AHSC Tips: Community Climate Resiliency

Communities will experience effects of climate change in various ways, including increased likelihood of heatwaves, droughts, sea level rise, flooding, wildfires, and severe weather. To be resilient to climate change, it is important to understand if the surrounding community is experiencing specific climate risks and how your AHSC project aims to address specific concerns. This section is worth 3 out of 15 points of the narrative, and includes a required supplemental Climate Adaptation Assessment Matrix (Matrix).

**STEP 1 - IDENTIFY CLIMATE RISKS:** If available, use a local climate vulnerability assessments created by the city, county, regional council of government (COG), or metropolitan planning organization (MPO) to gather information about local climate risks to the project area. You can search for local climate vulnerability assessments on the Adaptation Clearinghouse. If no local assessment is available, or if the local assessment does not provide sufficient data, Cal-Adapt.org is a recommended state website to use. To fill out your Climate Adaptation Assessment Matrix for the AHSC program, you will need to use the Local Climate Change Snapshot Tool and Sea Level Rise Tool. They are both easy-to-use and come with downloadable data specific to your project’s geographic area. See general tips about Cal-Adapt immediately below, then the Appendix that starts on page 7 for screenshots of the Local Climate Change Snapshot Tool and Sea Level Rise Tool and guidance on how to take data from the tool to fill out the Matrix for each climate projection.
Tips for using Cal-Adapt:

- After you have selected the tool, your next step will be to narrow in on the most localized data that is available. For the Local Snapshot Tool, you do this by inputting the project address. For the Sea Level Rise - CalFlo0-3D tool, you will select the appropriate region.
- Thirty years is the traditional length of record used in climatological studies and is considered the minimum number of years needed to characterize a regional climate and for applying statistical tests.
  - Historical baseline - 1961-1990: The historical baseline is chosen to represent the period in which the majority of California’s critical infrastructure was developed. This thirty year period represents the period in which anthropogenic climate change signals were beginning to be felt.
  - Mid-Century - 2035-2064: The mid-century epoch is a thirty year climatology centered about the middle of the 21st century. This period is chosen to be coincident with the timelines developed for the recently released Fourth National Climate Assessment.
  - End of Century - 2070-2099: The late-century epoch includes the last thirty years of the 21st century in which all model runs are available. This period is chosen to be coincident with the timelines developed for the recently released Fourth National Climate Assessment.
- Two emissions scenarios of Representative Concentration Pathway (RCP) are given: 4.5 and 8.5. The 4.5 RCP is a scenario in which global GHG emissions decline after 2040, whereas the 8.5 RCP describes a scenario in which global GHG emissions continue to increase over the next century. SGC uses the Planning and Investing for a Resilient California Guidebook to inform funding requirements. As that guidance directs, analysis considering impacts until mid-century (~2050-2060) should employ a high emission scenario, RCP 8.5. For analyses considering impacts after mid-century until 2100, please look at a range of projected impacts from RCP 4.5 – RCP 8.5, as these represent a range of plausible futures.
- To correctly fill out the Climate Adaptation Assessment Matrix, you will need the Observed Historical values (when available), RCP 8.5 projections for the Mid-Century, and RCP 4.5 and 8.5 projections for End of Century. The Appendix has step-by-step instructions for finding this information.
- For more guidance on how Cal-Adapt climate modeling is done and why we use the data points and time frames listed above, you can read more about methodology considerations here.

STEP 2 - INPUTTING CLIMATE INFORMATION INTO THE MATRIX: For inputting Cal-Adapt and/or local vulnerability assessment information into the Matrix, clearly follow the Matrix instructions to list the most relevant projected climate impacts for:

- Heat
- Precipitation Change (e.g. drought or extreme precipitation events)
- Sea Level Rise and Inland Flooding
- Wildfire

The Matrix will help you determine which climate impacts are a priority to address for your project. Additionally, the state’s Fourth Climate Change Assessment regional reports could provide more guidance on what priority impacts your project’s area is facing. These regional reports can be useful to
understand the significance of the magnitude of the projected impacts, and the associated risks and harms.

