Pajaro River Watershed Resilience Program

Network Workshop #2

Prioritizing Vulnerabilities

June 10, 2025 / 9:00 am – 12:00 pm

Welcome to Workshop 2:
Prioritizing Vulnerabilities in the Pajaro River Watershed

This program is funded in full or in part from the Budget Acts of 2022 and through an agreement with the State Department of Water Resources (DWR).

Workshop Speakers

Brian Lockwood,
PV Water

Kiernan Brtalik,
Project Manager

Ellen Cross,
Network Strategy

Adam Witt,
Hydrologic & Ecological Sciences Lead

Breakout Room Facilitators

Lower Pajaro Sub-Watershed (Room 1)

Reema Shakra

Marcus Mendiola

Elizabeth Simon

Upper Pajaro Sub-Watershed

Adam Witt

Anna Yip

San Benito Sub-Watershed

Kiernan Brtalik

Chad Taylor

Lower Pajaro Sub-Watershed (Room 2)

Ellen Cross

Cameron Tana

Maria Pascoal

Workshop Agenda

WELCOME
- Agenda and Goals for the Day
- Overview of PRWRP
- Timeline for Engagement

WORKSHOP #1 OUTCOMES
- Exit Survey & Lessons Learned
- Updated Mission & Vision Statement / Draft Goals

PRIORITIZING PROBLEMS IN THE WATERSHED
- Purpose & use of problem statements

ANTICIPATED FUTURE CLIMATE CONDITIONS
- Overview of example climate hazards from the region and projected climate conditions and hazards

IDENTIFYING WATER RESOURCES THAT ARE VULNERABLE TO CLIMATE CHANGE
- Impacts to regional water features and assets for priority climate hazards

NEXT STEPS

✓Polling

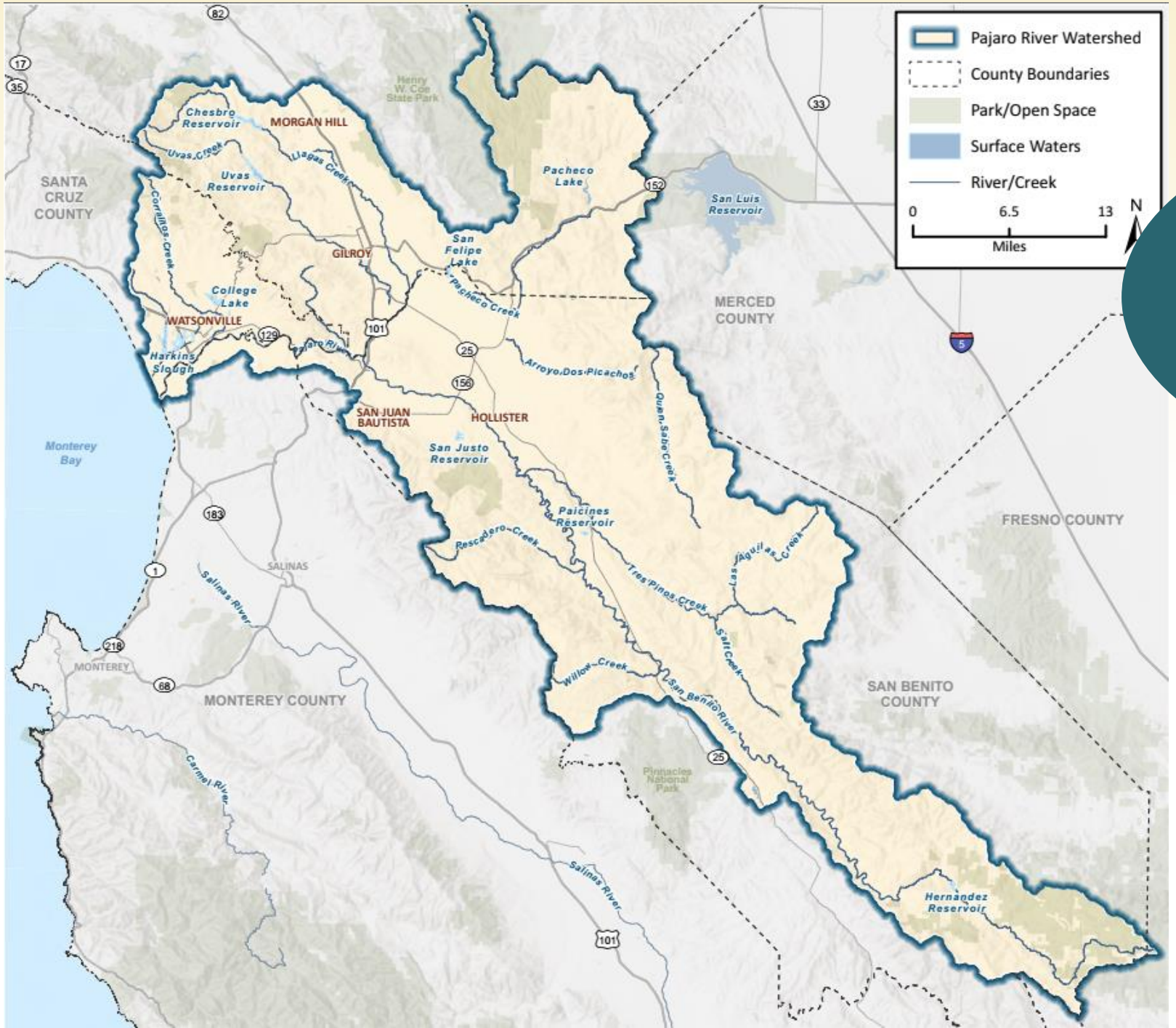
✓In-Depth Discussion

Goals for the Day

1. Meaningfully engage participants with the PRWRP planning process
   - Refamiliarize attendees with goals, structure, and engagement opportunities of the PRWRP
   - Demonstrate the climate vulnerability assessment process
   - Facilitate polls and structured breakout room discussions to assess the vulnerability of regional water resources
   - Conduct an all-attendee report-out to hear from breakout groups and exchange knowledge across the groups
2. Collect local and/or feature-specific information from participants to inform the project's next steps: Developing Adaptation Strategies

What will the Pajaro River Watershed Resilience Plan do?

- Holistically **study, plan, to manage** water resources at a watershed scale
- Integrate and prioritize **equity and inclusiveness**
- Develop a watershed **resilience vision**
- Enhance partnership among **non-traditional entities**
- Improve regional **competitiveness for funding**
- Identify **climate change vulnerabilities and prioritize adaptation strategies and projects**



