LOS ANGELES COUNTY
SANITATION DISTRICTS
Converting Waste Into Resources

Santa Clara River Temperature Study

Stakeholder Advisory Group (SAG) Meeting

July 21, 2026

Today's Agenda

- Introductions and Meeting Goals
- Project Background
- Technical Study Results
- Management Options
- Next Steps

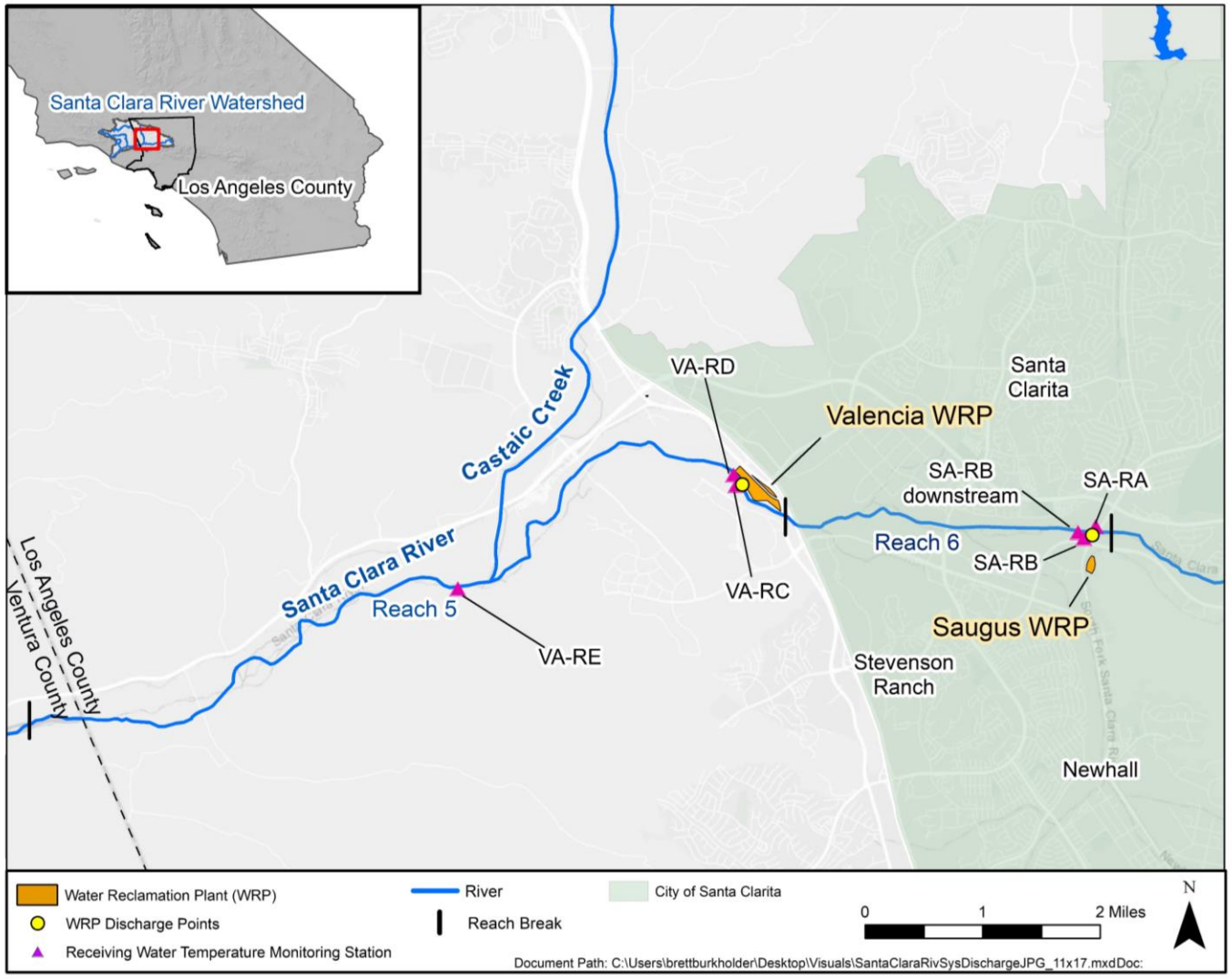
Meeting Goals

- Provide feedback on results of technical studies
- Discuss implications of findings
- Explore potential management actions to improve habitat quality in the SCR

Background and Issues

- Groundwater management and groundwater/surface water interactions (i.e., upwelling)
- Sensitive species
  - Unarmored three-spined stickleback
- Lower watershed restoration efforts
  - River parkway
  - Estuary and coastal restoration

Santa Clarita Valley Sanitation District
Water Reclamation Plants



September 2023

January 2024

September 2024

Santa Clara River Temperature Study

- Initiated in response to new temperature limits in WRP discharge permits (80°F and cannot alter river >5°F)
- Aimed at addressing the following question: **Are the plant discharges impacting the warm freshwater habitat (WARM) beneficial use of the Santa Clara River?**
  - How do waterbody temperatures affect local aquatic life?
  - How do plant discharges affect river temperatures?

Focus: Unarmored threespine stickleback

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Key Points

River and discharge temperatures are significantly influenced by ambient air

Saugus WRP discharge typically lacks hydrologic connectivity with UTS habitat

Static limits do not align with thermal tolerance of UTS

Nature-based options do not provide substantial cooling

Mechanical cooling is energy intensive and only provides short-term, localized cooling

Considering other habitat **improvements**

Technical and Stakeholder Involvement

- Technical Advisory Committee (TAC)
  - Includes Regional Board staff, California Department of Fish and Wildlife, United States Fish and Wildlife Services, and US EPA
  - Informed and reviewed technical study approach, analysis, and interpretation
  - Provided input to project team on project deliverables
  - Met 6 times since August 25, 2022

- Stakeholder Advisory Group (SAG)
  - Provide a forum for dialogue with potentially interested or affected stakeholder community
  - May provide community input on technical issues raised by the TAC
  - Last meeting was October 16, 2023

Temperature Study Overview

Source Investigation

- In-plant WRP temperature monitoring across treatment processes
- Industrial discharges
- Potable water supplies

Temperature Monitoring & Modeling

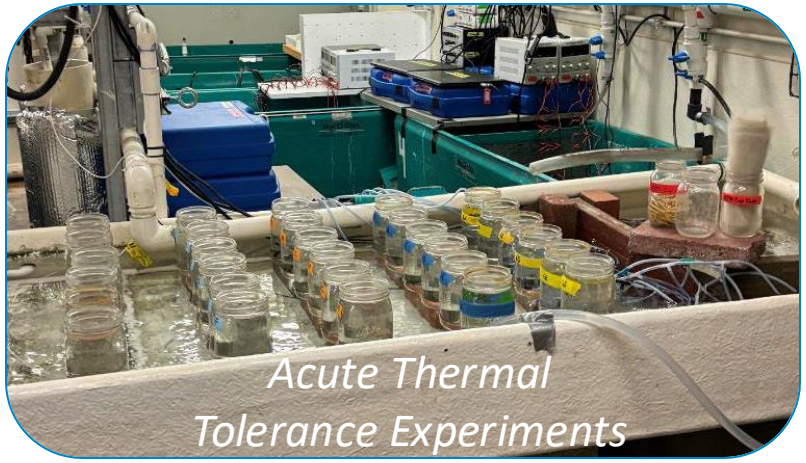
- Continuous monitoring
- Spatial surveys
- River model

Biological Evaluations

- Literature reviews
- Laboratory studies
- BMI / algae surveys

Evaluation of Control Options

- Nature-based / alternative strategies
- Mechanical options (chillers, cooling towers)



