Attachment 1 - WSIP Data and Information Summary for Water Quality Priorities 1 – Temperature

Methods

The 2015 current conditions data used in the analyses for the application was based on the DWR Delivery Capability Report and base scenario model released in July 2015 with project operations. The year 2015 was used for current conditions because the Delivery Capability Report and base scenario model the most recent and best data available for the analysis. Current conditions temperature modeling data for the WSIP application is presented in Sites_A6D Modeling Results Compendium under the ELIGIBILITY AND GENERAL PROJECT INFORMATION TAB.

The 2030 expected with- and without-project conditions analyses for the Sites Reservoir Project WSIP Application utilized the model products and assumptions described in section 6004(a)(1) of the code of regulations, including the 2030 and 2070 future conditions CalSim-II models provided by the California Water Commission on November 2, 2016. Temperature models for the primary river systems used the CalSim II reservoir storage, reservoir releases, river flows, and meteorological conditions to estimate reservoir and river temperatures. Water temperature models used were the Upper Sacramento River Water Quality Model (USRWQM) and U.S. Bureau of Reclamation Temperature Model (RECTEMP). A further description of the modeling used for the analysis is provided in Sites_A1 Modeling under the BENEFIT CALCULATION, MONETIZATION, AND RESILIENCY TAB. Temperature modeling data "Performance Measures Scorecard for Sites Reservoir Potential Beneficiaries", "Temperature Results DCR 2015 with Project vs DCR 2015 without Project", and "Temperature Results WSIP 2030 with Project vs without Project" are presented in Sites_A6D Modeling Results Compendium under the ELIGIBILITY AND GENERAL PROJECT INFORMATION TAB.

Water Quality Objectives and Beneficial Uses

Water quality objectives for waters affected by the project are specified in the basin plans for the North Coast, Central Valley, Tulare Lake, and the San Francisco Bay regions. Water quality objectives for water temperature are also specified in the SWRCB Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California. SWRCB Water Rights Orders 90-05 and 91 and the 2009 National Marine Fisheries Service (NMFS) biological opinion (BO) also include requirements related to storage and conveyance facility operations in order to achieve temperature compliance objectives.

The water bodies within the Project area support warm and cold fresh water habitat and other aquatic beneficial uses. Water bodies in these areas must maintain water temperatures supportive of resident and seasonal fish species habitats, particularly for endangered species. State Water Resources Control Board Order 90-5 compliance. Order 90-5 establishes water right requirements on the U.S. Bureau of Reclamation operations of Keswick Dam, Shasta Dam, the Spring Creek Power Plant and the Trinity River Division related to temperature control in the Upper Sacramento River for the protection of fishery resources and requires monitoring and reporting to evaluate compliance with those requirements.

As part of the requirements of the 2009 NMFS BO, the preparation of an annual temperature management plans by Reclamation are required to determine NMFS approved management strategies to protect the cold water pool of Trinity, Shasta, Folsom Reservoirs and acceptable temperatures at select compliance points within the river systems downstream of the reservoirs. State Water Project operations at Lake Oroville are also factored into the temperature management plans. The water quality objectives and beneficial uses are further described in Table 7.1 on pages 7-1 to 7-3 in Chapter 7,

"Surface Water Quality" of the EIR/EIS. Water quality objectives specific to temperature for the Trinity River system and the Sacramento River are presented on Tables 7-2, 7-3 and 7-4.

Areas of Temperature Improvements

The project would increase coldwater pool conservation in Shasta Lake, Lake Oroville, and Folsom Lake and improve temperatures in the Sacramento and American Rivers during certain months at specific compliance points, particularly in Below Normal, Dry, and Critical water years. The areas of temperature improvement for these waterways are shown on Figures Water Quality P – 1a and P – 1b.

