7 – ADAPTATION

INTRODUCTION

The County anticipates that some degree of climate change will occur regardless of existing and future GHG reduction and mitigation efforts. As a result, we should understand the potential impacts of climate change and take steps to adapt to or manage potential changes to the local environment or socioeconomic system in an effort to reduce risks and increase resilience. Climate adaptation refers to the "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (IPCC, 2007).

This chapter identifies adaptation measures that respond to the impacts of climate change in general and on:

- Public health
- Water supply
- Flooding and unpredictable weather
- Sea level rise
- Wildfire risks
- Agriculture
- Economy and tourism
- Natural systems

The following plans and programs represent some of the recent and/or ongoing activities that would complement an adaptation strategy.

- County General Plan, specifically the Conservation and Open Space Element and Safety Element
- Local Hazard Mitigation Plan

Differences between adaptation strategies and mitigation measures

The IPCC Fourth Assessment Report defines mitigation and adaptation as follows:

Mitigation (Reduction Measures) – Implementing policies to reduce greenhouse gas emissions and enhance sinks.

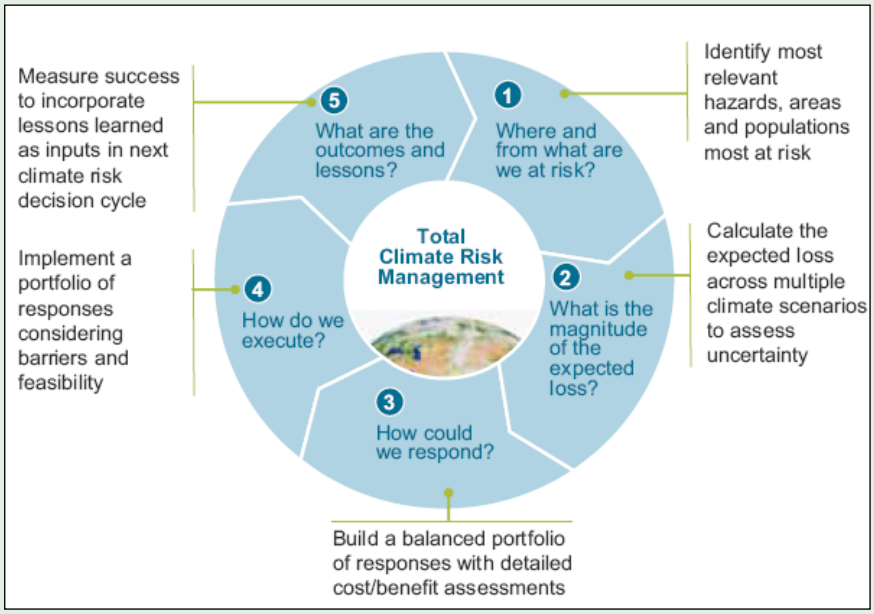
Adaptation – Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects.

- Integrated Regional Water Management Plan
- Public Health/Environmental Health/Office of Emergency Services/APCD/Planning and Building regulations and requirements
- The Local Government Commission's Integrated Climate Change Adaptation Planning in San Luis Obispo County

Figure 7-1 illustrates that when preparing for climate change, a community must:

1) Identify impacts;
2) Determine magnitude of risks (potential cost of risks);
3) Determine actions (and cost of such actions);
4) Implement actions (with highest risks/lowest costs); and
5) Reassess and determine additional actions.

Figure 7-1. A Framework for Assessing and Addressing Total Climate Risk



Source: Economics of Climate Adaptation Working Group. 2009. Shaping Climate Resilient Development: A Framework for Decision Making.

The County has identified climate change impacts that are likely to occur and actions to address those impacts. However, the measures in this Plan should be considered a starting point to adapt to climate change. To more fully adapt to climate change, the County will support research and technical assessments to fully develop a comprehensive countywide adaptation strategy.

CLIMATE CHANGE PROJECTIONS AND IMPACTS TO SAN LUIS OBISPO COUNTY

In 2009, the GEOS Institute[1] and the Local Government Commission received funding to evaluate climate change and adaptation in San Luis Obispo County. The project included an assessment of local climate change projections and culminated with the release of two reports. The first report, Projected Future Climatic and Ecological Conditions in San Luis Obispo County,[2] utilized climate modeling software to develop climate change projections specific to SLO County. The second report, Integrated Climate Change Adaptation Planning in San Luis Obispo County,[3] identified mitigation and adaptation strategies to limit the effect that climate change may have on San Luis Obispo's economy, natural systems, and the local population's quality of life.

SLO County Climate Change Projections

The following projections were provided in the first report prepared by the GEOS Institute and the Local Government Commission, Projected Future Climatic and Ecological Conditions in San Luis Obispo County:

Temperature – Annual average temperatures across SLO County are expected to increase between 2.1 and 3.9 degrees Fahrenheit by 2045 and between 4.1 to 7.6 degrees Fahrenheit by 2085 (Figure 7-2).

[1] Formerly known as National Center for Conservation Science and Policy.

[2] Koopman, Nauman, and Leonard 2010.

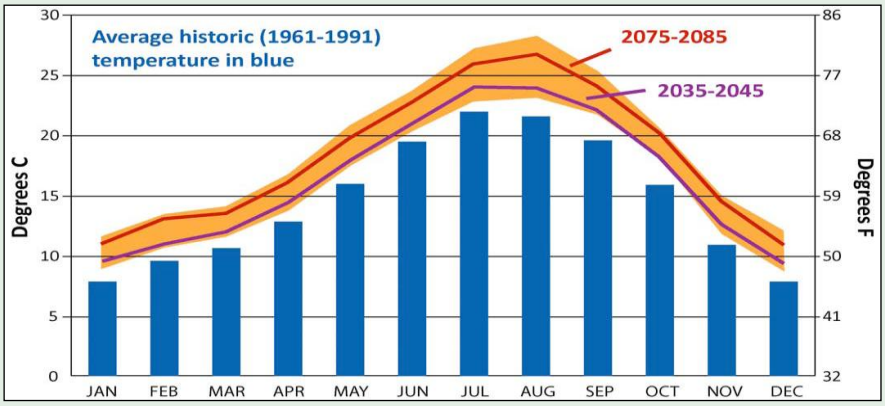
[3] Koopman, Meis, and Corbett 2010.

Climate change's threat to agriculture

Extreme events, such as heat waves, floods, and droughts, may be among the most challenging impacts of climate change for agriculture since they can lead to large losses in crop yields and livestock productivity. Since California plays a critical role in feeding not only state residents, but those of the U.S. and other countries, these large production declines and losses would translate to not only food shortages but financial and economic shifts that could disrupt local, regional, and national commodities systems.