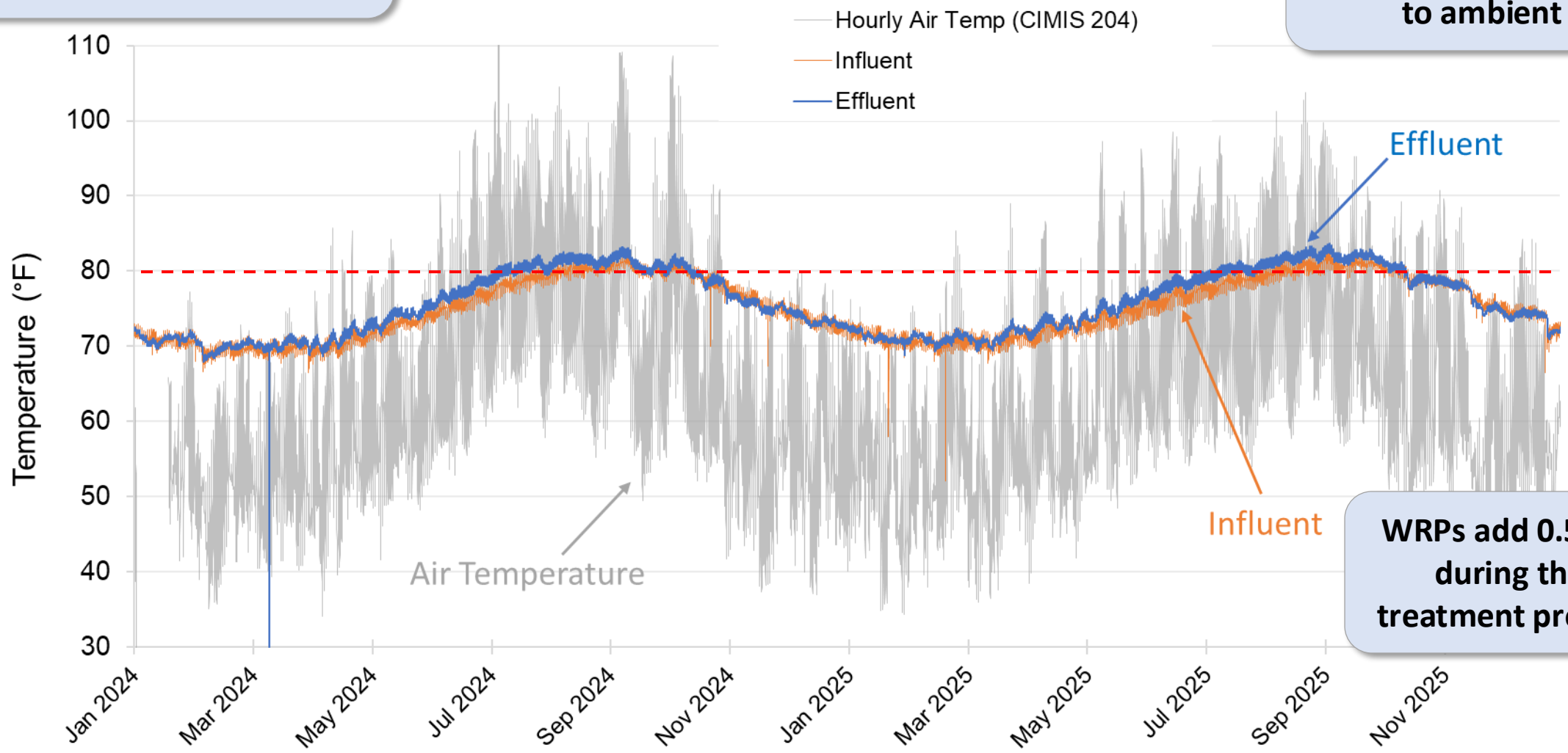
Acute Thermal Tolerance Experiments

Spatial Surveys

Wastewater Temperatures
Saugus WRP

During summer, wastewater comes into WRPs above 80°F

Wastewater temps are seasonal and correspond to ambient air

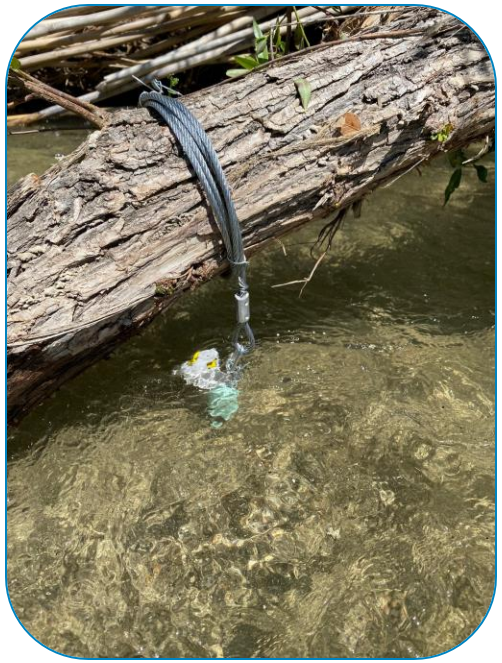


WRPs add 0.5-2°F during the treatment process

Temperature Monitoring

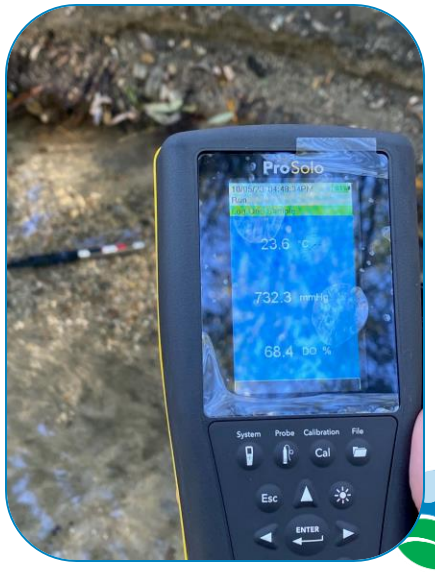
Temporal Temperature Monitoring

- Install Hobo continuous loggers throughout the study reach
- Installation has been very challenging: ~20 of 25 loggers lost