As discussed in the Operations Plan, Sites_A2 Operations under the BENEFIT CALCULATION, MONETIZATION, AND RESILIENCY TAB, it is thought that maximum temperature benefits in the Sacramento and American Rivers could be realized by emphasizing cold water releases during the months of highest potential water temperature related impacts (i.e., July through November). Adaptive management and monitoring would also be implemented to ensure that these benefits are achieved to the maximum extent possible. The areas of greatest temperature improvement are summarized in the "Performance Measures Scorecard for Sites Reservoir Potential Beneficiaries" are presented in Sites_A1 Modeling under the BENEFIT CALCULATION, MONETIZATION, AND RESILIENCY TAB. Temperature modeling data. All temperature modeling data is presented in "Temperature Results WSIP 2030 with Project vs without Project" are presented in" are presented in Sites_A1 Modeling under the BENEFIT CALCULATION, MONETIZATION, AND RESILIENCY TAB

Sacramento River

Approximately 59 river miles of the Sacramento River would be improved with the implementation of the Sites Reservoir Project downstream from Keswick Dam (River Mile 302) to the Red Bluff Diversion Dam (River Mile 243). Figure Water Quality P-1a shows the improvement area for the Sacramento River. Site project operations emphasize providing Sacramento River cold water releases during the months of July through November when it's most difficult to achieve temperatures water quality standards; therefore, the main focus of discussion regarding temperatures benefits is limited to this time of the year. Incidental benefits during other times of the year can also be seen, including January through February in most water year types in the Sacramento from below Keswick to Bend Bridge.

Sacramento River – Below Keswick

Long-term and water year type monthly temperature averages with and without the project in 2030 for the Sacramento River below Keswick Dam are presented in Table SQ2-1a. With the operation of Sites Reservoir project, temperatures would improve in August and September of dry water years and July through November in critical water years. Temperature benefits provided with the project in September during critical water years would assist to achieve compliance with 56◦F water quality standard; without the project temperatures would exceed 56◦F.

Sacramento River – Bonny view

Temperatures in the Sacramento River at Bonnyview would improve in August for all water year types, in September during dry water years, and July through November in critical water years. Temperature benefits provided with the project in August during critical water years would assist to achieve compliance with 56◦F water quality standard; without the project temperatures would exceed 56◦F. Long-term and water year type monthly temperature averages with and without the project in 2030 for the Sacramento River at Bonnyview are presented in Table SQ3-1a.

Sacramento River – Balls Ferry

In the Sacramento River at Balls Ferry, the project would improve temperatures in August for all water year types, in September during below normal and dry water years, and July through November in critical water years. Temperature benefits provided with the project in August during dry water years would assist to achieve compliance with 56◦F water quality standard; without the project temperatures would exceed 56◦F. Long-term and water year type monthly temperature averages with and without the project in 2030 for the Sacramento River at Balls Ferry are presented in Table SQ4-1a.

Sacramento River – Jelly's Ferry

Temperatures in the Sacramento River at Jelly's Ferry would improve in August for all water year types, in September during below normal and dry water years, and July through November in critical water years. Long-term and water year type monthly temperature averages with and without the project in 2030 for the Sacramento River at Jelly's Ferry are presented in Table SQ5-1a.

Sacramento River – Bend Bridge

Temperatures in the Sacramento River at Bed Bridge would improve in August for all water year types, in September during below normal and dry water years, and July through November in critical water years. Long-term and water year type monthly temperature averages with and without the project in 2030 for the Sacramento River at Bend Bridge are presented in Table SQ6-1a.

Sacramento River – Red Bluff

Long-term and water year type monthly temperature averages with and without the project in 2030 for the Sacramento River below Red Bluff are presented in Table SQ8-1a. With the operation of Sites Reservoir project, temperatures would improve in August and September of during below normal and dry years and August through November in critical water years. Temperature benefits provided with the project in September during critical water years would assist to achieve compliance with 56◦F water quality standard; without the project temperatures would exceed 56◦F.

American River

Cold water releases from Folsom Reservoir to the American River as part of site project operations are targeted during the months of July through November. During these months, it's most difficult to achieve temperatures water quality standards. The greatest benefits are seen between April and October during all water year types. Approximately 30 river miles of the American River would be improved with the implementation of the Sites Reservoir Project downstream from Folsom Dam to the mouth of the American River. Figure Water Quality P-1c shows the improvement area for the American River.

American River at Nimbus

Long-term and water year type monthly temperature averages with and without the project in 2030 for the American River at Nimbus Dam are presented in Table SQ9-1a. Modeling results indicate that temperatures in the American River at Nimbus would improve April through September during most water year types. The greatest benefits can be seen during the month of September.

