APPENDIX D

CLIMATE ADAPTATION

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Climate Vulnerability Assessment

This section describes the anticipated impacts of climate change in Yolo County. It provides an overview of forecasts for four climate-related hazards: drought, extreme heat, flooding, and wildfire, as well as the unique impacts on each sector as identified in Chapter 3, Climate Action. For each sector, current conditions are described, as are vulnerabilities and opportunities.

In California, the U.S. Environmental Protection Agency designates some census tracts as "disadvantaged communities." These communities are determined by a statewide mapping system, CalEnviroScreen, that analyzes socioeconomic and pollution exposure data to identify those census tracts with the highest pollution burden and highest vulnerability. These census tracts are eligible for set-aside grant funding and are discussed in detail in the Yolo County General Plan Land Use and Community Character Element. For the purposes of the Climate Action and Adaptation Plan (CAAP), in addition to the designated disadvantaged communities, any community that is expected to experience climate change first and with greater adverse effects as a result of having less capacity to respond to climate change (e.g., fewer economic resources to run air conditioners on hot days) is referred to as a "frontline community."

Climate Hazards in Yolo County

Drought and Water Quality

Drought occurs when less water is available to satisfy an area's usual water-consuming activities over a sustained period of time. Drought periods differ but are generally triggered by some combination of low precipitation and high temperatures. Warmer weather exacerbates drought conditions by drying the soil, dropping groundwater levels, and further reducing snowpack. In the absence of rain, surface water supplies from streams and reservoirs drop. The sustainability of the groundwater system relies on the ability of groundwater sources to "recharge" during wetter periods, while surface water systems depend on flows and storage capacity.

Yolo County utilizes a mix of surface and groundwater to meet its residential and commercial demand, though in drought periods users are more dependent on groundwater. In Yolo County, the Yolo Subbasin Groundwater Agency is the agency under the Sustainable Groundwater Management Act representing the user community charged with supplying agricultural water and protecting groundwater resources. In 2023 the California Department of Water Resources approved the Yolo Subbasin Groundwater Sustainability Plan (GSP), which provides a roadmap to sustainability for this system. A member agency, the Yolo County Flood Control & Water Conservation District is also responsible for allocating surface water to agriculture and municipal water systems. There are several methods of water delivery throughout Yolo County: municipal water

systems, community service districts, and privately owned groundwater wells. The primary source for drinking water for the nearly all domestic water users in Yolo County, including the frontline communities in unincorporated Yolo County, is groundwater (YSGA 2022). As the population grows, so will the demands on this system.

Communities reliant on relatively shallow wells, such as those near Capay, are highly vulnerable, as those wells dry out first, requiring the County to provide water hauling services (Yolo County OES 2023). The increase in demands on groundwater during periods of drought can cause seawater intrusion into the aquifer via the Sacramento River Delta, affecting water quality for the entire region; salinity is also associated with shallow groundwater zones as a result of irrigation and evaporation (YSGA 2022). Decreased surface water allocations during a drought reduce water availability and impact sectors involving water-intensive activities, such as agriculture. An increase in land subsidence (the gradual sinking of land) is associated with drought; this deformation has been documented in Yolo County, especially in the areas between Woodland and Zamora (YSGA 2022). There are several projects underway across Yolo County to increase recharge capacity and storage, monitor use, share resources, and mitigate domestic well impacts, as outlined in the GSP (YSGA 2023).

Climate change raises the likelihood of extreme weather, resulting in a Sacramento Valley region increasingly prone to droughts (Houlton 2018). All of Yolo County is likely to be affected by drought, with greater intensity in the southeastern region, where well depth tends to be shallower (Yolo County OES 2023).

Water quality, quantity, and availability issues impact all sectors, but are especially harmful to people, agriculture, and natural lands.

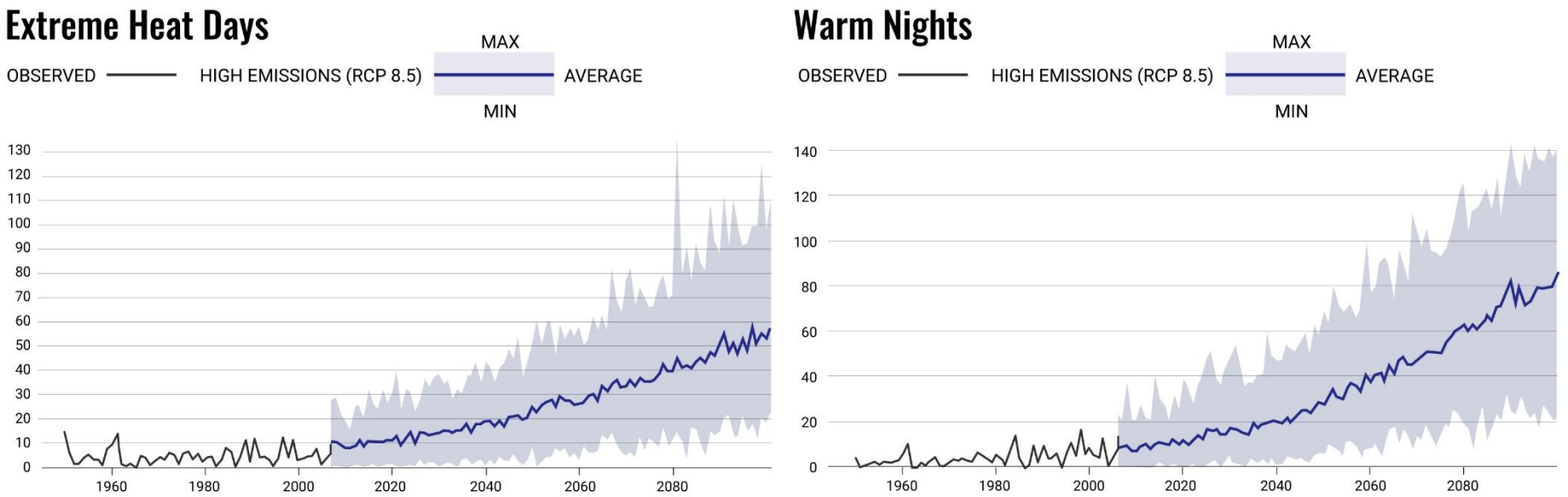
Extreme Heat

In Yolo County, an extreme heat day is any day above 103.2°F and warm nights are defined as overnight temperatures failing to drop below 65°F (Cal-Adapt 2024). Warm nights are significant in that they reduce the ability of the body and environment to recover from high temperatures during the day, impacting sleep and exacerbating the health issues related to extreme heat exposure. Based on mid-century projections, Yolo County is projected to experience an average of 25 extreme heat days a year from May to October and an average of 30 warm nights per year in the coming decades (Cal-Adapt 2024). Figure 1 illustrates forecasted increases in the occurrence of extreme heat days and warm nights in Yolo County (Cal-Adapt 2024).

Extreme heat[1] is the deadliest of weather hazards (Adams-Fuller 2023), with deaths occurring predominantly in vulnerable populations, including older adults, children, and those with chronic health conditions, as well as in frontline communities including low-income households and the homeless population (CNRA 2022a). Those reliant on walking, biking, or public transit to get around are highly exposed, as are those who work outdoors or in indoor spaces that are not properly climate controlled. Extreme heat exposure is associated with heat illness such as heat stroke, as well as increased illness and mortality among people with diabetes or heart or respiratory conditions (State of California 2022).

[1] The 2022 California Climate Adaptation Strategy reported that a preliminary analysis of the September 2022 heatwave showed a 5% increase in death rates statewide when compared to the rest of the summer.

Figure 1. Number of Extreme Heat Days and Warm Nights in Yolo County



Crops and livestock endure stress during periods of extreme heat and may experience damage indirectly by way of drought, a hazard exacerbated by higher temperatures. There is evidence that heat increases in the Sacramento Valley have been historically tempered somewhat by irrigation and that water conservation practices, such as drip irrigation, may further increase temperatures in Yolo (Houlton 2018).