**STEP 3 - DESCRIBE DESIGN STRATEGIES TO ADDRESS CLIMATE IMPACTS:** In both the Matrix and narrative, describe how potential climate impacts are taken into consideration in the design of the proposed project. The Matrix asks for what adaptive measures you are considering as options. The table below provides resources on what designs can adapt to certain climate impacts. Additional resources on design strategies can be found in the Adaptation Clearinghouse by searching for local and regional climate adaptation plans.

<table>
<thead>
<tr>
<th>Potential designs to address climate impacts</th>
<th>What does it address?</th>
<th>Resources</th>
</tr>
</thead>
</table>
| **Trees:** Trees provide shade for pedestrian pathways, hold moisture when it rains, and when placed strategically can decrease the amount of energy needed to cool and heat buildings. | Extreme Heat - Urban Heat Island; Drought and Extreme Precipitation | CA ReLeaf, [general resources on urban and community forests](#)  
[i-Tree planting calculator](#) for energy cost savings, stormwater capture, and air pollution mitigation |
| **Overall Building Design:** Modifications to buildings can increase ventilation, enhance insulation, provide passive cooling, and reduce grid demand. **Note:** In this section, it’s advisable to speak about energy efficiency as a strategy to reduce energy demand on extreme heat days. In your narrative, be sure to mention this connection to extreme heat and avoid over-emphasizing the GHG reduction of energy efficiency by itself, since this section is about climate adaptation. Additionally, if the project has on-site power generation and battery storage back-up, that is a strategy to address the likelihood of public safety power shutoff (PSPS) events during times of high wildfire risk. | Extreme Heat - Urban Heat Island | pg. 30 - 43 of Urban Land Institute, "Scorched: Extreme Heat and Real Estate"  
[US EPA, "Reducing Urban Heat Islands - Compendium of Strategies Cool Roofs"](#)  
| **Cool roofs:** Materials reflect sun rays back into the atmosphere and keep buildings cool up to 20% more than traditional roof shingles. Additionally, there are GHG reduction benefits if combined with rooftop solar. | Extreme Heat - Urban Heat Island | US EPA, “Reducing Urban Heat Islands - Compendium of Strategies Cool Roofs”  
[US EPA](#) |
<p>| <strong>Green roofs:</strong> Layers of plants growing on rooftops reduce urban heat island, capture water, and cool buildings by providing vegetation. | Extreme Heat - Urban Heat Island; Drought and Extreme Precipitation | US EPA, “Reducing Urban Heat Islands - Compendium of Strategies Green Roofs” |</p>
<table>
<thead>
<tr>
<th><strong>Shade structures</strong>: Solar panels over parking spaces and bike racks, canopies over tot lots and playgrounds, and awnings over entry ways provide shade that protect people from heat.</th>
<th>Extreme Heat - Urban Heat Island</th>
<th>pg. 30 - 43 of Urban Land Institute, “Scorched: Extreme Heat and Real Estate”</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bus Shelters</strong>: Shade protects riders from the heat as they wait for transit.</td>
<td>Extreme Heat - Urban Heat Island</td>
<td>Transit Center, “From Sorry to Superb: Everything You Need to Know about Bus Stops”</td>
</tr>
<tr>
<td><strong>Water features and hydration stations</strong>: Drinking fountains, swimming pools, and splash pads keep residents hydrated and the community cool during extreme heat events.</td>
<td>Extreme Heat - Urban Heat Island</td>
<td>Center for Disease Control and Prevention, “Extreme Heat Resources to Stay Cool, Hydrated, and Informed”</td>
</tr>
<tr>
<td><strong>Cool pavement</strong>: Paving materials are designed to reflect solar energy and stay cooler than traditional pavements.</td>
<td>Extreme Heat - Urban Heat Island</td>
<td>US EPA, “Reducing Urban Heat Islands - Compendium of Strategies Cool Pavements” GuardTop, CoolSeal</td>
</tr>
<tr>
<td><strong>Community Cooling Centers</strong>: Provides an air-conditioned common area for people to rest and recover during periods of extreme heat.</td>
<td>Extreme Heat - Urban Heat Island</td>
<td>California Public Utilities Commission, Cooling Centers</td>
</tr>
<tr>
<td><strong>Green and natural infrastructure</strong>: Permeable land cover, soil improvements, watersheds, riparian buffers, wetlands, and floodplains have multiple climate benefits. Vegetation provides evaporative cooling to help with extreme heat, and can help to manage stormwater.</td>
<td>Extreme Heat - Urban Heat Island; Drought and Extreme Precipitation; Sea Level Rise and Inland Flooding</td>
<td>US EPA, Green Infrastructure</td>
</tr>
<tr>
<td><strong>Native, drought-tolerant vegetation</strong>: Plantings save water resources, support biodiversity, and are natural pollinators.</td>
<td>Drought and Extreme Precipitation</td>
<td>CA Dept of Water Resources, “Water Efficient Landscaping”</td>
</tr>
<tr>
<td><strong>Water conservation mechanisms</strong>: Indoor/outdoor appliances, fixtures, and measures can save water.</td>
<td>Drought and Extreme Precipitation</td>
<td>Alliance for Water Efficiency, “Home Water Works” Metropolitan Water District of Southern California, “Be Water Wise Toolkit”</td>
</tr>
<tr>
<td><strong>Rainwater capture and infiltration systems</strong>: Systems capture water, conserve energy, reduce flooding, and prevent stormwater runoff.</td>
<td>Drought and Extreme Precipitation; Sea Level Rise and Inland Flooding</td>
<td>Contra Costa Water District, “Rainwater Harvesting 101”</td>
</tr>
<tr>
<td><strong>Coastal Adaptation to Sea Level Rise</strong>: Building</td>
<td>Sea Level Rise and Inland Flooding</td>
<td>Coastal Conservancy, “Natural”</td>
</tr>
</tbody>
</table>
solid barriers, protecting or reestablishing shoreline ecosystems, enhancing aquifer recharge, and reducing saltwater intrusion can mitigate the flooding impacts in a vulnerable region.

