SDG&E CAVA Public Workshop

February 12, 2025

Agenda

- Introduction **(10 min)**
- Climate Education **(45 min)**
  - Q&A
- SDG&E Infrastructure Vulnerability Assessment **(45 min)**
  - Q&A
- Break **(15 min)**
- Community Vulnerability Assessment **(45 min)**
  - Q&A
- Wrap Up & What's Next **(20 min)**

Introduction to Climate Adaptation Planning

- Extreme weather events in California and the western United States continue to heighten the need for utilities to expand their capacity to adapt to the changing climate
  - **Key hazards of concern in California include wildfires, extreme temperatures, variations in precipitation, sea level rise and cascading events[1]**
  - **Impacts from these climate hazards could exacerbate pre-existing social inequities[2]**
- In the face of these growing challenges and impacts, SDG&E remains steadfast in its commitment to providing clean, safe, reliable and affordable energy in its service area

We are investing in institutional capacity to integrate climate change risk assessment and vulnerability data into enterprise-wide decision-making, more specifically by developing:

1

Community Engagement Plan (CEP)

A guide to engaging with communities to build impactful climate adaptation measures

2

Climate Adaptation Vulnerability Assessment (CAVA)

Incorporating the best available climate science to assess and adapt to vulnerabilities to utility infrastructure, operations and services

1 – California Public Utilities Commission Decision D.20-08-046.
2 – San Diego Regional Climate Collaborative and San Diego Association of Governments, "An Equity-First Approach to Climate Adaptation" (2022). San Diego Regional Climate Collaborative.

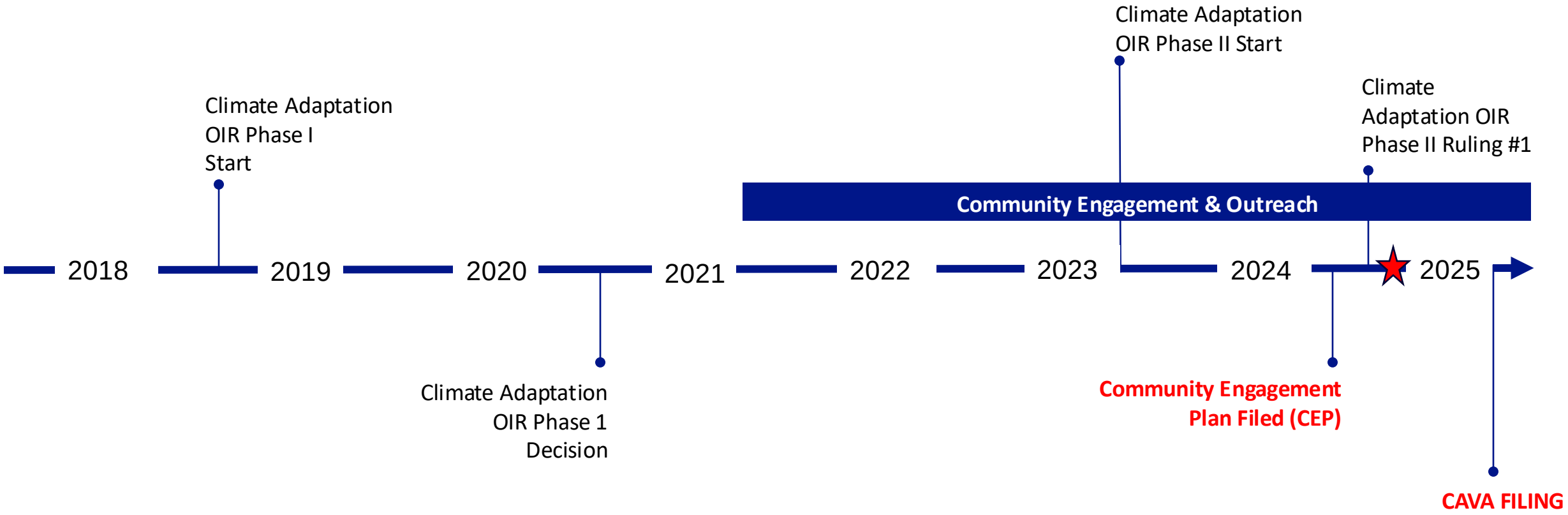
Regulatory Compliance Requirements

- **Order R.18-04-019,** instituted in 2018, established the CAVA process to **identify and address key system vulnerabilities** (physical infrastructure assets, operations and services) to ensure that energy utilities continue to fulfill their mission to provide clean, safe, reliable and affordable service

- Every four years as a Tier 2 Advice Letter, preceded by a Community Engagement Plan, using specific climate variables across set timeframes

- SDG&E's specific pre-filing requirements:
  - ✓ **Hold a workshop discussing CAVA findings 90 days before final submission**
  - ✓ Notify the public 20 days before the workshop
  - ✓ Include an educational session for non-experts
  - ✓ Allow questions and comments from attendees
  - ✓ Summarize stakeholder feedback in the CAVA report

CAVA Timeline

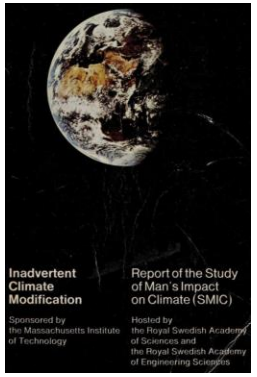


Climate Education

SDG&E CAVA uses the latest climate projection datasets

- **Intergovernmental Panel on Climate Change (IPCC)** is a United Nations body (since 1988) for accessing the science related to climate change
- **IPCC Assessment Reports (ARs)** evaluate the latest scientific, technical, and socioeconomic information regarding climate change
  - Released the 6th Assessment Report (AR6) in 2023

(1971)
Inadvertent Climate Modification: Report of the Study of Man's Impact on Climate



Models not yet organized as CMIP

SDG&E CAVA

CMIP 1 | CMIP 2 | CMIP 3 | CMIP 5 | CMIP 6 | CMIP 7

IPCC FAR (1990) | IPCC SAR (1995) | IPCC TAR (2001) | IPCC AR4 (2007) | IPCC AR5 (2014) | IPCC AR6 (2023) | IPCC AR7 (2029, planned)

2007 Nobel Peace Prize

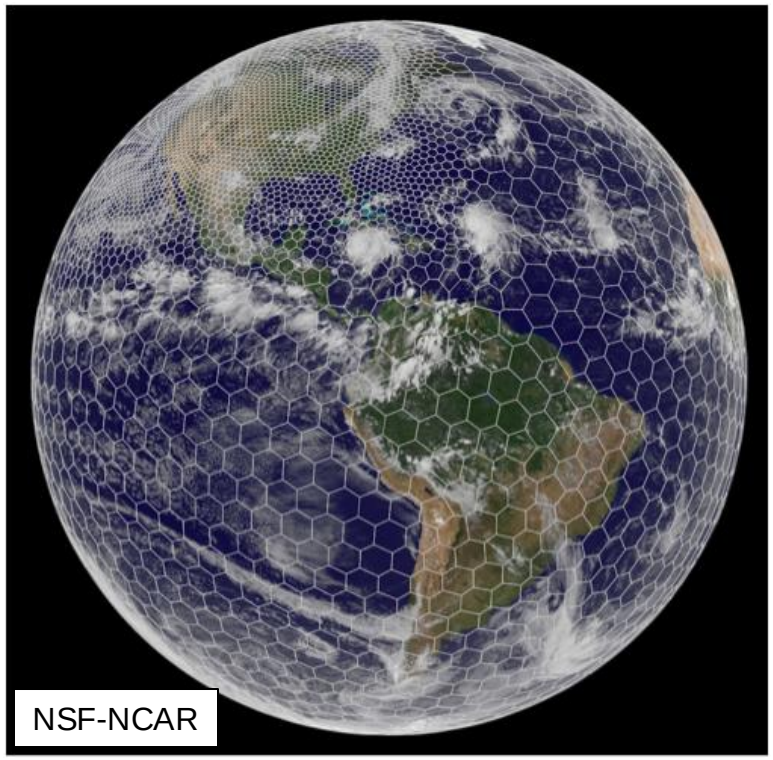
2016 Paris Agreement

5th CA Climate Change Assessment (2026)

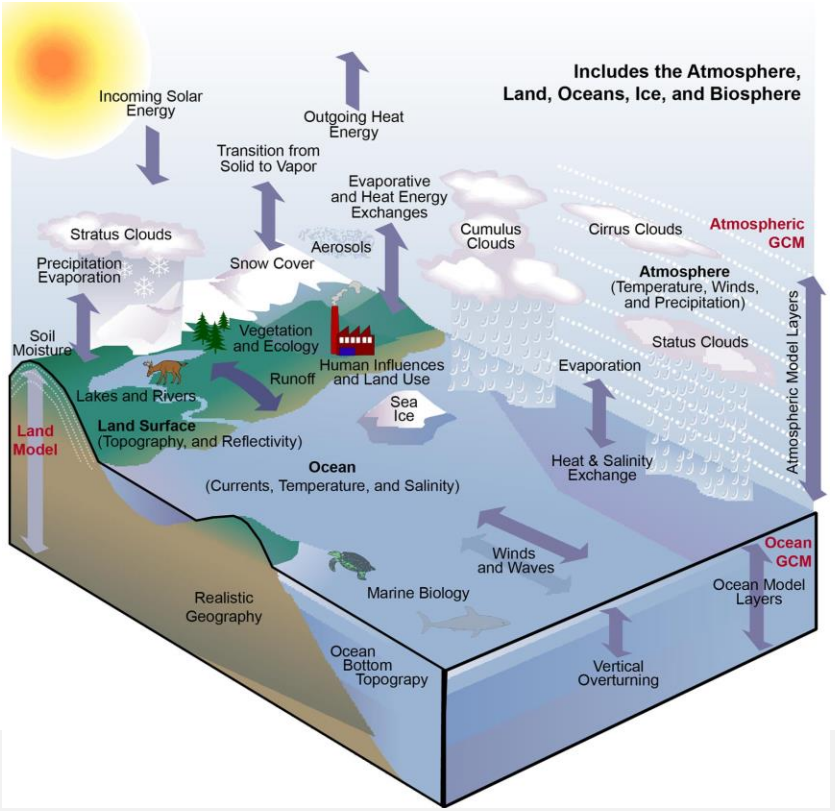
CMIP: Coupled Model Intercomparison Project

Fig. 1 of Emori et al. (2016)

What is a Global Climate Model (GCM)?



- A complex mathematical/numerical model that simulates Earth's climate system to study past, present, and future conditions
- Divides the Earth into a 3D grid and applies differential equations that are based on physics, fluid motion, radiation, biogeochemistry, etc.



Numerically solved (or estimated) with approximations and parameterizations

What is a Coupled Model Intercomparison Project (CMIP)?

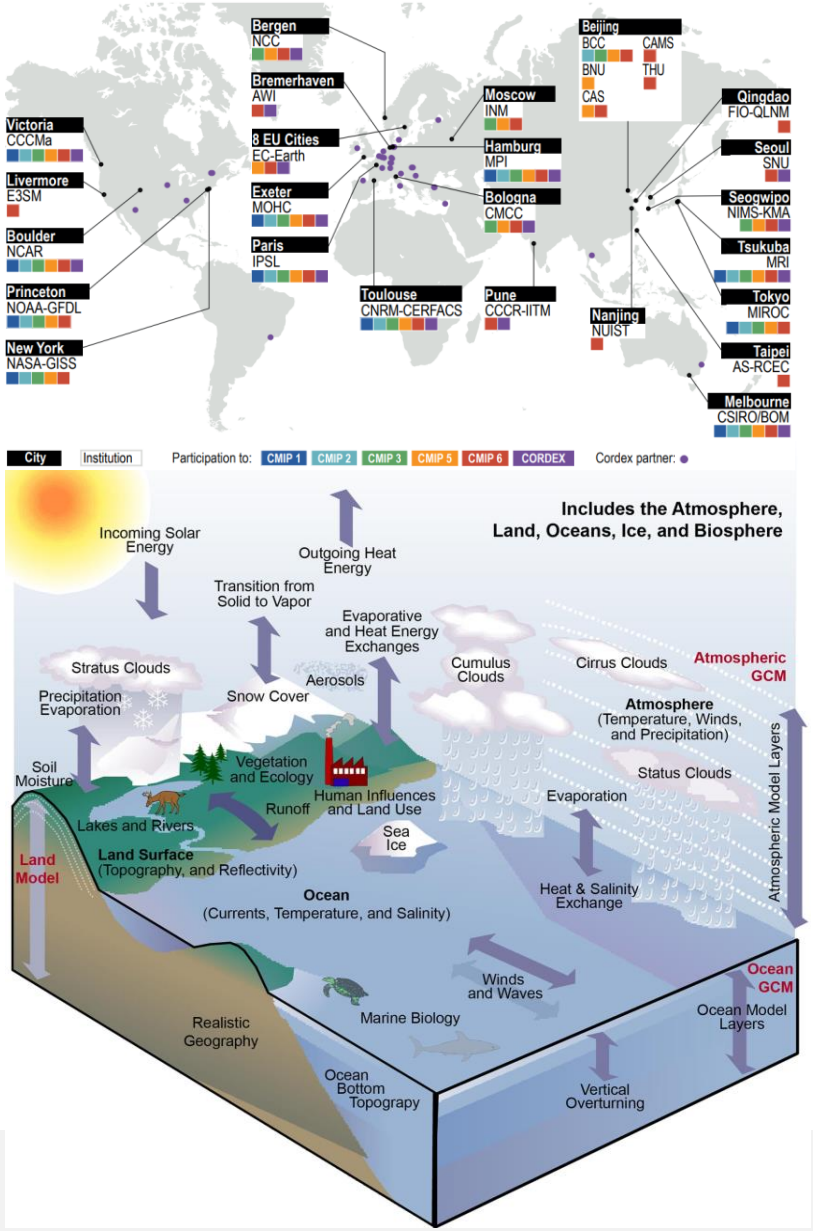
- CMIP is an international climate modeling project, designed to better understand past, present, and future climate change arising from natural, unforced variability or in response to changes in radiative forcings in a multi-model context (Eyring et al. 2016)

- Multiple modeling centers/GCMs participated in CMIPs
  - 25 models in CMIP3, 55 in CMIP5; 60 in CMIP6

- Different GCMs use different simplifications/numerical methods to simulate the Earth's climate system

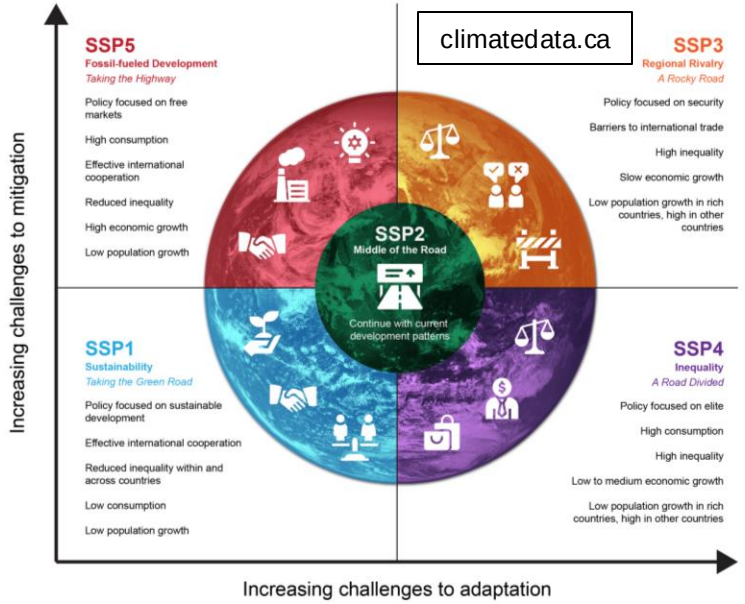
  → Sources of uncertainty

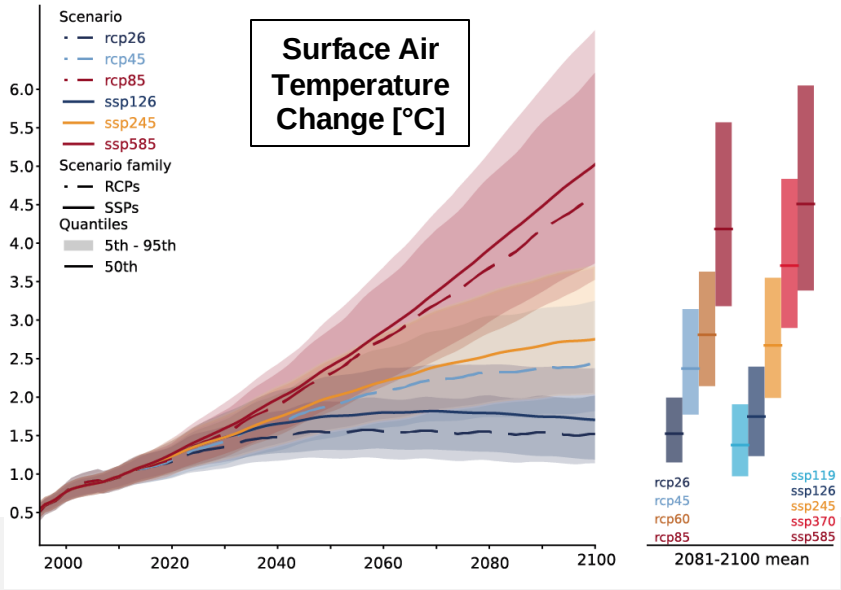
- This multi-model approach helps identify which climate change signal is consistent (or not) across GCMs



CMIP simulations are performed under pre-determined emission scenarios

- CMIP6 simulations have been performed under Shared Socioeconomic Pathway (SSP) scenarios
  - CMIP5 used Representative Concentration Pathway (RCP) scenarios
- CMIP5 RCPs: RCP2.6, **RCP4.5**, RCP6.0, **RCP8.5**
  - 8.5 = 8.5 W m^{-2} change in net radiative forcing from pre-industrial level
- SSP expands on RCP by accounting for different climate change policies (e.g., adaptation and mitigation)
- CMIP6 Tier-1 SSPs: SSP1-2.6, **SSP2-4.5**, **SSP3-7.0**, **SSP5-8.5**
  - SSP2-4.5: Middle of the road, continue with current developments
  - SSP3-7.0: Regional rivalry, rocky road → **Reference SSP for CAVA**
  - SSP5-8.5: Fossil-fueled development, taking the highway





IPCC AR6 WG1

GCM downscaling is needed: Localized Constructed Analogs (LOCA)