Pajaro River Watershed

1,300 Square Miles

1,843 Stream Miles

4 Counties

Santa Cruz, Santa Clara, San Benito, Monterey

5 Cities

Gilroy, Hollister, Morgan Hill, San Juan Bautista, Watsonville

Climate Hazards Impact Water Resource Systems

Extreme Heat

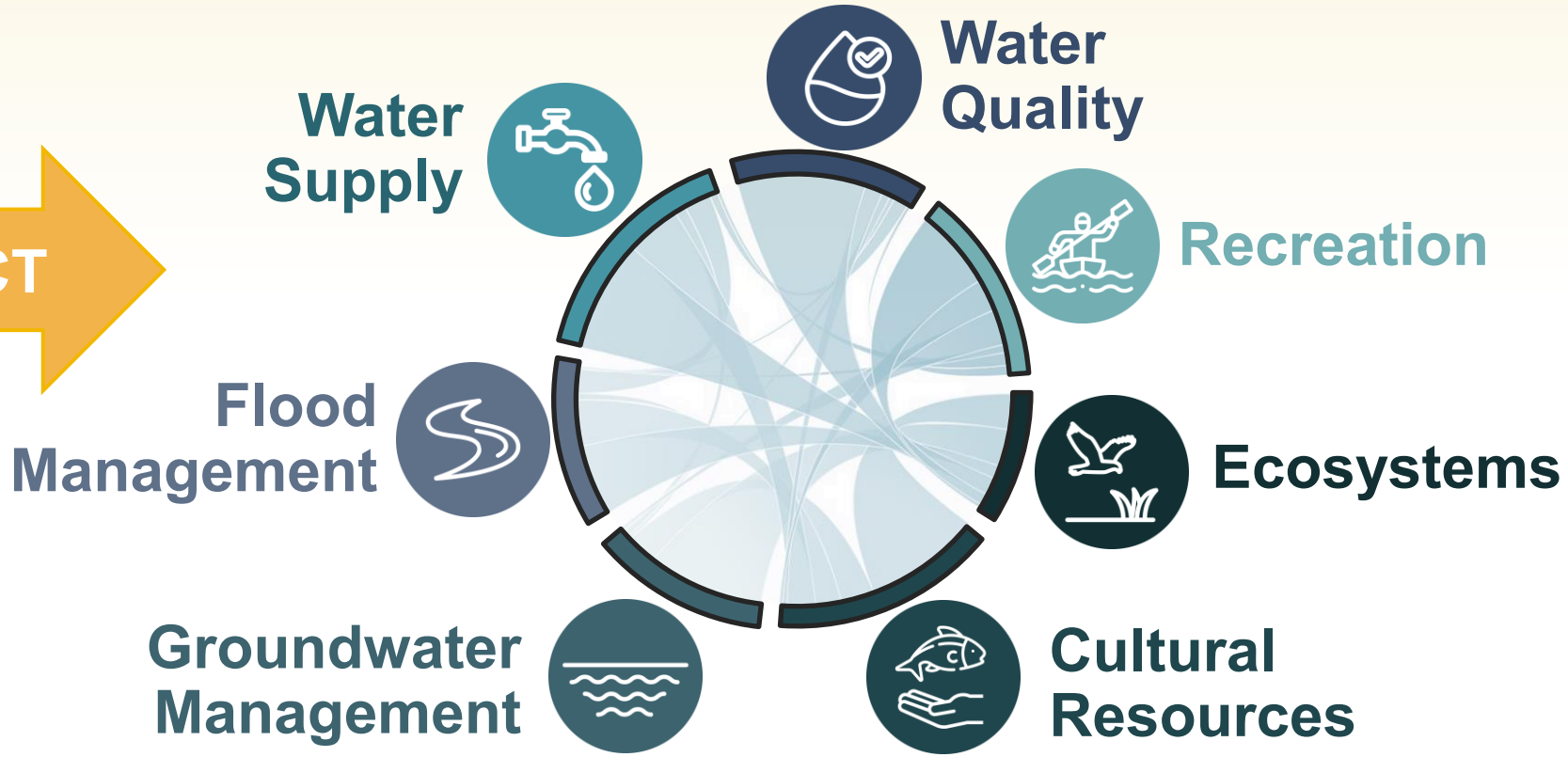
Extreme Precipitation

Wildfire

Drought

Sea Level Rise and Storm Surge

IMPACT

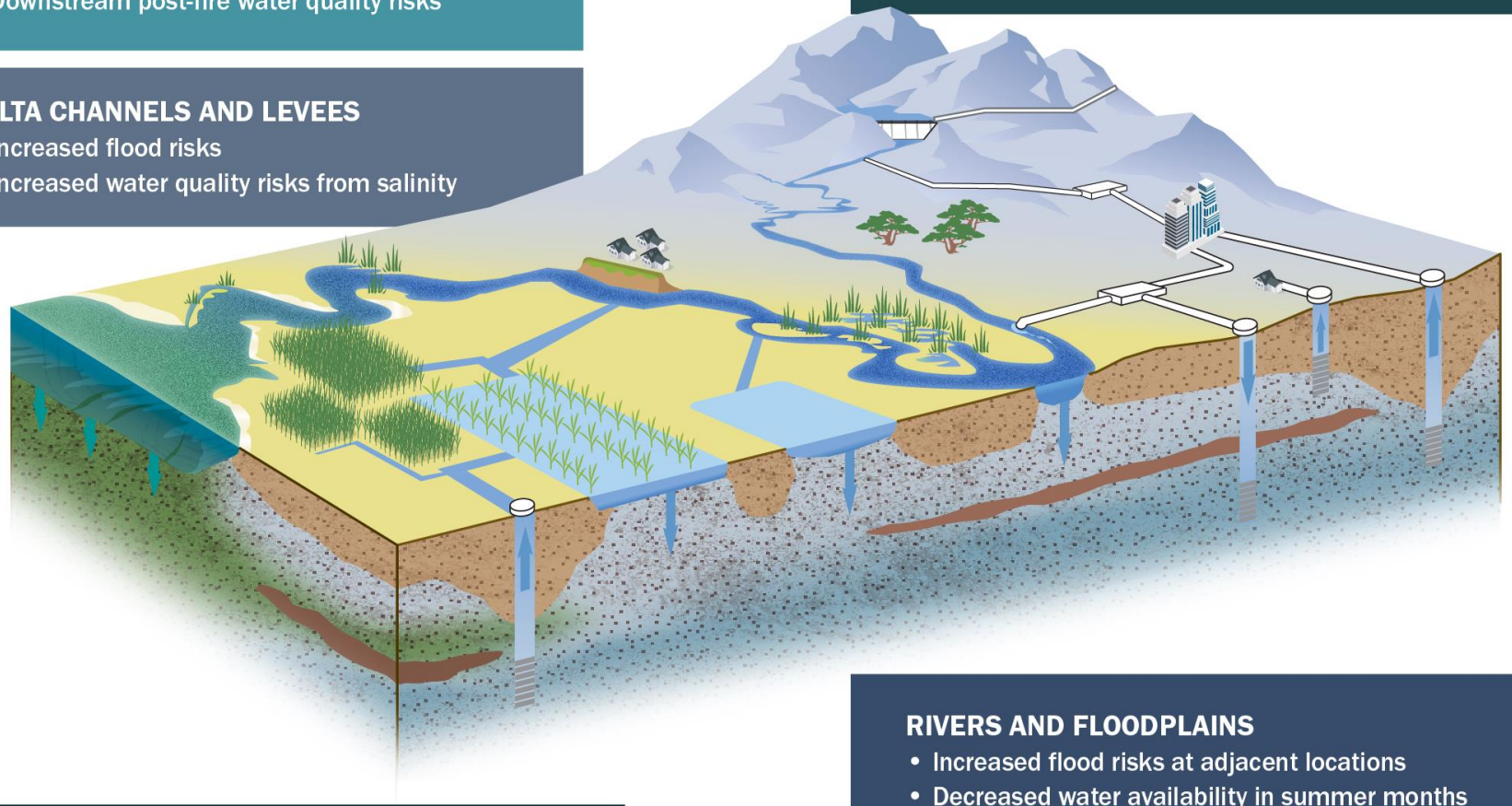


Impacts from Climate Hazards Vary Across the Watershed

HEADWATERS AND UPPER WATERSHEDS
- Increased water supply risks in summer months
- Increased flood risks at lower elevations
- Increased wildfire vulnerabilities
- Downstream post-fire water quality risks

DELTA CHANNELS AND LEVEES
- Increased flood risks
- Increased water quality risks from salinity

MAJOR RESERVOIRS
- Decreased water supply reliability in summer months
- Increased reservoir failure risks
- Increased flood risks at downstream locations



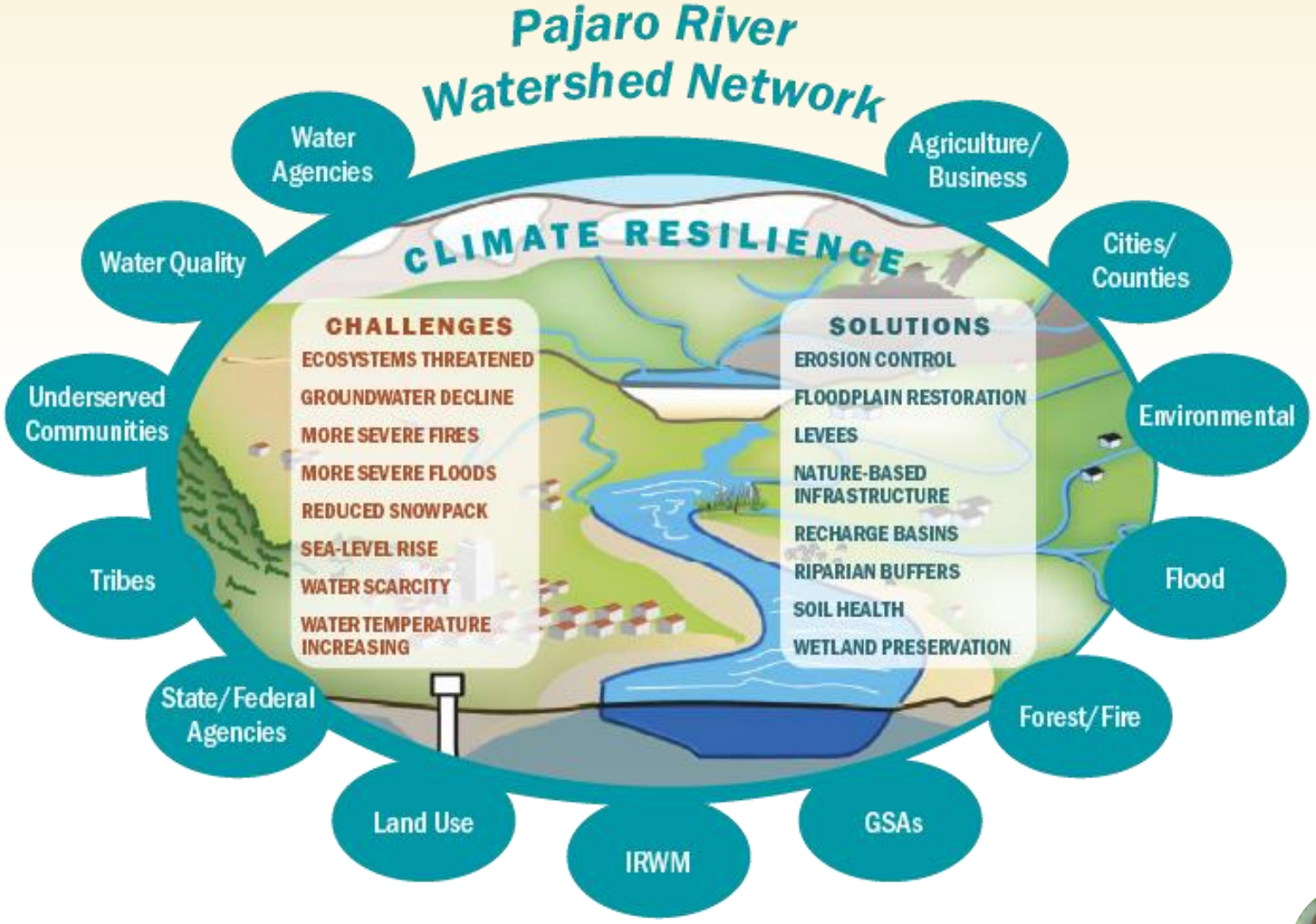
RIVERS AND FLOODPLAINS
- Increased flood risks at adjacent locations
- Decreased water availability in summer months

ECOSYSTEMS
- Increased vulnerability to temperature increased
- Increased vulnerability to invasive species
- Increased habitat degradation risks
- Greater stress on ecosystems

GROUNDWATER
- Increased groundwater depletion risks
- Increased groundwater quality risks

Who is informing the Plan?

