# Los Angeles River Temperature Study

- Technical Advisory Committee Meeting #7
- Stakeholder Committee Meeting #3

January 15, 2026

JANUARY 15, 2026

# Agenda

***Meeting Objective:*** Provide a brief summary of the Study findings and answer questions/receive feedback.

- Project Background
- Biological Summary
- Temperature Summary
- Modeling Summary
- Potential Control Measure Evaluation
- Study Conclusions
- Wrap Up, Questions, and Discussion

# Project Background

# Los Angeles County Temperature Studies

- Revised temperature standard - *At no time shall these WARM-designated waters be raised above 80°F as a result of the waste discharges or increased by more than 5°F*

- Revised standards apply to WRP discharge in all watersheds in Los Angeles County
  - San Gabriel River and Santa Clara River (LA County Sanitation Districts)
  - LA River (Cities of Burbank and Los Angeles)

- Technical issues are similar between SGR, SCR, and LAR, but LAR is unique

- Focus for today's meeting is on the LA River and Burbank Western Channel

# Compliance Schedule

- Study (5/13-12/25)
  - Identify potential impacts of effluent temperature
  - Identify potential control measures

**We are here**

- Regulatory Process (Present-TBD)

- Design and Build (2026-2031)

| | Task | Completion Date | |
|---|---|---|---|
| | | LA Permits | Burbank Permit |
| 1 | Submit and Begin Implementation of Pollution Prevention Plan (PPP) for Source Control | 4/1/23 | 2/1/24 |
| 2 | Select members for the Technical Advisory Committee and Stakeholder Committee and regularly convene the committee members to initiate the development of a Technical Workplan that includes a temperature study that identifies the potential impacts of the WRP's effluent temperature and potential control measures (including nature-based solutions) that can be implemented to protect beneficial uses. | 5/1/23 | 3/1/24 |
| 3 | Finalize and submit a Technical Workplan for the Los Angeles Water Board Approval, secure the necessary permits for Los Angeles River Channel access and deployment of in-situ monitoring devices, and initiate bidding and procurement for any necessary equipment and/or services. | 11/1/23 | 9/1/24 |
| 4 | Implement the Technical Workplan, initiate testing and deployment of any necessary equipment, and continue securing the necessary permits for Los Angeles River Channel access and deployment of in-situ monitoring devices. | 4/1/24 | 2/1/25 |
| 5 | Implement the Technical Workplan and begin drafting a Final Technical Report. | 12/1/24 | 10/1/25 |
| 6 | Complete and submit the Final Technical Report | 12/1/25 | 10/1/26 |
| 7 | Notify Los Angeles Water Board of Selected Preferred Project and Identify Regulatory Approval Process (if appropriate given the study findings), Present Results of Technical Workplan at Next Scheduled Los Angeles Water Board Meeting | 2/1/26 | 12/1/26 |
| 8 | Begin Preliminary Design and Environmental Review | 7/1/26 | 5/1/27 |
| 9 | Complete Preliminary Design | 4/30/27 | 2/28/28 |
| 10 | Complete Environmental Review | 4/30/28 | 2/28/29 |
| 11 | Design Preferred Project | 4/30/29 | 2/28/30 |
| 12 | Issue Notice to Proceed for Project Work | 4/30/30 | 2/28/31 |
| 13 | Complete Preferred Project | 2/1/31 | 12/1/31 |

# Biological Summary

# Biological Summary Overview

**Is there a Biological Impact of WRP effluent Temperatures?**

**?**

Location and Magnitude of effect?

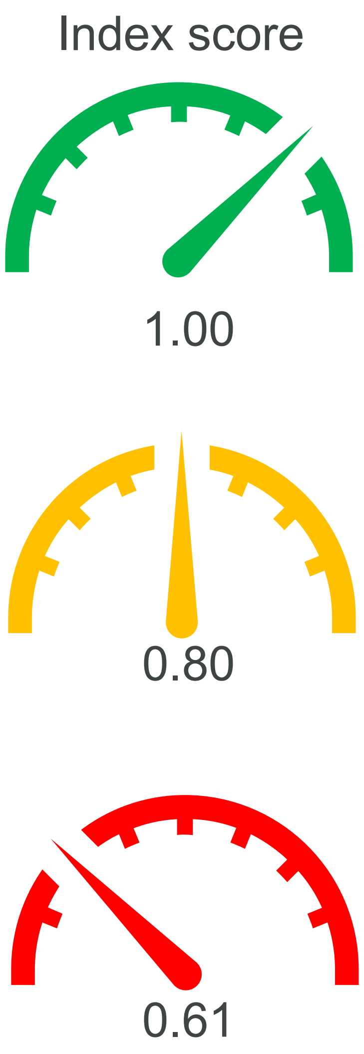
**LA River Temperature Study:**

1. **Utilize 20 years of data**
2. **Fill Gaps to Answer Questions**
3. **Address Study Objectives**

# Overview of Biological Data

## *California Stream Condition Index (CSCI) and Algal Stream Condition Index (ASCI)*

- Screening tools used by the state to measure health of wadeable streams using benthic invertebrates and algae
- Calculated using similar approaches and index score is similar
- Summer index period




### CSCI Field specimens

Mazor et al. 2016. Freshwater Science 35(1): 249-271

### CSCI Raw taxonomy data

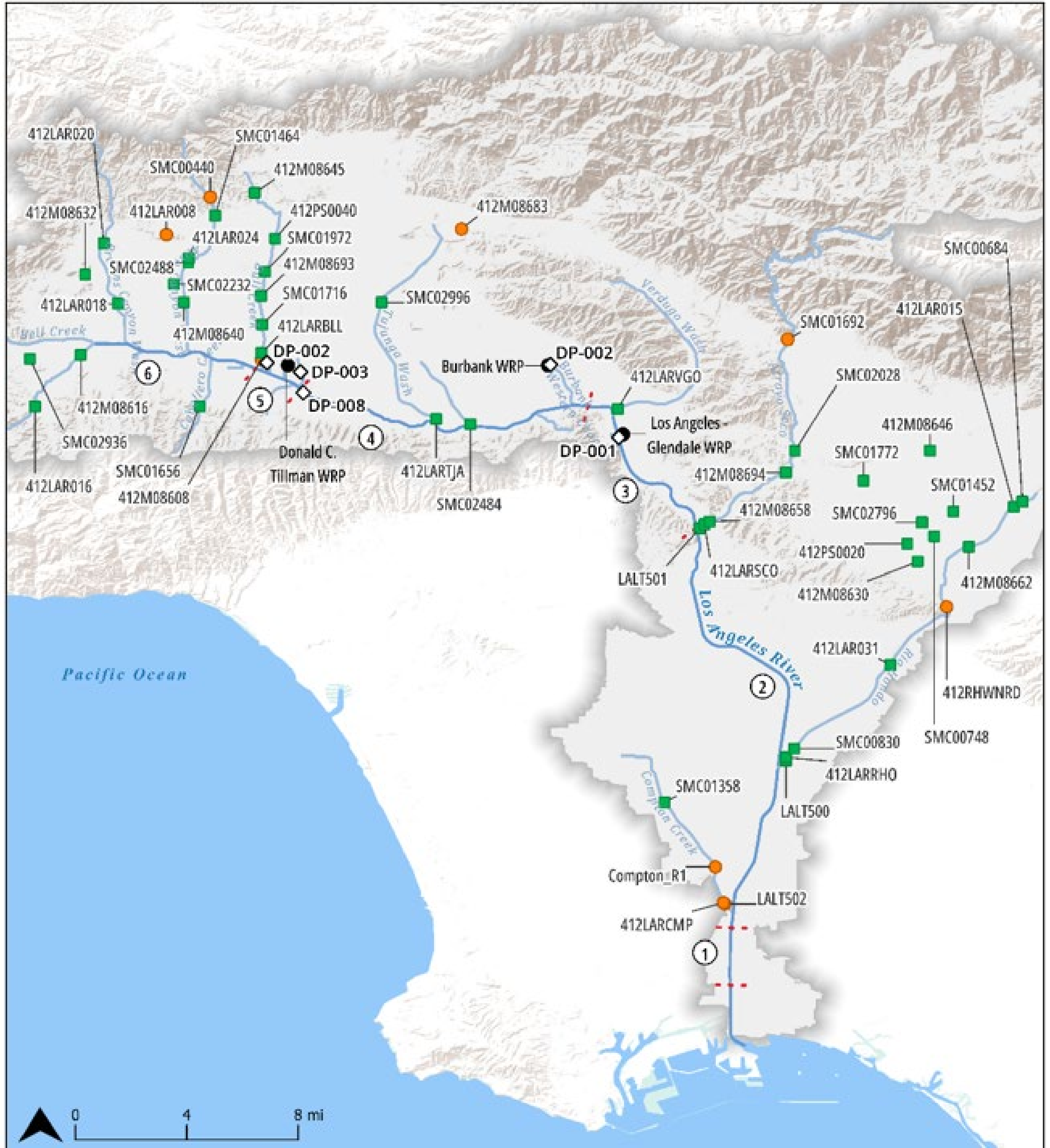
| Taxon | Abundance |
|---|---|
| Acari | 3 |
| Chironominae | 117 |
| *Cinygmula* | 3 |
| *Lepidostoma* | 15 |
| *Micrasema* | 20 |
| Orthocladiinae | 11 |
| *Paraleptophlebia* | 64 |
| *Simulium* | 15 |
| *Sweltsa* | 6 |

### CSCI Processed metrics

| Metric | Observed | Expected |
|---|---|---|
| # taxa | 23 | 22.5 |
| % clingers | 58 | 56 |
| % beetles | 14 | 8 |
| % mayflies, stoneflies, caddisflies | 54 | 56 |
| % sensitive | 35 | 33 |
| # shredders | 6 | 5.2 |

# Data Summary and Analysis

- **Data Compilation**
  - Reports/publications (includes vertebrate eDNA data)
  - BMI/algae back to 2005/09 (including indices)
  - New BMI/algae data in 2024
- **Questions**
  - Are there differences upstream and downstream of the WRPs?
  - Are there differences between waterbodies with and without WRP discharges?
- **Summary and Analysis**
  - Summarized taxa in Study waterbodies and similar tributaries without WRP flows
  - Wilcoxon analysis
  - Cluster analysis



# Descriptive Summary – Anything Obvious?

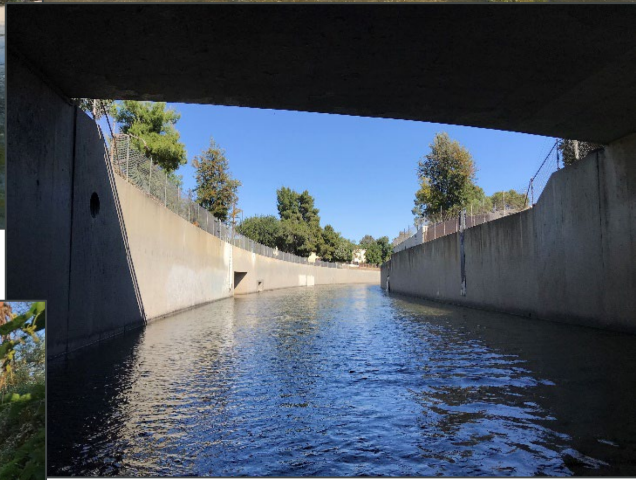
- More biological diversity in areas with better habitat and/or flow
  - Vertebrates: LAR3 and 5
  - BMI, diatom, and algae: LAR3, 4 and 5