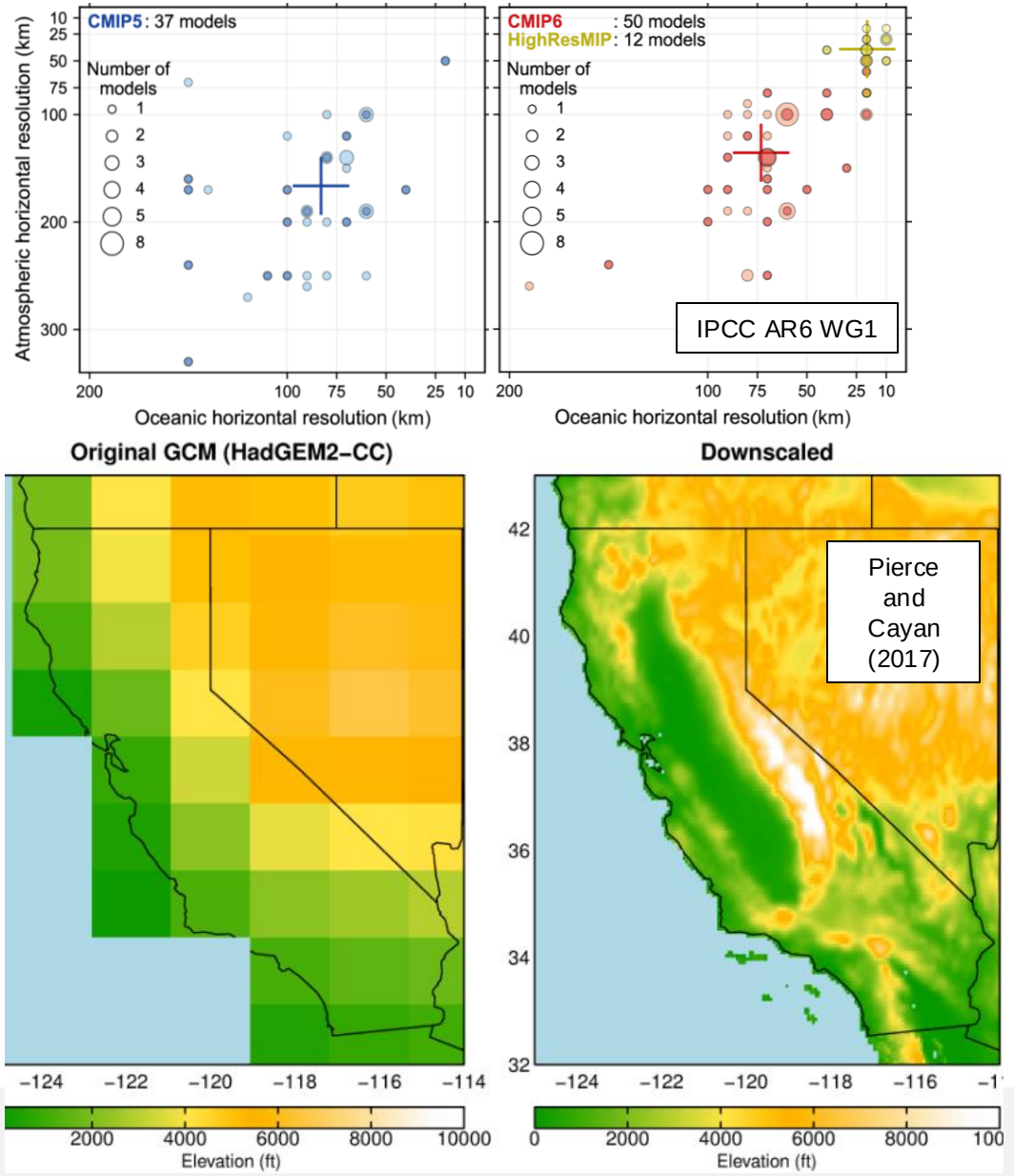
- CMIP simulations were performed on some of the fastest supercomputers available in the world
  - Still too coarse ($\Delta x > 100$ km)

- Downscaling helps better capture California's diverse topography and unique climate characteristics

- LOCA version 2 is a 3 km resolution, statistically downscaled CMIP6 climate dataset for California (hereafter, LOCA2-CA)

- Supported by CA Energy Commission, sourced from Cal-Adapt – the state-supported climate data platform

- Incorporates 15 CMIP6 simulations that performed well locally and globally (Krantz et al. 2021)



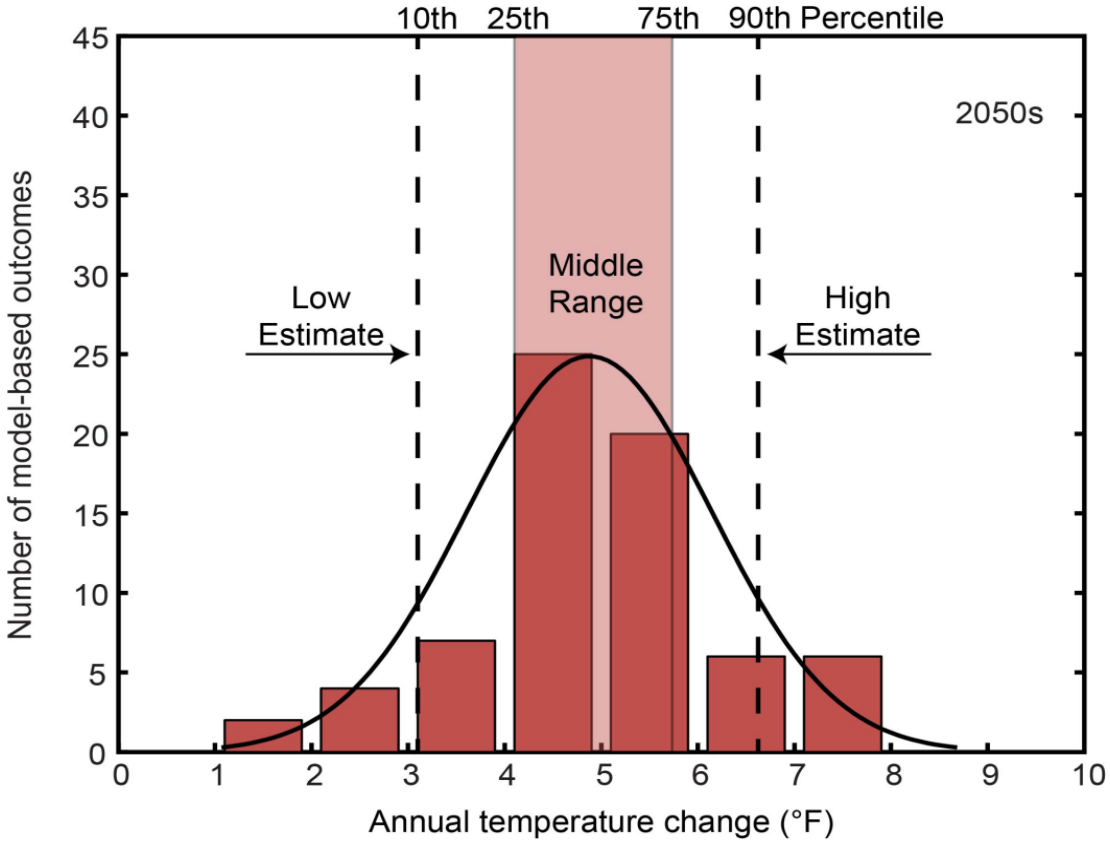
Uncertainty in climate modeling and probabilistic projections

- Sources of GCM uncertainty include:
  - Limitations of GCM formulation and resolution/grid size
  - Model uncertainty in representation of physical processes
  - Scenario uncertainty across emission scenarios
  - Natural variability in Earth's climate
  - Bias and measurement errors in observational data

- CMIP6 GCMs have multiple ensembles to sample a wide range of possible climate change outcomes

- To quantify a full range of future climate exposure, SDG&E CAVA quantifies uncertainty in two ways:
  - Model uncertainty using the 10th through 90th percentiles of the model ensembles
  - Median and extreme years for each time horizon (e.g., median year projections in 2041-2060 for Year 2050)

For example, model uncertainty can be visualized using an **ensemble of GCM simulations** to evaluate a **range of potential future outcomes**



Modeled Climate Hazards

SDG&E CAVA focuses on **7 climate hazards**

Coastal Flooding

Wildfires

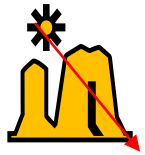
Winter Weather

Landslides

Inland Flooding

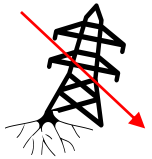
Extreme Heat

Coastal Erosion



Drought

Discussed as amplifier of wildfire



Subsidence

De-ramped

How do these climate hazards impact SDG&E?

Extreme Heat

- A long-duration heat wave in September 2022 caused temperatures to reach above 100 °F in many places, leading to thousands of customers without power

Wildfires

- Higher temperatures & lower humidity/rain exacerbate drought, impacting the magnitude, timing, frequency of wildfires (e.g., 2025 Border 2/Otay Fire)

Sea Level Rise

- Average sea level has already risen ~6 inches in the last 100 yrs
- Rate of sea level rise is projected to increase by mid-century
- King tides near winter solstices

Heavy Rain and Flooding

- Historically, flooding occurs during the wetter season (e.g., January 2024) or when heavy rain follows extended drought periods

Extreme Winter Weather

- While rare, icing and snow events has impacted transmission and telecommunication assets and roadway access to repair

SDG&E Climate Change Projection Datasets

Hazard	Data Source(s)
Extreme Heat	LOCA2-CA temperature
Wildfire	Canadian Fire Weather Index (C-FWI) and USDA/USFS Wildfire Risk to Communities
Inland Flooding	LOCA2-CA Variable Infiltration Capacity (VIC) and LOCA2-CA precipitation
Coastal Flooding	Coastal Storm Modeling System (CoSMoS) storm and CMIP6 sea-level rise (SLR) projections at La Jolla, CA tide gauge by California Ocean Protection Council (OPC)
Coastal Erosion	Medium and high sea-level rise CoSMoS-projected cliff retreat and shoreline conditions and CMIP6 SLR projections provided by CA OPC
Landslide	CA Dept. of Conservation/Geological Survey Deep Landslide Susceptibility Rating, LOCA2-CA precipitation

- SSP2-4.5, SSP3-7.0, and SSP5-8.5
- Focused on baseline (1995-2014), 2030, 2050, and 2070 time horizons using 20-year bands
- Using model ensemble 50th and 90th percentiles (P50 and P90)
- Evaluating 20-year median (P50) and extreme (P95) years

Climate Variables for SDG&E Exposure Calculations

Climate Hazard	Climate Variables
Extreme Heat	• Number of days with daily maximum temperature over 104°F (40°C) • Number of days with daily maximum temperature over 100.4°F (38°C) • Number of days with daily average temperature over 77°F (25°C)
Wildfire	• Annual number of days above historical 95th percentile Canadian Fire Weather Index (C-FWI) • Historical Wildfire Probability
Inland Flooding	• Annual maximum 1-day runoff • Annual maximum 3-day precipitation
Coastal Flooding	• Inundation from Sea Level Rise + 100-Year Storm Surge • Inundation from Sea Level Rise + 20-Year Storm Surge
Winter Weather	• Review of scientific literature and historical information on icing and snow events in isolated, highest elevations of service territory
Coastal Erosion	• Eroded area from cliff retreat and changes in shoreline conditions
Landslide	• Deep Landslide Susceptibility Rating • 1-in-2-year and 1-in-10-year 60-day precipitation total

Cascading & Compound Events

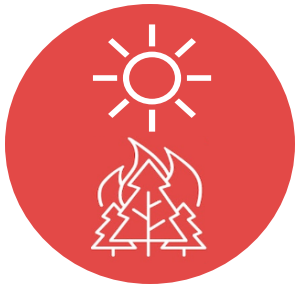
Cascading events	Compound events
Chain reaction of multifaceted weather and climate events that occur in **succession**	Multiple weather and climate events happening **simultaneously or in quick succession**

SDG&E's Climate and Vulnerability Assessment focuses on **4 cascading events**:

Coastal storms + swells/king tides

Extreme precipitation post-wildfire (debris flow)

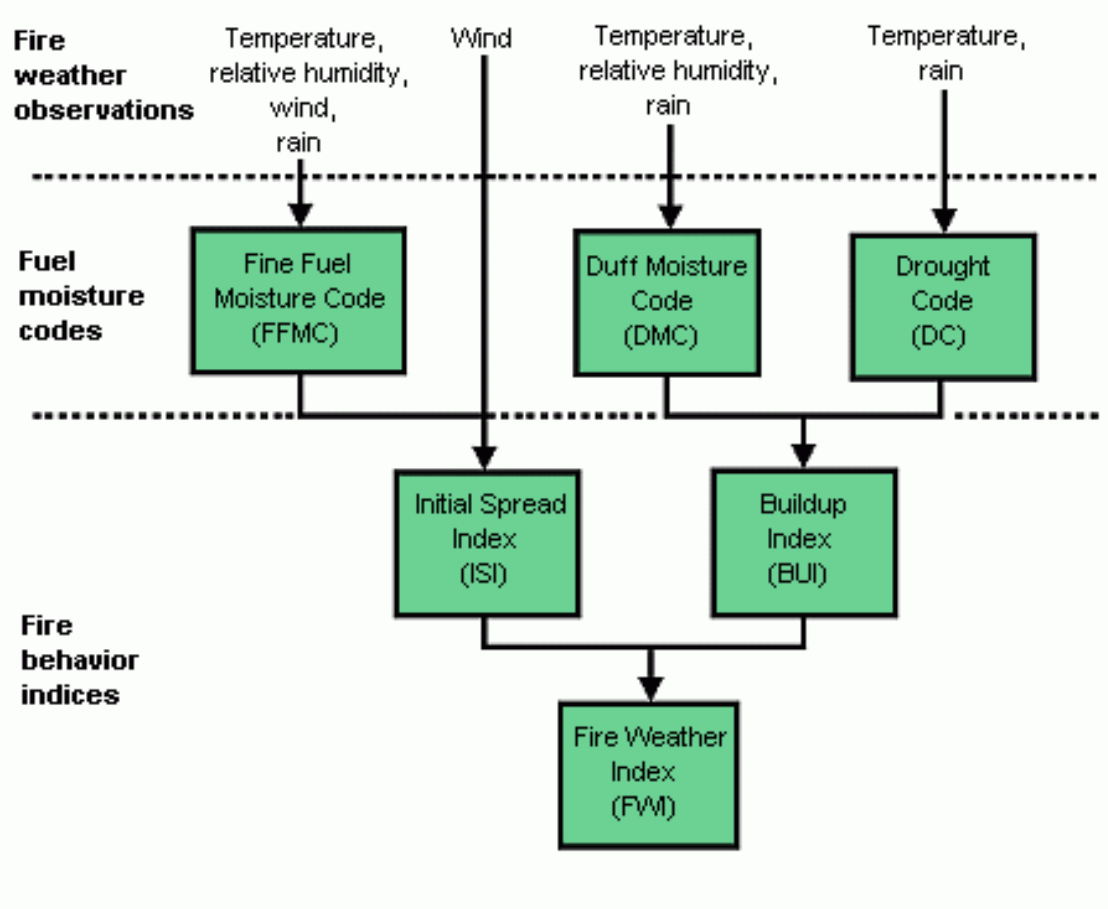
Flooding from atmospheric rivers



Warming-enhanced extreme drought and wildfire

Canadian Fire Weather Index (C-FWI) is used to quantify wildfire risk

- All of CMIP6-based datasets used in SDG&E CAVA are available and produced with support from State of California
- The only exception is the CMIP6-based wildfire projection, which is still in progress
- SDG&E created an alternative wildfire projection using the Canadian Forest Fire Weather Index (C-FWI), widely used in academic research community (e.g., Goss et al. 2020)
- The input to C-FWI is from the 3-km LOCA2-CA



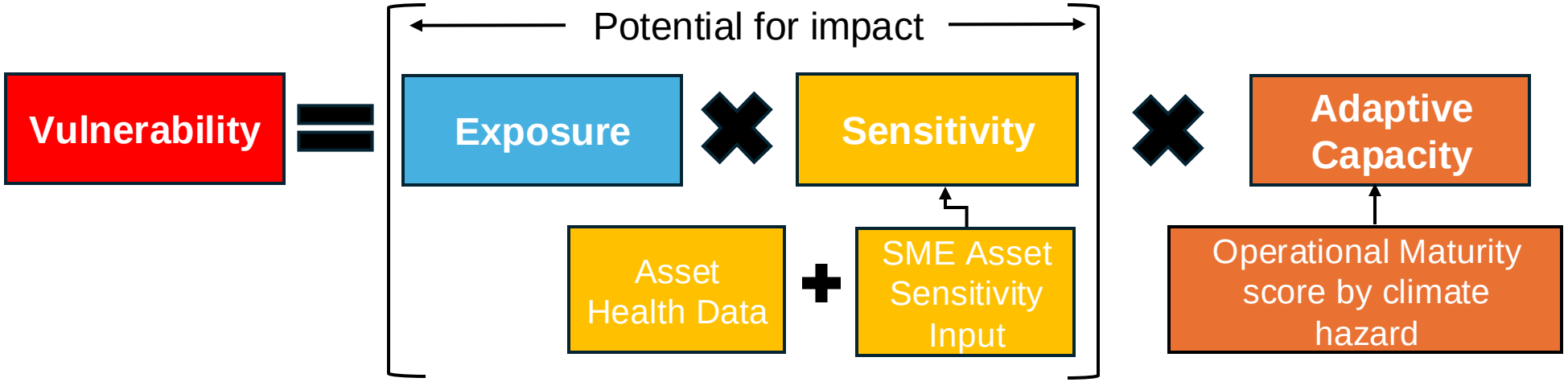
Climate Education

Questions & Feedback

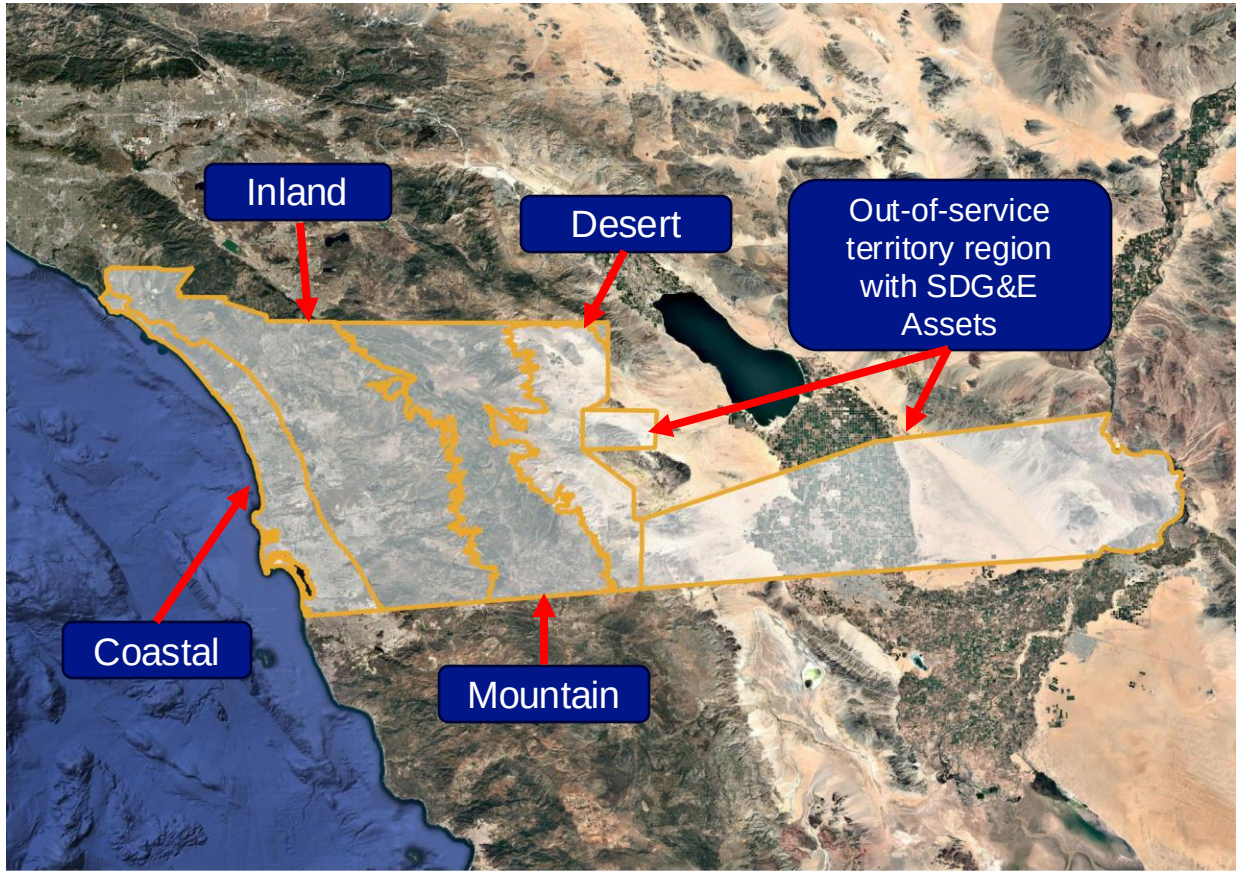
Infrastructure Vulnerability Assessment

Framing System-level Vulnerability

In compliance with the order, SDG&E's climate adaptation vulnerability assessment framework combines exposure, sensitivity, and adaptive capacity at the individual and grouped asset level