YOU are, the Network!



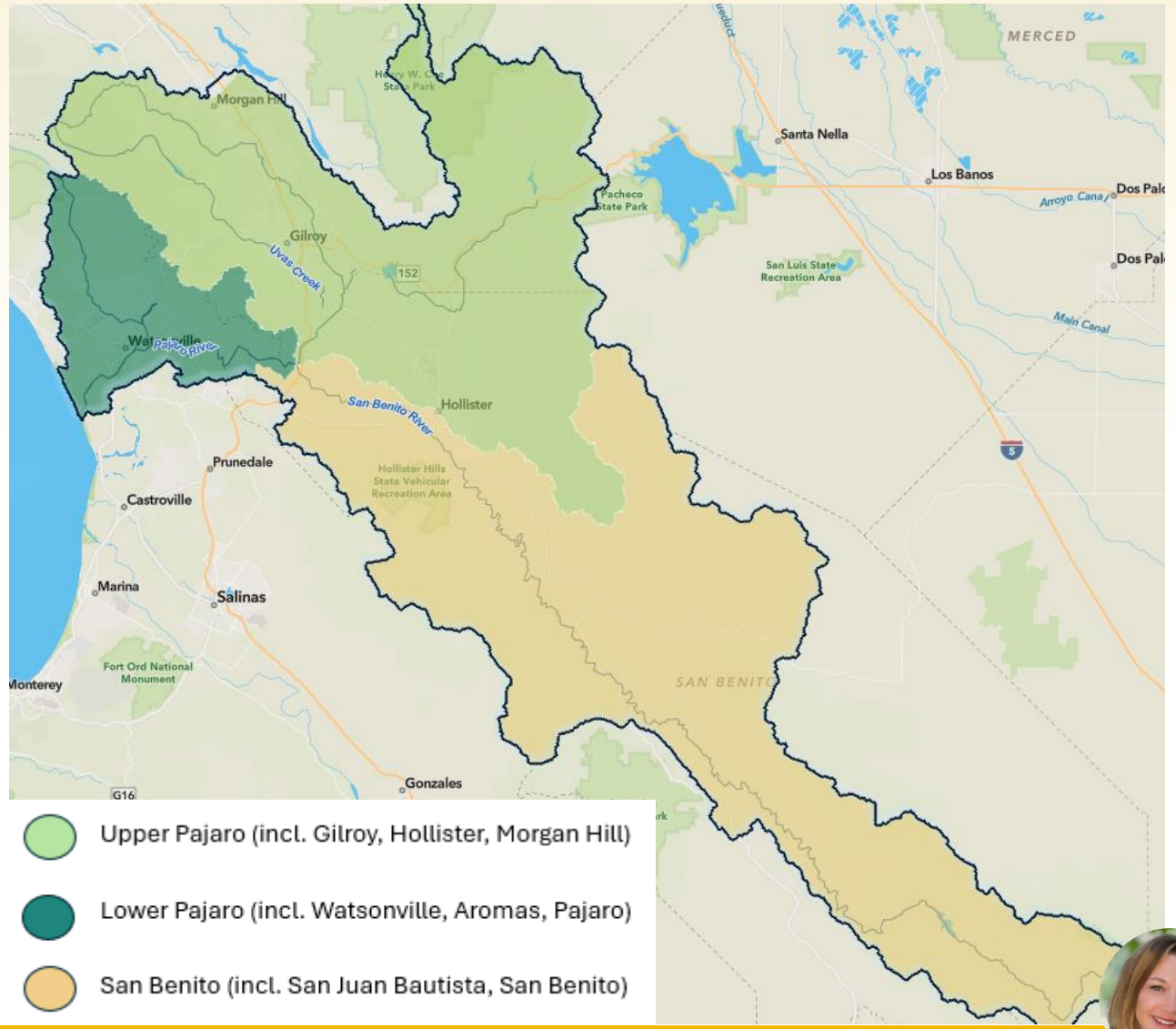
Please write in the chat:

- Your Name
- Organization/Interest

POLL #1

What part of the Watershed are you from or affiliated with? *(you may choose more than one)*

- ☐ Upper Pajaro (incl. Gilroy, Hollister, Morgan Hill)
- ☐ Lower Pajaro (incl. Watsonville, Aromas, Pajaro)
- ☐ San Benito (incl. San Juan Bautista, San Benito)



Engagement Opportunities

Winter 2024/25 → Spring 2025 → Summer/Fall 2025 → Fall/Winter 2025 → Spring 2026

Set the Stage → Explore Climate Hazards → Assess Vulnerabilities & Risks → Develop Adaptation Strategies → Implement & Monitor

Workshop #1 Visioning (In Person)
March 10, 2025

Workshop #2 Prioritizing Vulnerabilities (Virtual)
June 10, 2025

Workshop #3 Initial Adaptation Strategies (In-Person)
August 19 2025

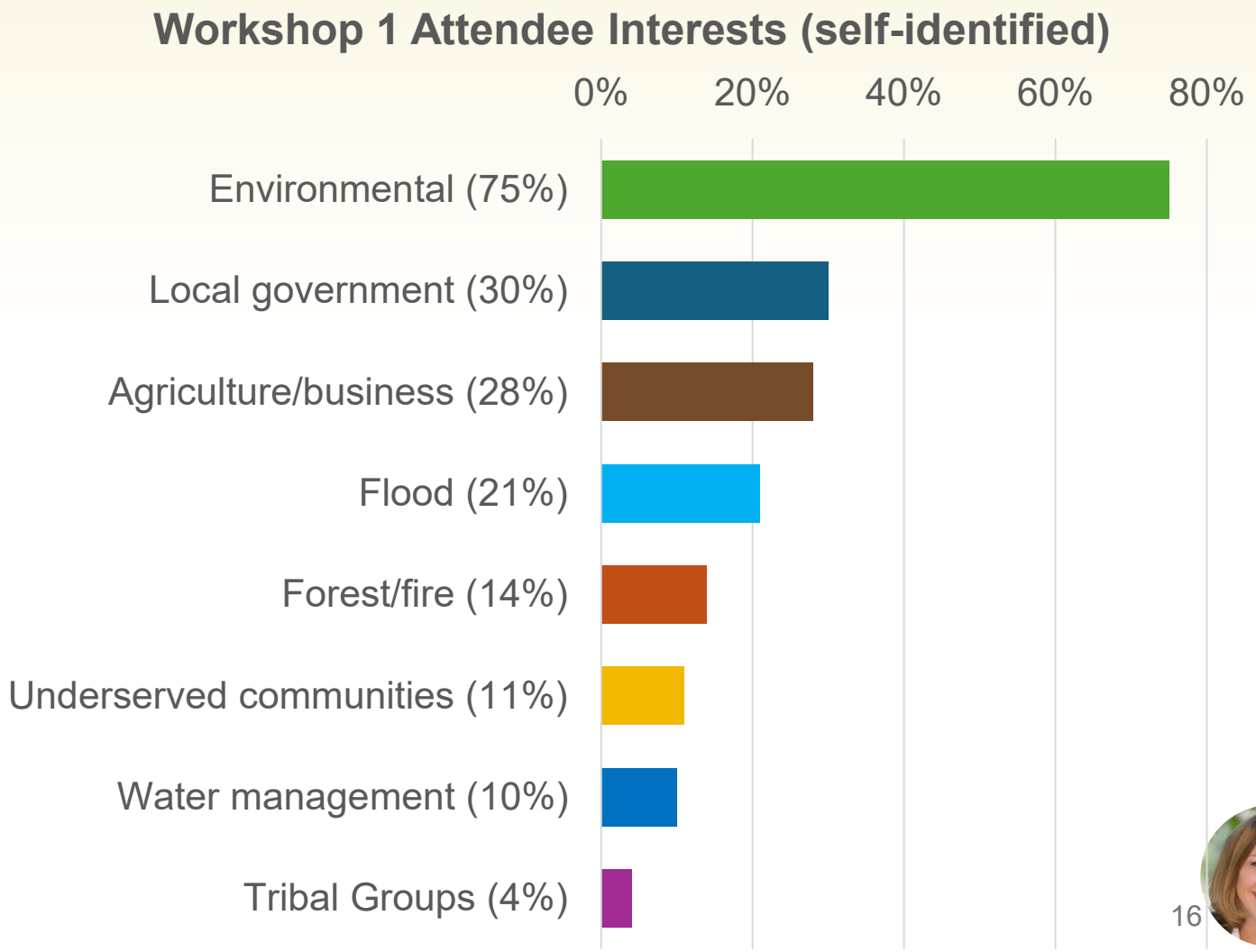
Workshop #4 Prioritizing Adaptation Strategies (Virtual)
October 23, 2025