Heat-related equipment failures have resulted in unintentional blackouts throughout Yolo County due to increased demand on an aging electrical grid, depleting electricity reserves. Yolo County's reliance on the macrogrid (powerlines connecting consumers with a central power source) increases the vulnerability to prolonged power outages during periods of extreme heat (Yolo County OES 2023).

Extreme heat is exacerbated by the urban heat island effect (UHIE)[2], generally found in urban areas, and compounds the effects of other hazards, such as drought, wildfire, and poor air quality. Global climate scientists are virtually certain that there will be more hot days and fewer cold days as global temperature continues to rise. It is very

[2] Heat-island effect: Impermeable, dry surfaces heat up 50°F–90°F hotter than the air on sunny summer days. At night these surfaces slowly transfer heat to the air, which can make air temperatures on average 1.8°F–5.4°F warmer than in other areas (EPA and CDC 2016).

likely that longer and more frequent heat waves will occur (CNRA 2018).

People, agriculture, and the built environment are especially vulnerable to extreme heat.

Flooding

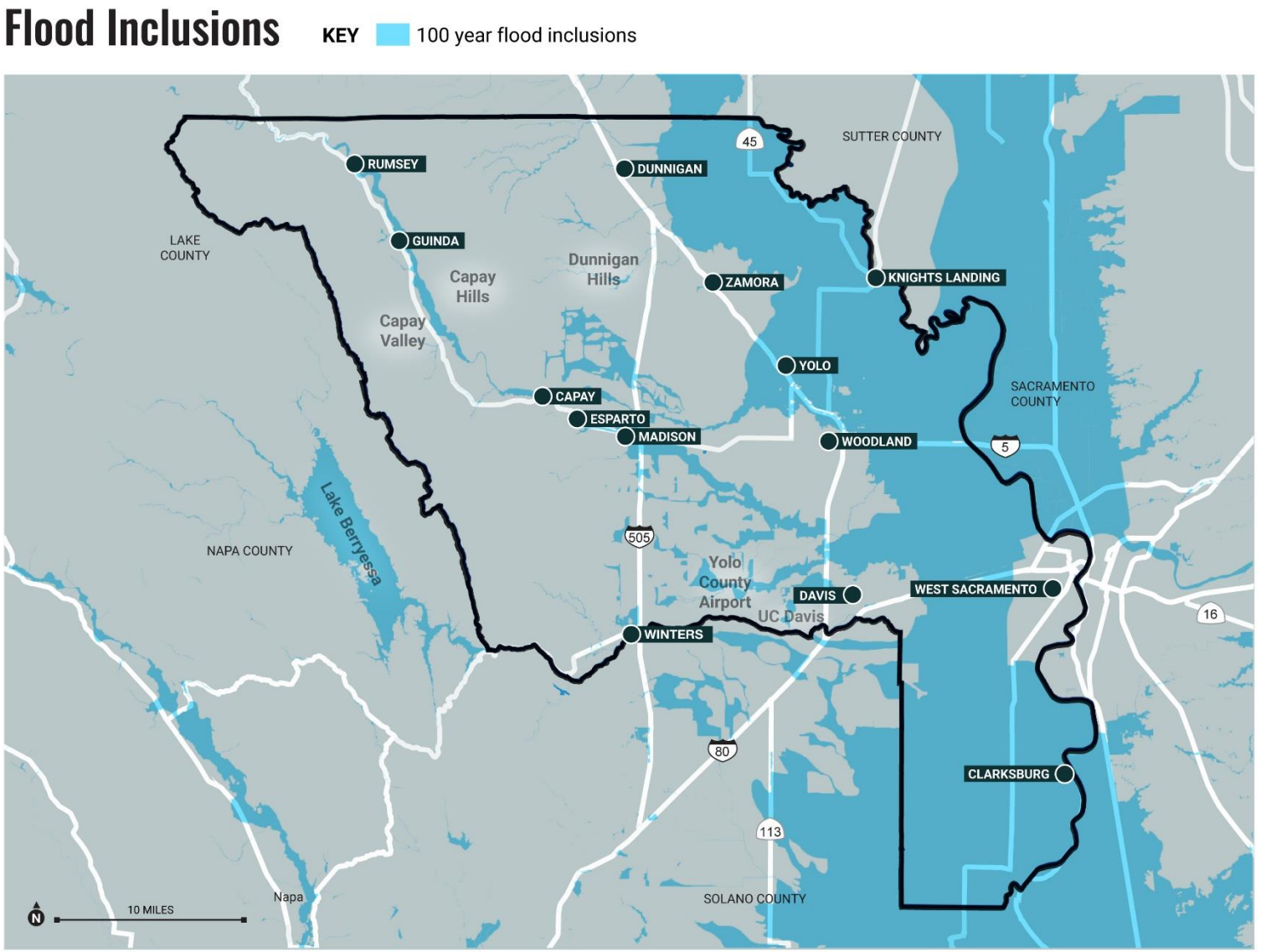
While average precipitation is expected to remain the same or increase slightly, climate change is forecasted to increase the intensity of storms and atmospheric rivers, a frequent cause of flooding in the Sacramento Valley (CNRA 2018). Additionally, flood events can be triggered by heavy rains and/or snow melting quickly in warm temperatures. The Federal Emergency Management Agency characterizes flood zones by their annual risk of flooding. The 100-year flood zone has a 1% chance of flooding annually (or a 26% chance over the course of a 30-year mortgage). 500-year flood zones refer to a 0.2% annual risk. In unincorporated Yolo County, 500- and 100-year flood zones predominantly overlap agricultural lands and open space, though several 100- and 500-year zones encroach on the communities of Esparto, Madison, West Plainfield, and areas on the outskirts of the City of Woodland, all of which can experience flooding of main roads and damage to structures. In the Capay Valley, in and around tribal lands, the Cache Creek drainage is prone to flooding, especially during the winter months (Yolo County OES 2023).[3] Figure 2 is a map of flooding in Yolo County, in which the blue areas depict 100-year flood zones.

Flooding is historically the most frequent natural hazard impacting Yolo County, which is susceptible due to its flat terrain and proximity to rivers. The magnitude of the flooding hazard is affected by the development of the land for residential and commercial use (Yolo County OES 2023). "Flood fighting" is a common undertaking for public officials and community members alike, often building long sandbag walls to divert water. Within Yolo County, flood infrastructure includes dams, drainage channels, levees, pumping mechanisms in depressed elevations, and the Yolo Bypass of the Sacramento River. The Yolo County Flood Control & Water Conservation District canal system acts as a drainage conveyance until the canals are too full and overtop, at which point their banks can erode and alter flow during storms. According to the Yolo County Multi-Jurisdictional Hazard Mitigation Plan, there are 11,006 parcels of land in the 100-year floodplain, with a total value of over $3 billion. The County's ongoing participation in the Central Valley Flood Protection Plan, the Regional Flood Management Plan, and the Floodway Corridor Protection Program is critical to protecting the County's residents and assets from flooding.

Undersized, damaged, and aging drainage infrastructure as well as increased runoff due to drought and wildfires can increase the risk of localized stormwater flooding (Water Resources Association of Yolo County 2018). In response to widespread flooding in 2017 and 2019, the County revived its Flood Safe Yolo Program as a new program "to minimize the risk from flooding in Yolo County through strengthened drainage system maintenance, construction of system wide drainage improvements, additional mapping and studies, and support for flood-friendly farming practices." (Yolo County Department of Natural Resources 2024).

[3] For detailed maps of floodplains and an in-depth analysis of the flooding hazard in unincorporated Yolo County, see the Annex in Volume 2 of the Yolo County Multi-Jurisdictional Hazard Mitigation Plan.