Scope & Focus Areas



Climate Hazards Reviewed

Gas and Electrical	Wildfire	Inland Flooding	Coastal Flooding
Gas only	Coastal Erosion	Landslide	
Electrical only	Extreme Heat	Winter Weather	

Asset Grouping

SDG&E's electrical and gas assets were grouped into the following asset families

Asset Family (Electrical)
Distribution
Transmission
Substation
Communications
Facilities*

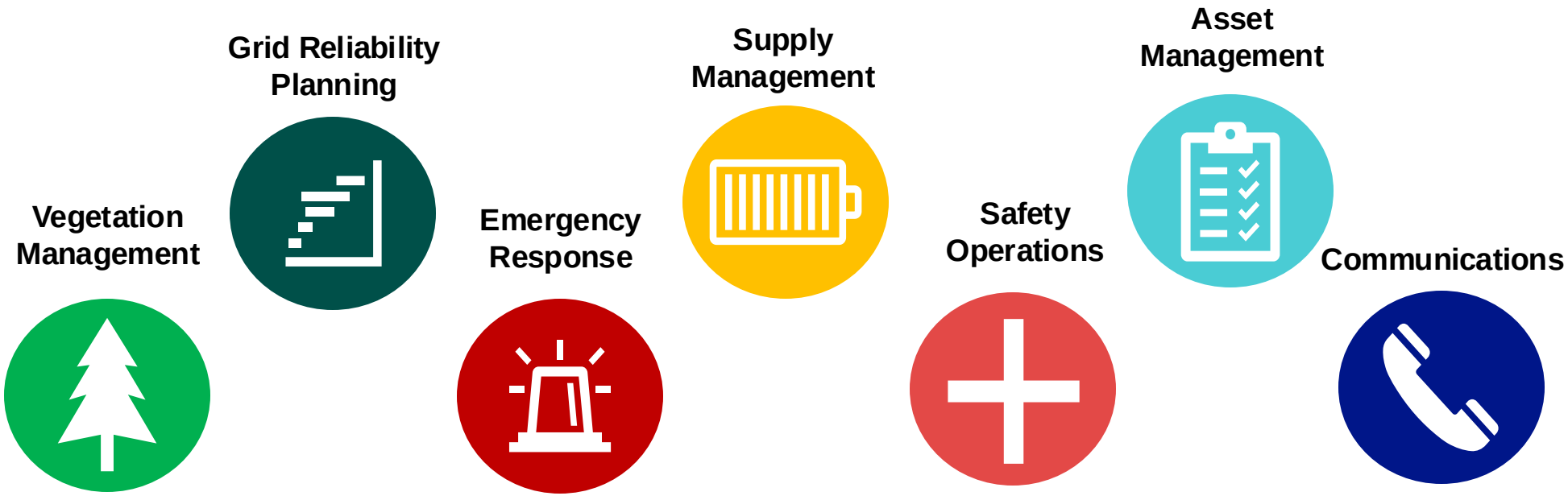
Asset Family (Gas)
High-Pressure Pipe
Medium-Pressure Pipe
Regulators, Compressors, Valves
Storage Fields**

*Facilities include office buildings where personnel within SDG&E's Electric and Gas businesses work; Gas-only Facilities are accounted for under Regulators, Compressors and Valves

**There are no storage fields in SDG&E service territory, they are included as part of SoCalGas CAVA in other areas of their service territory.

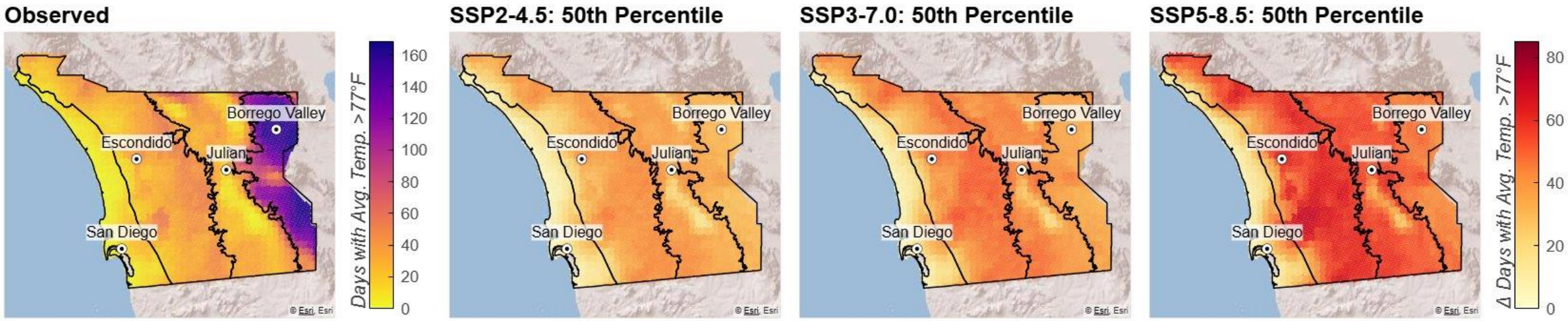
Operations & Services

We reviewed the following operations and services that are key to grid resilience



Exposure Findings – Extreme Heat

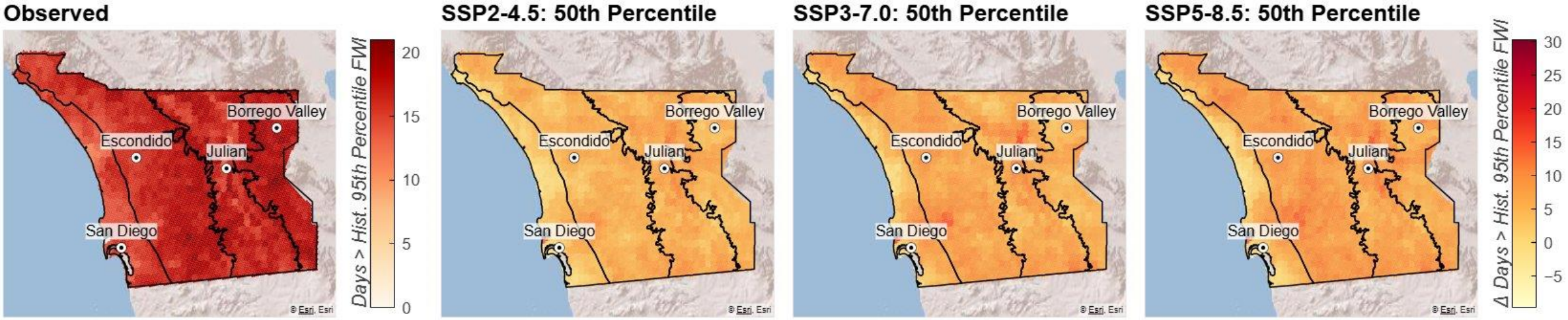
- Exposure to extreme heat is projected to increase steadily through the 21st century across SDG&E's service territory
- Inland and Mountain regions will see the greatest increase in exposure
- Communication and Distribution asset families are projected to experience the greatest change in exposure to extreme heat



Observed and projected changes by 2070 in the number of days with daily average temperature above 77°F.

Exposure Findings – Wildfire

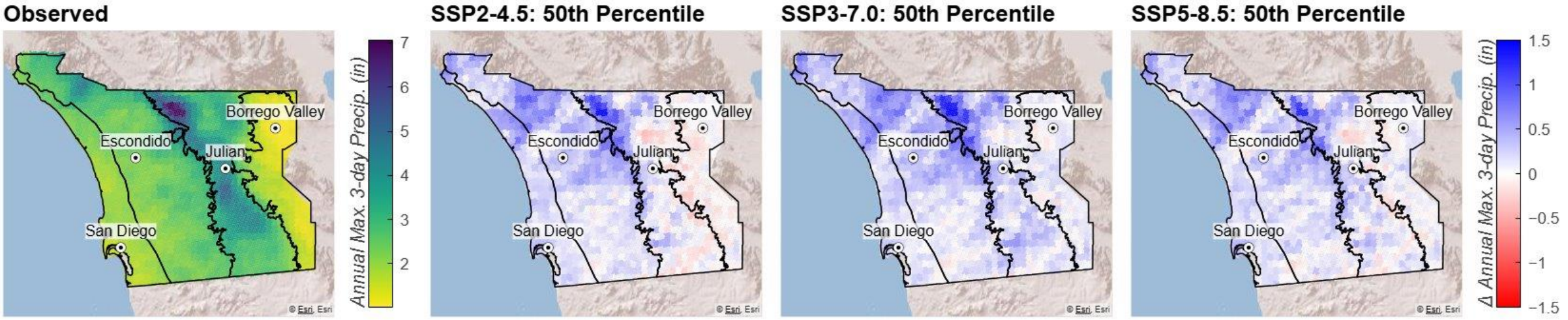
- Exposure to wildfire is projected to increase across the service territory through the 21st century, particularly in the Mountain and Inland regions.
- Communication and Transmission asset families are projected to experience the greatest change in exposure based on Fire Weather Index (FWI)



*Observed and **projected** change by 2070 in the number of days with FWI above the Historical 95th Percentile FWI value.*

Exposure Findings – Inland Flooding

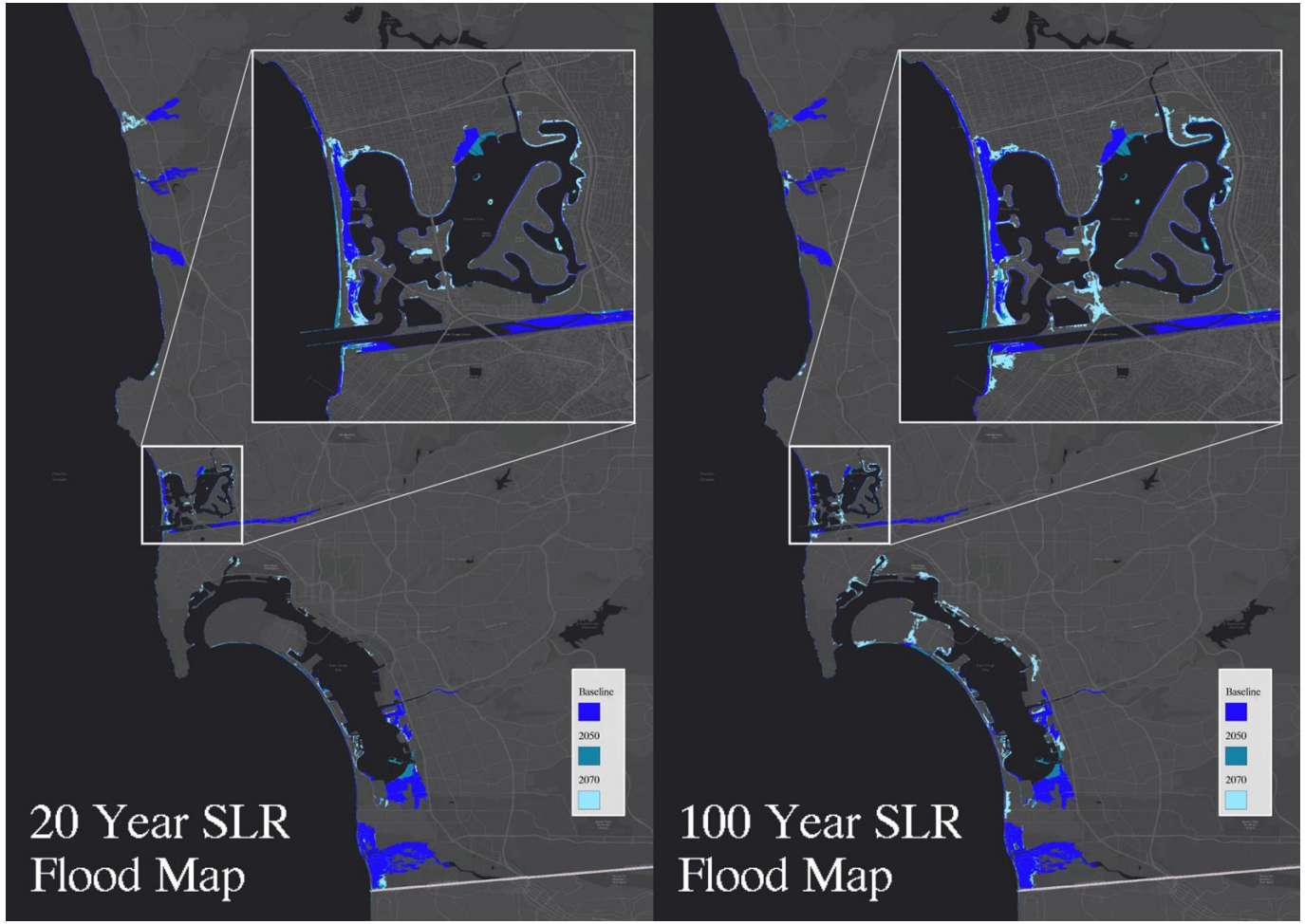
- Exposure to inland flooding is projected to increase across the service territory in the Coastal, Inland, and Mountain regions through the 21st century
- Communication, transmission and substation asset families experience the greatest change in exposure magnitudes



Observed and projected change by 2070 in annual maximum 3-day precipitation.

Exposure Findings – Coastal Flooding

- Only a small percentage of assets are exposed to coastal flooding at present
- By late century, the percentage of exposed assets is projected to more than double
- Substations are expected to experience the most significant increase in exposure, rising from 0.3% of assets in the observed period to 2.2% by 2070



Exposure Findings – Cascading Impacts

- Severe flooding from an atmospheric river (AR) event
- Extreme precipitation following a wildfire event (debris flow)
- Coastal storms coinciding with long-period swells or king tides
- Enhanced warming exacerbating extreme drought and wildfire

Exposure Scoring

Vulnerability = Exposure × Sensitivity × Adaptive Capacity

Hazard	Temperature	
Asset Type	Substation Transformers and Reactors, Distribution OH Transformers, and Distribution Voltage Regulators	
Variable	Number of days with daily maximum temperature over 104°F (40°C)	
Thresholds	**Days**	**Exposure Score**
	0 days	0
	>0 – 0.5 days	1
	>0.5 – 1 days	2
	>1 – 3 days	3
	>3 – 10 days	4
	>10 days	5

- Exposure scores are determined by intersecting the results of climate projections with the geospatial location of an asset
- Exposure is scored in a scale from 0 to 5 using values of the projected climate variables which are associated with asset design or operational standards

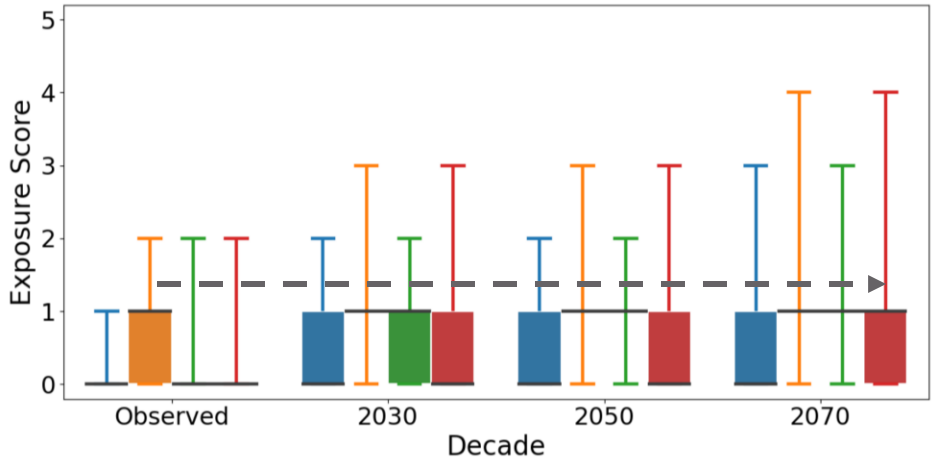
Exposure Scoring

Vulnerability = Exposure × Sensitivity × Adaptive Capacity

Extreme temperature exposure scores

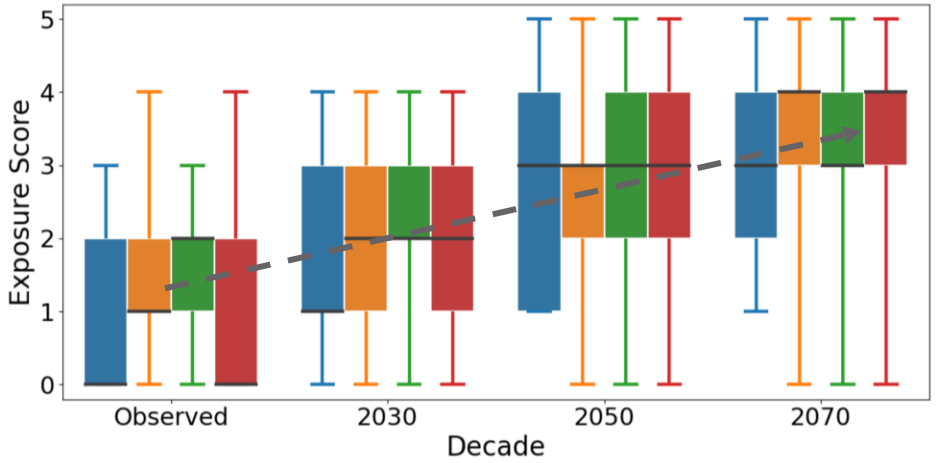
Coastal Areas

Minimal change



Inland Valleys

Increasing trend



Asset Family

- Substations
- Distribution
- Transmission
- Telecom

Sensitivity Scoring - Electrical

Vulnerability = Exposure × Sensitivity × Adaptive Capacity

The asset sensitivity to the exposure of each hazard was coordinated with SDG&E subject matter experts of each asset type. In addition, asset health is incorporated to arrive at asset-specific sensitivity scores