- Zero native fish species; 2 native frog species; 1 native turtle species

- Dominant BMI, diatom, and algae species throughout mainstem are the same

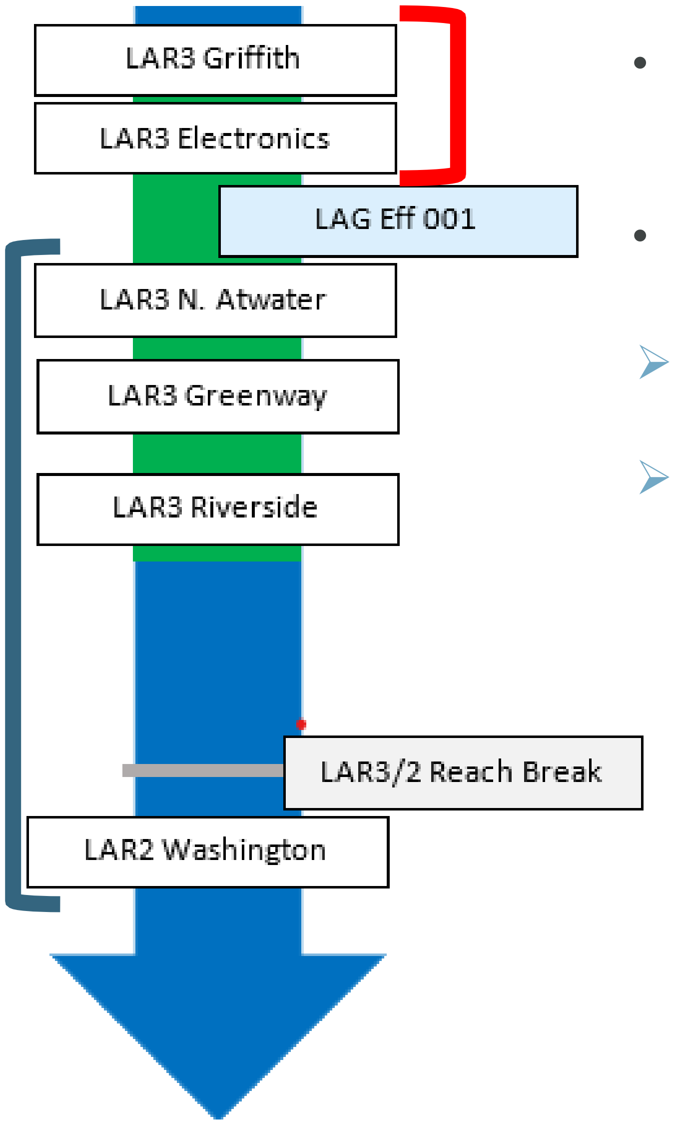
- Similarities with tributaries in area with no WRP flow

➢ No obvious impact on biology downstream of WRPs



# Wilcoxon Ranked Sum Tests: LAGWRP

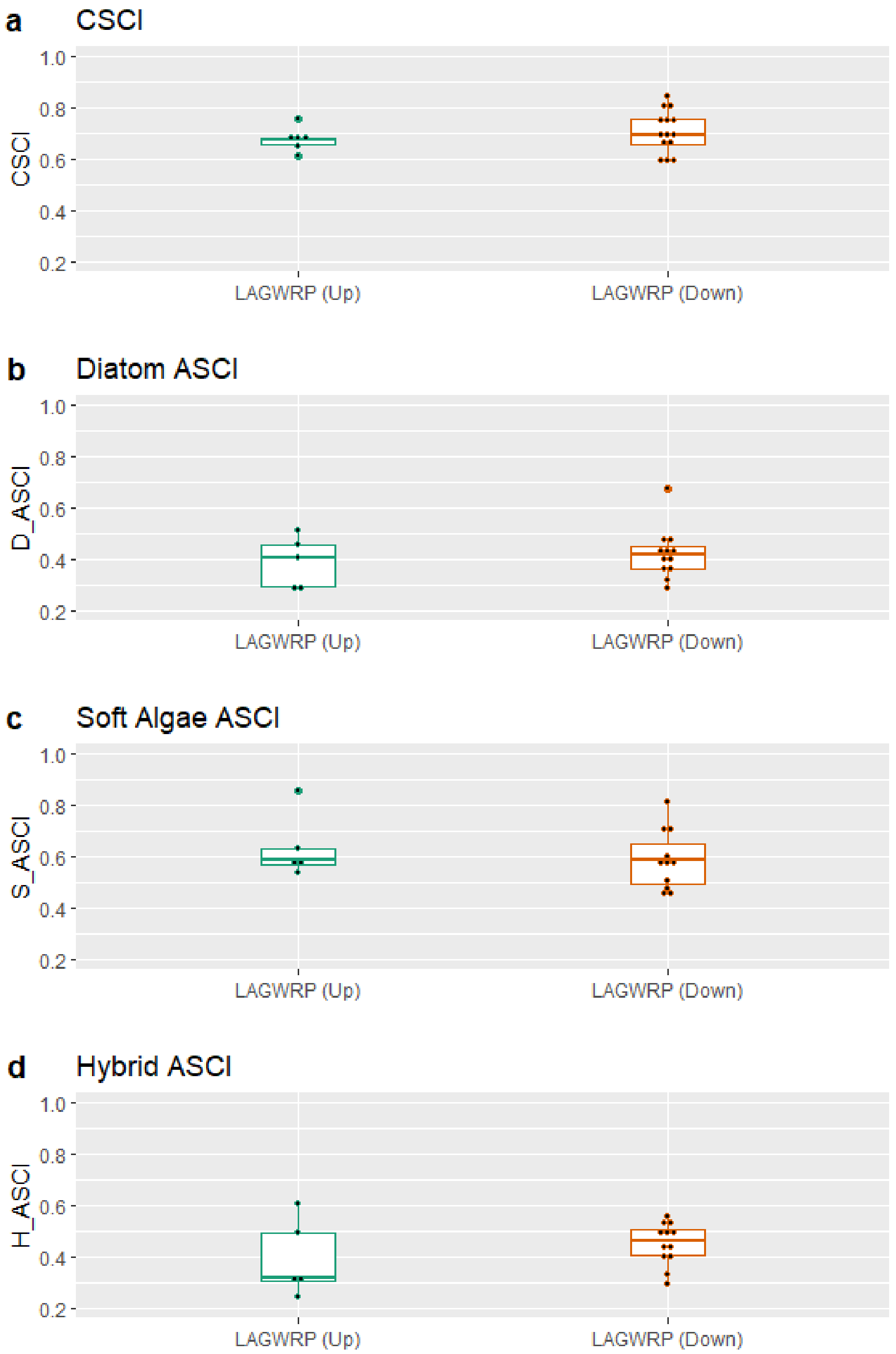
Used to test for differences in taxa count and biovolume of Individual Taxa and Index Values




- Near identical median values and complete overlap in CSCI, Diatom ASCI, and Soft ASCI
- Neither CSCI nor ASCI were statistically different above and below LAGWRP

➢ No consistent statistical differences downstream compared to upstream

➢ Similar findings for the other two WRPs



# Cluster Analysis – Did we miss something?

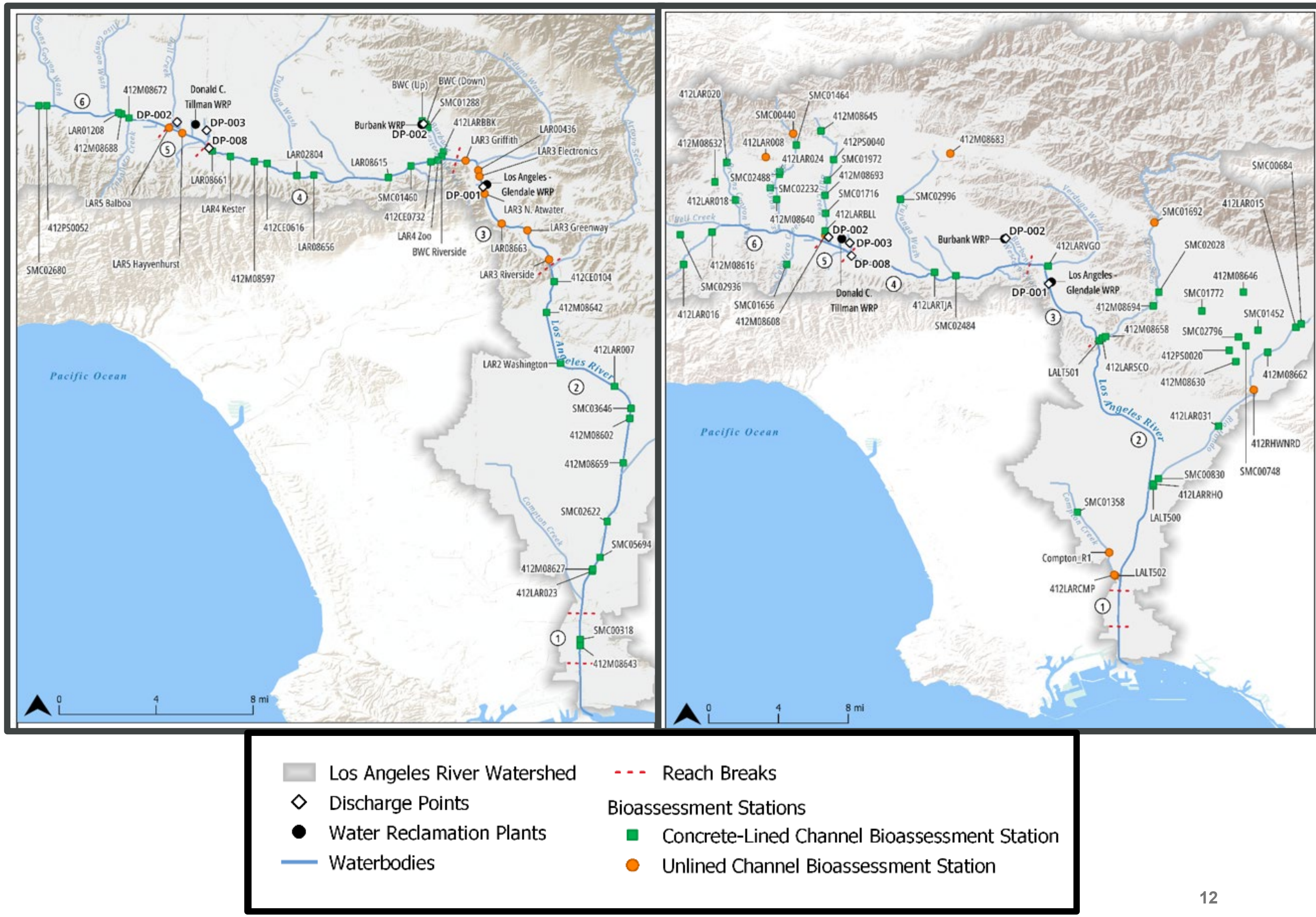
- Analysis of similarities in relative abundance or dominance in large and complex data sets
- Useful when one wants to identify distinct groups within the dataset

