### Ocean Acidification

Ocean acidification is a consequence of the ocean absorbing carbon dioxide from the atmosphere, which decreases the water's pH level and makes it more acidic. This is a direct result of climate change. The ocean

naturally absorbs approximately 30 percent of atmospheric carbon dioxide, so a rise in atmospheric carbon levels causes the ocean to absorb more.<sup>51</sup> The increase in acidity, measured on a scale from 0 (acidic) to 14 (basic), can make it difficult for marine organisms to

1. Agricultural pests and diseases
2. Coastal hazards
3. Drought
4. Extreme heat
5. Inland flooding
6. Decreased fog
7. Human health hazards
8. Landslides and debris flows
9. Severe weather
10. Wildfire



### Agricultural Pests and Diseases

According to the *2020 County of Santa Barbara Crop Report*, agriculture and livestock had total gross production of over \$1.8 billion in 2020, with strawberries being the largest-grossing crop.<sup>53</sup> Agricultural

pests and diseases can affect crop plants, vineyards, and livestock throughout the county. This hazard is measured by the number of pests and disease incidents, which are likely to increase as higher temperatures allow insects to reproduce more rapidly.

These pests and diseases, such as the light brown apple moth, white peach scale, Asian citrus psyllid, Pacific mealybug, and avian influenza, can retard the growth of plants and animals, damage them so that their products are less appealing and harder to sell, or even kill them.<sup>54</sup> Though there are treatment options for many agricultural pests and diseases, some have no cure. Many pests and organisms that carry diseases are most active during warmer months, so the threat of infection or infestation is higher during that time of year. Projection trends show temperatures getting warmer earlier in the year and remaining warmer until later in the year due to increases in air temperature, which creates a wider activity window for pests and diseases.



### Coastal Hazards

Coastal hazards are secondary hazards strengthened by increases in air temperatures and sea level rise, such as coastal flooding and dune and bluff erosion. Coastal storms and flooding are measured by inches of coastal inundation during a 100-year storm, which floods the shoreline more frequently and severely. Because ocean levels are already higher due to sea level rise, shoreline floods such as king tides can reach even farther onto land. For example, a storm with a one-in-ten chance of occurring in a given year (i.e., ten-year storm) can create a temporary increase in sea levels of approximately 28 to 30 inches. Higher sea levels can also give a “boost” to smaller storms that would not have been large enough to flood dry land during normal conditions, making shoreline flooding more frequent.



Along the Santa Barbara County coastline, a 100-year coastal storm is projected to increase high tide levels 48.4 inches by 2030, 70 inches by 2060, and 119.2 inches by 2100, including sea level rise.<sup>55</sup> **Figure 14** and **Figure 17** show the projected coastal inundation from both sea level rise and a 100-year storm along the North County



coastline and South Coast coastline by 2100 compared to historical baseline (year 2000).

Erosion along the coastline is the process by which local sea level rise, high tides, and wave action wear down and carry away rocks and sand or soil.<sup>56</sup> Dune and beach areas of the county, such as Refugio State Beach and Rancho Guadalupe Dunes Preserve, rely on accretion, which is the process of sediment accumulating on the beach from a river or other alluvial or oceanographic systems. Dunes have natural erosion and accretion processes that change the extent and shape of the sandy areas. Erosion severity is measured by the inches or feet that dune and bluff erode, and erosion is projected to increase. Bluff erosion projections include at least 16 feet (5 meters) from existing conditions, with 0.03 feet per year (0.01 meters per year) to 9 feet per year (0.23 meters per year) based on the amount of sea level rise and the geology of the bluff tops.<sup>57</sup> In bluff areas of the county, such as Isla Vista and Gaviota, accretion—the gradual accumulation of sand and other sediment along sandy beaches—typically does not occur, and erosive processes slowly eat away at the foundations of the bluffs. In these areas, higher sea levels and eroding bluffs can cause beaches to disappear, because they are not built up by accretion and not able to migrate inland due to bluffs and cliffs.

Projections illustrated an average of 623 feet of dune erosion and 177 feet of bluff erosion by 2100.<sup>58</sup> **Figures 18 to 20** show the projected areas of coastal erosion in North County without any action taken by 2030, 2060, and 2100 compared to historical baseline (year 2000). **Figures 21 to 23** show the same projected years along the South Coast. “Hold the Line” scenarios indicate natural protection or coastal armoring would be implemented to slow erosive processes. “No Hold the Line” scenarios indicate no armoring (natural or human-made) would be implemented.



Photo Credit: Mark Bright



Figure 18. Projected Areas of Coastal Erosion in North County, No Action Scenario, by 2030

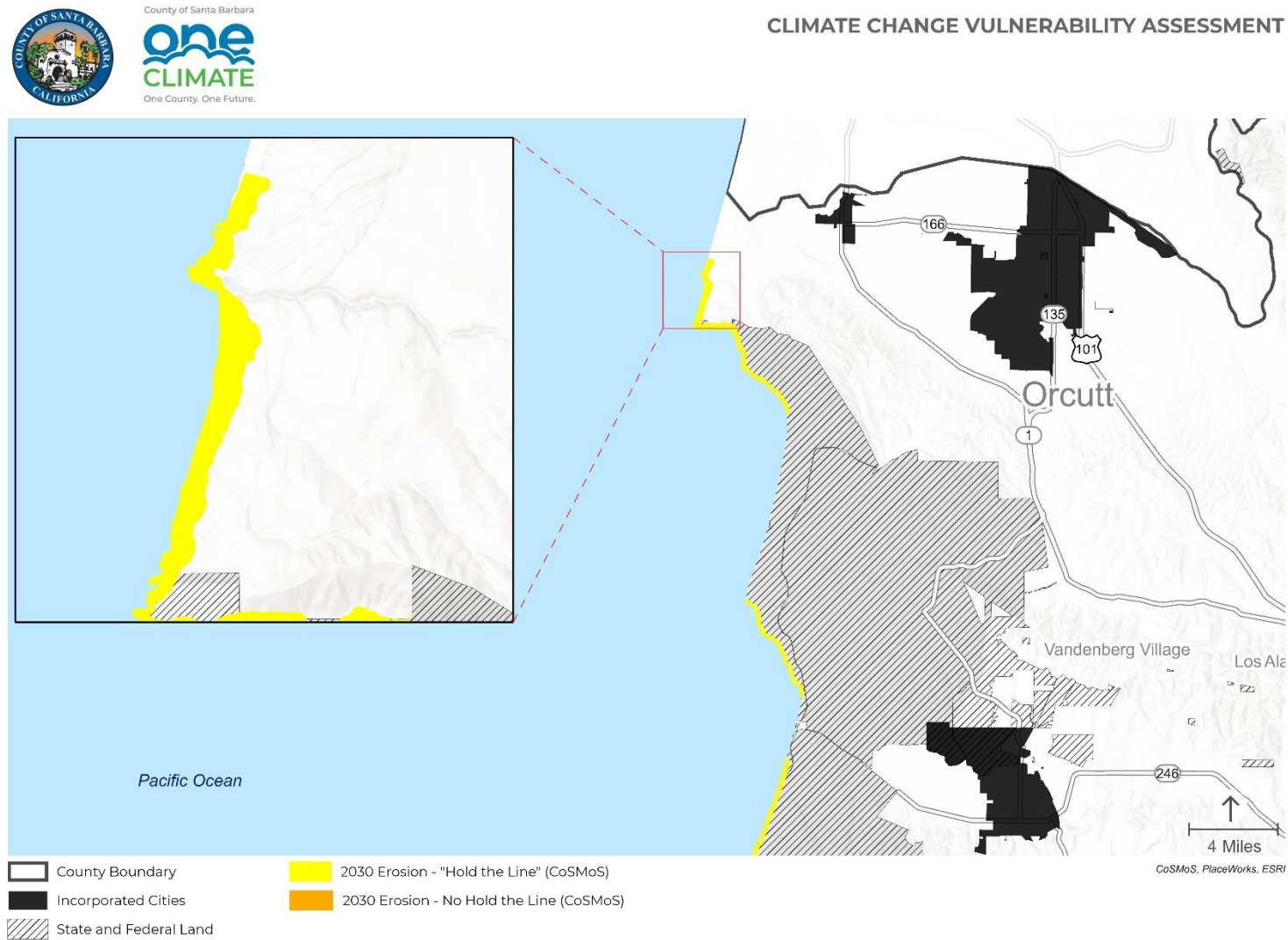




Figure 19. Projected Areas of Coastal Erosion in North County, No Action Scenario, by 2060

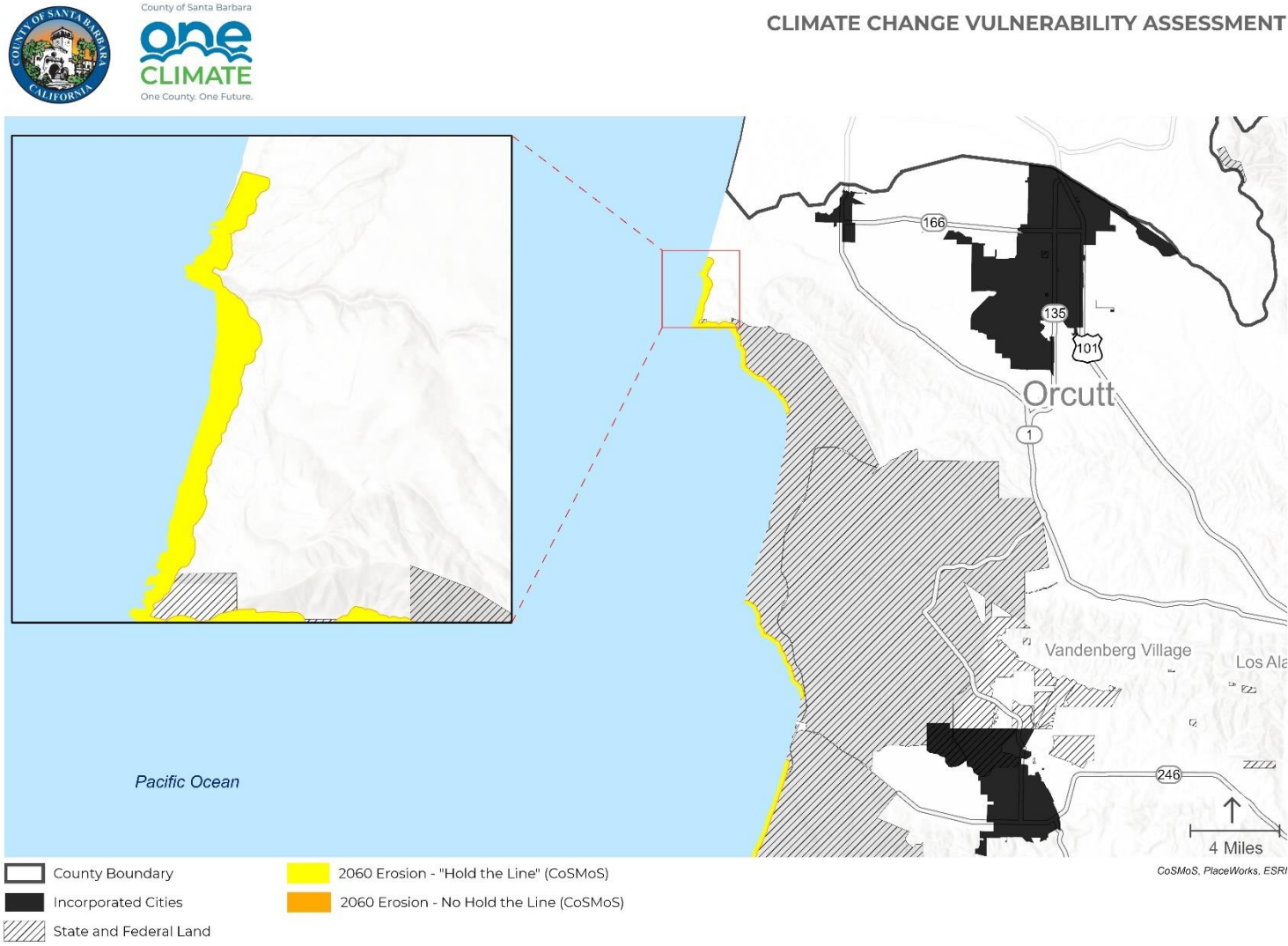




Figure 20. Projected Areas of Coastal Erosion in North County, No Action Scenario, by 2100

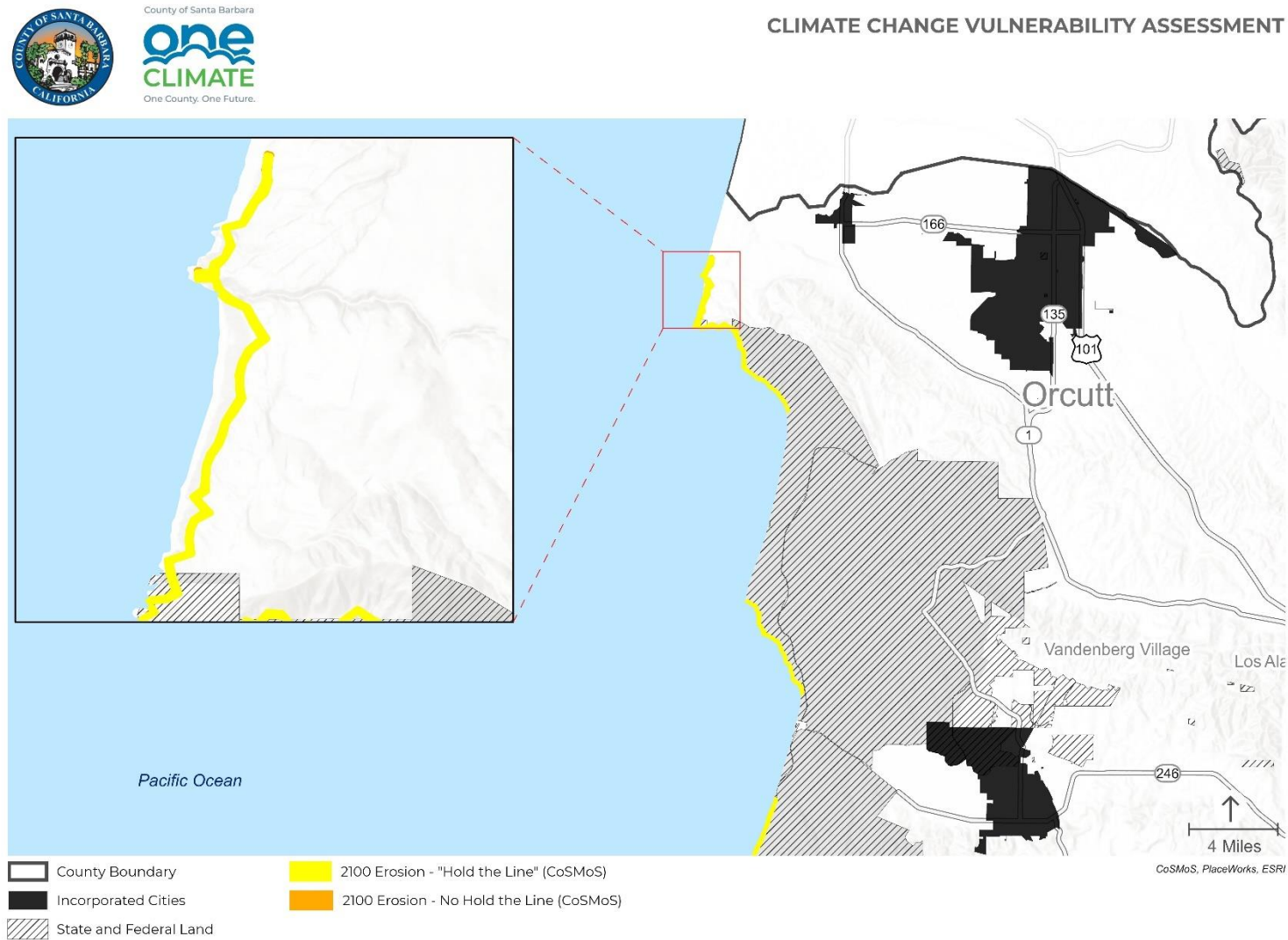




Figure 21. Projected Areas of Coastal Erosion on the South Coast, No Action Scenario, by 2030

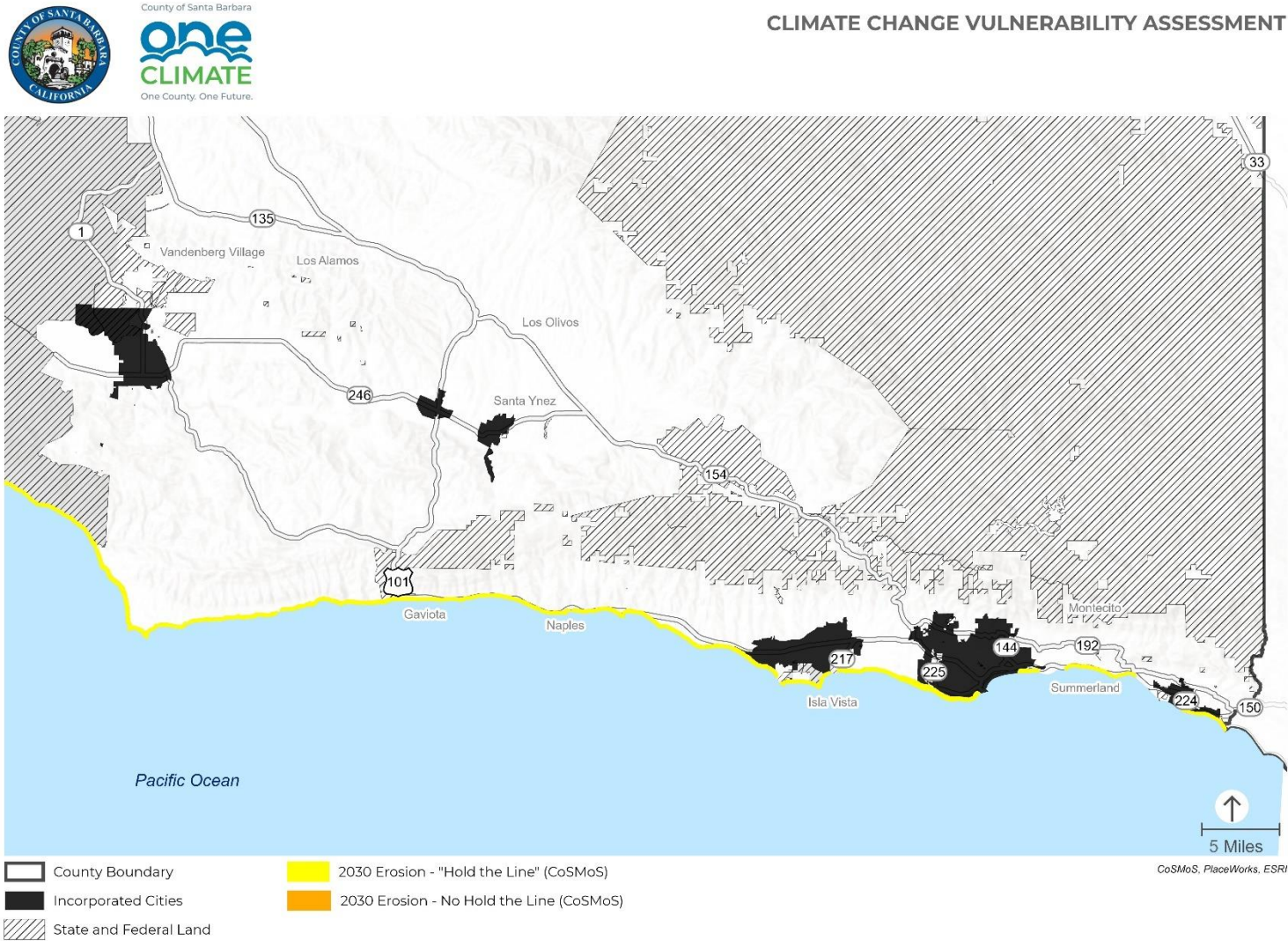






Figure 22. Projected Areas of Coastal Erosion on the South Coast, No Action Scenario, by 2060

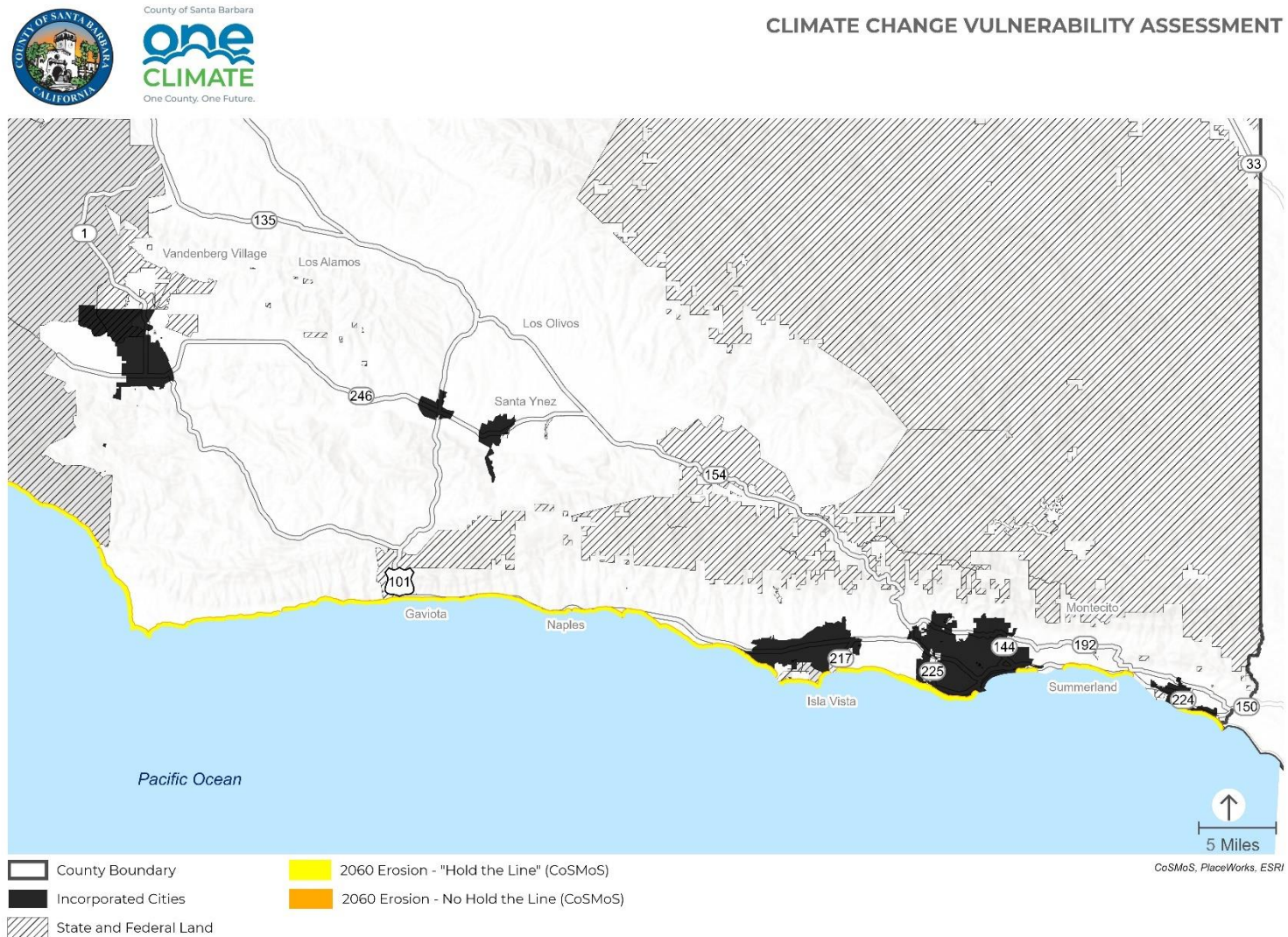
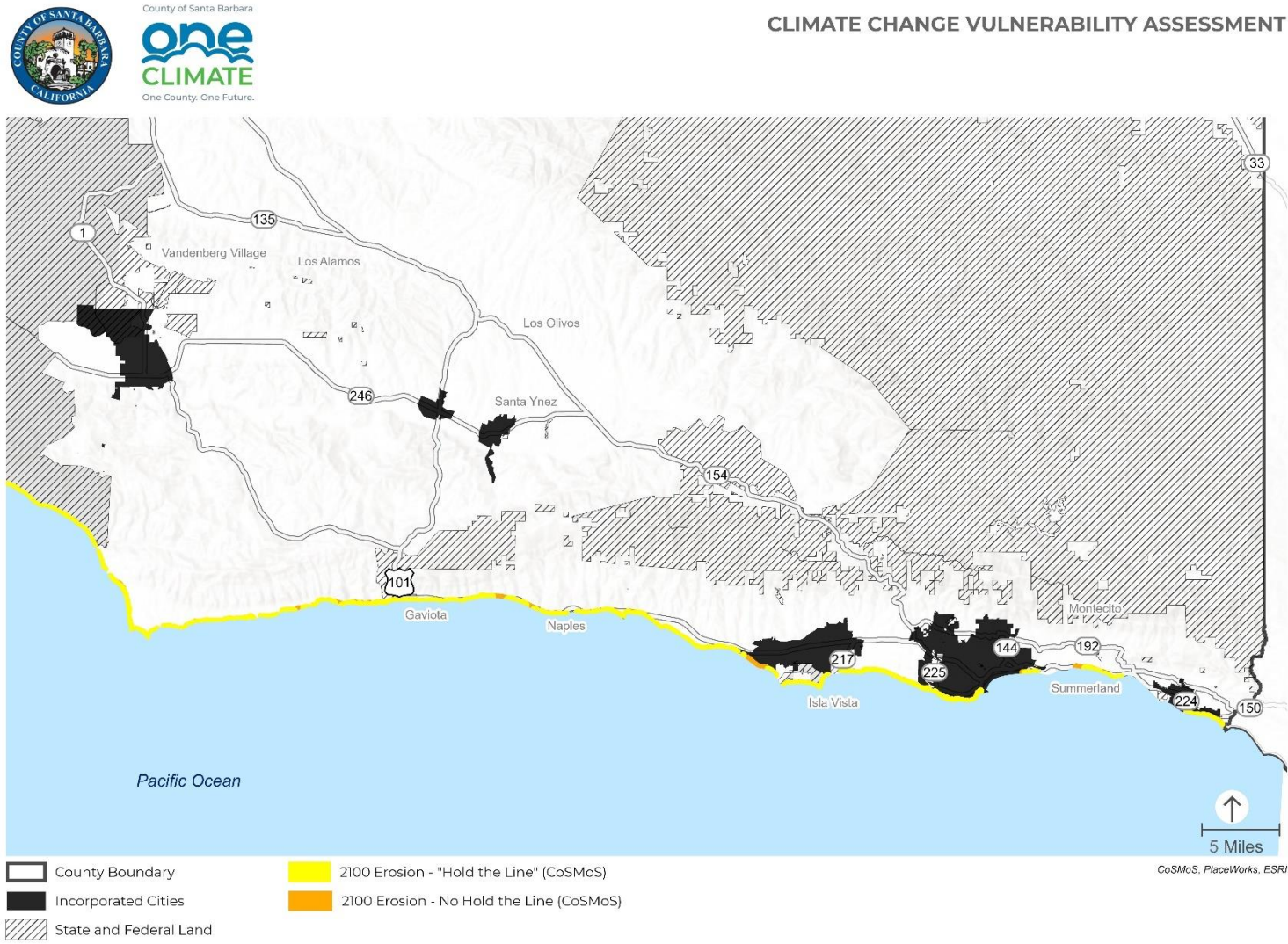




Figure 23. Projected Areas of Coastal Erosion on the South Coast, No Action Scenario, by 2100





## Drought

A drought occurs when conditions are drier than normal for a long period of time, making less water available for people, agricultural uses, and ecosystems. Historically, groundwater has accounted for 75 percent of the county's water use for domestic, commercial, industrial, and agricultural uses.<sup>59</sup> However, several of the basins are in overdraft conditions, where groundwater users pump more water to the surface than is replenished into the basin, causing a drawdown in the water table. **Figures 24** and **25** show the depth to groundwater in the Cuyama Valley Groundwater Basin in the springs of 2015 and 2017. These figures show that groundwater fell by nearly 50 feet in some areas of Cuyama Valley in just two years during the last major drought. In addition to the use of local groundwater and surface water supplies, unincorporated Santa Barbara County receives water from the State Water Project that is stored in Lake Cachuma. This supply depends on precipitation and snowpack in the Sierra Nevada.

## Water Supply in Santa Barbara County

The three subregions in Santa Barbara County receive water from different sources—groundwater, the State Water Project, surface water, and desalinated water. Some South Coast areas, including City of Santa Barbara and Montecito, have access to a desalination plant. South Coast and North County also receive water from the State Water Project through direct pipelines to water purveyors or Lake Cachuma. South Coast receives State Water Project water through Lake Cachuma; however, drought can reduce this supply below the minimum threshold for pumping out of the reservoir. Communities in the Santa Ynez Valley receive small amounts of water via surface water supplies from the Santa Ynez River, which can be drawn down in drought conditions. All regions of the county rely on some level of groundwater, but Cuyama Valley relies solely on groundwater. In years with little rainfall, higher levels of groundwater pumping can create overdraft in groundwater basins and higher concentrations of water pollutants. The Cuyama Valley region may have few alternatives if groundwater cannot be used; however, similar to other groundwater basins in the county, the Cuyama Valley groundwater basin has a Groundwater Sustainability Agency that is developing a Groundwater Sustainability Plan to bring the basin into sustainable conditions.

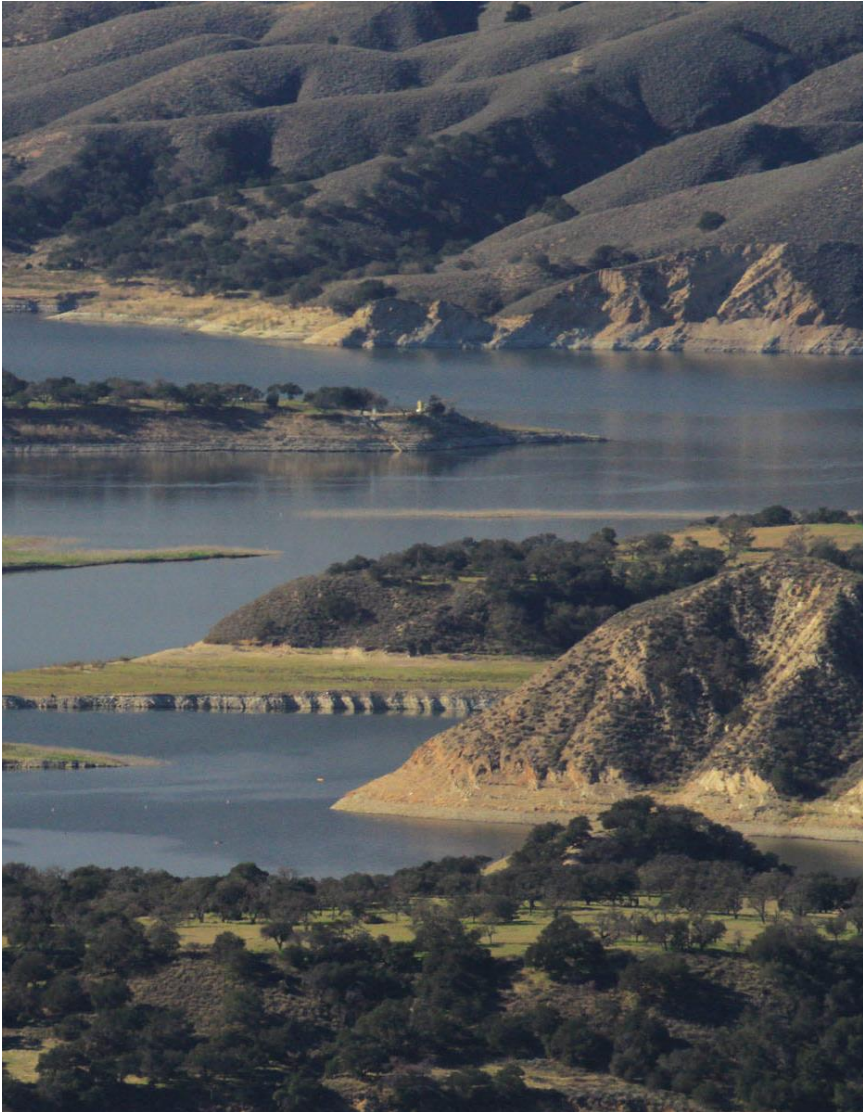


Photo Credit: Mark Bright

Droughts are a regular occurrence in California and are measured by the timing and length of the drought. However, in the past 50 years, there have been four major statewide droughts, plus smaller regional droughts.<sup>60</sup> Due to the changes in precipitation patterns discussed under “Primary Climate Stressors,” droughts will likely last longer and happen more frequently because of more variability in precipitation extremes. Base flows in rivers and creeks in the county’s coastal and inland areas are projected to decline significantly in the North County and South Coast subregions, in an early- and late-century extended drought scenario, shown in **Table 13**.

**Table 13. Changes in Base Flow in Creeks During Extended Drought Scenarios (in/yr), RCP 8.5**

Subregion	Historical	Early Century	Late Century	Subregion
Countywide	2.1	1.4	1.3	Countywide
North County	1.4	1.2	1.2	North County
Cuyama Valley	0.4	0.4	0.4	Cuyama Valley
South Coast	4.1	2.6	2.6	South Coast

Source: California Energy Commission. 2018. “Extended Drought Scenarios.” <https://cal-adapt.org/tools/extended-drought/>.

Note: Projections are an average of the four State-recommended climate models (HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5), averaged for 2030-2050, 2050-2070, and 2070-2099.



Figure 24. Depth to Groundwater in the Cuyama Valley Groundwater Basin in Spring 2015

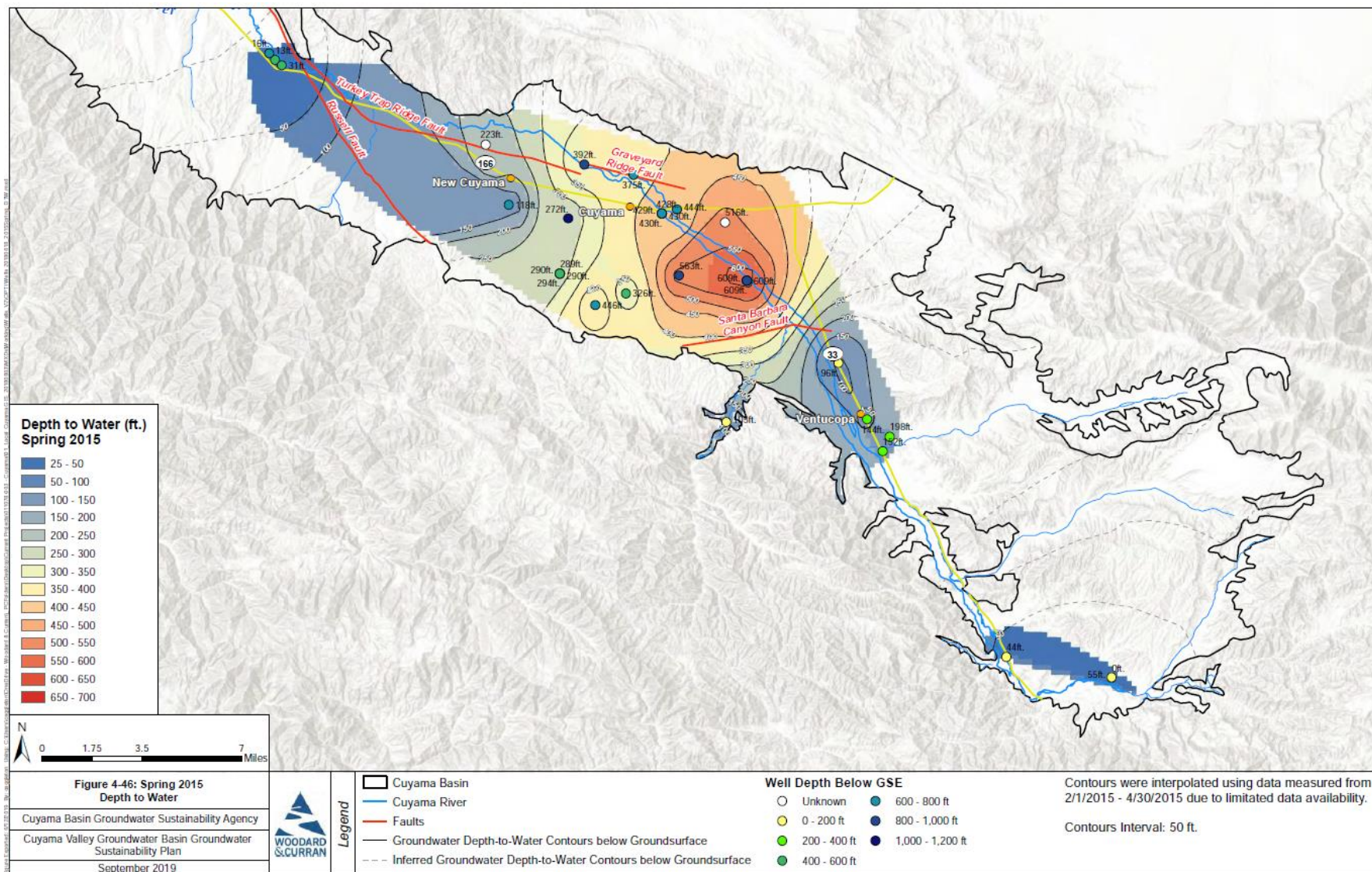
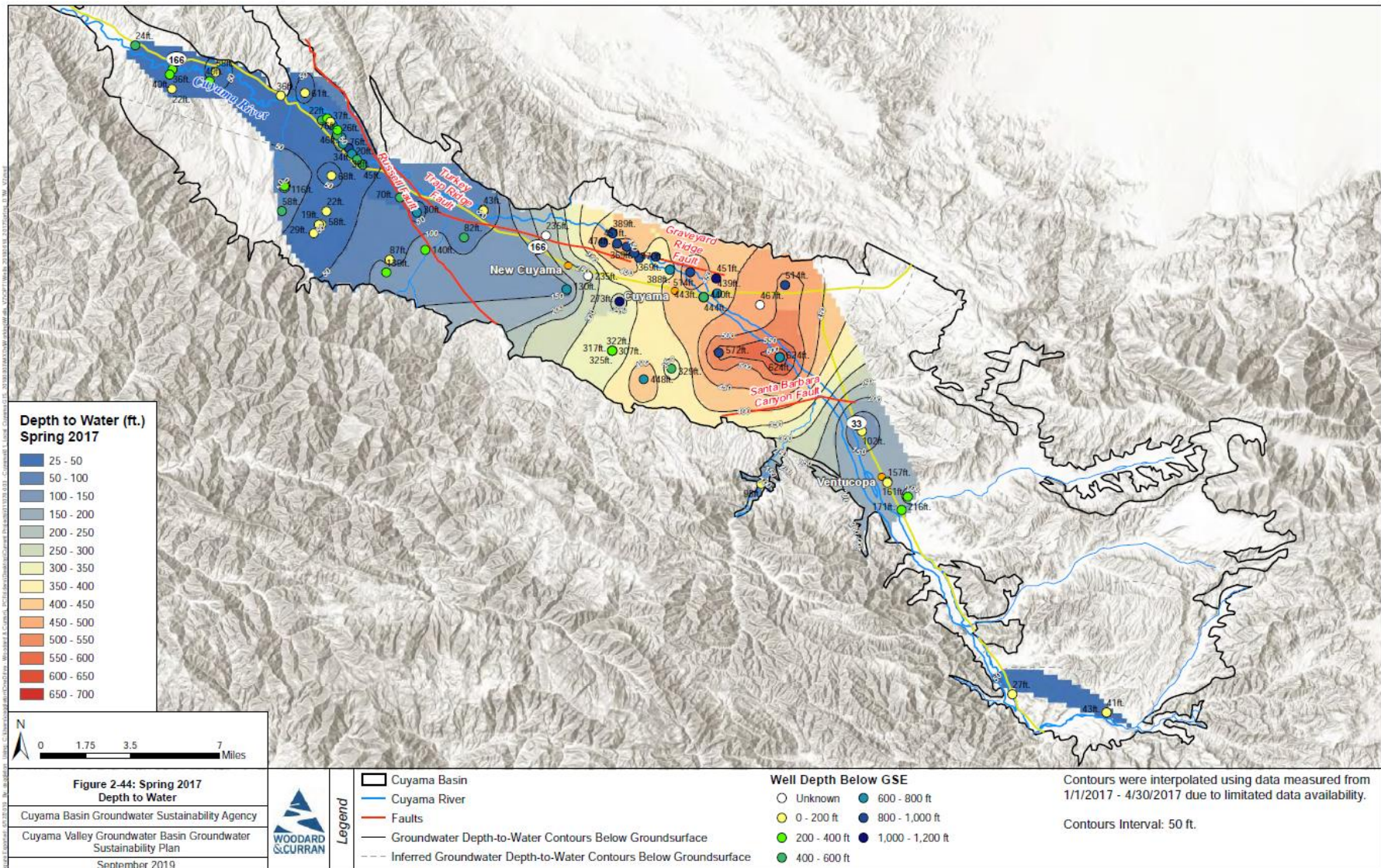




Figure 25. Depth to Groundwater in the Cuyama Valley Groundwater Basin in Spring 2017





### Sierra Nevada Snowpack

Snowpack is the amount of snow that accumulates during the winter. It is a natural reservoir that stores water during the winter. As it slowly melts in the spring and summer, it feeds streams and rivers that provide water to regions hundreds of miles away along the Central Coast and Southern California. The southwest region of the United States relies on snowmelt to supply 50 to 80 percent of the lake, reservoir, river, and creek inflows for water supply.

Snowpack levels dropped by 25 percent during the 2011 to 2016 drought, and average springtime snowpack is expected to drop 64 percent by 2100. In 2021, the snowpack in the Northern Sierra was 70 percent of the average, but the rain was less than 50 percent of the annual average, making it the third driest year on record. Loss of snowpack will increase as temperatures increase because of less precipitation during droughts, more precipitation falling as rain, and snow melting earlier in the spring.

Sources: ARCCA, 2018, *From Mountain to Cities: Exploring California's Urban Connections to Sierra Nevada Ecosystems*.  
<https://arccacalifornia.org/wpcontent/uploads/2018/08/ARCCA-UrbanRural-Whitepaper.pdf>.

California Department of Water Resources. 2021. "Statewide Snowpack Well Below Normal as Wet Season Winds Down".  
<https://water.ca.gov/News/News-Releases/2021/April-21/Statewide-Snowpack-Well-Below-Normal-as-Wet-Season-Winds-Down>.



### Extreme Heat

Extreme heat occurs when temperatures rise significantly above normal levels, and the key metric is the number of extreme heat events per year and heat wave duration. "Extreme heat" is a relative term—temperatures of 100 degrees are normal in places like Palm Springs, but almost unprecedented in coastal areas of Santa Barbara County. The county has different extreme heat temperatures in different regions. On an extreme heat day, temperatures reach at least 88.7 degrees in Los Alamos, 101.3 degrees in Cuyama, and 87 degrees in Montecito.<sup>61</sup> Although temperatures are lower in coastal areas, it is still dangerous when temperatures are higher than usual, because people and assets may not have the resources to cope with them.

Historically, the county has experienced an average of four extreme heat days a year. This is expected to increase to 12 extreme heat events per year by 2030, 19 extreme heat events per year by 2060, and 34 extreme heat events per year by 2100.<sup>62</sup> **Table 14** shows the number of extreme heat days projected in the three subregions. The duration of heat waves is projected to increase countywide—from 2.7 days historically to 4.3 days by 2030, 5.6 days by 2060, and 9.4 days by 2100.<sup>63</sup> **Table 15** shows the increases in heat wave duration by subregion.



**Table 14. Projected Number of Extreme Heat Days, RCP 8.5**

Subregion	Historical	2030	2060	2100
Countywide	4	12	19	34
North County	4	7	11	19
Cuyama Valley	4	22	31	46
South Coast	5	7	11	21

Source: California Energy Commission. 2018. "Extreme Heat Days and Warm Nights." <https://cal-adapt.org/tools/extreme-heat/>.

Note: Projections are an average of the four State-recommended climate models (HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5), averaged for 2030-2050, 2050-2070, and 2070-2099.

**Table 15. Projected Length of Heat Waves (days), RCP 8.5**

Subregion	Historical	2030	2060	2100
Countywide	2.7	4.3	5.6	9.4
North County	2.6	2.7	3.9	5.2
Cuyama Valley	2.2	6.9	9.0	14.7
South Coast	2.4	2.5	3.5	5.3

Source: California Energy Commission. 2018. "Extreme Heat Days and Warm Nights." <https://cal-adapt.org/tools/extreme-heat/>.

Note: Projections are an average of the four State-recommended climate models (HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5), averaged for 2030-2050, 2050-2070, and 2070-2099.

When the daily minimum temperatures remain significantly above normal, warm nights can worsen an extreme heat day because people and assets may not get relief from high temperatures. A warm night is when temperatures remain above 56.3 degrees in Los Alamos, 62.8 degrees in Cuyama, and 60.1 degrees in Montecito.<sup>64</sup> **Table 16** shows the number of warm nights projected in the county and subregions.

**Table 16. Projected Number of Warm Nights, RCP 8.5**

Subregion	Historical	2030	2060	2100
Countywide	4	26	51	88
North County	4	20	52	93
Cuyama Valley	4	16	30	52
South Coast	4	23	47	81

Source: California Energy Commission. 2018. "Extreme Heat Days and Warm Nights." <https://cal-adapt.org/tools/extreme-heat/>.

Note: Projections are an average of the four State-recommended climate models (HadGEM2-ES, CNRM-CM5, CanESM2, MIROC5), averaged for 2030-2050, 2050-2070, and 2070-2099.





## Inland Flooding

All flooding is a breakdown in conveyance. It happens when water surpasses the capacity of local water bodies to contain it, creeks and rivers to carry it, or soil to absorb it. When flood control infrastructure fails, water builds up and washes into normally dry areas, where it can cause significant harm to buildings, people, and ecosystems. Floods can be caused by heavy rainfall, long periods of moderate rainfall, or blocked-off drainage areas during rainfall. A break in a dam, water pipe, or water tank can also cause flooding in rare instances. Floods that develop very quickly are called flash floods; they are especially dangerous because they give little or no warning. Floodwaters can be deep enough to drown people and move fast enough to carry away people or heavy objects, such as cars. In some cases, floods have lifted buildings off their foundations. Inland flooding is measured by the size of the areas flooded per year, and this will likely increase as more precipitation falls in fewer storms, discussed under “Primary Climate Stressors.”