Sensitivity scoring matrix

Score	Explanation
N/A (0)	No adverse impacts.
Minimal (1)	Effects are minimal
Low (2)	Minimal adverse impacts, although long-term impacts may occur
Moderate (3)	Moderate, repairable physical damage
High (4)	Significant physical damage and possible prolonged operational disruptions
Severe (5)	Sudden failure, damage, and long-term outages

Sensitivity summary by asset type

Asset Type				
Transmission	4	3	4	3
Distribution	4	5	5	5
Substations	4	3	5	2
Communication	3	3	4	5
Facilities	3	4	4	4

Sensitivity Scoring - Gas

Vulnerability = Exposure ✖ Sensitivity ✖ Adaptive Capacity

The asset sensitivity to the exposure of each hazard was coordinated with SDG&E SMEs by asset type. In addition, asset consequence (i.e., criticality for the system) is incorporated to arrive at asset-family sensitivity scores

Sensitivity scoring matrix

Score	Explanation
N/A (0)	No adverse impacts.
Minimal (1)	Effects are minimal
Low (2)	Minimal adverse impacts, although long-term impacts may occur
Moderate (3)	Moderate, repairable physical damage
High (4)	Significant physical damage and possible prolonged operational disruptions
Severe (5)	Sudden failure, damage, and long-term outages

Sensitivity summary by asset type

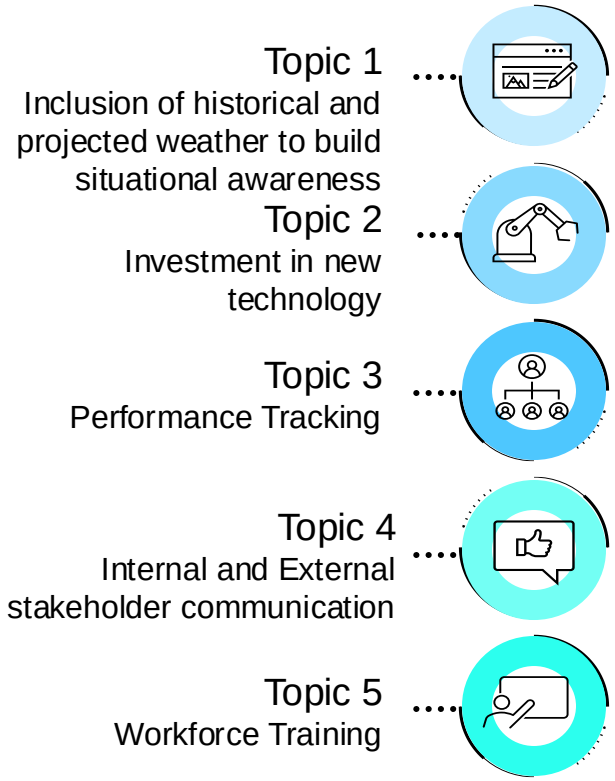
Asset Type					
High-Pressure Pipe	5	4	4	3	5
Medium-Pressure Pipe	3	3	3	3	3
Regulators, Compressor, Valves	5	5	5	5	5

Adaptive Capacity Scoring- Electrical

Vulnerability = Exposure ✖ Sensitivity ✖ Adaptive Capacity

The ability to moderate negative outcomes was characterized by scoring the operational maturity to each climate hazard. Operational maturity was scored from **0 to 5** by assessing five topics associated with resilient practices. The average operational maturity score was used to obtain the adaptive capacity multiplier.

Maturity Level Criteria



Adapted from Zamuda et al. 2019

Adaptive Capacity Scores by Climate Hazard

Hazard	Average Operational Maturity Score	Adaptive Capacity Score
Extreme Heat	3.1	0.969
Wildfire	4.4	0.956
Coastal Flooding	3.1	0.969
Inland Flooding	3.1	0.969

Adaptive Capacity Scoring - Gas

Vulnerability = Exposure ✖ Sensitivity ✖ Adaptive Capacity

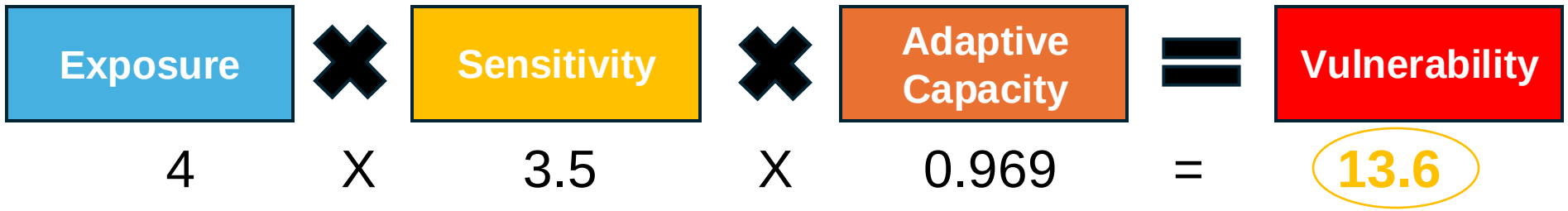
The ability to moderate negative outcomes was characterized by scoring the operational maturity to each climate hazard. Operational maturity was scored from **0 to 5** by assessing the extent to which current planning and operational measures may address the climate hazard

Adaptive Capacity Scores by Climate Hazard

Asset Class	Coastal Erosion	Coastal Flooding	Inland Flooding	Landslide	Wildfire
High-Pressure Pipe	3	3	3	3	3
Medium-Pressure Pipe	3	3	3	3	3
Regulators, Compressors, Valves	5	5	5	3	3

Vulnerability Scoring

Exposure, sensitivity, and adaptive capacity were combined into an asset-specific vulnerability score as shown in the example below. To summarize the vulnerability results, the values were categorized as low, medium or high according to the rubric shown below.



Vulnerability categorization rubric:

- Low (de-ramped) [<10]
- Medium (monitored) [10 - 18]
- High (prioritized) [>18 to 25]

Vulnerability Summary- Observed

The table summarizes the top 10% most vulnerable category of any component within each asset family-hazard combination

Asset Classes		Extreme Heat	Wildfire	Coastal Flooding	Inland Flooding	Landslides	Costal Erosion
Electrical	Transmission					N/A	N/A
	Distribution					N/A	N/A
	Substation					N/A	N/A
	Telecomm					N/A	N/A
	Facilities					N/A	N/A
Gas	High-Pressure Pipe	N/A					
	Medium-Pressure Pipe	N/A					
	Regulators, Compressors, Valves	N/A					

Legend:

- Low
- Medium
- High

Vulnerability Summary - 2070

Compared to observed vulnerability, by 2070, there are notable shifts towards medium and high vulnerability for all electrical asset classes & extreme heat as well as wildfire (except for substations)

Legend:

- Low
- Medium
- High

Asset Classes		Extreme Heat	Wildfire	Coastal Flooding	Inland Flooding	Landslides	Costal Erosion
Electrical	Transmission					N/A	N/A
	Distribution					N/A	N/A
	Substation					N/A	N/A
	Telecomm					N/A	N/A
	Facilities					N/A	N/A
Gas	High-Pressure Pipe	N/A					
	Medium-Pressure Pipe	N/A					
	Regulators, Compressors, Valves	N/A					

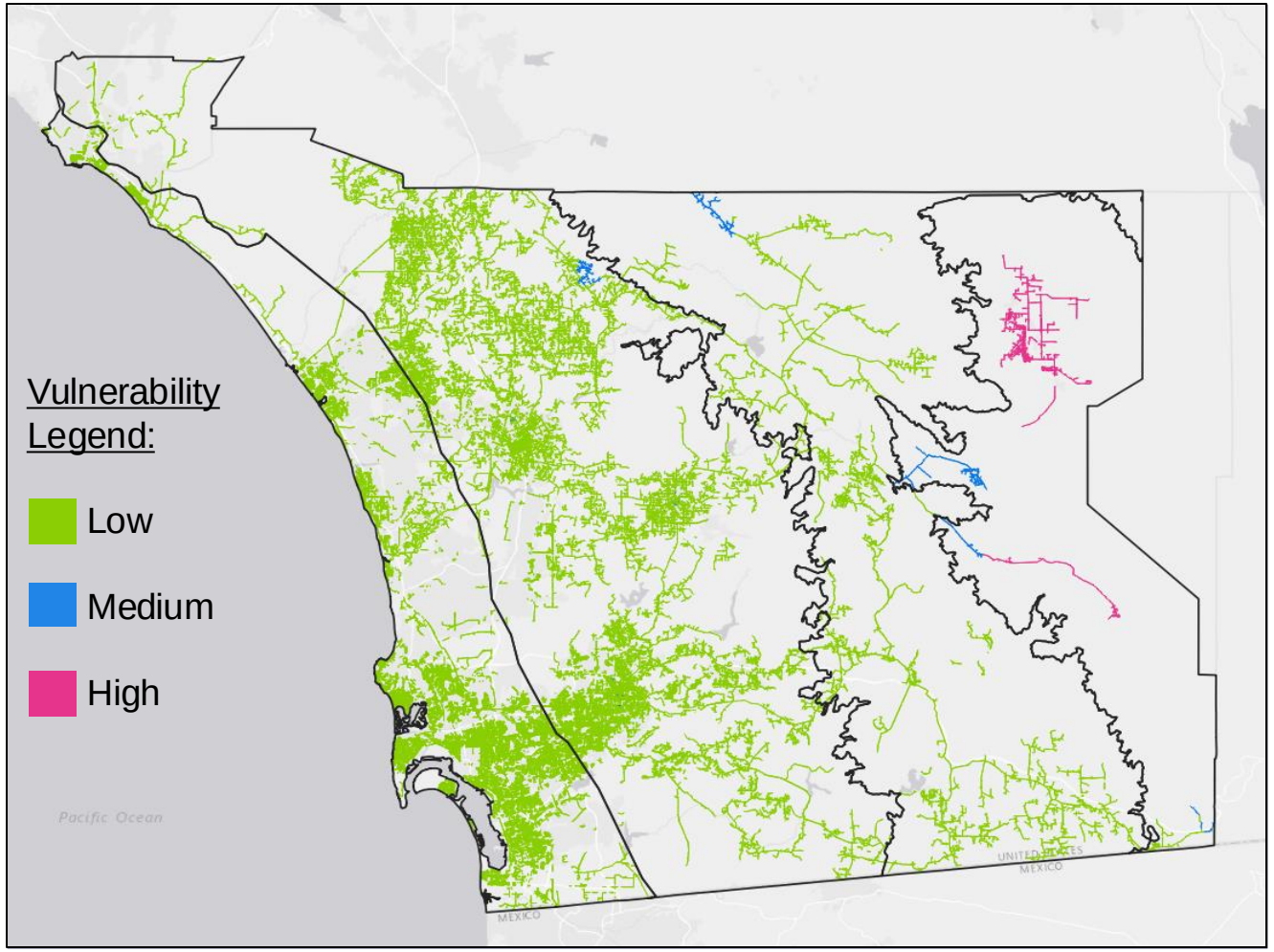
Overhead Conductors & Extreme Heat - Observed

Distribution overhead conductor vulnerability to extreme heat in present-day:

- 98% low
- 1% medium
- 1% high

Other notable assets with observed high vulnerability are:

- overhead transmission lines (6%)
- substation voltage regulators (5%)
- communication centers (11%)



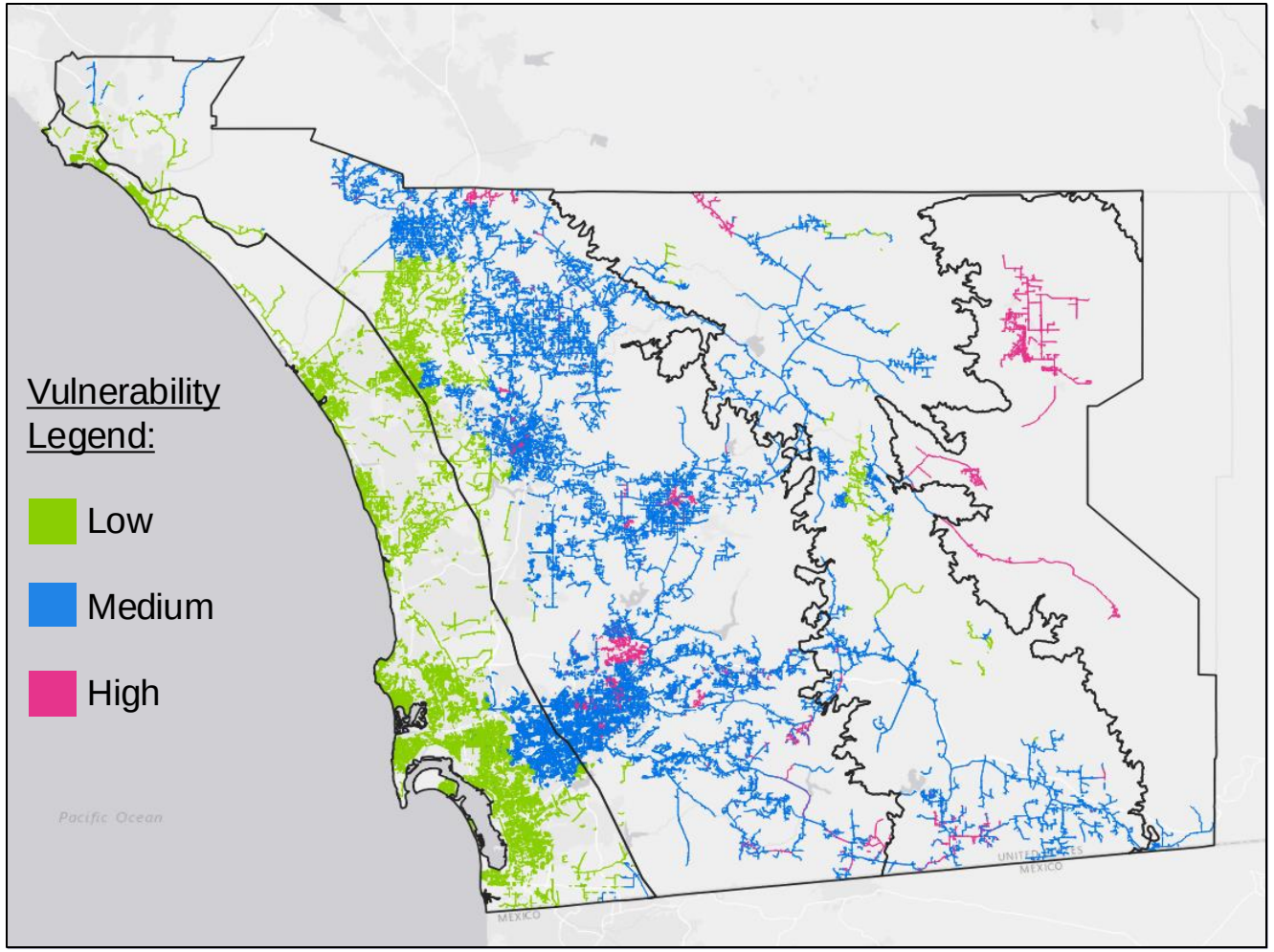
Overhead Conductors & Extreme Heat - 2070

Distribution overhead conductor vulnerability to extreme heat by 2070:

- 41% low
- 53% medium
- 6% high

Other notable assets with observed high vulnerability are:

- overhead transmission lines (26%)
- substation voltage regulators (35%)
- overhead transformers (41%)



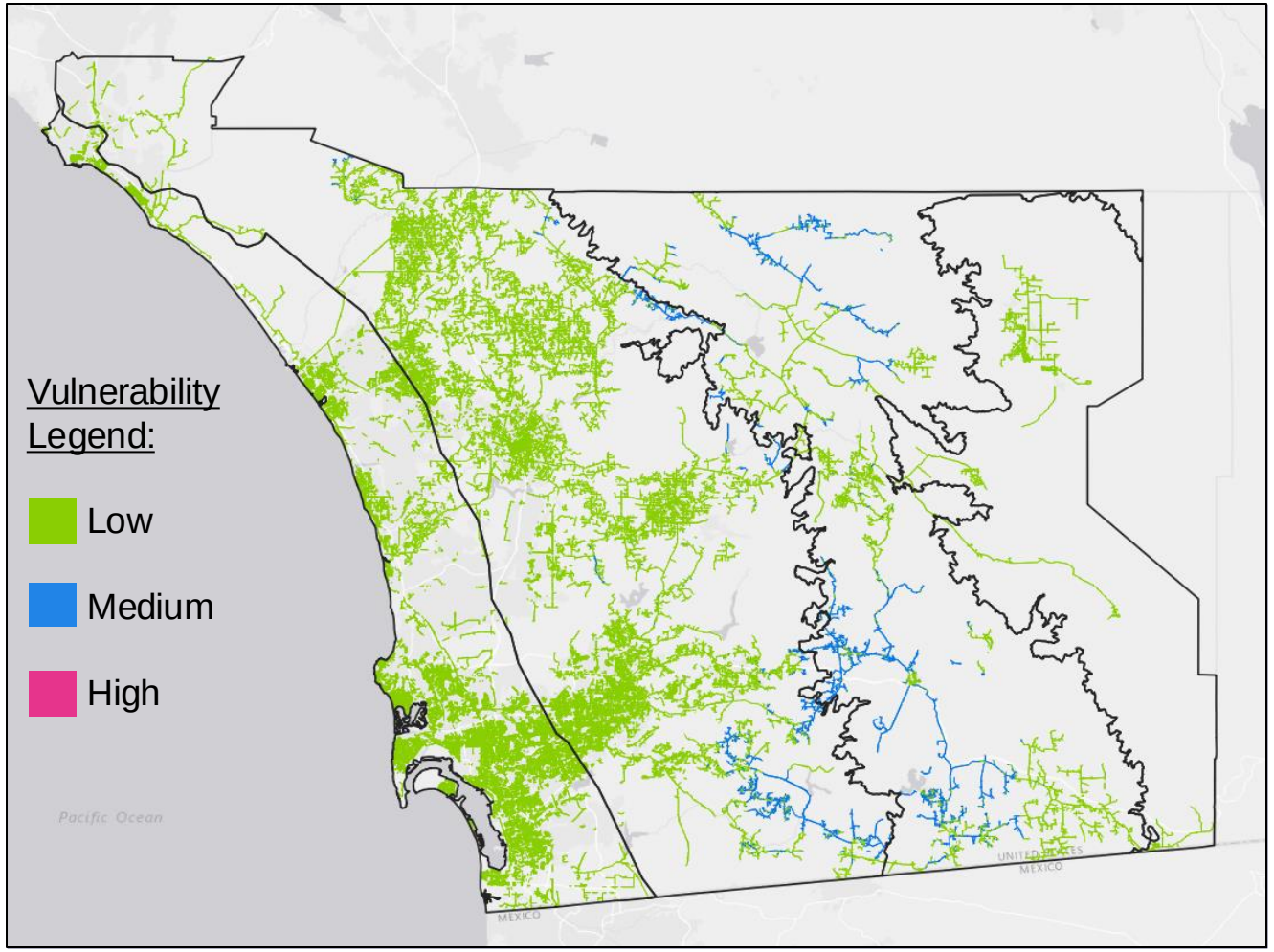
Overhead Conductors & Wildfire- Baseline

