RECLAMATION

Managing Water in the West

Plan of Study for the American River Basin Study

U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region

January 13, 2017

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Abbreviations and Acronyms

ARBS or Study	American River Basin Study
COR	Contracting Officer Representative
CVP	Central Valley Project
Delta	Sacramento-San Joaquin Delta
DWR	California Department of Water Resources
EDCWA	El Dorado County Water Agency
EID	El Dorado Irrigation District
ESC	Executive Steering Committee
GCM	global climate model
FERC	Federal Energy Regulatory Commission
Folsom	City of Folsom
HUC	hydrological unit code
M&I	municipal and industrial
MFP	Middle Fork American River Project
MOA	Memorandum of Agreement
N/A	not applicable
NID	Nevada Irrigation District
NAAO	Native American Affairs Office
PCWA	Placer County Water Agency
PG&E	Pacific Gas and Electric
PM	ARBS Project Manager
PMT	Project Management Team
POS	Plan of Study
RACI	Responsible, Accountable, Consulted, and Informed
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
Roseville	City of Roseville
RPA	Reasonable and Prudent Alternatives
RWA	Regional Water Authority
Sacramento	City of Sacramento
SECURE Water Act	Science and Engineering to Comprehensively Understand and Responsibly Enhance Water Act; Subtitle F of Title IX of Public Law 111-11, Omnibus Public Lands Management Act of 2009
SMUD	Sacramento Municipal Utility District
SSJRBS	Sacramento and San Joaquin Rivers Basin Study
State	State of California
non-Federal Partners	Placer County Water Agency, City of Roseville, City of Sacramento, El Dorado County Water Agency, City of Folsom, Regional Water Authority
SWP	State Water Project

TM	Technical Memorandum
TRMR	Temporary Reclamation Manual Release
TSC	Technical Services Center
USACE	U.S. Army Corps of Engineers
Water Board	State Water Resources Control Board
WTR	Water Management and Development
WTR TRMR-65	*Reclamation Manual, Directives and Standards, WTR TRMR-65*

Chapter 1
Project Information

1.1 Purpose of Study

Water managers in the American River Basin continue to experience a growing imbalance between water demands and water supply due to a variety of factors. These include population growth; increased regulatory requirements; changes in Central Valley Project (CVP) operations; inadequate infrastructure; and lack of interagency planning necessary to address emerging climate change conditions, and increasingly intense and more frequent extreme events (droughts and floods).

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) recently completed the Sacramento and San Joaquin Rivers Basin Study (SSJRBS) (March 2016). The SSJRBS forecasts the potential impacts of climate change on water supply, water quality and critical habitat within California's Central Valley. The 60,000 square mile study area for the SSJRBS encompasses all main tributaries within the Central Valley as well as the Sacramento-San Joaquin Delta (Delta), the largest estuary on the west coast of North America. The SSJRBS outlines potential impacts over a range of possible future climate conditions on various natural resources and presents portfolios of broad adaptive strategies for consideration by water agencies and other interests.

The purpose of the American River Basin Study (ARBS or Study) is to refine and update the data, tools, analyses, and adaptation strategies in the SSJRBS for the American River Basin. Specifically, the ARBS will update the SSJRBS to reflect basin-specific, integrated water management strategies to improve regional water supply reliability within the American River Basin, while improving the Reclamation's flexibility in operating Folsom Reservoir to meet flow and water quality standards and protect endangered fishery species in the lower American River.

The ARBS will present a holistic examination of water management practices to address significant recent changes in conditions and regulatory requirements related to the CVP and regional water management, including Biological Opinions for endangered fishery species protection, the State of California's (State) Sustainable Groundwater Management Act, and the science of climate change.

To develop the ARBS, the six non-Federal Partners – Placer County Water Agency (PCWA), City of Roseville (Roseville), City of Sacramento (Sacramento), El Dorado County Water Agency (EDCWA), City of Folsom (Folsom), and Regional Water Authority (RWA) –will enter into a Memorandum of Agreement (MOA) with Reclamation to complete the ARBS.

1.2 Plan of Study

As described in *Reclamation Manual, Directives and Standards, WTR TRMR-65* (WTR TRMR-65)[1], the Plan of Study (POS) is an attachment to the MOA for the ARBS. The POS serves as the project management plan for Reclamation and the non-Federal Partners. The ARBS POS includes the following chapters:

- **Chapter 1** – Project Information
- **Chapter 2** – Study Description
- **Chapter 3** – Study Management Requirements
- **Chapter 4** – Study Tasks
- **Chapter 5** – Communication and Outreach Plan

The ARBS POS includes all components required in WTR TRMR-65, as shown in Table 1-1.

Table 1-1. WTR-TRMR-65 Requirements in American River Basin Study Plan of Study

WTR TRMR-65 Requirement	Requirement Description	POS Location(s)
8.B.(2)(a)	Study Management Structure	Chapter 3.1
8.B.(2)(b)	Decision Making Process	Chapter 3.2 and Attachment A
8.B.(2)(c)	Roles and Responsibilities	Chapter 3.2
8.B.(2)(d)	Study Team Coordination	Chapter 3.2
8.B.(2)(e)	Administrative Records	Chapter 3.6
8.B.(2)(f)	Schedule and Cost Control	Chapters 3.3 and 3.4
8.B.(2)(g)	Deliverables and Project Documentation Requirements	Chapter 4 and Attachment D
8.B.(2)(h) / 8.C.	Description of how the Study will be Reviewed, including Reporting Requirements / Technical Sufficiency Review Plan	Chapter 3.5 and Attachment B
8.D.	Communication and Outreach Plan	Chapter 5 and Attachment C

Key:
POS = Plan of Study
TRMR = Temporary Reclamation Manual Release
WTR = Water Management and Development

[1] WTR = Water Management and Development; TRMR = Temporary Reclamation Manual Release. WTR-TRMR-65 was approved on December 8, 2016, and expires on December 8, 2016. Until it is replaced, WRT-TRMR-65 will be used as the guidance for Study development.

1.3 Study Objectives

Under the "new normal" of a changing climate, the ARBS will improve the resolution of regional climate change data and develop regionally-specific mitigation and adaptation strategies, building on those identified in the SSJRBS. The ARBS will:

- Further refine an assessment of water supplies and demands for the American River Basin over the data developed for the SSJRBS
- Address regional demand-supply imbalance and infrastructure deficiencies under the threat of climate change.
- Improve regional self-reliance and collaboration for sustainable water resources management and quality of life.
- Integrate regional water supply reliability with operational flexibility for Reclamation's Folsom Dam and Reservoir to help meet all authorized purposes of the CVP.
- Align water management tools, strategies, and planning efforts of Reclamation and water purveyors in the basin.

The ARBS will include all required Basin Study elements:

- Develop projections of future water supply and demand in the basin, including an assessment of risk to the water supply relating to climate change as defined in Section 9503(b)(2) of the SECURE Water Act[2].
- Analyze how existing water and power infrastructure and operations will perform in the face of changing water realities and other impacts identified in Section 9503(b)(3) of the SECURE Water Act, including the ability to deliver water; hydroelectric power generation; recreation; fish and wildlife habitat; applicable species listed as endangered, threatened, or candidate species and/or designated critical habitat under the Endangered Species Act of 1973; water quality issues (including salinity levels); flow and water dependent ecological resiliency; and flood control and/or management.
- Develop appropriate adaptation and mitigation strategies to meet future water demands.
- Complete a trade-off analysis of the identified options, including an analysis of all options in terms of their relative cost, environmental impact, risk, stakeholder response, or other common attributes.

[2] SECURE Water Act = **S**cience and **E**ngineering to **C**omprehensively **U**nderstand and **R**esponsibly **E**nhance Water Act; Subtitle F of Title IX of Public Law 111-11, Omnibus Public Lands Management Act of 2009

The ARBS will provide a unique opportunity to align the water management strategies and planning efforts of the region with those of Reclamation and the CVP to pursuing integrated water management solutions that benefit all parties.

1.4 Description of Study Area

The American River is one of four major tributaries to the Sacramento River. Figure 1-1 shows the Study Area – the American River Basin – that is bounded by the Bear River to the north, the Cosumnes River to the south, the Sierra Nevada mountain range to the east, and the Feather and Sacramento rivers to the west. The Study Area encompasses two parts:

- **American River Watershed** – This watershed covers 2,140 square miles from Sacramento to the peaks of the northern Sierra Nevada mountains west of Lake Tahoe. It includes all three sub-basins of the American River: the Lower American River Sub-basin (U.S. Geological Survey hydrological unit code (HUC) 18020111), North Fork American River Sub-basin (HUC 18020128), and South Fork American River Sub-basin (HUC 18020129). Folsom Dam and Reservoir, with a capacity of 977,000 acre-feet, is located downstream from the confluence of the North and South forks of the American River and is the primary regulating reservoir for the watershed, which has an annual average flow of 2.6 million acre-feet. The lower American River below Folsom Dam drains into the Sacramento River near downtown Sacramento. Areas outside of the watershed that are served by non-Federal Partners with American River water are also included in the Study Area.

- **North and South Groundwater Subbasins** – These two groundwater basins in the west side of the Study area are separated by the American River, and their eastern boundary represents the approximate edge of the alluvial basin, where little or no groundwater flows into or out of the groundwater basins from the Sierra Nevada basement rock. In addition to surface water from the American River, local water agencies use groundwater for their water supply needs.

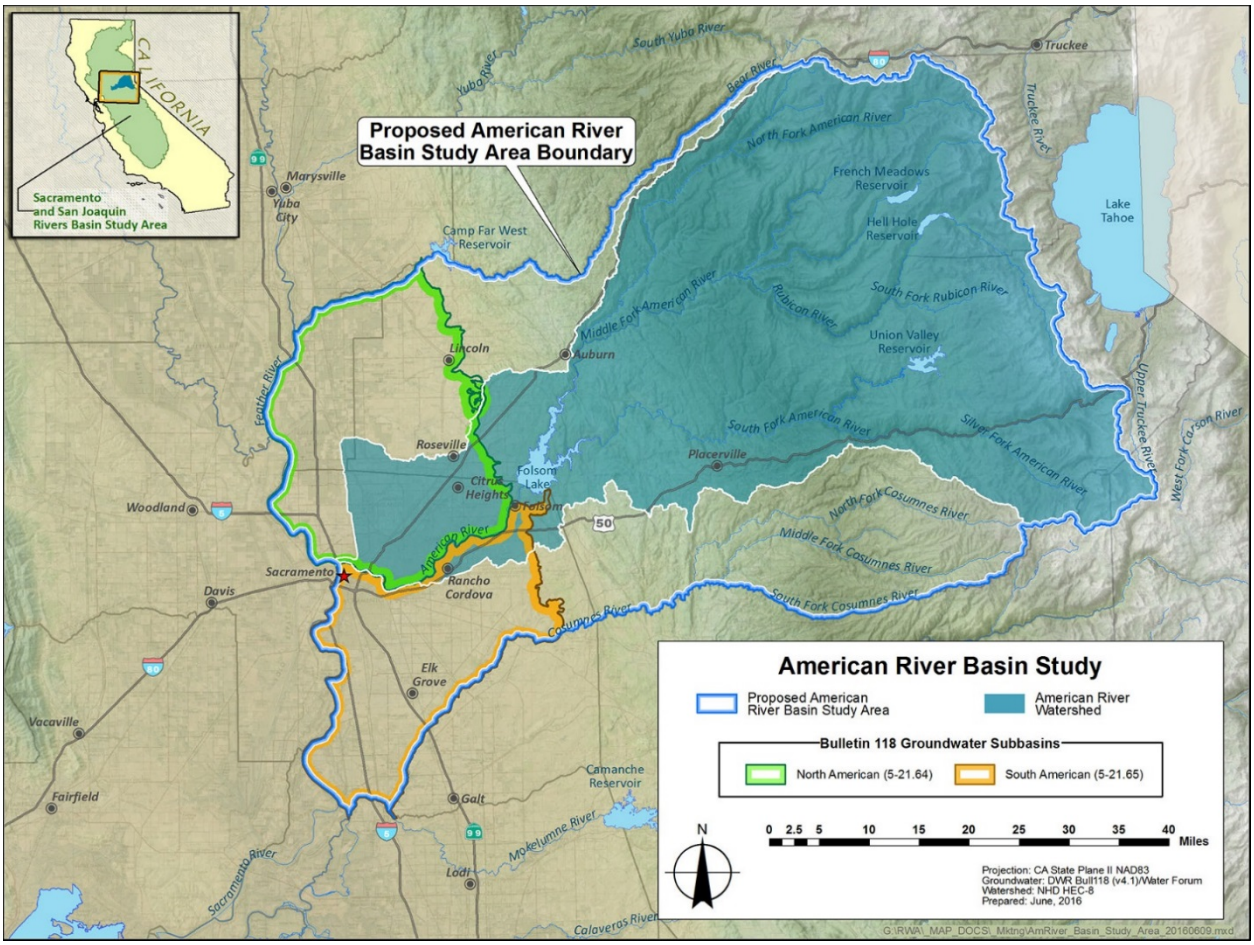

Figure 1-1. American River Basin Study Area Map

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Chapter 2
Study Description

2.1 Project Background

The dry lakebed of Folsom Reservoir has become symbolic of California's ongoing historic drought. In late 2015, access to water supplies in Folsom Reservoir was nearly lost due to low water levels, threatening deliveries to over one million people in the American River Basin. Severe drought conditions precipitated water right curtailments, severely reduced contract allocations, mandatory extraordinary conservation measures, and relaxed regulatory flow and quality requirements system-wide. These measures were in addition to increased regulatory requirements that further constrained Reclamation's flexibility in operating Folsom Dam to meet all authorized project purposes, stressing the already overburdened watershed. Months later in March of 2016, Reclamation operators were compelled to make flood control releases from Folsom Dam after several moderate El Niño storms. This rapid shift in hydrologic conditions led many water managers to question the adequacy of historical assumptions and regional infrastructure under the "new normal" of changing climate.

