# Santa Clara River Temperature Study
# Technical Advisory Committee Meeting #6 – March 17, 2026
# Meeting Notes

## Meeting goals

- Provide an update on the Santa Clara River Temperature Study, focusing on technical study results, modeling, and management implications.
- Discuss findings from fish physiology studies, benthic macroinvertebrate assessments, and temperature modeling.
- Review potential management options and solicit agency feedback on study adequacy and next steps.

## Agenda

1. Introductions
2. Project Background
3. Laboratory Fish Thermal Physiology Studies
4. Benthic Macroinvertebrate Results
5. Additional Temperature Modeling Results
6. Management Options
7. Next Steps

## Attendees

| Full Name | Organization |
|---|---|
| Fritz Rieman | CDFW |
| Andy Collison | ESA |
| Joel Mulder | ESA |
| Ramona Swenson | ESA |
| Taylor Spaulding | ESA |
| Sam Rojas | FivePoint |
| Ajay Malik | LACSD |
| Elizabeth Roswell | LACSD |
| Erika Bensch | LACSD |
| Jodie Lanza | LACSD |
| Josh Westfall | LACSD |
| Katie Marjanovic | LACSD |
| Ziad El Jack | LACSD |
| Adam Taing | LARWQCB |
| Celine Gallon | LARWQCB |
| Jeong-Hee Lim | LARWQCB |

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|---|---|
| Ryan Ham | SWRCB |
| Stefani Daryanto | LARWQCB |
| Steven Webb | LARWQCB |
| Veronic Cuevas | LARWQCB |
| Eric Stein | SCCWRP |
| Kris Taniguchi-Quan | SCCWRP |
| Scott Martindale | SCCWRP |
| Ali Elhassan | SCVWA |
| Najwa Pitois | SCVWA |
| Cassidy Cooper | UC Davis |
| Ken Zillig | UC Davis |
| Nann A Fangue | UC Davis |
| Chris Dellith | USFWS |
| Eric Morrissette | USFWS |

## Major action items

- Agency representatives to review and provide comments on the final technical report by April 1.
- Study team to compile and distribute meeting notes and presentation materials for review and posting.
- Continue evaluation of cooling tower feasibility and energy requirements for temperature management.
- Address any additional agency questions or concerns that arise before finalizing next steps.

## Meeting summary

- The meeting began with housekeeping and a review of the agenda.

**Regulatory Context**

- Elizabeth Roswell summarized the study area, regulatory context, and compliance milestones, highlighting the focus on the Santa Clara River and the revised temperature limits.
    - Temperature studies were initiated due to revised temperature limits for the Saugus and Valencia WRPs, specifically an eighty-degree limit and a maximum five degree difference between upstream and downstream receiving water temperatures (referred to as “delta five” limit).

**Fish Studies**

- Cassidy reviewed Phase 1 results and provided a summary of Phase 2 results, including the cycling and sensitive life-stage experiments. They conducted the cycling experiments with temperatures cycling between 73°F -83°F and two control groups with constant temperatures at 78°F and 80°F. They found that the fish had increased survival overall (about 50% increase in survival compared to constant temperatures) but did not gain additional thermal tolerance from cycling temperatures.
- Cassidy explained that the male parental care behavior experiments could not be performed because they were unable to collect the number of gravid females needed.
- Cassidy described the process for the sensitive life stage experiments where they collected $CT_{MAX}$ data for juveniles acclimated at the same four temperatures used for the adult $CT_{MAX}$ experiments. Juveniles were unable to be successfully acclimated to a constant 77°F because of high mortality. Overall, the juveniles appeared to be more thermally sensitive than the adults with $CT_{MAX}$ values about 2°F lower at each acclimation temperature. UCD spawned embryos and incubated them at the same four temperatures. They measured the hatch success, time to hatch, and length at hatch. Embryos at all temperatures hatched successfully. Embryos at higher temperatures hatched faster but appeared to have shorter lengths at hatch. It appears that the embryos are more thermally tolerant than the juveniles.
- Veronica asked if the cycling experiments had simulated refugia. Cassidy explained that there are two kinds of refugia: spatial refugia and temporal refugia. Since the temperatures change on a daily scale, the experiment included temporal refugia.
- Veronica asked at what temperature did fish lose their equilibrium and Cassidy clarified that it depended on the accumulation temperature.
- Veronica also asked which time of the year the fish typically spawn. Cassidy answered that the fish can spawn whenever conditions are conducive, which is typically around spring and summer.
- Najwa asked whether hatch temperature impacts thermal tolerance in juveniles, and Cassidy responded that while other species show mixed results, there is no specific data for the studied species, so effects could vary.
- Ramona explained that juveniles were the most sensitive life stage to temperature, while embryos were the most tolerant, and adults and juveniles could tolerate short-term excursions above 80°F if diurnal cooling was present.