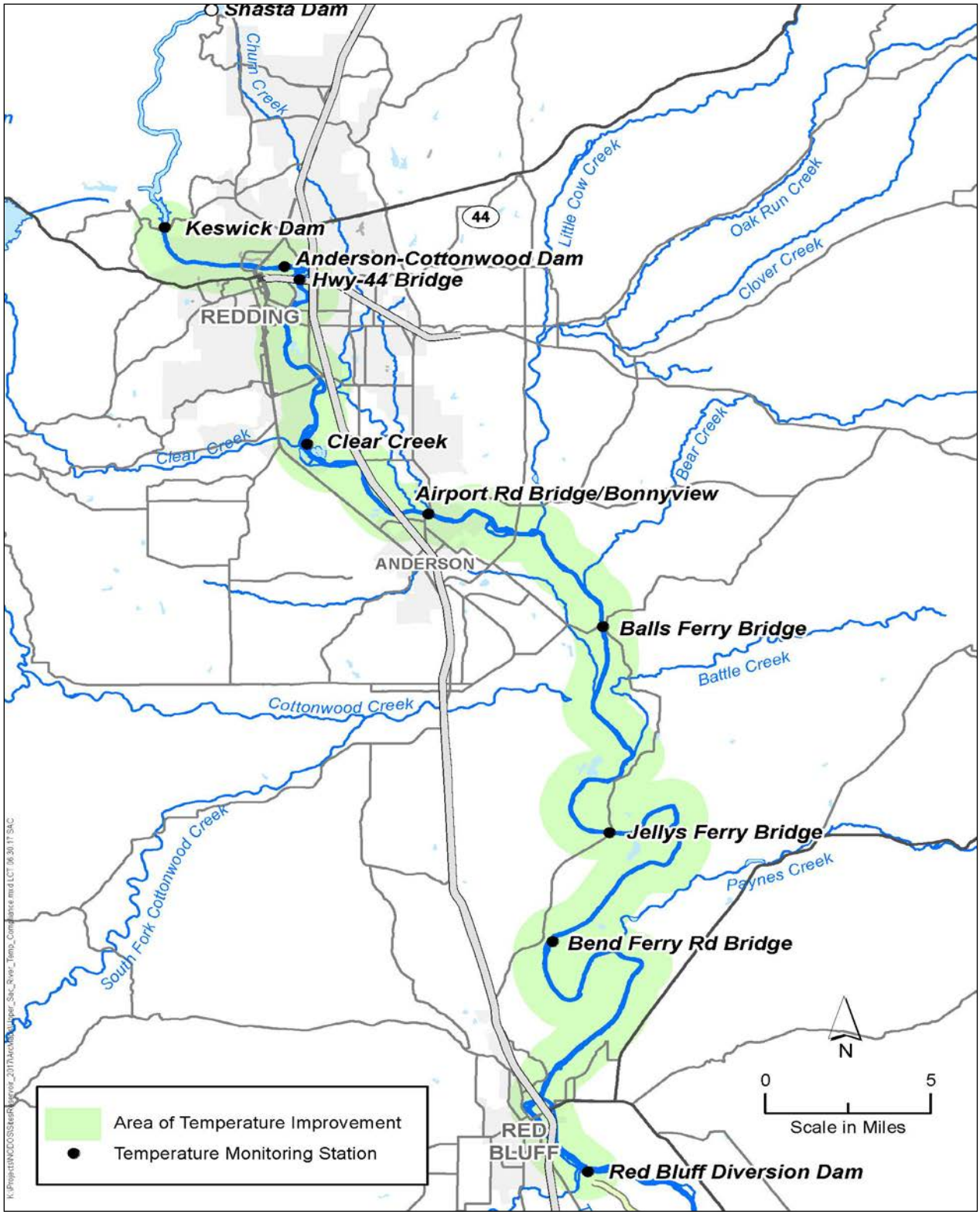
American River at Watt Ave

Temperatures in the American River at Watt would improve during April through September in most water year types. The greatest benefits can be seen during the month of September. Long-term and

water year type monthly temperature averages with and without the project in 2030 for the American River at Watt are presented in Table SQ10-1a.