Folsom Reservoir reached a record low of 135,000 acre-feet on December 5, 2015, threatening water supplies and ecosystems of the American River Basin and systemwide.

Although drought in California remained, Folsom Reservoir made releases in 2016 to maintain flood space (March 28, 2016).

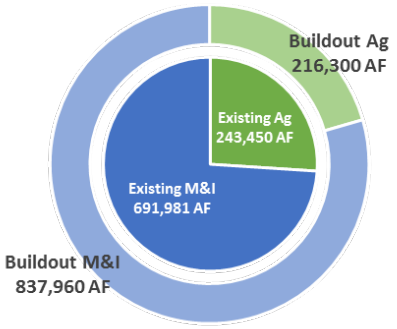
Reclamation's recently completed SSJRBS outlines major impacts from climate change on water supply, fish and wildlife protection, and flood management due to reductions in snowpack and changes in seasonal runoff. In the American River Basin, the potential effects of a changing climate have introduced significant uncertainty in long-term water supply reliability. Folsom Reservoir has a limited capacity relative to the watershed it serves, partially because seasonal snowpack is relied upon to provide a large portion of the storage necessary to regulate runoff for water supply. Changing climate conditions in the Sierra Nevada mountains threaten the volume of water stored in the snowpack and the timing of runoff entering the reservoir.

Further, the superior quality of water in the American River and its close proximity to the Delta give Folsom Reservoir a critical role in CVP operations to satisfy Delta flow and quality standards and other requirements for protecting endangered fishery species.

Reclamation exercises an integral role in water management in the American River Basin by storing and conveying CVP and other contract supplies and operating Folsom Reservoir for regional and statewide natural resource protection and flood management. Local water agencies and stakeholders have a long history of collaborating with Reclamation to meet this imposing responsibility. Reclamation's last watershed planning effort – the American River Water Resources Investigation of the late 1990s – recommended regional conjunctive use to leverage the region's rich water rights and contract entitlements alongside its groundwater resources. Consistent with that premise, regional entities completed the Sacramento Water Forum Agreement in 2000, which presented a balanced approach for water supply reliability and environmental protection along the lower American River. The 2006 American River Basin Integrated Regional Water Management Plan and subsequent 2013 Update continued the collaborative planning and implementation efforts in the region, serving as an innovative model for the State to implement regional planning to support planned economic development, enhanced protection for salmon and steelhead species in the lower American River, and social and recreation values unique to the region. Despite this history of successful collaboration in the basin, a need remains to integrate Federal and regional planning, address regulatory changes, and address evolving climate conditions. These issues must be resolved if the competing needs for regional self-reliance, CVP delivery reliability, and endangered species protection are to be met in a coordinated under an aligned vision for water management.

2.2 Problems, Needs, and Opportunities

The ongoing historic drought serves as an indicator of the potential future supply and demand imbalances under climate change, and highlights the need for better characterization of climate change effects and development of adaptation strategies tailored to the American River Basin.



Population in the American River Basin is expected to increase by 1 million people by 2060. The estimated demands are expected to increse from about 935,00 acre-feet per year to over 1 million acre-feet per year with planned devlopment.

Magnitude and Frequency of Water Shortages

Over the past several decades, local water agencies have experienced a growing imbalance between water demands and water supply availability in the American River Basin. Reclamation faces similar challenges with respect to environmental water management. Reasons for this imbalance include the following:

- **Population Growth** – According to the California Department of Finance's 2014 estimates, the population of the American River Basin portions of El Dorado, Placer, and Sacramento counties will rise to nearly 3 million – a 47 percent increase – by 2060. Local General Plans and water supply plans indicate that total demands will increase from

935,400 to 1,054,300 acre-feet per year, and the municipal and industrial (M&I) share of total demand will increase. Water supply reliability is even more challenging in areas without redundant water supplies or access to groundwater resources. For example, the EDCWA service area on the west slope of the Sierra Nevada foothills estimates shortages of up to 74,000 acre-feet at buildout, when considering climate change.[3]

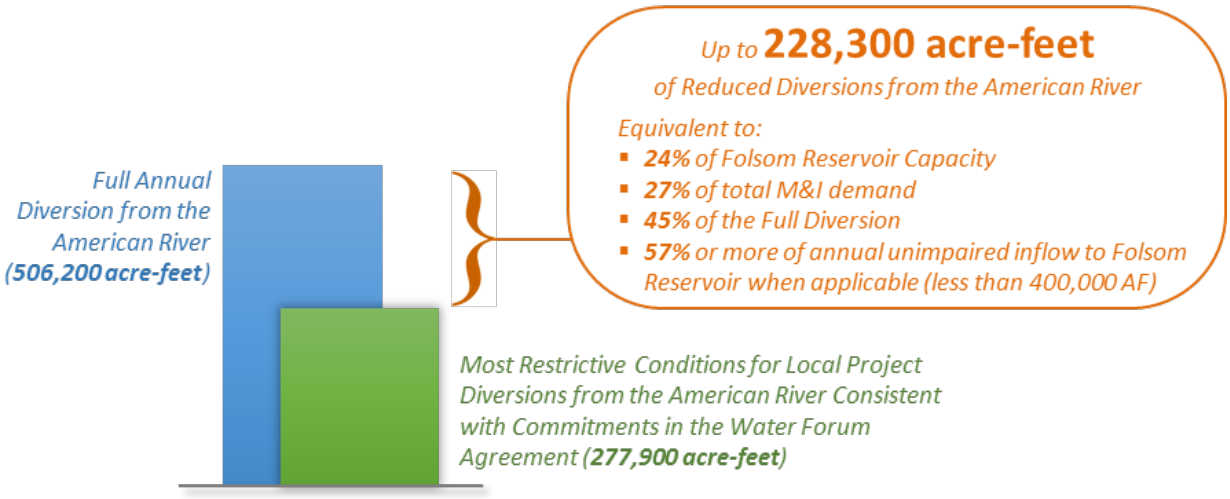
- **Revised CVP Operations** – CVP operations have changed significantly since the 1990s in response to new statutory and regulatory requirements related to fish and wildlife mitigation, water quality and other environmental-related purposes. Examples include the Central Valley Project Improvement Act of 1992 (Title XXXIV, Public Law 102-575 (106 Stat 4600)) which, among many other provisions, required Reclamation to dedicate 800,000 acre-feet per year of CVP yield to environmental restoration; State Water Resources Control Board (Water Board) decisions requiring Reclamation to meet flow and water quality standards in the Delta; and Reasonable and Prudent Alternatives (RPA) and other requirements in successive Biological Opinions governing operation of the CVP in coordination with the State Water Project (SWP). Revisions to CVP operations have contributed to a gradual reduction in CVP contract water allocations system-wide.

  The CVP provides the Sacramento region with a total contract entitlement of about 140,000 acre-feet for M&I use, or roughly 15 percent of the total buildout M&I demand in the American River Basin. According to the 2015 Final Environmental Impact Statement for Coordinated Long-Term Operation of the CVP and SWP, average annual delivery within the American River Basin is estimated at approximately 113,000 acre-feet (about 80 percent of the total contract amount), and dry year delivery at approximately 75,000 acre-feet (53 percent of the contract amount). Reclamation operates Folsom Reservoir as an integrated feature of the CVP and, due to its close proximity and superior water quality, the reservoir is a "first responder" to meet Delta flow and water quality requirements prescribed by the Water Board and the Biological Opinions and their respective RPAs.

- **Water Right Curtailments and Facility Constraints** – Water agencies in the American River Basin hold just over 500,000 acre-feet of American River water rights for consumptive use purposes. These water rights are either senior water rights (including pre-1914) or their priority of use in the region are protected by California water laws. Accordingly, water under these rights has historically been viewed as 100 percent reliable. However, in response to the current drought, the Water Board issued curtailments on water right diversions throughout the State, including senior pre-1914 rights. All water agencies in the American River Basin with water rights were impacted by the Water Board's actions in 2014 and 2015. Further, access to CVP supplies was limited by historically low storage in Folsom Reservoir resulting from competing interests for CVP deliveries and releases for downstream flow and temperature management. Water agencies were close to losing their intake's physical ability to access water in Folsom Reservoir in 2015, even though they still had a legal right to divert

[3] This potential imbalance is subject to refinement in the Study, including incorporating climate change effects on demand projection for all water purveyors in the region.

water. These regulatory and physical infrastructure constraints have redefined the water supply reliability vulnerabilities of many water users. With climate change, the intensity and frequency of extreme conditions that exacerbate these constraints is likely to increase.



- **Gap between Federal and Local Project Operations** – The ARBS will evaluate and propose strategies for balancing between Reclamation's operations for Folsom Dam and Reservoir and the CVP, and local water agency operations, consistent with their commitments in the Water Forum Agreement. For water management planning, Reclamation assumes that local water agency diversions will continue to occur, but their actual operations will be constrained by these commitments. To bridge the gap, development of a balanced solution is required in the ARBS to support the regional conjunctive use practices. For example, the gap for PCWA represents a projected shortage of up to 34,000 acre-feet per year in its wholesale treated water service area in western Placer County.

- **Climate Change** – Existing imbalances in the American River Basin for both consumptive use and environmental purposes will be further exacerbated by projected climate change conditions. The SSJRBS concluded that, in general, the Sacramento and San Joaquin river basins could likely face material changes in climactic conditions including: increases in average temperatures, more variable precipitation and reduced runoff, declining snowpack with more moisture falling as rain, and increasing sea levels. With climate change, the SSJRBS estimates that CVP deliveries would be further reduced by 2 to 3 percent and the loss of habitat would be up to 33 percent by 2100. The resulting significant threats to aquatic species, especially endangered salmonids and delta smelt, would translate to further reductions in CVP deliveries and the potential extirpation of certain species. With projected loss of average Sierra Nevada snowpack of greater than 20 percent and changes to the timing of runoff, significant mitigation actions will be needed to make the region more resilient to extreme events. The specific impacts to existing imbalances in the American River Basin need to be further quantified for purposes of developing appropriate mitigation and adaptation strategies.

Nature of Imbalances

Imbalances in the American River Basin relate to both water quantity (for consumptive uses) and water quality (for the management of temperature and flows for protection of endangered fishery species). The imbalances pose water supply reliability challenges for non-Federal Partners seeking to bridge the gap between supply and demand, and for Reclamation in operating the CVP (including Folsom Reservoir) for multiple authorized purposes consistent with a broad range of statutory and regulatory requirements. For example, water releases for temperature management must be balanced with other competing demands for consumptive uses. The imbalances between supply and demand in the American River Basin, as well as the CVP-SWP system as a whole, will be significantly amplified by changing climate conditions.

Severity of Potential Consequences of the Imbalances

The SSJRBS concluded that, in general, the Sacramento and San Joaquin river basins likely face material changes in climatic conditions including: increases in average temperatures, more variable precipitation and reduced runoff, declining snowpack with more moisture falling as rain, and increasing sea levels. The ongoing drought has exposed the vulnerabilities of surface water supplies to Folsom Reservoir operations. Climate change will result in increases in the frequency, severity, and duration of droughts within the basin. With the loss of average Sierra Nevada snowpack projected as greater than 20 percent and changes to the timing of runoff, significant mitigation actions will be needed to make the region more resilient to future drought. Folsom Reservoir is already undersized for its intended and expanding purposes. The potential for Folsom Reservoir to serve as a reliable water source will only degrade further over time under climate change conditions.

The potential consequences of these imbalances, if not addressed, are significant. As described previously, the EDCWA service area estimates shortages up to 74,000 acre-feet at buildout, and PCWA projects shortages of up to 34,000 acre-feet per year. For the American River Basin as whole, projected shortages represent 12 percent of total demand and translate to lost economic development, increased risks of groundwater overdraft, and further impacts on endangered fishery species in the lower American River. For Reclamation, the consequences include difficulty balancing the operation of Folsom Reservoir to meet multiple local, regional, and CVP-wide needs and obligations.