(California Natural Resources Agency 2009)

Figure 7-2. Projected SLO County Average Temperatures[4]



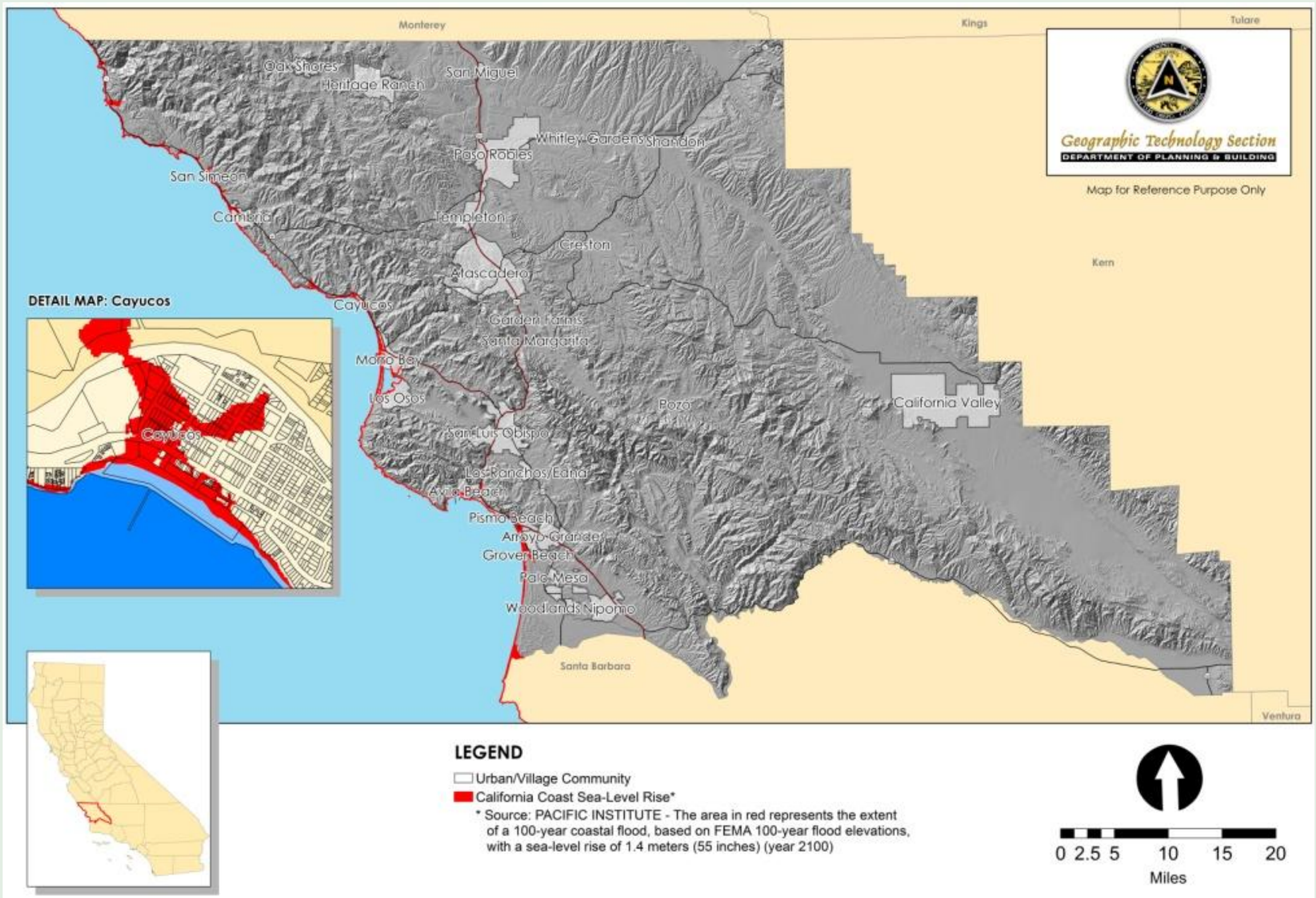
Source: Koopman, Marni, Richard Nauman, and Jessica Leonard. 2010. Projected Future Climatic and Ecological Conditions in San Luis Obispo County.

Precipitation – Climate model projections for future precipitation patterns in SLO County vary in predicting a moderate decrease or slight increase in annual precipitation. Annual average precipitation in SLO County is expected to decrease up to 4.2 inches or increase up to 1.5 inches by 2045 and decrease by 4.73 inches or increase by .88 inches by 2085. Even if levels of precipitation were to increase, soil moisture is expected to decline due to higher temperatures and evaporation.

Sea Level Rise – Over the last century, California has observed a nearly 8-inch rise in sea levels along the coast. Climate models have projected an additional 3.3 to 4.6 feet in sea level rise by 2100. Areas in San Luis Obispo County most at risk for sea level rise include Cayucos, Morro Strand State Beach, Avila Beach/Port San Luis Harbor, the Pismo Dunes/Oceano area, and San Simeon State Beach.

[4] Koopman, Nauman, and Leonard 2010.

Figure 7-3. Sea Level Rise



This page has intentionally been left blank.

SLO County Climate Change Impacts

As noted in the report, Projected Future Climatic and Ecological Conditions in San Luis Obispo County, potential consequences of climate change include:

Increased Rate of Wildfires – Changes in vegetation patterns within the county due to higher temperatures and changes in precipitation are likely to cause an increased risk of wildfires. Annual changes in the area of the county burned by wildfire are expected to increase from 3.7% to 6.8–7.3% by 2045 and to 8.1–8.5% by 2085. The projected increase in frequency and size of wildfires in San Luis Obispo County has the potential to significantly increase demand on local emergency services and water supply while negatively impacting the county's air quality, native ecosystems, and land productivity.

Negative Impacts on Wildlife – The increased threat of wildfire combined with reduced water supply and rising sea levels have the potential to significantly alter natural ecosystems and wildlife habitats. Wildfire and flooding events may interrupt or segment wildlife migration patterns and corridors. As climate change progresses, fish, wildlife, and plants may respond by shifting species distributions (potentially moving northward or upslope) in an effort to track suitable climate conditions.

Negative Impacts on Agricultural Productivity – Agriculture and agricultural-related tourism are two of the region's most significant economic industries. Higher temperatures, decrease in water supply, and shifts in seasonal changes have the potential to negatively affect agricultural productivity, resulting in a loss of food security and decrease in agricultural-related tourism. Wine grapes are San Luis Obispo County's top ranking crop in economic value.[5] The quality of wine grapes is highly dependent on certain climatic conditions, especially temperatures. Moderate changes in temperature may potentially increase the quantity of wine grapes

Vulnerable Populations

There are three primary segments of vulnerable populations: those at risk to adverse climate change impacts due to exposure, sensitivity, or adaptive capacity.

Exposure: Physical conditions may put particular populations at risk to the impacts of climate change. For instance, populations living in low-lying or coastal areas may be more exposed to flooding events and sea level rise, while those who work outside may suffer from health-related issues due to increased temperatures and decreased air quality.

[5] County of San Luis Obispo Department of Agriculture/Weights and Measures 2009.

Vulnerable Populations continued...

Sensitivity: Certain populations, including young children and those over the age of 65, are physiologically more sensitive to extreme temperatures and increased instances of air pollution.

Adaptive Capacity: The adaptive capacity of lower-income and institutionalized populations can be limited due to lower access to the resources necessary to prepare for or react to the long-term impacts of climate change and the increased frequency of disasters.

