APPENDIX B. REGIONAL CLIMATE ASSESSMENTS AND RESILIENCE PLANS

Resource managers in the Watershed have published a variety of planning documents relevant to climate vulnerability in some capacity, which are listed below. While each planning document has a unique scope, they collectively address the impacts that climate change is likely to have on the Watershed's ecosystems, infrastructure, and communities. Many of the plans incorporate climate adaptation strategies relevant to water supply, flooding, drought, and ecosystem health, reflecting what is addressed in the Calaveras Watershed Resilience Plan.

Climate resilience is defined as "…the ability to prepare for threats and hazards, adapt to changing conditions, and withstand and recover rapidly from adverse conditions and disruptions.[i] Systems can improve their resilience by implementing projects and strategies for adaptive management that account for and adjust to current climate conditions and prepare for likely future scenarios. Planning for climate resilience requires developing adaptation strategies at multiple scales. The climate vulnerability and adaptation analyses in the WRP build upon existing work, particularly from the following plans and studies:

1. Department of Water Resources Watershed Studies

In recent years, DWR has embarked on the task of assessing the climate change and flood risks of watersheds in the San Joaquin River Basin watersheds to evaluate Flood-MAR as a viable climate resilience strategy in the region.[ii] As part of this effort, DWR completed climate vulnerability assessments for several tributaries of the San Joaquin River, including the Calaveras River. [iii] The assessments, referred to as the Watershed Studies, considered a full range of future climate change scenarios and how they might impact surface and groundwater supply. The Calaveras River modeling results were used as the basis for a localized climate vulnerability assessment as part of the WRP (Chapter 5).

2. Eastern San Joaquin Subbasin Groundwater Sustainability Plan (ESJ GSP)

The Watershed overlaps the boundary of the Eastern San Joaquin Groundwater Subbasin. The most recent Amended ESJ GSP utilized climate projections from the 2070 Central Tendency scenario developed by DWR to project the impacts of climate change on precipitation, evapotranspiration, and streamflow.[iv] The WRP's vulnerability assessment builds upon the climate change analysis completed for the GSP.

3. Local Hazard Mitigation Plans: Calaveras County and San Joaquin County

The Calaveras and San Joaquin County Local Hazard Mitigation Plans (LHMPs) follow FEMA guidelines and emphasize impacts on infrastructure and emergency preparedness, especially in response to climate-related hazards. These include extreme rainfall and flooding, debris flows and landslides, wildfires, drought, and extreme heat. Climate change is anticipated to increase the frequency and severity of all the hazards listed.

The Calaveras County LHMP focuses on the intersection of many of these hazards, particularly as they relate to wildfire.[v] Hotter and drier conditions increase the risk of destructive wildfires, while intense storm events increase the risk of severe floods and debris flows. Furthermore, wildfires often cause the destruction of vegetation, which increases the possible volume of erosion, sediment loss, and debris flows. Wildfires and flooding are of particular concern for Calaveras County due to its steep topography and many forested areas. The Calaveras County LHMP outlines several adaptation strategies for these risks, including fuel reduction, infrastructure upgrades, and expanding water supply reliability.

The San Joaquin County LHMP focuses primarily on floods, drought, and extreme heat.[vi] In comparison to Calaveras County, San Joaquin County is at a lower risk for wildfire impacts, as it is relatively flat and dominated by agricultural land use. Flood risk is a major consideration in San Joaquin County due to its position in a FEMA floodplain, its water conveyance and storage infrastructure, and intersection at several key waterways including the San Joaquin River, Calaveras River, and the Sacramento-San Joaquin Delta. In the event of severe storms, levees and rivers are highly likely to overflow, causing flood damage in rural and urban areas. Drought can have an outsized impact on the County's agricultural economy, leading to increased water costs and fallowing of fields. Additionally, extreme heat can cause severe public health impacts in densely populated areas like the City of Stockton. San Joaquin County's climate adaptation strategies include drainage system improvements, increased water supply resilience, and emergency preparedness.

4. Eastern San Joaquin (ESJ) and Mokelumne/Amador/Calaveras (MAC) Integrated Regional Water Management (IRWM); Mokelumne Watershed Interregional Sustainability Evaluation (MokeWISE) Program

The IRWM Plans (ESJ IRWM and MAC IRWM) consider climate vulnerabilities in planning for long-term water supply.[vii] In 2015, the two IRWM groups came together to prepare the MokeWISE Program, the first ever inter-regional IRWM project that considered water supply planning at a watershed scale.[viii] The three plans emphasize the risks of drought, groundwater overdraft, and severe storm events. MokeWISE includes a more detailed analysis of specific impacts of climate change on water supplies, including reduced Sierra snowpack, precipitation whiplash, and extended dry periods. MokeWISE presents additional issues that may affect surface water quality and ecosystem health, such as more frequent wildfires, elevated water temperatures, and increased sediment loading. The ESJ IRWM also considers the downstream effects of increased salinity due to sea-level rise in the Sacramento-San Joaquin River Delta. The IRWM Plans and MokeWISE include adaptation strategies to address several risk areas, such as fuel reduction, ecosystem restoration, flood management, streamlined reservoir operation, and infrastructure upgrades.

5. Other Reviewed Documents and Plans

Several other plans were reviewed to ensure a comprehensive understanding of climate vulnerabilities, adaptation strategies, and priorities across the Watershed and surrounding region. The reviewed plans, listed below, included climate adaptation strategies such as infrastructure upgrades, emergency response planning, groundwater banking, conjunctive use, groundwater recharge projects, and stormwater capture.

- Calaveras County Community Wildfire Protection Plan (2019; update under development)
- Calaveras County Mokelumne River Long-Term Water Needs Study (2017)
- Calaveras County Water District 2020 Urban Water Management Plan (2021)
- Calaveras River Habitat Conservation Plan (2019)
- City of Stockton Climate Action Plan (2014)
- City of Stockton Water Master Plan (updated 2021)
- San Joaquin Area Flood Control Agency Strategic Plan (updated 2024)
- San Joaquin Council of Governments Climate Adaptation & Resiliency Study (2020)
- San Joaquin Council of Governments Regional Resiliency Implementation Plan (2022)
- Stanislaus County Drought Resilience Plan (under development as of 2026)
- Stanislaus County Multi-Agency Regional Stormwater Resource Plan (2018)
- Stockton East Water District 2020 Urban Water Management Plan (2021)

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[i] The White House, 2023
[ii] California Department of Water Resources, 2022
[iii] California Department of Water Resources, 2025
[iv] California Department of Water Resources, 2023; Eastern San Joaquin Groundwater Authority, 2024; California Natural Resources Agency, 2020
[v] Calaveras County, 2023
[vi] San Joaquin County, 2023
[vii] ESJ IRWM, 2021; MAC IRWM, 2018
[viii] ESJ and MAC IRWM, 2015