**Station/Year Combinations:**

BMI – 155

Diatoms – 91

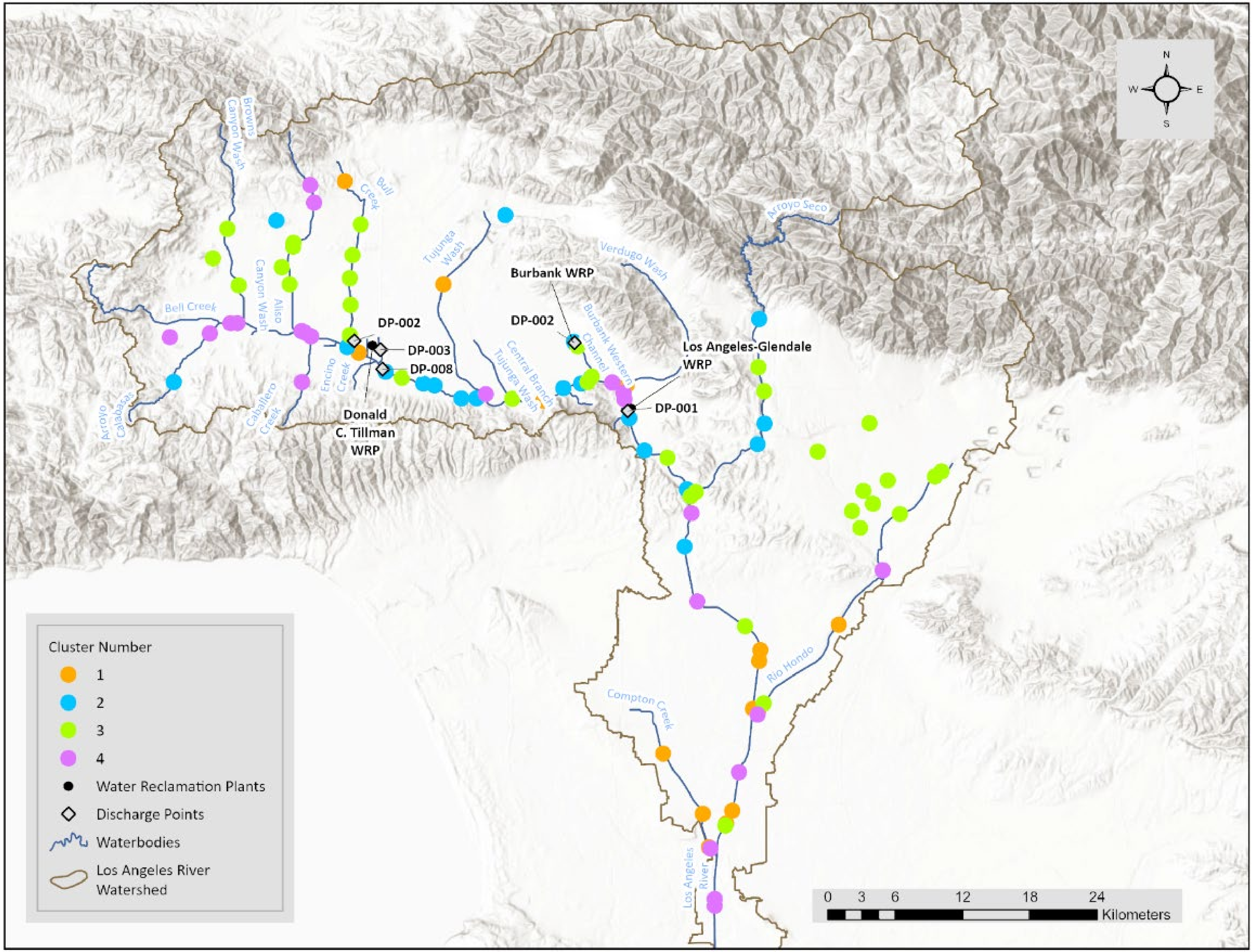
Soft Algae – 92



# Cluster Analysis – Results

- No one group composed of stations restricted entirely to locations in close proximity below WRP outfalls
- Widespread overlap of stations, regardless of WRP flow or proximity to WRP
- No obvious trends in relative abundance/dominance between station groups

➢ Analysis supports finding of no impact on biology due to WRP effluent temperature



# Biological Analysis and Conclusion

1) **Qualitative:** Summarized BMI, diatom, and algae in mainstem + tributaries to answer the question: Is there an obvious difference between sites up and downstream and with and without WRP flows?
   - No obvious differences
     - Fish are non-native warmwater taxa with greatest diversity in LAR3 and LAR5, which are subject to WRP flow and have the most suitable habitat in the Study area for fish
     - Dominant BMI, diatom, and algae species throughout mainstem and tributaries are the same or similar

2) **Quantitative:** Analyzed biological data up and downstream of WRPs to answer the question: Is there a difference between sites up and downstream of WRPs?
   - Wilcoxon analysis: there is no consistent statistical differences downstream compared to upstream

3) **Quantitative:** Analyzed biological data in mainstem + tributaries to answer the question: Did we miss anything?
   - Cluster analysis indicated that communities downstream of WRP discharges are not unique and can be found throughout the Study area, including at locations with no WRP discharges

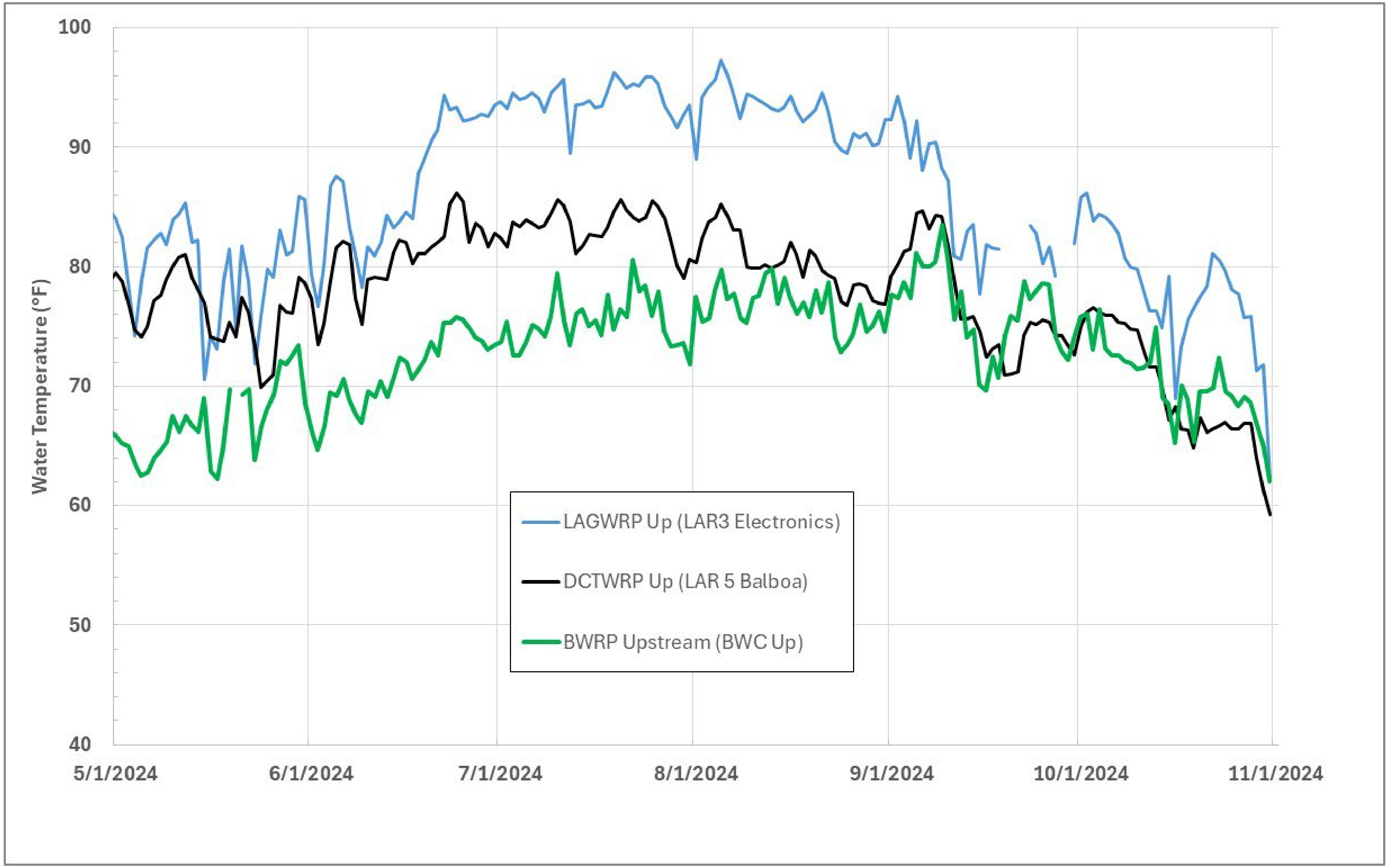
**Conclusion:** Alterations to receiving water temperatures due to WRP effluent temperatures does not adversely affect the biological communities in the LA River Mainstem or BWC.

# Temperature Summary

# Data Collection Efforts

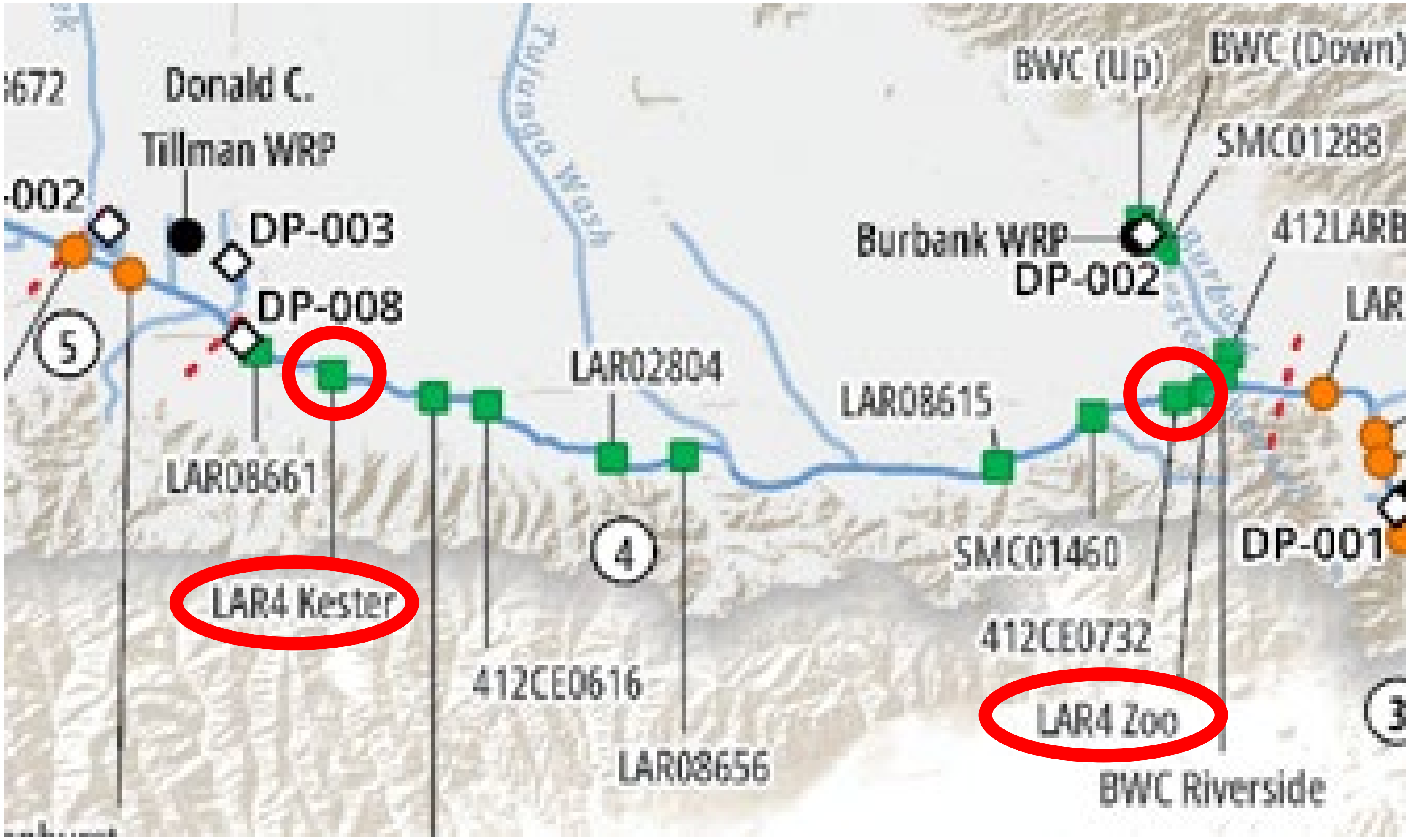
- 20+ Years of historical data available; however, additional diurnal data desired to support answering key questions and modeling
- May through October 2024 (27 weeks)
- Continuous temperature probes (thermistors) with temperature measured on a half-hour basis
- DCTWRP (10 stations): Effluent (2), LA River (6), and lakes (2)
- LAGWRP (6 stations): Effluent (1) and LA River (5)
- BWRP (6 stations): Effluent (1), BWC (3), and LA River (2) up and downstream of the confluence with the BWC