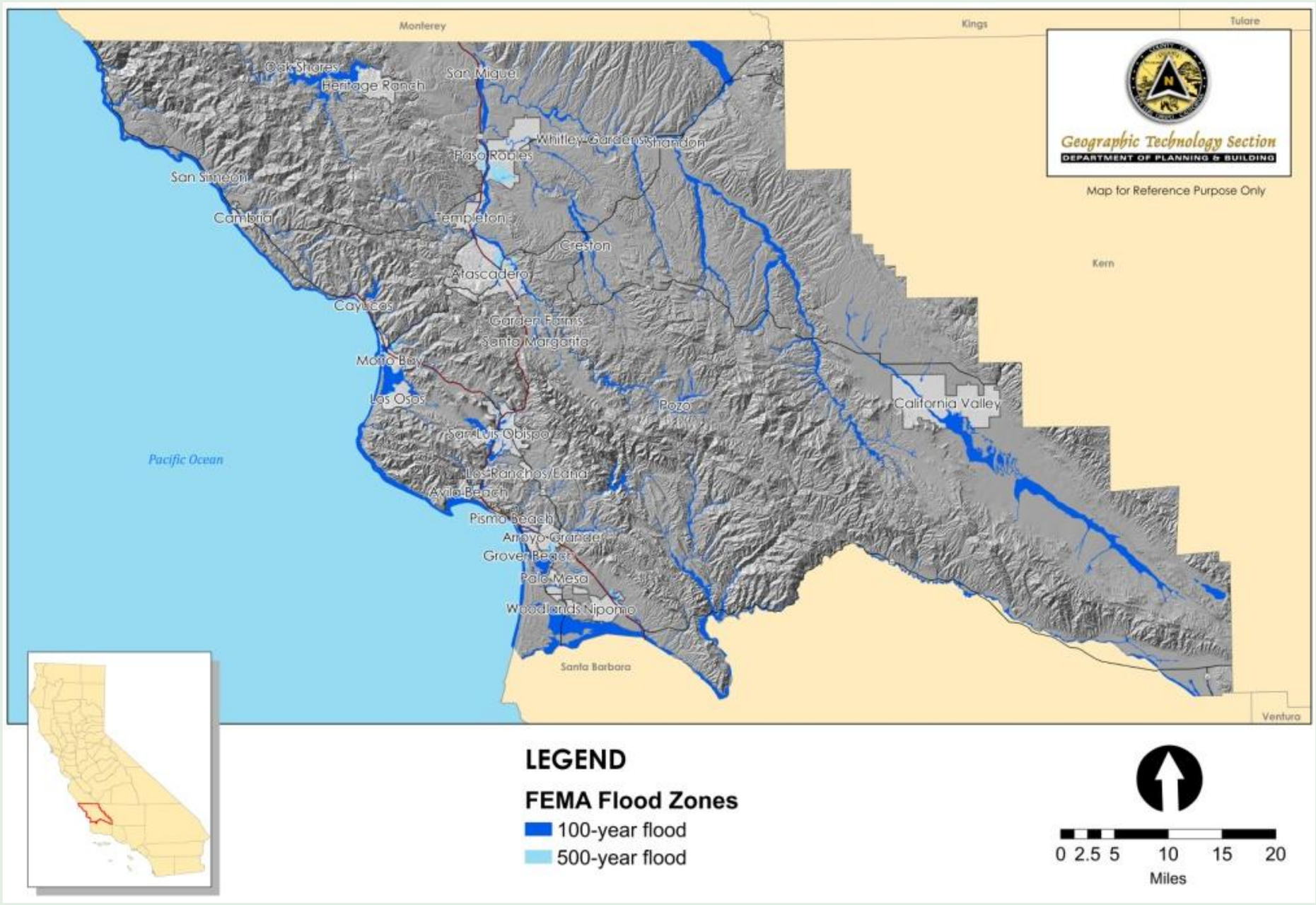
produced. However, seasonal temperature changes may negatively impact the quality of the wine grapes produced and limit the production of certain grape varieties.

Deteriorating Public Health – Public health in San Luis Obispo County may be substantially impacted by a variety of environmental conditions due to climate change. For example, changes in temperature and rainfall will decrease water supplies and increase the risk of wildfires, which have a detrimental effect on local air quality. Increased average temperatures combined with unpredictable weather occurrences can result in more extreme heat and cooling events, and unless actions are taken to protect the county's population, increased mortality and asthma-related admissions to local hospitals may occur.

Decreased Supply of Fresh Water – Higher temperatures and continued population growth suggest that there will be a growing demand for water while local groundwater and reservoir supplies are shrinking. Increased temperatures in San Luis Obispo County will continue to expose inland populations to more frequent heat days, and a decrease in coastal fog will also significantly increase the temperatures of coastal communities, resulting in increased electricity and water use.

Increased Severity of Flood Events – While climate model projections indicate that total annual rainfall may decrease or slightly increase, rainfall events are likely to occur less frequently but with greater severity. These rainfall events will pose additional challenges to manage runoff, sedimentation, soil water retention, and water storage. The combination of wildfire events followed by large amounts of rainfall can cause severe soil erosion, sedimentation runoff, and mudslides or landslides.

Figure 7-4. Flood Zone Map



This page has intentionally been left blank.

Several areas in San Luis Obispo County have been determined by the Federal Emergency Management Agency (FEMA) to fall within 500- and 100-year floodplains.[6] Areas within the floodplains will likely be more vulnerable to the heightened flooding threats that are anticipated to result from climate change. Localized flooding of low-lying areas will continue to be a concern as rainfall events become more severe.

Rising Sea Levels – Sea level rise is attributed to the increase of ocean temperatures and the resulting thermal expansion and melting of ice sheets, which contribute to the volume of water held in the oceans. The speed and amount of sea level rise will be determined by the increase in average temperatures and rate of melting of glacial ice. While there is a degree of uncertainty in the magnitude of projections, to date, the actual impacts of climate change have been more severe than the projections. With nearly 100 miles of coastline in San Luis Obispo County, sea level rise is likely to have the following effects:

- Increased erosion of coastal bluffs and risk of additional cliff failures;
- Higher storm surges and coastal flooding, making transportation and local infrastructure vulnerable to inundation during storms;
- Increased infrastructure and maintenance costs to protect local harbors and ports from storm surges and sea level rise;
- Loss of coastal wetlands due to permanent inundation;
- Saltwater intrusion into coastal freshwater supplies that serve local residents and agricultural uses.

[6] San Luis Obispo County 1999.

These impacts have the potential to negatively affect natural coastal ecosystems and the tourism and marine industries that rely on these ecosystems and land areas for economic productivity.

The years of 1995–2005 had the warmest global temperature ever recorded since record keeping began in 1850.[7] Higher temperatures will cause more rainfall than snowfall, which will impact water supplies not only for SLO County but for every other user of water in the state. Combined with longer summer seasons, the increased temperature will reduce soil moisture levels, increase irrigation, increase the need for air conditioning use, increase the rate and spread of wildfires, and stress the electrical infrastructure that serves the county. Increased flooding due to more intense and less predictable storms, along with sea level rise, will require proactive efforts in order to reduce the potential for damaging coastal flooding and erosion.

How are adaptation measures different from reduction measures?