Distribution overhead conductor vulnerability to wildfire in present-day:

- 96% low
- 4% medium
- 0% high

Other notable assets with observed medium vulnerability are:

- overhead fiber (18%)
- SCATA RDU (9%)
- communication centers (7%)



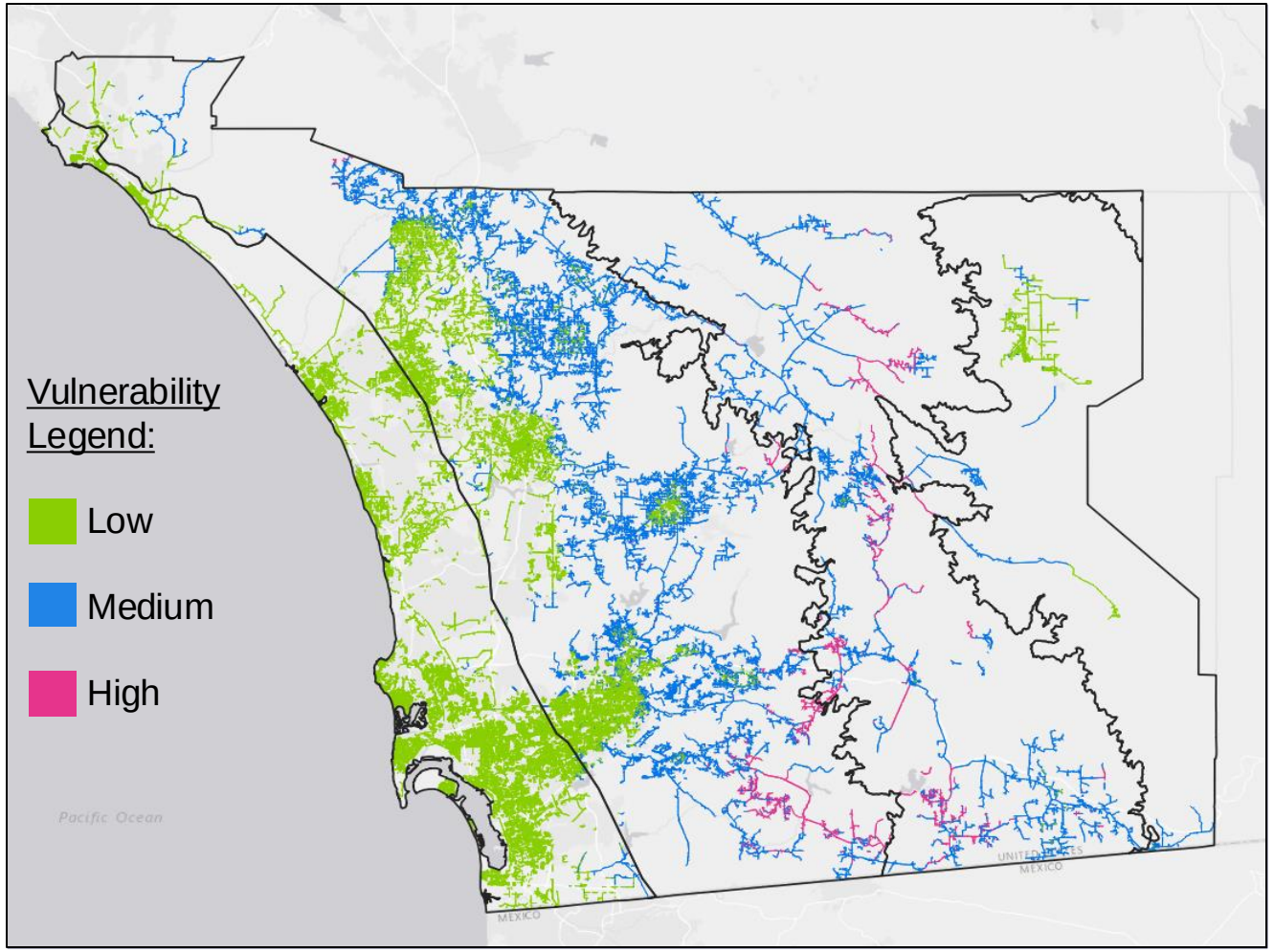
Overhead Conductors & Wildfire- 2070

Distribution overhead conductor vulnerability to wildfire by 2070:

- 66% low
- 31% medium
- 3% high

Other notable assets with observed high vulnerability are:

- overhead fibers (15%)
- SCADA RTU (7%)
- communication centers (7%)



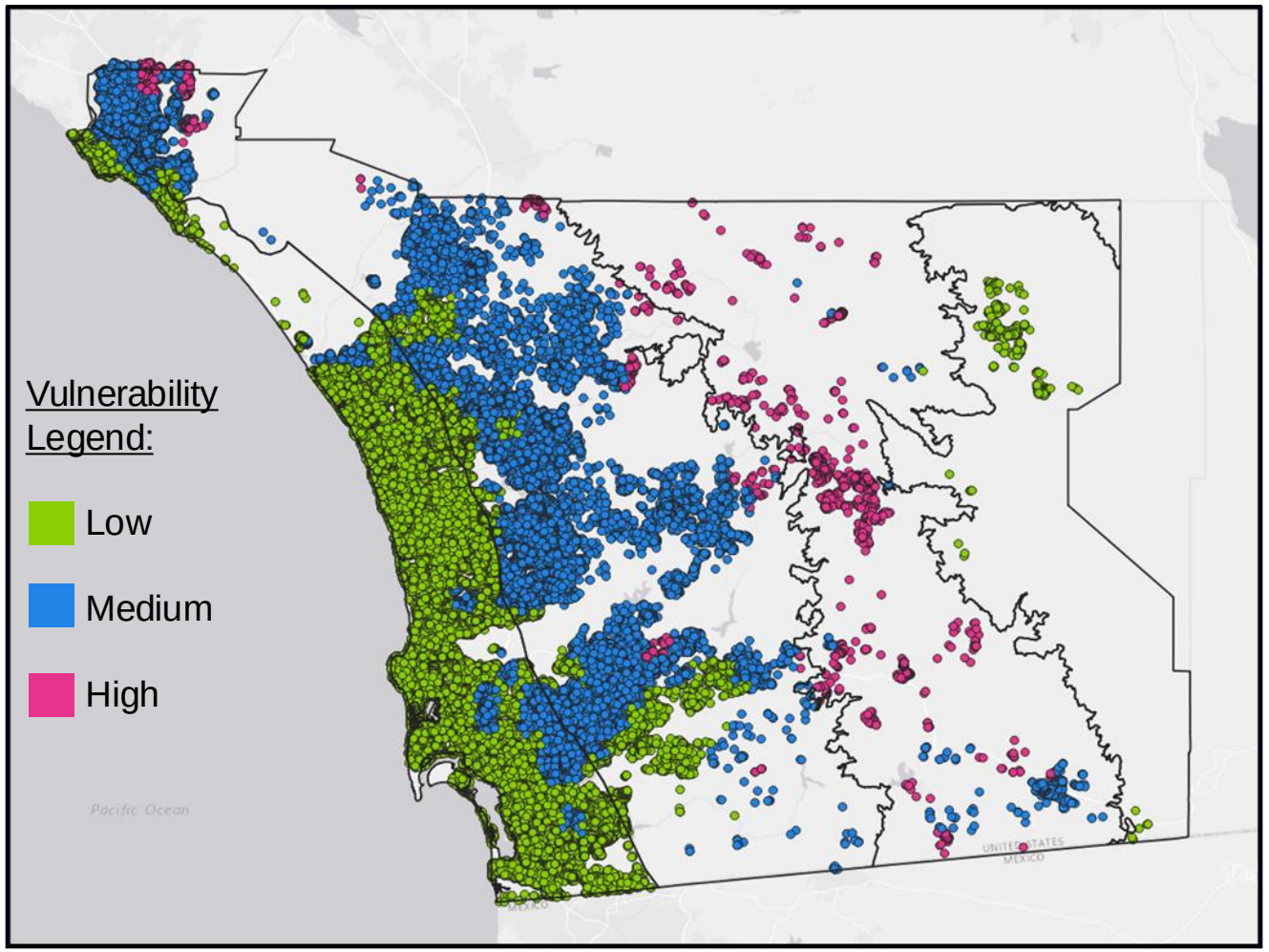
Pad-mount Transformers & Inland Flooding - Observed

Distribution pad-mount transformers vulnerability to inland flooding in present-day:

- 55% low
- 43% medium
- 2% high

Other notable assets with observed high vulnerability are:

- communication centers (5%)
- dynamic protection devices (2%)
- overhead transmission structures (2%)



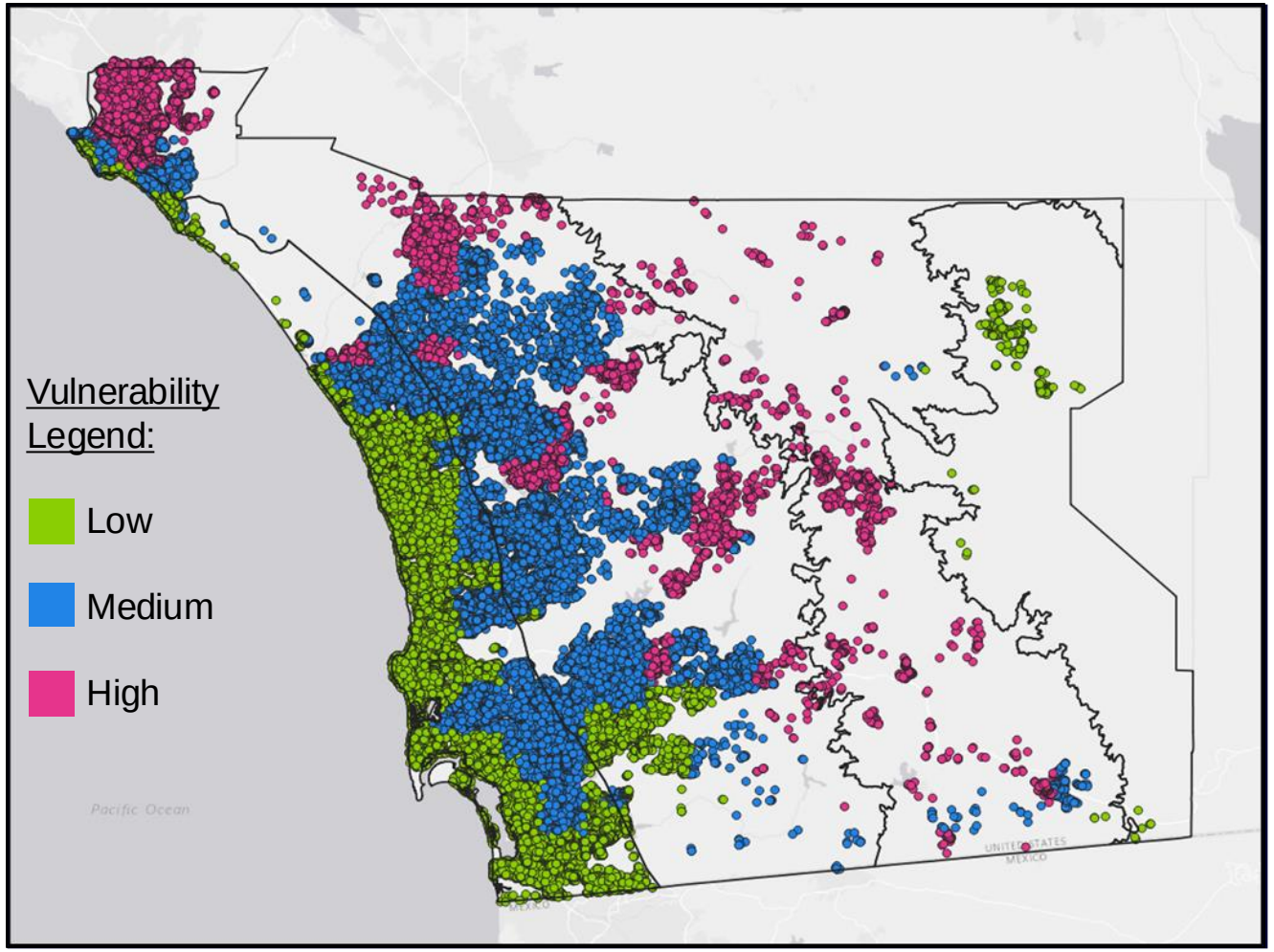
Pad-mount Transformers & Inland Flooding - 2070

Distribution pad-mount transformers vulnerability to inland flooding by 2070:

- 36% low
- 50% medium
- 14% high

Other notable assets with observed high vulnerability are:

- communication centers (11%)
- dynamic protection devices (7%)
- pad-mount switches (10%)



Substation Transformers & Coastal Flooding – Observed + 2070

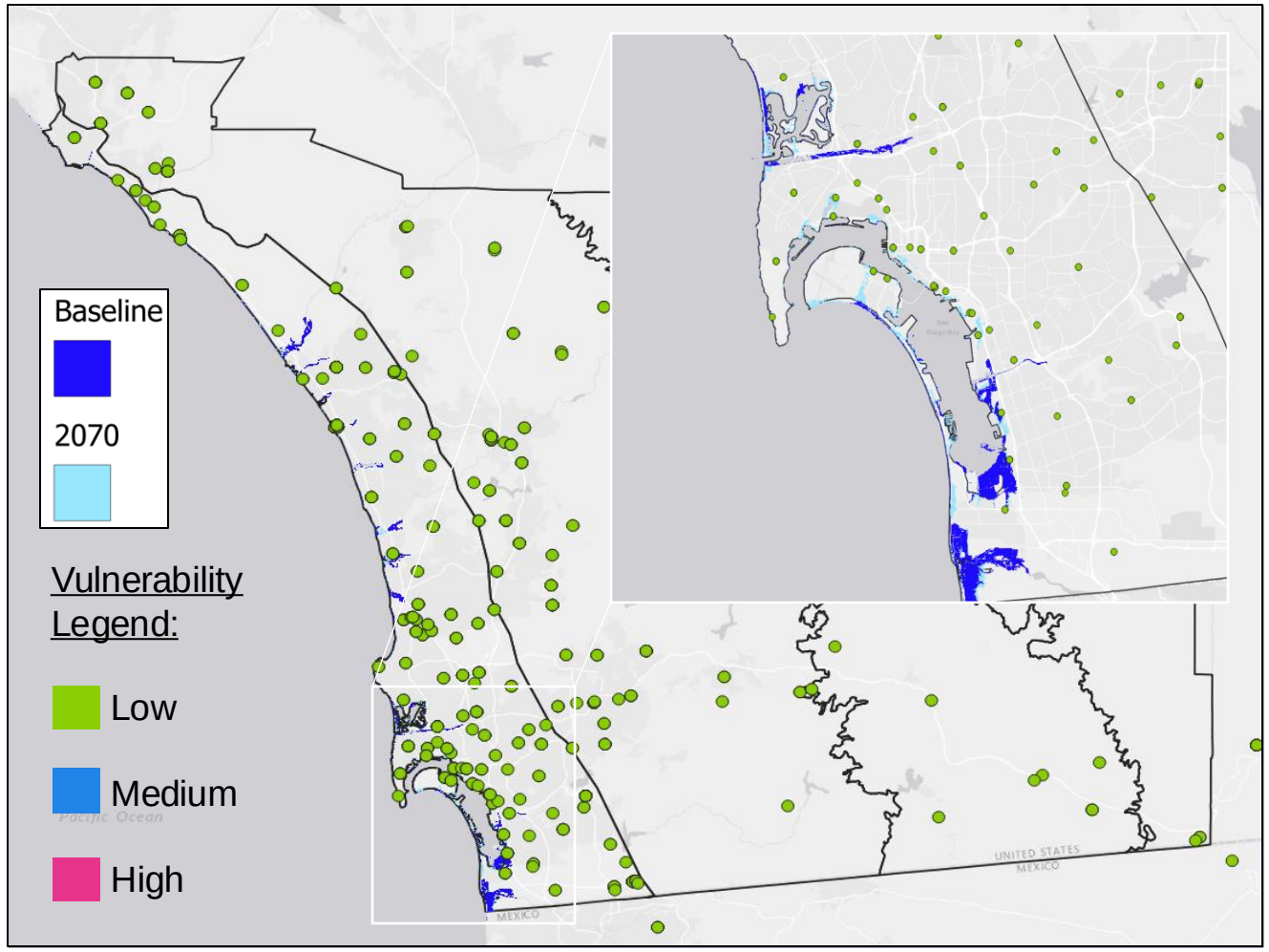
Substation transformers vulnerability to coastal flooding during present-day and by 2070:

- 100% are low
- 0% are medium or high

There are 5 substations within the 100-year floodplain + SLR

Other notable assets with observed high vulnerability are:

- underground transmission lines (0.8%)
- substation capacitor banks (0.5%)
- substation switchgear (0.5%)