Figure 2. Flooding in Yolo County



Larger flood events are often caused by extreme precipitation events, which are expected to increase in frequency in the Sacramento Valley (CNRA 2018). There is uncertainty in current climate change models on the effects of climate change on precipitation events in Yolo County, and better data is needed to predict changes in precipitation patterns, timing, and intensity. What is highly likely is that as temperatures warm, storms become wetter, and when they occur are likely to increase the flood hazard for Yolo County (CNRA 2018). Increased precipitation causes flooding while also damaging existing flood infrastructure and compounding the hazard. Flooding is a threat to public health and can damage crops, homes, businesses, and community facilities.

Flooding impacts every sector, with significant impacts on people, the built environment, transportation, agriculture, and wastewater.

Wildfire

As in the whole of the western United States, wildfires in the Sacramento Valley are projected to become larger more frequent, posing the highest risk to the wildland–urban interface, defined as areas where homes are built near or among lands prone to wildfire. This is due to a combination of changing weather patterns driven by climate change and historic forest management activities. Wet, mild winters spur plant growth, which subsequently dry out in drier, hotter summers. The increase in low-moisture vegetation and small-diameter fuels such as pine needles contribute to a high fuel load in the landscape. Tree mortality from storms and drought contributes to overall fuel load over time. These conditions are expected to increase both the intensity and the amount of area burned by wildfires across California (CNRA 2018).

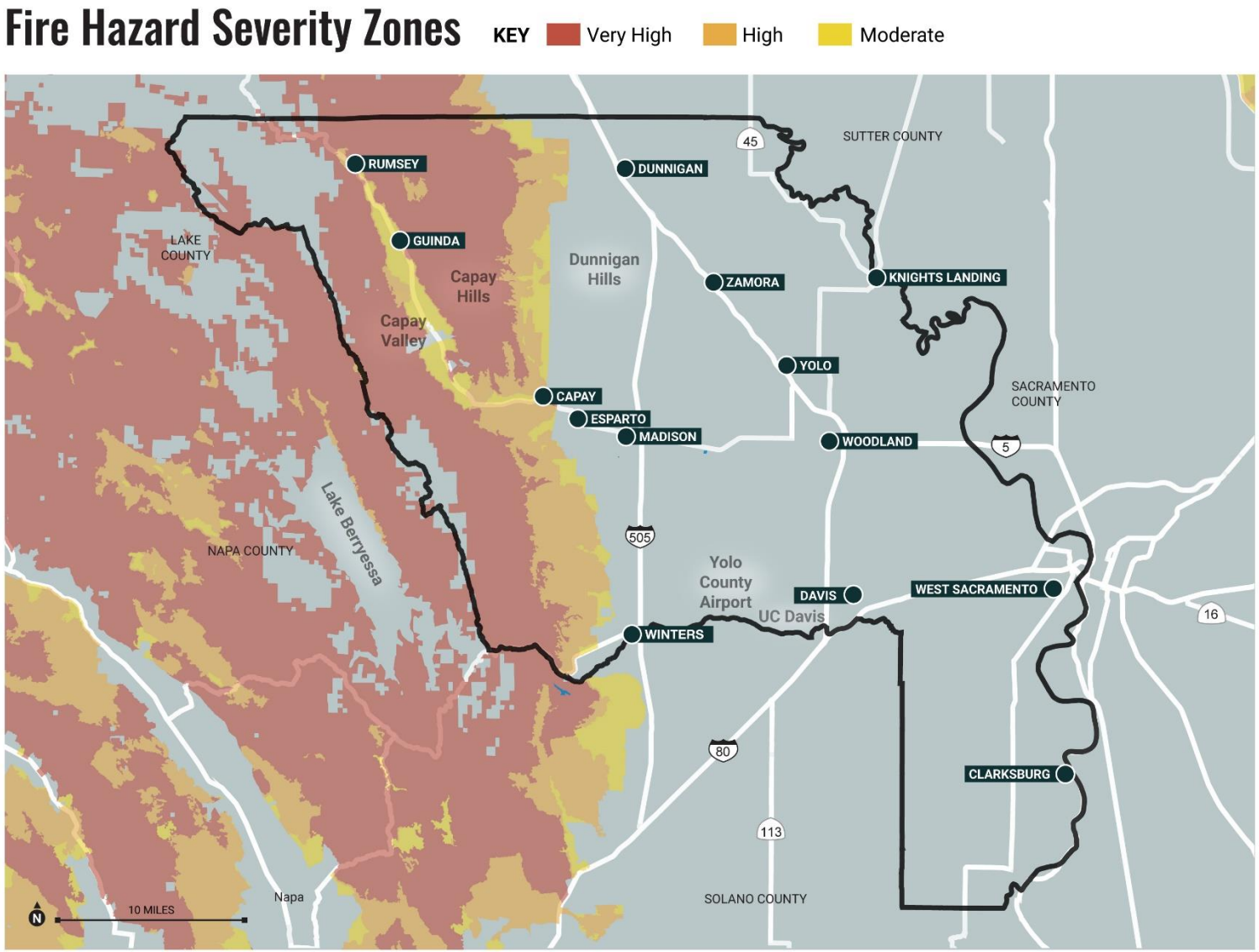
In Yolo County, wildfire risk is concentrated in areas to the north and the west, where rugged landscape, concentration of fuels, and urban landscapes are in proximity. Residents living in isolated rural communities and in the wildland–urban interface are particularly vulnerable, such as the Capay Valley communities of Rumsey, Guinda, Brooks, and Capay. The California Department of Forestry and Fire Protection (CAL FIRE) designates the western portion of Yolo County, including areas on the western borders of Esparto and Winters, as Moderate to Very High Fire Hazard Severity Zones, based on the criteria of fuel loading, weather, and topography. Though larger wildfires occur in forested areas, grass fires are more common and can cause damage to agricultural areas and structures. Figure 3 is a map of CAL FIRE 2023 Fire Hazard Severity Zones in Yolo County.

As a result of wildfire, all of Yolo County may experience poor air quality due to smoke, a significant risk to public health and safety, especially for vulnerable and frontline communities. Smoke impacts levels of $PM_{2.5}$, which refers to tiny pollutant particles that travel deep into the respiratory tract. Yolo County residents have been impacted by smoke-related air quality issues from fires both within and outside of Yolo County; when air quality becomes a concern, the Yolo-Solano Air Quality Management District issues a warning that is then amplified by County public officials (Yolo County OES 2023).

Additionally, during periods of wildfire or high fire risk, power may be turned off to reduce risk of electrical infrastructure igniting fires, in what is known as a Public Safety Power Shutoff (Yolo County OES 2023), which affects commercial and household activities (including the ability to mitigate extreme heat and poor air quality) and impacts first responder capabilities.

Wildfire impacts people, natural lands, the built environment, agriculture, transportation, and water.

Figure 3. Fire Hazard Severity Zones in Yolo County



Agriculture

Over 85% percent of the land in unincorporated Yolo County is designated for agriculture-related uses (Yolo County Agricultural Commissioner's Office 2021), much of which is considered by the California Department of Conservation as Prime Farmland and has ideal growing conditions for long-term, high-yield agricultural production, while most of the remaining land is suitable for other types of agriculture and grazing (CDC 2006). Agriculture is critical to the economy and character of Yolo County; a longstanding commitment to the preservation of agricultural lands is encapsulated in both County and city planning documents. Leading crops are tomatoes, grapes, almonds, organic produce, hay, pistachios, sunflower seeds, and rice. Plant nurseries and apiaries are also an important part of Yolo County's agricultural economy. (Yolo County Department of Agriculture 2023). Agriculture is most at risk from drought.

Drought and Water Quality

Periods of drought reduce the quality and availability of both surface water and groundwater, directly impacting agriculture and related economic activities in Yolo County. Longer and more intense droughts threaten the region's prosperity and livability. Periods of drought result in drier vegetation, increased wildfire risk, and drier, compact soil more susceptible to flooding.

The water used in Yolo County agricultural activities is sourced from a combination of surface water (when available) and groundwater, managed by the Yolo County Flood Control and Water Conservation District. Many of the top-performing crops in the area are also some of the most water intensive, including almonds, alfalfa, wine grapes, and rice. The Sacramento River basin recently experienced some its worst drought conditions in decades, resulting in an estimated $435 million in losses for the entire valley in 2021 (Medellín-Azuara et al. 2022).