Adaptation and reduction measures are closely tied, but differ in that adaptation measures address the *effects* of climate change, whereas reduction or mitigation measures address the *cause.* The adaptation measures in this chapter are presented in a different format than the reduction measures in Chapters 5 and 6, as the adaptation measures have not been quantified for their greenhouse gas (GHG), energy, or economic benefits.

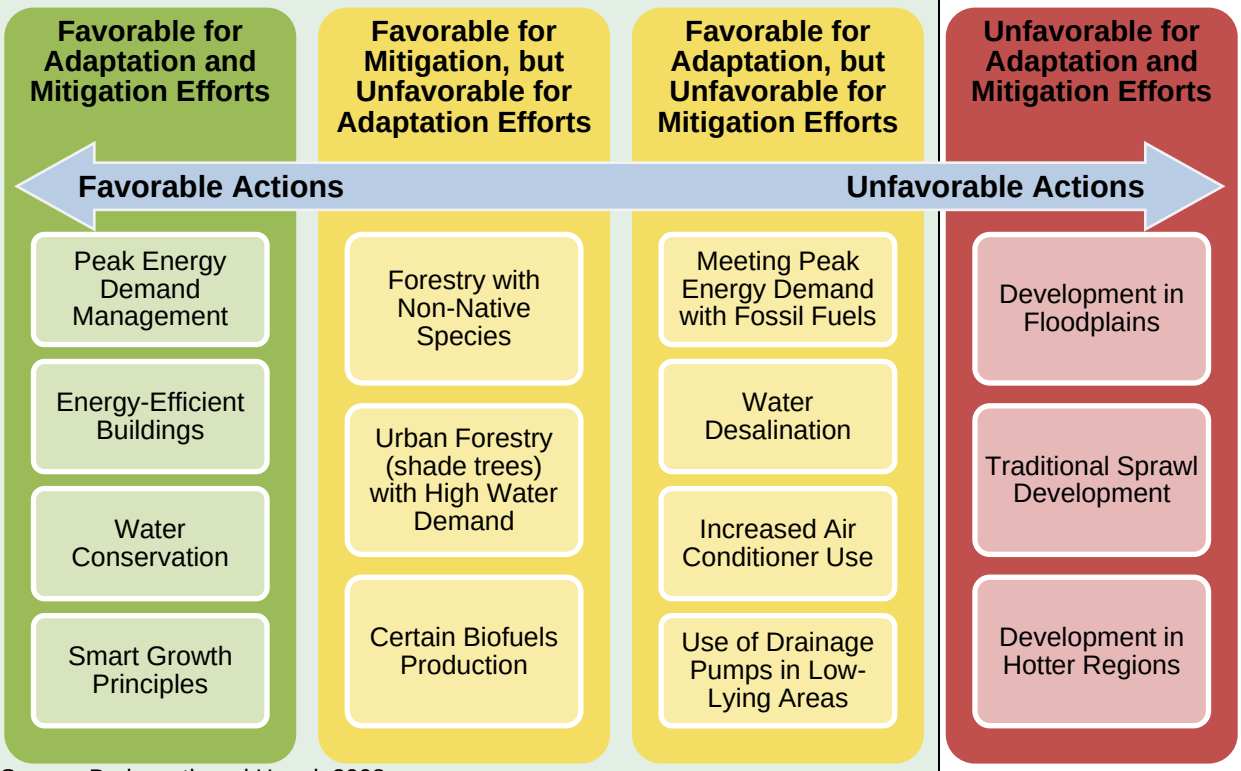
There are two types of adaptation measures: operational changes and increases to adaptive capacity. Operational measures assess climate change vulnerabilities and sensitive populations on a regular basis. They also address climate change adaptation in planning and public safety documents. Adaptive capacity measures are strategies that help prepare for and adjust to the impacts of climate change. Examples include the establishment of cooling centers during heat waves, promotion of energy efficiency and renewable energy to reduce peak load demand, and

[7] Rosenweig et al. 2007.

implementation of low impact development standards to reduce stormwater runoff and increase groundwater recharge. While adaptation measures and reduction/mitigation measures may differ significantly in their goals, there can be significant common ground between them. For instance, a mitigation measure to plant native trees reduces GHG by sequestering carbon and can lower energy consumption for air conditioning. Native tree planting also helps to adapt to climate change impacts by reducing the urban heat island effect and increasing storm water infiltration. Figure 7-5 presents a spectrum of complementary and conflicting adaptation and mitigation (or GHG reduction) actions.

It should be noted that not all adaptation measures are reduction measures, and vice versa. This Plan incorporates adaptation measures that are not harmful to or in conflict with proposed GHG reduction or mitigation efforts at this time.

Figure 7-5. Complementary and Conflicting Adaptation and Mitigation Actions



Source: Bedsworth and Hanak 2008

EXISTING ADAPTATION EFFORTS

The County has implemented many programs that serve as a foundation for climate change adaptation. Examples of such programs are Strategic Growth initiatives, integrated regional and water supply and management planning, water conservation strategies, energy conservation and alternative energy development, habitat management and conservation, and stormwater management with an emphasis on green infrastructure.

While climate change will not create new types of disasters in SLO County, it may instead make existing problems that already occur, either periodically or chronically, more severe or more frequent. While many of the County's existing disaster and emergency preparedness policies and programs are already in place to address disasters like flooding or wildfires, the intent of incorporating these existing policies and programs into the EnergyWise Plan is to identify that these policies either will support climate change adaptation efforts or may require additional attention. For example, consider the policy, "Coordinate between local, regional, state, and federal agencies before disasters occur to educate and organize people to respond appropriately to disasters and ensure there are few or no bureaucratic obstacles to performing emergency operations." This is something that the County already does through the Office of Emergency Services. However, the intent of including this policy in the EnergyWise Plan is to utilize climate change projections to ensure that the public and all necessary agencies are prepared, coordinated, and have the resources to respond to more frequent or larger disasters.

The County's existing efforts to prepare for the effects of climate change include the following policies and measures:

Climate Change Projections and Impacts

1) Continue to work with climate change experts, and utilize available tools such as CalAdapt, to identify local climate change impacts to inform public policy decisions and to incorporate climate change adaptation measures into

planning documents. (*SLO COSE AQ 5.2.2, Safety Element Policy S-4*)

2) Coordinate between local, regional, state, and federal agencies before disasters occur to educate and organize people to respond appropriately to disasters and ensure there are few or no bureaucratic obstacles to performing emergency operations. (*Safety Element Program S-2, S-3, LGC Adaptation Measure Public Health and Emergency Preparedness*)

3) Activate the County Emergency Operations Plan during climate change induced emergencies or natural disasters.

4) Educate County residents on what to do during disasters or climate change related emergencies.

5) Coordinate between appropriate local, regional, state, and federal agencies during disasters to respond to risks and minimize damage or loss of life.

6) Continue to train, certify, and engage Community Emergency Response Teams (CERT) in emergency response operations.

7) Ensure quick recovery following severe events through the declaration of a federal and/or state disaster zone, waiving building permit fees for structures damaged or lost, or providing assistance to impacted economies.