Between 1862 and 2014, the county experienced 19 significant inland flooding events.<sup>65</sup> Although climate change will increase the frequency and intensity of droughts, scientists also project that it will increase the frequency and intensity of heavy rainstorms that cause inland flooding, although precipitation levels are expected to increase only slightly. Up to half of California’s

precipitation comes from a relatively small number of intense winter storms, which are expected to become more intense with climate change. For example, what is currently a 200-year storm, or one that has a 1 in 200 chance of occurring in a given year, by 2100 would increase in frequency by 40 to 50 years (to a 1 in 150/160 chance in a given year).<sup>66</sup> This means that the 100-year and 500-year floodplains may expand, and the current floodplains may become 40- to 50-year floodplains. **Figures 26 to 28** show the 100-year and 500-year floodplains in the North County, Cuyama Valley, and South Coast subregions, respectively.



*Photo Credit: County of Santa Barbara*



### Decrease in Fog

Fog is a very low cloud, usually low enough to touch the ground. It forms when the air near the Earth's surface reaches the right temperature for water in the air to condense into a cloud. Fog is measured by the

number of fog days per year, which projections show will decrease 12 to 20 percent by 2070, although the future of fog is uncertain due to the complexity of factors used to model future fog scenarios.<sup>67</sup> In Santa Barbara County, fog forms along the coast as it flows in from the Pacific Ocean to warmer temperatures on land. The cool air brought in by fog is necessary for cooling off both coastal and inland areas of the county, which could experience an increase in air temperature if fog decreases.



Photo Credit: Mark Bright



Figure 26. North County Floodplains

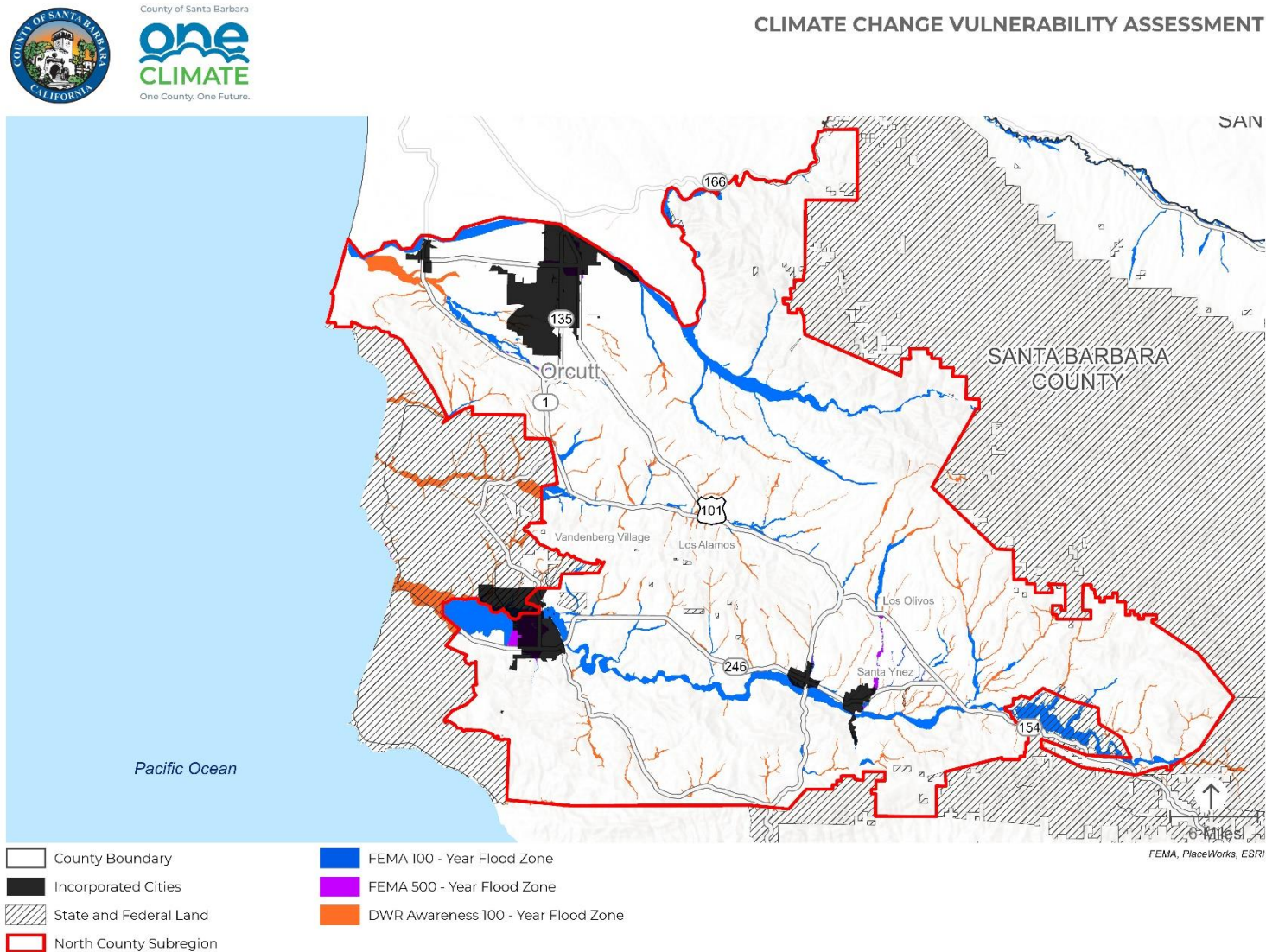




Figure 27. Cuyama Valley Floodplains

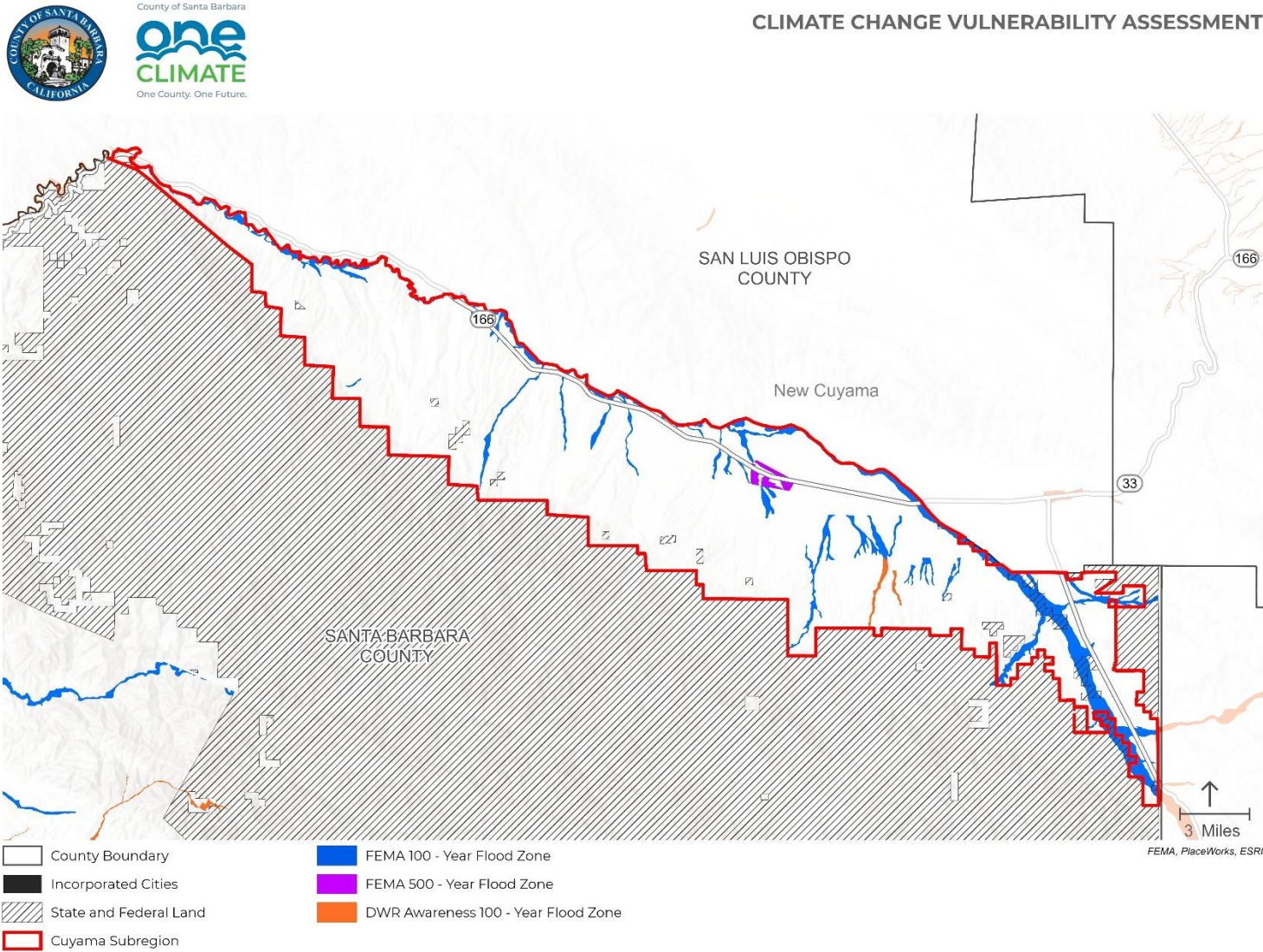
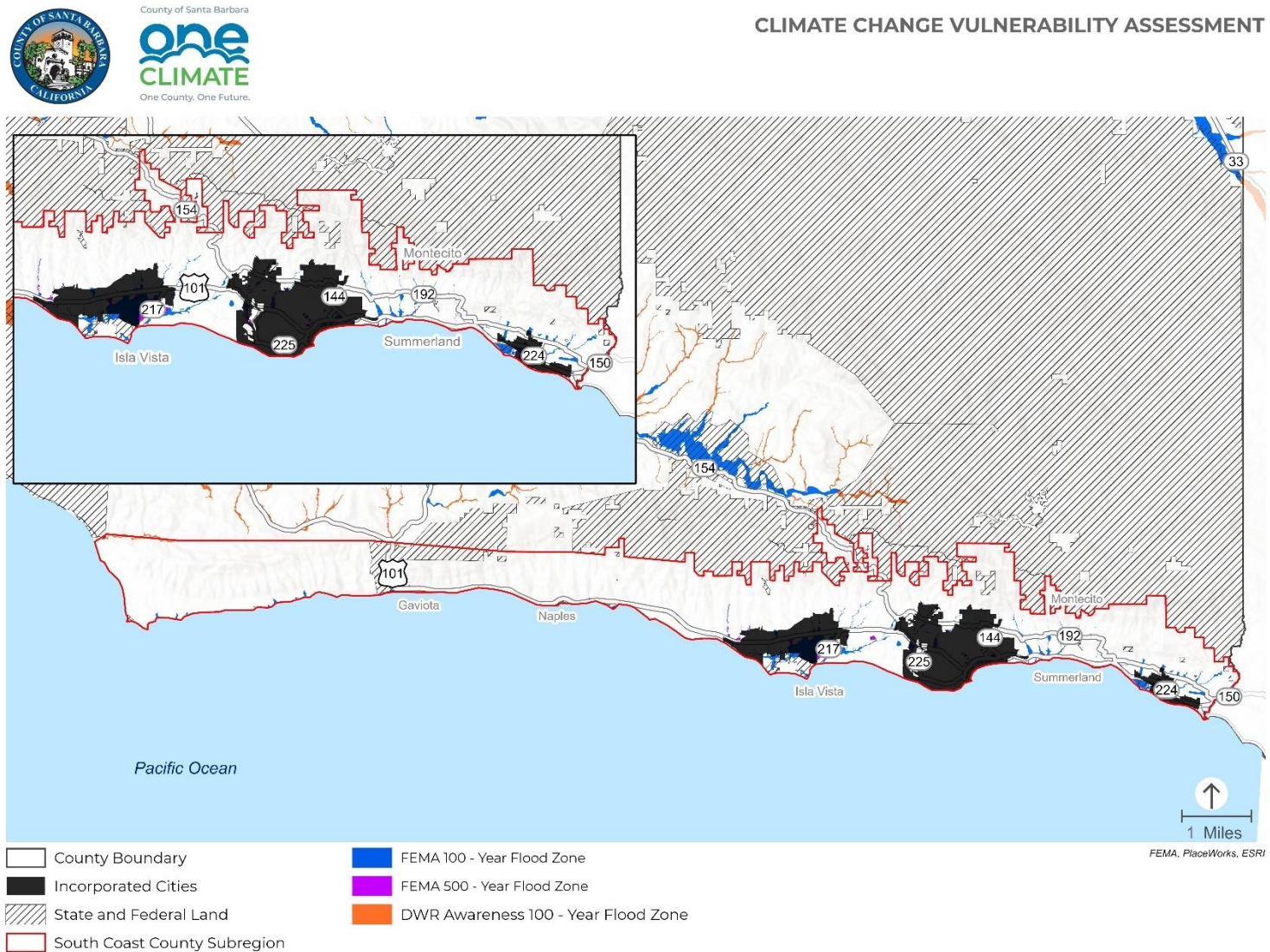




Figure 28. South Coast Floodplains





### Human Health Hazards

Human health hazards are bacteria, viruses, parasites, and other organisms that cause diseases and illness in people. These diseases are carried by animals such as mice and rats, ticks, and mosquitos—which are usually regarded as pests even if they do not cause diseases. Changes in temperature and precipitation can increase the activity of animals that carry diseases because they are more active during warm weather. Warmer temperatures earlier in the spring and later in the autumn cause these animals to be active for longer periods, increasing the time that diseases can be transmitted. This hazard is measured by the incidence of health hazards, which are likely to increase as temperatures allow insects and other pests to reproduce more rapidly.



### Landslides and Debris Flows

Landslides occur when a hillside becomes unstable, causing soil and rocks to slide downslope. Landslides are most common on steep slopes made of loose soil and other material, but they can also happen on shallower slopes. Hillsides commonly absorb water, which increases the instability of the slope and leads to more frequent slope failure. Slope failure is likely to become

more frequent as more precipitation falls during fewer storms throughout the year (see “Inland Flooding”). Steep slopes made of loose or fractured material are more likely to slide. In some cases, hillsides become so saturated that slope failures result in a mudslide (a mixture of soil and water moving downslope). Higher temperatures, wildfires, and droughts can kill vegetation that holds soil in place and dry out soil, making it unable to absorb as much water and creating a risk of landslides when heavy rains return.

Debris flows—fast-moving flows of mud, rock, boulders, trees, and other debris—are especially a hazard in or below areas with steep topography that have recently burned. High-intensity wildfires strip areas of vegetation and make soils hydrophobic, preventing water from percolating into soil during a high-intensity precipitation event, as was the case in the 2018 Montecito debris flow. Similar conditions have led to numerous documented landslide and debris flow events along the South Coast throughout the 19th, 20th, and 21st centuries. **Figure 29** shows the debris flow hazard areas along the South Coast as of 2018, after the Thomas Fire. This hazard area may shift after a debris flow or landslide or other hazards have affected an area, such as wildfire, flooding, or drought. Debris flows and landslides can move fast enough to damage or destroy buildings or other structures in their path, block roads or railways, and injure or kill people caught in them. **Figures 30 to 32** show the landslide susceptibility areas in the North County, Cuyama Valley, and South Coast subregions, respectively.



Figure 29. Debris Flow Hazard Areas on the South Coast

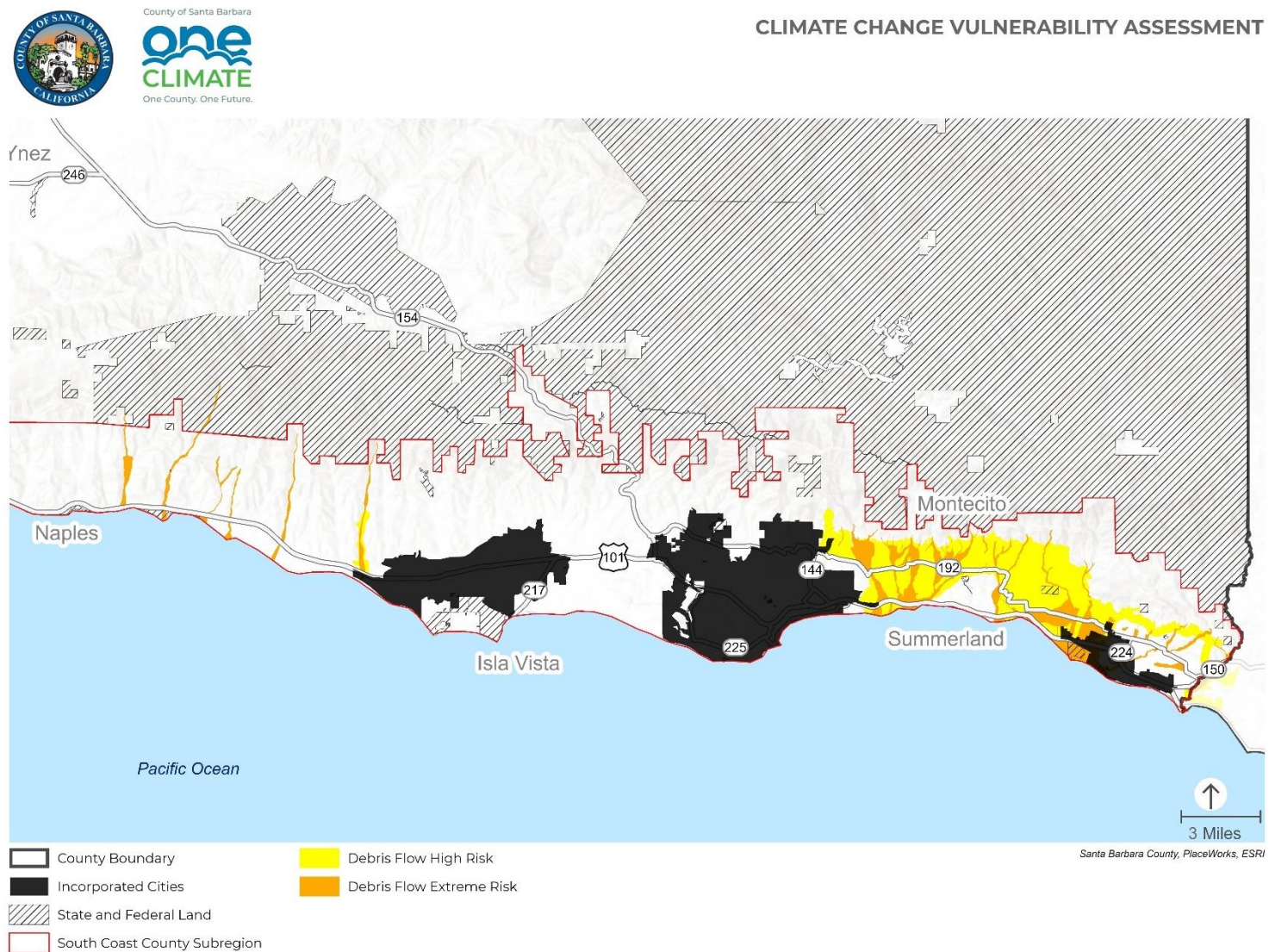


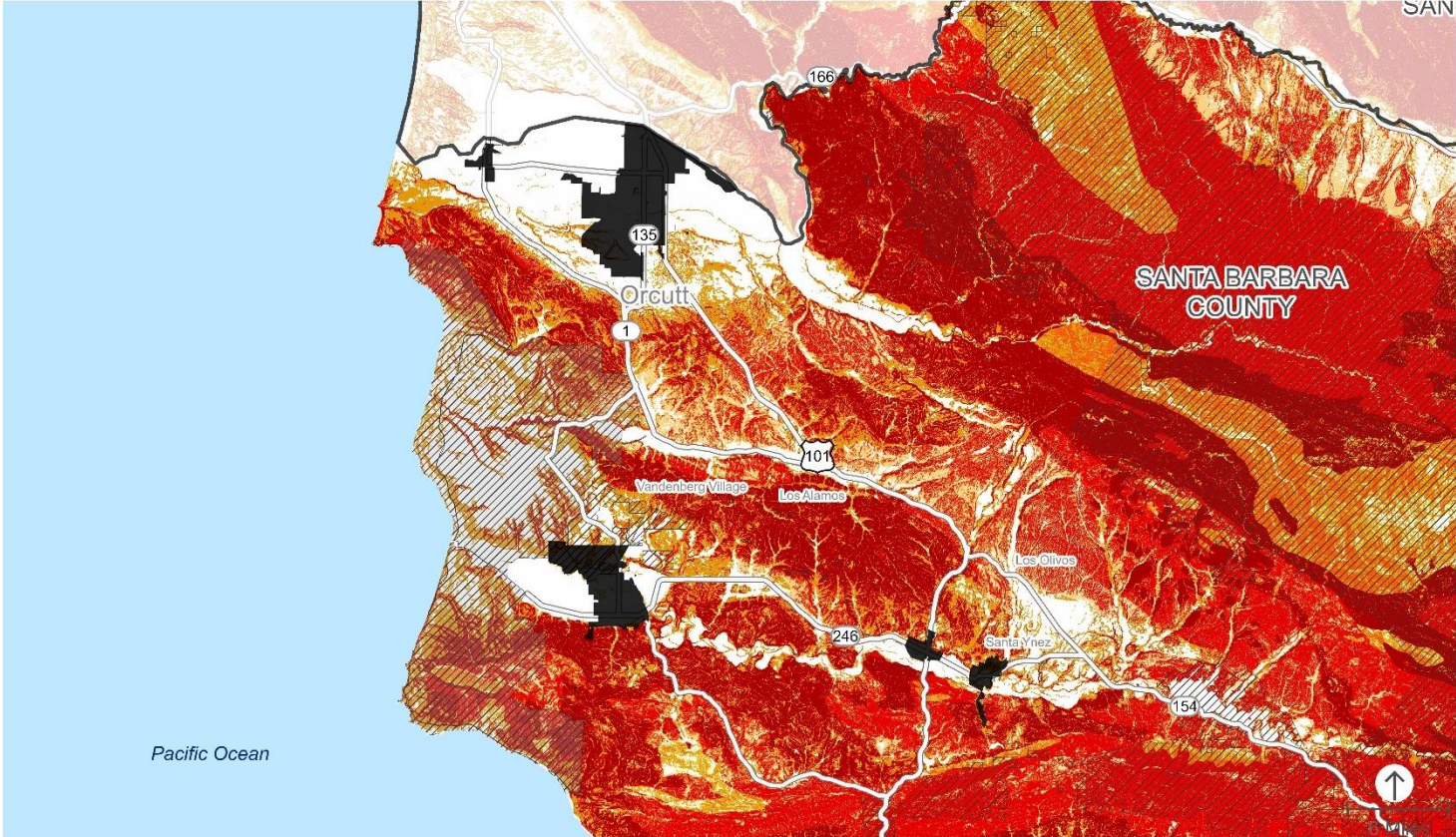


Figure 30. Landslide Susceptibility Areas in North County



County of Santa Barbara  
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One County. One Future.

CLIMATE CHANGE VULNERABILITY ASSESSMENT



County Boundary	Landslide Susceptibility Classes	
Incorporated Cities	0 (low susceptibility)	VI
State and Federal Land	III	VII
	V	VIII
		IX
		X (higher susceptibility)

California Geological Survey, PlaceWorks, ESRI





Figure 31. Landslide Susceptibility Areas in the Cuyama Valley

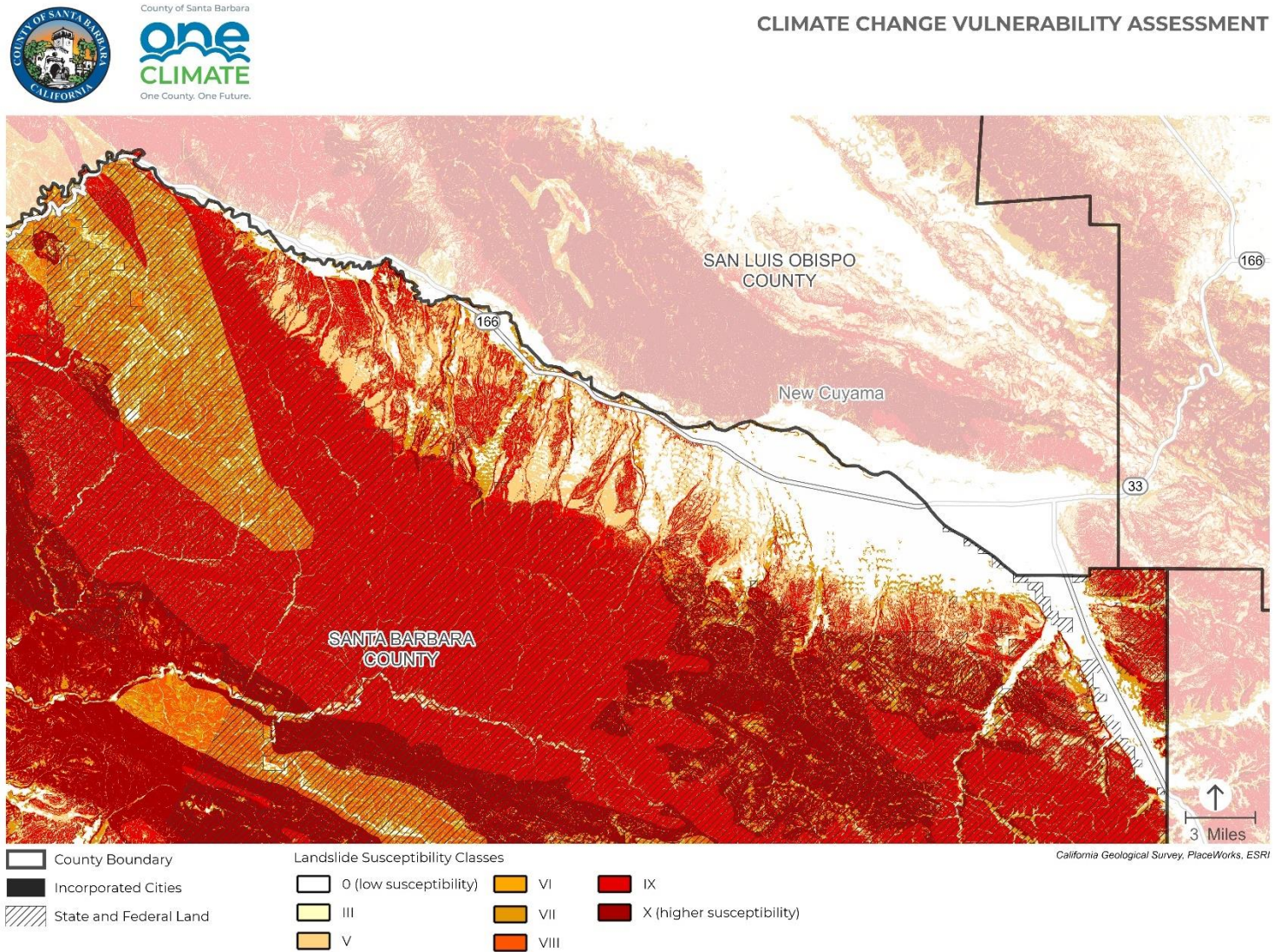
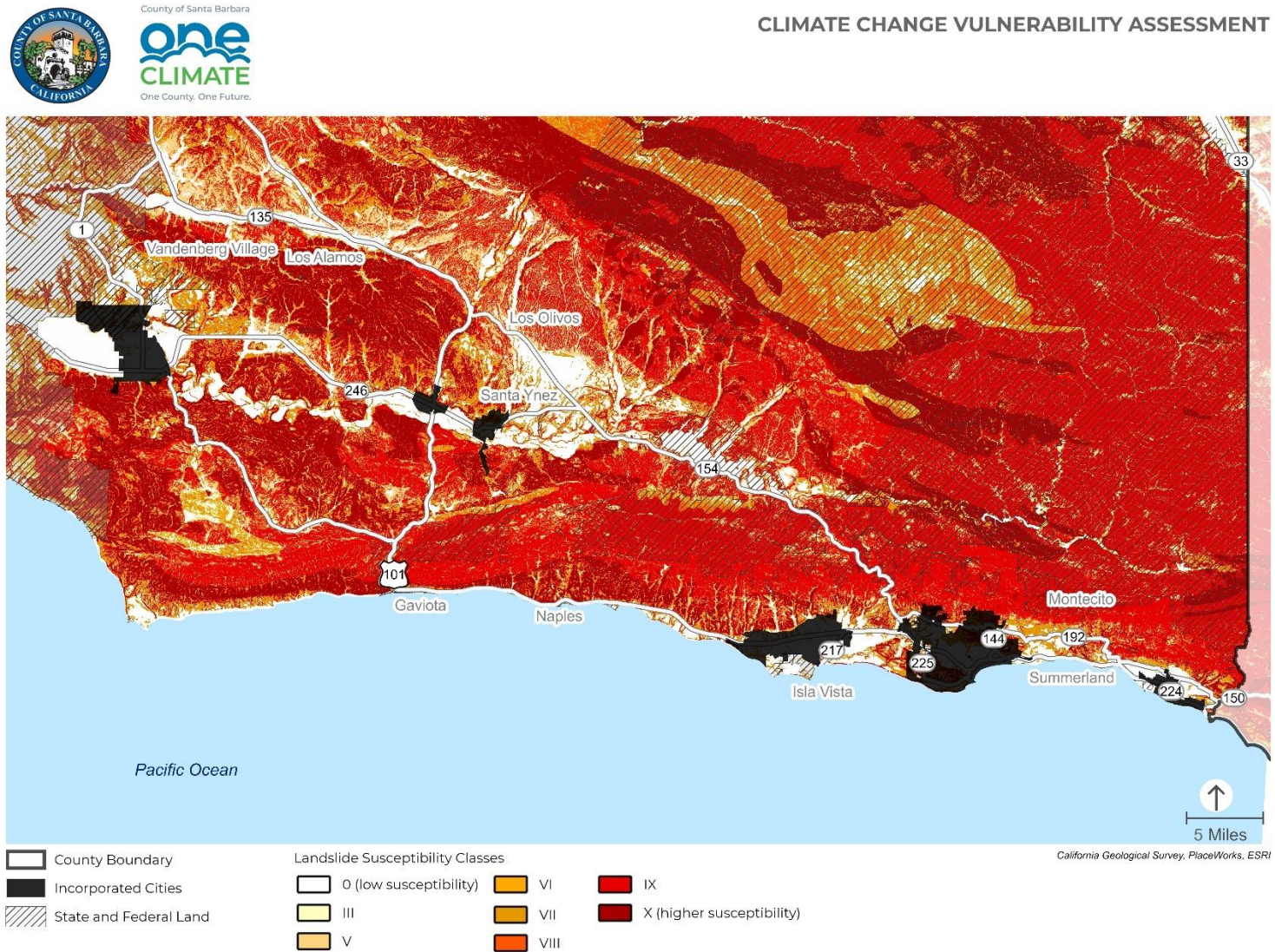




Figure 32. Landslide Susceptibility Areas on the South Coast





### Severe Weather

Severe weather includes strong winds, hail, lightning, and heavy rainfall typically caused by intense storm systems, although types of strong winds, such as sundowners, can occur without a storm. Severe weather is measured by the number of events per year, which is likely to increase. Severe winds can damage or destroy buildings, knock over trees, and damage power lines and electrical equipment. This includes sundowner winds, which can reach over 120°F and speeds of 60 miles per hour in some areas.<sup>68</sup>

#### Extreme Winds in Santa Barbara County

Santa Barbara County experiences two types of severe wind events that can harm people and cause cascading effects such as sparking wildfires and spreading them more quickly. They can also lead to Public Safety Power Shutdowns (PSPS) that can impact the County's economic drivers and key services. Santa Ana winds tend to blow most frequently during October to April. They flow from the inland deserts to the coastal areas of Southern California at an average wind speed of 40 miles per hour. Sundowner winds, which are unique to Santa Barbara County, flow down from the Santa Ynez Mountains. Both types of wind events are hot, gusty winds with low humidity that can raise the temperature in the region by 20 degrees Fahrenheit or more and can exacerbate other hazards occurring simultaneously in the county. Mapping known wind corridors associated with Santa Ana and Sundowner winds may assist in identifying additional vulnerabilities to severe weather and wildfire.



### Wildfire

Wildfires are a regular feature of the landscape in Santa Barbara County. **Figure 33** shows the Fire Hazard Severity Zones throughout the county as designated by CAL FIRE. The Mediterranean-type climate and ecosystems in much of the state, including Santa Barbara County, are especially fire prone. Winter rains support plant growth, and the summer dry season, droughts, and extreme heat events dry out vegetation, increasing the potential for ignition during the late summer and autumn when temperatures are high for several months without precipitation. Wildfires can be sparked by lightning, malfunctioning equipment, vehicle crashes, or many other causes. Most wildfire ignition is human caused. High winds can then spread wildfires quickly over the terrain. Wildfires are fires burning in natural areas, although they can easily spread into developed areas between urban and wildland zones, known as the wildland-urban interface.<sup>69,70</sup> The wildland-urban interface can expose people and property to the flames, increasing the risk of injury, death, and property damage or destruction. As shown in **Figure 34**, dozens of wildfires have burned in Santa Barbara County over the last century. Wildfires can be linked to landslides and debris flows on steep slopes in the county, as seen after the 2017 Thomas Fire.



Wildfires as a secondary climate stressor are measured by the number of acres burned per year, which is expected to increase in the 21st century. Historically, an annual average of 17,681 acres burned per year in the county, although some years have seen significantly more burnt acres. A projected increase in annual average precipitation can lead to an increase in the amount of fuel growth available for wildfires to burn. Due to higher annual average temperatures and the increased frequency and intensity of droughts, annual average acres burned is expected to increase to 23,040 acres per year (30 percent increase) by 2030, 25,782 acres per year (46 percent increase) by 2060, and 24,050 acres per year (36 percent increase) by 2100.<sup>71</sup>

**Figures 35 to 37** show projected annual average acres burned in the county by 2030, 2060, and 2100, compared to historical baseline conditions (1961 to 1990). These figures show that the Los Padres National Forest has the highest annual average acres burned in early and midcentury, but that will shift toward Vandenberg Space Force Base and western Santa Barbara County by late century. In Cuyama Valley, annual average acres burned increase only slightly in early and midcentury and decrease in late century.



*Photo Credit: Santa Barbara County Fire Department*



*Photo Credit: Santa Barbara County Office of Emergency Management*

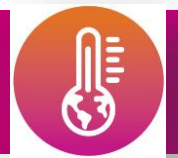


Figure 33. Fire Hazard Severity Zones

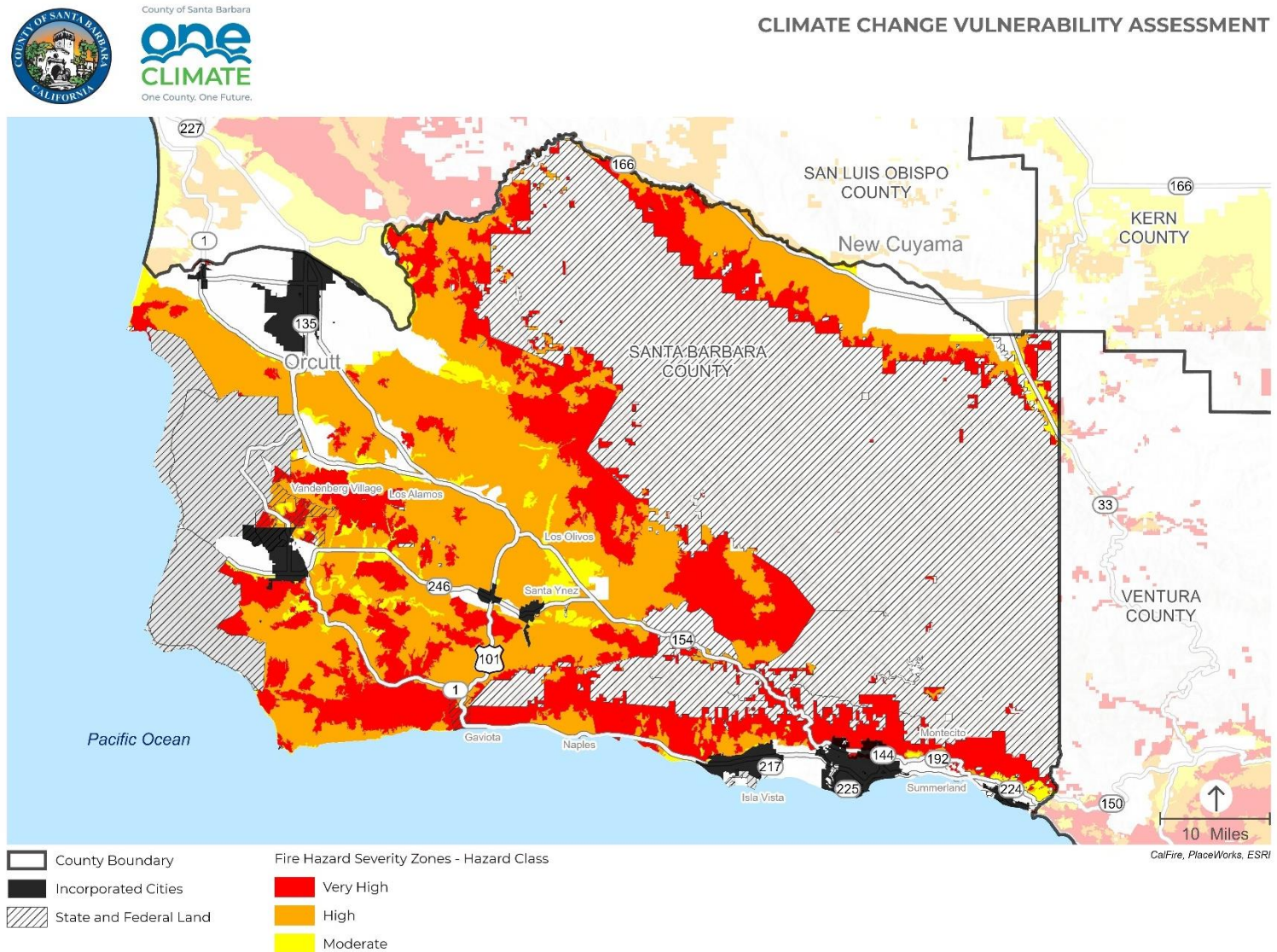




Figure 34. Historical Wildfire Burn Areas

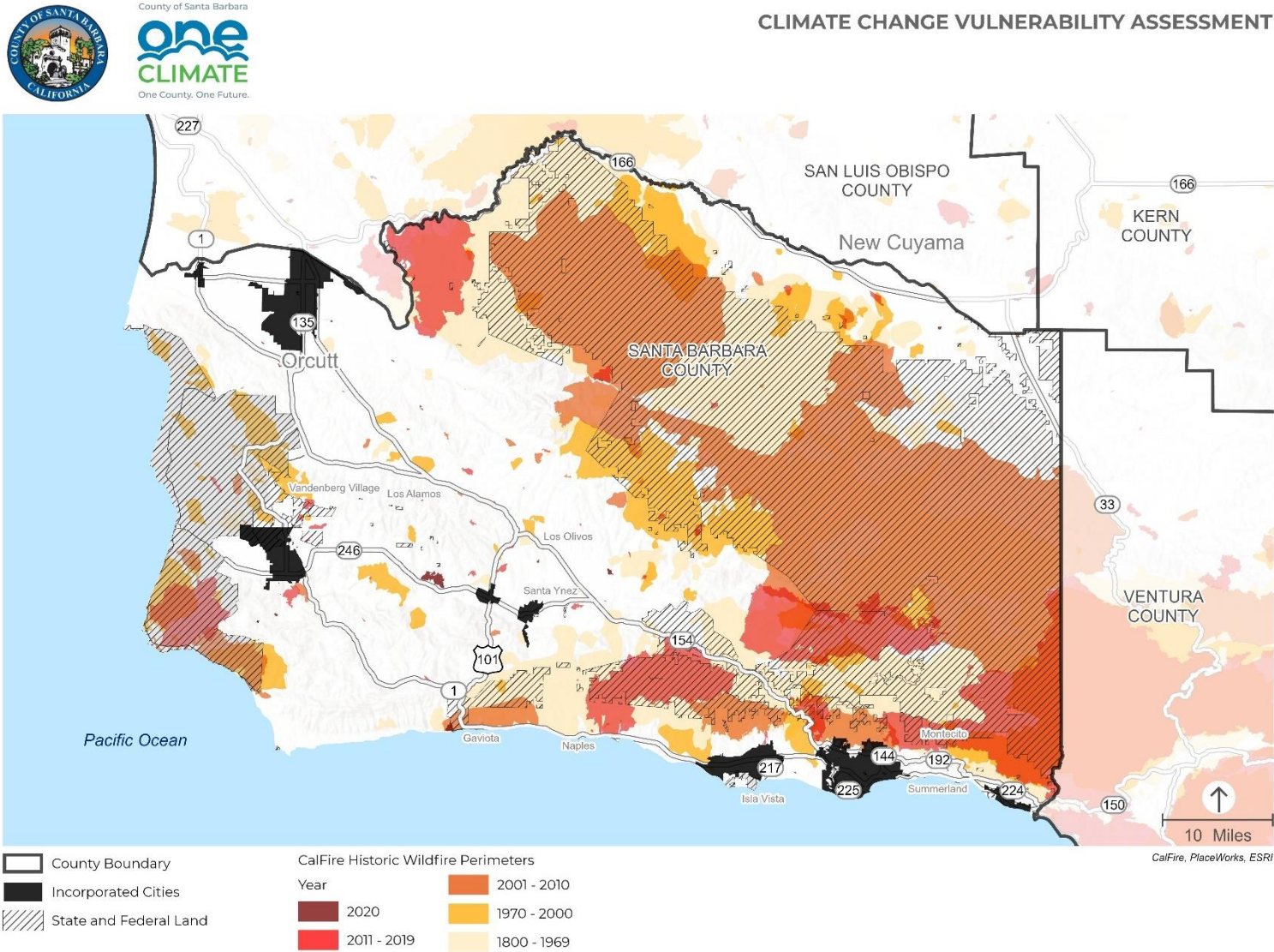
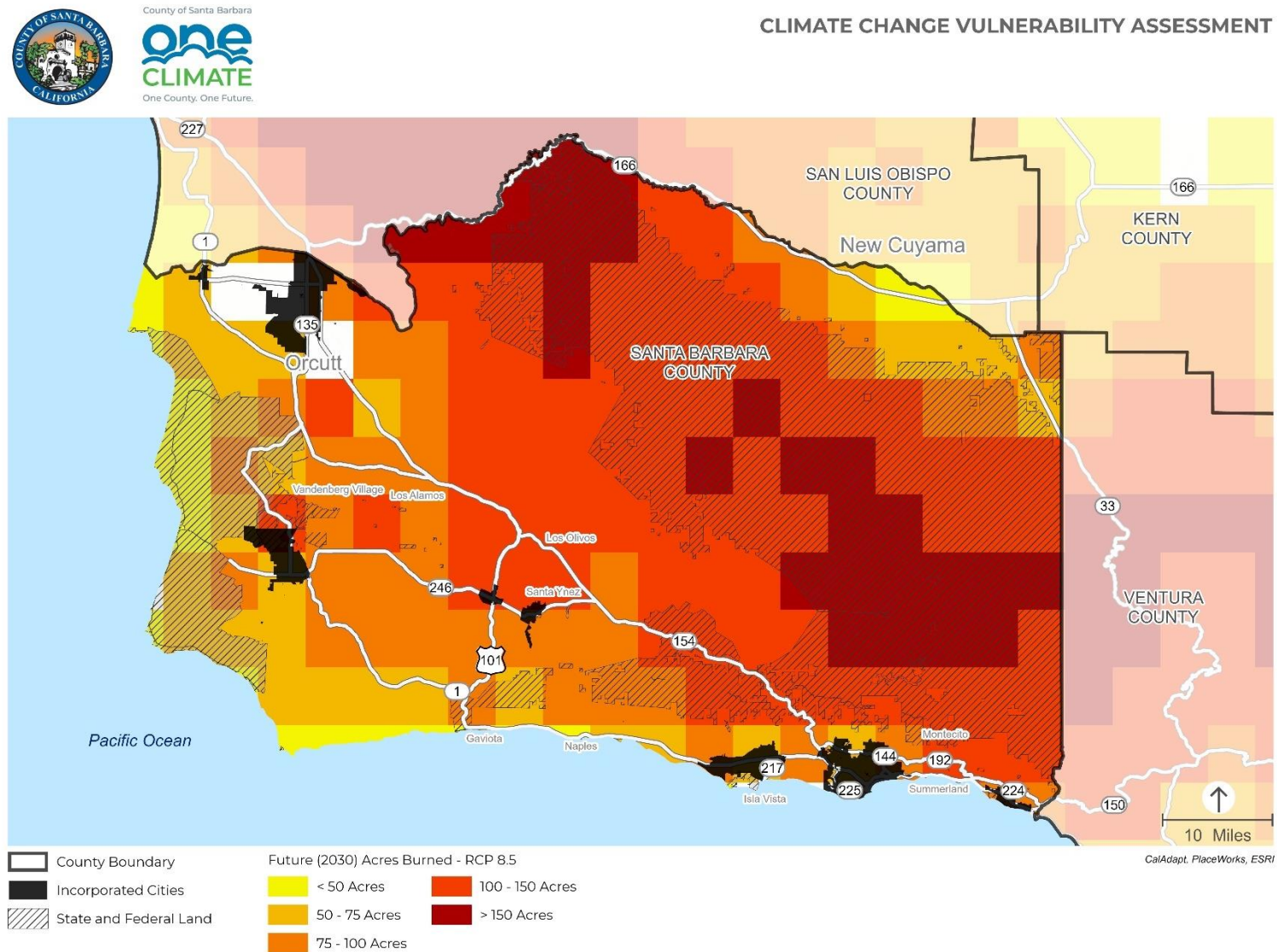