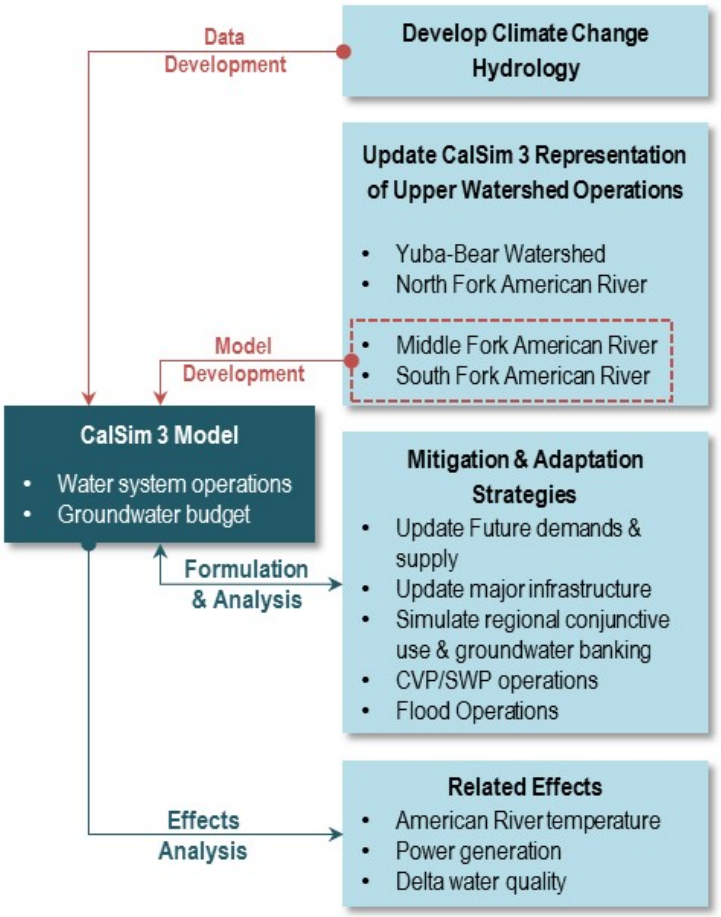
2.3 Previous Work and Available Data Models

Many water agencies in the study area divert water from the lower American River based on a mix of water rights, CVP contracts, and wholesale agreements. Water also is diverted from the lower Sacramento River to supply this region. Surface water supplies are used conjunctively with groundwater. For planning purposes, a system operation model is required to account for the availability of surface water and groundwater to meet demands. Additionally, regional water management actions must take place within the context of broader, statewide water management operations. Further, CVP operations must be coordinated with SWP operations such that the two projects can meet both contractual obligations and in-basin needs, as prescribed in their water right permits.

For the ARBS, CalSim 3 will be analytical tool to conduct integrated surface water and groundwater analyses and regional / system-wide operations, per recommendation from Reclamation's Technical Service Center. CalSim 3 is a new platform developed by Reclamation and the California Department of Water Resources (DWR). For this Study, key model and data development activities will include the following:

- Global climate model (GCM) downscaling and hydrological modeling at an appropriately refined scale to support regional planning, including obtaining downscaled GCM data and refining runoff for CalSim 3.

- Refined representation of the upper watershed of the American River (North, Middle, and South Forks) by mapping existing upper watershed models into CalSim 3.



CalSim 3, developed by Reclamation and DWR, provides a state-of-the-art integrated platform for simulating regional and statewide water systems. It includes:

- A detailed representation of the water supply portfolio of individual water purveyors in the region
- Representation of the upper watershed (with anticipated additional refinement by the ARBS)
- Capability for full integration with the existing groundwater model for the North and South American River groundwater subbasins

Climate Change Hydrology Development

The SSJRBS used interpolated GCM outputs at a 1/16 degree resolution to perform downscaling of climate change information, and used a coarse-grid WEAP model from California Water Plan (with 500-meter elevation band intervals) to perform statistical downscaling to produce hydrology. For the ARBS, additional resolution in hydrologic information will be required for regional planning purposes and for input to the upper watershed operation models. This will be cost-effectively achieved by adopting the same approach and data set used by the SSJRBS, and updating the WEAP model with additional refinements for the American River upper watershed, supported by available long-term records. This will allow for more detailed information on a narrower elevation interval, greatly improving the accuracy of runoff estimates and timing. The net result will be a more accurate picture of climate change effects on runoff from the upper watershed and inflow into Folsom Reservoir; this, in turn, will

allow evaluation of the effects of climate change on the operation of the CVP, regional water supply reliability, fishery management in the lower American River, and Delta water quality.

CalSim 3 Model Updates

The non-Federal Partners and other American River interests have conducted extensive, state-of-the-art modeling in the upper American River watershed. Modeling included flow and temperature models in the North and South forks and tributary streams. Conclusions of the model identify alternatives for improving cold water pool management in Folsom Reservoir, flow regimes, and temperature plans for the lower American River that optimize water supply reliability and resource protection. These modeling efforts were conducted in support of high-priority water resource initiatives within the basin and include: Federal Energy Regulatory Commission (FERC) re-licensing for PCWA's MFP, FERC re-licensing for the Sacramento Municipal Utility District's (SMUD) Upper American River Project, and PG&E'S Drum-Spaulding Project; PCWA's MFP water rights extension; and the Sacramento Water Forum's Modified Lower American River Flow Management Standard.

Under the ARBS, there will be updates to CalSim 3 simulation of the Middle Fork and South Fork of the American River. A detailed operations model of the Middle and South forks was built on an OASIS platform similar to CalSim3 to support relicensing of PCWA's hydroelectric facilities and EDCWA's ongoing Alder Reservoir feasibility study and county-wide water management strategy development. The key task for the ARBS will be to map the OASIS model into CalSim 3 to ensure a fully integrated model that includes upstream operations and the broader CVP/SWP system operation.

Modeling Tools Available for the American River Basin Study

- Climate Data – GCMs interpolated data (Reclamation; from SSJRBS)
- WEAP – Hydrologic data downscaling (Reclamation from SSJRBS based on DWR California Water Plan Update; further refinements are required)
- CalSim II – Water Operations (Reclamation/DWR)
- CalSim 3 – Water Operations (Reclamation/DWR)
- CVP/SWP System Operation – Long-term Operation Baseline (Reclamation/DWR)
- DSM2 – Delta Water Quality Model (DWR)
- HEQ-Q5 – Lower American River Temperature Model (Reclamation)
- CE-QUAL-W2 – Upper American River and Folsom Lake temperature model (PCWA)
- OASIS – Upper Watershed water operations (PCWA)
- HEC-RESSIM – Flood reservoir operations (U.S. Army Corps of Engineers (USACE))
- HEC-RAS – Flood releases (USACE)
- SacIWRM – Groundwater model for the North and South American River groundwater subbasins

It is anticipated that the CalSim 3 model updates to refine upper watershed representation will be followed by technical reviews by Reclamation and the non-Federal Partners. The updated CalSim 3 model will then be used to evaluate the performance of various adaptation strategies under climate change conditions. The updated CalSim 3 will also include the most updated baseline for the coordinated long-term operation of CVP and SWP, including identified RPAs for compliance with endangered species protection requirements set in the Biological Opinions and court determinations.

2.4 Study Approach

There will be three key components of the ARBS:

1. For projections of supply and demand[4], the agency-specific Urban Water Management Plans will be used for projected build-out demands, considering the State's conservation goals and best management practices. Additional climate change impacts on demand projections will be considered, where available. The current projected water supplies will be updated with information from the SSJRBS and recent regulatory actions on water rights to establish the initial comparison between supply and demand and define the Study baseline.

2. For the impact analysis, the ARBS will leverage recent investments in analytical tools for local project operations in the upper American River Basin, and information on regional infrastructure capacity. This will form a comprehensive, basin-wide analytical framework for unifying Federal and regional planning. Refined hydrology to be developed through the ARBS will be used to assess regional and agency-specific vulnerability to climate change and the effectiveness of identified mitigation and adaptation strategies.

3. For the trade-off analysis, a range of strategies will be identified, including structural improvements, operational improvements, and institutional / administrative improvements. These strategies will be formulated to achieve the identified ARBS objectives to address projected climate change impacts, improve regional self-reliance in water supply, align regional and federal water management strategies, and enhance the operational flexibility for Reclamation's Folsom Dam. Evaluation criteria will be developed with stakeholder input and be consistent with Federal planning guidance (effectiveness, efficiency, acceptability, and completeness).

Several complementary cost-share efforts by the non-Federal Partners have been identified that will assist in development of the ARBS (detailed in Chapter 4.4). Through the above defined planning process, the ARBS will be executed effectively and efficiently.

A transparent ARBS development process will be employed, involving stakeholders and diverse water interests throughout the region – M&I, agricultural, tribal, environmental, recreation, power generation, and flood management. In addition to Reclamation, the ARBS will be coordinated with other Federal, state, and local agencies with relevant authorities and natural resource management responsibilities.

As described in Chapter 3 (Study Management Requirements) and Attachment C (Communication and Outreach Plan), Reclamation and the non-Federal Partners will conduct the ARBS in a transparent manner through the Stakeholder Forum, public meetings/workshops, and other venues (ARBS website, news/press releases, email notifications, targeted invitations, webinars, and/or other methods, as appropriate). In addition, the flexible communication and

[4] Supply and demand projections need to extend to 2100 or buildout under climate change conditions. If existing planning documents do not reflect this period, the non-Federal Partners may need to develop projections for use in the ARBS.

outreach framework will allow stakeholders and interested parties many opportunities to participate at the level they prefer.

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Chapter 3
Study Management Requirements

3.1 Study Management Structure

Reclamation and the non-Federal Partners will implement an ARBS management structure that fully integrates members from both parties with joint partnership at all levels. Figure 3.1 depicts the management structure of the ARBS

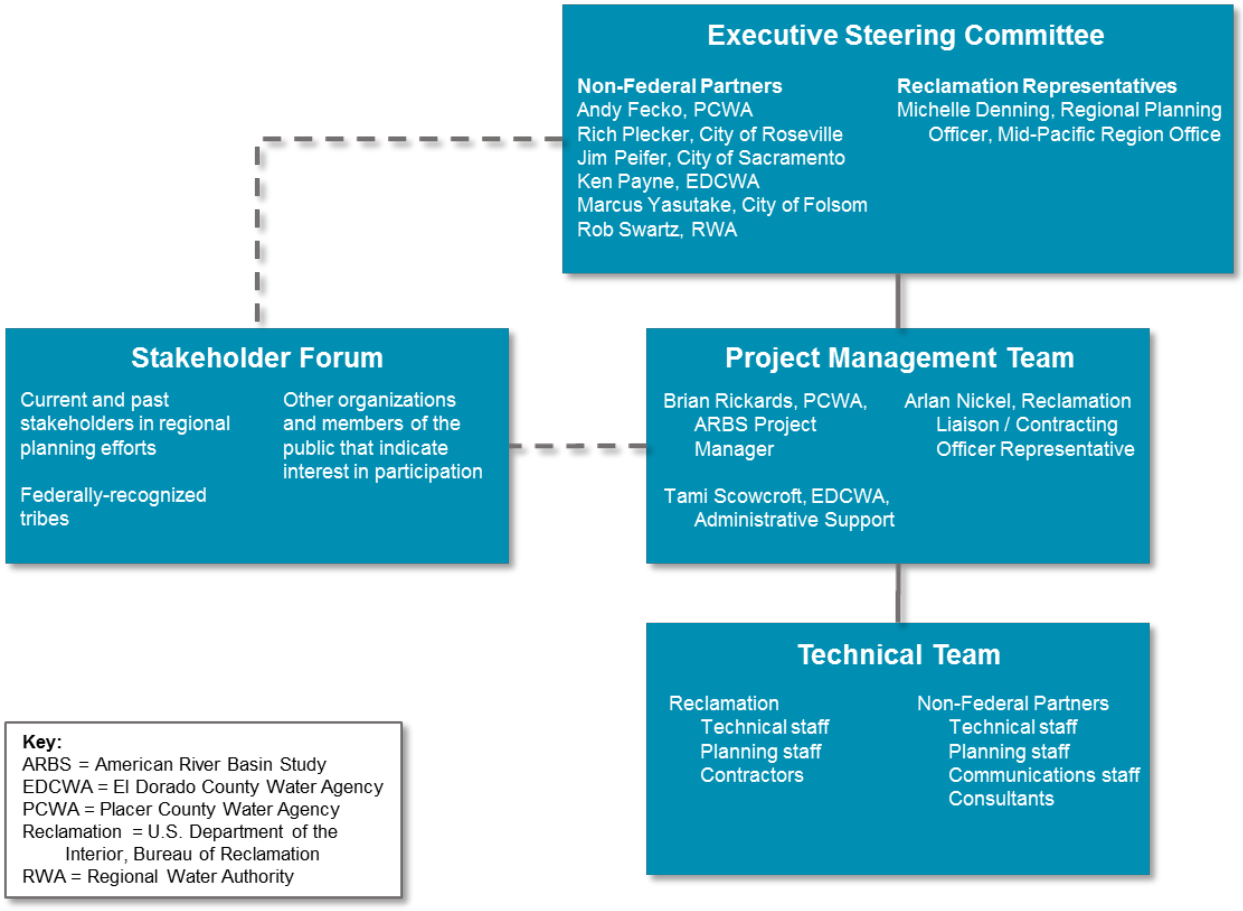

Figure 3-1. American River Basin Study Management Structure

3.2 Roles and Responsibilities

The success of the ARBS depends on clearly defined roles and responsibilities of Reclamation, the non-Federal Partners, the Technical Team, and the Stakeholder Forum. Table 3-1 shows a RACI (Responsible, Accountable, Consulted, and Informed) matrix that summarizes the identified roles and responsibilities.