Public Health

8) Maintain public health procedures and regulations for the identification, investigation, and containment of suspected diseases and conditions that may become more prevalent with a warming climate. (Local Hazard Mitigation Plan, *LHMP*)

9) Continue to work with the Air Pollution Control District to improve local air quality and minimize air pollutants that negatively affect public health.

10) Encourage energy conservation through energy efficiency retrofits, conservation behaviors, and distributed renewable energy to reduce pressure on the electrical grid during heat waves.

Water Supply

11) Continue to coordinate with water suppliers to encourage water conservation, reuse water, and develop additional water supply sources. *(SLO COSE WR 1.1)*

12) Establish partnerships with local water suppliers (cities, CSDs) to develop a comprehensive water conservation program.

13) Prepare a region-wide Master Water Plan that will:

- Analyze supply and demand by evaluating the potential for new supplies;
- Investigate whether drought contingency plans or other emergency supplies are available to water purveyors.

Flooding and Unpredictable Weather

14) Enforce flood hazard regulations by maintaining standards for the development and placement of structures in areas with poor drainage or prone to flooding. *(LHMP)*

15) Identify areas suitable for floodplain corridor easements to maintain agricultural production that is compatible with flood conveyance and protects urban areas from flooding.

Sea Level Rise

16) Protect areas that are directly upland from dunes, coastal marshes, and wetlands to account for shifts in habitat due to sea level rise. *(LGC Coastal and Marine Resources and Related Tourism)*

17) Implement proactive and cost-effective measures to protect coastal infrastructure from damage due to coastal erosion, storm surges, landslides, and other hazards caused by sea level rise.

Wildfire Risks

18) Reduce the risk of catastrophic wildfires through controlled burns, fuel reduction programs, improved fire access and defensible space, and the increased resiliency of buildings and structures in high fire hazard areas, as identified in **Figure 7-6**.*(Safety Element S-14, S-34)*

19) Support prescribed burning programs and minimize any air quality impacts that may occur. *(SLO COSE AQ 3.1.3, BR 2.7)*

20) Utilize fire-resistant building materials in the construction of new buildings. *(Safety Element S-32, LHMP)*

21) Implement Strategic Growth Principles to direct most new development into existing communities, avoiding high-risk wildfire areas.

Agriculture

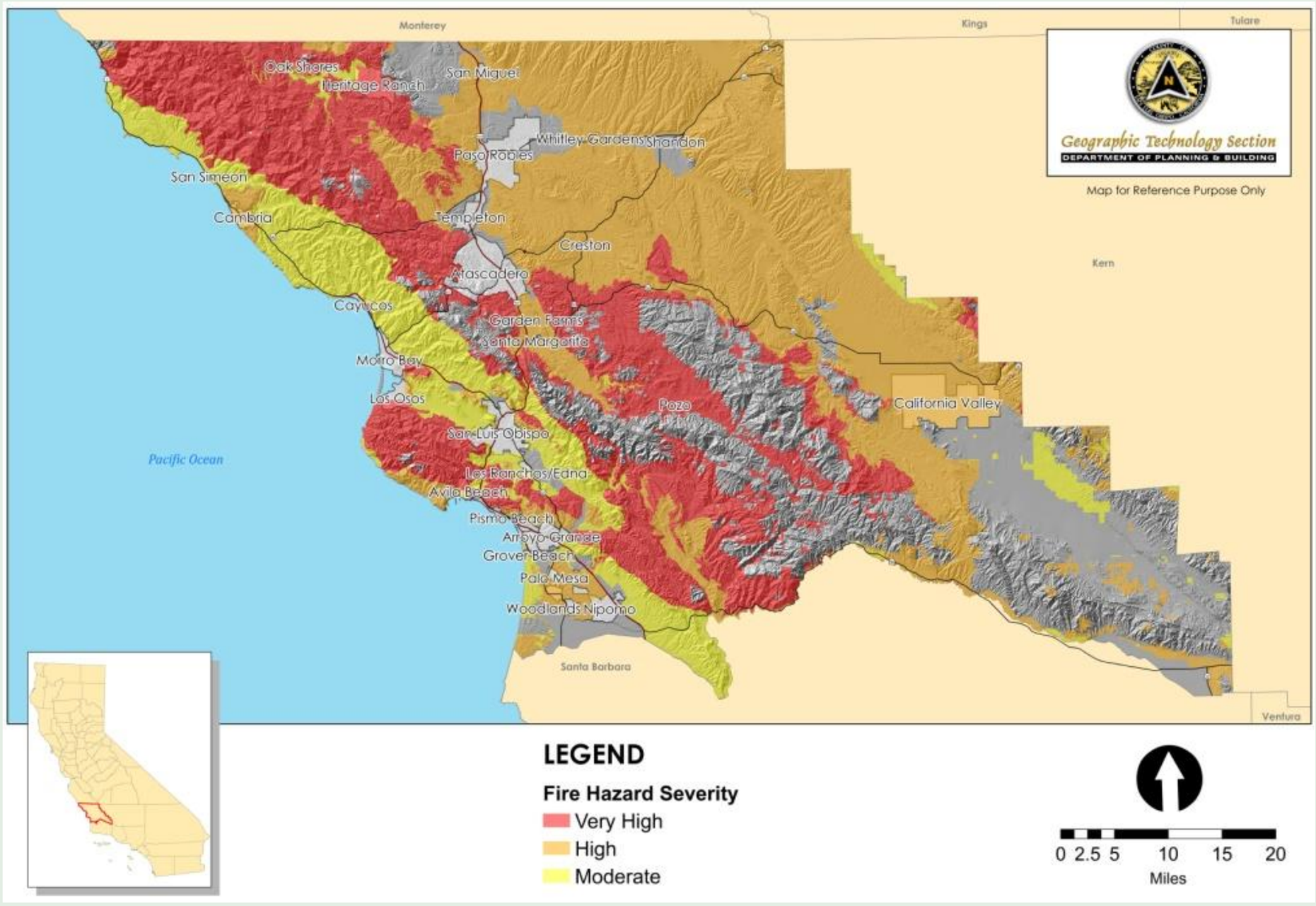
22) Assist farmers to implement conservation practices in their agricultural operations.

Natural Systems

23) Implement Strategic Growth Principles and direct most new growth into existing communities to protect natural ecosystems and wildlife corridors.

This page has intentionally been left blank.

Figure 7-6. Fire Hazards Map



This page has intentionally been left blank.

NEW ADAPTATION MEASURES

The following adaptation measures are organized according to the type of climate change impacts that they address. The County has developed goals (see Table 7-1) for addressing each potential climate change impact. Within each impact area, measures are organized by the time frame during which that measure is expected to be carried out, as follows:

Implementation Time Frame	
Ongoing	Continual Implementation
Near Term	0–10 years
Mid Term	10–20 years
Long Term	20+ years

Table 7-1. Adaptation Goal Summary

Potential Impact	Goal
Climate Change Impacts	Identify, assess, and prepare for climate change impacts in the county.
Public Health	Minimize potential risks from climate-related events that may compromise public health.
Water Supply	Ensure a secure, reliable, and safe water supply for county residents, agriculturists, businesses, and the environment.
Flooding and Unpredictable Weather Events	Reduce potential vulnerability to and impacts of extreme weather events.
Sea Level Rise	Identify and minimize risks of local sea level rise.
Wildfire Risks	Reduce the risk of catastrophic wildfires.
Agriculture	Ensure resiliency of the county's agriculture sector.
Economy and Tourism	Minimize the county's vulnerability to the economic impacts of climate change.
Natural Systems	Protect, restore, and improve local and regional ecosystems, habitats, and wildlife corridors.