| Fuel management work: Creating defensible space and maintaining a low fuel profile can greatly reduce the risk of fire. |
| Wildfire | University of California Agriculture and Natural Resources, "Forest Research and Outreach" |

| Wildfire rehabilitation work: Controlling soil erosion through mulching, maintaining tree health through pest management, and using other ecosystem treatments can help forests recover after wildfires. |
| Wildfire | University of California Agriculture and Natural Resources, "Forest Research and Outreach" |

| Fire hazard prevention work: Using fire-resistant building materials and designs, such as noncombustible roofs, noncombustible siding, fire sprinklers, and double-pane windows, can protect housing from fires. |
| Wildfire | CAL FIRE, “Homeowner’s Checklist” |

The following designs or actions can have a negative impact on climate resilience. If possible, these should be avoided, but if not, they can be mitigated using the strategies listed above for the relevant climate impacts.

<table>
<thead>
<tr>
<th>Potential negative outcomes to avoid or mitigate</th>
<th>What does it affect?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replacing agricultural lands or natural land cover: Replacing green space with hardscape increases the urban heat island effect and reduces stormwater management benefits of permeable surfaces.</td>
<td>Heat and Extreme Precipitation</td>
</tr>
<tr>
<td>Changing permeable surfaces to paved surfaces: Reduces the potential for stormwater to enter the groundwater supply.</td>
<td>Extreme Precipitation</td>
</tr>
<tr>
<td>Project increasing water use: The project should not create a significant new demand on local water supplies.</td>
<td>Drought</td>
</tr>
<tr>
<td>Project developing buildings or structures in floodplains: Areas prone to flooding will be subject to greater risk in the future and should be avoided for new development.</td>
<td>Sea Level Rise and Inland Flooding</td>
</tr>
<tr>
<td>Project involves new construction in a high priority landscape for reducing or preventing wildfire threats: Buffer zones are a strategy to make the wildland-urban interface less risky by eliminating contact in high risk areas.</td>
<td>Wildfire</td>
</tr>
</tbody>
</table>
STEP 4A - FOSTERING COMMUNITY RESILIENCE