# Upstream Temperatures

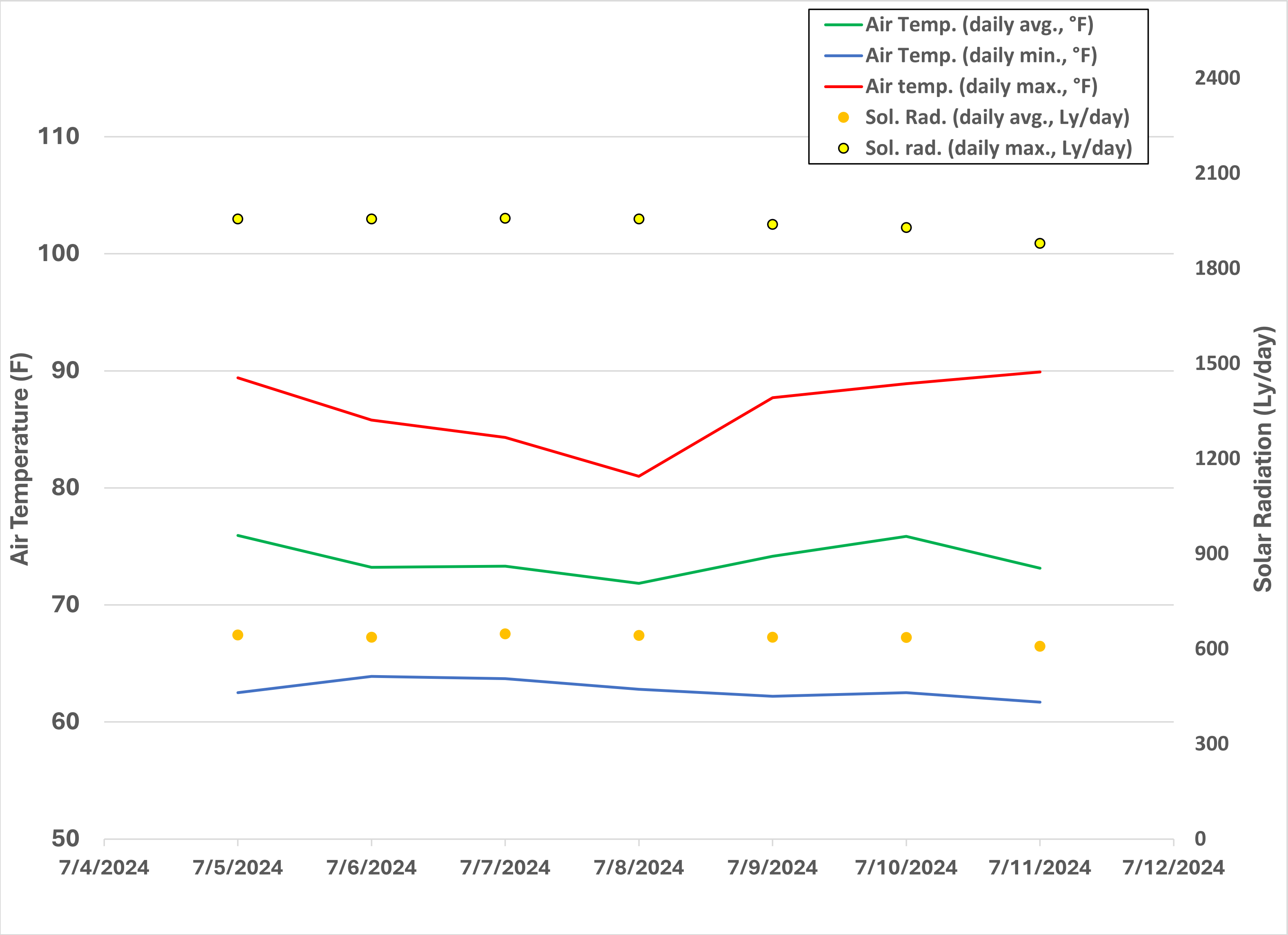


# Air Temperature and Upstream to Downstream Temperatures

- **Example**
  - 7/5 – 7/11/24
  - Upstream: LAR4 Kester (<1 mile below DCT EFF)
  - Downstream: LAR4 Zoo (~ 9 miles downstream)



# Example of Stream Temperatures Upstream to Downstream

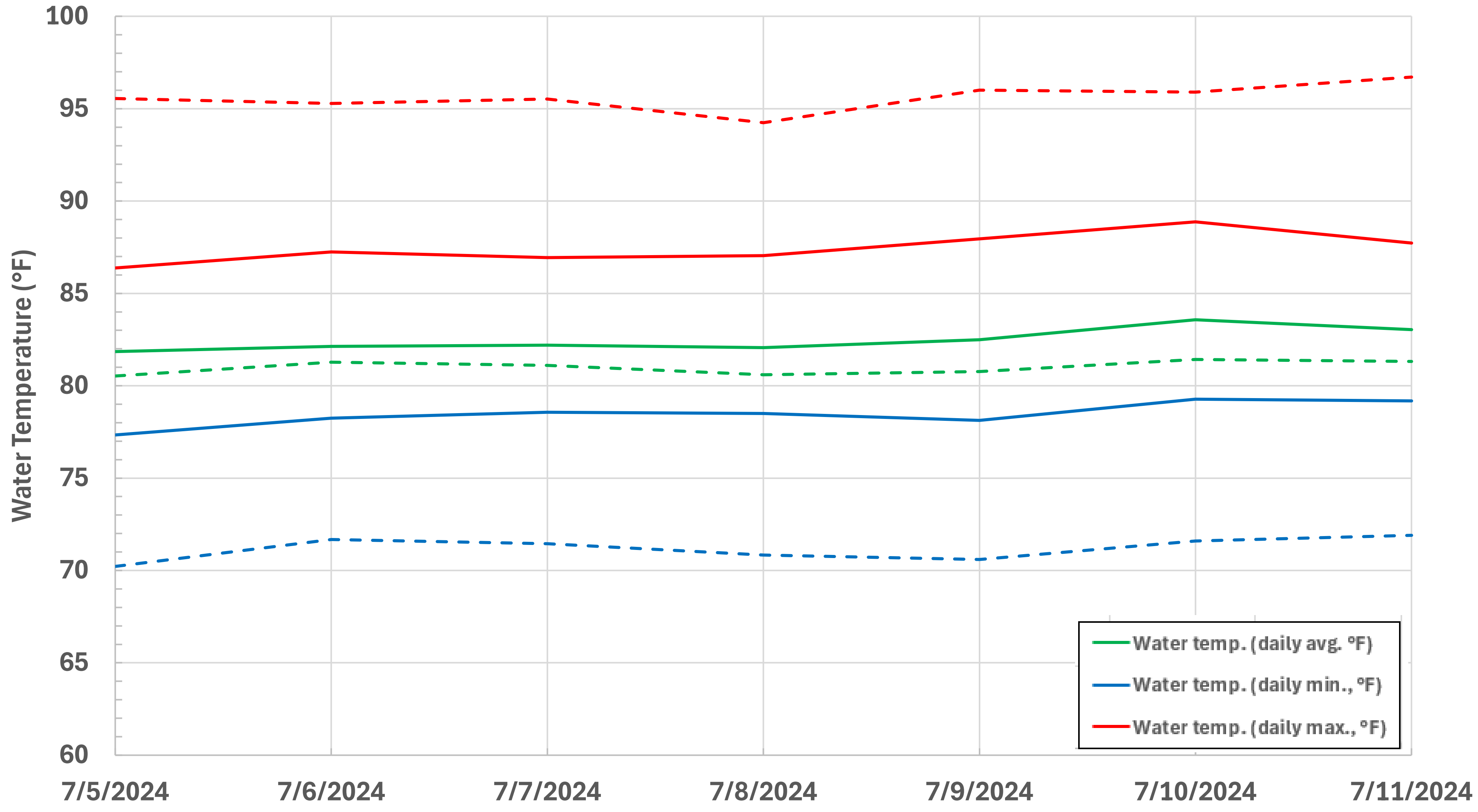



**CIMIS N. Hollywood**

Avg., Max and Min Air Temperature and Solar Radiation

- Solar Radiation – At Peak
- Max Air Temp 80 - 90 °F
- Avg Air Temp 72 - 76 °F
- Min Air Temp 62 - 64 °F
- ΔT Air Temp range: 18 - 28 °F

# Example of Stream Temperatures Upstream to Downstream




**LAR4 Kester (solid lines)**
**In-Stream** Temperature

- Max: 86 - 89 °F
- Avg: 82 - 83 °F
- Min: 77 - 79 °F
- ΔT Range: 8 - 10 °F

**LAR4 Zoo (dashed lines)**
**In-Stream** Temperature

- Max: 94 - 97 °F
- Avg: 80 - 82 °F
- Min : 70 - 72 °F
- ΔT Range: 23 - 26°F

# Temperature Data Findings

- Daily maximum exceeds 80°F up and downstream of the WRPs
- Diel water temperature fluctuations greater than 5°F are common May through September regardless of location and WRP flow
- Water temperature in other portions of the LA River is the result of other factors (e.g., air temp, solar radiation) affecting temperature besides WRP effluent temperature

# Modeling Summary

# If there are temperature effects… What do we want to do about it?

Evaluate potential control measures

management strategies inc. nature-based solutions

Evaluate future conditions based on management strategies

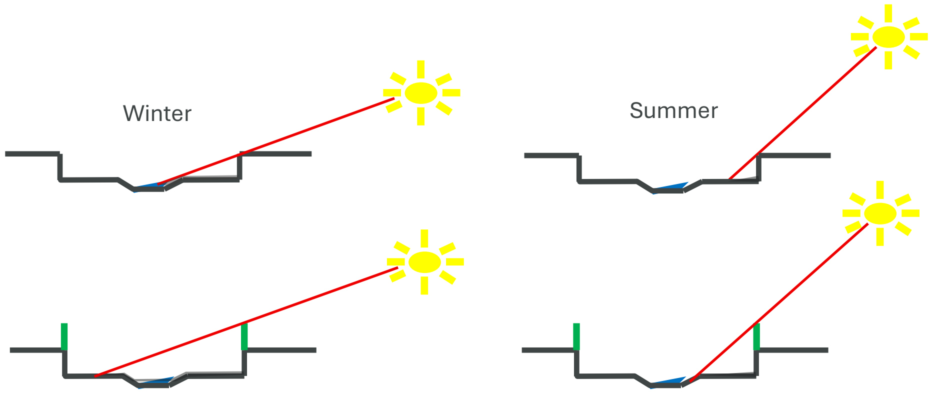
Using predictive tools to understand long-term impacts