*Key takeaways included that juveniles are more sensitive to temperature than adults, and embryos showed unexpected thermal robustness.*

*Discussion addressed the implications of temperature variation, the role of refugia, and the limited biological relevance of a strict 5°F delta in winter. Ramona concluded that fixed numeric thresholds, such as the 80°F limit and 5°F delta, are insufficient to define acceptable biological conditions in the dynamic river system.*

**Benthic Invertebrate Studies**

- Ramona Swenson and Taylor Spaulding reported on benthic macroinvertebrate and algal assessments, finding no significant differences between upstream and downstream sites, with naturally low scores attributed to the sandy, dynamic river system.
- Ramona explained that benthic macroinvertebrate sampling was conducted in June 2025 near the Valencia plant for the first time since 2015, after obtaining necessary permits, and sampling upstream of Saugus was limited due to water availability and incidental stickleback collection.
- Taylor presented analysis showing that downstream mean CSCI scores were slightly higher than upstream scores, but differences in individual metric differences were not significant, and there was no discernable effect from WRP discharge.
- Taylor explained that BMI scores are generally low and reflect the natural sand-bedded stream conditions, and that the BMI community is tolerant and consistent with expectations for this river type.

*BMI and algae sampling showed no major differences between upstream and downstream reaches, and any observed variation was likely due to sampling patchiness rather than true ecological differences*.

**Temperature Modeling**

- Andy Collison detailed additional temperature modeling done to look at the effects of riparian shading and found that 100% shading could reduce river temperatures by 2–4°F. However, it is infeasible to maintain needed level of shading in the river due to highly dynamic channel conditions. Andy explained that previous management scenarios, such as reducing Valencia effluent or limiting its temperature, lowered river temperatures but did not prevent exceedances of the 80°F threshold, especially during dry years.
- Ali Elhassan asked if chillers could meet the delta 5 temperature limit. Elizabeth confirmed that chillers could meet both the 80°F and delta 5 temperature requirements, but cooling towers cannot meet delta 5 and their ability to meet the 80°F limit is uncertain.

**Temperature management analysis**

- Elizabeth reported that various nature-based temperature management solutions, including groundwater blending, subsurface infiltration, discharge reduction, water recycling, and shading, were evaluated but found insufficient to meet temperature limits due to effectiveness and feasibility issues.
- Elizabeth presented preliminary cost estimates for installing chillers at Saugus and Valencia, with a capital cost of about $200 million and annual operation and maintenance costs of $3 million. The chillers also required significant energy, with potential need for a new substation at Valencia due to grid limitations.  and subsequently had large  greenhouse gas impacts.

- Elizabeth explained that cooling towers have a preliminary capital cost of $50 million and $117,000 annual O&M, but cannot meet the delta five requirement and may not reliably meet the 80°F limit during heat waves, with operational challenges and energy needs still under review.

**Conclusions and Summary of Findings**

- River temperatures closely tracked air temperatures and solar loading, with downstream summer peaks around 80–83°F and upstream temperatures averaging 9°F cooler; temperature effects from wastewater discharge diminished with distance and were largely dissipated by Newhall Orchards.
- Biological surveys found no measurable effluent-related degradation in benthic macroinvertebrate or algal indices, and that the unarmored three-spine stickleback is the only native fish in the watershed, with juveniles being the most sensitive life stage to temperature exposure.
    - Hydraulic conditions downstream of Valencia frequently limited suitable habitat for unarmored three-spine stickleback, regardless of temperature.
    - Arundo can concentrate flows and lead to deeper, faster stream conditions. As a sand bed river the SCR is naturally dynamic and susceptible to scouring associated with changing flow conditions.
- Management options were reviewed, including nature-based solutions and mechanical cooling. Chillers could meet regulatory limits but are costly and energy-intensive; cooling towers are less expensive but may not meet all requirements.
- Agency staff discussed the timing and biological relevance of temperature exceedances, with consensus that fixed numeric thresholds alone do not capture biological risk in this system.
- No major unanswered questions were raised by TAC ; the study team requested any final comments by April 1, 2026 to inform next steps.