Table 3-1. American River Basin Study RACI Matrix

Group	Responsible[1]	Accountable[1]	Consulted[1]	Informed[1]	Chartered?
	R	A	C	I	
Executive Steering Committee		☑	☑		Y
Project Management Team	☑				N
Technical Team	☑				N
Stakeholder Forum				☑	N

Note:

[1] **Responsibility** describes where the work is done, who is responsible for carrying out a task.
Accountability describes where the buck stops, who is held accountable.
Consulted are the critical people who need to contribute prior to completing the activity.
Informed indicates that it is less critical for this person to be involved but they need to be updated and informed about the outcome of the activity.

Key:
RACI = Responsible, Accountable, Consulted, and Informed

Executive Steering Committee

The Executive Steering Committee (ESC) will be a chartered group that consists of management-level officials with authority to commit their respective organizations to a course of action. The charter is included as Attachment A to the POS.

The primary purpose of the ESC is to provide management-level oversight of the ARBS process, consider and make decisions presented by the Project Management Team (PMT) and technical staff to ensure continued forward progress and timely completion of the study, and provide guidance and direction as appropriate on any or all aspects of study formulation, performance, funding, and management. The ESC will make decisions as a consensus-seeking group and will have a process to address disagreements.

Project Management Team

The purpose of the PMT is to ensure completion of all study phases and tasks according to the approved critical path schedule and within the approved project budget. This includes guidance and direction to contractor and agency staff members of the Technical Team who will be completing the project work. The PMT will be comprised of the ARBS Project Manager (PM), the Reclamation Liaison/Contracting Officer Representative (COR), and administrative support staff. The PMT will not be chartered.

The PM will be provided by PCWA but will work for and report to the ESC. The PM is responsible for the following together with the Reclamation Liaison/COR:

- Management and completion of all ARBS milestones and tasks according to the approved critical path schedule and approved study budget.

- Coordination and communications with the ESC, including formulation and presentation of all study decision actions.

- Coordination of non-Federal technical, planning, and communications staff working on the ARBS. These staff will be part of the Technical Team.

- Development of Basin Study Performance Reports (every six months) and Basin Study Financial Status Reports (every six months and upon completion of the ARBS).

- Implementation of the Technical Sufficiency Review Plan (included as Attachment B to the POS), Change Management Plan (described in Chapter 3.3), and Risk Management Plan (described in Chapter 3.4).

- Implementation of the Communication and Outreach Plan (included as Attachment C to the POS).

- Coordination and oversight of consultants engaged in specific work deliverables.

The Reclamation Liaison/COR will be responsible together with the PM for management and completion of all ARBS milestones and tasks according to the approved critical path schedule and approved study budget. In addition, the Reclamation Liaison/COR will:

- Formulate and submit all federal acquisitions for contract support, and direct the work of federal contract staff.

- Coordinate and facilitate Reclamation staff support from the Mid-Pacific Region and Technical Services Center (TSC)

- Ensure Reclamation leadership is updated and informed on all aspects of ARBS progress.

Administrative Support for the ESC and PMT will be provided by EDCWA. Administrative Support will include, but may not be limited to, meeting support and other administrative activities.

Technical Team

The Technical Team is responsible for completing technical, planning, and communications and outreach activities, as directed by the PMT. The Technical Team will be comprised of non-Federal Partner technical, planning, and communications staff and consultants, and Reclamation technical and planning staff and contractors. Active participation of Technical Team members will vary during the conduct of the ARBS, as different tasks are executed. The Technical Team will not be chartered.

Stakeholder Forum

The purpose of the Stakeholder Forum is to provide regular opportunities for stakeholders – interested parties, non-governmental organizations, and other organizations/individuals – to be kept informed of ARBS progress and provide feedback. Participation in the Stakeholder Forum will be open and voluntary; the ESC will direct the PMT to develop a contact list from current and past stakeholders in regional planning efforts and email them to provide information on the ARBS and request responses related to active participation. The ARBS website will also include information on how to participate in the Stakeholder Forum. The PMT will communicate directly with participants in the Stakeholder Forum. The Stakeholder Forum is for information purposes only and will not be chartered.

Reclamation will coordinate with its Native American Affairs Office (NAAO), its solicitor, and other offices (as needed) to contact Federally-recognized tribes in the study area to determine their desired levels of engagement.

3.3 Change Management Plan

The purpose of the Change Management Plan is to establish procedures for documenting and implementing changes to the approved scope of work. Scope of work changes may also require associated changes to the budget, schedule, performance, quality, and technical output. For the ARBS, change management will involve the following:

- A potential need for change in scope, schedule, and/or budget may be identified by any member of the ESC, PMT, or Technical Team. Identified issues will be raised to the PMT, and the PMT will assess the relevance of the proposed change and develop a proposed approach for resolution.

- Once a potential change is identified, it will be added to a change management register to allow for monitoring. This register will include the referenced task, description, project impact (cost and time), change order status, approval status, and comments. The PMT will be responsible for maintaining and updating the change management register.

- Minor adjustments that can be accommodated without affecting scope, schedule, and/or budget for major tasks may be approved by the PMT. More significant changes that could affect scope, schedule, or budget for major tasks will be documented in a change management form for review and action by the ESC. This form will include nature of the change, amount of budget impact, length of schedule impact, reason for change, and associated impacts and risks.

- Change management forms will be retained in the project records by the PMT and tracked through to completion, regardless of approval. Upon approval, the PMT will update relevant project documents and communicate the change to relevant Technical Team members and any key stakeholders.

- A change request that involves deviation from scope, schedule, or budget understandings established in the MOA and POS will be documented in a memorandum from

Reclamation's Regional Director to the Director of Policy and Administration. Corresponding approved changes approved will be documented in an amendment to the MOA.

3.4 Risk Management Plan

The purpose of the Risk Management Plan is to establish a framework for identification and assessment of project risks, and development of strategies to mitigate or avoid those risks. For the ARBS, risk management will involve the following:

- An initial risk register will be developed based on the scope, schedule, and budget described in the POS. For each risk, the risk register will include a description, effect, probability, impact, response, owner, status, and comments.

- The PMT will be responsible for maintaining and updating the risk register, obtaining input from all applicable parties to effectively manage project risks, developing responses to each identified risk.

- PMT and Technical Team meeting agencies will include an item for discussing risk. New risks or modifications to existing risks will be reflected in an updated risk register.

- Risks determined to be most likely to have the greatest potential impact will be documented and reported to the ESC and monitored during the time the ARBS is exposed to each risk. Risk monitoring will be a continuous process throughout the life of the study.

3.5 Technical Sufficiency Review Plan

The Technical Sufficiency Review Plan outlines the approach and methods for reviewing technical information, data, models, analyses, and conclusions of the ARBS. The Technical Sufficiency Review Plan is included as Attachment B to the POS.

3.6 Administrative Records

Reclamation and its contractors will maintain the administrative records for the ARBS, in coordination with EDCWA that will be providing administrative support for the ESC and PMT.

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Chapter 4
Study Tasks

4.1 Study Tasks

The major ARBS work tasks and deliverables are described below.

Task 1 – Study Initiation

Purpose
This task will prepare the ARBS MOA and POS. The MOA will establish the terms that will guide completion of the study. The POS will be attached to the MOA and will serve as the project management plan for Reclamation and the non-Federal Partners.

Descriptions
Preparation of the POS will involve conducting technical scoping with Reclamation and the non-Federal Partners' staff to detail the technical activities for the ARBS. In addition, a detailed roles and responsibility matrix will be developed to clarify the lead, support, and review roles for each tasks in the POS.

In consultation with Reclamation and the non-Federal Partners, a MOA will be developed and signed following the preparation of the POS.

Deliverables
- Draft and Final POS.
- Draft and Final MOA.

Task 2 – Climate Change Data and Model Development

Subtask 2.1 Global Climate Change Model Downscaling and Hydrological Modeling
Purpose. This subtask will prepare runoff hydrology for the American River Basin using downscaled GCM data at refined scale for the American River Basin.

Description. Downscaled GCM data for the American River Basin will be obtained from the SSJRBS, or from the recent climate change modeling efforts conducted by the California Water Commission. Refined-scale WEAP models for the American River upper watershed will be developed by updating the coarse-grid WEAP model (with 500-meter elevation band intervals) developed for the California Water Plan and used in the SSJRBS. The refined scale for the WEAP models will be consistent with the resolution for OASIS model inputs. Refined runoff hydrology for CalSim 3 will be developed using the refined-scale WEAP models and the updated downscaled GCM data to improving the accuracy of runoff estimates and timing.

Reclamation's TSC will be tasked to prepare downscaled climatological data and develop hydrological information at a refined scale for the American River Basin that will be consistent with upstream operation models developed by the non-Federal Partners. These data will be used to better understand the potential impacts of climate change in the Study area and develop appropriate mitigation and adaptation strategies for the benefit of both the non-Federal Partners and Reclamation. Note that there is an ongoing effort as part of the technical assistance to PCWA in assembling existing climatological data and climate change hydrology from the SSJRBS. For ARBS, that effort is assumed to be completed independent of the ARBS deliverables, budget, and schedule.

Deliverables

- Draft and Final Climate Change Hydrology Development Technical Memorandum (TM).
- Updated WEAP model files and runoff hydrology time series (electronic).

Subtask 2.2 CalSim 3 American River Upper Watershed

Purpose. This subtask will update CalSim 3 Model representation of the upstream local project operations on the North, Middle, and South Forks of the American River, and update regional infrastructure representation and agency-specific water supply portfolios.

Description. CalSim 3 currently simulates water management activities in the upper watersheds of the Yuba and Bear rivers, and the American River's North, Middle, and South forks. This includes water management facilities owned and operated by NID, PG&E, PCWA, SMUD, and EID. CalSim 3 simulation of the Yuba-Bear system is based on modeling conducted by NID for relicensing of the Yuba-Bear Hydroelectric Project (FERC Project No. 2266). Similarly, CalSim 3 simulation of PG&E facilities in the watershed is based on modeling conducted for relicensing of the Drum-Spaulding Hydroelectric Project (FERC Project No. 2310).

CalSim 3 simulations of the Middle Fork and South Fork of the American River, which encompasses the PCWA MFP (FERC Project No. 2079), SMUD American River Project (FERC Project No. 2101), and EID El Dorado Project (FERC Project No. 184), are based on HEC5 modeling conducted by DWR in the 1980s and 1990s. These representations for the Middle and South forks are outdated and should be updated for the ARBS.

A detailed operations model of the Middle and South forks was built on an OASIS platform to support relicensing of PCWA's hydroelectric facilities and EDCWA's ongoing Alder Reservoir feasibility study and county-wide water management strategy development. CalSim 3 simulated operations of the PCWA Middle Fork American River Project and SMUD American River Project will be refined and updated by mapping the OASIS model into CalSim 3 to ensure a fully integrated model that includes upstream operations and the broader CVP/SWP system operation. CalSim 3 simulated operations of PCWA operation of the lower Boardman Canal and water purchases from PG&E's Bear River Canal will be refined and updated. The upper American River watershed will be added to the existing CalSim 3 GIS database for the model domain, including development of a georeferenced schematic.

CalSim 3 represents water users aggregated into 'demand units'. Within the model's representation of the American basin there are over 20 urban demand units – some represent a single water agency, other represent groups of water agencies. The aggregation of water users within the American basin will be reviewed, and demand units will be disaggregated to provide a spatial resolution consistent with the regional groundwater model, which will be developed under a separate effort. For these demand units, CalSim 3 input data and operational algorithms relating to water supplies, water demands, and conjunctive use operations will be updated and revised so as to be consistent with current regional planning processes. These data will be developed in consultation with the non-Federal Partners and other local water agencies, and will reflect both existing and future levels of development. CalSim 3 will be modified to output water budgets for local water agencies.

Deliverables

- Draft and Final CalSim 3.0 Update and Validation for the Upper American River watershed TM.
- Revised CalSim 3 disaggregated water demand units and associated input data (electronic).
- Revised CalSim 3 reservoir operational logic (wresl files) and associated input data (electronic).
- GIS files (electronic).

Subtask 2.3 Relevant Model Assumptions and Operations Agreement

Purpose. This subtask will seek to achieve a common representation of the water resources of the region and to build, share, and use common data sets across planning and modeling activities.

Description. A summary of modeling and operation assumptions for the American River Basin will be prepared, highlighting tools and data used in recent Federal, State, and local planning efforts. The summary will identify key areas of discrepancies, focusing on water operations and temperature. Up to four (4) technical workshops will be facilitated for Reclamation and the non-Federal Partners staff to review the various upstream model assumptions and operations, including temperature models to be incorporated into CalSim 3. Following each workshop, a summary of key points of agreement and other areas for further discussion will be developed. Up to ten additional meetings/conference calls will be conducted to prepare an agreed-upon set of modeling and operations assumptions for the American River Basin. A summary of key points and actions will be prepared following each meeting/call.