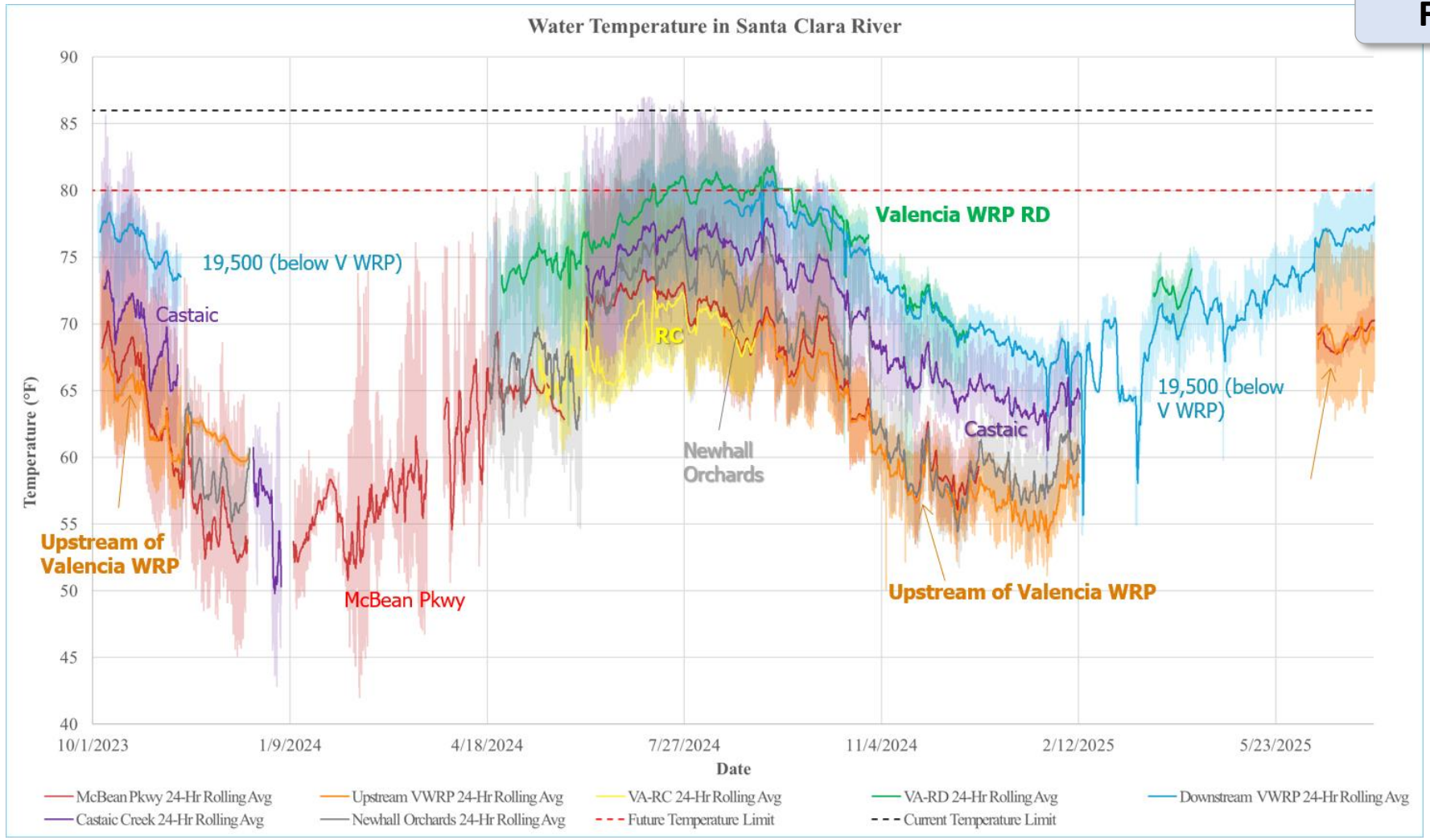
Spatial Temperature and Physical Habitat Measurement and Mapping

- Measure and map temperature with a concentration around Valencia WRP
- Quarterly
- Added DO, velocity, depth, substrate and cover at request of TAC