# Modeled Potential Control Measures

- HEC-RAS model (based on LAR Flow Study)
  - Calibrated and validated model using historical and study data
- Control Measure: Reduce Effluent Temperature to Meet Limits
  - Maximum 80°F
  - No more than 5°F difference between upstream receiving water temperature and temperature downstream of effluent (a.k.a., Δ5°F)
- Control Measure: Reducing Effluent Discharge
  - Current flows 2017-2024 Annual Average Flowrate
- Control Measure: Shading
  - Shading along 100% of the river length on the banks
  - Each side of the channel
  - Height of a mature tree to maximize potential for shading
- Scenarios
  - Combinations of potential control measures
  - Climate change
- Shading Exploratory Analysis

| Max Temperature Reductions Needed to Attain Limits | | |
|---|---|---|
| DCT | LAG | BUR |
| 32°F | 35°F | 37°F |

| WRP | Effluent Flowrate (MGD) | | | | |
|---|---|---|---|---|---|
| | Current | Reduction | | | |
| | | 5% | 10% | 25% | 50% |
| DCT | 21.6 | 20.5 | 19.4 | 16.2 | 10.8 |
| LAG | 8.5 | 8.1 | 7.7 | 6.4 | 4.3 |
| BUR | 3.0 | 2.9 | 2.7 | 2.3 | 1.5 |



# Effluent Temperature Reduction

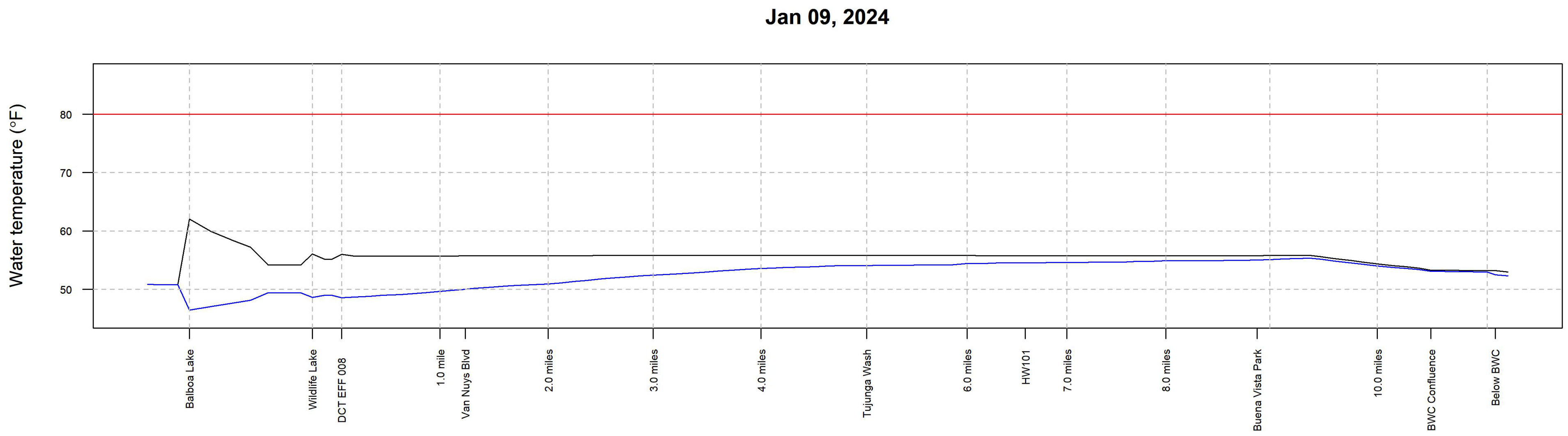
WRP effluent temperatures reduced to ensure limits are met:

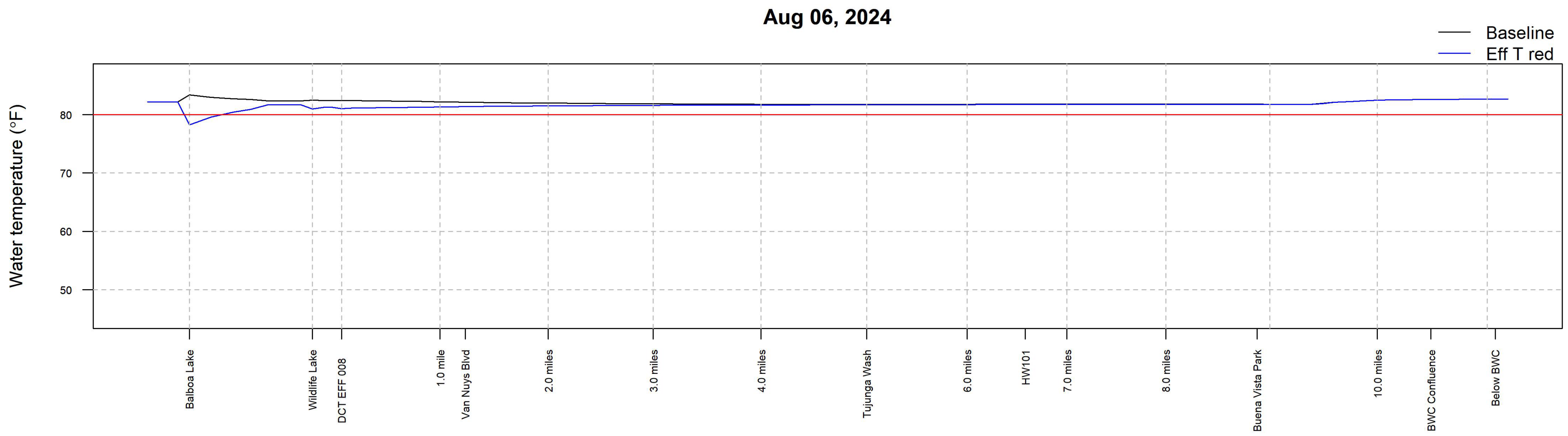
- Maximum 80 °F
- No more than 5 °F difference between upstream receiving water temperature and temperature downstream of effluent (a.k.a., ∆5°F)

Reviewed 20+ years of data (2000-2024) and found that ∆5°F is the primary driver of reductions needed (fall/winter timeframe)

| Max Temperature Reductions Needed to Attain WQOs | | |
|---|---|---|
| DCT | LAG | BUR |
| 32°F | 35°F | 37°F |

# Effluent Temperature Reduction - DCT



# Effluent Flow Reduction

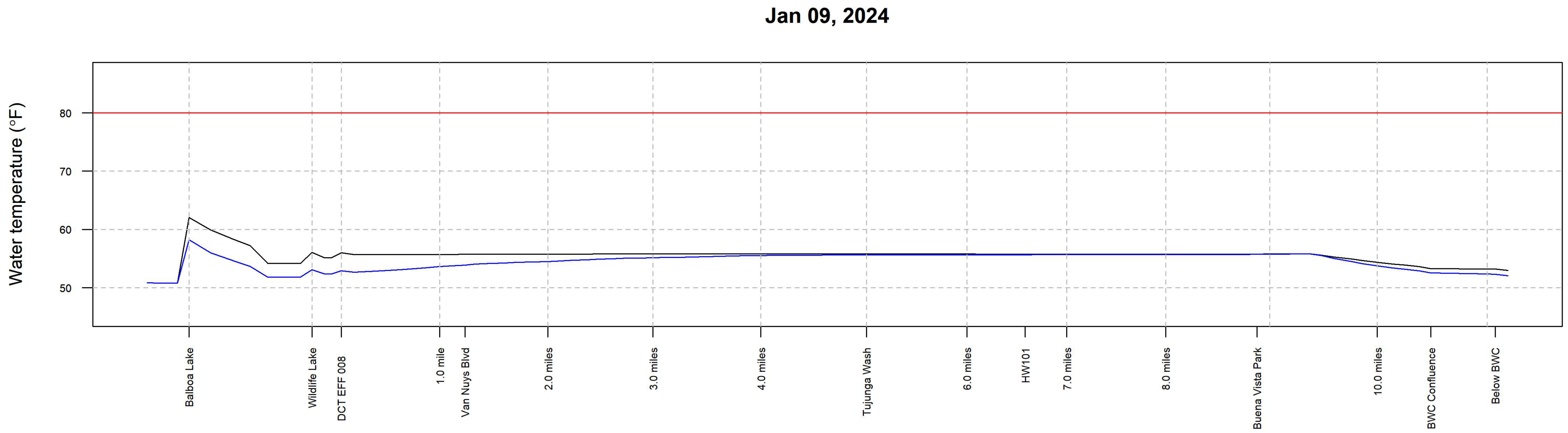
WRP discharge flowrate reduced to reflect increased recycle:

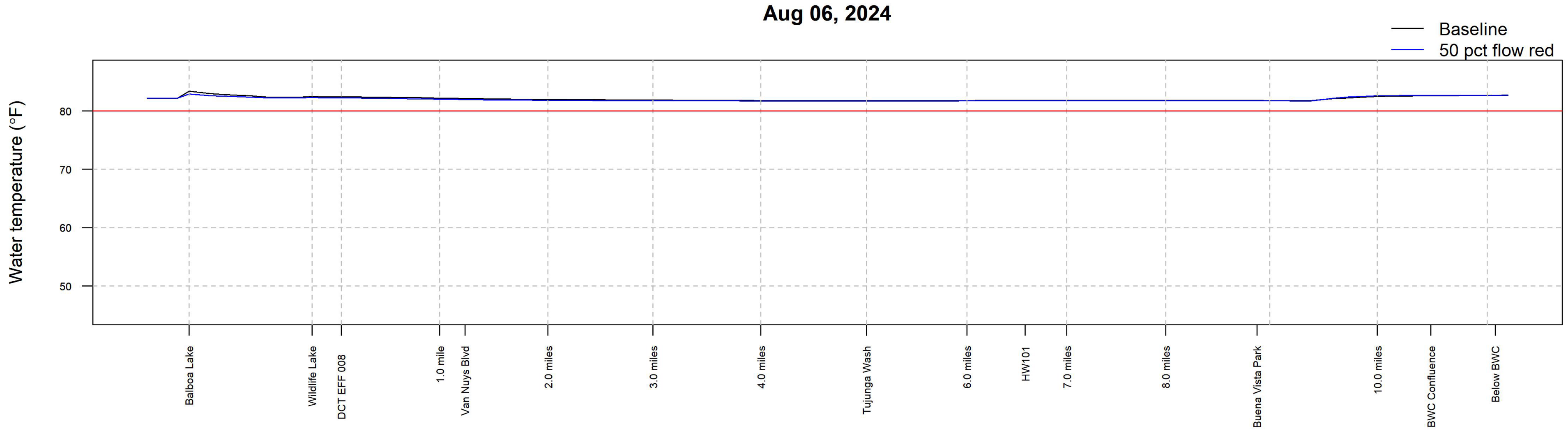
- Current flows 2017-2024 Annual Average Flowrate
- DCT Total Effluent