CLIMATE CHANGE IMPACTS

GOAL: IDENTIFY, ASSESS, AND PREPARE FOR CLIMATE CHANGE IMPACTS IN THE COUNTY.

Best practices direct local governments to coordinate and integrate short-, medium-, and long-term policy, infrastructure, and programmatic decisions across sectors as part of a comprehensive climate change adaptation strategy. In order to effectively adapt to the impacts of climate change, the County will need to continue to identify potential impacts through research, projections, and observations and implement policies to reduce these impacts. This adaptation strategy is the starting point for the County's coordinated efforts on adapting to the impacts of climate change.

Ongoing Measures:

1) Implement cost-effective policies and programs to mitigate greenhouse gas emissions and reduce the magnitude of climate change impacts.

2) Implement cost-effective policies and programs to adapt to the unavoidable impacts of climate change.

3) Update the County Emergency Operations Plan and contingency plans to comply with the State Emergency Plan.

Near-Term Measures:

4) Prepare a formal vulnerability assessment for the unincorporated county.

5) Identify potential barriers to climate change adaptation including funding, uncertainty, and the cooperation and coordination of agencies.

6) Engage the public in evaluating potential responses for adapting to climate impacts and risks.

7) Identify funding needs and potential sources of funding to implement climate adaptation programs and policies.

8) Incorporate potential climate change impacts into the decision-making process when siting new facilities and prioritizing repairs and improvements to critical infrastructure. *(LGC Adaptation Measure Public Health and Emergency Preparedness)*

Mid-Term Measures:

9) Coordinate an integrated update to the County's Local Hazard Mitigation Plan, the Safety Element of the General Plan, and other relevant plans to analyze the potential effects of climate change and develop policies, programs, and strategies to minimize risks to life, property, and natural systems. *(Safety Element Program S-2, S-3, LGC Adaptation Measure Public Health and Emergency Preparedness)*

10) Prepare and implement a program to educate county residents and businesses about potential climate change risks and identify the key steps individuals can undertake to prepare for potential climate change risks. *(LGC Adaptation Measure Public Health and Emergency Preparedness)*

Long-Term Measures:

11) Address reoccurring risks through continued research, updates to local plans and policies, and additional preparation and coordination (rebuilding in floodplains, coastal bluff erosion, air quality impacts to sensitive receptors, transitioning economies, etc.).

PUBLIC HEALTH

GOAL: MINIMIZE POTENTIAL RISKS FROM CLIMATE-RELATED EVENTS THAT MAY COMPROMISE PUBLIC HEALTH. (SLO COSE AQ 3.5)

Public health in the county may be affected by a variety of environmental conditions due to climate change. For example, changes in temperature and rainfall may decrease water supplies and increase the risk of wildfires that have a detrimental effect on

local air quality. Increased average temperatures combined with unpredictable weather occurrences may result in more extreme heat and cooling events. Unless actions are taken to protect the county's population, increased mortality and asthma-related admissions to local hospitals may occur.

Ongoing Measures:

1) Mitigate the urban heat island effect through the planting of urban forests and the use of light-colored building and pavement materials. *(SLO COSE E 4.4.2)*

2) Encourage businesses and local and regional agencies to participate in PG&E's Demand Response Program to curtail facility energy use during times of peak demand.

Near-Term Measures:

3) Establish formal partnerships with local and regional health-oriented organizations such as HEAL-SLO, CCPN, local parks and recreation departments, YMCA, and state and local health agencies to identify health risks and conditions that may compromise the population's ability to adapt or withstand to health-related stressors. *(LGC Adaptation Measure Public Health and Emergency Preparedness)*

4) Identify specific populations or segments of the local population that may have limited capacity to adapt to certain health-related stressors such as heat waves or cold spells, disease or virus outbreaks, or poor air quality events.

Mid-Term Measures:

5) Identify potential costs and funding sources for protecting the population from increased public health risks.

6) Update the existing Countywide Emergency Energy Contingency Plan to meet peak electricity and natural gas needs of essential facilities within the county at all times. *(SLO COSE E 1.2.2)*

7) Update the SLO County Emergency Operations Plan to incorporate public health-related events or outbreaks and establish procedures to protect the population from exposure to outbreaks or events.

8) Advise and contact sensitive or vulnerable populations during public health-related events or risks.

9) Identify accessible and secure locations for public cooling centers during extreme heat events.

Long-Term Measures:

10) Update plans and procedures as necessary following outbreaks or events to minimize risk or damage from future events.

WATER SUPPLY

GOAL: ENSURE A SECURE, RELIABLE, AND SAFE WATER SUPPLY FOR COUNTY RESIDENTS, AGRICULTURISTS, BUSINESSES, AND THE ENVIRONMENT.

While increased temperatures in San Luis Obispo County may continue to expose inland populations to more frequent heat days, a decrease in coastal fog will also significantly increase the temperatures of coastal communities, resulting in increased electricity and water use. Higher temperatures and continued population growth suggest that there will be a growing demand for water while local groundwater and reservoir supplies are shrinking.

Ongoing Measures:

1) Promote conservation of groundwater and evaluate potential improvements to groundwater recharge practices to provide additional water storage in case of drought. *(SLO COSE WR 2, LGC Water Resources & Infrastructure)*

2) Create requirements to reduce indoor water use from existing residential and nonresidential buildings, in accordance with State Law SB 407.

3) Minimize water loss through maintenance and repair of water delivery infrastructure.

4) Diversify the county's water supply sources through expanded use of reclaimed water, encouragement of rainwater catchment and greywater systems, and development of additional water supply sources. *(SLO COSE WR 1.4, WR 4.6, WR 4.6.1)*

5) Implement mandatory water conservation measures for County-operated water systems during times of drought or compromised water supply.

6) Evaluate the effectiveness of water conservation measures and identify additional measures to meet water conservation goals or needs.

Near-Term Measures:

7) Develop a GIS application identifying major land uses and quantifying their water demands based on acreage, land use, and consumptive use statistics.

8) Institute tiered water rate structures to encourage water conservation for customers of County-operated water supplies.

9) Implement CALGreen new residential and nonresidential building standards to reduce indoor and outdoor potable water use.

Mid-Term Measures:

10) Identify new potential water supplies to meet the demand of a growing population (including additional capacity at reservoirs, recycled water, on-site greywater systems, and rainwater harvesting systems).

Long-Term Measures:

11) Evaluate a water demand and water efficiency monitoring program in coordination with the County Planning Department's Resource Management System to monitor municipal, industrial, agricultural, recreational, and environmental demand on an ongoing basis.

