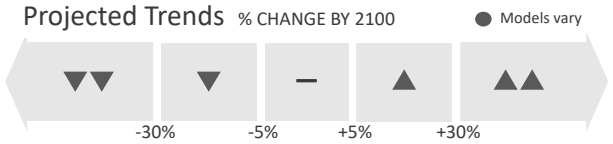
PROJECTED CLIMATE CHANGES AND ASSOCIATED IMPACTS FOR SANTA ROSA, CA



CLIMATE CHANGES	METRIC	TREND	PROJECTED CHANGES
Air temperature	Minimum temperature	▲	+4.4°F by 2050 and +8.1°F by 2100 COMPARED TO OBSERVED ANNUAL AVERAGE OF 43°F FROM 1961–1990
	Maximum temperature	▲	+4.3°F by 2050 and +7.5°F by 2100 COMPARED TO OBSERVED ANNUAL AVERAGE OF 71.1°F FROM 1961–1990
Precipitation	Annual precipitation	●	+5.5 inches per year (+16%) by 2050 and +9.9 inches per year (+28%) by 2100, but model projections vary widely COMPARED TO OBSERVED AVERAGE OF 34.9 INCHES FROM 1961–1990
	Seasonality	▲▼	Shorter/more intense wet season, with later onset of fall rains and earlier onset of the dry season; more pronounced interannual variability
Extreme heat	Extreme heat days MAXIMUM TEMPERATURES OVER 98.1°F	▲▲	+10 days per year (+250%) by 2050 and +20 days per year (+500%) by 2100 COMPARED TO OBSERVED AVERAGE OF 4 DAYS PER YEAR FROM 1961–1990
	Heat wave duration MOST CONSECUTIVE EXTREME HEAT DAYS PER YEAR	▲▲	+2.5 days per year (+109%) by 2050 and +4 days per year (+174%) by 2100 COMPARED TO OBSERVED AVERAGE OF 2.3 DAYS PER YEAR FROM 1961–1990
Extreme precipitation	Intensity of extreme events 2-DAY TOTAL EXCEEDED ONCE IN 20 YEARS	▲	+0.3 inches (+3%) by 2050 and +1.9 inches (+20%) by 2100 COMPARED TO OBSERVED 20-YEAR RETURN LEVEL OF 9.4 INCHES FROM 1961–1990
	Frequency of extreme events # OF EVENTS WITH 2-DAY TOTAL OVER 1.99 INCHES	●	+2 events per year (+67%) by 2050 and +3 events per year (+100%) by 2100, but model projections vary widely COMPARED TO OBSERVED AVERAGE FREQUENCY OF 3 EVENTS PER YEAR FROM 1961–1990
Drought	Risk of drought years	▲▲	Drought years are twice as likely to occur in any given year by 2050
	Drought severity	▲▲	Severe droughts that now occur every 20 years will occur once every 10 years, while 100-year droughts will occur every 20 years by 2100
Wildfire	Annual area burned	▲	+9 hectares per year (+9.7%) by 2050 and +16.9 hectares per year (+18%) by 2100 COMPARED TO OBSERVED ANNUAL AVERAGE OF 93.1 HECTARES (RANGE OF 20–220) FROM 1961–1990

Projections were obtained from Cal-Adapt (http://cal-adapt.org) using high-emissions scenario for 2050/mid-century (average of 2035–2064) and 2100/late-century (average of 2070–2099) time periods compared to average conditions between 1961–1990. Precipitation seasonality and drought projections from (1) Swain, Langenbrunner, Neelin, Hall, *Nature Climate Change*. **8**, 427 (2018); (2) Cook, Ault, Smerdon, *Science Advances*. **1**, e1400082 (2015); (3) Pierce, Kalansky, Cayan, "Climate, drought, and sea level rise scenarios for the Fourth California Climate Assessment" (California Energy Commission, 2018).

CLIMATE CHANGES	LIKELY IMPACTS ASSOCIATED WITH PROJECTED CHANGES
Higher average temperatures & more extreme heat	• Reduced growth and productivity of agricultural crops and native vegetation due to heat stress and increases in evapotranspiration • Potential increase in insect pests and disease vectors (e.g., mosquitoes, rodents), with associated impacts to agriculture, public health, and native plants and wildlife • Increased heat-related illness and death, particularly among vulnerable populations • Greater demand for emergency services, public spaces that provide relief from extreme heat (e.g., libraries, community centers), and water-dependent recreation
Shifts in rainfall seasonality & increased risk of extreme flooding	• Reduced growth and productivity of agricultural crops and native vegetation due to a longer dry season • Increased runoff during heavy rainfall events that follow dry periods, resulting in greater risk of landslides and flash floods • Increased risk of injuries/death and property damage or loss during extreme flooding • Damage to roadways and/or temporary loss of access to isolated neighborhoods • Interruption of public services and possible public health impacts following damage to utilities • Economic impacts of damage to businesses and agricultural operations
More frequent and/or severe droughts	• Reduced water availability due to declining surface water supplies and groundwater recharge combined with increased demand for agricultural and household use • Increased stress and mortality in agricultural crops and native vegetation • Increased cost of food and water • Economic losses due to crop failures and loss of tourism associated with water-dependent activities
More frequent and/or intense wildfires	• Increased risk of injuries and death due to burns and smoke inhalation, as well as longer-term health impacts related to eye and respiratory issues • Damage and loss of homes, businesses, and other infrastructure, particularly within the wildland-urban interface (WUI) • Possible disruption of critical supply chains, access to public services, and other linkages • Economic losses due to direct damages (i.e., to businesses) as well as declines in tourism and recreation following fire • Increased frequency of preemptive power outages for wildfire prevention, resulting in the loss of air conditioning, greater risk of food/medication spoilage, disruptions to public services, and other impacts

*Climate change icons are from the Sonoma County Climate Protection Authority report, "Climate Action 2020 and Beyond"

Sources:

- Cal-Adapt (http://cal-adapt.org)
- California's Fourth Climate Change Assessment (https://www.climateassessment.ca.gov/)
- California Adaptation Clearinghouse (https://resilientca.org/)
- California Governor's Office of Emergency Services, "California Adaptation Planning Guide" (Cal OES, Mather, CA, 2020)
- Sonoma County Regional Climate Protection Authority, "Climate Action 2020 and Beyond: Sonoma County Regional Climate Action Plan" (Sonoma County RCPA, Santa Rosa, CA, 2016)

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