In drought years, groundwater management agencies typically reduce the amount of surface water supplies to the agricultural community of Yolo County. In 2022, water supplies were so scarce that virtually no surface water was supplied to farmers within Yolo County (YSGA 2023). During such drought years, farmers must completely rely on private groundwater supplies or fallow their land.

As snowpack decreases, new sources of surface water may be necessary to support agriculture in Yolo County into the future. Meadow restoration in the Sierra Nevada and additional water storage facilities in the Sacramento Valley will be necessary to offset the impacts of climate change on agricultural production in the region (CNRA 2018). Yolo County districts are already adopting diversion technologies that redirect excess water flows away from crops into areas that allow for groundwater recharge.[4] These actions implemented through the GSP seek to reach a balance between pumping and recharge within 20 years. Improved storage and conveyance technology will play a key role in adapting the region's working lands to the drought hazard (Escriva-Bou et al. 2022).

Extreme Temperatures

High temperatures can directly reduce yield and/or quality of many crops that are grown in Yolo County and harm livestock by causing heat stress. Higher temperatures can also increase

[4] For description and status updates of local groundwater infrastructure projects, see the annual reports published at https://www.yologroundwater.org/yolo-subbasin-groundwater-sustainability-plan.

evapotranspiration rates and are associated with periods of drought, which further reduces productivity. High temperatures and drier conditions also create an ideal environment for many agricultural pests and diseases to thrive. This can lead to damaged crops or even crop mortality (Union of Concerned Scientists 2019). Farmers use water to mitigate heat by cooling the soil, though high-efficiency irrigation systems make it more difficult to apply water quickly, as does a limited water supply (USDA 2024).

Extreme heat directly impacts agricultural workers, who may need to restrict activities in order to stay safe. For more on impacts to workers, see the People and Equity section below.

Flooding

Extensive flooding can damage crops and lead to soil erosion and contaminate soil. (California Department of Food and Agriculture 2013). Flooding presents a significant risk to crops in Yolo County, where the West Plainfield district is especially vulnerable (Yolo County OES 2023). Many crops cannot survive prolonged flood conditions (Yolo Habitat Conservancy 2018),[5] which can affect productivity. Other risks from to agriculture from flooding include water contamination, flooded farm machinery, and increased susceptibility of livestock to disease (Yolo County OES 2023). Periods of drought followed by heavy rains increase the flooding risk, when dry and compact soils are unable to absorb water. Flooding can be triggered by extreme storms, whose intensity may complicate recovery, as they did during the historic winter storms of 2022/2023, when the Clarksburg community lost power, preventing farmers from pumping excess water away from crops (Rogers 2023).

Wildfire

Much of the agricultural land west of Esparto and Winters is within a Fire Hazard Severity Zone, with the majority designated as Moderate. Beyond direct losses of crops to fire, smoke, ash, and increased heat from wildfires can cause agricultural commodities to die or become useless to the consumer (California State Assembly 2020). Fire mitigation and response can place additional pressures on water supply, and roadblocks may limit water access and transport. Like extreme heat, wildfire and wildfire smoke are especially dangerous farm workers. These impacts are discussed more thoroughly in the People and Equity section of the CAAP.

Findings

As the main driver of commercial activity and employment in unincorporated Yolo County, agriculture is vital to the community's future. Agriculture faces risks due to climate change, especially those risks resulting from changes in precipitation. Drought and flooding cause direct damage to crops, while also causing indirect harm by damaging infrastructure and decreasing livability. Adapting to climate change will involve coordination and partnership between local growers and local and State government to achieve climate goals while preserving and protecting this critical land and the people for whom it provides. The process will incorporate a range of tactics, including the repurposing and protection of certain lands; adopting climate-smart agricultural practices; optimizing water use by investing in water conservation, irrigation, and storage infrastructure; and developing strategies for improving the living standards and livelihoods of those in the agricultural industry.

[5] Rice is an exception and is typically grown in fields that are flooded for most of the growing period, such as in the Colusa and Yolo Basins and the Madison syncline.

Buildings

Unincorporated Yolo County is characterized by 15 census-designated communities set amongst large swaths of farmland. Most of the built environment exists within these communities and includes numerous businesses; community organizations; public service buildings, including fire stations, post offices, educational institutions; and residential structures. New development is concentrated in urban areas and is limited by land use designations and flood zone restrictions. Many of these buildings are essential to the health and safety of the community and include critical facilities utilized in response and recovery as well as assets known as "community lifelines" that enable human well-being and security. Critical and community lifeline facilities in Yolo County include transportation hubs; medical facilities; hazardous materials sites; energy production facilities; food, water, and shelter hubs; communication facilities; safety and security hubs; and other related critical infrastructure. Mitigating risk in these facilities is central to building resilience in response to climate change. Adapting residential structures protects the people within them from hazards and prevents property loss. The biggest risk to the building sector overall is from extreme heat, and in certain areas, flooding and wildfire pose a high risk as well. Table 1 shows an inventory of critical facilities and community lifelines in unincorporated Yolo County.

Table 1. Critical Facilities and Community Lifelines in Unincorporated Yolo County

Facility Type	Number in Unincorporated Yolo County
Communication	3
Finance	1
Fuel Stations	10
Power Grid	2
Food Pantry	2
Accommodations	11
Water	5
Solid Waste	1
Medical (including Veterinary and Supply)	6
Flood Safety	2
Fire Services	17
Community and Public Services	15
Police Services	3
Airport	1

Drought and Water Quality

Drought does not uniquely affect the function of the built environment.

Extreme Temperatures

The built environment contributes to UHIE, which is why areas with more pavement and structures are hotter than areas with less development. Sidewalks and other heat-absorbing surfaces can get so hot as to be harmful to human contact and may even buckle or warp as a result of extreme temperatures.

People residing and working in buildings without air conditioning or buildings otherwise ill-equipped to deal with extreme heat are especially exposed to the health impacts of extreme heat. Older buildings are often less efficient and more expensive to cool. Community engagement performed for this plan outlined challenges to adaptation for extreme temperatures (Appendix A-2). Updating older structures with climate-smart cooling technologies (such as cool roofs, insulation, and heat pumps) can be cost prohibitive to low-income home and building owners. Additionally, many incentives are only available to owners, such as single-family homeowners, whereas renters are dependent on landlords to make the necessary investment. The cost of increased utility bills is an additional burden to low-income households. Aside from housing, the built environment includes warehouses and other commercial structures that may not be climate controlled due to size, use, or age; according to worker testimony, this subjects employees working in these buildings to extreme indoor air temperatures (see the Farmworkers' Voices section of the CAAP).

Elevated power demand due to the increased use of air conditioning can strain power grids and cause blackouts. As noted, unincorporated Yolo County is also subject to Public Safety Power Shutoff blackouts due to the risk of fire, which is often elevated during periods of extreme heat. When this occurs, the Yolo County Office of Emergency Services (OES) updates a live interactive map of the areas impacted. Unexpected power outages also occur during heatwaves due to grid strain, as occurred in September 2022 (Giacomo 2022). Warnings for these events are posted by OES to social media; residents may also access information by calling 211 (Yolo County OES 2024). A lack of power limits people's ability to mitigate heat in the built environment and underscores the need for backup power sources, resilience grid infrastructure, and the use of indoor cooling technology in buildings.

Flooding

As previously noted, flooding is historically the most frequently experienced climate hazard in Yolo County, and many Yolo County residents have firsthand knowledge of flooding's potential to damage buildings. Floodwaters contaminate structures with agricultural chemicals and other debris and cause damages to the interiors and exteriors of buildings, along with their contents. In 2019, Yolo County OES installed a 1,500-foot-long sandbag wall in Madison after floodwater impacted nearly half of the community's structures, many of which had flooded repeatedly (CBS News 2019). In Madison on the 100-year floodplain, there are 46 residential structures in the Madison Migrant Center, 105 homes, and a fire station, all of which are designated as a priority for retrofit or elevation in the Yolo County Multi-Jurisdictional Hazard Mitigation Plan.