Deliverables

- Workshop summaries.
- Meeting/conference call summaries.
- Draft and Final Modeling and Operations Assumptions TM.

Task 3 – Conduct Water Supply and Demand Assessment to Identify Imbalances

3.1 – Demand Scenarios under Climate Change

Purpose. This subtask will prepare future demand scenarios reflective of climate change.

Description. Climate change will have an effect on future M&I demands due to increases in and seasonal changes in evapotranspiration, and agricultural water demands. This subtask will examine and revise the projected water demands in the region by agency to form demand scenarios for the imbalance assessment in Subtask 3.2.

Deliverables

- Draft and Revised Draft Demand Scenarios TM.

3.2 – Future Imbalances under Climate Change Scenarios

Purpose. This subtask will assess the imbalances between existing and future water supply and demands under climate change scenarios on a regional basis.

Description. Using the tools and data developed under Task 2 and the demand scenarios developed under Task 3.1, a water supply and demand assessment will be conducted to identify imbalances and vulnerabilities under future climate change conditions. The projected future demands at buildout conditions will be based on the non-Federal Partners' buildout water demand information, if available, and revised demand projections in Subtask 3.1. Total source capacity (i.e., surface water, groundwater pumping capacity, and interconnections) will be estimated. Total source capacity with estimated water demands for existing and future demand conditions will be compared, under both dry and average hydrologic conditions. This comparison will be developed for each agency to highlight the demand variability throughout the course of year, and variability of supplies across multiple years of different hydrological conditions.

Deliverables

- Draft and Revised Draft Water Supply Assessment TM.

Task 4 – Develop and Evaluate Adaptation Strategies

Subtask 4.1 Evaluation Criteria and Metrics

Purpose. This subtask will develop criteria and metrics to evaluate the adaptation strategies in subtasks 4.2 and 4.3.

Description. The evaluation criteria may cover the following considerations:

- Achieving and maintaining the reliability in water supply threshold under future hydrologic conditions.

- Meeting both short-term and long-term growth needs, and providing flexibility to address uncertainty from the dynamic urban growth.

- Protecting the groundwater basin by observing the long-term average annual sustainable yield, as defined in the Water Forum Agreement.

- Maintaining compatibility with existing and planned water supply infrastructure.

- Leveraging regional solutions to achieve resiliency goals for multiple agencies in a cost-efficient matter.

- Implementation complexity and practicability.

The evaluation criteria and metrics will be vetted and refined by the ESC, PMT, and Technical Team.

Deliverables

- Draft and Revised Draft Evaluation Criteria and Metrics TM.

Subtask 4.2 Alternative Formulation and Refinement

Purpose. This subtask will identify, screen, and prioritize actions and activities to improve the region's resiliency in the face of climate change. In particular, the demand imbalance (vulnerabilities) identified in Task 3 will be used to develop adaption strategies.

Description. This subtask will identify a wide range of adaption strategies to address the identified vulnerabilities to climate change. This range could include structural, non-structural/operational, and institutional actions.

Conceptual-level evaluation and screening of adaption strategies will be conducted using available information. The purpose of this conceptual level evaluation is to identify major flaws or undesirable attributes of the compiled adaptation strategies.

The screened adaptation strategies will be formulated into alternatives to represent a range of investment levels or types of approaches. The formulated adaptation strategy alternatives will be evaluated and compared. This evaluation and comparison may use a mix of quantitative and qualitative information. The initial alternatives will be refined to enhance their desired attributes and mitigate for any shortcomings.

Deliverables

- Draft and Revised Draft Alternative Formulation and Refinement TM.

Subtask 4.3 Alternative Evaluations (Technical Evaluation)

Purpose. This subtask will evaluate and compare the adaptation strategy alternatives formulated in subtask 4.2.

Description. Using the tools developed under Task 2, the ability of the formulated adaptation strategy alternatives to address the study objectives (as described in Chapter 1.3) will be evaluated and compared. These objectives include analyzing how existing water and power infrastructure and operations will perform in the face of changing water realities and other impacts identified in Section 9503(b)(3) of the SECURE Water Act, including:

- Ability to deliver water

- Hydroelectric power generation

- Recreation
- Fish and wildlife habitat
- Applicable species listed as endangered, threatened, or candidate species and/or designated critical habitat under the Endangered Species Act of 1973
- Water quality issues (including salinity levels)
- Flow and water dependent ecological resiliency
- Flood control and/or management

An initial, limited evaluation to further screen and refine the formulated adaptation strategy alternatives will be conducted. Detailed evaluation and comparison of the refined alternatives will then be conducted, focusing on the changes in water management in the American River Basin and CVP/SWP system under the various future climate change scenarios (developed under Task 2). If necessary, functionality will be added to CalSim 3 for agency-specific accounting routines and allocation for surface water use, groundwater use, losses, and groundwater bank operations. The ability to specify operating rules in CalSim 3 may also be added, depending on groundwater levels simulated by CalSim's groundwater module.

The secondary effects of water management changes on temperature in the lower American River, hydropower production, and Delta water quality will be assessed.

Deliverables

- Draft and Revised Draft Alternative Evaluations TM.
- Revised CalSim 3 operational logic for regional operations, if applicable (electronic).

Task 5 – Findings and Recommendations

Purpose

This task will develop study findings and recommendations, and conduct a review of those findings and recommendations.

Description

Based on the evaluation of the refined adaptation strategy alternatives to address vulnerabilities due to climate change, draft findings and recommendations will be developed for review and approval. One technical working session will be facilitated for Reclamation and non-Federal Partners focusing on ESC review and approval needs, and one technical working session will be with the stakeholders to solicit feedback on the draft findings and recommendations. A summary of key points and actions will be prepared following each workshop.

Deliverables

- Workshop summaries.
- Draft and Final Findings and Recommendations TM.

Task 6 – Technical Sufficiency Review

Purpose
This task will perform the Technical Sufficiency Review as required by the Reclamation's Basin Study guidelines.

Description
Included as Attachment B to the POS, the Technical Sufficiency Review Plan outlines the approach and methods for reviewing technical information, data, models, analyses, and conclusions of the ARBS. The plan describes the timing, scope, process, number and selection of reviewers, and use of reviews. This task will adhere to the Technical Sufficiency Review Plan.

A total of four reviews will be conducted at key milestones during the performance of Tasks 2, 3, and 4. Reviewers will not have been directly involved with conducting a specific analysis under review, and selection of reviewers will be confirmed by the ESC. Review comments will be requested within a specific timeframe, as agreed to in advance with the reviewers, with the objective of maintaining progress and meeting schedule targets.

Review comments will be evaluated by the ESC, in consultation with the PMT and Technical Team, and determinations will be made regarding resolution. Review comments will be considered to be informative; no commitment will be made by the ESC to incorporate each comment into the ARBS.

Each set of review comments will be summarized into a separate Technical Sufficiency Review TM.

Deliverables
- Technical Sufficiency Review TMs.

Task 7 – Final Report

Purpose
This task will prepare the Draft and Final Report for the ARBS.

Description
A study report will be prepared to summarize the study process, key accomplishments, finding, recommendations, and stakeholder participation. Any recommendations from the technical sufficiency review will be addressed therein. A draft study report will be circulated for review by Reclamation and the non-Federal Partners. Comments on the draft study report will be considered, and a final study report will be prepared.

Deliverables
- Draft and Final ARBS Report.

Task 8 – Stakeholder Outreach and Involvement

Purpose

This task will prepare a Communication and Outreach Plan, implement the plan, and document the process.

Description

Preparation of the Communication and Outreach Plan will involve scoping with Reclamation and the non-Federal Partners' staff to detail the approach for outreach and formalize venues for engagement. Communication and outreach for the ARBS are intended to effectively leverage existing venues and build on a long history of coordinated planning in the region. This plan is meant to be a dynamic document that will be revised as needed by the PMT and Technical Team members, and approved by the ESC.

Included as Attachment C to the POS, the purpose of the Communication and Outreach Plan is to ensure that interested stakeholders and the public are informed and that their input is sought and considered throughout development of the ARBS. The plan describes goals for communication and outreach, measures for success, roles and responsibilities, key messages, and communication and outreach activities and tools. This task will adhere to the Communication and Outreach Plan.

Implementation of the Communication and Outreach Plan is intended to occur throughout conduct of the ARBS and will be documented in the Communication and Outreach Record TM. As appropriate for the venue, materials will be developed to support communication and outreach activities. Over the 3-year ARBS, it is assumed that up to 5 public meetings/workshops and up to 12 presentations/briefings will be held, and that content will be developed for up to 50 percent of the Reclamation weekly staff notes.

Deliverables

- Draft and Final Communication and Outreach Plan.
- Communication and outreach support materials (as appropriate).
- Draft and Final Communication and Outreach Record TM.

4.2 Study Task Roles and Responsibilities

Roles and responsibilities of Reclamation, the non-Federal Partners, and stakeholders will vary by task and subtask, and are shown in Table 4-1.

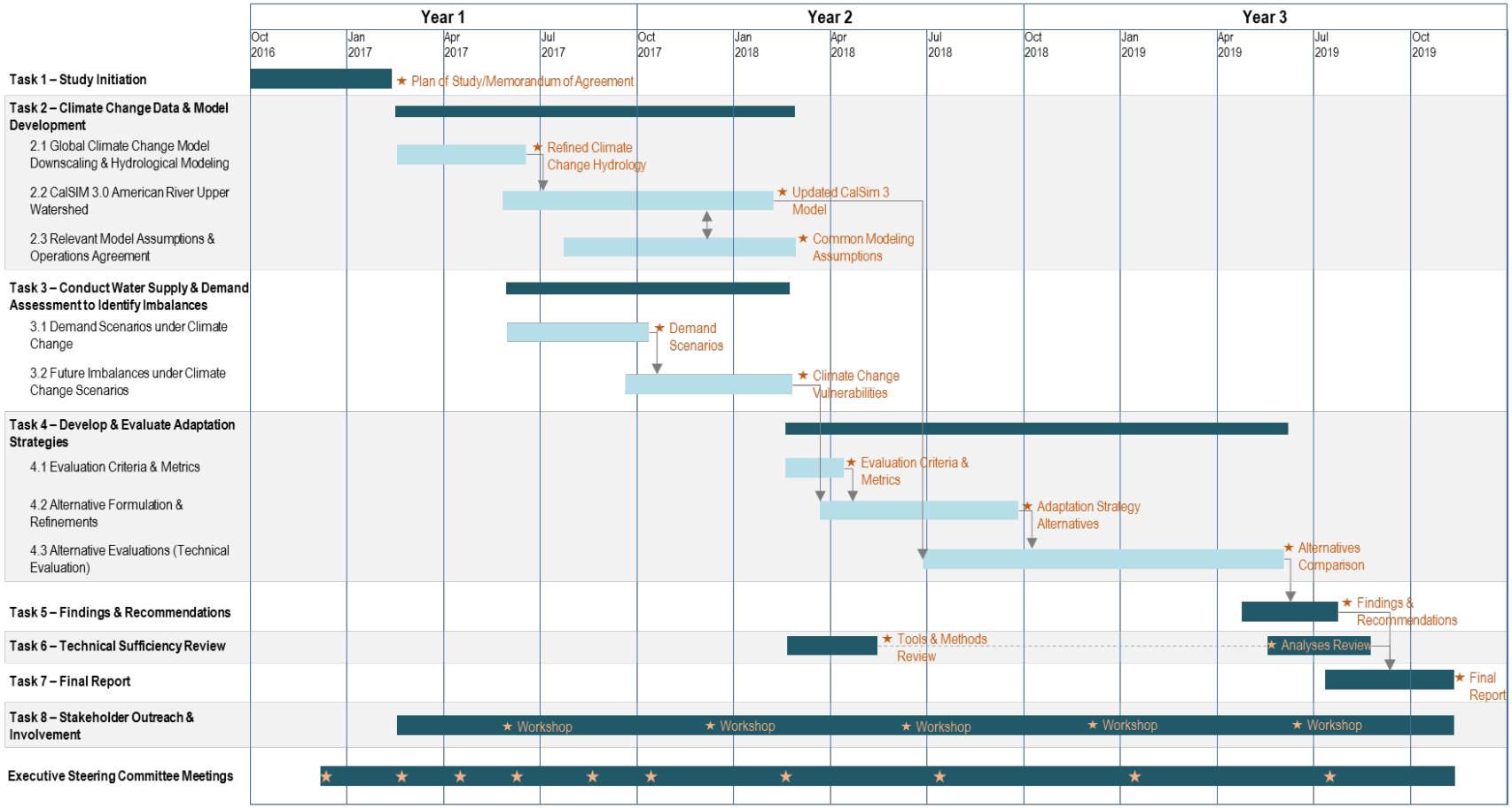
Table 4-1. American River Basin Study Task Roles and Responsibilities