Workshop #5 Public Release of WRP (Virtual)
February 2026

Workshop #1 Outcomes

Workshop #1: Visioning

- March 10 at Aromas Grange
- 75 participants
- 9 Advisory Group members
- Attendees identified with diverse interests (bar chart)
- All groups except Federal represented



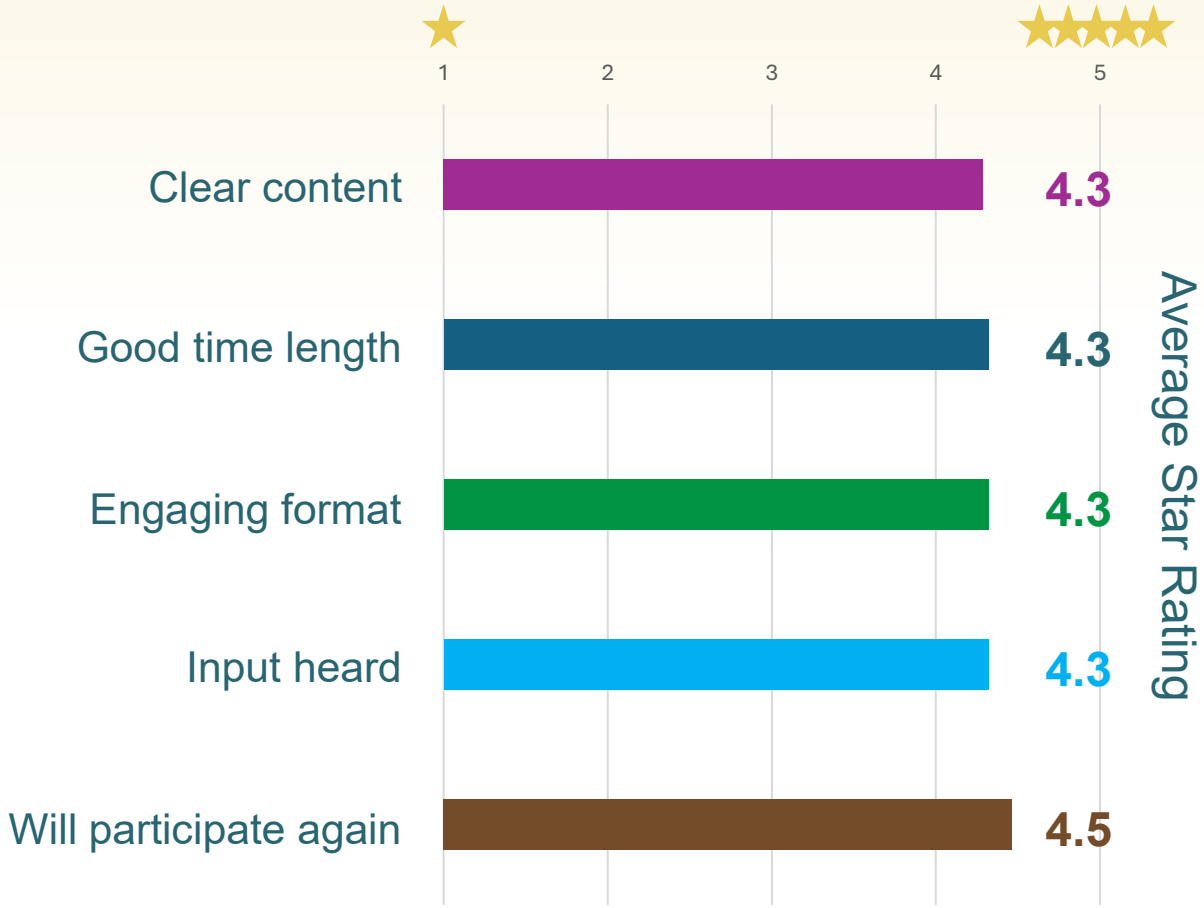
Outcomes from Visioning Workshop

Workshop content informed…

- ✓ Mission, Vision, and Goals
- ✓ Milestone Timeline
- ✓ Problem Statements
- ✓ Climate Scenarios
- ✓ “State of the Watershed” WRP Chapter

Exit Survey & Lessons Learned

32 responses



Accessibility, Inclusion, and Representation

- Schedule events outside business hours
- Increase outreach to underrepresented communities
- Create alternative participation options
- Encourage student participation

Preparation and Logistics

- Share agendas and materials in advance to support better engagement.
- Improve readability of presentation slides (e.g., larger projector screen, adjust lighting).

Impact and Follow-Through

- Incorporate workshop ideas into future planning and implementation.
- Communicate how feedback will influence the action phase.
- Explore both climate change and systemic resilience (e.g., funding stability, governance).

PRWRP MISSION STATEMENT

The **Pajaro River Watershed Network** recognizes that it is our collective responsibility to learn from the past and create adaptive, responsive, and cost-sustaining solutions that strengthen resilience of the watershed at large against climate change impacts.

Our enduring Watershed Network continually collaborates for reliable and clean water, and prepares for the impacts of more severe and frequent droughts, wildfire, precipitation, floods, sea level rise, and heat on people and ecosystems. Our Watershed Network will:

- Proactively safeguard our watershed, including the health of our people and habitat, natural and built environment, cultures and livelihoods by managing our water resources to prepare for extreme climate variability.
- Commit to the shared vision and goals that unify us across the watershed while protecting our communities and ecosystems, especially those most at-risk from climate challenges.
- Plan, prioritize, and implement regional partnership-based solutions that provide multiple-benefits, including: climate-resilient infrastructure, nature-based solutions, and integrated resource management, to prevent, reduce, respond to, and mitigate for future climate uncertainty.

PRWRP VISION STATEMENT

We envision a resilient future that protects our people, water resources and ecosystems most vulnerable to climate extremes.

Our watershed, from summit to sea, has reliable clean water for people, habitat, and working landscapes to thrive while our living water systems expand and contract to adapt to climate extremes through thoughtful sustaining solutions.

PRWRP Goals

POLL #2

Are there any key words missing from the PRWRP goals?

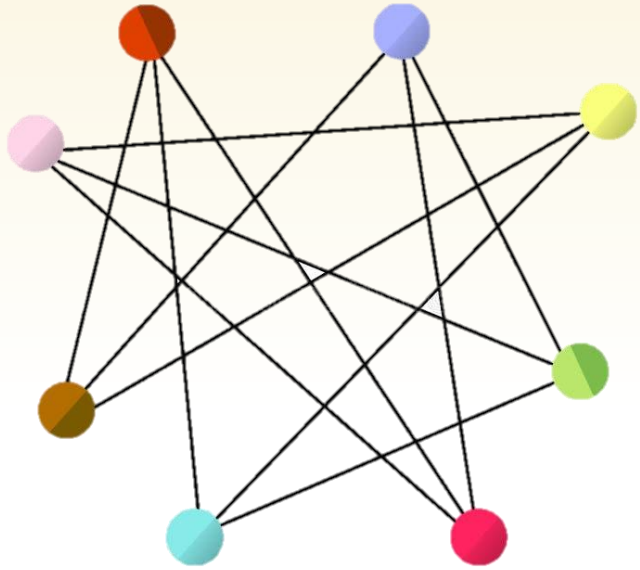
Implementation of the Watershed Resilience Plan will:

1. **Improve and diversify reliable water supplies:** Strengthen water security by enhancing groundwater supplies and diversifying direct and indirect sources of supply to sustain future generations.
2. **Protect and enhance natural ecosystems**: Restore the environmental health of impaired fish and wildlife reliant on a well-balanced watershed with healthy river, streams, and groundwater basins.
3. **Build physical and nature-based connections:** Improve our physical infrastructure to store, move, recycle, and share water more flexibly and integrate water and flood management through shared use of science, data, innovative nature-based strategies and technology.
4. **Improve water quality:** Prioritize actions that improve accessibility of clean water for all community members and support ecosystem health across the watershed.
5. **Protect vital water resources for economic productivity and cultural stewardship:** Balance beneficial water uses to sustain jobs and cultural traditions throughout the watershed with municipal, industrial, agricultural and tribal water needs to support working lands, the local economy, and cultural stewardship.
6. **Be climate ready**: Prepare for more intense climate threats, including more severe and frequent droughts, wildfire, precipitation, floods, sea level rise, and heat. Increase protective actions, preparation, communications, recovery strategies, and adaptive management to weather these evolving stresses.
7. **Engage with each other**: Actively listen to all perspectives, including those from historically underrepresented in decision-making processes, and prioritize solutions that address the needs of the most vulnerable community members.

Prioritizing Problems in the Watershed

Understanding Impacts and Prioritizing Vulnerabilities with Problem Statements

A strong problem statement articulates **the interconnected nature of climate change impacts**—to water, land, ecosystems, and human communities—and the approach for **coordinated, multi-benefit solutions.**



Moving from Existing Problems to Future Impacts

Higher-level, regional, multi-hazard problems that impact multiple water resource systems.