There are 14 critical and lifeline facilities located in the flood zones of unincorporated Yolo County including a landfill, multiple fire stations, a library, and a wastewater treatment plant, as shown in Table 2.

Table 2. Critical Facilities and Community Lifelines in Flood Zones

Facility Type	Facility
Solid Waste	Yolo County Central Landfill
Fire Services	Madison Fire Station, Knights Landing Fire Station
Food Pantry	Manna House Food Pantry
Fuel	Two gas stations in Madison and outside Woodland
Government Service	Yocha Dehe Wintun Nation Administrative Building
Faith Org/Cemetery	Mary's Chapel, Union Church of Dunnigan
Historic Site	James Moore House
Library	Yolo Branch Library
Power Grid	Microwave tower outside Davis
Shelter	Empower Yolo – Knights Landing
Water	Davis Wastewater Treatment Plant

Wildfire

Wildfire has the potential to impact many buildings throughout unincorporated Yolo County. Structure loss from wildfires is often the result of embers from a nearby fire landing on a roof or adjacent vegetation—a building does not need to be in the direct path of flames to be ignited. Residential homes located in the wildland–urban interface are at a very high risk, and egress/evacuation routes for them are critical to saving lives.

In unincorporated Yolo County, 13 community lifelines are located in wildfire hazard zones, as shown in Table 3.

Table 3. Critical Facilities and Community Lifelines in Fire Zones

Facility Type	Facility
Fire Services	Yocha Dehe Station, CAL FIRE Brooks Station, Capay Fire Districts 21–23
Gas	Gas Station in Brooks
Tribe	Yocha Dehe Wintun Nation Administrative
Medical	University of California Davis Animal Science
Educational	Capay-Langville School
Power Grid	Cache Creek Regional Park Generation
Historic Site	Rumsey House, Rumsey Bridge
Water	Winters Water Treatment Facility

Findings

Controlling interior climate for the people inside buildings becomes increasingly important as temperatures rise. Reducing UHIE in urban areas will additionally protect people and lower environmental temperatures. Strategies to adapt residential and commercial buildings to extreme heat involves the installation of cool roofs and pavement, upgrading insulation and window sealing, increasing shade by planting trees, and using efficient cooling systems such as heat pumps.

High-temperature- and storm-related power outages compound the challenge of adapting to climate change and emphasize the need for a resilient grid and backup power sources, especially in critical facilities and community lifeline buildings, but also in residential areas so that people may mitigate the hazards at home. Climate-controlled facilities, such as libraries with backup power, can increase community resilience, as they are often used as cooling centers during extreme heat events. Backup power is necessary at critical facilities to avoid interruptions in response and recovery capacity.

Buildings located in flood and fire hazard zones are at risk of damage relative to the risk of the hazard occurrence and should be prioritized for adaptation accordingly. For fire, mitigating the risk to structures includes incentivizing and implementing fire-smart construction in new developments and in renovations, reducing fuel loads in the landscape, and creating defensible space around structures. Additionally, routes to these buildings must be considered for mitigation to allow for evacuation and response. Adapting the built environment for flooding includes improving stormwater infrastructure and relocating certain facilities,

Natural Lands

Natural lands refer to landscapes that are undeveloped for urban or agricultural use but may include those that are used for recreation and flood control. Historical land use activities in Yolo County resulted in the conversion of natural lands for agricultural and urban development uses. Consistent with area General Plans, further urban development requires mitigation for future conversions of this type. Natural lands found in Yolo County include managed and natural wetlands, riparian forests along waterways, grasslands, and mixed chaparral (areas dominated by shrubs and bushes) (Yolo Habitat Conservancy 2018). Much of this land is managed by State and Federal agencies, while the County manages several regional parks. Natural lands play a role in hazard mitigation beyond their ability to sequester carbon. Wetlands reduce flood impacts and recharge groundwater sources. Healthy riparian forests reduce fire intensity and magnitude, while grasslands and open space provide natural fire breaks. Trees provide shade, mitigate extreme temperatures, and reduce air quality issues.

Drought and Water Quality

Groundwater pumping during droughts, coupled with reduced rainfall, will lead to lower amounts of groundwater and surface water that is accessible to be used by natural lands (USGS 2018). The effects of droughts on natural lands can cause the loss of biodiversity because certain plants or animals cannot adapt or migrate faster than the changes. Wetland and riparian systems are especially vulnerable to prolonged droughts due to warmer water temperatures, poorer water quality, and greater variability of water delivery. Droughts can cause physical and chemical changes to wetland soil, often causing loss of organic matter, compaction, and acidification, potentially terminating those important habitats

(University of Adelaide 2020). Furthermore, droughts can lead to desertification and increased dust storms because there is no water to replenish natural lands (WorldAtlas 2023). Anticipated impacts include rising dominance of non-native species and extinctions of many native and endemic species (CNRA 2018).

Extreme Temperatures

Prolonged extreme heat or cold events can cause plants and animals to die off or migrate if they cannot cope with the change in temperature, leading to a loss of biodiversity. Furthermore, geographic and human-caused factors will limit the ability of species to migrate away from high temperatures as they encounter urban development or other unsuitable corridors. Higher temperatures result in increased drying during periods of drought and exacerbate those impacts.

Flooding

Regular flood events can have positive impacts on natural lands. Floods carry essential nutrients, recharge groundwater, trigger breeding and migration events, bring life to wetlands, and boost fish stocks adapted to seasonal flooding, all of which contributes to ecosystem renewal (CNRA 2018). Catastrophic flood events, however, can leave debris in their path and can deposit water and sediment in areas not usually underwater, impairing their natural stormwater treatment abilities.

Wildfire

Wildfires are an important part of the forest lifecycle; however, the increased magnitude and intensity of wildfires and land cover changes from agriculture and timber uses can make wildfires more devastating. These factors are projected to increase the frequency and magnitude of wildfires on natural lands. Many natural areas throughout Yolo County are at risk from wildfires, especially in the eastern parts of the County and in the wildland–urban interface (Yolo County OES 2023). In addition, wildfires release carbon stored in the forest back into the atmosphere, which further contributes to climate change.

Findings

Participants in community engagement for this plan shared that they have seen noticeable habitat loss, biodiversity decline, and decreased wildlife sightings in Yolo County. Natural lands are important to communities for their health and safety, while also providing a connection to nature and a sense of place. Adapting to climate change in Yolo County requires reestablishing sustainable floodplain systems (Yolo Habitat Conservancy 2018). Protecting landscapes near waterways should be combined with efforts to increase natural water flows and connections among rivers and streams, including setting back levees and restoring wetlands (CNRA 2018). Wetlands are an important part of groundwater sustainability in Yolo County (YSGA 2022). Prescribed burns and strategic thinning of forest stands can reduce fuel loads for fire and reduce the number of smaller trees, allowing for the increased growth and carbon sequestration capacity of the remaining larger trees (CNRA 2022b). Stewardship of forests includes vegetation management and invasive species removal. Natural lands play a key role in climate adaptation; identifying and implementing opportunities for preservation, restoration, and enhancement requires year-round attention from County staff, along with coordination with State and local conservation agencies (and other entities) for projects and actions.

People and Equity

The approximately 19,000 people of unincorporated Yolo County live primarily in rural towns and on farms rich in heritage, tradition, and local knowledge. Within Yolo County is the Yocha Dehe Wintun Nation, a federally recognized tribal government with sovereign jurisdiction and lands within the Capay Valley, in the northwestern area of Yolo County. For more information on communities in Yolo County, including in-depth community profiles, see the Community Engagement section of the CAAP.