Task	Reclamation			Non-Federal Partners	Stakeholders
	Region	TSC	Contractor		
Task 1 – Study Initiation	• Co-Lead	• Review	• N/A	• Co-lead	• N/A
Task 2 – Climate Change Data and Model Development					
Subtask 2.1 – Global Climate Change Model (GCM) Downscaling and Hydrological Modeling	• Coordinator	• Lead	• N/A	• Review	• N/A
Subtask 2.2 – CalSim 3 American River Upper Watershed	• Review	• Review	• Co-lead	• Co-lead	• N/A
Subtask 2.3 – Relevant Model Assumptions and Operations Agreement	• Co-Lead	• Review	• Co-lead	• Co-lead	• N/A
Task 3 – Conduct Water Supply and Demand Assessment to Identify Imbalances	• Review	• Limited support	• Co-lead	• Co-lead	• Review
Task 4 – Develop and Evaluate Adaptation Strategies					
Subtask 4.1 – Evaluation Criteria and Metrics	• Coordinator • Review	• Limited support	• Co-lead	• Co-lead	• Review
Subtask 4.2 – Alternative Formulation and Refinement	• Coordinator • Review	• Limited support	• Co-lead	• Co-lead	• Review
Subtask 4.3 – Alternative Evaluations	• Coordinator • Review	• Limited support	• Co-lead	• Co-lead	• Review
Task 5 – Findings and Recommendations	• Coordinator • Review	• Limited support	• Co-lead	• Co-lead	• Review
Task 6 – Technical Sufficiency Review	• Lead	• Limited support	• Limited support	• Lead / limited support	• N/A
Task 7 – Final Report	• Coordinator • Review	• Limited support	• Co-lead	• Co-lead	• Review
Task 8 – Stakeholder Outreach and Involvement	• Participant	• N/A	• Coordinator	• Participant	• Participant

Key:
GCM = global climate model
N/A = not applicable
Reclamation = U.S. Department of the Interior, Bureau of Reclamation
Non-Federal Partners = Placer County Water Agency, City of Roseville, City of Sacramento, El Dorado County Water Agency, City of Folsom, Regional Water Authority
TSC = Technical Services Center

4.3 Study Schedule

The anticipated ARBS schedule is presented by task and subtask in Figure 4-1.



Schedule assumes Memorandum of Agreement will be executed in February 2017.

Figure 4-1. American River Basin Study Schedule

4.4 Study Budget

The proposed budget for the ARBS is presented by task and subtask in Table 4-2. Table 4-3 details the non-Federal Partners' complementary cost-share efforts included in Tasks 1, 2.2, 2.3, 3.1, 4.1, 4.2, 4.3, and 8.

Although the POS includes an inventory of studies, reports, and technical work which the non-Federal Partners have proposed as their in-kind services match, the actual reports and studies proposed, as well as the amount for that in-kind services reporting period, will be identified in each non-Federal Partner's in-kind services documentation/report (see Attachment D) which is required to be submitted to Reclamation every 6 months. It is allowable that a non-Federal Partner's in-kind services report may include that only a portion of the full cost of a study (or other in-kind match) is proposed to be used in a particular reporting period."

Table 4-2. Proposed American River Basin Study Budget

Task	Description	Non-Federal Partners' Share[1]		Federal Share		Total Cost
		In-Kind Contribution[1]	Monetary Contribution[2]	Reclamation Staff Time and Contractor Support	Reclamation Project Management[3]	
Task 1 – Study Initiation	• Technical Scoping and Detailed POS, and MOA	**$ 33,300** [5]	**$ -**	**$ 5,000**	**$ 1,400**	**$ 39,700**
Task 2 – Climate Change Data and Model Development	• Climate change data and downscaling • CalSim 3 Model development • Agreements on assumptions and operations of upstream local projects	**$1,383,400** [5]	**$ -**	**$ 255,000**	**$ 70,700**	**$1,709,100**
Subtask 2.1 – Global Climate Change Model Downscaling and Hydrological Modeling	• Obtain downscaled GCM data for the American River Basin from SSJRBS • Refine the SSJRBS WEAP model for American River Basin • Develop refined runoff hydrology for CalSim 3 using WEAP hydrological model, using downscaled GCM data	*$ -*		*$ 80,000* [4]	*$ 22,200*	*$ 102,200*
Subtask 2.2 – CalSim 3 American River Upper Watershed	• Update CalSim 3 Model representation of the upstream local project operations on the North, Middle, and South Forks of the American River • Update regional infrastructure representation and agency-specific water supply portfolios	*$ 789,200* [5]		*$ 135,000*	*$ 37,400*	*$ 961,600*
Subtask 2.3 – Relevant Model Assumptions and Operations Agreement	• Obtain agreements with Reclamation on various upstream model assumptions and operations, including temperature models to be incorporated into CalSim 3	*$ 424,200* [5]		*$ 40,000*	*$ 11,100*	*$ 475,300*

Table 4-2. Proposed American River Basin Study Budget (continued)

Task	Description	Non-Federal Partners' Share		Federal Share		Total Cost
		In-Kind Contribution[1]	Monetary Contribution[2]	Reclamation Staff Time and Contractor Support	Reclamation Project Management[3]	
Task 3 – Conduct Water Supply and Demand Assessment to Identify Imbalances	• Imbalances between existing and future water supply and demands	**$ 37,800** [5]		**$ 50,000**	**$ 13,900**	**$ 107,700**
Subtask 3.1 – Demand Scenarios under Climate Change	• Prepare future demand scenarios reflective of climate change	*$ 33,900* [5]		*$ 10,000*	*$ 2,800*	*$ 46,700*
Subtask 3.2 – Future Imbalances under Climate Change Scenarios	• Assess the imbalances between existing and future water supply and demands under climate change scenarios on a regional basis	*$ 3,900* [6]		*$ 40,000*	*$ 11,100*	*$ 55,000*
Task 4 – Develop and Evaluate Adaptation Strategies	• Identify and evaluate adaptation strategies to address the imbalances (vulnerabilities) • Conduct an alternative analysis to evaluate and prioritize strategies	**$ 515,500** [5]	**$ -**	**$ 250,000**	**$ 69,200**	**$ 834,400**
Subtask 4.1 – Evaluation Criteria and Metrics	• Develop criteria and metrics to evaluate the adaptation strategies	*$ 57,900* [5]		*$ 20,000*	*$ 5,500*	*$ 83,400*
Subtask 4.2 – Alternative Formulation and Refinement	• Develop management actions for adaptation strategies and preliminary screening • Formulate and compare adaptation strategy alternatives	*$ 331,500* [5]		*$ 80,000*	*$ 22,200*	*$ 433,700*
Subtask 4.3 – Alternative Evaluations (Technical Evaluation)	• Limited technical evaluation of management actions for adaptation strategies for preliminary screening • Alternative evaluation, refinements, and comparative analyses; each with multiple climate change scenarios • Limited secondary CVP/SWP system effects evaluation for alternatives (temperature, hydropower production, and Delta water quality)	*$ 126,200* [5]		*$ 150,000*	*$ 41,500*	*$ 317,700*

Table 4-2. Proposed American River Basin Study Budget (continued)

Task	Description	Non-Federal Partners' Share[1]		Federal Share		Total Cost
		In-Kind Contribution[1]	Monetary Contribution[2]	Reclamation Staff Time and Contractor Support	Reclamation Project Management[3]	
Task 5 – Findings and Recommendations	• Prepare a draft report summarizing the findings and recommendations, and conduct a Quality Assurance/Quality Control review	**$ 12,500** [6]	**$ -**	**$ 30,000**	**$ 8,300**	**$ 50,800**
Task 6 – Technical Sufficiency Review	• Conduct Reclamation Technical Sufficiency Reviews of technical information, data, models, analyses, and conclusions	**$ 7,800** [6]	**$ -**	**$ 20,000**	**$ 5,500**	**$ 33,300**
Task 7 – Final Report	• Develop a draft and final report summarizing the findings of the ARBS	**$ 7,800** [6]	**$ -**	**$ 20,000**	**$ 5,500**	**$ 33,300**
Task 8 – Stakeholder Outreach and Involvement	• Develop a Communication and Outreach Plan, implement the plan, and document the process	**$ 27,900** [5]	**$ -**	**$ 20,000**	**$ 5,500**	**$ 53,400**
	TOTAL ARBS BUDGET	**$1,856,000**	**$ -**	**$ 650,000**	**$ 180,000**	**$2,686,000**

Key:

ARBS = American River Basin Study
CVP = Central Valley Project
GCM = global climate model
MOA = Memorandum of Agreement
POS = Plan of Study
Reclamation = U.S. Department of the Interior, Bureau of Reclamation
SSJRBS = Sacramento and San Joaquin Rivers Basin Study
SWP = State Water Project

Notes:

1 In-kind contribution from Placer County Water Agency, El Dorado County Water Agency, City of Sacramento, City of Roseville, City of Folsom, and Regional Water Authority. In-kind contribution includes complementary cost-share efforts and/or staff time for ARBS participation.
2 Monetary contribution includes funds provided to Reclamation for conduct of the ARBS. There are no monetary contributions from the Non-Federal Partners.
3 Reclamation Project Management includes labor and administrative costs, per Reclamation Policy Group review comments.
4 Assumes Reclamation's Technical Services Center has completed certain tasks prior to ARBS initiation.
5 In-kind contribution includes both complementary cost-share efforts and staff time for ARBS participation.
6 In-kind contribution includes staff time for ARBS participation only.

Table 4-3. Non-Federal Partners' Complementary Cost-Share Efforts[1]

Description	Proponent(s)	ARBS Task	Cost Share	Cost-Share Schedule
ARBS POS and Communication and Outreach Plan – Development of detailed ARBS POS and Communication and Outreach Plan for inclusion in the MOA.	EDCWA, Folsom, PCWA, Roseville, Sacramento	Task 1	$ 25,500	Oct 2016 – Feb 2017
		Task 8	$ 4,500	
Alder Reservoir Feasibility Update – The Alder Reservoir is included in the Sacramento-San Joaquin River Basin Study as a potential climate change adaptation measure. This effort is updating the feasibility evaluation of a range of water supply and hydropower generation scenarios.	EDCWA	Subtask 2.2	$ 117,000	Jul 2016 – Jun 2018
		Subtask 2.3	$ 163,000	
Alder Reservoir Options Development Analysis – This effort includes development and analysis of the range of water supply and hydropower generation options for Alder Reservoir.	EDCWA	Subtask 2.2	$ 33,000	Mar 2017 – Aug 2017
		Subtask 2.3	$ 17,000	
Integrated Regional Watershed Management Program: River Models and Water Supply Alternatives – Development of consistent models to allow for integration of the South Fork American River model and SMUD facility operation model. The intent is for this model and work to be integrated with the ongoing PCWA modeling effort.	EDCWA	Subtask 2.2	$ 208,000	Jul 2016 – Jun 2018
		Subtask 2.3	$ 112,000	
Inflow Temperature Regression Model and Refinements in Integration Study (with EDCWA efforts) – Integration of the inflow temperature regression model for Folsom Lake with those being developed in the ongoing EDCWA modeling effort.	PCWA	Subtask 2.2	$ 62,000	Feb 2016 – Feb 2018
		Subtask 2.3	$ 34,000	
Folsom Reservoir CE-QUAL-W2 Model and Refinements in Integration Study (with EDCWA) and River Arc – Integration of the Folsom Reservoir CE-QUAL-W2 model with those being developed in the ongoing EDCWA modeling effort (see above) and RiverArc. The proposed RiverArc Project is a new water facility that will use surplus water from the Sacramento River to benefit the Sacramento region and the statewide water delivery system. Near-term activities that will be complementary to the ARBS include ongoing planning efforts and the upcoming feasibility study and Calsim modeling.	PCWA	Subtask 2.2	$ 250,000	Feb 2016 – Feb 2018
		Subtask 2.3	$ 134,000	
Lake Natoma CE-QUAL W2 Model and Refinements in Integration Study (with EDCWA) and RiverArc – Integration of the Lake Natoma CE-QUAL-W2 model with those being developed in the ongoing EDCWA modeling effort (see above) and RiverArc. The proposed RiverArc Project is a new water facility that will use surplus water from the Sacramento River to benefit the Sacramento region and the statewide water delivery system. Near-term activities that will be complementary to the ARBS include ongoing planning efforts and the upcoming feasibility study and Calsim modeling.	PCWA	Subtask 2.2	$ 62,000	Feb 2016 – Feb 2018
		Subtask 2.3	$ 34,000	

Table 4-3. Non-Federal Partners' Complementary Cost-Share Efforts[1] (continued)