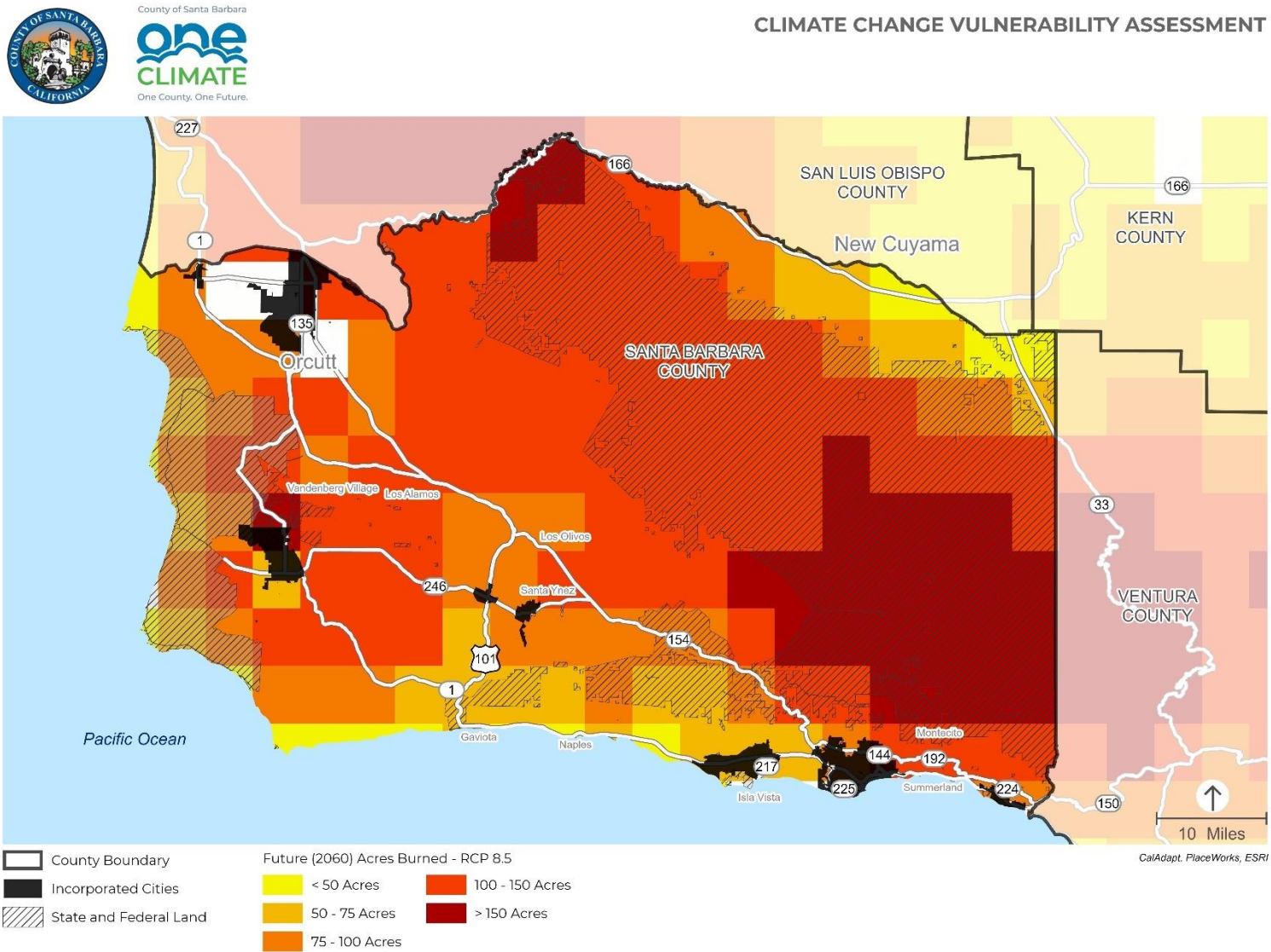


Figure 35. Projected Annual Average Acres Burned in the County in 2030





### Figure 36. Projected Annual Average Acres Burned in the County in 2060





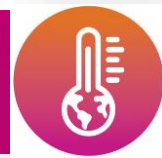
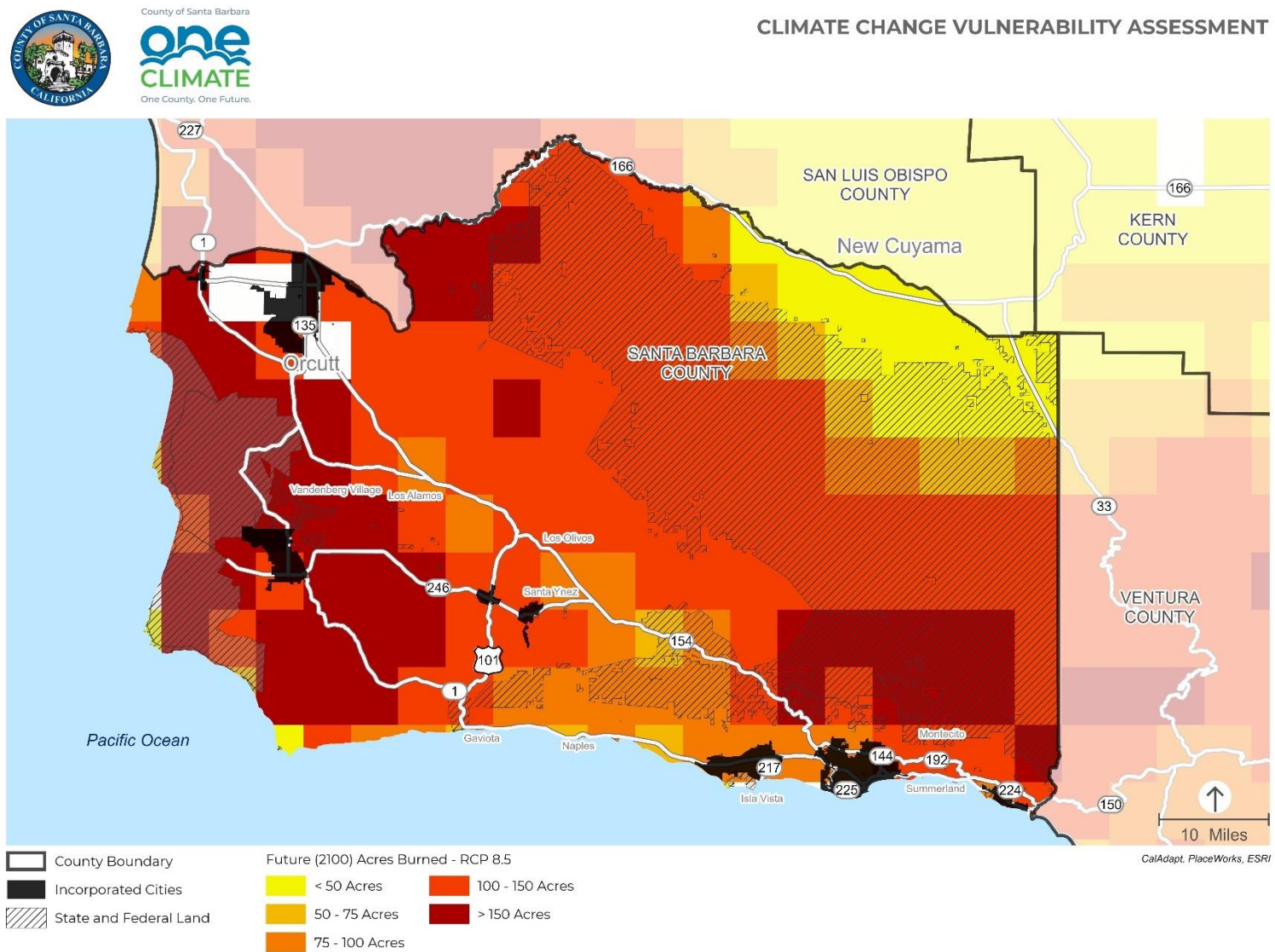


Figure 37. Projected Annual Average Acres Burned in the County in 2100





## Cascading and Compounding Hazards

The four primary climate stressors and secondary climate change hazards can also have cascading or compounding effects throughout the county. Cascading hazards are extreme events that link together hazards over days, weeks, or months, resulting in multiplied effects that cause secondary and sometimes tertiary damage, exceeding the damage of the initial hazard event. Cascading hazards tend to hit hardest in the social, economic, and infrastructure vulnerabilities caused by human interaction with the natural environment, such as buildings and infrastructure in hazard-prone areas. The destruction caused by the 2017 Thomas Fire and loss of life in the subsequent 2018 Montecito debris flow, followed by the disruption when US 101 closed, is an example of a cascading disaster. **Table 17** presents a non-exhaustive list of the cascading and compounding effects that are likely in Santa Barbara County due to climate change.








Photo Credit: Mark Bright

### Compounding and Cascading Effects of Wildfire






Many of the county's ecosystems, such as chaparral, are adapted and highly resilient to wildfire. However, increasing fire frequency and severity can negatively impact chaparral regeneration and lead to "type conversion," or changes in ecosystem types that can negatively impact plants and wildlife. Areas that once supported chaparral or woodlands can become other shrublands and grasses, which ignite more easily. Native conifers are also threatened by increasing fire severity as well as long-term drought. Increasing wildfire occurrence rates and severity, along with potential increases in the intensity of rainfall, can decrease the lifespan of our water reservoirs due to erosion and siltation. Increasing fire intensity is challenging many of the County's fire suppression strategies and tactics. As a result, we will continue to see damage and loss in our Wildland-Urban Interface communities. However, one long-term solution is a significant increase in risk mitigation and fire prevention activities such as fuels management, ignition prevention, and structure hardening.






**Table 17. Cascading Effects in Santa Barbara County**

Secondary Climate Hazard	Cascading Effects
<b>Increase in Air Temperature</b>	
<p>Agricultural Pests and Diseases</p> 	<ul style="list-style-type: none"> <li>Weakens crops, vineyards, and livestock, causing them to be more susceptible to harm from extreme heat and wildfire.</li> </ul>
<p>Extreme Heat</p> 	<ul style="list-style-type: none"> <li>Dries out vegetation, enabling a wildfire to spark or burn more quickly through an area.</li> <li>Weakens crops, vineyards, and livestock, making them more susceptible to agricultural pests and diseases.</li> <li>Causes cardiovascular and respiratory illnesses, making people more susceptible to other illnesses and diseases.</li> <li>Increases evaporation and evapotranspiration rates, worsening drought conditions.</li> <li>Increases the potential for planned or unplanned electricity blackouts.</li> </ul>
<p>Decrease in Fog</p> 	<ul style="list-style-type: none"> <li>Worsens extreme heat days by not providing relief from high temperatures.</li> <li>Impacts crops that rely on cooler temperatures.</li> <li>Harms coastal ecosystems can increase dune and bluff erosion, due to loss of vegetation.</li> <li>Can dry vegetation in dune habitats, increasing erosion.</li> </ul>
<p>Human Health Hazards</p> 	<ul style="list-style-type: none"> <li>Harms economic sectors if people are unable to perform their jobs.</li> </ul>
<p>Wildfire</p> 	<ul style="list-style-type: none"> <li>Burns vegetation on hillsides, destabilizing slopes and causing landslides or debris flows.</li> <li>Increases flooding due to the lack of vegetation on previously burned surfaces and debris in watersheds.</li> </ul>



Secondary Climate Hazard	Cascading Effects
<b>Changes in Precipitation Patterns</b>	
Agricultural Pests and Diseases 	<ul style="list-style-type: none"> <li>• Weakens crops, vineyards, and livestock, causing them to be more susceptible to harm from drought.</li> </ul>
Drought 	<ul style="list-style-type: none"> <li>• Dries out or changes vegetation, increasing natural fuel sources for wildfires.</li> <li>• Change(s) to or addition of new, permanent, or temporary local water supplies for drinking water and irrigation (e.g., increased dependence on groundwater or desalinated water), resulting in increases in the cost of water and/or to products dependent on water.</li> <li>• Worsens poor water quality.</li> </ul>
Inland Flooding 	<ul style="list-style-type: none"> <li>• Contributes to dune and bluff erosion downstream.</li> </ul>
Landslides and Debris Flows 	<ul style="list-style-type: none"> <li>• Debris from landslides can fill water bodies or drainage basins, leading to flooding.</li> </ul>
Severe Weather 	<ul style="list-style-type: none"> <li>• Heavy rainfall causes inland flooding and worsens coastal flooding.</li> <li>• Lightning can spark wildfires.</li> <li>• Strong winds spread wildfires more quickly and increase their intensity.</li> <li>• Strong winds cause the need for Public Safety Power Shutoffs.</li> </ul>



Secondary Climate Hazard	Cascading Effects
<p>Wildfire</p> 	<ul style="list-style-type: none"> <li>• Burns vegetation on hillsides, destabilizing the slopes and contributing to landslides or debris flows.</li> </ul>
<b>Sea Level Rise</b>	
<p>Coastal Storms</p> 	<ul style="list-style-type: none"> <li>• Increases inland flooding.</li> <li>• Increases saltwater intrusion into coastal aquifers.</li> </ul>
<p>Dune and Bluff Erosion</p> 	<ul style="list-style-type: none"> <li>• Exposes buildings and infrastructure behind dunes, increases coastal flooding.</li> <li>• Undermines the foundations of buildings along bluffs.</li> </ul>

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# Santa Barbara County Climate Change Vulnerability Assessment



Photo Credit: Mark Bright



Photo Credit: Mark Bright

## Vulnerability Assessment Results

### Population and Asset Considerations

While selecting and assessing various populations and assets to include in the Vulnerability Assessment, the project team kept a few considerations in mind, including 1) differences in the population sample pool between datasets, 2) the limitations of the data sources for Santa Barbara County that were used to prepare this assessment, and 3) how some population and asset categories may appear to refer to the same thing. In total, the Vulnerability Assessment evaluated the vulnerabilities for:

- ❖ 22 frontline populations groups
- ❖ 44 infrastructure types
- ❖ 26 building and facility types
- ❖ 11 economic drivers
- ❖ 12 ecosystems and natural resources
- ❖ 23 key services



## Population Sample Pool

Statistics, especially statistics related to population, use the concept of a “sample pool.” In the context of this Vulnerability Assessment, the sample pool draws from the overall group of people that are being measured or studied. For example, in a political poll among registered voters, the sample pool only includes registered voters, since unregistered voters do not fall into this category.

This concept is important for the Santa Barbara County Vulnerability Assessment because some of the demographics used in the Vulnerability Assessment have different sample pools. Most of the demographic data come from the US Census Bureau’s American Community Survey (ACS), and most of these data have a sample pool of either all residents or all households in the county. However, a few are different, such as:

- ❖ Data on persons with limited English proficiency only count people who are at least 14 years old instead of the total population, since young children generally are not proficient in any language.
- ❖ Statistics that only count the noninstitutionalized population (e.g., people not in prisons or long-term care homes).

This does not affect the outcome of the Vulnerability Assessment, but it creates slight differences in the number of people counted as part of each population.

## Data Limitations

The Vulnerability Assessment pulled in data from a wide array of sources. The project team used only reliable, credible sources with the best available information. In some cases, the Vulnerability Assessment was constrained by the lack of high-quality information or spatial information about the geographic distribution of particular populations or assets. For example, there is no accurate information about the distribution of undocumented persons in Santa Barbara County, and even information about the total number of undocumented persons countywide is an educated estimate. Because of this, the Vulnerability Assessment considered undocumented persons but cannot identify specific areas where they may face an elevated risk from certain hazards.

The climate change projections also have data limitations. For some of the secondary climate stressors—agriculture pests and diseases, decrease in fog, human health hazards, and severe weather—spatial data are not available, or projections have a high degree of uncertainty. For these hazards, the project team used peer-reviewed studies and the California Fourth Climate Change Assessment to supplement the information.





## Related Assets

Of the 138 populations and assets in the Vulnerability Assessment, a few may appear redundant. For example, the Vulnerability Assessment looked at both public safety buildings (as a Buildings asset) and at public safety response (as a Community Service asset). To be as comprehensive as possible, the Vulnerability Assessment looks at physical structures separately from the services or benefits they provide. In the same way, the Vulnerability Assessment looks at frontline or underserved populations separately from the homes they live in or the industries where they work.

This is because the effects of climate change on one type of population or asset can be different from the effects on related populations and assets. For example, if a flood damaged or destroyed a rural road, such as SR-166, it would have a significant impact on public safety services in and around the community of Cuyama, particularly if other areas in Santa Barbara County needed staff and resources. However, the loss of SR-166 would do no physical damage to police or fire stations. Similarly, a drought can have a major effect on water and wastewater services by reducing the amount of water available, but droughts have little or no physical effect on water and wastewater pipelines or pumps.

## Non-climate Stressors

Non-climate stressors are trends unrelated to climate that can nevertheless exacerbate impacts or impede adaptive capacity, making populations or assets more vulnerable.<sup>72</sup> They are also known as pre-existing conditions that can affect the adaptive capacity for populations and assets. Non-climate stressors are factors that make populations or assets especially susceptible to harm from hazards because the stressors may impair their ability to prepare for, respond to, or recover from hazards. Addressing existing non-climate stressors is essential for creating an overall resilient community. The following sections provide a non-exhaustive list of the non-climate stressors in each population and asset category.



### Populations

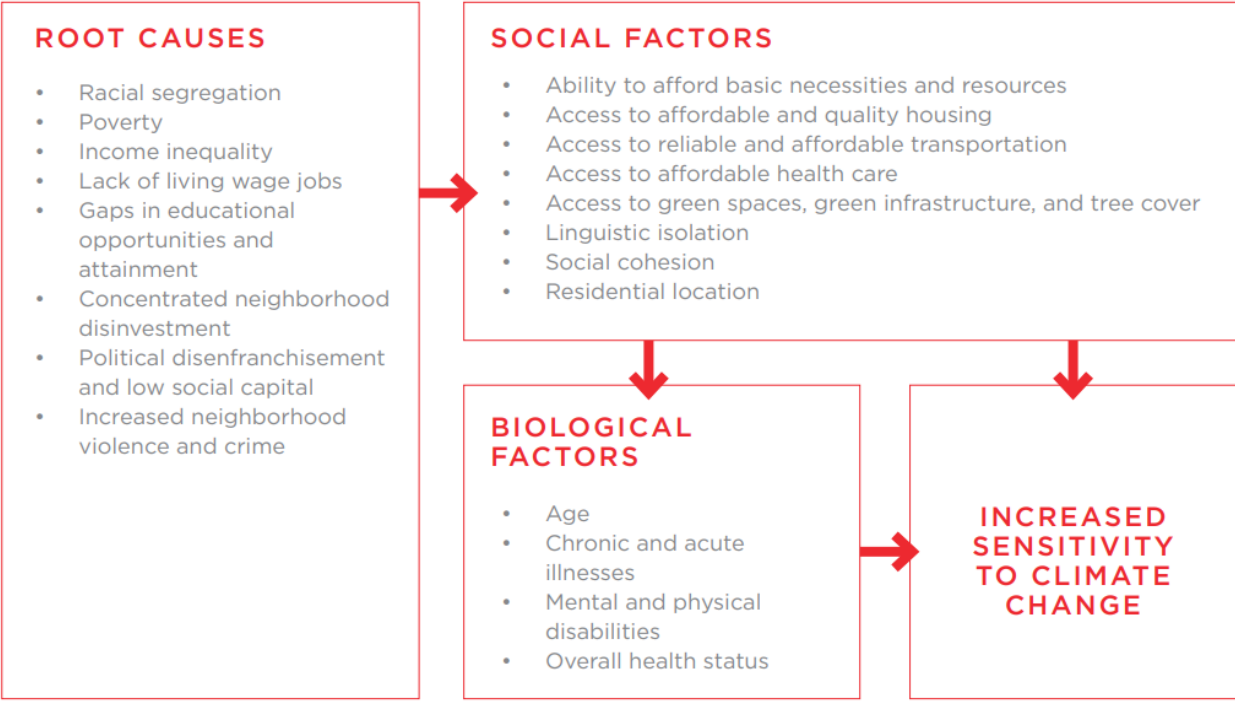
Each of the 22 frontline populations in the Vulnerability Assessment likely experience one or more non-climate stressors.

According to the Urban Sustainability Directors Network (USDN), three factors affect a person's sensitivity to climate change hazards—root causes, social factors, and biological factors.<sup>73</sup> Root causes include the institutionalized and structural discrimination practices that create disparities and inequities and result in frontline populations. Social factors include the location of residents, languages spoken, and ability to access basic



necessities and resources. This is factored into biological factors, such as age, illnesses, mental and physical disabilities, and overall health. As shown in **Figure 38**,<sup>74</sup> each of these are non-climate stressors that interact with one another to increase sensitivity and decrease adaptive capacity to climate change hazards.

**Figure 38. Non-climate Stressors Affecting Sensitivity to Climate Change**



Urban Sustainability Directors Network. 2017. Guide to Equitable Community-Driven Climate Preparedness Planning, Figure 2, Pg. 12. [https://www.usdn.org/uploads/cms/documents/usdn\\_guide\\_to\\_equitable\\_community-driven\\_climate\\_preparedness-\\_high\\_res.pdf](https://www.usdn.org/uploads/cms/documents/usdn_guide_to_equitable_community-driven_climate_preparedness-_high_res.pdf)



In Santa Barbara County, non-climate stressors include the following:

- ❖ Lack of affordable housing or homeownership
- ❖ Financial instability
- ❖ Remote location of housing or employment
- ❖ Language and communication barriers
- ❖ Mobility and/or health issues
- ❖ Citizenship status
- ❖ Distrust of government programs, staff, and officials
- ❖ Existing pollution burden
- ❖ Poor housing quality
- ❖ Lack of air conditioning, cool spaces, or reliable electricity supply
- ❖ Lack of community centers and shelters
- ❖ Lack of access to healthcare, transportation, or communication
- ❖ Educational attainment and availability of educational opportunities



### Buildings and Infrastructure

Buildings and infrastructure face several non-climate stressors primarily based on long-term funding for maintenance, expansion, and staff capacity. Long-term lack of funding and staff capacity for retrofits, repairs, and upgrades can cause climate change hazards to affect aging buildings, infrastructure, and technology more severely. In the case of remote location or topographic challenges, there may be little redundancy and few alternatives if buildings or infrastructure become unusable during a hazardous event. Even if funding and staff capacity are available, some buildings and infrastructure assets are difficult to relocate to prevent damage. Each of these non-climate stressors factors into the severity of impacts and the adaptive capacity of these assets.



### Economic Drivers

Non-climate stressors related to economic drivers can vary by the economic sector; however, the majority of the unincorporated county relies on agriculture, recreation, and tourism. These industries rely heavily on existing water quality and quantity as well as ecosystem services (e.g., land for recreation, cleaning the



air and water, flood protection).<sup>vii</sup> The industries may lack alternatives or may be subject to large-scale economic fluctuations. Non-climate stressors for other major employers in the county include lack of capital to change business practices, lack of funds to hire employees, lack of alternative buildings or infrastructure, difficulty in relocating, and large-scale economic fluctuations. These non-climate stressors can render economic drivers unstable, making it more difficult for them to prepare for climate change hazards and increasing the severity of impacts.



### Ecosystems and Natural Resources

Ecosystems and natural resources in the county can have several non-climate stressors because of pressures created by urban development. The Central Coast has several endemic species that only live in specific regions, and they might not be able to survive in alternative locations or conditions. Broader ecosystems may currently experience habitat fragmentation, which reduces the amount of suitable habitat available for plants and wildlife and decreases overall biodiversity. It may also limit an ecosystem's or resource's ability to migrate or adapt in response to climate change impacts. Human influences on natural resources can cause poor water, air, and soil quality as well as contamination from oil spills, all of which

stress the ecosystems and reduce their ability to provide ecosystem services.



### Key Services

Key community services include both the human aspect of people providing the services and the buildings and infrastructure that support the services, so the non-climate stressors are similar. Currently aging infrastructure and buildings could cause disruptions in services if they fail or need constant repairs. Several services rely on transportation infrastructure and may not have alternatives if transportation infrastructure fails. Funding is another key non-climate stressor because some services already lack funding to maintain operations. Key services need people to administer and maintain them, but people can experience the non-climate stressors listed under the Populations category, and some service sectors may have an overall lack of funding or capacity for staff.



<sup>vii</sup> Ecosystem services are the benefits that humans receive from ecosystems.



## Critical Vulnerabilities

The Vulnerability Assessment evaluates the impact and adaptive capacity of 138 populations and assets for each of the relevant 13 hazards. Vulnerability scores were assigned on a scale of 1 to 5 (as shown in Figure 6) to reflect how susceptible the population or asset is to the harm posed by the hazard. The project team assessed 963 different pairings for vulnerability, 361 of which scored as highly or severely vulnerable (V4 or V5). This section summarizes the key vulnerabilities in unincorporated Santa Barbara County, which only includes descriptions of population and assets with high or severe vulnerability (scores of V4 or V5). The population and assets are grouped by common categories because many of them share similar reasoning for impacts and adaptive capacity. For example, bus routes, evacuation routes, and major roads and highways all depend on the County roadway network and would therefore experience similar impacts and have similar adaptive capacities. For a detailed list of vulnerability scores for all populations and assets, refer to **Appendix D**.

### Critical Vulnerability Table Legend

Agricultural Pests and Diseases		Human Health Hazards	
Coastal Storms		Landslides and Debris Flows	
Drought		Ocean Acidification	
Dune and Bluff Erosion		Sea Level Rise	
Extreme Heat		Severe Weather	
Inland Flooding		Wildfire	
Decrease in Fog			



## Populations

The most vulnerable frontline populations are those with limited mobility, limited resources, existing social or economic disparities, and/or those directly endangered by climate change hazards. These communities may have existing conditions that make it more difficult for them to prepare, respond, and recover from disasters, and existing help may be limited, especially for frontline populations in the Cuyama Valley subregion, which are isolated from other areas of the county. The County and community-based organizations have several programs that can help these communities, such as the Independent Living Resource Center's Disaster Plan Program, Housing and Homelessness COVID-19 Taskforce, 805UnDOCUFund, CommUnify, weatherization programs, and evacuation assistance programs.<sup>75</sup> However, the lack of a formal extreme heat plan, isolated and rural portions of the county, health and emergency information distributed in inaccessible languages, and inability to access critical information may prevent frontline populations from adequately responding and recovering from hazardous events.<sup>76</sup>

### Disaster Plan Program: Independent Living Resource Center

The Independent Living Resource Center (ILRC) is a private nonprofit organization providing disability services and advocacy for San Luis Obispo, Santa Barbara, and Ventura counties. An essential program of the ILRC is the Disaster Plan Program, which help persons with disabilities prepare for and respond to disasters. These plans include hazard-specific disaster planning based on where an individual lives and include a planned evacuation route, a go kit, and places to shelter if an individual is unable to evacuate.

Additionally, the ILRC is working with PG&E to provide batteries to those who depend on electricity for medical devices or medicine refrigeration. Programs that the ILRC offers include individual support with medical baseline and early alerts for PSPS events, transportation services to hotels or medical appointments, food deliveries and food replacement if lost due to a hazard, and educational events.



Of the 22 frontline populations evaluated in the Vulnerability Assessment, 21 were highly or severely vulnerable (scoring V4 or V5) for at least one hazard type. Populations generally are most vulnerable to extreme heat, human health hazards, and wildfire. The most vulnerable frontline populations include households in poverty, low-resource people of color, outdoor workers, and senior citizens living alone. **Table 18** summarizes the high (V4) and severe (V5) population vulnerabilities in the unincorporated areas of Santa Barbara County. **Table 19** shows which population types are highly or severely vulnerable to each applicable hazard. Blank squares in this table indicate that a hazard is not applicable to a population type, and gray squares indicate that the hazard is applicable, but the score is less than V4 (highly vulnerable).

### Vulnerability of Pregnant Women to Climate Change Hazards

Pregnant and nursing women are uniquely vulnerable to climate change hazards due to the physiological changes that occur during and after pregnancy. Pregnant and nursing women are more susceptible to dehydration, which can increase due to extreme heat events or unreliable water supplies in drought conditions. Human health hazards, such as Zika virus or Dengue, may increase with severe weather and flooding, which can cause microcephaly and other diseases in fetuses. During emergencies, such as road closures, pregnant women may not be able to reach essential services at one of the two hospitals that provide labor and delivery services. Mobility constraints may also make it difficult to evacuate during disasters. Due to the temporary condition of pregnancy, there is no spatial data to pinpoint where this population lives in the county; however, they are captured in the CCVA through the analysis of persons with limited mobility or chronic health conditions.

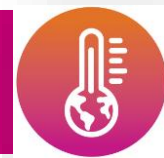
Source: Public Health Institute, Center for Climate Change and Health. 2016. "Climate Change and Pregnant Women". <https://climatehealthconnect.org/wp-content/uploads/2016/09/PregnantWomen.pdf>.



**Table 18. Frontline Population Vulnerabilities**

Population Category	Frontline Population Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Persons with high outdoor exposure	<ul style="list-style-type: none"> <li>Children</li> <li>Outdoor workers</li> <li>Persons experiencing homelessness</li> </ul>	<ul style="list-style-type: none"> <li>Mobility and/or health issues</li> <li>Lack of air conditioning or cool spaces</li> <li>Lack of access to healthcare, transportation, or communication</li> </ul>	<p>Longer exposure to outdoor conditions can increase the risk of these populations developing heat-related illnesses, catching illnesses from pests and diseases, and acquiring respiratory or cardiovascular conditions from smoke inhalation. Outdoor work and outdoor sports can be halted in hazardous conditions. Persons experiencing homelessness can face physical harm and loss of belongings during and after climate change hazard events.</p>	<p>Persons with high outdoor exposure may be unable to seek adequate shelter or evacuate during hazardous conditions or be aware that hazardous conditions are occurring due to age, working conditions, or living conditions. Programs such as cooling centers, homeless shelters, and adult education programs are available in some areas of the county. However, these populations can be difficult to reach during emergencies. Cal/OSHA's heat illness prevention standards require employers to provide water, shade, and rest during unhealthy condition; however, this still may not be sufficient to protect workers.</p>	





Population Category	Frontline Population Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Income-constrained communities	<ul style="list-style-type: none"> <li>• Cost-burdened households</li> <li>• Households in poverty</li> <li>• Low-income households</li> <li>• Unemployed persons</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of affordable housing</li> <li>• Financial instability</li> <li>• Poor housing quality</li> <li>• Lack of air conditioning and cool spaces</li> <li>• Lack of access to healthcare</li> </ul>	<p>Income constrained communities may live in structures that are less structurally sound and can be damaged or destroyed by climate change hazards.<sup>77</sup> Indoor air quality can become unhealthy due to mold and mildew, smoke conditions, or high indoor air temperatures, causing heat-related and respiratory illnesses.<sup>78</sup> Income constrained communities may be unable to pay for increased water or electricity utility bills or afford to take time off of work for health concerns.<sup>79</sup> During emergencies, people in these communities may be unable to evacuate due to limited financial resources or lack of transportation, and they may have few places to go due to income constraints.</p>	<p>Income constrained communities may not have health insurance or access to healthcare to treat illnesses created or worsened by climate change hazards. Financial instability may also cause these communities to have limited capacity to retrofit homes to resist damage from hazards or recover from hazards if damaged. There are several low-income weatherization assistance programs that can help retrofit homes; however, these communities may be unaware of these programs or not able to qualify.<sup>80</sup></p>	



Population Category	Frontline Population Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
<p>Persons with limited mobility or chronic health conditions</p>	<ul style="list-style-type: none"> <li>• Persons with chronic health problems</li> <li>• Persons with disabilities and access and functional needs</li> <li>• Persons without access to transportation or telecommunications</li> <li>• Senior citizens</li> <li>• Senior citizens living alone</li> </ul>	<ul style="list-style-type: none"> <li>• Mobility and/or health issues</li> <li>• Financial instability</li> <li>• Lack of air conditioning, cool spaces, or reliable electricity supply</li> <li>• Lack of access to transportation or communication</li> </ul>	<p>Persons with limited mobility or chronic health conditions may face elevated health risks during hazardous events due to loss of electricity supply, inability to evacuate, and inability to receive emergency messages, and exposure to conditions that may worsen or cause new illnesses. These persons may be unable to prepare their homes for disasters or receive basic services at evacuation or cooling centers.<sup>81</sup></p>	<p>Services such as SMOOTH, Easy Lift, or the Senior Ride Program can assist these persons in seeking shelter or evacuating during hazardous conditions.<sup>82</sup> The Independent Living Resource Center also provides emergency preparedness resources for those with disabilities or chronic health conditions and can help prepare these persons for disasters.<sup>83</sup> However, persons with limited mobility or chronic illnesses may still have difficulty evacuating due to medicine or equipment needs. Existing chronic illnesses can also make new illnesses from climate change hazards more difficult to treat.</p>	



Population Category	Frontline Population Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Persons living in remote areas or in locations with limited roadway access	<ul style="list-style-type: none"> <li>Isolated and rural communities</li> <li>Persons living on single access roads</li> </ul>	<ul style="list-style-type: none"> <li>Remote location of housing or employment</li> <li>Lack of community centers and shelters</li> <li>Lack of access to communication</li> </ul>	Persons living in areas with limited access could become isolated if climate change hazards cause roadways to become impassable, preventing them from evacuating or receiving basic goods and services. These communities may have limited water and energy supplies that can be damaged by hazardous events, or a lack of backup supplies, leaving people without water or electricity for hours or days.	Persons living in areas with limited access can prepare their homes and communities for hazardous conditions through retrofitting buildings and infrastructure and creating emergency supply kits if they have the financial means. However, these communities may be unable to receive emergency notifications or may not have access to alternative roadways to evacuate, or utilities may not be available to provide or quickly restore services to the area.	



Population Category	Frontline Population Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
<p>Persons living in nonresilient living conditions</p>	<ul style="list-style-type: none"> <li>Households in mobile homes</li> <li>Overcrowded households</li> <li>Renters</li> </ul>	<ul style="list-style-type: none"> <li>Lack of affordable housing or homeownership</li> <li>Poor housing quality</li> </ul>	<p>Persons living in nonresilient living conditions may experience unhealthy living conditions due to increased indoor air temperatures, mold and mildew growth, and close living quarters causing the spread of illnesses. These households may pay more in energy and water bills due to lack of control over the housing unit or inability to retrofit the home. If the homes are not well-maintained, these risks are exacerbated.</p>	<p>Persons living in nonresilient living conditions may be unable to retrofit their homes to reduce damage or unhealthy living conditions from hazards due to lack of homeownership or lower income levels. Some households may be able to participate in low-income weatherization programs; however, this may not be possible for renters or households in mobile homes.</p>	



Population Category	Frontline Population Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Persons with limited resources and/or living in high pollution areas	<ul style="list-style-type: none"> <li>Communities with high pollution burden</li> <li>Low-resourced people of color</li> <li>Persons with limited English proficiency</li> <li>Undocumented persons</li> </ul>	<ul style="list-style-type: none"> <li>Financial instability</li> <li>Language and communication barriers</li> <li>Citizenship status</li> <li>Distrust of government programs</li> <li>Existing pollution burden</li> <li>Poor housing quality</li> <li>Lack of air conditioning or cool spaces</li> <li>Lack of access to healthcare or communication</li> </ul>	<p>Persons with limited resources and/or living in high pollution areas often face disparities in living conditions and institutionalized biases that reduce access to high-quality housing. This can cause people in these populations to live in housing that may be substandard or is located in areas exposed to hazardous conditions.<sup>84</sup> Their homes can be damaged or destroyed or they can be exposed to unhealthy living conditions due to smoke, high indoor air temperatures, and mold or mildew growth. In some cases, existing illnesses can be exacerbated by climate change hazards.</p>	<p>Disparities in living conditions and institutional biases may cause persons with limited resources and/or living in high pollution areas, to prepare for or recover from hazardous events.<sup>85</sup> Due to citizenship status or language barriers, these persons may be afraid to seek help, qualify for, or connect with disaster-relief services during, or after a disaster.<sup>86</sup> Language barriers may also prevent this group from receiving evacuation and other emergency notifications, decreasing their ability to adequately prepare for and respond to hazardous events.<sup>87</sup></p>	



**Table 19. Frontline Populations Highly and Severely Vulnerable to Climate Change Hazards**

Frontline Population Types											
Children		-			V5	-	-	V4		-	V4
Communities with high pollution burden		-	V5	-	V4	V4	V5	-		-	V5
Cost-burdened households		-	-	V4	V4	-	-	V4		-	-
Households in mobile homes					V5	V4	-	-		V4	-
Households in poverty		V4	V5	-	V5	V5	V5	V4		V5	V5
Isolated and rural communities	-		V4	V5	V4	V4	-	V5		V4	V4
Low-income households		-	-	-	-	-	-	-		-	V4
Low-resourced ethnic minorities people of color	V4	-	V4	-	V5	V5	V4	V4		V4	V5
Outdoor workers	V4	-	V5	-	V5	V4	V5	V4	-	V4	V5
Overcrowded households		-			-	-	V4	-		-	-
Persons experiencing homelessness		V5			V5	V5	V5	V5		V5	V5
Persons living on single access roads		V4		V5	-	V4	-	V5	V4	V4	V4
Persons with chronic health problems		-			V5	-	V5	V4		V4	V4



Frontline Population Types											
Persons with disabilities and access and functional needs		V4		-	V4	V4	-	V5		V4	V4
Persons with limited English proficiency		-		-	-	-	-	V4		-	-
Persons without a high school degree		-		-	-	-	-	-		-	-
Persons without access to transportation or telecommunications		V4		-	V4	V5	-	V4		V4	V4
Renters		-		V4	-	-	-	-		-	-
Senior citizens		-		-	V4	V4	V4	V4		-	V4
Senior citizens living alone		V4		V4	V5	V5	V5	V5		V4	V5
Unemployed persons		-			-	-	-	-		-	V4
Undocumented persons	V5	-			V5	V5	V5	V4		V5	V5

Note: Blank squares in this table indicate that a hazard is not applicable to a frontline population type, and gray squares indicate that the hazard is applicable, but the score is less than V4 (highly vulnerable).



## Infrastructure

The most vulnerable infrastructure types are transportation- and water-related infrastructure.

Several major pieces of transportation and transit infrastructure, such as US-101 and single access roads along the South Coast (Hollister Ranch Road, Sandspit Road, Fernald Point Lane, and Edgecliff Lane) are in close proximity to the coastline, increasing the likelihood of damage by coastal hazards. Bridges along SR-166, a major inland route, can be damaged by inland hazards, such as landslides, flooding, and wildfire. Many of these routes have multiple uses beyond just daily commuting, such as bus routes, evacuation routes, and regional economic corridors, which can be disrupted by both coastal and inland hazards in all regions of the county. Severely vulnerable inland transportation and transit routes include US-101 through the Gaviota Pass, SR-154 through the San Marcos Pass, SR-246 between Buellton and Lompoc, and SR-166 through the Sierra Madre Mountains. In some cases, there are fuel reduction, slope stabilization, coastal armoring, and flood infrastructure projects to protect these routes from climate change hazards; however, these routes may have few or no alternatives for the communities that rely on them, making them highly or severely vulnerable to several hazards.

The Union Pacific Railroad carries both freight and passenger services and is also located along the westernmost and southernmost edges of the county, in close proximity to the coastline. Due to the lack of alternative railroads and space to move the railroad inland, the entire railroad through the county is highly or severely vulnerable to coastal hazards. Proximity to floodplains, steeply sloped areas, and high fire hazard zones also make this asset highly vulnerable to inland flooding, landslides, and wildfire. If one section of the railroad were damaged, the entire line would cease to function.

Water and wastewater infrastructure, including the Goleta and Goleta West Sanitation District facilities, El Estero Water Resource Center, and Santa Barbara Desalination Plant, can be damaged or malfunction due to temporary or permanent coastal flooding by 2060.<sup>88</sup> Pipelines going through steeply sloped areas of the Santa Ynez Mountains can be disrupted due to landslides or debris flows. These facilities are large, expensive, and complex systems with little to no redundancy, and therefore rerouting water and wastewater lines if a treatment plant is relocated, or a new one is built can be difficult.





Of the 44 infrastructure types evaluated in the Vulnerability Assessment, 39 were highly or severely vulnerable (scoring V4 or V5) for at least one hazard type. Infrastructure is generally most vulnerable to wildfire, inland flooding, and landslides. The most vulnerable infrastructure types were evacuation routes, major roads and highways, railroads, and single access roads. **Table 20** provides a summary of the high (V4) and severe (V5) infrastructure vulnerabilities in the unincorporated areas of Santa Barbara County. **Table 21** shows which infrastructure types are highly or severely vulnerable to each hazard. Blank squares in this table indicate that a hazard is not applicable to an infrastructure type, and gray squares indicate that the hazard is applicable, but the score is less than V4 (highly vulnerable).

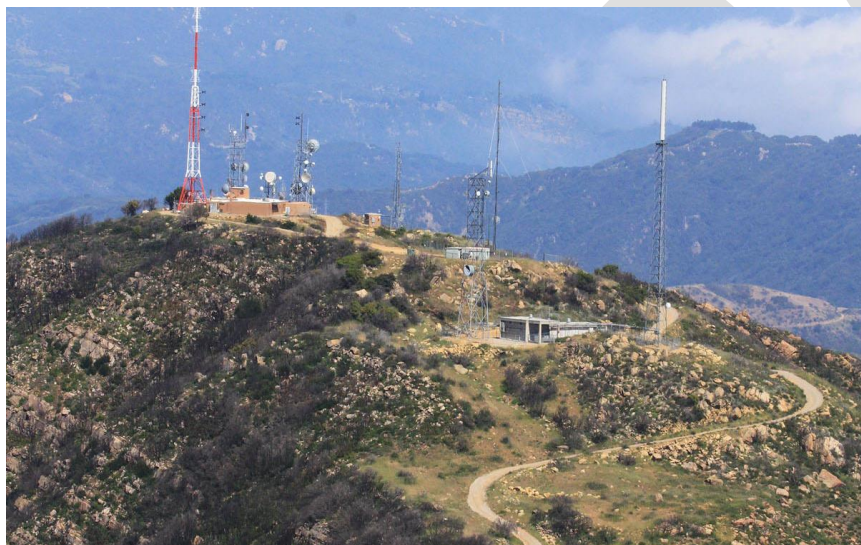


Photo Credit: Mark Bright

## Adaptation Planning in Transportation Infrastructure

In 2020, the Santa Barbara County Association of Governments (SBCAG) completed a Multi-Modal Transportation Network Resiliency Assessment. The county's multimodal transportation network includes highways, arterial roads, and surface streets; bus transit routes, stops, and stations; the Union Pacific Railroad and the Amtrak routes and stations; the Santa Barbara Municipal Airport; and the county's network of bicycle paths. SBCAG's vulnerability assessment, the first product in the Resiliency Assessment, identifies 10 high-priority transportation systems, selected for their criticality to the county. It evaluates each high-priority transportation system and the current usage of the system, the importance of the system for emergency access, and the degree to which it serves low-income communities as well as its duplicability with already-selected systems. The high-priority systems are:

- US-101 Corridor
- Mission Drive (CA 246)
- San Marcos Pass Road (CA 154)
- Broadway/Orcutt Expressway (CA 135)
- Hollister Avenue/State Street
- Union Pacific Railroad
- Santa Barbara Municipal Airport/Goleta Slough
- Santa Barbara Train Station
- Breeze Bus Santa Maria – Lompoc
- UCSB Bicycle Paths



**Table 20. Infrastructure Vulnerabilities**

Infrastructure Category	Infrastructure Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
<p>Transportation and transit infrastructure</p>	<ul style="list-style-type: none"> <li>• Airports</li> <li>• Bridges</li> <li>• Bus routes</li> <li>• Evacuation routes</li> <li>• Major roads and highways</li> <li>• Railroads</li> <li>• Single-access roads</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of funding and staff capacity for retrofits, repairs, and/or upgrades</li> <li>• Lack of alternatives or redundancy</li> <li>• Aging infrastructure</li> <li>• Difficulty in relocating</li> </ul>	<p>Transportation and transit infrastructure can be damaged, blocked, inundated, or destroyed by climate change hazards. Chronic hazards can also speed up the deterioration of pavement, railways, and other materials supporting this infrastructure. If blocked or damaged, these facilities could prevent movement of people, goods, or services, including evacuating during emergencies, which could affect the regional economy. Major corridors and assets at risk include the Union Pacific Railroad, US-101, SR-166, SR-154, SR-246, SR-192, Hollister Ranch Road, and the Santa Barbara Municipal Airport.</p>	<p>Transportation and transit infrastructure can be hardened, raised, moved farther inland, and upgraded with materials that will last longer under hazardous conditions. However, the infrastructure may not be usable for days or weeks if it is damaged by climate change hazards and requires repairs. In some areas of the county, there are no or few alternative transportation infrastructure options that can be brought online.</p>	



Infrastructure Category	Infrastructure Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Park and recreation infrastructure	<ul style="list-style-type: none"> <li>• Beaches</li> <li>• Bicycle routes</li> <li>• Hiking trails</li> <li>• Parks and open space</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of funding and staff capacity for retrofits, repairs, and/or upgrades</li> <li>• Lack of alternatives or redundancy</li> <li>• Difficulty in relocating.</li> </ul>	<p>Park and recreation infrastructure can be damaged, inundated, or destroyed by climate change hazards, disrupting regional recreation and tourism economy in the county. Parks and bicycle routes along the South Coast and beaches can be inundated by sea level rise and coastal storms, or the foundations of facilities can deteriorate due to dune erosion. In the inland areas of the county, trails can be blocked, and park facilities can be damage or destroyed, causing these facilities to become unusable.</p>	<p>Park and recreation infrastructure can be hardened, moved farther inland, or upgraded with materials that will last under hazardous conditions. Park facilities may be able to be repaired if damaged by climate change hazards; however, this could be expensive for repetitive loss facilities and may not be financially feasible. Alternative park and recreation facilities may be available; however, people may have to travel to another sub-region to use these facilities.</p>	



Infrastructure Category	Infrastructure Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Electrical infrastructure	<ul style="list-style-type: none"> <li>• Electric vehicle charging stations</li> <li>• Electrical substation</li> <li>• Electrical transmission and distribution lines</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of funding and staff capacity for retrofits, repairs, and/or upgrades</li> <li>• Lack of alternatives or redundancy</li> </ul>	<p>Electricity infrastructure can be damaged or destroyed by climate change hazards, preventing electricity from traveling to residents and businesses in the county. In extreme heat conditions, increases in air conditioning use can stress and overload the grid, causing power outages and potential damage to electricity transmission lines and substations. During severe wind events, electricity transmission lines can be damaged or turned off by PG&amp;E or SCE, causing widespread power outages and hardships for County residents. Drought can also reduce electricity generation, which can harm statewide electricity transmission networks.</p>	<p>To prevent damage, electricity infrastructure can be turned off; however, this causes secondary affects to those relying on the electricity for critical services. Electrical infrastructure can be cleared of nearby vegetation, retrofitted to resist damage, or undergrounded to prevent secondary impacts from occurring. However, this can be expensive and due to the large size of the system, this could take several years to complete. EV charging stations and fuel pumps may be able to install backup battery systems to ensure that people can still use the infrastructure during power outages.</p>	



Infrastructure Category	Infrastructure Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Water, wastewater, and flood control infrastructure	<ul style="list-style-type: none"> <li>• Dams</li> <li>• Flood control infrastructure</li> <li>• Water and wastewater infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of funding and staff capacity for retrofits, repairs, and/or upgrades</li> <li>• Lack of alternatives or redundancy</li> <li>• Difficulty in relocating</li> </ul>	<p>Water, wastewater, and flood control infrastructure can become overwhelmed by water and debris from climate change hazards, causing them to malfunction and become damaged. The foundations supporting these structures can also be damaged from ground movement or inundation. Drought and flooding conditions can prevent dams and wastewater infrastructure from functioning properly, causing secondary impacts and contamination of the soil and water.</p>	<p>Water, wastewater, and flood control infrastructure is highly regulated and can be hardened to prevent damage from climate change hazards. However, this infrastructure is very difficult and expensive to move or raise outside of a hazard prone area. Additional pumping or pipeline systems may have to be installed to keep this infrastructure functioning properly.</p>	





Infrastructure Category	Infrastructure Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Communication facilities	<ul style="list-style-type: none"> <li>Communication facilities</li> </ul>	<ul style="list-style-type: none"> <li>Lack of funding and staff capacity for retrofits, repairs, and/or upgrades</li> <li>Lack of alternatives or redundancy</li> </ul>	<p>Communication systems, such as cell towers, are nearly all in landslide-prone areas of the county, which can undermine the foundations supporting these systems. Severe winds on these steep slopes can also damage communication facilities. Public Safety Power Shutoffs can shut off the power supply to these facilities. Phone and internet service are already unreliable in some areas of the county and hazardous events can worsen these conditions.</p>	<p>In some areas of North County and South Coast there are several redundancies in the communication system, such as multiple cell towers or internet cabling, that can be brought online if others fail. However, in remote areas of North County and Cuyama Valley, there are few redundancies. Communication systems can also be retrofitted to prevent damage and keep communication capabilities on.</p>	



Infrastructure Category	Infrastructure Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Oil and gas infrastructure	<ul style="list-style-type: none"> <li>Oil and gas infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Difficulty in relocating</li> </ul>	<p>Oil and gas infrastructure, including wells, pipelines, and storage facilities, can be damaged by inundation from coastal storms, undermined by dune and bluff erosion and landslides, or burned by wildfires.<sup>89</sup> Damage to these facilities can cause toxic materials to be released into the surrounding air, water, and soil. This can negatively affect both the local economy and public health.</p>	<p>Oil and gas infrastructure is typically highly regulated and must account for hazardous materials released during a natural disaster. However, these facilities may not have accounted for an increase in frequency and intensity of hazardous events due to climate change and few are actively monitored for damage.<sup>90</sup> Oil and gas infrastructure can be retrofitted to resist damage from these hazards; however, this infrastructure is difficult to relocate outside of hazard prone areas.</p>	



Infrastructure Category	Infrastructure Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Landfills and transfer stations	<ul style="list-style-type: none"> <li>Landfills and transfer stations</li> </ul>	<ul style="list-style-type: none"> <li>Lack of funding and staff capacity for retrofits, repairs, and/or upgrades</li> <li>Difficulty in relocating</li> </ul>	Landfills and transfer stations in landslide prone areas, such as Lompoc Sanitary Landfill, Tajiguas Landfill, and Santa Maria Regional Landfill, can be damaged by landslides that move the materials stored at these facilities. Disaster debris management, from debris flows, can also affect the landfills capacity and lifespan, and may overwhelm the system.	Landfills are highly regulated by the California Department of Resources Recycling and Recovery (CalRecycle) and must go through inspections and permitting processes to maintain operations. <sup>91</sup> However, increased debris from hazardous events may not be accounted for in long-term planning of these facilities, which can affect their lifespan.	
Military infrastructure	<ul style="list-style-type: none"> <li>Military bases</li> </ul>	<ul style="list-style-type: none"> <li>Difficulty in relocating</li> </ul>	Vandenberg Space Force Base is located within a wildfire prone area. Wildfires can cause major disruptions to base operations and damage critical facilities.	Vandenberg Space Force Base can conduct vegetation management and create defensible space around buildings to prevent damage from wildfires. However, roadways and buildings may not be useable for hours or days if damaged by a wildfire.	