River Temperatures – Multiple Locations

Follows air temps

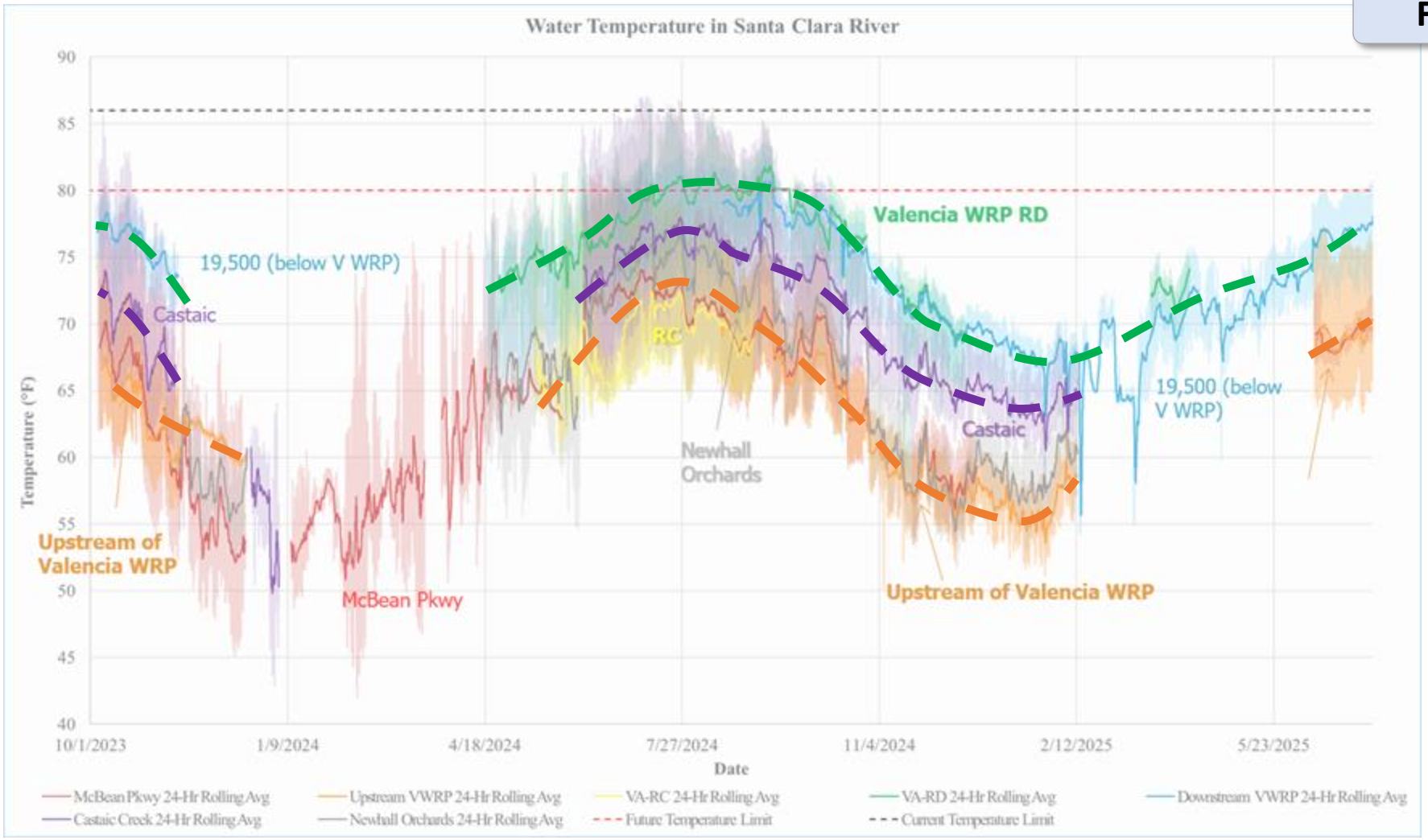


River temps exceed 80°F upstream of WRP in summer

Diurnal fluctuations of up to 20°F

River Temperatures – Multiple Locations

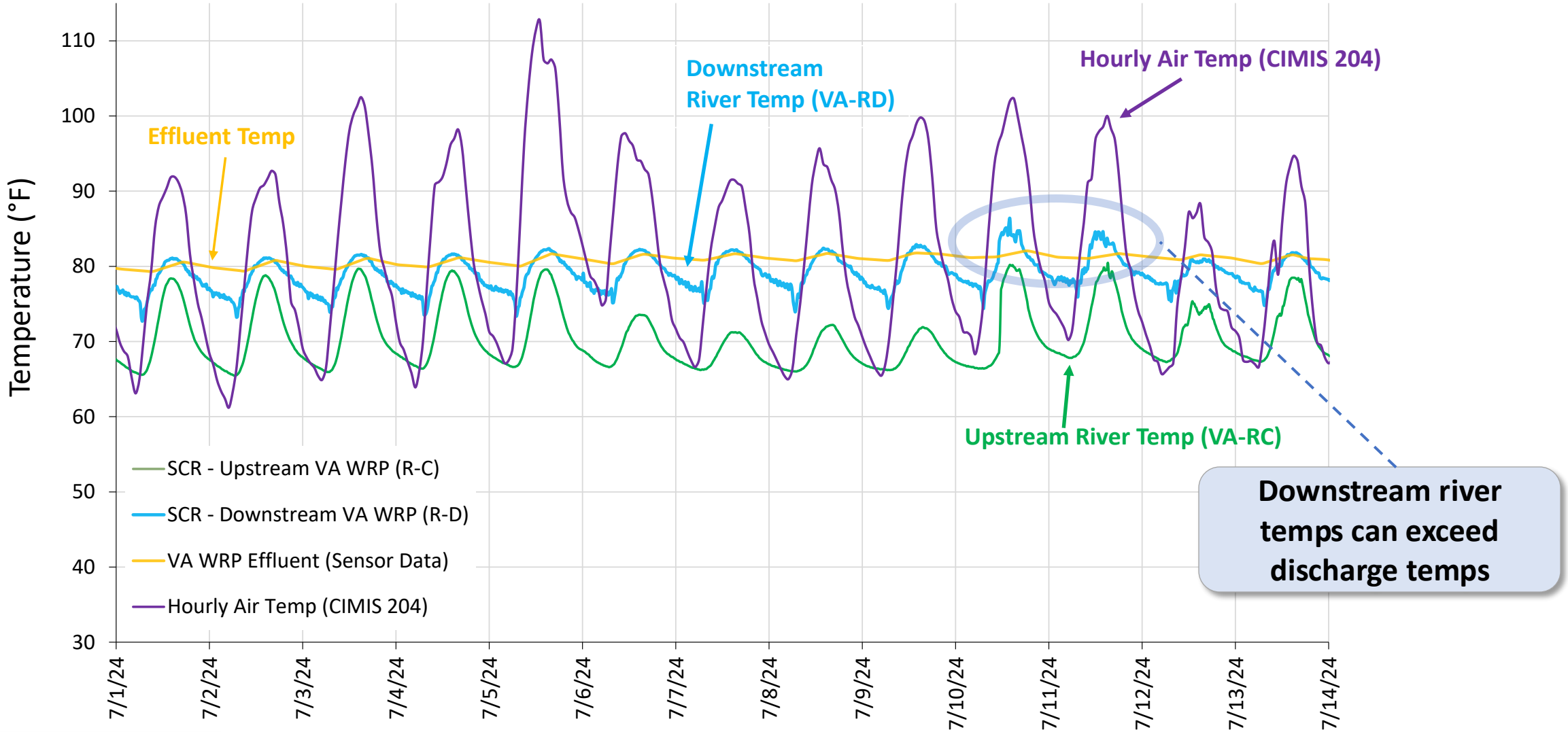
Follows air temps



River temps exceed 80°F upstream of WRP in summer

Diurnal fluctuations of up to 20°F

River Temperatures – Near Valencia WRP

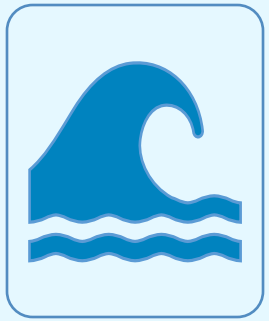


Follows air temps

Temperature Monitoring - Key Points

WRP Temperatures

- **Seasonal** and **correlate with ambient air temperatures**
- Diurnal variation is small relative to seasonal variation
- Summer **influent temps >80°F**
- **Minimal heat is added** during treatment (effluent ≈ influent)



River Temperatures

- **Diurnal and seasonal patterns** correlate with **ambient air temperature**s
- Upstream can exceed 80°F
- **Diurnal changes** are significant and **greater than delta 5°F**

Biological Studies – Laboratory Fish Studies

- Study Objectives
  1. What are the effects of temperature on multiple life stages and development?
  2. Are cycling temperatures beneficial for threespine stickleback?
  3. What are the effects of temperature on different lifestages and development of threespine stickleback?

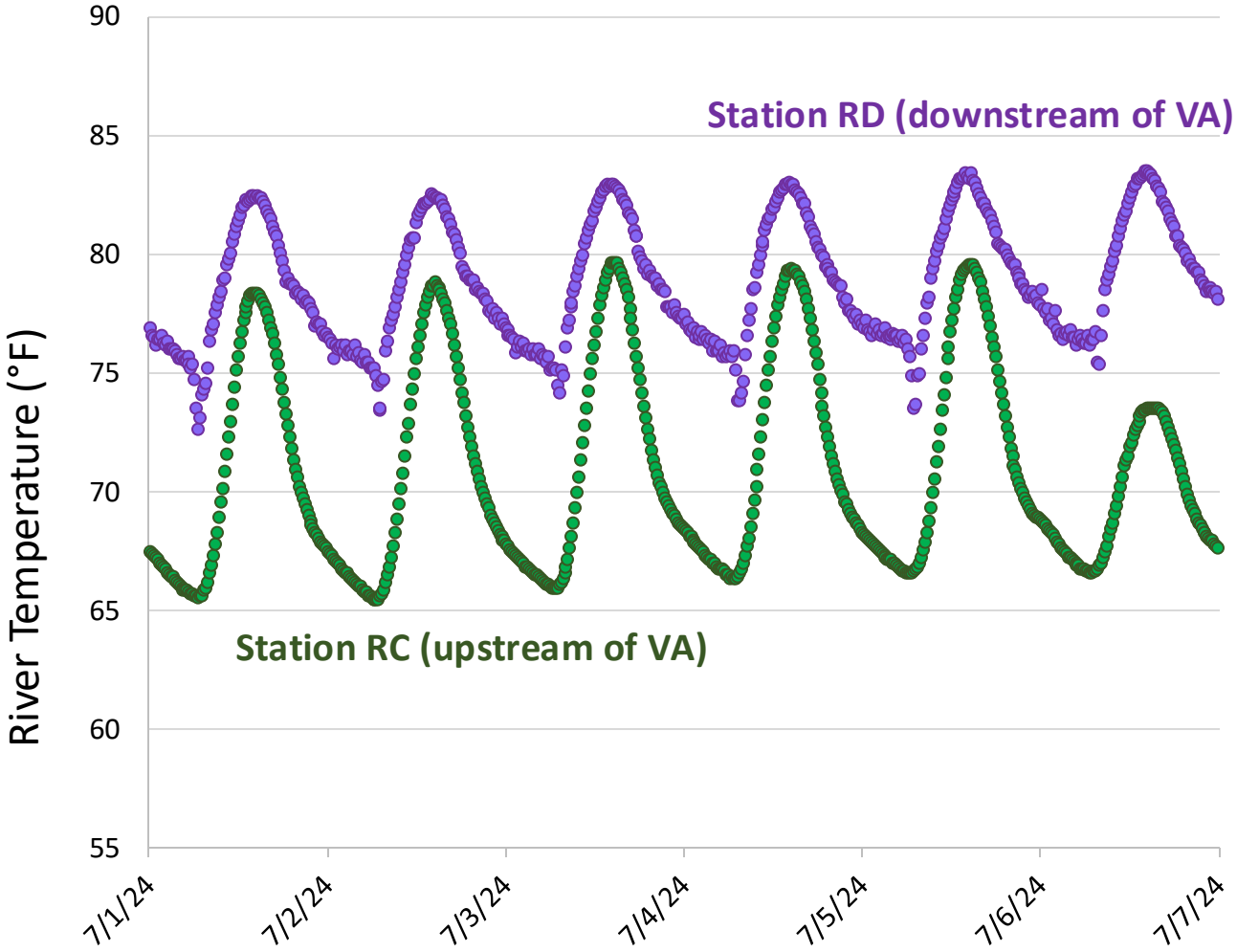
Biological Studies – Laboratory Fish Studies

- Wild local stickleback
  - Used surrogate (partially armored threespine stickleback - PATS)
  - Collected from lower SCR where river temperatures exceed permit limits (daily fluctuations 62°F to 82°F)
- Experimental trials
  - Physiological thermal metrics
    - Acute (CT_{max}) and chronic (UILT) tolerance limits
    - Performance (acclimation, metabolic traits, aerobic scope, preference)
  - Acclimation to steady and cycling (diurnal) temperatures
  - Life stages (adults, juveniles, embryos)

Fish Collection

Partially armored threespine Stickleback (PATS)

Biological Studies – Laboratory Fish Studies



Adults (survival decreases ≥80°F) are more tolerant than juveniles (survival decreases ≥73°F); embryos are thermally robust