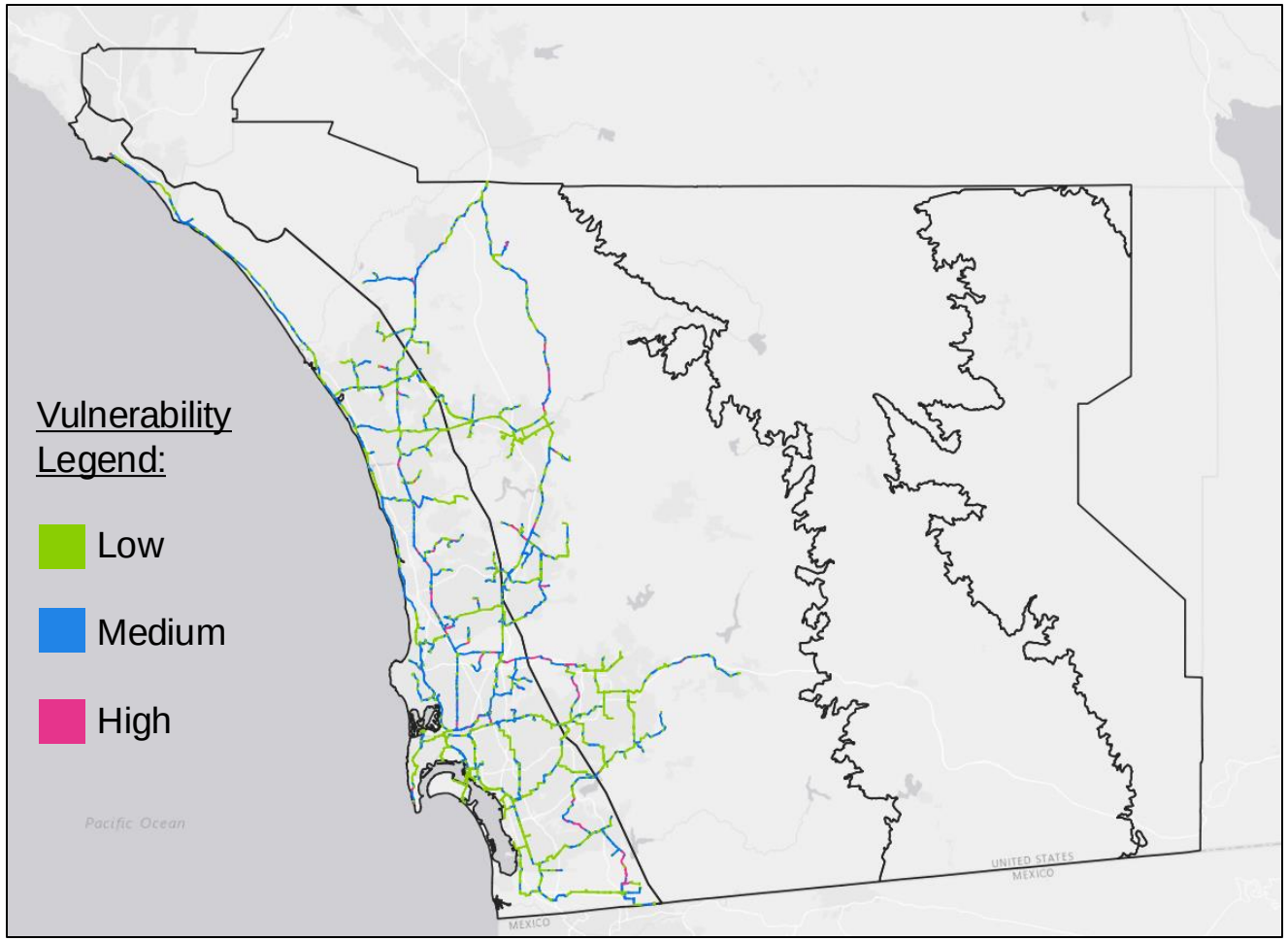
High Pressure Pipe & Landslides- Observed

High Pressure Pipe vulnerability to landslides in present-day:

- 69% are low
- 29% are medium
- 2% high

Other notable assets with observed medium vulnerability are:

- Medium pressure pipes (15%)
- Regulators (19%)



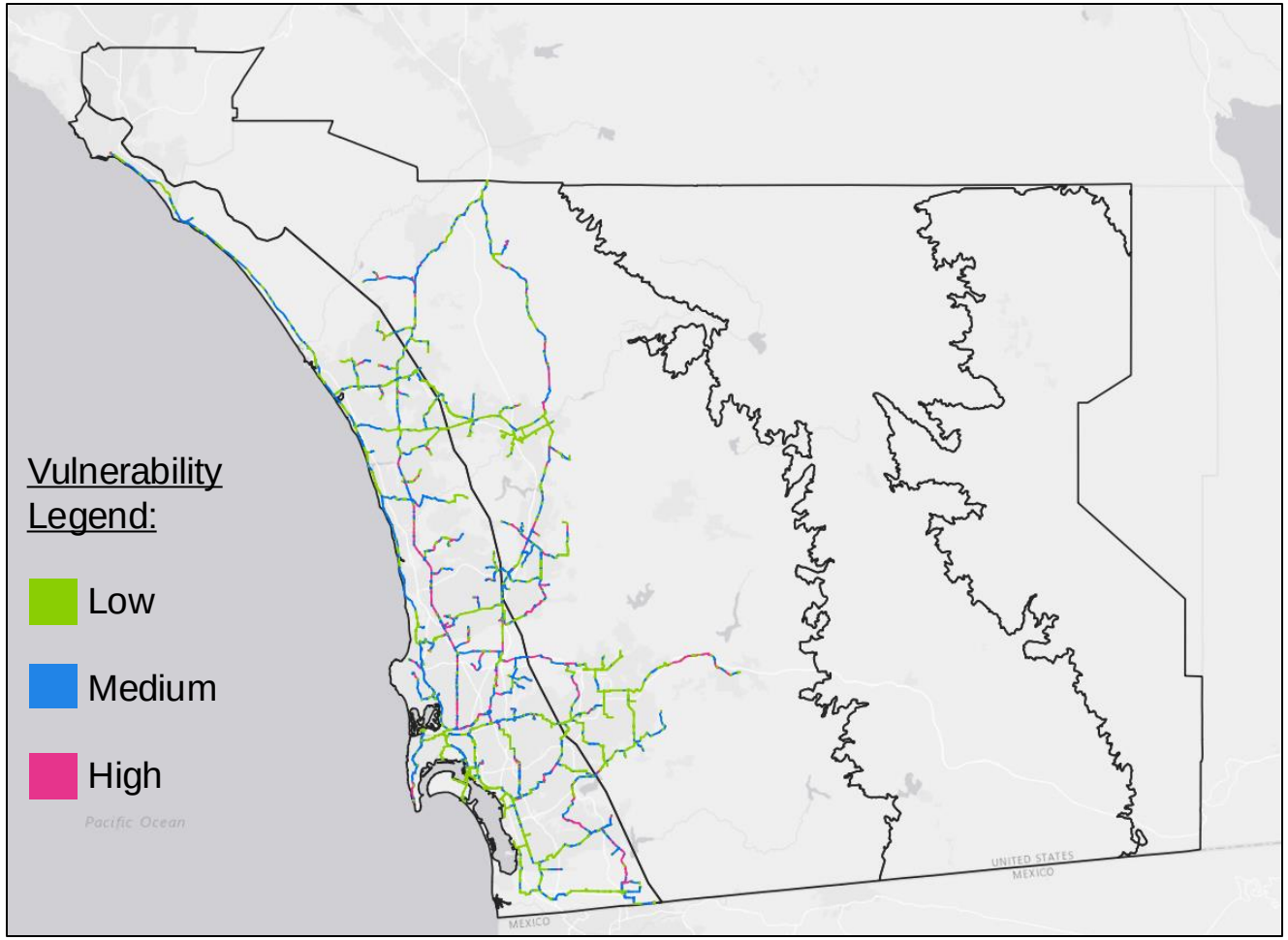
High Pressure Pipe & Landslides- 2070

High Pressure Pipe vulnerability to landslides by 2070:

- 65% are low
- 29% are medium
- 6% high

Other notable assets with observed high vulnerability are:

- Regulators (2.6%)
- Controllable gas valves (1.1%)



SDG&E's Gas System Takeaways

Wildfire

Landslide

Inland Flood

Coastal Flood

Coastal Erosion

- Above-ground gas assets are exposed to multiple climate hazards. Regulator stations, city gate stations, and compressor stations can be above ground, while the majority of transmission and distribution pipelines and service lines are below ground
- Vulnerability scores for landslides and inland flooding are higher for gas assets than other hazards
- SDG&E does not own or operate gas storage facilities, which based on SME input, could be considered the most vulnerable class of gas assets to multiple climate hazards

Infrastructure Vulnerability Assessment

Questions & Feedback

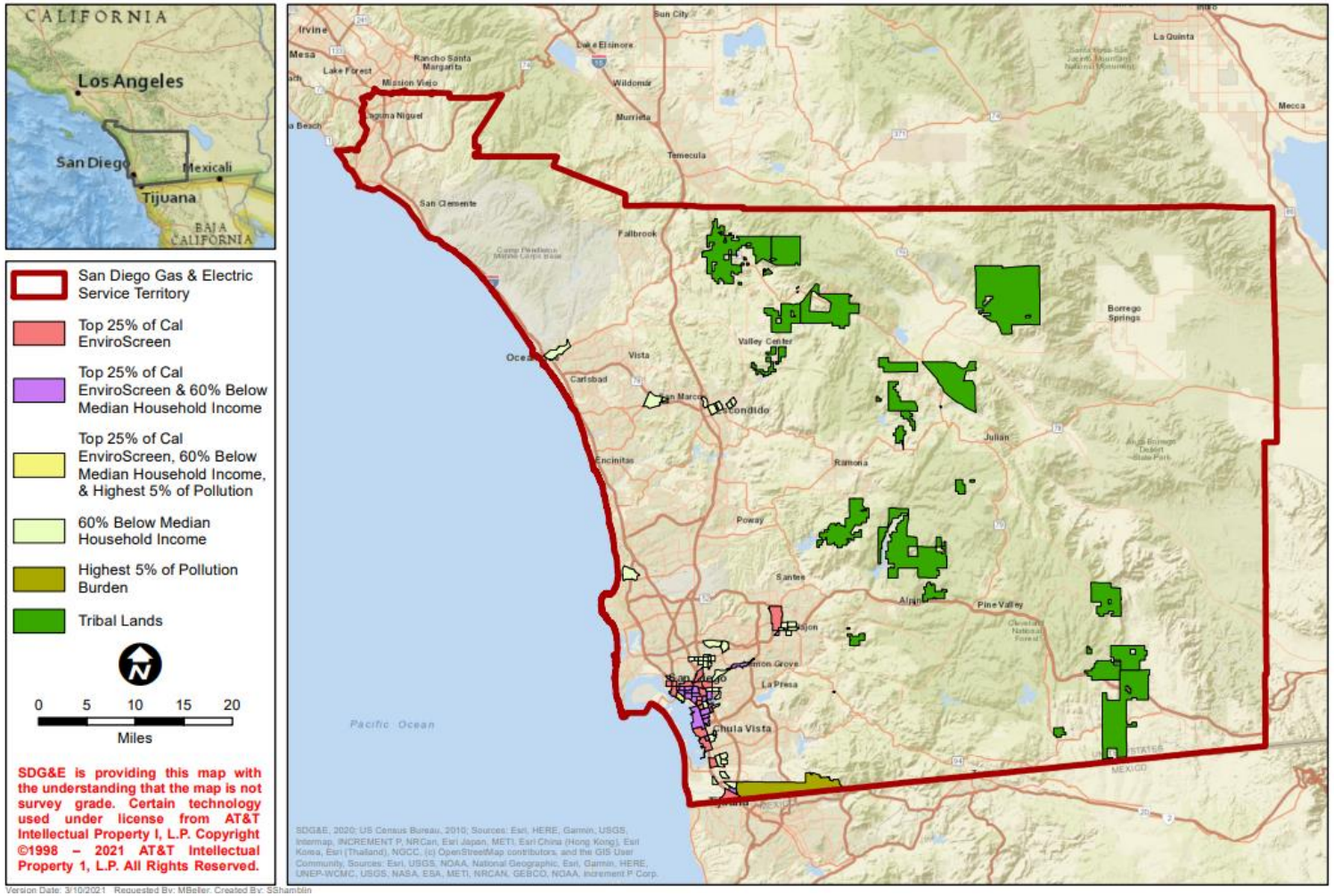
Community Vulnerability Assessment

Evaluating Community Vulnerability

CA OIR Phase I Topics 3&4

- *The IOUs' vulnerability assessments for DVCs should include an analysis of the DVC's adaptive capacity. (Conclusions of Law #8)*

- *…IOUs should analyze how to promote equity in DVCs…based on the DVC's adaptive capacity and funding so that DVCs are not left behind…(Conclusions of Law #12)*



Measuring Community Adaptive Capacity

The Community Vulnerability Index (CVI)

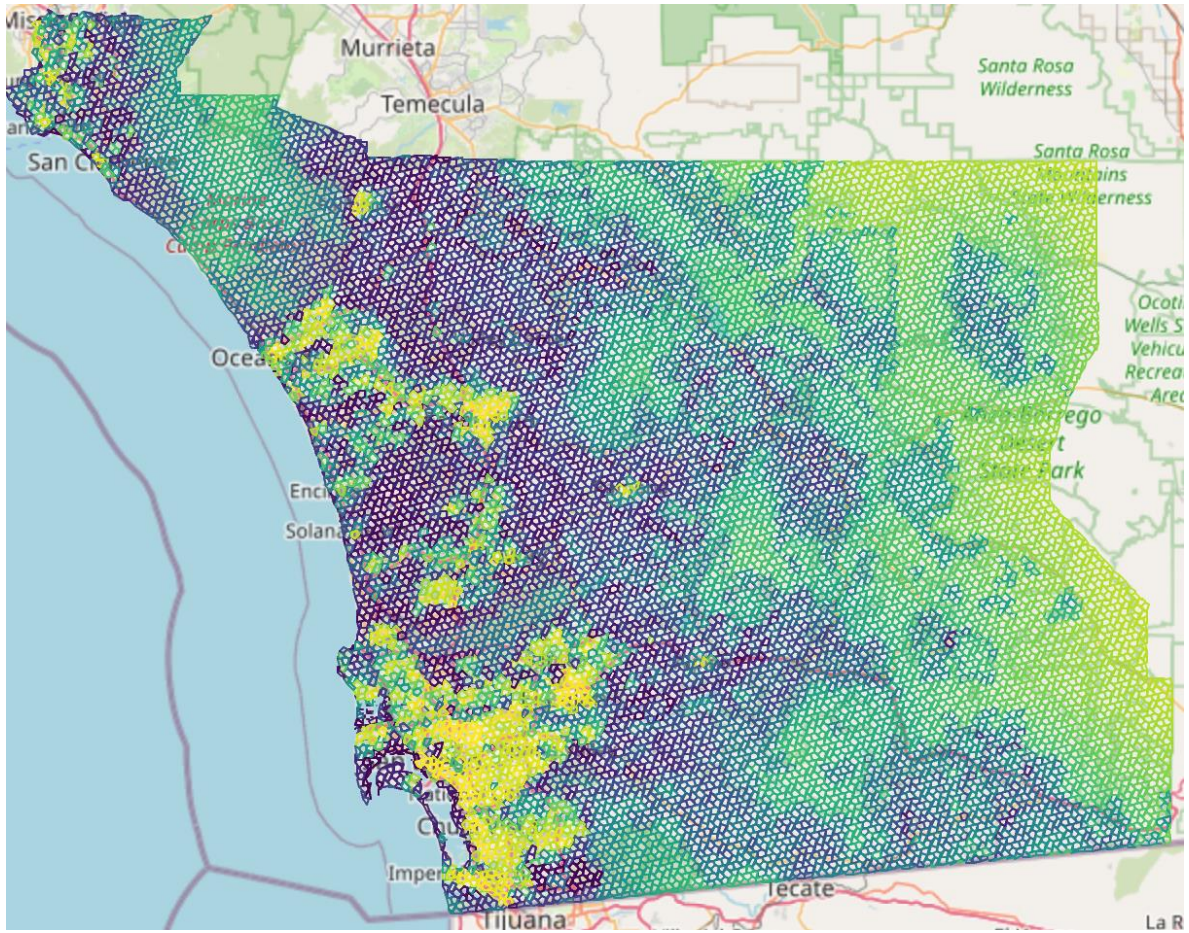


Figure: Map showing the vulnerable areas as seen in the CVI. Yellow is most vulnerable.

- Low Income Households
- CES4 Top 25%
- Pollution Burden Areas
- Tribal Lands
- Access & Functional Needs
- Critical Facilities

Analytical Enhancement

The Community Vulnerability Index (CVI)

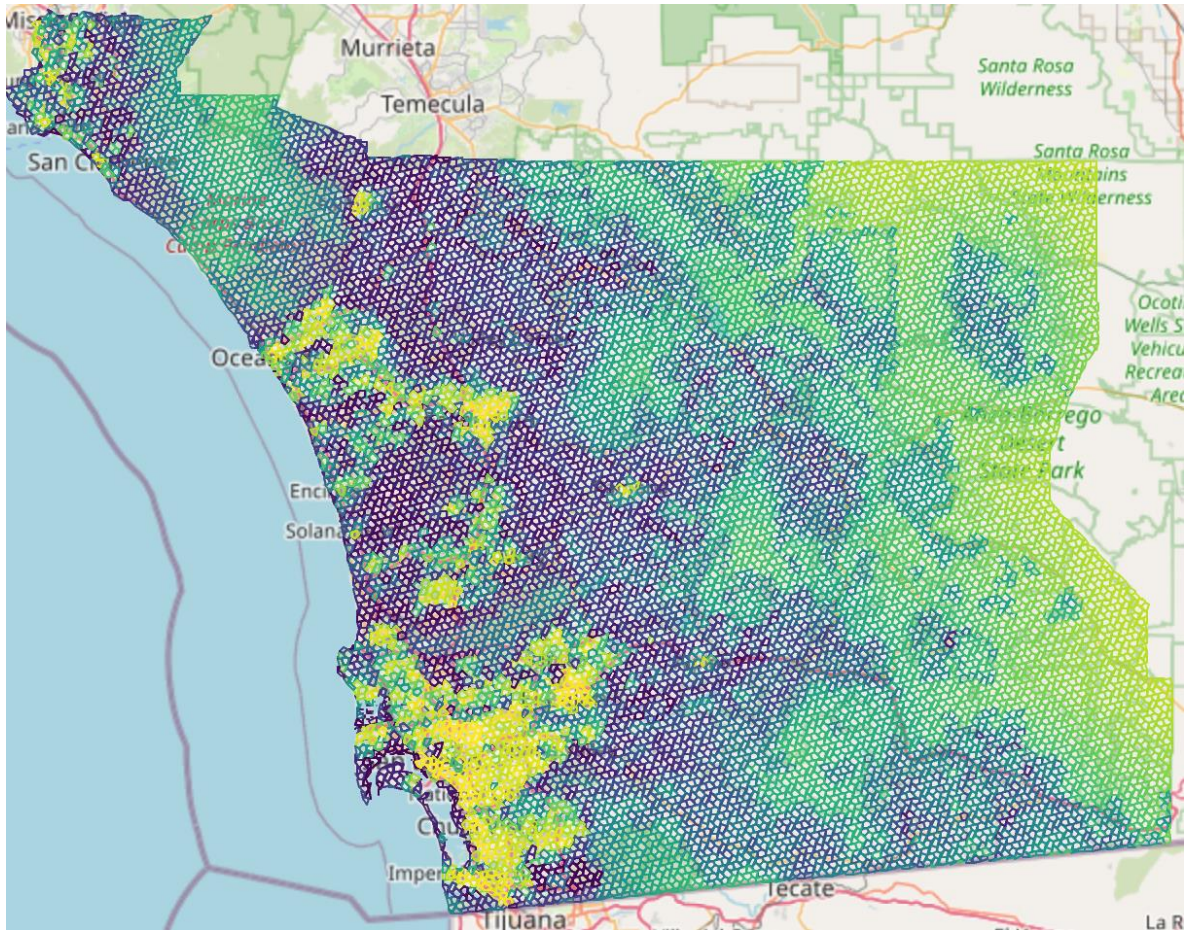
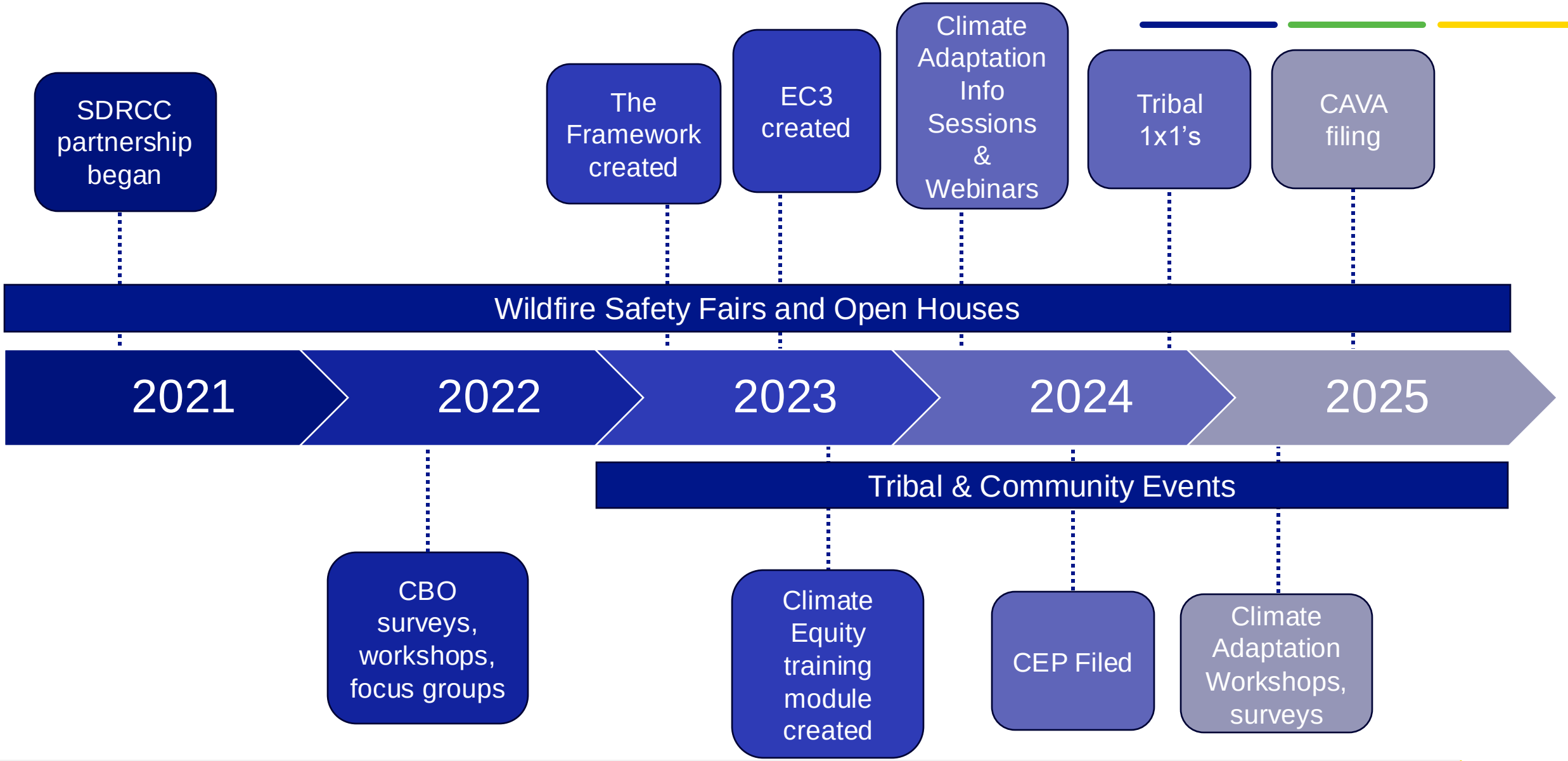