Focused attention on specific and place-based assets, communities and resources.

Desktop Review → Gather Community Input → Identify Problems and Challenges → Assess Future Vulnerability → Identify Adaptation Strategies

Anticipated Future Climate Conditions

Climate and Hydrology

The hydrologic regime of the watershed is highly variable within a year (dry summers to wet winters) and from year to year (droughts to floods)

Climate change is anticipated to make these swings **more extreme**

Pajaro River flooding in 2023

Source: Pajaro Regional Flood Management Agency

The Pajaro River during the dry season

Source: https://baynature.org/2021/12/06/how-birds-help-keep-the-pajaro-river-levees-safe-without-poison/ (Photo by Elyse DeFranco)

Climate Hazards to be Assessed

The Watershed Resilience Plan will:

- Identify water resource systems that are vulnerable to future climate hazards
- Develop adaptation projects/strategies to minimize those vulnerabilities

Future climate change will be assessed across five climate hazards:

Extreme Heat: Periods of significantly higher-than-average temperatures.

Extreme Precipitation and Flooding: Intense rainfall events that can lead to flooding, soil erosion, and challenges to water management systems.

Wildfire: Uncontrolled fires occurring in forests, grasslands, or other vegetated areas, often intensified by dry conditions and capable of causing widespread damage to property and ecosystems.

Drought: Extended periods of deficient rainfall leading to water shortages, adversely affecting agriculture, water supply, and natural ecosystems.

Sea-Level Rise and Storm Surge: The combination of rising sea levels and intensified coastal storms increases the risk of coastal erosion, flooding, and damage to coastal infrastructure, habitats and water supply.

What Are Recent Science-Based Projections for Future Climate Hazards in the Pajaro River Watershed?

Extreme Heat

What:

High temperatures and/or humidity for extended periods of time.

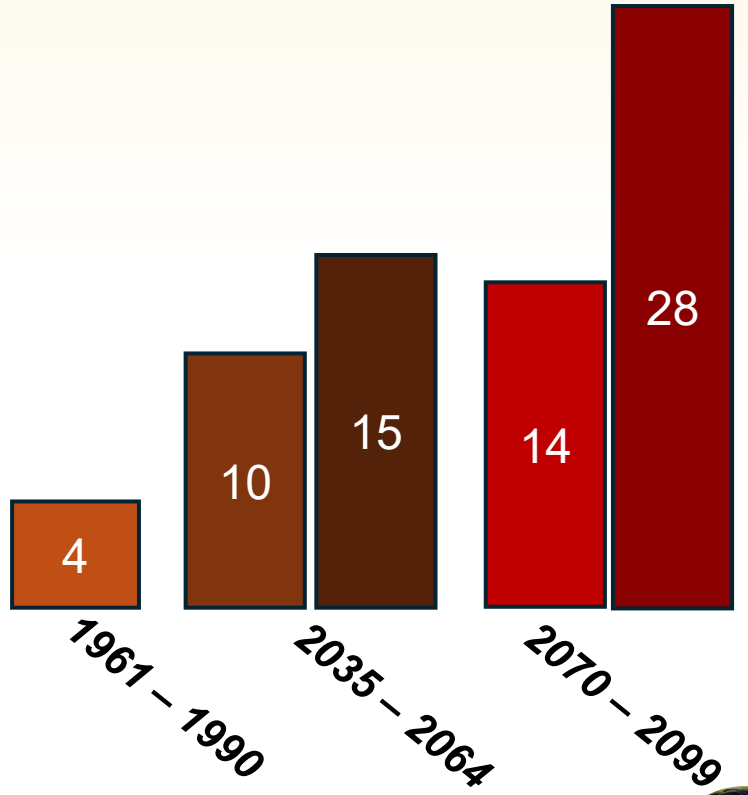
Projections:

For most areas around the state, climate models project a significant rise in the number of days exceeding what is now considered extremely hot for the given area.

Threats:

Impacts human health, heat- and water-sensitive industries, and infrastructure. Higher temperatures can threaten the biological diversity and viability of the watershed's ecosystems.

Average # of Extreme Heat Days per Year in Morgan Hill with Daily Max > 97°F

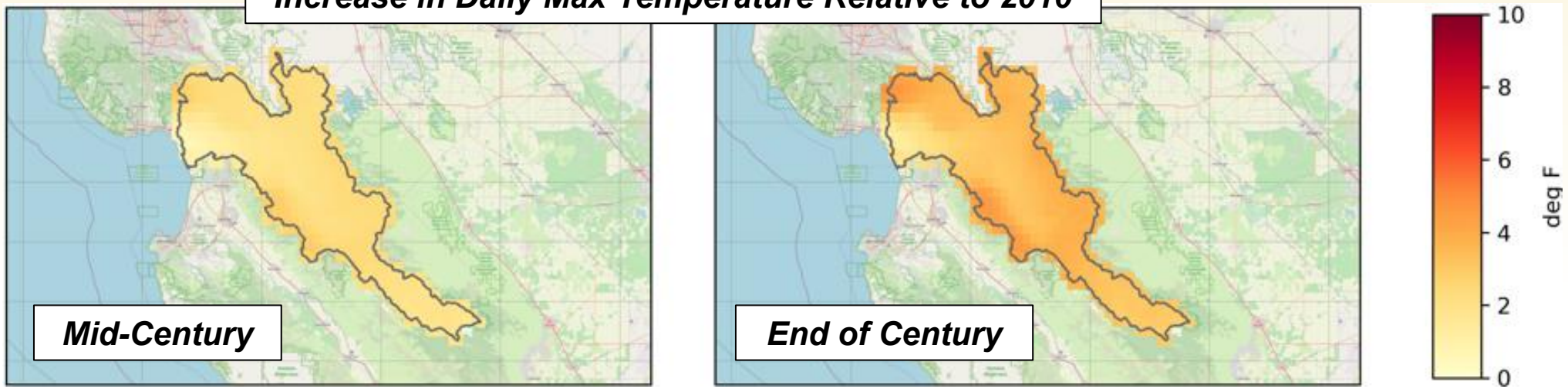


Source: https://cal-adapt.org/tools/extreme-heat, Left = RCP 4.5, Right = RCP 8.5

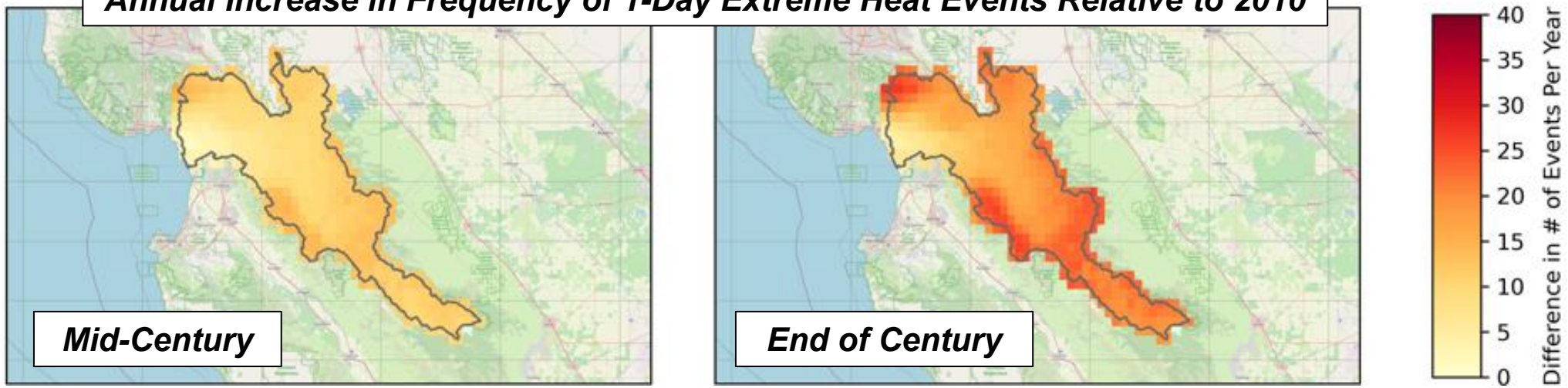
Source: 50th percentile of 137 down-scaled simulations using CMIP6 models from California's Fifth Climate Change Assessment, processed by Eagle Rock Analytics.
Extreme Heat: 95th percentile of average daily max

Extreme Heat

Increase in Daily Max Temperature Relative to 2010



Annual Increase in Frequency of 1-Day Extreme Heat Events Relative to 2010



Drought

What:

Extended period of dryness caused by low precipitation and high temperature.

Projections:

Extreme drought years (100-year dry event) become 2 – 3 times more likely over next 75 years, and warmer/hotter than historical.

Threats:

Creates water scarcity, which limits both local and imported water supplies and may lead to shortages. Low rainfall and flows can stress ecosystems. Impacts span timescales ranging from weeks to years.

Drought (Extreme Dry) Years

Source:
https://www.ioes.ucla.edu/project/future-extreme-precipitation-california/

Flooding & Extreme Precipitation

What:

Intense periods of heavy rain extending multiple days.