Higher survival was observed at cycling water temps (i.e., daily fluctuation 73-83°F) than constant high temps

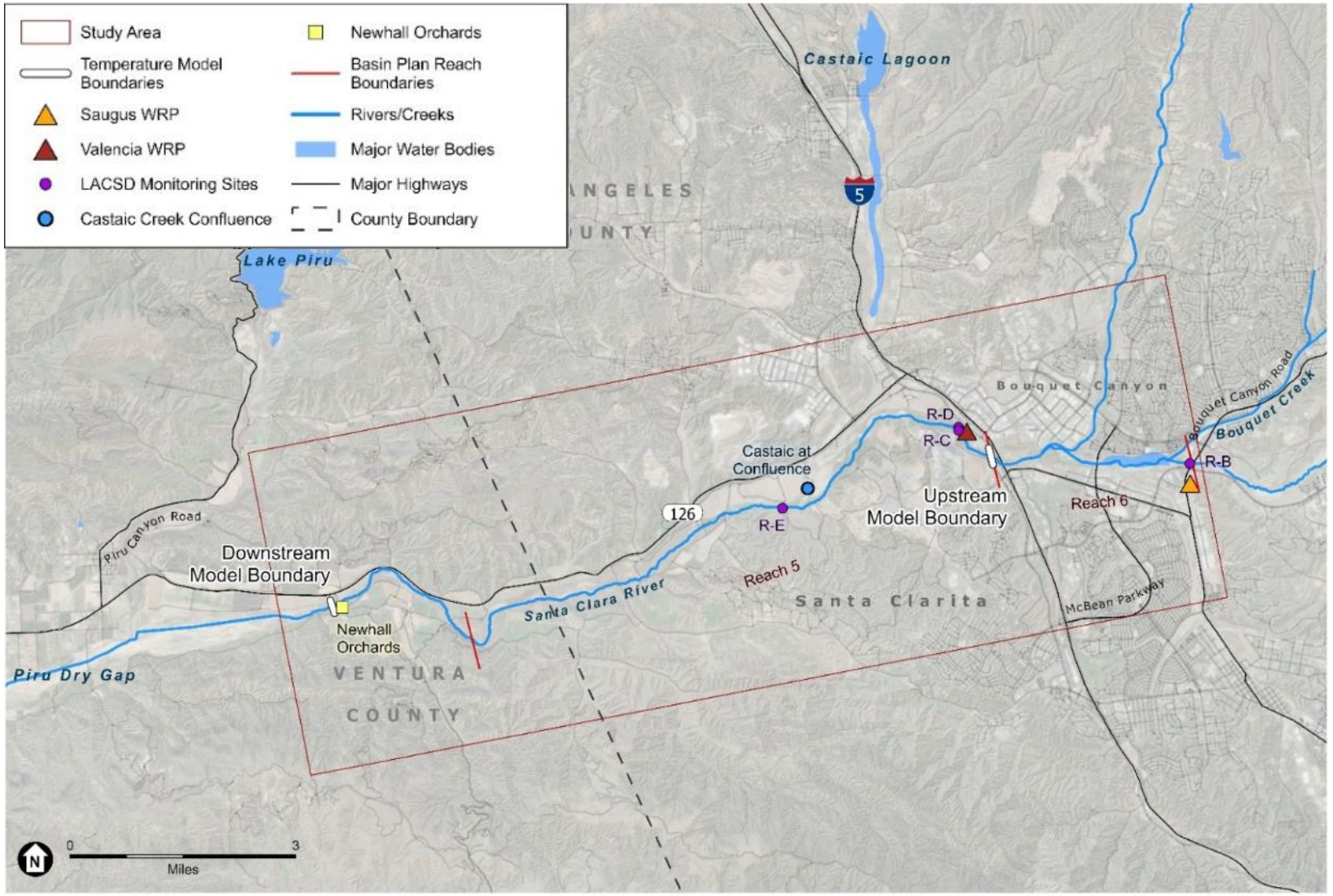
Implication: River spikes >80°F can be tolerated if cooler night temperatures are available for recovery

Biological Studies - BMI

- Benthic Macroinvertebrate (BMI) Surveys
  - Conducted historically (2004-2015 except 2012), but **unable since 2016** due to permitting prohibitions
  - BMI collected around VA WRP June 10-11, 2025
  - Historic and current California Stream Condition Index (CSCI) scores indicate **"likely altered" biological condition** relative to reference conditions; **Stream is highly dynamic** (scouring flows, sandy channel)
  - **No difference in CSCI score between upstream and downstream** of VWRP discharge

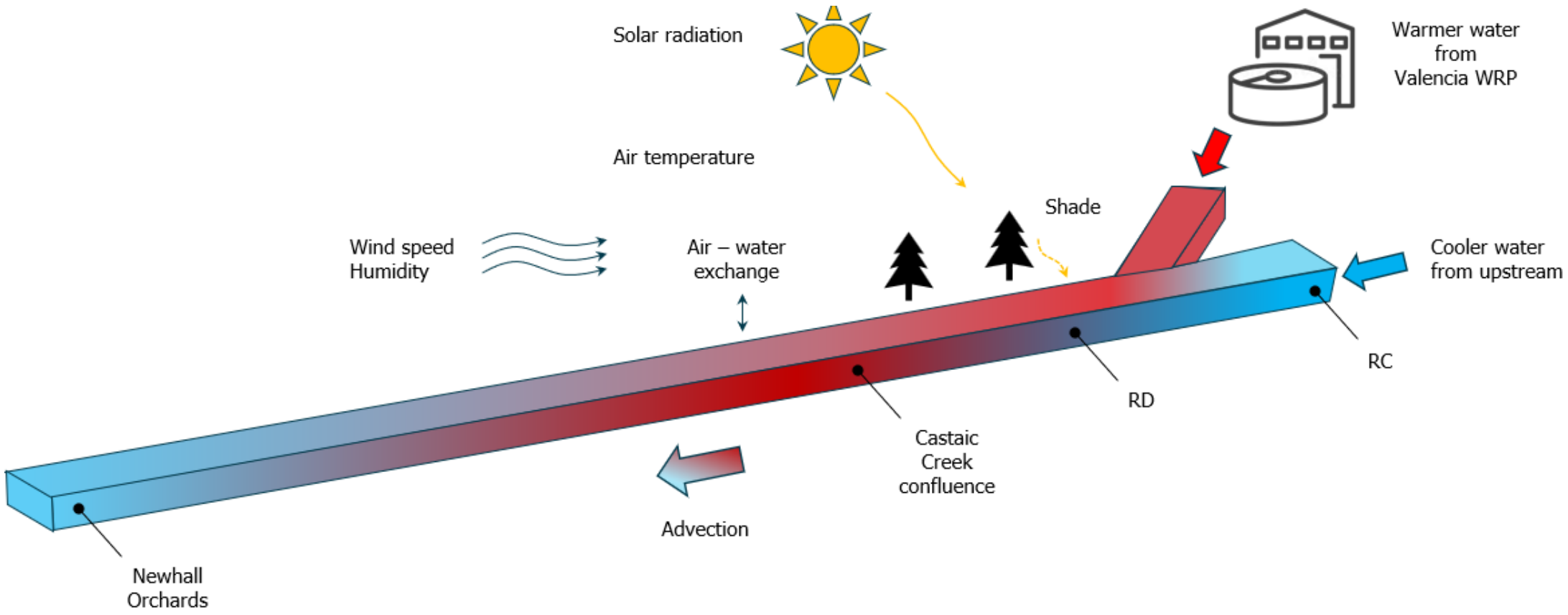
Benthic organisms not impacted by discharge temperature

River Temperature Modeling - Goals



- Model potential river management actions for their effect on river temperature under a range of conditions
- Screen potential management actions for more consideration