Bookend (50%) Reduced Discharge results displayed

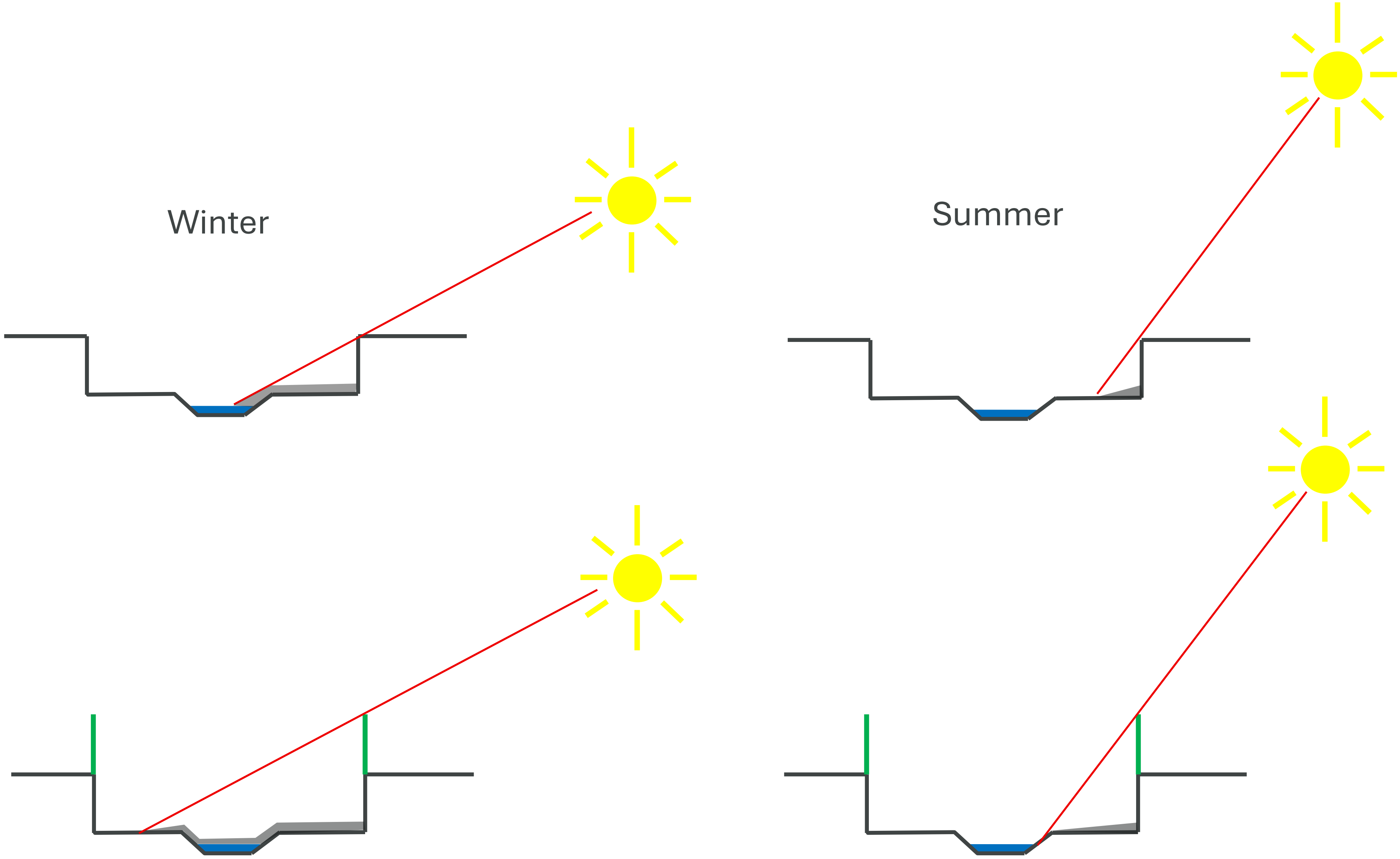
| WRP | Effluent Flowrate (MGD) | | | | |
|---|---|---|---|---|---|
| | Current | Reduction | | | |
| | | 5% | 10% | 25% | 50% |
| DCT | 21.6 | 20.5 | 19.4 | 16.2 | 10.8 |
| LAG | 8.5 | 8.1 | 7.7 | 6.4 | 4.3 |
| BUR | 3.0 | 2.9 | 2.7 | 2.3 | 1.5 |