Community resilience is also about fostering a social hub and network where neighbors know each other and have services to thrive. Think about how to make your affordable housing development or transit center a hub for community interaction and how it can be developed holistically in conjunction with other community services (clinics, schools, parks, art centers, etc.). Social cohesion is an incredibly important element of resilience, leading some local organizations to look at creating resilience hubs to center the idea of community in resilience (the US Sustainability Directors network has additional resources). See below examples of how AHSC projects foster community resilience:

- **Balboa Park Upper Yard** (AHSC Round 5) will include a 3,994-square-foot licensed early childhood education center, a family wellness community resource center, and a commercial space operated by PODER, a grassroots environmental justice organization, for bicycle maintenance.
- **Santa Ana Arts Collective** (AHSC Round 2) intends to help spark the renewal of the lost artist landscape by providing space for low-income working artists households vis-à-vis permanent, affordable housing, and a free gallery, woodshop, studios, music room, and onsite arts staffing.
- **Six Four Nine Lofts** (AHSC Round 2) will be built above a new 25,000 square foot community clinic development by Skid Row Housing Trust and will be owned and operated by Los Angeles Christian Health Centers. The three-story clinic will provide top-quality healthcare to meet medical, dental, optometry, mental health, and social service needs.

STEP 4B - FOSTERING EMERGENCY PREPAREDNESS

In preparing for more frequent climate events, affordable housing developments can commit to creating emergency preparedness plans. See some resources below on proactively establishing a cooling center location, “check on your neighbor” systems, a Community Emergency Response Team (CERT), and more:

- Enterprise Community Partners, “Ready to Respond- Tools for Resilience”
- Listos California, Trainings and Toolkits
- Department of Homeland Security, "Neighbors Helping Neighbors"
- Department of Homeland Security, Community Emergency Response Team Program
- Center for Disease Control and Prevention, “The Use of Cooling Centers to Prevent Heat-Related Illness - Summary of Evidence and Strategies for Implementation”
- Heat preparedness information from Federal Emergency Management Agency (FEMA), Center for Disease Control (CDC), and California Environmental Protection Agency (CalEPA)
- Flooding preparedness information from Ready.gov and Red Cross
- Wildfire preparedness information (evacuation and smoke) from CalFIRE, National Fire Protection Association, CDC, and California Department of Public Health (CDPH)
- U.S. Environmental Protection Agency, AirNow Fire and Smoke map

Your affordable housing project could host training sessions and/or post educational information on a community bulletin or display monitor in a common area.

STEP 5 - RELATING AHSC PROJECT TO CITY’S CLIMATE PLANNING EFFORTS: Consider the lifetime of project elements, risks posed by changing climate conditions, and consequences of those risks (impacts to occupant health and safety, structural integrity, heating and cooling systems, etc.). If your local city or county has added adaptation measures to their General Plan (Safety Element) or other local planning documents, such as a climate adaptation plan or hazard mitigation plan, describe how the project conforms to the implementation of that plan. You can check to see if such a local plan exists by searching for it on the Adaptation Clearinghouse.
CONCLUSION: By identifying climate risks, inputting climate information into the Matrix, describing strategies to address climate impacts, fostering social networks, and relating the AHSC project to the city’s climate planning efforts, the AHSC project can be more resilient to climate change. As a reminder from the Narrative Rubric, full points are awarded to projects that: identify climate vulnerabilities found in Cal-Adapt or other reliable data source; give site-specific description of project area's adaptation needs; and substantially mitigate multiple vulnerabilities in the near future and intermediate future, or are at least scalable to address heightened vulnerabilities expected in 2100.
Appendix - Example Snapshots for Using Cal-Adapt Tools

To use the new Cal-Adapt Local Climate Change Snapshot Tool, go to https://cal-adapt.org/ and click on the tool at the bottom left of the opening page. From there, enter the address, county, city, census tract, or watershed you wish to get information on. The Local Snapshot tool will then access temperature, precipitation, and wildfire data for that location.