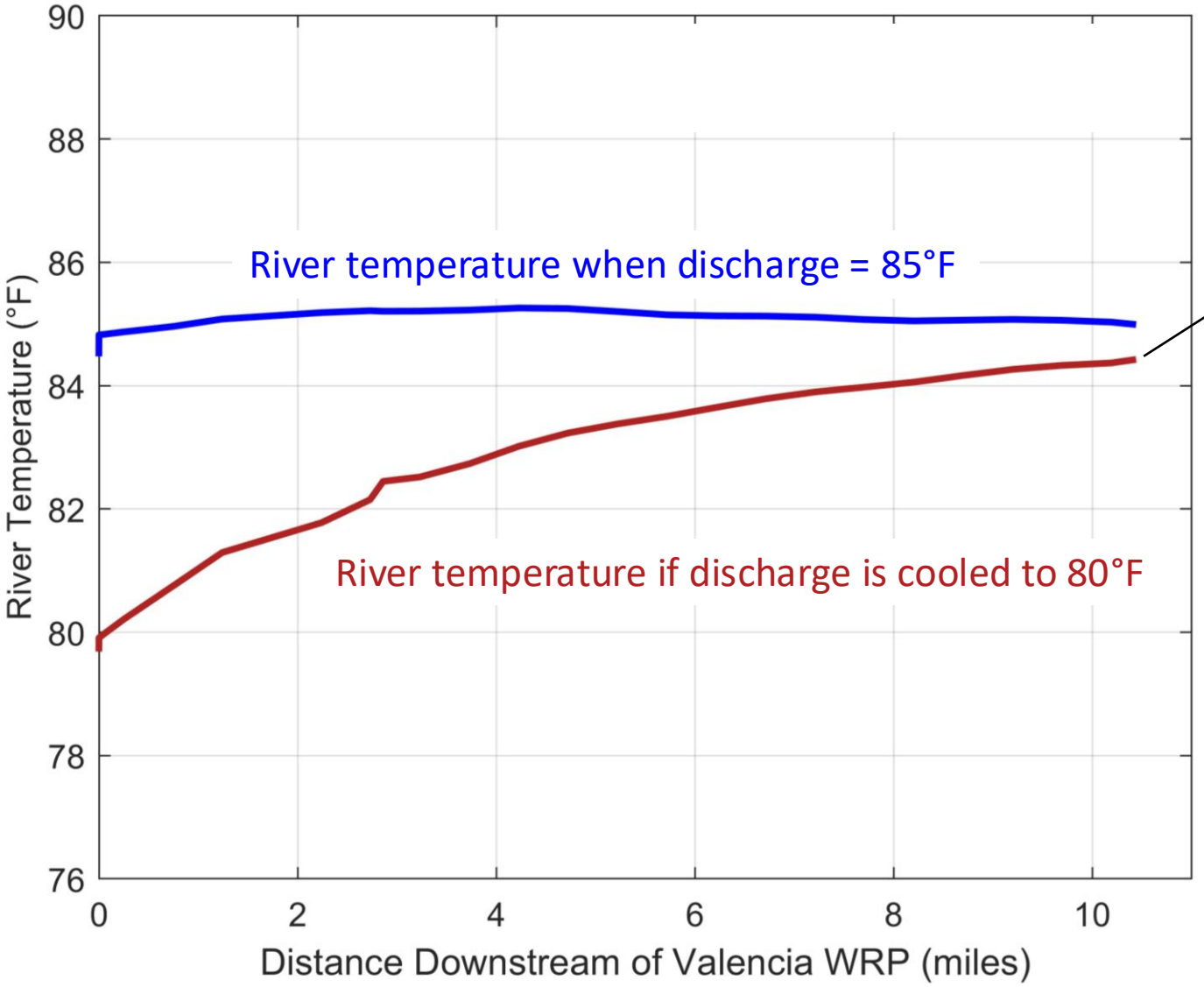
Temperature Model - CE QUAL W2



River Temperature Modeling - Scenarios

- Simulated summer and fall from a year with higher and lower than average upstream flow contributions
- Tested management scenarios:
  - Existing conditions
  - 50% reduction in effluent
  - 100% reduction in effluent
  - Cap effluent temperature at 80°F
- All management actions still resulted in some days when river temperatures exceeded 80°F (including complete elimination of effluent)