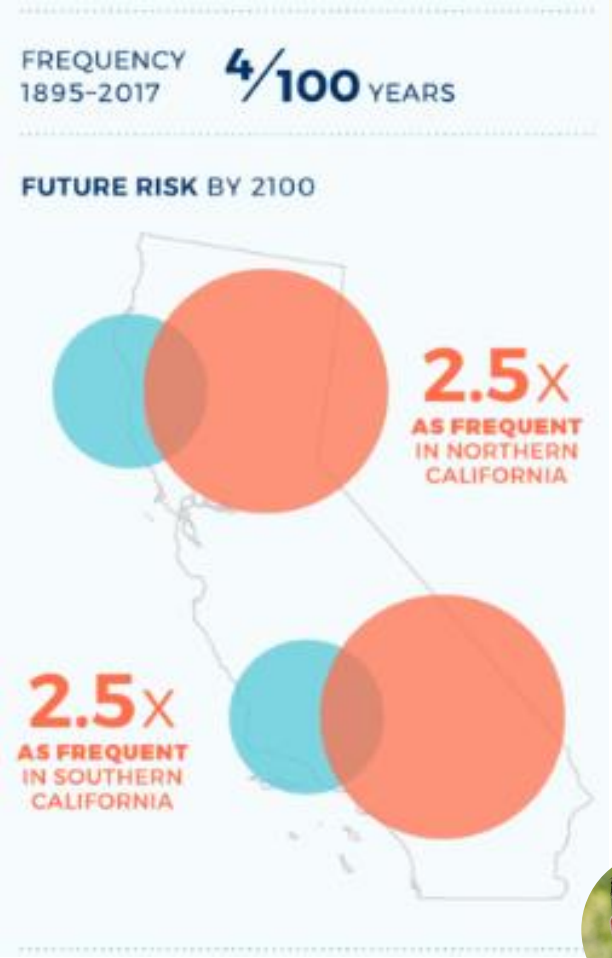
Projections:

More frequent and more intense heavy precipitation events with higher cumulative seasonal precipitation.

Threats:

Can damage homes and infrastructure, displace and harm people, disrupt water supplies, result in compounding events (such as mudslides), and impact water quality.

Extreme Precipitation Years

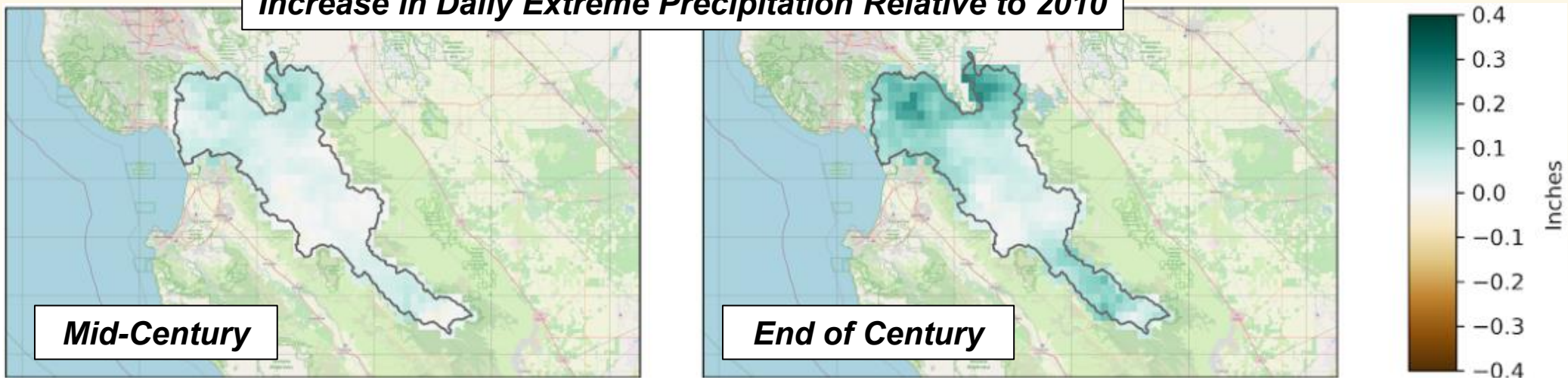


Source: *https://www.ioes.ucla.edu/project/future-extreme-precipitation-california/*

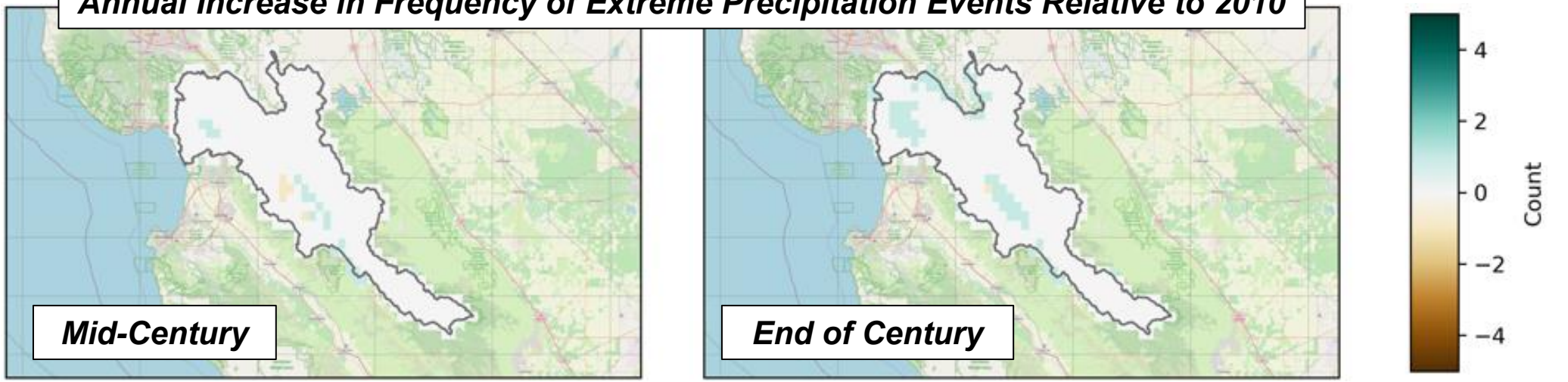
Source: 50th percentile of 137 down-scaled simulations using CMIP6 models from California's Fifth Climate Change Assessment, processed by Eagle Rock Analytics.
Extreme Precipitation: 95th percentile of average daily max

Flooding & Extreme Precipitation

Increase in Daily Extreme Precipitation Relative to 2010



Annual Increase in Frequency of Extreme Precipitation Events Relative to 2010



Wildfire

What:

Destructive fires that can start in wildland and spread quickly into urban areas.

Projections:

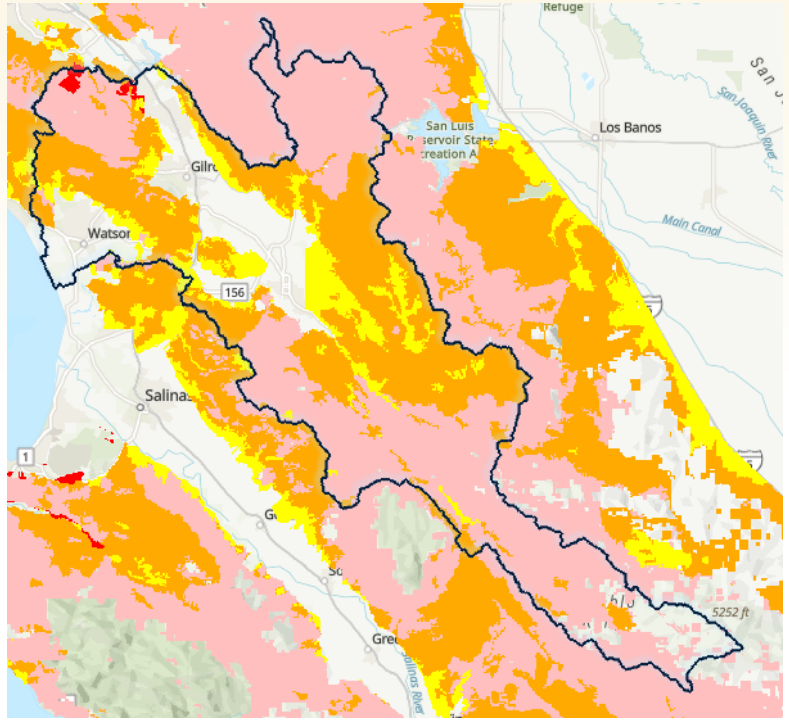
Much of California can expect an increased risk of wildfire, with a wildfire season that starts earlier, runs longer, and features more extreme fire events.

Threats:

Causes widespread destruction impacting various sectors; threatens local water quality and supply by damaging assets, interrupting power supply and using up water supplies.

Source: https://cal-adapt.org/tools/wildfire/

Wildfire



CalFire Fire Hazard Severity Zones (FHSZ)

FHSZ in SRA - Effective April 1, 2024

Very High

High

Moderate

Sea Level Rise and Storm Surge

What:

Coastal flooding due to future sea level rise, coastal storms, and long-term topographic change.

Projections:

Sea level rise of up to 1 ft likely by 2050, and by 2100, statewide averaged sea levels are expected to rise between 1.6 ft and 3.1 ft.

Threats:

Sea level rise threatens the Pajaro River Watershed's coastal areas with increased tidal flooding, rising groundwater levels and saltwater intrusion, and habitat loss, particularly near the Pajaro Lagoon and low-lying infrastructure.