12) Identify any water deficiencies and recommend projects, policies, and programs to address those deficiencies. *(SLO COSE WR 1.1.1, WR 5.2, LGC Water Resources & Infrastructure*)

FLOODING AND UNPREDICTABLE WEATHER

GOAL: REDUCE POTENTIAL VULNERABILITY TO AND IMPACTS OF EXTREME WEATHER EVENTS.

While climate model projections indicate that total annual rainfall may decrease or slightly increase, rainfall events are likely to occur less frequently but with greater severity. These rainfall events may pose additional challenges to manage runoff, sedimentation, soil water retention, and water storage. The combination of wildfire events followed by high-intensity rainfall can cause severe soil erosion, sedimentation runoff, and mudslides or landslides.

Several areas in San Luis Obispo County have been determined by the Federal Emergency Management Agency (FEMA) to fall within 500- and 100-year floodplains.[8] Areas within the floodplains will likely be more vulnerable to the heightened flooding threats that are anticipated to result from climate change. Localized flooding of low-lying areas will continue to be a concern as rainfall events become more severe.

The years of 1995–2005 had the warmest global temperature ever recorded since records have been kept (1850).[9] Higher temperatures will cause more rainfall than snowfall, which may

[8] San Luis Obispo County 1999.

[9] Rosenweig et al. 2007.

impact water supplies not only for SLO County but for every other user of water in the state. Combined with longer summer seasons, the increased temperature may reduce soil moisture levels, increase irrigation, increase the need for air conditioning use, increase the rate and spread of wildfires, and stress the electrical infrastructure that serves the county. Increased flooding due to more intense and less predictable storms, along with sea level rise, will require proactive efforts in order to reduce the potential for damaging coastal flooding and erosion.

Ongoing Measures:

1) Implement low-impact development (LID) standards in new development to minimize stormwater runoff, reduce the risk of flooding, and increase groundwater recharge. *(SLO COSE WR 6, WR 6.2.2, WR 6.4, WR 6.4.1, 6.4.2)*

Mid-Term Measures:

2) Work with property owners in areas prone to flooding to improve drainage, and develop a public information and education program in these areas to inform residents of best practices and emergency procedures. *(SLO COSE WR 6.1, WR 6.7)*

Long-Term Measures:

3) Consider utilizing transfer of development rights incentives to discourage the rebuilding of structures damaged or destroyed due to flooding in high-risk areas.

SEA LEVEL RISE

GOAL: IDENTIFY AND MINIMIZE RISKS OF LOCAL SEA LEVEL RISE.

Rising sea levels are attributed to increasing ocean temperatures and the resulting thermal expansion and melting of snow and ice, which increases the volume of water held in the oceans. The speed and amount of sea level rise will be determined by the increase in average temperatures and rate of melting of glacial ice. While there

is a degree of uncertainty in the magnitude of projections, historical projections have been more conservative than the actual impacts of climate change once they occurred. With nearly 100 miles of coastline in San Luis Obispo County, sea level rise is likely to have the following effects on these areas:

- Increased erosion of coastal bluffs and risk of additional cliff failures;
- Higher storm surges and coastal flooding, making transportation and local infrastructure vulnerable to inundation during storms;
- Increased infrastructure and maintenance costs to protect local harbors and ports from storm surges and sea level rise;
- Loss of coastal wetlands due to permanent inundation;
- Saltwater intrusion into coastal freshwater supplies that serve local residents and agriculture uses.

Near-Term Measures:

1) Require all applications for new development of a beach, beachfront, or bluff-top property to account for projected sea level rise. *(CA Coastal Act)*

Mid Term Measures:

2) Reassess coastal land use policies and plans to reduce potential impacts associated with sea level rise and coastal erosion. *(LGC Coastal and Marine Resources and Related Tourism, LHMP, Safety Element S-23)*

3) Create a supporting scientific effort to translate sea level rise data into decision-relevant metrics such as coastal erosion rates; extent, frequency, and change in elevation of flood events; groundwater salinity changes; wetland inundation risks; etc. *(CA Pacific Council)*

4) Educate and train coastal planners, managers, and decision makers to increase their level of understanding of climate change science, potential impacts, on-the-ground vulnerabilities, and the techniques and tools of adaptation planning. *(CA Pacific Council*)

5) Work with the California Coastal Commission to identify and protect coastal access points that may be vulnerable to damage from sea level rise, coastal bluff erosion, or storm surges.

6) Collaborate with local, regional, and state transportation and infrastructure agencies to identify and evaluate the options to mitigate potential risks to coastal infrastructure such as roads, water and wastewater facilities, energy generation and distribution facilities, and erosion control or sea wall protection structures.

7) Update local coastal plans to incorporate information from the statewide coastal vulnerability assessments produced by the California Natural Resources Agency. *(CA Pacific Council)*

Long-Term Measures:

8) Monitor the impacts and identify potential threats of sea level rise on coastal communities. *(SLO COSE AQ 5.1.1)*

9) Encourage insurers and reinsurers to incorporate future climate impacts into risk assessment models used to determine homeowner and business insurance rates.

10) Assess existing transportation design standards and their adequacy to protect transportation facilities from sea level rise and extreme weather events. (*CCAS)*

11) Work with state and national insurance programs to protect development along coastlines and other high-risk areas.

WILDFIRE RISKS

GOAL: REDUCE THE RISK OF CATASTROPHIC WILDFIRES.

The projected increase in frequency and size of wildfires in San Luis Obispo County has the potential to significantly increase demand on local emergency services and water supply while negatively impacting the county's air quality, native ecosystems, and land productivity. Invasive species or disease resulting in increased fuel accumulation (dead plants/shrubs/trees) may increase the severity or spread of wildfires. Wildfires have a significant impact on air quality and/or public health.

Ongoing Measures:

1) Continue to update and re-evaluate fire risk maps to identify areas that may become a higher fire risk, including Cal Fire's Fire Hazard Severity Zone Mapping System for State responsibility areas.

2) Consider project alternatives that avoid new development in areas that cannot be adequately protected from wildfire risks.

3) Require new development in fire hazard areas to cluster buildings to allow for adequate wildfire protection zones and defensible space. *(LHMP, Safety Element S-30, S-31, S-33)*

4) Strengthen efforts to guide and invest in vegetation management to minimize future fire risks and avoid additional natural hazards such as landslides or mudslides.

AGRICULTURE

GOAL: ENSURE RESILIENCY OF THE COUNTY'S AGRICULTURE SECTOR.

Agriculture and agricultural-related tourism are two of the region's most significant industries. Higher temperatures, decrease in water supply, and shifts in seasonal patterns have the potential to negatively affect agricultural productivity, resulting in a loss of food security and decrease in agricultural-related tourism.

ADAPTATION

Wine grapes are San Luis Obispo County's top ranking crop in economic value.[10] The quality of wine grapes is highly dependent on certain climatic conditions, especially temperatures. Moderate changes in temperature may potentially increase the quantity of wine grapes produced. However, seasonal temperature changes may negatively impact the quality of the wine grapes produced and limit the production of certain grape varieties. Increased temperatures may lead to the outbreak of existing diseases such as Pierce's Disease and powdery mildew or the outbreak of new diseases.