River Temperature Modeling - Results

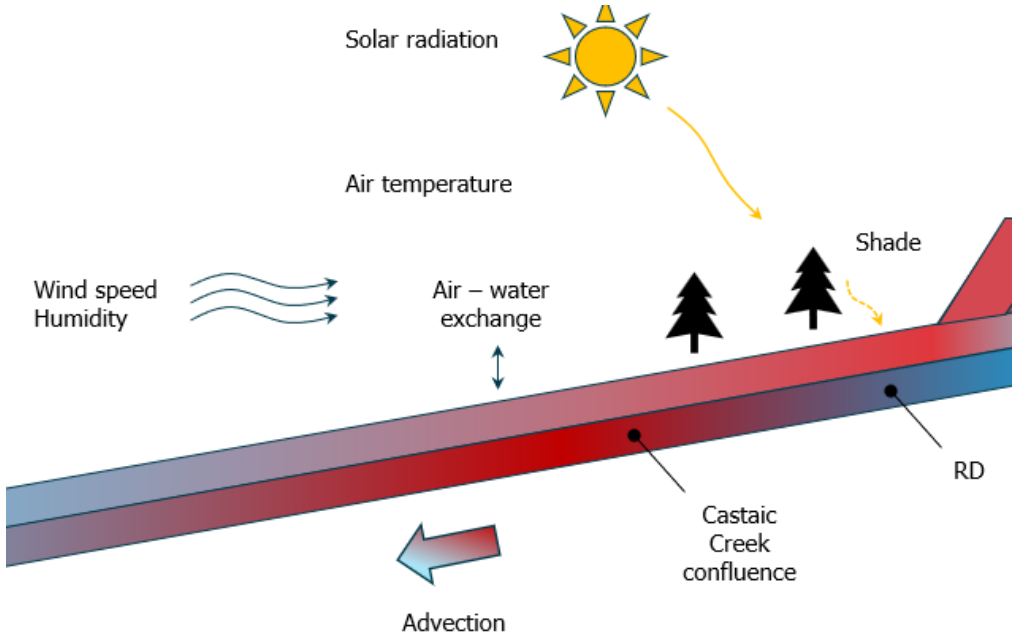


Modeled
September 2022
Conditions

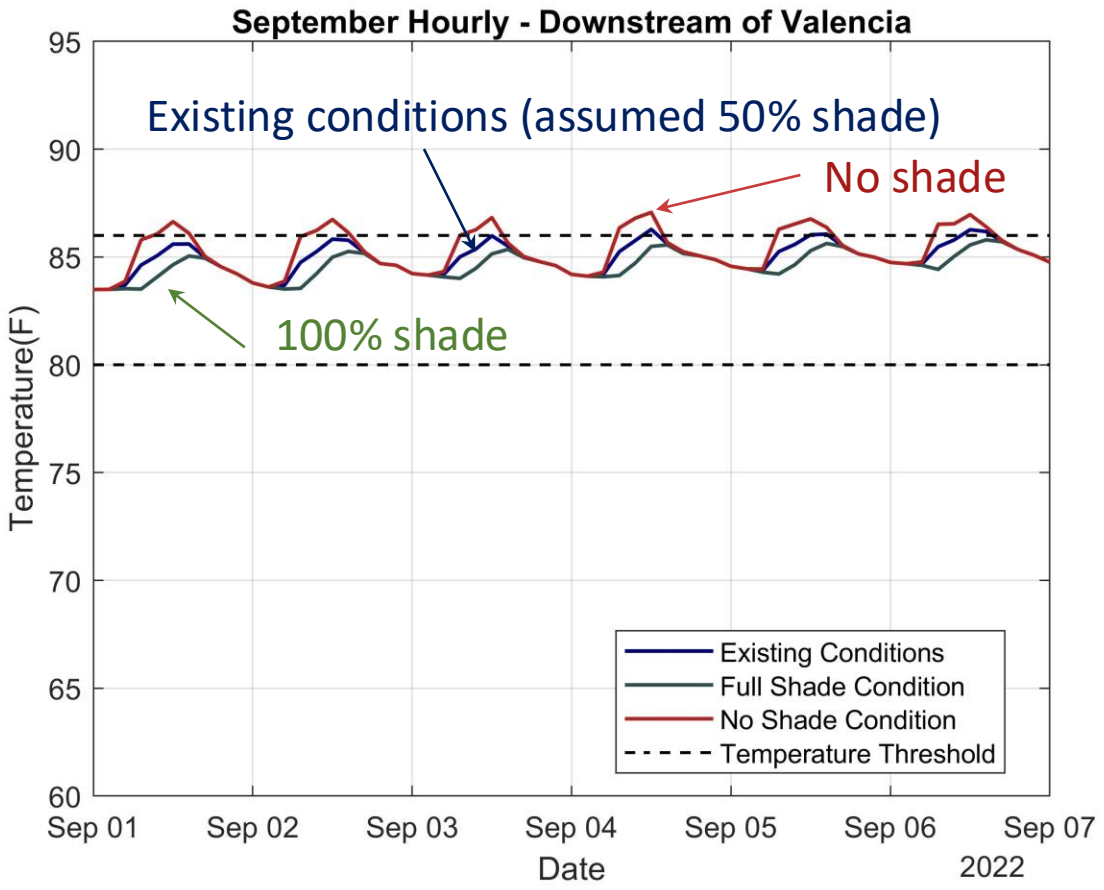
River heats back up if wastewater discharges are cooled to 80°F

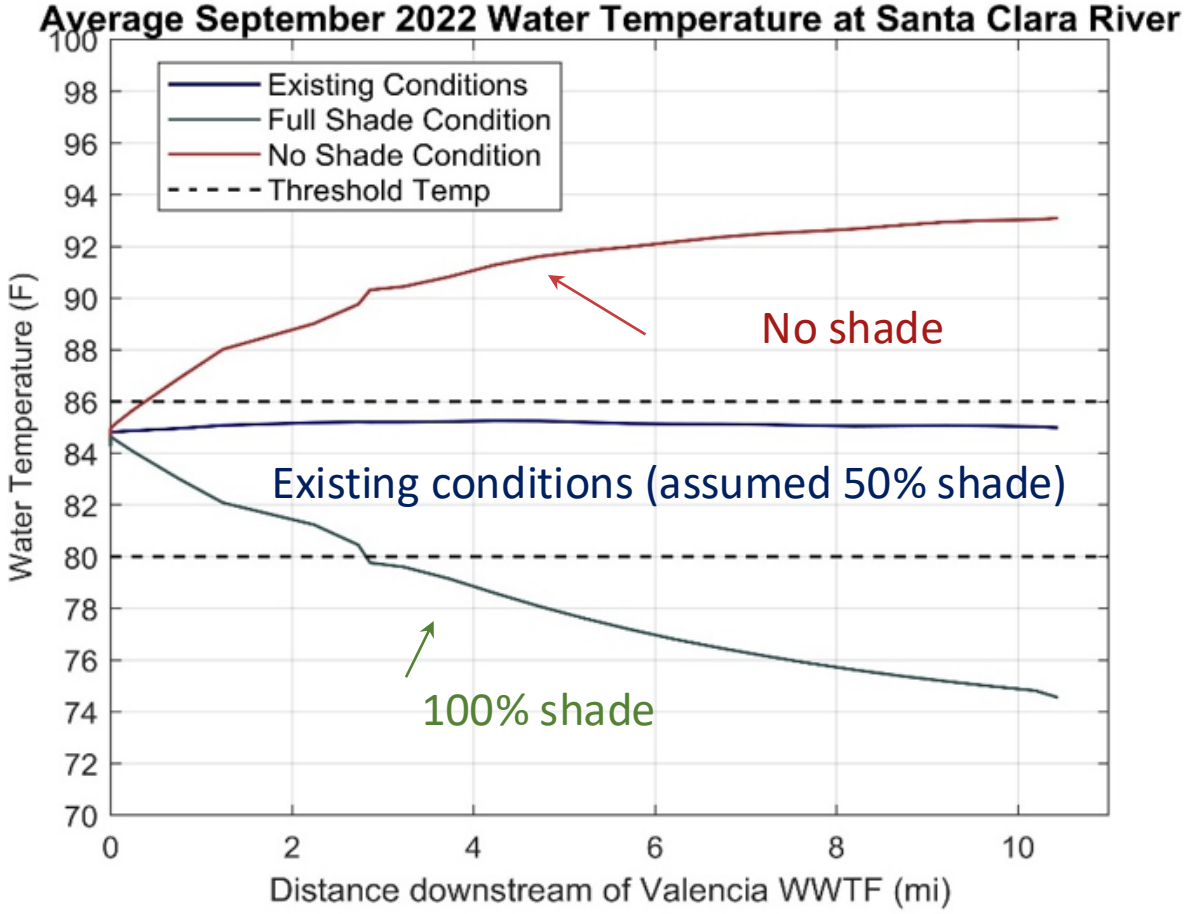
River Temperature Modeling – Shading Scenario

- Sensitivity of river temperatures to riparian shade



Effects of shade (Water year 2022)





Results: While shade can reduce river temperature by 2-4 degrees F by Castaic Creek, there is no way to guarantee continuous cover given the natural dynamism of the river (e.g., erosion of riparian corridor)

Variation in riparian cover following 5-year flood

6/2023

Variation in riparian cover following 5-year flood

3/2024

Variation in riparian cover following 5-year flood

8/2024

Variation in riparian cover following 5-year flood

10/2024

Variation in riparian cover following 5-year flood

Castaic Creek confluence

5/2022

Valencia WRP

Variation in riparian cover following 5-year flood

Castaic Creek confluence

5/2023

Valencia WRP

Variation in riparian cover following 5-year flood

Castaic Creek confluence

2/2024

Valencia WRP

Variation in riparian cover following 5-year flood

Castaic Creek confluence

8/2024

Valencia WRP

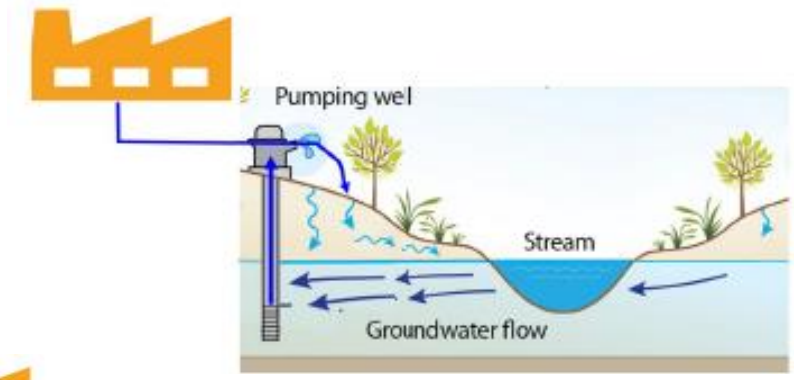
Nature Based Options Expert Panel

Scott Struck – National Renewable Energy Lab
Eric Stein – SCCWRP, *Facilitator*
Brian Bledsoe – University of Georgia, Athens
Jon Hathaway – University of Tennessee, Knoxville
Elizabeth Fassman-Beck – SCCWRP, *not pictured*