**Table 21. Infrastructure Highly and Severely Vulnerable to Climate Change Hazards**

Infrastructure Types									
Airport (Commercial)	V4				V4		V5	-	-
Airport (Military)								-	-
Airport (Public-noncommercial)					V5	-		-	-
Beaches	V5		V5		-	-	V5	-	-
Bicycle routes (North County)	-	-			-	V4		-	V4
Bicycle routes (Cuyama Valley)		-			-			-	-
Bicycle routes (South Coast)	V4	-	V4		-	V4	V4	-	-
Bridges (North County)	-				V4	V5		V4	-
Bridges (Cuyama Valley)					V5	V4		V5	-
Bridges (South Coast)	-		-		V4	V4	-	V5	-
Bus routes (North County)				-	V4	V3		-	V5
Bus routes (Cuyama Valley)				-	V5	V4		V4	V5
Bus routes (South Coast)	-		V4	-	V4	V4	-	-	V4
Communication facilities	-		-	-	-	V4	-	V4	-
Dams					-	V4		-	-
Electric vehicle charging stations	-		-	-	-	-	-	V4	-
Electrical substations	-			V4	-	-	-	-	V4
Electrical transmission and distribution lines	-			V5	-	V4		V4	V5



Infrastructure Types									
Evacuation routes (North County)			-		V4	V4		-	V4
Evacuation routes (Cuyama Valley)					V5	V4		V4	V5
Evacuation routes (South Coast)	V4		V4		V4	V5	V4	V4	V4
Flood control infrastructure	V5				-	V4	V4	V4	-
Hiking trails (North County)		-	-		-	V4		-	V4
Hiking trails (Cuyama Valley)		-			-	-		-	V4
Hiking trails (South Coast)	-	-	-		-	V4	V1	-	V4
Landfills and transfer stations	-				-	V4		-	-
Major roads and highways (North County)			-	-	V4	V4		-	V4
Major roads and highways (Cuyama Valley)				-	V5	V4		V4	V5
Major roads and highways (South Coast)	V4		V4	-	V4	V5	V4	V4	V4
Military bases	-		-		-	-	-	-	V4
Parks and open space (North County)	-	-	-	-	-	-	-	-	-
Parks and open space (Cuyama Valley)		-		-	-	-		-	-



Infrastructure Types									
Parks and open space (South Coast)	V4	-	V4	-	-	-	-	-	-
Power plants		-	-	-	-	-		-	-
Railroads	V5		V5	V4	V4	V5	V4	-	V5
Oil and gas infrastructure (North County)					-	V4		-	V4
Oil and gas infrastructure (Cuyama Valley)					-	-		-	V4
Oil and gas infrastructure (South Coast)	V4		V5		-	-	-	-	V4
Single access roads (North County)				-	V5	V4		V4	V5
Single access roads (Cuyama Valley)				-	-	V4		V4	V5
Single access roads (South Coast)	-		V5	-	V4	V5	V4	V4	V5
Water and wastewater infrastructure (North County)		-			-	-		-	V4
Water and wastewater infrastructure (Cuyama Valley)		V4			-	-		-	V4
Water and wastewater infrastructure (South Coast)	V5	-	V4		-	V4	V5	-	V4

Note: Blank squares in this table indicate that a hazard is not applicable to an infrastructure type, and gray squares indicate that the hazard is applicable, but the score is less than V4 (highly vulnerable).



## Buildings and Facilities

The most vulnerable buildings and facilities throughout the County are homes, residential structures, and residential opportunity sites. In coastal areas along the South Coast, these buildings can be damaged or destroyed by coastal hazards. Along bluff tops, they can fall into the ocean along with the bluffs. In inland areas in all subregions of the county, homes can become uninhabitable due to mold and mildew growth from inland flooding, foundation failures from landslides, and damage from severe weather or wildfire. These structures can be retrofitted, upgraded, or raised to prevent damage, but these solutions can be expensive or infeasible for property owners to complete.

Historic buildings and facilities are also highly vulnerable to climate change hazards, which can damage or destroy them, including their historic significance. Not only can retrofits or repairs be expensive, but they can cause these sites to lose their historic significance.

In Cuyama Valley, specifically New Cuyama, schools and commercial buildings are highly vulnerable to inland flooding, extreme heat, and severe weather. These buildings can be damaged, deteriorate more quickly, or cease to function as needed due to high winds, heavy rainfall, and heat waves. Due to the remoteness of the area, there are few alternative buildings and facilities that

could meet the demand of the community. In addition, building owners may not be able to afford retrofits.

The County and several community-based organizations have weatherization programs that can help owners upgrade buildings and facilities and protect them from a variety of hazards. These programs include Property Assessed Clean Energy Financing, Go Green Financing, SoCal Gas tax deductions, and funding through the California Earthquake Commission. There are also several wildfire reduction and mitigation programs available in certain areas of the county, including defensible space surveys and inspection programs, community chipping programs, and vegetation management programs through the California Vegetation Treatment Program. The Santa Barbara County Fire Department is also working with CAL FIRE and Santa Barbara County Fire Safe Council to develop and update Community Wildfire Protection Plans and assist with the development of a Regional Wildfire Mitigation Program, which will buffer development in the wildland-urban interface, prioritize retrofits, and conduct FireWise training in fire-prone areas.<sup>92</sup>

Of the 26 buildings and facility types evaluated in the Vulnerability Assessment, 12 were highly or severely vulnerable (scoring V4 or V5) for at least one hazard type. Buildings and facilities are generally most vulnerable to inland flooding and wildfire. The most vulnerable building types are residential structures and residential opportunity



sites, especially in the South Coast subregion. **Table 22** summarizes high (V4) and severe (V5) building and facility vulnerabilities in the unincorporated areas of Santa Barbara County. **Table 23** shows which buildings and facility types are highly or severely vulnerable to each hazard. Blank squares in this table indicate that a hazard is not applicable to a building or facility type, and gray squares indicate that the hazard is applicable, but the score is less than V4 (highly vulnerable).



Photo Credit: Mark Bright

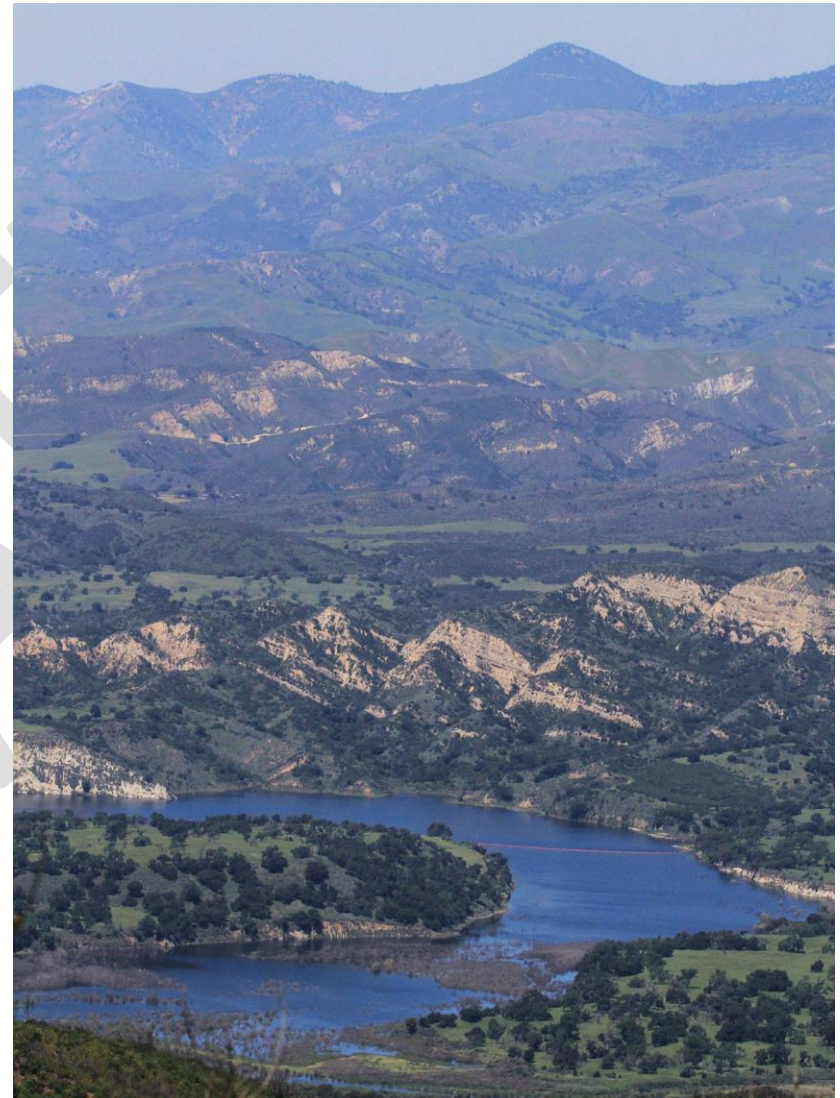


Photo Credit: Mark Bright



**Table 22. Building Vulnerabilities**

Building Category	Building Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Education buildings	<ul style="list-style-type: none"> <li>Schools</li> </ul>	<ul style="list-style-type: none"> <li>Lack of funding for retrofits, repairs, and/or upgrades</li> <li>Lack of alternatives</li> <li>Aging buildings</li> </ul>	Education buildings can be damaged or deteriorate more quickly due to climate change hazards. These facilities may also not have adequate heating, ventilation, and air conditioning systems to maintain healthy air temperatures.	In the Cuyama Valley, there are few alternative schools that could be used if the elementary school or high school were to be damaged by hazard events. Schools can be retrofitted and upgraded to resist damage for hazards; however, this can be expensive for school districts to complete for all schools.	
Community and government facilities	<ul style="list-style-type: none"> <li>Community centers</li> <li>Libraries</li> </ul>	<ul style="list-style-type: none"> <li>Lack of funding for retrofits, repairs, and/or upgrades</li> <li>Lack of alternatives</li> <li>Aging buildings</li> </ul>	Community centers in North County and the Cuyama Valley, and the library in Cuyama Valley are highly or severely vulnerable to damage or destruction by inland flooding or wildfire. Damage to these facilities could cause them to become unusable to the community until repaired or rebuilt.	Community centers and libraries can be raised or retrofitted to prevent damage from climate change hazards. However, if damaged, there are no alternatives in the Cuyama Valley subregion, and few nearby alternatives in the North County subregion. These facilities are often used for evacuation or cooling centers and would be offline during emergency events if damaged.	



Building Category	Building Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Residential properties	<ul style="list-style-type: none"> <li>Homes, residential structures, and residential opportunity sites</li> </ul>	<ul style="list-style-type: none"> <li>Lack of funding for retrofits, repairs, and/or upgrades</li> <li>Aging buildings</li> <li>Difficulty in relocating</li> </ul>	<p>Homes in all three subregions can be damaged or destroyed by inland flooding, severe weather, and wildfires. On the steeper slopes in North County and the South Coast, the foundations can be undermined by landslides and debris flows. Along the South Coast, homes can also be inundated, damaged, or foundations crumbled due to coastal storms, dune and bluff erosion, and sea level rise. These hazards can cause unhealthy indoor air quality, unsafe living conditions, or completely destroy homes, reducing the numbers of homes available to meet the needs of county residents.</p>	<p>Homes and residential structures can be retrofitted to resist damage from hazards, including flood proofing, creating defensible space, and weatherizing. However, some homeowners, especially low-income or cost-burdened households, may not have disaster-related home insurance or the ability to pay for retrofits and restorations if the building is damaged. Chronic climate change hazards could cause buildings to become permanently uninhabitable.</p>	



Building Category	Building Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Emergency and public safety sites	<ul style="list-style-type: none"> <li>Evacuation and homeless shelters</li> <li>Public safety buildings</li> </ul>	<ul style="list-style-type: none"> <li>Lack of funding for retrofits, repairs, and/or upgrades</li> <li>Lack of alternatives</li> <li>Aging buildings</li> </ul>	<p>The evacuation center in the Cuyama Valley and fire stations throughout the county could be damaged or destroyed by inland flooding or wildfire. If not destroyed, these buildings may have mold and mildew growth or smoke damage that make them unusable during emergencies, reducing the availability of emergency services and personnel in the sub-regions.</p>	<p>Few alternative evacuation centers exist in the Cuyama Valley that could be brought online if one is damaged. Evacuation shelters and public safety buildings can be retrofitted, raised, or relocated to prevent damage from climate change hazards. However, this could be expensive and financially infeasible for the County or school districts.</p>	





Building Category	Building Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Commercial buildings	<ul style="list-style-type: none"> <li>Commercial buildings</li> </ul>	<ul style="list-style-type: none"> <li>Lack of funding for retrofits, repairs, and/or upgrades</li> <li>Aging buildings</li> </ul>	<p>Commercial buildings in the Cuyama Valley are highly or severely vulnerable to damage and destruction by inland flooding and severe weather. If not destroyed, mold and mildew can grow, creating unhealthy indoor air quality. This may become chronic as severe rainstorms occurring more frequently and intensely.</p>	<p>Due to the remote location of the Cuyama Valley, it would likely be more difficult for commercial building owners to retrofit for or repair buildings from hazardous events. Property financing programs could help building owners retrofit building to resist damage.<sup>93</sup> Disaster recovery programs may be a long process and may not be helpful for commercial building owners.</p>	
Historic sites	<ul style="list-style-type: none"> <li>Historic buildings and facilities</li> </ul>	<ul style="list-style-type: none"> <li>Lack of funding or staff capacity for retrofits, repairs, and/or upgrades</li> <li>Aging buildings</li> <li>Difficulty in relocating</li> </ul>	<p>Historic sites can be damaged or destroyed by climate change hazards. If damaged, these buildings and sites may lose all or part of their historical significance.</p>	<p>Some historic buildings and facilities can be retrofitted to prevent damage from climate change hazards. However, this might reduce the historic significance or require extensive permitting and design review if the building or facility is on a regional, state, or federal list of historic places. Moving historic buildings outside of hazard prone areas may also reduce historical significance.</p>	



**Table 23. Buildings and Facilities Highly and Severely Vulnerable to Climate Change Hazards**

Building and Facility Types								
Colleges and universities (North County)			-	-	-		-	-
Colleges and universities (South Coast)	-	-	-	-	-	-	-	-
Commercial buildings (North County)			-	-	-		-	-
Commercial buildings (Cuyama Valley)			-	V5			V4	-
Commercial buildings (South Coast)	-	-	-	-	-	-	-	-
Community centers (North County)			-	-	-		-	V4
Community centers (Cuyama Valley)			-	V4			-	-
Community centers (South Coast)			-		-		-	-
Evacuation and homeless shelters (North County)			-	-	-		-	-
Evacuation and homeless shelters (Cuyama Valley)			-	V4			-	
Evacuation and homeless shelters (South Coast)	-		-	-	-	-	-	-
Government buildings and maintenance yards			-	-	-		-	-
Hazardous material facilities	-		-	-	-	-	-	-
Historic buildings and facilities	V4		-	-	-	-	V4	V4



Building and Facility Types								
Homes, residential structures, and residential opportunity sites (North County)			-	V4	V4		V4	V5
Homes, residential structures, and residential opportunity sites (Cuyama Valley)			-	V5	-		V5	V4
Homes, residential structures, and residential opportunity sites (South Coast)	V4	V5	-	V5	V5	V4	V4	V5
Libraries (North County)			-	-			-	-
Libraries (Cuyama Valley)			-	V4			-	-
Libraries (South Coast)			-		-		-	-
Medical and care facilities (North County)			-		-		-	
Medical and care facilities (South Coast)			-				-	-
Public safety buildings	-		-	-	-		-	V4
Schools (North County)			-	-	-		-	-
Schools (Cuyama Valley)			V4	-			V4	
Schools (South Coast)	-	-	-	-	V4	-	-	-

Note: Blank squares in this table indicate that a hazard is not applicable to a building or facility type, and gray squares indicate that the hazard is applicable, but the score is less than V4 (highly vulnerable).



### Economic Drivers

Agriculture, one of the major economic drivers in the county, is the most vulnerable of all economic drivers due to potential disruptions from most climate change hazards. Drought and extreme heat can increase the water demand on crops and make them more susceptible to pests and diseases. The outdoor workers in agriculture can be harmed by illnesses caused by extreme heat, vector-borne diseases, and smoke from wildfires. The crops and facilities needed for agricultural operations can be damaged by inland flooding, severe weather, or wildfire, including the transportation routes to carry goods across the region or state. Little can be done to protect crops from many of these hazards, but farm and ranch owners may be able to protect their facilities and workers from some hazardous events. Agritourism is highly dependent on agriculture and therefore is also highly vulnerable to similar hazards.

Several agricultural and outdoor worker programs are in place to help agriculture operators prepare and respond to climate change hazards, including the Ag Pass Program, which allows agriculture owners to get approval to go behind fire lines before events to do essential work; altered work hours to reduce exposure to poor air quality and extreme heat; groundwater sustainability plans to ensure water resources remain available; and educational efforts by the University of California Cooperative

Extension and the County Agricultural Commissioner's Office.<sup>94</sup>

The next most vulnerable economic sectors are recreation and tourism in coastal and marine areas and on State and federal land. This sector is highly dependent on visitors traveling from other regions in the county and California to participate in outdoor recreation and tourism activities. Climate change hazards can create unhealthy conditions for outdoor activity or damage recreation and tourism facilities. In coastal areas, coastal hazards are likely to damage or even destroy beaches, reducing the number of outdoor recreation areas available along the South Coast. Wildfires and debris flows can destroy the aesthetic beauty of State and federal lands or block the roadways that visitors travel on to locations such as Rincon Beach, Los Padres National Forest, and Lake Cachuma.

Programs for economic drivers outside of agriculture include the Green Business Program, Paycheck Protection Program, Santa Barbara Better Together Fund, and Women's Economic Ventures, which provide funding or education to help local businesses increase resilience.<sup>95,96</sup>



### Santa Barbara County Green Business Program

The Green Business Program is a countywide program—funded by the County, cities, and water districts—that works with businesses to help them earn a California Green Business certification. This certification is for businesses meeting energy conservation, water conservation, transportation reduction, waste reduction, and pollution prevention requirements. Metrics recorded as part of the certification include greenhouse gas reductions, kilowatt-hours saved, therms saved, water saved, and solid waste diverted. During the COVID-19 pandemic, the chambers of commerce and Green Business Program helped businesses get Paycheck Protection Program loans and other grants.

Of the 11 economic drivers evaluated in the Vulnerability Assessment, 8 were highly or severely vulnerable (scoring V4 or V5) for at least one hazard type. Economic drivers are generally most vulnerable to wildfire, coastal storms, and drought. The most vulnerable economic drivers are agriculture, agritourism, and State and federal land recreation and tourism. **Table 24** provides a summary of high (V4) and severe (V5) economic driver vulnerabilities in the unincorporated areas of Santa Barbara County. **Table 25** shows which economic driver types are highly or severely vulnerable to each hazard. Blank squares in this table indicate that a hazard is not applicable to an economic driver type, and gray squares indicate that the hazard is applicable, but the score is less than V4 (highly vulnerable).



Photo Credit: Mark Bright



**Table 24. Economic Driver Vulnerabilities**

Economic Driver Category	Economic Driver Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Agriculture	<ul style="list-style-type: none"> <li>• Agriculture</li> <li>• Agritourism</li> <li>• Livestock</li> </ul>	<ul style="list-style-type: none"> <li>• Resistance or lack of capital to change in business practices</li> <li>• Lack of alternative crops</li> <li>• Existing water quality or quantity issues</li> <li>• Difficulty in relocation</li> <li>• Large scale economic fluctuations: changes to economic sectors or recessions</li> </ul>	<p>Agriculture can be affected by fungal pathogens, invasive disease vectors, and animal pathogens due to climate change hazards.<sup>97</sup> These pests and diseases can worsen as crops and livestock become more stressed by heat and drought conditions. Inland flooding, severe weather, and wildfire can also decimate crops and livestock, causing major economic hardships for farmers, ranchers, and wineries that depend on these products. Vector-borne illness, extreme heat, and smoke from wildfires can harm outdoor workers, preventing operations from functioning adequately.<sup>98</sup> Agricultural operations may also be disrupted by hazards that prevent farm and</p>	<p>Pesticides, herbicides, and antibiotics can help crops resist pests and diseases and new cultivars of crops that are heat and drought resistant can be planted. However, this may be expensive for farm and ranch owners and there may be hesitancy from the community even if these options were available.<sup>100</sup> Agricultural operations may recover from decimated crops or livestock overtime; however, if climate change hazards happen year after year they may not be able to recover as well.<sup>101</sup> The Ag Pass program has been developed by the County to help farm and ranch owners access their properties during hazardous events to protect agricultural operations and help first</p>	



Economic Driver Category	Economic Driver Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
			ranch owners from accessing their properties or by power shut-offs that prevent wells and other infrastructure from functioning properly. <sup>99</sup>	responders reach hazardous areas. <sup>102</sup>	
Recreation and tourism	<ul style="list-style-type: none"> <li>• State and federal land recreation and tourism</li> <li>• Coastal and marine recreation and tourism</li> <li>• Cultural and historic sites</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of alternative buildings or infrastructure</li> <li>• Lack of employees</li> <li>• Reliance on the ecosystem services</li> <li>• Difficulty in relocation</li> </ul>	The recreation and tourism industry relies on visitors traveling to the area from other regions. These visitors may be deterred from traveling to the county if parks, hiking trails, bicycle routes, beaches, and historic sites are damaged and become unusable due to climate change hazards. Visitors may also be deterred from visiting the area due to lower water levels, extreme heat, severe weather, or smoke from wildfires that make recreation activities unhealthy or dangerous to do. Outdoor recreation facilities may also shut down during these conditions.	Alternative recreation and tourism lands may be available in other areas of a subregion or in other subregions of the county where hazards may not be occurring. However, this would still negatively affect local tourism areas. Some outdoor activities can temporarily move indoors avoiding harm to participants; however, these alternatives may not be viable for all activities. Cultural and historic sites may be able to be moved if within hazard prone areas; however, this can reduce historic or cultural significance.	



Economic Driver Category	Economic Driver Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Commercial fishing	<ul style="list-style-type: none"> <li>Commercial fishing</li> </ul>	<ul style="list-style-type: none"> <li>Lack of alternative marine life</li> <li>Reliance on the ecosystem services</li> </ul>	<p>Commercial fishing, especially those dependent on shellfish, can be devastated by ocean acidification.<sup>103</sup> Some fish and crustacean species may not be healthy enough to harvest by commercial fisherman. Sea level rise may also inundate piers, marinas, and harbors, decreasing the facilities that directly support commercial fishing. This could cause commercial fishing businesses to lose money and potentially close.</p>	<p>There is little that can be done to adapt to lower pH levels of ocean water. Commercial fisherman may be able to switch to other species; however, this can be expensive as much of their equipment is specialized to catch specific fish or other animals. Piers, marinas, and harbors can be retrofitted or raised to ensure they are useable even with sea level rise. However, this may be difficult as coastal storms may become more destructive for this infrastructure due to sea level rise.</p>	
Oil and gas	<ul style="list-style-type: none"> <li>Oil and gas industry</li> </ul>	<ul style="list-style-type: none"> <li>Resistance to change in business practices</li> <li>Difficulty in relocation</li> <li>Large scale economic fluctuations: changes to</li> </ul>	<p>Oil wells, pipelines, and other infrastructure can be damaged due to climate change hazards, disrupting operations of the oil and gas industry. Access roads and railways supporting these facilities can also be damaged, preventing workers from traveling to</p>	<p>Oil and gas infrastructure in active use can be monitored for corrosion and access roads can be maintained to ensure access during or after hazardous events. However, information on capped inactive wells and older oil and gas infrastructure is limited,</p>	

















Economic Driver Category	Economic Driver Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
		economic sectors or recessions	and from the sites and importing or exporting of oil and gas products. <sup>104</sup> Some oil and gas infrastructure is on the sea floor, and therefore is especially susceptible to damage from coastal hazards.	decreasing the ability of these sites to be monitored. Therefore, they could pose a long-term threat to local communities if damage from coastal storms cause this infrastructure to release contaminants into the surrounding environment. <sup>105</sup>	

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**Table 25. Economic Drivers Highly and Severely Vulnerable to Climate Change Hazards**

Economic Driver Types												
Agriculture	V4	-	V5	-	V5	V4	V4	-		-	V4	V5
Agritourism	-	-	V5	-	V4	V4	V4	-			V4	V5
Chumash Casino						-	-	-			-	-
Coastal and marine recreation and tourism		V5		V5	-	-	-	V4	-	V5	-	V4
Commercial fishing		-					-	-	V5	V4	-	-
Cultural and historic sites		V4		-	-	-	-	V4		-	-	-
Livestock	V5		V4		V5	-	-	-			-	V5
Major employers		-		-		-	-	-		-	-	-
Oil and gas industry		V4		V4		-	-	-		-	-	V4
State and federal land recreation and tourism		V4	V4	V5	V4	-	-	V4		-	-	V4

Note: Blank squares in this table indicate that a hazard is not applicable to an economic driver type, and gray squares indicate that the hazard is applicable, but the score is less than V4 (highly vulnerable).



## Ecosystems and Natural Resources

The most vulnerable ecosystems in the county are the aquatic ecosystems (e.g., streams, creeks, rivers, and lakes). High temperatures can easily disrupt these ecosystems, and changes in precipitation that reduce available water and cause harmful algae to grow, changing dissolved oxygen content and nutrient cycling and degrading water quality.<sup>106</sup> Sea level rise may cause these habitats along the coast to become more saline, which can harm the plant and wildlife species that depend on a mixture of both fresh and salt water.<sup>107</sup> These habitats can be restored and protected, but a lack of water supply may prevent this.

Along the coastline in North County and South Coast, slough and coastal marshes are the most vulnerable ecosystems. These habitats have little space to migrate inland due to buildings and infrastructure in urban areas and may become permanently covered in water due to sea level rise.<sup>108</sup>

Several projects and programs are currently underway to restore and protect the ecosystems and natural resources of Santa Barbara County, including:<sup>109</sup>

- ❖ Goleta Slough vulnerability assessment
- ❖ Channel Islands Restoration project
- ❖ Arroyo Burro Open Space Restoration
- ❖ Fish passage projects and steelhead restoration programs

- ❖ Land Trust restoration at Arroyo Hondo
- ❖ Ice plant removal and oak tree planting at Dangermond Preserve
- ❖ Coal Oil Point Reserve beach habitat for snowy plovers
- ❖ Marine Protected Areas along the coastline

Several species or ecosystems may also have capacity to adapt to climate change hazards: such as plants that migrate landward behind seawalls at Hollister Ranch; Devereux Slough migrating inland to North Campus Open Space; raptors that are doing well under current conditions; and meso predators (e.g., skunks, raccoons, crows, and sea gulls).<sup>110</sup>

Of the 12 ecosystems and natural resources evaluated in the Vulnerability Assessment, 11 were highly or severely vulnerable (scoring V4 or V5) for at least one hazard type. Ecosystems and natural resources are generally most vulnerable to coastal storms and drought. The most vulnerable ecosystems are aquatic ecosystems and sloughs and coastal marshes. **Table 26** provides a summary of ecosystem and natural resource vulnerabilities in the unincorporated areas of Santa Barbara County. **Table 27** shows which ecosystems and natural resources are highly or severely vulnerable to each hazard. Blank squares in this table indicate that a hazard is not applicable to an ecosystem or natural resource, and gray squares indicate that the hazard is applicable, but the score is less than V4 (highly vulnerable).



**Table 26. Ecosystem and Natural Resource Vulnerabilities**

Ecosystem and Natural Resource Category	Ecosystem and Natural Resource Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Freshwater ecosystems	<ul style="list-style-type: none"> <li>• Aquatic</li> <li>• Riparian forests and woodland</li> <li>• Wetlands</li> </ul>	<ul style="list-style-type: none"> <li>• Existing poor water, air, and soil quality</li> <li>• Habitat fragmentation</li> <li>• Existing poor water quality</li> </ul>	<p>Freshwater ecosystems can be harmed by changes in water quality and quantity due to climate change hazards. Extreme heat and drought conditions can cause harmful algal blooms that affect fish and wildlife species.<sup>111</sup> Wetland habitats can be altered to the point that native vegetation can no longer survive, which can cause conversion to ruderal areas or encroachment of tree and shrub habitat.<sup>112</sup> Rising sea levels can increase the salinity of the water in these habitats, harming plant and wildlife species that depend on fresh water. Other hazards can cause pollutants and sediment to flood into these ecosystems, preventing them from functioning properly.</p>	<p>Due to low connectivity and fragmented distribution, freshwater ecosystems may have difficulty recovering from climate change hazards. Increased temperatures and lack of precipitation can make recovery from climate change hazards more challenging for these ecosystems. If native species are outcompeted by non-native species, the entire ecosystem may change permanently.<sup>113</sup></p>	



Ecosystem and Natural Resource Category	Ecosystem and Natural Resource Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Marine or coastal ecosystems	<ul style="list-style-type: none"> <li>Coastal bluffs</li> <li>Sandy beaches and coastal dunes</li> <li>Sloughs and coastal marshes</li> <li>Marine Protected Areas</li> </ul>	<ul style="list-style-type: none"> <li>Contamination from oil spills</li> <li>Encroachment of development</li> <li>Existing poor water quality</li> </ul>	<p>As sea levels rise, coastal hazards can increase causing more wave action that harms marine and coastal ecosystems. Some ecosystems, such as sandy beaches and coastal dunes may disappear as a result of sea level rise. Sloughs and coastal marshes, which have delicate water chemistries, are already seeing higher saltwater levels, which disrupt physical and biological aspects of the ecosystem.<sup>114</sup> Drought can exacerbate this condition as less freshwater flows into estuarine habitats. A reduction in fog and increase in severe weather can kill dune grass and other species on sandy beach and coastal dune habitat.<sup>115</sup></p>	<p>Some marine and coastal ecosystems may be able to migrate inland to prevent sea level rise from destroying the habitat. However, most of these ecosystems are surrounded by buildings and infrastructure, and therefore prevented from migrating. There is little that can be done to prevent habitats from being harmed by a decrease in fog, increase in ocean acidification, or severe weather.</p>	














Ecosystem and Natural Resource Category	Ecosystem and Natural Resource Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Groundwater basins	<ul style="list-style-type: none"> <li>Groundwater basins</li> </ul>	<ul style="list-style-type: none"> <li>Existing poor water and soil quality</li> </ul>	<p>During drought and extreme heat conditions, more groundwater extraction may occur to fill in the gaps of the water supply from other sources. This can lead to overdraft conditions when groundwater recharge cannot keep up with groundwater extraction, and sometimes leads to higher concentrations of nutrients and contaminants in the water. In North County and in some areas of the South Coast, sea level rise can cause saltwater intrusion into groundwater basins, downgrading water supplies for both domestic and agricultural users.<sup>116</sup></p>	<p>Groundwater basins throughout the county have Groundwater Sustainability Agencies that are currently developing Groundwater Sustainability Plans to bring the basins into sustainable conditions by 2040.<sup>117</sup> However, with continual droughts, this goal may be more difficult to achieve. Reducing inland groundwater pumping may also prevent saltwater intrusion, but other options for stopping saltwater intrusion can be expensive or infeasible.</p>	
Shrublands, woodlands, and forests	<ul style="list-style-type: none"> <li>Chaparral and scrub habitat</li> <li>Forests</li> <li>Woodlands and savannah</li> </ul>	<ul style="list-style-type: none"> <li>Existing poor water, air, and soil quality</li> <li>Habitat fragmentation</li> </ul>	<p>Shrublands, woodland, and forest ecosystems can be harmed by drought, extreme heat, and a decrease in fog conditions that stress trees and plant life, weaken them, and make them more</p>	<p>Drought and extreme heat conditions can prevent shrubland, woodland, and forest ecosystems from recovering from other climate change</p>	



Ecosystem and Natural Resource Category	Ecosystem and Natural Resource Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
			<p>susceptible to other hazard conditions, such as pest infestations and wildfire. In some cases, woodland and forest ecosystems can be replaced by grassland or shrubland ecosystems.<sup>118</sup> These ecosystems have historically been accustomed to wildfire conditions; however, increased wildfire frequency and intensity can result in type conversion, where existing habitats are converted to other habitat types that do not provide the same ecosystem services. In woodland and savannah ecosystems, severe wind can spread “sudden oak death,” which harms the trees that are a foundation for the ecosystem.<sup>119</sup></p>	<p>hazards.<sup>120</sup> Some of these ecosystems may be able to migrate upslope to find cooler temperatures or persist in small areas with ideal climatic conditions; however the ecosystem may not move quickly enough to escape rising temperatures or may not be of sufficient size to sustain itself.<sup>121,122</sup> For hazards such as decreased fog, severe weather, and wildfire, there is little that can be done for these ecosystems to adapt to changing conditions.</p>	



**Table 27. Ecosystems and Natural Resources Highly and Severely Vulnerable to Climate Change Hazards**

Ecosystem and Natural Resource Types											
Aquatic	V4	V5		V4	V4	-	V4		V5	V5	V5
Chaparral and scrub habitat	-	V4	-	V4	-	-	-		-	-	V4
Coastal bluffs	V5	-	V5	-		-	-		V4	-	-
Forests		V4		V5	-	V4	-			-	V5
Grassland	-	-	-	-	-	-	-		-	-	-
Groundwater basins		V5		V4					V5		
Marine Protected Areas	-		-	-			-	V4	-	-	
Riparian forests and woodland	-	-		-	-	-	-		-	V4	-
Sandy beaches and coastal dunes	V5	-	V5	-		V4	-	-	-	V5	
Sloughs and coastal marshes	V5	V4		-	V4	-		V4	V5	-	-
Wetlands	V5	V5		V4	-	-	-		-	-	-
Woodlands and savannah		-		-	-	-	-			V4	-

Note: Blank squares in this table indicate that a hazard is not applicable to an ecosystem or natural resource, and gray squares indicate that the hazard is applicable, but the score is less than V4 (highly vulnerable).





### Key Services

Water and wastewater services and public transit access are the most vulnerable key services because of water scarcity and the lack of alternative transportation routes.

Water services are highly dependent on surface and groundwater supplies, whose amount or quality can be diminished by drought and coastal hazards. The facilities that support this service can be damaged or destroyed by inland flooding, landslides, and wildfires. Drought conditions can even reduce the amount of water available to process wastewater.

The County is currently supporting the efforts of Groundwater Sustainability Agencies in developing groundwater sustainability plans for the Santa Ynez River Valley Groundwater Basin, San Antonio Groundwater Basin, Carpinteria Groundwater Basin, Cuyama Valley Groundwater Basin, and Montecito Groundwater Basin. The Santa Maria and Goleta Groundwater Basins are adjudicated and under stricter control than the other groundwater basins in the county.<sup>123</sup> There are also several programs or projects related to water and wastewater, planned and implemented, that improve adaptive capacity of this service:<sup>124</sup>

- ❖ Regional Water Efficiency Program

- ❖ Recycled water generated by Laguna County Sanitation District, Goleta Sanitation and Water Districts, and Santa Barbara
- ❖ Connection of Carpinteria Water District in Ventura County to water connections in Santa Barbara County
- ❖ Desalination Plant in Santa Barbara providing water to Montecito
- ❖ Wastewater treatment plant construction or improvements in Guadalupe and Los Olivos
- ❖ Flood protection berms for the Laguna County Sanitation Wastewater Treatment Plant

Electricity service is also highly vulnerable because it is highly dependent on electrical transmission lines and substations functioning properly. During extreme heat conditions, electricity facilities may be overwhelmed by energy demand and reduced efficiency, causing system failures and power outages. During severe weather events, Public Safety Power Shutoffs cause loss of power to residences and businesses. Much of the infrastructure for electrical service is in remote areas that are prone to landslide or fire, making it susceptible to damage from these hazards<sup>125</sup>.

Of the 23 key services evaluated in the Vulnerability Assessment, 15 were highly or severely vulnerable (scoring V4 or V5) for at least one hazard type. Key services are generally most vulnerable to wildfire and landslides and debris flows. The most vulnerable key services are water



and wastewater service on the South Coast and public transit access in Cuyama Valley. **Table 28** provides a summary of key service vulnerabilities in the unincorporated areas of Santa Barbara County. **Table 29** shows which key services are highly or severely vulnerable to each hazard. Blank squares in this table indicate that a hazard is not applicable to a key service, and gray squares indicate that the hazard is applicable, but the score is less than V4 (highly vulnerable).



Photo Credit: Mark Bright

### Emergency Communications

Santa Barbara County has an Emergency Notification System called Aware and Prepare. Santa Barbara County residents can register for emergency alerts through this program at [awareandprepare.org](http://awareandprepare.org). Aware and Prepare alerts are a free, opt-in emergency notification service, and any member of the public can create an account and determine what kind of notifications (phone call, text, email, etc.) they want to receive. Notifications are categorized depending on the urgency and severity of the incident. This ensures that the methods used are appropriate for the situation and minimizes over-alerting and “alert fatigue.” The public can also opt into the County’s Nixle emergency alert service, which is a zip-code-based system that provides short text message alerts.

Santa Barbara County’s emergency notifications are managed and published by the County Sheriff’s Dispatch Center and the County Executive’s Office (CEO) of Emergency Management. The CEO also issued a directive that all emergency alerts be in English and Spanish to the greatest extent possible. However, notification of county residents is still a challenge because thousands of people in the county speak neither language.



**Table 28. Key Service Vulnerabilities**

Community Service Category	Community Service Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Emergency services	<ul style="list-style-type: none"> <li>Emergency medical response</li> <li>Public safety response</li> </ul>	<ul style="list-style-type: none"> <li>Aging infrastructure and technology</li> <li>Reliance on transportation infrastructure</li> <li>Staff capacity</li> <li>Increase in County population</li> </ul>	<p>Emergency services in the Cuyama Valley are highly dependent on transportation infrastructure that runs through hazard prone areas and therefore can be disrupted by inland flooding, landslides and debris flows, and wildfire. Emergency medical services throughout the county may be unable to meet the need of the community if human health hazards affect a large majority of the population. There may be shortages of health care facilities, equipment, pharmaceuticals, and personnel if health care workers become sick or if supply chains are disrupted. Cascading and compounding effects will increase the frequency and amount of emergency services needed to address hazards, straining staffing</p>	<p>SR-166 could be protected by retaining walls, vegetation management, and berms or levees to protect the roadway from damage. However, relocation may be difficult and multiple agencies would need to coordinate to harden the roadway. To respond to human health hazards, local and regional medical centers and providers can strengthen medical supply chains and prepare emergency contingency plans for if/when human health hazards increase in frequency and intensity. However, this may take time and require extensive coordination.</p>	



Community Service Category	Community Service Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
			and resources, interrupting staff time dedicated to non-response activities, projects, and programs.		
Government services	<ul style="list-style-type: none"> <li>Public health</li> </ul>	<ul style="list-style-type: none"> <li>Aging infrastructure and technology</li> <li>Staff capacity</li> <li>Reduced funding</li> </ul>	Due to the remote location and reliance on SR-166, the Cuyama Valley could be cut off from public health services if roadways were to become blocked by landslides or debris flows.	Public health services can keep emergency facilities stocked with supplies; however, roadways could be impassable for days or weeks depending on the severity of the slide.	
Transportation services	<ul style="list-style-type: none"> <li>Public transit access</li> </ul>	<ul style="list-style-type: none"> <li>Staff capacity</li> <li>Reduced funding</li> <li>Reliance on transportation infrastructure</li> </ul>	Transportation services are highly dependent on roadways and railways functioning adequately, and therefore can be disrupted due to climate change hazards. In some cases, transit riders may be unable to wait for public transit due to extreme temperatures, smoke conditions from wildfires, or severe weather.	There may be few alternative transportation service options for those living or working in North County and the Cuyama Valley. There may be some alternative routes; however, bus schedules may be severely delayed. Bus stops can be retrofitted to include shade structures and seats for those who rely on public transit. However, this can be expensive and not always possible along all transit routes.	