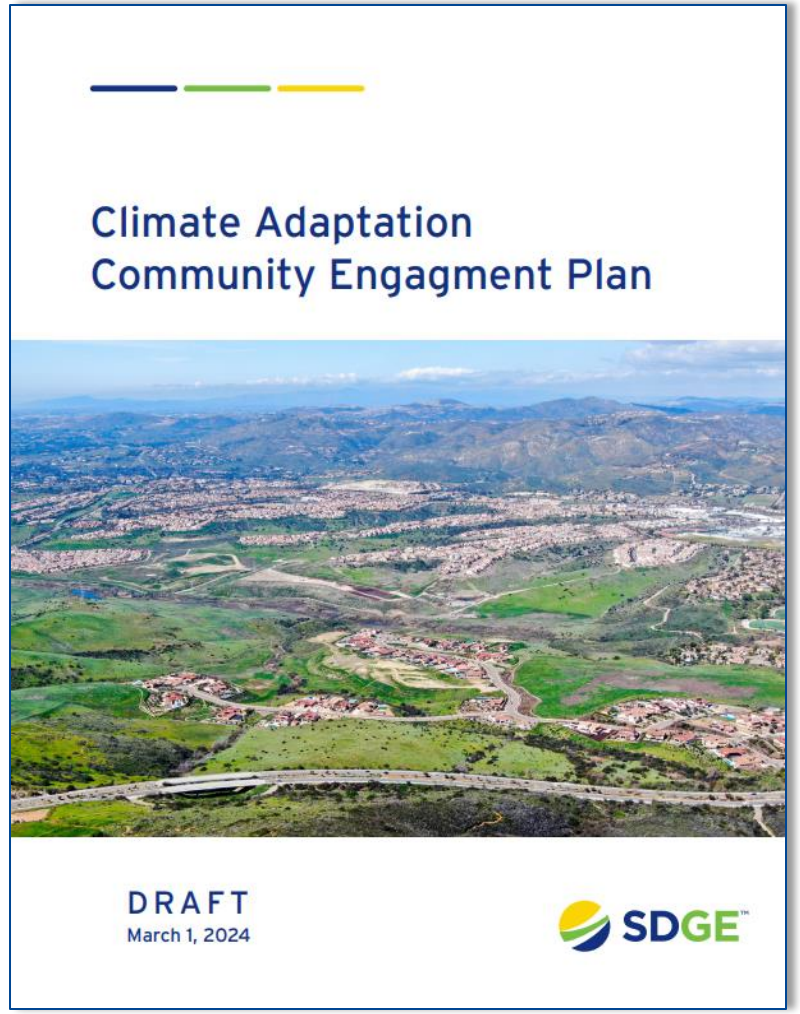
Figure: Map showing the vulnerable areas as seen in the CVI. Yellow is most vulnerable.

- The goal of CVI is to provide a more granular identification of DVCs and help in the development of targeted solutions that are fit for purpose
- This indicator will advance our understanding of “hot spots” that lie at the intersection of climate, infrastructure and community vulnerability

Community Outreach & Engagement

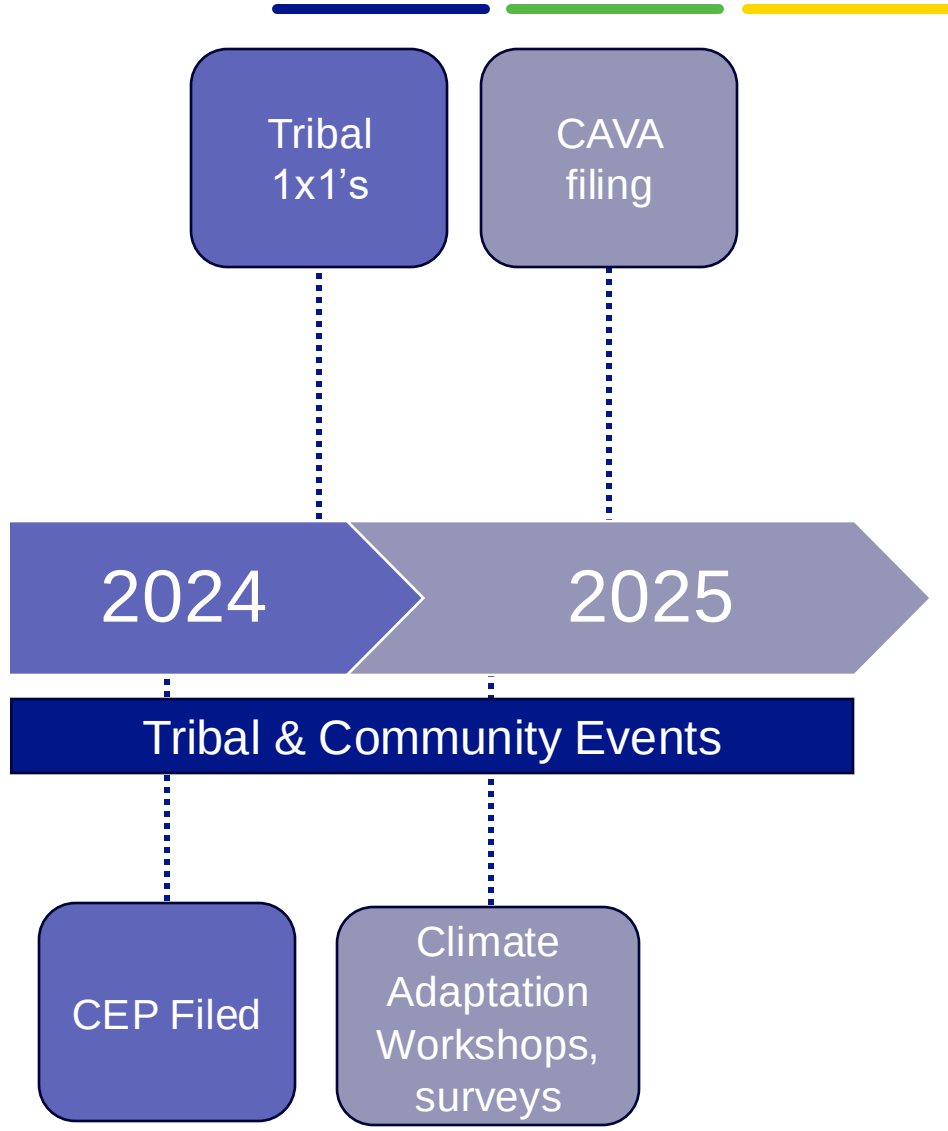
CAVA Outreach & Engagement Timeline




Climate Adaptation
Community Engagment Plan
DRAFT
March 1, 2024
SDGE

Implementation of the CEP

- Sticker board Surveys*
- Community Workshops*
- Tribal 1x1’s



*Non-Tribal

Sticker board Survey

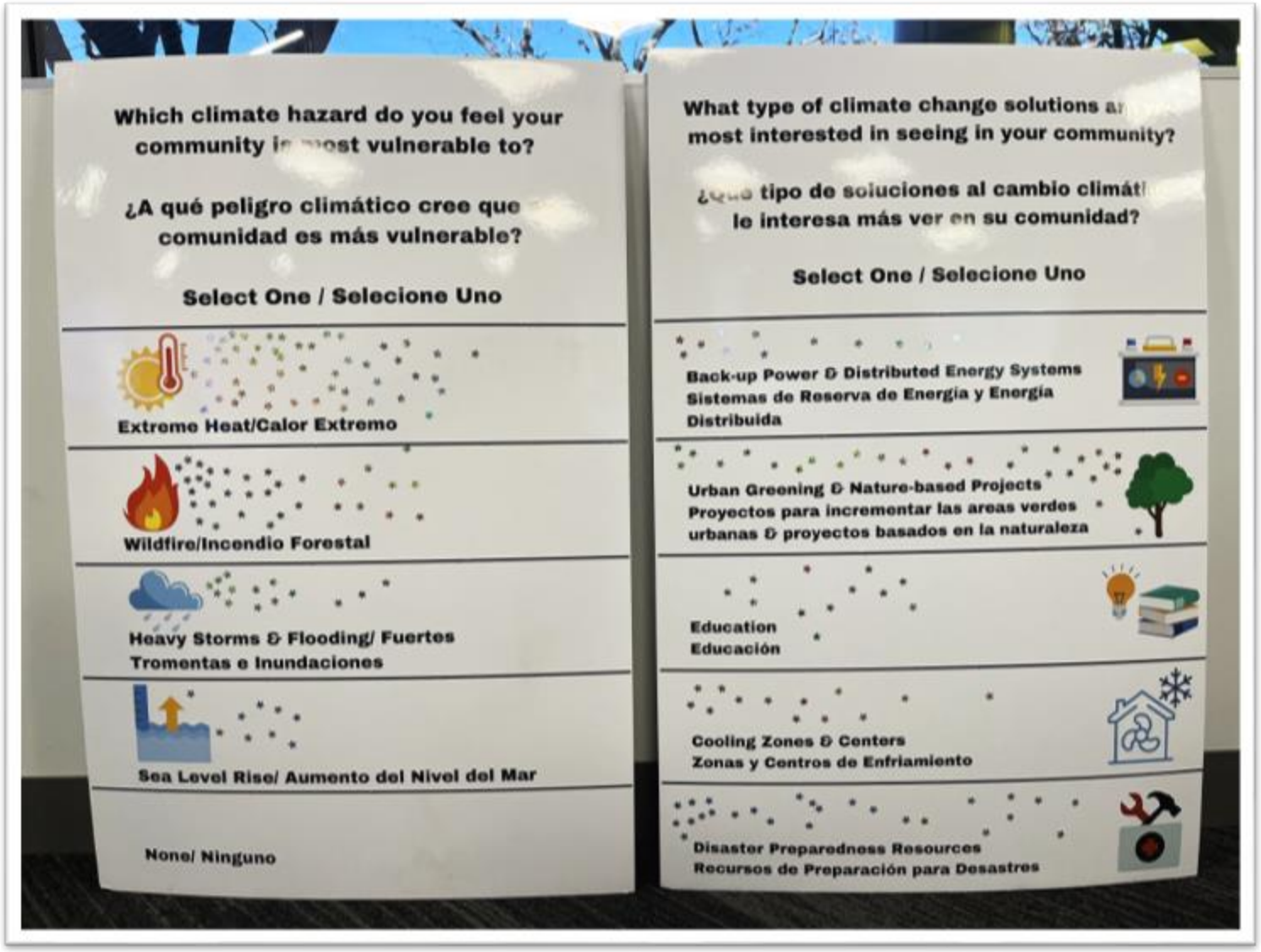
Key Topics:

- Climate hazard concerns
- Climate change solutions

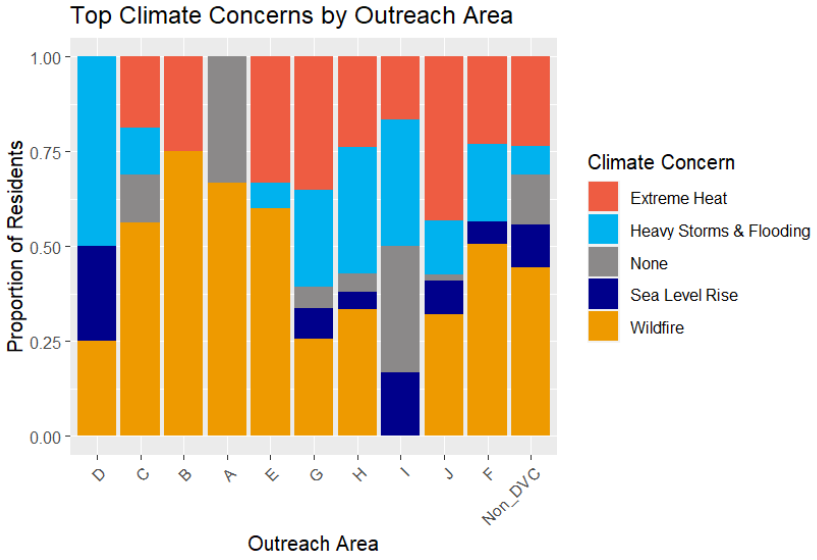
Total # Surveyed	% Non-Tribal DVC Overlap
473	79%

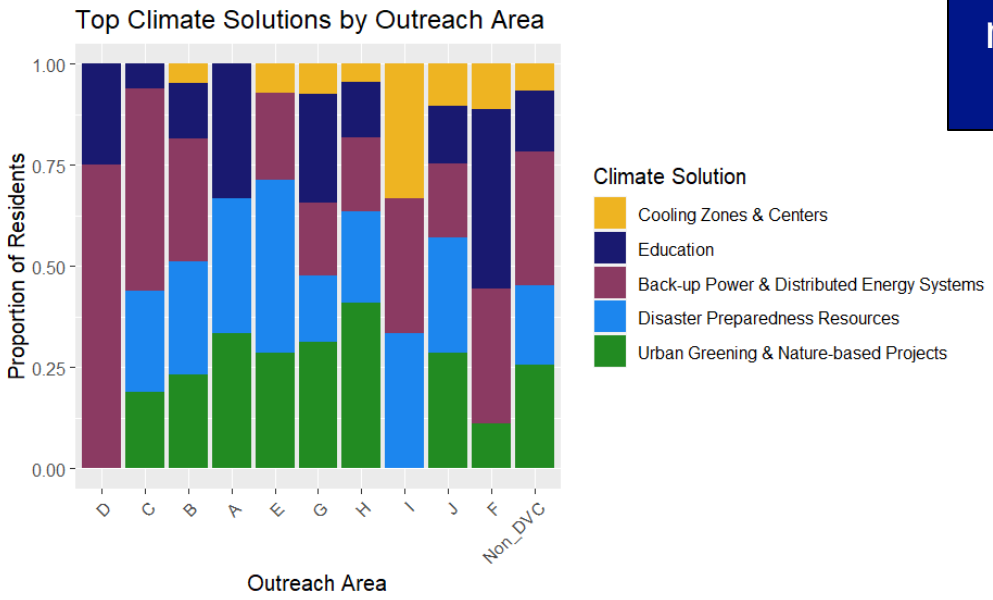
Types of Events

- Wildfire Preparedness Fairs
- Children's Museum "Fun Animal Friday's"
- Community Resource Fairs

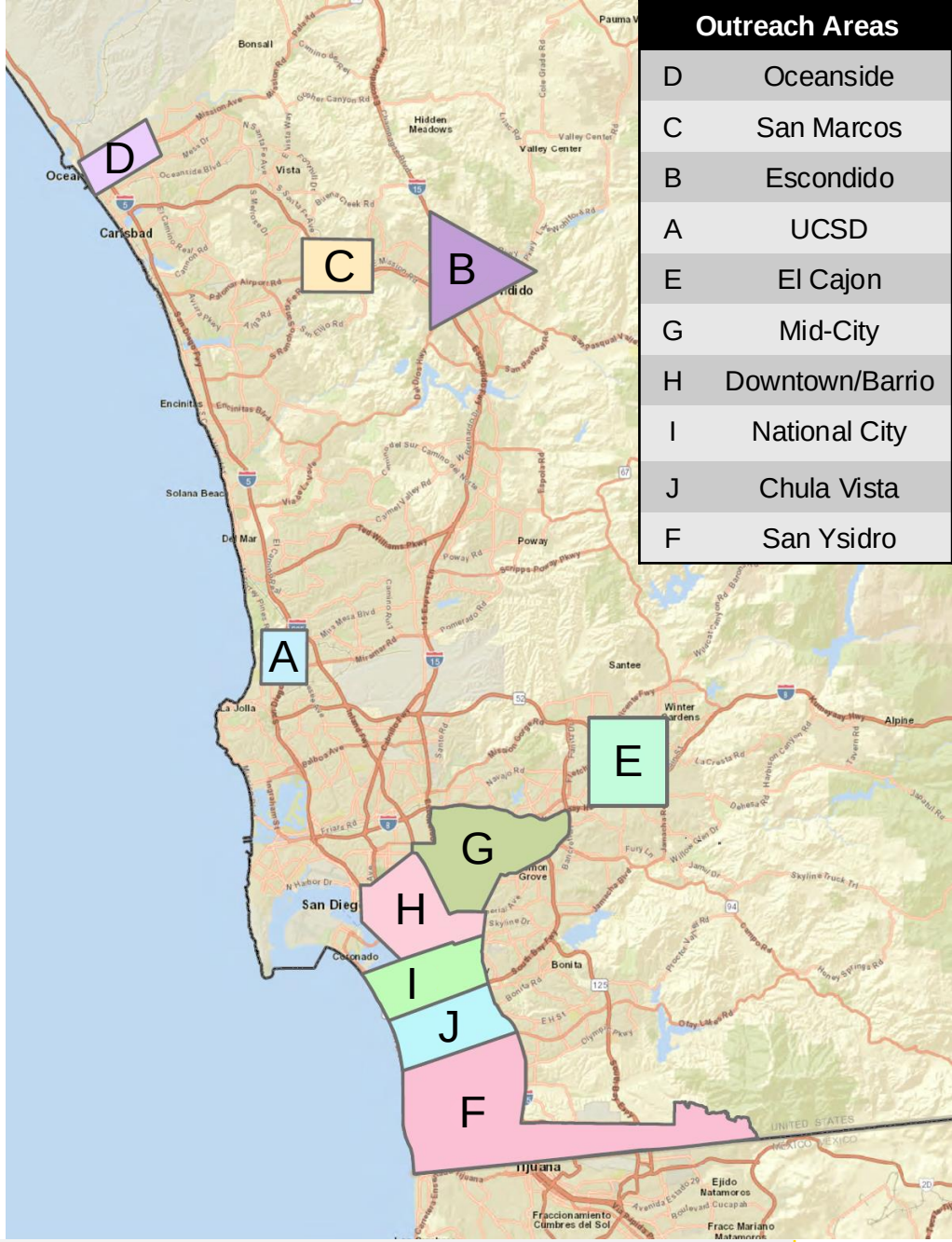


Sticker board Survey Results





Survey participants' climate hazard concerns are consistent with modeled climate exposure data



Outreach Areas	
D	Oceanside
C	San Marcos
B	Escondido
A	UCSD
E	El Cajon
G	Mid-City
H	Downtown/Barrio
I	National City
J	Chula Vista
F	San Ysidro

SDGE™

Source: Abid, M., Scheffran, J., Schneider, U.A. et al. Farmer Perceptions of Climate Change, Observed Trends and Adaptation of Agriculture in Pakistan. (2019).