Description	Proponent(s)	ARBS Task	Cost Share	Cost-Share Schedule
Lower American River HEQ 5Q Model Update and Refinements in Integration Study (with EDCWA) and RiverArc– Integration of the Lower American HEC 5Q model with those being developed in the ongoing EDCWA modeling effort (see above) and RiverArc. The proposed RiverArc Project is a new water facility that will use surplus water from the Sacramento River to benefit the Sacramento region and the statewide water delivery system. Near-term activities that will be complementary to the ARBS include ongoing planning efforts and the upcoming feasibility study and Calsim modeling.	PCWA	Subtask 2.2	$ 42,000	Feb 2016 – Feb 2018
		Subtask 2.3	$ 22,000	
Development of Demand Scenarios Under Climate Change – Development of future demand scenarios for the ARBS that are reflective of the downscaled climatological data and refined hydrological information (from Subtask 2.1).	EDCWA, Folsom, PCWA, Roseville, Sacramento	Subtask 3.1	$ 30,000	May 2017 – Oct 2017
Regional Water Reliability Plan – Locally-led effort to identify the most promising regional opportunities to improve water supply reliability by evaluating opportunities for intra- and interregional transfers and exchanges, to reduce water use, to support interregional groundwater management and conjunctive use efforts, to support recycled water planning, and to utilize shared infrastructure and resources. The agency-level vulnerability assessments are identifying existing and future water supply and demand imbalances. Development of the plan includes development of evaluation criteria and metrics, and identification of response actions and mitigation strategies at both the agency and project levels.	RWA	Subtask 4.1	$ 50,000	Apr 2016 – Dec 2017
		Subtask 4.2	$ 200,000	
ARBS Alternative Formulation and Refinements, and Alternative Evaluations – Support identification and conceptual-level screening of actions and activities to improve the region's resiliency in the face of climate change, and formulation of alternatives, using the screened actions and activities. Support the evaluation and comparison of the adaptation strategy alternatives formulated in Subtask 4.2, using the tools developed under Task 2.	EDCWA, Folsom, PCWA, Roseville, Sacramento	Subtask 4.2	$ 100,000	Mar 2018 – Sep 2018
		Subtask 4.3	$ 100,000	Oct 2018 – May 2019

Table 4-3. Non-Federal Partners' Complementary Cost-Share Efforts[1] (continued)

Task 1 Total	**$ 25,500**	
Subtask 2.2 Total	**$ 774,000**	
Subtask 2.3 Total	**$ 416,000**	
Subtask 3.1 Total	**$ 30,000**	
Subtask 4.1 Total	**$ 50,000**	
Subtask 4.2 Total	**$ 300,000**	
Subtask 4.3 Total	**$ 100,000**	
Task 8 Total	**$ 4,500**	
TOTAL (All Subtasks)	**$ 1,700,000**	

Key:

ARBS = American River Basin Study
EDCWA = El Dorado County Water Agency
Folsom = City of Folsom
PCWA = Placer County Water Agency
Roseville = City of Roseville
RWA = Regional Water Authority
Sacramento = City of Sacramento

Notes:

1 Does not include Non-Federal Sponsor staff time in support of ARBS development.

Cost Share Points of Contact

The total cost of the ARBS is $2.686 million. Reclamation will provide $830,000 as the Federal cost-share partner ($650,000 in Reclamation staff time and contractor support; $180,000 in Reclamation project management labor and administrative costs, per Reclamation Policy Group review comments). PCWA will be the official point of contact with Reclamation regarding funding agreements and fiscal management for the ARBS. PCWA will serve as the fiscal agent for the ARBS on behalf of the non-Federal Partners and will be the legal entity responsible for execution of the MOA with Reclamation.

ARBS Cost-Share Partner Contact Information		
Entity	Reclamation	PCWA
Contact Person	Arlan Nickel Mid-Pacific Region Basin Study Coordinator, Senior Project Manager	Brian Rickards Project Manager
Contact Information	Mid-Pacific Regional Office 2800 Cottage Way Sacramento, California 95825-1898 Office: 916.978.5061 Email: anickel@usbr.gov	144 Ferguson Road Auburn, California 95604 Office: 530.8234.845 Email: brickards@pcwa.net

Key:
PCWA = Placer County Water Agency
Reclamation = U.S. Department of the Interior, Bureau of Reclamation

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Chapter 5
Communication and Outreach Plan

A Communication and Outreach Plan has been developed to ensure that interested stakeholders and the public are informed and that their input is sought and considered throughout development of the ARBS. The Communication and Outreach Plan is included as Attachment C to the POS.

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Plan of Study for the American River Basin Study

Attachment A – Executive Steering Committee Charter

U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region

January 13, 2017

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Attachment A – Executive Steering Committee Charter

Purpose and Goals

The purpose of the American River Basin Study (ARBS) is to refine and update the data, tools, analyses, and adaptation strategies in the Sacramento and San Joaquin Rivers Basin Study (SSJRBS) for local application. Specifically, the ARBS will update the SSJRBS to reflect basin-specific, integrated water management strategies to improve regional water supply reliability within the American River Basin, while improving the U.S. Department of the Interior, Bureau of Reclamation's (Reclamation) flexibility in operating Folsom Reservoir to meet flow and water quality standards and protect endangered fishery species in the lower American River.

The ARBS will provide a unique opportunity to align the water management strategies and planning efforts of the region with those of Reclamation and the Central Valley Project (CVP), and the non-federal cost-sharing partners are dedicated to pursuing integrated water management solutions that benefit all parties.

The ARBS Executive Steering Committee (ESC) will:

- Provide management level oversight of the ARBS process, and consider and make decisions presented by the Project Manager and technical staff to ensure continued forward progress and timely completion of the study.

- Provide guidance and direction as appropriate on any or all aspects of study formulation, performance, funding, and management.

The ESC will be supported by a Project Management Team (PMT) that will ensure completion of all study phases and tasks according to the approved critical path schedule and within the approved project budget. This includes guidance and direction to contractor and agency staff members of the study Technical Team who will be completing the project work. The PMT will be comprised of the ARBS Project Manager, the Reclamation Liaison/Contracting Officer Representative, and administrative support staff. The PMT will not be chartered.

Background

The ARBS is a joint effort between Reclamation and six non-Federal cost-sharing partners (non-Federal Partners). Non-Federal Partners include the Placer County Water Agency (PCWA), City of Roseville (Roseville), City of Sacramento (Sacramento), El Dorado County Water Agency (EDCWA), City of Folsom (Folsom), and the Regional Water Authority (RWA).

Given observations of a changing climate, the non-Federal Partners are proposing the ARBS to improve the resolution of regional climate change data and to develop regionally-specific mitigation and adaptation strategies, building on those identified in the SSJRBS. The objectives of the ARBS are as follows:

- Address regional demand-supply imbalance and infrastructure deficiencies under the threat of climate change.
- Improve regional self-reliance and collaboration for sustainable water resources management and quality of life.
- Integrate regional water supply reliability with operational flexibility for Reclamation's Folsom Dam and Reservoir.
- Help meet all authorized purposes of the CVP.
- Align water management tools, strategies, and planning efforts of Reclamation and water purveyors in the basin.

The ARBS will present a holistic examination of water management practices to address significant recent changes in conditions and regulatory requirements related to the CVP and regional water management, including Biological Opinions for endangered fishery species protection, the State's Sustainable Groundwater Management Act, and the science of climate change.

The first key deliverable for the ESC will be a Plan of Study (POS) and Memorandum of Agreement (MOA) for the ARBS. The final deliverable will be the ARBS Report.

Roles and Responsibilities

The ESC members agree to:

- Contribute data/information to clarify issues and assumptions.
- Act collaboratively and seek common ground where possible.
- Attend ARBS ESC meetings, Stakeholder Forum meetings, public meetings/workshops, and briefings.
- Act in good faith.
- Act a liaison to communicate information to and from their agency and stakeholders.
- Act in a manner that will enhance trust among fellow members.

Membership

The seven-party ESC will include membership from each the six non-Federal Partners and Reclamation. The ESC membership is as follows:

Non-Federal Partners

1. Andy Fecko, PCWA
2. Rich Plecker, Roseville
3. Jim Peifer, Sacramento
4. Ken Payne, EDCWA
5. Marcus Yasutake, Folsom
6. Rob Swartz, RWA

Reclamation

7. Michelle Denning, Regional Planning Office, Mid-Pacific Region Office

Public and Stakeholder Participation

The ESC will seek to be open and inclusive and to encourage diverse viewpoints. The ESC will be seeking broad stakeholder and public participation at key points during the ARBS development process. Stakeholders and interested members of the public will be notified of public meetings/workshops via the ARBS website, news/press releases, email notifications, targeted invitations, and/or other methods (as appropriate). The ESC may elect to make a public meeting/workshop accessible via webinar, in order to reach a broader audience with relevant content. ESC representatives (both Reclamation and the non-Federal Partners), the Project Management Team, and Technical Team members will be present at these meetings/workshops.

Key Tasks and Deliverables

Throughout conduct of the 3-year ARBS, the key tasks of the ESC include:

- Managing the ARBS.
- Providing feedback and guidance on the POS (including the Communication and Outreach Plan), MOA, ARBS Technical Memoranda, ARBS Report, and all other supporting materials.
- Engaging members of the public and stakeholders in the basin study area through execution of the ARBS Communication and Outreach Plan.

- Confirming selection of Technical Sufficiency Reviewers, and evaluating and determining resolution of review comments.

The key deliverables of the ESC include:

- ARBS POS (including the Communication and Outreach Plan) and MOA.
- ARBS Technical Memoranda.
- ARBS Report.

Decision Making Process

The ESC will use a consensus-seeking process and will have a process to address disagreements. If there is fundamental disagreement among the ESC on an item, the group will be asked to continue working on an area where more agreement is possible. It is understood that ESC members may not always be able to commit their agency/organization to a particular conclusion; however, members will operate and represent their organizations in good faith and contribute the best available information.

Time Commitment/Attendance

It is anticipated that the ESC will convene periodically; meetings will be more frequent during study initiation (monthly) and then will be quarterly. If an ESC member cannot attend a meeting, s/he will send an alternate who (1) is fully informed on the ARBS and (2) has the authority to make decisions on behalf of her/his organization. The ESC will also attend Stakeholder Forum meetings (which may be combined with ESC meetings) and public meetings/workshops. At this time, there is no set schedule for the Stakeholder Forum or public meetings/workshops. ESC members will be asked to commit to maintain the integrity of the group by attending meetings.

Ground Rules

All meetings of the ESC will utilize standard, best meeting practices.

Disclosure

During the course of the ARBS and Memorandum of Agreement deliberations, significant policy issues will be discussed. It is recognized that ESC members are associated with operating organizations and groups, and have an obligation to make management decisions and take actions necessary for the proper function of those organizations. It is understood that during the course of deliberations, ESC members may take public positions to protect their immediate interests. It is also understood these interests may conflict with what is or might be derived from the ARBS at any given point in time. Public positions taken in this context will not be considered

a lack of commitment to the long-term mission. ESC members embarking on a course that may result in conflict with immediate deliberations are asked to advise the ARBS Project Manager of potential and pending activities intended as a method to keep the ESC informed.

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Plan of Study for the American River Basin Study

Attachment B – Technical Sufficiency Review Plan

U.S. Department of the Interior
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January 13, 2017

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Attachment B – Technical Sufficiency Review Plan

The Technical Sufficiency Review Plan outlines the approach and methods for reviewing technical information, data, models, analyses, and conclusions of the American River Basin Study (ARBS). The Technical Sufficiency Review Plan includes the following:

Timing

Four individual reviews will be conducted at key milestones (or stages) in the ARBS technical work:

- **Technical Sufficiency Review #1 – Modeling Tools, Data, and Climate Change Information.** This review will cover the data, information, and materials developed through execution of Task 2, Climate Change Data and Model Development.

- **Technical Sufficiency Review #2 – Problem Statement.** This review will cover the supply and demand imbalance scenarios that will be reflective of climate change. This work will be conducted in Task 3, Conduct Water Supply and Demand Assessment to Identify Imbalances.

- **Technical Sufficiency Review #3 – Initial Adaptation Strategies.** This review will cover the initial plan formulation work included in Subtask 4.2, Alternative Formulation and Refinement.

- **Technical Sufficiency Review #4 – Full Analyses of Adaptation Strategies.** This review will cover evaluation of the adaptation strategies formulated in Subtask 4.2 to be conducted under Subtask 4.3, Alternative Evaluations (Technical Evaluation).

Scope

Reviews will focus on the technical information, data, models, analyses, and conclusions as developed for each of the key milestones. The volume and detail of information relevant for each review will vary in accordance with the specific content of the corresponding technical memorandum (TM).

Process

Reviews will be conducted largely through electronic transmittals of draft TMs and associated data. Review comments will be requested within a specific timeframe, as agreed to in advance with the reviewers, with the objective of maintaining progress and meeting schedule targets.

Reviewers will be requested to clearly identify and characterize scientific uncertainties and limitations. Comments received from reviewers will be recorded along with descriptions of how each comment was resolved, and any remaining technical uncertainties will be documented in the Final ARBS Report. All results from Technical Sufficiency Reviews will be documented and made available to U.S. Department of the Interior, Bureau of Reclamation; the Executive Steering Committee (ESC); the Project Management Team (PMT); and the Technical Team. It is possible that previously-completed peer reviews and/or comparable review processes completed by contractors and/or non-Federal parties may be sufficient for some portions of the ARBS information and/or analyses; such reviews will be documented and thereby incorporated into the Technical Sufficiency Review.