Last Updated 3.11.21
1. **HEAT - MAXIMUM TEMPERATURE**: Below are snapshots of *Temperature: Average Annual Maximum Temperature* covering the 30-year average for the Mid-Century and End-Century periods and for RCP 4.5 and 8.5. To access heat data, you must do the following:
   a. Set the tool to *Temperature* on the Top left of the screen
   b. Under “select climate indicator” choose *Annual Average Maximum Temperature* (example location is 525 S Hewitt St, Los Angeles, CA 90013).
   c. The data is posted at the bottom. Boxed in blue is:
      i. The *Observed Historical (1961-1990)* annual value for Annual Average Maximum Temperature for the area you inputted, set up in a 30-year average
      ii. *RCP 8.5 for Mid-Century (2035-2064)* for Annual Average Maximum Temperature for the area you inputted
      iii. *RCP 4.5 and 8.5 for End-Century (2070-2099)* for Annual Average Maximum Temperature for the area you inputted
Example: Between 1961 and 1990, 525 S Hewitt St’s annual average maximum temperature was 75.5 degrees F. RCP 8.5 projects that the annual average maximum temperature will increase to 80.0 F by mid-century (2035-2064) and 83.3 degrees F by end-of-century -- a nearly 8 degree F increase over the historical average. RCP 4.5 projects an annual average maximum temperature of 80.0 degrees F by end-of-century.

2. HEAT - EXTREME HEAT DAYS AND THRESHOLD TEMPERATURE: Below are snapshots of Temperature: Extreme Heat Days and the Threshold Temperature covering the 30-year average for the Mid-Century and End-Century periods and for RCP 4.5 and 8.5. To access the data on the number of extreme heat days, you must do the following
   a. Set the tool to Temperature on the top left of the screen
   b. Under “select climate indicator,” choose Extreme Heat Days (example location is 525 S Hewitt St, Los Angeles, CA 90013)
   c. The data is posted by the Climate Indicator toolbar and at the bottom. Boxed in blue is:
      i. The threshold temperature for the location you inputted (Located under the Climate Indicator toolbar). This threshold indicates the temperature above which is considered an extreme heat day.
      ii. The Observed Historical (1961-1990) annual value for number of Extreme Heat Days for the location you inputted, shown as a 30-year average
      iii. RCP 8.5 for Mid-Century (2035-2064) for Extreme Heat Days for the location you inputted
      iv. RCP 4.5 and 8.5 for End-Century (2070-2099) for Extreme Heat Days for the location you inputted

Last Updated 3.11.21
Overall temperatures are projected to rise in California during the 21st century. While the entire state will experience temperature increases, the local impacts will vary greatly with many communities and ecosystems already experiencing the effects of rising temperatures.

This visualization shows the most likely outcome (—), (+), and range (---) of future projections of Extreme Heat Days.

- Tour this visualization
- About the data
- Best practices for working with climate data
- Explore related climate tools

This table provides a snapshot of Extreme Heat Days for three 30-year time periods.

- About this table

<table>
<thead>
<tr>
<th>Observed (1961-1990)</th>
<th>Change from baseline</th>
<th>30yr Average</th>
<th>30yr Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MODELED HISTORICAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline (1961-1990)</td>
<td>-</td>
<td>2 days</td>
<td>1 - 3 days</td>
</tr>
<tr>
<td>Mid-Century (2035-2064)</td>
<td>MEDIUM EMISSIONS (RCP 4.5)</td>
<td>+6 days</td>
<td>8 days</td>
</tr>
<tr>
<td></td>
<td>HIGH EMISSIONS (RCP 8.5)</td>
<td>+8 days</td>
<td>10 days</td>
</tr>
<tr>
<td>End-Century (2070-2099)</td>
<td>MEDIUM EMISSIONS (RCP 4.5)</td>
<td>+9 days</td>
<td>11 days</td>
</tr>
<tr>
<td></td>
<td>HIGH EMISSIONS (RCP 8.5)</td>
<td>+21 days</td>
<td>23 days</td>
</tr>
</tbody>
</table>