Community Workshops

Key Questions:

- What are the impacts of **unplanned** and **planned outages** on you and your community?
- Which climate hazard do you feel your community is most vulnerable to?
  - Can you **please expand** on why you are concerned?

	DVC Region	Date	Venue	# Attendees	Presentation Language
Workshop #1	South San Diego - San Ysidro	December 10th, 2024	Casa Familiar	45	Spanish
Workshop #2	South Central San Diego	December 13th, 2024	MAAC	35	English
Workshop #3	Southeast San Diego	January 28th, 2025	Malcolm X Library	30	English

Co-created with our partners at:

Casa Familiar

MAAC

SDUSC

San Diego Urban Sustainability Coalition

SAN YSIDRO HEALTH

Climate Collaborative SAN DIEGO REGION

Community Workshops

Unplanned Outages Results

Economic

Food Spoils

Education

Can’t do Schoolwork

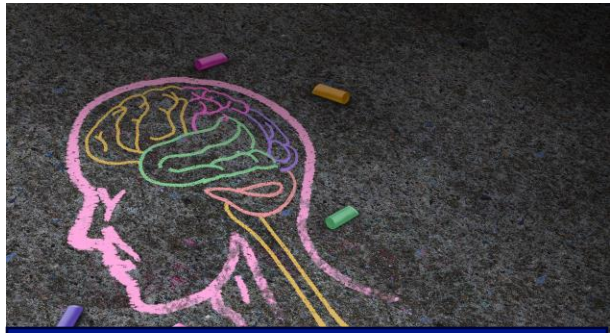
Health & Safety

Medicine Spoils

Transportation

Unable to Charge EV’s

Mental Well-Being



Frustration & Stress

Communication & Info

No Cell or Internet Info

Community Workshops

Planned Outages Results

Many of the same concerns as unplanned outages, however, participants also talked about…

Planning Ability

Flashlights

Batteries

Charge Cell Phone

Non-Perishables

Tribal 1 x 1s

Key Questions:

- How do unplanned and planned outages impact the Tribe?
- How does climate change impact the Tribe now and in the future?
- What adaptation/resilience investments would you like to see for your community?

INSY

Outages

- Spoiled and rotten foods is a key issue
- Many homes do not have backup energy
- PSPS warning is very helpful

Climate Impacts

- No one has time to collect firewood so reliance on utility energy
- Cost of extreme weather and affordability of energy a central concern

Adaptation Solutions

- Make the individual housing generator assistance program more feasible for DVC communities
- Sponsor a community trusted liaison – Tribal members need more weekend support
- Home weatherization

Tribal 1 x 1's

PALA

Outages

- Would limit access to services such as air-conditioning, telecommunications, and emergency healthcare
- Extended power outages may force temporary relocations, affecting cultural and spiritual health

Climate Impacts

- Most concerned about wildfire, drought, cultural traditions, and human health
- Concerned about culturally important plants disappearing

Adaptation Solutions

- People want to go somewhere more fun than a cooling center
- Technical assistance with regulations and policies could help communication

LA JOLLA

Outages

- Remote work not possible for employees during an outage due to lack of power
- Food spoils
- When it's planned, water tanks can be filled ahead of time
- They have some solar and back-up power that can be distributed

Climate Impacts

- Flooding can cause damage of roads, power lines, and water infrastructure
- Unsafe heat conditions resulting in heat stroke, exhaustion

Adaptation Solutions

- Microgrid (community scale renewable power generation)
- Want to add EV charging but requires DC fast charging (systemic infrastructure upgrades)

Tribal 1 x 1's

LOS COYOTES

Outages

- PSPS notification is sent to head of household, but might not get to the rest of household
- Warnings of power shut off are helpful, but might have to notify in person

Climate Impacts

- Focusing on extreme weather and heat from emergency ops side
- Flooding an issue due to one main road through the reservation

Adaptation Solutions

- Undergrounding highest priority
- AC, but comes down to cost and power availability
- Cooling center not reasonable

MESA GRANDE

Outages

- Power loss = Water treatment loss
- Witch Fire -> lost power for 3 months
- Loss of air conditioning, cooking, toilets

Climate Impacts

- Basket weaving materials lost
- Loss of fauna and oak forests

Adaptation Solutions

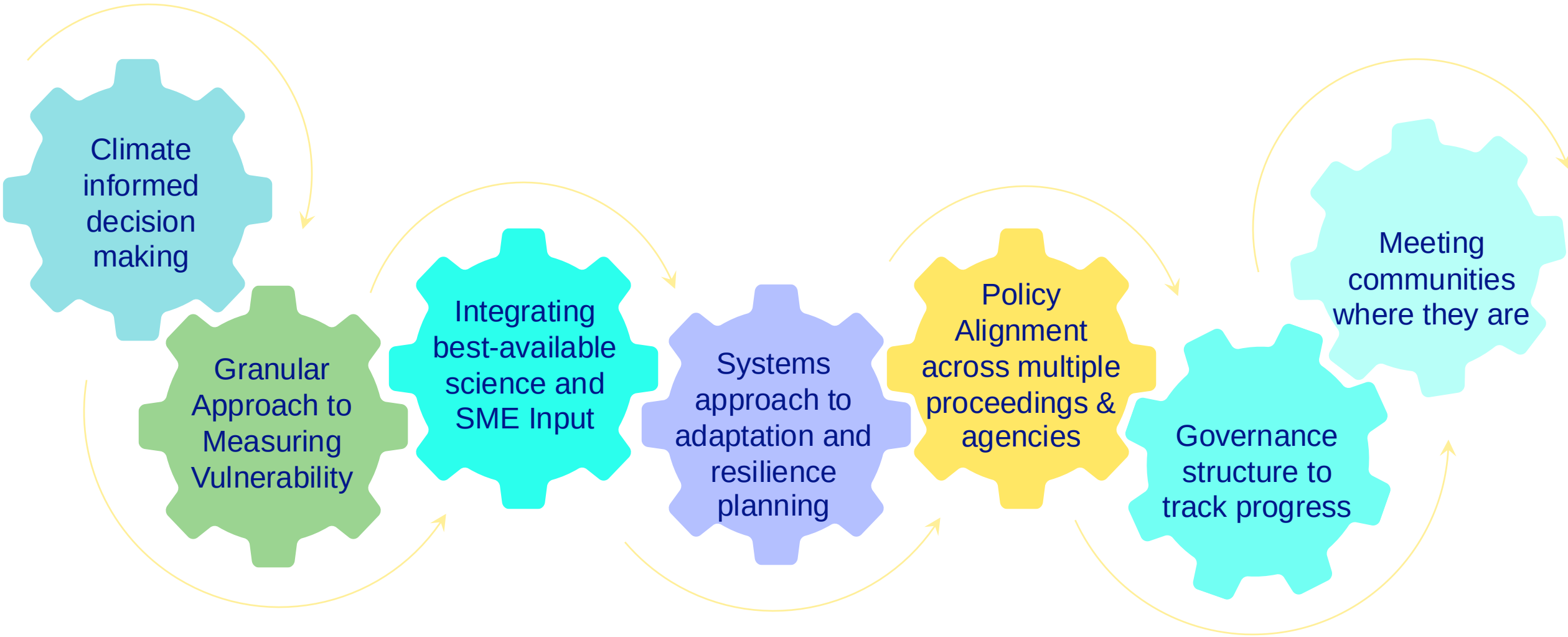
- Alternatives to costly and toxic diesel generators
- Development of new residences with climate resistant building materials
- Employ solar well pumps

Community Vulnerability Assessment

Questions & Feedback

Wrap Up & What's Next?

Desired CAVA Outcomes

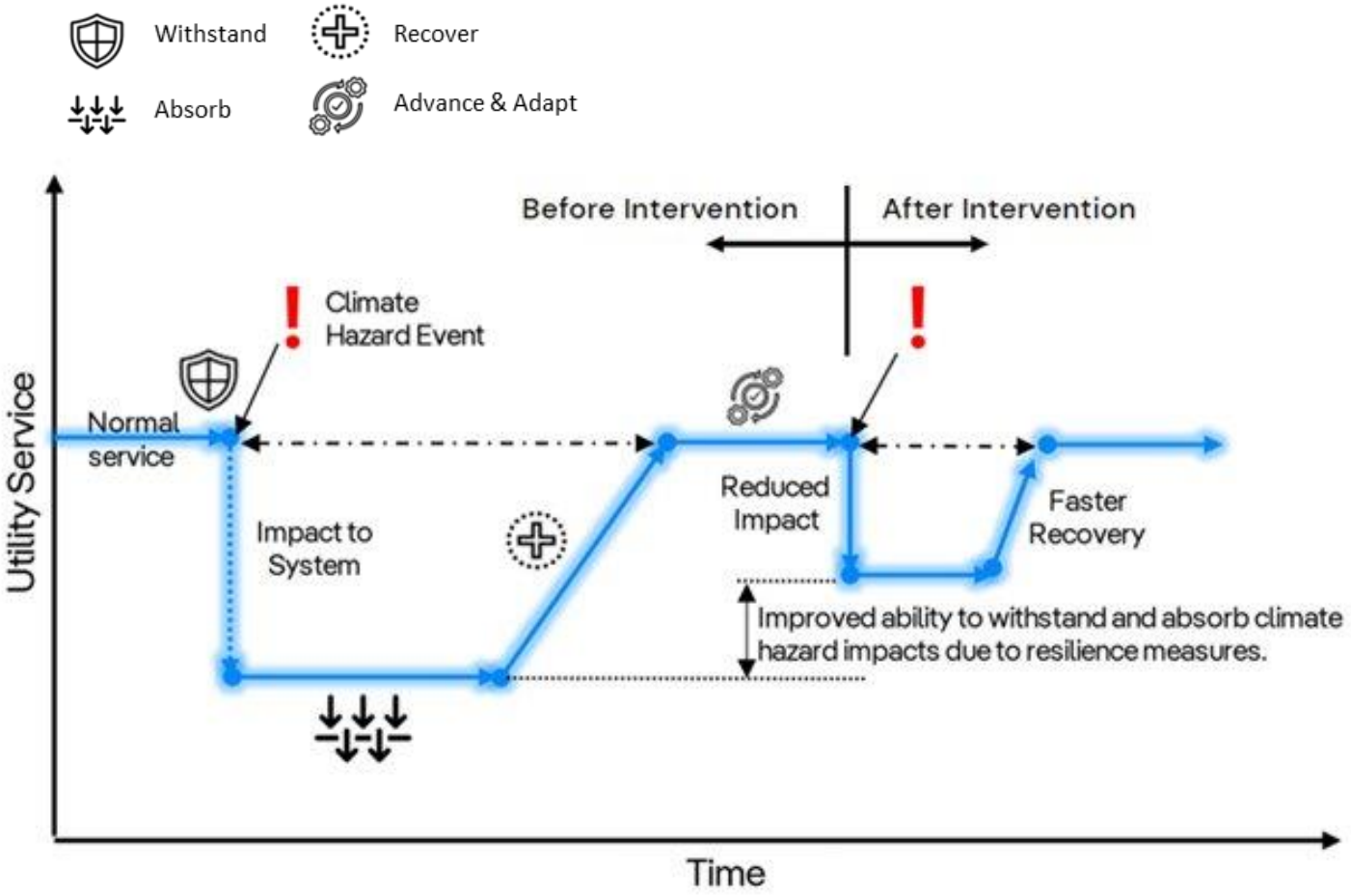


Collective Action & Internal Governance Structure

- CAVA-focused Climate Advisory Group, Cross-functional and inter-disciplinary teams engaged
- Director engagement in Multi-agency Technical Advisory Council focused on Climate Resilient Energy Infrastructure (CEC Grant, EPC-21-041)
- Resilience Hub collaboration with City of San Diego (HMGP Award)
- Local and Regional Stakeholder engagement - Quarterly Wildfire Safety Community Advisory Council led by Chief Operating Officer
- External Climate Science collaborations – Argonne National Lab, Scripps (SIO), Cal-Adapt Analytics Team, ICF, Accenture

CAVA - Governance Structure

Fit for Purpose Adaptation & Resilience Measures



- System Hardening
- Vegetation Management Practices
- Incident Management Training & Tabletop Exercises
- Situational Awareness Tools & Training
- Integrated community communication applications and dashboards
- Climate-informed load forecasting
- Multi-stakeholder education and engagement

SDG&E has a strong continuous improvement focus on resilience, designed to anticipate, prepare for, react to and recover from any hazard impacting our entire service area

Share Feedback

Contact: Climate@sdge.com
Website: https://www.sdge.com/climate-adaptation-sdge

Supplemental Data

CAVA Glossary

- **Adaptation:** “the process of adjustment to actual or expected *climate* and its effects, in order to moderate harm or exploit beneficial opportunities” (from IPCC AR6)
- **Adaptive Capacity:** the ability of the system to adjust to or moderate the negative outcomes of climate change
- **AFN:** Access and Functional Needs
- **Cascading Event:** multifaceted weather and climate events that occur in succession and can lead to more significant impacts than when they occur individually
- **CEI:** Climate Equity Index
- **CES4:** CalEnviroScreen 4.0 model assesses the cumulative impacts of pollution on California communities by combining data on *pollution burden* with *population characteristics*, including health vulnerabilities and socio-economic factors including poverty and education
- **CF:** Critical facilities deemed as crucial for emergency services
- **Climate Hazard:** climate-related events, a sequence of events, or trends that may lead to negative impacts, such as physical damage to assets, operations, human injury or adverse health effects, or financial loss (e.g., extreme heat, wildfires, etc.)

CAVA Glossary

- **Climate Projection:** simulation of a range of plausible climate futures based on assumed scenarios for greenhouse gas concentrations and earth system climate sensitivity
- **CMIP (Coupled Model Intercomparison Project):** an international collaboration of climate scientists that standardizes experiments using GCMs to assess and compare climate projections under various scenarios
- **Coastal erosion:** loss of land along the coastline due to natural forces such as waves, currents, tides, sea level rise and wind
- **CPUC:** California Public Utilities Commission
- **CVI:** Community Vulnerability Index
- **Coastal flooding:** coastal inundation from sea level rise and storm surge events
- **Compound Event:** multiple climate events happening simultaneously or in quick succession leading to greater total impacts than a single event
- **DVC:** Disadvantaged Vulnerable Community
- **Emissions trajectory:** A pathway showing the observed or projected levels of greenhouse gas emissions over time, influenced by socio-economic, technological, and policy changes

CAVA Glossary

- **Energy Transition Risk:** challenges and uncertainties associated with moving towards cleaner energy systems.
- **Exposure:** the degree to which assets, operations, or systems could face climate hazards based on their physical location and projected climate change (i.e. climate projections)
- **Extreme heat:** long-term increases in temperature and acute heat events, including heat waves, days above a certain temperature threshold, and average annual temperatures
- **Global Climate Model (GCM):** a mathematical model that simulates Earth's climate system, including the atmosphere, oceans, land surface, and ice, to study past, present, and future climate conditions
- **Hexbin:** Uber H3 Resolution 8 hexbins, each hexbin covers on average approximately 0.85 square kilometers within SDG&E's service area
- **Inland flooding:** inundation in areas away from the coastline, often associated with heavy precipitation events, oversaturation of soils and flooded drainage systems, river overflow, and/or dam or levee failure
- **IPCC (Intergovernmental Panel on Climate Change):** a United Nations body that synthesizes scientific research to provide policymakers with assessments on climate change, its impacts, and potential adaptation and mitigation strategies

CAVA Glossary

- **J40:** Justice40 Initiative
- **Landslide:** movement of a mass of land or debris along a slope, often due to flooding from heavy rain, changes in landscape or drainage, or geologic activity
- **LOCA:** a statistical downscaling technique that uses past history to add improved fine-scale detail to global climate models
- **Mitigation:** “a human intervention to reduce emissions or enhance the sinks of greenhouse gases” (from IPCC AR6)
- **Model ensemble:** A group of simulations used to capture a range of possible outcomes and reduce uncertainty in climate projections by averaging or comparing their results due to variability in initial conditions, parameter choices, and structural differences between models
- **Physical Climate Risk**: damages and losses to property that occur due to the physical consequences of climate change.
- **Sensitivity:** the degree to which assets could be negatively affect by climate hazard exposures
- **Vulnerability**: a combination of exposure, sensitivity, and adaptive capacity that represent the potential for assets, operations, or customers to be negatively affected by a given climate hazard

CAVA Glossary

- **Wildfire:** large destructive wildfires that spread quickly over forests, brush, or other flammable vegetation
- **Winter weather:** cold weather precipitation events such as icing from freezing rain and/or snow-storms