Community Service Category	Community Service Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
Energy and communication services	<ul style="list-style-type: none"> <li>• Communication services</li> <li>• Energy delivery</li> </ul>	<ul style="list-style-type: none"> <li>• Disruption of services from the failure of buildings or infrastructure during repairs</li> <li>• Aging infrastructure and technology</li> <li>• Staff capacity</li> </ul>	<p>Energy and communication services are highly dependent on the infrastructure in place to provide these services, which can be damaged, destroyed, or turned off due to climate change hazards. As climate change hazard increase in frequency and intensity, disruptions are likely to occur more frequently and last longer. Power outages and communication system failures can directly harm the economy, government operations, public safety, and hinder recovery efforts.</p>	<p>Energy and communication services can focus on protecting the infrastructure that supports the service to ensure services are not disrupted. In some cases, there are alternatives that can be brought online, such as cell towers or substations, which can continue services during climate change hazards.</p>	












Community Service Category	Community Service Types	Non-climate Stressors	Impact Description	Adaptive Capacity Description	Climate Change Hazards
<p>Water and wastewater services</p>	<ul style="list-style-type: none"> <li>Water and wastewater</li> </ul>	<ul style="list-style-type: none"> <li>Disruption of services from the failure of buildings or infrastructure during repairs</li> <li>Aging infrastructure and technology</li> <li>Reduced funding</li> </ul>	<p>Water and wastewater services can be disrupted by climate change hazards that reduce water supplies, disrupt electrical supplies, and damage pipelines or wastewater treatment plants. Water is needed to provide domestic and users with adequate water supplies, but also ensure wastewater can effectively be carried to wastewater treatment plants and processed. Saltwater intrusion, reduction in snowpack in the Sierra Nevada that supplies that State Water Project, and overdraft of groundwater basins can reduce water supplies. Damage to wastewater treatment plants or septic systems can cause the systems to backup and leak effluent into the surrounding soil and water.</p>	<p>Water and wastewater systems are large, intricate, and complex, with little to no redundancies, and therefore cannot easily be rerouted if facilities are damaged. Some facilities can be hardened or protected to maintain service during hazardous events. However, increased frequency of drought conditions may make it more difficult for water and wastewater services to provide services and price hikes may be put in place to supplement decreased water usage and increased maintenance costs.</p>	



**Table 29. Key Services Highly and Severely Vulnerable to Climate Change Hazards**

Key Service Types									
Communication services	-		-	-		V4	-	V4	V4
Emergency medical response (North County)			-	-	V4	-		-	-
Emergency medical response (Cuyama Valley)			-	-	V5	-		-	V4
Emergency medical response (South Coast)	-		-	-	V4	-	-	-	-
Energy delivery (PG&E)	-	-	V5	-		V4	-	V5	V5
Energy delivery (SCE)	-	-	V5	-		V4	-	V5	V5
Energy delivery (SoCal Gas)	V4			-		V4	-		V4
Government administration	-		-	-	-	-	-	-	-
Public health (North County)			-	-	-	-		-	-
Public health (Cuyama Valley)			-	-	-	V4		-	-
Public health (South Coast)			-	-	-	-		-	-
Public safety response (North County)			-	-	-	-		-	-
Public safety response (Cuyama Valley)			-	V4	-	V4		-	-
Public safety response (South Coast)	-		-	-	-	-	-	-	-
Public transit access (North County)			V4	-	-	-	-	-	-
Public transit access (Cuyama Valley)			V4	V5	-	V5		V4	V4
Public transit access (South Coast)	V4		V4	V4	-	V5	-	-	-
Solid waste collection (North County)			-	-		-		-	-
Solid waste collection (Cuyama Valley)			-	-		-		-	-
Solid waste collection (South Coast)	-		-	-		-	-	-	-
Water and wastewater (North County)		V4	-	V4		V4	-	-	V5



Key Service Types									
Water and wastewater (Cuyama Valley)		V5	V4	V5		-		-	V4
Water and wastewater (South Coast)	V5	V4	-	V4		V4	V5	-	V5

Note: Blank squares in this table indicate that a hazard is not applicable to a key service, and gray squares indicate that the hazard is applicable, but the score is less than V4 (highly vulnerable).

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# Santa Barbara County Climate Change Vulnerability Assessment

## Key Findings

The Vulnerability Assessment identifies how the populations and assets of Santa Barbara County are vulnerable to climate change and its associated hazards. Out of the 138 populations and assets analyzed, 106 are highly or severely vulnerable to one or more hazard conditions. Wildfire and flooding accumulate the highest and most severe vulnerabilities of the 13 hazards addressed in the assessment. Climate change will likely affect all populations and assets in some way, but the County should consider those with high and severe vulnerabilities when addressing climate change in work plans and budgets. Moving forward, the County will work with community members and community-based organizations, private businesses, government agencies, and other key partners to address these issues and improve community resilience. This section describes some of the key vulnerabilities and related issues for the different missions and responsibilities of County departments and divisions, which will help to inform local resilience efforts. At the end of the section, **Table 30** shows which departments engage in each of the key-finding topics.

## Social Vulnerability

Of the approximately 142,111 people in the unincorporated county, people across the socioeconomic spectrum and throughout the region experience behavioral health issues, although no one knows the exact number. Many of the climate change hazards in Santa Barbara County, including a 36 percent increase in wildfire activity by 2100, several feet of sea level rise, and more frequent floods and landslides, may create or exacerbate behavioral health challenges. Persons facing increased levels of social isolation are particularly vulnerable to these issues, including the 4,900 senior citizens living alone,<sup>126</sup> the 13,000 people with disabilities as well as access and functional needs,<sup>127</sup> and the approximately 80 persons experiencing homelessness.<sup>128</sup> Climate change will likely mean additional people needing behavioral wellness assistance, especially in areas experiencing regular disasters or other emergency events.

Human health hazards pose a threat to all community members in Santa Barbara County, although the risk is highest for people with existing health issues or high levels of climate change hazards, such as frontline communities. These include the county's approximately 25,400 senior citizens; 12,985 people with disabilities, access needs, and functional needs; and several areas with elevated pollutants. Climate change will increase human health hazards such as West Nile virus and other



mosquito-borne illnesses, diseases carried by mice and rats, and other environmental risks. The County's Public Health Department can reduce these risks through expanded monitoring, prevention, and treatment programs, especially for frontline and underserved communities. The presence of environmental health hazards and lack of access to quality medical care is a major contributor to inequity in the county, and addressing these issues moves everyone toward a more equitable community.

Though virtually all homes in Santa Barbara County face some risk from climate change hazards, renters and low-income homeowners face higher vulnerabilities because they face limits on what they can do to prepare their homes for hazardous events. The County and its partners can help provide resources to harden homes, particularly those in hazard-prone areas such as sea level rise inundation areas, flood zones, and wildfire hazard areas. Providing weatherization and cooling systems is a critical step to protecting people against extreme heat, especially since only about 23 percent of households have air conditioning.<sup>129</sup> Severe weather events, such as high winds, may be infrequent, but may cause significant damage and require expensive repairs that are financially burdensome for many people. Regular preventative maintenance can help reduce the risk of damage from hazards. The County also administers federally and locally funded grant programs dedicated to addressing the needs of

individuals and families who are homeless and particularly vulnerable to climate change hazards.

## Coastal Hazards

The coastline of Santa Barbara County faces rising sea levels of 8.4 inches by 2030, 30 inches by 2060, and nearly 80 inches by 2100. This will likely increase the intensity of flooding and wave runup associated with coastal storms and increase the rate of dune and bluff erosion by up to 9 feet per year.<sup>130</sup> Not only are homes, commercial buildings, and historic sites at risk for damage, but the land they sit on could disappear due to permanent inundation or erosion. Key infrastructure that supports community services and economic drivers, such as roadways, beaches, airports, railroads, and bridges, could become blocked or unusable due to coastal hazards, preventing economic activity or evacuations during emergencies. The commercial fishing industry will also likely be harmed by a reduction in marine life due to ocean acidification. The County, in coordination with the California Coastal Commission, Santa Barbara County Association of Governments, and Los Angeles-San Diego-San Luis Obispo Rail Corridor Agency (LOSSAN), can implement natural and coastal armoring projects to protect key assets from coastal hazards.



Where protection is not possible, the County can accommodate coastal hazards through stringent coastal buildings codes that allow for temporary flooding without damaging assets. Over time, the County can implement retreat policies so that development can move farther inland, and the land can transition back to a natural landscape, providing additional protection for development farther inland. This will take extensive coordination with community members, State and regional agencies, and County departments to ensure equitable and timely adaptation to coastal hazards.

## Wildfire

Santa Barbara County faces a 36 percent increase in wildfire activity by 2100. Wildfire-prone areas cover large sections of the county, including the mountains, foothills, and low-lying scrub and grassland habitats. The County and key partners can help secure funding for and implement defensible space requirements, ensure regular maintenance, encourage other fire-resistant features during construction, provide adequate evacuation routes and transportation services to help with emergency evacuations, and implement frequent vegetation management. This is essential in wildfire-prone, single-access-road communities, such as Hollister Ranch, Mission Hills, Santa Rita Hills, White Hills, Las Lieges Canyon, Las Varas Canyon, Glen Annie Canyon, San Pedro Canyon, Wylie Canyon, and Mission Canyon. Regular preventative

activities are critical, especially in areas that will increase in wildfire activity, such as the canyons behind the South Coast and in the hills around Lompoc and Vandenburg Village, listed above.

## Agriculture

The agricultural industry and related agritourism are a major component of the Santa Barbara County economy. The county's fields, orchards, vineyards, and pastures produced over \$1.8 billion of products in 2020. However, the county faces an increase in the frequency and severity of drought conditions, and up to eight times as many extreme heat days in future years, which can stress crops and livestock, reducing productivity. A 36 percent increase in wildfire activity may harm agricultural operations and decrease agritourism, and wildfire smoke may impact the health of outdoor workers and diminish the value of commodities. The industry is also at risk from increased agricultural pest and disease activity and from increases in the frequency and severity of severe weather and inland flooding events.

Agriculture remains a major economic driver in the county, representing a significant source of income, employment, and community contributions. Agricultural workers, many of whom already face numerous non-climate stressors, are likely to face economic hardships from reduced agricultural productivity or agriculture moving from Santa Barbara County to other counties,



states, and countries, exacerbating inequities in the county and lost income and employment. Continued agricultural productivity depends on 1) crops' and other products' ability to resist changing climate conditions, 2) "hardening" agricultural operations to prevent or lessen damage (e.g., to drought and wildfire), and 3) providing agricultural operators with tools and resources to quickly recover from disasters.

## Ecosystems

Ecosystems and natural resources throughout Santa Barbara County are currently strained and fragmented due to buildings and infrastructure, especially in urban areas. The ecosystems that do remain will likely experience reduced water quantity and quality, habitat conversion, or increased pests and diseases due to climate change. Coastal ecosystems, such as coastal bluffs, sandy beaches, and sloughs, will decrease in size and quality due to rising sea levels that increase erosion, permanently inundate areas, and disrupt the delicate balance of salt and fresh water in estuarine systems. The County and its partners currently have several restoration and habitat protection programs underway, but additional programs will likely be needed to ensure that ecosystems can effectively withstand disruption from climate change hazards. This will require coordination with organizations such as the Coastal Conservancy, resource conservation districts, land trusts, and other federal or State agencies. If

preserved and restored, the natural lands in the county can continue to provide ecosystem services that support key services and economic drivers throughout the county.

## Water, Wastewater, Flooding, and Drought

Santa Barbara County will experience fluctuations in precipitation patterns, with a general increase in annual average precipitation. Droughts will increase in length and intensity, but heavy rainfall and associated flooding will also increase in frequency and strength. This will likely cause major disruptions to water and wastewater services due to lack of water or infrastructure malfunctions. Flood control infrastructure may also be unable to accommodate stronger storms, increasing the risk of flooding in communities protected by this infrastructure.

The County can work with other agencies with purview over important local infrastructure—such as FEMA, USACE, and local community services districts that provide water supply and wastewater services—to encourage upgrades to their infrastructure and services that ensure resilience. This is especially important for flood control facilities in the inland areas of the county, water and wastewater infrastructure in Cuyama Valley, and treatment plants such as the Summerland Wastewater Treatment Plant, El Estero Water Resource Center, and Santa Barbara Desalination Plant.



## The Built Environment

Vulnerabilities related to infrastructure in Santa Barbara County can be challenging to address because much of it is owned or regulated by other entities, including federal, State, and local agencies. For instance, major highways and roads are the responsibility of Caltrans, and local water and wastewater service is often provided by non-County water purveyors. Because of this, the County would need to work with these agencies to ensure infrastructure is fortified and services consider future climate hazards, especially when considering new development.

Many of the infrastructure networks and buildings in Santa Barbara County are at risk from climate change hazards. This especially includes the inland flooding and landslide and debris flow risks to bridges, and risk of road and bike lane closure associated with events such as floods and wildfires. Such disruptions not only create significant inconveniences and require costly repairs, but they may hamper evacuation efforts and impede emergency response and other vital community services, creating a major safety concern. For example, as wildfire risks increase, there is a higher threat of major highways or evacuation routes becoming blocked. Historically, hazards have blocked roads such as SR-154, SR-192, and SR-166. These major roads, and others, will likely face greater stress in the future due to climate change hazards.

### Caltrans District 5 Adaptation Priorities

In 2021, Caltrans District 5 completed an Adaptation Priorities Report that prioritized State roadways, bridges, and culverts for adaptation measures. Based on a previously completed vulnerability assessment, this report lays out the methods used to assess each roadway, bridge, and culvert within the Caltrans Right-of-Way for potential impacts from climate-related hazards. The highest priority roadways for Caltrans in Santa Barbara County include SR-166 and US-101. Caltrans will begin undertaking detailed adaptation assessments for assets, starting with the highest priorities. These detailed adaptation assessments will take a closer look at the exposure to each asset using more localized climate projections and more detailed engineering analyses. If impacts are verified, Caltrans will develop and evaluate adaptation options for the asset to ensure that it is able to withstand future impacts and will include coordination with key stakeholder groups.

Similarly, much of the County's key utility infrastructure, including electrical lines and communication facilities, traverses areas at risk for hazards, increasing the chance of service disruption. For example, most of the electrical transmission lines that serve the South Coast run through the Santa Ynez Mountains, increasing the risk of wildfire by 36 percent, increasing the risk of landslides, and



increasing susceptibility to blackouts from a Public Safety Power Shutoff.

The County, utilities, and other key partners are able to help conduct regular maintenance and other preventative activities on and around key infrastructure networks to improve their resilience. As resources allow, these agencies can also study the need for, and work to construct, new and retrofitted infrastructure to create redundancy, expand capacity, and reduce the risk of damage to County facilities and operations from hazard events.

Many existing developments in Santa Barbara County—such as homes, commercial buildings, and community and government buildings—and sites for new development or redevelopment are in hazard-prone areas. Over 30,500 housing units, or 63 percent of all housing units in the unincorporated county, were built prior to the adoption of more stringent building codes in 1980.<sup>131</sup> This increases the risk of damage to the property and harm to occupants as well as indirect harm to the wider community through loss of service and economic activity. As the threat of floods, wildfires, coastal storms, and other hazards increase, these properties face greater threats. The County is responsible for ensuring that the siting and design of new developments reduce the risk of damage, which may include locating them outside of hazard-prone areas or incorporating design features that make them more resistant to hazards.

The County's development standards and approval process can be updated to incorporate new resiliency standards and permit processes. Future projects can become more resilient through policies and development standards that promote resilience, and regular maintenance and retrofit standards can help the County ensure the improvement of existing properties and relevant infrastructure.

### Economic Drivers

Santa Barbara County economic drivers will likely be disrupted due to failures in the infrastructure that supports them. Major employers, outdoor recreation and tourism, and the oil and gas industry depend on roadways and railways to carry goods, people, and services that support these industries, and climate change hazards could damage roadways and railways. After the 2018 Montecito debris flow, US-101 was shut down for almost two weeks, preventing travel along the South Coast and disrupting nearly all sectors of the regional economy. To prevent disruptions in the future and help businesses recover, the County can work with community-based organizations (Santa Barbara Better Together Fund, Green Business Program, etc.) to help businesses plan for these disruptions, minimize damage or harm to their facilities and workers, and help businesses rebuild after hazardous events.



There are approximately 8,600 acres of County-operated parks and open space, many of which are at risk from natural hazards that will increase in frequency and severity in the future.<sup>132</sup> Coastal sites such as Jalama Beach, Goleta Beach, Arroyo Burro Beach, and Rincon Beach may be inundated by sea level rise and harmed by coastal storms and erosion, disrupting outdoor recreation and tourism economic drivers. Open space areas in the mountains and foothills, such as Nojoqui Falls Park, Santa Rosa Park, Miguelito Park, and Toro Canyon Park face damage from wildfires. Along with these sites, there are numerous parks and open space areas managed by cities or by state or federal agencies, such as the Los Padres National Forest or El Capitan State Beach. In addition to maintenance activities such as brush clearing and tree trimming, hardening or relocating at-risk facilities can help prevent damage and preserve park access. Changes in drought and pest activities and decreases in fog levels can harm the ecology of open space areas, which may require changes to park maintenance.

## Emergency Management

Emergency management is an essential County function to protect people, buildings, and infrastructure from harm during hazardous events. Emergency management includes emergency communication, evacuations, operation of the Emergency Operations Center when needed, and planning for and reducing hazards through

the Local Hazard Mitigation Plan process. Climate change hazards will likely increase the need for emergency management throughout Santa Barbara County in the future, especially due to the projected increase in flooding, landslide and debris flow, wildfire, and coastal hazard events. The County will use the results of the Vulnerability Assessment to strengthen staff capacity and emergency management programs to help county residents and businesses prepare, respond, and recover from hazardous events. This includes providing adequate emergency communication in multiple languages appropriate to the demographics of the county, ensuring all populations (regardless of mobility status) can safely evacuate when needed, working with the agriculture community to ensure continued access to properties and protection of crops and livestock in emergencies, and that emergency shelters and cooling centers are prepared for multiple hazard types and can accommodate all people in need of shelter.



*Photo Credit: Mark Bright*



## Agency and Nonprofit Coordination

Santa Barbara County's diverse natural environments, including the Channel Islands, the Los Padres National Forest, beaches, and numerous other natural lands, are a major contributor to the quality of life and economic growth of the community. However, climate change stressors increasingly threaten these areas with hazards, such as coastal storms, wildfires, drought, and extreme heat, which prompts ecosystem shifts. Compounding the challenge, a variety of diverse organizations, including incorporated cities, state and federal agencies, and nonprofits manage these lands and waters. County agencies will need to continue coordinating with these other organizations, including nonprofit resilience-oriented organizations such as the Santa Barbara County Climate Collaborative and Beach Erosion Authority for Clean Oceans and Nourishment, to support resilience efforts and allow for public access as appropriate. The County must also coordinate with the U.S. Forest Service to proactively manage vegetation in the Los Padres National Forest. Such coordination may include partnering to secure funding for projects, sharing data and other resources, and agreeing to implement similar efforts across jurisdictional boundaries (for example, working to preserve and enhance a key wildlife corridor that might cross federal, State, and County lands). Coordination also includes integrating adaptation into all county department projects and programs, to ensure the County

comprehensively looks at resilience in all County operations.



*Photo Credit: Mark Bright*





**Table 30. County Departments with Responsibilities related to Key-Finding Topics**

Key-Finding Topics	Applicable County Departments
Social Vulnerability	Behavioral Wellness, Community Services Department, Parks Division, Planning & Development Department, Public Health Department, Social Services Department
Coastal Hazards	Community Services Department, General Services Department, Parks Division, Planning & Development Department, Public Works Department
Wildfire	Fire Department, Agricultural Commissioner's Office, Community Services Department, Parks Division, Planning & Development Department, Public Health Department, Public Works Department, County Executive Office of Emergency Management
Agriculture	Agricultural Commissioner's Office, Planning & Development Department, Public Health Department, Public Works Department
Ecosystems	Community Services Department, Fire Department, Parks Division, Planning & Development Department, Public Works Department
Water, Wastewater, Flooding, and Drought	Community Services Department, General Services Department, Parks Division, Planning & Development Department, Public Health Department, Public Works Department, County Executive Office of Emergency Management
The Built Environment	General Services Department, Community Services Department, Fire Department, Parks Division, Planning & Development Department, Public Health Department, Public Works Department
Economic Drivers	Agricultural Commissioner's Office, Community Services Department, Fire Department, Parks Department, Planning & Development Department, Public Health Department, Public Works Department
Emergency Management	Behavioral Wellness, Community Services Department, General Services Department, Parks Department, Planning & Development Department, Public Health Department, Public Works Department, Sheriff, County Executive Office of Emergency Management
Agency and Nonprofit Coordination	Behavioral Wellness, Community Services Department, General Services Department, Parks Division, Planning & Development Department, Public Health Department



## Conclusion

The Vulnerability Assessment provides a detailed analysis of assets and frontline population vulnerabilities created or worsened by climate change hazards. While the Vulnerability Assessment is not a policy document and does not provide project or program solutions to reducing risk and vulnerability, the prioritized list of vulnerable assets and frontline populations in the Critical Vulnerabilities section and **Appendix D** of this report provides a starting point for increasing resilience in the unincorporated areas of Santa Barbara County through adaptation.

Adaptation is defined as the process of making changes in response to current or future conditions to reduce harm and take advantage of new opportunities.<sup>133</sup> The integration of adaptation and resilience into the update of County documents, such as the Multi-Jurisdictional Hazard Mitigation Plan, Seismic Safety and Safety Element, Capital Improvement Program, and Integrated Regional Water Management Plan, is essential for addressing these vulnerabilities. The update processes for these documents can use the analysis and results of the CCVA as the starting pointing to meet state and federal requirements to address climate change.

The development of effective adaptation and resilience programs and projects relies on the collaboration among County departments and with community-based organizations, businesses, and other stakeholders.

Examples of collaborative efforts already underway to increase resilience are the Santa Barbara County Regional Wildfire Mitigation Program, Groundwater Sustainability Plans, and the Multi-County Transportation Emergency Preparedness Plan. These partnerships can leverage county resources and increase eligibility for grant funding to develop and implement programs and projects.

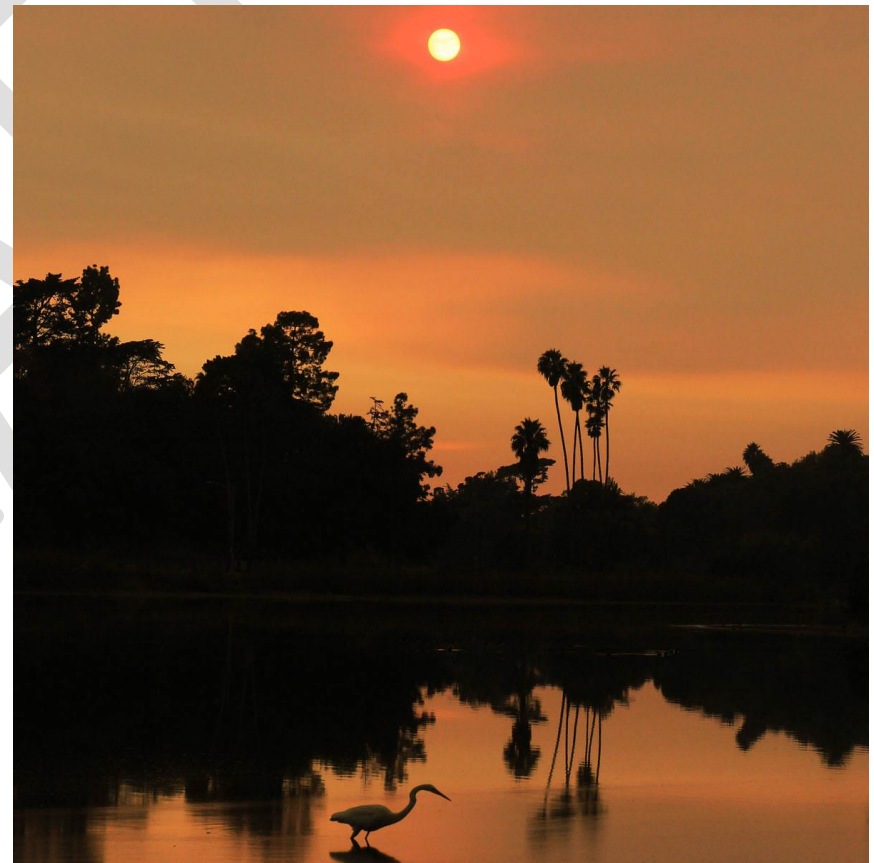


Photo Credit: Mark Bright

# Santa Barbara County Climate Change Vulnerability Assessment

## List of Abbreviations

**°F:** Degrees Fahrenheit

**ACS:** American Community Survey

**APG:** California Adaptation Planning Guide

**CAL FIRE:** California Department of Forestry and Fire Protection

**GHG:** Greenhouse gas

**GIS:** Geographic Information System

**RCP:** Representative concentration pathways

**SB:** Senate bill

**SR:** State route

**USDN:** Urban Sustainability Directors Network

**V, V score:** Vulnerability, vulnerability score

## Glossary

**Adaptation:** Making changes in response to current or future conditions (such as the increased frequency and intensity of climate-related hazards), usually to reduce harm and to take advantage of new opportunities.<sup>134, 135</sup>

**Adaptive Capacity:** The “combination of the strengths, attributes, and resources available to an individual, community, society, or organization that can be used to prepare for and undertake actions to reduce adverse impacts, moderate harm, or exploit beneficial opportunities.”<sup>136</sup>

**Cascading or Compounding Effects:** Extreme events that link together hazards over days, weeks, or months, resulting in multiplied effects that cause secondary and sometimes tertiary damage, exceeding the damage of the initial hazard event.

**Climate Change:** A change in the state of the climate that can be identified by changes in the mean, and/or the variability, of its properties, and that persists for an extended period, typically decades or longer.

**Climate Justice:** The concept that no group of people should disproportionately bear the burden of climate impacts or the costs of mitigation and adaptation.<sup>137</sup>



**Climate Stressor:** A condition or trend related to climate variability and change – such as decreased precipitation or warmer temperatures – that can exacerbate natural hazards.<sup>138</sup>

**Community Asset:** A valued feature of a community that may be harmed by climate change. Community assets may include buildings, infrastructure, community services, ecosystems, and economic drivers.

**Disadvantaged Communities:** Areas disproportionately affected by environmental pollution and other hazards that can lead to negative public health effects, exposure, or environmental degradation, or with concentrations of people that are of low income, high unemployment, low levels of homeownership, high rent burden, sensitive populations, or low levels of educational attainment.<sup>139,140</sup>

**Exposure:** The presence of people; infrastructure; natural systems; and economic, cultural, and social resources in areas that are subject to harm.<sup>141</sup>

**Extreme Event:** When a weather or climate variable exceeds the upper or lower thresholds of its observed range.<sup>142, 143</sup>

**Frontline Communities:** These communities experience first and most severely the impacts of issues such as environmental pollution, climate change, and the economic crisis. These communities are most often communities of color and/or low income.<sup>144</sup>

**Hazard:** An event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural losses, damage to the environment, interruption of business, or other types of harm or loss.<sup>145</sup>

**Hazard Mitigation:** Sustained action taken to reduce or eliminate the long-term risk to human life and property through actions that reduce hazard, exposure, and vulnerability.<sup>146</sup>

**Hold the Line:** Coastal erosion projection scenario indicating natural protection of coastal armoring would be implemented to slow erosive processes.

**Impact:** The effects (especially the negative effects) of a hazard or other conditions associated with climate change.

**No Hold the Line:** Coastal erosion project scenario indicating no armoring (natural or human-made) would be implemented to slow erosive processes.

**Non-Climate Stressor:** Trends unrelated to climate change that can exacerbate impacts or impede adaptive capacity, making populations or assets more vulnerable.

**Resilience:** The capacity of any entity—an individual, a community, an organization, or a natural system—to prepare for disruptions, to recover from shocks and stresses, and to adapt and change from a disruptive



experience. Community resilience is the ability of communities to withstand, recover, and to learn from past disasters to strengthen future response and recovery efforts.

**Risk:** The potential for damage or loss created by the interaction of hazards with assets such as buildings, infrastructure, or natural and cultural resources.

**Sensitivity:** The level to which a species, natural system, community, government, etc. would be affected by changing climate conditions.<sup>147</sup>

**Social Vulnerability:** Social vulnerability is “the susceptibility of a given population to harm from exposure to a hazard, directly affecting its ability to prepare for, respond to, and recover from the hazard.”<sup>148, 149</sup>

**Susceptibility:** A person’s or population’s potential for vulnerability due to demographic, socioeconomic, and geolocation characteristics.

**Vulnerability:** Climate vulnerability describes the degree to which natural, built, and human systems are susceptible “...to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt.”<sup>150</sup>

**Vulnerability Assessment:** An analysis of how a changing climate may harm a community and which elements—people, buildings and structures, resources, and other

assets—are most vulnerable to its effects based on an assessment of exposure, sensitivity, potential impact(s), and the community’s adaptive capacity.

**Vulnerable Communities:** Vulnerable communities experience heightened risk and increased sensitivity to climate change and have less capacity and fewer resources to cope with, adapt to, or recover from climate impacts. These disproportionate effects are caused by physical (built and environmental), social, political, and/or economic factor(s), which are exacerbated by climate impacts.<sup>151</sup>

**Vulnerable Populations:** Vulnerable populations include, but are not limited to women; racial or ethnic groups; low-income individuals and families; individuals who are incarcerated or have been incarcerated; individuals with disabilities; individuals with mental health conditions; children; youth and young adults; seniors; immigrants and refugees; individuals who have limited English proficiency (LEP); and lesbian, gay, bisexual, transgender, queer, and questioning (LGBTQQ) communities, or combinations of these populations.<sup>152, 153</sup>



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## Endnotes

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# Santa Barbara County Climate Change Vulnerability Assessment

## Appendix A: Climate Change Vulnerability Assessment Data Sources

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## Appendix B: Outreach and Engagement Summaries

This appendix summarizes each of the outreach and engagement events completed as part of the Climate Change Vulnerability Assessment. The outreach summaries include:

- ❖ Virtual Community Workshop #1
- ❖ Virtual Community Workshop #2
- ❖ Adaptive Capacity Meetings
- ❖ Stakeholder Meetings

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## Virtual Community Workshop #1

This section summarizes the first virtual community workshop held as part of the first phase of outreach for the County of Santa Barbara One Climate Initiative, with a focus on the Climate Change Vulnerability Assessment (Vulnerability Assessment). The County offered two sessions of the workshop, one in the afternoon and one in the evening. Each session followed the same agenda and covered the same information to ensure wider community participation. This summary includes a description of the workshop, discusses the questions asked of participants in small group breakout rooms, and presents the results of each question. A full summary of the small group breakout room discussions is provided after the workshop summary.

### Workshop Summary

The County hosted two 90-minute community workshops online via Zoom on December 9, 2020, to raise awareness in the Santa Barbara community about the One Climate Initiative and the Vulnerability Assessment. The first session was held at 12:00 pm and the second session was held at 6:00 pm.

PlaceWorks project manager Tammy Seale facilitated the workshop and provided ongoing support, and the County staff Vulnerability Assessment project manager, Whitney Wilkinson, and One Climate Initiative project manager, Garrett Wong, led the presentation. PlaceWorks assistant project manager Eli Krispi was support staff during the question-and-answer part of each session. Staff from the County and PlaceWorks provided facilitation support and notetaking during small group discussions. County Supervisors Das Williams and Joan Hartmann gave opening remarks during the evening session.

The workshop offered several accessibility options to ensure that all participants could learn about the One Climate Initiative and Vulnerability Assessment. All project materials, including flyers, small group discussion documents, the PowerPoint presentation, Eventbrite registration, and Participation Guide were provided in both Spanish and English. The presentation and breakout rooms also had options for both Spanish and English. The Spanish presentation was provided by a County-certified translator through a Spanish language channel on Zoom, and one of the breakout rooms was dedicated to Spanish speakers.

The County's Planning and Development Department, Community Services Department, and Public Information Office coordinated to promote the workshop online via social media posts on Facebook, Instagram, and Twitter.

The workshop was also promoted on the County’s website and through e-blasts, e-newsletters, and a press release.

Participants registered for one or both sessions through Eventbrite in advance of the workshop. Workshop registrants received multiple reminder emails in advance of the sessions. The reminder emails also included a Workshop Participation Guide and links to the One Climate Initiative web page, which posted project information and draft documents to review in advance of the workshop. A total of 90 stakeholders registered for the 12:00 pm session, and approximately 70 attended; 52 stakeholders registered for the 6:00 pm session and approximately 38 attended.

The workshop recordings, presentation slides, and other materials in both English and Spanish can be viewed on the project website—[www.countyofsb.org/ccva](http://www.countyofsb.org/ccva).

### Workshop Purpose and Desired Outcomes

The County hosted the workshop to raise awareness and promote the One Climate Initiative launch, inform community stakeholders about the Vulnerability Assessment, and share an in-depth overview of the Vulnerability Assessment process and the next steps to initiate the analysis. The County was committed to providing an inclusive, equitable, and transparent opportunity for participation in the Vulnerability Assessment planning process.

The goals for participants at the workshop included:

- ❖ Participant will become aware of the One Climate initiative and learn about the One Climate projects, including the County’s efforts to-date and anticipated work in the next couple of years.
- ❖ Participant will understand how to best engage with staff and the projects.
- ❖ Participants will have a better understanding of the Vulnerability Assessment, including what it will accomplish and why the County is preparing it.
- ❖ Participants will learn about how Santa Barbara County may be harmed by climate change.
- ❖ Engage with other stakeholders to hear and share their concerns, ideas, and vision for an equitable, sustainable, and resilient Santa Barbara County.
- ❖ Engage with members of the One Climate project team and talk about how climate change has affected them/the community and share ideas.
- ❖ The County will provide an inclusive, equitable, and transparent opportunity for participation in the planning process.

## Agenda

Each session of the workshop followed the same agenda.

12:00 pm/6:00 pm	Welcome and introductions to workshop, County staff, and project team
12:10 pm/6:10 pm	Agenda review and poll
12:15 pm/6:15 pm	Project presentation
12:40 pm/6:40 pm	Visioning word cloud activity using Mentimeter
12:45 pm/6:45 pm	Introduction to small group breakout discussions
12:50 pm/6:50 pm	Small group breakout discussions
1:20 pm/7:20 pm	Reports from small groups
1:30 pm/6:30 pm	Workshop wrap-up and end

## Project Presentation

The project presentation gave participants an overview of the One Climate Initiative and an introduction to the Vulnerability Assessment project. The presentation had three parts: 1) an introduction of the project team, 2) an overview of the One Climate Initiative, and 3) an overview of the Vulnerability Assessment project. Workshop facilitator Tammy Seale introduced the project team and reviewed the agenda.

Garrett Wong with the County Community Services Department presented the goals, flagship projects, outreach schedule, and ways to get involved with the One Climate Initiative. The flagship projects include the Vulnerability Assessment, 2030 Climate Action Plan, Active Transportation Plan, and Central Coast Community Energy (3CE) enrollment. The outreach program began with this workshop and will go through 2022 for drafting and implementing these plans.

After Garrett Wong concluded his presentation, Whitney Wilkinson with the County Planning and Development Department gave an overview of the Vulnerability Assessment project. This included the purpose of the project, the guidance for conducting a vulnerability assessment from the California Adaptation Planning Guide, a summary of key climate effects the project would assess, and a review of frontline communities and community assets the project team would be assessing. Whitney also introduced the “engagement map,” which is on the project website, [www.countyofsb.org/ccva](http://www.countyofsb.org/ccva).

Following the presentation, community workshop participants posted questions to the project team through the Zoom chat feature.

- ❖ Does this apply to So Cal Edison customers? (in reference to 3CE and Garrett’s slides)
- ❖ Is there a link for this engagement map?

- ❖ And for customers, on 3CE, what does opting in do for the customer, what should their expectations be?
- ❖ Goleta Beach was listed as an asset, but is it also considered an at-risk ecosystem / natural resource (the beach and slough)?
- ❖ How will you verify/qualify the community inputs to the map?
- ❖ How will you be coordinating with the City of Santa Barbara recently approved update process for the municipal CAP that has been approved by the City?
- ❖ What is the timeline for 3CE in Buellton?
- ❖ I already pay extra to get clean energy from Southern California Edison. Am I already a customer of 3CE?
- ❖ Is there a cost difference in the 3CE versus PG&E?
- ❖ How are rates expected to change under 3CE?
- ❖ For Whitney, the models predicting the SLR at Goleta Beach Park look highly optimistic even given the admission it does not include storm surge. Which Climate scientists and or climate organizations are [you] consulting with? Are these models available on the website?

Several questions were answered during the meeting, and all questions and responses were written up and provided online.

## Mentimeter Word Cloud Activities

After the One Climate Initiative and Vulnerability Assessment project overview presentation, workshop participants opened up Menti.com to engage in a word cloud activity, which was inclusive of both English and Spanish. The Mentimeter activity asked: “What words describe your vision of a climate resilient Santa Barbara County? ¿Qué palabras describen su visión de un condado resistente al clima?”

Participants responded by typing in the one or two words that they thought represented a climate-resilient Santa Barbara County. If multiple participants typed in the same word(s), those words would become larger. **Figure 1** and **Figure 2** show the results of the word cloud activity during both sessions of the workshop. As shown, the most common words received for this question were equitable, healthy, connected, affordable housing, safe, sustainable, clean, inclusive, and equity.





shared screen throughout the discussion. Small group facilitators asked participants four questions related to their experiences and concerns with climate change and climate hazards.

1. How have climate hazards or natural disasters affected you and/your community?
2. What climate hazards, changes, or impacts are of most concern to you?
3. What areas of the county seem most vulnerable to climate change and natural hazards/disasters?
4. Who do you think will be most affected by climate changes and potential impacts?

Community workshop participants expressed support for both the One Climate Initiative and the Vulnerability Assessment project. Recurring topics in breakout room discussions included evacuation, wildfire, extreme heat, flooding, sea level rise, housing, transportation, agriculture, and vulnerable populations. Several discussion groups expressed concern about the wildland-urban interface, low-lying coastal areas, communities living along riverine systems, and remote areas of the county.

## Post-workshop Survey

After the workshop, the County sent workshop registrants a link to a post-workshop survey through Eventbrite. A total of 20 workshop participants responded to four survey questions.

1. **Share any comments you have on Santa Barbara County Climate Change Vulnerability Assessment.** Participants felt the County had a grip on the project and knew what they were talking about. Some found it very educational and appreciated the opportunity to contribute to a sustainable and resilient county.
2. **Are you likely to participate in a future online/virtual workshop or event hosted by the County?** All but 2 respondents answered Yes.
3. **Please provide feedback on the virtual workshop event (e.g. setup, length, breakout rooms, etc.).** Participants were very receptive to the breakout rooms. Overall, participants had a positive response to the effectiveness, educational, and engaging aspects of the breakout rooms.
4. **If you are interested in receiving a response to your comments or updates on the project, please provide your name and email address below.** Nine survey respondents provided email addresses to receive updates on the project.

## Virtual Community Workshop 1– Small Group Discussion Summary

After the presentation and question-and-answer part of both workshops, community workshop participants joined small groups with a facilitator and a notetaker. Small group facilitators asked participants to introduce themselves by sharing their name, neighborhood, organization, or business, if applicable, and their favorite thing about the county. Following introductions, facilitators guided discussions in response to four questions.

1. How have climate hazards or natural disasters affected your and/your community?
2. What climate hazards, changes, or impacts are of most concern to you?
3. What areas of the county seem most vulnerable to climate change and natural hazards/disasters?
4. Who do you think will be most affected by climate changes and potential impacts?

The majority of workshop participants provided suggestions for steps to move toward a more sustainable and collaborative community. Most of the participants expressed support for the County's Vulnerability Assessment and gave constructive feedback for increasing success in future resiliency and adaptation strategies in

the Vulnerability Assessment. The feedback received for each question, from both workshops, is summarized by question.

### Question 1:

*How have climate hazards or natural disasters affected you and/your community? Climate hazards would include those mentioned in Whitney's presentation, like wildfires, extreme heat/heat waves, wildfire smoke, windstorms/extreme weather, flooding, sea level rise, high tides, or similar events.*

Workshop participants' responses were sorted into six categories: 1) suggestions, 2) wildfires/extreme heat, 3) evacuations, 4) housing, 5) flood/sea level rise, and 6) general comments.

### Suggestions

#### Community Participation, Collaboration, and Resiliency

- ❖ More education opportunities need to be provided to those who are not familiar with wildfire risks and evacuation efforts.
- ❖ Platform should be developed for citizens, businesses, and other nonprofits who wish to participate and contribute during a disaster response.

- ❖ How can the County best partner with public sector groups and other community groups to be more prepared and provide aid and allocate available resources?
- ❖ Going to where people work or congregate, for those who can't attend these outreach meetings to actively engage them or figure out ways to pull marginalized communities into these types of meetings.

## Wildfires / Extreme Heat

### Areas of Concern

- ❖ The hillside areas
- ❖ Santa Ynez Valley

### Challenges / Barriers

- ❖ Wildfires have increased each decade and pose a significant threat.
- ❖ Wildfire impacts, concerning frequency and intensity.
- ❖ Being underprepared such as lack of food and water or late fire evacuation notices.
- ❖ Major communitywide concerns related to ongoing fire hazards and climate change.
- ❖ Encroachment.
- ❖ Heat and drought have devastating impacts on the agricultural sector and its workers as well as the natural habitat.

### Resilience and Mitigation

- ❖ Identify and plan for emergency evacuation routes.
- ❖ Identify and plan for access points for emergency personnel to access fire zones.

### Health

- ❖ Living with constant and expanded threats of fire, smoky air, and all the negative impacts on the quality of life is stressful.
- ❖ Set notification systems to warn community about safety concerns due to wildfire impacts and air quality.
- ❖ Physical impacts such as migraines and other long-term affects related to fires.

## Evacuations

### Disaster Preparedness

- ❖ There needs to be a robust disaster preparedness plan.
- ❖ Subsequent debris flow impacts HWY 101 and rail.
- ❖ Transportation and accessibility redundancies in our systems/infrastructure need to be addressed.

## Housing and Transportation

### Equity

- ❖ Major impacts from COVID, fires, and heatwaves disproportionately impact lower income individuals, students; the ways in which they're experienced by

different communities is something we should take into account.

- ❖ Severe housing crisis in the county, especially in the South Coast. Teachers, doctors, EMTs, and others face challenges when it comes to living where they work.
- ❖ Housing and transportation—there needs to be alternatives to transportation to help reduce GHG impacts, by promoting more active transportation opportunities.
- ❖ Workforce housing concerns—policies should be requiring employers to provide transportation in order to reduce round trips and GHG emissions.
- ❖ Improve requirements for transportation for an employer—newer employers but not existing.
- ❖ Renters are unable to adequately adapt to natural hazards.

## Floods and Sea Level Rise

### Areas of Concern

- ❖ Lower west side has flooding issues
- ❖ Carpinteria area
- ❖ Isla Vista community
- ❖ Housing should not be permitted in flood hazard zones

## General Comments

Many community workshop participants provided miscellaneous comments.

- ❖ Given the huge sense of community, when one thing affects one it affects all of us.
- ❖ Seeing worldwide differences and in our region makes us realize that our realities are unique, and the challenges ahead are real and must be addressed.
- ❖ Vast amount of plastic is found in wildlife.
- ❖ Modeling impacts of climate change predictions have come true, science has proven to be true, for example: sea level rise, UCSB bike path impacts.
- ❖ Wildfires, emergency evacuations, debris flow, and the prolonged health risks of poor air quality impact the enjoyment of the county and area.
- ❖ Fires are becoming more and more commonplace.
- ❖ Essential workers who lack appropriate safety measures for work, such as PPE, and may lack health care benefits are highly at risk to the impacts of climate change.

## Question 2:

*What climate hazards, changes, or impacts are of most concern to you? These can include changes or events that have happened or are expected to happen here in the county or other parts of California.*

Workshop participants' responses were sorted into six categories: 1) suggestions, 2) agriculture, 3) barriers/challenges, 4) transportation, 5) floods and sea level rise, and 6) general comments.

### Suggestions

- ❖ There needs to be better systems in place for rain retention: bio swales, debris basins, green infrastructure used to capture stormwater runoff and recycle into landscaping.
- ❖ County should leverage community partnerships with water districts and other water resources.
- ❖ Provide awareness by telling the history of areas affected by climate change.
- ❖ Carbon sequestering needs to improve in the county through more tree planting.

### Agriculture

- ❖ Crops need to be analyzed to determine which are most stable under extreme conditions.
- ❖ Extreme droughts pose great threats to agriculture.

- ❖ Agriculture faces large economic impacts.

### Challenges and Barriers

- ❖ Those lacking proper air conditioning systems during extreme heat create major health concerns.
- ❖ There needs to be a robust disaster preparedness.
- ❖ Connectivity issues considering the Thomas Fire and subsequent debris flow impacting Hwy 101 and rail. Transportation and accessibility redundancies in our systems/infrastructure need to be addressed.

### Transportation

- ❖ Reduce vehicle miles traveled (VMT) through incentivizing more biking, mass transit, EV, walking, and ridesharing.
- ❖ Make residents more aware of the number of gallons of gasoline they consume on average.
- ❖ Fade out diesel equipment and replace with reliable renewable energy systems.
- ❖ Sea level rise poses a severe threat to transportation systems, recreation, and housing.

### Floods and Sea Level Rise

#### Areas of concern

- ❖ Lower East Side Santa Barbara is seeing sea level rise.
- ❖ Sea level rise near Mesa Cliffs.
- ❖ Must preserve beaches at all costs.

- ❖ Carpinteria is only 7 feet above sea level in some areas.

### General Comments

Many community workshop participants provided miscellaneous comments. These are as follows:

- ❖ The County needs to prevent or slow down any further sprawl.
- ❖ Due to long period of drought and lack of rain this puts enormous pressure on our community's assets.
- ❖ Provide adequate water supply in anticipation of increasing housing stock.
- ❖ The interconnection of hazards sheds light on the importance of biodiversity.
- ❖ Biodiversity loss impacts wildlife, ocean acidification, coral bleaching, smoke, and air quality.
- ❖ People of color already don't feel welcome and safe in Santa Barbara; with sea level rise where will people go?
- ❖ New big businesses and corporations in the Carpinteria and Goleta areas are bringing in new jobs that mainly require specific qualifications and training.
- ❖ Need more sufficient water resources that cater to all residents.
- ❖ Limit oil companies applying for exemptions.

- ❖ Oil drilling is prone to spilling, and the consequences on our water must be considered before approving any oil projects.
- ❖ Butterfly populations in Santa Barbara and SLO have been dramatically reduced.
- ❖ Santa Barbara can be a model for other places.
- ❖ Need for green energy.

### Question 3:

*What areas of the county seem most vulnerable to climate change and natural hazards/disasters? Responses should focus on areas of the unincorporated county, but we'll take all responses.*

Workshop participants' responses are sorted into four categories: 1) vulnerable populations, 2) areas of concern, 3) floods and sea level rise, and 4) general comments.

### Vulnerable Populations

- ❖ Getting necessary messages out and in the appropriate languages for evacuation and emergency information.
- ❖ Elderly population.
- ❖ Populations lacking larger social networks and community connections.
- ❖ It is important to conduct a detailed analysis of communities who may be left out due to census counting methods.

- ❖ Areas of the county that are most vulnerable aren't provided the opportunities to be heard.
- ❖ Agricultural communities may face physical and economic impacts.
- ❖ Communities of color.
- ❖ Low-income and impoverished communities.
- ❖ Unsheltered populations.
- ❖ Extreme droughts pose great threats to agriculture.

### Areas of Concern

- ❖ Areas developed on wetlands, missing conventional assessments.
- ❖ Communities living along streams and river systems are most vulnerable to flash floods.
- ❖ Areas close to ocean and wilderness have a greater vulnerability.
- ❖ Montecito/Summerland in the backcountry area are at risk of wildfire impacts and threats in the WUI (wildland-urban interface) area.
- ❖ Foothills and WUI boundaries.
- ❖ Entire South Coast due to the proximity to the WUI.
- ❖ Coastal infrastructure.
- ❖ Northern and central county.
- ❖ Santa Barbara city area and south county.
- ❖ Solvang, Santa Ynez, Lompoc, Buellton, and Santa Maria.