1. Data derived from 32 LOCA downscaled climate projections generated to support California’s Fourth Climate Change Assessment. Details are described in Pierce et al., 2018.
2. Observed historical data derived from Grided Observed Meteorological Data. Details are described in Livneh et al., 2013.
3. Data presented is for LOCA grid cell (~0km x 0km resolution) at -118.2301,34.04076.
4. Threshold temperature for a location is defined as the 98th percentile value of historical daily maximum/minimum temperatures (from 1961-1990, between April and October) observed at that location.
Example: Between 1961 and 1990, 525 S Hewitt St has historically experienced on average 4 extreme heat days per year. RCP 8.5 projects that it will experience an average of 10 extreme heat days by mid-century (2035-2064) beyond a threshold temperature of 97.9 degrees F, and 23 extreme heat days by the end-of-century (2070-2099) -- a nearly 6-fold increase over the historical average. In the RCP 4.5 scenario, 11 days of extreme heat are projected for the end-of-century.

3. PRECIPITATION CHANGE - ANNUAL: Below are snapshots of Precipitation: Annual Precipitation covering the 30-year average for the Mid-Century and End-Century periods and for RCP 4.5 and 8.5. To access the data on Annual Precipitation, you must do the following
   a. Set the tool to Precipitation on the top middle of the screen
   b. Under “select climate indicator” choose Annual Precipitation (example location is 525 S Hewitt St, Los Angeles, CA 90013)
   c. The data is posted at the bottom. Boxed in blue is
      i. Observed Historical (1961-1990) annual value for Annual Precipitation (inches) for the location you inputted, shown as a 30 year average
      ii. RCP 8.5 for Mid-Century (2035-2064) for Annual Precipitation (inches) for the location you inputted
      iii. RCP 4.5 and 8.5 for End-Century (2070-2099) for Annual Precipitation (inches) for the location you inputted

California's climate varies between wet and dry years. Research suggests that for much of the state, wet years will become wetter and the dry years will become drier. Dry years are also likely to be followed by dry years, increasing the risk of drought.

While California does not see the average annual precipitation changing significantly in the next 50-75 years, precipitation will likely be delivered in more intense storms and within a shorter wet season. We are already seeing some of the impacts from a shift towards larger year to year fluctuations.
Example: Between 1961 and 1990, 525 S Hewitt St’s annual precipitation average was 15.6 inches. RCP 8.5 projects that the annual average precipitation will increase slightly to 15.9 inches by mid-century (2035-2064) and 16.0 inches by end-of-century. RCP 4.5 projects a 16.2 inches of total annual precipitation by end-of-century.
4. **PRECIPITATION CHANGE - MAXIMUM 1-DAY PRECIPITATION:** Below are snapshots of Precipitation: Maximum 1-day Precipitation covering the 30-year average for the Mid-Century and End-Century periods and for RCP 4.5 and 8.5. To access the data on Maximum 1-day Precipitation, you must do the following:

   a. Set the tool to **Precipitation** on the top middle of the screen
   b. Under “select climate indicator” choose **Maximum 1-day Precipitation** (example location is 525 S Hewitt St, Los Angeles, CA 90013)
   c. The data is posted at the bottom. Boxed in blue is:
      i. **Observed Historical (1961-1990)** annual value for Maximum 1-day Precipitation (inches) for the location you inputted, shown as a 30 year average
      ii. **RCP 8.5 for Mid-Century (2035-2064)** for Maximum 1-day Precipitation (inches) for the location you inputted
      iii. **RCP 4.5 and 8.5 for End-Century (2070-2099)** for Maximum 1-day Precipitation (inches) for the location you inputted

California’s climate varies between wet and dry years. Research suggests that for much of the state, wet years will become wetter and the dry years will become drier. Dry years are also likely to be followed by dry years, increasing the risk of drought.