As the effects of climate change intensify, it is critical for public officials to understand the unique capacities and strengths of Yolo County's diverse community. Part of this process is identifying and engaging with residents who are more vulnerable to harm from a changing environment due any combination of physical, environmental, and/or social stressors. People with fewer economic resources, limited mobility, lack of access to transportation, lower English language proficiency and education, and uncertain citizenship can also be considered vulnerable. This is because these groups have fewer resources with which to adapt, evacuate, or access information, and their opinion is often marginalized. These frontline communities may require specialized adaptations or targeted support in their efforts to increase individual and group resilience in the face of climate shocks. Furthermore, as efforts to reduce greenhouse gas emissions are undertaken, equity is a major concern. The County is committed to a Just Transition, as first articulated in the 2020 Climate Emergency Declaration describing the rapid mobilization of resources toward effecting "a just transition to an inclusive, equitable, sustainable, and resilient local economy while also supporting and advocating for regional, national, and international efforts necessary to reverse the climate, social justice, and economic crises" (Yolo County Board of Supervisors 2020).

The California Senate Bill 535 map identifies one census tract as a disadvantaged community, as cited in the Yolo County General Plan. However, the California Climate Investments map identifies several other tracts as priority populations for investment, aligning closely with those that the U.S. Environmental Protection Agency identifies as disadvantaged tracts in in the northern parts of unincorporated Yolo County. Together these tracts include the communities of Dunnigan, Zamora, Knights Landing, and Yolo, as well those living in unincorporated parts of West Sacramento. It is important to note that vulnerable communities can be found in every part of Yolo County. The following sections examine the potential impacts of hazards to frontline communities, to help the County identify and prioritize adaptation actions in a Just Transition.

An essential piece of building climate resilience is preparedness, so that people have the tools and information they need to cope with climate hazards safely. Access to materials and warnings must be inclusive of individuals in frontline communities, including those with other language proficiency. Internet and broadband access is another important element in this effort.

Drought and Water Quality

The effects of drought on people are concentrated especially within communities related to the agricultural sector and in low-income communities reliant on groundwater such as those in Yolo, Dunnigan, Knights Landing, and the Capay Valley (YSGA 2022). According to communities engaged for this CAAP, when Yolo County crops fail due to drought, workers often lose work, which impacts their economic security. Water quality and quantity issues impact public health in these same communities and may be accompanied by higher rates of valley fever, heat stroke, and mental health issues (CNRA 2023). When private and public wells dedicated to households go dry, a household is left without access to a safe water supply for drinking,

cooking, and hygiene, and must rely on the County to provide water hauling resources (Yolo County OES 2023). Adapting to drought requires sustainability planning and implementation efforts at the State and local level (as outlined in the GSP), as well as engagement with and services to those communities that are impacted.

Extreme Temperatures

Extreme heat is the deadliest weather-related hazard, as it often results in heat health events (EPA and CDC 2017). Populations that can be sensitive to extreme heat include those under the age of 5, above the age of 65, or those lacking air conditioning. This means they can encounter heat stroke or other health impacts at lower temperatures than the general public and therefore experience more extreme heat events per year than others. Reducing UHIE in communities by way of tree planting, cool roofs, and cool pavements was the most popular equity strategy among community members surveyed for this plan.

Extreme temperatures increase utility bills, disproportionately impacting low-income households and renters, who have little control over the adaptive capacity of their residences. People unable to mitigate extreme heat at home must access climate-controlled community facilities to cool down. In an effort to connect with people at risk during the 2023 July heatwave, the County released a map with places to cool down, with locations in unincorporated areas including libraries in Esparto, Knights Landing, and Yolo. Residents may also access information about cooling centers and cooling strategies by calling 211 and by accessing the County website and social media channels (Appendix A-1).

Additionally, according to testimonials from farm workers engaged for this plan, they are highly exposed to extreme heat in *both* indoor and outdoor settings, causing health problems and loss of wages (see Farmworkers' Voices section of the CAAP). People reliant on active forms of transportation are at risk of exposure while waiting for a bus, walking, or riding a bike in the sun.

Higher temperatures may increase ozone levels, which increase the incidence of respiratory disease and asthma, especially in vulnerable and frontline communities (Yolo County OES 2023).

Flooding

Floods have the potential to impact entire communities, yet the people who face the greatest risk are those who lack the ability or resources to protect themselves, evacuate properly, or relocate/rebuild after a flood. Older adults and children usually require assistance in their daily lives and therefore may rely on others when evacuating, running the additional risk of losing important possessions because they have no way to transport their belongings. While much of the residential development in Yolo County exists beyond flood zones, and many homes are protected by levees, there are communities in unincorporated areas consistently plagued by flooding, such as those living in Madison, Yolo, and Knights Landing. Flooding can damage and/or contaminate wells. Flooding covers roads and impairs people's ability to travel to work, school, or the doctor. Farmworkers lose wages when farms are too flooded to work or the crops are lost.

Wildfire

The most common impact of wildfire on people in Yolo County results from smoke, in the form of impaired air quality. Those most vulnerable to the health impacts of smoky air include children, older adults, pregnant people, and those with respiratory or heart conditions. People who work outside, such as farmworkers, are exposed for longer periods and are therefore at higher risk. Physical

activity also increases the amount of air that lungs intake by as much as 10 to 20 times, allowing pollution to travel deeper into the lungs (Yolo-Solano Air Quality Management District 2022). Mitigating this risk involves staying indoors and running air filters, or wearing protective equipment, such as a respirator, while outside. Wildfires often deposit ash onto homes and must be removed safely, as it may contain hazardous materials if structures were involved in the burn.

Findings

Because the effects of climate change do not affect people equally, climate adaptation strategies should reflect the lived reality of vulnerable and frontline communities in Yolo County. At community engagement events during development of this plan, participants requested that the climate resilience measures of the CAAP be built in collaboration with community partners, recorded and reported transparently, driven by an inclusive decision-making process that integrates the diverse voices of Yolo County, and tailored to the needs of marginalized communities. Participants also shared concerns around limited broadband reliability in the unincorporated areas and an interest in educational resources for preparedness and adaptation techniques. Opportunities for future engagement with frontline communities include enhanced partnerships with education, service and advocacy organizations based in these communities as well as through events and outreach in libraries and other public spaces.

Yolo County communities are already experiencing harm from climate change, especially from extreme heat, precipitation, and flooding. Climate change impacts their health and also their ability to earn a living wage, as when climate harms crops and reduces productivity. Farmworkers are especially exposed to climate hazards because they are exposed to heat and smoke at high rates and tend to suffer the most immediate economic impacts. Adaptations require resources, which may be out of reach for some, but also education and awareness. Relationships between the County and frontline communities, such as farmworkers, are required to build resilience in those communities and can be strengthened through coordination and partnerships with organizations and groups within those communities.

Many adaptations cannot be undertaken by individuals and require government action. For instance, community engagement participants noted concerns about limited/and or unequal access to public transit and interest in its expansion to include transportation access to schools and other community assets. Water quality and flooding impacts are other example of climate hazards that require investment in regional infrastructure. Yolo County will need to coordinate interdepartmentally and across jurisdictions in order to accomplish its adaptation goals.

Solid and Hazardous Waste

Disposing of industrial, agricultural, and household waste is a utility function managed by the County in partnership with private sector haulers and processors. Within unincorporated Yolo County, the primary solid waste facility is the Yolo County Central Landfill. There are also two hazardous waste sites, the non-operational J.R. Simplot site, and a facility undergoing closure called Safety-Kleen of California Inc. - Davis. Disturbance or damage to these facilities could lead to public health concerns from exposure to contaminants. Preparing these sites for hazardous events like wildfires and floods will help keep the communities residing near this infrastructure safe, County services operational, and crops healthy. As Yolo County takes measures to reduce emissions from solid waste, increasing physical resilience to hazards should be considered.

Drought and Water Quality

Drought events are not projected to impact hazardous or solid waste facilities.

Extreme Temperatures

Extreme temperature events are not projected to impact hazardous or solid waste facilities.