- ❖ 101 freeway can't possibly sustain the need to become a major evacuation corridor.
- ❖ Low-lying areas, Goleta Slough, the airport (economic driver) and neighboring areas, UCSB, downtown, Vandenberg Air Force Base, City of Lompoc and surrounding areas.
- ❖ Evacuation routes, especially in rural/forested areas are insufficient.
- ❖ The parts closest to the coast are vulnerable due to sea level rise and fluvial flooding.

### Floods and Sea Level Rise

- ❖ Ocean life, Channel Island impacts, and sea level rise impacts on tidal zones, and slough areas/wetlands.
- ❖ Coastal infrastructure needs to be better assessed.

### General Comments

Many community workshop participants provided miscellaneous comments.

- ❖ All areas of the county are vulnerable to one impact or another. Important to prepare the community for the future (adapt and mitigate) whether that means planned retreat from the coastline, etc.
- ❖ Carpinteria has gone through disaster training (possibly through the County).

- ❖ It is important to keep issues around climate change apolitical.
- ❖ Food systems in the unincorporated areas should be prioritized.

#### Question 4:

*Who do you think will be most affected by climate changes and potential impacts? "Who" can include populations/group types, communities, businesses/economic sectors, or other interpretations.*

Workshop participants' responses are sorted into four categories: 1) suggestions, 2) vulnerable populations, 3) business sectors, and 4) areas of concern.

#### Suggestions

- ❖ Implement both unconventional and traditional communication methods to reach a larger audience.
- ❖ Must expedite the communication process when threats are present.

#### Vulnerable Populations

- ❖ Low-income populations.
- ❖ Renters and rent-burdened populations.
- ❖ Non-English speakers.
- ❖ Future generations.

- ❖ Elderly populations and/or populations with limited mobility.
- ❖ Populations with disabilities.
- ❖ Healthcare workers.

#### Business Sectors

- ❖ Restaurant sector.
- ❖ Agricultural sector.
- ❖ Oil industry.
- ❖ Fishing industry.
- ❖ Tourism and tourism-dependent businesses.
- ❖ Public sector.

#### Areas of Concern

- ❖ Residents living near WUI.
- ❖ Remote areas.
- ❖ Housing near areas of sea level rise threats.



## Virtual Community Workshop #2

This section summarizes the second virtual community workshop held as part of the impact and adaptive capacity outreach for the County of Santa Barbara Climate Change Vulnerability Assessment. It includes a description of the workshop, discusses the questions asked of participants through Mentimeter and small group discussions, and presents the results of each question. A full list of the Mentimeter questions and responses and Google Jamboard responses from the small group discussions are provided after this summary.

### Workshop Summary

The County hosted a 1.5-hour community workshop online via Zoom on February 25, 2021, to engage Santa Barbara County residents, businesses, and community-based organizations in confirming impacts and identifying adaptive capacity.

PlaceWorks project manager Tammy Seale facilitated the workshop, led the Mentimeter surveys, and provided support. County staff interim project manager Julie Harris, PlaceWorks assistant project manager Eli Krispi, and PlaceWorks key staff Jacqueline Protsman led the presentation and the question-and-answer session. In

addition, staff from the County and PlaceWorks provided facilitation during small group discussions.

The workshop included several accessibility options to ensure that all participants could learn about the project and share their experiences. All project materials, including flyers, handouts, PowerPoint presentation, Google Jamboard, Mentimeter surveys, Eventbrite registration, and Participation Guide were provided in both Spanish and English. The Spanish versions were translated by a County-certified Spanish translator. The presentation and breakout rooms also had options for both Spanish and English. The Spanish presentation was provided by a County-certified translator through a Spanish language channel on Zoom, and one of the breakout rooms was dedicated to Spanish speakers. Each participant also had the option to see simultaneous closed captioning in English during the presentation, and a transcript of the meeting was created.

The County's Planning and Development Department promoted the workshop through e-blasts—including in partnership with the Community Services Department to include workshop information in the Sustainability e-newsletter—and e-blasts as part of the One Climate Initiative. Planning and Development Department staff also coordinated with the County's Public Information Officer to publicize the workshop online via social media posts on Facebook, Instagram, and Twitter. County staff also attended the February Equity Advisory and Outreach

Committee meeting to promote the workshop to committee members and the people that their organizations represent. All materials were provided in both English and Spanish and reviewed by a County-certified translator.

Participants registered for the workshop through Eventbrite in advance of the workshop. Workshop registrants received multiple reminder emails in advance of the workshops. The reminder emails included a Workshop Participation Guide and links to Vulnerability Assessment handouts and project information to review in advance of the workshop. A total of 67 stakeholders registered for the workshop, including 58 community members and 9 County staff, with approximately 50 attendees in total.

The workshop recording, presentation slides, and climate stressors handout can be viewed on the project website, [www.countyofsb.org/ccva](http://www.countyofsb.org/ccva).

### Workshop Purpose and Desired Outcomes

The County hosted the workshop to continue efforts to raise awareness about One Climate and the Climate Change Vulnerability Assessment and to share and receive feedback about impacts from hazards and the adaptive capacity of residents and businesses. The County was committed to providing an inclusive, equitable, and

transparent opportunity for participation in the Vulnerability Assessment planning process.

The goals for participants at the workshop included:

- ❖ Learning more about the Vulnerability Assessment project, including the County's efforts to-date and anticipated work in the next few months.
- ❖ Understanding how to engage with staff and the project.
- ❖ Having a better understanding of the CCVA, including what it will accomplish and why the County is preparing it.
- ❖ Learning about how the community may be harmed by climate change and the current adaptive capacity.
- ❖ Engaging with other stakeholders to hear and share their concerns, ideas, and vision for an equitable, sustainable, and resilient Santa Barbara County.

Engaging with members of the CCVA project team and talk about how climate change has affected them and the community and sharing the resources currently available to adapt to climate change hazards.

## Agenda

The agenda for the workshop follows.

6:00 pm	Meeting begins and welcome from Supervisor Das Williams
6:05 pm	Agenda review and Mentimeter poll
6:10 pm	Project presentation, part 1: Vulnerability Assessment overview and what we've heard so far
6:25 pm	Identifying hazards and impacts activity using Mentimeter
6:35 pm	Project presentation, part 2: introduction to adaptive capacity
6:50 pm	Introduction to small group breakout discussions
6:55 pm	Small group discussions in zoom breakout rooms
7:20 pm	Rapid reports from small groups
7:30 pm	Workshop wrap-up and end

## Mentimeter Polls

At the beginning of the meeting and after Part 1 of the presentation, community workshop participants opened up Menti.com to engage in two online surveys in either English or Spanish. The first Mentimeter poll was to gauge how participants heard about the workshop, if they had participated in a workshop previously, and if they needed

an overview of Zoom before diving into the presentation. A total of 23 participants engaged in the poll, and the full results are provided after the workshop summary.

The second Mentimeter poll focused on hazards and the impacts created by those hazards. The poll asked participants the following questions:

1. What effects have you or your community experienced from coastal hazards or flooding? / ¿Qué efectos han experimentado usted o su comunidad por los peligros costeros o las inundaciones?
2. What effects have you or your community experienced from wildfires and debris flows? / ¿Qué efectos han experimentado usted o su comunidad por los incendios forestales y los flujos de escombros?
3. What effects have you or your community experienced from extreme heat? / ¿Qué efectos han experimentado usted o su comunidad por el calor extremo?
4. What effects have you or your community experienced from drought? / ¿Qué efectos han experimentado usted o su comunidad por la sequía?

5. What effects have you or your community experienced from human health hazards? / ¿Qué efectos han experimentado usted o su comunidad por los peligros para la salud humana?
6. What hazard event has been especially memorable and why? / ¿Qué evento de peligro ha sido especialmente memorable y por qué?

The first five questions were multiple choice and participants could select all applicable answers. The sixth question was a fill-in-the blank, and participants could provide multiple answers as well. A total of 19 participants engaged in the poll.

When asked the first question, the majority of participants stated that they were seeing bluffs eroding at a faster pace and noticing ecosystem loss or changes to marine life. For wildfires and debris flows, nearly all participants had experienced ash coming down where they live and times they couldn't exercise outside. Extreme heat had several main effects on the community, including causing community members to buy and install appliances to stay cool; increasing utility bills; and disruptions to sleep, work, or mental health. During drought conditions, the biggest effect on participants was an increase in water and power bills. For human health hazards, most participants experienced changes in their day-to-day routine, delayed or cancelled events, and changes to physical and mental health. When asked which hazard events were especially memorable, the majority of participants mentioned the

2017 Thomas Fire and associated Montecito Debris Flow. Nearly all other events included fires from the last 20 years in Santa Barbara County. The full results follow the summary.

### Small Group Discussions

After Part 2 of the presentation and question-and-answer portion of the workshop, community workshop participants joined small groups with a facilitator. The small group discussions allowed for an interactive and in-depth discussion of what their experiences were and the resources available to prepare for, respond to, and recover from climate change hazards. The small groups were created using the breakout room feature of the Zoom platform, and the interactive activity was conducted using Google Jamboard, allowing participants to put virtual sticky notes onto a virtual whiteboard. Small group facilitators asked participants an introductory question and two adaptive capacity questions:

1. **Each person share your:** Name, neighborhood or organization/business you represent, and your favorite thing about Santa Barbara County
2. **What has been your experience in preparing, responding, and recovering from past hazard events?** Climate hazards include poor air quality, extreme heat, Public Safety Power Shutoffs, wildfires, debris flows, windstorms, flooding, high tides, etc.

3. **What resources, programs, and tools were available to you, your organization, or the community before, during, or after these events? How have the resources, programs, and tools available been working?** These can include local, regional, or State resources, programs, or funding mechanisms. We would like to know whether the existing programs are working and meeting the needs of community members.

The majority of workshop participants used Google Jamboard to provide their comments and stories regarding adaptive capacity to different hazards in the past. Most of the participants expressed support for the County's Vulnerability Assessment, and some participants voiced their concerns about the meeting registration process and suggested targeted events for Spanish speakers in the future.

When asked about their experience preparing for, responding to, and recovering from past hazards, participants said that they received conflicting emergency alerts for Public Safety Power Shutoffs (PSPS), had difficulties obtaining fire insurance, were unable to find adequate supplies during extreme heat or poor air quality events, and suffered anxiety and stress from these events. On a more positive note, participants shared several organizations and programs that helped the community through these hazards, such as the Santa Barbara Bucket Brigade, CERT teams, SBA Business and Personal Loans through FEMA, and 805 Undocufund. Participants also

shared the resources and tools available during or after hazard events, which included text alerts, the ReadySBC Alert program, United Way, Santa Barbara Foundation, Direct Relief, flexible funds to support students and teachers, and grants from the Santa Barbara Association of Realtors. The feedback received for each question is summarized by question and topic in the next sections.

## Virtual Community Workshop 2 – Mentimeter Results

At the beginning of the meeting and after Part 1 of the presentation, community workshop participants engaged in two online surveys in either English and Spanish.

### Introduction Mentimeter Poll

The first Mentimeter poll was to gauge how participants heard about the workshop, if they had participated in a workshop previously, and if they needed an overview of Zoom.

### Question 1

Have you participated in a County Board of Supervisors hearing, planning commission hearing, or workshop before today? / ¿Ha participado en una audiencia de la Junta de Supervisores del Condado, en una audiencia de la comisión de planificación o en un taller antes de hoy?

Multiple Choice Answers	Number of Responses
Yes / Sí	18
No / No	5

### Question 2

How did you hear about this workshop? / ¿Cómo se enteró de este taller?

Multiple Choice Answers	Number of Responses
Sustainability Newsletter / Boletín de Sostenibilidad	10
County website / Sitio web del Condado	3
County social media / Redes sociales del Condado	2
Friend or colleague / Amigo o colega	6
Other / Otros	6

### Question 3

Would you like a brief overview of how to use Zoom before we get started? ¿Desea una breve descripción general de cómo utilizar Zoom antes de empezar?

Multiple Choice Answers	Number of Responses
Yes / Sí	1
No / No	20

### Hazards and Impacts Mentimeter Poll

The second Mentimeter poll focused on hazards and the impacts created by those hazards.

1. What effects have you or your community experienced from coastal hazards or flooding? / ¿Qué efectos han experimentado usted o su comunidad por los peligros costeros o las inundaciones?
2. What effects have you or your community experienced from wildfires and debris flows? / ¿Qué efectos han experimentado usted o su comunidad por los incendios forestales y los flujos de escombros?
3. What effects have you or your community experienced from extreme heat? / ¿Qué efectos han experimentado usted o su comunidad por el calor extremo?
4. What effects have you or your community experienced from drought? / ¿Qué efectos han experimentado usted o su comunidad por la sequía?
5. What effects have you or your community experienced from human health hazards? / ¿Qué efectos han experimentado usted o su comunidad por los peligros para la salud humana?

6. What hazard event has been especially memorable and why? / ¿Qué evento de peligro ha sido especialmente memorable y por qué?

The first five questions were multiple choice, and participants could select all applicable answers. The sixth question was a fill-in-the blank, and participants could provide multiple answers as well. The following results from both Mentimeter polls are summarized according to question.

### Question 1

What effects have you or your community experienced from coastal hazards or flooding? / ¿Qué efectos han experimentado usted o su comunidad por los peligros costeros o las inundaciones?

Total Responses: 19

Multiple Choice Answers	Number of Responses
Beaches seem to be getting smaller / Las playas parecen ser cada vez más pequeñas	10
Noticing ecosystem loss/changes to marine life / Notar la pérdida/cambios de los ecosistemas en la vida marina	11

Multiple Choice Answers	Number of Responses
Flooding or water damage to my home or business / Inundaciones o daños por agua en mi casa o negocio	3
Flooding or water damage to a business I frequent / Inundaciones o daños por agua a un negocio que frecuento	5
Flooding or water damage to a park, trail, or recreation facility I use / Inundaciones o daños por agua en un parque, sendero o instalación recreativa	7
Increase cost or loss of property insurance / Incrementar el costo o pérdida del seguro de propiedad	7
Bluffs eroding at a faster pace / Los acantilados se erosionan a un ritmo más rápido	17
Death of a loved one / Muerte de un ser querido	1

## Question 2

What effects have you or your community experienced from wildfires and debris flows? / ¿Qué efectos han experimentado usted o su comunidad por los incendios forestales y los flujos de escombros?

Total Responses: 19

Multiple Choice Answers	Number of Responses
Couldn't go to work/school / No pudimos ir al trabajo/escuela	8
Trouble breathing due to poor air quality / Problemas para respirar debido a la mala calidad del aire	13
Couldn't exercise outside / No pudimos hacer ejercicio afuera	16
Ash coming down where I live / Ceniza bajando donde vivo	18
Fire, smoke, or debris damage to my home / Incendios, humo o escombros dañan mi casa	7
Costs to rebuild and repair / Costos de reconstrucción y reparación	3

Multiple Choice Answers	Number of Responses
Damage to nature near me / Daño a la naturaleza cerca de mí	15
Traffic due to road closures / Tráfico por cierres de carreteras	15
Disruption to sleeping, working, or other personal activities / Interrupción de dormir, trabajar o otras actividades personales	12
Increase cost or loss of property insurance / Incrementar el costo o pérdida del seguro de propiedad	9
Lost power to my home/business / Perdió electricidad en mi casa/negocio	13
Death of a loved one / Muerte de un ser querido	1
Changes to physical and/or mental health / Cambios en la salud física y/o mental	8



### Question 3

What effects have you or your community experienced from extreme heat? / ¿Qué efectos han experimentado usted o su comunidad por el calor extremo?

Total Responses: 18

Multiple Choice Answers	Number of Responses
Increased utility bills (water, power) / Aumento de los billes de servicios públicos (agua, energía)	12
Sickness and/or doctor visit / Enfermedad y/o visita al médico	3
Had to buy/install appliances to stay cool / Tuvo que comprar/instalar electrodomésticos para mantenerse fresco	13
Lost power to my home/business / Perdió electricidad en mi casa/negocio	6
Couldn't get a fruit or vegetable due to a shortage / No pudimos obtener frutas o verduras debido a un escasez	2
Delayed or cancelled an event / Retraso o cancelación de un evento	4

Multiple Choice Answers	Number of Responses
Death of a loved one / Muerte de un ser querido	0
Changes to physical and/or mental health / Cambios en la salud física y/o mental	6
Disruption to sleeping, working, or other personal activities / Interrupción de dormir, trabajar u otras actividades personales	11

### Question 4

What effects have you or your community experienced from drought? / ¿Qué efectos han experimentado usted o su comunidad por la sequía?

Total Responses: 16

Multiple Choice Answers	Number of Responses
Increased utility bills (water, power) / Aumento de los billes de servicios públicos (agua, energía)	14
Sickness and/or doctor visit / Enfermedad y/o visita al médico	1

Multiple Choice Answers	Number of Responses
Lost power to my home/business / Perdió electricidad en mi casa/negocio	3
Couldn't get a fruit or vegetable due to a shortage / No pudimos obtener frutas o verduras debido a un escasez	5
Loss/reduce use of water / Pérdida/reducir el uso de agua	12
Changes to physical and/or mental health / Cambios en la salud física y/o mental	5

### Question 5

What effects have you or your community experienced from human health hazards? / ¿Qué efectos han experimentado usted o su comunidad por los peligros para la salud humana?

Total Responses: 15

Multiple Choice Answers	Number of Responses
Death of a loved one / Muerte de un ser querido	2
Loss of income / Pérdida de ingresos	6

Multiple Choice Answers	Number of Responses
Change in housing / Cambio en la vivienda	5
Increased medical costs / Aumento de los costos médicos	5
Changes to day-to-day routine / Cambios en la rutina diaria	14
Changes to physical and/or mental health / Cambios en la salud física y/o mental	12
Delayed or cancelled an event / Retraso o cancelación de un evento	13

### Question 6

What hazard event has been especially memorable and why? / ¿Qué evento de peligro ha sido especialmente memorable y por qué?

#### Responses

- ❖ Debris flow
- ❖ Thomas Fire and Debris Flow. I am worried about future fires and decreased affordability: higher cost of living, cost of utilities, housing cost etc.
- ❖ The Thomas Fire due to its size and impact to our backcountry watersheds and the subsequent debris flow because of its impacts to the community and adjacent trail systems.

- ❖ Thomas Fire and evacuations, debris flow; Tea Fire; Jesusita Fire and evacuation; COVID pandemic lockdown year.
- ❖ Montecito Debris Flow. A close friend lost two of her children in the event and was seriously injured herself along with her surviving child.
- ❖ Thomas Fire and 1/9 debris flow, COVID pandemic. There have been many wildfires and air quality has been a memorable hazard that affects nearly everyone.
- ❖ Wildfire. We had to evacuate temporarily. Did not lose our home to fire.
- ❖ Our family had to evacuate our home due to extremely poor air quality and ashfall during the Thomas Fire. It could have harmed our infant grandson. My kids could not go to work or college.
- ❖ Gap Fire.
- ❖ Painted Cave Fire.
- ❖ Zaca Fire, Gap Fire, Jesusita Fire, Thomas Fire.
- ❖ The Holiday Fire came within 3 blocks of our house, and we had to get ready for evacuation without any power, since it was cut off. We had a substantial amount of ash in our yard. The Thomas Fire caused considerable disruption, including breathing.
- ❖ Personally, the fires, loss of trees, and degraded air quality. For my community, the mud slide was the most memorable because people died immediately, and Montecito was impacted with all the attention that brings.

- ❖ The recent Camino Cielo fire and the smoke for weeks from the statewide fires.

## Virtual Community Workshop 2 - Jamboard Responses

After Part 2 of the presentation and question and answer portion of the workshop, community workshop participants joined small groups with a facilitator and a Google Jamboard activity. The small group discussions allowed for an engaging and in-depth exploration of adaptive capacity topics/issues using the breakout room feature of the Zoom platform. Small group facilitators asked participants three questions:

1. **Will each person share your:** Name, neighborhood or organization/business you represent, and your favorite thing about Santa Barbara County?
2. **What has been your experience in preparing, responding, and recovering from past hazard events?** Climate hazards include poor air quality, extreme heat, Public Safety Power Shutoffs, wildfires, debris flows, windstorms, flooding, high tides, etc.
3. What resources, programs, and tools were available to you, your organization, or the community before, during, or after these events? How have the resources, programs, and tools available been working? These can include local, regional, or State

resources, programs, or funding mechanisms. We would like to know whether the existing programs are working and meeting the needs of community members.

The majority of workshop participants used Google Jamboard to provide their comments and stories regarding adaptive capacity to different hazards in the past. The feedback received for each discussion group, from both workshops, is summarized by question.

### Group 1 – Spanish

#### Question 1

Comments Shared During Introductions (Names are not included in this summary.)

- ❖ Moved out of Santa Barbara last year due to high rents.
- ❖ The last fire in Santa Barbara really affected my son, he fainted during P.E. due to the high heats and my daughter has asthma which is bad for her breathing.
- ❖ High energy costs during fires have really affected us financially.
- ❖ Shortage of food and water during COVID has also really affected us.

#### Question 2

What has been your experience in preparing, responding, and recovering from past hazard events? (Poor air quality, extreme heat, Public Safety Power Shutoffs, wildfires, debris flows, etc.)

- ❖ After the fire (Thomas fire), began to prepare by taken classes (CERT) to start learning and prepare myself in the case of another fire in the near future.
- ❖ I enjoy staying informed about all issues in the County in order to spread the word to the community.

#### Question 3

What resources, programs, and tools were available to you, your organization, or the community before, during, or after these events? How have the resources, programs, and tools available been working?

- ❖ Could there be more targeted events like this for Spanish speakers?
- ❖ City college has been actively sending email to distribute food since the start of COVID. Would appreciate if these types of programs continued, not only during disasters.
- ❖ Would like to see more programs for adults

## Group 2

### Question 2

What has been your experience in preparing, responding, and recovering from past hazard events? (Poor air quality, extreme heat, Public Safety Power Shutoffs, wildfires, debris flows, etc.)

- ❖ Maintain defensible space around childhood property.
- ❖ Good opportunities for long-term residents to share their experience and knowledge, especially for wildfires.
- ❖ PSPS warnings but then rumors and conflicting info. on if our area was still projected to be affected.
- ❖ I've been evacuated at least 4 times since 1976. Very temporarily each time. Never had to stay in a hotel.
- ❖ Hot down canyon winds from many fires - going to the beach to cool off.
- ❖ Neighbor couldn't get fire insurance; the rates were too high. Had to take out all vegetation around his house to get insurance.
- ❖ Concerns about getting elderly relatives who live by themselves to evacuate or get good information.
- ❖ Sycamore Canyon fire nearly burned out our home - emptied home of contents, stood ground with hose, returned next day. Had a place to stay (my parents had a shop downtown).

- ❖ I have experienced poor air quality during wildfires that has impacted my ability to passively cool my home and engage in outdoor activities.
- ❖ Conflicting information during the PSPS events
- ❖ Cancelled insurance.

### Question 3

What resources, programs, and tools were available to you, your organization, or the community before, during, or after these events? How have the resources, programs, and tools available been working?

- ❖ CAL FIRE active incident map
- ❖ Defensible space, fire prevention education. Text alerts, current info posted on websites, NWS forecasts, ReadySBC Alert program.
- ❖ I didn't know what the options were for evacuation with a pet; we ended up finding a hotel that would allow pets.
- ❖ PSPS alerts were not reliable, SCE website not updated, text alerts, website for fires.

### Notes from the Group Chat

- ❖ Microgrids can help improve resilience.
- ❖ County about to launch Energy Assurance and Auditing Service for public/community facilities.

- ❖ Beach access/pool/shaded parks for heat events.
- ❖ Access to outdoor cooling

### Group 3

#### Question 2

What has been your experience in preparing, responding, and recovering from past hazard events? (Poor air quality, extreme heat, Public Safety Power Shutoffs, wildfires, debris flows, etc.)

- ❖ Digital divide is an important issue. Access is very important for isolated persons and children.
- ❖ Loss of home to fire
  - Fire fighters unable to reach the area, lack of access.
  - Discounts to permit fees to rebuild and clear the property.
- ❖ Purchasing N95 masks and distributing while ash rained.
  - Volunteering at shelters post-fire
- ❖ Still paying for the SBA Business and Personal Loans we got from FEMA during the Thomas Fire for repairs and lost work.
- ❖ Trained about a 1,000 people for community emergency response training for Gap Fire.
- ❖ Losing power and internet, shuts everything down. Having to use hotspot on phone. This is getting worse.
  - Have solar and purchasing a battery.
- ❖ Animals and livestock, there isn't much that you can do. Put fans on them.
- ❖ PSPSs affect emergency evacuation noticing. Concern when evacuating from fire.
- ❖ Participated with Santa Barbara Bucket Brigade
  - Developed after debris flow to dig out people's homes.
  - Now clearing trails and making/distributing masks.
- ❖ Appliances stores do not have enough ACs.
  - Extreme heat concern - elderly relatives.
  - Homes were not built for extreme heat.
- ❖ Thomas Fire: I have asthma, ashes were brutal. Freeway was shut, work disrupted, home covered with ash. Lost friends in the debris flow. Mentally and emotionally traumatic. We were evacuated twice. I live in Samarkand, and we evacuated during Jesusita Fire too. I did crisis social media communications for Tea Fire, Jesusita, Gap Fire, and Thomas Fire (we're journalists).

### Question 3

What resources, programs, and tools were available to you, your organization, or the community before, during, or after these events? How have the resources, programs, and tools available been working?

- ❖ Isolated communities, make sure they are represented.
- ❖ The ReadySBC Alert program sends me emails that I greatly appreciate.
  - ReadySBC Alert invested in the preparedness infrastructure, which helped more people each time.
  - Started in 2005 as County was not prepared. Builds preparedness, emergency response, and communication.
  - Helped build EOC [emergency operations center], team trainings, and communication tool.
- ❖ Local nonprofits provide incredible extra services during crisis. Shout outs: local media disaster coverage, SB Bucket Brigade, United Way, 805 Undocufund, SB Fund for SB, SB Foundation, SB Food Bank and generous donors.
- ❖ Another shout out: Direct Relief, with free N95 masks, aid and support during the Thomas Fire.
- ❖ First responders like legions of firefighters, nurses, EMTs, medical personnel, fire pilots, police, sheriffs,

the prisoners who fight fires, Los Prietos, County EOPS ... these guys saved us all.

- ❖ The emergency notifications from Nixle are great (except for a few errors during the Thomas Fire).
- ❖ FEMA teams and the office they set up during the Thomas Fire were very helpful, got us set up with SBA loans.
- ❖ Errors—terrifying messages and people who didn't need to evacuate were told to evacuate.

### Group 4

### Question 2

What has been your experience in preparing, responding, and recovering from past hazard events? (Poor air quality, extreme heat, Public Safety Power Shutoffs, wildfires, debris flows, etc.)

- ❖ Wildfire smoke affecting health.
- ❖ Was involved in Search and Rescue many years ago, and learned about evacuation kits and preparedness, CPR/first aid certifications.
- ❖ Was a student at time of Thomas Fire—poor air quality/smoke, very sensitive, had to leave town to escape the smoke. Cave Fire also sensitive to the smoke but wasn't allowed to leave town. In both instances it disrupted learning.

- ❖ CERT training.
- ❖ County resident over 50 years. Most disasters have been more recent. Don't really remember many evacuations until the last 10 to 12 years.
- ❖ COVID has overshadowed thinking about climate hazards. Climate hazards haven't been at the forefront of planning for a while.
- ❖ 101 closure impacted ability to commute south for work.
- ❖ Had a carton of masks to prepare for smoke—useful now for COVID.
- ❖ Feel a lot of anxiety.

### Question 3

What resources, programs, and tools were available to you, your organization, or the community before, during, or after these events? How have the resources, programs, and tools available been working?

- ❖ During the fires her own community of housemates shared resources such as N95 masks, but if there were university or County resources she wasn't aware of them.
- ❖ Emergency calls very useful.
- ❖ Some trainings a few years ago provided a lot of individual counseling, to recover from the debris flow. Not sure of the organization or if it is still present.

- ❖ During evacuations, don't seem to be hotel rooms available, depending on network of friends.
- ❖ Sandbags wear out, so always need more.

### Notes from the Group Chat

- ❖ I didn't get a chance to share this, but I would say a main concern of mine going forward is affordability.
  - Housing and cost of living just keeps increasing and I am concerned that this will push people (including myself) out of the community.
  - I worry that resources will become scarcer and those without the highest income will not have as much access to quality food, water, and clean air.

### Group 5

### Question 2

What has been your experience in preparing, responding, and recovering from past hazard events? (Poor air quality, extreme heat, Public Safety Power Shutoffs, wildfires, debris flows, etc.)

- ❖ Registered for emergency alerts.
- ❖ Transportation infrastructure/road closures.
- ❖ Poor air quality days, disruptions to work and outdoor activities.



- ❖ Lack of air conditioning both at work and at home makes extreme heat days more challenging.
- ❖ LA County residents' feedback: stay indoors (poor air quality); sit under large trees (extreme heat); turn on fans (extreme heat).
- ❖ Decide to close park and rec facilities like swimming pools when ash/air quality is too bad for staff and patrons; host essential workers (ex: teachers) who can't travel to and from home daily; distribute items like bottled water, masks, meals; plan for financial assistance (to students and people who are undocumented, who may not have access to mainstream financial aid following loss of employment due to events).

### Question 3

What resources, programs, and tools were available to you, your organization, or the community before, during, or after these events? How have the resources, programs, and tools available been working?

- ❖ Flexible funds were invaluable—we were able to use unrestricted funds to support student and teacher needs during the Thomas Fire/debris flow and COVID-19.
- ❖ Translators and interpreters have been superstar communication pros.

- ❖ Undocufund has been an amazing resource over the past few years (financial support and morale booster).
- ❖ Anticipation of FEMA reimbursement was reassuring.
- ❖ Increased insurance premiums or loss of coverage.
- ❖ LA county resilience hubs as an idea to address hazard concerns impacts.
- ❖ Need for community cooling centers/resilience hubs.
- ❖ Ensure emergency preparedness, notification system provides timely and effective notice to all communities and populations.

### Group 6

### Question 2

What has been your experience in preparing, responding, and recovering from past hazard events? (Poor air quality, extreme heat, Public Safety Power Shutoffs, wildfires, debris flows, etc.)

- ❖ Need for masks and air purifiers for fires. Need for fans and AC for extreme heat.
- ❖ Various power shut-offs.
- ❖ Red Cross volunteering to help out during various events. See the effects firsthand—debris flow and Thomas Fire.

- ❖ Our best preparation was buying a house that was in a safer area....not too close to beach or mountains.
- ❖ Had to "ship off the kids" due to poor air quality.
- ❖ We had to evacuate during the Thomas Fire due to poor air quality. Went to the Red Cross Shelter at UCSB.
- ❖ Power shutoffs—text alerts.

### Question 3

What resources, programs, and tools were available to you, your organization, or the community before, during, or after these events? How have the resources, programs, and tools available been working?

- ❖ Santa Barbara Association of Realtors provided grants to those who lost their homes during the Thomas Fire and Debris Flow. These grants helped with rents or mortgages.
- ❖ We kept track of the fire through the phone notifications.
- ❖ The Red Cross was a fantastic resource. Very organized and helpful.
- ❖ The collaborative effort during and after the fires/debris flow worked well so that all resources were available in one source.

- ❖ Reverse 911 with text messages keep us informed of impending disasters. Very helpful since I don't watch a lot of TV.

## Adaptive Capacity Meetings

### Introduction

The Santa Barbara County Climate Change Vulnerability Assessment process included evaluation of potential impacts of climate stressors and hazards to the unincorporated county's populations, assets, and services and an analysis of the County and community's adaptive capacity. Adaptive capacity is considered the ability of the County, residents, businesses and organizations, and assets to adjust to potential damage, to take advantage of opportunities, or to respond to the impacts of climate change.

Identifying the adaptive capacity of the County and assets required knowledge and familiarity with application of related research and best practices as well as local knowledge of the area and roles in social, built, natural, economic, and cultural systems provided by County staff, the core team,<sup>1</sup> the Equity Advisory and Outreach Committee, and other stakeholders.

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<sup>1</sup> The Core Team consisted of County staff across several departments and expert advisors from the community.

The project team hosted a series of adaptive capacity discussions throughout December 2020 to identify and describe existing procedures, policies, projects, and programs that may support adaptive capacity and how these measures were being implemented or funded. These discussions included a variety of stakeholders, including the core team, County staff, members of the Equity Advisory and Outreach Committee, and subject matter experts. The following summary describes the key discussions that took place at these meetings and how the meeting results were integrated into the Climate Change Vulnerability Assessment.

## Summary

The project team supported discussions of the adaptive capacity with the County's Equity Advisory and Outreach Committee on December 2, 2020, and with the core team, other County staff, and subject matter experts in a series of online meetings from December 10, 2020, through December 18, 2020. For each meeting, the project team prepared a packet of background materials and a questionnaire for meeting participants to submit in advance of the scheduled meetings. All meetings were held online using Zoom.

The project team participated in the County's Equity Advisory and Outreach Committee on December 2, 2020, to share information and receive input on the adaptive capacity of populations and overall social vulnerability. The

project team sent committee members a worksheet prior to the meeting providing background on the project, impact statements for populations, and an explanation of adaptive capacity; providing questions to help gain a sense of programs, policies, and funding available; and offering a chance to score the adaptive capacity of the populations in the assessment on a scale of low, medium, and high adaptive capacity. The project team received three completed worksheets from the committee and completed an activity during the meeting using MURAL, an online collaboration tool.

The project team hosted a series of nine discussions from December 10, 2020, through December 18, 2020, with the core team, County staff, and subject matter experts. These discussions covered a variety of topics, including:

- ❖ Agriculture
- ❖ Coastal Hazards
- ❖ Economic Drivers
- ❖ Ecosystems
- ❖ Flooding and Severe Weather
- ❖ Social Vulnerability
- ❖ The Built Environment
- ❖ Water, Wastewater, and Drought
- ❖ Wildfire

Prior to these discussions, the project team sent out worksheets to the participants with questions to help identify programs, policies, and funding sources that may be available throughout the county to help people and assets adapt to changing conditions. To facilitate sharing responses in completed worksheets, whether sent in or provided during the meetings, the project team used Google Jamboard. Each virtual Jamboard presented the questions from the worksheet and responses as “virtual sticky notes”. During the discussions, participants and project team facilitators added comments to the Jamboards to fully capture the thoughts and ideas of participants. The project team received 32 completed worksheets and facilitated 9 discussion activities using the Jamboards.

Each adaptive capacity discussion provided insight into the existing programs, funding sources, and policies available for County government, residents, businesses, and other community members to increase adaptive capacity. The project team identified key takeaways from these discussions.

- ❖ One similarity across the discussions was the discussions related to barriers to adaptive capacity, which included lack of funding and staff capacity to implement programs and projects, political challenges among agencies, difficulty in reaching vulnerable populations, and lack of community

acceptance that the potential for hazards will increase in the future.

- ❖ Participants noted several programs that increased adaptive capacity in multiple sectors, such as the weatherization and retrofit programs available for homes and businesses, various evacuation assistance programs for residents, and the new assistance programs that have become available due to COVID-19.
- ❖ Other helpful programs include ReadySBC Alert, the Regional Wildfire Mitigation Program, and the bilingual directive from CEO Mona Miyasato that requires Dispatch and OEM to publish all emergency alerts in both English and Spanish where feasible.
- ❖ For funding, several discussion groups mentioned that while grants are helpful, they require more staff time to prepare applications (and to manage if grant is awarded); this can be beyond the current capacity of many County departments.

Overall, these discussions provided the project team with a series of programs, projects, and funding mechanisms that are currently available to help increase adaptive capacity throughout the county. This summary was used to evaluate the adaptive capacity of specific populations and assets to unique hazards and to accurately convey vulnerability to various hazards.

## Summary of Results

The following summaries include results from engagement with the Equity Advisory and Outreach Committee, County staff, and subject matter experts in December 2020. For each topic, the project team presented climate change hazards and associated impacts, and then asked participants to respond to a set of discussion questions.

### Social Vulnerability

#### Adaptive Capacity Questions

1. Are there cooling centers or resilience centers available throughout the unincorporated county? If so, where are they, and which areas do not have access to cooling centers? Are shuttles or buses available to help people travel to these locations?
2. Are shuttles or buses available to help people evacuate or travel to cooling centers or resilience centers? If so, where are these services located and what do they include?
3. Is there a home weatherization program or home energy retrofit program that homeowners and/or renters can participate in? If so, please explain.
4. Are there health advisories and emergency notifications that go out on multiple platforms and in multiple languages? If so, please explain.

5. Are there programs available for outdoor workers to ensure that water, shelter, and/or protective gear are available in hazardous conditions? Or are options available to change work hours to avoid hazardous conditions?
6. Are there homelessness or housing assistance programs, policies, or projects to address the adaptive capacity of persons experiencing homelessness or financially burdened populations?
7. Are there vegetation management, defensible space, or slope stabilization policies and programs to increase the adaptive capacity of frontline communities to wildfires, landslides, and debris flows?
8. Are there other programs, policies, or projects to address the adaptive capacity of frontline populations and communities?
9. Are there barriers or challenges that reduce the adaptive capacity of frontline populations and communities?
10. Other comments, information, or resources to share with the project team.

#### Discussion Summary

##### Health and Housing Programs

- ❖ The Santa Barbara County Continuum of Care has a coordinated entry system for persons experiencing homelessness to get rental assistance and other

financial assistance that facilitates a housing placement. This program can get funding through Emergency Solutions grants, Homeless Emergency Aid Program grants, Housing Assistance Program grants, and California Emergency Solutions and Housing grants. COVID-19 has also sparked the creation of the Housing and Homelessness COVID-19 Taskforce. Additional sanitation services have been offered per CDC guidance for persons who remain unsheltered in encampments.

- ❖ The 805UNDOCUFund assists individuals and families who have lost their homes, wages, and/or employment due to disasters with expenses.
- ❖ Other community-based organizations providing services: CommUnify (formerly Community Action Commission of Santa Barbara County), United Way and Santa Barbara Foundation, Foodbank of Santa Barbara County, Housing for the Harvest.
- ❖ Outdoor workers advocacy organizations: Ventura County Farmworker Resource Programs, Central Coast Alliance United for a Sustainable Economy.

#### Increasing Resiliency of Homes

- ❖ Independent Living Resource Center provides support for Public Safety Power Shutoffs and other power-outage-related events by offering free batteries to charge medical equipment.
- ❖ Weatherization programs: California's Low-Income Weatherization Program, 3C-REN Home Energy Savings Program, Central Coast Community

Energy, SCE, PG&E, SoCal Gas, Energy Savings Assistance Program, Swell Energy battery storage, Solarize Santa Barbara.

- ❖ Community Development Block Grant Program grants available for emergency homeless shelter improvements.

#### Emergency Preparation and Response

- ❖ During COVID-19, the Office of Emergency Management has made cooling spaces available and distributed supplies to the persons experiencing homelessness.
- ❖ Known cooling center locations: Santa Maria, Buellton, and City of Santa Barbara.
- ❖ Types of cooling centers: libraries, community centers, Unitarian Society of Santa Barbara, family resource centers, senior centers, and churches have functioned as cooling centers.
- ❖ SCE has set up Community Resource Centers during PSPS events.
- ❖ Communications
  - County has a bilingual directive from County Executive Officer Mona Miyasato that requires Dispatch and Office of Emergency Management to publish all emergency alerts in both English and Spanish where feasible.

- Public Health manages its California Health Alert Network notifications that provide health- and emergency-related notices to care facilities in the county.
- ReadySBC Alerts use social media, text, and phone calls. Nixle is limited to 138 characters (including spaces and punctuation), and Spanish translation may not be correct.
- SCE and PG&E provide advance notifications of PSPS events through email and text messages.

#### Evacuation Assistance

- ❖ OEM notifies EasyLift and SMOOTH during emergencies, which provides emergency evacuation assistance on an as-needed basis.
- ❖ Easylift, SMOOTH, and Senior Ride Program (SB County 211) provide low cost or free transportation for low-income individuals, children and teenagers, persons with chronic illness, and persons with physical or cognitive disabilities to medical appointments and other essential services.
- ❖ A Multi-County Transportation Emergency Preparedness Plan has been prepared in collaboration with SBCAG and Ventura County Transportation Commission to make transit agencies part of formal emergency response effort.

#### Barriers

- ❖ Some community members (low-income, low-resource ethnic communities, undocumented persons) may not feel safe traveling to public facilities. There may be sensitivity to “mixing” at cooling center.
- ❖ Lack of funding, staff capacity, or reimbursement for managing emergency and health preparedness and response efforts.
- ❖ No formal extreme heat or cooling center plan, residents may be unsure of where/when to go, other hazards may be prioritized for funding. Cooling centers may not accommodate all people and pets.
- ❖ Access to information and trust of the information (access to computer/internet, time to navigate complex state/federal/local programs).
- ❖ Inadequate health and emergency information distributed in indigenous or accessible languages, such as Mixteco and American Sign Language.
- ❖ Undocumented residents may be unable to access funding or participate in weatherization programs.
- ❖ Housing or rental agreements may prevent residents from retrofitting or weatherizing structures.
- ❖ Others: competing political interests, spatial technology, no engagement/dialogue at community level.

## Coastal Hazards

### Adaptive Capacity Questions

1. Does the County's Capital Improvement Program include measures to protect buildings and infrastructure from coastal hazards? If so, please describe.
2. Are there natural systems or human-made structures to protect assets from flooding and storm surge along the coastline? If so, please explain.
3. Are there policies or programs to protect infrastructure and buildings from dune and bluff erosion? If so, please explain.
4. Does the County have partnerships with Caltrans, utility providers, local jurisdictions, and private entities to ensure infrastructure, such as highways, evacuation routes, water systems, and railways, is protected from coastal hazards? If so, please explain.
5. Are there alternative buildings or infrastructure that could provide similar services if others are impacted by coastal hazards? Please review the lists above.
6. Are there other programs, policies, or projects to address the adaptive capacity of assets to coastal hazards?
7. Are there barriers or challenges that reduce adaptive capacity to coastal hazards?

### Discussion Summary

#### Natural or Human-Made Protections

- ❖ Point Castillo defending the Santa Barbara Harbor.
- ❖ Carpinteria Marsh protect adjacent residential development and Union Pacific RR.
- ❖ Goleta Slough protects the Santa Barbara Airport.
- ❖ Goleta Beach and nourishment activities protect Goleta Beach Park, and there is a study on this retreating beach from the Parks Department funded by an SB 1 grant to look at long-term management.
- ❖ Marshes on the Margins project.
- ❖ Stormwater infrastructure provides some flood control.
- ❖ Several revetments and sea walls in place along the county coastline.
- ❖ Santa Claus Lane railroad and road improvements.
- ❖ Coastal trail development at Rincon Beach County Park.

#### Policy Protections

- ❖ California Coastal Act.
- ❖ Local Coastal Plan (policies to protect bluff and dune vegetation).
- ❖ Cliff erosion policies set triggers for existing development and thresholds for red tagging.



- ❖ Multi-jurisdictional Transportation Emergency Preparedness Plan.
- ❖ Creek buffer ordinance.

#### Partnerships

- ❖ Partnership with SBCAG for emergency transportation efforts.
- ❖ Sustainability Dept., Public Works Dept., and water agencies work together.
- ❖ Los Angeles-San Diego-San Luis Obispo Rail Corridor Agency for railroad issues.

#### Barriers

- ❖ California Coastal Commission permitting time frame.
- ❖ Currently there is no process to screen develop projects for hazards and climate change.
- ❖ No flood control projects are currently associated with the coastline. Flood control is more land based.
- ❖ Beach management for coastal hazards can reduce the ability for beaches as recreation assets.
- ❖ Lack of perceived urgency, political will, or prioritization.
- ❖ Physical barriers: roads, parking lots, railroads, buildings.

## Wildfire

### Adaptive Capacity Questions

1. Are there vegetation management, defensible space, or slope stabilization policies and programs to increase adaptive capacity of transportation, utilities, recreation, communication, or oil and gas infrastructure to wildfires? If so, please explain.
2. Are there vegetation management, defensible space, or slope stabilization policies and programs to increase adaptive capacity of buildings to wildfires? If so, please explain.
3. Are there defensible space assistance programs for those who may have mobility or financial challenges? If so, please explain.
4. Are there hazard mitigation measures, capital improvement programs, or other wildfire prevention, response, or recovery projects currently or planned to be implemented? If so, please describe.
5. Are there programs available to provide protective gear for outdoor workers in smoke and ash conditions? If so, please explain.
6. Please describe any emergency preparation, response, and recovery plans for key community services throughout the county specific to wildfire.
7. Are there other programs, policies, or projects to address the adaptive capacity of assets to wildfire?

8. Are there barriers or challenges that reduce adaptive capacity of assets to wildfire?

## Discussion Summary

### Programs or Projects

- ❖ Montecito Fire District:
  - Defensible space surveys and assistance programs with cost-sharing.
  - Funding for large vegetation management projects or those who need financial assistance.
  - Structure Hardening Grant Program and \$25,000 already set aside for vent retrofits.
  - Other programs: Neighborhood Chipping Program, Roadside Hazard Abatement Program, Sheep Grazing Program, Dead Tree Removal Program, and maintenance of Fuel Treatment Network.
  - Mails flyers to each resident explaining the programs prior to each fire season.
- ❖ Community chipping projects
- ❖ Regional Wildfire Mitigation Program
  - Funded up to \$6 million so far.
  - Plan to buffer the WUI, prioritize retrofits, conduct FireWise training.
  - In coordination with Santa Barbara County unit, California Vegetation Treatment Program, and multiple Community Wildfire Protection Plans.
- Project with Cachuma Resource Conservation District (RCD).
- ❖ Wildland Residence Association in mountain pass area that helps with defensible space.
- ❖ Several vegetation management projects can use the California Vegetation Treatment Program for CEQA streamlining.
- ❖ Utilities
  - Hardening electrical and power infrastructure throughout the county.
  - Weather stations and cameras installed.
  - Upgrading technology to control circuits from wood to steel and going beyond mandates for vegetation management.
- ❖ Fire departments have defensible space inspection programs and are required to inspect a certain number of parcels each spring to ensure defensible space requirements are met. People can also request inspections.
- ❖ Countywide educational efforts through Fire Safe Council with good participation and feedback.