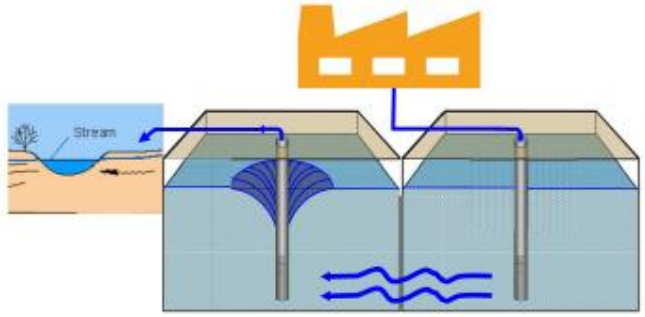
- Five virtual meetings
  - Approach
  - List of potential solutions
  - Evaluation criteria
- Iteratively refine solution list
  - Provide preliminary scoring
    - Practicality, risks, cost, co-benefits
- Four-day workshop
  - Tour WRPs and SCR
  - Refined solutions and scoring
  - Developed recommendations
- Review by TAC

Nature Based Options Expert Panel

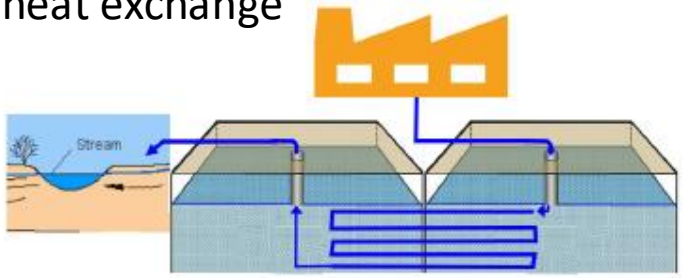
- Strategies considered:
  - Hyporheic discharge
  - Extractive groundwater mixing
  - Open loop groundwater heat exchange
  - Closed loop groundwater heat exchange
  - Infiltration
  - Green roof and green wall
  - Subsurface gravel beds
  - In-plant thermal recovery
  - Spray-diffuser



Extractive groundwater mixing



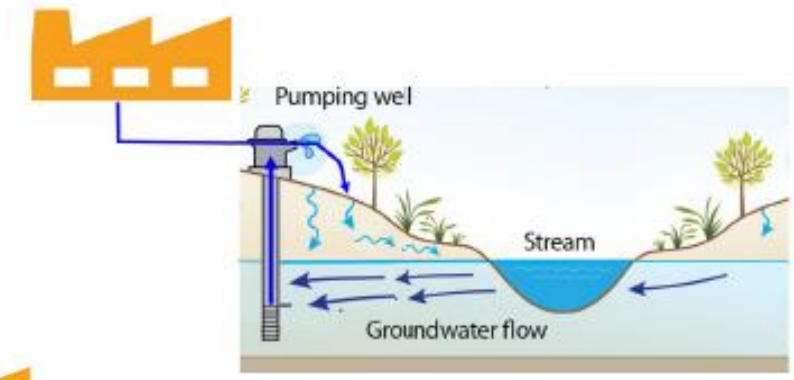
Open-loop groundwater heat exchange



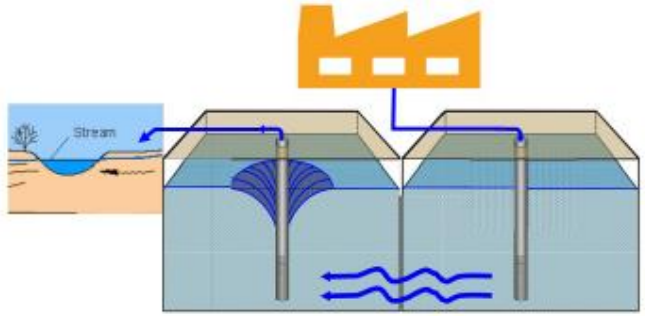
Closed-loop groundwater heat exchange

Nature Based Options Expert Panel

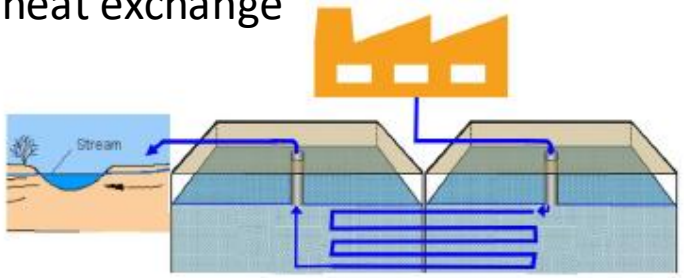
- Findings:
  - No options provide the needed temperature reduction
  - Feasibility issues (e.g. space, permitting, etc.)
  - Could be poor use of drinking water (groundwater blending)



Extractive groundwater mixing



Open-loop groundwater heat exchange



Closed-loop groundwater heat exchange

Mechanical Cooling Analysis

- Chiller Cost Estimates (Preliminary)

	Saugus and Valencia WRPs
Total Capital Cost ($)	$213 M*
Annual O&M Costs ($)	$3.2 M / yr
Annual Energy Needs (MWh)	16.4 MWh / yr
Annual Emissions - GHG Equivalents	8.6 M lb CO_2 / yr
Annual Emissions - Gas passenger cars equivalents	910

~65% increase in energy usage

*Includes estimated costs for 66kV substation for VA WRP to accommodate larger energy demands

- Cooling Towers
  - Less expensive and energy intensive than chillers
  - Unreliable during hot months when cooling is needed most
  - Does not work for the delta 5 limit

Overall Findings and Implications

Biology	Temperature Monitoring and Modeling	Control Measures
• No difference in benthic or algal communities upstream and downstream of WRPs • The UTS lab study indicates that thermal excursions above 80°F, including peaks near 82 to 83°F, can be tolerated when fish experience daily cooling periods at night.	• Temperatures upstream of the WRPs exceed 80°F • River temperatures naturally fluctuate more than 5°F • Modeling indicates that even if discharges are cooled to 80°F, downstream river temperatures will still exceed the water quality objective	• Chillers may meet permit limits, but will require significant energy and potable water and will cause significant GHG emissions • Alternative control measures would not allow WRPs to meet 80°F and Delta 5°F limits and infeasible
Temperature is not the limiting factor for aquatic life in the river	**No control measures will result in consistent attainment of WQOs**	**Attaining the limits is energy intensive and requires potable water**

Feedback and Next Steps

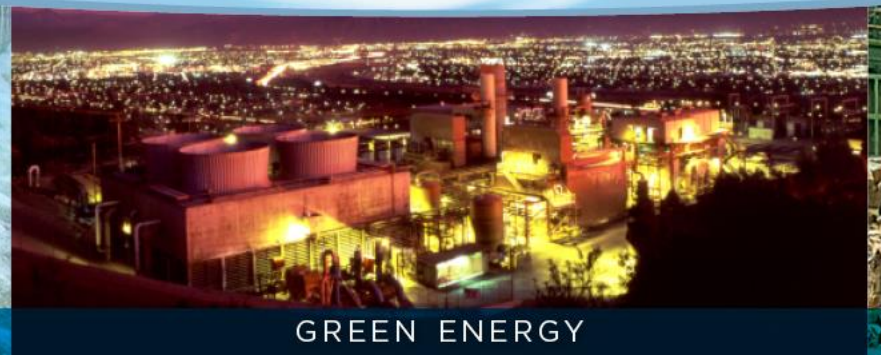
- Any additional questions or concerns over the work presented?
- Ongoing Work
  - Finalizing Technical Study Report
  - Discussions and presentations with Regional Board on implications
  - Considering other habitat improvements
    - Managing non-native vegetation (e.g. Arundo)
    - Adjusting flow regimes
    - Controlling invasive species

LOS ANGELES COUNTY
SANITATION DISTRICTS
Converting Waste Into Resources

OUR MISSION

To protect public health and the environment through innovative and cost-effective wastewater and solid waste management and, in doing so, convert waste into resources such as recycled water, energy, and recycled materials.


WATER RECYCLING


GREEN ENERGY


MATERIALS RECYCLING