Flooding

The Yolo County Central Landfill exists in a 100-year Federal Emergency Management Agency flood zone. In addition, the non-operating J.R. Simplot Company south of Clarksburg also exists in a 100-year flood zone. As such, maintaining safe and effective drainage systems and access routes is important for these facilities to ensure effective mitigation and response. Facilities that handle solid waste maintain inventories and have emergency response plans. The County's 2030 General Plan includes a policy to compile a database of these facilities and plans to ensure emergency responders are aware of potential dangers and can prepare accordingly.

Wildfire

Wildfire is not expected to impact solid and hazardous waste facilities. However, with wildfire intensity and area burned projected to increase, there is the potential that there will be more structures requiring demolition, generating intermittent need for diversion and recycling of demolition waste.

Findings

The County's hazardous waste facilities generally have limited overlap with hazards. Some facilities are at risk of flooding and must ensure adequate drainage and facility access, while all hazardous waste facilities must adhere to emergency response plans. Meanwhile, fire presents the potential for additional waste to be generated within Yolo County, which will create a need for continued waste diversion and recycling.

Transportation

The transportation system includes public transit, highways, railways, evacuation routes, and bike- and vehicle-specific traffic infrastructure. Yolo County's proximity to Sacramento International Airport and two major interstate highways places it within a significant California transportation hub.

Yolo County Transportation District provides public transportation services known locally as Yolobus, which primarily services the cities in Yolo County, including Woodland, as well as the Cache Creek Casino in the Yocha Dehe Wintun Nation. Buses run 365 days a year, and the Yolo County Transportation District includes programs for paratransit and on-demand transportation in some of the unincorporated areas, namely Knights Landing and Winters.[6] The standard bus lines do not reach many of the community facilities in unincorporated areas, including schools. Evacuation routes are those that provide a safe route away from a site before or after hazards

[6] Paratransit is a shared-ride public service that supplements the fixed-route service to accommodate individuals with special needs.

occur. Usually these are main roads meant for vehicle travel and are of critical important to reduce life and safety impacts, especially as a result of fast-moving hazards such as wildfire and flooding. Evacuation orders and warnings typically indicate the best route and include other options when available.

When transportation infrastructure, including roads but also signals and signage, is compromised by flooding or fire, people's ability to go about their daily lives is compromised. This is especially challenging to those who commute to work and people who need regular medical care, and it disproportionately impacts those with lower incomes, who rely on daily or weekly income to meet their needs. Additionally, businesses suffer from lack of customers or workers, and deliveries are delayed.

Drought and Water Quality

Drought is not expected to directly impact the transportation system.

Extreme Temperatures

The extreme heat hazard is primarily a hazard to the people walking, biking, or taking the bus. Currently, several bus stops along major arterial roads within Yolo County include minimal cover and seating but do not include water fountains. Bus stops along less-frequented roads have a sign but no cover, seating, or easy access to water. Community members surveyed for this plan showed interest in using public transit as a strategy to reduce their carbon footprint; these new public transit users would be well served by shaded stops and water access along routes.

Flooding

Many transportation assets are vulnerable to flooding events. The following freeways, which serve as regional connections and evacuation routes, run through flood-prone areas: Interstate 80 between Davis to Sacramento; State Route (SR-) 84 between Sacramento and Courtland; Interstate 5 going northwest from Woodland to Hershey and east to Fremont; SR-113 going north or south from Woodland; and Interstate 505 and SR-16 on the western side of Yolo County. The single transit stop in Madison is in a flood zone. As a result, transportation between the cities of West Sacramento, Woodland, and Davis through unincorporated areas and around other areas within Yolo County may be difficult during or after a flood event. Almost every major highway in Yolo County lies at least partially within a flood zone, making evacuation and commuting difficult for outlying communities.

Wildfire

Wildfire hazard zones stretch along the western border of the Yolo County, reaching as far east as Esparto and Winters. The following freeways, which serve as regional connections and evacuation routes, are within wildfire hazard zones: SR-16 and SR-128. The communities along SR-16 are most at risk, as the highway is covered by Moderate, High, and Very High Fire Hazard Severity Zones from Esparto up to the northwestern corner of Yolo County. The communities of Rumsey, Guinda, Brooks, Capay, and the Yocha Dehe Wintun Nation use this road as a primary evacuation route to the north and south. Additionally, SR-128 headed west from Winters is covered by Moderate and Very High Fire Hazard Severity Zones, limiting one potential evacuation route for Winters. Three public transit stops exist within Moderate Fire Hazard Severity Zones, including the only stop in Brooks and the two stops in Capay.

Findings

Climate-related hazard events have the potential to significantly impact transportation routes and those who rely on them for evacuation. Transportation systems are not vulnerable to drought because they do not rely on water to function; however, they are vulnerable to extreme temperature, flooding, and wildfire events. Residents of Yolo County that rely on public transit are vulnerable to extreme temperatures, as many bus stops in Yolo County lack infrastructure that protects people from the elements, including shelter, seating, and water fountains. Because many evacuation routes connecting various cities and areas in Yolo County are overlayed with fire hazard and flood zones, Yolo County residents may face impaired evacuation capacity in the event of a hazard. It is important to note that these evacuation routes require access to a vehicle. Many of the unincorporated areas throughout Yolo County are not well served by public transit, which puts residents in those areas at a greater risk from hazard events.

Water and Wastewater

Yolo County includes extensive amounts of water management infrastructure to guide natural waterways and stormflows away from development and protect against flooding, including dams, levees, drainage systems, and others. There are also water and wastewater systems that convey extracted water throughout Yolo County for a variety of uses. In addition, centralized wastewater treatment facilities are managed by municipalities in Yolo County, while various unincorporated communities are served by special districts. Wastewater treatment facilities in unincorporated Yolo County include the Winters Water Treatment Facility and the Davis Wastewater Treatment Facility, located north of El Macero.

Issues related to storm drainage within Yolo County include levee erosion, inadequate levee protection in Madison and Esparto, and inadequate vegetation removal on Cache Creek (Water Resources Association of Yolo County 2018).

Water and wastewater infrastructure are key to protecting Yolo County from climate-related hazards, as flood and drought events impact water supplies and put people, their livelihoods, and their properties at risk.

Drought and Water Quality

Climate-related activities that generate or contribute to the pollution of stormwater or dry weather runoff include hazard debris from fire or flooding, as well as agricultural and industrial contamination from peak storm runoff. Periods of drought lead to increased groundwater pumping, which results in subsidence and can compromise levees ((Yolo County 2018).

Extreme Temperatures

Extreme temperatures will not directly impact water management infrastructure.

Flooding

Flood events have the potential to cause serious damage to wastewater treatment facilities and water management infrastructure in Yolo County. Flooding of wastewater treatment facilities can cause contaminated water to discharge from facilities. Raw sewage, even when diluted by floodwaters, can have a negative impact on people and the natural environment because it is a breeding ground for harmful bacteria such as E. coli. Although dams, levees, drainage systems, and other water management

infrastructure are designed to properly direct floodwaters away from civilization and development, these systems are known to fail, as unexpected, large volumes of water can overwhelm them.

The Davis Wastewater Treatment Facility is located within a flood hazard zone. This facility is located within 1 mile of the Yolo Bypass West Levee, which handles storm surges and stormwater runoff and is not protected by a berm. This issue is currently being addressed with improvements to the Yolo Bypass West Levee, completed in 2023.

Wildfire

Wildfires cause debris in the form of ash and dead vegetation. When combined with large storms, this can result in especially large flows along creeks and stormwater infrastructure and cause blockages, damage to infrastructure, and potential mud or debris flows downstream of the fire's watershed. Each of the four watersheds in Yolo County (Putah Creek, Cache Creek, Sacramento-Stone Corral, and Lower Sacramento) overlap to varying degrees with Fire Hazard Severity Zones (Water Resources Association of Yolo County 2018). Fire may also directly damage water infrastructure including treatment facilities, culverts, pipes, and pumping equipment. The Winters Water Treatment Facility is located in a Fire Hazard Severity Zone. The location and severity of fires vary, and thus this type of concern should be assessed after a wildfire to identify potential areas of risk.