Developing crops, varieties, and traits that are resistant to pests and diseases will improve producers' ability to adapt to climate change.

Near-Term Measures:

1) Utilize GIS mapping systems to analyze the potential impacts of climate change on agricultural resources.

Mid-Term Measures:

2) Identify actions and responses to minimize the spread or invasion of new pests, diseases, or weeds that may be harmful to agricultural productivity.

3) Work with the UC Cooperative Extension and agricultural organizations to assist and educate farmers in adapting to the effects of climate change. Adaptation techniques may include changes in crop selection, patterns, and practices.

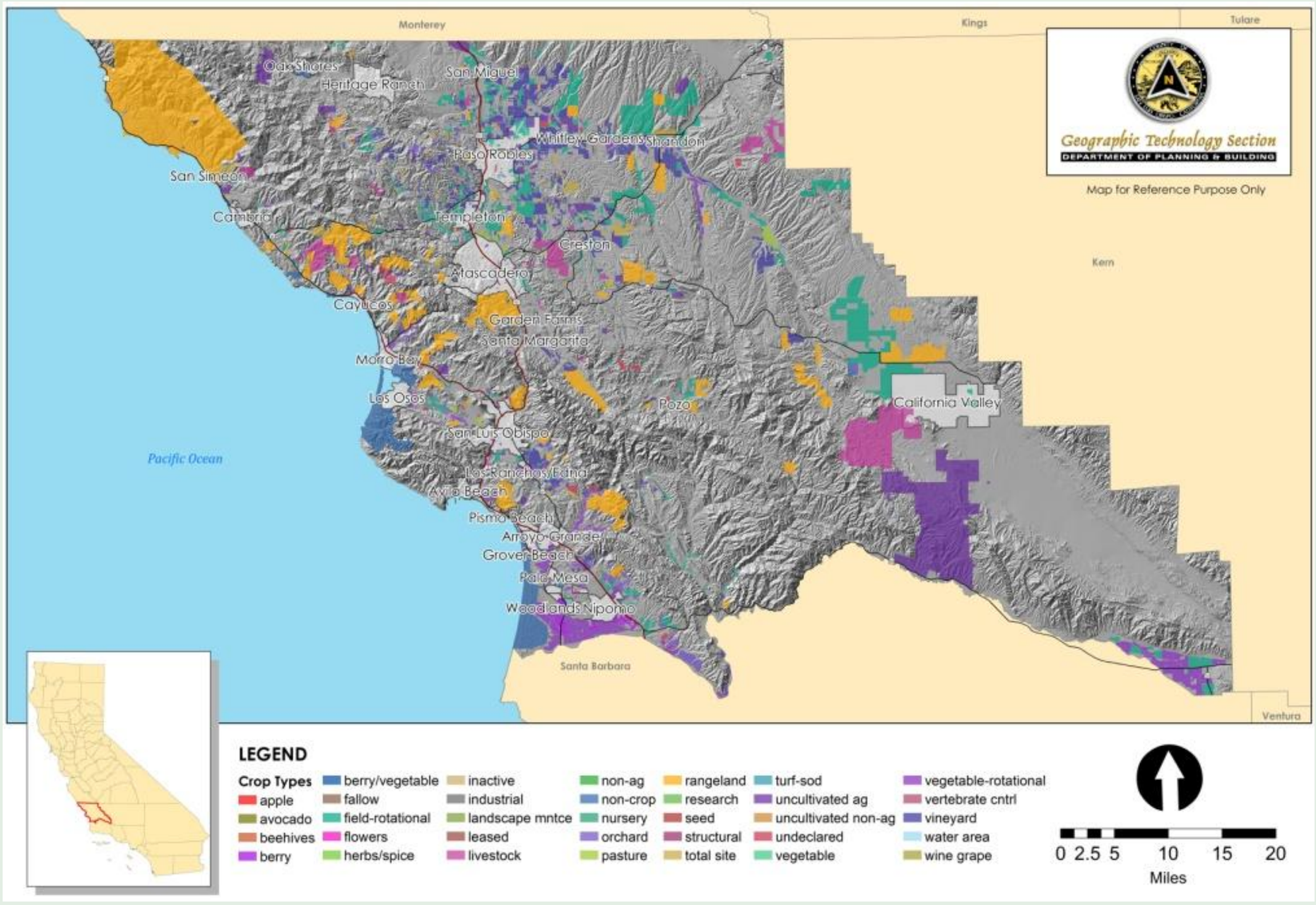
Long-Term Measures:

Work with agricultural providers, the UC Cooperative Extension, and researchers to identify crops that may be better fit to adapt to warmer growing seasons and more frequent freeze events. (a shift to greater crop diversity will offset some of the risks from weather variation and potential pest outbreaks due to climate change).

---

[10] County of San Luis Obispo Department of Agriculture/Weights and Measures 2009.

Figure 7-7. Crops Map



This page has intentionally been left blank.

ECONOMY AND TOURISM

GOAL: MINIMIZE THE COUNTY'S VULNERABILITY TO THE ECONOMIC IMPACTS OF CLIMATE CHANGE.

Climate change has the potential to cause some economic sectors to decline and to stimulate growth of new and growing economic industries. Local impacts of climate change have the potential to negatively affect natural coastal ecosystems and, in turn, the tourism and marine industries that rely on these ecosystems and land areas for economic productivity. The following potential effects of climate change can negatively affect recreation and tourism, but can be addressed by preserving rare or vulnerable ecosystems:

- Declining fish populations (both freshwater and ocean)
- Shift in migratory bird routes (decline in birding)
- Loss of biodiversity in ocean (decline in both fishing and scuba)
- Primary route closures (landslides or sea level rise along Highway 1)

Ongoing Measures:

1) Develop and promote strategies to draw visitors in ways that boost local businesses, minimize impacts to natural resources, and build environmental awareness. (ecotourism)

2) Continue to develop and implement programs that expand local economic opportunities and prepare local economies to adapt to a changing climate. *(EVC Clusters of Economic Opportunities Report)*

NATURAL SYSTEMS

GOAL: PROTECT, RESTORE, AND IMPROVE LOCAL AND REGIONAL ECOSYSTEMS, HABITATS, AND WILDLIFE CORRIDORS.

The increased threat of wildfire combined with reduced water supply and rising sea levels have the potential to significantly alter natural ecosystems and wildlife habitats. Wildfire and flooding events may interrupt or segment wildlife migration patterns and corridors. Fish, wildlife, and plants may respond to increasing temperatures and other climate changes by shifting species distributions (potentially moving northward or upslope) in an effort to track suitable climate conditions.

Ongoing Measures:

1) Continue to monitor and research the potential impacts that climate change may have on local (oceanic, coastal, and inland valley) habitats and wildlife. *(SLO COSE BR 1.5.2)*

2) Protect wildlife habitats through improved land management practices to reduce sedimentation flows into creeks and other waterways. *(LGC Species, Ecosystems, and Ecosystem Services)*

Mid-Term Measures:

3) Identify and protect locations where native species may shift or lose habitat due to climate change impacts (sea level rise, loss of wetlands, warmer temperatures, drought).