While California does not see the average annual precipitation changing significantly in the next 50-75 years, precipitation will likely be delivered in more intense storms and within a shorter wet season. We are already seeing some of the impacts from a shift towards larger year to year fluctuations.
Example: Between 1961 and 1990, 525 S Hewitt St had about 2.230 inches of rainfall as its maximum 1-day precipitation event. RCP 8.5 projects that it will increase to 2.360 inches by mid-century (2035-2064) and 2.509 inches by end-of century -- a 12.5% increase over the historical average. RCP 4.5 projects 2.371 inches on the wettest day of the year by the end-of-century.

5. PRECIPITATION CHANGE - MAXIMUM LENGTH OF DRY SPELL: Below are snapshots of Precipitation: Maximum Length of Dry Spell covering the 30-year average for the Mid-Century and End-Century periods and for RCP 4.5 and 8.5. To access the data on Maximum Length of Dry Spell, you must do the following:
   a. Set the tool to Precipitation on the top middle of the screen
   b. Under “select climate indicator” choose Maximum Length of Dry Spell (example location is 525 S Hewitt St, Los Angeles, CA 90013)
   c. The data is posted at the bottom. Boxed in blue is:
      i. Observed Historical (1961-1990) annual value for Maximum Length of Dry Spell (days) for the location you inputted, shown as a 30 year average
      ii. RCP 8.5 for Mid-Century (2035-2064) for Maximum Length of Dry Spell (days) for the location you inputted
      iii. RCP 4.5 and 8.5 for End-Century (2070-2099) for Maximum Length of Dry Spell (days) for the location you inputted
California's climate varies between wet and dry years. Research suggests that for much of the state, wet years will become wetter and the dry years will become drier. Dry years are also likely to be followed by dry years, increasing the risk of drought.

While California does not see the average annual precipitation changing significantly in the next 50-75 years, precipitation will likely be delivered in more intense storms and within a shorter wet season. We are already seeing some of the impacts from a shift towards larger year to year fluctuations.

Example: Between 1961 and 1990, the average maximum length of dry spells for 525 S Hewitt St was 142 days. RCP 8.5 projects that it will increase to 166 days by mid-century (2035-2064) and 172 days by
end-of-century -- a 21% increase in duration over the historical average. RCP 4.5 projects a maximum dry spell length of 163 days by end-of-century.

6. **WILDFIRE - ANNUAL AVERAGE AREA BURNED:** Below are snapshots of *Wildfire: Annual Average Area Burned* covering the 30-year average for the Mid-Century and End-Century periods and for RCP 4.5 and 8.5. To access the data on Annual Average Area Burned, you must do the following:
   a. Set the tool to *Wildfire* on the top right of the screen
   b. Under “select climate indicator,” choose *Annual Average Area Burned* (example location is Pasadena, CA)
   c. The data is posted at the bottom. Boxed in blue is:
      i. RCP 8.5 for Historical (1961-1990) annual value for Annual Average Area Burned (acres) for the 6 x 6 km area surrounding the location you inputted, shown as a 30 year average. Note: Observed historical data is not comprehensive for wildfire area burned, and so you are advised to use the RCP 8.5 Historical data instead.
      ii. RCP 8.5 for Mid-Century (2035-2064) for Annual Average Area Burned (acres) for the 6 x 6 km area surrounding the location you inputted
      iii. RCP 4.5 and 8.5 for End-Century (2070-2099) for Annual Average Area Burned (acres) for the 6 x 6 km area surrounding the location you inputted
The frequency, severity and impacts of wildfire are sensitive to climate change as well as many other factors, including development patterns, temperature increases, wind patterns, precipitation change and pest infestations. Therefore, it is more difficult to project exactly where and how fires will burn. Instead, climate models estimate increased risk to wildfires.

The information presented here (Annual Average Area Burned) can help inform at a high level if wildfire activity is likely to increase. However, this information is not complete - many regions across the state have no projections (such as regions outside combined fire state and federal protection responsibility areas), and more detailed analyses and projections are needed for local decision-making.