Findings

Because climate change is projected to increase storm intensity and duration, stormwater infrastructure will degrade at faster rates due to high-stress hazard events that push design limits. New updated infrastructure will be necessary to continue protecting people and property from hazard events, as outlined in the Water Resources Association of Yolo County's Stormwater Resource Plan and the GSP. Wastewater and stormwater structures in wildfire hazard zones should be hardened against hazards with fire-resistant materials, and defensible space and fuel load issues should be addressed.

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ACRONYMS AND DEFINITIONS

Acronyms

CAAP	Climate Action and Adaptation Plan
CAL FIRE	California Department of Forestry and Fire Protection
GSP	Groundwater Sustainability Plan
OES	Yolo County Office of Emergency Services
SR-	State Route
UHIE	urban heat island effect

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REFERENCES

Adams-Fuller, Terri. 2023. "Extreme Heat Is Deadlier Than Hurricanes, Floods and Tornadoes Combined." *Scientific American*. July 1, 2023.

Cal-Adapt. 2024 "Local Climate Change Snapshot" Geospatial Innovation Facility, University of California, Berkeley. Retrieved from https://cal-adapt.org/tools/local-climate-change-snapshot.

California Department of Food and Agriculture. 2013. Climate Change Consortium for Specialty Crops: Impacts and Strategies for Resilience. Accessed March 25, 2024. https://www.cdfa.ca.gov/oefi/climate/docs/CCC_Report.pdf.

California State Assembly. 2020. "Information Hearing: The Impact of Wildfires on California Agriculture Report." November 2020.

CNRA (California Natural Resources Agency). 2018. *California's Fourth Climate Change Assessment: Sacramento Summary Report***.** California: California Energy Commission

CNRA. 2022a. *California Climate Adaptation Strategy: 2022 Implementation Report.* California: California Energy Commission

CNRA. 2022b. *Natural and Working Lands Climate Smart Strategy*. California: California Energy Commission

CNRA. 2023. *Climate Justice Report*. California: California Energy Commission

CBS News. 2019. "County Puts up 1500-Foot Sandbag Wall to Protect Community of Madison from More Flooding." CBS Broadcasting. March 8, 2019. Accessed March 21, 2024. https://www.cbsnews.com/sacramento/news/sandbag-wall-protect-madison-flooding/.

California Department of Conservation. 2019. *2016–2018 California Farmland Conversion Report. California Department of Conservation.* California: California Department of Conservation

EPA (U.S. Environmental Protection Agency). 2006. *Excessive Heat Events Guidebook*. Washington, DC: United States Environmental Protection Agency. Accessed March 25, 2024. https://www.epa.gov/sites/default/files/2016-03/documents/eheguide_final.pdf.

EPA and Centers for Disease Control (CDC). 2016. *Climate Change and Extreme Heat*. Washington, DC: United States Environmental Protection Agency https://www.epa.gov/sites/default/files/2016-10/documents/extreme-heat-guidebook.pdf

Escriva-Bou, A., J. Medellín-Azuara, E. Hanak, J. Abatzoglou, and J.H. Viers. 2022. "Policy Brief: Drought and California's Agriculture." Public Policy Institute of California. April 2022. Accessed March 21, 2024. https://www.ppic.org/publication/policy-brief-drought-and-californias-agriculture/.

Giacomo, Luca. 2022. ABC Channel 10. "Unprecedented heat wave causes power outages in West Sacramento and Davis" September 2022. https://www.abc10.com/article/weather/severe-weather/unprecedented-heat-wave-causes-power-outages/103-c2783baa-a5ac-4f17-a36e-c5ce26562b39

Medellín-Azuara, J., A. Escriva-Bou, J.M. Rodriguez-Flores, S.A. Cole, J. Abatzoglou, J.H. Viers, N. Santos, and D.A. Summer. 2022. "Economic Impacts of the 2020–22 Drought on California Agriculture." Prepared for the California Department of Food and Agriculture. November 22, 2022. Accessed March 21, 2024. https://wsm.ucmerced.edu/wp-content/uploads/2022/11/Economic_Impact_CA_Drought_V01.pdf.

Rogers, Paul. 2023. "Newsom Relaxes California Drought Rules after Visit to Yolo County." *The Daily Democrat*. March 24, 2023. https://www.dailydemocrat.com/2023/03/24/newsom-relaxes-california-drought-rules-2/.

State of California. 2022. *Protecting Californians from Extreme Heat: A State Action Plan to Build Community Resilience*. April 2022. Accessed March 25, 2024. https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Climate-Resilience/2022-Final-Extreme-Heat-Action-Plan.pdf.

California Climate and Agriculture Network. 2018. *Climate Threats, Abundant Solutions: Climate Change and Agriculture Recommendations for the New California Governor.* CalCAN, California Climate and Agriculture Network. September 2018. Accessed March 25, 2024. https://calclimateag.org/wp-content/uploads/2018/08/AbundantSolutions.pdf.

University of Adelaide. 2020. "Droughts are threatening global wetlands." Phys.org. October 9, 2020. Accessed May 24, 2023, https://phys.org/news/2020-10-droughts-threatening-global-wetlands.html.

USDA (U.S. Department of Agriculture). 2024. "California Crops Under Climate Change." USDA Climate Hubs, California Climate Hub. Accessed March 21, 2024. https://www.climatehubs.usda.gov/hubs/california/california-crops-under-climate-change.

USGS (U.S. Geological Survey). 2028. "Groundwater Decline and Depletion." June 6, 2018. Accessed August 2, 2023. https://www.usgs.gov/special-topics/water-science-school/science/groundwater-decline-and-depletion.

Water Resources Association of Yolo County. 2018. *Storm Water Resource Plan for Yolo County*. Prepared by Kennedy-Jenks Consultants. May 2018. Accessed March 21, 2024. https://www.yologroundwater.org/files/feab92e80/FINAL_SWRP_YoloCo_Dec2018--hi-res.pdf.

WorldAtlas. 2023. "What Are The Effects Of A Drought On The Environment?" WorldAtlas. Accessed May 23, 2023. https://www.worldatlas.com/articles/what-are-the-effects-of-a-drought-on-the-environment.html.

Yolo County Board of Supervisors. 2020. "*Climate Emergency Declaration (Resolution No. 20-114).*"

Yolo County Department of Agriculture/Weights and Measures. 2023. *2022 Crop Report*. Yolo County, CA: Yolo County

Yolo County Department of Natural Resources. 2024. "About Flood Safe 2.0." https://www.yolocounty.org/government/general-government-departments/community-services/natural-resources/flood-safe-yolo-2-0.

Yolo County OES (Office of Emergency Services). 2023. *Yolo County Multi-Jurisdictional Hazard Mitigation Plan*.

Yolo County OES. 2024. "Know Your Alerts and Stay Informed." https://www.yolocounty.org/government/general-government-departments/office-of-emergency-services/alerts.

Yolo Habitat Conservancy. 2018. *Yolo Habitat Conservation Plan/Natural Community Conservation Plan.* Yolo County, CA: ICF.

YSGA (Yolo Subbasin Groundwater Agency). 2022. *2022 Yolo Subbasin Groundwater Sustainability Plan*. Yolo County, CA: GEI Consultants Inc. Adopted January 24, 2022. Accessed March 25, 2024. https://www.yologroundwater.org/files/acff83c75/YoloGSP_Adopted.pdf.

YSGA. 2023. *Yolo Subbasin Annual Report: Water Year 2022*. March 31, 2023. Accessed March 25, 2024. https://www.yologroundwater.org/files/5ebfd42ee/Annual+Report+2023+FINAL.pdf.

Yolo-Solano Air Quality Management District. 2022. "Wildfire Smoke Information." Accessed March 21, 2024. https://www.ysaqmd.org/about-the-district/news-outreach/wildfire-smoke-information/.

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