Number and Selection of Reviewers

It is anticipated that two reviewers[1] will be identified for each Technical Sufficiency Review. If feasible, one reviewer will be from within Reclamation and one from outside Reclamation (potentially another agency, an educational institute, or "think tank," as appropriate). Potential reviewers with appropriate technical expertise and experience may be identified by ESC members or Technical Team members. Individuals to be considered will not have been directly involved with conducting the specific analyses under review. Final selection of reviewers will be confirmed by the ESC. Depending on the needs for each review and reviewers' areas of expertise, reviewers may be consistent throughout the ARBS or different.

Use of Reviews

Review comments will be evaluated by the ESC, in consultation with the PMT and Technical Team, and determinations will be made regarding resolution. Review comments will be considered to be informative; no commitment will be made by the ESC to incorporate each comment into the ARBS.

[1] The number of reviewers for each Technical Sufficiency Review will not be fixed at two, but will be determined based on what the ESC determines to be appropriate for each review.

Plan of Study for the American River Basin Study

Attachment C – Communication and Outreach Plan

U.S. Department of the Interior
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Mid-Pacific Region

January 13, 2017

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Attachment C – Communication and Outreach Plan

A Communication and Outreach Plan has been developed to ensure that interested stakeholders and the public are informed and that their input is sought and considered throughout development of the American River Basin Study (ARBS). The Communication and Outreach Plan includes the following:

- Goals for Communication and Outreach, Measures for Success, Roles and Responsibilities, and Key Messages
- Communications and Outreach Activities and Tools

Communication and outreach for the ARBS are intended to effectively leverage existing venues and build on a long history of coordinated planning in the region. The ARBS Communication and Outreach Plan is mean to be a dynamic document that will be revised as needed by the Project Management Team (PMT) and Technical Team members, and approved by the Executive Steering Committee (ESC).

Goals for Communication and Outreach

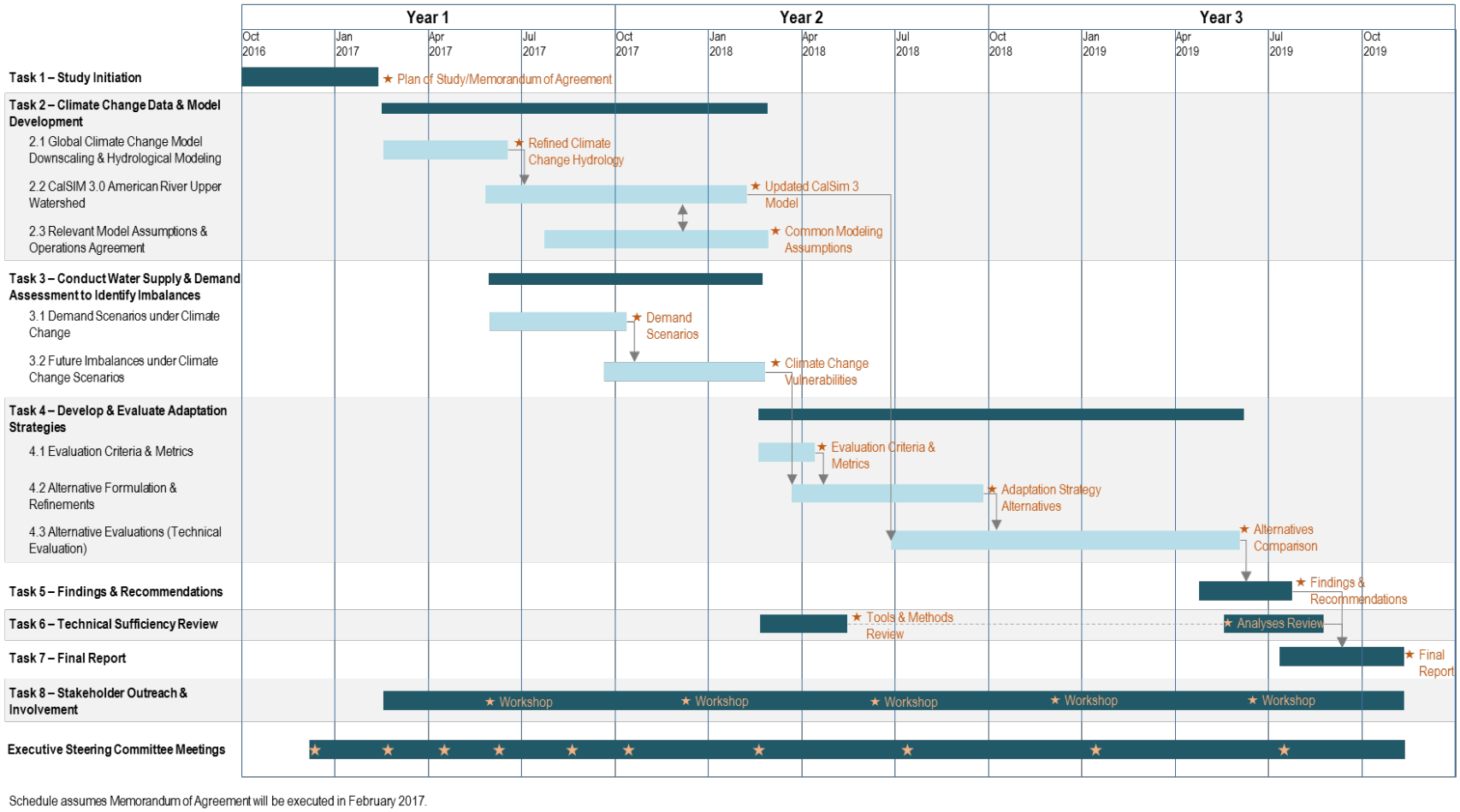
Goals for communication and outreach include:

- Timely, reliable communication with stakeholders at all levels, leveraging familiar venues and processes whenever possible.
- Effective engagement of interested stakeholders in the Stakeholder Forum.
- Clearly defined and understandable roles and responsibilities for stakeholders.
- Consistent and clear delivery of key messages identified.

Measures of Success

Specific outcomes identified to help understand the ARBS Communication and Outreach Plan success include:

- Meeting all scheduled deadlines outlined in the potential ARBS schedule (as presented in Figure C-1).
- Maintaining a stable level of participation in the Stakeholder Forum.



Schedule assumes Memorandum of Agreement will be executed in February 2017.

Figure C-1. American River Basin Study Schedule

Roles and Responsibilities

The roles and responsibilities of the ESC, PMT, Technical Team, Stakeholder Forum, and Administrative Support are described in Chapter 3.2 of the Plan of Study (POS). The Stakeholder Forum will provide regular opportunities for stakeholders – interested parties, non-governmental organizations, and other organizations/individuals – to be kept informed of ARBS progress and provide feedback. However, members of the public and some interested parties ("general public") may not be interested in a Stakeholder Forum-level of participation in the ARBS; rather, they may want to be informed via email or website postings, and on a more periodic basis at key points during study development. These organizations and individuals will be added to the ARBS contact list.

Reclamation will coordinate with its Native American Affairs Office (NAAO), its solicitor, and other offices, and the NAAO will contact Federally-recognized tribes in the study area to determine their desired levels of engagement.

Both the Stakeholder Forum and the general public are considered outreach audiences for the purposes of this plan, and communication will be consistent with their anticipated activities.

Key Messages

Key messages can serve as a reference to those responsible for communicating about the ARBS. These are statements that the ESC would like to see included in a tailored fashion in initial communications to anyone outside of the planning process. That could include members of the media, elected officials, non-Federal Partner service area customers, stakeholders, or the public. Key messages identified include:

- The ARBS is a Reclamation[1] basin study with 6 non-Federal partners.
- The ARBS will include development of detailed hydrologic analysis and models for the American River Basin, with consideration of the impacts of climate change.
- The ARBS seeks to improve regional water supply reliability in the basin.
- The ARBS seeks to align regional water management strategies and planning efforts with those of Reclamation.
- The ARBS builds on years of coordinated and collaborative planning efforts in the region.
- A draft of the ARBS Report is anticipated in mid-2019.

[1] U.S. Department of the Interior, Bureau of Reclamation.

These key messages will be refined by the ESC after the POS is approved and the Memorandum of Agreement is signed in early 2017.

Communication and Outreach Activities and Tools

Website

An ARBS webpage will be created by PCWA on its website. This webpage will be updated regularly to include content on ARBS development, upcoming meetings and workshops, meeting materials, and ARBS documents. Reclamation may have a webpage that will provide a brief description of the project with a hyperlink to the ARBS webpage for up-to-date information. The other non-Federal Partners' websites will also provide brief descriptions of the project with hyperlinks to the ARBS webpage.

The goal of the webpage is to keep stakeholders, including the public, informed about the ARBS process. The content will be updated as ARBS milestones are reached. For questions or comments on the material posted on the website, the ARBS Project Manager will be the primary point of contact to address inquiries.

Contact Information

As required in *Reclamation Manual, Directives and Standards, WTR TRMR-65,* contact information for Reclamation staff and the non-Federal Partners conducting the ARBS will be distributed to interested stakeholders, upon request.

News/Press Releases

In an effort to maximize public outreach, news/press releases will be developed and issued by the ESC at key points in the ARBS process, including:

- Initiation of ARBS development.
- Major ARBS milestones.
- Completion of the Draft ARBS Report.
- Completion of the Final ARBS Report.
- Notification of Public Meetings/Workshops.

The ESC may also elect to issue news/press releases at other points during the ARBS. These news/press releases will also be posted to the ARBS website and distributed via email to Stakeholder Forum participants and other interested parties on the ARBS contact list.

Contact List

Email distribution will be an important tool in communicating with ARBS stakeholders and the public. Email communications from the PMT will be used to keep interested stakeholders and the public informed on ARBS progress, timing of deliverables, and opportunities for input (e.g., public meetings/workshops). The PMT will utilize existing email lists from current and past regional planning efforts to develop an initial contact list. Organizations or individuals may

request to be added to the contact list via the ARBS webpage or by contacting the ARBS PM. If an organization or individual indicates it wants to be removed from the ARBS contact list, it will be removed. Any comments or questions received via email will be professionally responded to in a timely manner by the appropriate member of the ESC, PMT, or Technical Team.

Public Meetings/Workshops

The ESC intends to hold public meetings/workshops at key points during development of the ARBS for informational purposes and to solicit feedback/input. These meetings/workshops will be publicized with news/press releases, email notifications, website postings, targeted invitations, and/or other methods (as appropriate). The ESC may elect to make a public meeting/workshop accessible via webinar, in order to reach a broader audience with relevant content. ESC representatives (both Reclamation and the non-Federal Partners), the PMT, and Technical Team members will be present at these meetings/workshops.

Workgroups

The ESC may determine that a specific ARBS issue or topic would be best addressed through a workgroup of short duration. The ESC would then invite participants and convene the workgroup for a pre-determined number of sessions (likely one or two).

Presentations/Briefings

From time-to-time, the ESC may be requested to or determine the need to provide ARBS presentations or briefings for Reclamation, State agencies (e.g., California Department of Water Resources, State Water Resources Control Board), local water agencies, stakeholders (e.g., Sacramento Water Forum, Environmental Caucus), elected officials and staff, or other organizations. Depending on the subject matter, briefings will be conducted by the appropriate member(s) of the ESC, PMT, and/or Technical Team.

Reclamation Staff Notes

To maintain visibility of the ARBS in Reclamation's Mid-Pacific (MP) Region, periodic study updates will be developed for inclusion in the Planning Division's (MP-700) weekly staff notes.

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Plan of Study for the American River Basin Study

Attachment D – Bi-Annual Report of Non-Federal Partner's In-Kind Cost Share Form

U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region

January 13, 2017

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American River Basin Study

Bi-Annual Report of Non-Federal Partner's In-Kind Cost Share

Partner/Agency Name:

Study Period(s) Covered: 6 month Period from _____ to _____

Labor Expenses:

Employee (optional)	Job Category	Hourly Rate[1]	Number of Hours	Total Cost
				$0
				$0
				$0
				$0
				$0
				$0
				$0
				$0
				$0
			Total	**$0**

[1] Estimated hourly cost of the employee or job category, including overhead and indirect costs

Other In Kind Contributions:[2]

Description	Total Cost
	$0
	$0
	$0
	$0
	$0
	$0
	$0
Total	**$0**

[2] Other "in-Kind" Contributions includes the estimated value of technical studies, water plans and reports utilized this reporting period which provides data used in preparation of the Basin Study, including work conducted by consultants or contractors.

Other Expenses:[3]

Description	Total Cost
	$0
	$0
	$0
	$0
	$0
Total	**$0**

[3] Other expenses necessary to accomplish the work (i.e., printing, shipping, etc.)

Travel:

Location	Reason for Trip	Number of Travelers	Total Cost
			$0
			$0
			$0
			$0
		Total	**$0**

Cash Contributions:

Date	Total Amount
Total	**$0**

Total Expenses:

Cost Category	Amount
Labor	$0
Other In Kind Contributions	$0
Other Expenses	$0
Travel	$0
Cash Contributions	$0
Total Non-Federal Expenditures	**$0**

Note: Back-up Documentation for staff, travel, study costs, etc. does not need to be submitted to Reclamation. However, this data should retained during the duration of preparation of the Basin Study and made available to Reclamation upon request.

Responsible Partner/Agency Official **Date**