Sea Level Rise

Inundation at 1.5 ft of Sea Level Rise

Source: https://coast.noaa.gov/slr

Source: State of California Sea Level Rise Guidance. 2024 SCIENCE & POLICY UPDATE

Climate Hazards

Extreme Heat

Extreme Precipitation & Flooding

Wildfire

Drought

Sea Level Rise and Storm Surge

POLL #3

Which climate hazard are you most impacted by and/or are most worried about?

5 MINUTE BREAK

Identifying Water Resources Vulnerable to Climate Change

Defining Vulnerability

Vulnerability is defined based on ***Exposure***, ***Sensitivity***, and ***Adaptive Capacity***

Exposure + **Sensitivity** + **Adaptive Capacity** = **Vulnerability**

Is the resource in an area where a climate hazard could occur?

The degree to which a resource could be harmed or damaged by that exposure.

The ability of the resource to respond to a climate hazard by continuing to function with little or no changes in the current ecosystem, operational, or management structure.

From DWR Watershed Resilience Toolkit: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/California-Water-Plan/Docs/Update2023/Supporting-Documents/Watershed-Resilience-Framework-and-Toolkit.pdf

Exposure

Example for Sea Level Rise and Storm Surge

Low **High**

Sensitivity

Example for Sea Level Rise and Storm Surge

Low **High**

Adaptive Capacity

Example for Sea Level Rise and Storm Surge

High **Low**

Defining Vulnerable Resources

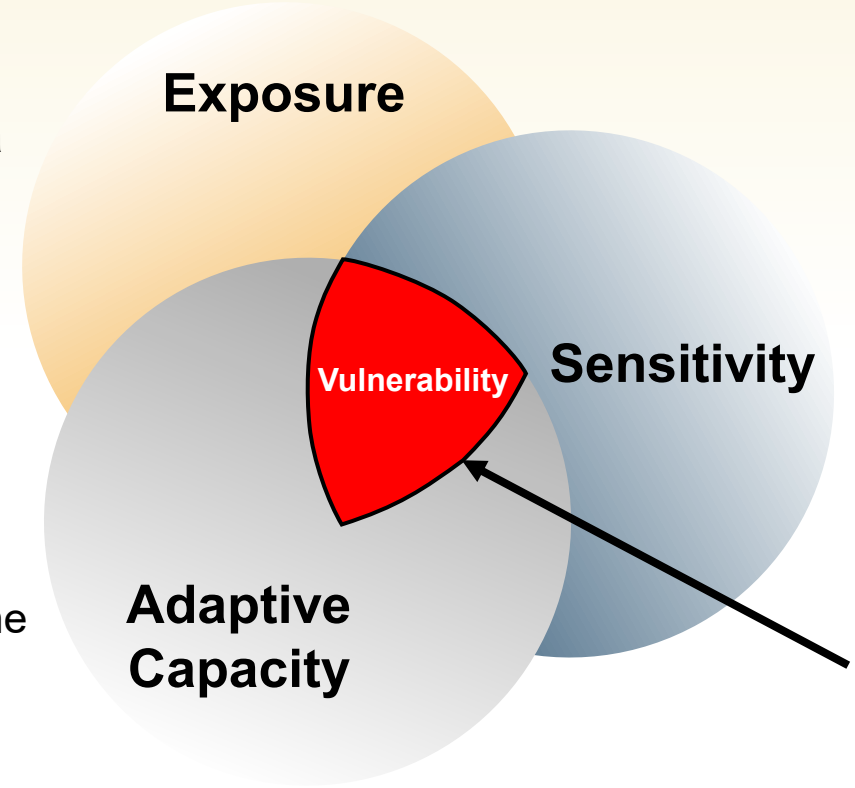
Each component of vulnerability is rated qualitatively from **low** to **high**

Exposure
Is the resource in an area where a climate hazard could occur?

Low High

Adaptive Capacity
Ability to adapt or recover from the impacts of a climate hazard

High Low



Sensitivity
How severe is the impact from the climate hazard?

Low High

<u>High Vulnerability =</u>
High Exposure
High Sensitivity
Low Adaptive Capacity

From DWR Watershed Resilience Toolkit: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/California-Water-Plan/Docs/Update2023/Supporting-Documents/Watershed-Resilience-Framework-and-Toolkit.pdf

Qualitative Vulnerability Scoring

Vulnerability score is listed in colored cells of table, assuming this area has high **Exposure**

		Sensitivity				
		Low = 1	Moderate/Low = 2	Moderate = 3	Moderate/High = 4	High = 5
Adaptive Capacity	Low = 1	Low	Moderate/Low	High	High	High
	Moderate/Low = 2	Low	Moderate	Moderate/ High	High	High
	Moderate = 3	Low	Low	Moderate	Moderate	High
	Moderate/High = 4	Low	Low	Low	Moderate	Moderate
	High = 5	Low	Low	Low	Low	Moderate

From DWR Watershed Resilience Toolkit: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/California-Water-Plan/Docs/Update2023/Supporting-Documents/Watershed-Resilience-Framework-and-Toolkit.pdf

Qualitative Vulnerability Examples

Vulnerability evaluated quantitatively for **one** water resource and **two** climate hazards

Water Resource: Pajaro Valley Subbasin Groundwater Basin (**water supply**)				
Climate Hazard	**Exposure**	**Sensitivity**	**Adaptive Capacity**	**Vulnerability Score**
Extreme Heat	**Moderate/Low** (coastal influence)	**Moderate/Low** (underground storage/higher pumping)	**Low** (primary water supply)	**Moderate/Low**
Sea-Level Rise and Storm Surge	**High** (coast adjacent)	**Moderate/High** (saltwater intrusion)	**Low** (primary water supply)	**High**

Qualitative Vulnerability Input

We want your input on the specific water resource systems of the Pajaro River watershed you are familiar with:

- Are they **exposed** to climate hazards? (assume yes for this workshop)
- Are they **sensitive** to the projected effects of climate hazards?
- Can they **adapt to or easily recover** from climate hazard impacts?

We are looking for **qualitative** feedback:

High **Moderate** **Low**

Qualitative Vulnerability Input

We will use your input to inform a comprehensive vulnerability rating for all water resource system features and assets in the watershed.

Water Resource System Feature/Asset Examples					
Pajaro Valley Subbasin	Med	Low	Low	**High**	**High**
Watsonville Slough	**High**	Low	Low	Med	Low
Pajaro River Levee System	Low	**High**	Low	Low	**High**
Tribal ceremonial area	Med	**High**	**High**	Low	Low
Pajaro Dunes	Med	Low	Low	Med	**High**

We will focus future planning efforts and quantitative modeling for this project on **high vulnerability systems**

Process to Identify Vulnerable Resources

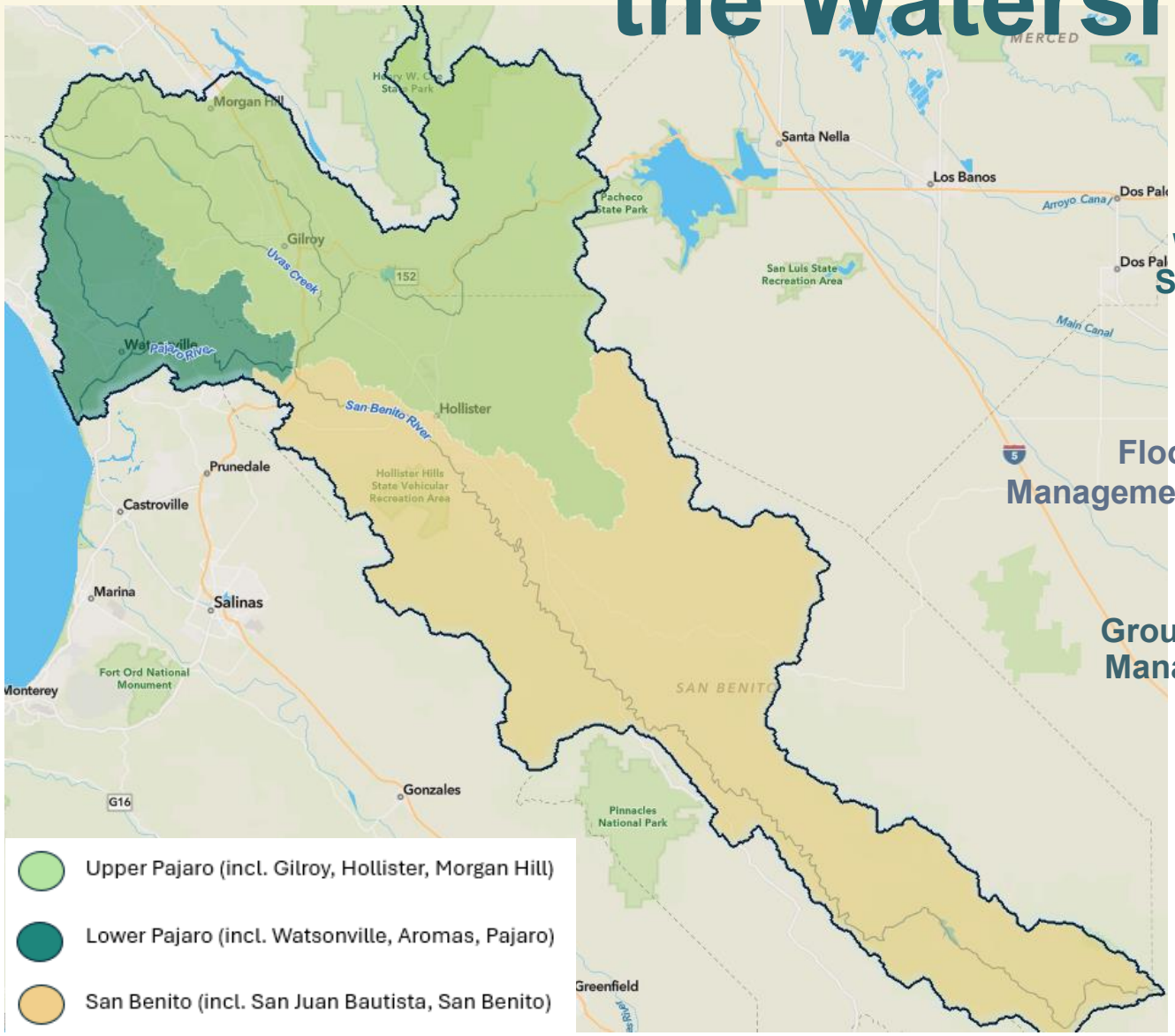
All water resource system assets and features