American River at Mouth

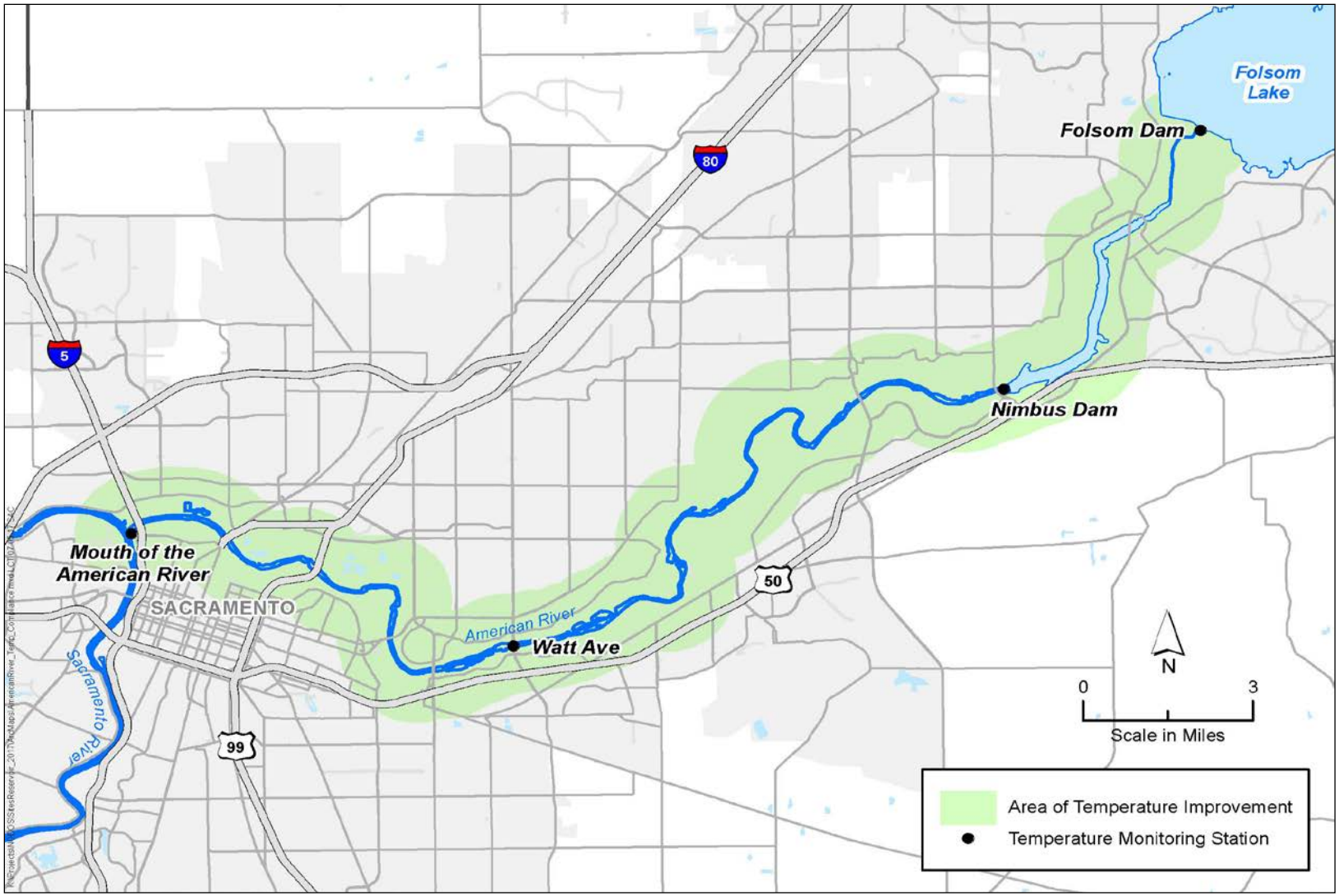
At the mouth of the American River, temperatures would improve April during most water year types. The greatest temperature benefits provided with the project are July through September during critical water years. Long-term and water year type monthly temperature averages with and without the project in 2030 for the American River at the mouth are presented in Table SQ11-1a.



Source: Prepared by AECOM 2017

Figure Water Quality P – 1a Area of Temperature Improvement for the Sacramento River

STATUS:	FINAL	PREPARER:	N SMITH	PHASE:	1	VERSION:	A
PURPOSE:	PHYSICAL PUBLIC BENEFIT	CHECKER:	J HERRIN	DATE:	2017 AUGUST		
CAVEAT:		QA/QC:		REF/FILE #:	WSIP APPLICATION		
NOTES:	WATER QUALITY PRIORITIES 1			PAGE:	5	OF	6



Source: Prepared by AECOM 2017

Figure Water Quality P – 1b. Area of Temperature Improvement for the American River

STATUS:	FINAL	PREPARER:	N SMITH	PHASE:	1	VERSION:	A
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NOTES:	WATER QUALITY PRIORITIES 1			PAGE:	6	OF	6