These projections are most robust for the Sierra Nevada given model inputs. However, as we have seen in recent years, much of California can expect an increased risk of wildfire, with a wildfire season that starts earlier, runs longer, and features more extreme fire events.

This visualization shows the most likely outcome (—) and range ( ) of future projections of Annual Average Area Burned.

- Tour this visualization
- About the data
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Note: This area may contain locations outside the combined fire state and federal protection responsibility areas. These locations were excluded from these wildfire simulations and have no climate projections.

This table provides a snapshot of Annual Average Area Burned for three 30-year time periods.

- About this table

<table>
<thead>
<tr>
<th></th>
<th>Change from baseline</th>
<th>30yr Average</th>
<th>30yr Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline (1961-1990)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDIUM EMISSIONS (RCP 4.5)</td>
<td>-</td>
<td>58.3 acres</td>
<td>57.5 - 59.5 acres</td>
</tr>
<tr>
<td>HIGH EMISSIONS (RCP 8.5)</td>
<td>-</td>
<td>56.1 acres</td>
<td>55.1 - 56.0 acres</td>
</tr>
<tr>
<td><strong>Mid-Century (2035-2064)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDIUM EMISSIONS (RCP 4.5)</td>
<td>+11.0 acres</td>
<td>69.3 acres</td>
<td>68.3 - 70.3 acres</td>
</tr>
<tr>
<td>HIGH EMISSIONS (RCP 8.5)</td>
<td>+12.2 acres</td>
<td>69.3 acres</td>
<td>68.4 - 70.4 acres</td>
</tr>
<tr>
<td><strong>End-Century (2070-2099)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDIUM EMISSIONS (RCP 4.5)</td>
<td>+9.5 acres</td>
<td>67.8 acres</td>
<td>66.9 - 68.6 acres</td>
</tr>
<tr>
<td>HIGH EMISSIONS (RCP 8.5)</td>
<td>+9.8 acres</td>
<td>67.8 acres</td>
<td>66.4 - 68.1 acres</td>
</tr>
</tbody>
</table>

1. Data derived from wildfire simulations generated to support California’s Fourth Climate Change Assessment. Details are described in Westerling et al., 2019.
2. Data presented are aggregated over all LOCA grid cells that intersect Pasadena boundary.
3. Pasadena boundary may contain locations outside the combined fire state and federal protection responsibility areas. These locations were excluded from wildfire simulations and have no climate projections.
Example: Between 1961 and 1990, Pasadena’s annual mean area burned was 56.1 acres for RCP 8.5. RCP 8.5 projects Pasadena’s annual mean area burned will increase to 68.3 acres by the mid-century (2035-2064), and to 65.9 acres by the end-of-century -- a 17.5% increase. RCP 4.5 projects an annual mean area burned of 67.8 acres by the end-of-century.

7. **SEA LEVEL RISE / INLAND FLOODING, MAXIMUM INUNDATION DEPTH:** Below is a snapshot of the Sea Level Rise (SLR) tool to evaluate flood risk (inundation/water depth in meters) from sea level rise or inland flooding under a 1.0 meter SLR scenario (mid-century) and a 1.41 meter SLR scenario (end-of-century). Red boxes show where
   a. to change and view location (example location is Long Beach)
   b. where to zoom in, and
   c. where to toggle SLR scenarios.

Blue box shows where
   d. a legend is located to interpret what the color on the map signifies in terms of maximum inundation depth during a 100 year storm.

One would need to use a cursor on the map to center the location, zoom in on the map, and reference the legend to see what the actual inundation depth range is around a potential project site. Outside of the San Francisco Bay Area and Sacramento - San Joaquin Delta, the California Coast tab of the Sea Level Rise Tool covers the rest of the state’s coast lines. Projects located in inland communities do not have to report this data.

Description of above readout: At a sea level rise scenario of 1.0 meters (mid-century) and during a likely 100 year storm, a couple of residential neighborhoods of Long Beach could have a maximum inundation depth of between 1.01 and 1.5 meters.

Last Updated 3.11.21