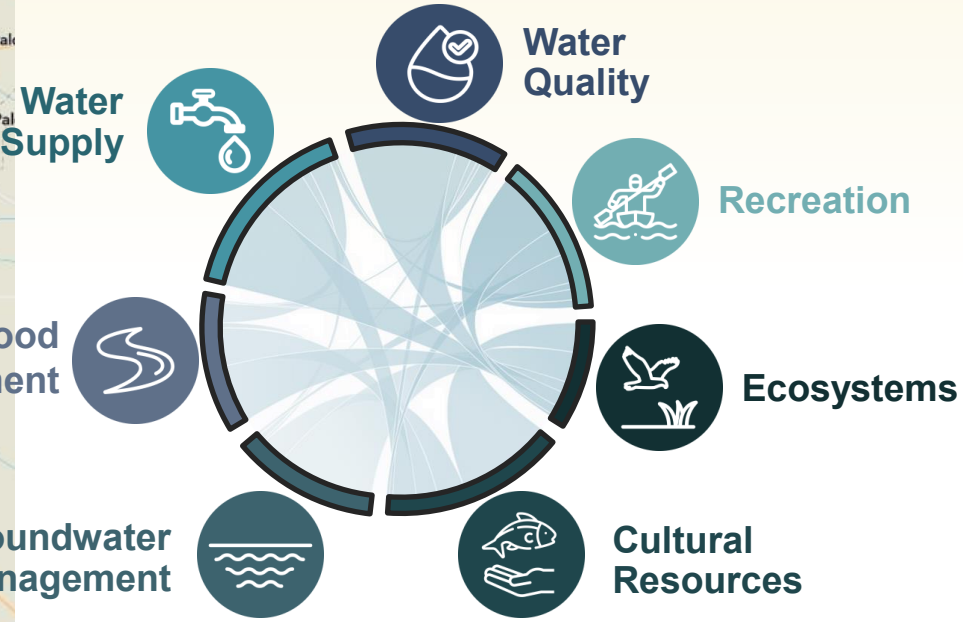
Feedback from Watershed Network, including Workshop #1 →

Feedback from Today →

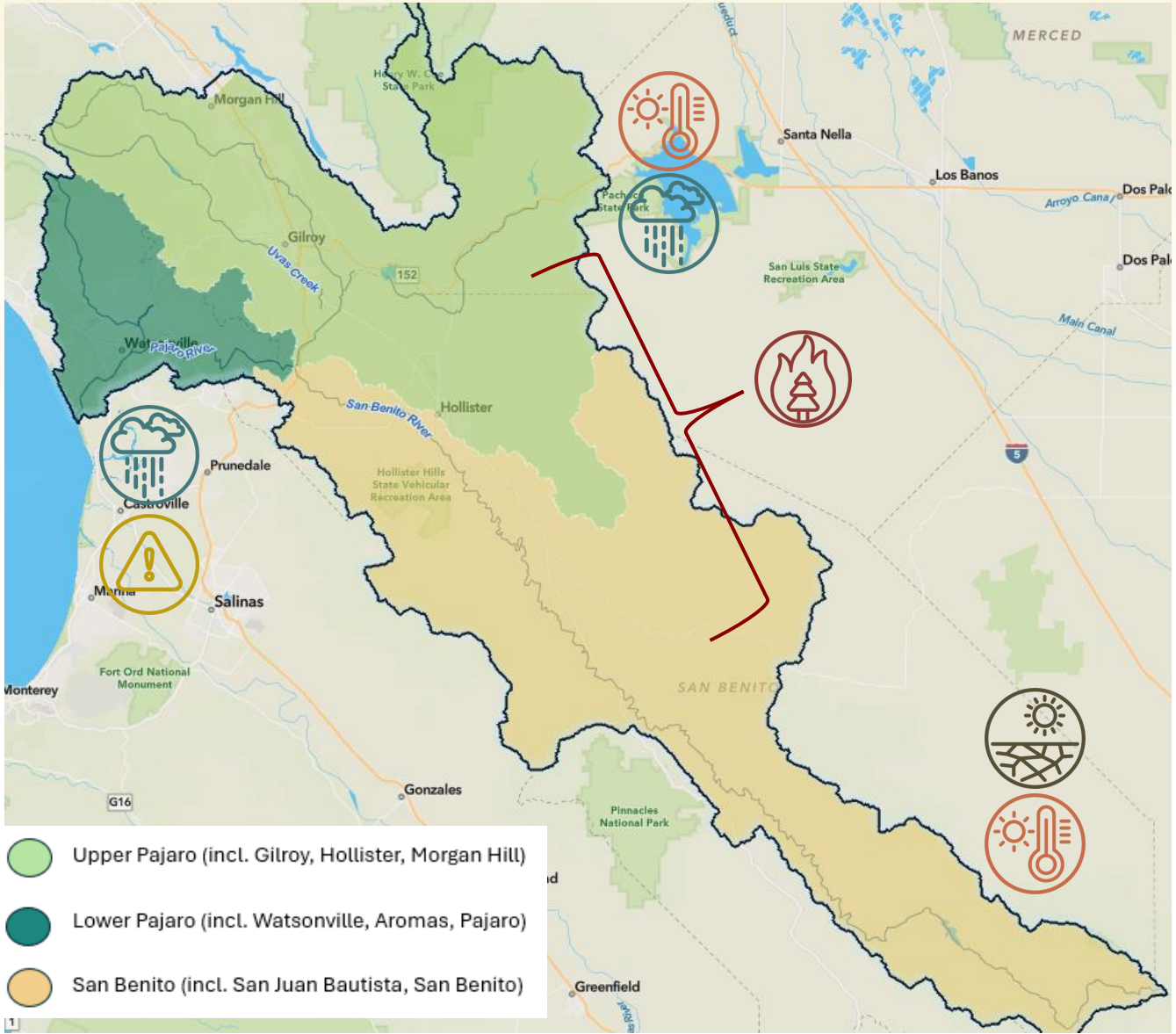
Most vulnerable
water resource system assets/features and climate hazards

Identifying Vulnerable Resources in the Watershed





Climate Hazards in the Watershed



- Extreme Heat
- Extreme Precipitation & Flooding
- Wildfire
- Drought
- Sea Level Rise and Storm Surge

Focus on TWO hazards per region for this Workshop, based on input from Advisory Group

Assessing Climate Exposure and Impacts

Activity Goal

Identify water resource **assets and features** in your region most vulnerable to **climate hazards** and discuss **impacts** and ability to **adapt.**

1. **Join breakout room** for your geographic region
2. **Review** identified assets, features and climate hazards for your region using regional worksheet. **Provide comments** in worksheet on assets/features you consider most vulnerable. ***Get specific!*** (5 minutes)
3. **Discuss** vulnerable assets and features for each hazard and impacts to the community *(facilitated by PRWRP Consultant Team,* 25 minutes per hazard)

Assessing Climate Exposure and Impacts

Launch and Join Breakout Rooms

Breakout Room Region	Climate Hazard Focus
Lower Pajaro	Sea Level Rise and Storm Surge, and Extreme Precipitation and Flooding
San Benito	Extreme Heat and Drought
Upper Pajaro	Extreme Precipitation and Flooding and Heat
San Benito and Upper Pajaro	Wildfire

Report Out

- What Water Resource System did you focus on and why?
- What **assets/features** were considered most vulnerable and why?
- What **key impacts** to the community were identified?
- What did we **miss** that you think is important to consider?

Next Steps and Close Out

Upcoming Activities

- Complete Exit Survey – thank you!
- Complete "Assessing Impacts" Survey
- Mark Your Calendar for
  Workshop #3: Initial Adaptation Strategies
  - In Person Only
  - August 19th, 1:00 – 4:00 PM in Watsonville
  - Identifying initial adaptations strategies and projects
- Check out the PRWRP website and **join** the Network: www.pvwater.org/PRWRP

Exit Survey

Link in Chat

Thank you!!!