### Policy Protections

- ❖ Ag Pass: allows agriculture owners to get approval to go behind lines of fire prior to events to do essential work.

- ❖ National forests, national parks, public utilities are required to have adaptation plans.
  - Los Padres National Forest Land Management Plan and Fire Management Plan.
- ❖ Santa Barbara County Fire Department has a vegetation management plan, and the Santa Barbara County Fire Hazard Area has requirements for all buildings, roads, and driveways.
- ❖ California Building Code Chapter 7: Minimum standards for Fire Hazard Severity Zones within a State Responsibility Area or Wildland-Urban Interface.
- ❖ Santa Barbara County Unit Strategic Fire Plan (2020).
- ❖ Community Wildfire Protection Plans: San Marcos Pass/Eastern Goleta Valley Mountainous Communities, Montecito, Santa Barbara City, Mission Canyon, Goleta, Carpinteria-Summerland, Gaviota.

## Funding Options

- ❖ Fire Prevention Grant Program (projects outside of 100-foot buffer from residential properties).
- ❖ New grant programs for upgrading homes in fire-prone areas being developed by California Earthquake Authority to implement funding available through State legislation.

- ❖ The Santa Barbara Fire Safe Council received \$10,000 from PG&E to assist with education for wildfire hazards and potential mitigation opportunities in northern SB County.
- ❖ SCE and PG&E have grant funding programs to assist with wildfire prevention programs.
- ❖ Multi-Jurisdictional Hazard Mitigation Plan included structure hardening, which enables FEMA funding.

## Agriculture and Outdoor Workers

- ❖ Ag Pass: allows agriculture owners to get approval to go behind lines of fire prior to events to do essential work.
- ❖ CAUSE handed out masks to outdoor workers during the Thomas Fire.
- ❖ Air Resource Advisory (Incident Management Team) through California Air Resources Board provides educational programs.
- ❖ Direct Relief International has provided masks to the general public.

## Barriers

- ❖ Privately owned land complicates public hazard mitigation efforts because funding sources may not be able to go to privately owned land.
- ❖ Challenges to justify controversial treatment projects, develop best practices, coordinate with State and/or federal agencies, or complete CEQA/NEPA review.

- ❖ Cost to residents and lack of funding for retrofits, vegetation management, or defensible space assistance.
- ❖ There is a lot of electrical infrastructure in remote areas, making it harder and more time consuming to upgrade hardware to be more fire resilient.
- ❖ Lack of codes, regulations, ordinances for building future fire-smart communities.
- ❖ Amtrak manages the vegetation in its right-of-way.

## Agriculture

### Adaptive Capacity Questions

1. Are there programs available for outdoor workers to ensure that water, shelter, and/or protective gear are available in hazardous conditions? Or are options available to change work hours to avoid hazardous conditions?
2. Are there agricultural pests and disease education programs to help farmers and ranchers stay up to date on pests and diseases and changing conditions in the region, and appropriate management measures? If so, please describe.
3. Does the County have groundwater management policies and programs to reduce overdraft and ensure reliable water supplies for agriculture? If so, please explain.

4. Are there hazard mitigation measures, capital improvement programs, or other wildfire prevention, response, or recovery projects currently or planned to be implemented? If so, please describe.
5. Are there vegetation management programs or requirements for agricultural land in wildfire prone areas? if so, please describe.
6. Are there other programs, policies, or projects to address the adaptive capacity of agricultural populations and assets?
7. Are there barriers or challenges that reduce adaptive capacity of agricultural populations and assets?

### Discussion Summary

#### Outdoor Workers

- ❖ Some workers are reluctant to seek medical care due to cost.
- ❖ Concerns among workers of costs from not working.
- ❖ Cal/OSHA regulations are the main tool for ensuring that basic workplace safety conditions exist for agricultural workers.
- ❖ Santa Barbara County Ag Commissioner's Office has provided Personal Protective Equipment (PPE) to workers during COVID-19 and smoke events.

- ❖ Cachuma RCD has assisted with distribution to Spanish-speaking small-scale farmers.
- ❖ We have altered work hours and given people paid time off.

## Educational and Other Programs

- ❖ County's Agricultural Commissioner's Office
  - Seminars and email updates
- ❖ UC Cooperative Extension
  - Seminars, tail gate meetings, webinars
- ❖ Chemical companies have chemical representative updates with minor pest updates.
- ❖ Pest Control Advisor
  - Educational programs
- ❖ Livestock education efforts: veterinarians, pharmaceutical companies, and/or their local livestock auction yard.
- ❖ Air Pollution Control District (APCD) has grants available for replacing ag engines, tractors, other stationary and off-road equipment, irrigation equipment.
  - Agriculture engine and off-road equipment grants
- ❖ Cachuma RCD works with private and public landowners/managers to identify voluntary projects to be implemented on their land.
  - State Water Efficiency and Enhancement Program (SWEEP), Healthy Soils Program

- ❖ Increased effort to plant pest-resistant grape clones/varieties as limited buffers in vineyards.

## Water Management

- ❖ State grant programs such as SWEEP to help aid in irrigation and energy efficiency in agriculture.
- ❖ County groundwater regions, depending on the location, are subject to management from previous adjudication or from impending regional management by the Groundwater Sustainability Agencies (GSA) created under Sustainable Groundwater Management Act (SGMA).
  - Cuyama Valley, Santa Ynez River Valley, and San Antonio Valley are due in 2022.
  - Cachuma RCD is engaged with the San Antonio Basin GSA and will be working directly with the agricultural community to help define management strategies.

## Wildfire and Smoke Preparedness, Response, and Recovery

- ❖ Spraying kaolin clay seems to reduce smoke taint on wine grapes.
- ❖ Cachuma RCD has a Regional Priority Plan to reduce wildfire risk.
- ❖ Permit can be obtained for Fire Hazard Reduction Burning: burning of cuttings from trees, vines, or bushes cut specifically for the purpose of reducing fire hazard.

- ❖ USDA's Natural Resources Conservation Service (NRCS) has Environmental Quality Incentives Program (EQIP) funding for improvements and has had funding for fire recovery.
- ❖ Ag Pass Program to assist landowners during fires or other emergencies.
- ❖ Range Improvement Association works with rangeland owners to use prescribed fire on their rangelands.
- ❖ Santa Barbara County Blueprint Atlas has mapping of wildland fire areas and modeling.
- ❖ Ag land can be used as a fire buffer in WUI.

#### Barriers

- ❖ Capacity for nonregulatory entities to assist agricultural operations in resilience projects.
- ❖ Cost, literacy, education associated with adaptation and updated science.
- ❖ Lack of feasible solutions (smoke taint of wine grapes).
- ❖ Lack of funding for agencies and landowners/managers to implement projects, including wildfire mitigation.
- ❖ Traditional beliefs in agricultural practices.
- ❖ OSHA requirements for lighting can restrict ability to change hours (e.g., to early morning).
- ❖ Transportation/movement of workers is also an issue during and after hazardous events, especially with disrupted transportation networks.

## Ecosystems

### Adaptive Capacity Questions

1. Are there ecosystem restoration programs, policies, or projects in the county? If so, please describe (briefly) what they are, and which ecosystems are covered. Please provide links to projects if available.
2. Are there conservation or open space areas available for coastal dune, marsh, and wetland to migrate inland from coastal hazards?
3. Have you observed or learned of specific plant or animal species in the county that may be highly adapted to changing or hazardous conditions?
4. Are there concerns about exotic and/or non-native species migrating into the County in response to changing conditions? Are there current programs to manage these new plant or animal species?
5. Are there other programs, policies, or projects to address the adaptive capacity of existing ecosystems and natural resources?
6. Are there barriers or challenges that reduce adaptive capacity of existing ecosystems and natural resources?

## Discussion Summary

### Programs, Projects, Migration Potential

- ❖ SB Blueprint contains list of restoration projects and other relevant ecological layers.
- ❖ Channel Islands Restoration has been working to remove tamarisk.
- ❖ Goleta Beach Park
  - Using cobbles instead of large rocks to reduce sea level rise impacts.
  - Cobble berms at eroding beaches to build back sandy beach ecosystems and recreational beaches, which also protects inland area assets.
- ❖ Devereux Slough can migrate inland somewhat to North Campus Open Space.
- ❖ Goleta Slough has a vulnerability assessment.
- ❖ Marshes on the Margins study to look at tidal wetlands in southern California to see if there is land available near wetlands for migration.
- ❖ Private land at Hollister Ranch provides area for plants to migrate uphill behind seawalls if restoration activities took place.
- ❖ Arroyo Burro Open Space Restoration (City of Santa Barbara).
- ❖ Coal Oil Point Reserve preserves beach habitat for snowy plovers.
- ❖ Fish Passage projects and steelhead restoration program.

- ❖ San Marcos Foothills Preserve: riparian/scrub.
- ❖ Land Trust restoration at Arroyo Hondo.
- ❖ Ice plant removal and oak planting at Dangermond Preserve.
- ❖ Marine reserves: reports of new studies that demonstrate how fisheries outside of reserves are stronger, and evidence indicates that there is little poaching within our reserves (thus, the reserve is improving the fishery).

### Adaptive Species

- ❖ Raptors seem to be doing pretty well under current conditions.
- ❖ Meso predators like skunks, raccoons, crows, and sea gulls seem to be doing fine, but have negative impacts on other, more-special-status animals.

### Funding

- ❖ Coastal Conservancy has given grant to Cachuma RCD to prioritize wildfire resilience.

### Barriers and concerns

- ❖ Lack of education on importance of protecting ecosystems, such as economic or recreation benefits and community protection.
- ❖ Lack of weed control programs.
- ❖ Funding for projects and cost of land in Santa Barbara County.

- ❖ Physical barrier: no room to migrate, transportation corridors, water conveyance structures, seawalls, built environment.
- ❖ Unwillingness of agencies to change practices and procedures.
- ❖ Invasive plants associated with the degradation of the environment establishing without control.
- ❖ Cycle of fire/invasive species leads to loss of coastal sage scrub and chaparral, especially around ecosystem edges (roads and railroads).

## Water, Wastewater, Drought

### Adaptive Capacity Questions

1. Does the County have groundwater management policies and programs to reduce overdraft and ensure reliable water supplies for agricultural, industrial, and domestic uses? If so, please explain and/or provide links to online resources and programs.
2. Are there drought restrictions, water conservation programs, or alternative water supplies to ensure water is available to existing and new development throughout the county? If so, please describe.
3. Does the County have approved and/or planned capital improvement projects for water-related infrastructure in both coastal and inland areas? If so, please describe.

4. Are there flood, landslide, or fire protection measures for water-related assets? If so, please explain.
5. Are there other programs, policies, or projects to that address the adaptive capacity of water-related assets and to drought? Assets include flood control infrastructure and the provision of this service, the entities that supply water and wastewater services throughout the County and all of the infrastructure needed to support the supply and treatment associated with these services.
6. Are there barriers or challenges that reduce adaptive capacity of water-related assets and to drought?

### Discussion Summary

#### Groundwater Management

- ❖ Santa Ynez River Water Conservation District is coordinating the groundwater planning for the three Groundwater Sustainability Agencies (GSAs) in the Santa Ynez River Valley Groundwater Basin.
- ❖ Cuyama groundwater basin has a Groundwater Sustainability Plan, others to follow in 2022.
- ❖ Montecito Groundwater Basin Groundwater Sustainability Agency established in 2018.
- ❖ GSAs limit water use and County will permit wells, although these permits do not consider supply or scarcity.



- ❖ Santa Maria and Goleta groundwater basins are adjudicated.

#### Programs or Projects

- ❖ Cuyama Valley
  - County has emergency-trucked water that delivered potable water to households in the Cuyama Valley when public wells failed.
  - Some businesses provide potable/drinking water to employees; or provide potable/drinking water for sale to residents whose wells are dry or have low-quality water.
  - Some rural residents share wells and have small-scale water systems.
- ❖ Regional Water Efficiency Program: All purveyors are partners.
- ❖ State Water Project: Central Coast Water Authority is trying to bring suspended Table A water back to the county.
- ❖ South County and State Water purveyors have great flexibility to sell and trade water among themselves through the Cachuma project.
- ❖ Recycled water: Laguna, Goleta, Santa Barbara.
- ❖ Carpinteria will have potable reuse soon through advanced purification project.
- ❖ There is plan (no funding yet) to develop a pipeline from Carpinteria that connects to Casitas Water District in Ventura County to bolster regional water supply and sharing.

- ❖ Desalinization
  - Desal plant in Santa Barbara provides some water to Montecito.
  - Desal plant regional water pipeline partially funded through Integrated Region Water Management Plan.
- ❖ Infrastructure
  - Cachuma Operations Board uses a pump barge for when lake gets low.
  - Solvang: working to obtain permit(s) for a new well(s) in Santa Ynez River.
  - Guadalupe: wastewater treatment plant improvements.
  - Los Olivos: new wastewater treatment plant.
  - Montecito: pursuing recycled water from wastewater treatment plant.
- ❖ Hazard Protection
  - Laguna County Sanitation Wastewater Treatment Plant completed a flood protection berm project this year.
  - County Flood Control manages many debris basins that protect water assets and many other assets downstream, with a focus on regional flooding instead of specific assets.
  - Prerelease of water from reservoirs to allow for inflow to the lake during rainfall or flood.

#### Policies

- ❖ SB 332: ocean dischargers to reuse certain percentage of water by specific date. State revised Title 22.

#### Barriers

- ❖ Lack of funding, community acceptance, or political will to create pipelines for emergency supplies.
- ❖ Shared resources and older infrastructure make aquifers a delicate resource.
- ❖ Legal actions and adjudications of groundwater basins.
- ❖ Time and cost to establish a new water source.
- ❖ Drought surcharges help with revenue loss for purveyors.
- ❖ Small water systems have less adaptive capacity due to difficulty in raising money and finding people to have administrative roles.

### Flooding and Severe Weather

#### Adaptive Capacity Questions

1. Are there hazard mitigation measures, capital improvement programs, or other flood prevention, response, or recovery projects currently or planned to be implemented? If so, please describe.

2. Is there a home or business weatherization program or home energy retrofit program that homeowners and renters can participate in? If so, please explain.
3. Are there flood warnings and emergency notifications that go out on multiple platforms and in multiple languages? If so, please explain.
4. Are there ecosystem restoration programs, policies, or projects in the unincorporated county to help with flooding and severe weather? If so, please describe what they are and which ecosystems would be included?
5. Are there other programs, policies, or projects to address the adaptive to flooding and severe weather?
6. Are there barriers or challenges that reduce adaptive capacity flooding and severe weather?

#### Discussion Summary

##### Programs and Projects

- ❖ Ecosystem restoration
  - Goleta Slough
  - Carpinteria Marsh: allows marsh to drain when it needs to.
  - Retrofitted debris basins may provide restoration benefits.

- North Campus Open Space restoration project near UCSB.
- ❖ Debris basins
  - Cold Springs, Romero, and San Ysidro modifications underway. Grants in progress for others.
  - Construction of a new debris basin at Randall Road to prevent future debris flow hazards.
  - Awarded FEMA Hazard Mitigation Grant Program (HMGP) grant (\$18 million, 75% from federal sources)
  - Montecito area HMGP requests focus on 6 debris basins—4 existing and 2 new. Operational improvements at existing.
  - Temporary debris nets have been installed in the Montecito area.
- ❖ Laguna County Sanitation Wastewater Reclamation Plant has completed a flood protection project costing \$1.35 million that created a berm for a 100-year flood event.
- ❖ Santa Maria area has levees in place to reduce the impact of catastrophic dam failure at Twitchell Dam.

#### Policies

- ❖ Countywide Integrated Stormwater Resources Plan.
- ❖ Flood Control District has a Capital Improvement Program, although much of it is unfunded.
- ❖ National Flood Insurance Program provides codes that benefit construction in special flood hazard areas.

#### Communications

- ❖ ReadySBC Alert sends incident-specific information with GIS mapping.
- ❖ Integrated Public Alert and Warning System through Sheriff's Dispatch and OEM.
- ❖ CEO's Office has directed emergency responders to publish emergency alerts bilingually (English and Spanish) for each alert when possible.
- ❖ Santa Ynez River is monitored, and warnings through OEM and Sheriff Dispatch to lower Santa Ynez River Valley can be issued (25 property owners, primarily agriculture).
- ❖ The National Weather Service has the ability to send emergency alerts to impacted areas within their reporting region. OEM will echo their alerts in English and Spanish.
- ❖ Biggest challenge with radio is that many channels are automated or managed remotely, and private stations are not required to participate in emergency alert systems but can choose to participate.

- ❖ Montecito Fire Protection District has their own radio station that can be used for alerts.

#### Barriers

- ❖ Lack of staff capacity, funding, legislative teeth.
- ❖ Cost to pursue grants, administer grant funded projects, and processing time.
- ❖ Homeless population lives/gathers in riverbeds, which is a hazard to their lives and puts search and rescue responders in harm's way if their services are needed.
- ❖ Flooding is viewed as a nuisance as opposed to a hazard. Community thinks that if they've survived flooding once they can do it again.
- ❖ Existing development in floodplains that we must protect.
- ❖ Community acceptance (education and awareness).
- ❖ There is a need to negotiate permits with wildlife organizations for many infrastructure retrofit projects.

### The Built Environment

#### Adaptive Capacity Questions

1. Have local, regional, state, or utility-sponsored home and/or business weatherization, energy efficiency, or other energy retrofit programs been available to and accessed by those in need, such as owners of

older buildings or buildings in at-risk areas? Please explain.

2. Are there hazard mitigation measures, capital improvement programs, or other prevention, response, or recovery projects currently or planned to be implemented for landslides and debris flows? If so, please describe.
3. Are there hazard mitigation measures, capital improvement programs, or other prevention, response, or recovery projects currently or planned to be implemented for extreme heat? If so, please describe.
4. Please describe any emergency preparation, response, and recovery plans for key services throughout the county specific to landslides and debris flows. Explain any lessons learned from previous or current efforts.
5. Are there other programs, policies, or projects to address the adaptive capacity of the built environment?
6. Are there barriers or challenges that reduce adaptive capacity of the built environment?

#### Discussion Summary

##### Programs and Projects

- ❖ San Ysidro Creek Debris Basin
- ❖ Montecito Response and Recovery projects following the 1/09/2018 debris flow.

- ❖ LIDAR/Analysis done from Thomas Fire burn scar is great to present how local topography will behave.
- ❖ Ring Net Project privately funded.
- ❖ Santa Barbara Unified Solar Plus Energy Resiliency Project: Project that includes solar at 14 sites, with full solar microgrids at six of those sites.
- ❖ Central Coast Community Energy (3CE) allocated \$25 million to create the Uninterruptible Power Supply (UPS) Fund, which provides electricity resilience project financing for public and private customers operating critical facilities backup power public and private entities.
- ❖ Energy Assurance Assessment Services: Site assessments for solar, battery storage, EV charging infrastructure, and microgrids. (Launching in 2021.)
- ❖ CPUC's Self-Generation Incentive Program (SGIP): energy storage for residential / nonresidential facilities.
- ❖ NAPA Living River Project. While addressing flooding first it demonstrates many ecosystem benefits derived from adaptive actions.
- ❖ Weatherization
  - Property Assessed Clean Energy Financing: commercial properties only.
  - Go Green Financing: statewide (residents and business owners).
  - SoCal Gas: replace older gas appliance, they provide a rebate.
- IRS: Tax deduction for energy efficient upgrade to home.
- New grant programs for home upgrades in fire-prone areas will be developed by California Earthquake Commission to implement funding that will be available through State legislation.
- ❖ Emergency Preparedness
  - Caltrans repaired and replaced 6 bridges along State Route 192, and the County reconstructed bridges in Montecito, including the Ashley Road bridge.
  - When expecting significant rainfall following a fire and the watershed has been burned, emergency planning set in place using the National Incident Management System (NIMS) and the Standardized Emergency Management System (SEMS).
  - Disaster Debris Management Plan being developed.
  - LIDAR and vegetation mapping.

#### Policies

- ❖ AB 841: funding for HVAC systems for schools. Energy-efficiency focused and HVAC systems to prevent COVID transmission.
- ❖ Multi-jurisdictional Hazard Mitigation Plan.
- ❖ Office of Arts and Culture: Emergency Preparedness for Cultural Venues (continuity of operations plans).

- ❖ Chapter 15A of National Flood Insurance Program (NFIP).

#### Alternative Assets Available

- ❖ Schools have agreements to share campuses if hazards close other schools.
- ❖ Installation of battery backup systems for traffic signals in case of power outages, including fires.
- ❖ Redundancies in place to keep communications equipment that is installed on mountain peaks powered should an incident cut electrical services.

#### Barriers

- ❖ Lack of incentive programs for residential building improvements such as home hardening for wildfire.
- ❖ Lack of countywide aerial photography and LIDAR.
- ❖ Continued pattern of rebuilding in high-risk areas due to lack of funding for land purchase/conversion to open space.
- ❖ Lack of funding for transportation infrastructure improvements, staffing support for response efforts, and to build back better.
- ❖ Lack of political will and education on available programs.
- ❖ OEM only has 1 GIS-dedicated staff.

## Economic Drivers

### Adaptive Capacity Questions

1. Are there insurance, financing/funding, or other programs available to help components of the County's economy prepare for or respond to hazards?
2. What has been the local response to disaster-related economic disruptions, such as the Montecito debris flow or any recent wildfires?
3. What, if any, economic recovery efforts have been implemented in the most recent pandemic-related or other economic disruptions? What programs have been successful?
4. Are there gaps in economic recovery efforts for specific sectors, specific groups of people, or to specific hazards?
5. Are there programs available for outdoor workers to ensure that water, shelter, and/or protective gear are available in hazardous conditions? Or are options available to change work hours to avoid hazardous conditions? If so, please explain.
6. Does the County have educational programs or guides for creating sustainable or resilient business plans? If so, please explain.
7. Are there other programs, policies, or projects to address the adaptive capacity of economic drivers? If so, please explain.

8. Are there barriers or challenges that reduce adaptive capacity of economic drivers? If so, please explain.

## Discussion Summary

### Funding

- ❖ Santa Barbara Better Together Fund: grants for small businesses in the unincorporated area.
- ❖ 805 UndocuFund: Community based organizations to support daily wage workers (migrants and other workers).
- ❖ Uninterruptable Financing Fund for battery backup supplies (public and private entities).
- ❖ Self-Generation Incentive Program: statewide program.

### Previous Response Efforts

- ❖ CBOs like CAUSE providing PPE and information.
- ❖ Bucket Brigade/SB Mask Makers.
- ❖ Montecito Center for Preparedness, Recovery and Rebuilding.
- ❖ Montecito Bank and Trust and other community banks: loans and other efforts.
- ❖ Like for Like Land Use Ordinance was passed that allowed people to rebuild in a safer place on their lot without needing to go through an extensive permitting process (waiver).
- ❖ Postevent federal assistance of \$66 million.

- ❖ Crisis and Recovery Emergency Services (CARES) and Paycheck Protection Program (PPP) programs.
- ❖ COVID-19 Rental Assistance Grants.
- ❖ Quick action to remove economic impacts to restaurants.

### Agriculture

- ❖ USDA Coronavirus Food Assistance Program: Federal funding has been made available for farmers facing market losses due to coronavirus.
- ❖ Agricultural producers have the option to purchase crop insurance to help defray the costs of unforeseen incidents such as frost, heat, or smoke damage.
- ❖ Federal programs exist that can provide financial support for farmers facing certain issues. Ex: Federal funds available for replanting vineyards affected by red blotch virus.
- ❖ Cannabis provides a larger variety of crops for farmers, especially wineries.

### Educational Programs

- ❖ Women's Economic Ventures (WEV): educational efforts for small businesses to become more resilient.
- ❖ Green Business Program: County led.
- ❖ Energy Assurance Assessment Services.

Barriers

- ❖ Communication to vulnerable populations and Latinx.
- ❖ Lack of coordinated preplanning and inconsistent recovery opportunities for different hazards.
- ❖ The USDA Coronavirus Food Assistance Program does not cover all crops, so some producers may not be eligible for assistance.
- ❖ Money may not be available for small businesses.
- ❖ Service workers or those working in/at home are often overlooked.
- ❖ There is not a centralized local resource set up in advance to seek help.

DRAFT



## Stakeholder Meetings

### Purpose

Throughout the winter and spring of 2021, the County held a series of focused stakeholder engagement meetings to review, inform, and vet the technical analyses, particularly to expand the analyses to include and be responsive to the “lived experience,” local knowledge, and expertise of residents and other community stakeholders. Engaging community partners prior to conducting the Climate Change Vulnerability Assessment improved the analysis and supported the identification of locally appropriate climate adaptation and resilience strategies that build upon the community successes and lessons learned from community members and business owners.

Types of community-based organization stakeholders included representatives of partner public agencies, community health providers, environmental groups, and community groups. Engaging these groups helped identify existing and potential programs that share climate resilience goals and/or co-benefits and facilitated a collaborative and equitable approach to implementation.

Throughout preparation of the Climate Change Vulnerability Assessment, County staff developed a network of stakeholders for the One Climate Initiative, participating in stakeholder-led meetings as available and establishing a countywide Equity Advisory and Outreach Committee. Members of this committee requested the opportunity to talk with the Climate Change Vulnerability Assessment project team directly to provide additional information on their experiences and the experiences of the community members they represent in their organizations. County staff presented project updates and invited input and feedback from the Equity Advisory and Outreach Committee during multiple meetings.

The project team identified organizations and community members who have experience or expertise relevant to the Climate Change Vulnerability Assessment but have not been able to engage in community workshops or other stakeholder engagement opportunities. The project team also wanted to engage with the business community in Santa Barbara County, including agricultural groups and chambers of commerce who may represent and provide services for these key industries. The organizations and committees who participated in this outreach were:

- ❖ Santa Ynez Band of Chumash Indians
- ❖ Independent Living Resource Center
- ❖ 350 Santa Barbara
- ❖ Santa Barbara County Green Business Program

- ❖ Agricultural Advisory Committee
- ❖ Southern California Gas Company (SoCal Gas)

County staff reached out to several other organizations and companies to participate in stakeholder interviews, but the project team was unable to set up meetings with them. These stakeholders were:

- ❖ CAUSE (Central Coast Alliance United for a Sustainable Economy)
- ❖ Santa Barbara County Chamber of Commerce
- ❖ Investor-owned utilities, including Pacific Gas and Electric and Southern California Edison
- ❖ Chambers of commerce

## Format

County staff hosted one-hour stakeholder meetings using the videoconference Zoom platform between April 20, 2021, and July 1, 2021. County staff sent each stakeholder individual or group an agenda with specific stakeholder questions. The project team tailored questions to each group type. The community organization groups received similar questions, and the business organization groups and utilities received questions catered to their business, company, or committee.

In addition, the project team attended two scheduled monthly Agricultural Advisory Committee meetings on May 6, 2021, and June 3, 2021, to connect with agricultural community stakeholders. Following the first meeting, the project team created a supplemental questionnaire for the Agricultural Advisory Committee members, which was available online for two weeks.

## Agenda

The agenda for each one-on-one stakeholder meeting followed the same format:

- ❖ Welcome and introductions – 5 minutes
- ❖ Overview of the Climate Change Vulnerability Assessment – 5 to 10 minutes
- ❖ Discussion – 40 to 45 minutes
- ❖ Wrap-up and next steps – 5 minutes

## Stakeholder Questions

The project team asked the following questions in each **community organization** stakeholder interview, with the goal of learning more about specific organizations, the services they provide, and how the people they represent respond to hazardous events.

1. Which community members does your organization represent or provide services for?

2. What type of services does your organization provide?
3. How have the community members that your organization represents prepared for, responded to, or recovered from hazardous events?
4. Has your organization created or provided new programs since the beginning of the COVID-19 pandemic? If so, does your organization have the capacity and/or funding to continue these existing programs when the pandemic subsides?
5. How does your organization work, partner, or engage with the County?
6. What climate hazards are of most concern to your organization? What do feel most and least prepared to address?
7. Who and what do you think is most vulnerable to climate change hazards in the unincorporated county?
8. What opportunities do you see available to the County, your organization, or others that would increase the County's resilience to climate change and reduce vulnerability to climate hazards?
9. If you've been able to review any of the project materials available on the project website, do you have any recommendations or comments that we can consider as we move through the project?
10. Do you have any questions for us?

The project team asked the following questions during the **Green Business Program** stakeholder interview, with the goal of learning more about program, the services the program provides, and how the people they assist and represent respond to hazardous events.

1. What type of services does the Chamber of Commerce and Green Business Program provide?
2. How has the business community prepared for, responded to, or recovered from natural disasters or hazard events like wildfires, wildfire smoke, debris flows, extreme heat, or similar events? What strategies have been most effective?
3. What type of businesses or industries do you think are most vulnerable to climate change hazards in the unincorporated county?
4. What climate hazards are of most concern to the Chamber of Commerce, Green Business Program, and business community? What do you feel most and least prepared to address?
5. Have the Chamber of Commerce and/or the Green Business Program created or provided new programs since the beginning of the COVID-19 pandemic? If so, does your organization have the capacity and/or funding to continue these existing programs when the pandemic subsides?
6. How does the Chamber of Commerce and Green Business Program work, partner, or engage with the County?

7. What opportunities do you see available to the County, your organization, or others that would increase the business community's resilience to climate change and reduce vulnerability to climate hazards? Are there barriers that the County can help remove?
8. If you've been able to review any of the project materials available on the project website, do you have any recommendations or comments that we can consider as we move through the project?
9. Do you have any questions for us?

The project team asked the following questions during the **Agricultural Advisory Committee** meeting, with the goal of learning more about the committee, the services and programs it provides, and how the people it represents respond to hazardous events.

1. How has the agricultural community, including different groups such as vineyards, nurseries, ranchers, berry and row crop farmers, and farmworkers, successfully prepared for, responded to, or recovered from natural disasters or hazard events like wildfires, wildfire smoke, debris flows, extreme heat, or similar events? Have there been barriers to your preparedness or mitigation? What programs or resources are most critical to your preparedness and/or recovery from these events?
2. What climate hazards are of most concern to the agriculture community now and in the future?

What do you feel most and least prepared to address?

3. Who and what, in regard to agriculture, do you think is most vulnerable to climate change hazards in the unincorporated county?
4. Are there changes made as a response to the COVID-19 pandemic that you plan to continue?
5. What opportunities do you see available to the County, your group, or others that would increase the County's agricultural community resilience to climate change and reduce vulnerability to climate hazards?
6. Do you have any questions for us?

The project team asked the following questions during the **SoCal Gas** meeting, with the goal of learning more about the company, the natural gas assets in Santa Barbara County that it manages, and how it has prepared for and responded to hazardous events.

1. What type of assets does your company manage and operate in Santa Barbara County? (Please note the Climate Change Vulnerability Assessment project area is the unincorporated county.)
2. How has SoCal Gas prepared for, responded to, or recovered from natural disasters or hazard events in recent history, such as wildfires, debris flows, extreme heat, or similar events? What strategies

have been most effective? How have they varied by hazard or event?

3. What climate hazards are of most concern to your company? What do you feel most and least prepared to address?
4. What type of SoCal Gas assets, including physical infrastructure and the services, do you think are most vulnerable to climate change hazards in the unincorporated county?
5. Are you concerned about having to potentially shut off natural gas service in anticipation of hazardous conditions out of an abundance of caution?
6. Has SoCal Gas created or provided new resilience-related programs since the beginning of the COVID-19 pandemic? If so, does your organization have the capacity and/or funding to continue these existing programs when the pandemic subsides?
7. How does SoCal Gas work, partner, or engage with the County?
8. What opportunities do you see available to the County, your company, or others that would increase the community's resilience to climate change and reduce vulnerability to climate hazards? Are there barriers that the County can help remove?

9. If you've been able to review any of the project materials available on the project website, do you have any recommendations or comments that we can consider as we move through the project?

10. Do you have any questions for us?

### Supplemental Questionnaire: Agricultural Advisory Committee

The project team gave the Agricultural Advisory Committee a supplemental online questionnaire to help gain an understanding of the hazards of most concern for the agriculture community, which agricultural populations and assets may be most vulnerable, and what opportunities are available to reduce the vulnerability of the agriculture community to climate-related hazards. The individual responses of the questionnaire could not be seen by others on the committee, only the project team. The project team presented the combined responses to the Committee. The questionnaire included an overview of the Climate Change Vulnerability Assessment, contact information, and the following questions:

1. How have you and the agricultural community successfully prepared for, responded to, or recovered from natural disasters or hazard events like wildfires, drought, wildfire smoke, debris flows, extreme heat, or similar events? (Long Answer)

2. Have there been barriers to your preparedness to respond to natural disasters or hazard events? (Long Answer)
3. What programs or resources are most critical to the agricultural community's preparedness and/or recovery from these events? (Long Answer)
4. What climate hazards are of most concern to the agriculture community now and in the future? (Check all that apply)
5. What climate hazards do you feel most prepared to address? (Check all that apply)
6. What climate hazards do you feel least prepared to address? (Check all that apply)
7. Who and what, in regard to agriculture, do you think is most vulnerable to climate-related hazards in the unincorporated county? (Long Answer)
8. Are there changes in the agricultural community that have been made as a response to the COVID-19 pandemic that may continue? (Long Answer)
9. What opportunities do you see available to the County and the agricultural community that would reduce the vulnerability of the County's agricultural community to climate-related hazards? (Long Answer)

## Summary of Responses

The project team hosted five stakeholder interviews, attended two stakeholder meetings (e.g., Agricultural Advisory Committee meetings), conducted one stakeholder survey to provide an overview of the Climate Change Vulnerability Assessment project, and asked each organization the questions listed above. The following sections summarize the responses received by each of the organizations.

### 350 Santa Barbara

The project team met with representatives from 350 Santa Barbara on April 20, 2021. 350 Santa Barbara is a grass roots, nonprofit organization based in Santa Barbara that focuses on educating people on international, regional, and local issues related to climate change. This organization represents people of all ages and ethnicities, with a primary focus on reducing greenhouse gas emissions and creating a space for individuals and communities to voice their concerns about climate change. 350 Santa Barbara works outside of the County government system, working with environmental supporters and forming relationships with students, researchers, indigenous groups, and elected officials to promote energy and environmental justice issues.

While 350 Santa Barbara focuses on the greenhouse gas reduction side of climate change, the members had insight into the lived experiences of community members preparing for and responding to hazards. One person noted that senior citizens and those with respiratory issues are vulnerable to wildfire smoke. Another person mentioned how non-English-speaking families found it difficult to find safety in past disasters due to poor translation of emergency notifications and lack of accurate, reliable information. It was also noted that those with chronic illnesses might be forgotten during disasters, and many may not be able to find refuge from extreme heat because of lack of air conditioning. Others mentioned that there is little information on where to go during wildfires and what roads are open when evacuating, and the recovery and rebuilding process was very long and difficult.

When asked which climate hazards were of most concern, members of 350 Santa Barbara said:

- ❖ Wildfire
- ❖ Extreme heat
- ❖ Drought
- ❖ Coastal erosion
- ❖ Sea level rise

When asked who and what they think is most vulnerable to climate change hazards, members listed the following:

- ❖ People with cancer
- ❖ Persons in physical rehabilitation
- ❖ Seniors
- ❖ Children
- ❖ Persons experiencing homelessness, who may be most vulnerable to air quality
- ❖ Agricultural workers, who may be most vulnerable to extreme heat
- ❖ Electricity infrastructure
- ❖ La Casa de la Raza
- ❖ Homeless encampments
- ❖ LGBTQ youth
- ❖ Low-income persons
- ❖ Highways 101 and 154
- ❖ Persons with disabilities, those living alone, and chronically ill
- ❖ Senior retirement and resource centers

### Independent Living Resource Center

The project team met with representatives from the Independent Living Resource Center (ILRC) on April 22, 2021. The ILRC is a private nonprofit organization providing disability services and advocacy for San Luis Obispo, Santa Barbara, and Ventura counties. They represent and help people of all ages and all types of disabilities with services such as independent living support, advocacy and education, personal assistance, aging and disability

support and resources, and emergency and disaster preparedness. The ILRC is part of multiple committees with formal programming with the County.

The ILRC explained how public safety power shutoffs, evacuations, and general response to hazardous events disproportionately negatively affect people with disabilities. The ILRC mentioned that when evacuating, many people with disabilities are judged or mistreated at evacuation centers and shelters because of their disability. During previous evacuation events, emergency shelters have not had the resources and services to assist persons independently living with disabilities, which harmed the response and recovery of these individuals.

The ILRC created an Emergency Services Manager position and launched the Disaster Plan Program to help persons with disabilities prepare for and respond to disasters. These plans include hazard-specific disaster planning based on where an individual lives and includes a planned evacuation route, a go kit, and places to shelter if an individual is unable to evacuate. Additionally, the ILRC is working with PG&E to provide batteries to those who depend on electricity for medical devices or medicine refrigeration. Programs that the ILRC offers include individual support with medical baseline and early alerts for PSPS events, transportation services to hotels or medical appointments, food deliveries and food replacement if lost due to a hazard and hosting educational events.

During the COVID-19 pandemic, the ILRC provided personal protective equipment to people, scheduled COVID vaccine appointments and organized transportation to appointments, helped individuals get home from the hospital, and loaned or gifted Chromebooks to individuals to help them stay connected with the community, doctors, and their families. These services will likely continue post-pandemic.

When asked which climate hazards were of most concern, members of the ILRC said the following:

- ❖ Most or all hazards
- ❖ Flooding
- ❖ Extreme heat
- ❖ Extreme cold

When asked who and what they think is most vulnerable to climate change hazards, the ILRC listed the following:

- ❖ Persons with disabilities of any kind: physical, mental, cognitive health, mobility issues, substantial medical need, and other disabilities.

### **Santa Ynez Band of Chumash Indians**

The project team met with members of the Santa Ynez Band of Chumash Indians and their consultant on May 6, 2021. They are completing a tribal climate change vulnerability assessment for the traditional lands of the



Chumash people, which extend beyond the designated reservation to the traditional area where the Chumash historically traded, lived, and traveled.

When asked which climate hazards were of most concern, the members of the Santa Ynez Band of Chumash Indians said the following:

- ❖ Wildfire and physical damages
- ❖ Flooding and physical damages
- ❖ Sea level rise
- ❖ Drought and plant communities, habitat, species of importance
- ❖ Temperature changes and plant communities, habitat, species of importance
- ❖ Extreme heat and health effects
- ❖ Debris flows

When asked who and what they think is most vulnerable to climate change hazards, the member of the Santa Ynez Band of Chumash Indians listed the following:

- ❖ Traditional resources: places, plants, food, water in both inland and coastal areas.

The Santa Ynez Band of Chumash Indians are one of three bands of Chumash that have traditional lands in Santa Barbara County. Other bands include the Coastal Band of the Chumash Nation and Barbareño Band of Chumash Indians.

### Agricultural Advisory Committee

The Agricultural Advisory Committee is a formal County of Santa Barbara advisory committee that advises the Board of Supervisors, Planning Commission, and County departments on agriculture-related matters. It consists of members from the Santa Barbara County Flower and Nursery Growers Association, Santa Barbara Vintners, Santa Barbara County Farm Bureau, Grower-Shipper Association of Santa Barbara and San Luis Obispo Counties, Santa Barbara County Cattlemen's Association, California Strawberry Commission, California Women for Agriculture, and representatives of each Supervisorial District appointed by the Board of Supervisors.

The project team attended two meetings with the Agriculture Advisory Committee on May 6 and June 3, 2021. During these meetings, the project team provided an overview of the content and goals of the Climate Change Vulnerability Assessment, discussed the questions presented earlier in this memo, and received feedback. After the meeting on May 6, 2021, the project team sent out the supplemental questionnaire and received five responses from committee members. At the June 3, 2021, meeting, the project team held a question-and-answer period that built on the survey responses and took notes using Google Jamboard, an online collaboration tool.

When asked which hazards are of most concern to the agricultural community, committee members mentioned wildfire, drought, agricultural pests and diseases, and extreme heat. For the hazards that the agricultural community feels least prepared to address, the committee discussed drought, severe weather, landslides, and wildfire.

The project team also asked how the agricultural community has responded to and recovered from natural disasters. Members explained how each year is different, but that alternative scheduling (including alternative harvest and planting times) have been put in place during extreme heat and smoke events, the Ag Pass program<sup>2</sup> has helped keep operations running during disasters, and N95 masks have been handed out to employees per state standards. Barriers to response include a disconnect between emergency responders and the agricultural community, short supplies of N95 masks, and the hurdles needed to acquire generators when the power goes out.

When asked who and what, in regard to agriculture, they think is most vulnerable to climate change hazards, committee members listed the following:

- ❖ Field crops
- ❖ Irrigated crops

- ❖ Animals
- ❖ Properties adjacent to open land that is not managed
- ❖ Land adjacent to homes

Overall, the committee emphasized that County, State, and federal agency cooperation is needed to help farmers and ranchers maintain operations in the face of climate change hazards.

### **Santa Barbara County Green Business Program**

The project team met with the program director of the Santa Barbara County Green Business Program on May 12, 2021. The Green Business Program is a countywide program funded by the County, cities, and water districts that works with businesses to help them earn a California Green Business certification. This certification includes businesses meeting energy conservation, water conservation, transportation reduction, waste reduction, and pollution prevention requirements. Metrics recorded as part of the certification include greenhouse gas reductions, kilowatt-hours saved, therms saved, water saved, and solid waste diverted.

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<sup>2</sup> The Ag Pass Program provides a unified way to identify commercial farm and ranch owner-operators and their employees to firefighting personnel, law enforcement, and emergency personnel during hazardous events to allow limited emergency access to their properties. These activities include protecting or caring for agricultural assets and providing support to emergency personnel.

The Green Business Program Director explained that through all of the recent disasters, they have seen the community come together to create a local network and support local businesses. During the debris flow disaster, the chambers of commerce throughout the county stepped up to help all businesses in their areas. During the COVID-19 pandemic, the chambers of commerce and Green Business Program helped businesses get Paycheck Protection Program loans and other grants. The Food Action Network also stepped up to feed the community and meet the local needs of the community.

The Green Business Program Director discussed how the business community is likely most prepared for energy and water efficiency that is needed for drought and extreme heat. There are several programs for retrofitting toilets, sinks, showerheads, landscaping, and heating or cooling equipment. The business community is likely least prepared for sea level rise, erosion, and wildfire. Barriers that increase vulnerability in the business community include business permitting for energy- and water-efficiency measures, lack of trust of the Green Business Program in the business community, and ultimately “we don’t know what we don’t know.”

When asked which climate hazards were of most concern, the program director said:

- ❖ Wildfire and smoke
- ❖ Extreme heat

- ❖ Coastal erosion to tourism businesses
- ❖ Sea level rise to tourism businesses

When asked who and what they think is most vulnerable to climate change hazards, the program director listed:

- ❖ Businesses in older buildings
- ❖ Small and family-owned businesses
- ❖ Businesses and residents in rural areas
- ❖ Tourism industry
- ❖ Agriculture industry
- ❖ Businesses owned by women, black, indigenous, and other people of color, veterans, immigrants, and lesbian, gay, transgender, bisexual, and queer persons

### Southern California Gas Company

The project team met with staff of SoCal Gas on July 1, 2021. SoCal Gas provides natural gas services to customers in Santa Barbara County and throughout Southern California. The infrastructure assets they manage in Santa Barbara County include transmission pipelines, natural gas meters for customers, natural gas distribution lines, regulatory stations and valves, the La Goleta storage field, and offices with vehicles in various locations. Additional infrastructure currently being updated and installed includes advanced meters that are read wirelessly and automated valves that can be turned on or off remotely during a hazardous event.

SoCal Gas staff explained how they worked with the County Fire Department to shut down the natural gas system during the Montecito Debris Flow event and brought in hundreds of service staff to re-ignite stoves, water heaters, pool heaters, and other appliances during the recovery effort. SoCal Gas staff mentioned how the transmission and distribution lines are air- and watertight, usually underground, and therefore resilient to flooding and wildfire. The climate change hazards of most concern were those associated with ground movement, such as landslides and debris flows. However, SoCal Gas was in the process of installing a fiber optic monitoring system to detect earth and water movement for advanced notice, in order to turn pressure down or to shut off pipes in an emergency.

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# Santa Barbara County Climate Change Vulnerability Assessment

## Appendix C: Population and Asset Profiles

### Introduction

The Santa Barbara County Project Team reviewed and confirmed the proposed list of populations and assets in July 2020. This appendix provides the profiles for each asset, including background, limitations, and relations among assets, as well as an overview of current populations and assets in the unincorporated county. The Project Team used these profiles during each step of the Climate Change Vulnerability Assessment.

### Selected Populations and Assets

Populations and assets are the people, buildings and infrastructure, economic assets, ecosystems and natural resources, and key community services in unincorporated Santa Barbara County and/or serving the unincorporated communities that can be affected by climate change hazards. PlaceWorks gave the County Project Team and Core Team a draft list of populations and assets based on the general list in the California Adaptation Planning Guide. The project team and core team revised and

refined this list to be more appropriate to the unincorporated county and to ensure that the vulnerability assessment looks at all populations and assets that are important to the community. In total, PlaceWorks evaluated 22 populations and 66 assets in the Climate Change Vulnerability Assessment (CCVA). These populations and assets fall into six categories:

- ❖ **Populations:** Persons who are likely to be disproportionately harmed by climate change.
- ❖ **Infrastructure:** Public infrastructure and other structures that provide important services to the community.
- ❖ **Buildings:** Essential buildings that provide key services to the community.
- ❖ **Economic Drivers:** Facilities and activities that contribute significantly to the county economy.
- ❖ **Ecosystems and Natural Resources:** A range of natural environments and associated resources throughout the unincorporated county.
- ❖ **Key Community Services:** Critical functions carried out by both public and private agencies throughout the county.

## Population and Asset Considerations

In selecting and assessing various populations and assets to include in the CCVA, it is important to keep a few considerations in mind, including: (1) differences in the population universes between datasets, (2) the limitations of the data sources for Santa Barbara County that the project team used to prepare this assessment, and (3) how some population and asset categories may appear to refer to the same thing.

### Population Sample Pool

Statistics, especially statistics related to population, use the concept of a sample pool. In this context, the sample pool is the overall group of people that the individuals being measured or studied are drawn from. For example, in a political poll that is conducted among registered voters, the sample pool is registered voters, since people who are not registered voters are not counted.