# Effluent Flow 50% Reduction - DCT

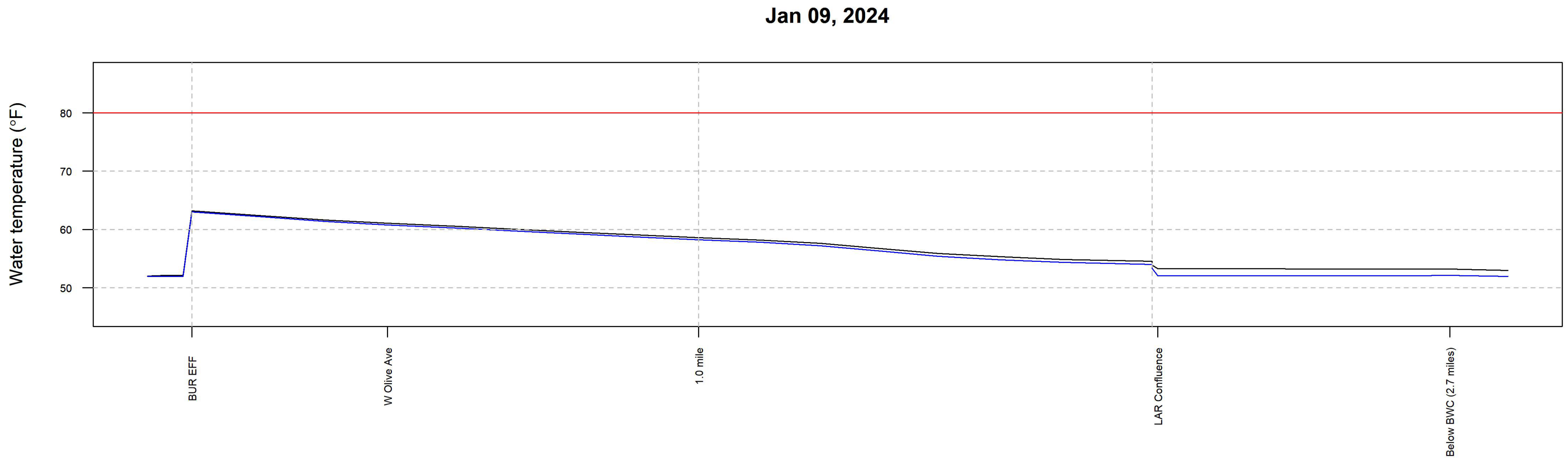


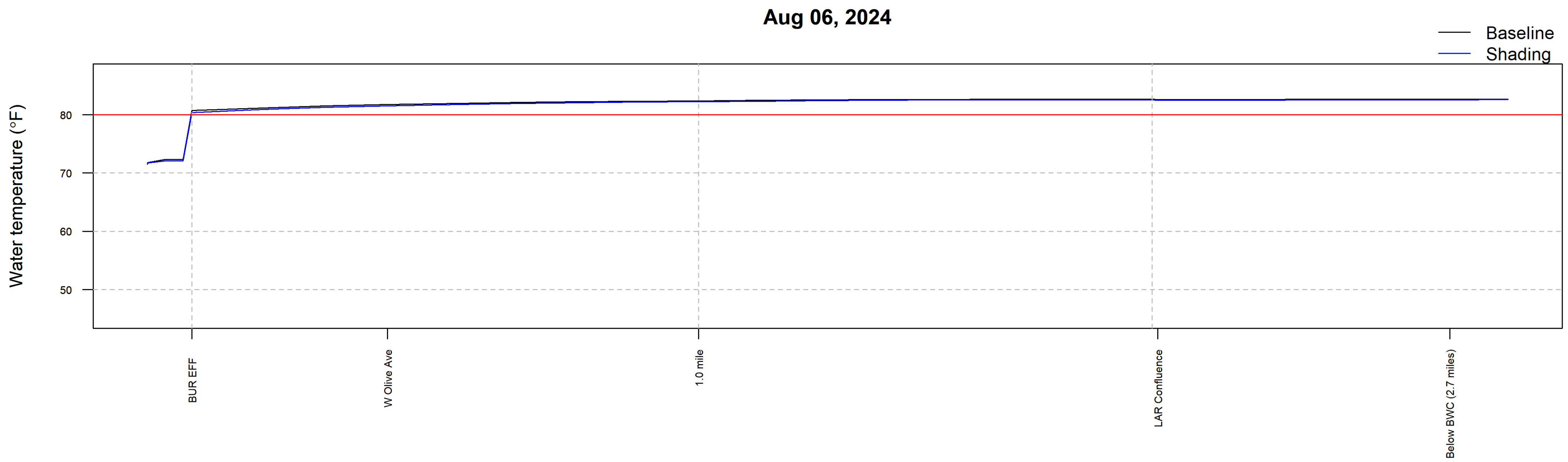



# Shading



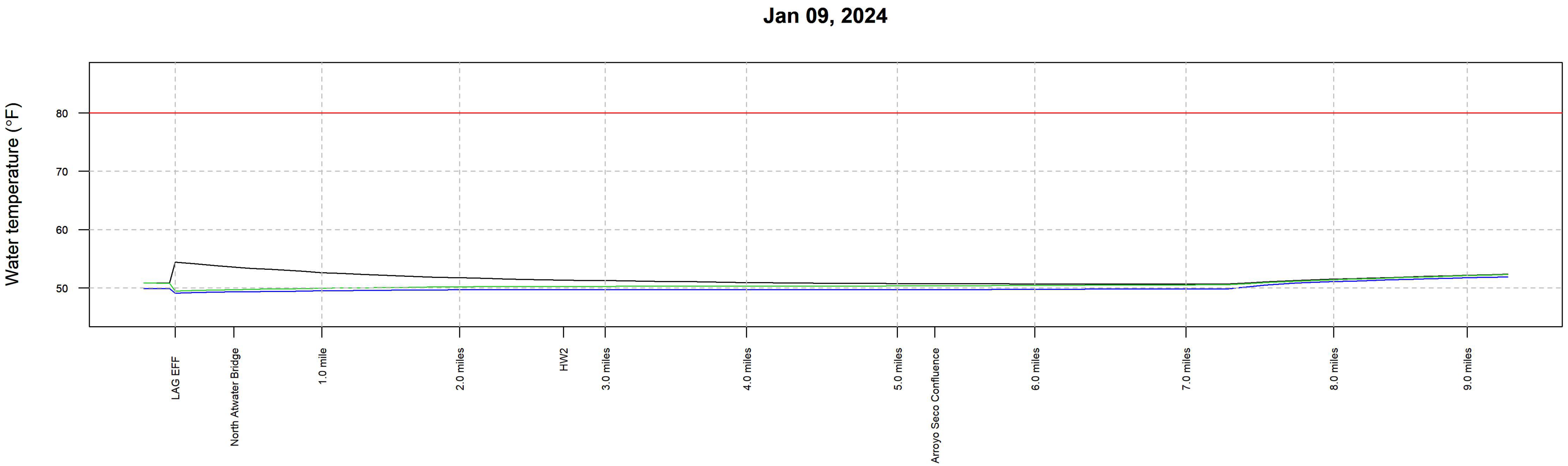
# 100% Shading - BUR

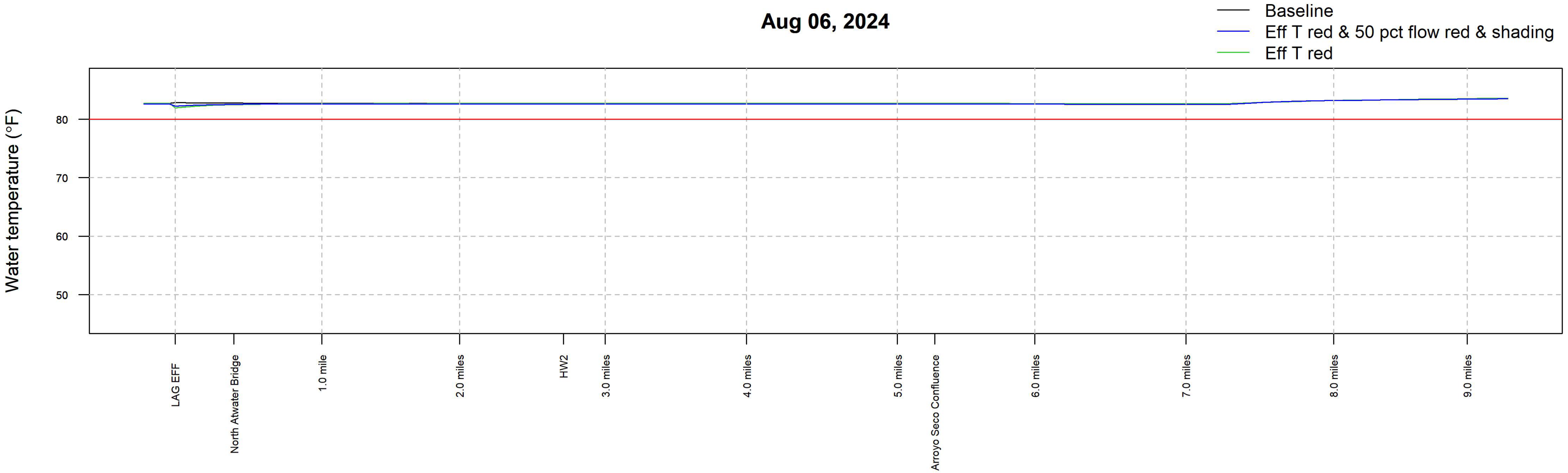


# Modeling Summary: Scenarios

# Scenario: Effluent Temperature + Flow Reduction + Shading - LAG



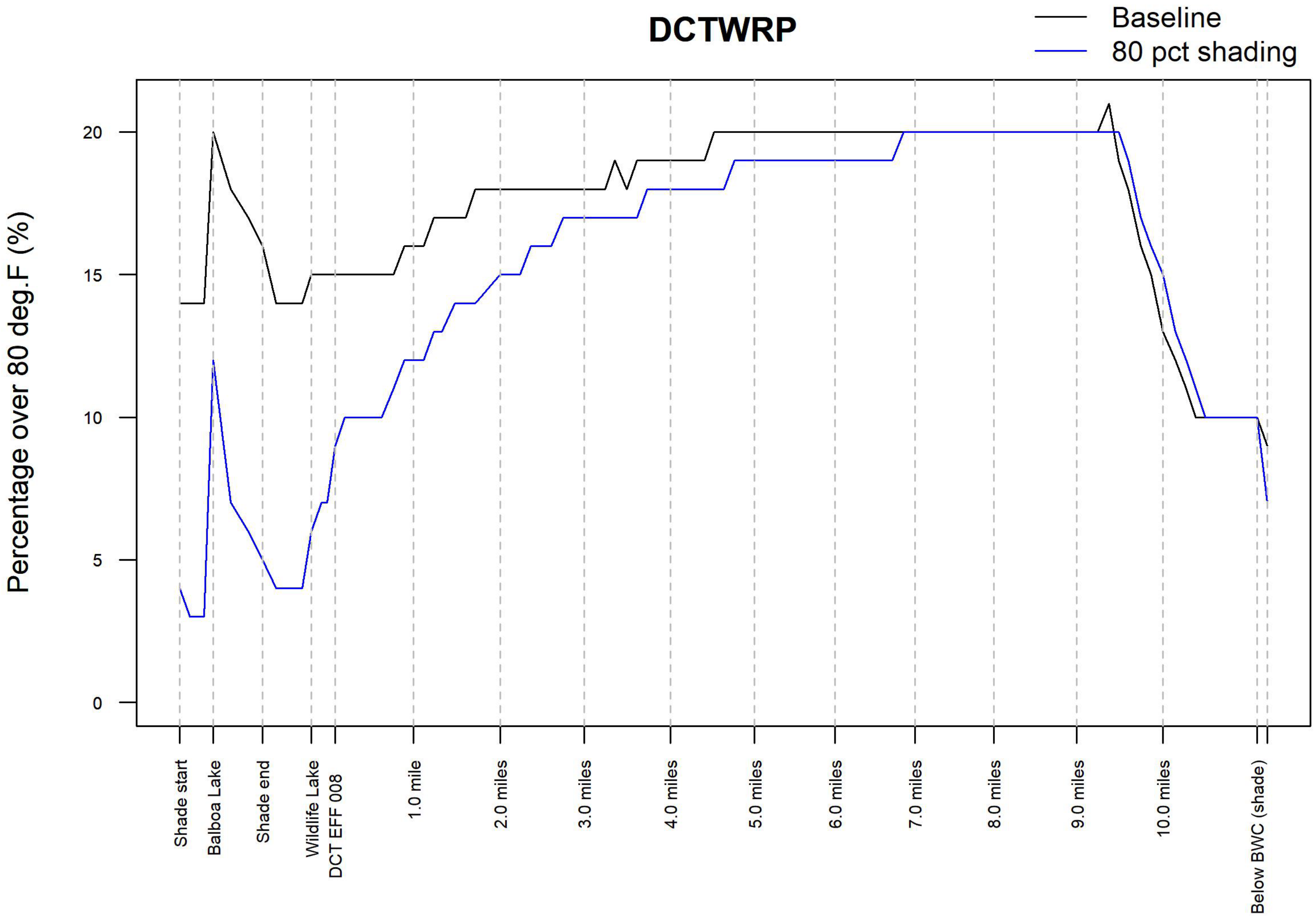



# Modeling Summary: Exploratory Analyses

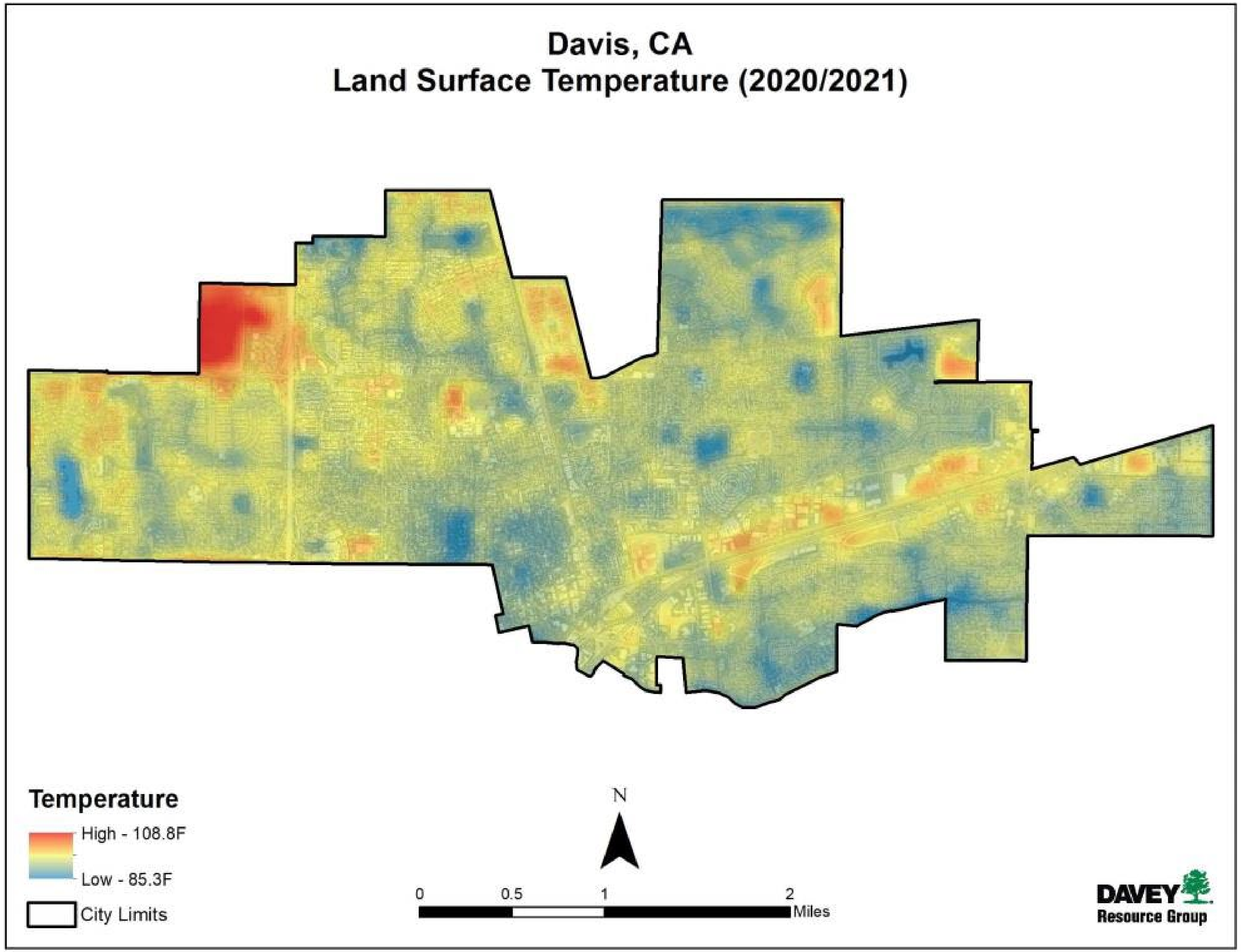
# Exploratory Scenarios for Shading

- Given results of initial shading analysis, the TAC requested additional investigation. Two additional exploratory scenarios were identified:
    - Exploration 1: 80% shading in current unlined sections of the LA River (LA River Reaches 3 and 5)
    - Exploration 2: Amount of shading required to consistently attain of 80°F