This concept is important for the Santa Barbara County CCVA because some of the demographics used in the CCVA have different sample pools. Most of the demographic data come from the US Census Bureau's American Community Survey (ACS), and most of this data have a sample pool of either all residents or all households in the county. However, there are a few differences, such as:

- ❖ Data on persons with limited English proficiency only counts people who are at least 14 years old, since young children generally are not proficient in any language.
- ❖ Statistics that only count the noninstitutionalized population (e.g., people not in prisons or long-term care homes).

This does not affect the outcome of the vulnerability assessment, but it creates slight differences in the number of people counted as part of each population.

### Data Limitations

The CCVA pulled data from a wide array of sources. PlaceWorks used only reliable, credible sources with the best available information. In some cases, the CCVA was constrained by the lack of available high-quality information or spatial information about the geographic distribution of particular populations or assets. For example, there is no accurate information about the distribution of undocumented persons in Santa Barbara County, and even information about the total number of undocumented persons countywide is an educated estimate. Because of this, the vulnerability assessment considers undocumented persons but cannot identify specific areas where they may face an elevated risk from certain hazards.

## Related Assets

Throughout the 88 populations and assets in the CCVA a few that may appear redundant. For example, the CCVA looked at both public safety buildings (as a Buildings asset) and public safety response (as a Community Service asset). To be as comprehensive as possible, the CCVA looked at physical structures separately from the services or benefits they provide. In the same way, CCVA looked at frontline or underserved populations separately from the homes they live in or the industries where they work.

This is because the effects of climate change on one type of population or asset can be different from the effects on related populations and assets. For example, if a flood damaged or destroyed a single-access road, such as State Route 166 (SR-166), it would have a significant impact on public safety services in and around the community of Cuyama, particularly if staff and resources were needed from elsewhere in the county. However, the loss of SR-166 would not damage police or fire stations. Similarly, a drought can have a major effect on water and wastewater services by reducing the amount of water available, but droughts have little or no physical effect on water and wastewater pipelines, pumps, or treatment facilities.

## Population and Asset Profiles

### Populations

The CCVA evaluated 22 populations that could be disproportionately harmed by climate change hazards. PlaceWorks gathered the data for many of these populations from the ACS 2013 to 2017 5-year estimates at the block level. Other sources for population data included CalEnviroScreen 3.0, the Healthy Places Index, and the 2019 Santa Barbara Point-in-Time Count & Survey.

**Children:** Children are 10 ten years of age or younger. There are approximately 12,285 children in the unincorporated county, or 9 percent of the total population.<sup>1</sup>

**Communities with high pollution burden:** Persons living in areas with high levels of soil, water, and/or atmospheric pollution, as measured by the number of permitted facilities and measurements of key pollutants. These areas include Casmalia, Garey, Sisquoc, Los Alamos, New Cuyama, Cuyama, Vandenberg Village, and Mission Hills.<sup>2</sup>

**Cost-burdened households:** Households paying over 30 percent of their income toward housing-related expenses, including mortgage and rental payments, real estate taxes, homeowner's insurance, and utilities. There are approximately 17,548 cost-burdened households in the unincorporated county, or 39 percent of all households.<sup>3</sup>

**Households in mobile homes:** Households living in prefabricated structures, built in a factory before being transported to the site. There are approximately 2,712 households in mobile homes in the unincorporated county, or 6 percent of households.<sup>4</sup>

**Households in poverty:** Households with an income below the 2020 federal poverty level, which is \$26,200 for a household of four.<sup>5</sup> There are approximately 6,839 households in poverty in the unincorporated county, or 15 percent of all households.<sup>6</sup>

**Isolated and rural communities:** Communities in rural, low-density areas away from large, developed areas, often with limited access routes, such as Casmalia, Cuyama, and New Cuyama.

**Low-income households:** Households with an income below \$95,300 (the threshold for low-income levels for a household of four in Santa Barbara County, according to state income limits from the California Department of Housing and Community Development). There are approximately 26,303 low-income households in the unincorporated county, or 59 percent of all households.<sup>7</sup>

**Low-resourced ethnic minorities:** Persons identifying as a member of a racial and/or ethnic minority and facing limited access to resources, such as financial, social, healthcare, or educational assistance.<sup>8,9</sup>

**Outdoor workers:** Persons in industries that require them to be outdoors, such as agriculture, outdoor recreation, construction, and landscaping. Approximately 12 percent of people older than 16 and employed work outdoors in the unincorporated county.<sup>10</sup> This percentage includes undocumented workers; however, undocumented workers may be underrepresented in census data and other datasets.

**Overcrowded households:** Persons living in households with more than 1.0 person per room (including all rooms except bathrooms) are considered overcrowded. Persons living in households with more than 1.5 persons per room are considered severely overcrowded. There are approximately 2,195 overcrowded households in the unincorporated county, or 5 percent of all households.<sup>11</sup>

**Persons experiencing homelessness:** Persons experiencing homelessness are individuals with a primary nighttime residence that is in a public or private space not designed for use as a regular sleeping accommodation for human beings. There are approximately 80 persons experiencing homelessness in the unincorporated county, or 0.05 percent of the population.<sup>12</sup>

**Persons living on single access roads:** Persons living on roadways with only one access point in or out of the neighborhood or community.<sup>13</sup>



**Persons with chronic health problems:** Persons with a persistent or long-lasting illness or disease, including those with compromised immune systems.<sup>14</sup>

**Persons with disabilities and access and functional needs:** Persons with a physical condition that limits their movements, senses, or activities, including those with access and functional needs, and persons with psychological conditions, including mental, behavioral, cognitive, and developmental disabilities. There are approximately 12,985 persons with disabilities in the unincorporated county, or 9 percent of the population, although this may not include all persons with access and functional needs.<sup>15</sup>

**Persons with limited English proficiency:** A person 14 years of age or older who speaks a language other than English at home and does not speak English very well. There are approximately 480 limited English-proficiency households in the unincorporated county, or 1 percent of all households.<sup>16</sup>

**Persons without a high school degree:** Adults (at least 25 years of age) who did not complete high school or receive their GED. There are approximately 8,770 persons without a high school degree in the unincorporated county, or 20 percent of the population.<sup>17</sup>

**Persons without access to transportation or telecommunications:** Persons (with or without disabilities and access and functional needs) without access to a car, transit, or communication systems (internet and phone services). There are approximately 1,643 households without access to a vehicle in the unincorporated county, or 4 percent of all households.<sup>18</sup> Approximately 20,048 households do not have internet access in the county, or 18 percent of all households.

**Renters:** Persons who do not own the household in which they reside. There are approximately 15,721 households that rent in the unincorporated county, or 35 percent of all households.<sup>19</sup>

**Senior citizens:** Individuals 65 years or older. There are approximately 21,923 senior citizens in the county, or 16 percent of the population.<sup>20</sup>

**Senior citizens living alone:** Individuals 65 years or older living alone. There are approximately 4,927 senior citizens living alone in the unincorporated county, or 3 percent of the population.<sup>21</sup>

**Unemployed persons:** Persons who are actively searching for employment but are unable to find work. There are approximately 7,840 unemployed persons in the unincorporated county, or approximately 7 percent of the working population.<sup>22</sup>

**Undocumented persons:** Persons residing in the country and the county without legal documentation.

## Infrastructure

There are 22 types of infrastructure in the CCVA. Some infrastructure is publicly owned by the County or other government agencies, and some is private property.

**Airports:** Airports and the associated facilities serving or in Santa Barbara County—Vandenberg Space Force Base, Lompoc Airport, Santa Barbara Airport, Santa Maria Public Airport, and Santa Ynez Airport.<sup>23</sup>

**Beaches:** Local beaches, including Goleta Beach, Arroyo Burro Beach, Santa Claus Lane Beach, Butterfly Beach, Jalama Beach, Rincon County Beach/Park, Rancho Guadalupe Dunes County Park, Point Sal State Beach, and Ocean Beach Park, as well as state beaches at Carpinteria, El Capitan, Refugio, and Gaviota.<sup>24</sup>

**Bicycle routes:** Paved or unpaved trails that are mostly intended for bicycling activities. The county has over 400 miles of bicycle routes.<sup>25</sup>

**Bridges:** Bridges may carry roads, rails, or trails. In the county, these range from large, state-owned bridges that carry Highway 101, to locally owned bridges that carry hiking trails over small creeks. There are approximately 198 local bridges, 233 state highway bridges, and 105 rail bridges in the county.<sup>26,27,28</sup>

**Bus routes:** Bus transit routes that serve the unincorporated areas are operated by Santa Barbara Metropolitan Transit District, Santa Ynez Valley Transit, the Breeze Bus, Chumash Casino Bus, Clean Air Express, Coastal Express by VCTC, City of Lompoc Transit, Cuyama Transit, Greyhound, San Luis Obispo Regional Transit Authority, and Wine Country Express.<sup>29</sup>

**Communication facilities:** These include public radio and television transmitters, cell phone towers, emergency communication antennae, and a wide range of other public and private communication infrastructure systems. There are 23 known cell towers in the county as well as smaller towers and additional communication facilities (radio, TV, etc.).<sup>30</sup>

**Dams:** A barrier to hold back water, resulting in a reservoir. Public and private dams in Santa Barbara County include Alisal Creek, Bradbury, Dos Pueblos, Edwards Reservoir, Gibraltar, Glen Annie, Juncal, Los Carneros Lake, Ortega, Dennis Reservoir, and Twitchell.<sup>31</sup>

**Electric vehicle charging stations:** As of 2017, there were approximately 71 electric vehicle charging stations available in the county for both public and private use.<sup>32</sup>

**Electrical substations:** Electrical substations are facilities that convert electricity from one voltage to another, making it suitable for long-distance transmission or for use by homes, businesses, and other electrical customers. There are 34 substations in the county owned and

operated by Pacific Gas and Electric Company (PG&E), Southern California Edison (SCE), and other owners.<sup>33</sup>

**Electrical transmission and distribution lines:** Electrical transmission lines carry high-voltage electricity long distances between power plants and electrical customers. Transmission lines in the county are owned and operated by SCE, PG&E, and others.<sup>34</sup>

**Evacuation routes:** Major roadways or access roads that act as emergency evacuation routes during disasters.

**Flood control infrastructure:** This infrastructure includes levees, dikes, drainage channels, and other infrastructure meant to help prevent creeks and other water bodies from overflowing their banks and causing floods. In the county are 24.5 miles of levees along the Santa Maria River, 42 miles of closed conduits, 22 miles of lined channel, 200 miles of improved and unimproved earth channels, 38 recharge basins, 25 debris basins, and 10 sediment trapping basins.<sup>35</sup>

**Hiking trails:** These trails are mostly intended for hiking, although some are suitable for equestrian activity and off-road vehicles. These trails may be paved or unpaved. Major trails in the unincorporated county include the California Coastal Trail, Los Padres National Forest, state parks and beaches, County trails, and private and nonprofit trails such as Arroyo Hondo.

**Landfills and transfer stations:** Sites that are used for the disposal or transfer of waste materials. There are 21 landfills or transfer stations in the county.<sup>36</sup>

**Major roads and highways:** Santa Barbara County's major roads and highways connect individual communities to others in the region and to points beyond. Major highways include US 101, SR-1, SR-154, SR-166, SR-246, SR-135, SR-192, SR-217, SR-150, Lompoc-Casmalia Road, Ocean Avenue, Aliso Canyon Road, Foxen Canyon Road, Zaca Station Road, Tepusquet Road, Harris Grade Road, Santa Rosa Road, Camino Cielo, and additional city roads that provide critical access.<sup>37</sup>

**Military bases:** The Vandenberg Space Force Base along the northwestern edge of Santa Barbara County.<sup>38</sup>

**Parks and open space:** County open space and preserves, Santa Barbara County Land Trust properties, University of California Natural Reserve System land, and others.<sup>39,40,41</sup>

**Power plants:** Power plants generate large amounts of electricity that is distributed through the state and regional electrical grid. There are 15 power plants in the unincorporated areas (not including small-scale facilities, such as rooftop solar panels), including the large Cuyama Solar Project and Lompoc Strauss Wind Energy Project power plants.<sup>42</sup>

**Railroads:** The county has three railroads. The Union Pacific Railroad carries both freight and passengers along the coastal areas. The Santa Maria Valley and Lompoc Industrial Lead railroads carry primarily freight.<sup>43</sup>

**Oil and gas infrastructure:** This infrastructure includes oil and gas wells, pipelines (including natural gas), oil fields, refineries, and other facilities that extract, process, and transfer oil and gas products in the county.<sup>44</sup>

**Single access roads:** Roadways that only have one access point in or out of a neighborhood or region. The single or limited number of entry and exit points does not make the road itself more vulnerable than other roads, but the loss of such a road effectively cuts off large numbers of people from the rest of the county.

**Water and wastewater infrastructure:** These facilities provide and/or treat water for public use and treat wastewater so it can be safely discharged into the environment. These facilities include surface storage reservoirs, distribution systems, State Water Project facilities, desalination plants, water treatment facilities, and wastewater treatment facilities.<sup>45</sup> Water purveyors and community service districts that serve the unincorporated areas are listed under “water and wastewater” in the “Key Community Services” section.

## Buildings

Buildings include different types of public and private structures. The CCVA includes 12 types of building assets.

**Colleges and universities:** Higher education buildings and greater campus areas. Santa Barbara County has seven colleges and universities—Allen Hancock College, Santa Barbara City College, University of California Santa Barbara, Westmont College, Antioch University, Pacifica Graduate Institute, and San Joaquin Valley College’s Santa Maria campus.

**Commercial buildings:** Buildings that support economic activities such as retail and tourism.

**Community centers:** Community centers are public properties that provide spaces for gathering and activities—youth centers, senior centers, veterans’ centers, and other community centers. They are owned by the County or by special government districts and include Oasis Center, Los Olivos Grange Hall, Isla Vista Community Center, Los Alamos Senior Center, Earl Warren Showgrounds, Cuyama Family Resource Center, and Cachuma Clubhouse.

**Evacuation and homeless shelters:** Facilities that provide housing and shelter for persons experiencing homelessness or evacuees that do not have other housing options, such as the Earl Warren Showgrounds and other shelter facilities.<sup>46</sup>

**Government buildings and maintenance yards:**

Buildings owned and/or operated by Santa Barbara County that provide administrative and other services. These buildings include, among others, the Santa Barbara County Engineering Building, which houses Planning and Development, Public Works Administration, and Transportation Divisions; Naomi Schwartz County Office Building, which houses Public Works; Santa Barbara County Emergency Operations Center; County Education Office; County Fire Headquarters; County Public Health Department; Santa Barbara County Offices Lompoc; Santa Barbara County Planning & Development North County Office; Department of Public Works North County Office; Department of Social Services; Department of Behavioral Wellness; County Elections Office, County Administration Building; and County Courthouse, which serves the courts and County Clerk-Recorder Office.

**Hazardous material facilities:** Commercial, industrial, and manufacturing facilities that use, produce, sell, or transport hazardous materials. According to the County's list of Hazardous Business Plan Level 5 sites, Resource Conservation and Recovery Act (RCRA) Large Quantity Generators, non-RCRA Large Quantity Generators, APST 3: 10,000-100,000g sites, and CalARP Program 1 sites, there are approximately 351 hazardous materials facilities in the county.

**Historic buildings and facilities:** Buildings, facilities, and sites on the County's List of Historic Landmarks. There are approximately 51 historic buildings and facilities in the county.<sup>47</sup>

**Homes, residential structures, and residential opportunity sites:**

Homes and residential structures in the unincorporated county, including older buildings that may have greater heating/cooling needs or be more susceptible to damage. Undeveloped key sites or opportunity areas for potential future housing sites.<sup>48</sup>

**Libraries:** Facilities containing collections of books, periodicals, and other resources for public or institutional use. Libraries serving the unincorporated county include Guadalupe Branch Library, Goleta Library, Santa Barbara Main Library, Santa Barbara County Law Library, Orcutt Branch Library, Village Library, Los Alamos Branch Library, Los Olivos Branch Library, Eastside Branch Library, and Montecito Library.

**Medical and care facilities:** The largest medical facilities are Marian Medical Center, Lompoc Healthcare District, Santa Ynez Valley Cottage Hospital, Goleta Valley Cottage Hospital, Santa Barbara Cottage Hospital, Rehabilitation Institute at Santa Barbara, Santa Barbara County Psychiatric Health Facility, Sansum Clinic, and the Santa Barbara County Crisis Stabilization Unit.<sup>49</sup>

**Public safety buildings:** Public safety buildings include police and sheriff buildings, fire stations, California Highway Patrol facilities, and related structures such as dispatch centers, correctional facilities, animal shelters, and emergency operation centers. In the unincorporated county are 18 County fire stations,<sup>50</sup> 7 Sheriff's offices, a Sheriff's Dispatch and other Public Safety Answering Points, the North County Jail, the South County Jail, Montecito Fire Protection District stations, and Carpinteria-Summerland Fire Protection District stations.

**Schools:** Schools in the unincorporated areas of the county include elementary schools, middle schools, and high schools and continuing education and special education facilities owned and managed by the 21 school districts—Carpinteria Unified Schools District, Cuyama Joint Unified School District, Lompoc Unified School District, Santa Barbara Unified Secondary School District, Cold Spring School District, Goleta Union School District, Hope School District, Montecito School District, Santa Barbara Elementary School District, Santa Maria Joint Union High School District, Blochman Union School District, Guadalupe Union School District, Orcutt Union School District, Santa Maria-Bonita School District, Santa Ynez Valley Union High School District, Ballard School District, Buellton Union School District, College School District, Los Olivos School District, Solvang School District, and Vista Del Mar Union School District.<sup>51,52</sup>

## Economic Drivers

Economic drivers are the primary contributors to the Santa Barbara County economy. This category of the CCVA covers 11 economic drivers.

**Agriculture:** This category includes the production of strawberries, wine grapes, nursery products, cut flowers and foliage, broccoli, cauliflower, lettuce, avocados, and other crops. These agricultural operations are scattered throughout northern and southern Santa Barbara County. In 2018, agriculture produced approximately \$1.5 billion in agricultural products (excluding livestock, poultry, dairy, and bee products).<sup>53</sup>

**Agritourism:** The economic activities provided by wineries, festivals, U-pick operations, and other agriculture-based tourism activities. There are over 16 different agritourism sites in the unincorporated county.<sup>54</sup>

**Chumash Casino:** Chumash Casino in the Santa Ynez Valley is the primary economic driver for the Chumash tribal nation. The casino provides a source of tourism that employs approximately 1,700 people.<sup>55</sup>

**Coastal and marine recreation and tourism:** This category includes economic activities provided by beaches, historic landmarks, parks and open space, hiking trails, bicycling routes, and shorelines along the coast. It also includes sailing, boating, whale-watching, and other ocean-oriented tourism.

**Commercial fishing:** This category includes catching fish and other seafood for commercial profit from wild fisheries. In 2017, commercial fishing from Santa Barbara Harbor, Goleta Beach, and Surf Beach included over 127 species of fish and totaled approximately \$13 million in profits.<sup>56</sup>

**Cultural and historic sites:** Santa Barbara County has over 51 cultural and historic sites in different subregions of the county.<sup>57</sup> These sites include schoolhouses, cemeteries, adobes, cottages and homes, hotels, and wineries.

**Livestock:** This category includes livestock, poultry, dairy, and bee products. These livestock operations are primarily in north county. In 2018, livestock produced approximately \$59 million in revenue.<sup>58</sup>

**Major employers:** This category includes economic activities provided by major employers, outside of agriculture and livestock, that support residents or are in the unincorporated areas of the county. They include University of California, Santa Barbara; the County of Santa Barbara; Santa Barbara Cottage Hospital; Santa Barbara City College; and Santa Barbara Unified School District.<sup>59</sup>

**Oil and gas industry:** The oil and gas industry includes economic activities provided by the extraction, processing, or transporting of oil and gas products. There are approximately 23 different companies that have oil and gas operations in the county.<sup>60</sup>

**State and federal land recreation and tourism:** This category includes economic activities provided by state and federal land in the county, including state parks and beaches, Los Padres National Forest, and Channel Islands National Park.

**Vandenberg Space Force Base:** Vandenberg Space Force Base is along the northern county coast. The base supports approximately 6,800 military, family members, contractors, and civilian employees.<sup>61</sup> Vandenberg Space Force Base's growing space operations will contribute to job and tourism growth in the area.

### Ecosystems and Natural Resources

There are 10 primary ecosystems and 2 unique natural resources in Santa Barbara County, excluding barren, agricultural, and developed land. The ecosystems are based, in part, on the ecological units presented in the Conservation Element of the County of Santa Barbara Comprehensive Plan.

**Aquatic:** Aquatic habitat includes plants and wildlife in the streams, creeks, rivers, and lakes. The county has only one natural lake (Zaca Lake) and several reservoirs. Many of the streams and creeks are intermittent, but the few that flow continuously include Rattlesnake Creek, Mission Creek, San Roque Creek, San Jose Creek, Dos Pueblos Creek, Tajiguas Creek, Arroyo Hondo Creek, Refugio Creek, and Jalama Creek. Rivers include Santa Ynez River, Santa Maria River, New River, Cuyama River, and Sisquoc River.<sup>62</sup>

**Chaparral and scrub habitat:** This category includes 10 different subhabitats, including coastal sage scrub, Great Basin sagebrush, alkali sink, chamise chaparral, mixed chaparral, deciduous oak chaparral, serpentine chaparral associations, semidesert chaparral, montane chaparral, and Channel Islands chaparral. This ecosystem is abundant in both high and low elevations and is made up of several types of evergreen shrubs, such as manzanita, ceanothus, and scrub oak.<sup>63</sup>

**Coastal bluffs:** This ecosystem is along coastal strands of the county, specifically, from the northernmost point of Carpinteria State Beach to eastern Montecito, from western Montecito to Sycamore Creek, from west of the Santa Barbara Harbor to the mouth of Atascadero Creek, from the University of California campus to the dunes along Vandenberg Space Force Base, and from north of the base to the Guadalupe Dune Preserve.<sup>64</sup>

**Forest:** This category includes 10 different subhabitats, consisting of canyon oak-bigcone spruce, coast live oak, interior cypress, Torrey pine forest (Santa Rosa Island), mixed evergreen, coastal pine, Douglas fir, mixed conifer, Jeffrey pine, and Coulter pine forest or woodland. These forests are primarily in the coastal mountains in south county and the inland mountains in the northeast county, including Los Padres National Forest. Animal species that can be found in this ecosystem include mountain lion (*Puma concolor*), ring-tailed cat (*Bassariscus astutus*), California mountain kingsnake (*Lampropeltis zonata*), and California lyre snake (*Trimorphodon biscutatus*).<sup>65</sup>

**Grassland:** This ecosystem consists of native grasslands, introduced grassland, high-altitude grassland, and Portrero. Grasslands may be made up of annuals (species that grow and die each year) or perennials (species that survive multiple years). Grasslands are found in both coastal and inland areas of the county, and they support animal species such as white-tailed kite (*Elanus leucurus*), California meadow mouse (*Microtus californicus*), and western spadefoot toad (*Spea hammondi*).<sup>66</sup>

**Groundwater basins:** There are nine groundwater basins that lie partially or completely within Santa Barbara County—the Carpinteria, Cuyama Valley, Foothill, Goleta, Montecito, San Antonio Creek Valley, Santa Barbara, Santa Maria River Valley, and Santa Ynez River Valley basins.<sup>67</sup> Groundwater basins provide drinking water and agricultural water supplies for most of the county.

**Marine Protected Areas:** Marine Protected Areas are marine sanctuaries, estuarine research reserves, ocean parks, and marine wildlife refuges established to protect ecosystems, preserve cultural resources such as shipwrecks and archaeological sites, or sustain fisheries production.<sup>68</sup>

**Riparian forests and woodland:** This ecosystem includes lowland riparian woodland, which primarily occurs along streams and creeks throughout the county. Several oak species grow in these communities as well as liverworts, maidenhair ferns (*Adiantum* spp.), California bay



(*Umbellularia californica*), and the spotted owl (*Strix occidentalis*).<sup>69</sup>

**Sandy beaches and coastal dunes:** This category includes coastal dunes, supratidal splash zone, intertidal zone, and subtidal zone along the coastal areas of the county. This ecosystem supports very distinctive plant life north of Point Sal, between Point Sal and Purisima Point, south of Purisima Point, around Surf, along the Devereux Dunes, along the Vandenberg Dunes, and along the Oso Flaco Dunes.<sup>70</sup>

**Sloughs and coastal marshes:** This ecosystem includes estuaries and supratidal, intertidal, and subtidal zones along the coast of the county. Wildlife supported by this ecosystem includes the peregrine falcon (*Falco peregrinus*); Ridgway's rail (*Rallus obsoletus*), formerly known as the clapper rail; Savannah sparrow (*Passerculus sandwichensis*); California black rail (*Laterallus jamaicensis coturniculus*); and grey fox (*Urocyon cinereoargenteus*).<sup>71</sup> Significant sloughs are Goleta Slough, Devereux Slough, and Carpinteria Salt Marsh.

**Wetlands:** Wetlands can include freshwater and saltwater features and primarily consist of freshwater marsh and vernal pools. Freshwater marshes are nontidal marshes that contain fresh water and are continuously or frequently flooded. Vernal pools are seasonal wetlands that occur along the west coast of the United States. Vernal pools are near Mescalitin Island, adjacent to the

Santa Barbara Airport, at the western edge of Isla Vista, and northwest of the Devereux Slough.<sup>72</sup>

**Woodland and savannah:** This category consists of central oak woodland, southern oak woodland, pinyon juniper woodland, Channel Islands woodlands, and foothill woodland habitats. This ecosystem is primarily in the Santa Ynez Valley, along the south coast, and at the northwestern edge of Los Padres National Forest.<sup>73</sup>

### Key Community Services

There are nine key community services evaluated as part of the CCVA.

**Communication services:** Communication services include radio, television, cellular and landline phone, and internet. These services can be delivered via wires or wirelessly, and most are delivered by private companies. Communication services are often used for entertainment but are also vital for information sharing and remaining connected.

**Emergency medical response:** Emergency medical response services are usually ambulances but may also be fire or police responders if ambulances are not available. In remote areas away from roads, emergency medical response may arrive by helicopter. These services are critical for rapid and urgent medical care. Agencies that provide emergency medical response in the county include Santa Barbara County Emergency Medical

Services Agency, Santa Barbara County Fire Department, Montecito Fire Protection District, and Carpinteria-Summerland Fire Protection District.<sup>74</sup>

**Energy delivery:** Energy delivery in Santa Barbara County is delivered through high-capacity utility lines and pipelines connected to small local lines. Electricity and natural gas are needed for vital functions such as space heating and telecommunications as well as many forms of entertainment and comfort. Electricity is provided by PG&E, SCE, Central Coast Community Energy (Monterey Bay Community Power),<sup>75</sup> and SoCal Gas.

**Government administration:** Government administration and community services include the programs, permitting centers, County assessor's office, and other services provided to the public by the County. These services could also include emergency services and emergency public works projects during disasters.

**Public health:** Public health services include programming provided by Santa Barbara County Public Health Department and public and private healthcare providers, including mental and behavioral healthcare providers. These services include healthcare and immunization clinics, women's and children's services, senior nutrition, and many others. Some public health services are administered by private medical facilities.<sup>76</sup>

**Public safety response:** Public safety services are provided by law enforcement, fire, and emergency management agencies. These agencies include the Santa Barbara County Sheriff's Office, Santa Barbara County Fire Department, Santa Barbara County Office of Emergency Management (County Executive Office), Montecito Fire Protection District, Carpinteria-Summerland Fire Protection District, incorporated police and fire departments, and university police and fire departments.<sup>77</sup>

**Public transit access:** Public transit in Santa Barbara County is provided by the Santa Barbara Metropolitan Transit District, Santa Ynez Valley Transit, the Breeze Bus, Chumash Casino Bus, Clean Air Express, Coastal Express by VCTC, City of Lompoc Transit, Cuyama Transit, Greyhound, San Luis Obispo Regional Transit Authority, and Wine Country Express.<sup>79</sup> Additional public transit that provides access to other regional locations includes Amtrak.

**Solid waste collection:** Solid waste collection services involve the collection, recycling, and disposal of solid waste created by homes and businesses. Solid waste removal services are provided by two waste haulers through franchise agreements in three unincorporated collection areas: South Coast (from the Ventura County line to the Gaviota Pass), the Lompoc unincorporated area (from the Gaviota Pass north to the crest of Drum Canyon

and Harris Grade Roads), and the Santa Ynez and Santa Maria Valley unincorporated areas.<sup>80</sup>

**Water and wastewater:** These services involve treating and transporting water to be used by customers and treating and transporting wastewater so it can be safely released into the environment. Several agencies, special districts, and small private organizations provide water and wastewater services to residents and businesses in the unincorporated county. These services are critical to ensure public and environmental health. Water and wastewater providers include Casmalia Community Services District, Cuyama Community Services District, Los Alamos Community Services District, Los Olivos Community Services District, Mission Hills Community Services District, Santa Ynez Community Services District, Vandenberg Village Community Services District, incorporated community water and wastewater service providers, water and wastewater wholesalers and state/regional agencies, and small-scale community water and wastewater systems.<sup>81</sup>

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## Appendix C Endnotes

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# Santa Barbara County Climate Change Vulnerability Assessment

## Appendix D: Climate Change Vulnerability Assessment Results Matrix

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Populations and Assets	Agricultural Pests and Diseases	Coastal Storms	Drought	Dune and Bluff Erosion	Extreme Heat	Inland Flooding	Fog	Human Health Hazards	Landslides and Debris Flows	Ocean Acidification	Sea Level Rise	Severe Weather	Wildfire
<b>Populations</b>													
Children	-	V2	-	-	V5	V3	-	V3	V4	-	-	V3	V4
Communities with high pollution burden	-	V3	V5	V3	V4	V4	-	V5	V3	-	-	V3	V5
Cost-burdened households	-	V3	V3	V4	V4	V3	-	V3	V4	-	-	V3	V3
Households in mobile homes	-	-	-	-	V5	V4	-	V2	V3	-	-	V4	V3
Households in poverty	-	V4	V5	V3	V5	V5	-	V5	V4	-	-	V5	V5
Isolated and rural communities	V3	-	V4	V5	V4	V4	V2	V3	V5	-	-	V4	V4
Low-income households	-	V3	V3	V2	V3	V3	-	V3	V3	-	-	V3	V4
Low-resourced ethnic minorities people of color	V4	V3	V4	V3	V5	V5	-	V4	V4	-	-	V4	V5
Outdoor workers	V4	V2	V5	V2	V5	V4	V3	V5	V4	V2	V1	V4	V5
Overcrowded households	-	V3	-	V3	V3	V3	-	V4	V2	-	-	V2	V3
Persons experiencing homelessness	-	V5	-	-	V5	V5	-	V5	V5	-	-	V5	V5
Persons living on single access roads	-	V4	-	V5	V2	V4	-	V2	V5	-	V4	V4	V4
Persons with chronic health problems	-	V3	-	V3	V5	V3	-	V5	V4	-	-	V4	V4
Persons with disabilities and access and functional needs	-	V4	V3	V3	V4	V4	-	V3	V5	-	-	V4	V4
Persons with limited English proficiency	-	V2	-	V2	V3	V3	-	V2	V4	-	-	V3	V3
Persons without a high school degree	-	V1	-	V1	V3	V3	-	V2	V2	-	-	V2	V2
Persons without access to transportation or telecommunications	-	V5	-	V3	V4	V5	-	V3	V4	-	-	V4	V4
Renters	-	V3	-	V4	V3	V3	-	V1	V3	-	-	V2	V3
Senior citizens	-	V3	-	V3	V4	V4	-	V4	V4	-	-	V3	V4
Senior citizens living alone	-	V4	-	V4	V5	V5	-	V5	V5	-	-	V4	V5
Unemployed persons	-	V3	-	-	V3	V2	-	V3	V3	-	-	V3	V4
Undocumented persons	V5	V3	-	-	V5	V5	-	V5	V4	-	-	V5	V5

Populations and Assets	Agricultural Pests and Diseases	Coastal Storms	Drought	Dune and Bluff Erosion	Extreme Heat	Inland Flooding	Fog	Human Health Hazards	Landslides and Debris Flows	Ocean Acidification	Sea Level Rise	Severe Weather	Wildfire
<b>Infrastructure</b>													
Airport (Commercial)	-	V4	-	-	-	V4	-	-	-	-	V5	V2	V1
Airport (Military)	-	-	-	-	-	-	-	-	-	-	-	V1	V1
Airport (Public-noncommercial)	-	-	-	-	-	V5	-	-	V2	-	-	V3	V3
Beaches	-	V5	-	V5	-	V3	-	-	V3	V1	V5	V3	V2
Bicycle routes (North County)	-	V1	V1	-	-	V2	-	-	V4	-	-	V2	V4
Bicycle routes (Cuyama Valley)	-	-	V1	-	-	V2	-	-	-	-	-	V2	V3
Bicycle routes (South Coast)	-	V4	V1	V4	-	V3	-	-	V4	-	V4	V2	V2
Bridges (North County)	-	V1	-	-	-	V4	-	-	V5	-	-	V4	V3
Bridges (Cuyama Valley)	-	-	-	-	-	V5	-	-	V4	-	-	V5	V3
Bridges (South Coast)	-	V3	-	V2	-	V4	-	-	V4	-	V3	V5	V3
Bus routes (North County)	-	-	-	-	V2	V4	-	-	V3	-	-	V3	V5
Bus routes (Cuyama Valley)	-	-	-	-	V3	V5	-	-	V4	-	-	V4	V5
Bus routes (South Coast)	-	V2	-	V4	V2	V4	-	-	V4	-	V2	V3	V4
Communication facilities	-	V3	-	V3	V2	V1	-	-	V4	-	V2	V4	V3
Dams	-	-	-	-	-	V2	-	-	V4	-	-	V3	V1
Electric vehicle charging stations	-	V1	-	V1	V3	V1	-	-	V2	-	V1	V4	V2
Electrical substations	-	V2	-	-	V4	V2	-	-	V3	-	V2	V3	V4
Electrical transmission and distribution lines	-	V1	-	-	V5	V2	-	-	V4	-	-	V4	V5
Evacuation routes (North County)	-	-	-	V1	-	V4	-	-	V4	-	-	V2	V4
Evacuation routes (Cuyama Valley)	-	-	-	-	-	V5	-	-	V4	-	-	V4	V5
Evacuation routes (South Coast)	-	V4	-	V4	-	V4	-	-	V5	-	V4	V4	V4
Flood control infrastructure	-	V5	-	-	-	V2	-	-	V4	-	V4	V4	V2
Hiking trails (North County)	-	-	V2	V2	-	V2	-	-	V4	-	-	V1	V4
Hiking trails (Cuyama Valley)	-	-	V2	-	-	V2	-	-	V3	-	-	V2	V4

Populations and Assets	Agricultural Pests and Diseases	Coastal Storms	Drought	Dune and Bluff Erosion	Extreme Heat	Inland Flooding	Fog	Human Health Hazards	Landslides and Debris Flows	Ocean Acidification	Sea Level Rise	Severe Weather	Wildfire
Hiking trails (South Coast)	-	V3	V2	V2	-	V3	-	-	V4	-	V1	V2	V4
Landfills and transfer stations	-	V1	-	-	-	V2	-	-	V4	-	-	V1	V3
Major roads and highways (North County)	-	-	-	V1	V1	V4	-	-	V4	-	-	V3	V4
Major roads and highways (Cuyama Valley)	-	-	-	-	V3	V5	-	-	V4	-	-	V4	V5
Major roads and highways (South Coast)	-	V4	-	V4	V1	V4	-	-	V5	-	V4	V4	V4
Military bases	-	V1	-	V1	-	V1	-	-	V2	-	V1	V2	V4
Parks and open space (North County)	V1	V3	V3	V1	V3	V3	V3	-	V3	-	V1	V3	V3
Parks and open space (Cuyama Valley)	V2	-	V3	-	V3	V3	V3	-	V2	-	-	V3	V2
Parks and open space (South Coast)	V1	V4	V2	V4	V3	V3	V3	-	V3	-	V3	V3	V3
Power plants	-	-	V1	V1	V2	V2	-	-	V2	-	-	V2	V3
Railroads	-	V5	-	V5	V4	V4	-	-	V5	-	V4	V3	V5
Oil and gas infrastructure (North County)	-	-	-	-	-	V3	-	-	V4	-	-	V3	V4
Oil and gas infrastructure (Cuyama Valley)	-	-	-	-	-	V3	-	-	V3	-	-	V3	V4
Oil and gas infrastructure (South Coast)	-	V4	-	V5	-	V3	-	-	V1	-	V3	V3	V4
Single access roads (North County)	-	-	-	-	V2	V5	-	-	V4	-	-	V4	V5
Single access roads (Cuyama Valley)	-	-	-	-	V3	V3	-	-	V4	-	-	V4	V5
Single access roads (South Coast)	-	V3	-	V5	V2	V4	-	-	V5	-	V4	V4	V5
Water and wastewater infrastructure (North County)	-	-	V3	-	-	V3	-	-	V3	-	-	V3	V4
Water and wastewater infrastructure (Cuyama Valley)	-	-	V4	-	-	V3	-	-	V1	-	-	V3	V4
Water and wastewater infrastructure (South Coast)	-	V5	V3	V4	-	V3	-	-	V4	-	V5	V3	V4

Populations and Assets	Agricultural Pests and Diseases	Coastal Storms	Drought	Dune and Bluff Erosion	Extreme Heat	Inland Flooding	Fog	Human Health Hazards	Landslides and Debris Flows	Ocean Acidification	Sea Level Rise	Severe Weather	Wildfire
<b>Buildings and Facilities</b>													
Colleges and universities (North County)	-	-	-	-	V1	V2	-	-	V1	-	-	V3	V2
Colleges and universities (South Coast)	-	V3	-	V3	V1	V1	-	-	V3	-	V3	V3	V3
Commercial buildings (North County)	-	-	-	-	V2	V3	-	-	V2	-	-	V3	V3
Commercial buildings (Cuyama Valley)	-	-	-	-	V3	V5	-	-	-	-	-	V4	V3
Commercial buildings (South Coast)	-	V1	-	V2	V2	V2	-	-	V3	-	V2	V3	V2
Community centers (North County)	-	-	-	-	V1	V2	-	-	V1	-	-	V3	V4
Community centers (Cuyama Valley)	-	-	-	-	V3	V4	-	-	-	-	-	V3	V2
Community centers (South Coast)	-	-	-	-	V1	-	-	-	V2	-	-	V3	V2
Evacuation and homeless shelters (North County)	-	-	-	-	V3	V2	-	-	V2	-	-	V2	V3
Evacuation and homeless shelters (Cuyama Valley)	-	-	-	-	V3	V4	-	-	-	-	-	V3	-
Evacuation and homeless shelters (South Coast)	-	V2	-	-	V3	V2	-	-	V2	-	V3	V2	V3
Government buildings and maintenance yards	-	-	-	-	V2	V3	-	-	V2	-	-	V2	V2
Hazardous material facilities	-	V3	-	-	V2	V2	-	-	V3	-	V2	V3	V3
Historic buildings and facilities	-	V4	-	-	V3	V3	-	-	V3	-	V3	V4	V4
Homes, residential structures, and residential opportunity sites (North County)	-	-	-	-	V3	V4	-	-	V4	-	-	V4	V5
Homes, residential structures, and residential opportunity sites (Cuyama Valley)	-	-	-	-	V3	V5	-	-	V2	-	-	V5	V4
Homes, residential structures, and residential opportunity sites (South Coast)	-	V4	-	V5	V3	V5	-	-	V5	-	V4	V4	V5
Libraries (North County)	-	-	-	-	V1	V3	-	-	-	-	-	V3	V3

Populations and Assets	Agricultural Pests and Diseases	Coastal Storms	Drought	Dune and Bluff Erosion	Extreme Heat	Inland Flooding	Fog	Human Health Hazards	Landslides and Debris Flows	Ocean Acidification	Sea Level Rise	Severe Weather	Wildfire
Libraries (Cuyama Valley)	-	-	-	-	V3	V4	-	-	-	-	-	V3	V3
Libraries (South Coast)	-	-	-	-	V1	-	-	-	V2	-	-	V3	V2
Medical and care facilities (North County)	-	-	-	-	V3	-	-	-	V2	-	-	V2	-
Medical and care facilities (South Coast)	-	-	-	-	V3	-	-	-	-	-	-	V2	V2
Public safety buildings	-	V1	-	-	V1	V3	-	-	V3	-	-	V1	V4
Schools (North County)	-	-	-	-	V3	V1	-	-	V2	-	-	V3	V3
Schools (Cuyama Valley)	-	-	-	-	V4	V3	-	-	-	-	-	V4	-
Schools (South Coast)	-	V2	-	V2	V3	V3	-	-	V4	-	V1	V3	V2
<b>Economic Drivers</b>													
Agriculture	V4	V2	V5	V2	V5	V4	V3	V4	V3	-	V3	V4	V5
Agritourism	V3	V2	V5	V2	V4	V4	-	V4	V3	-	-	V4	V5
Chumash Casino	-	-	-	-	-	V3	-	V3	V2	-	-	V2	V3
Coastal and marine recreation and tourism	-	V5	-	V5	V1	V3	V2	V2	V4	V3	V5	V3	V4
Commercial fishing	-	V3	-	-	-	-	-	V2	V2	V5	V4	V3	V1
Cultural and historic sites	-	V4	-	V3	V3	V3	V3	V3	V4	-	V3	V2	V3
Livestock	V5	-	V4	-	V5	V2	V3	V2	V2	-	-	V3	V5
Major employers	-	V1	-	V2	-	V1	-	V3	V3	-	V2	V1	V2
Oil and gas industry	-	V4	-	V4	-	V3	-	V2	V3	-	V3	V3	V4
State and federal land recreation and tourism	-	V4	V4	V5	V4	V3	V2	V3	V4	-	V3	V3	V4
Vandenberg Space Force Base	-	V1	-	V1	-	V1	-	V1	V3	-	V1	V2	V3
<b>Ecosystems and Natural Resources</b>													
Aquatic	-	V4	V5	-	V4	V4	V2	-	V4	-	V5	V5	V5
Chaparral and scrub habitat	-	V3	V4	V3	V4	V2	V2	-	V2	-	V2	V3	V4
Coastal bluffs	-	V5	V2	V5	V2	-	V3	-	V2	-	V4	V3	V2
Forests	-	-	V4	-	V5	V1	V4	-	V3	-	-	V3	V5

Populations and Assets	Agricultural Pests and Diseases	Coastal Storms	Drought	Dune and Bluff Erosion	Extreme Heat	Inland Flooding	Fog	Human Health Hazards	Landslides and Debris Flows	Ocean Acidification	Sea Level Rise	Severe Weather	Wildfire
Grassland	-	V2	V3	V3	V2	V1	V3	-	V1	-	V1	V1	V3
Groundwater basins	-	-	V5	-	V4	-	-	-	-	-	V5	-	-
Marine Protected Areas	-	V2	-	V2	V2	-	-	-	V3	V4	V1	V1	-
Riparian forests and woodland	-	V3	V3	-	V3	V3	V2	-	V3	-	V2	V4	V3
Sandy beaches and coastal dunes	-	V5	V2	V5	V2	-	V4	-	V1	V2	V3	V5	-
Sloughs and coastal marshes	-	V5	V4	-	V3	V4	V2	-	-	V4	V5	V2	V1
Wetlands	-	V5	V5	-	V4	V2	V3	-	V3	-	V2	V2	V3
Woodlands and savannah	-	-	V2	-	V3	V2	V3	-	V2	-	-	V4	V3
<b>Community Services and Utilities</b>													
Communication services	-	V2	-	V3	V2	V1	-	-	V4	-	V2	V4	V4
Emergency medical response (North County)	-	-	-	-	V3	V2	V2	V4	V2	-	-	V3	V3
Emergency medical response (Cuyama Valley)	-	-	-	-	V3	V3	V1	V5	V3	-	-	V3	V4
Emergency medical response (South Coast)	-	V3	-	V2	V3	V2	V2	V4	V2	-	V2	V3	V3
Energy delivery (PG&E)	-	V1	V2	-	V5	V1	-	-	V4	-	V1	V5	V5
Energy delivery (SCE)	-	V3	V2	V3	V5	V1	-	-	V4	-	V1	V5	V5
Energy delivery (SoCal Gas)	-	V4	-	V3	-	V3	-	-	V4	-	V2	-	V4
Government administration	-	V1	-	-	V1	V2	-	V2	V1	-	V2	V1	V2
Public health (North County)	-	-	-	-	V2	V2	-	V3	V3	-	-	V2	V2
Public health (Cuyama Valley)	-	-	-	-	V3	V3	-	V3	V4	-	-	V3	V3
Public health (South Coast)	-	-	-	-	V2	V1	-	V3	V2	-	-	V2	V2
Public safety response (North County)	-	-	-	-	V2	V3	V2	V2	V1	-	-	V3	V3
Public safety response (Cuyama Valley)	-	-	-	-	V3	V4	V1	V3	V4	-	-	V3	V3
Public safety response (South Coast)	-	V3	-	V2	V2	V3	V2	V2	V2	-	V3	V3	V3
Public transit access (North County)	-	-	-	-	V4	V3	V1	V2	V3	-	V1	V3	V3



Populations and Assets	Agricultural Pests and Diseases	Coastal Storms	Drought	Dune and Bluff Erosion	Extreme Heat	Inland Flooding	Fog	Human Health Hazards	Landslides and Debris Flows	Ocean Acidification	Sea Level Rise	Severe Weather	Wildfire
Public transit access (Cuyama Valley)	-	-	-	-	V4	V5	V1	V3	V5	-	-	V4	V4
Public transit access (South Coast)	-	V4	-	V3	V4	V4	V1	V2	V5	-	V3	V3	V3
Solid waste collection (North County)	-	-	-	-	V2	V3	V2	-	V3	-	-	V3	V3
Solid waste collection (Cuyama Valley)	-	-	-	-	V2	V3	V2	-	V2	-	-	V3	V2
Solid waste collection (South Coast)	-	V3	-	V1	V2	V3	V2	-	V3	-	V1	V3	V2
Water and wastewater (North County)	-	-	V4	-	V3	V4	-	-	V4	-	V3	V2	V5
Water and wastewater (Cuyama Valley)	-	-	V5	-	V4	V5	-	-	V2	-	-	V3	V4
Water and wastewater (South Coast)	-	V5	V4	V3	V2	V4	-	-	V4	-	V5	V3	V5

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