# Exploration 1: Shade 80% in Existing Unlined Reaches



# Exploration 2: Shading to Consistently Attain 80°F



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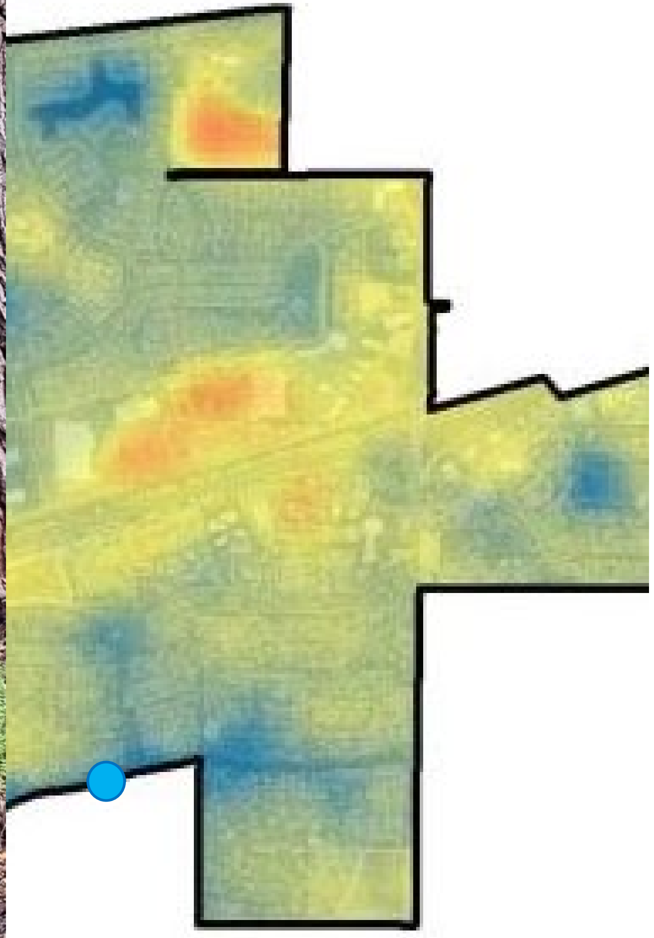
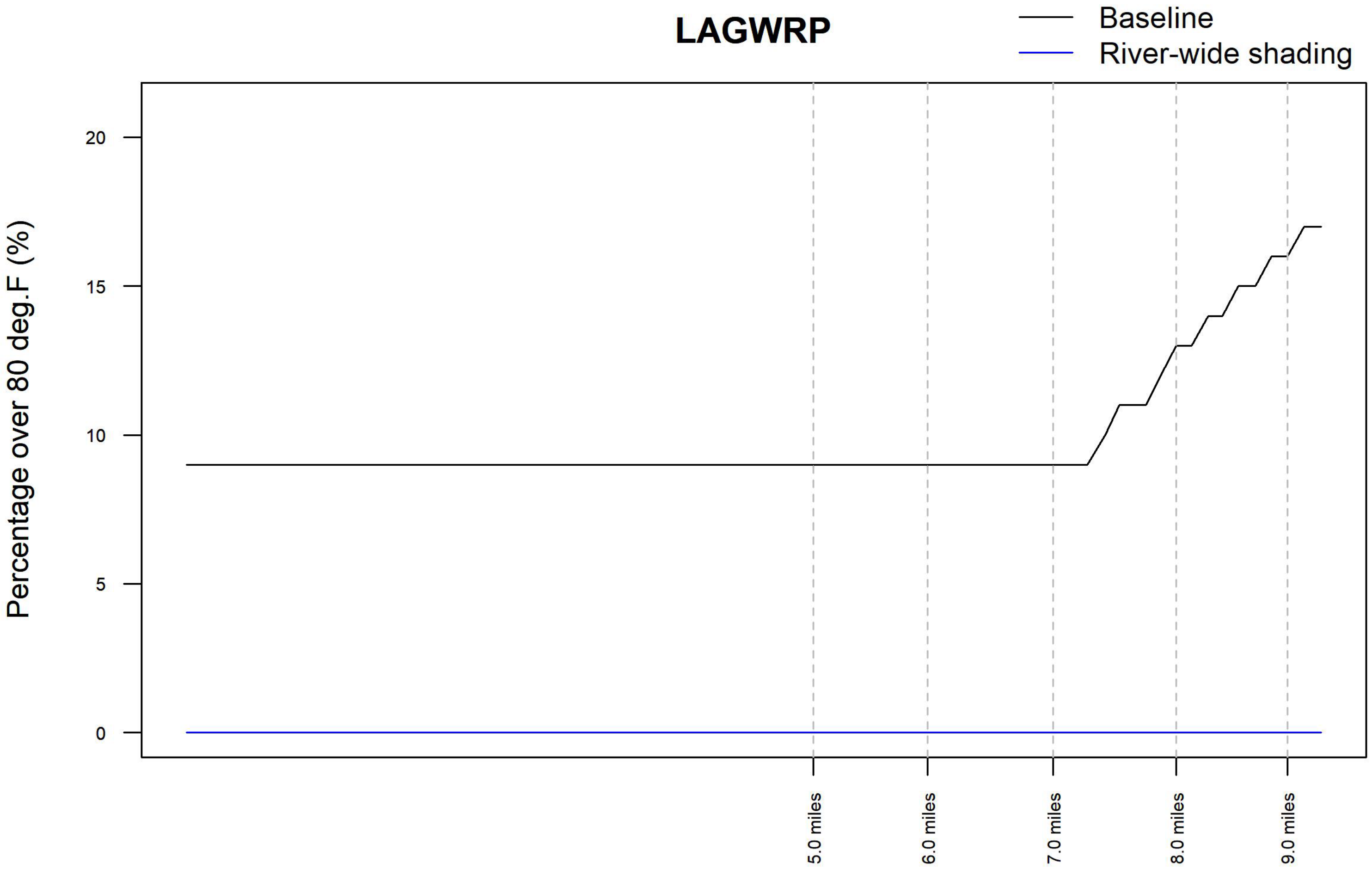


Low - 85.3F

# Exploration 2: Shading to Consistently Attain 80°F

Requirements to Consistently Attain 80°F

- Block 80% incident solar
- Reduce local air temperature 15%



# Modeling Summary

- Effluent Temperature Control
  - River temperatures reach equilibrium with atmospheric temperatures short distance downstream in summer
  - Winter river temperatures reach equilibrium generally further downstream
- Reducing effluent discharge, reduces heat addition to river
  - Atmospheric equilibrium achieved in shorter distance
- Shading on the banks is generally ineffective
  - Microclimates control water temperature
- Future climate results in 1-2$^{o}$F warmer water in 30 years
- Modeling of scenarios did not indicate a significant change in results
- Summary: River temperature reaches equilibrium with atmosphere regardless of potential control measures or scenarios

| Max Temperature Reductions Needed to Attain Limits | | |
|---|---|---|
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| 32°F | 35°F | 37°F |

| WRP | Effluent Flowrate (MGD) | | | | |
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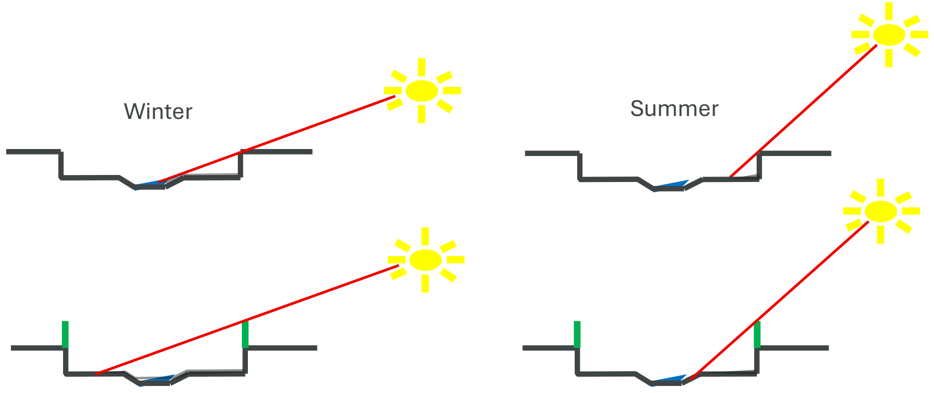


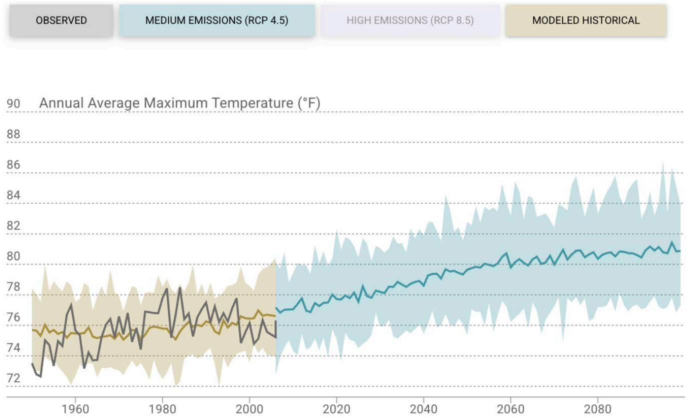

# Treatment Controls

# Treatment Controls

| Traditional Control Measures | Alternative Control Measures |
| --- | --- |
| Engineering controls that directly treat effluent to reduce temperatures prior to discharge<br>• Cooling towers<br>• Chillers | Non-traditional, including solutions that rely on natural processes, to reduce heat effects of effluent on receiving waters<br>• Natural heat flow<br>• Evaporative cooling<br>• Source control<br>• In-plant process changes<br>• Shading |

# Treatment Controls: Alternative Control Measures

- Alternative Control Measures Evaluated:
  - Natural heat flow, Evaporative cooling, Source control, In-plant process changes
- Six screening criteria considered
- Findings: None of the options will meet the limits

| Screening Criteria | Criteria Description | Metric |
| --- | --- | --- |
| Ability to Meet Regulations | Complies with NPDES requirements for effluent temperature (no more than 80 degrees F) and not altering receiving water by more than 5 degrees F. | Pass/Fail/Unknown |
| Technology Implementation (at this size) | Proposed technology/approach has at least one proven installation in the United States for water/wastewater application. | Pass/Fail/Unknown |
| Site Constraints | Structures, equipment, etc., fit within the existing WRP boundaries. | Pass/Fail |
| Cost | Descriptions of infrastructure required to calculate costs. | N/A |
| Operations | Facilities can be fully operated by staff (i.e., contract operations are not required). Not overly complicated operationally. | Pass/Fail |
| Provides Other Benefits | Recreation, treatment, GHG reduction, etc. | Yes/No |

# Treatment Controls: Traditional Control Measures

- Traditional Control Measures Evaluated:
  - Cooling towers, Chillers
- Findings:
  - Space limitations at the WRPs create significant challenges which could impact other upgrades (e.g., increased water recycling, plant capacity expansion, etc.)
  - Cooling towers expected to meet 80°F, but not delta 5°F
  - Chillers can meet both
    - Capital Costs of $457M and annual O&M of $15M
    - GHG increases of 18%, 44%, and 59% at the BWRP, DCTWRP, and LAGWRP, respectively
    - Increase use of potable water (up to ~350 MG/year under average conditions)

# Study Conclusions

# Study Conclusions

| Temperature and Biology | Modeling | Control Measures |
| --- | --- | --- |
| ▶ Instream temps >80°F and +5°F irrespective of WRP flow or location<br>▶ No difference in BMI and algae up and downstream of WRPs<br>▶ Communities downstream of WRPs are not unique in the Watershed<br>▶ The number of fish taxa are highest in LAR3 and LAR5<br>▶ Temperatures downstream of WRPs support species that can be present based on current habitat conditions | ▶ Modeling of individual control measures and combinations of control measures demonstrates that temperatures return to baseline conditions downstream of WRPs<br>▶ Modeling demonstrates that 80°F and +5°F objectives are exceeded regardless of control measures | ▶ Alternative control measures do not meet 80°F and +5°F limits<br>▶ Cooling towers do not meet +5°F limit<br>▶ Chillers can meet the limits<br>  ▶ $457M Capital $15M O&M<br>  ▶ Increases in GHGs (18-59%)<br>  ▶ Increases in potable water usage<br>  ▶ Other projects (e.g., water recycling) may be impacted due to space constraints |
| **Alterations to temperatures due to WRP effluent does not adversely affect the WARM beneficial use** | **No individual or set of control measures will result in consistent attainment of water quality objectives** | **Attaining the limits is costly and energy intensive, while potentially precluding improvements to the WRPs** |

# Wrap Up, Questions, and Discussion

# Wrap Up, Questions, and Discussion

- Given the Study Conclusions
  - Cities are seeking a regulatory solution that considers the Study findings that alterations to temperature are not adversely affecting the WARM beneficial use and control measures will not fundamentally change temperatures in the Study area
- Thank you for your participation
  - 2+ years of meetings and input
  - Captured input via meeting notes and document revisions (posted here)
  - Resulted in changes to monitoring, modeling, and analysis approaches